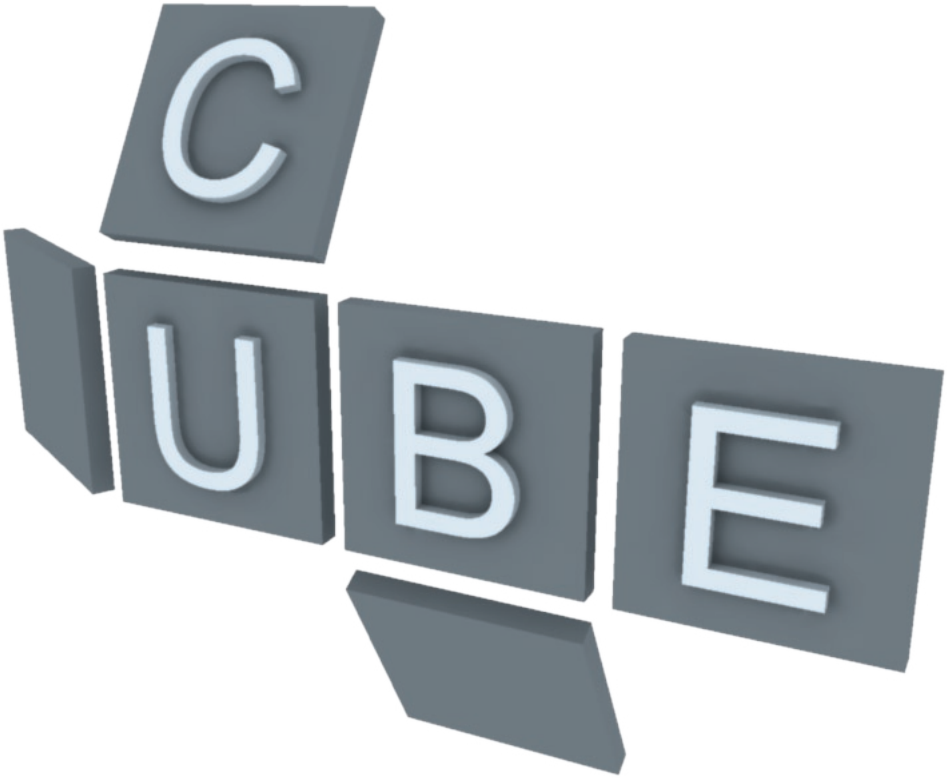

CUBE

Centre for the Understanding of the Built Environment dissertation design project

Colin Sackett 20170922

Mentor
Roger Fisher

Submitted in fulfillment of part of the requirements for the Degree of Professional Masters in Architecture in the Faculty of Engineering, Built Environment and Information Technology.

The University of Pretoria
Pretoria
South Africa

November 2006

dedicated to my family, friends and loved ones

Cabe chief executive Jon Rouse plans a series of media campaigns and vows to engage with the public 'at their level'

Public blanks architects

Robert Booth

The government design watchdog Cabe has branded architects a complete failure at communicating their importance to society and has unveiled a new three-year strategy which will see it turn away from the profession to promote its agenda to the public.

Jon Rouse, Cabe's chief executive, cited a new Mori survey of the public that showed that only one in eight could name a living architect. Of those, a quarter named dead architects, including Christopher Wren.

He said: "Architects have managed to completely detach themselves from society. They are fantastic at communicating with one another but have completely failed at communicating with the wider public. The evidence is there, and you can't argue with it."

Further findings revealed almost no interest in which architects designed which buildings. Eight out of 10 could not link the Eden Project, the Millennium Bridge and the Dome with their architects, even when given a list of their names.

Stating that "we will have to forget about architecture as a high-brow subject. The public has voted and we have to engage at their level", Rouse revealed that Cabe is planning a series of public facing media campaigns.

The first will use enthusiasm generated by the World Cup and the start of the next football season to launch a campaign about the impact of well-designed stadiums on the people that use them – fans and athletes.

Other initiatives include the promotion of better healthcare buildings and the direct advantages that can have for patients, and an extension of its campaign for better housing design. "We don't want to be on page 15 of the architecture section, we want to be in the sports pages," said Rouse. "It is a form of proselytisation."

Cabe officials are understood to have agonised over whether to use the word "architecture" or "the A-word" in communication with the public. Its strategy document, published today, says it will promote the importance of "place-making" which it plans to "inject into the blood of the nation".

Penoyre & Prasad partner Sunand Prasad backed Rouse, saying: "It is true that the profession has walked away from the social agenda."

Cabe's new tack, which also aims to reposition it as the public's design watchdog rather than the government's agency, represents a blow for the RIBA which is dedicated to promoting architects as well as architecture.

Its director of communications, Roula Konzotis, refused to comment on Rouse's assertion that the profession is suffering from a communication failure: "Jon Rouse is entitled to say what he wants. We are well aware that we have to communicate with the public as much as we can. We doubled our media coverage last year but I am conscious that we cannot be complacent."

Cabe's new strategy and attitude towards architects' communication skills is geared towards changing attitudes among groups who demand new buildings and urban design, rather than those who supply them.

In the strategy document Cabe chairman Stuart Lipton revealed a bleak picture of the English built environment. "We are failing to deliver sufficient buildings and spaces of a quality in which we can take pride," he said before warning that schools and hospitals are being planned which will be "blots on the landscape" and will "undermine the ability of public workers to do their jobs properly".

Public image limited

Can you name a living architect?
84% said no
5% said Norman Foster
3% said Richard Rogers
4% named a dead architect
4% named other architects

Which profession's work do you value most (two to three choices)
Architects 5%
Planners 8%
Teachers 69%
Doctors 88%

Source: Mori/Cabe

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Cabe should focus on key issues

"If you want something doing quickly, ask a busy man" the adage goes. And you don't get much busier than Cabe's Jon Rouse. The commission's output since its inception has been more than a little impressive. Now though, with the news that Cabe is to extend its activities abroad to promote British architecture in developing countries it is in great danger of over-reaching itself.

It is not as if there is a shortage of things to do in the UK. Sorting out PFI for instance, or the *Ojec* procedures, or competitions, or affordable housing. Cabe is already involved in at least some of these matters but adding overseas activities to the portfolio can only dilute its concentration on the key issues.

This is decidedly not a "charity begins at home" argument. If anything, the opposite is true. Even the World Bank, not by any measure the most right-on of organisations, recognises that 40% of its projects in developing countries should be carried out by local consultants. This could be a lot higher, of course, in many parts of the world and is a reflection of the bank's policy to force free markets (for Western goods and services) wherever possible. Rouse says he is interested in "aiding the role of British talent in the developing world" and helping the architectural profession step up its exports.

These are business arguments, which may be fine in themselves but can easily become distinctly suspect when elided with support for developing and urbanising countries. This already happens far too often at the Department for International Development.

Globalisation and disinterested international co-operation are very different animals. Get them confused and someone somewhere gets badly bitten. Rouse and Cabe would be far better channelling their considerable energies and expertise more narrowly. Leave the promotion of British architectural business abroad to the RIBA and the DTI.

COMMENT
ANDREW KELLY

Bristol would concentrate on solutions and the future, not problems of the past.

One example is Bristol Legible City (BLC) – a generic movement and information system, inte-

R1 Billion deve the green light

Pretoria – News on the blossoming local development Lombardy Estate & Health Spa in Pretoria East to proc (the developers of Oubaai Golf Estate) reported that al has commenced recently.

Further good news is that ABSA has placed its considerable financial muscle behind the development to the tune of R200 million. These funds will be used to finance all services and infrastructure requirements. Overall Lombardy's development value is estimated at R1 billion (R1 000 000 000) which translates into a healthy investment in the economy of the region. Funding for the planned luxury apartments on the Estate (named Lombardy Piazza, designed by the legendary Stefan Antoni) is currently being finalised.

In the news

The Lombardy Estate & Health Spa name rose to prominence about 2 years ago when plans were announced to develop the luxury estate on the land surrounding the Lombardy Boutique Hotel, which is also home to the famous La Stalla & Lombardy Restaurants. "Lombardy is being hailed as the ultimate in luxury estate living, and it's not hard to see why", says Mr. Hazem Ashry, Deputy Managing Director - Africa of Kharafi Holdings.

Drawing inspiration from the towns of Bergamo, Cremona and Mantova in Italy, the Lombardy Estate and Health Spa will feature classic horizontal lines, generous roof overhangs and boundary walls. The combination of rustic stonewalling and modern finishes will further underline the predominantly country feel that is so carefully instilled in the luxurious Lombardy Estate and Health Spa. Situated only minutes from the centre of Pretoria, Lombardy Estate and Health Spa has received an overwhelming response. All 285 of Lombardy's stands have been sold out, in addition to 55 of the luxury townhouses called Lake Lombardy.(A few are still available)

moulded around a central water feature, make a statement of unconventional urban flair.
It is a style that is layered, white, shiny, sleek. Buildings cascading into one another – like a series

sement

PROPERTY

elopment given

front is that the green light has been given for
ceed with full-scale development. Kharafi Holdings
l necessary approvals had been granted. Construction

Above and below are artist's impressions of the Lombardy Estate.

New Tuscan dev
North renews int

Based in the heart of Pretoria North, just a few minutes drive from Wonder Park Shopping Mall is a newly built Tuscan development with full title units ranging from 60sqm - 130 sqm. You have a choice of several different plans to choose from and a various range of optional extras to be included to your newly built Tuscan home.

We include all bank costs and transfer duties, as well as ceramic tiles, carpets in all the bedrooms, four-plate stove and a three-sided wall to mark your own stand. There is a lot of positive potential in this area with phase 1 and phase 2 being sold out in less than six months. Prices have escalated to over R50 000 and will climb even higher by the end of the year.

Property investment is on a high in the North and everyone is welcome to the party. If you qualify for a loan at the bank for an amount of R382 000 and we can get your bond approved, then you will be looking at a newly built Tuscan house with 3 bedrooms, 2 bathrooms, lounge

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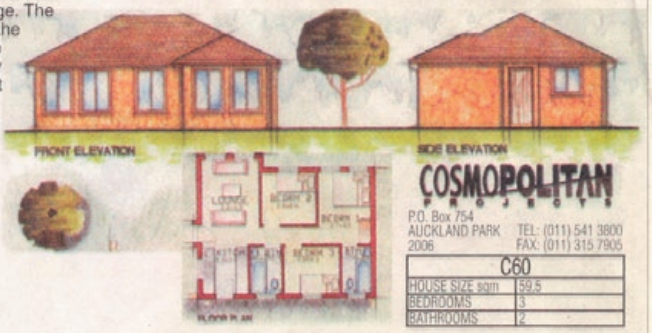

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BEDROOMS	3
BATHROOMS	2

Tuscan is all about sophistication.

R15b 'city' to link Pretoria and Joburg

ANNA COX

A new R15-billion "city" – likely to be the catalyst that will unite Tshwane and Johannesburg all along the highway – is to be established in Midrand.

Waterfall City is billed as the single largest mixed-use development on the biggest tract of empty land in the province.

It will not have one single, independent liquor outlet because it is to be established on Muslim-owned land, and the religion frowns on the use of alcohol.

With an additional 6 000 vehicles a day expected in the area – where peak hour starts at 2pm – the development is causing controversy among residents who are mobilising to protest against the expected congestion on the already-clogged roads.

But according to the brains behind the scheme, developer Werner van Rhyn, it's all systems go. Most of the environmental impact, and traffic impact studies, had already been completed, he said.

"Residents need not fear traffic. Although our road plans have not yet been approved, it is a strict condition that we may not proceed with the various phases until roads are upgraded," he said.

Waterfall City lies on property owned by Witwatersrand Estates Ltd, started in 1934. It was purchased by Moosa Ismail Mia, a trader, who bought the 3 000ha farm.

The Asiatics Tenure Act, an apartheid law, prevented him from owning property in his personal capacity, so he purchased it as a charity, the basis of which was to educate underprivileged children.

The land is still owned by the Mia family and is held in trust for the Islamic Trust. The family still lives on the land.

Some R217-million is to be spent on road improvements and upgrading, including a proposed new bridge at Allandale off-ramp and the widening and extension of many surrounding roads such as Maxwell Drive in Woodmead.

About 15 000 jobs are expected to be created in the development.

Most of the approvals had already been obtained, said Van Rhyn.

"We are awaiting the last few rezoning approvals. In the meantime, good progress is being made on infrastructure. Off-plan sales have already started."

Van Rhyn has been trying for six years to get the development up and running but has met resistance from the Mia family.

They did not want to proceed because of the land's religious status, which dictates the development must make a contribution to the community.

They eventually agreed, on condition that all profits due to the trust would go to educating underprivileged children. They also insisted on having a cemetery, public golf course and lower-cost housing as part of their contribution to community development.

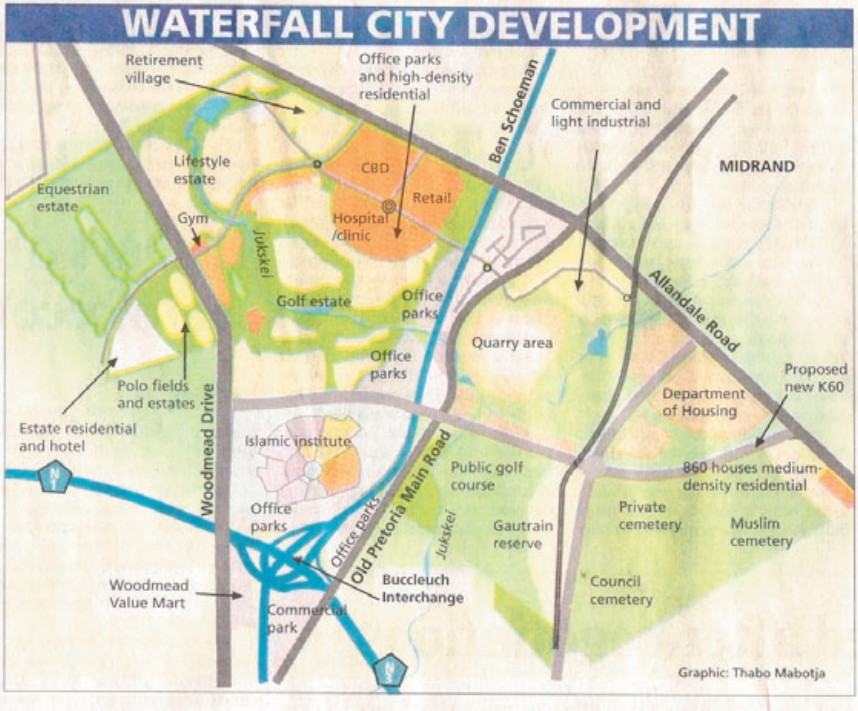
The apartheid government tried to expropriate parcels of land several times and succeeded in getting land for Eskom's headquarters and for the N1 highway that runs through it.

Midrand residents have expressed extreme concern about the increased traffic and have prepared a petition. Councillor Annette Deppe said residents were demanding roads be upgraded before any development took place.

"Residents want Johannesburg mayor Amos Masondo to ensure bulk service contributions are paid by the developers towards upgrading and widening all local roads surrounding the proposed development," she said.

The project will be completed in phases and should take between five and 10 years.

Although there will be no bottle stores allowed, alcohol will be allowed in restaurants.



What it entails

- 20 000 apartments;
- 5 500 affordable houses;
- a golf estate with 2 600 houses;
- a lifestyle village on the river-front;
- a central business district;
- a hotel;
- a polo village with three polo fields;
- two retirement villages;
- a health clinic;
- a private school;
- an equestrian estate with 120 houses;
- 150 000sq m of shopping areas;
- an Islamic university and research centre;
- A service yard and call centre for the Gautrain rapid rail system;
- a 500 000-grave cemetery (already in use), which is the largest burial centre in Africa; and
- about 800 000sq m of office space and 160 000sq m of industrial sites.

Finally – Gautrain project starts rolling

Toll-free centre to be set up to minimise disruptions

ANNA COX

Work on the long awaited Gautrain will start later this month when the first properties are expropriated and a start is made on moving the services and utilities infrastructure.

To minimise disruption to motorists' lives, a toll-free call centre is to be set up within about 10 days, linked to the Johannesburg Metropolitan Police Department, to give people information about route planning.

The centre, a first of its kind, will be linked to the Johannesburg Metro Police Department so that comprehensive information on all traffic problems can be dispersed to the public. The information will also be available on the Gautrain website.

In addition to this, said project spokesman Barbara Jensen, motorists using the same routes every day will be able to subscribe to an SMS service which will send them information at certain times of day, requested by them, about road works.

Businesses will also be notified of any planned power or water cuts timeously.

The preliminary work, which includes the relocation of utilities and services such as water, electricity and phone lines, will take about five months. The work will also include road upgrades, the demolition of certain buildings and the installation of site offices.

"This work needs to be undertaken prior to the start of construction of the train and to ensure a smooth transition and to minimise disruption to the public, said project leader Jack van der Merwe.

Work will start in several places consecutively but the main disruptions are expected in the CBD around Park Station. A public meeting is planned on May 15 to discuss the works with affected residents.

The Gauteng MEC for public transport, road and works, Ignatius Jacobs, said the proclamation and expropriation of land for the Gautrain Project has begun. The proclamation of properties needed for the first phases of construction were published in the Provincial Gazette on May 5.

The areas affected by this proclamation are Johannesburg Park Station and tunnel portal; Rosebank Station; Sandton Station; Marlboro tunnel portal; Marlboro Station; and the maintenance yard.

"Land surveys and property valuations for all these properties have been finalised and the majority of properties are already available. The owners of those properties not yet vacated are now in the position to give final 30-day notices to their tenants as was agreed with them. These property owners started receiving their official letters of proclamation/expropriation with offers for compensation from May 8," Jacobs said.

Discussions started with the affected property owners in October 2005 to reach agreement on early access to their properties.

In terms of the Gauteng Transport Infrastructure Act (GTIA), letters of "intention to proclaim" were handed to these landowners during December 2005.

Their final comments were received early in January 2006 and were provided to Jacobs who approved the proclamation on April 26.

"This is truly a milestone towards the implementation of the Gautrain Project. We have been involved in the planning and negotiations for some time and at last people will be able to see the project moving forward. The importance of expropriation is that it allows for project construction to commence.

"The procurement of land of this public transport infrastructure project has to date taken place according to the GTIA," Jacobs said. He assured landowners that each step of proclamation and expropriation was done according to the stipulations of this Act.

"They will all be treated in a fair and just manner," he said.

In terms of the GTIA, a "Notice of Intention to Proclaim" must be given to landowners before proclamation takes place and the public has 21 days to comment on this notice. For the majority of the sections, the notices will go out within the next two weeks.

It is expected that the Phase 2 draft Preliminary Design document, which includes the variant alignments as proposed by the preferred bidder, Bombela, is to be published towards the end of May. This is, however, subject to the approvals required from the Gauteng department of agriculture, conservation and environment. The public will then have a further 30 days to comment on the documents before Jacobs considers approval.

Roads closures, traffic diversions

The proposed Gautrain Park Station will be next to Johannesburg Park Station, east of Rissik Street and south of Wolmarans Street.

The station will be on the western side of the station building, next to Rissik Street.

Road will be closed and traffic diverted for about 12 weeks.

■ Wolmarans Street will be closed to

The old Johannesburg College of Education and Mentor building will be demolished.

The proposed Rosebank Station will be in Oxford Road. The work will be executed in three stages, the first lasting three-and- a-half months with an expected May 22 starting date.

To limit the impact on vehicles and

The Sandton taxi rank on the corner of Rivonia and West streets will be relocated in July.

The north-bound carriageway of Rivonia Road will be closed after the completion of the Katherine and West Street upgrades (early in September 2006) until the completion of the Sandton Station construction (i.e. at the end of

PRETORIA NEWS WEDNESDAY JULY 25 2007

Tshwane News
YOUR ESSENTIAL GUIDE TO METRO MATTERS

Projects to rid city of crime, grime

PATRICK HLAHLA
METRO REPORTER

The Tshwane Metro Council and the Department of Public Works are pushing ahead with their multi-billion rand project aimed at renewing Pretoria's inner city.

The R11-billion "Re Kgabisa Tshwane Programme" is aimed at improving the working environment of public servants at 40 national departments or agencies in the inner city.

The buildings are expected to be brought to "an acceptable norm, attracting private sector investment and ensuring the urban environment is improved" in terms of urban security, public space and accessibility.

Crime and grime – especially in the inner city – will be tackled by the metro council and the Department of Public Works.

Details of which buildings will be refurbished and what improvements will be made are still under wraps.

Attempts to get comment from project manager Dumisa Dlamini on what improvements will be undertaken and whether any government buildings will be demolished to make way for new ones, were unsuccessful.

The bulk of the work is expected to take place between 2008 and 2010, and is due to be completed by 2014.

The initiative includes the provision of two corridors concentrating on government accommodation and improvements to the city's infrastructure and the metro council's inner city development strategy.

Seven precincts – Mandela Corridor, Presidency (Union Building), Museum Park, Salvokop, Paul Kruger North, Sammy Marks Square and Church Square – will be provided along these corridors "for consolidating and clustering department accommodation around a public space network".

❑ The Department of Public Works and the Tshwane Metro Council are working together to ensure the country has a capital city its people can be proud of. Construction has started on the new National Library in Andries Street.
PICTURE: KENDRIDGE MATHABATHE

The programme will:

- Improve the physical working environment for national government departments or agencies in the inner city;
- Contribute to inner city renewal and rejuvenation;
- Develop the image of Tshwane as an important capital city in Africa;
- Contribute to black economic empowerment; and
- Attract private sector investment.

The programme involves the renovation, upgrade and repair of government buildings which are in the category "good to fair" as opposed to excellent in terms of their condition.

Options being considered include the refurbishment of the buildings or demolition of existing ones to make way for new structures.

Deputy programme director Peter Chiapasco said they would undertake a feasibility study to determine the needs of 13 government departments in Pretoria's inner city.

Chiapasco said there were a number of buildings which were between 60 and 70 years old and the metro council and the department would look at ways of improving them. "We cannot let government departments operate from inappropriate buildings," said Chiapasco.

"It is difficult to say what will come out from the feasibility study. It is also difficult to say if there are any buildings which will be demolished," he said.

Chiapasco said sites had been identified for the offices of three government departments – Land Affairs, Education and Foreign Affairs.

"Sites have been identified and we are busy with the procurement process," said Chiapasco.

The Civitas Building is being renovated while the new National Library is under construction on the corner of Andries and Struben streets. The projects form part of the proposed Government Boulevard.

Inner city won't be a slum – council

PATRICK HLAHLA

The Tshwane Metro Council has drawn up regulations to ensure Pretoria's inner city does not become a slum.

The Tshwane Inner City Strategy provides clear development and management guidelines for developers interested in the inner city housing market.

It is also is aimed at ensuring that all residential development in the inner city is of an acceptable standard and makes a positive contribution to the overall urban environment.

Nava Pillay, strategic executive officer: housing, city planning and environmental management, said the strategy would ensure that developers met standards in line with the National Building Regulations.

The residential market in the inner city has seen rapid growth recently, primarily in the form of conversions of commercial buildings into residential units.

But the conversion of existing office buildings into residential units needed to be carefully managed and monitored to ensure that existing office stock in the inner city was not depleted.

Pillay said one of the key issues was that proper amenities – including parks, cinemas and schools – were provided in the inner city.

"According to the strategy, the number of residential units would have to correspond with the availability of social and recreational facilities such as day-care centres, schools, parks and sports grounds."

The municipality also wants residential developers to contribute to the provision of recreational facilities.

A survey would be undertaken shortly to determine what percentage of inner city residents own vehicles so that planning could be done for parking.

Pillay said one of the biggest problems facing the municipality was the fact that some landlords illegally convert their buildings. "The strategy will ensure that landlords do not partition their offices and then turn them into residential units," said Pillay.

Stevens Mokgalapa, the Democratic Alliance's spokesman on inner city regeneration, said the city had experienced rapid urbanisation with a high demand for housing in the inner city.

Mokgalapa said people migrating to the city to be close to work had put a strain on the infrastructure which could no longer sustain the influx.

"This trend allowed ambitious property developers to find innovative ways of addressing the demand by illegally turning unoccupied and dilapidated office space into residential units," said Mokgalapa.

He said this happened without proper planning and the provision of necessary public facilities and support services, "which led to the creation of slums and social problems in the inner city".

"The municipality needs to enforce its planning laws and policies and deal decisively with transgressors," he said.

They have houses, but no homes

Hostel residents in Atteridgeville fed up with the unhealthy squalor they live in

JANINE DU PLESSIS

Residents living in temporary housing at hostels in Atteridgeville have slammed the "unhealthy squalor" they are forced to live in.

And it seems the Tshwane Metro Council is buckling under the pressure to house the continuous influx of people – and ensure the hostels are fit to live in.

A member of the Atteridgeville Residents' Association who did not want to be identified, said he was "disgusted" with the conditions of the temporary housing where thousands of people have been living for the past two years. About 11 000 people are on the waiting list for council houses.

"There are kids playing in the rubbish and leaking sewage water. The council says there is not money to clean this place up.

"The people have to relieve themselves outside because there are no proper toilet facilities. Some structures have been broken down and are dangerous.

"This is not a home, how can people live under these conditions and still have faith in the council?" he asked.

The 36 family units of the Murray & Roberts Hostel, made by renovating some of the older structures, have not made a dent in the housing backlog.

And at the Saulsville Hostel, where 411 three-bedroom family

The new homes built at the Saulsville Hostel in Atteridgeville, west of the city, where people have started moving in after living in temporary housing for the past two years.
PICTURES: PHILL MAGAKOE

Residents are also complaining about the shoddy workmanship on the houses.

The hostel official said the council had to look at emerging contractors, some of whom have little work experience.

Fears of illicit building boom

Delay in approval of plans by city council

under fire from property developers, architects

PATRICK HLAHLA
METRO REPORTER

Illegal buildings are springing up around the city due to long delays in obtaining municipal approval of building plans. Frustrated property developers and architects have criticised the Tshwane Metro Council for the delays, which they said could lead to more people erecting buildings without approved plans.

Most of the property developers and architects – who spoke on condition of anonymity – said they have waited for more than six months for their plans to be approved by the municipality's building control division.

They said the delays were frustrating as their clients could not legally build new houses or make additions or alterations to their existing homes.

The property developers and architects have called on the Metro Council to urgently implement steps to tackle the delays.

The failure by the municipality to approve plans on time has already led to some people making alterations without the necessary plans, according to several sources.

The municipality had by yesterday not responded to an inquiry sent through last month about the problems experienced by property developers and architects.

The Pretoria News repeatedly asked how many plans were submitted from the municipality – or indeed a response of any kind.

The Metro Council was recently taken to court for allegedly dragging its feet in considering building plans.

The application was brought by seven building and property development companies that stated in court papers that the National Building Regulations stipulated that council had to consider building plans within 30 days.

Instead, the builders said, the municipality took up to six months or longer when it came to duets – two houses on a property.

This did not only cause frustration for prospective home owners but also for builders who suffered cash flow problems as a result.

A property developer, who did not wish to be named, said the whole system needed a complete revamp.

"The current system is unacceptable to the public. The council's slow pace in approving plans has resulted in some people building illegally," he said.

The developer said he had been struggling for the past three years to have building plans approved.

"The biggest problem is that there are not enough qualified people to approve the plans. The municipality should also look at extending the working hours of its officials in the Building Section," he said.

The developer said he wrote a letter to Executive Mayor Dr Gerry

He said it would appear the municipality had capacity problems. "The lack of staff is hindering the process of approving building," he said.

The delays in approving building plans have led to architects and developers "jumping the gun", he said. "They proceed with their buildings without approval from council," he said.

Garsfontein resident Leon Strydom said he submitted building plans for approval on June 23 this year for a small alteration and additions at his house for the construction of a garage and storeroom.

Strydom said he phoned the municipal offices after five weeks to inquire about the plan approval and was informed that it would take another two months.

"I strongly objected and the lady said I should invite the TV people to investigate that department," said Strydom.

It was frustrating to wait so long for building plans to be approved, he said.

Dr Clive Napier, the Democratic Alliance's spokesperson on city development in the Metro Council, said it was shocking that seven builders and property developers had to seek court action to have relatively simple plans approved.

"Why has no progress been made over the past two years in addressing plan approval bottlenecks?" asked Napier.

Ontwikkelaars - hoe ver strek hulle eer

RIA LOGGENBERG

"Beloftes maak skuld." Of, "my woord is my eer" - aldus bekende gesegdes in die Afrikaanse spreektaal.

Die vraag is net - hoe ver strek mense se eer?

Mediaberigte van beweerde bedrog met die vervalsing van okkupasiesertifikate deur 'n bekende ontwikkelaar in Pretoria, was die afgelope maand of twee hoog nuus wat menige huiseienaar - veral in sekuriteitskomplekse in die ooste van Pretoria - met skok verslae en benoud gelaat het. Die vraag het telkens op bekommerdes se lippe gelê: "hoe ver strek mense se eer? Wat het van mense se integriteit geword?"

Hierdie vraag is nie net tot die ooste van Pretoria beperk nie, maar word met groot ontsteltenis en kommer ook deur huiseienaars, van 'n multi-miljoen Rand sekuriteitsoord digby Irene, Centurion, uitgebasuin.

Ry jy met die besige Nelmapiusweg in die rigting van Irene, merk jy, benewens die grondverskuiwingswerke regs van die pad, die bemarkingsborde wat aandui dat 'n nuwe komplek, *Irene Mall*, teen einde 2007 op die terrein gevestig sal wees. Onwillekeurig val jou oog, net daarna, op die smaakvolle dubbelverdieping huise op 'n sekuriteitsomheinde landgoed in Pierre van Ryneveldpark. Gaan maak jy nader kennis, pryk die sierletters teen beide die netjiese geboue, wat as sekuriteitsbeheerde toegange dien, om aan te dui dat dit die gesogte *Irene Farm Villages* (IFV) is.

Onmiddellik besef 'n mens dat die ontwikkelaars van hierdie nuwe *"mall"* 'n uitstekende terreinkeuse gemaak het vir die ontwikkeling téén die gevestigde hoë inkomste landgoed, en digby die buurlandgoed bekend as *Cornwall Hill Country Estates*. Wat meer kan winkeleienaars vra?

Terug na die IFV sekuriteitslandgoed. Die enorme 250 ha landgoed wat, na verneem word, uiteindelik gaan spog met ongeveer 670 moderne huise op erwe wat wissel tussen 500 en 2 000m², is op die oog af 'n toonbeeld van goeie beplanning, maksimum sekuriteit, gelukkige en gevestigde huiseienaars wat elk om 'n spesifieke rede juis hier gekoop het. Vir sommige 'n goeie aftreebeplanning met 'n "aftree-oord wat op die terrein" gevestig gaan word, vir ander die rustigheid om hul kinders onder veilige omstandighede eersdaags by die beplande "privaatskool in te skryf vir onderwys van die hoogste standaard." Die natuurliefhebbers is natuurlik gelok deur die "landgoedterasse en oopplanparke wat ontspannings- en sportfasiliteite sal bied asook die *'extensive, manicured parkland"* en vir die natuurkinders, 'n "ryskool en perdestalle." Dit is "slegs enkele van die voordele" wat hierdie landgoed sal bied. Aldus 'n landskapgroen glans bemarkingsbrosjure wat deur goed ingeligte agente, reeds vroeg in 2000, aan belangstellendes met verwagtinge gegee is.

Wat meer wil enige huiseienaar hê?

Ongeag jonk, middeljarig of bejaard?

Vervolg op bl. 5

ver strek hulle eer

"Extensive manicured parkland" *Foto: Ria Loggenberg*

Vervolg vanaf bl. 1

Maar...op hierdie rustige kalm landgoed is daar 'n onstuimige kookpot. Sedert die eerste bemarkingsaksies in 2000, blyk dit dat die inwoners nog steeds geen van die genoemde luukshede ervaar nie. Met besoek van die *Centurion Nuus* se Redaksie aan die spog landgoed, was daar geen sig van 'n skool, aftree-oord, park, perdryskool of perdestalle nie. Ook geen aanduidings dat dit binne die nabye toekoms gaan verrys nie. Die *"unobtrusively 24 hours a day protection and high technology monitoring systems"* klink egter indrukwekkend, maar of dit effektief is, is 'n goeie vraag.

Is al hierdie voorregte van beloofde fasiliteite, nie net wensdenkery nie?

Die inwoners se "nee." Tereg ook as daar na die brosjure gekyk word.

Die bekommerde en hoogs ontevrede inwoners van IFV het pas (Februarie) die *Concerned Residents Association* (CRA) gestig. Vrywillige bydraes word deur die inwoners in 'n Trustrekening gestort vir moontlike regsaksie teen die ontwikkelaar oor die gebrek aan nakoming van bemarkingsbeloftes en om eienaars se belange te beskerm.

Volgens lede van die Uitvoerende Komitee van die CRA, is dit vir hulle uiters belangrik om hierdie huiseienaars se belange te beskerm, maar ook in die proses toe te sien dat inwoners van ander sekuriteitskomplekse, gewaarsku word oor soortgelyke beweerde optrede van ontwikkelaars. Die *Centurion Nuus* is in besit van 'n regsopinie van Advokaat Jurg Prinsloo wat namens die CRA optree. 'n Uittreksel uit dié dokument lui: "Hierdie is dusver een van die mees ontstellende voorbeelde van 'n ontwikkelaar se versuim om beloftes wat dit in advertensie materiaal gemaak het, na te kom."

Die CRA het verskeie besware aan die *Centurion Nuus* geopper wat onder meer die volgende insluit:

- kommer oor die substandaard sekuriteitstelsel; (Die heining moet volgens die CRA oorgedoen word);
- die terrein wat vir besigheidsdoeleindes asook die privaatskool gereserveer is, is in 'n dolomietiese verslag as medium- tot hoë risiko gebied bevind en ongeskik verklaar vir die oprigting van die skool; ('n Aanvanklike verslag is volgens die CRA reeds in 2000 opgestel.)
- die terrein wat vir toesluit motorhuise en die aftree-oord afgebaken is, vorm uiteindelik nie deel van die landgoed nie en moet die huidige heining geskuif word om die gedeelte uit te sluit. (Volgens die CRA is die ontwikkelaars in proses om ander ontwikkelings daar te vestig.)
- die onregmatige gebruik van die watertoevoer;
- gebrek aan vestiging van die beloofde *"manicured parklands"*. (Die inwoners het glo self ingegryp en op eie koste met grondverskuiwingstoerusting die terrein ontwikkel en bome en gras aangeplant.)
- die totale gebrek aan telefoonlyne.

Die groot vraag aan die CRA is: "Wat se beskerming en ondersteuning verkry julle as huiseienaars van jul beheerliggaam wat vir die doel gestig is?" Die antwoord: "Die Raad van Trustees van die *Home Owners Association* bestaan uit ses direkteure waarvan twee plus die Voorsitter, deur die *Irene Land Corporation* aangestel word en oor 'n ekstra stem beskik. Dus blyk dit dat die inwoners se drie verkose direkteure se stemming, solank as wat die *Irene Land Corporation* volgens voorskrifte die Raad van Trustees beheer, in die minderheid is.

Na wat van die CRA verneem word, hou Standard Bank en Retail Africa onderskeidelik 'n 10% en 37.5% belang in *Irene Land Corporation*. Die surplus aandeelhouding word deur verskeie ander direkteure gehou.

In gesprek met van die inwoners in IFV, was dit duidelik dat heelwat van hulle hul aftreebeplanning rondom hierdie "toegeruste" landgoed gemaak het. 'n Landgoed waarop hulle ook sou kon aftree met die nodige fasiliteite van 'n aftree-oord.

Centurion Nuus is ook ten volle bewus van die wyse waarop die integriteit van ander bekende ontwikkelaars, waaronder Riaan Botma en Jan Zederberg van 'n bekende ontwikkelaarsgroep in Centurion en Midrand, aangeprys is. Hulle is in 2004 deur die Centurion Sakekamer vereer met 'n toekenning vir hul uitstaande diens aan die inwoners van Centurion en in besonder vir die uitbouiing van Centurion oor die afgelope 10 jaar.

Kommentaar van belanghebbendes asook buitestaanders word in 'n opvolgartikel in die *Centurion Nuus* se Junie-uitgawe gepubliseer. ■

Beweerde onregmatige watergebruik in Irene Farm Villages. *Foto: Ria Loggenberg*

Don't rename Pretoria – call

HANTI OTTO

Voortrekker leader Andries Pretorius yesterday promoted co-operation and conciliation with black South Africans.

Singer Steve Hofmeyr, members of the trade union Solidarity and the Federasie van Afrikaanse Kultuurverenigings (FAK) yesterday handed over a memorandum to the Office of President Mbeki at the Union Buildings.

The memorandum appealed for the retention of the name Pretoria as the name of the country's capital.

It was signed by, among others, legal expert Professor Marinus Wiechers, chairman of the Blue Bulls Ex-Players' Association Piet Uys, chairman of the FAK Professor Danie Goosen and Wim du Plessis, chief executive of the Gauteng North Business Chamber.

This followed after Mbeki recently said he supported the name change of the city.

"We, the undersigned, together with thousands of others who also regard Pretoria as an important part of their heritage, want to ask your government and you as President not to agree to change the name of South Africa's capital from Pretoria to Tshwane," said the memorandum.

They requested to have discussions with Mbeki before a decision was made on the name change, saying they would co-operate constructively to find a solution.

The first argument for keeping Pretoria's name was that the successful future of the country depended on the ability of different groups to reach win-win solutions.

"The current usage of Pretoria as the name of the city and Tshwane as the name of the Metropolitan Municipality is such a win-win solution – one that accommodates everyone," they said.

Reducing the name Pretoria to a few city blocks would not promote conciliation, but instead send a message of retribution.

In support of this, the memorandum stated that according to the Constitution, South Africa belonged to everyone who lived here.

It also demanded respect for all who helped to build and develop the country. "Changing the name ... would be a disparagement of the heritage and contribution of a segment of the country's population," it continued.

Referring to Andries Pretorius, after whom Pretoria was named, the memorandum said he brought black rulers together to resist British imperialism.

It pointed out that the fact that the chairman of the South African Geographical Names Council assisted the Tshwane Metro Council to draw up its application to register Tshwane as a place name did not constitute an acceptable administrative action.

"The name change will cost approximately R1,5-billion. This money would be better spend on the alleviation of poverty," they argued.

Professional workmanship?

I always understood that one attained a professional career (and status) through study and subsequent application of one's learning but I am confused with architectural design application in the parking and floor areas of shopping and office block developments.

Take for instance the concrete edge paving around trees, flower beds and general space demarcations in parking areas which are of such a height that damage is caused to the front spoiler/bumper/wheel rims of vehicles when parking.

Is it not obvious that the "professional" should take note of vehicle design and cater for such when determining the height of edge paving. Half the height would suffice and still serve the purpose of intended use as well as reduce material costs.

I would suggest that the "professional" should get familiar with vehicle body design and also visit any parking area and witness for themselves the tyre and vehicle body scrape marks on the concrete edging and specify user friendly design.

I would also address with the "architect" about the non-user friendly floor tiles in shopping centres. Are there any comments from the professionals?

NF Thompson, Glenstantia

Work starts on new parking bays at Menlyn

Work has started on the R88-million expansion of parking facilities at Menlyn Park Shopping Centre.

The expansion, which will add a further 1 750 covered bays over 63 000sq/m of space, is due for completion in May 2007, says Brent Wiltshire, development executive of Old Mutual Properties.

"With the success of Menlyn Park, the customer experience needs to be enhanced by additional parking," he said.

"Menlyn Park continues to attract increasing numbers of visitors and recorded parking traffic of 6,6-million vehicles in 2005, the highest among the major retail centres in the Old Mutual portfolio. It is also clear that if the centre is to be expanded in time, there must be adequate parking."

He said the major road developments being planned for the area, including new on- and offramps from the N1, would involve the reconfiguration of entrances into Menlyn Park.

"Positioning additional parking in an appropriate location on site will facilitate traffic flows."

The parking expansion is on the southern side of the property, and involves extensions over six levels, with new entrances and exits and two additional lifts. There will be 6 976 bays at Menlyn Park after the extensions.

Is Hatfield becoming seedy and dangerous?

Latest death of club-goer fuels this perception

JANINE DU PLESSIS

The death of a Hatfield club-goer earlier this month and reports of assaults have raised concerns that crime levels may be rising in the neighbourhood. Phillip Weber (34) was beaten up outside Good 4 Fella's last week, which led to his death at the weekend. Police have arrested three men.

While some Hatfield businesses have appealed for action to curb the fights, others say these incidents are to be expected at places where alcohol is served.

The ward councillor for Hatfield, Kate Prinsloo, said it would be "fair" to warn people against going to Hatfield as it had become unsafe. She said police and pub owners were "not as vigilant as they should be".

"Sometimes they forget that they have a responsibility towards their clients' safety.

"Many of the people are young students and parents assume they will be safe at these places. This is not true if you look at the increase in these incidents," said Prinsloo.

Prinsloo said Hatfield had always been a "risky" area.

The chairman of the Students Representative Council at Pretoria University, Walter de Fortier, said there had been a definite increase in complaints from students. "The students don't feel safe anymore, mostly because of muggings and fighting in Hatfield Square itself.

"Women are very worried about more visible."

Private investigator Mike Bolhuis said the increase in crime was shocking and the pub and club world was "rotten and out of control".

A Brooklyn CPF member said crime around Hatfield was "too high". He said common assault was a big problem, but smash and grabs and vehicle theft were higher.

"The students drink too much and walk in the streets, causing problems. Criminals prey on them," said the member, who did not want to be identified.

SAFETY TIPS

- Know your surroundings.
- Always tell someone like a family member where you are going and what time you will be home.
- Go home with the same people you originally went out with. Never leave with strangers.
- Know at all times where and how to find help.
- Never accept drinks from strangers, and never leave your drink unattended.
- Reporting incidents is crucial for successful prosecution.

He said the Brooklyn police were busier than others. "Each and every day there is something reported. Case numbers are given according to the number of cases opened for that day and by the end of the day we have five-digit case numbers," he said.

Good 4 Fella's security, said there had been many fights outside clubs in general lately, not only in Hatfield. "There are also other crimes, like handbags being snatched. These things can happen anywhere and outside any club," said Botha.

But Danie Basson of the Hatfield City Improvement District (CID) said the Hatfield cases were isolated. "People should be careful of perceptions," he said.

Police spokesman Inspector Paul Ramaloko said the crime levels in Hatfield were not out of hand. "We can't say as a result of one incident that crime rates are high," said Ramaloko. Some business owners in the area agreed.

The Lightshield security company manages security in Hatfield Square. Owner Keith Pyper said it only seemed like these incidents were on the increase because people had not reported them before.

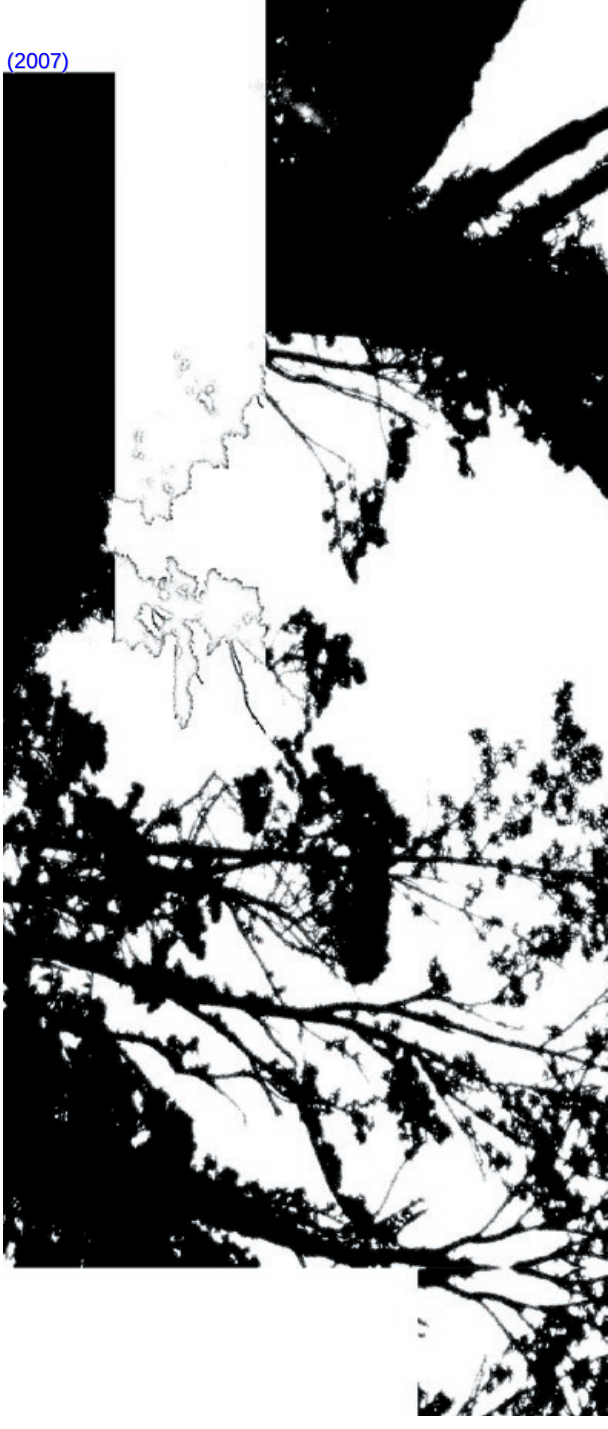
"Together with the police and CID, we are being more proactive (about crime).

"We hold weekly meetings with businesses and put up cameras in the streets. We are trying our best to implement a strategy to make things better," said Pyper.

He said, however, that people needed to take responsibility for their actions. "Hatfield is a students entertainment hub; we have thousands of people visiting venues which sell alcohol. If it is so dangerous, why is it so busy?" he asked.

Cool Runnings owner Willem Brink said drunken fights had been

contents



L I S T O F I L L U S T R A T I O N S

07_THEORY

08_**PRECEDENT STUDIES**

09_**DESIGN DEVELOPMENT**

10_DESIGN PROPOSAL

11_TECHNICAL STUDY

12_TECHNICAL DRAWINGS

13_**ADDENDUMS**

L I S T O F A C R O N Y M S

CUBE - The Centre for the Understanding of the Built Environment (Project building)
C.U.B.E. - The Centre for the Understanding of the Built Environment (Manchester, UK)
CBE - Council for the Built Environment
SACAP - South African Council for Architectural Practitioners
SACLAP - South African Council for Landscape Architectural Practitioners
EISA - Engineering Institute of South Africa
SACPCMP - South African Council for the Project and Construction Management Professions
SACPVP - South African Council for the Property Valuators Profession
TICP SDF - Tshwane Inner City Programme Spatial Development Framework
CBD - Central Business District
DPW - Department of Public Works
DAC - Department of Arts and Culture
CIDB - Construction Industry Development Board

PROJECTOUTLINE

ABSTRACT

The city of Pretoria faces a multitude of impending changes on a monumental scale involving the city in its entirety. The establishment of Pretoria as the identifiable capital of South Africa and as the intended capital of the African continent has pushed government to revise its plans for the city. The approaching 2010 FIFA Soccer World Cup due to be hosted by South Africa has also presented a unique economic and social opportunity with which to rebuild the city.
Yet high demand for safe housing has resulted in rife developments of sub-standard quality architecture, both in respect of construction build and design with the overruling concern of economy and profit dictating most decisions.
In an atmosphere such as this, concern over the massive changes due to be performed in Pretoria, is growing. This project seeks to find a solution to these two problems by developing a public interface between the professions of the built environment and the general public. This facility will inform the public on all new developments in the city, allowing for public comment and critique and providing resources for the development of critical thinking on architecture amongst the public.
This project aims to develop the city in partnership with its people who will remain to inhabit and use the city long after any international event has ended. To guard against the possible estrangement of the people from their city once alterations have been implemented, involvement of the public during the development stages will ensure the city remains functional and loved by its people.

PROJECTOBJECTIVES

In order to develop both awareness and interest in the built environment by the people living within Pretoria, this project recognises the need to engage with the public realm on several levels to maximise the influence of the facility.
The problem that generated the need for this facility is the lack of a sufficient public interface with the designers responsible for the development of the city of Pretoria. The project thus targets public involvement as the principle design objective in the development of various networks of interaction into the culture of our built environment design.

The solution proposed by this project aims to deal with this matter in a very pragmatic manner through the development and installation of an interface structure with the motivation of reconnecting an understanding through communication between a profession that has isolated itself, and the public domain where the influences of design decisions are felt.
In order to stimulate public awareness in the built environment, the interface will need to access the public domain at multiple levels, as proposed. The following items outline the initial practical concepts to achieve the envisioned public involvement.

METHODS

01_ The Council Headquarters for the professions of architecture, landscape architecture, urban planning, town planning, interior design and quantity surveying as well as the over-arching Council for the Built Environment (CBE) to be moved into the CUBE facility. These representative bodies seek to protect the public interest within the built environment. To locate them within the public interface will enhance the public awareness of such bodies as well as generate a more efficient inter-working relationship.

02_ The Built Environment Network will establish enhanced communication between the various governmental public works and planning departments and the private profession of the built environment by combining both into the interface. Urban and town planning, public works and private development of the city can thus be planned and managed in a symbiotic manner.

03_ Future Development Plans of the city of Pretoria and surrounding areas will be housed and displayed for public viewing to promote awareness of the ideas and proposals aimed at implementation within the city. Public opinions can be polled and suggestions or reactions to any proposals taken into consideration through the development of city projects.

04_ University Study Partnerships with the University of Pretoria will seek to pair Masters and Honours students directly with the planning authorities to give creative input into the future city proposals. Designs undertaken by the students will in return be founded on an informed, practical and reliable base.

05_ The Education Network seeks to established an appreciation for culturally significant and historical architecture in the education process of learners in primary and high schools. Excursions to the CUBE facility will aim to develop an understanding of the practical and theoretical considerations in the profession of the built environment.

06_ Construction Methods area will give visitors to the building a practical insight into architectural practice and the physical considerations required in the field. This will connect with the Education Network and enable school children to learn to build and develop an interest in construction. University students in their first or second year of study will explore architectural thinking through construction of either historical or contemporary architectural elements such as groin vaults or tent tension structures. These projects will form part of an ever-changing public display.

07_ A Research and Information Hub for the Built Environment will be created in CUBE to archive historical and contemporary architectural planning theories and works in a library from which planning professionals and students can learn. Scale models and working drawings will be available for perusal.

08_ The Historical City Network will consist of a network of publicly displayed markers throughout the city, forming historical pathways in a connect-the-dots fashion, indicating historical and culturally significant buildings in the city. These networks are seen as an aid in generating awareness in the public and become informative pathways through the city for visitors and tourists to generate an understanding of the historical context of Pretoria.

D E S I G N O B J E C T I V E S

Architecture, as seen by the author, remains the timeless manner in which a structure imparts experience to its user. No definable element or composition can be isolated and identified as ‘Architecture’, for the presence of architecture is created through the connections and inter-relationships between smaller, individual parts which equate to something greater than the sum of the elements. Architecture is the spirit which connects us to the habitable voids we pass through.

It is this idea of architecture that this project seeks to promote amongst the public. Presently there exists a mystical distance between the profession of architecture, including to some degree the entire built environment industry, and the general public. Architects and building designers have as a result begun to see a shift in the development and construction processes of the industry whereby

property developers have begun to disassemble the role of the architect amongst various other professions. Due mainly to the mysterious nature and indistinct definition of what role the architect fills in the public eye, this has been allowed to continue. The resultant quality in architecture leaves something to be desired through the lack of synthesis that would ordinarily be provided by the professional architect but has now been disseminated amongst the other professions.

A single work of architecture can change the way people think; this cannot be denied. In a time where the dogmatic concerns of economy and cost determine virtually all aspects of architectural designs, this project returns to focus on architecture as experience. The final design will attempt to ignite passion and inspiration in the people of the city, leading by example and crystallising the idea that functional buildings need not consider purely financial objectives.

The three core design objectives are presented in order.

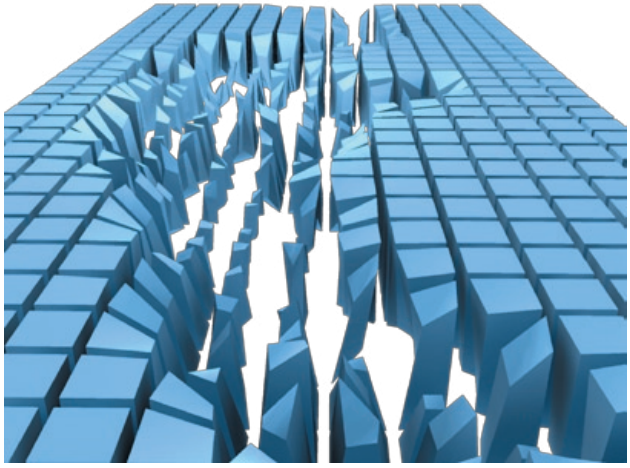
01_ Create a multitude of variations of spatial experiences through the structure to stimulate the visitor.

02_ The permeability of space must remain readable or made as tangible as possible.

03_ The physical structure must observe economical issues yet also allow the variations of experience sought for.

The three ideas presented here are possibly best understood through the principle conceptual image which identifies the regular, economical structure, the variation of spatial experiences and the permeating nature of space through structure.

Fig.1_01.Concept image 1



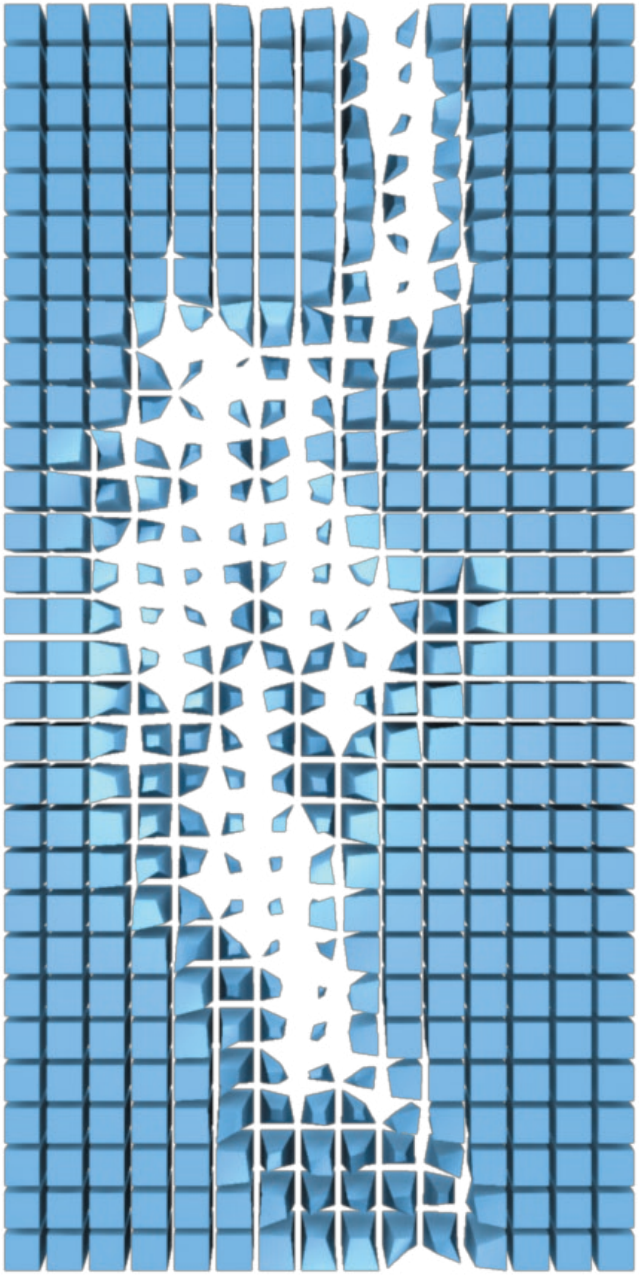


Fig.1_02.Concept image 2


context
01_location
02_societal conditions
03_existing facilities
04_project motivation
05_client requirements

C O N T E X T

L O C A T I O N

The chosen city within which this project operates is Pretoria, the capital city of South Africa which can be found at the southern most tip of the African continent. The co-ordinates for Pretoria are 26° south, 28° east, locating it in the 'highveld' or Northern Steppe climactic zone.

Fig.2_01.African map, Readers Digest, 1984
Fig.2_02.Pretoria City map, Readers Digest, 1984
Fig.2_03.Aerial photograph of Pretoria City

SOCIETAL CONDITIONS

Pretoria has seen a vast number of changes to the way the city operates since the end of apartheid in 1994. Since then the city's structure has been in constant fluctuation due in part to the new activities being brought into the city with the large number of people coming to Pretoria to seek employment and a better life.

The outlying settlements of Soshanguve, Atteridgeville and Mamelodi as well as a multitude of smaller "squatter camps", are slowly becoming more connected to Pretoria through the upgrading of infrastructure. Large numbers of people commute between these settlements and Pretoria daily since these towns were established by the apartheid government to act as "sources of labour" (Fisher, 1998:163). As an indication to the numbers being spoken about, "In 1983, they recorded 400 000 African commuters were focusing on the Pretoria core" (Fisher, 1998:163).

This number will have changed since a large percentage of these people chose to relocate to the city to be closer to their employment. The influx of outer lying populations into the Pretoria area has had the effect of an increasing crime rate, shortages of housing and lack of employment.

In response to this, a significant number of Pretoria's residents have chosen to move out from the city, extending development of the city far into the eastern suburbs, mainly to escape the apparent rampant increase in crime. The shift in population movement together with the lack of safety in the neighbourhoods, has generated a demand for high security, high density housing. The prolific establishment of these "lifestyle estates" is a direct reaction to these social conditions which explains the reason for their success. Estates now can be found throughout the south-eastern corner of the city, extending off to the east and southwards towards Centurion.

Centurion itself is comprised mostly of these 'security estates' where a working population resides between commuting to either Pretoria or Johannesburg. As can be seen from the articles in the previous section, there are massive plans to establish Midrand, the relatively undeveloped area of land between Pretoria and Johannesburg, as the housing centre for the two major cities. The development focuses on the large scale erection of housing estates which have grown to incorporate golf courses, wildlife sanctuaries, spa facilities, shopping malls and gymnasiums. The increased size and diversity of the estates has two immediately recognisable consequences. Firstly, the erection of secure, impenetrable perimeter walling around estates on this larger scale will prevent any kind of movement other than vehicular occurring in the area. Pedestrian routes between suburbs, neighbourhoods and houses will cease to exist. Secondly, the increased diversity within these estates will reduce the reliance of the user population on the surrounding areas, possibly to such an extent that the only time residents may ever leave the estate will be to go on holiday. Whilst this aspect may still remain a future vision, it does further highlight the problem of a self-imposed segregation.

The ability of a people to use their cities and suburbs depends on access. Restricting access will only alienate the people from parts of their own city, reducing the effectiveness with which a city can serve it's people.

Expansive developments outside of the city centre require significant amounts of infrastructure to be put in place in order to connect with the city's services. In contrast, empty spaces within the city already have connections to required services and are far easily connected if not due to the extensive framework of services within the city already.

These are the social forces and problems the project seeks to tackle through its establishment. In terms of the pragmatic concerns of functionality and site, residual space in the city will be targeted for development as the project location. Through the

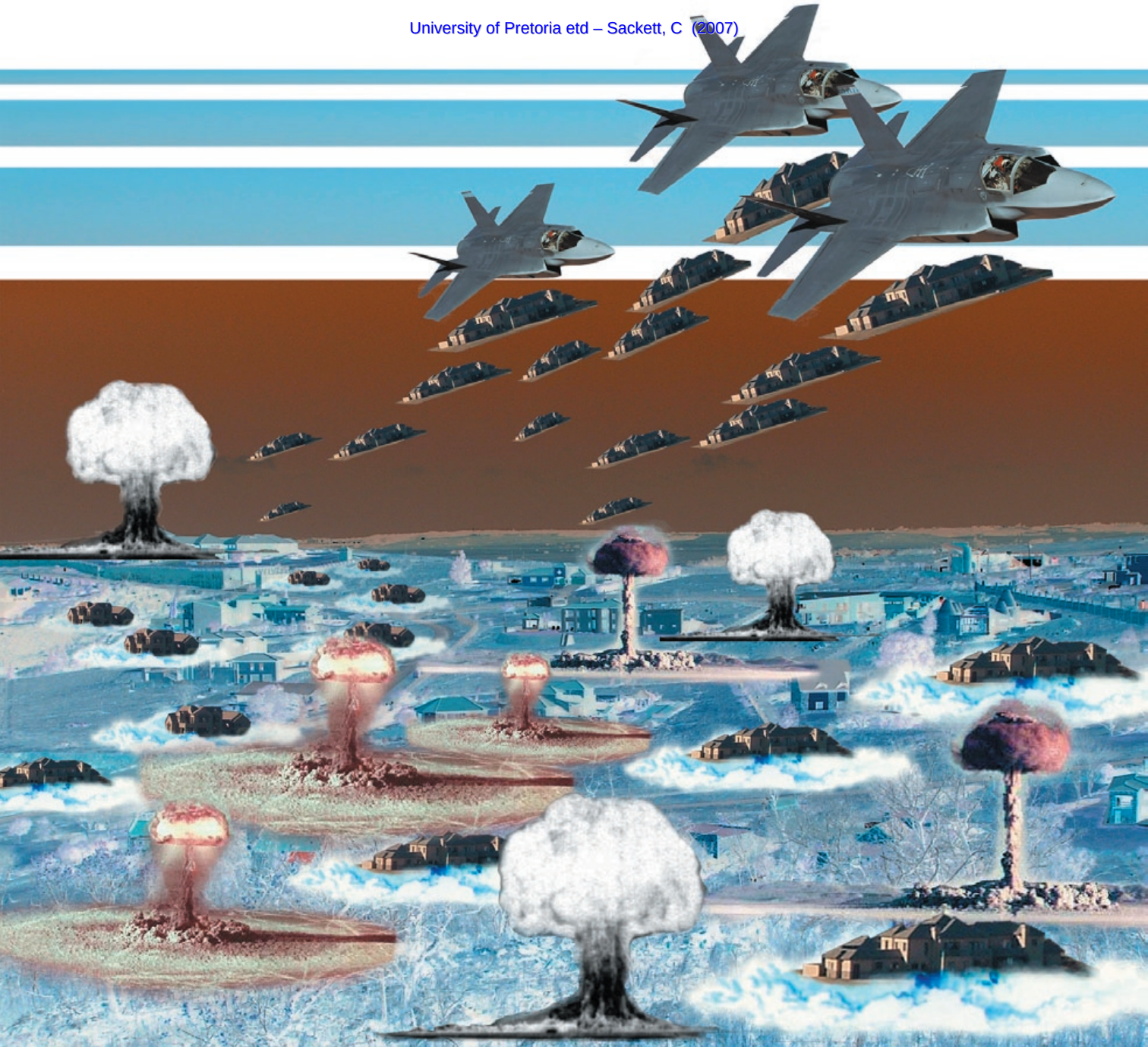


Fig.2_04.Estate development destroying the landscape

facility, a greater understanding of the benefits of our city as well as the possible problems faced with its continued expansion and current development trends, is sought.

E X I S T I N G F A C I L I T I E S

Architectural education in South Africa remains an exclusive field which one can only access through the universities and technical colleges found in the main cities. The general public do not have a way, other than texts in public libraries or exhibitions in galleries, to access the fields of the built environment. Naturally if there is interest, an uninformed person can educate themself using these sources but this is the exception. Indeed the problem presents itself in attempting to inform people of their city without requiring dedicated interest for their part.
At present there is no such place or facility for this to occur within the public realm - were the architectural departments to be opened to the public perhaps this would suffice. But this is unlikely to ever happen being the privately funded institutes universities are which require their students to pay for their education.
At present the Council for the Built Environment (CBE) is the highest administrative power in the field. This Council has six smaller, specialised sub-councils which report to it on the various professions within the built environment field. All were established by various Acts in 2000 to act as public serving entities, reviewing all laws pertinent to the operation of the various professions.

But as mentioned previously, the CBE and the sub-councils remain only administrative entities, operating within the realm of the built environment professions. There is no connection to other fields outside of the construction and technical professions and certainly no manner in which the councils can bring education of the built environment to the general public. Seminars and lectures are organised which are open to the public which attempts to perform this service but meant mainly for the professionals in the field.
It is interesting to examine the following diagram which is posted on the CBE website. It gives a step-by-step breakdown of all interested and affected parties, their functions and how this is achieved. Note the section dedicated to public involvement under the stakeholders section. According to the CBE then, the public only serves to inform two of its functions: to bring about the discipline of professionals and review appeals arising from disciplinary actions. This merely serves to re-iterate the fact that the CBE and the councils are administrative bodies, establishing the need for a central educational interface which is founded in the public realm.

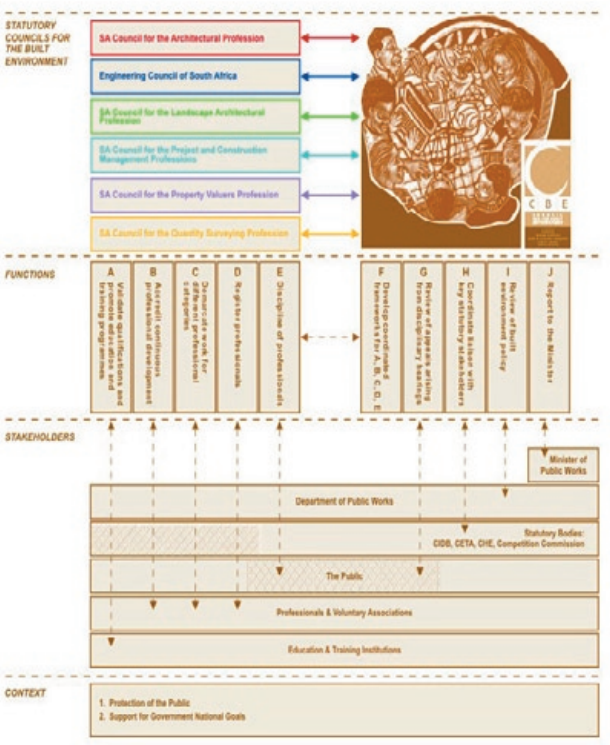
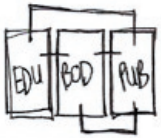


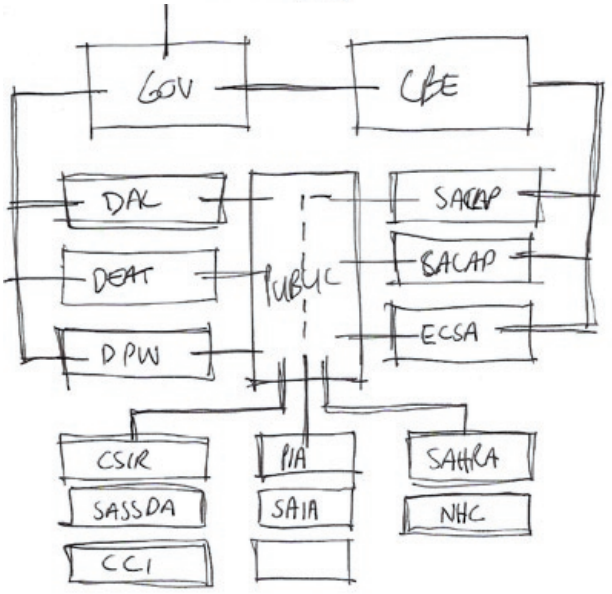
Fig.2_05.CBE structure, CBE website, 2006

Fig.2_06.Walls barricading the city

PROJECT MOTIVATION

Taking initial inspiration from the previous diagram, a process of mapping the various entities within the built environment fields was undertaken, in order to validate the premise that a public educational interface was required. The following diagrams explore the many stakeholders and contributors to the professions.





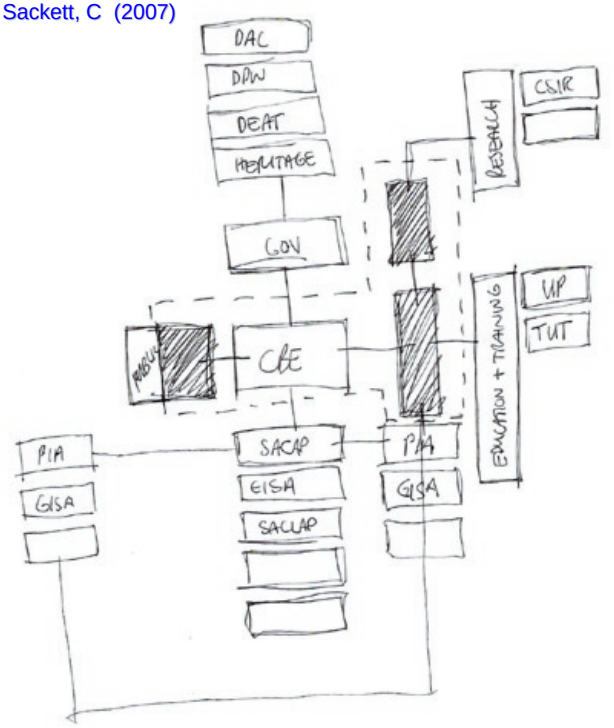


Fig.2_07.Exploring project integration

In concluding this process, the original motivation for this project begins to find its footing in the real world. The need to bridge and develop a connection between the public and the built environment professions finds its position in relation to the various other bodies involved.

From a personal perspective, it is the author's wish that a project of this nature be developed in Pretoria to showcase the great possibilities of South African cities and the great architecture of both past and present times.

The planned investment of billions of rand towards the upgrade and establishment of Pretoria as the identifiable capital of South Africa will seek to place Pretoria as the capital of the African continent as a whole. The implementation of national public transport routes and infrastructure to prepare for the 2010 FIFA

Soccer World Cup to be hosted by South Africa and the complimentary urban framework changes; all these projects are massive in scale. Yet there is very little information allowed into the public realm where the effect of these projects will be most felt.
The project facility will thus act as the vehicle for information between public and built environment realms, conveying to the public the ideas the government has regarding the development of Pretoria. In turn, the public can become involved, approving or dismissing proposals made by the government and in so doing, form a future for the city with the people who will continue to use it for many years to come.

CLIENT REQUIREMENTS

VISION
To be an appropriate regulatory body for a dynamic, robust and ever-evolving architectural profession that is in the forefront of the development of the built environment.

MISSION
To guide, facilitate and promote a high standard of competency and responsibility in the architectural profession and to increase public awareness of the range of architectural services offered. To ensure the profession fulfils its total role in the development of South Africa.

SACAP Annual Report, 2006

To develop towards a viable project, the CBE and the six statutory councils are the principle clients to use the facility. In order to develop an interface which represents the fields of the built environment, it is deemed suitable that the ruling administrative bodies be present. Additional layers of functionality will need to be incorporated to expand the ability of the public to access and harness the information provided through the project facility but this will be developed in detail to follow.
A broad overview of the CBE and its council's functions and processes will be formed at this stage, for further analysis and breakdown to occur in the latter development stages.
The idea to combine the CBE with the six subsidiary councils makes excellent sense when considering the day-to-day activities and overall administrative processes involved. All bodies operate in a very similar manner, due not only to the similar nature of the fields each is focussed upon but to the composition of each of the councils.
All the councils require a certain number of full-time staff, working professionals and public individuals as laid out in the Acts establishing the councils. This translates to similar working environments due to the part-time nature of some of the members.

The following requirements were identified:

01_adaptable office space
02_private and public meeting areas
03_temporary workstations/ hot-desking
04_administrative areas (filing, telephone exchange, computer rooms)
05_common facilities (toilets, kitchenettes)

The ability to share facilities will become a core component of the design in order to reduce redundancy of spaces.
The overall process of reporting to the CBE on issues relating to the various fields will also be enhanced through the collection of the bodies into a single location. At present, different councils are based in different cities in S.A. Communication between these councils would be greatly improved and allow for possible cross-field support between councils, were they to be incorporated into a single building.


baseline
01_client brief
02_client requirements
03_preliminary accomodation schedule
04_target setting
05_triple bottom line
06_SBAT

B A S E L I N E D O C U M E N T

C L I E N T B R I E F

Feasibility of a project is mainly dependant on the client's requirement which the project must serve and the client's resources which the project must draw from.

S C E N A R I O O N E

The principal client would be the CBE (Council for the Built Environment) but since they are a council instituted by a government act, any structure for their intended use would be financed by the government. With this being the case, additional space within this facility could be made to serve other government departments too such as the DPW or DAC. The six main councils comprising the CBE (SACAP,SACLAP,EISA etc) will be relocated into this facility.

S C E N A R I O T W O

Examination of the Spatial Development Framework (SDF) reveals the government's intention to consolidate fragmented government departments into singular units. The reshuffle of department premises is also planned to maximize the usage of government owned properties within the city.
As such, it is unlikely that the government will be willing to purchase or develop new facilities within Pretoria.
Due to the fact however that the CBE and subsidiary councils were formed and continue to operate out of government funds, a third party structure would suffice as the location for CUBE with payments executed by the government on behalf of the CBE and the other councils.
A third party developer or property owner is thus the second option available to us with which to find adequate occupation. Groups such as Old Mutual or Investec, who own numerous properties throughout the city and lease these out to companies as office space could be approached. In addition, property developers such as Century which buy existing rundown buildings in the city and refurbish or alter their usage from residential to office spaces can be approached to develop a solution.
The ideal client would be one which owns underutilised inner city land and is seeking to build to capitalise on an investment opportunity not fully developed.

P A R T N E R S H I P S

A Public Private Partnership (PPP) is the funding and management processes defined by government regulations and established through the National Treasury to develop city projects with both private and government investment. In this manner the government is aiming to generate renewed inner city growth by providing partial support during the development stages. Government will retain part ownership of the project but with a minor share, allowing government resources to be allocated across a larger number of other potential projects.
A similar kind of partnership is envisioned for this project. The site owner or developer together with government will provide the initial capital outlay to build the facility. Upon completion government subsidies will help provide a continuing operating budget for the project through the financing of the statutory councils while private sector businesses and manufacturers will be approached for partnerships with CUBE to promote the construction fields. Thus government, private partnerships and the site owner will each retain a 33% stake in the project overall.

CLIENT REQUIREMENTS

C . B . E .

The CBE is seen as the principle client. However with the inclusion of the six subsidiary councils, the needs of these bodies will also need to be taken into account. But since the various councils operate in a similar manner, it is not envisioned that there will be much deviation from the core requirements.

- According to information laid down by Act 43 of 2000 responsible for the formation of the CBE, the council is to be constituted as follows:
  - 1 member from the Public Works Department
  - Up to an additional 3 persons from related government departments
  - 2 members from each subsidiary council
  - 4 members from the general public

In total this leads to a preliminary membership of 20 people, requiring space in the CBE offices.

COUNCILS

Requirements are similar in nature to those of the CBE except with differences pertaining to the specific nature of the technical skill represented by the different councils. Yet all deal with the evaluation of design and as such it is merely workspace that is required.

SACAP

- According to information laid down by Act 44 of 2000 responsible for the formation of the SACAP, the council is to be constituted as follows:
  - 7 registered members of which 4 must be practising
  - 2 members in service of the State
  - 2 members from the general public

SACLAP

- According to information laid down by Act 45 of 2000 responsible for the formation of the CBE, the council is to be constituted as follows:
  - 1 member from the Public Works Department
  - Up to an additional 3 persons from related government departments
  - 2 members from each subsidiary council
  - 4 members from the general public

ECSA

- According to information laid down by Act 46 of 2000 responsible for the formation of the CBE, the council is to be constituted as follows:
  - 1 member from the Public Works Department
  - Up to an additional 3 persons from related government departments
  - 2 members from each subsidiary council
  - 4 members from the general public

SACPVP

- According to information laid down by Act 47 of 2000 responsible for the formation of the CBE, the council is to be constituted as follows:
  - 1 member from the Public Works Department
  - Up to an additional 3 persons from related government departments

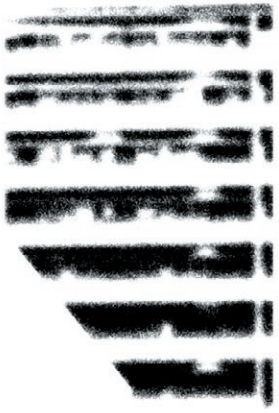
- 2 members from each subsidiary council
- 4 members from the general public

SACPCMP

- According to information laid down by Act 48 of 2000 responsible for the formation of the CBE, the council is to be constituted as follows:
  - 1 member from the Public Works Department
  - Up to an additional 3 persons from related government departments
  - 2 members from each subsidiary council
  - 4 members from the general public

SACQSP

- According to information laid down by Act 49 of 2000 responsible for the formation of the CBE, the council is to be constituted as follows:
  - 1 member from the Public Works Department
  - Up to an additional 3 persons from related government departments
  - 2 members from each subsidiary council
  - 4 members from the general public



S I T E O W N E R

Due to the fact that the selected site already contains an existing structure and has an owner already, the main motivation for the owner/s to give the go ahead for this project would be to develop under-utilised portion of the site.
With the principal design being developed for the CBE and its subsidiary councils, it is proposed that additional office space be developed to allow other groups, still in the built environment fields, to operate from this facility.
Preference is given to any non-profit or public group such as the PIA, GIA etcetera rather than allowing individual architectural firms to operate from this facility. If this were to be allowed an unfair sense of advantage may be given to those firms which operate out of this public interface.
This inclusion of additional sources of income generated through the letting of space to localised councils and institutes will promote the idea of developing this location to the client.

U S E R P R O F I L E

As a publicly orientated structure, all manner of people are welcomed into the building. Naturally due to special interest in the fields, professionals and students of the built environment will be the principle users. But in reality the targeted user is any pedestrian in the vicinity of the project.
The design aims to appropriate the walking time of pedestrians by providing interesting and informational displays along the public arcade route. In so doing the facility will influence and reach more people than it ordinarily would were all exhibits isolated from public view. This process of walking and viewing is the hook utilised to shift pedestrians from the role of passer-by into that of user.

PRELIMINARY ACCOMMODATION SCHEDULE

The total composition of the required functional spaces in the facility will be required to serve the various roles the building adopts as a public interface. Thus the final schedule has been broken down into the various networks and developed to ensure that these services can be provided for.

EDUCATION NETWORK – the spaces in facility centered on architectural learning.

- Library – space for 30 people, similar to reading room, (+- 16m x 7m)
- Archive – attached to library (accessible by itself?). archive for project material rather than historical books and references which should be available through library, possibly a reserved section. model storage, drawing storage, project material storage required here. (possible entire lower level or one 2nd or 3rd level)
- Reading Room area – take material to examine (located within library area)
- Computer research area – viewing of drawings and 3D models (link this with honours and masters working labs with public works – this space must double as computer lab when not in use by students and be able to be part sectioned off to allow public pc access when in use by students.)

BUILT ENVIRONMENT NETWORK – spaces utilized by those in councils, practicing individuals and informed professionals in the administrative field of the built environment.

- Lecture rooms – 2 or 3 in facility, used for lecturing of students; addressing and making announcements to the public; utilize for internal talks between councils; rented and utilized for business/company talks; designed for 100 - 160 people
- Meeting rooms – smaller than lecture halls, these serve the individual councils for small scale administration in the built environment; due to the similar nature in use these rooms can probably be shared between councils and used at differing times creating a better use of spaces and freeing space for additional uses in the building; serve as connection between larger lecture rooms and office areas.
- Display Area – mainly for architecture related items; can be hired to host exhibitions of art and sculpture as well; certain rooms convertible for architectural and art installations.

OFFICE NETWORK – Each module for the various groupings to be designed for a base of 10-20 people; open plan office layout to be followed with ease of use partitioning system that will enable re-configuration for changing needs and spaces.
Consideration must also be made for working professionals that belong to the boards of the councils and as such require temporary office environments to do work on an intermittent basis. These spaces should be easily re-configurable into working space for the permanent staff. **SACAP, SACLAP, ECSA, SACPCMP, SACPVP, SACQSP.**

Smaller councils and institutes – module here to be designed for a base of 5-10 individuals; individual modules must be reconfigurable to be opened into larger spaces to incorporate larger office environments or compartmented into smaller modules should smaller councils seek position. **PIA, GIA, CIDB, CETA**

PRACTICAL NETWORK – spaces for the teaching and building of physical construction to students in

first and second year. Utilized as showcase elements in facility on sculpture/feature basis.

- Material storage – place for cement, bricks, tiles etc.; locate products that can be viewed by public; artists and artisans can display building products (mosaics, air bricks etc)
- Building area – open for viewing by public; locate possibly near central courtyard or connected to; will need to accommodate 25 – 50 people and constructable objects. Surface to be cleanable, access to water and drainage.
- Tool storage/service shed type space

EXHIBITION NETWORK – the spaces in the facility that inform the public visitors on the world of architecture and developments through Pretoria and South Africa. Specific display rooms can be hired as location for exhibiting individual artist or architects work.

- Main display area – located along route throughout facility sharing circulation space.
- Installation rooms – themed/selected artwork exhibition in secluded spaces connected to main circulation space; final year exhibition space; new projects in the city etc.

HISTORICAL NETWORK – the informative routes through the city depicting the best of Pretoria's architecture.

- Starting point - located near entrance to CUBE, facing paul kruger street onto the boulevard; initial meeting area usable as reception waiting area for clients of CBE or other council; information regarding tour to be located near this point, near entrance.
- Tour routes – can be selected from a preset according to choice of the tourist group, either pastiche of everything, or selected styles, selected time periods, selected designers or selected usage based on cultural or economic significance etc.

A D D I T I O N A L

BUILDING FACILITIES – spaces of use to both the general public and building occupants.

- Restaurant/Eatery – place connected to viewable interior courtyard, connected to both the bookshop and near to offices of users, serving all visitors and working individuals within the building.
- Bookshop – purchases of books some of the books in the library, mainly architecture in selection, along the guidelines of RIBA bookshop in CUBE.
- Receptions – at both entry points into the structure.
- Archive – models of well known buildings in both Pretoria and South Africa accessible to viewing as well as building plans

BUILDING SERVICING

- Air conditioning plant
- Lift room and core
- Fire stairwells, extinguisher and hose positions
- Openly accessible toilet space to serve public in building
- Privately accessible toilet space for working occupants
- Kitchen, chef office, food storage and prep to serve restaurant with air extraction
- Book storage, manager office attached to bookshop
- Central server and networking room, intelligent building operation centre
- Telephone exchange
- Maintenance storage of tools, chemical, locker room
- Main reception/directions to the various parts

- Security desk, observation post, alarm control
- Electrical connection point, emergency shutoff etc
- Water, waste connection room, shutoff

CBE FACILITIES

- Office area
- Enclosed main office (dependant on requirement)
- Meeting rooms
- Lecture hall
- Reception
- Maintenance

COUNCIL FACILITIES

- Office area
- Enclosed main office (dependant on requirement)
- Shared meeting area
- Reception

RENTABLE OFFICE SPACE

- Office area
- Shared reception area
- Shared meeting space

T A R G E T S

In order to gauge the project and its potential successes and failures, focus on the central objectives must be highlighted and examined with regards to the setting of targets. In particular, the social objectives are considered to be of greatest importance with the educational role the project is seeking to take as the principle reason for its establishment.

01_ Interface equals access
Primarily seen as a public interface with office working area, the promotion of information towards the public must begin from the entrance of the structure and remain prevalent throughout the visitor's journey. In order to achieve this, ground and first floor have will be designed together to act as the public realm within the structure. Between these two floors all the public serving and informative areas will be accommodated to ensure maximum usability by visitors.

02_ Circulation
On a functional level, the building is required to be accessible to all members of the public including the disabled and the partially sighted.

03_ Multi-Use
This target seeks to maximise the role of the facility by incorporating many methods for interaction with the public on a functional level. Diversification of functions will ensure a continued use of the facility throughout the day rather than experiencing peaks in user numbers.

04_ Diversification (of networks)
In connection with the target of Multi-use, this target however seeks the generation of diversity on a spatial rather than functional level. Development of urban spatial relationships between the facility and other elements in the city fabric will promote the integration, acceptance and usage of the facility once complete.

05_ Construction
The process of erection of the project structure must incur a minimal impact on the surrounding buildings during the construction phase. Method of construction and fabrication processes must be considered in order to achieve this target which will depend in large on the amount of earthworks involved and the construction of structure near to boundaries, each of which must be reduced to a minimum to comply with this objective.

T R I P L E B O T T O M L I N E

"And, of course, delight: a building which both works and feels good to be in will be a much better investment in the long run than one which is functional but unloved."

Metric Handbook, 1999

S O C I A L I S S U E S

Occupant comfort
Office environments are where most people spend the majority of their day, in front of computers or reading material. With the prolonged amount of time spent in offices, the design must respond to the users comfort and health.

Lighting
Maximising the utilisation of natural light is a must in a climate with plentiful solar radiation. Thus the use of skylights to illuminate the central atrium and circulation spaces will lessen the energy requirement to light these spaces. Offices, lecture rooms and other functional spaces will be lit with energy efficient luminaires to the correct and suitable working levels required specific to the room's function.
Direct sunlight penetration should be avoided through either the use of fenestration, recessing or solar reflective glass panes. Night lighting to be provided in all publicly accessible parts of the facility with

Ventilation
Passive ventilation through the central atrium spaces and out through the skylight roof vents will be employed as principle air circulator in the main spaces of the building. Mechanical ventilation will only be employed when necessary and will only serve the individual office compartments, reducing the energy

requirement were the entire building volume to be mechanically circulated.
Provision of ground floor openings through doorways and stacking window facades will allow multiple points of entry and exit to air flow, generating cross ventilation throughout the public levels in the structure.

Working Environments
The avoidance of sterile, working environments is considered a must especially with the potential for internal office spaces to have negative, unhealthy effects on the people working within them. Design focus will be placed on creating interesting, individualised spaces within the building that allow a relationship between outside and inside, stimulating and informing the users of their surroundings.

Indoor/Outdoor
The climate in Pretoria with predominantly high percentages of solar incidence has generated communities which centre about external activities. This relationship of the people to the outdoors must be adapted into the design and provide such a space for the gathering and interaction of people external from the building.

Thermal Comfort
Suitable internal temperatures must be maintained to ensure the ability of users and visitors to perform normal daily functions and work processes. Control of the temperature however will be restricted to internal office and working spaces which are smaller in scale and thus able to be regulated quicker and improve energy efficiency.

Views
The dense urban environment surrounding the site and the site shape restricts much of the views afforded a normal site within the city. The western and southern side edges will allow the only two visible facades from the street. These have thus been designed to be the principle viewpoints, becoming glass facades with a sun protection louver system. This will allow control of both light intensity and visibility into and out of the structure. The remainder of the building design has an internal focus on spaces generated through the many atriums. Views are thus established within the structure where no other option exists.

Entrances
Provision through design must be made to enhance the possible opportunities in which to enter the CUBE building. Regular and visible entrances and exits to be located throughout the structure to introduce the concept of permeability between building and urban environments.
The linear length of the building and shape would inhibit circulation and pedestrian movement were access restricted to a single entrance. Thus entrances at both ends of the facility have been created. In addition to this, secondary entrances via the courtyard have been added to increase the permeability of flow between structure and urban environment.

Inclusive environment
The ability of disabled and partially sighted persons to utilise the building and its services should not be restricted in any way. Changes in levels will be accommodated through either lifts or ramps at no greater than a 1:12 slope and complying with the relevant building codes.

Access to facilities
The regular use of building services and spaces must be considered and the design should reflect a relative level of access according to frequency and function.

Participation and control
Variable control of ventilation, air heating and cooling, sunlight penetration as well as the configuration and adaptability of working space will allow users to be in control of their environment to a degree. The ability

to conform to user wishes will mean the building shall remain functional and not disused.

Education, Health and Safety
User and visitor learning is a key design objective in this facility. The spread of information occurs not only between the building and the public but also between councils and the larger citywide planning networks. Working environments must be considered in depth and through design, seek to create healthy and exciting places in which to work.

E C O N O M I C I S S U E S

Local economy
Sources of labour and construction management will be utilised from the surrounding area. Technical work of high standards requiring special workmanship or specific construction techniques will be completed by local fabricators and builders who will be trained in the necessary techniques. This will aid in establishing a sense of construction quality in the local environment.

Efficiency of use
The designed composition of the final structure will focus to achieve the continued use of the building throughout the day. Constant use through diversification of services and activities will facilitate this. In addition the ability of the building to operate after business hours will be achieved by permitting social gathering and events to occur with the necessary safety and security considerations.

Adaptability and Flexibility
The use of reinforced concrete frame structure removes the dependency on load-bearing walls to provide structural support. Thus infill clay brick wall construction will allow future spatial alterations to be achieved if so required. The same principle will apply to open plan office spaces which will allow maximum adaptability utilising temporary and permanent partitioning, according to the office operating processes.

Capital costs
Where possible, design must help achieve a cost-effective solution to building construction. Standardisation of jointing, fixings and building elements will help reduce costs in complicated construction work. Initial costs into the project are seen to be feasible through the development of under-utilised space on the client's site. The building must serve the public interest and not isolate any services from general use due to expense.

Ongoing costs
After initial expenditure on the construction of the building, continued financing will be required to clean, maintain and secure the facility. Through the income generated by the rentable office space and government subsidies, the cost of maintenance will be reduced. The design must consider each process of cleaning, maintenance and security to alleviate unnecessary wastage and expenditure.

Repairs and Maintenance
The cleaning of windows, replacement of broken elements and fixing of potential building flaws must be considered and provision for the manner and processes involved in such operations to be kept in mind during the design phase.

Cost Monitoring
Methods to inform users of building consumption will be developed to create awareness in the user/ visitors of the facility, and indeed of all buildings, of the various energy demands and requirements. This follows closely the ideology of the building in establishing public knowledge of building operation, not only design.

Diversification
To provide a stable economic base on which the building can operate, multiple use spaces and a variety of services will be developed to ensure continued operation. The failure of one aspect will thus not place the feasibility of the entire project into jeopardy.

E N V I R O N M E N T A L I S S U E S

Water
The use of water-efficient dispersing fixtures will be mandatory throughout the building to reduce the total amount of water consumed by the building occupants.

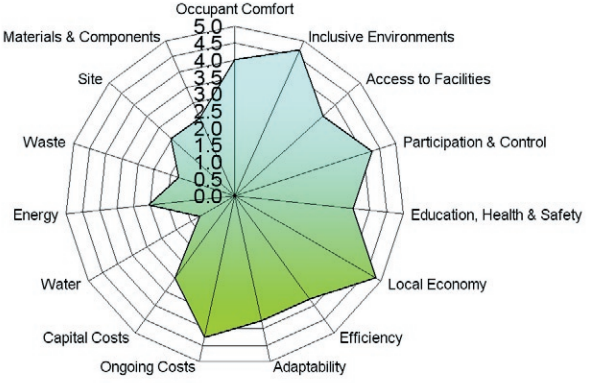
Energy
The use of natural lighting and ventilation will aim to alleviate excessive energy demands the building may require. Luminaires throughout the building must be energy-efficient with suitable ratings for both energy consumption and light intensity in order to facilitate working in suitably lit conditions.
Direct sunlight will be used to provide a heating source during winter months and the incorporation of atrium spaces in the design will facilitate air flow through the structure.

Waste
Brown water waste management will remain the responsibility of the city infrastructure. Due to the large percentage of office space, recycling of waste material such as paper and plastic will be performed. Electrical sources will be turned off during the night, including all computers and office lighting, in order to reduce energy waste.

Site
By developing an existing site within the inner city, the upgrade of an existing brownfield site will prevent the disturbance of development on another site which possibly may be virgin land more suitable for public spaces and parks.

Materials
All materials chosen for construction must either be commonly available and allow ease of workmanship or have the ability to be recycled and reused later in the material's lifespan should they contain a high embodied energy. The aesthetic of the materials must reflect the local built environment in style and use to provide contextual suitability.

Fig.3_01.SBAT performance graph



S B A T P E R F O R M A N C E

Final examination of the results from the SBAT analysis shows a marked difference between the social and economic fields when compared to the environmental section. Performance ratings are high for both social and economic aspects related to the project which highlights the focus in this project.
Socially, the design seeks to begin an interaction between the city and its residents, utilizing the building as ground zero for the establishment of this social activity. All the design goals dealing with the accessibility of the structure, not only physically but intellectually have been achieved through the involvement of people in the buildings operation.

Economically, the project is seen to be slightly less successful although remaining quite within acceptable limits. Consideration must however also be given to the external positive economic effects of this project. The development of the under-utilised space on the site will improve the overall site's performance economically, returning additional funds to the land owner through rent and leasing, improving the land utilisation within the city centre and the incorporation of income generating aspects such as the bookshop and restaurant will provide streams of future funds. Some of these elements are not considered through the SBAT analysis yet such aspects however must be held in mind when considering the larger picture economic performance of the project.

Environmentally however, the performance of the project is rather disappointing. Indeed the analysis shows minimum acceptable limits with regards to target levels. For such a marked difference between these fields, closer examination is required.
The SBAT analysis breaks the environmental section into five smaller categories as listed above. With regards to waste and water management and recycling, extremely narrow site dimensions prevent anything other than the project structure from occupying the site. Recycling systems for waste and water would also require integration with the existing building on site which places much doubt whether this could be achieved. The building scores average under the remaining three categories but again an understanding of the larger picture may help to dispel conceptions of poor performance.

The enhanced development of an inner city site such as this one by converting previously unused space into a functional and economically active space will alleviate the impact a similar development elsewhere in the city. Minimal infrastructure upgrades will be required alleviating the need for extensive groundworks since all services are readily available on the site. Far distances to the periphery of the city will not be required during the construction phase due to the central location of the proposed site, saving on fuel and transport costs and the impact of pollution. Indeed, utilising this site prevents the unnecessary development of undeveloped plots in the city which can in turn be used for public green spaces or parks. With the existing site being a brownfield site too, the development of disturbed land is far more acceptable than that of virgin natural land.
Under these criteria it was decided that the minimal performance of the project in this regard was acceptable.


framework
01_urban approaches
02_macro scale
03_medium scale
04_micro scale

URBAN FRAMEWORK ANALYSIS

The integration of this design project on an urban scale has been approached with the recently formulated Tshwane Inner City Project Spatial Development Framework (TICP SDF) in mind. Due to the fact that this framework is under development, yet provisionally accepted by the government, the decision to adopt the strategies and approaches laid out in the SDF was taken in order to anchor the proposed design in as realistic a setting as possible. The viability, development, integration and final success of the design depends heavily on the contextual setting and in order to propose a real-world solution, real-world parameters and scenarios have be adopted.

URBAN APPROACHES

Prior to beginning the examination of the proposed urban framework for the Tshwane area, the objectives seeking to be achieved through the design on an urban scale, must be identified. Whilst the following represents the author's main concerns and ideas with regards to urban planning, grounding these into the Pretoria context remains uppermost in the author's mind since these ideas and approaches will influence the final design's success accordingly.

01_DENSIFICATION

The extensive development of areas surrounding the city has the left the city in a state of urban sprawl. The ability of a city to operate and serve its inhabitants successfully comes through the close connection of the various necessitites which the city serves. Whilst Pretoria continues to operate as a vibrant city, the marks of urban decay in certain areas are showing themselves. The goal of densification of the city seeks the focussed development of the fabric in the city to serve multiple groups and functions simultaneously.

02_PERMEABILITY

Whilst the ability to enhance permeability of the city structure may in part oppose the idea of densification, these two goals are achievable together. Through the provision of small scale public access routes and communal spaces in the designs of buildings and streets, there is enough opportunity to enhance the permeability of the city for the individual user.

Road networks and transport routes are a necessity for the survival of the city and its continued operation but the ability of the city to relate to pedestrians should not also be confined to these routes. By increasing permeability on a small scale, an entirely independant pedestrian network can be created through the city with a variety of alternative experiences for the people.

03_MULTI-USE

The provision of public facilities determines the ability of the city to serve it's people. If there are not sufficient places for people to live out their everyday lives, the city will fall into disuse.

Also problematic however is the stipulation of singular functions to dedicated areas. By providing places which serve only part of the daily requirements of people, occupation of such places will remain temporary and result in abandonment when not in use.

In order to provide for all the needs of the people a system of diversification of uses and facilities is required. Economic, residential, retail, manufacturing, transport are some of the common day-to-day requirements for living. Installing all these uses into a single area will allow people to work, live and play without leaving the area. The improved utilisation of the city land will restrict unnecessary external development to meet needs. Diversification also improves reliability of a system and ensure the continued usage should one function or part thereof

falls into disuse.
In this manner it is hoped that the revival of the inner city can be achieved by attracting people to return to living in the city.

04_NETWORKS THROUGH THE CITY
The diversification of functions within the city sets up smaller networks between places which share similar interests and processes of operation. These networks relate to the manner of use whether pedestrian, vehicular, environmental, historical and so forth.
It is these networks that can begin to play a part in changing the way the city is experienced. For example, consider a historical network through the city which links sites of significant heritage and importance. The exploration of such a network focuses on a specific aspect of the city, informing the user and developing a different manner in which the city is experienced by the user as a result.
By installing such systems and networks, a variety of ways in which the city can be explored and discovered can be created to develop the love and appreciation of the people in their city.

05_PUBLIC INTERFACE
Specific to this project, the development of CUBE as a public interface will seek to create a special sense of place that relates to the unique role of the facility in the city.
Designed to serve a range of public interests from educational and intellectual to functional, the ability to serve a variety of interested people within the city remains key to the success of the project.

P R O P O S A L S

The following sections examine the proposed urban framework in an attempt to identify and discuss methods by which integration with this project can be achieved.


Fig.4_01.Aerial view of Pretoria, TICP SDF 2005

M A C R O S C A L E

T H E S E V E N P R E C I N C T S

The latest development plans for the city have broken the two main axis on the city, Paul Kruger and Church Streets, into seven precinct areas which link the Union Buildings with Church Square and Freedom Park.

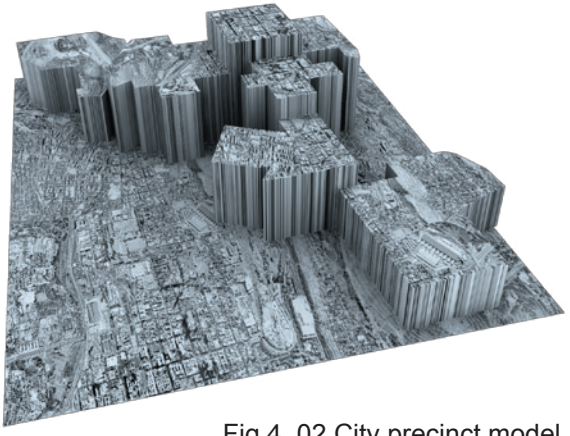


Fig.4_02.City precinct model

These three site are the main anchors in the city fabric and as such the visual and physical connections between each has been emphasized.
The seven precincts extending from the east to the west are:

01_Taung or Precidency Precinct (Union Buildings)
02_Mandela Corridor Precinct
03_Sammy Marks Precinct
04_Church Square Precinct
05_Paul Kruger North Precinct
06_Museum Park Precinct
07_Salvokop Precinct (Freedom Park)

Each precinct will house a set group of government departments at their heart from which development will expand. An identifiable design and aesthetic is sought to be achieved in each precinct to encompass the multitude of South African cultures.
This project will only require the examination of two of the seven precincts, namely the Church Square and Paul Kruger North precincts. This has been done to ascertain the suitability of the project integration into the chosen area.

C O N S O L I D A T I O N

"Consolidating individual departments"
"Clustering departments in synergistic and functional relationships"

The TICP SDF sets out 10 key objectives for implementation through the new city framework. Out of these ten, several share focus with the reasons for establishing the CUBE facility.
Consolidation on the part of the government features heavily throughout several of these objectives with the construction of public and pedestrian transport spines to feed the city, bringing individual government departments into line with each' requirements and positioning them strategically through the city.

In response to the framework's directive of consolidating existing government departments into "synergistic and functional relationships", from 128 locations into just 48, CUBE is envisioned as the equivalent consolidation for representatives of the built environment professions. Bringing together all the various councils and institutes makes functional sense too as most operate fairly similarly to each other which gives rise to opportunities of sharing commonly used facilities and is more conducive to a multi-functional and multi-faceted building environment.
What is meant by this is the possibility of expanding and contracting usage throughout the building due to the fact that most of the functions performed by the various council groups are homogenous and can thus be dealt with almost as if they were a singular functional entity. Not to say that the design will follow this route since the independence of the various entities within the facility will need to be conserved. There is merely the opportunity to create an adaptable and easily configurable internal environment due to the homogenous nature of the functions being performed between council groups.

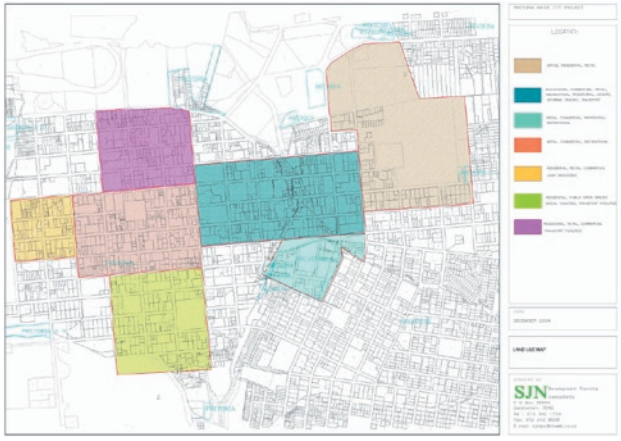


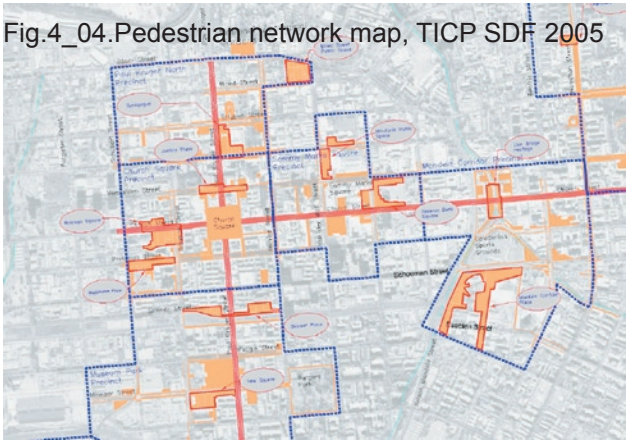
Fig.4_03.Land use map, TICP SDF 2005

PUBLIC SPACE NETWORK

Within the fabric of the city exists a series of public spaces, squares and edges which have been created to serve communal functions. These existing places in addition to the development of others laid out in the TICP SDF form the Public Space Network, a series of spaces connected through the city which focus on public interaction.
With the focus of CUBE towards public involvement the choice of site will follow closely with this network.

Post Site Selection
The elevated focus on the Paul Kruger and Vermuelen Streets intersection provides an ideal centrally located ,public orientated space. The development of an envisioned public access route between elements in the fabric will find considerable use in such a location from which the CUBE facility can only benefit.

Fig.4_04.Pedestrian network map, TICP SDF 2005



PEDESTRIAN NETWORK

Proposals by the framework to improve pedestrian movement through the city focus on generating activity and mobility spines to serve pedestrian and transport needs. With the conversion of Paul Kruger and Church Streets into public transport spines, large volumes of pedestrian movement will be centered here with a great possibility for project success.
The design solution must take note of this and offer up ways in which this can be catered for and utilized to the facilities benefit.

Post Site Selection
The planned implementation of activity spines running the length of DS Bosman and Andries streets in town mean that the entire length of road running along the south of the site will be accessed mainly by foot. The framework makes reference to pedestrian volumes through the day and it can be seen that only 30% of the volume of pedestrians walking along Paul Kruger, walk in a west to east direction. The volumes increase closer to Church Square and mainly near Skinner, Pretorius and Schoeman streets.
However, opposite the proposed site is the main Pretoria north bus stop that feeds people northwards from Church Square into the Pretoria North and Annlin areas. With such a localized hot spot for pedestrians, there is sure to be an increase in pedestrian numbers near the building at peak times and a possible heightened level throughout the day due to the continuing bus movements.

PRIVATE VEHICLES AND PARKING

Since the existing site usage is predominantly parking for the surrounding structures, relocating this use or providing for it differently will need to be addressed.
With the implementation of the “pedestrian capital web” with the development of several new public squares, additional parking is being provided for within the city in underground parking structures beneath these public squares. In addition to this, several parking centers will be developed through

the city.
The SDF aims for this to cater for the private vehicular transport but sees the creation of the central public transport spines to operate within the city as a method to alleviate private transport within the CBD.

Post Site Selection
Plans have been proposed to implement a parking garage facility on the corner of Proes and Paul Kruger street, one block north of the site. Since this would provide all the parking required for the surrounding structures while remaining within a 400m walking distance, the need to provide on site parking is now voided, ideally allowing for the conversion of this site into a more productive and functional space within the city.

VEHICULAR ACCESS

The intended conversion of Paul Kruger and Church Street will see a significant alteration to the vehicular network operations in the city. Large volumes of traffic will be required to be redirected away from these central routes which may have extremely negative results in other parts of the city.
Yet the fact remains that in order to attract people into the city, it must first be made into an inhabitable environment which places the quality of life above all other considerations.

Post Site Selection
Vehicular flow along the southern edge of the site will remain as is with the redesign of Paul Kruger allowing only service and light vehicular movement. Delivery access will thus be from the southern service entrance with refuse removal possible from both the eastern and southern sides.
The installation of a parking garage one block north and public parking on Church Square will allow the use of private vehicles to visit CUBE.

Fig.4_05.Existing road network, TICP SDF 2005

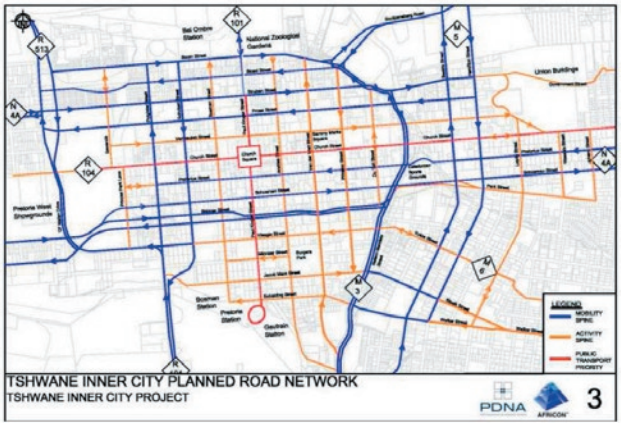


Fig.4_06.Proposed road network, TICP SDF 2005

PUBLIC TRANSPORT ROUTES

The sharp increase in vehicle numbers recently has generated large problems for the city infrastructure and road networks. In a bid to remove traffic from the city, authorities are planning extensive public transport systems which will operate to reduce the reliance on private vehicles. There are discussions at present on the viability of imposing a conjestion tax on all vehicles into the city in an attempt to force the utilisation of public transport systems.

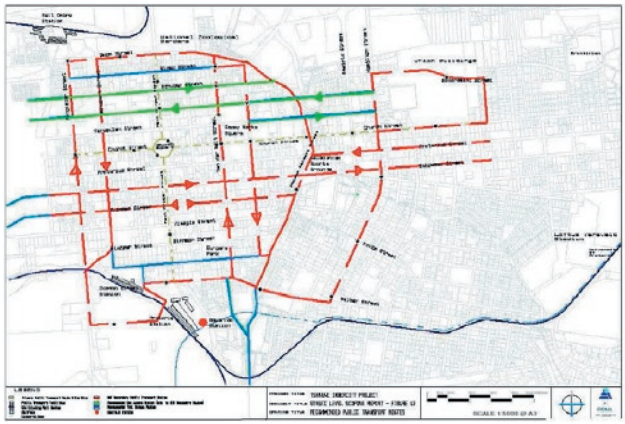


Fig.4_07.Public transport routes, TICP SDF 2005

A series of routes through the city will facilitate the transport of people to any of the cardinal extremes of the city from where larger scale transportation systems will take over.

Post Site Selection
The positioning of the main Pretoria North busstop and route adjacent to CUBE will see large volumes of pedestrians bypassing the chosen site.
Later once the SDF has been completed the public transport node will be located at all the intersections northwards along Paul Kruger. The slight repositioning of this public point will not significantly alter the pedestrian movement at present.

D E N S I F I C A T I O N

"This area should be characterized by an agglomeration of high-density buildings..."

The Traditional Inner City Core identified as the area from Skinner Street in the south to Vermuelen Street in the north, will become the focus area for the development of a government core of buildings. Aims to increase the urban structure density will be particularly aggressive in this zone with the incorporation of NGO's and offices of parastatals.
The chosen site must been identified as a typical gap in the envisioned density of the city. The under-utilisation of space in the inner city comes at a high expense to property owners due to the elevated land costs in this zone.

"To develop the area as a transition zone between the National Zoological Gardens and the Inner City Core through the creation of public spaces."

Post Site Selection
The site falls on the boundary between the Traditional Inner City Core zone and the Inner City North zone. The focus in the north of the city is to develop a less dense fabric focused on transport, movement and connections in and out of the city.
The appropriate response thus taken on site development is to attain the density requirements sought through the framework whilst promoting public space.

H E R I T A G E L I N K S

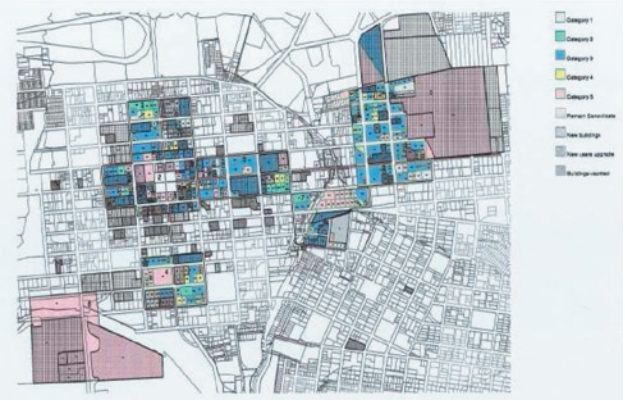
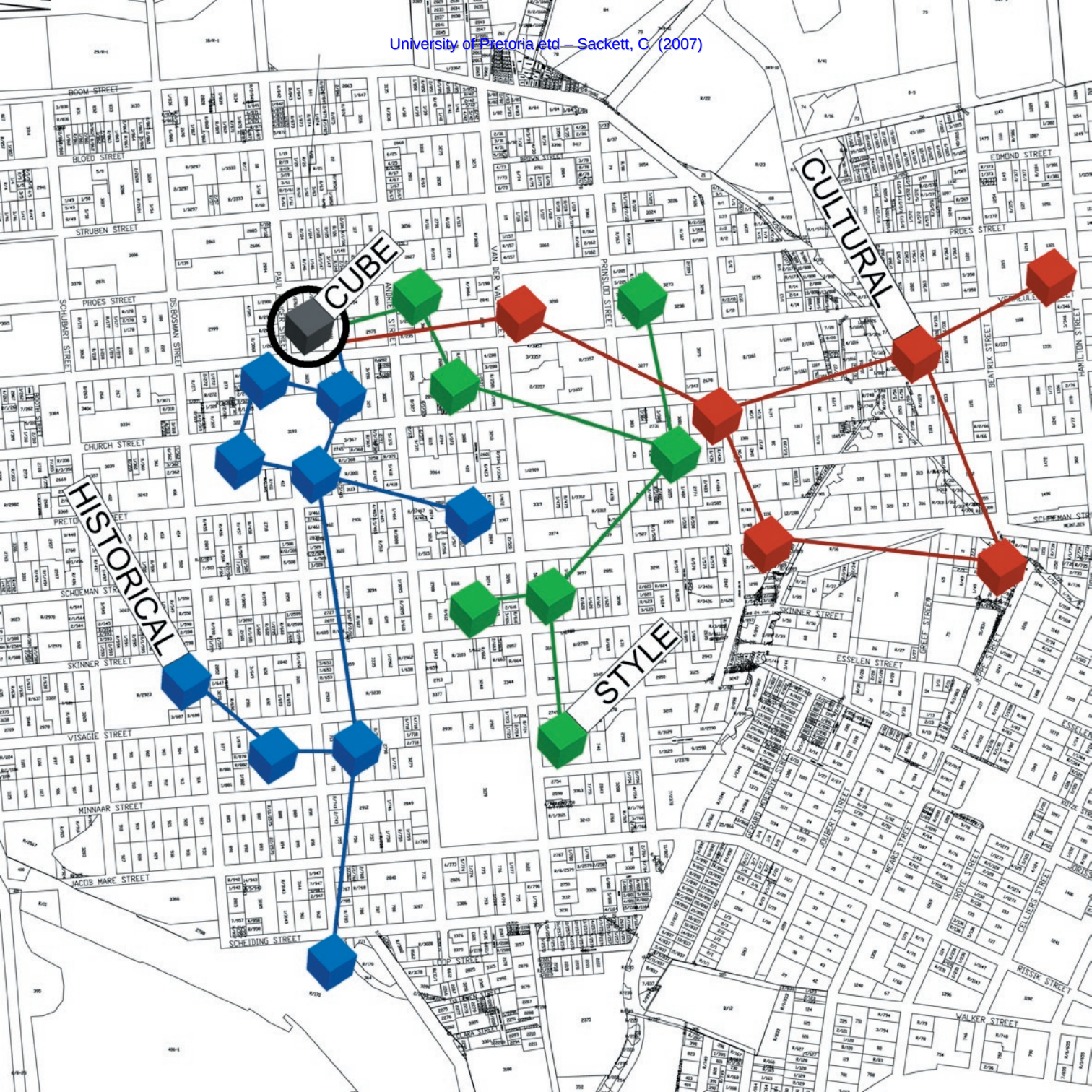


Fig.4_08.Heritage sites, TICP SDF 2005



There is a large focus on the part of the framework to connect with all the cultures and people of South Africa. Since the end of apartheid, extensive work has gone into celebrating the historical events of the previously marginalised cultures. The recent proposals to change city, street and building names is typical of the change authorities are trying to make to include all people in the future of the country.
Heritage thus forms a large part of the revised framework and shares this sentiment with the objectives of CUBE in educating people about their city.

Post Site Selection
The proposal to develop a Historical Network in the city connecting places and buildings of similar styles, functions and history will develop an awareness in the people of their city.
With CUBE as the central focal point from which to access this network it will ensure that the facility will not only be used by local people but also visiting tourists and foreigners who have travelled to Pretoria to see and learn about South Africa.

Fig.4_09.Historical Network (left)

M E D I U M S C A L E

C H U R C H S Q U A R E P R E C I N C T

Conceptually, Church Square will be designed to become the centre of justice for the people and national development. This precinct is already highly developed with major landmark and historical buildings forming a significant heritage factor. The establishment of the Historical and Heritage Network in CUBE will promote routes through the city which interact with the important sites for tourists and locals alike.

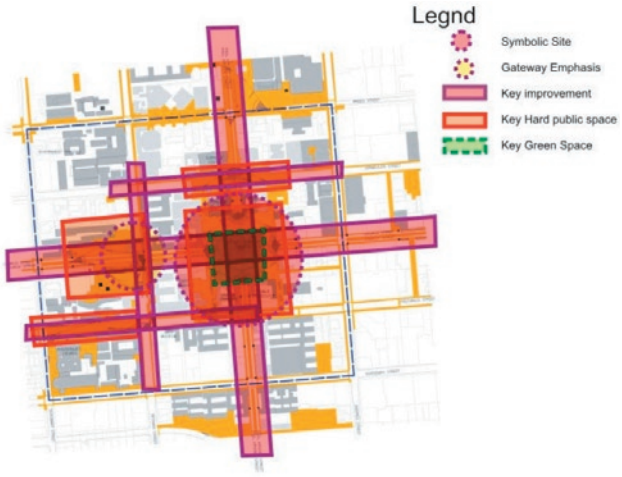


Fig.4_10.Church Square proposal, TICP SDF 2005

Presently, several government departments are already positioned within the precinct with a final target of 24% of all departments to be located into this area (TICP SDF Phase 2:192) Included amongst these is the Department of Public Works, identified through the Built Environment Network as a key location for generating spatial connections to CUBE.

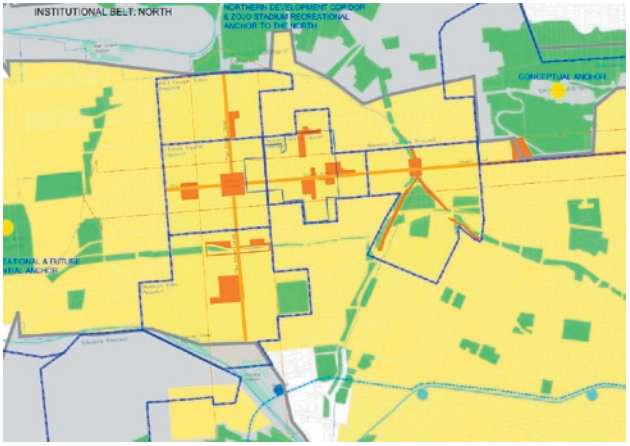


Fig.4_11.Land use strategy, TICP SDF 2005

Pedestrian movement through the area will in future be predominantly along the pedestrianised Paul Kruger and Church routes. However this change will promote infiltration of movement adjacent and perpendicular to these routes.

Fig.4_12.Future pedestrian movement

Public space improvements and upgrades will form a large part of the urban works planned for this precinct. The development plan has identified the intersection of Paul Kruger and Vermuelen Streets as one focus area which will require consideration through the design. Ideally, the design must seek to allow this public space to 'participate' in the building space.

New developments in the future which will alter the urban environment can be summarised as follows:

01_ Creation of Bosman Square to the west of Church Square

02_ Development of Justice Place and accompanying square

03_ Pedestrianisation of main routes

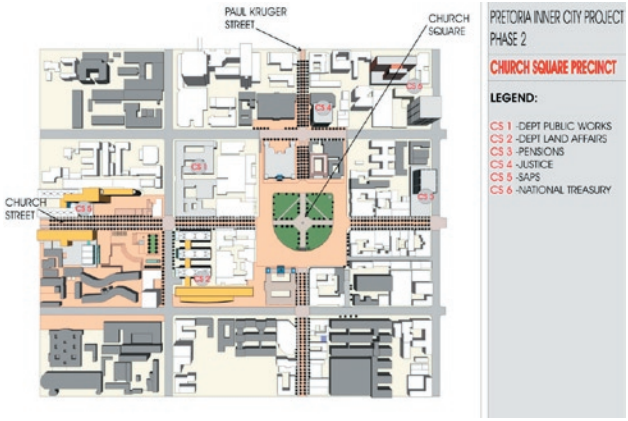


Fig.4_13.Church Square precinct development plan, TICP SDF 2005

P A U L K R U G E R N O R T H P R E C I N C T

"...one of the precincts where the impact of government accommodation investment could have its greatest urban renewal impacts, as it is still an under developed area in terms of the Inner City."

TICP SDF Phase 2:199

One of the identified aims of the precinct plans seeks to expand the poorly developed green areas and the limited public space provided at present.
Thus Paul Kruger street as one of the main movement corridors in the city will become a proper continuation of the strong north-south axis generated with Pretoria Main Train Station.

Fig.4_14.Paul Kruger North proposal, TICP SDF 2005

Post Site Selection

The creation of a symbolic site as identified by the framework to be at the intersection of Paul Kruger and Vermuelen streets gives an indication into the level of design required should development occur in this area.

The envisioned design seeks to incorporate a technical and inspirational structure to stimulate interest in the public. The site thus provides an ideal setting for something of this nature.

M I C R O S C A L E

A R C H I T E C T U R A L G U I D E L I N E S

Each precinct sets out specific guidelines to the design of any building within the precinct limits in an attempt to develop an identifiable aesthetic through the city.

These guidelines will set all building parameters from height and build-to lines to material usage. It is important that in adhering to the TICP SDF, note is taken of the various characteristic visual requirements in order to develop a design in harmony with it's surroundings.

Some debate however can be placed over the setting of visual criteria. The TICP SDF makes reference to past African and European design aesthetics and seeks to re-establish the usage of these historical styles. Whilst the symbolic stability of a good government is reflected through some historical, especially classical, styles one must question the relevance in a modern society. This point however falls outside the realm of consideration of this dissertation with the awareness of such design regulations considered of greatest importance.

Post Site Selection

Situated in the heart of the city, the Church Square precinct is dominated by government departments which reflect the historical classical and renaissance styles of architecture. Use of stone, concrete and brickwork is mandatory to establish a formal and grand aesthetic.

B U I L D I N G T Y P O L O G Y

The local zoning of the site requires a mixed use design solution to any development within the area. Framework recommendations seek to create ground floor retail areas with the upper floors dedicated to offices or residential space.

Post Site Selection

The design of CUBE follows these recommendations by creating the openly public ground and first floors of the facility with the upper floors dedicated to the offices of the respective councils and the CBE.

Additional commercial activities are included through the inclusion of a bookshop and restaurant in the public realm of the building.

S T R E E T D E S I G N

The change of Paul Kruger Street into a pedestrian route will lead to changes in the design of the route. Fig.4_14 shows a typical section through the street landscape with the focus on pedestrian movement evident. As a result of this however, it must be noticed how this change will allow a change to the manner in which a visitor will approach the project building.

Reducing the sense of isolation on either side of the road experienced at present, the redesigned route will promote focus and experience towards the buildings lining the route and inwards on the route itself as an axis.

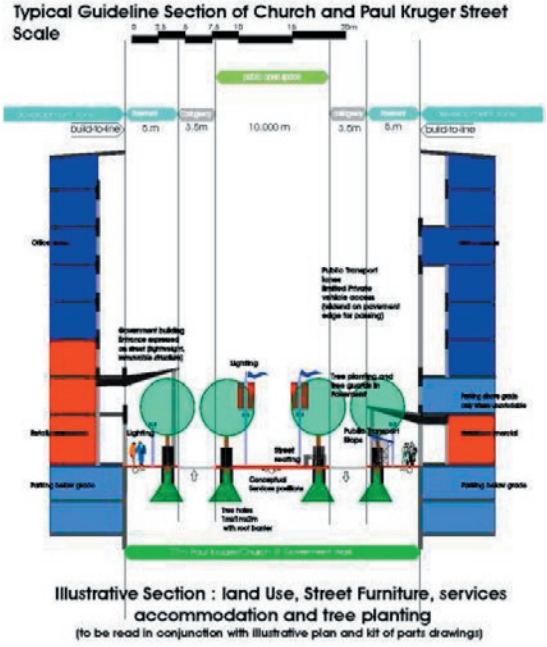


Fig.4_15.Street section, TICP SDF 2005

Opportunity is thus created to establish a more direct link between the building and its surroundings. The formation of public areas adjacent to structures is ideally suited where travel on foot is the dominant mode of transport.

Post Site Selection

Pedestrianisation of the route adjacent to the project structure will promote public accessibility to the structure. Advantage of this aspect can be furthered through the incorporation of publicly orientated spaces in connection with the building. The existing arcade on site provides the initial inspiration to re-develop this public forum to share a connection with the project structure.


01_building requirements
02_zoning
03_built environment network
04_selection
05_site identification
06_chosen site
07_site limitation
site
selection

S I T E S E L E C T I O N

The principle aim with the selection of site is to identify a location that not only acts as a connection between the various departments and professional bodies but enhances accessibility by the public.
Since the facility envisioned is there to generate public awareness and opinion on the subject of architecture, it would not suffice to locate it outside of the main routes of the city. Doing so, would result in the building becoming merely another symbol of the practice of architecture and not the crucial link between the public and built professions as hoped for.
Similarly there is little justification for placement of this facility directly on main routes through the city which have been identified as positions for government departments, formal administrative corridors and high density economic development. The selection of site will thus seek to find a median between these criteria.

B U I L D I N G R E Q U I R E M E N T S

Pragmatic concerns and site constraints dictate the feasibility of building construction and erection. In order to assess the suitability of the site thus the building's requirements and functionality must be determined. The following have been identified as such:

01_ Location near main routes
Transport routes to and from the site as well as pedestrian pathways through the city will determine the level of accessibility and hence use of the facility.

02_ Sufficient site space
The final design whilst looking to inhabit previously disregarded city space, must acknowledge the need and requirement for suitable space in which to develop. Building codes and standards must be adhered to in addition with suitable space for an unimpeded design.

03_ Access to services
Electrical, water and sewerage connections are readily available through most of the inner city sites. Air intake and exhaust for ventilation should be unobstructed and not create uncomfortable pedestrian atmospheres. The ability to perform maintenance on the building must be considered.

04_ Possible future expansion
The future addition of parking or the creation of extra storage areas once an increase in capacity is required are a minor concern yet due thought has been given to this matter and proposals will be developed through the design stages.

Z O N I N G

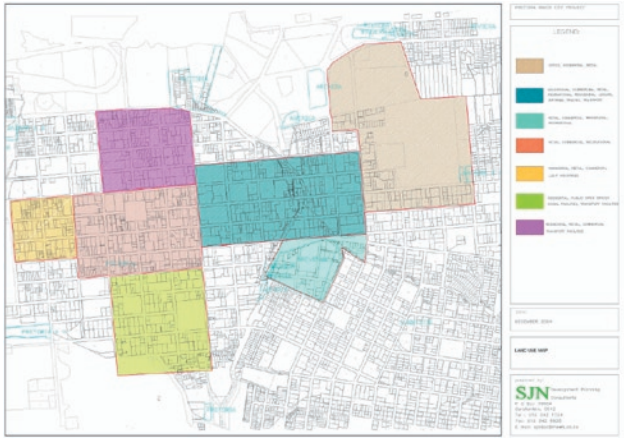


Fig.5_01.City precinct zoning, TICP SDF 2005

The zoning of the site thus falls along the boundary between two zone types. The northern urban zone focuses development on residential, retail and commercial activities while the Church Square zone seeks office, residential and retail spaces primarily.
The multi-use nature of the design will thus comply with these criteria, establishing the office spaces for the councils as well as the public educational and commercial environments.

> "This area should be characterized by an agglomeration of high-density buildings, mostly with retail at street level and offices above street level…"
>
> TICP ISP Phase 2: 80

Increasing the density of the urban fabric remains a core objective of the design which will be accomplished by the utilization of functionless space. The lower floors in the building will become the accessible public realm with the upper floors restricted to semi-private office space.

> "The development of the area as a government core supported by offices of parastatals, transnational public agencies, Non Governmental Organizations (NGOs)…"
>
> TICP ISP Phase 2: 80

The positioning of CUBE on this site relates to the urban framework objectives for the Church Square area. The statutory councils implemented through government acts which will inhabit the CUBE structure are such an example of government agencies. Whilst the main corridors of Church Street and Paul Kruger Street will be the preferred areas for government departmental buildings, the close proximity of CUBE to the formal government structures, correctly portrays the administrative hierarchy spatially.

B U I L T E N V I R O N M E N T N E T W O R K

The aspect of integration of the project with the city occurs on multiple levels. The establishment of the built environment network seeks to build connections between government departments and organisations charged with the design and construction of the city.
Two key examples of this are the Department of Public Works and Munitoria, the city authorising body responsible for the review and adherence of planned works to the local building regulations.

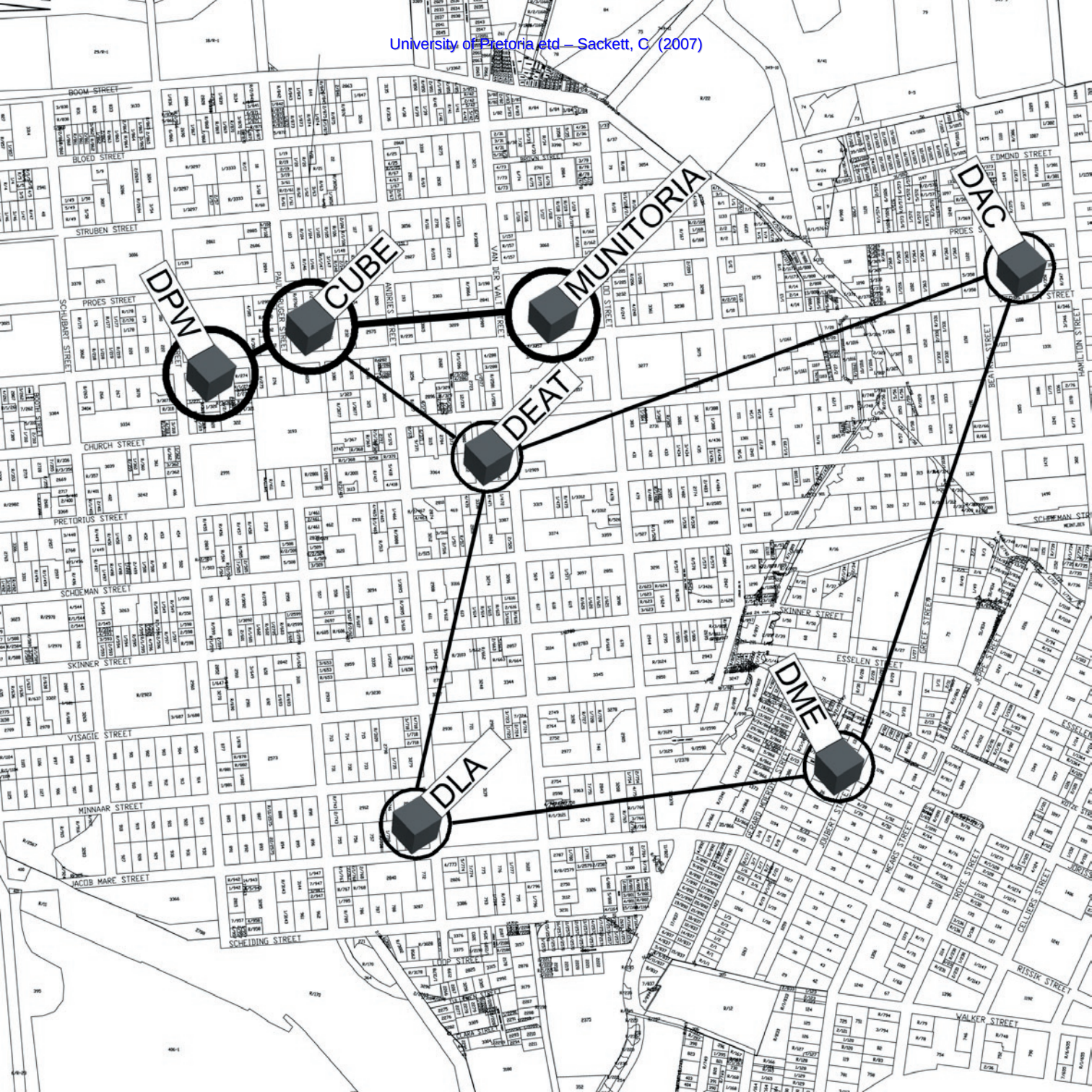
Fig. location of interest parties
Fig. spatial connections between places

S E L E C T I O N

The building is seen primarily as not being a destination in itself but rather a point along a path through the city. In this manner, large numbers of people may pass by and view the displays held within the structure without overloading the facility.
Naturally those employed within the building and those seeking information, help or merely curious will access the building as the destination.
Yet for the passer-by and the commuter, the building is just another element within the city fabric. By providing the possibility of interaction with the building, the chances that these pedestrians may begin to experience the facility and not merely view it as another street façade, is increased.

From this it becomes self evident that this idea of pedestrian interaction has developed into a design objective and thus the site must cater for this and offer up possible ways in which this can be achieved.

The second part of the site criteria relates to the connection and locality in relation to existing and



future locations of the various government planning departments and professional bodies.

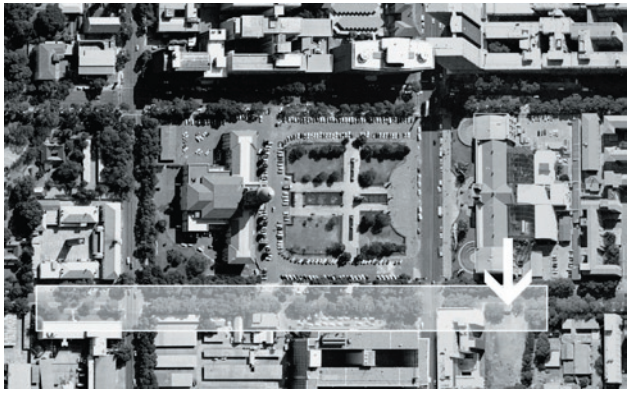
The latest TICP ISDP shows the intended conversion of the scattered departments throughout the city into condensed units and locations to enhance public service. This needs to be taken into consideration when deciding on site location and if the future relocations may impact negatively on the role of the CUBE facility.

SITE IDENTIFICATION

01_ African Window (Berea) Area

Advantages
- The area is already established as a cultural area within the city and would suit the role of CUBE.
- The streetscapes in this precinct are some of the best in the city, creating well developed pedestrian movement routes
- Home and Land Affairs government departments are nearby acting as the anchors within the precinct from which development will spring.

Disadvantages
- Even though the streets are well designed there is very little pedestrian movement through the streets due to the position of Nelson Mandela road to the west acting as a barrier to pedestrian flow.
- Berea is far removed from the city centre where the most public movement and government related structures are situated.
- The ability to develop connections with other buildings involved in the built environment fields, is difficult due to the degree of separation in the fabric.



02_ Church Square

Advantages
– The site is located on main transport routes and adjacent to the future pedestrian boulevard.
- There are a number of nearby facilities which deal with the built environment and can develop a built environment network in the city.
- The chosen site has undeveloped inner city space which can communicate ideas on densification.

Disadvantages
– Inner city land is considerably more valuable which could be used for commercial activities.
- The existing commercial activity on-site would need to be relocated or removed entirely.

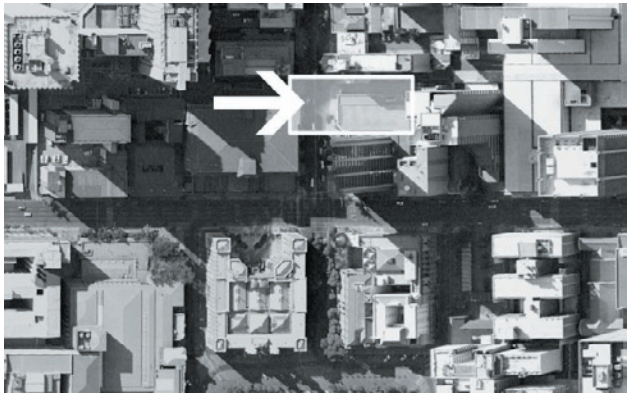


Fig.5_02.Built Environment Network (left)

Fig.5_03.Berea site proposal (top right)

Fig.5_04.Church Square site proposal (right)

03_ Cultural Circle Area

This area within the city extends upwards and along Nelson Mandela drive, encompassing the Pretoria Art Museum in the north eastern corner and connecting with the State Theatre in the western edge. This area houses within it most of the cities cultural arenas and places.

Advantages
– Falling into this area ensures that CUBE will become a place with cultural focus for the people of the city.
- It is well situated within the city context to be accessible on a larger than city scale. Ie. With Centurion, Midrand and Johannesberg.

Disadvantages
– High speed and high volume road infrastructure and vehicular routes restrict the pedestrian interaction with the project site.

C H O S E N S I T E

The site upon which the project was decided to be established is the site adjacent to Church Square, in the very heart of the Pretoria city. With the proposed pedestrianisation of both Paul Kruger and Church Street, the element of public interaction sought for by the project will be achieved through the utilisation of this site due to its immediate proximity to these routes.
The argument for densification of the city fabric also finds grounding here through the under-utilisation of an inner city site which already contains existing buildings and a tight urban fabric.
These characteristics are seen to be challenges that may be difficult to overcome but are ones which face any development within the city context and in order to illustrate ideas on densification, public interaction, building as spatial composition and connecting pathways through the city, this site offers up possible scenarios for illustrating such arguments as will be shown through the design.

Fig.5_05.West view of chosen site

S I T E L I M I T A T I O N S

Whilst densification of the urban fabric is an objective of the project, such a process becomes highly problematic in trying to improve the city spaces made redundant by the surrounding structures.
The challenge to design such an 'infill' building is a great one with the possible creation of an incredibly unique space in the city. Yet not only must the designed structure remain functional, serviceable and accessible but so too must the neighbouring buildings remain able to operate without hindrance.

The project site has several limitations which have influenced and altered the design of the CUBE facility. These limitations have been listed and examined as to the manner in which they have had design influence.

01_ SITE DIMENSIONS

The project site is the remains of a larger site area on which the LVW Sentrum building is located on the corner of Paul Kruger and Vermuelen Streets, north of Church Square.
The site forms an L-shape, consisting of two 26m wide portions, one of which extends northwards from Vermeulen Street for 70m and the other which extends 76m west to connect onto Paul Kruger Street. Such a narrow and complicated site shape naturally generated a very linear building form but focus had to be placed on circulation through the building and site. With the extended path length for movement from one end of the building to the other, enhancing pedestrian and user flow through the structure became of highest importance and the starting point for design generation.

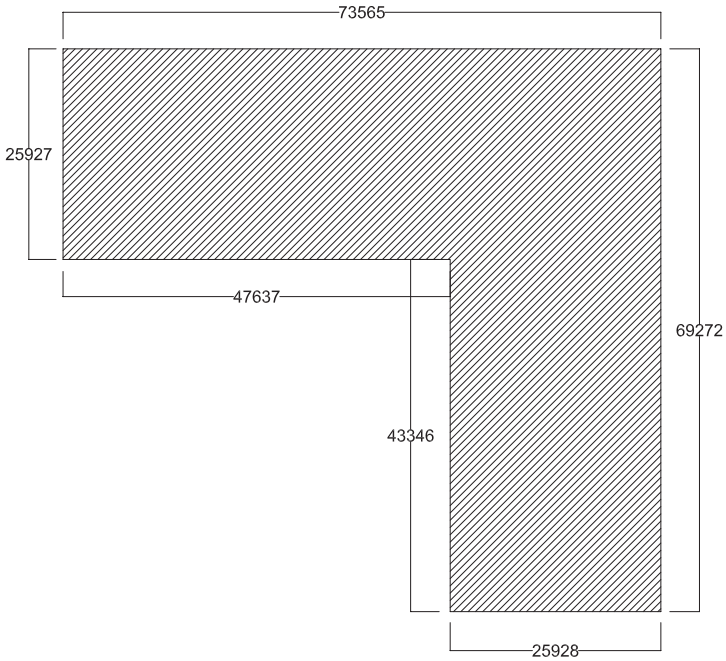


Fig.5_06.Site dimension diagram

02_PARKING

Basement on site parking has become necessary for inner city buildings with the extensive private use of cars. Public transport systems within Pretoria do not cater sufficiently for the elimination of private transport just yet.
The project site was investigated into the possibility of providing parking for the users of the building. It must be noted that in the Spatial Development Framework analysis the development of parking garages to serve the parking requirement of the city was identified. Further the creation of one of these garages one block north of the project site meant that the CUBE facility would fall into the parking garages service zone area and allow the building occupants and visitors to utilise this parking facility.

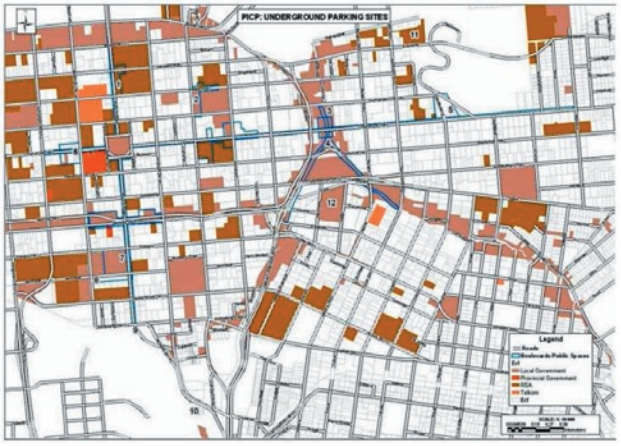


Fig.5_07.City parking strategy, TICP SDF 2005

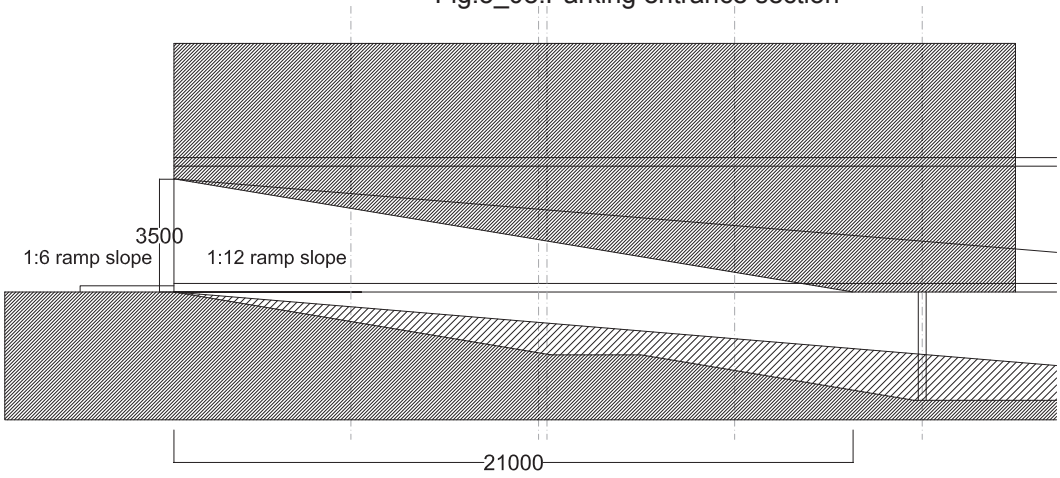
Nevertheless, investigation into on site parking needed to be done in order to determine the possibility for it. Yet the main problem in developing a parking solution was in accessing the parking area.
Typical slopes for a parking garage ramp range from 1:10 and lower. In order to achieve an average 3m fall into the basement, the ramp would be a minimum of 30m in length. Considering a clearance height of 2.8m this meant that over 40m of ground floor space would be voided in order to cater for parking.

Parking layout was also investigated and sufficient structural requirements were met. However the parking solution only provided an estimated 40 bays. In order to construct the basement level at high cost for only an additional 40 parking bays was not deemed feasible.
Another factor to consider with access was the impact to the building façade. A two way access road requires a minimum of 6m in width (most likely 8m would be required) and with circulation through the centre of the structure it meant the removal of the central portion of the building façade.
Variations on the parking system were developed and are identified below.

1. Initial two way access
2. Single road access at single point
3. Single road access at opposite ends
4. Combine basement level with neighbouring structure

In the first three variations, no feasible or sufficient solution could be developed. The fourth and final proposal would be the only proposal worth consideration although the impact of the access route as mentioned above would then require careful handling.

Fig.5_08.Parking entrance section



The fourth proposal however is not without its own constraints, the most relevant being the functional use of the basement level at present. The VWL Sentrum structure houses offices with ground floor shop access. However this structure has been identified through the new SDF to become the location of the Supreme Justice. With this in mind, it is doubtful whether possible office space would be relegated for parking and if it were, the problem of structural layout remains a large obstacle.

Considering all the above it has become decided that no parking will be provided on site and instead all parking requirements will be met by the installation of the parking garage to be constructed on the neighbouring northern city block. The parking proposals have been included for inspection but will not be taken any further through the development of the design.

03_SERVICING SURROUNDINGS

The eastern edge of the site running in the north-south direction faces onto the Pretoria News building which at present receives service access from the project site. Deliveries are sent and received here although the newspaper production and distribution is done elsewhere. Refuse removal and additional building servicing are preformed through this entrance.
In order that this design does not impede the operation of the surrounding structures, this aspect requires attention and a solution through the design.
At present, a fire escape stairwell is built on the site boundary, set back 5m from the Vermeulen street edge. The remainder of the building is set back 2m from the site edge and an additional 5m at the northern part of the site where the service access doors are located.

This provides a fortuitous form when considering a suitable response from the facilities design. Indeed a

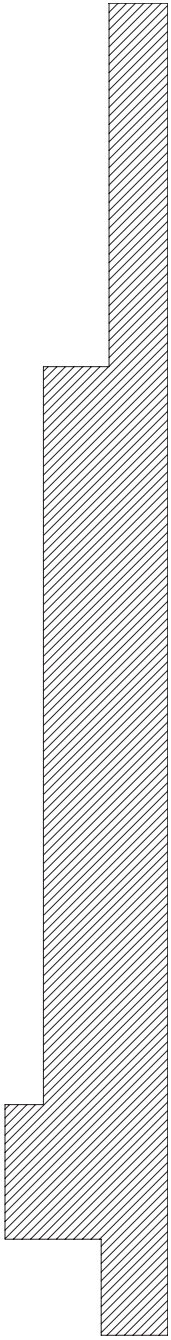


Fig.5_09.Eastern site edge plan

built edge along the site boundary would not restrict the accessibility of the service area but access to this narrow service road does need to be provided.
Hence a service gate has been created which arose from the shifting of building edges not apart horizontally but vertically on plan. With the setback of the building edge behind the fire escape stairs, enough space was provided for the access gate to the service road. This would not be able to accommodate vehicles however so a parking/service bay was needed from which deliveries could be made with trolleys and forklifts for heavy loads. The parking bay was suitably accommodated beneath the overhang of the lecture room on the first floor.

04_VWL SENTRUM ACCESS

The redevelopment of the arcade route between the two structures was initially designed to be a route in isolation. This basis required revision when it was found that the two main entrances into the office tower were not from the street facing edges but from within the arcade. The structural system for the arcade thus required revision to achieve the doorway openings in the steel and glasswork to allow access into the building.

A structural solution was found by forming a steel portal that supported the perpendicular arcade portals, allowing the loads to be carried to either side of the doorway opening and down to the foundations. Since the glasswork had to be removed to allow movement into the VWL building there was no necessity for any increased amount of supporting steelwork and the door portal frame sufficed.

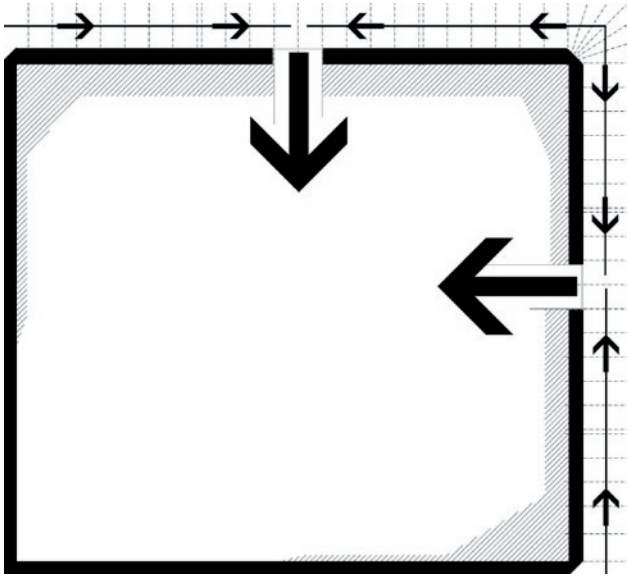


Fig.5_10.Access routes of VWL Sentrum

05_BUILDING FACADES

The close proximity of the CUBE facility to the neighbouring structures, whilst a sought for objective of the project, presented problems with the construction and articulation of the building facades. Indeed the relevance of façade detailing and design was put in question. Naturally for the street facing facades, design remained important as these would be the representative faces of the building. But the buildings sides hidden beside existing structures would not receive visible attention.
In addition, future construction of existing or new buildings in the immediate area could alter the manner in which the building is viewed, hiding or revealing parts in contrast to as how they would be seen.
Whilst this may not be a true limitation of the site, this aspect of the site does require a change in thinking as to how the building is perceived and where this focus is placed.

Hence, external focus on the buildings appearance was exchanged for an internal focus on the spatial quality in the building. Since this fell in line with the design theory for the project and the elevated status which internal space would receive, this shift is deemed appropriate.

06_CONSTRUCTION AND STRUCTURE

One of the greatest concerns this project faces is in the construction process. There is an increased level of difficulty building within the confines of an existing built environment. Consideration and protection must be given to the surrounding structures and design of the building to be constructed must be continually aware of the manner and order in which construction must proceed to avoid complications.
Since the project site is bordered on three sides by existing structures right up to the site boundary line, certain precautions must be considered.

01_ Excavation work for the laying of foundations has the possibility of exposing and damaging the existing foundations of the neighbouring buildings. Adequate shoring and stabilisation of existing foundations needs to be done prior to commencement of construction.

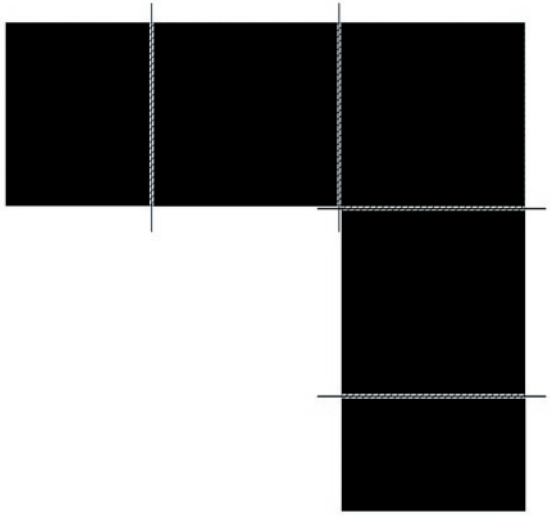
02_ The casting of reinforced concrete columns and slabs require that dimensions of shuttering be considered, especially where the slab edge approaches the existing buildings around the site.

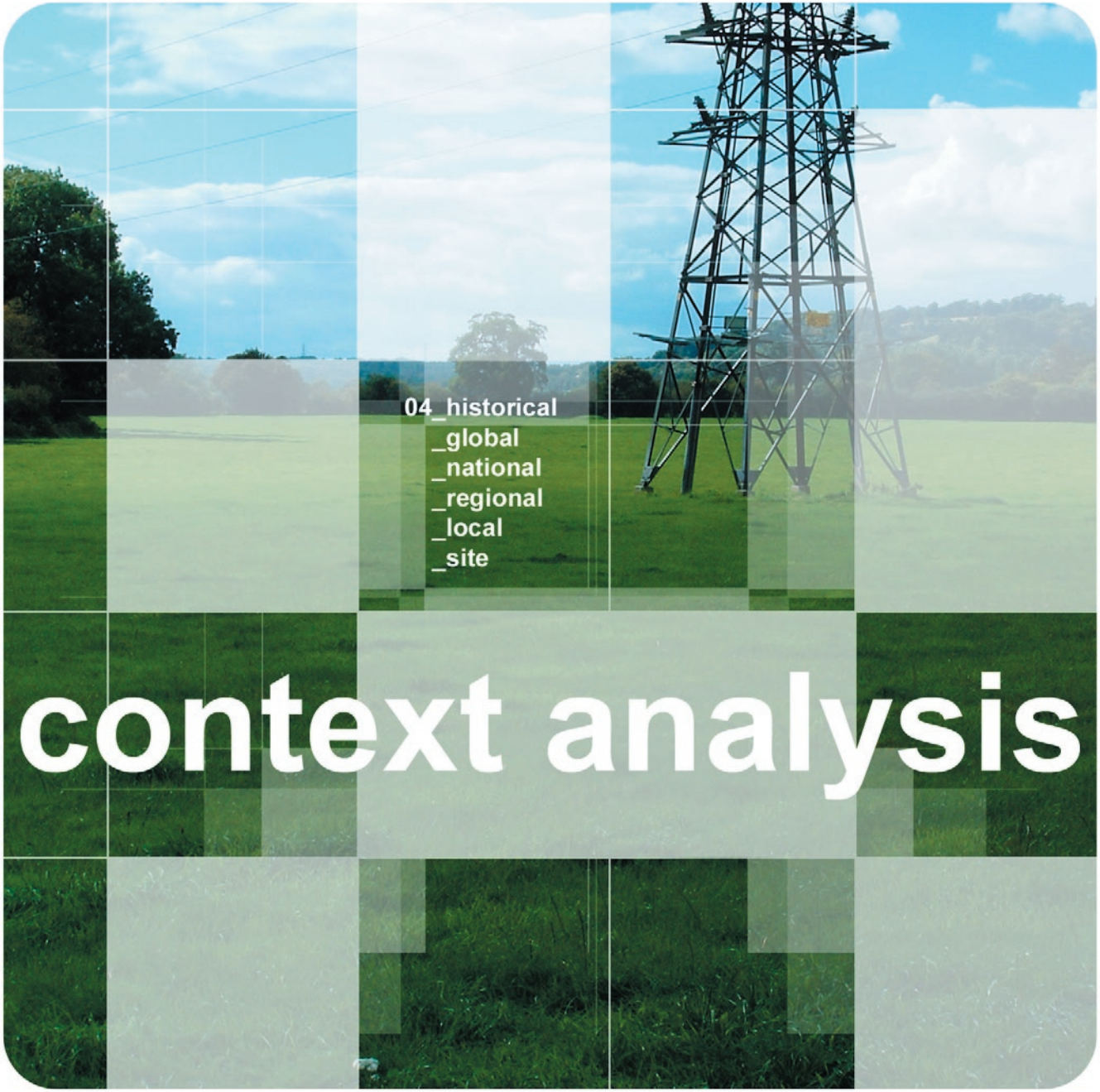
03_ Construction and expansion joints must be considered and planned. The L-shape of the site and thus building form, presents the problem that expansion will happen along both arms but in perpendicular directions. The structure must be able to accommodate this with special focus at the central connecting part of the structure.

04_ Protection of the surrounding structures must be provided during the construction period through either netting or chipboard panels supported on scaffolding.

05_ Services and drainage routes to the surrounding buildings may require temporary re-direction during the construction process. Provision has already been made to establish service routes beneath the arcade which will be put into use upon completion.

Fig.5_11.Expansion joint positions




04_historical
_global
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context analysis

CONTEXTANALYSIS

HISTORICAL

1825_ Paul Kruger born

1840_ First homestead in Fountains Valley built

1840_ Andries Pretorius, a leader of the Great Trek in Natal and then Transvaal

1854_ Elandspoort village proclaim “kerkplaats” for central Transvaal

1855_ Founding of Pretoria as a town

1860_ Pretoria declared official capital of the independent Voortrekker Republic of Transvaal

1870_ Marthinus Pretorius is replaced by Reverend Thomas Francois Burgers as president

1873_ University of South Africa founded in Pretoria

1877_ British annex Transvaal resulting in flow of migrants and immigrants

1880_ First Boer War

1881_ Pretoria Convention signed after the First Boer War

1888_ Jacarandas brought into the city from Brazil by J.D Cilliers

1902_ Signing of the Peace Treaty of Vereeniging

1910_ Pretoria made capital of the Union of South Africa

1910_ Church Square redesigned as a tramway to disappointment of residents

1930_ University of Pretoria founded

1954_ Statue of Paul Kruger relocated to Church Square

1970_ Public outcry over intended government tower buildings on Church Square stops development

1994_ Abolishment of apartheid state

1997_ Bus parking areas on Church Square removed

2006_ Present

G L O B A L

Pretoria as the capital of South Africa has strong international diplomatic relations with the establishment of all foreign embassies found throughout the city. The Union Buildings designed by Sir Herbert Baker act as the central seat of governmental power where the president receives many international dignitaries. Pretoria's importance in the global realm is also set to expand in the future with the governments plans to establish Pretoria as the capital city of the African continent. Thus not only will Pretoria be required to speak of the South African people as a nation but it will required to speak of and relate to African people as a world community.

Future development along these lines has identified Pretoria as the city for the construction of the African Parliament, to act as the central seat of power throughout Africa. Initiatives such as NEPAD and the countries of the SADAC region will utilize this facility to develop laws and trade agreements between the countries in Africa, striving for peace, economic stability and prosperity.

N A T I O N A L

Pretoria as the official capital of South Africa is also the administrative capital of the country. Home to all government departments spread throughout the city there is a high concentration of large corporations, legislation bodies, NGO's and commerce which dictates the countries economy in connection with the other major centres in the country. The emergence of Pretoria as a leading city dates back to the discovery of gold and diamonds in the Johannesburg and surrounding regions. In addition the development of the first Iskor steel mills near the city helped establish the important infrastructure backbone of the region.

R E G I O N A L

The city of Pretoria serves the needs of not only its inhabitants but the residents of outer lying communities too. The establishment of 'worker towns' around the city during the apartheid era has established Pretoria as the heart being fed by a network of settlements. Soshanguve, Mamelodi and Atteridgeville are all large townships which feed the city with workers and labourers on a daily basis. Several smaller industrial townships are also interspersed through the countryside, providing infrastructure support and services.

To the south of Pretoria is Centurion, a rapidly expanding residential area for people working in both Johannesburg and Pretoria. Massive housing estates and office park developments dominate this area which fulfils the role of extended suburbia to the main city.

Further south still is Midrand, a largely undeveloped semi-industrial, semi-commercially zoned area which forms the outer country separation between the cities of Pretoria and Johannesburg. This however is soon to change with massive plans to establish the Midrand area as yet another pool of residential potential between the two main cities.

Johannesburg to the south of Pretoria forms the opposite end of one of the most travelled and economically active corridors in South Africa, following the route of the N1 highway.

L O C A L

Within Pretoria is a wealth of historical references to the rise of South Africa as a country. Since 1860 with the declaration of Pretoria as the capital of the Voortrekker Republic of Transvaal, it has remained so and the architectural development reflects the strong administrative capital city it is today. Examining the local context of the site, one finds many typical buildings in both function and style of the Pretoria region.

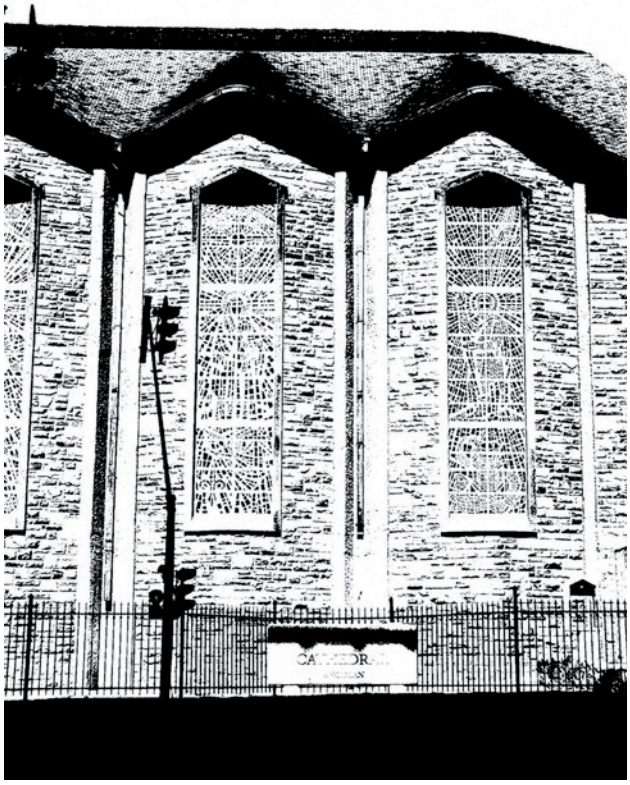


Fig.6_01.St. Albans Church, Pretoria (above)

Fig.6_02.Telkom buildings, Pretoria (left)

Fig.6_03.Opera Plaza building, Pretoria (below)

Fig.6_04.Laboriagebou, Pretoria

Fig.6_05.Unknown building, Pretoria

Art Deco
Constantia Court, Amanda Centre

Art Nouvea
Burlington house, Café Riche

Neo-Classicism
Old Mutual Building, Standard Bank Building

Victorian
Laboriagebou

Baker School
Union Buildings, St Albans Church

Modernism
Garthforth House

International Style
Eaton Hall Private Hotel

Brutalism
Telkom buildings

Brazilian Modernism
Receiver of Revenue Building

Le Roux, S W, 1990

STUDY AREA

SITE

ADDRESS

The site lies on the corner of Paul Kruger and Vermuelen Streets, one city block north of Church Square. There is an existing twenty storey tower positioned on the south-western corner of the site allowing the remaining north and eastern portions of the site to be developed.

B U I L T F A B R I C

The city structures surrounding the site are all multi-storey buildings, rising higher than the proposed design. As mentioned previously, the VWL Sentrum office tower stands on site at twenty storeys, one of three towers of this height in the city block.
To the north separated by the adjacent site's access road, is the Woltemadegebou residential block, rising eight storeys into the air providing partial northern protection. East of the site is the seven storey Pretoria News building requiring access to the rear printing areas.
Several similar residential blocks exist to the north of the city block with a massive twenty-four storey tower in the north east corner of the city block. The equally impressive twin towers of the High Court Chambers building lies to the extreme east of the city block.

F I G U R E G R O U N D S T U D Y

S U R R O U N D I N G I M P A C T

With the intended construction of the project within such a limited area, concern was noted over the possible impact the structure could have on the existing buildings. The following decisions were taken and used to inform the design during development:

_01 The eastern edge of the site facing the Pretoria News building required and access road to the rear service area. Thus the building façade will be set back to allow limited access into the interior of the site whilst creating an external protected space onto which the facility can open during good weather.

Fig.6_06.Aerial photo of city centre (right)
Fig.6_07.Terrain model (below)

_02 The northern edge of the site facing the Woltemadegebou building already has a significant distance between the buildings and will not require any special attention from the design.

_03 The tower of the VWL Sentrum will be influenced on two sides by the intended project. However since the building is mechanically ventilated only, there are no opening windows to the outside. This will allow construction right up to the buildings façade with the provision that sufficient design with regards to lighting permit a continued use of the internal office spaces. These edges are thus identified as the ideal position for the creation of the arcade to provide both access and light to both structures on the site.

P U B L I C T R A N S P O R T

At present the main Pretoria North bus stop servicing the Paul Kruger North areas is located opposite the western edge of the site. The southern edge borders on Vermuelen Street, a very busy four lane single direction carriageway moving east with multiple bus and taxi stops along its length.
In addition, Church Square, one block to the south, remains a central transport point for the entire city providing ample opportunity to get to and from the site.

P E D E S T R I A N M O V E M E N T

Church Square acts as a large magnet within the surrounding urban fabric, attracting economic activity along the public spaces. The pedestrianised routes to the east of the Square, allow north-south movement between the stronger east-west corridors.
This all is set to change in the future with the adoption of Paul Kruger and Church Streets as pedestrian routes through the city. This will generate high volumes of pedestrian traffic permissible through the inner city in all directions which will feed into the surrounding fabric accordingly.

Fig.6_08.Aerial photo of site (left)
Fig.6_09.City model (below)

L E G A L

As an inner city site, there are few restrictions on the site other than those imposed on the design itself. Building regulations permit construction right to the boundary edge with medium rise height restriction other than what the geology and soil profile can provide support for. Space for access roads and escape routes require external frontage from site but will be addressed through the design.

S L O P E

There is very little slope on the site at present due to its use as a parking and access road. A 0,5m rise is all that exists, running from the south of the site upwards to the northern edge along the 70m length of the site.

L O C A L C L I M A T E

The densely built urban environment of the city produces high amounts of heat within the city due to long-wave re-radiation from all built structures. This leads to the heat island effect within the city which can result in uncomfortable local environments for pedestrians and an increased energy use within buildings for cooling. Shading provided by trees lining the streets help to combat this effect and give protection.

On a larger scale, Pretoria is situated within the Northern Steppe climactic zone.The following climatological information is the normal values and, according to World Meteorological Organization (WMO) prescripts, based on monthly averages for the 30-year period 1961 – 1990.

T E M P E R A T U R E R A N G E S

Month	Temperature (° C)				Precipitation		
	Highest Recorded	Average Daily Maximum	Average Daily Minimum	Lowest Recorded	Average Monthly (mm)	Average Number of days with >= 1mm	Highest 24 Hour Rainfall (mm)
January	36	29	18	8	136	14	160
February	36	28	17	11	75	11	95
March	35	27	16	6	82	10	84
April	33	24	12	3	51	7	72
May	29	22	8	-1	13	3	40
June	25	19	5	-6	7	1	32
July	26	20	5	-4	3	1	18
August	31	22	8	-1	6	2	15
September	34	26	12	2	22	3	43
October	36	27	14	4	71	9	108
November	36	27	16	7	98	12	67
December	35	28	17	7	110	15	50
Year	**36**	**25**	**12**	**-6**	**674**	**87**	**160**

Fig.6_10.Climatic data, S.A. Weather Bureau website

Summer months show an increase of 10° in comparison to winter month maximum temperatures. This range is increased to 13° with regards to minimum temperatures between the seasons.
Variations between the record lows and highs indicate the massive temperature scale fluctuations which can occur and must be considered during design. The greater the range however, the more difficult it becomes to provide control in a cost effective and sustainable manner. As a result, most buildings in the Pretoria area endure the fewer colder months, favouring an overall design approach which adapts to summer conditions.

C O M F O R T Z O N E S

To generate an atmosphere in which to work and concentrate remains the functional objective of a working structure. Complication arises through the varied types of activity however, experienced in this facility. Ranging from outdoor dining and practicals to internal exhibitions, seated office areas, lecture and meeting rooms and reading areas, all these activities require different control of the environment for best comfort.

Thus mechanical ventilation has been provided in the administrative areas of the building allowing regulation of both air temperature and rate of air flow. The form of the built structure with internalised atriums will shelter the central movement spaces to maintain a target temperature of 20°C – 23°C. According to season the comfort ranges will vary in accordance with external air temperatures and weather.
Humidity may only become problematic during thunderstorms where it will increase from the relatively unnoticeable norm.

D A Y L I G H T / S U N L I G H T

The *highveld* region in which Pretoria is situated receives high amounts of solar incidence with approximately 80% during the summer months, reduced to 67% in the winter months. Activity is thus high in outdoor areas through much of the year.
The sunlight is however characteristically aggressive with large amounts of UVA and UVB radiation which can lead to sunburn in reduced amounts of time when compared to regions in Europe. The quality of light is also very bright with glare being a significant factor to consider in design.
To combat the large heat gain associated with the high percentages of solar incidence in the area, building openings such as windows require special consideration with regards to sunlight in terms of fenestration, shading, plantings and deep recesses to avoid direct sunlight penetration.

Pretoria Solar Times and Angles							
Solar Times	06.00	08.00	10.00	12.00	14.00	16.00	18.00
Clock Times	06.18	08.18	10.18	12.18	14.18	16.18	18.18
Azimuth 21/12	112E	101E	91E	0	91W	101W	112W
Altitude 21/12	10	35	63	88	63	35	10
Azimuth 21/3 + 9	90E	76E	53E	0	53W	76W	90W
Altitude21/3 + 9	0	26	51	65	51	26	0
Azimuth 21/6	-	55E	34E	0	34W	55W	-
Altitude 21/6	-	14	32	40	32	14	-

Fig.6_11.Pretoria solar angles, Napier, A, 2000

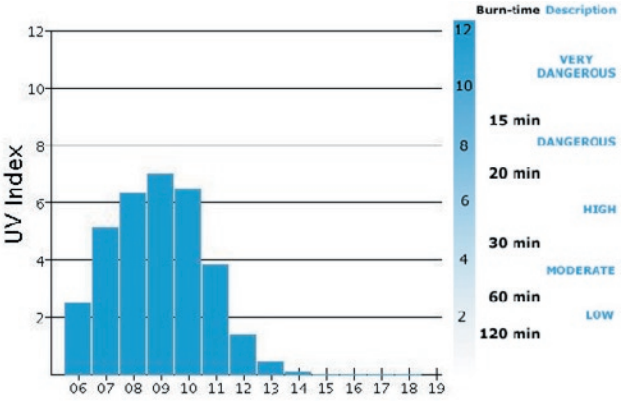


Fig.6_12.UVB levels on 19/10/06, S.A. Weather Bureau

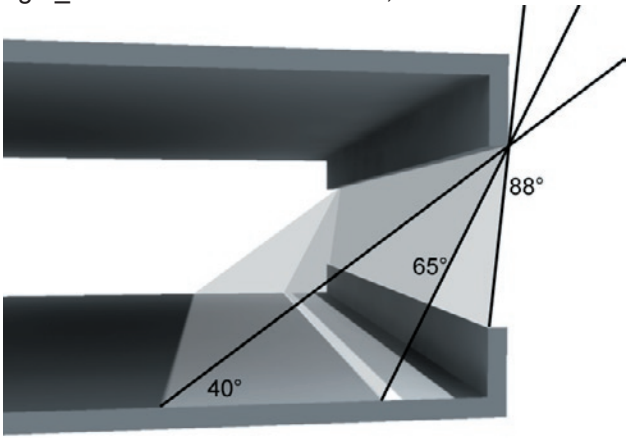


Fig.6_13.Solar solctice angles

W I N D

Summer winds originate between a north-easterly to south-easterly directions whilst winter winds are generally from a north westerly direction as identified in the diagram.
The density of the built fabric surrounding the site will during windy conditions develop channels of high speed air between structures. Summer months will see this movement focus mainly down Vermuelen Street

and the northern adjacent access road, providing cross ventilation through the building. Winter winds from the north-west will find a channel for movement down Paul Kruger Street. The eastern access road will be mostly sheltered from the wind being protected along its length on both sides. This narrow outdoor space will be suitable hence for outdoor activities and exhibitions.

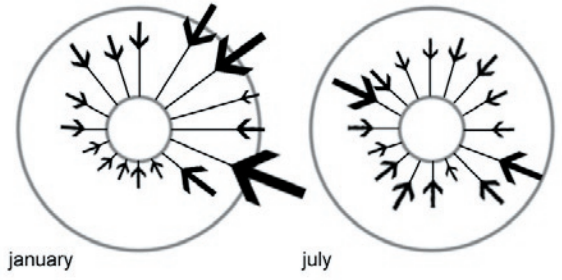


Fig.6_14.Wind roses

R A I N F A L L

Due to Pretoria's position on the plateau of the *highveld* of South Africa, rainfall is sporadic but concentrated. A result of the convection winds rising up into the atmosphere from ground level due to the extreme heating provided by the sun and in turn generating the massive thunderstorms the area is known for. High volume rains occur very quickly and dissipate equally swiftly during the summer months with continuous, gentler rains typical of the winter months.

H U M I D I T Y

Monthly humidity on average is 60% which can lead to discomfort in the higher temperatures of summer but are generally not regarded as a climactic problem which requires special attention.

V E G E T A T I O N

Known to the locals as the "jacaranda city", Pretoria is most famed for its wealth of jacaranda trees that create a purple blanket throughout the city in springtime from the flowering of the trees. Originally brought over from Brazil, the trees are exotic which presents a problem with the city council intent on the removal of all exotic species from the city. Yet the love the people hold for the trees has become an integral part of the identity of Pretoria.
Other trees found throughout the city are the *Acacia Karoo*, the locally known "fever trees" (*Acacia Xanthophloea*), *Rhus Lancea* thorn trees, *Ceretonia Seliqua* or the Carob tree and a multitude of other perennial trees.
Recent efforts to remove exotic specie populations from the area have resulted in large numbers of Blue Gum and Wattle trees being removed, leaving parts of the city uncomfortably open and unprotected. In addition, many of the large cycads lining routes around the University of Pretoria are dying due to plant disease and insect related decay. Concern with the maintenance of the city's planting is thus high and it is hoped that suitable action will be planned in the future to repopulate the city with trees.

G E O L O G Y

The geological profile of the soil on site will require a technical survey to be performed prior to the start of construction to obtain exact information on the load support provided by the soil. The following extract is taken from the TICP SDF describing the composition of the general soil profiles for the city region.

"Hekpoort Andesite which generally consists of an upper residual clay horizon followed at depth by jointed moderately weathered rock which is often water bearing. Below this there is hard competent rock.

Timeball Hill Shale which could contain subordinate quartzite layers. Excavatability may be hampered by these layers and at worst blasting would be necessary.
A combination of shale and diabase – Post Transvaal Cills.
Strubenkop shale with a small intrusion of Diabase – Post Transvaal Cills."

S I T E H I S T O R Y

Paul Kruger Street remains one of the principle axes in the city, connecting the Pretoria Railway Station directly to Church Square; two of the largest public places in the city. Prior to 1938 however, Paul Kruger Street was known as Markstraat. It established the kernel of the city with its intersection with Church Street, creating Church Square which became the symbol of Pretoria's authority together with the positioning of highly influential government buildings and banks along its edges.
Vermuelen Street defines the northern most edge of Church Square. Development of the city over time has not resulted in the expected dense fabric in a westerly direction where the street is bounded by a *spruit*, since its establishment. Many empty sites remain on the western side, probably due to the single direction of traffic flow that moves east across the city which resulted from the termination of the street in the west. Many important buildings lie along this route such as the Head Offices of the Post Office, High Court Chambers, Palace of Justice and the Old Mutual Building on Church Square; all significant buildings and institutions.

A R C A D E A N A L Y S I S

Due to the nature of the proposed design incorporating the design of an arcade, it was deemed proper to investigate the development of arcades in Pretoria; to understand the spatial and design approaches used in respect to Pretoria and the regional variations adopted in the city.

H I S T O R I C A L B A C K G R O U N D

The roots of arcade development as a built element can be found in Early Christian Roman and Islamic styles. The Roman development of the arch in building as a structural element generated increased heights and spans as had not been previously achieved in building. As early as the first and second centuries this is visible in projects such as Pont du Gard, France, the Pantheon, Rome and many of the early Christian basilicas such as the Old St. Peter's Basilica, also in Rome. The various configurations of arches as structural support elements resulted in not only the development of the arcade but also the groin vault, barrel vault and the dome utilized in these structures.

Fig.6_15.Arch development, Fleming, 1995

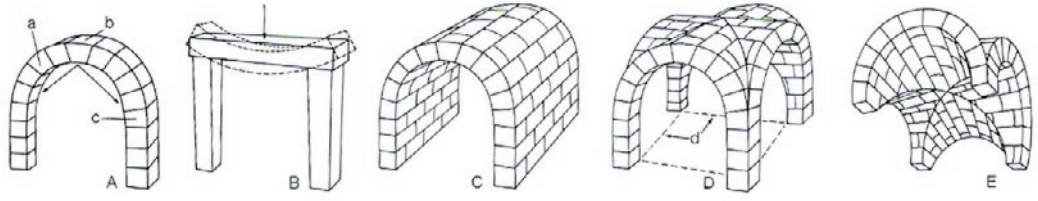


Fig.6_16.Pont du Gard, Fleming, 1995

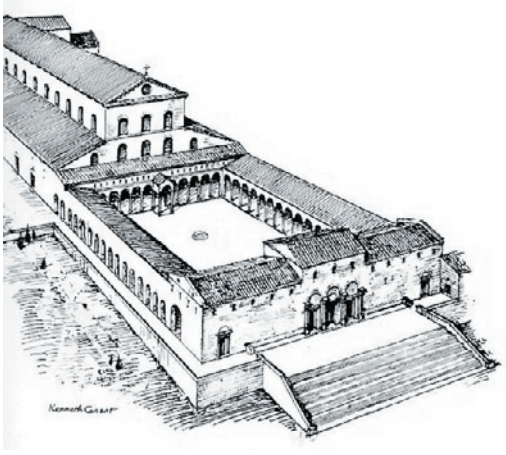


Fig.6_17.Old St. Peters basilica, Fleming, 1995

Particular interest must be paid to the manner in which the arcade informed the structural composition of the early Christian basilicas. To provide support to the roofs covering the large volumes of the churches, series of arcades were placed at positions along the churches length, forming outer aisles and the inner central nave. Similarly in the Islamic mosques of the fifth and sixth centuries, many series of arches and arcades were utilised to provide roof support to extremely large internal volumes which were required to accommodate the large numbers of worshippers at these mosques.

It is in the earlier mosque and basilica typologies that we find another distinct use of the arcade. In the Middle East, due to the extreme climate and temperature ranges experienced, responses in the building layout were required.

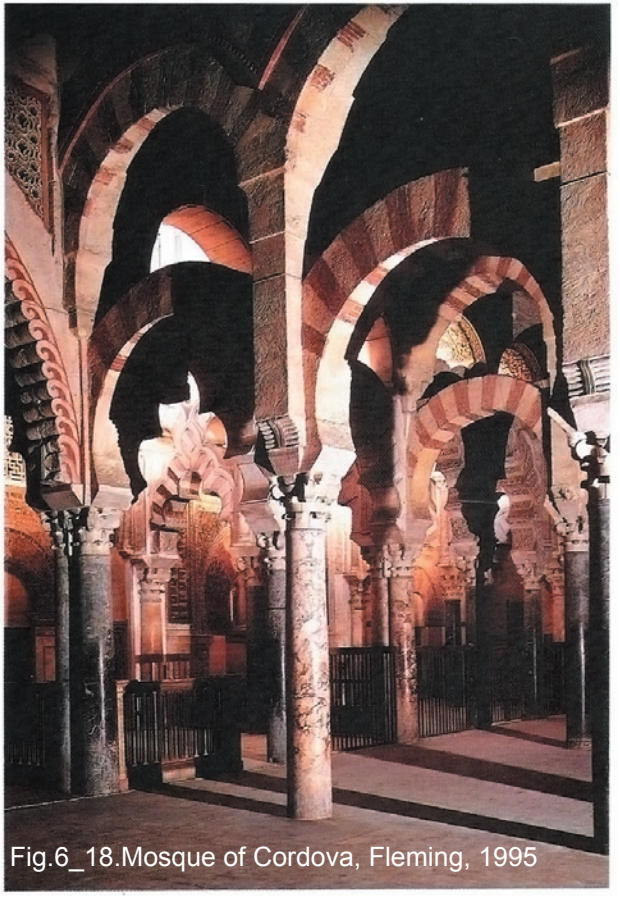


Fig.6_18.Mosque of Cordova, Fleming, 1995

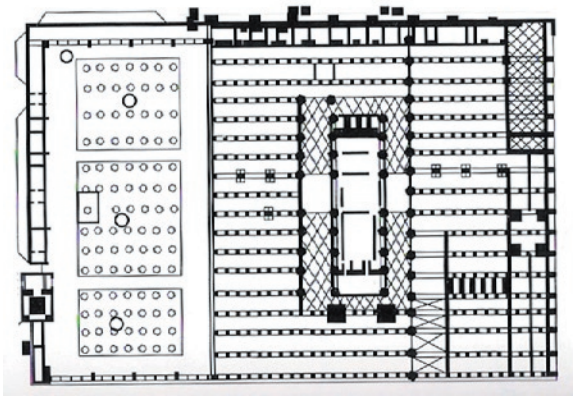


Fig.6_19.Mosque of Cordova plan, Fleming, 1995

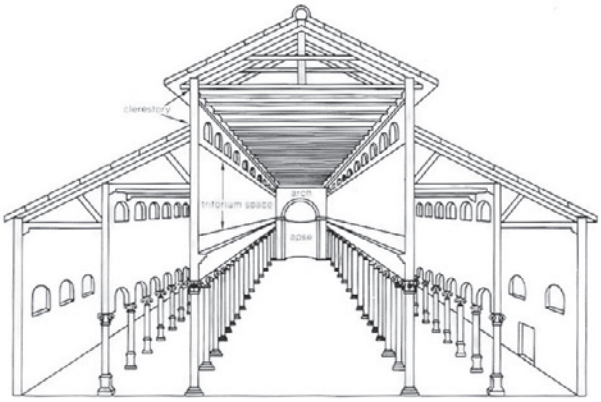


Fig.6_20.Basilica section, Fleming, 1995

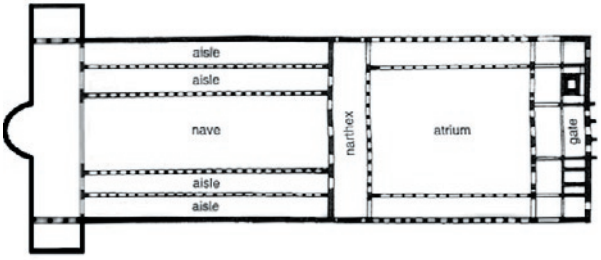


Fig.6_21.Basilica plan, Fleming, 1995

One of these responses was the shading and protection of rooms with outdoor corridors that prevented sunlight from directly penetrating the entrances to rooms. It is here that the arcade was used but no longer with the requirement of providing structural support. Here instead one identifies the beginnings of the use of the arcade in providing spatial organisation. By incorporating a permeable interface as the arcade between the outdoors, the shaded external corridor and the internal room, organisation of space use and typology is achieved. In the earlier Roman basilicas we see a similar occurrence, with arcade routes being placed around the internal courtyards of the basilicas. In both cases, the arcade has evolved into a spatial element, ordering the progression of space and allowing the activation and participation of the surroundings with the built structure.

Fig.6_22.Cloister, Abbey of St. Trophine, Fleming, 1995

The predecessor to this spatial element is visable in the colonnaded porticos of earlier Roman and Greek architecture. Positioned at the edge of the podiums upon which these buildings were constructed, these

colonnades provided support for the roof, sheltering the immediate spaces around the structure. The construction technique of beam and column was limiting due to the short spans achievable with stone which required many supports along a lintels length. In comparison, arch construction provided support along the entire length of the lintel, supporting greater weights and spanning further as a result.

It is significant to the author to identify the changes, not only in the physical construction of the arch and the arcade, but also the manner in which the arcade is utilized as a built element. Initially used to provide intermediate support to roofs covering large volumes in a functional manner, arcades developed further into a spatial organizing element. The shift from internal to external arcade construction saw the attempt to activate space through the inclusion of the built elements surrounding the arcade. In other words, the arcade became a tool in bringing cohesion between the various elements of the built fabric and organising these elements along spatial spines.

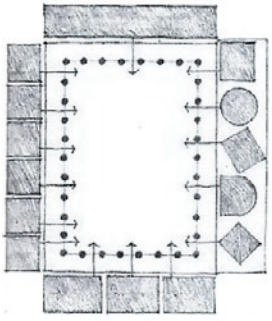


Fig.6_23.Activating space, Ching, 1996

Most modern examples of the arcade as a spatial system refer to the Isfahan Bazaar as its principle reference. Established at the beginning of the seventeenth century, the arcade's influence as

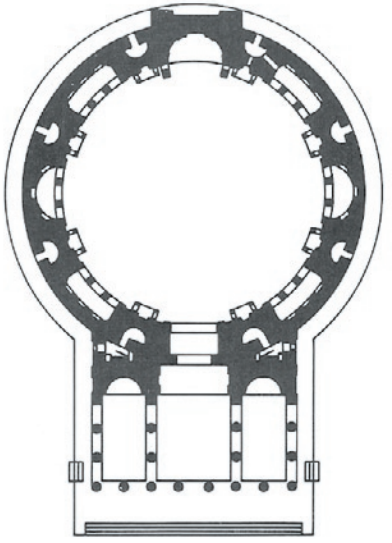


Fig.6_24.Plan of the Pantheon, Fleming, 1995

Fig.6_25.Pantheon, Fleming, 1995

a commercial entity found great admirers in the Western traders to the Middle East. With the rise of consumerism and mass markets in the world, the bazaars translation into the arcade was quickly adapted into the cities of the West. It must be noted here however that this permutation of the arcade moved away from being a built element to one which embodied spatial and functional ideas. No longer merely forming interactive spaces and accessible routes, the arcade was now extended to serve economic and commercial demands.

The European context over the last few centuries however has seen another alteration to the idea of the arcade. Whilst the major arcades in European cities have been planned and integrated into the urban environment, the remainder have emerged through residual space. This refers to the spaces through the city that remain once development has occurred; the holes and tears in the urban fabric that remain due to any number of various planning or contextual issues. The need for covered passages of movement providing protection from the weather through the cities of Europe now sees the development of arcades occurring between buildings, between city blocks, attaching onto shopping malls and public transport routes. This adaptation works due to the spatial functionality of the arcade as an organising system but it is not the original nature of the arcades creation.

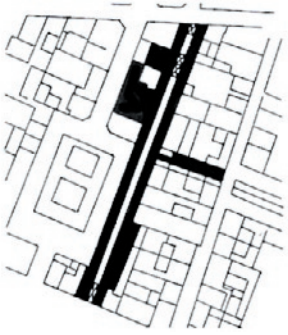


Fig.6_26.Passage Choiseul, Paris, Adler, 1999

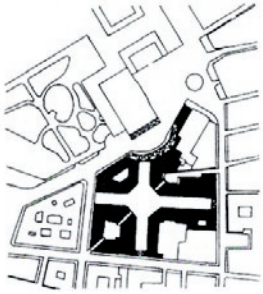


Fig.6_27.Plan, Gallerie Umberto I, Naples, Adler, 1999

Fig.6_28.Perspective, Gallerie Umberto I, Adler, 1999

Fig.6_29.Hanse quarter shopping arcade, Hamburg, Adler, 1999

It is this third iteration of the arcade that holds interest pertinent to this project. Arcade development in the "seam space" of a city seeks to maximise the functionality and accessibility of our cities. In dense urban fabrics, it is the author's opinion that such a spatial element can renew and drastically reinvigorate the interaction between the people and their city, especially in a context where primary focus is given to vehicular routes.

P R E T O R I A C O N T E X T

Positioned in a valley between two parallel *berg* ranges in the north and south, Pretoria has an extremely favourable local climate for the majority of the year, receiving high amounts of solar radiation and experiencing temperatures over 30 degrees centigrade regularly during the summer. Low humidity promotes much outdoor activity with the exceptions during the fierce highveld thunderstorms in summer and the uncomfortable chill during the winter months.
As the capital of South Africa, Pretoria houses many of the governmental and official institutions of the country. With the outlying 'worker towns' and townships established during the apartheid era, there are a large number of people who move through the city on a daily basis. The development of Pretoria has thus accelerated to become the busy metropolis we know today.

Presently, the architecture in Pretoria finds its roots in neo-classical and renaissance styles with heavy influences from the modernist period, international style, art deco, art nouveau, brutalism and Brazilian architecture.

There is an extensive history of arcade use within Pretoria with many still in use today yet with the massive increases in vehicular numbers recently the governments focus remains on the traffic routes through the city and the further development of these paths of movement. As a result, the inner city movement networks continue to become more restricted, stopped at every turn as it were by the necessity for vehicular access.

U R B A N F A B R I C

The manner in which people experience the city, demands consideration during planning stages, for it becomes the basis upon which perceptions of the city are created. The reliance on vehicular transport in Pretoria and indeed South Africa as a whole, has furthered the development of the city in a particular direction

Arcades generate a particular kind of space in the city and a counterpart experience which differs from walking along a street or down an alley. However the functional performance of arcades is directly responsible for their incorporation into cities as they provide several key methods for maximising the potential of inner city sites.

- Access to interior of city block
  Since land values and rent are high in the inner city areas, it makes economic sense to maximise the portion of site dedicated to income. An arcade allows both serviceability and public movement to be incorporated into a single route, so allowing areas which would originally be designated as service roads to be developed.
- Public space through private property
  Arcade design today incorporates multiple shop units along its length. This extension of the public route across private boundary lines increases the accessibility of the city to the public. In addition it has the inherent benefit of increased pedestrian traffic past shops and places of business.
- Systems of access
  The linear nature of an arcade allows multiple points of access to the spaces along its edge. These points of access together give purpose and define the arcade as an element. Usually only bi-directional in nature, there are many examples of arcades which diverge in multiple directions to serve as access routes to buildings outside of the arcades primary

focus.

- Spatial organisation
  The hierarchy of spaces and spatial progression is a characteristic of arcades. It can be altered to provide a uniform manner of access to the individual spaces along its length or can place emphasis on certain points, such as those at intersections. By forming a central movement route, the arcade activates all buildings and built elements along its length to participate together in forming spatial relationships, rather then acting in seclusion with their immediate neighbouring structures.
- Connecting movement routes
  Pedestrian routes along the edges of streets are the primary conveyors of people through the city. City block lengths however can become barriers of movement if too long in length, requiring pedestrians to walk further than should be necessary. By connecting streets along their lengths with arcades, providing points of penetration through the built fabric of the city blocks, movement along the streets can be connected together to provide a far more accessible environment. Connecting arcades with each other can lead to the development of alternative pedestrian routes through the city, creating an exciting and characteristic experience of the city.

Recent revisions to the city's framework have revealed exciting new directions which the government is willing to implement. Primarily the pedestrianisation of Paul Kruger and Church Streets is of high interest as this begins to show the authorities conviction in attempting to bring residents back into the city by generating accessible environments in which people can live. The shift of importance from vehicular to pedestrian routes through the city will provide such environments.

A R C A D E S I N T H E C I T Y

Design for a specific context requires investigation and comparison. Certain techniques and solutions are specific to locations and the people there. The idea of fit as written about by Christopher Alexander in *Synthesis of Form*, demonstrates this.

"In the pursuit of urbanism, the ensemble which confronts us is the city and its habits. Here the human background which defines the need for new buildings, and the physical environment provided by the available sites, make a context for the form of the cities growth. In an extreme case of this kind, we may even speak of a culture itself as an ensemble in which the various fashions and artifacts which develop are slowly fitted to the rest"

Commenting not only on the manner of formation of urban environments but also the elements within a culture itself, it is understandable that the process of fit will restrain in part the design and build of a specific element with regards to its context.

Specifically with regards to the arcades in Pretoria, it was seen by the author as necessary that some investigation be done into those arcades already in use through the city to attempt at understanding the common characteristics in thinking between them in accordance with the idea of 'fitting' in the same manner to their environment. These characteristics and ideas can be adopted and built into the envisioned project to synthesize a fit between the project and the built environment.

Fig.6_30.Burlington arcade sign

B U R L I N G T O N A R C A D E

One of the most successful and distinctive arcades in the city, Burlington arcade was formed through the construction of Burlington House and the adjacent shopfronts. Completed in 1934, it was one of the first projects completed by Gordon Ellis in Pretoria, commissioned by the then largest property owners in Pretoria, the Bourke Trust and Estate Company.

Burlington Arcade embodies the Art Deco style with emphasis on the vertical elements of the building and the ornamentation. It reveals the ideas and expression of the time when it was created. The impact of modernism was yet to be felt fully in South Africa at this time yet the fore thoughts can be identified through the shopfront framing and glasswork fabrication of the arcade.

Several aspects serve to make Burlington arcade stand out from the others in the city. Firstly it has no covering roof but is open to the sky. Taking advantage of the excellent weather in Pretoria and the shading provided by the surrounding tall buildings allows this characteristic of this arcade to be successful. Secondly, with the lack of any covering over the arcade, the functional volume of the arcade is restricted to the ground floor but with multiple storey high facades on either side. This is to say that there are no mezzanine or first floor balcony levels along which movement is permitted. Thirdly the adjacent


Fig.6_31.South view in Burlington arcade


Fig.6_32.North view in Burlington arcade

building Burlington House, has its entrance facing onto the arcade. Indeed the entire one side of the arcade is Burlington House which has been designed to receive all its guests through the arcade. This most interesting system of access works extremely well by substituting the busy street edges for a more private and secluded entrance.

Burlington arcade connects not only the two perpendicular streets of Church and Bureau Lane but also the Noordvaal arcade, north across Church Street and Koedoe arcade in the south towards Pretorius Street. Effectively this creates a pedestrian route through the city block, isolated from the city road network for an alternative and intimate passage through the city fabric.

Fig.6_33.Roof over Polleys arcade

P O L L E Y S A R C A D E

The most famous arcade in Pretoria, Polleys Arcade acquired its name from Polleys Hotel which previously stood on the site. It is famed for its intricate marble off-cut tiling and mosaic patterning which lines the arcade floor and the large columns running along its length. Designed by Norman Eaton, a famed and prominent architect at the time, it is easily one of the largest arcades in Pretoria.

Fig.6_34.Polleys arcade

The arcade is double volume in height and is broken into two parts on different levels, joined together by wide curved concrete shell stairwells, also covered in the linear marble off-cuts which line the floors. This break in level is necessary to accommodate the site slope from Schoeman to Pretorius Streets. A skylight roof covers the arcade allowing sunlight to penetrate down between the buildings. Unfortunately however, since the SAPS headquarters are located adjacent to this arcade and the heightened security level required, all access points into the buildings have been isolated and protected. In addition the skylight roof has been replaced with corrugated sheeting. Hence, Polleys

arcade has become a mere shadow of its previous character, now lit with orange incandescent street lighting and resolved to become merely a corridor from Schoeman street to Pretorius street.

Fig.6_35.Stairway in Polleys arcade

Described as “one of the most exceptional urban spaces in Pretoria”, Polleys Arcade is an excellent example of the kind of articulate and intimate alternative experience one as a pedestrian can have of the city.

K O E D O E A R C A D E

Dating also from 1934, Koedoe Arcade was one of the first and biggest commercial buildings erected by Johannes Rienk Burg, the founder of the firm Bild based in Pretoria. At present the arcade has been transformed to resemble more a shopping mall model than the traditional street arcade. The ground floor shops are entrenched in place beneath the mass of the seven storeys above them, rising upwards to form the walls of a large internal atrium. This atrium and the arcade are lit from above by a skylight as well as internal street lamp lighting.

Fig.6_36.Skylight in Koedoe arcade

Fig.6_37.Koedoe arcade

The solid massing surrounding the pedestrian and the lack of visibility to outside the structure can lead to an air of claustrophobia from within the arcade. Additionally the arcade only remains open to the public during business hours after which time, since the arcade is merely the ground floor of the larger overall structure, it is closed along with the building. This presents a problem when faced with reliability of use by the public which could lead to the potential failure of the arcade as a commercial system.

Fig.6_38.Van Erkom arcade

Fig.6_39.Van Erkom arcade sign

THIBAULT AND VANERKOM ARCADES

These are two of the smaller and less impressive arcades in the city. Fully enclosed with natural lighting only penetrating from each end and electrical lighting along their lengths, these arcades reveal themselves as purely functional expressions of commercial activities. The arcades are suitably wide enough to avoid uncomfortable distances between strangers. Interestingly these arcade widths are a lot wider than Burlington arcade for instance. However with the open air design of Burlington arcade, the distance of enclosure does not read as significantly as it does in the Thibault and the Van Erkom arcades.

Both arcades utilise the same materials, finishes and store front assemblies which begin to read more of the modernist aesthetic of production in design. Yet in the Van Erkom arcade, running for twenty metres along its central length, one can find a beautifully ornate mosaic covering the entire eastern wall. Such an artwork again invites the more intimate relationship a pedestrian can have with the city and with the reduced speed of travel, the greater attention to detail becomes highly important in this design. Aside from this the arcades serve the shops along their edges as well as the occasional entrance to the office towers above. Whilst the character of the arcade may be lacking, the functional role of connecting paths of pedestrian movement is still achieved and serves to further expand the network of routes through the city offering a more intimate experience of the city.

A P P L I C A T I O N

Thus it can be seen how arcades operate on both a functional and spatial level in cities and that the certain characteristics identified in this contextual study can be applied in this project. These characteristics now require identification and explanation in order to show their application into the design of the project.

- Detail in design at pedestrian level
  With the slower rate of movement, pedestrians have a much larger time span to survey their environment than passengers in a vehicle. Thus any design encountered on the route is examined in far more detail and critically. To retain the viewers interest, the design should have detail which speaks to viewers at all levels; small, medium and large scale.

- Reliability of use
  It is unfortunate that some of the arcades in the city are closed at night. What could become vibrant social spaces are separated from the city to the detriment of the local environment and its people. Attempts to move through the urban fabric are frustrating when denied passage. Ultimately this can lead to a disinterest amongst pedestrians to attempt to use that route in the event that it is closed, negating the use for an arcade and leading to its abandonment as a public space.

- Natural lighting; skylights enhance character
  The excellent weather which Pretoria enjoys must be taken advantage of through any design, in particular a public space. The decision to enclose an arcade or not does not need to affect the final appearance of the space. Natural light can be brought into a space in a number of ways, be it skylights, clerestory windows or removal of the enclosure at parts. But there should be no delegation on the point whether sunlight should be allowed to light an arcade.

- Tactile materials
  On much the same point as detail in the design, material selection, whether it be extremely textured and colourful or smooth and reflective, must be chosen and constructed in such a way that it becomes a point of interest for pedestrians to look at or touch.

- Increased volumes
  Public spaces require that the design considers the maximum numbers of users at any one time which could possibly use the space. The psychology of the user inherent in the utilisation of that space must be considered when gauging the success of any project. With the large numbers of people arcades can convey, increasing the volume of the space aids to diminish any discomfort or phobias the users may experience.

- Building access
  One of the first examples of this as mentioned above was the Burlington arcade with access to Burlington House being provided from within the arcade. This organisation of access succinctly grades the changes from public to private space and can generate more intimate systems of access.

- Connect movement routes
  Enhancing the pedestrian networks through the city generates an alternative manner in which to experience the city. The increased permeability in the urban structure prevents pedestrians from walking uncomfortable distances around city blocks. The arcade

exists as a conduit for connecting public spaces yet allowing a gradation of spatial access to semi public and semi private.

- Relationship to external environment, natural environment
  Whilst arcades may be covered and built along both edges, there remains the need for the user to be able to locate themselves in relation to their environment. Physical restrictions on the passage of movement by built structures do not mean that visual continuity need suffer the same fate. Indeed the establishment of visual lines can eliminate the sense of physical enclosure.

With regards to this project, the facility comprises of two parts: the main building housing users and visitors to the Centre and the arcade which runs adjacent to it, providing access to both CUBE and the existing on-site structure. Both elements, whilst operating differently, have been designed and imbued with the spatial organising properties of an arcade. Initial design sketches sought to maintain the nature of the site as an individual entity but to be aware of its spatial nature in the context of the urban environment.

The fact remains that the site is the remainder of another project; the excess spatial off-cuts of a built project. This characteristic of the site in providing the 'ground' portion of a figure-ground relationship must not be ignored. In all truth, the project's design seeks to enhance this and communicate this idea to the people and the city fabric. At present the site operates as a passageway between structures for vehicles. And whilst the change of user and function of the space can be altered through the design, the nature of this space as a passageway through the fabric remains and is sought for in this design.

The arcade provided the spatial model to achieve this. The building operates as a casing, providing a shell in which space is allowed to permeate through, upwards and outwards. The building operates through circulation and movement as its foremost goal. Examination of the Koedoe Arcade in Pretoria can begin to give an understanding of the manner in which the building can be manifest to contain and 'hold' space.

A R C A D E A S D E V I C E

In relation to the main building of CUBE, the designed arcade which runs adjacent to it, serves a similar project goal but in a slightly differ manner. Whilst both the arcade and the building exist as spatial conduits through the urban fabric, the arcade does not make distinctions between its users. The primary nature of an arcade is to provide a system of access to other elements.

Fig.6_40.Mosaic in Van Erkom arcade

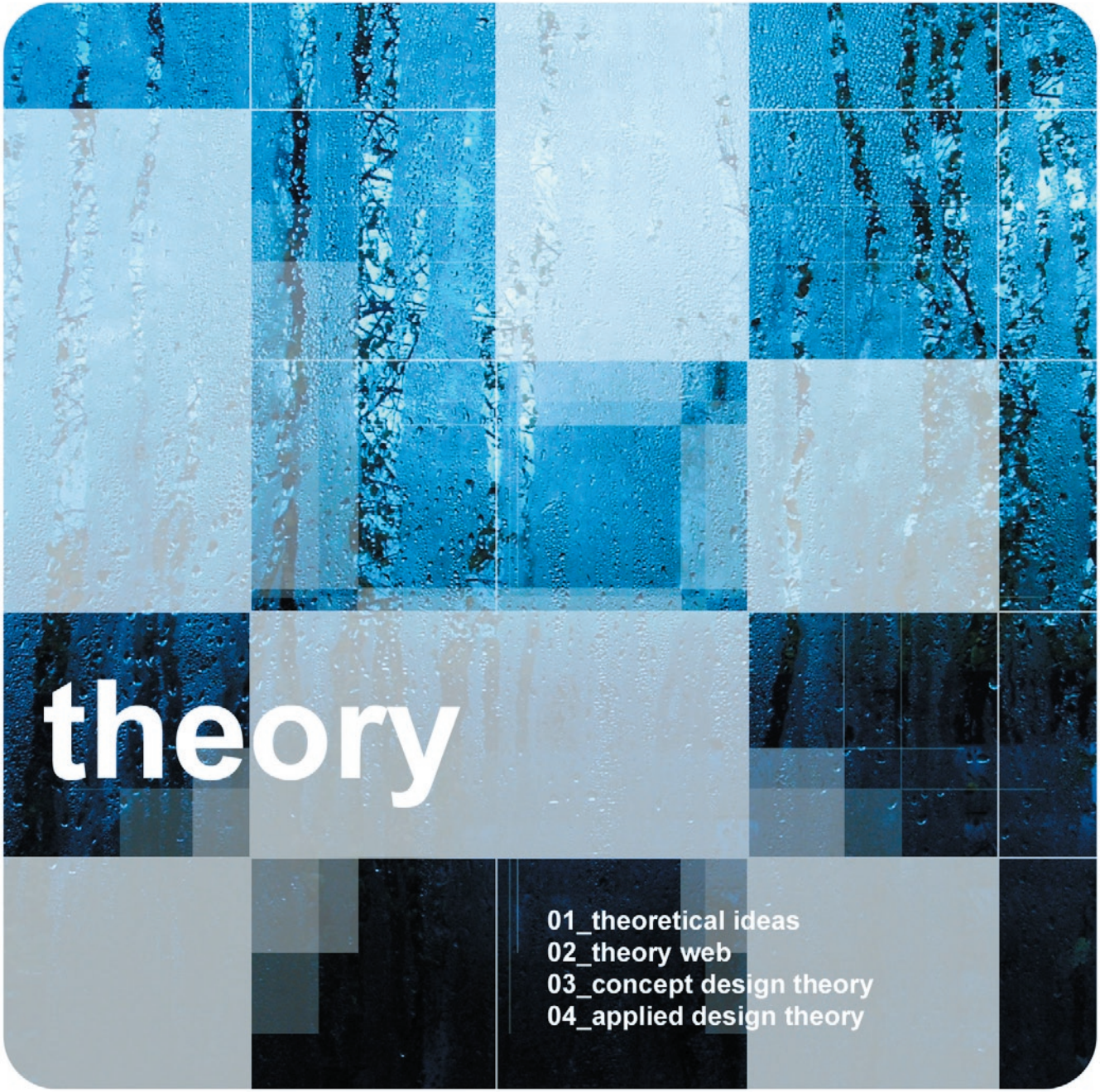
In the theoretical chapter, distinction is given between the manner in which people experience the city, or rather the manner in which people experience buildings in the city. Two levels are identified: buildings experienced as periphery and buildings experienced as destination. This variation carries with it the two inherent variations in the people in the city: person as pedestrian or person as user. A pedestrian only remains as such until the destination is reached for then the shift from pedestrian to user in the person's profile occurs. It is this shift which is focussed upon in the design for it determines the manner in which, as previously mentioned, the buildings are experienced. Designing for this shift becomes a goal of the project's design in order to maximise the potential usage of CUBE.

To illustrate, functionally all three elements of the project work together in providing various configurations of access: the arcade, courtyard and building. The arcade provides a movement route for pedestrians with external destinations to pass through. Yet at the midpoint of the arcade, access into the central courtyard of the CUBE facility is provided, allowing interested parties to move into the realm of the facility. This then marks the shift from pedestrian to user where access into the buildings is then provided from the courtyard space. In the event of public gatherings or exhibitions in the courtyard space, the building can be locked, isolating movement to only the arcade and the courtyard. The courtyard can also be isolated from the arcade, preventing access into the facility should there be a need for a private function in the courtyard. In all configurations however, the arcade remains open for continued use by the public during all hours of the day. This important aspect goes to develop the public's reliance on the arcade as a passageway; a lesson learnt from the daily closing of the Koedoe Arcade.

It is in this manner, utilising the inherent characteristics of the arcade that the role and functions of the CUBE facility can be communicated and begin to create an awareness in the public of their city and their built environment through the ease of accessibility afforded the facility through the arcade as a spatial access element.

Fig.6_41.Existing on-site arcade, west

Fig.6_42.Existing on-site arcade, south



T H E O R Y

I N T E R N A L S P A C E S

"A perception cannot be drawn. The form must be imagined immediately before this. The conception can, if sufficiently clear, guide the creative process known as drawing"

Sven Hesselgren(Porter, T, 1997)

With the aim of the project seeking to stimulate awareness in the public of architectural and building design, the theoretical standpoint takes this pragmatic concern as the departure point for investigating possibilities of enhancing the communication of architecture through the spatial quality within an interface structure.

A dual approach to stimulating architectural ideas in the public is thus created. Firstly through the physical and functional usage of the interface as a built structure and secondly, utilizing spatial quality within the building to provide insight into architectural design and attempt to demonstrate the palpability of spatial experience. This 'enabling' environment is aimed at stimulating architectural thinking within the public individual, on which to apply to projects encountered throughout the city. In so doing, a set of criteria against which to evaluate such designs can be developed and begin critical viewpoints on architecture in the city from the public.

E N A B L I N G S P A C E

This term refers to the ability of space to stimulate critical thought. On a basic level it gives cognition to the educational and informational aspects of the facility on a functional level. An 'enabling' through the public facilities provided through the project in expanding awareness of the city.

However this concept of 'enabling' also refers to the phenomenological experiences or architecture and structure from which one gains cognition and insight into the thinking of people.

The development of such a space centres on the exact role of this project: to convey and communicate thinking and understanding of the built environment.

But in order to achieve this a method or methods are required to translate between the realm of ideas and that of physical design.

P E R S P E C T I V E I N P E R C E P T I O N

The evolution of perspective through art and history has already been well documented, intimating the changes that underwent society when examining their surroundings since its invention in Renaissance times (Panofsky,1991:27).

Perspective manipulations of an environment can arrest the comforting gaze of the viewer and demand consideration to understand what is being shown before them. Escher used predominantly this technique in his paintings to present images of impossible spatial relationships.

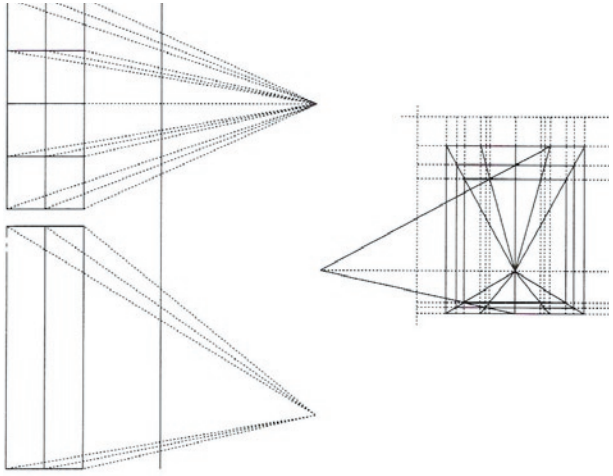


Fig.7_01.Perspective projection, Panofsky, 1997

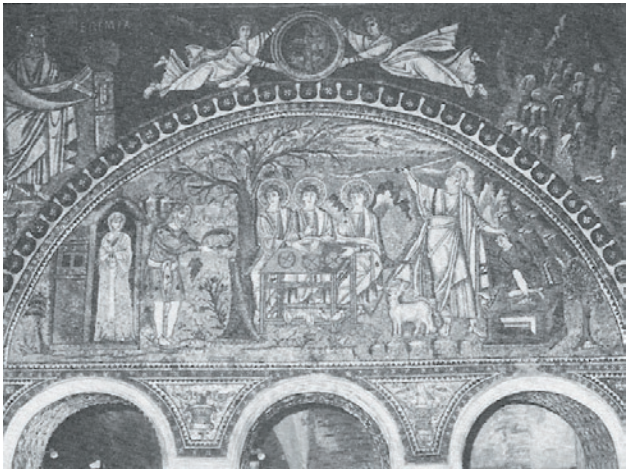


Fig.7_02.San Vitale mosaic, Panofsky, 1997

Linear perspective (Fig.7_01) utilised today is the result of continued investigations throughout the centuries to correctly illustrate the relationships of objects to each other. Earlier attempts, as seen in the above painting (Fig.7_02), portrayed depth in an orthographic manner rather than perspectival. The focus on the individual properties of the objects overwhelmed the overall spatial nature of scenes. The fact that a table's surface contained four perpendicular edges could not dissuade the artist to draw a table whose edges converged toward a central point.

Pictorial representation underwent other shifts as can be seen through the comparison of Fig.7_02 and Fig.7_04. As described by Panofsky, the process of illustration in the first picture recognises the fact of the picture's surface with finite edges which contain a scene. The true representation is exchanged for one focused on the viewer with elements in the picture conforming to the restrictions in the real world.
Such cannot be said for the painting by John Constable. Instead here we are presented with a more stable, rigid system of representation which

Fig.7_03.Laocoon Group sculpture, Fleming, 1995

Fig.7_04.John Constable, 1826, *Salisbury Cathedral from the Bishop's Garden*, Fleming, 1995.

pays no notice to the restrictions of the picture surface. Objects are cut-off at the edges and distant elements appear fainter and blurred; true to reality. The sense of depth and perspective is achieved because of such lack of reference to the viewer and the real world.

Alternative perceptions of space were born out of these variations in representation. Classical period artworks utilised space in opposition to the represented objects. A true figure-ground relationship existed where space comprised the 'nothingness' that surrounded 'something'. The famous sculpture of the *Laocoon Group* (Fig.7_03) portrays this absolute nature of space.

Later in the artworks of the Romanesque period however, space and object were sought to be merged into a singular medium. This resulted from further investigations into the subtleties of perspective and respresentation.
In Fig.7_04 the change to this form of depiction is evident. Object and space seem to share the same nature.

"...by these very means is also managed for the first time to confirm and establish the homogeneity of bodies and space. It did this by transforming their loose, optical unity into a solid and substantial unity"

Panofsky, 1997:51

This brings us in turn to the techniques of representation today.

"One aspect of our spatial experience is perceptual conditioning"

Porter, T, 1997

In this statement, the author Tom Porter explains how the modern Westernised cultures have come to inhabit a rectilinear world. Through this we have become highly sensitive to perspective and proportion to the point where we can experience optical illusions.

"As a means of broadening our perceptual awareness it is, therefore, important that we immerse ourselves consciously in spatial diversity…"

Porter, T, 1997

Thus the author concludes that in order to create a stimulating, enabling environment for the comprehension of architectural thinking, certain manipulations with the physical perspective in space will serve to make the viewer question their environment and their own perception of their spatial surroundings.
The works of Escher as mentioned before, clearly embody the manner in which perspective can be used as a tool for displacing spatial perception and generate a questioning of the local environment.

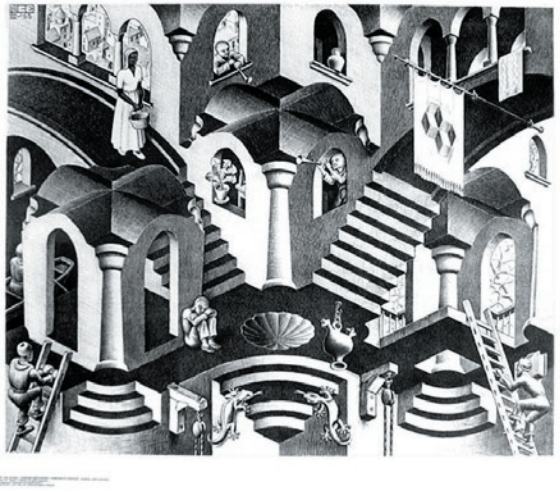


Fig.7_05.Concave and Convex, Escher, M.C., 1955

S P A C E

The spatial conception in this project borrows from the idea of homogeneity in modernist thinking, with some difference. Rather it is the aspect of continuity through homogeneity that is taken and utilised in the development of the design. The permeating nature of space which has been considered as object through void-space reversals, shows itself through the establishment of horizontal corridors and vertical shafts and atriums which dominate the design.

But the essence of homogeneity will receive no recognition in this project other than the previously mentioned continuation of void. Instead localised variations in spatial quality are a dominant thought in creating individualised and atypical spatial configurations in the building. The generation of varying experiences on the pathways through the structure are dependant on these relative inconsistencies and abnormalities in the space contained.

Glenn Robert Lym in his book, *A Psychology of Building,* discusses the two types of space that we as people immerse ourselves in.
Neutral or profane space is the space of ordinary moments of existence, seen as merely "a container for our activities" (Lym, G.R., 1980)
In contrast to this is the experience of acute space. The sense of boundary between ourselves and the environment that surrounds us is removed. Whilst limited in duration, the knowledge of experiencing space acutely is a conscious one which contributes to the significance of such a moment by virtue of its direct contrast with neutral space.

These fluctuations between acute and profane space cannot be pre-determined or constructed but are subjective; dependant on a variety of an individual persons life experiences. However the idea of designing for the possibility of an acute spatial experience is one which seems to share some similarities in the end effect with the goals seeking to be achieved through this project.

By concentrating on mapping acute and profane experiences to a structure lies the possibility for expanding the awareness and preception of an individual. Whilst in reality this will hardly be the case, the process of design is seen to benefit from this standpoint. Designing for point-specific experiences through a structure has the potential for an architecture which speaks to a range of people in a multitude of ways. The physical translation of these point-specific into a design however requires certain set relationships.

Thus fluctuations between acute and profane space will become translated into a series of expanded and confined spaces in the structure. By shifting the viewer between instances of enclosure and openness it is likely that the varying experiences along the pathways in the building will be matched by an equal shift in sensory and spatial awareness and perception.

The constant fluctuations of expanding and contracting awareness through spatial volume and visual connection thus becomes the device used to generate and develop the spatial thinking of the visitor.

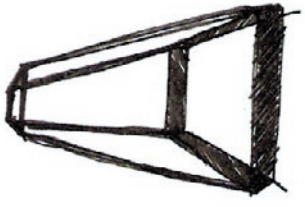


Fig.7_06.Space cage sketch

T H E O R Y W E B

Throughout the various readings on the subjects of space, perspective, perception and visual studies, certain ideas begin to repeat themselves across not only individual works but also subject matter.
This section deals with the identification of the various relevant thoughts which pertain to this project and traces the manner of similarity between texts with the intention of displaying the author's thinking with regards to the chosen project. Any inability on the part of the author to convey the ideas contained within these pages is hoped to be overcome through the words of the writers and thinkers he looks to.

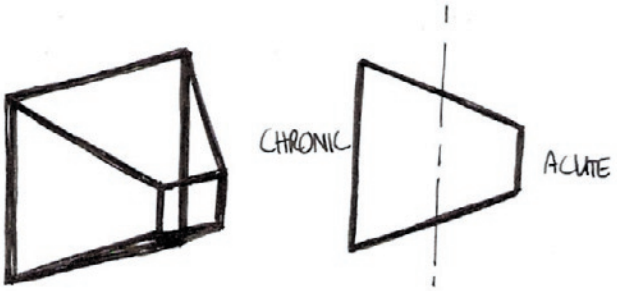
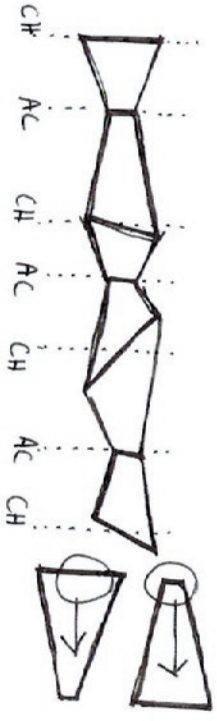


Fig.7_07.Space cage experiences

Fig.7_08.Space cage pathway



ARCHITECTURE, NOT SCULPTURE

"Sculpture works in three dimensions, but man remains apart, looking on from the outside. Architecture, however, is like a great hollowed out sculpture which man enters and apprehends by moving about within it."

Bruno Zevi - ARCHITECTURE AS SPACE

VOID

"Architecture, however, does not consist in the sum of the width, length and height of the structural elements enclose the space, but in the void itself, the enclosed space in which man lives and moves."

Bruno Zevi - ARCHITECTURE AS SPACE

ENCLOSED SPACE

"To enclose a space is the object of building; when we build we do but detach a convenient quantity of space, seclude it and protect it, and all architecture springs from that necessity. But aesthetically space is even more supreme. The architect models in space as a sculpture in clay. He designs his space as a work of art."

Geoffrey Scott - WARPED SPACE

TYPES OF SPACE

"Western man and woman live by and large in neutral space, or what Eliade terms profane space. Here space is homogeneous. It is mapped and delineated. Yet all parts are considered qualitatively alike. For archaic man and woman, space if nonhomogeneous. Parts of it are qualitatively different from other parts. Some are sacred and of great significance to the religious person. Eliade called this sacred space. In sacred space, the world is alive and may invade and live through us."

Glenn Robert Lym - A PSYCHOLOGY OF BUILDING

NATURAL SPACE

"Through architecture a piece of natural space is as it were set on its side so as to correspond to our experience-space.

Dom. H. van der Laan - ARCHITECTONIC SPACE

RELATING TO SPACE

"The sun comes forth and goes down again in a circle. The moon does the same, and both are round...our teepees were round like the nests of birds, and these were always set in a circle, the nations hoop, a nest of many nests, where the Great Spirit meant for us to hatch our children. But the (white man has) put us in these square boxes. Our power is gone and we are dying, for the Power is not in us anymore."

Glenn Robert Lym - A PSYCHOLOGY OF BUILDING

NATURE AND SPACE

"The space nature offers us rises above the ground and is orientated entirely towards the earth's surface...Through his intellect and his upright stance man can detach himself from this order and relate to himself the piece of space that he needs...a space around him in the midst of the space above the earth."

Dom. H. van der Laan - ARCHITECTONIC SPACE

SPACE EXPERIENCES

Architecture can become meaning. For this to happen, architects search directly for important space experiences that a user might have in their buildings. To do this, architects must identify the life issues of the users and anticipate the objects, space, and rituals related to those issues.

Glenn Robert Lym - A PSYCHOLOGY OF BUILDING

PSYCHOLOGY

"Fear, anxiety, estrangement, and their psychological counterparts, anxiety neuroses and phobias, have been intimately linked to the aesthetics of space throughout the modern period."

Glenn Robert Lym - A PSYCHOLOGY OF BUILDING

QUALITIES IN ARCHITECTURE

"By affirming the unity of the arts and thereby granting...the same qualification to understand and to judge all works of art, critics extend the methods of evaluating painting to the entire fiel of the plastic arts and so reduce everything to pictorial values. In this way they...miss the qualities which are uniquely essential to architecture."

Bruno Zevi - ARCHITECTURE AS SPACE

SPACE DESIGNED FROM WITHIN

"Wright resolved this conflict. He came to see that buildings should be formed from the insides outward. Just as the person of integrity and conviction derives strength and actions from within rather than from external social mores, so too would the Prairie houses be formed from within."

Glenn Robert Lym - A PSYCHOLOGY OF BUILDING

REVERSE ENGINEERING

"Writers on visual studies often begin by emphasizing that images are constructed, not natural, and that images imply and construct viewers in turn...visual literacy is equated with the ability to deduce the "operator"...to find the intentions which establish...the operator's sense of image-making, by engineering understanding in "reverse", from the spectators standpoint."

James Elkin - VISUAL STUDIES

ILLUSIONS IN SPACE

"Segall, Campbell and Herskovits argued just this point in their study of cross-cultural differences in space perception. They predicted that people who grew up in environments with flat, planar buildings at right angles to each other – what the authors called a carpentered world – are susceptible to different visual-spatial illusions than people who grow up in non-carpentered environments."

Glenn Robert Lym - A PSYCHOLOGY OF BUILDING

SHIFTING PERSPECTIVE

"The modern preoccupation with space was thus founded on the understanding that the relationship between a viewer and a work of art was based on a shifting "point of view" determined by a moving body....The spatial dimension rapidly became a central preoccupation for those interested in understanding the special conditions of architecture, an art that, while perceived visually, was experienced in space."

Anthony Vidler - WARPED SPACE

WARPED PERSPECTIVE

"For the purposes of the following reflections, we might say, echoing Hubert Damisch and agreeing with Panofsky, that the warping of perspectival space is tantamount to thinking in architecture, a discursive meditation on the place of the subject and the other in space and the way in which architecture might mark a reflection on this place."

Anthony Vidler - WARPED SPACE

CREATING PERCEPTION

"by contrast, Schmarsow posited that space, and architectural space in particular, was an active bodily creation and perception"

Anthony Vidler - WARPED SPACE

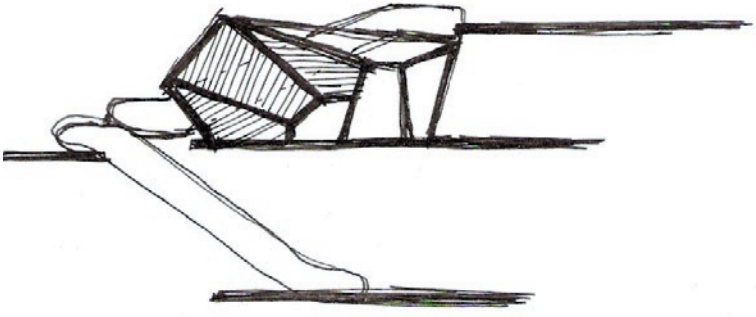


Fig.7_09.Connection concept sketch

CONCEPTDESIGN THEORY

'REVEALING'ARCHITECTURE

Fig.7_10.Concept sketch of canyon

The process of developing perceptions over time through the design begins from the acute space path way idea generated in the previous section.
The conceptual sketch above highlights for the author the root nature sought for in the project design.
Just as the explorer will venture into the canyon, so too must the visitor enter CUBE and begin a journey which reveals itself over time. The twisting pathway and restricted visibility of the canyon prevents the explorer from perceiving too much of the canyon's overall structure too quickly. Through a gradual process of exploration the true nature is revealed; what was initially thought to be one thing becomes another over time.

Fig.7_11.City walls in Chester, UK

Fig.7_12.Spanish settlement passageway, 2004

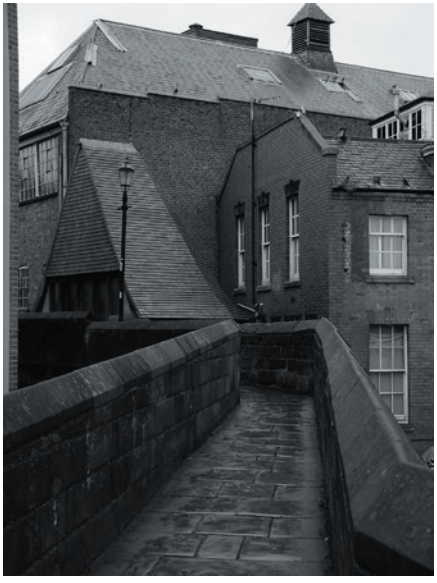


Fig.7_13.City wall in Chester, UK, 2004

CONVERSATIONS WITH ARCHITECTURE

Observation techniques in the fields of psychoanalysis and visual studies propose a multitude of ways in which the brain and the eye evaluate and develop our sense of experience through the objects, forms and spaces surrounding us. Typically this process is a three stage cycle:

- Viewer
- Observes object
- Feels emotion

This is the most basic examination of the process of experience through built forms and space. However if examination of this process is done in more detail and with elements of psychoanalytical procedure included, several more stages reveal themselves and the method into thinking through object form.

- Viewer
- Establishes relationships of form to void
- Visually questions and assesses these relationships
- Evaluates self in relation to form
- Positions self within form (empathises)
- Nature of form generates reaction from within
- Feelings translate into an emotional response
- Expressed by viewer
- Iterative questioning cycle begins again from next point along path of movement

This process of questioning, self-positioning and expression will occur throughout the evaluation of the initial scene along the path of movement. Yet it is through the movement and change of relationship of space between the viewer and the scene that the evolution of the perception begins.

- Assessment of change in visual stimulus compared with change in emotional state generates perception
- Perceptions alter along larger scale segments

of path movement.
It is of interest how this process follows an iterative cycle between object/form and viewer. It is through this cyclical nature that we are able to generate a perception and through extended time, alter these perceptions.

It is through the basic technique employed through psychoanalysis that this can be derived. The cyclical questioning and re-directing of intent executed by the analyst during a typical session reflects similarly on the manner in which the ordinary viewer 'questions' their physical environment, focusing on certain aspects and disregarding others during the formulation of their perceptions and attributing emotion to a space.

POINT-EXPERIENCE CONSTRUCTED SPACES

Thus begins the process of design with the intention of setting up spatial pathways through the structure which utilises shifts between enclosure and openness to redirect focus of the viewer from form to void and vice versa.

Initial development of the site established two main pathways. One pathway focussed on external public movement while the second was established as the internal public circulation space. The connection of these two pathways acts as the mechanism to facilitate public interaction with the facility.

Different criteria were required for the creation of each pathway. The external public path required the connection of similar local spaces which when combined would provide a relatively continuous experience when moving through the space. The internal building pathway however sought the fluctuation and variation of spaces.

For example, the creation of a smaller, intimate space brings the focus of the viewer down to a micro scale where detail construction and refinement of texture, colour and light palettes is more distinctly notable.

Contrast this with the movement from such a space into a large, multi-storey atrium, the focus of the viewer now shifts to the relationships of mass to void, solid to transparency. No longer does detailing captivate but rather larger, broad-stroke design arrangements demand the viewer's attention.

Whilst this process is already well known to designers the fact that setting up a progression of varying spatial sizes and characteristics will redirect any typical viewers gaze from large to small scale and back again remains true. In so doing, the architect is reverse-engineering the experiences of the viewer and embedding them within the construction of the space.

"...visual literacy is equated with the ability to deduce the 'operator'...to find the intentions which establish... the operator's sense of image-making,by engineering understanding in 'reverse', from the spectators standpoint."

James Elkins (Young, F,1985)

Consider the secluded balcony, high above the ground overlooking the movements of others through a space.

Imagine the bridge which connects two protected, enclosed space but requires one to pass across an open chasm.

See the corridor which guides you through the building, leading you onwards, upwards, outwards as if it knows where you wish to go.

These are the point-specific spaces which contain a

multitude of user specific experiences and together ,create a pathway of movement rich in the spirit of architecture.

B U I L D I N G A S S K I N

Focus on the spatial nature of the building to such a degree must affect the manner in which the other aspects of the structure are approached. Indeed this has occurred with respect to the main counter-point of built space: built mass.

Built mass in this project is seen as the container which holds within it a multitude of spaces, each containing specific and varying built environments and spatial experiences. As the container, the built mass and the building as a totality, responds by allowing the various fluctautions of internal space to be reflected through the building's skin. Indeed the building begins to act as the membrane surrounding the internal spaces.

As a result, the responding building form will change from large, solid masses to minute, transparent films, becoming thicker when surrounding smaller, confined spaces and thinning in response to outward, expanding spaces.

In this manner, dominance is given to the built space and the built mass is subjected to the internal conflictions and forces of the assembled spaces.

Fig.7_14.Skin response to space

I N T E R N A L T O E X T E R N A L

"The plan proceeds from within to without; the exterior is the result of an interior."

Le Corbusier, 1986

Le Corbusier continues, "A building is like a soap bubble. This bubble is perfect and harmonious if the breath has been evenly distributed and regulated from the inside. The exterior is the result of the interior."

The same sentiments are found on the works of Frank Lloyd Wright, another prominent modernist. Glenn Robert Lym identifies this aspect of his designs:

"Wright resolved this conflict. He came to see that buildings should be formed from the insides outward. Just as the person of integrity and conviction derives strength and actions from within rather than from external social mores, so too would the Prairie houses be formed from within."

Lym, G.R, 1980

Through the initial massing development of the design, this core idea that finds an astute believer in the author, was applied and sought for yet without the modernist search for perfection of form. Instead the focus was shifted to the user and the spatial use as would be required by the public in the interaction of this facility.

T H E N A T U R E O F S P A C E

In sharp contrast to the existing building philosophy prevalent in SA dealing with the phenomenon of 'virgin sites' where sites are cleared and levelled prior to construction, mandated by designs that begin with flat horizontal planes, this facility attempts to focus elsewhere for design inspiration. The left-over spaces, gaps in the urban fabric and otherwise dysfunctional or dead space within the city can, through active

architectural design, be formed into something other than what public opinion has relegated to being and labelled as useless space.

The site of CUBE is based in one of these kinds of spaces. Accessible from two sides of a city block forming an L-shape with narrow site dimensions, this site has received little attention from a design standpoint and the resulting low density existing structure is the mark of a space in the city where little potential for functionality was seen.
This space is what the author terms a "seam space" – the space bordering between several entities within the urban fabric which come together but rather than meet, remain apart, asserting their own dominance over their sites and disregarding each other with a cold shoulder.

This also presents the trouble with this seam space. With such hard edges and built reactions from several, if not all sides of the site, it becomes very difficult to give the site a sense of connection within the fabric of the city. Establishing a sense of location within the site on its own, rather than being the dead space left over from other sites, is the most difficult design challenge. One might say that by building on the site one already solves this problem by providing location through structure which is certainly true. Yet it becomes extremely difficult to generate an integrated design between such hard and unresponsive urban facets.

The term 'seam space' however helps give insight into the possible solutions to this. A seam by definition is the joining together of two parts into a singular cohesive whole and this forms the basic site design principle. As a between-space within the city, the functional role of such a space is connection and accessibility between the larger entities that border the space. Subsequently, and from another angle we are led towards a similar conclusion as before: that the facility must be based on accessibility towards experiencing architecture in the city.

E X T E R N A L S P A C E

P A T H W A Y S

Alexander et al identify in their work, five specific characteristics of building thoroughfares. Of particular interest is their summation of the pattern Shortcut which states:

"A person will not use a public place if he/she has to make a special motion towards it, a motion which indicates the intention to use the facility "officially"."

Alexander C. et al, 1977

In addition, "…when people feel free to hang around they will necessarily get acquainted with what goes on in the building and may begin to use it"

Alexander, C. et al, 1977

The latter quote finds its echo in the previously mentioned "opportunity" aspect of the arcade design. The writings of Alexander et al support this aspect and the idea that by providing opportunity for the public to utilise this interface with the built environment profession, they will in time, if not immediately, come to use it.

Through the contextual examination of the city, two aspects relating to the manner of experiencing buildings within the city are revealed.

B U I L D I N G A S P A T H

Ordinary pedestrian movement and interaction through the city only experience the buildings surrounding them through the facades, at a skin depth. The façade is read and interpreted to infer possible function and relevance to the viewer. A

couple seconds, if any, is spent looking at what surrounds the pedestrian and then the moment of experience between that pedestrian and building is gone; a shallow experience of structure.

BUILDING AS DESTINATION

The alternate manner in which a pedestrian can experience structures in the city is through the transition into a user.
Movement through the city infers a destination. Upon arrival at such a destination, the pedestrian will shift into the behaviour of a user. As discussed previously, the experience of the city up till this point has been relatively superficial, focussed upon only building facades as periphery along a path.
The user however remains within a single structure

FIGURE, FORM, SPACE, GROUND

"…since the development of Gestalt psychology, space has been subject to all the intellectual and experiential reversals involved in the identification of figure and ground…thus many modernists have employed figure/ground reversals to demonstrate the very palpability of space…models were cast, as it were, as the solids of what in reality were spatial voids…"

Vidler, A, 2000

This piece of text from Professor Anthony Vidler's writings on the psychological influence of modernist spaces, examines the technique many designers employed from the 1930's till past the 1950's. The modelling and construction of spatial models that translated void space into solid form was a reversal that was seen to possibly aid in expanding and altering the designers approach to space in design.

This technique indeed holds merit for the author, for the process, if not as a direct tool for spatial design, contains the mental and critical questioning regarding what is being designed. By shifting from the figure to the ground, so to say, a more critical view is developed through the removal of the designer's mental self from the design. It is this process that has been utilised and adapted in this projects design.

COMPARTMENTALISATION

Further in Professor Vidler's work, he examines the temporary creation of Rachel Whiteread's *House*, a concrete cast of the interior spaces of a terrace house in London which generated considerable public reaction.
Through this work, Whiteread's statement on modern design reveals "the twin phobias of late nineteenth-century urbanism, agoraphobia and claustrophobia." (Vidler, 2000)
It is impressive to read articles regarding the public's reactions towards Whiteread's creation and their vehement dislike for the piece.

Parallel to this, we seem to be faced with a multitude of pieces like Whitereads in the Pretoria context. Not in the sense of being a non-functional or design flouting equating with Whiteread's house, but through her comment of claustrophobic urbanism.
Indeed Le Corbusier's reaction against the closed and dead spaces of urbanism was to open everything through design; to clean out and rid the city of these negative spaces.

Rampant development of Pretoria to the east and the mass estate development has led to difficult and closed compartmentalisation of the city and surroundings. These developments act on a larger scale, disrupting spatial continuity through the city

and out into the countryside through their use of perimeter walling.
Most alarming perhaps is the public's open acceptance, if not demand, for these estate developments. The promise of safety and a comfortable living lifestyle are the motivating factors in a social and political climate relatively new on the world stage and still in a process of daily change and instability.
While it may be a sign of the times, it does draw concern on the possible future expectations the public may have of the building designers creating the city around them.

critical aspect for the author in a design. Together with the opinion that architecture is experience-based through movement, the departure point for the design is established.
Preliminary investigations into the built form of this project thus involved a process of mass-play experimentation, developing a pathway between the existing structures and the proposed facility.

Fig.7_15.Housing estate island

MASSING

"Architecture is the masterly, correct and magnificent play of masses brought together in light."
Le Corbusier, 1986

As relevant today as it was when written, Le Corbusier captures the basis for an architecture of experience in this quote. Identified from the very beginning of architectural theoretical writings in Vitruvius' *Ten Books on Architecture*, the inter-relationships and play of masses remain the most significant and

APPLIED DESIGN THEORY

PRINCIPLE DESIGN FORMULATORS

The two core design ideas embedded within the project are

1. Movement
2. Forced and Shifting Perspective

It is from the precedent studies and readings done that these two have most consistently revealed

themselves through the designs analysis. Clarification on each is perhaps required here in their application to this project.

M O V E M E N T

Stemming from the modern fascination and focus on the special difference between subject and object within architectural design, as well as having extended to the other arts of film and sculpture amongst other, this design incorporates movement as the experiential base for understanding, seeking to impart both a questioning and comprehension in the viewer. Yet modern quests into the creation of a universal spatial type as embodied through Le Corbusier's *plan libre*, have been deliberately put aside. To the author's mind, there are no two identical spatial qualities. Similar perhaps but through function, ritual, action, spaces define themselves towards us. The office corridor comprises the same function as a street pavement; a route to allow access and transport people along movement lines. Their similar function allows us to group them together as movement spaces yet one can clearly not ignore the large difference in spatial quality between these spaces. Thus neither can spaces created within structure, while housing similar or even exact functions, be designed and developed as having identical spatial qualities; for in these cases environment, orientation, colour, lighting as well as a multitude of human based components: cultural perception, social norms, accessibility, these all combine to generate the quality of spaces which we enter, move through, look at, turn around and leave from.

F O R C E D P E R S P E C T I V E

Utilised within film as a mechanism for skewing and distorting the virtual film space in relation to the viewer, this technique could be applied to an architectural environment as well to create real yet seemingly conflicting forms.

S H I F T I N G P E R S P E C T I V E

The connotation behind the word 'shifting' gives a hint of the combination of both previously mentioned design ideas. The properties of forced perspective altered through time with movement. This generated the idea of shifting perspective which as previously mentioned 'was tantamount to thinking in space'. Indeed this is where the conceptual design finds its first footings.

Primarily, the conception of a system of shifting perspective involves initially the incorrect or awkward representation of void space towards the viewer. Being brought up in a very planar environment as our cities and houses are, our brains have been trained to detect imperfections in perspective naturally. To purposefully represent space incorrectly stimulates the mind of the viewer into resolving this conflict within themself in order to come to a sense of security and stability in relation to their environment. Should the viewer not be able to resolve this incongruency they may be further pressed to explore in order to reveal the solution or feel separation and alienation from their environment; a most inhospitable emotion. But the over-riding objective has by then already been achieved. In order to generate the culture of critical thinking so desperately searched for through this project, the occurrence of occupants questioning the spaces around them through the mechanism of shifting perspective forms the seed to the solution.

Movement remains the vehicle with which to experience architecture. The concept of a shifting-perspective in the design will translate spatial experience into readable form-space play.

Decisions made in any design field affect the users for which that design is intended and it becomes important to realise that it is solutions for real world problems which are being sought. The luxury of remaining purely theoretical cannot not afforded. The design philosophy for this project stems from this pragmatic stance, seeking to connect and link problems with their solutions through the adaptation of theory into design ideas.

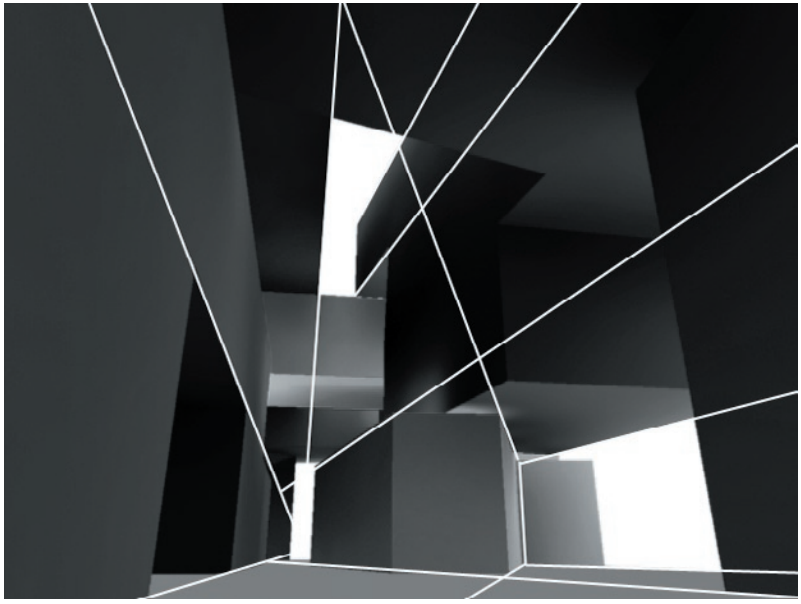


Fig.7_16.Shifting perspective in design


01_theoretical
02_formulator
03_operational
04_local
precedent

P R E C E D E N T S

The projects examined in this section are grouped into three spheres according to the manner in which their design influenced and enhanced the design objectives of this dissertation project.

Theoretical precedents gave insight into the creation and development of the theoretical design principles used in the design of CUBE.

Formulator precedents are those that through a physical form or structure design element or elements, inspired techniques on how the design principles of CUBE can be utilised to achieve the design objectives.

Operational precedents are the projects that have been initiated in other parts of the world with similar objectives with regards to built environment education.

T H E O R E T I C A L

F R O N T : V A S E

Provocative and intriguing in form, this design for a vase highlighted for the author a very important aspect in dealing with the perception of an object: movement. At first appearance we are presented with an ambiguous amorphic shape that holds several repetitive characteristics. Indeed it is these repetitive elements that infer a deeper logic than initially anticipated. Through constant visual questioning the logic is revealed to be a single form that seems to fall through space and is frozen at specific moments, these moments combining to
create the final shape of the vase. Our perception of the object has shifted from a singular ambiguous

Fig.8_01.Front vase

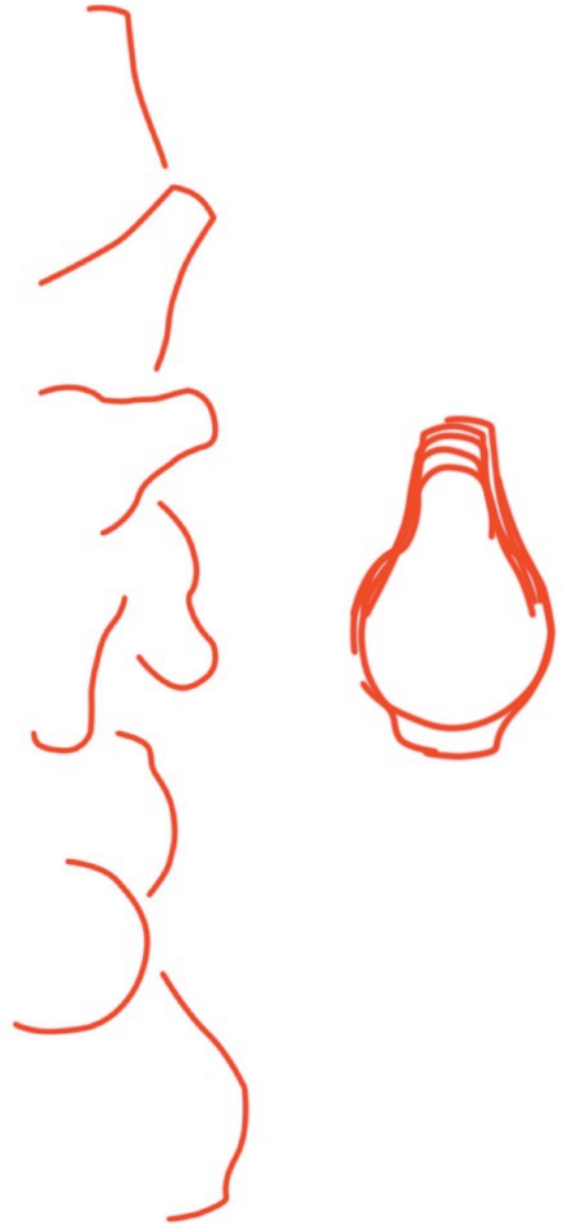


Fig.8_02.Front vase analysis

shape to an array of smaller standard unit shapes.
This aspect of the object would naturally come to reveal itself a lot quicker were we able to view it in its three dimensionality. Yet the fact that this conclusion can be reached through only the two dimensional representation of the object through the picture underscores the importance of movement in generating perception far greater.
A procedural analysis of the vase shows reasons to the author's mind how this has been achieved. Most significant in generating this reasoning is the object outline. Since colour will not give any insights into the deeper logic of this piece, as neither texture nor overall shape will, the recurring elements are focused upon. The identification of similar units on the surface allows the viewer to reconstruct the hidden dimensions of the base unit in relation to each other so that once the entire object has been examined, it is possible to bring together all these parts and reconstruct the hidden object within the overall body.

This precedent crystallises the role that movement has in developing an understanding of an object. In a similar fashion, the movement of the viewer through any structure must have the ability to, if designed for, extend the viewer's understanding of the form and space.

E S T U D I O S A N C H O - M A D R I D E J O S - C H A P E L

In similar fashion to the vase, this chapel was chosen as a precedent to represent a design principle and form generator due to its clarity of readability in this aspect. Initially, one is intrigued when viewing the external view of the chapel: the geometry of the design together with an appreciation for the construction of the cantilevering roof which excites the viewer. Yet what was taken from this project was

the use of perspective in design. Tracing the various edges of the structure, it came to the attention of the author that the geometry contained several points of perspective,
each set altering and skewing the space in and around the chapel and the manner in which one viewed it. Continuous examination of this picture forces one to attempt to consolidate the various perspective shifts into a singular set of perspective planes, yet incongruencies refuse to resolve themselves to the viewer's will. As such, one is left feeling somewhat confused regarding the pictorial representation and hence, definition of the chapel's space.
When considering the internal view of the chapel these aspects are highlighted again from another angle. With two sloping non-rectilinear planes coinciding in relation to the other two wall planes, the two sets of perspective systems clash again and with the addition of an angular cross plane in the glass wall, clarity is evaded further.
Regardless of whether this element in the design remains a delusion of the author in the opinion of the reader or is seemingly justified, an important quality of perspective has been revealed.

"…perspective remains "thinking in painting", a formal apparatus given to the artist similar to that of the sentence in language. For the purposes of the following reflections, we might say, echoing Hubert Damisch and agreeing with Panofsky, that the warping of perspectival space is tantamount to thinking in architecture, a discursive meditation on the place of the subject and the other in space."

Vidler, 2000

Indeed it is a quality that demands attention and thought by the viewer in order to obtain a comforting resolution. This special characteristic lends itself as a design solution to the objectives of CUBE, seeking to develop and impart a critical questioning of designed space.

Fig.8_03.Chapel internal view (top left), Riley, T, 2006

Fig.8_04.Chapel view analysis (top right)

Fig.8_05.Chapel external view (bottom left), Riley, T, 2006

Fig.8_06.Chapel view analysis (bottom left)

Fig.8_07.High and Low, Esher, M.C., 1947

M . C . E S C H E R

World renowned artist and illustrator of the early to mid twentieth century, Escher is most famed for his complex explorations of perspective pictorial space. Through extremely clever manipulation of the rules of perspective, he has created pictures that portray reality in both a stable and conflicting manner.
Most relevant to this project is once again the technique of shifts in viewer-scene relationships that occur with the shifts in perspective. Drawing from the above quote, it is quite obvious that this “thinking in painting’ is precisely what Escher was seeking and is the instrument to generate thinking in architecture if applied to the architectural design of the project.

F O R M U L A T O R S

E . U . P A R L I A M E N T

Providing alternative interpretations on spaces within buildings is one of the aims of the CUBE facility. With regards to this, the Parliament of the European Union provides an interesting example that was re-interpreted into this projects design.
The picture shows a view of one of the internal atriums spaces that sit between the various structural blocks. While this may appear to read as an external outdoor space, it
is in reality within the overall skin of the Parliamentary building. One can imagine the shift in experience of this space as one passes across the bridges, through the atrium, to the other side. Moving out from within the building, a true internal space with little connection to the outside environment, the atrium space expands the awareness of the viewer and re-established a sense of orientation and involvement on a larger scale. This is a regular occurrence experienced when exiting any enclosed built structure but to incorporate

this experience into an internal space certainly gives insight into how space can be read in a different manner.
Thus for this project, a hybrid space, an internal-external space has been developed as the main circulation through the building, connecting the true internal-internal functional spaces of the offices to the true external urban spaces surrounding the facility.

N I K K E N S E K K E I - M U S E U M O F A R T , E H I M E

Two design principles relating to the CUBE facility were extracted from this precedent. Firstly, in formulating the idea of housing the CBE, the six statutory professional councils and other built environment related bodies, the assemblage of these various units together, not only in a hierarchical but also accessible manner, revealed itself to be of great importance. In this regard, the Museum of Art gave inspiration on how this could be achieved.
Whilst one may be able to identify very separate units in the Museum's design, such degrees of isolation between the different councils in this project would not be possible due to significant space restriction. However the method in how this can be achieved; how smaller physical distance is required between units while still remaining readable as singular unit is through the second aspect taken from this precedent: massing.
Massing involves the relationship between solid and void, form and space, of which in the author's opinion, the Museum design communicates extremely well. The structure reads as a set of floating boxes with the use of glass work dominating the ground floor. Considering how this perception could be changed were the solid, encasing first floor walls to be extended to the ground plane, one becomes more conscious of the role that massing and indeed material usage too,

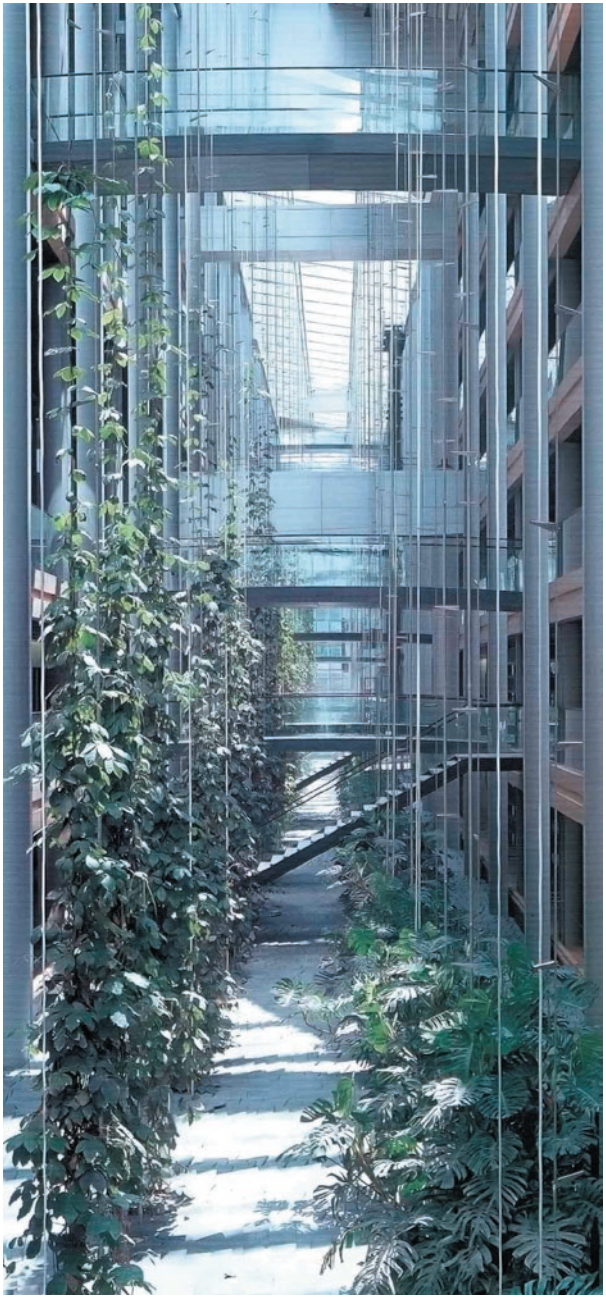


Fig.8_08.E.U. Parliament atrium, Gaston, 2000

Fig.8_09.Museum of Art, Heine, Nacasa and Partners Inc., 2000

Fig.8_10.Composition of units

plays in the design.
Returning to the design of CUBE, this play between solid and void is seen to be the solution to generating an assemblage of functional units for the various council bodies that remain within close proximity to each other yet retain an individual identification as the functional space of a council.
It can further be seen how this form to void play extends into other aspects of the design including the arcade and the internal-external circulation/journey space.

R E L A X A T I O N P A R K A L I C A N T E

Drawing upon to aspects already mentioned in the design, one theoretical and the other physical, this precedent represents the connection of these two parts through design. Shifting perspective from a theoretical side and the arcade as a functional design element, see their product together in the lattice tunnel work built along the shorelines of Alicante's beach.
The interior tunnel picture reveals through examination a series of perspective vanishing points that exist close together but are hidden in part by the curve of the tunnel's path. The effect on the viewer is that of intrigue, seeking to move to the right along the curved pathway to reveal what is hidden beyond. The perspective scaling of the lattice work enhances this desire but is in truth, generated through the over-arching curved main supports that do not cross perpendicularly but move diagonally across the viewer's path, drawing focus to the hidden vanishing points. It is this intrigue in design that encourages movement through space that the arcade design will seek to accomplish in CUBE, to promote the interest in the space and in so doing, generate the most truthful of circulation spaces: a space that obliges the viewer to move through it to an unknown destination of their own free will.

T B W A O F F I C E B U I L D I N G

The subtle articulation of this design through elements such as the down stand edge of the overhang, the railing and staircase and the cantilevering side shield does more than merely create addition to built form. It imparts from the built structure, an extremely readable sense of the void surrounding and permeating the design and it is through these elements that this has been done.
Examining the form and void separately and then in connection to one another, it can be seen how the void space receives tangible form through the structure. In addition these two halves seem to have been design in equal but inverse parts, giving a sense of figure-ground or ground-figure, depending on your viewpoint.

The building is seen as a composition of shapes which can slide and shift together to fit and form new larger shapes. The appropriate similar dimensions between masses heighten the sense that the structure could rearrange itself which in turn gives an extremely tangible sense of the spatial void. One can imagine the roof overhang in the picture sliding down to cover the balcony railings due to the similar nature and dimensions of the shape. This characteristic of transformability is what gives the tangible sense of space through the building, as if the space is merely a vacuum awaiting the movement of mass to fill it.

In so doing it echoes the relationships found in much of Escher's figure- ground work.
Combining this idea of figure-ground play between form and space with that of massing previously discussed, the framework is set for generating an interpenetrating and exploratory design approach of spatial dynamics.

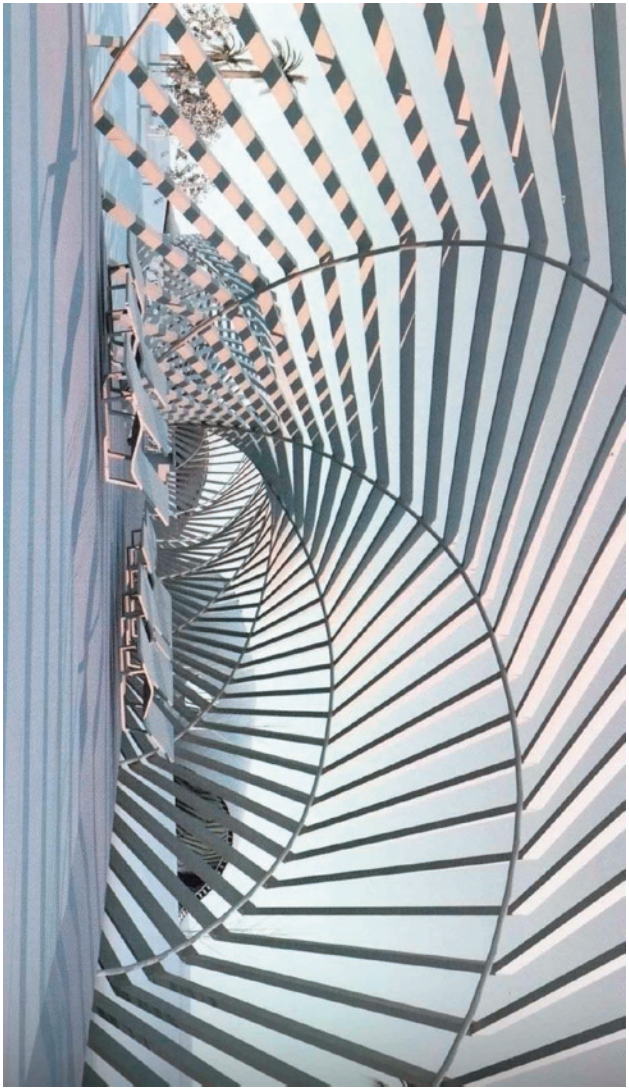


Fig.8_11.Relaxation Park shaded walkway, Riley, T, 2006

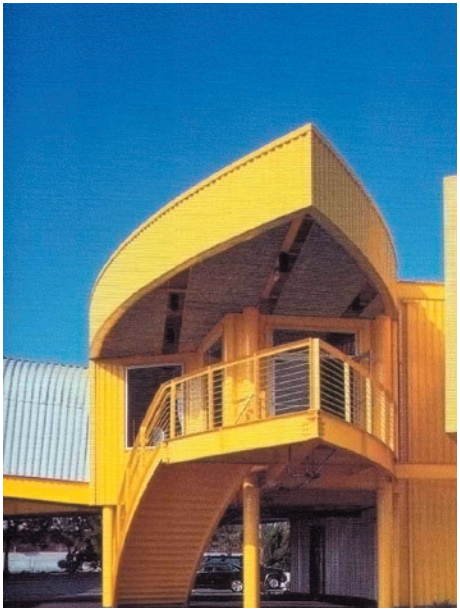
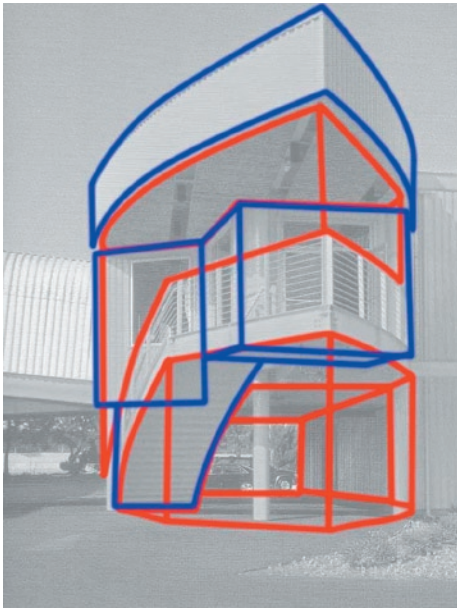


Fig.8_12.TBWA entrance, Chan, B, 2000

Fig.8_13.TBWA analysis



O P E R A T I O N A L

C . U . B . E

"If CUBE is to succeed in playing a leading role in improving our built environment it is vital that we develop an inclusive programme, which recognises the complete spectrum of architecture and urban design activity. Only by doing so can CUBE be truly known as an effective centre for the understanding of the built environment and thereby relevant to a wide range of urban constituencies."

Jim Chapman, CUBE Chairman

Founded in Manchester, Great Britain in 1998, C.U.B.E seeks to expand the appreciation and understanding of the people towards their historical and modern built environment. Formed after several white papers were drafted by the government at that time concerning preservation and restoration of historic structures in English cities, C.U.B.E focuses on educating the public through community and culture on architecture.

Thus the C.U.B.E. facility embodies the very ideas which formed this project. In the author's opinion however the facility seems to act more as a gallery for the exhibition of projects and historical buildings – little interaction is afforded with the public in hands-on education. Aside from the people who actively seek out the C.U.B.E facility with the intention of learning about their city, there is no manner in which the uninformed public can spontaneously interact with the information held with C.U.B.E.

That said, since the creation of C.U.B.E., an independent built environment network has been established throughout England, between all facilities concerned with education of the built environment.
"Deliver(ing) some of the most compelling and

innovative programmes in Europe in construction, architecture, housing renewal and urban design. Each centre offers a unique approach to exploring modern architectural practice, for both communities and professions, through programmes of education, exhibition and empowerment."

This idea of establishing a built network between universities and cities in South Africa would translate extremely well from the English model. With the large distances between major cities in this country, architectural regionalism is extremely prevalent. The Cape Dutch architecture of the Cape regions, Pretorian regionalism (Fisher, 1998) and the coastal variations on Indian and Malay styles presents a vast range of architecture within this country. The establishment of built networks between the learning institutes in these cities could open doors to the exploration of South African architecture to the entire population. Indeed this idea of establishing networks in our cities becomes one of the key design methods towards achieving an integrated and useful facility, as will be seen later through the design development.

In addition to this, the C.U.B.E. facility achieves its success through diversification. Not only serving as a gallery and exhibition space, the incorporation of the RIBA bookshop provides the means to attract additional users. Containing over 4000 titles, extensive ranges in all graphical and design related fields and leading contemporary publications, this aspect of the design will ensure a continued and dedicated base of users.
"The RIBA Bookshop is Manchester's best equipped resource for servicing an ever increasing interest in architecture and design."

C . A . B . E .

"CABE, the Commission for Architecture and the Built Environment, is the government's advisor on architecture, urban design and public space.

We work directly with architects, planners, designers, developers and clients, offering them guidance on projects that will shape lives. And parks and open spaces are as important to us as bricks and mortar.

We give clients hands-on advice on ways to get better value through better design, keeping them up to date and encouraging them to take the best approach from the very start. And our design review work shows clients what mistakes to avoid and what opportunities to seize.

Fundamentally, CABE works on behalf of the public. That's why we're determined to inspire people to demand more from buildings and spaces. They, after all, are the people left behind after the planners and architects have moved on.

CABE was set up in 1999 and it is now a statutory body, funded by the Department for Culture, Media and Sport and the Office of the Deputy Prime Minister."

CABE website

In connection with the establishment of C.U.B.E., the formation of CABE sought to create the administrative

body tasked with the protection of the historical and important projects in the cities. In addition however, CABE was given the power of 'future' protection of the cities by becoming a design critical watchdog, evaluating all projects within the city to maintain high levels of architecture. All proposals for development in the city on large urban scales require the approval of the CABE committee prior to development permission can be obtained from the city planning council.

This brings to light an extremely debatable issue. The power of an individual building or project within the city is capable of doing significant alteration to the manner in which that part of the city operates. When does this influence present a large enough problem that requires city planners to step in to ensure a better built environment for the public at large?

At present there is no design review committee in place to critique the developments in the city. The revised TICP SDF promotes such review procedures during the design phases of projects in the inner city in order to achieve a recognisable identity between the buildings in the city. This dissertation project presents itself as an ideal place for such a review committee to be established and work together with the Public Works Department on the integration of design and technical matters concerning the city. This aspect will however remain a future proposal which can further enhance the functionality of CUBE.

N . A . I .

"The Netherlands Architecture Institute (NAI) is more than a museum of architecture. It is above all a cultural institute which is open to the public and which uses a variety of methods for communicating about the shaping of human space."

NAI website

Dutch architecture has a rich and diverse history with some of the world's greatest designers originating here. In response to this, the NAI was established to document this history for its people with excellent results. In 1993 the new premises began their occupation, located at the edge of Museum Park in Rotterdam, hosting a range of facilities such as:

Collections of prominent architect's works
Archives and reading areas
Library with over 35 000 books related to design fields
Exhibitions and symposium spaces
Guided tours
Lecture and Conference facilities
Educational classes

Educational programmes target schools and families with children to develop understanding of design and construction from a young age. The building also comprises various lecture halls and auditoriums which can be rented by individuals, institutions and companies. Complete with pool-side terrace and foyers, this allows the NAI building to host even dinners with ease.

On another level, the Friends of the NAI are an association through membership which supports the NAI and organises lectures and excursions to promote architectural knowledge. Membership will ensure that one is kept abreast of the latest news and publications in the world and free access to the facilities provided. This money goes towards the continued operation of the NAI which only receives money from government, grant-giving bodies and the business community.

Thus, catering from small scale activities such as children's parties to large scale business conferencing,

the NAI has developed a diverse relationship with the people it serves, ensuring multiple ways in which the public can engage with the facility. It is this characteristic which is most admired and a similar approach will be adopted into the design of this project.

The NAI represents the most successful example of a precedent which this project seeks to develop and fosters an appreciation in its people of their proud heritage found in their cities.

Fig.8_14.Various views of the NAI, NAI website

L O C A L

M U S E U M O F S T R U G G L E P O R T E L I Z A B E T H

Located at a national site of struggle during apartheid, this museum speaks to the memory of the people who resisted the laws of that time. Situated in Red Location, the first settled black township in the area, the museum is designed to intentionally involve the viewer as “active participants”.

The creation of twelve rusted corrugated “memory boxes” each rising four storeys in height, contain artifacts from the days of the struggle and more importantly, a “total” experience of what took place. These boxes are anonymous from the outside, each identical to the other yet contain completely different environments inside.

Two design ideas spring from this project as a precedent.
Firstly, the process of moving between these boxes lends itself to the notion of exploration of space. The design is revealed over time to the viewer through restricting visual connections. The spaces between the boxes become meditatory whilst moving from one experience to another. This concept of ‘revealing’ over time in an exploratory nature will be embedded within this project.
Secondly, the play on the internal-external relationship. Moving into the ‘memory’ boxes one is aware of the enclosed nature of the space yet upon exiting into the space of the larger structure, one connects with an internal space on a larger scale, still internal. Only moving out of the structure sees the true emergence into external space. This internal-external space that acts as the medium between true internal and true external spaces provides an interesting aspect towards experiencing a building.

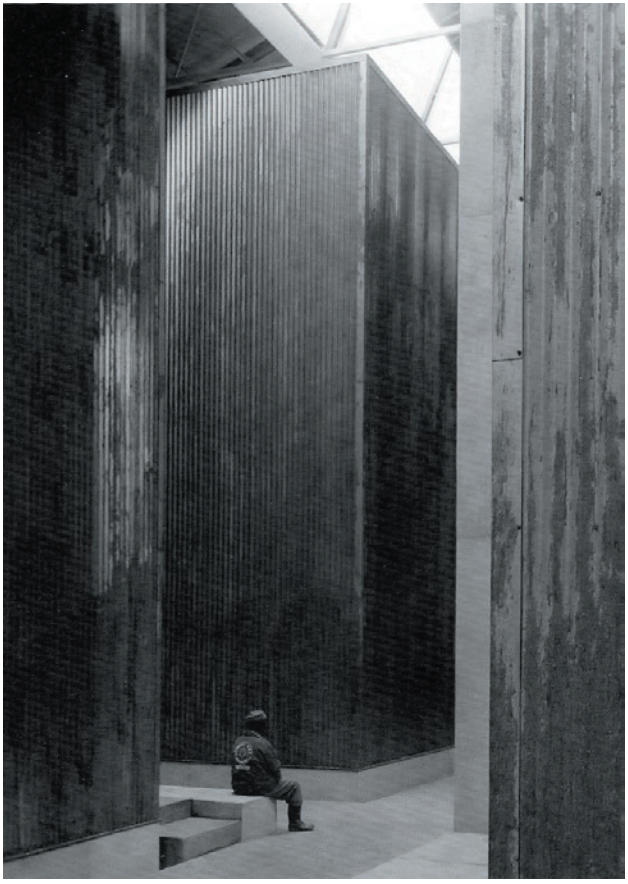


Fig.8_15.Museum of Struggle, internal view

UNIVERSITYOFTHEFREESTATE STUDENTCENTRE BLOEMFONTEIN

Suitably described as a “bridge building”, the new student centre on the university’s campus extends the western axis across the DF Malherbe Drive, connecting the main campus with the outer-lying western buildings. The building acts as a functional bridge, comprising restaurants, commercial facilities, conference rooms and student centre offices on the top floor. In doing so it also connects the library with the rest of the main campus and provides a secure and safe pathway across the road.

The focus on this project as a precedent examines the spatial connections the building generates and especially the manner in which these connections are utilised. One of the main concerns presented in the development of the CUBE facility on the chosen site was that the site remains utilised as a passage way through the city fabric, even though occupied by a built structure. The UFS student centre tackles this concept with a similar idea in mind, utilising the site and structure to not only provide functional spaces but permit movement on a larger scale through the surrounding urban fabric.

Indeed the student centre is compared to the famous historical model of a habitable bridge, namely the Ponte Vecchio in Florence. This historic example indeed scores at the root of the design concept of providing a usable ‘bridge’ through its surroundings.

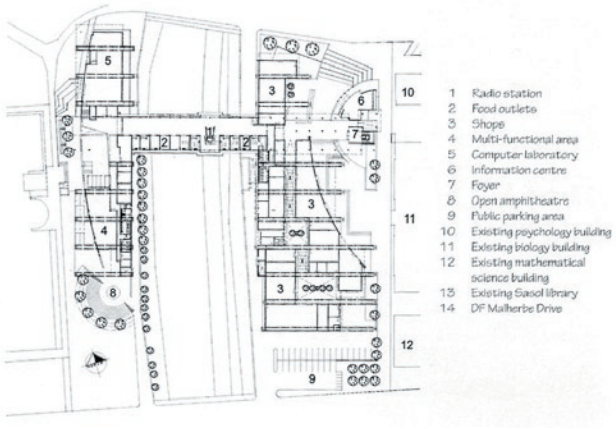


Fig.8_16.UFS studen centre plan

Fig.8_17.UFS student centre photo

Returning to the student centre however, one notes how the problem of urban continuity is addressed. Rather than creating an enclosed passage from one side to the other, which personifies much of the design thinking in shopping malls and their subsequent “blindness” to their surroundings, the student centre is created as an “intrinsically interesting object”. This avoidance of “mall fatigue” has been achieved through openings to the outside and external views of the activity within the building.

Interestingly, this echoes similar thoughts on the design of CUBE. In order to remain a passage way for users and pedestrians alike, visual connections between spaces must be made to identify progress along a route. These routes then become the pathways and bridges through an urban fabric on a large scale and through functional spaces within the context of the site.

PRECEDENTSUMMATION

In conclusion to this precedent study, it remains of significant importance that ideas taken from various designs are indeed utilised and embedded within the design of this project. To revise, the following design concepts have been identified as embodying the author’s intentions with respect to site and structure, function and space.

01_Movement
02_Perspective
03_Internal-External relationships/environments
04_Composition of units
05_Tangible space
06_Interlocking relationship of void and mass
07_Urban Pathways
08_Diversification of functions
09_Administrative and practical roles
10_Establish multiple networks of access to services


01_project objectives
02_design considerations
03_fire response
04_lighting
05_ventilation
06_vegetation
07_services
08_design objectives
09_theoretical model
10_massing
11_sketch model
12_concept images
development

DESIGN DEVELOPMENT

PROJECTOBJECTIVES

The establishment of functional and spatial networks through the city with the common nexus as the CUBE facility, remains the core objective of the project. The following networks have been identified in the design formulation and have been deemed suitable for implementation.

CBE and Council Headquarters
Built Environment Network
Future Development Plan Exhibition
University Student Partnerships
School Education Network
Construction Network
Research and Information Hub
Historical City Network

Through the following chapters these relationships will be developed into physical and functional form which will establish CUBE as the public interface with the city and the built environment.

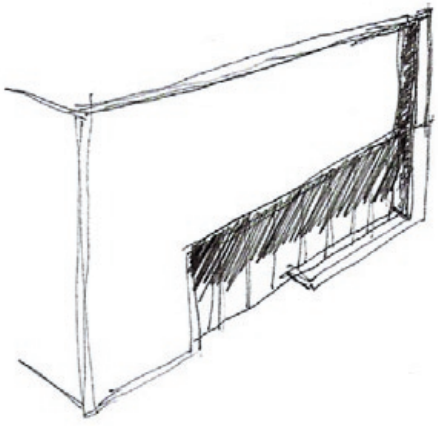


Fig.9_01.Concept mass sketch

DESIGN CONSIDERATIONS

FUNCTIONS

ARCADE

- Width for adequate comfort and usage.

Preliminary provision for the full construction width of the arcade was taken at 5m. This includes the support and glazing systems used to contain and protect the arcade walkway.
The pattern Public Thoroughfare (Alexander, 1977) examines the psychological requirements for the users of arcades in respect of width.
"Since the likelihood of three people passing three people is not high, we consider as a maximum two people passing two people, or three people passing one person. Each person takes about two feet; there needs to be about one foot between two groups which pass…" Alexander, 1977
These estimates put the total width for a four person wide arcade at 11 feet or 3.3m. Further research into the width variations of existing arcade systems around the world range from 2.7m to over 4m. (Adler, 1999)
Thus a desired width for the arcade was taken initially at 3m internally, allowing a 1m distance for the structure and glazing of the arcade on each side.

- Structure

The column grid through the building became the main determining factor in the structural decisions regarding the arcade. Initially the entire site width was equally divided into a rectilinear grid of column supports, with columns running along the edge of the site boundary.
This approach was later rejected and altered to provide the same column spacing but shifted across to create a cantilevering slab edge. This would reduce the column count, provide a better bending

moment solution in the slab and eliminate possible problematic construction of structure near to existing buildings around the site.

From this last point, an alteration to the support structure of the arcade was required. Initially the arcade framework was to utilise the same structure as the rest of the facility. Since the problem of casting structural members so close to existing buildings was quite evident, it was decided that the arcade would need to obtain its support from the building framework, rather then support itself. This fell in line with a design objective to create a very transparent space between the facility and the adjacent building.

A steel framework box was designed to fix onto the one side of the load-bearing concrete structure of the facility, within which the arcade would be able to be contained, supported and served.

This solution serves to alleviate any costly construction techniques and continue the effect of cantilevering on the one side, aiding the bending moment through the slabs.

- Height

"…a comfortable distance between strangers is the distance at which you cannot distinguish facial features…this distance as being between 12 and 16 feet. Thus, the ceiling height in an indoor street should be at least in this range." Alexander, 1977

Using this premise as the basis for an arcade height, an initial height of 4.8m was aimed for.

The ratio of width to height however in enclosed spaces is critical in determining the psychological and emotional feeling of the user within that space. The degree of visible enclosure also contributes to the experience of such a space.

"…the higher the ceiling, the more distant people seem from each other" Alexander, 1977

With this in mind, the design objective required as 'sensitive a touch' between the facility and the adjacent building. The arcade has the possibility of becoming extremely claustrophobic to the users so to combat this, the initial height of the arcade was increased to 6.5m. In so doing a width to height ratio of 1:2 was created which helps to alleviate any phobic sense within the space. With the main material identified as glass to aid the penetration of light, the degree of enclosure is somewhat hidden, further combating any sense of claustrophobia.

- Lighting

During the day, natural lighting will be the main source of illumination in the arcade. Due to the extensive use of glass work with lighting in mind, the only provision may need to be for shading devices to prevent direct penetration of solar radiation.

At night, illumination will be provided through floor lighting under the arcade walkway and luminaires built into the ceiling glass work of the arcade. Sand blasted polycarbonate sheeting will provide adequate ambient glow illumination of the walkway. The polycarbonate sheets will be secured with countersunk head bolts which can be removed to replace the luminaire bulbs once expired.

- Ventilation

As a public space with open air access at both ends of the arcade, natural ventilation will be the primary method of air circulation. With the additional height increase of the arcade creating a double volume through the arcades length, sufficient flow of air will be achieved.

The warmest air would be found at the central corner of the arcade. Heated air generates a low pressure through the expansion of air molecules which should create airflow into the arcade from a relatively cooler, higher air pressure state outside the arcade. This air inflow will require an outlet to achieve circulation.

The access route into the courtyard from the arcade will act as this outlet for air flow, enabling each arm of the arcade to act independently of each other.

- Access

A public arcade requires that it be open and accessible throughout the entire day and night. At present, some arcades in Pretoria are closed over weekends and after certain times during the day which restricts

pedestrian flow and the subsequent experience of the city.

The arcade has thus been designed to operate independently of the facility and remain accessible even when the building may not be. This goes directly to the success of the project as routes through the city require reliability in order to remain in use.

The arcade must remain accessible to all people including those with disabilities. Extremely low slopes allow for full accessibility and surface water drainage; walkway surfacing providing sufficient footing grip to pedestrians even when wet and sufficient lighting to light route to the partially sighted. Arcade width additionally allows for wheelchair usage and sizeable deliveries to the entrance of the adjacent building.

- Drainage

Public routes become polluted and dirty through use and provision for cleaning must be made especially with surface water runoff drainage required. Parts of the arcade near the entrances will also be exposed to external weather and will require sufficient drainage should it rain to prevent surfaces from becoming slippery or damaged through standing water pools.

- Fire safety/evacuation

High importance must be given to the fire behaviour of any structure should a fire be started within it.

The arcade, with the design emphasis being light and sensitive, has support members reduced to a minimum to give a maximum feeling of openness. This however negatively impacts on the ability of the structure to resist fire.

Steel and glass are the two materials used and both have limited resistance to fire. Thus additional measures will need to be taken to improve their performance in this regard.

Specified glass within the arcade to be of safety glass type, multi-layered for additional strength with epoxy bonding between panes to improve safety should the glass crack or break.

The supporting steelwork is to be painted with fire resistant paint. Critical supports and joints may need to be encased in concrete or a more resistant material. Additionally the design of the support structure should be such that multiple paths are created to transfer load to supports in the event of member failure.

A sprinkler system will also be incorporated into the design of the arcade structure which will ensure a fire resistant surface as well as reduce temperatures and hence expansion of the steel and glass, increasing the time until failure if the fire is unable to be extinguished.

Fire within building

In this scenario the arcade operates as a central escape route onto which all fire escape stairwells open in emergency.

Fire within arcade

In the case of fire in the arcade, the central through route of the facility becomes the main escape path. In either case, the part of the structure unaffected by the fire becomes the main escape route to minimise the possibility of users unable to reach safety.

- Materials

To establish a continuity in materials throughout the construction of the arcade, glass will be used as the principle material for the roof, walls and floor.

Increased thicknesses of glass to be used in the roof construction to support additional loads such as rain and wind.

Glass wall panes up to a height of 1.6m to be of increased thickness and comply with class 2 safety glass for increased impact resistance.

The floor glass will be sandblasted to hide services running below the arcade. Adequate thickness and pane size to support users will also be of laminated safety glass. The sandblasting of the glass floor will increase friction over its surface and create a non-slip pedestrian walkway. Under floor lighting will permit good visibility at night with the diffusal of light through the sandblasted panes.

C O U R T Y A R D

- Access

Entrance into the courtyard is provided through both the CUBE building and the public arcade. Doorways allow pedestrians in the arcade to move into the courtyard and access the building indirectly. These doors can also be closed to limit access to the building or close the facility at night while still allowing public use of the arcade.

- Lighting

Sunlight will provide sufficient illumination during the daytime. At night, lighting will come from overhead luminaires suspended below the third floor connecting bridge. Upward facing spotlights positioned around the edges of the courtyard will reflect illumination off of the building walls, giving definition to the courtyard space.

- Floor surfacing

Adequate grip for pedestrian footing, a robust surface and drainage requirements must be considered in selection of a surfacing material. Adoption of a local material from the surrounds identified sandstone tiling as a suitable and complimentary material.

- Shading/Protection

Northern sunlight must be permitted to enter the courtyard for a certain amount of time during the day. However to combat possible heat problems that are generated through excessive exposure to sunlight, only a minor break in the building edge will be created. The third floor will also extend across the open air volume of the courtyard to protect the southern side of the courtyard and possible sunlight penetration into the arcade space.

- Drainage

Rainwater will drain away from the entrances facing the courtyard, towards the centre where drainage gratings will allow water to flow underground into suitable stormwater pipes which run beneath the arcade and connect with municipal drainage lines.

P U B L I C C I R C U L A T I O N S P A C E

- Lighting

Light will primarily be provided through roof skylights located along the length of the structure while the atriums will allow the natural daylight to filter down through the building. Additional light fixtures to be places overhead main passage routes for additional lighting during low daylight levels. Emergency LED lights to be placed along all escape routes and stairwells and activated during a fire.

- Temperature requirement

User comfort requires the maintenance of the air temperature to be held around 20°-22°C. Cooled air from the office areas can be vented out into the larger circulation volume to aid in reducing temperature increase.

- Ventilation

Vertical movement of warm air provided through the atriums and expelled through vents located in the skylights. Mechanical extractor fans will be installed to provide additional air flow should the passive system not be sufficient during extreme weather.

- Fire resistance and escape routes

Fire escape stairwells provided at both ends and in the centre of the building will allow for vertical movement during a fire. The stairwells exit into both the building and the arcade to allow either to act as independant routes out in an emergency.

- Visibility and visual linkage

A connection between the internal circulation space of the building and the adjacent space of the arcade will be created by allowing the users of each space to observe the movements within the other. Visual links to the external city environment to also be created along the building length in order to protect against northern sunlight exposure. Creating transparent divisions in an east-west direction will permit a strong visual axis through the building.

O F F I C E D E S I G N

- Lighting

Controlled levels of lighting will be provided through overhead luminaires. Additional natural light however will be able to penetrate the office environment from both sides due to the central atrium spaces. The increased penetration of natural light will create a more pleasant working space.

- Ventilation

Mechanical ventilation is provided in these spaces and will supplement fresh, cool air whilst the warmer air is vented into the central atrium spaces. Heating will also be provided through this system during winter months.

- Servicing

A suspended ceiling system will be installed in all office areas to allow ease of servicing and installation of electrical conduiting.

- Storage and filing

Filing of records to be done within the enclosed offices provided in each office module for security reasons. Central server rooms will provide electronic storage of information and media which can be accessed through the building computer network systems.

- Workstation design

A large percentage of the members of the councils work on an intermittent basis. These members' working spaces will be incorporated into the open plan office areas. Utilising a hot desking system will allow usage of workstations based on requirement with access for visiting professionals and delegates to also be met.

- Fire routes

Central movement routes through the office areas will serve to convey the users out of their working spaces, onto the main circulation routes which provides access to the fire escape stairwells.

- Structural layout

The chosen structural grid of 5m-8m-5m allows the development of office space in the two 5m spaces with the central 8m area acting as container for circulation and atrium spaces.

R E S T U R A N T D E S I G N

- Capacity

The restaurant is to be designed as a small, localised eatery which will serve the building users and additional members of the public during the day. A target of 20-40 customers will inform the design. Food served will be light meals with quick preparation times with possible self-service buffet area.

- Equipment storage

After business hours the courtyard tables and chairs will be stored within the internal restaurant area and secured behind the folding glass doors. Waitrons personal belongings must be stored in a separate lockers near the service entrance of the kitchen.

- Kitchen

Main cooking and preparation areas to be combined with separate area for cleaning and food storage. Access to external refuse removal.

- Ventilation

Overhead cooking hobs must ventilate the kitchen space to the outside with the implementation of mechanical ventilation to introduce fresh air.

- Smoking areas

No smoking regulations within buildings restricts the act of smoking to the outdoor courtyard area where the open air space will permit dispersion.

- Fire escape

The kitchen area should be located near to the building edge to allow quick exit to staff through the service entrance. People in the dining area will be able to move either through to the courtyard or return into the building and exit through the main entrance.

- Surfacing materials

All surfaces should be easily maintained and washable to retain an hygienic environment. Ceramic tiling and off-shutter concrete to be principle materials with all

clay brick wall surfaces to be plastered and painted.

B O O K S H O P

- Quantity of books

The book collection will be restricted to the available shelf space but specific works and larger volume orders can be placed through the bookshop directly to publishers. An initial estimate of 2500-3000 books will be able to be accommodated in the bookshop.

- Book storage

The majority of books will remain on the shelf available for purchase since large volumes of specialised material will not be sold quickly. Provision for minimal storage of books however will be made and alternative storage can be made in the library areas.

- Office requirements

A single multi-purpose room will suffice to serve the administrative needs of the bookshop.

- Capacity of shop

Due to the bookshops specialised nature of reading material available, a maximum of 10 people browsing the shelves was acceptable.

- Fire escape and prevention

Protection of the books in the case of fire will be through either powder chemical or carbon dioxide extinguishers. Automated dispersal systems will be linked to fire alarms with the provision of additional handheld extiguishers.

- Security

All books will receive magnetic strips and detectors placed at the entrance to the shop will detect unauthorised removal of material

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L I B R A R Y

- Capacity

Estimate book numbers of between 5000-10000 as well as the storage of models and plans to be provided.

- Book storage

All books will be available on the shelves, minimising the need for additional storage. Books which can be lent out to the public will be stored in a librarian office during check-in prior to being replaced on the shelves to examine book condition. Books in need of repair will be kept aside until fixed.

- Office requirements

A preliminary of 4 staff librarians are required to maintain the collection. Offices will be usable by any of the staff members and used to store secure filing equipment.

- Security

All books will be fitted with magnetic detection strips and scanned upon lending. A security station near the entrance to the facility will allow a quick response to incidents of theft.

- Fire escape and prevention

Direct access to the ground floor is provided via the main staircase to the library which will facilitate rapid evacuation of people. An additional route through the nearby fire escape stairwell will serve this purpose should the way be blocked or unaccessible.

Dry powder and CO2 extinguishers will be linked to a fire alarm and activated to protect the books and other materials from fire damage.

- Restricted material

Drawings, plan, models and other material considered to be of a valuable or sensitive nature will be stored in the second floor laboratory for limited use. These additional collections will be mainly used by the students and designers utilising the lab area.

F I R E R E S P O N S E

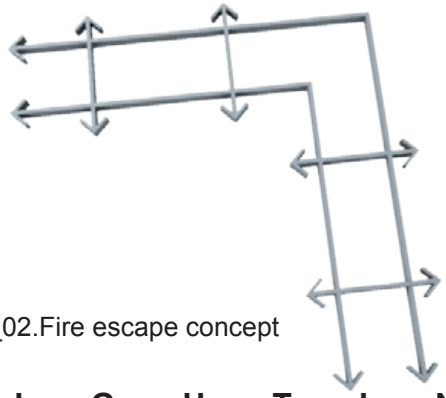


Fig.9_02.Fire escape concept

L I G H T I N G

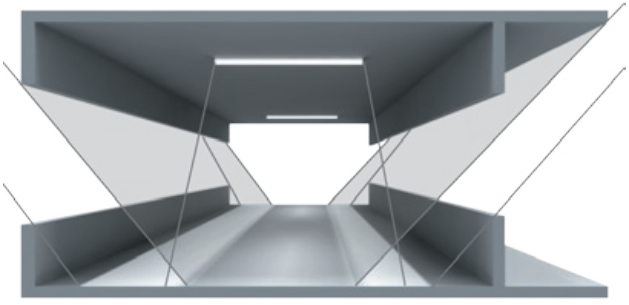


Fig.9_03.Light penetration principle

V E N T I L A T I O N

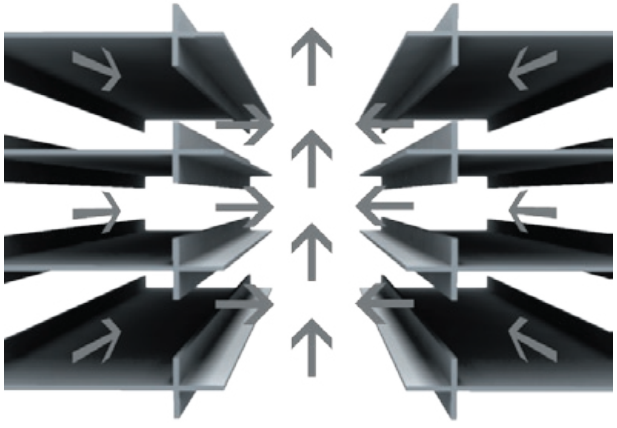


Fig.9_04.Ventilation

V E G E T A T I O N

Restricted space on site has meant that little natural vegetation could be incorporated into the design. In order to protect the northern edge of the courtyard however, several trees are planted to provide semi-shade to the coutyard. The trees will become a focal point in the courtyard and provide a pleasant atmosphere near the restaurant for dining.

S E R V I C E S

The following services are included in the main service spine located beneath the arcade. Positioning of the services in this manner was considered a cost effective and practical solution, allowing good access to the systems through access hatches and serving the building with the minimum distance of conduiting and piping.

Waste management
Water
Electricity
Drainage
Telecommunications
Refuse removal
Servitude

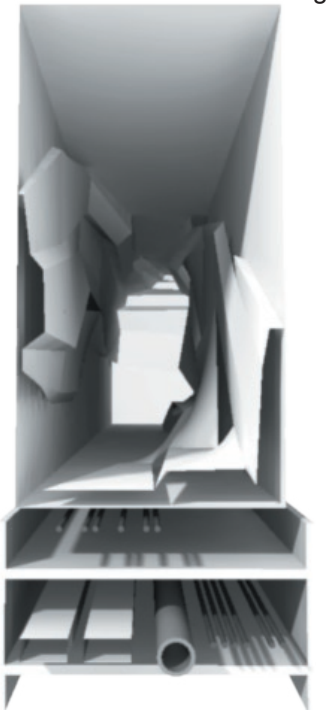


Fig.9_05.Service spine

DESIGN OBJECTIVES

ARCADE

An iconic form is required which will generate public interest and become synonymous with the CUBE facility. With glass as the principle material identified for use in the arcade, the formal design would need to capture the public interest since glass work is common in arcade design.
Spatial quality as an objective in the projects design requires translation into the arcade structure. Since the principle nature of an arcade is in its role as a movement space, the nature of the arcade's design should express movement.
Predominantly in arcade design there is a tendency to generate a constant cross-section that enhances continuity along the passage of movement. With such a focus on spatial expression as mentioned previously, the cross-sectional volume of the arcade will become variable in this design, expressing the movement of pedestrians through the city through fluctuations of arcade volume.
The functional nature of the arcade as a movement route will be expressed through the 'movement' of the form of the arcade.
The complicated construction envisioned to achieve this goal will require specialised workmanship. Training of skilled craftsmen will be implemented which will improve local construction quality once CUBE is complete. In addition the special nature of the design is hoped to inspire local designers and builders into tackling more intriguing and inspirational projects.
The technical design of the arcade must seek however to lower costs through possible standardisation of jointing, reduction of support members and ease of fabrication.

CUBE BUILDING

The CUBE facility itself must house all the necessary functional spaces to serve it's users and the intended role the facility will play in relation to the city.
The physical design of the building must speak on both mass and void and through this relationship, express to the viewer the variable role of space in any built object.
In order to impact a tangible sense of space in the design, permeability and continuity in space through the building will be created. The use of vertical atriums and circulation spaces, horizontal passages and the shifting between indoor and outdoor spaces will seek to manifest this.
Economy of structure and construction must be sought for but will not become a design generator in this project. Reinforced concrete as the identified material is robust, strong and easily erected and will provide the necessary framework to support an assemblage of differing spaces within the building.
The process of exploration and the development of perceptions over time are core design formulators. Response to this aspect of the design is through the progression of varying degrees of public and private use attached to the different spaces in the structure.
The ground and first floor will be designed together as the public realm within the structure with the second and third floors dedicated to the semi-private operations of the councils and it's users.

CONCEPTUAL MODELS

THEORETICALMODEL

The development of various models identifying with the different stages of the design, epitomises the author's belief in the need for a method in which the translation of theoretical premises can be adapted to design ideas. This first stage sees the adaptation of theoretical ideas onto the physical context to generate a framework for a conceptual design.

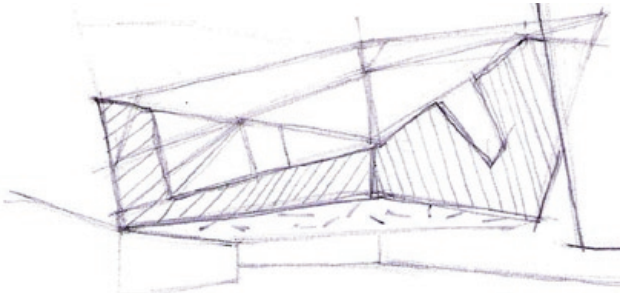
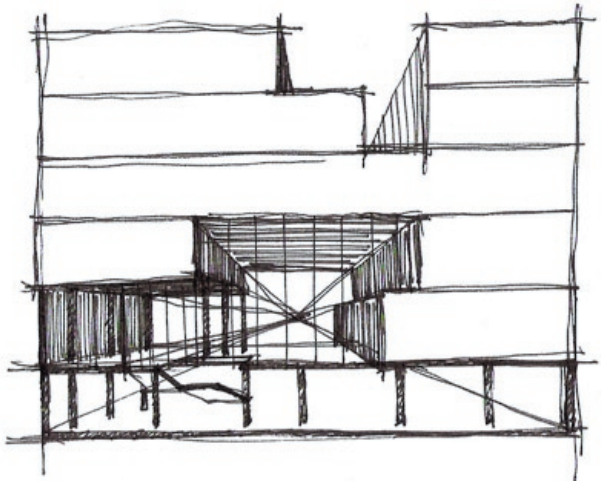


Fig.9_06.Concept sketch

Fig.9_07.Concept perspective



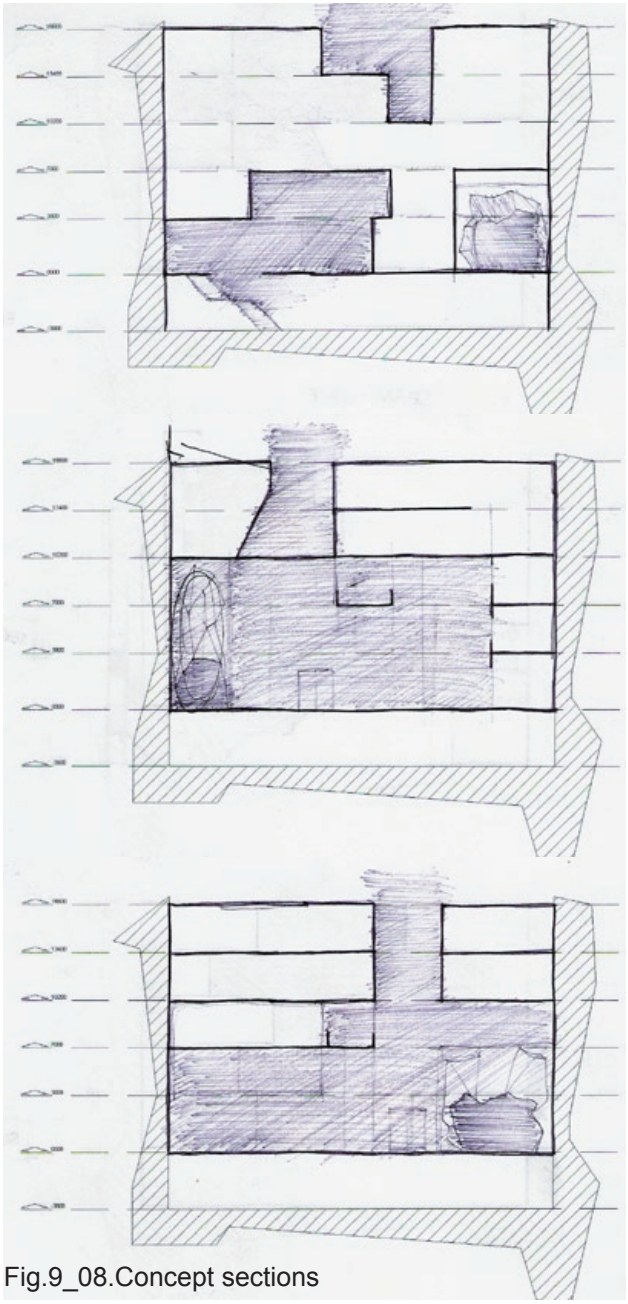


Fig.9_08.Concept sections

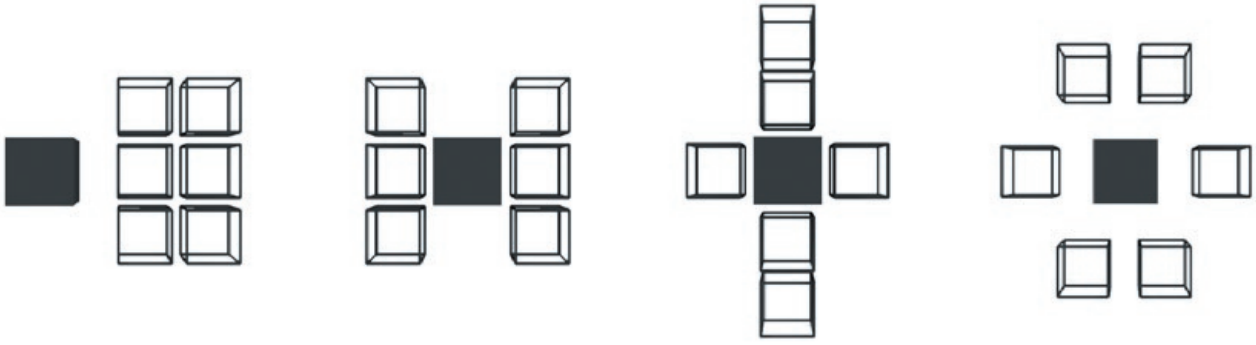


Fig.9_09.Spatial order ideas

the first order of organisation seeks to establish appropriate relationships between the main components in the design, in this case the CBE and six sub-council offices.

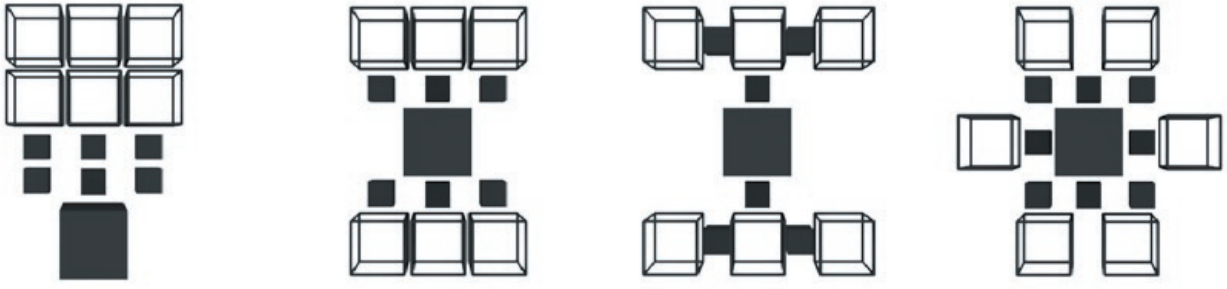


Fig.9_10.Spatial order ideas 2

the second layer of organisation examines the integration of the main builcing components with the lesser serving functional spaces. The spatial model seeks maximisation of access to all spaces and diversifiction of movement routes.

Fig.9_11.Site constrained order

the third layer of organisation stems from site constraints, in this case the limiting nature of site dimensions. In order to establish order and hierarchy through the project, site pathways and boundaries must be observed.

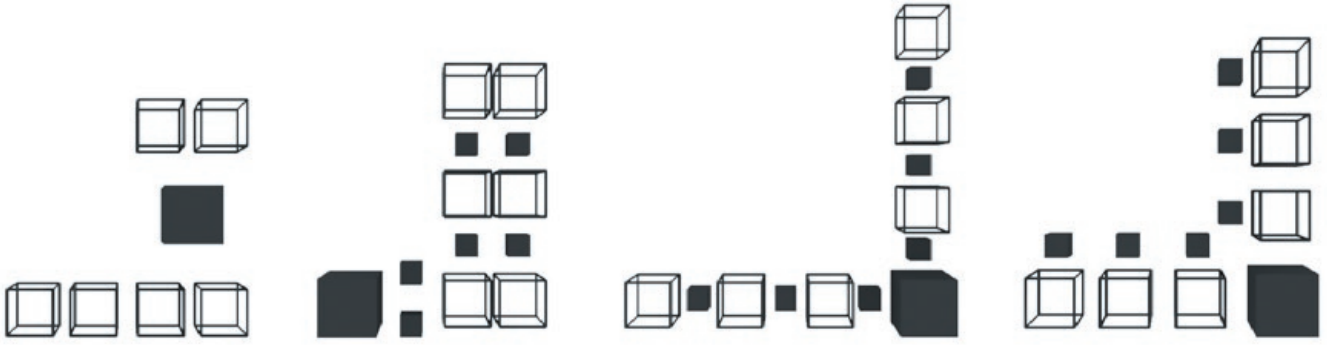


Fig.9_12.Site specific hierarchy

the fourth and final layer of organisation seeks to establish a medium between all three prior organisational layers, combined to facilitate maximum clarity of order and appropriate sequence of spaces.

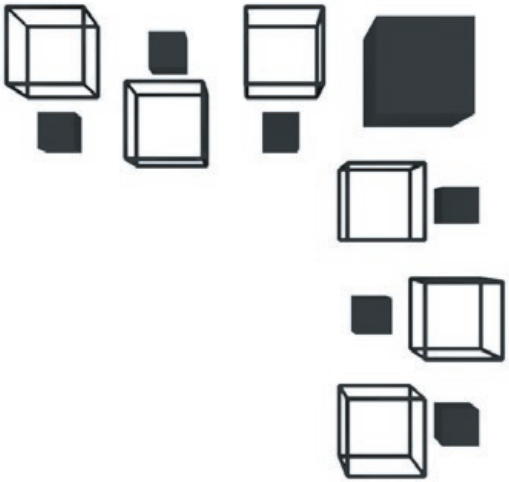


Fig.9_13.Final spatial layout

the final spatial model achieved at the end of this process reveals the ideal relationships between building components, establishing a readable order and spatial progression in accordance with hierarchy. Maximisation of access has generated a diversification of movement routes between spaces within the structure whilst remaining readable and functional.

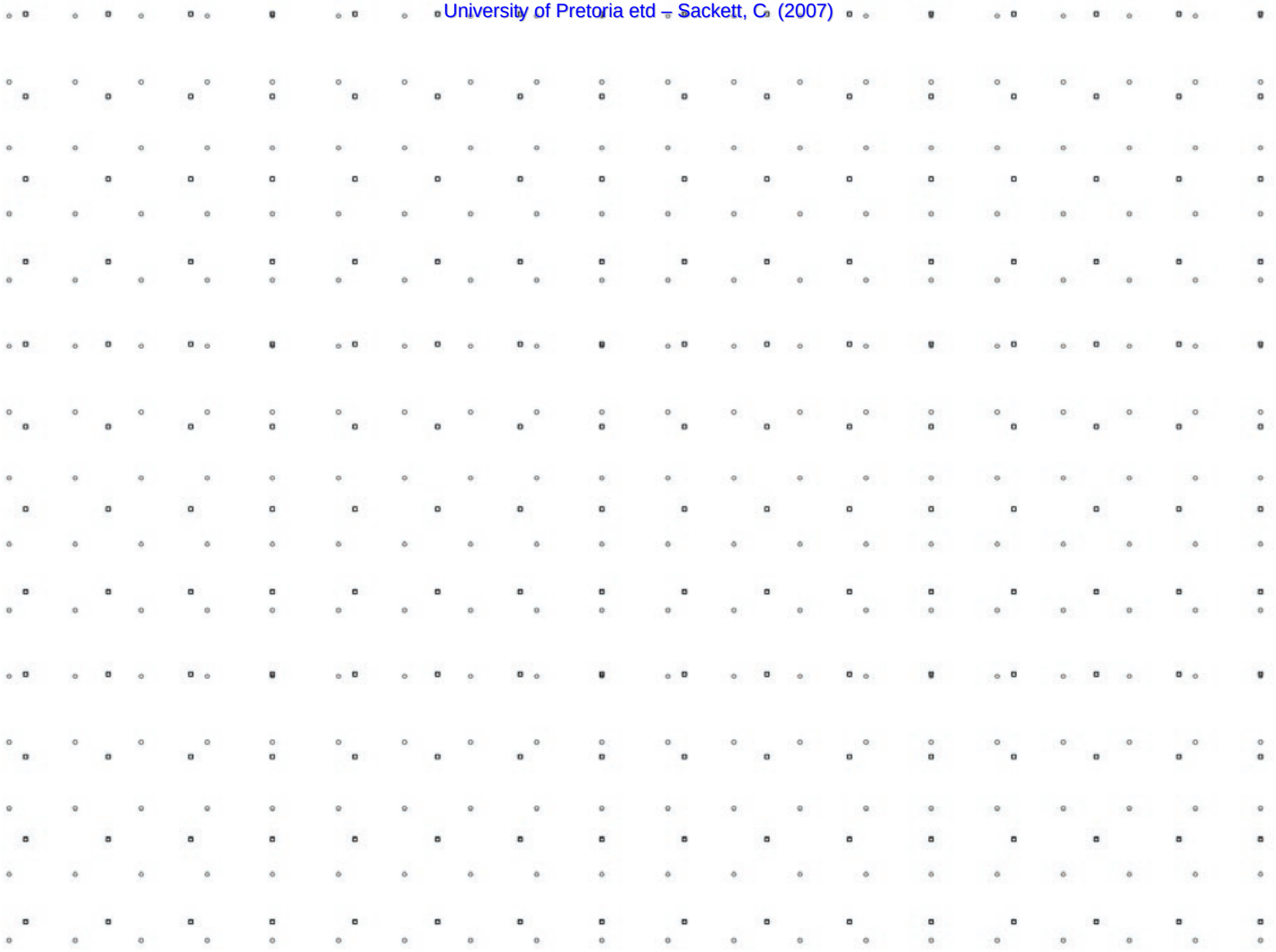


Fig.9_14.Grid overlays generating spatial quality

Generating spatial pathways through the structure required some form of connection between these two elements. By overlapping varying grids which suited the site dimensions, a variation in spatial fabric revealed itself. At certain distances the different grids would align, generating a very strong centre which seemed to ‘expand’ outwards. Conversely at the points of greatest divergence between the grids, a sense of ‘compression’ can be felt in the structural arrangement. This relationship between grids seemed able to communicate a sense of spatial quality related to structure. By connecting these spatial points together, a pathway can be generated through the structure that fluctuates in terms of its spatial expression; either motivating focus inward or outward.

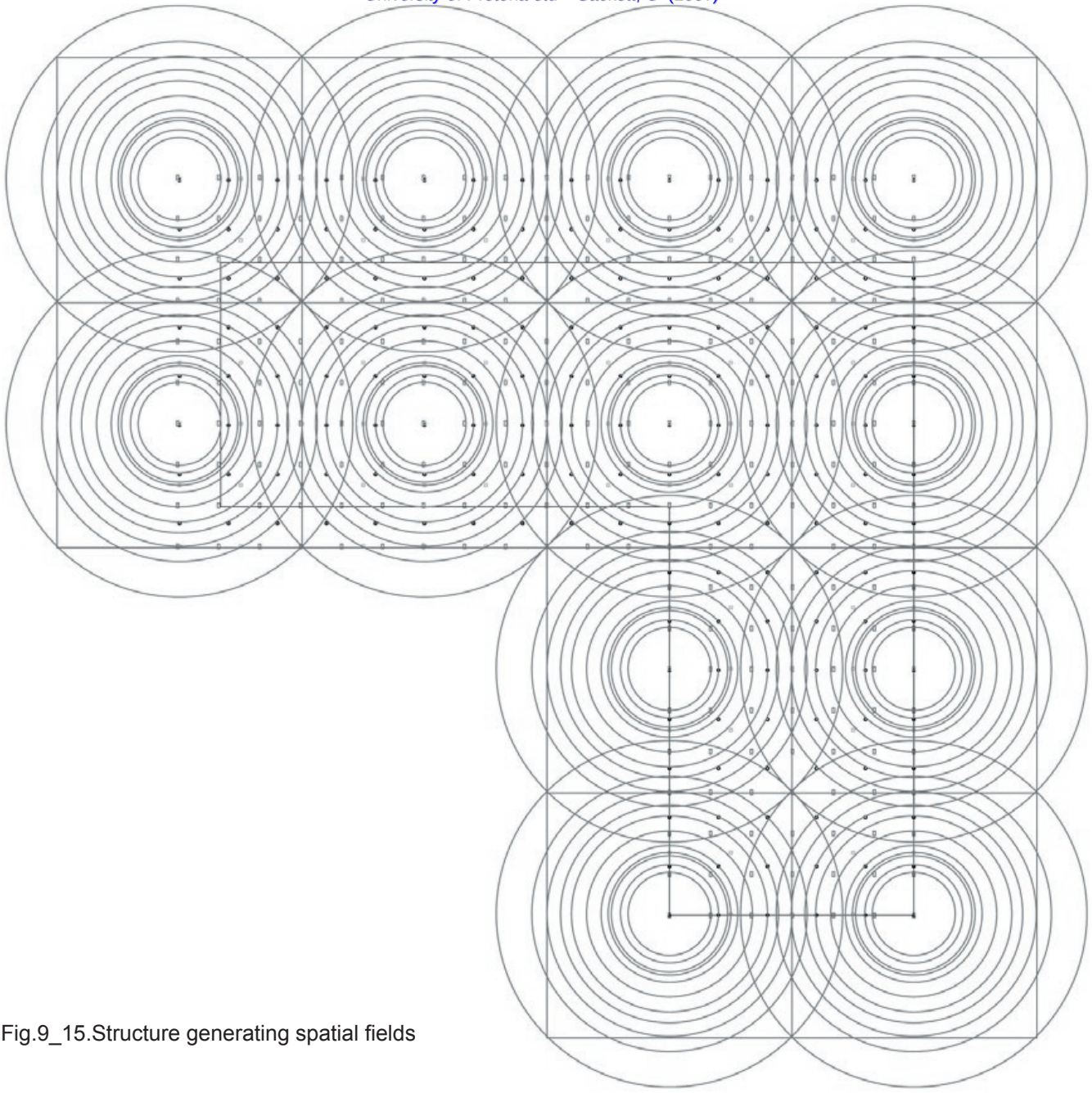


Fig.9_15.Structure generating spatial fields

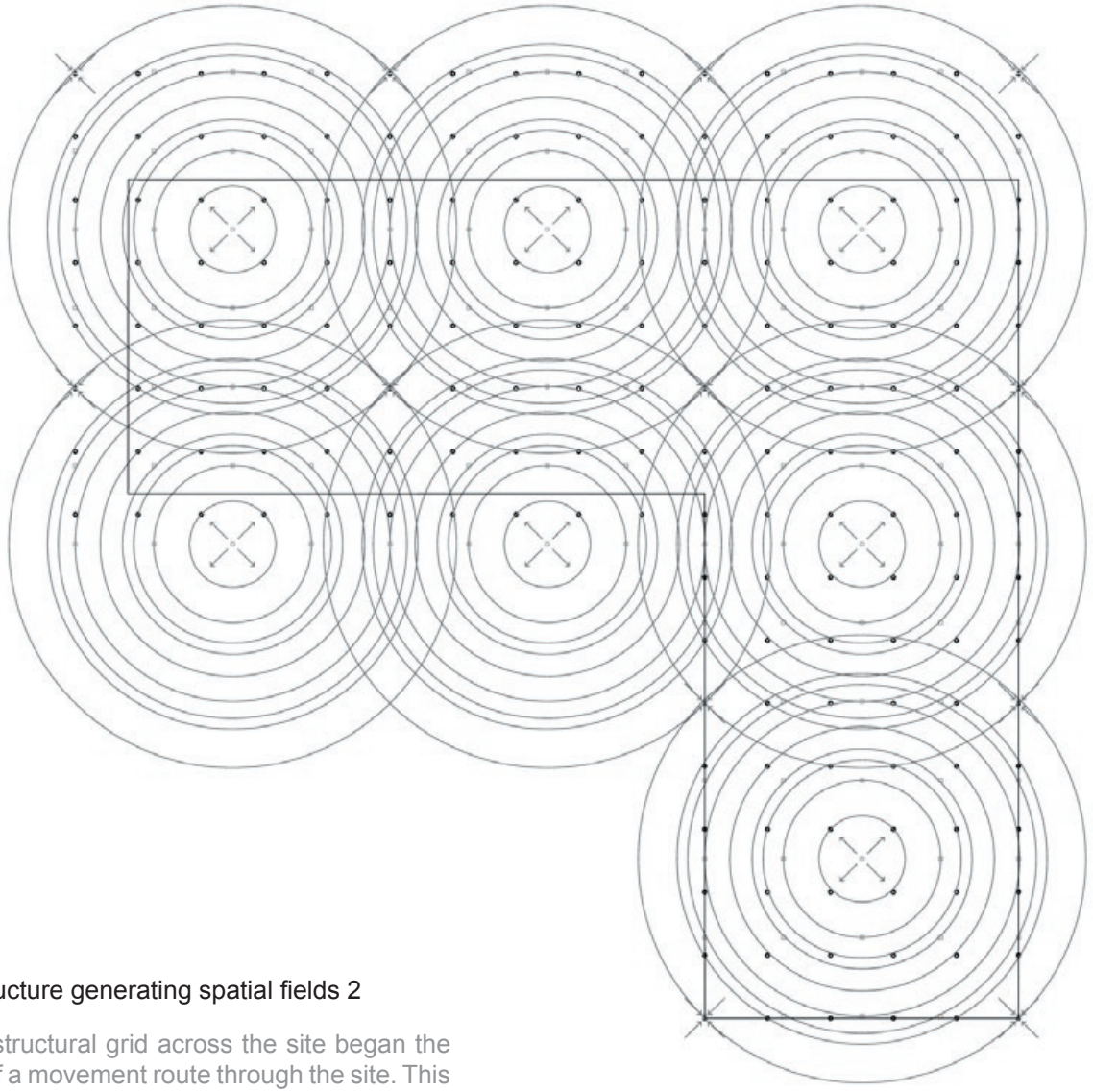


Fig.9_16.Structure generating spatial fields 2

Shifting the structural grid across the site began the positioning of a movement route through the site. This series of points will later become the building circulation areas which will move through spaces of varying spatial expression as sought for in the design.

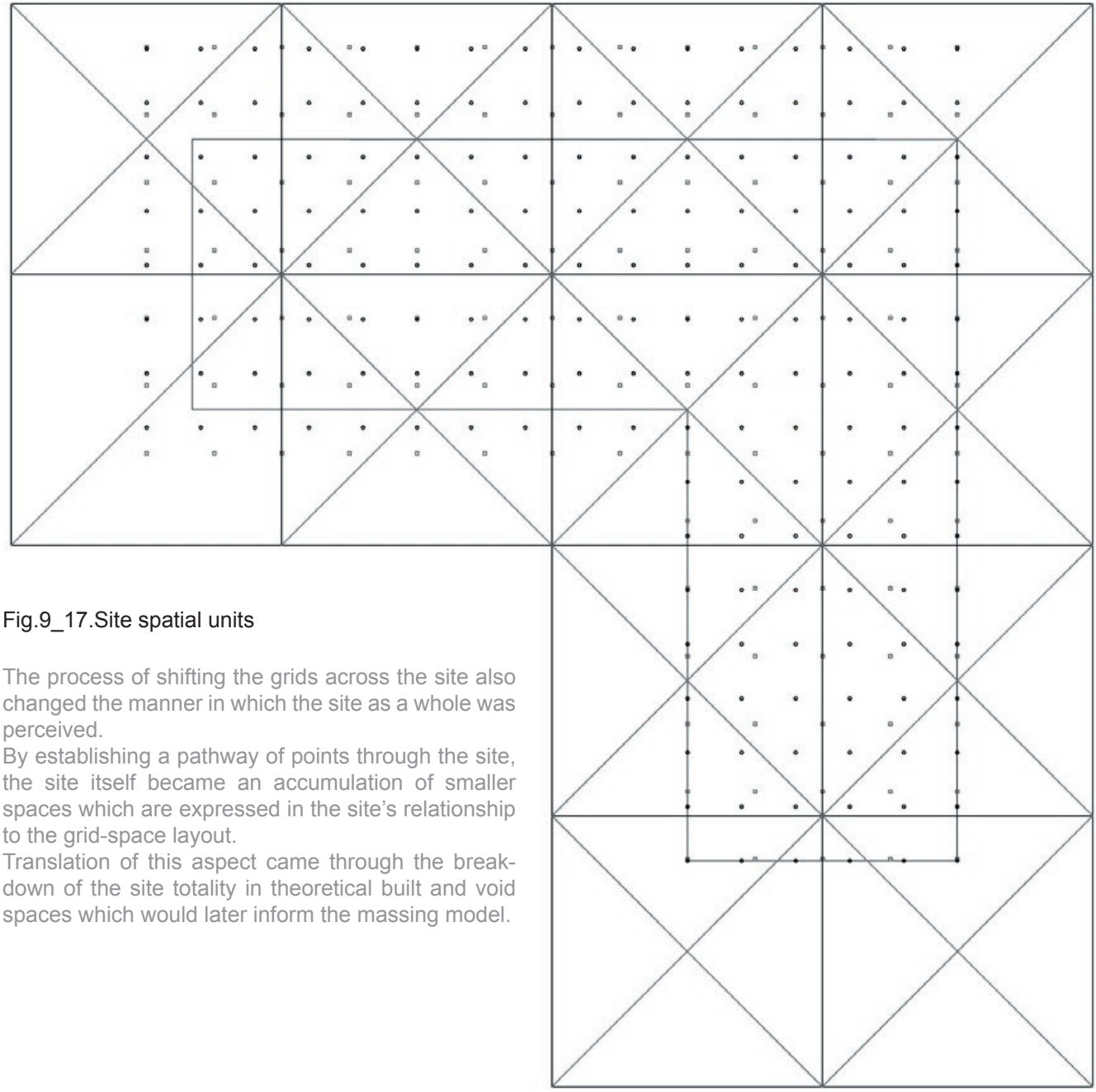


Fig.9_17.Site spatial units

The process of shifting the grids across the site also changed the manner in which the site as a whole was perceived.
By establishing a pathway of points through the site, the site itself became an accumulation of smaller spaces which are expressed in the site's relationship to the grid-space layout.
Translation of this aspect came through the break-down of the site totality in theoretical built and void spaces which would later inform the massing model.

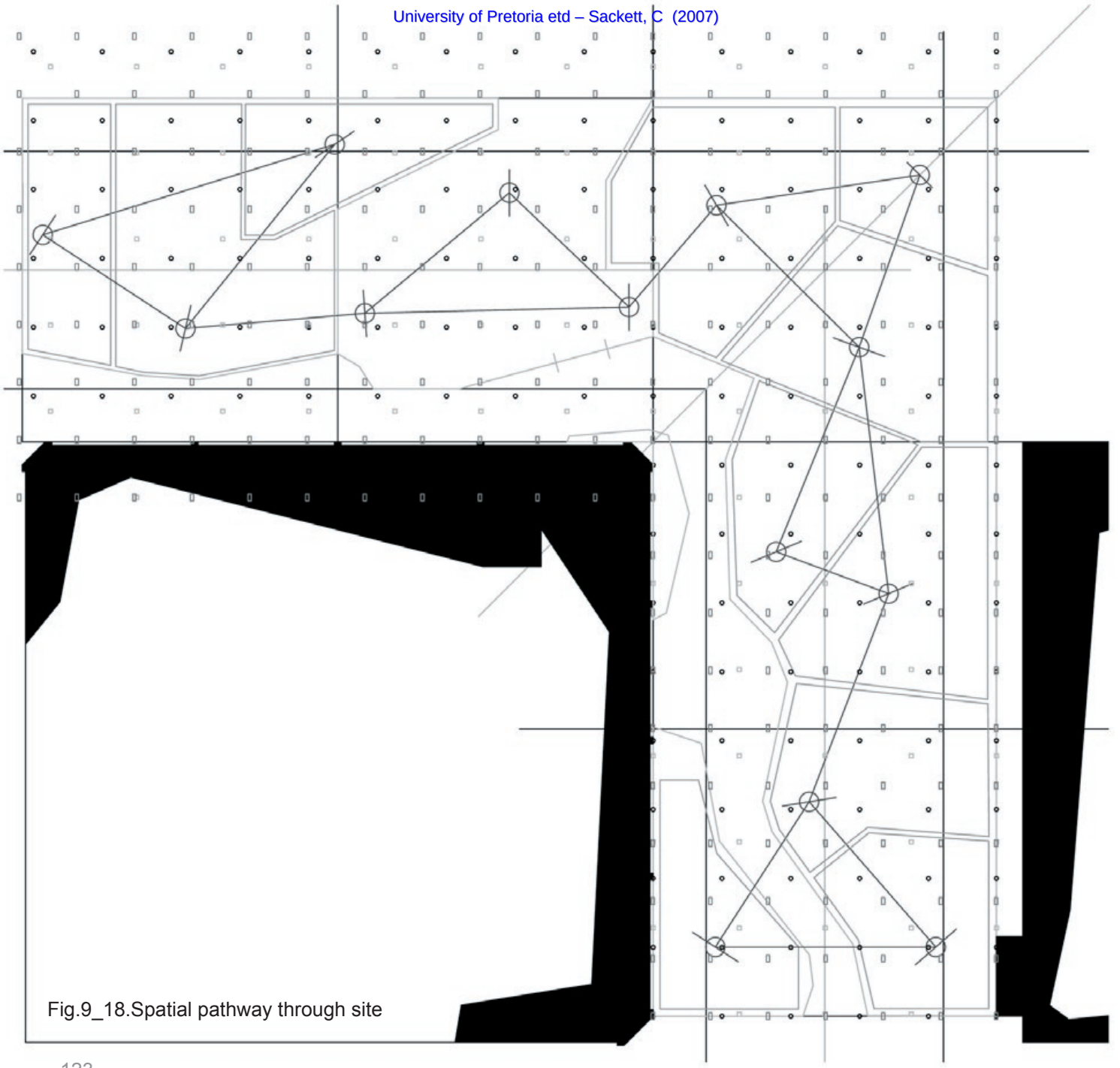


Fig.9_18.Spatial pathway through site

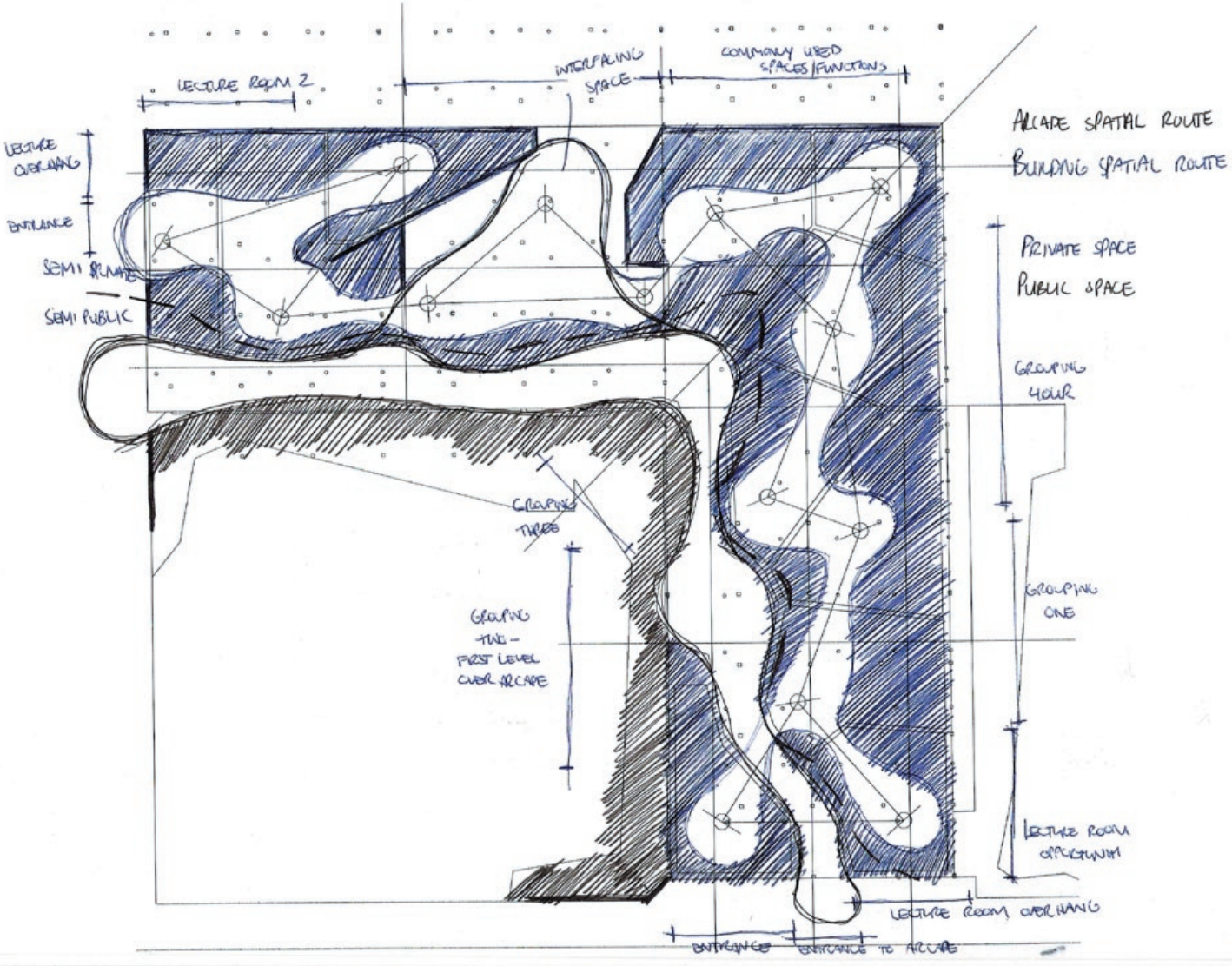


Fig.9_19.Public and built spatial pathways

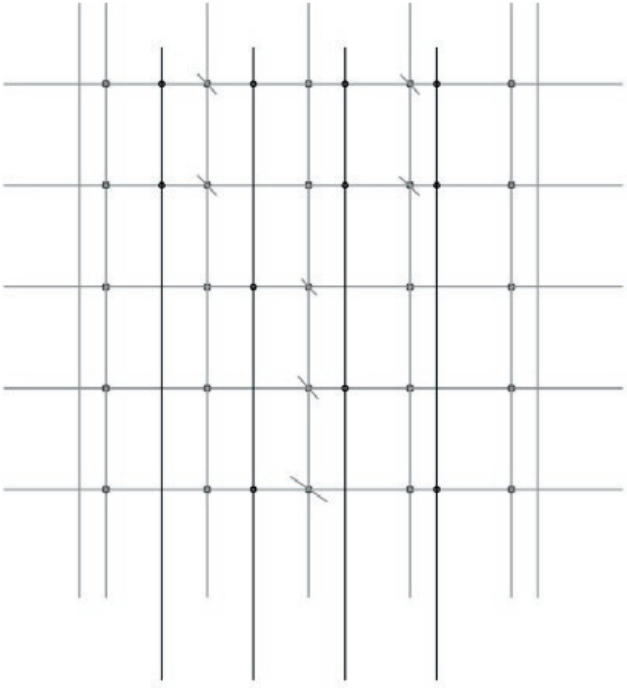
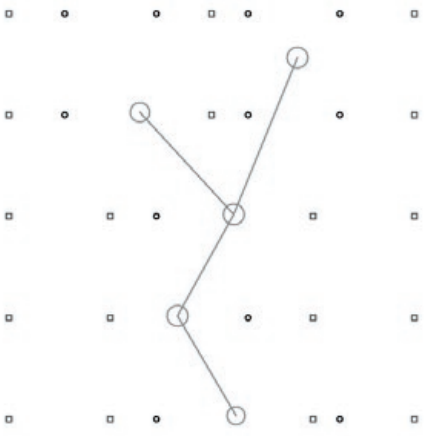


Fig.9_20.Developing paths through structure



M A S S I N G

Form-space play became the next focus in this project, utilising the general outlay developed through the theoretical stage.
The built mass thus began to be modelled around the pathways to separate the various realms within the building, both public and private, functional and spatial.

"To enclose a space is the object of building; when we build we do but detach a convenient quantity of space, seclude it and protect it, and all architecture springs from that necessity."

Geoffrey Scott

Dictated by the varying spatial character required at each point along the path, the built mass was pulled and twisted, stretched and compressed to generate a final assemblage which conceptually resembled the building in relation to the site and the void space permeating it.

The final built mass model was then intersected with a purely functional model of a structure that could occupy the site. This stage was required in order to return the irregular design of the concept model into a representation of an economical and realistic structure.
The result of this intersection left behind the beginnings of the sketch plan phase into which the design was to proceed.

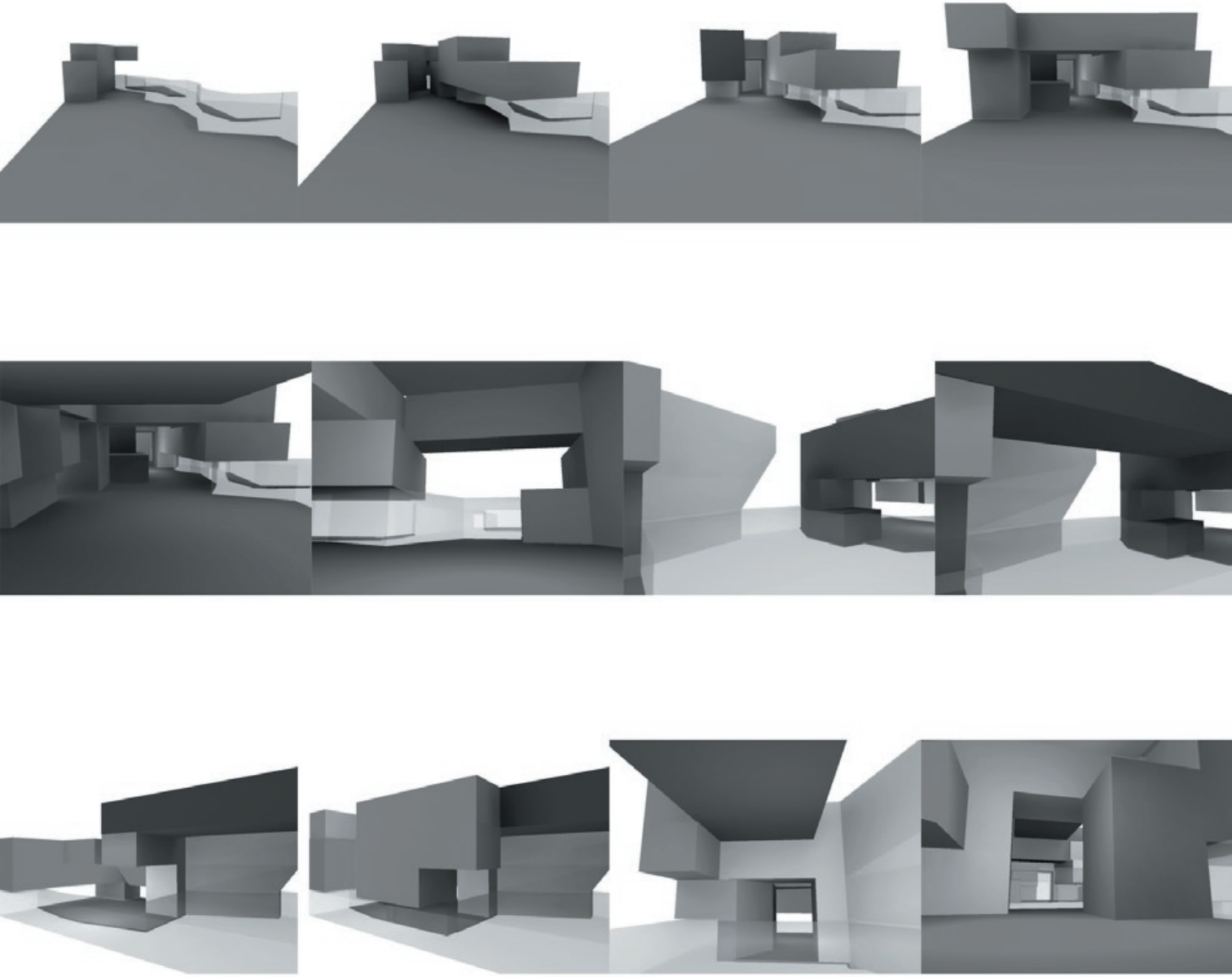


Fig.9_21.Built mass constructed around pathways

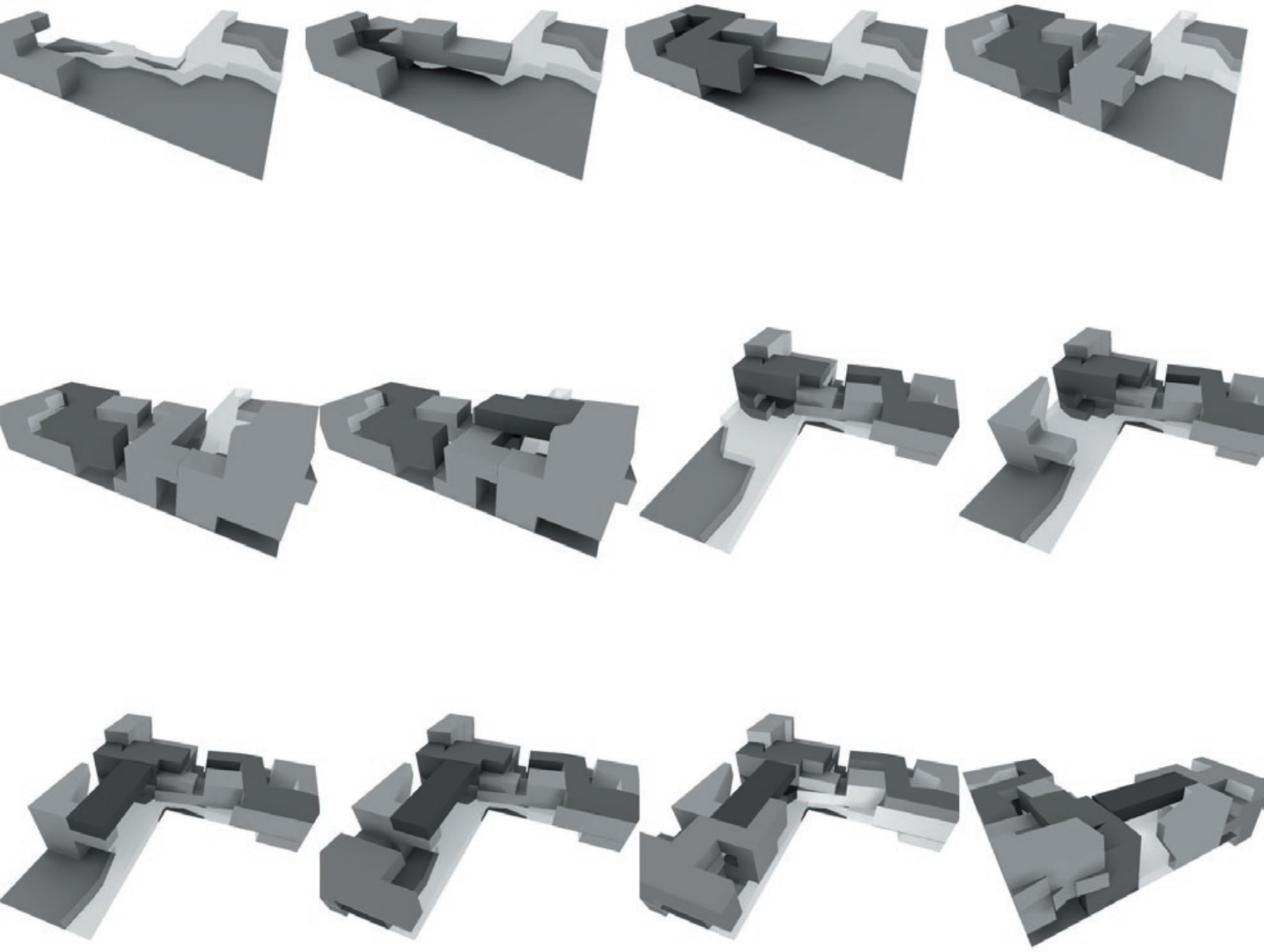


Fig.9_22.Built mass constructed around pathways 2

Fig.9_23.Final conceptual mass model

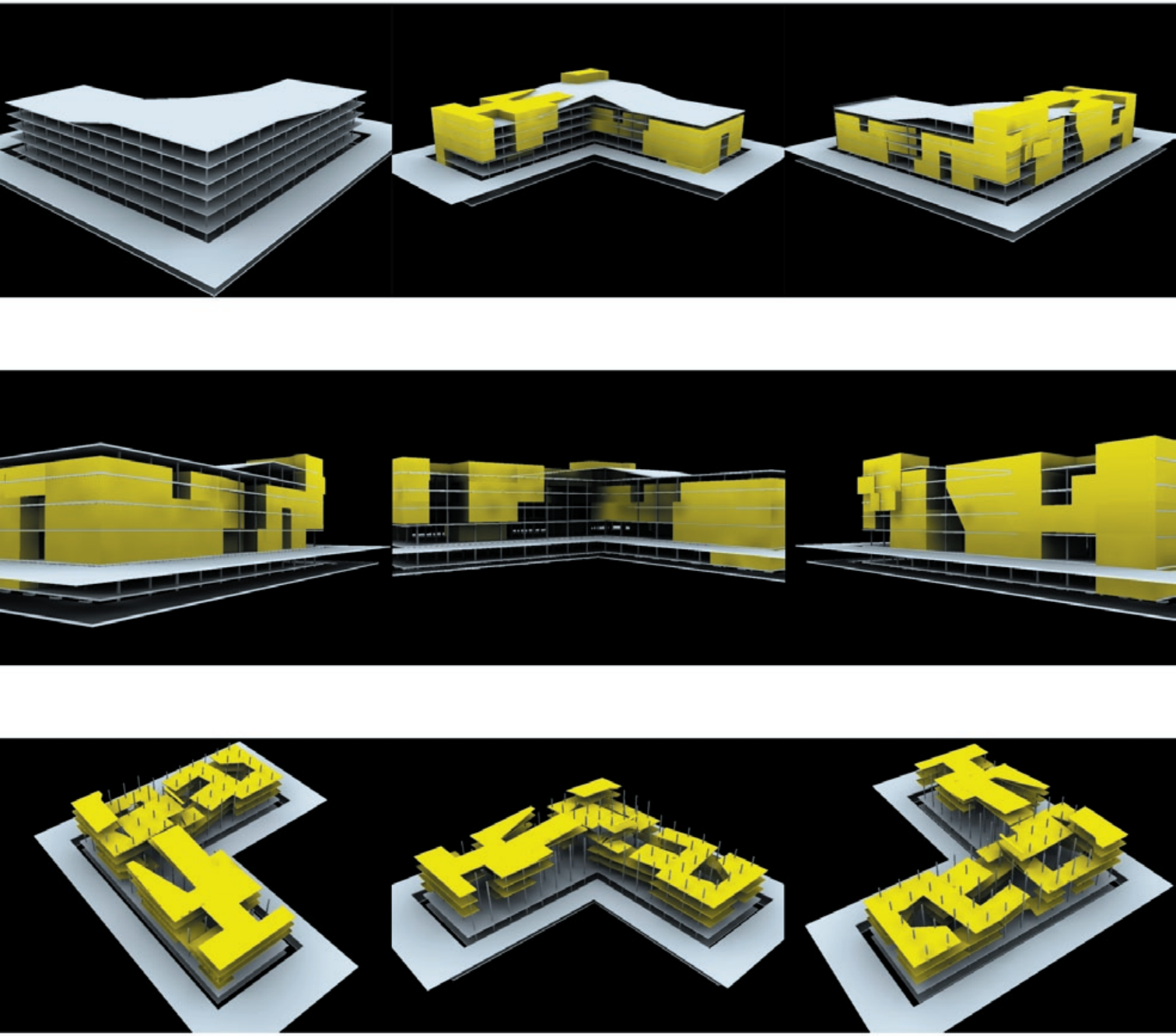


Fig.9_24.Combined models

S K E T C H M O D E L

The process of intersection resulted in the transformation of the built mass model into a semi-realistic arrangement of structure that if constructed would result in the massing model.
However the irregularities in the model required much refining and as such, the sketch design phase concentrated on this refinement process.
Returning to the design considerations mentioned previously, the functional aspects of the design and issues of construction and practical use, receive foremost attention in order to create a user friendly environment.

The spatial quality of the building remained throughout the refinement process as a result of two parts of the design process.
Firstly, the initial focus of the project stemming from the theoretical ideas of space and which in turn were connected with the basic structure, imbued the design heavily with the sought after spatial character.
Secondly through the process of 3D modelling of the space, a much greater sense of spatial connection through the building could be generated. Intricate form-space plays between the various levels in the structure were greatly enhanced through the modelling process which allowed the author remarkable communication with the design of the form. This process finds earlier echoes in the spatial clay modelling done by architects and designers in the middle of the last century.

"The architect models in space as a sculpture in clay. He designs his space as a work of art"
Geoffrey Scott

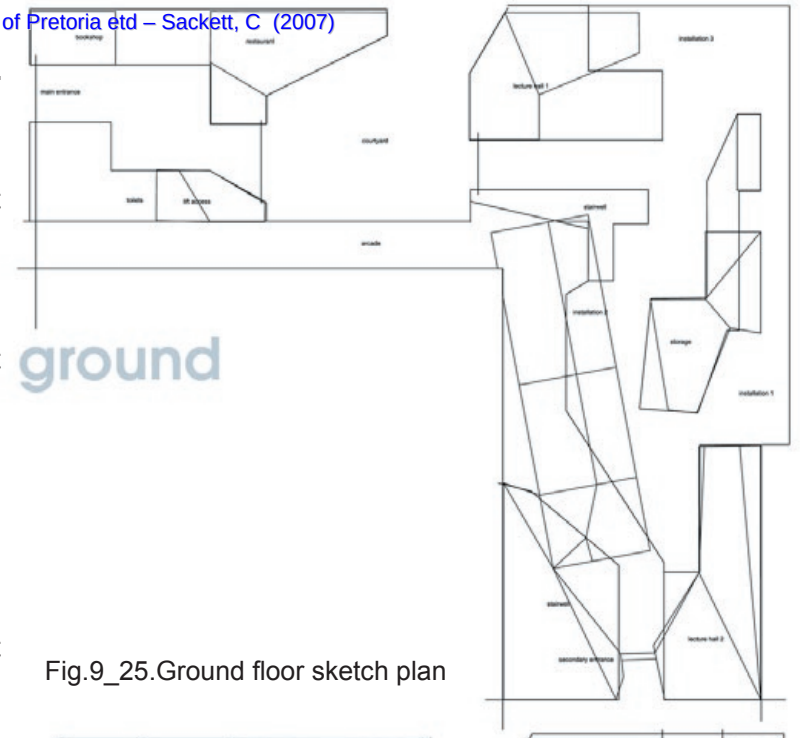


Fig.9_25.Ground floor sketch plan

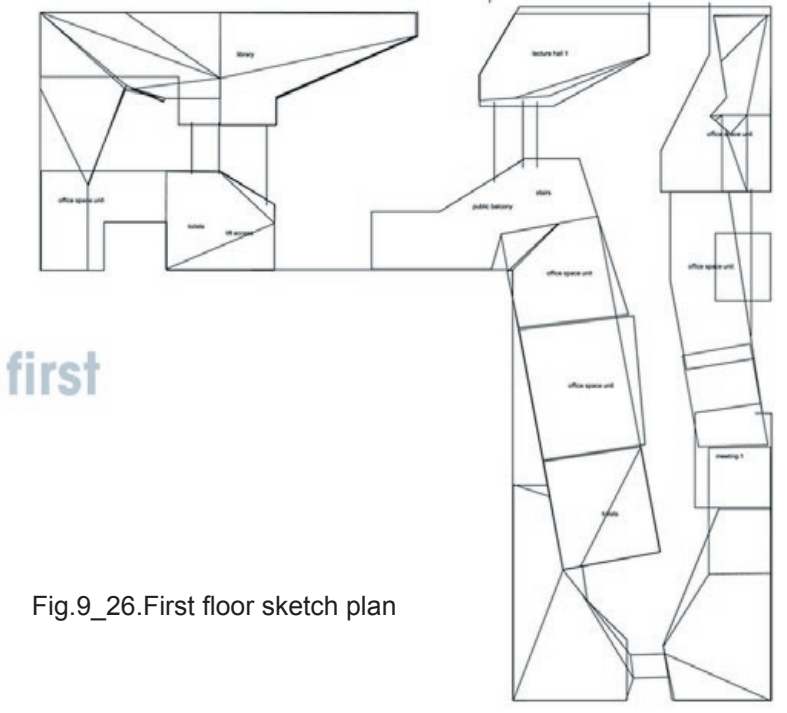


Fig.9_26.First floor sketch plan

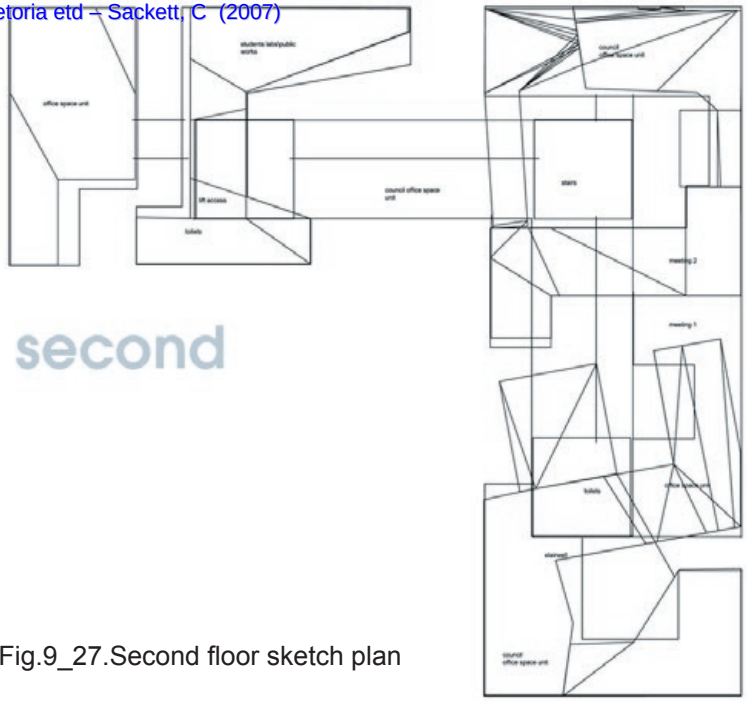


Fig.9_27.Second floor sketch plan

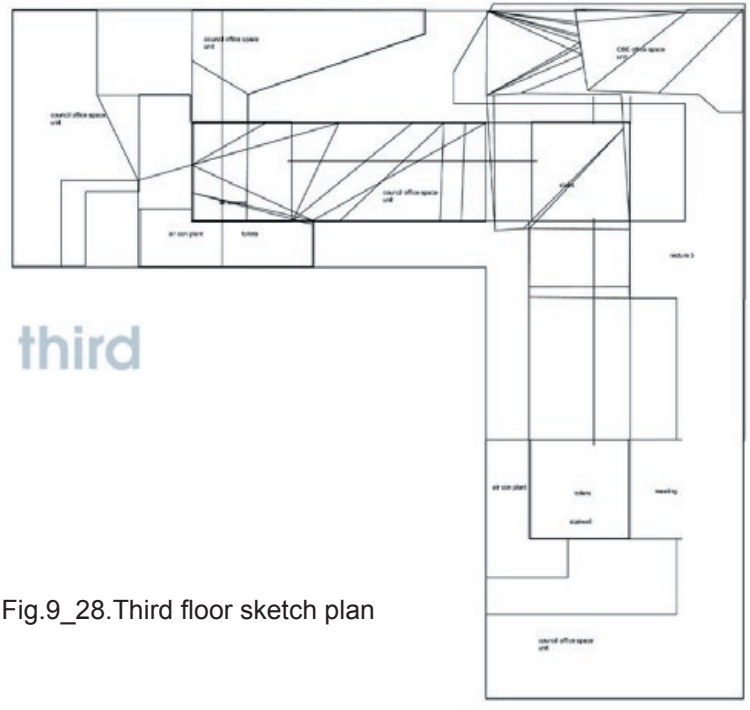


Fig.9_28.Third floor sketch plan

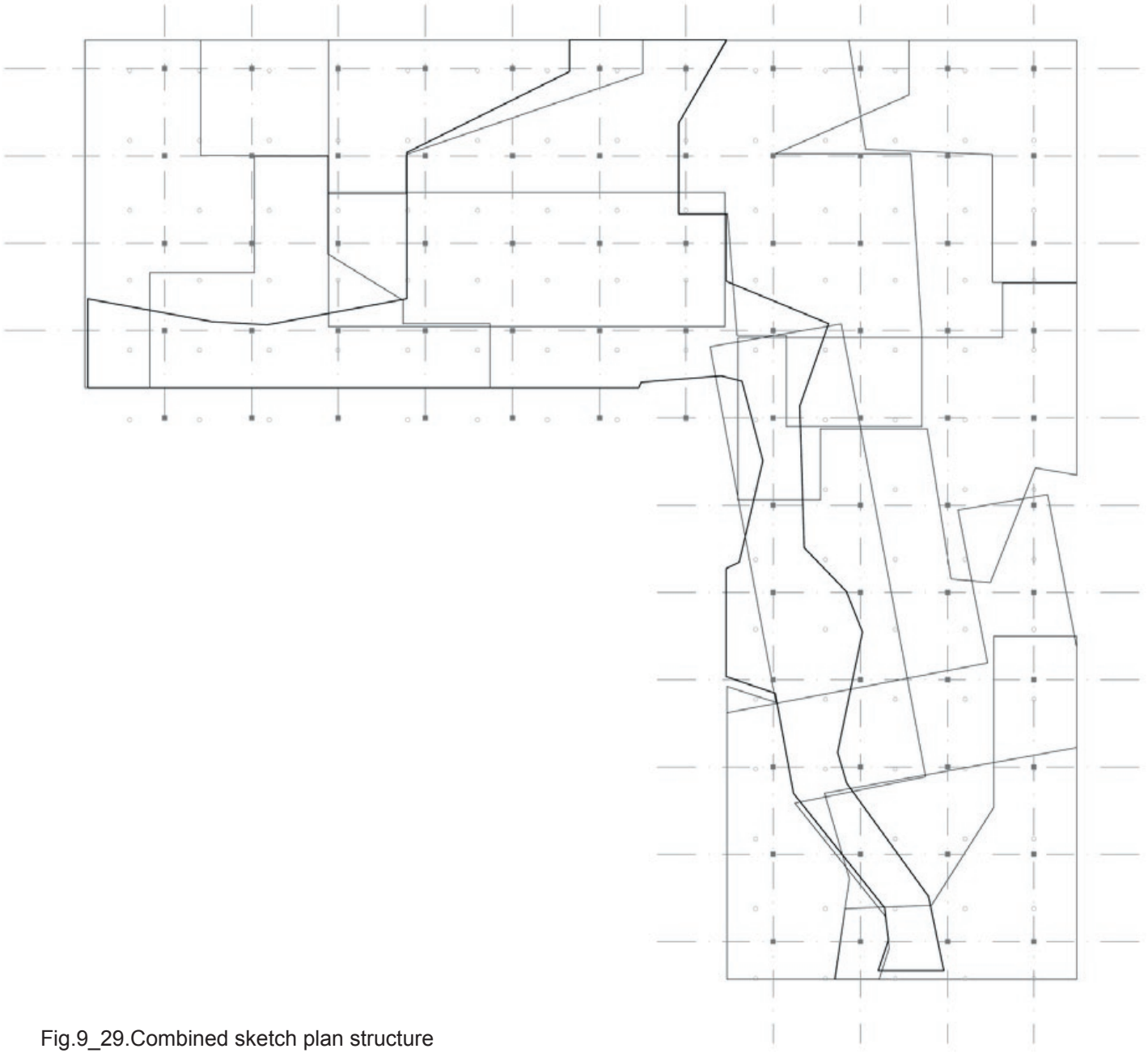
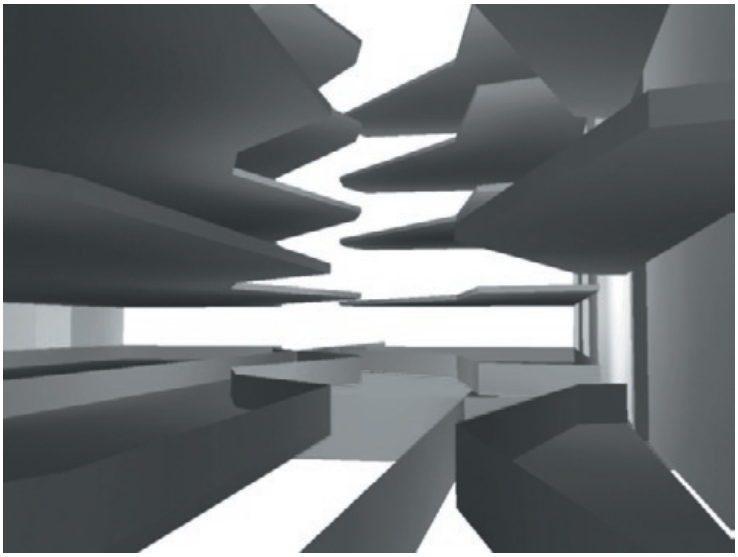


Fig.9_29.Combined sketch plan structure

C O N C E P T U A L I M A G E S



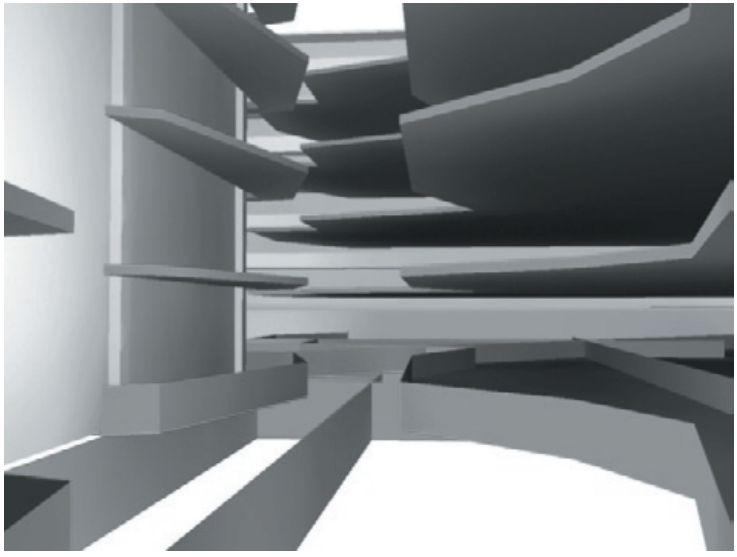


Fig.9_30.Exploration conceptual images

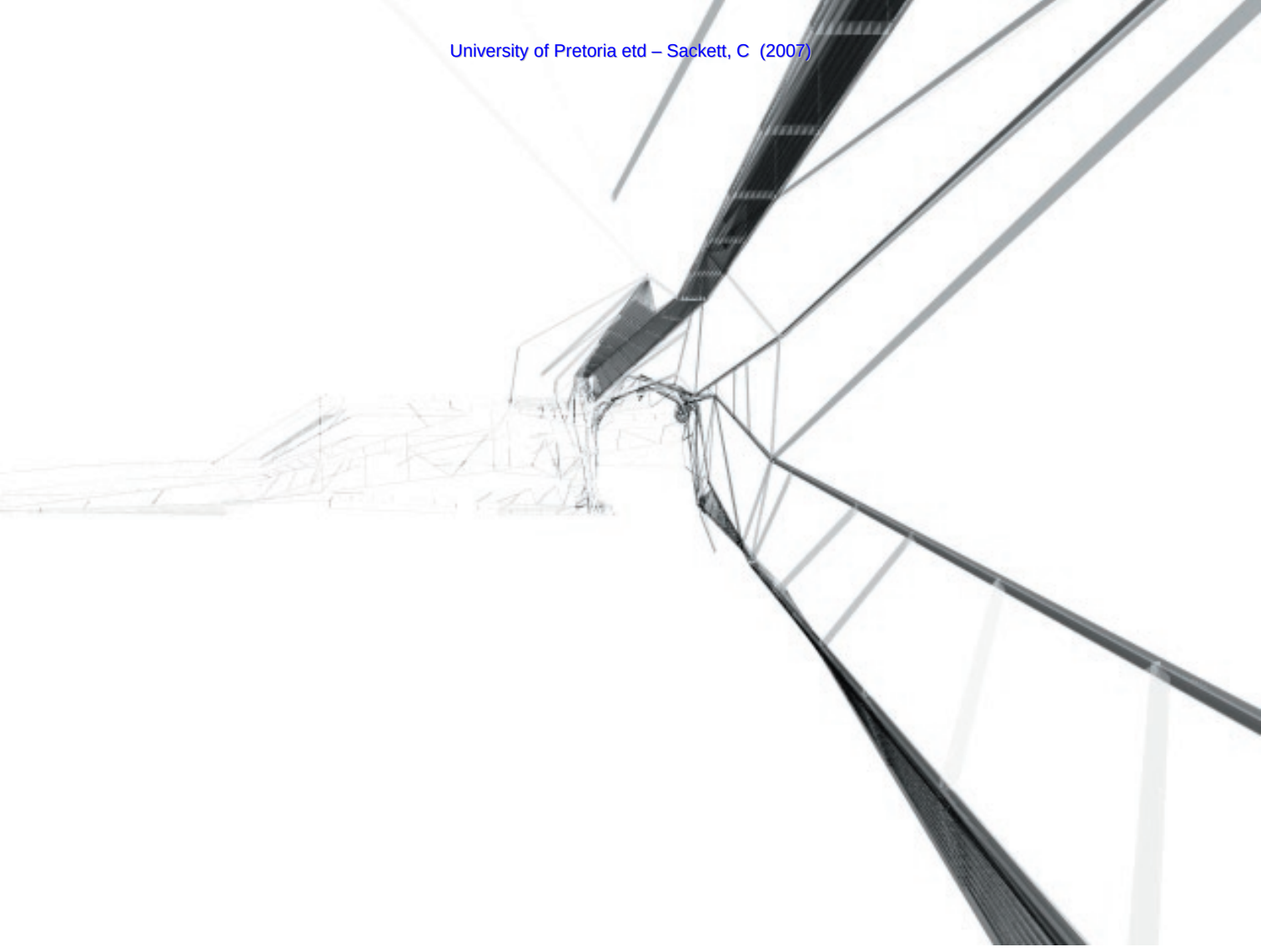


Fig.9_31.Arcade concept 1

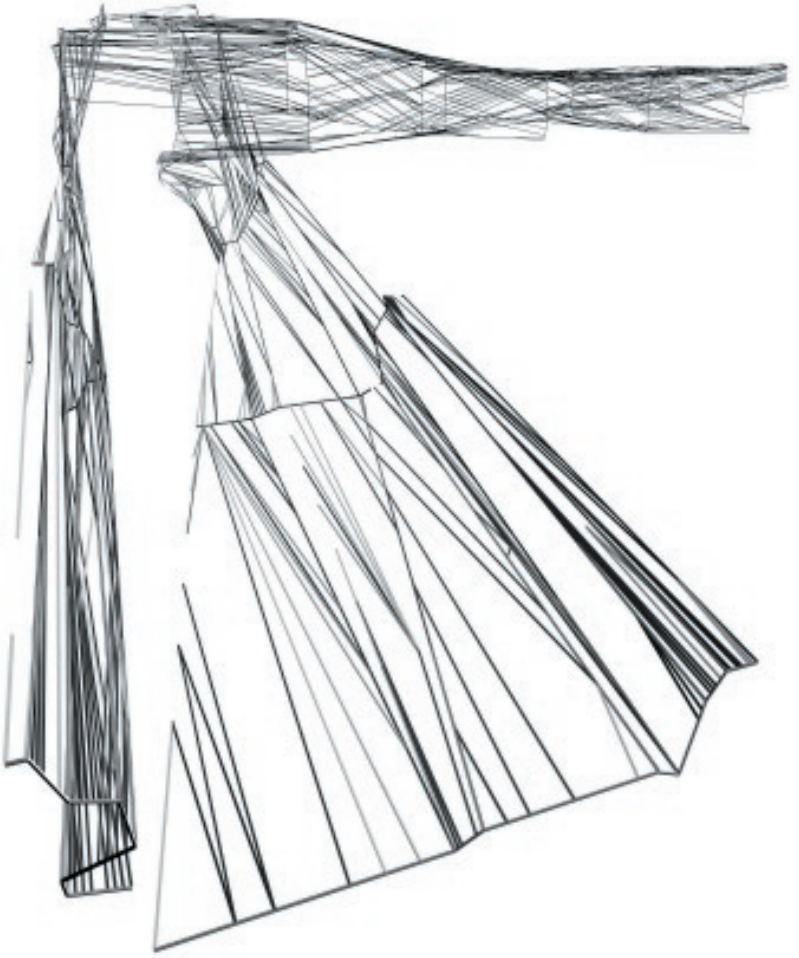
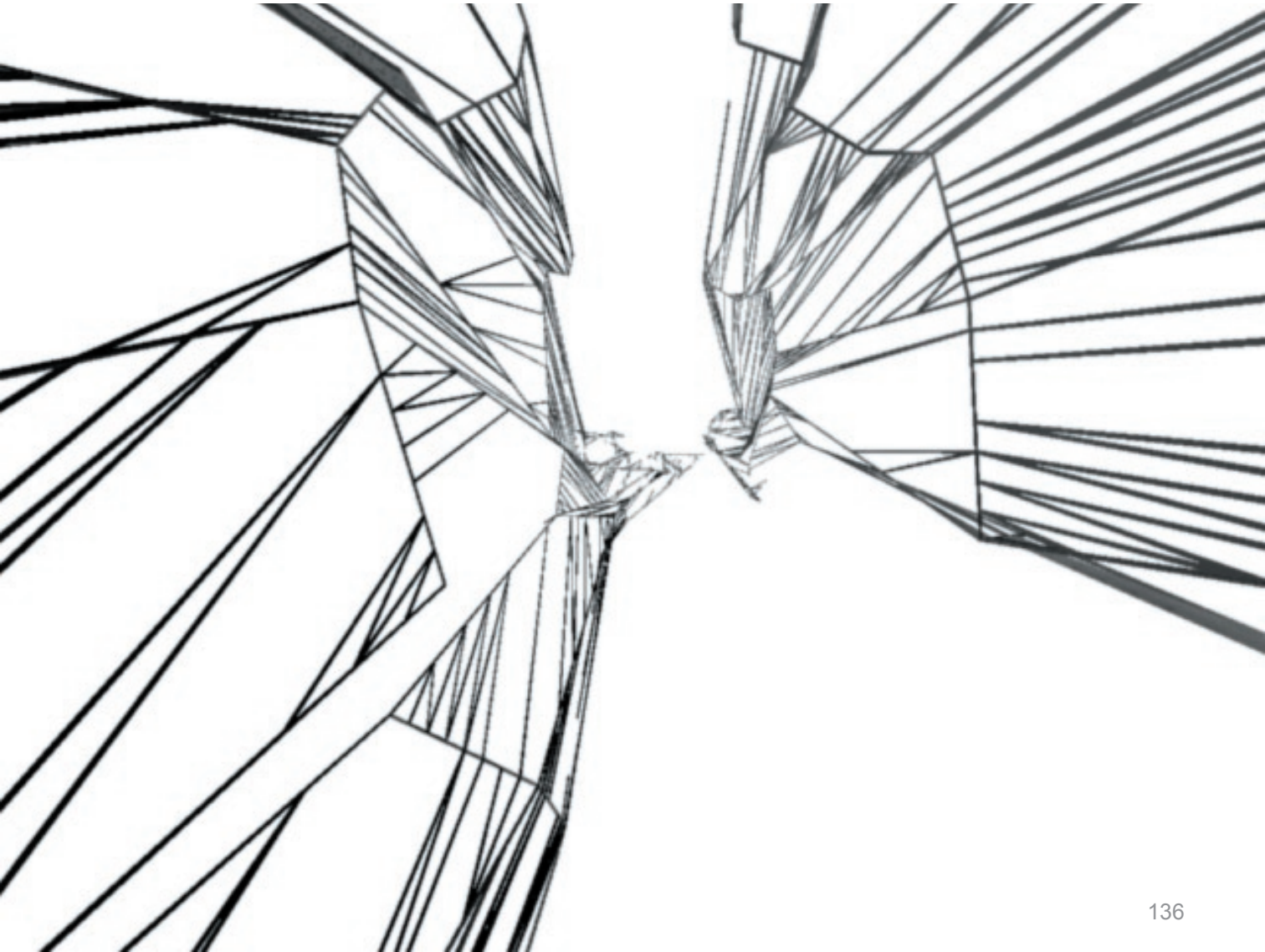


Fig.9_32.Arcade concept 2

Fig.9_33.Arcade concept 3



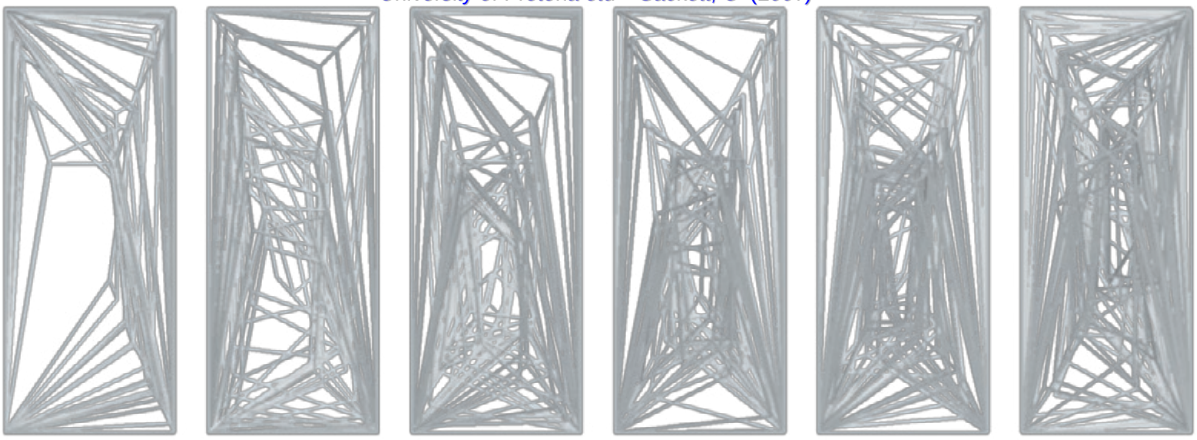


Fig.9_33.Reading space exploration

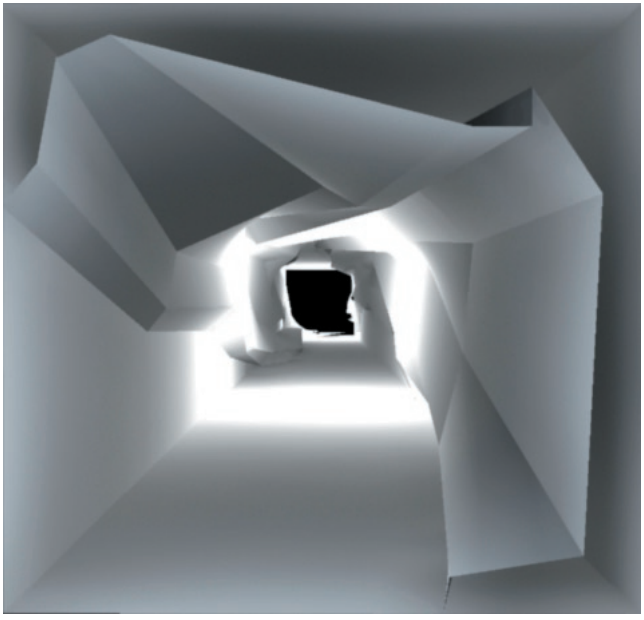


Fig.9_34.Arcade conceptual model 1

Fig.9_35.Arcade conceptual model 2

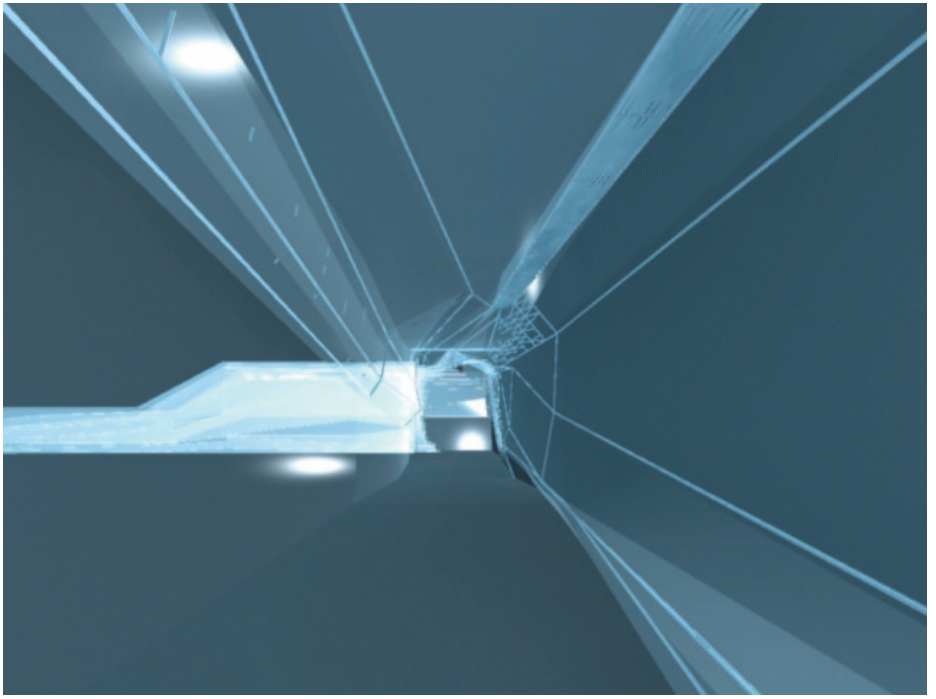
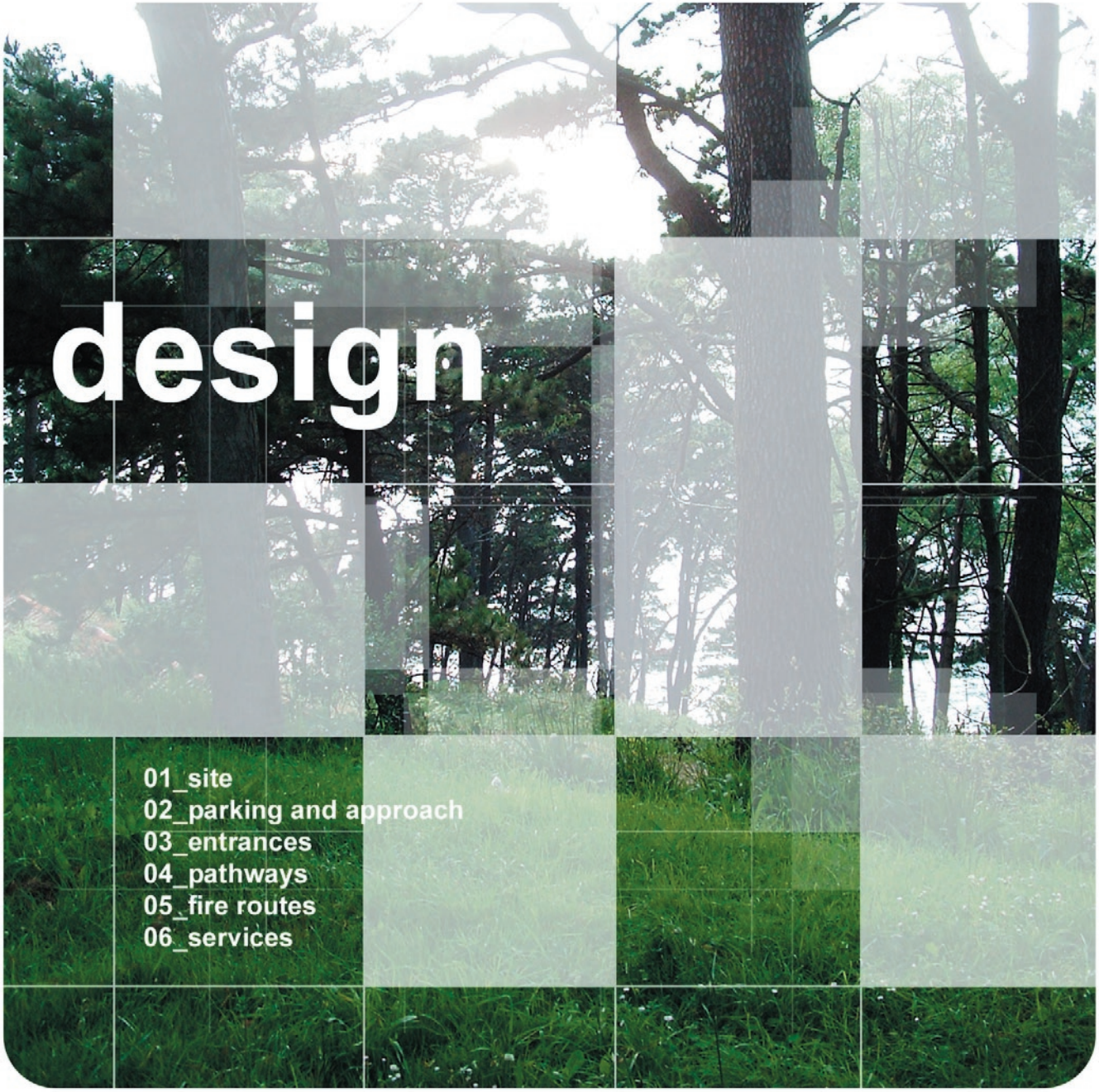


Fig.9_36.Arcade conceptual model 3


design
01_site
02_parking and approach
03_entrances
04_pathways
05_fire routes
06_services

DESIGN PROPOSAL

This chapter deals with the examination of the final built structure as an end product. The various movement routes, access points and servicing issues are examined as final solutions to the various design related problems identified through this document.

The final design speaks on both the theoretical ideas and the necessary functional responses to the project requirements and context.

SITE

PARKING AND APPROACH

The investigation into on-site parking was been discussed previously with the resolution to have all necessary parking requirements fulfilled by the newly planned parking garage to be constructed on the adjacent northern city block. The route thus from the parking garage to the facility will follow Paul Kruger street south to the site.

Additional approaches to the facility are through pedestrian and public transport routes.

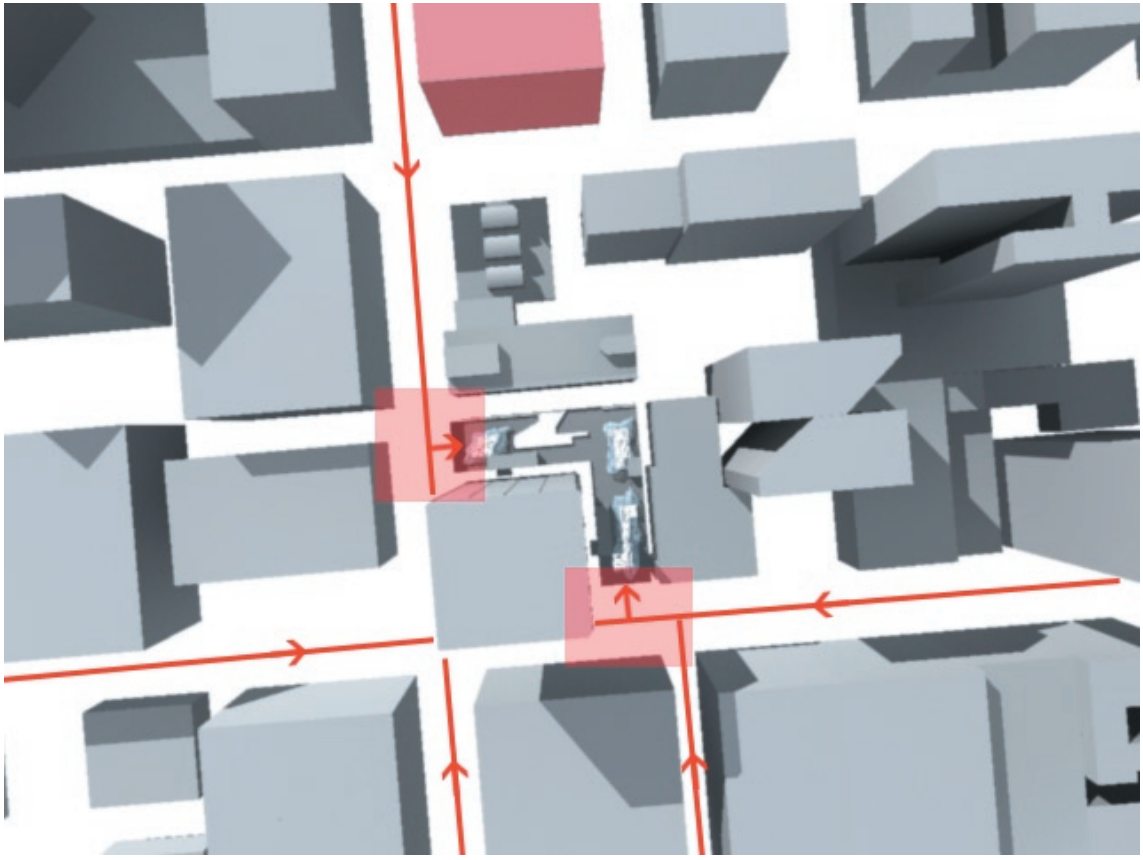


Fig.10_01.Site access model

The main bus stop serving the northern areas of Church Square is located opposite the eastern entrance to the CUBE building. Large volumes of people will gain access to the project through this public transport point.

On the southern edge of the site facing Vermuelen Street there are a number of public taxi stops and an additional bus stop which serves the flow of people from east to west.

Private vehicle parking around Church Square will enable visitors to find nearby parking within easy walking distance of the facility.

Pedestrian flow through the city will remain confined to the sidewalks. With the incorporation of the public arcade however, this movement around the edges of the site is given an alternative route to follow. One which welcomes the public into the built fabric rather than exclusion to the edge.

E N T R A N C E S

The various flows of public movement centre along the southern and eastern edges and through the length of the arcade. Each of these points have been provided with access into the building.

The eastern main entrance will face onto the pedestrianised Paul Kruger Street in the future where the majority of visitors and users will enter the structure.

The southern entrance is secondary and provides easier access to visitors arriving by the east-west bus and taxi routes. Facing onto Vermuelen Street, movement is restricted to the sidewalk adjacent to the road and as such does not make an ideal pedestrian friendly experience.

The arcade entrance into the courtyard provides quick access to the public facilities within the building. The movement of people along this route also allows the CUBE facility the opportunity to inform people on issues related to the built environment of the city.

P A T H W A Y S

Movement through the building on a large scale is centered about the main atriums and acts in a similar manner to the arcade with the availability of natural light and the central line of movement.

Each floor is examined with regards to movement between the spaces to examine the ability of the user to use the building in a safe, secure and functional manner.

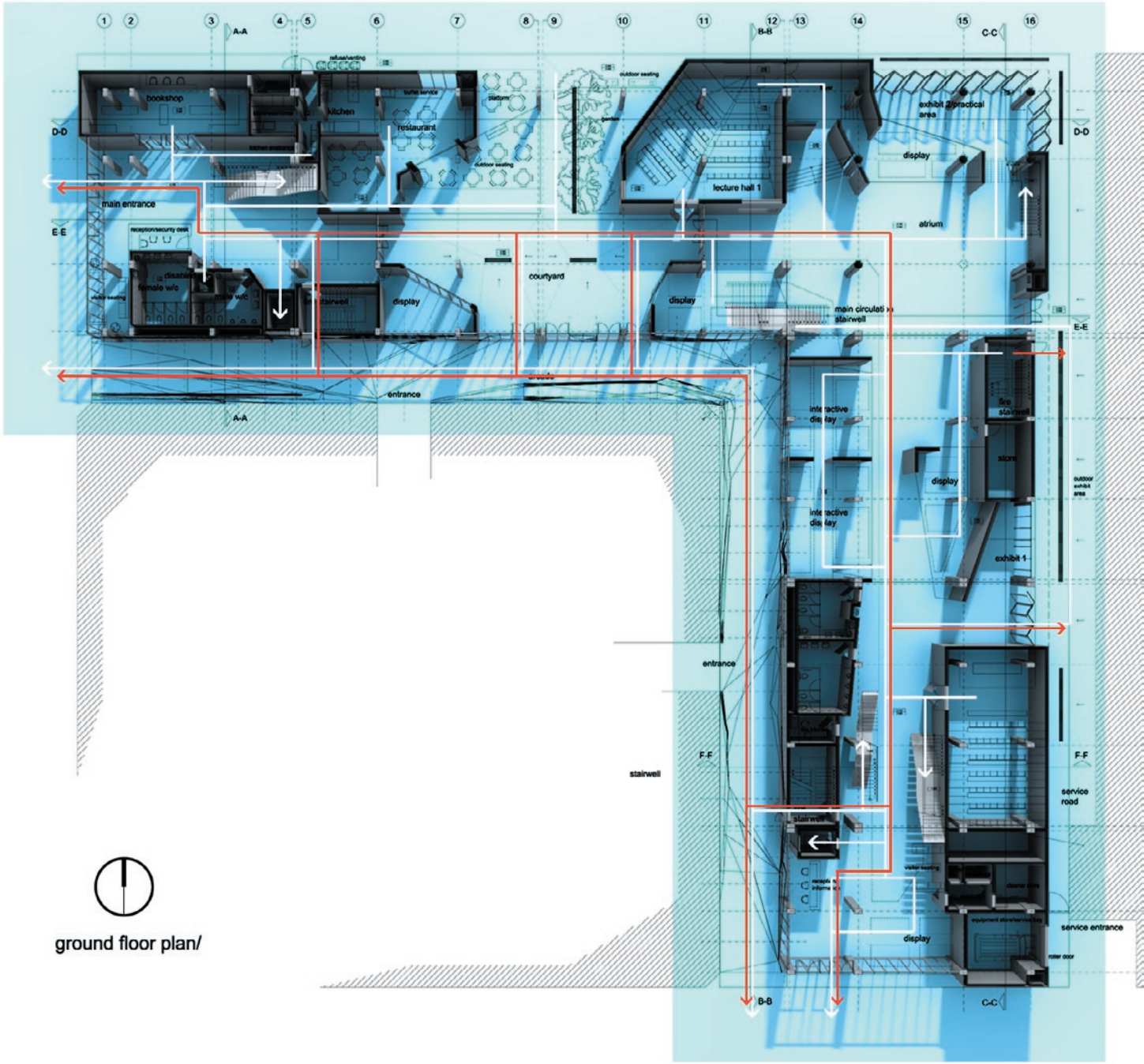
F I R E R O U T E S

The general fire escape movement principal as discussed earlier is now implemented through the design and is indicated in red in the diagrams.

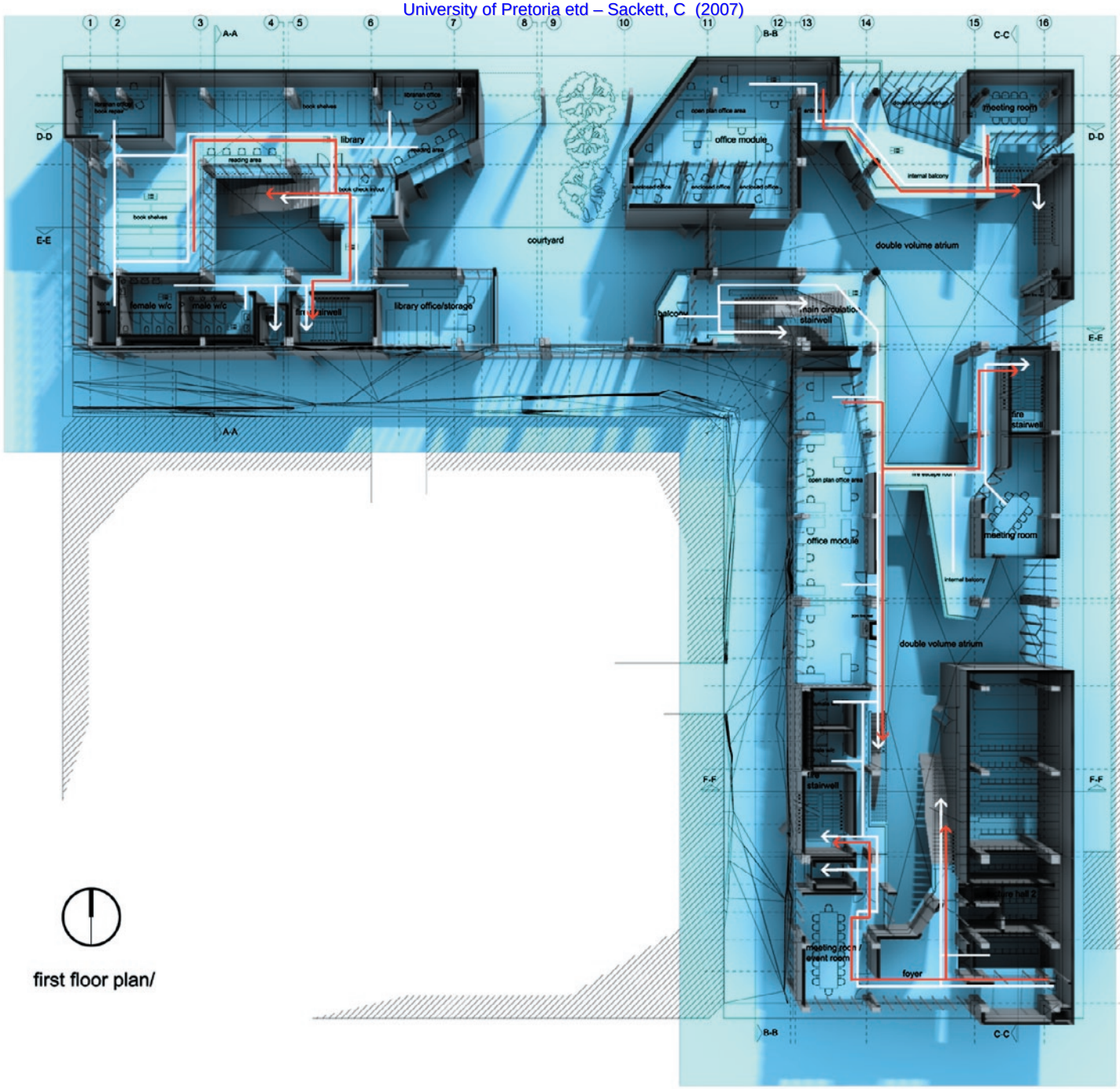
S E R V I C I N G

The central servicing spine which runs below the arcade provides the necessary services at any point along the buildings length. Through the use of dropped ceiling construction systems and vertical ducts, the services can be brought up to the top floor and spread to serve the individual spaces.

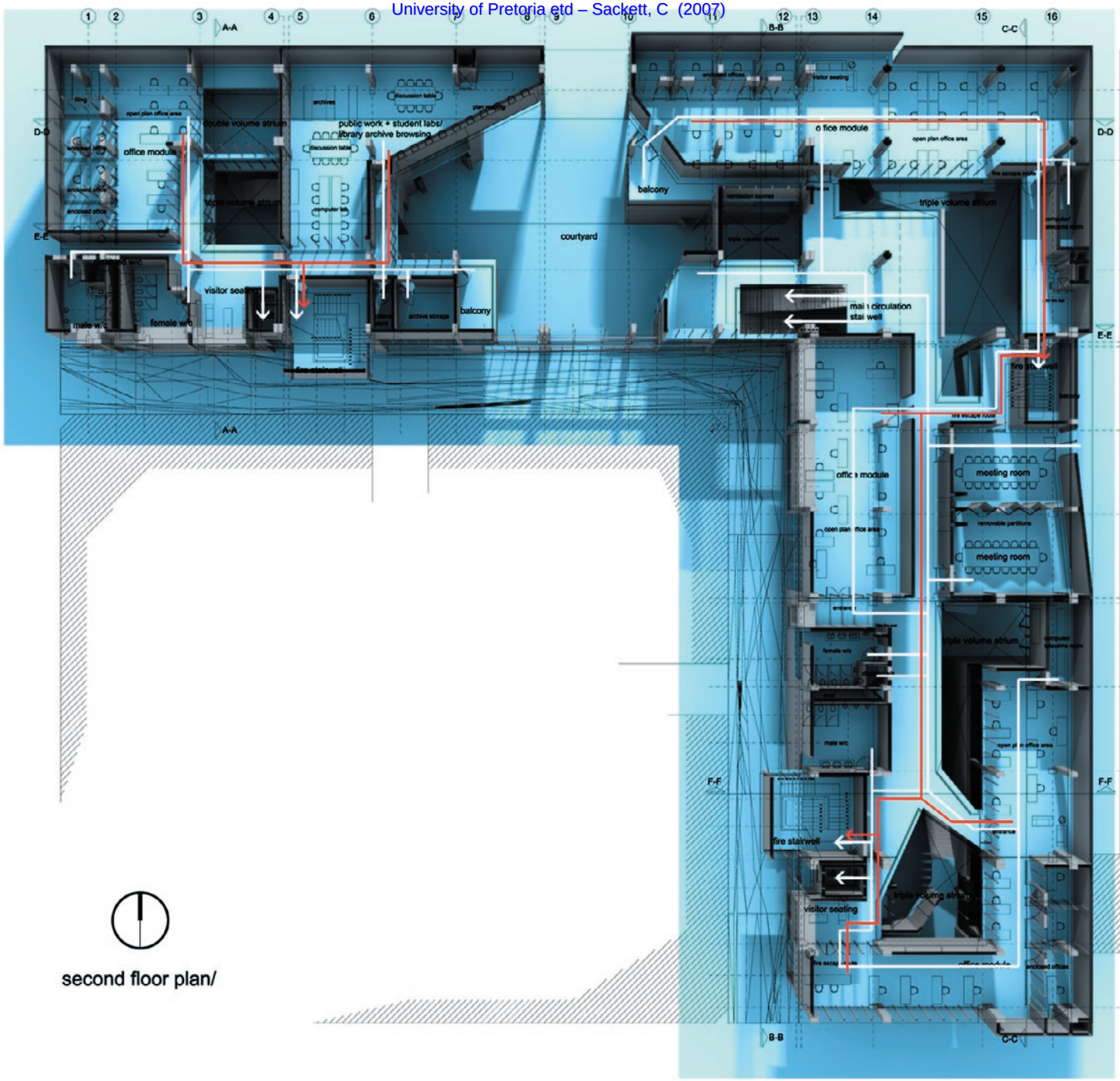
The plant rooms located on the roof operate in a similar manner. Both provide the necessary heating and cooling equipment to stabilise the air temperature within the building to suit the users comfort. The two plant rooms work together to extract air from the outside environment and push the air downwards into the building.



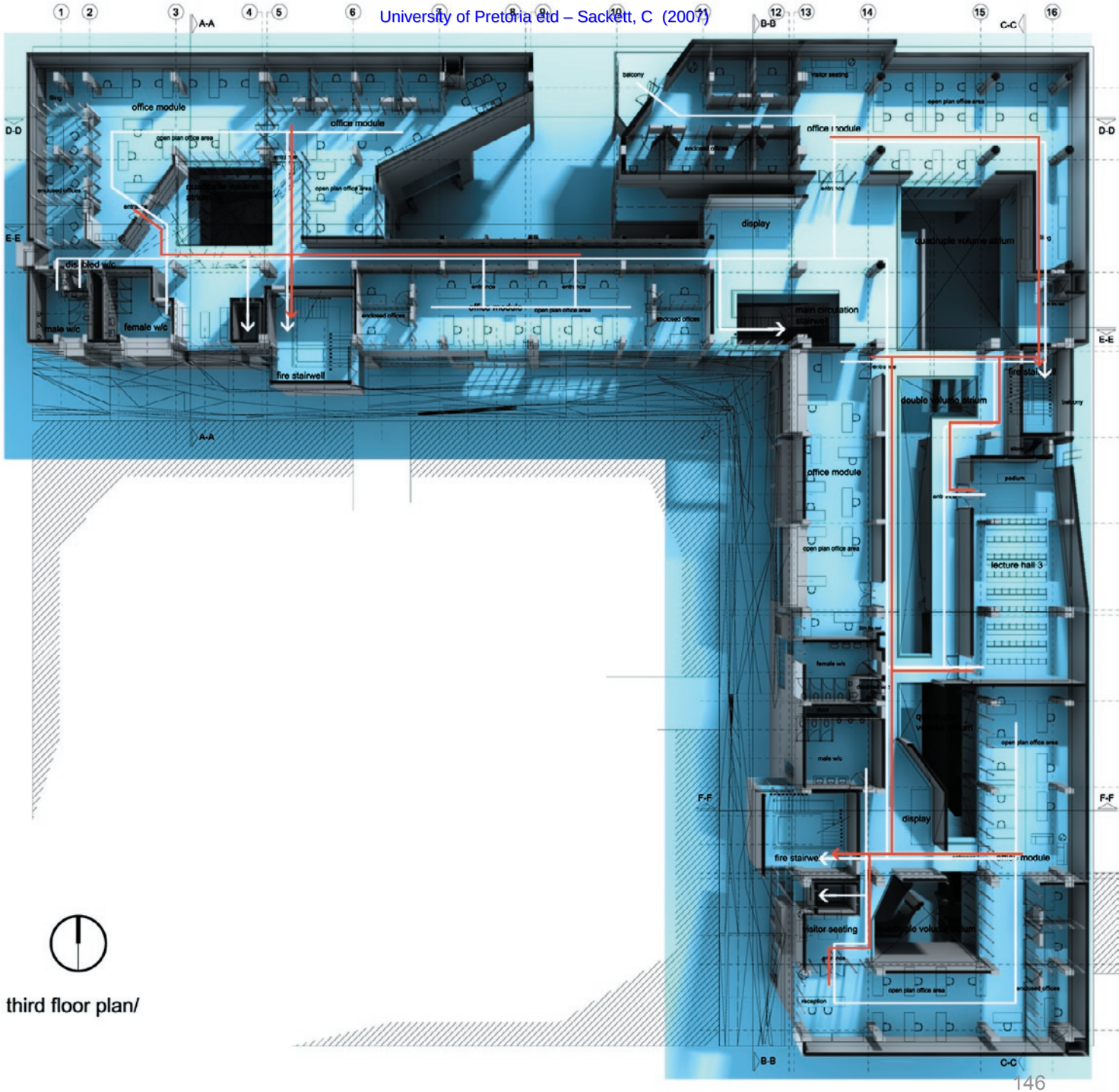
ground floor plan/



first floor plan/



second floor plan/



third floor plan/

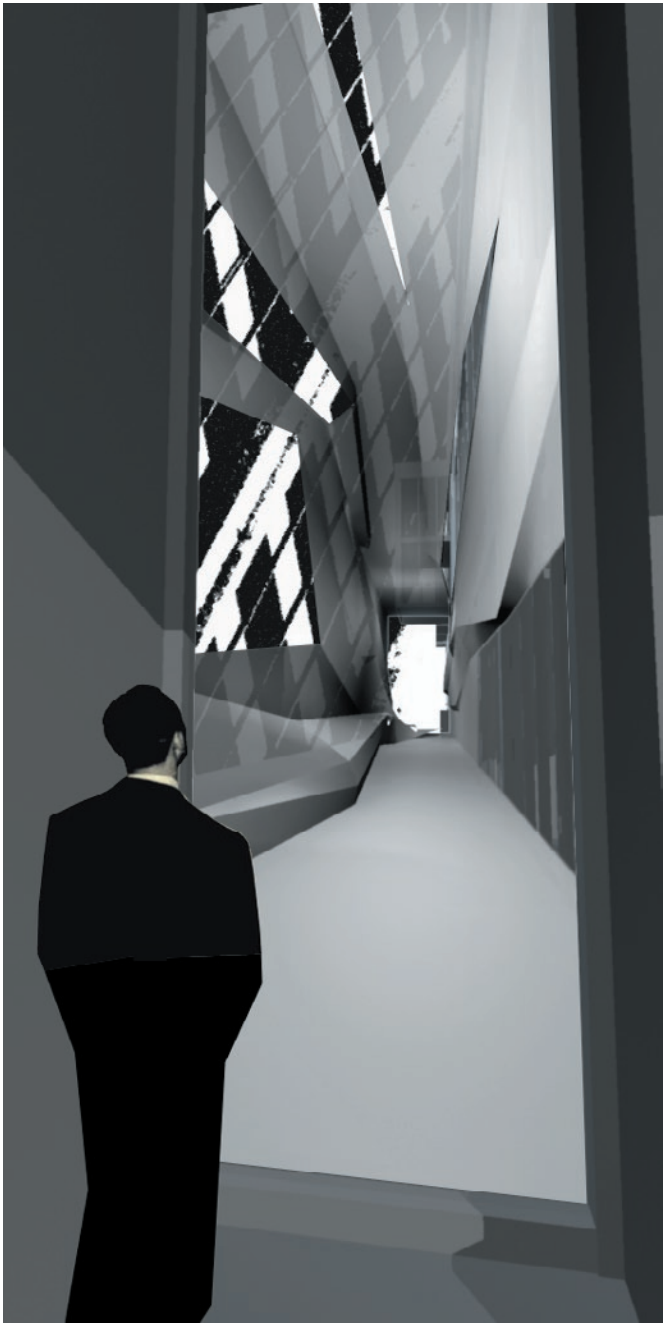


Fig.10_02.View into arcade space west

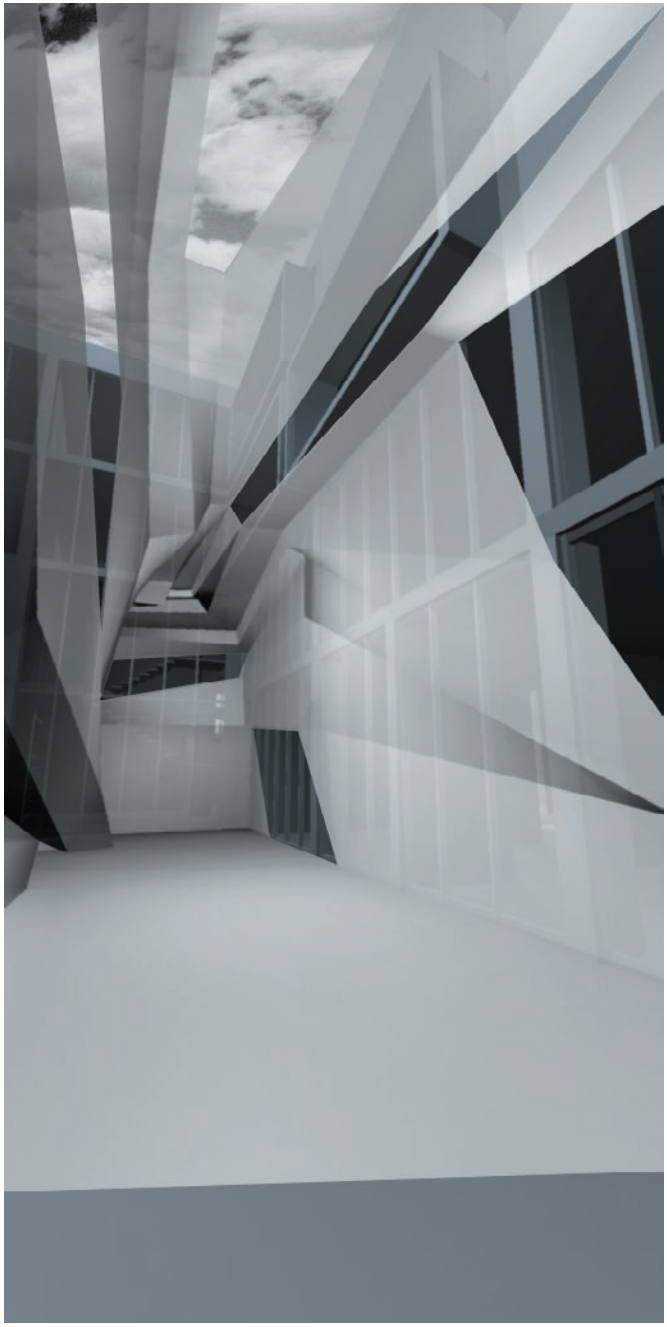


Fig.10_03.Internal arcade view north

Fig.10_04.View of arcade from main stairwell

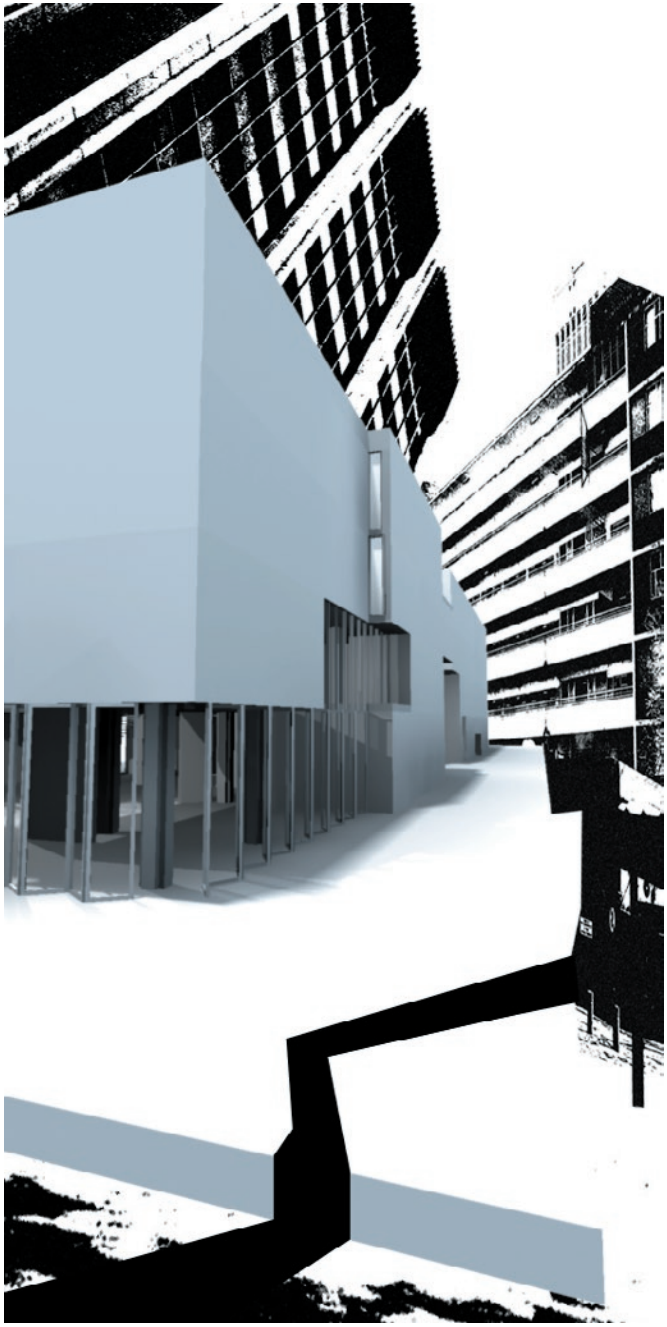


Fig.10_05.North eastern external view

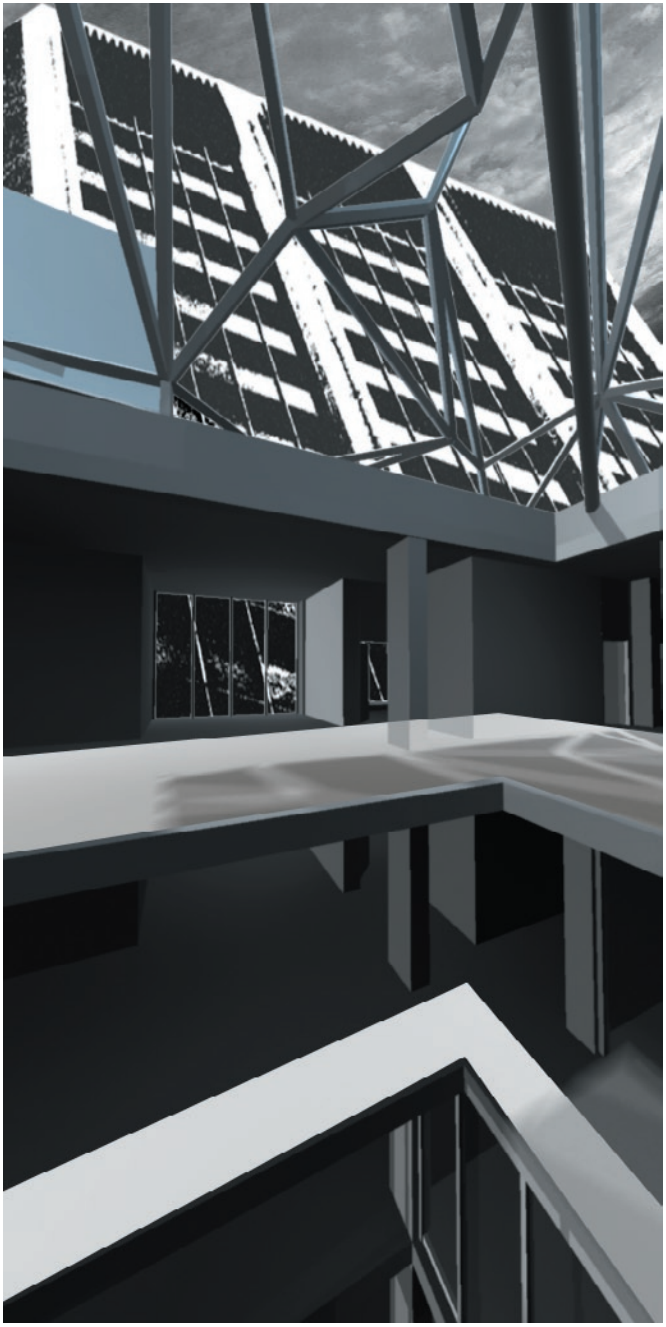


Fig.10_06.Atrium space

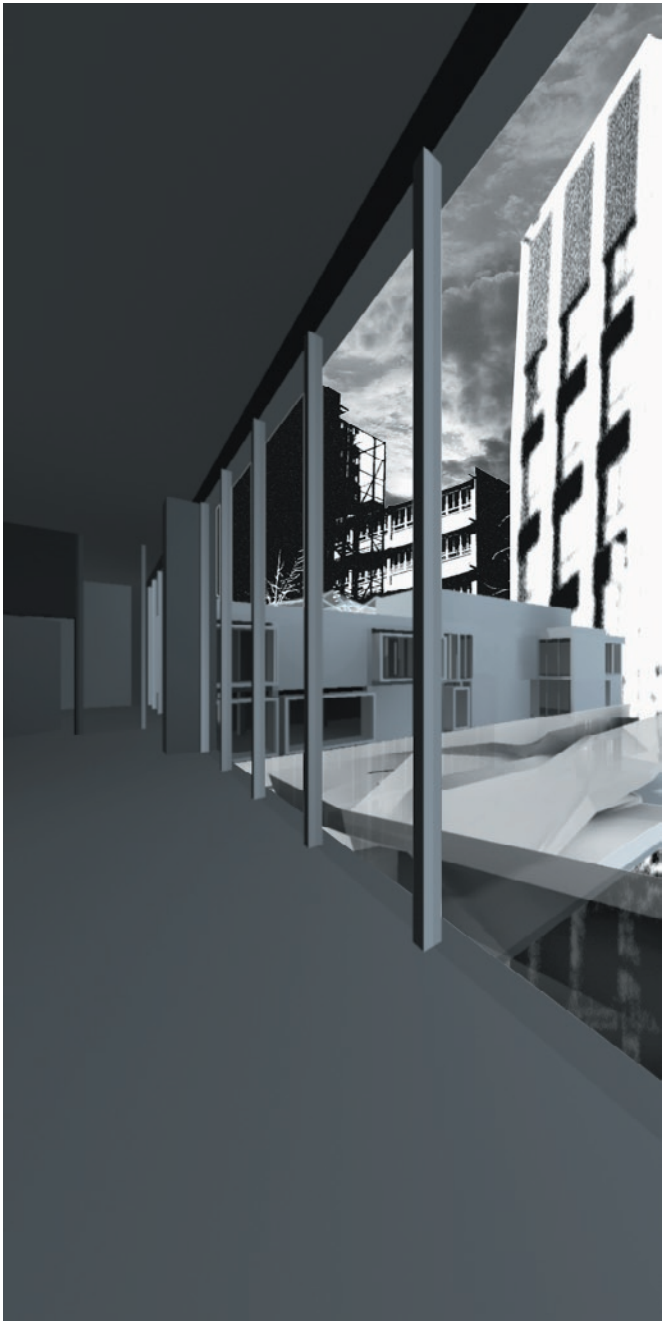


Fig.10_07.View over arcade

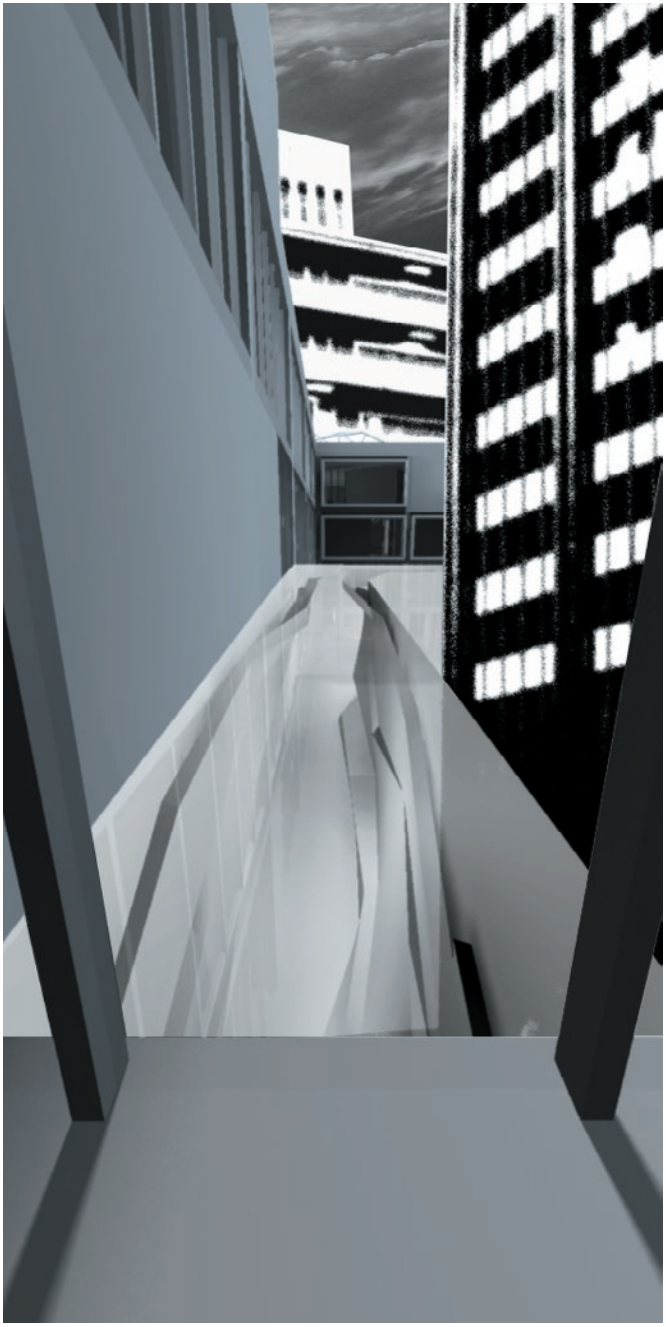


Fig.10_08.Stairwell view over arcade

TECHNICAL STUDY

INTRODUCTION

This section serves to highlight the numerous technical considerations and decisions taken towards the practical realization of the project. Success of any architectural structure is measured in part through its fabrication and construction processes which when successfully integrated with design can lead to both a feasible and provoking form. This investigation will thus impart to the reader, the processes of synthesis between the theoretical design objectives and the technical manner of their solution.

TECHNICAL DESIGN

There is sufficient basis in the authors experience to state that technical resolutions of designed spaces may at times, begin to either remove focus from the spatial design of the structure or, of greater concern, begin to detract from the initial expressions of the design.
It thus becomes of great importance for the author that objectives be stated and met, not only at a design level but at a technical level too, expressing similar thinking to that of the buildings design. To negate this step puts into jeopardy the clarity of expression and communication through the design.
Thus several objectives have been identified in the technical resolution of the design of this project, to be kept foremost in thought through the investigative process into solutions.

SPATIAL QUALITY PRIMARY

Through the theoretical investigations expressed earlier in the book, focus was placed primarily on the quality of spaces in the facility during the design phase. In order that the design of the building be read in this manner, the viewer should not be asked to understand the physical construction and assembly of such spaces. The focus must be kept on the spatial experience of the user.
One may argue that technical articulation of space can however add to this spatial experience. This fact is true in the author's opinion and as such, remains the only exception to technical design.
Where the quality and experience of space is enhanced through technical articulation, only then is the solution permissible. Initial thoughts on possible examples of this could be tensile cable supports of an atrium stairwell, where the experience of rising through a space is enhanced through a lack of structural mass.

MASS / VOLUME INTERPLAY

Point, line and plane generate through their interplay, volume. Space throughout the building becomes an interplay of these volumes, represented through the mass of the building.
The 'interlocking' nature of structural mass and spatial volume is used to enhance the readability of the design as an assemblage of spaces. Focus shifts to internal space by givng the appearance that structure has been pulled apart. The semi-congruent structural forms establish between them a sense of possible fit and inter-locking.
The use of relevant materials to suit this relationship will also enhance this aspect of the design by suitably positioning transparent and solid elements.

EXPRESSION OF ELEMENTS

Whilst visible construction detailing as mentioned before will only be appropriate in order to enhance spatial sensations, the expression of the building as a composition of smaller units each comprising smaller elements remains a firm design goal.
Enlightening visitors to the facility on the intricacies and complexities involved in the design and development of a built structure shall be communicated through the juxtapositioning of the various building elements. Walls, columns, piers, windows, partitions, doors and concrete slabs must remain identifiable as an individual element through the detailing yet also combine together to create a composition greater than the sum of its parts.
Throughout the building, various messages and devices will proclaim this relationship of built elements to each other and to the viewer.

This wall took 7 men,
2498 clay bricks,
12 bags of cement,
360 litres of water and
140 hours to build.

In a similar manner, all taps will be fitted with individual meters which will monitor the amount of water flowing through the taps. Electrical connections will also house individual meters displaying consumption of power from each point. In so doing, the user will begin to comprehend the building as an amalgamation of processes providing for the people contained within the structure.

Interestingly, these three technical objectives each concern themselves with a different scale in relation to the building structure, ranging from the large-scale massing to, medium-scale readability and the small-scale detailing of the technical structure.

STRUCTURE

The entire structure of the facility can be broken down into several core elements that require attention in isolation and then in relation to the other structural elements. The differentiations can arise out of material, practical or performance requirements and are be analysed in the following sections.

REINFORCED CONCRETE FRAME

Since the inception of reinforced concrete frame structures, this has become one of the most economical and easily constructed methods of building. With a focus on user spatial experience in the building, thought must in addition be bent towards the practicalities of erection and assemblage for such experience to even occur. The reinforced concrete frame is seen as the ideal solution to remove dependability of spatial layout on the structure to a degree. In the same breath, with the popularity of reinforced concrete frame construction, this project seeks to investigate in part an alternate approach to the building design using this structural system; to place space foremost and design with feasibility and functionality of secondary importance to user experience.

Design objective – To alter the manner in which structure dominates modern buildings and to free spatial experience from this, to allow space to permeate through the building and so give a tangible sense of space to the viewer.

Technical resolution – The reinforced concrete frame was decided upon due to its ability to allow spatial design freedom from alternatives such as load-bearing masonry or mass in-situ cast concrete.

S K Y L I G H T R O O F

Daylight is a highly important design consideration and its utilisation within a building in the South African climate is considered a must. With the high amounts of solar radiation South Africa receives, it is irresponsible of designers to not facilitate the use of daylight in their buildings. Whilst heat generation is a concern, the correct use of shading and reflective materials can ensure a minimal heat gain, combated by intelligent passive and mechanical ventilation systems.
Stemming from the theoretical ideas towards the designed structure, to encapsulate a sense of exploration through the structure and a process of unveiling and revealing along a path, the use of daylight is seen to connect this idea with the conceptual exploration of a canyon with its meandering route through rock, lit from above with daylight cascading down to the canyon floor.
Addressing practical concerns sees the inclusion of a central skylight as a method to improve office design quality through the use of natural light being able to permeate through both sides of office compartments, from the outside and the central atrium.

Design objective – To enhance the sense of exploration similar to that of exploring a natural environment and bring that experience into the building structure through the use of the skylight. To also improve the quality of working spaces, such as offices, in the building by allowing light to permeate from both sides. Ventilation vertically through the atriums and out through the skylights will also establish comfortable temperatures for the users of the building. Building occupants will as a result have an increased connection with the environment outside the building.

Technical resolution – In order to achieve continuity not only through design but construction too, the same construction solution as found in the arcade portal frame structure will be used. This will allow a very fragmented and abstract form to be created to enhance the refraction and reflecting abilities of glass when in contact with light. Glass is require to be laminated safety glass which will be drilled and bolted to the frames with a UV reflective interlayer to reduce the problem of the greenhouse effect.

G L A S S A R C A D E

The existing arcade on the site was an abandoned, concrete roofed danger spot in the city block. All the shop units were available to let and no one utilised the arcade other than to gain access to the VWL Sentrum building. The redesign of the arcade and its incorporation in the CUBE facility has taken a reactionary approach in several aspects in opposition to the existing arcade.
Instead of solid enclosure which created a darker and potentially dangerous place, the materials of glass and steel only were selected to reduce structural member sizes and allow in the maximum volume of light. The single storey enclosure has been doubled in height and will act as a central movement route between both structures on site.

Design objective – Presently the VWL Sentrum tower block connects physically to the arcade as it wraps around the building like an apron. This approach was deemed unsuitable both functionally and design wise and was thus reversed in the new design. The establishment of the new glass arcade will separate the buildings, allowing each to stand independently and be observed thus with the arcade existing ‘as light a touch as possible’ between the two structures.

Technical resolution – The positioning of the arcade on the north and east sides of the VWL building ensured that it would be protected by the four storey height of CUBE, providing the necessary shade to create a

comfortable internal climate. A mono-pitch glass roof drains onto the CUBE facility's roof, protecting the internal arcade space. Steel portal frames constructed off site were designed to be positioned easily and quickly, attaching onto the concrete structure of the CUBE building to act as the frames for the glasswork of the arcade.

S T E E L T R U S S B R I D G E

Design objective - The bridging of the two halves of the building on either side of the courtyard serves several purposes. Firstly to provide a direct route between the office areas on the upper floors and eliminate the need to return to ground floor to access the other side of the building; an inefficient and time costly exercise in circulation. Secondly to provide partial protection to the courtyard and the users below. In addition to this shading is provided to the arcade space too allowing a shaded and cooler public movement route. The design of the building structure ensures that direct sunlight will only be allowed to penetrate for a small amount of time during the day.

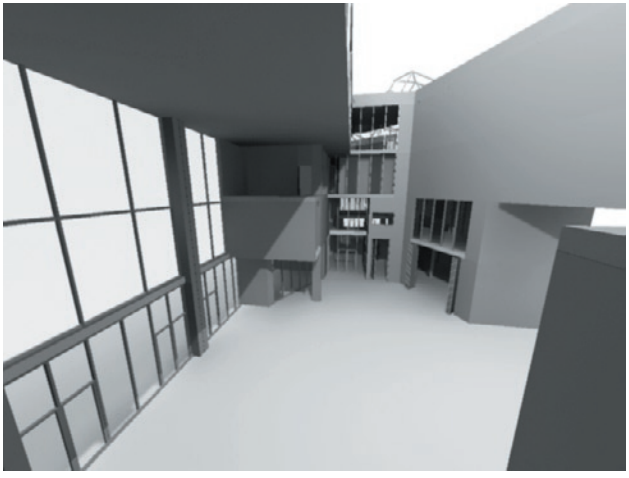


Fig.11_01.Shading of arcade

Technical resolution – The lack of vertical supports for approximately 18m resulted in the selection of a steel girder truss to bridge the distance between buildings. This provided an economical structure which could be assembled on site post fabrication and integrated into the existing structural layout of the concrete frame buildings with relative ease.

M A T E R I A L S

The smallest scale of technical design deals with the physical properties of the materials which will be used to achieve the proposed structure and all the considerations required at this level to achieve the design.

C O N C R E T E

- Shuttering considerations

The process of building within the narrow confines of the site does represent some technical problems with the assemblage of shuttering for the concrete super structure. Consideration has been given to the close proximity of the building to the surrounding structures and adequate space provided. The cantilevering slab edges have been provided with sufficient distance between column and edge to allow shuttering modules to be used.

- Mixture ratios for strength ratings

A design strength mixture of 30MPa has been used in the calculations of the building structure. A suitable mixture according to engineer's specifications and complying with cube and slump tests will be used.

- Fire resistance

Depending on the thickness of the concrete element the resistance to fire will vary. However with similar ratings as clay brick wall, concrete provides adequate support during a fire for the protection of evacuating people. According to SABS 0400, a minimum of 120 minutes is required for the safe evacuation of the

Fig.11_02.Concrete finish example

designated occupancy class of the building. This equates to a minimum of 50mm cover on structural steel members and plastered brick walls of 150mm in thickness.

- Max spans, cantilevers and thicknesses

The various methods of concrete constrution were considered. Coffer slabs however were rejected due to the increased thickness of the slab and inability to run services below the slab. Flat slab construction was chosen with reinforced concrete beams along the outer edges to provide support to the cantilevering edges. A structural grid of 6m x 5m was chosen which allowed a 250mm-280mm slab thickness. The reduced thickness of the slab allowed the use of suspended ceilings to hide service conduits without requiring significant floor to ceiling heights.

All slab edges are designed to cantilever to improve structural bending moments in the concrete. The increase in space between the structure and neighbouring buildings will create a far less difficult construction problem.

Maximum spans are set at 8m with the inclusion of reinforced edge beams to improve stability.

- Reinforcing required

Various thicknesses of mild steel bars are used in the reinforcing of concrete. Whilst the steel does need to be made into the reinforcing cages, the fabrication process can be done off-site. Rapid construction speed once the reinforced cages are delivered, can be achieved.

- Service life

Concrete is a remarkably robust, durable and strong material. If there are no faults made during the erection of the concrete structure, there is little which can negatively affect the structure other than earthquake damage, explosions, fires or flooding.

- Construction and expansion joints

The expansion of concrete is similar to that of brickwork which makes the two materials ideal to be used in conjunction. Expansion calculations predict that a 20mm construction joint will be required every 18m-25m for which the design catered. Expansion and day joints during the erection process would be located at column and slab junctions where the completion of a days work resulted in the differing curing times of different elements.

- Concrete finishes

A variety of finishes allows designers to achieve a large range of aesthetics looks from concrete. Hacking, sandblasting, brushing, grinding, painting and arbeton are all locally used finishes which range from a fine sand texture to a large particle abrasive look. The required concrete finish for the project will utilise brushing to achieve a fine, sandy, rock texture similar to that of sandstone cladding found

on neighbouring buildings. The use of sandblasting is restricted within the city and as such the brushing technique has been chosen.

- Adaptability of structure

Once built, the concrete structure will not be able to be altered without significant construction being required. However the adaptability of brick walls and partitions utilised within the concrete frame is not restricted at all other than by the service ducts. This does allow a large range of possible variations to be done during the buildings lifespan should it be necessary to alter the buildings spaces.

- Reasons for choice

Concrete remains one of the most economical construction materials. The process of reinforced concrete construction is also very fast which can reduce time spent on site by contractors and workers. It is a robust material with a variety of textured finishes which relate to the surrounding buildings and the extensive use of concrete throughout Pretoria. The texture especially relates to one of the design ideas of generating a rough, rock-like texture to enhance the sense of exploration through a built structure.

- Sourced from location

Multiple locations around the city provide concrete ingredients and readymix concrete which can be transported to site with reletive ease.

- Location in building

Reinforced concrete is used as the main structural element of the CUBE building. Reinforced concrete columns and slabs provide the necessary vertical and horizontal load paths to support the designed spaces with minimal support sizes.

- Alternatives

Loadbearing brickwork was considered as the structural material but was rejected through the increase in support sizes. Space on site was greatly restricted and minimal supports were required.

Steel frame construction was considered as well due to the minimal area required for the vertical supports. However steel construction remains costly and requires high amounts of energy to be produced. Both these alternatives were rejected in favour of the economical and common concrete construction system.

G L A S S

- Type of glass

Any use of structural glazing requires that certain pane thicknesses are used in specific situations. For the construction of the arcade, all the glass will be required to be laminated safety glass and comply with the necessary class ratings for safety. Comprising two layers of clear float glass with a PVB interlayer of 0.76mm will allow the glass work in the arcade to comply with class 2 safety ratings for high impact and burglar proof glass. The incorporation of the interlayer will hold glass fragments together safely should the glass pane break.

- Pane sizes available

Laminated glass is produced from multiple panes of clear float glass which is maufactured in sizes of 2400mm x 3200mm. The various thicknesses can vary from 2, 3, 4, 6 to 10mm. For the construction of the arcade glass floor 2 x 10mm thick laminated glass will be used with 2 x 6mm thicknesses used for the walls and roof.

- Fire resistance

Ordinary clear float glass does not react well under the influence of fire with most of the glass breaking due to heat stress or pressure variations. Laminated safety glass however has the benefit of increased numbers of glass panes and the PVB interlayer which binds the layers together, providing additional strength to the glass pane.

- Framing types

Extruded aluminium frames are easily available but do require large amounts of energy during manufacture. Steel window frames are also readiliy available in the Pretoria area with the added benefit of being able to be recycled. Both are used in the building with

aluminium frames used in visible public areas and in folding doors due to their appearance.

- Sourced from location/manufacturer

With the only float glass plant in South Africa located in Springs, Gauteng, the glass will be purchased either directly or through a secondary manufacturer in the case of either tinted or laminated glass. The availability of glass in the immediate area thus does not require large expenditure on travelling costs.

- Location in building

The predominant use of glass is found in the construction of the arcade. Elsewhere in the building glass is mainly used in windows, stacking and folding doors and display areas.

- Alternatives

Annealed or toughened glass construction was considered in place of the laminated safety glass but several aspects resulted in the decision to remain with the safety glass.

The high cost of toughened glass due to the additional processes involved in the manufacture of the glass was an initial disadvantage. The process of producing toughened glass also results in the panes not being allowed to be drilled or cut in any way as the stress forces between the layers of glass would cause the pane to break. Since construction of the arcade required the panes to be drilled to be fixed to the framing system, the ability to use toughened glass was voided.

Steel sheeting panels were also considered however the inability to allow light through was a major design drawback. However a similar system of using perforated and patterened steel sheets clipped onto the glass panes was chosen to be used in the design to create unique light shadows and spatial sensations.

S T E E L

- Location and usage in building

Mild steel bars are the reinforcing material used in conjunction with concrete in the structure of the building. The steel provides much greater tensile strength for spanning distances in contrast with concretes significant compressive strength for vertical load transfers.

The public arcade uses purely steel construction to support the glass work in order to reduce member sizes and create a design aesthetic based on transparency and light.

- Sizes available

Steel profiles vary in their dimensions according to manner of manufacture and profile shape. Hot-rolled H-profile steel members are used as the main vertical column supports for the arcade structure. I-profile beams are used to span horizontally between supports with angle profiles used to fix elements together and provide surfaces on which to secure and weld other members.

- Sourced from location

Several steel producing plants exist around South Africa with many located in Gauteng in the surrounding cities and towns of Pretoria. Whilst steel is high in embodied energy and heavy to transport, the benefit of being able to recycle steel components qualifies steel as a suitable construction material.

- Methods of fixing

Bolting remains the main method of fixing steel elements together in this project. The ability to disassemble the structure will allow future construction or repairs to be undertaken far more easily than if the structure was welded. High-friction bolts and washers have been used on structural steel joints and connections with the reinforced concrete super structure.

- Alternatives

Reinforced concrete of the main building was considered as the material for the arcade. However

whilst the member sizes of concrete and steel columns may have been only of minor variation, it was the design aesthetic of steel as a clean and precise material that was preferred in conjunction with the glass work of the arcade.

B R I C K W O R K

- Types of bricks

Three main types of clay brick are produced locally. Non Face Plaster bricks or 'stock' bricks are used in the construction of walls which will be plastered or rendered at a later stage. These are the chosen clay bricks for use in the project where internal, non-loadbearing wall will be finished to appear similar to concrete. Face Brick Aesthetic and the other classes of face bricks as well as the Non Face Extra category are the other two types of clay bricks produced in South Africa.

- Fire resistance

SABS 0400 gives a 120 minute safety rating to a brick wall of 150mm when plastered. The design of the internal walls of the building are single-brick 240mm thick walls which will comply adequately with the required resistance to fire.

- Finishing

All brick surfaces are to be plastered with small to medium sized aggregate and brushed to produce a sandy, rough finish similar to brushed concrete. The design seeks to create a semi-natural, rock-like feel to the structure which will enhance a sense of exploration through the building.

- Mortar

Mixtures according to manufacturers specifications to be used as the brickwork mortar.

- Jointing

Due to the plastering and rendering processes to be performed on the wall post construction, no specific jointing is required.

- Location in building

All walls as indicated on plans will be constructed from clay bricks and plastered.

F I N I S H E S

- Tiling

Ceramic tiling will be used in all bathrooms. Manufacturers directions for tiling cement and backing fixative must be followed to ensure the tiles do not displace under the influence of water and condensation.

- Power screed

A power trowel will be used to finish off a concrete screed over the concrete slab floors. The smooth finish of the concrete floor will provide a smooth and level surface on which to walk and be aesthetically similar to the finish of the walls.

- Plaster

A plaster mix with a small percentage of medium grain aggregate to be used on all clay brick walls. A light sand colour similar to that of sandstone to be used. After several days of drying time the plaster will be brushed to provide a semi-smooth, sandy texture with an irregular spread of medium particles.

- Paintwork

The steel construction of the arcade must be painted once all welds and joints have been completed, prior to the installation of the glass work. Suitable base coats and matt gun-metal grey coloured overcoat will be used to provide protection to the steel. An intumescent paint layer will also be applied to provide some resistance to fire and ensure sufficient time for the evacuation of the arcade space.

S T R U C T U R A L C A L C U L A T I O N S

The following pages document some of the initial calculations of structural member sizes and loading that could be expected from the designed building.

CONCRETE EXPANSION: $12 \times 10^{-6} \times 40 \times 28000\,mm$

$= 13.44\,mm$ over 28 metres

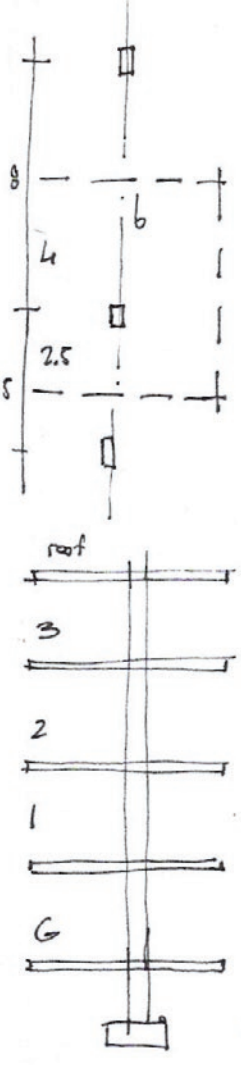
$\therefore 6.7$ in one direction

$\therefore 20mm$ joint sufficient

CANTILEVER $\frac{L}{8} = d$

$\frac{1300}{8} = 162.5$

TOTAL CRUSHING FORCE



$\therefore 7.5 \times 6 = 45m^2$

$h = \frac{L}{24} = \frac{8000}{24}$ USING 280 AS PRELIM.

$= 333\,mm$

$\therefore V = 45m^2 \times 0.28m$

$= 12.6m^3 \times 2400\,kg/m^3$

1 SLAB $= 30240\,kg$ (30.24kN) **302.4 kN**

5 SLABS $= 151.2\,kN$ (151 200 kg) **1512 kN** (DL)

(LL) OFFICE BUILDING $- 2.5kN/m^2$

$LL_T = 1.6 \times 2.5kN$ PER FLOOR

$= 4kN/m^2$

$LL_T = 4kN \times 45m^2 \times 5$

$LL_T = 900kN$

$P_f = 1.2(DL) + 1.6(LL)$

$= 1.2(1512) + 900$

$= 1814 + 900 = \mathbf{2714.4\,kN}$

$C_r = 0.35 \times 30MPa \times A_c$ $\frac{FORCE}{AREA} = STRESS$

$A_c\,(mm^2) = \frac{C_r}{0.35 \times 30}$

$= \frac{151200\,N}{0.35 \times 30}$ (10.5)

$= 144000$ (RARE CASE)

$C_r = (0.35 \times f_{cu} \times Ag) + (0.6 \times f_y \times 0.02Ag)$

$= (0.35 \times 30 \times 0.98Ag) + (0.6 \times 300 \times 0.02Ag)$

$= 10.29Ag + 3.6Ag$

$1512 = 13.59Ag$

$\times 10^3 N = 111258.3\,mm^2$

$450 \times 250 = 112500$

$\therefore$ WILL SUFFICE

$450 \times 250 = 112500\,mm^2$

$\therefore$ NOT ENOUGH

$\frac{CA}{LTA} = 0.0025\% \times 100$

$= 0.25\%$ OF FLOOR AREA

$150000 = 500 \times 300$

STEEL AREA IN COLUMN

$A_{sc} = 0.02 \times 111\,258.5$

$= 2225.166$

6 BARS $\times 370 = \pi r^2$

$r = \sqrt{\frac{370}{\pi}}$

$r = \phi 11$ BARS

$\phi = \phi 22$

$F_{ac} = 0.35 \times f_{cu} \times A_c + 0.6 \times f_y \times A_s$

$= (0.35 \times 30 \times 0.98 A_g) + (0.6 \times 300 \times 0.02 A_g)$

$= 10.29 A_g + 3.6 A_g$

$2714.4 = 13.89 A_g$

$\times 10^3$

$= 195421\ mm^2$

$\simeq 442 \times 442\ mm^2$

$\therefore 450 \times 350$ WILL NOT SUFFICE

$+ [500 \times 390]$

$+ [550 \times 350]$

$+ [600 \times 385]$

$A_{sc} = 0.02 \times 195421$

$= 3908.42$

$\therefore$ 10 BARS of $390.8\ mm^2$

$\therefore$ 12 " of 325.7

$\therefore$ 14 " of 279

$\frac{CA}{LTA} = \frac{0.2}{45} = 0.0044$

$= 0.44\%$

AREA $= \pi r^2$

$\therefore r = \sqrt{\frac{A}{\pi}}$

(10) $r = \sqrt{124.4}$

$r = 11.1$

$\therefore \phi 22 \times 10$ BARS

$\therefore 16 \times \phi 16$

(12) $r = \sqrt{103.7}$

$= 10.1$

$\therefore \phi 20 \times 12$ BARS

(14) $r = \sqrt{88.8}$

$= 9.4$

$\therefore \phi 18 \times 14$ BARS

GLASS WEIGHT

$\simeq 2400\ kg/m^3$

$5.5m \times 0.01 = 0.05\ m^2$

$0.05 \times 2400 = 132\ kg/m$

$P_f = 1.2 \times 132$

$= 158.2\ kg/m$

$\simeq 1.6\ kN/m$

$15.5 \times 0.006 = 0.093$

$0.093 \times 2400 = 223.2$

$1.2 \times 223.2 = 267.8$

$\simeq 2.8\ kN/m$

$5 \times 0.01 = 0.05\ m^2$

$0.05 \times 2400 = 132\ kg/m^2$

$1.2 \times 132 = 158.2$

$\simeq 1.6\ kN/m$

$5m \times 0.02 = 0.1$

$0.1 \times 2400 = 240$

$1.2 \times 240 = 288$

$\simeq 2.9\ kN/m$

$\simeq 11.5m \times 0.01 = 0.115$

$0.115 \times 2400 = 276$

$1.2 \times 276 = 331$

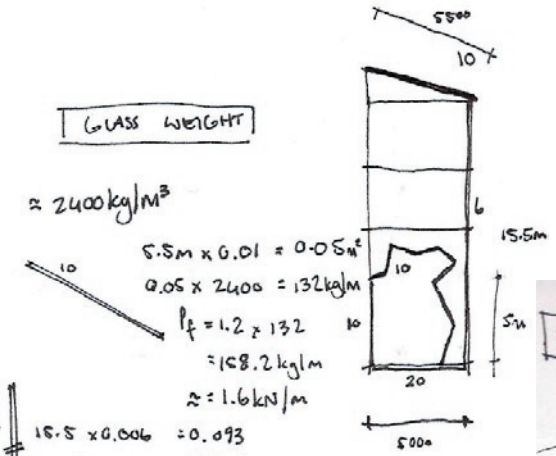
$\simeq 3.3\ kN/m$

(VARY TO PORTAL SIZE)

TOTAL GLASS WEIGHT IN PORTAL

$1.6 + 2.8 + 2.9 + 1.6 + 3.3$

$= 12.2\ kN/m$



STEEL PORTAL WEIGHT

$\simeq 7000\ kg/m^3$

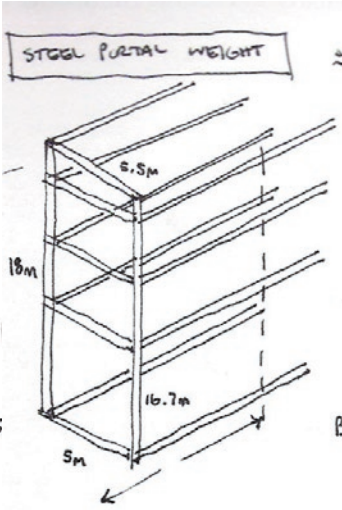
Area $= 2(250 \times 0.015) + (250 \times 15)$

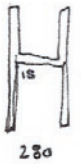
$= 0.01125\ m^2$

$\therefore 0.01125 \times 7000 \times 1.2$

$= 94.5\ kg/m$

$= 0.95\ kN/m$





$\therefore$ PORTAL$_w = (18 \times 0.95) + (16.7 \times 0.95) + (55 \times 0.95) + 4(5 \times 0.95)$

$= 57.19\ kN$

$Box_w = 10\,(6m \times 0.95)$

$= 57\ kN$

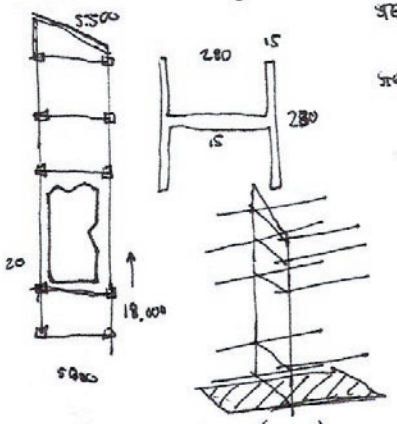
$\therefore$ TOTAL BOX SEGMENT WEIGHT

$= 57.19 + 57$

$= 114.19\ kN$

STEEL CALCULATIONS

DENSITY = 7000 kg/m³



• 305 x 305 x 137 (13.8)

STEEL LOAD

STEEL LENGTHS: 18 + 20 + 5(6) + 5.5

STEEL WIDTHS: 10(6)

∴ 68.5m + 60 = 128.5 x WEIGHT/m

∴ 128.5m x 137kg = 17604 kg per 6m

FACTOR FOR SAFETY OF LIVE + DEAD LOADS

PUBLIC AREA = 5kN/m²

∴ LL_f = 1.6(5 kN x 5 x 6m)

= 240kN OVER 6m AREA

DL = 17604kg (176 kN) 1.2

= 211 kN

∴ = 320.2 kN / 2

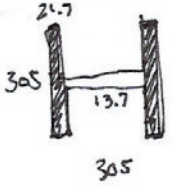
∴ 160.1 kN per column

$C_r = \phi \times (A)^2 \times f_{eff} \geq C_f$

320.2 kN = 0.9 x A x 46MPa

$\frac{320\,200\,N}{0.9 \times 46} = A$

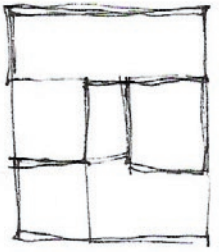
A = 7734

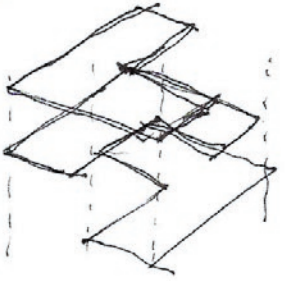


A = 2(305 x 21.7) + (261.6 x 13.7)

= 13237 + 3583.9

= 16820.9





GLASS LOAD

THICKNESS = 20mm

DENSITY = 2480kg/m³

LENGTH = 5.5 + 26 (OVERLOSS/GAP)

= 31.5m x 6m = 189m²

∴ 189m² x 0.02 = 3.78m³

W = 3.78 x 2400

= 9072 kg (91 kN)

DL_f = 1.2 (91)

= 109.2 kN

..... WILL INCREASE LATER WITH GLASS WEIGHT

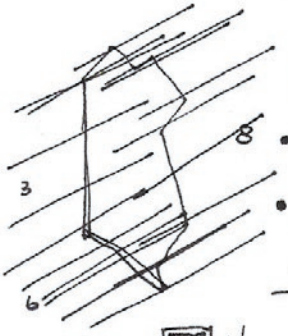
SR = $\frac{L_e}{B}$ = $\frac{3900}{15.2}$

= $\frac{L}{r}$ = $\frac{3900}{15.2}$

= $\frac{3600}{78.2}$ or $\frac{3600}{138}$

= 46 OR 26.2

N = 10 x M



PORTAL BOX

• 26M PROFILE LENGTH x 6 PORTALS

• 18 LENGTHS OF 6M

PORTAL BOX TOTAL = 1153.15 + 798

= 1951.15 kg

= 19.51 kN

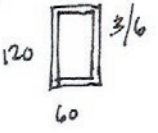


Fig.11_03.Support detail view (above), Lyall, S, 2002

Fig.11_04.Vault construction (below left), Lyall, S, 2002

Fig.11_05.Vault elevation (below right), Lyall, S, 2002

TECHNICAL PRECENDENTS

SPANDAU TRAIN STATION BERLIN

Completed recently, the new Spandau Train Station in Berlin has become the largest train station in Europe. Of particular significance is the massive glass and steel tunnel construction which provides protection to the trains and passengers.

A series of large, hollow-profile steel arches span the space and give support to smaller intermediate arches. The glass work is integrated into this supporting structure along the outer edge.

The resulting structure sees the structural arch frames put into compression with diagonal tension bracing cables connected along the inside of the structure. This ensures the supports remain in compression and provides lateral stability.

O R A N G E R Y
P R A G U E C A S T L E

The construction of this project provides an alternative to the traditional glassed vault. In this instance, the supporting framework and the glass have been separated to form two different skins; the outer structure supporting the inner glass work.

In contrast to the Spandau Station's construction, the Orangery utilises circular, compressive, diagonal members to support the load with very little vertical structure required. The elimination of these typically large vertical support members allows the transparent nature of the glass to be enhanced.

The glass panes are laminated safety glass, bolted to stainless steel joints which are ingeniously integrated into the support structure. Such a construction allows the internal space to be entirely surrounded by glass work creating a smooth and homogenous surface.

Fig.11_06.Outside view (above right), Lyall, S, 2002

Fig.11_07.Inside view (below right), Lyall, S, 2002

Fig.11_08.Details (below), Lyall, S, 2002

BUILDING CODES AND STANDARDS

REINFORCED CONCRETE

SANS 1083 – Aggregates for Concrete
SANS 0109 – Concrete Floors (part 1 and 2)
SANS 0161 – Design of Foundations for Buildings
SANS 0100 – Structural Use of Concrete
SANS ENV 197-1 – Cement
SANS 920 – Steel Bars for Concrete Reinforcement

CLAY BRICKWORK

SANS 227 – Clay Bricks Masonry Units
SANS ENV 413-1 – Masonry Cement
SANS 28 – Metal Ties for Cavity Walls

GLASSWORK

SANS 1263 –Safety Glazing Materials
SANS 1305 – Sealing Compounds, Silicone based
SANS 0137 – Installation of Glazing Materials
SANS 50572 – Work on Glass for Glazing

STEELWORK

SANS 1431 – Weldable Structural Steel
SANS 044 – Welding
SANS 064 – Preparation of Steel Surfaces for Coating
SANS 14713 – Structural Steel Component Design
SANS - Fire Protection of Steelwork
SANS 1319 – Paint Primer
SANS 684 – Structural Steel Paint
SANS 1700 – Fasteners
SANS 1282 – High Strength Bolts, Nuts, Washers

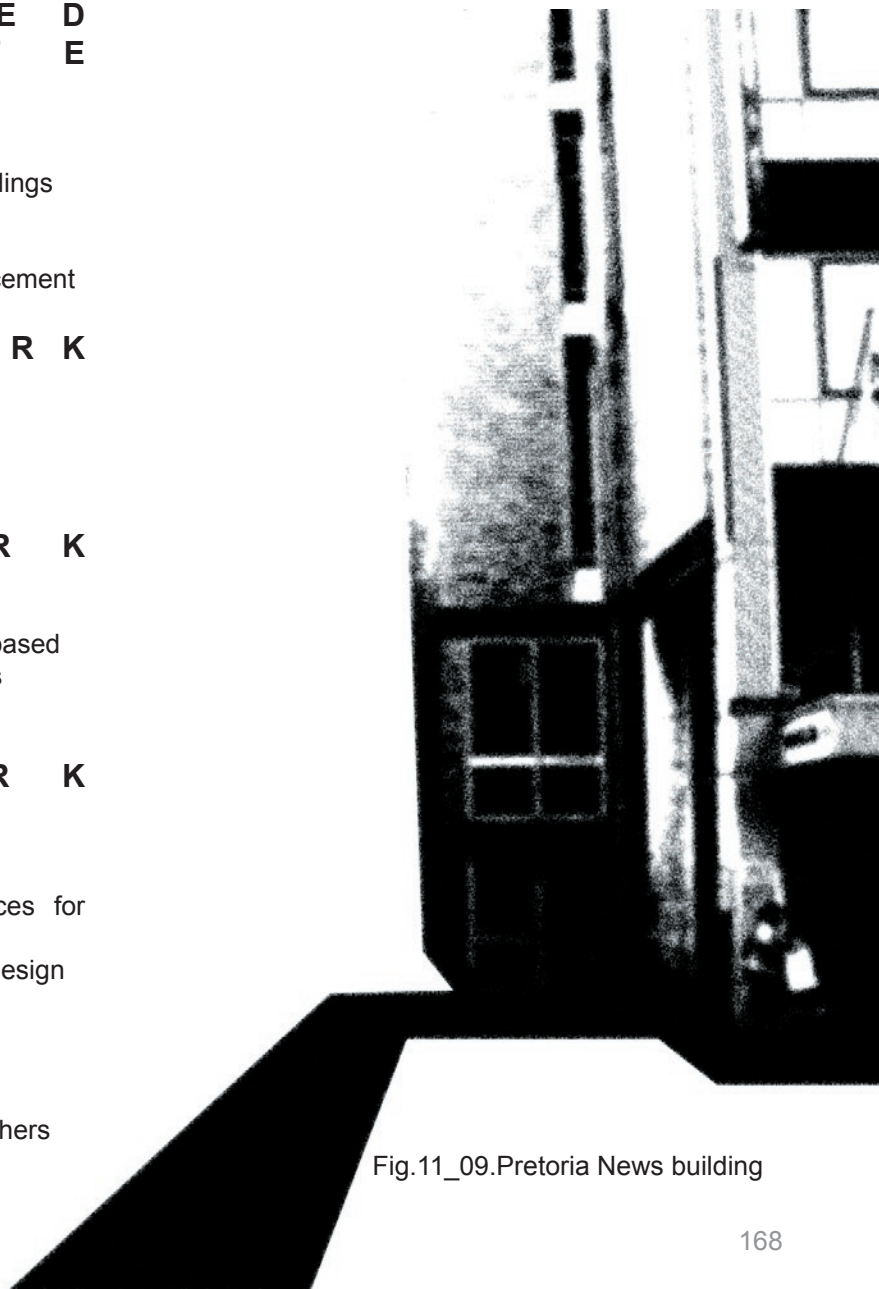


Fig.11_09.Pretoria News building

PROJECT SPECIFICATIONS

REINFORCED CONCRETE

Storage
Keep all bagged cement stored under cover and dry until ready for use.
Type, composition and strength of cement to be indicated on bags with the SABS mark of compliance to manufacture.
Always use oldest cement first and in proceeding chronological order.
Do not use cement with lumps that cannot be crumbled by hand and cement which may have been contaminated with foreign material due to bag being opened or damaged.

Preparation of Shuttering
Ensure access to sufficient quantity of shuttering prior to project execution.
Timeous erection of shuttering and supports to be followed in accordance to the preparation of the concrete mixture.
Shuttering to be cleaned and prepared with suitable non-adhesive coating prior to casting.
Ensure no foreign, organic or chemical matter is left inside shuttering prior to casting.
Steel reinforcing cage positions to be checked and monitored by engineer during construction.
Correct shuttering material to be used in accordance with architects specified finishes for the surfaces as indicated on drawings. All concrete surfaces will be finished as defined below or as otherwise specified.
Shuttering to remain in position until approval given by the engineer.
Supports to remain in place while slabs cure until full concrete (28 day) strength is achieved.

Notice
Give timely notice in advance to the architect or principal agent before commencing with casting of concrete.

Reinforcement
Steel reinforcing bars sizes and tensile strength to engineer's specifications.
Ensure reinforcing cages are checked by engineer or contractor for integrity upon delivery to site or post-assemblage if constructed on site.
Reinforcing cage placement within shuttering to be monitored and checked by engineer or contractor prior to commencing with casting.
Clean steel reinforcing cages of foreign and organic matter and brush with steel brush prior to casting.

Concrete Mix
Mix cement, sand and stone by volume or mass to produce the specified compressive strength at 28 days according to engineers specifications.
Mixing of concrete to be done by machine.
Proportions to be calculated prior to mixing according to either the cement manufacturer's instructions or the engineer's certified design mix.
Ensure adequate stock of all materials is stored on site prior to commencement of mixing.
Examine aggregates for continuity in colour and appearance and do not use any aggregate material which falls outside acceptable limits.
Ensure sand aggregate complies with SANS 1083 and acceptable particle size distribution is achieved.
Ensure stone aggregate complies with SANS 1083 and only particle sizes as specified by the engineer are used.
Have sand filtered prior to mixing to remove organic and foreign material.

Water
Water to be used in mix must be potable, clean and free from any amount of acids, alkalis, organic matter

or any chemical substance which could impair the strength or durability of the concrete.
Ensure water tests are conducted if there is any doubt about the source.

Curing
Cast concrete to be cured for seven days; longer if ambient temperatures fall below 10`C.
Ensure concrete surface remains damp by spraying with water and protect all surfaces with polyethylene cover sheeting.

Testing
Cast concrete test cubes of size and quantity at intervals as specified in accordance with SANS test methods 861-2 and 861-3.
Have all test cubes tested for compressive strength at an approved laboratory according to SANS test method 863.

Finishing of surfaces
Surfaces of concrete to remain off shutter with any honey combing or voids made good according to approved methods.
Surface discolourations be allowed to remain.
Concrete to be grinded to smooth surface three days after casting.

A R C A D E G L A S S W O R K

Material
Arcade glasswork to consist entirely of clear laminated float glass with 0.76mm polyvinyl butyral interlayer to comply with SABS 1263 part 2 for burglar-resistant strength (High Penetration Resistance).
Sandblasted laminated glass floor panes to be 20mm in thickness and factory cut to specified sizes prior to transport to site.
Clear laminated float glass panes of 12mm thickness to be used for wall and roof glazing of the arcade passageway.
Markings specifying glass strength class to be visible after installation and situated at bottom left corner of the pane.

Preparation
Glass panes must be stored in a secure area on site and held stable in a vertical position. Laminated glass panes to be examined prior to installation for surface imperfections, delamination, cracking and any other defects or damage. Glass panes not passing inspection will not be approved for installation and must be replaced.
Do not cut any glass panes on site with a thickness greater than 4mm.
Ensure frames are clean, dry and true to shop drawings prior to installation of panes.

Fixing
Laminated safety glass must be cut and drilled upon completion of manufacture to the specified dimensions as laid out in the glass specialist's report once pane dimensions have been measured and confirmed to be suitably accurate in relation to the supporting frame construction on site.
High strength bolt as per engineers specifications and complying with SABS 1282.
Neoprene washers to be used on both sides of glass pane where in contact with bolt head and nut.

Jointing and sealants
Glass panes joints to remain open unless where specified on drawings.
Where required a silicone rubber sealant complying with SABS 1305 will be used. Joint sizes to be 12 - 20mm maximum in width.
A suitable backing material that does not adhere to the structural frame such as cellular polyurethane foam or fibrous soft board must be used.
Sealant must be fungus proof.

Protection and Cleaning

Protect against harmful splashes and weld spatter. Damaged glass panes must not be installed.

Clean as soon as practical after installation with mild soap and water mixture.

Ensure cleaning equipment and materials are not harmful to glazing surface or sealant compounds.

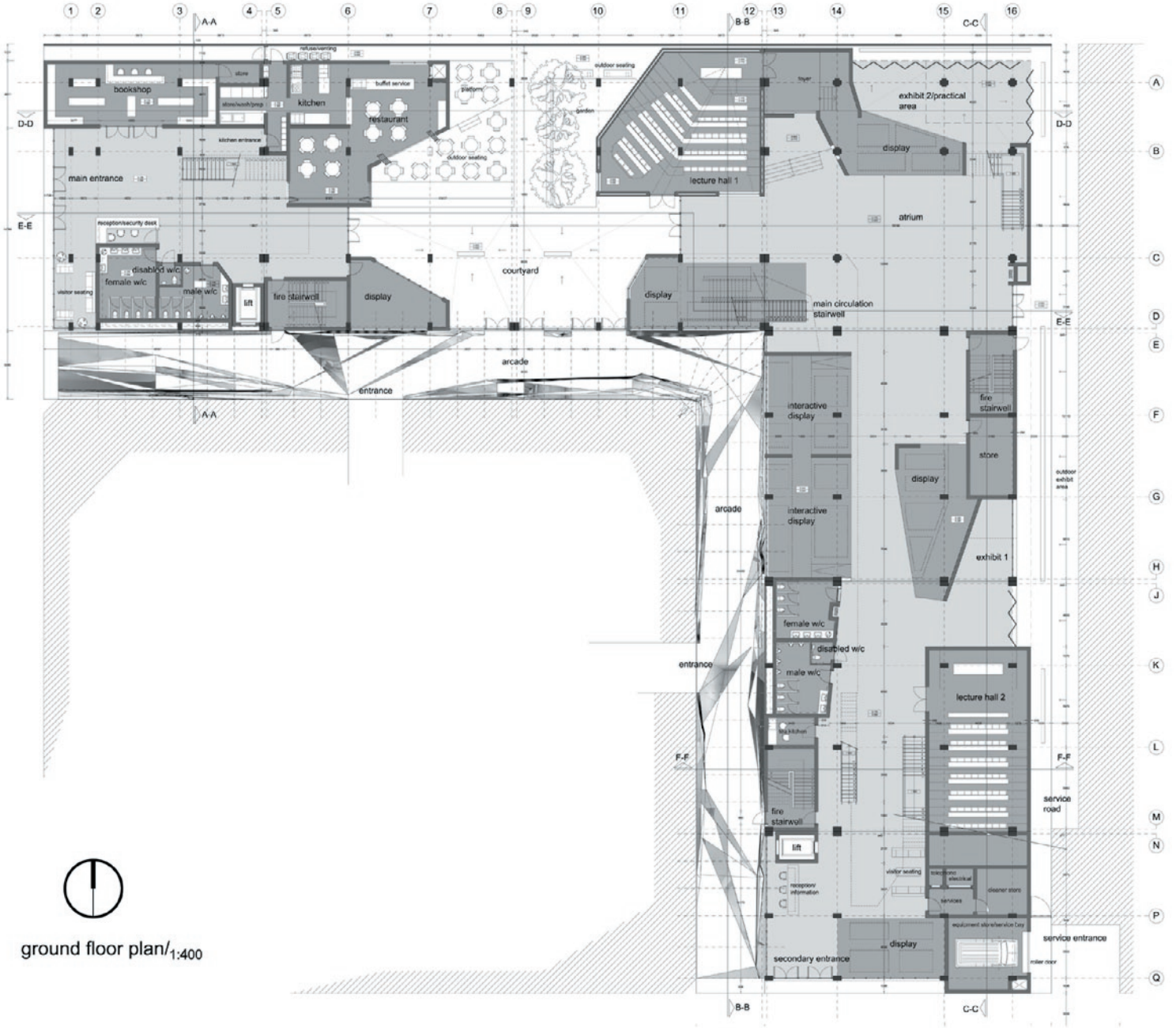
Completion

Obtain a warranty by the manufacturer of the laminated glass against delamination for a minimum period of five years.

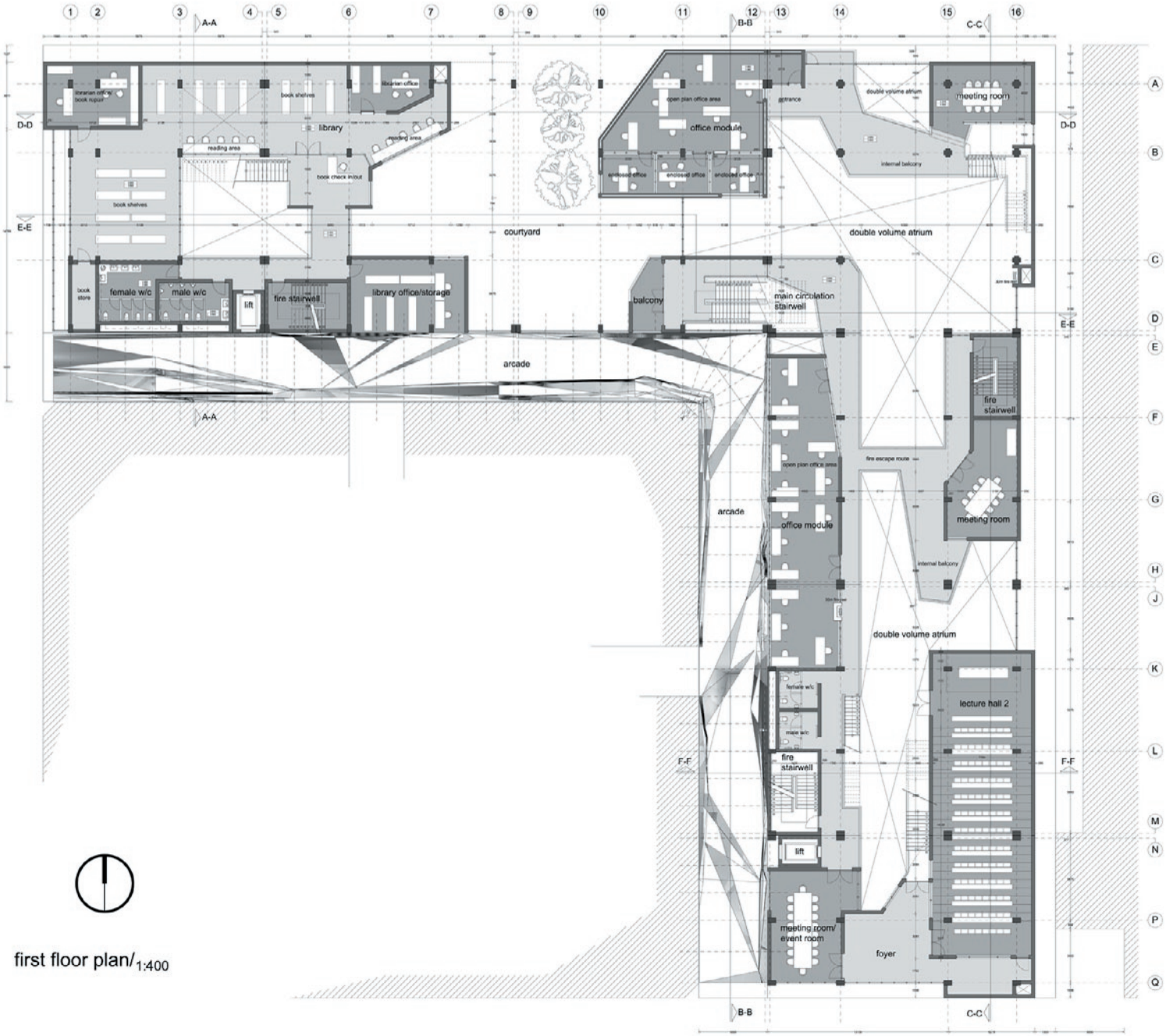
Obtain written proof that all stages of fabrication and installation have been completed in accordance with the relevant level of quality as specified in SABS ISO 9000

Provide written proof that the sealants specified for use in the glazing installation are compatible with the framing material, any tape used and the glass type specified.

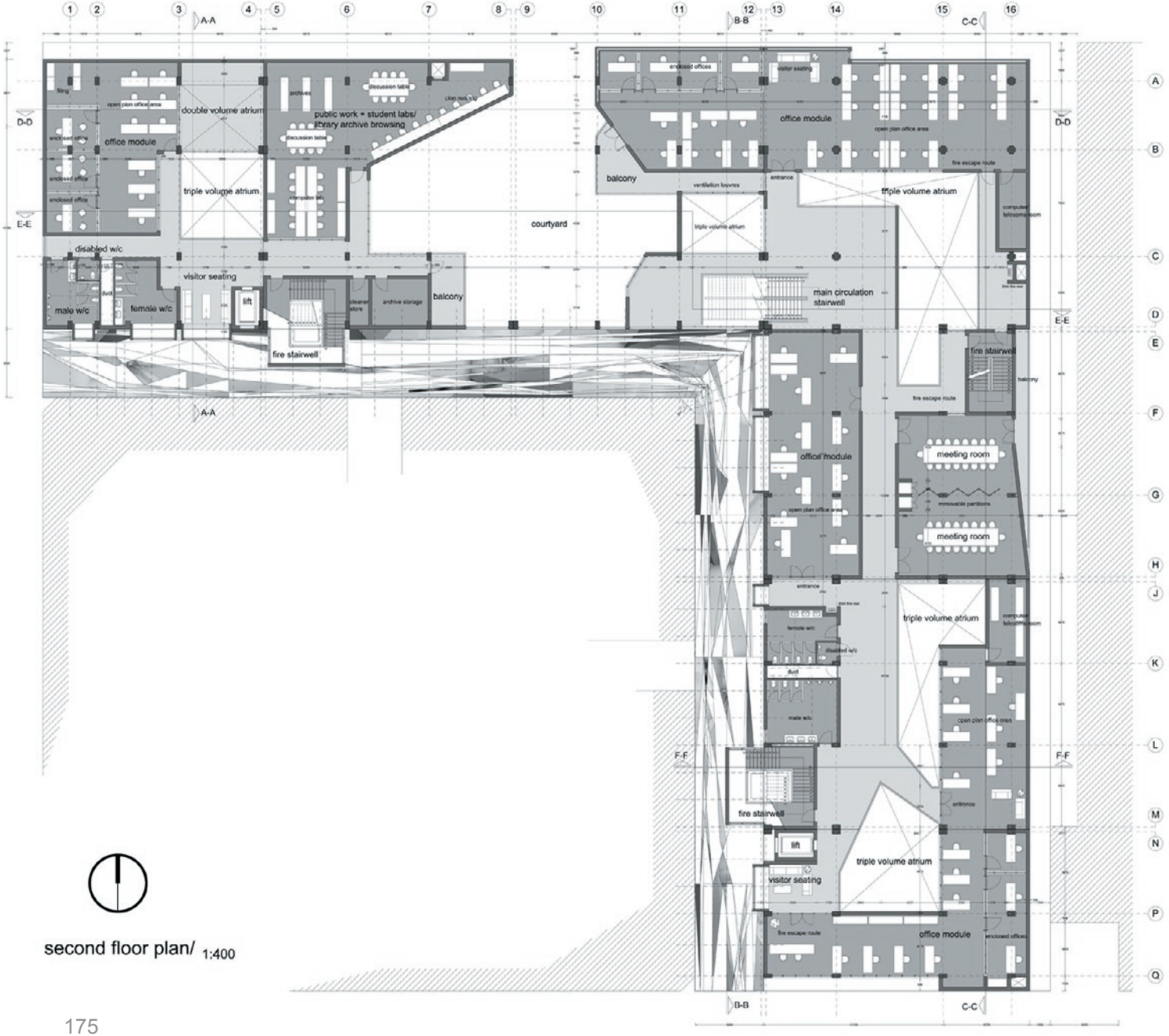

technical
01_site plan
02_ground floor plan
03_first floor plan
04_second floor plan
05_third floor plan
06_roof plan
07_sections
08_elevations
09_sunscreen details
10_arcade details
11_arcade development
12_structural renders



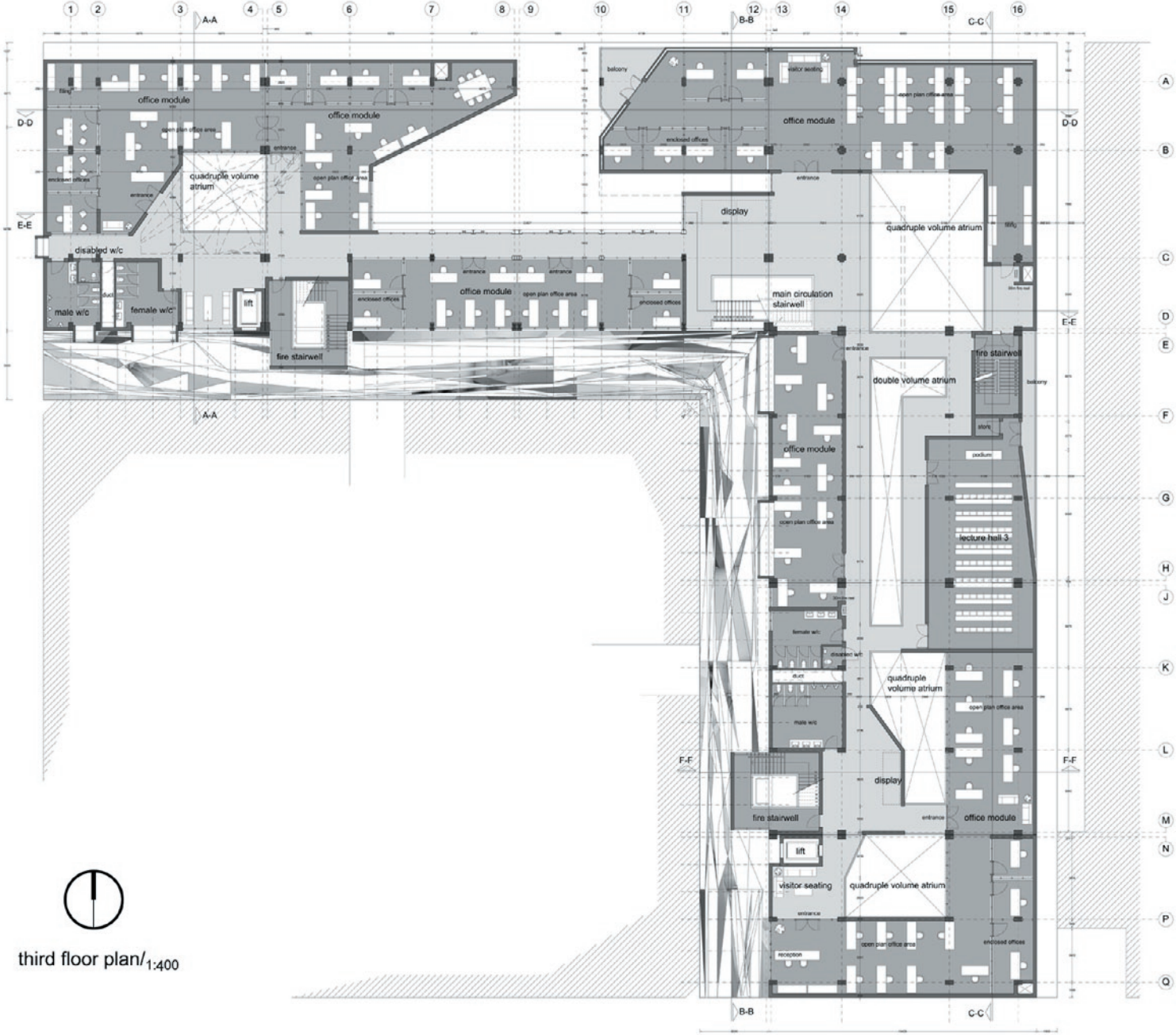
ground floor plan/1:400



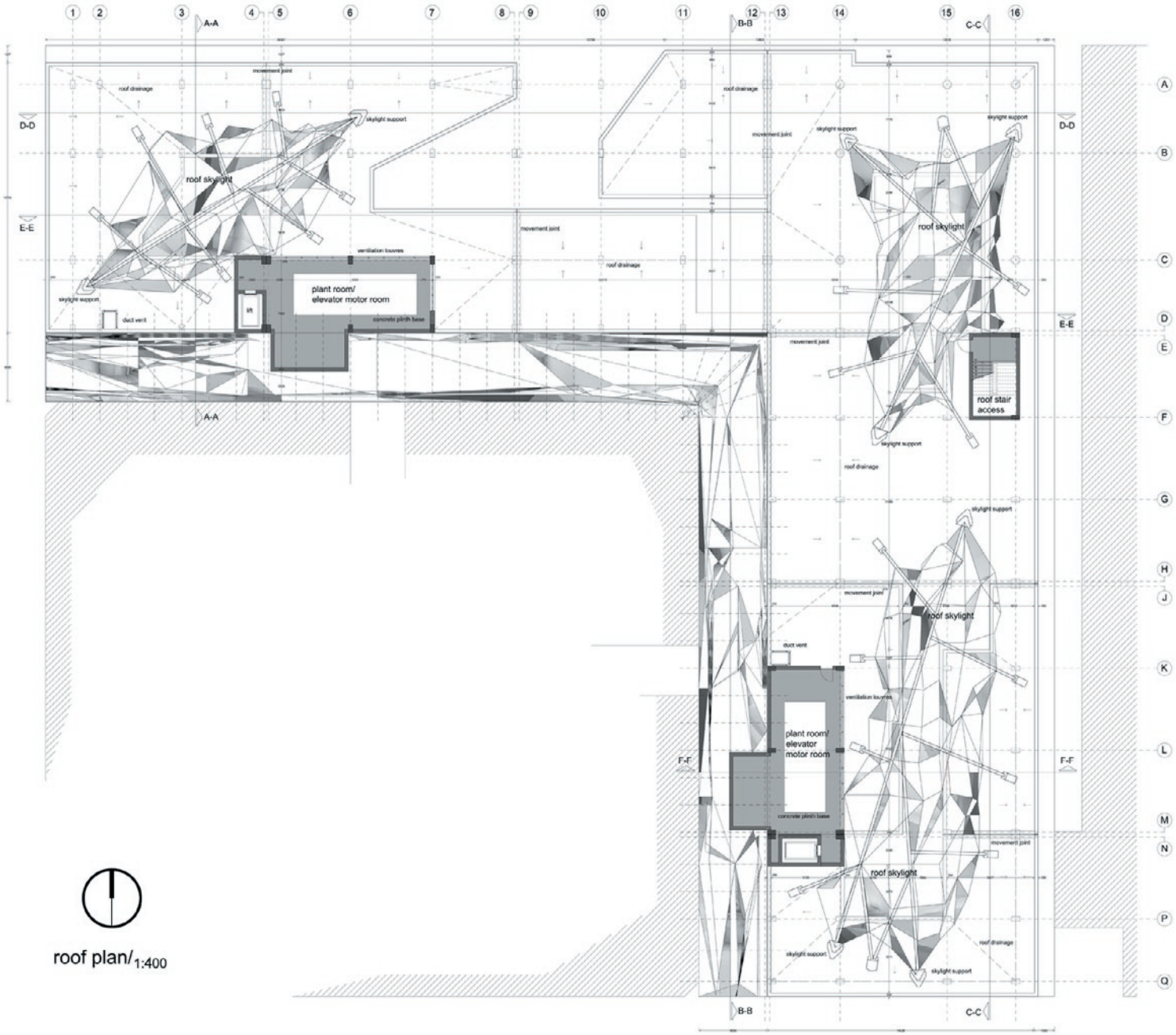
first floor plan/1:400



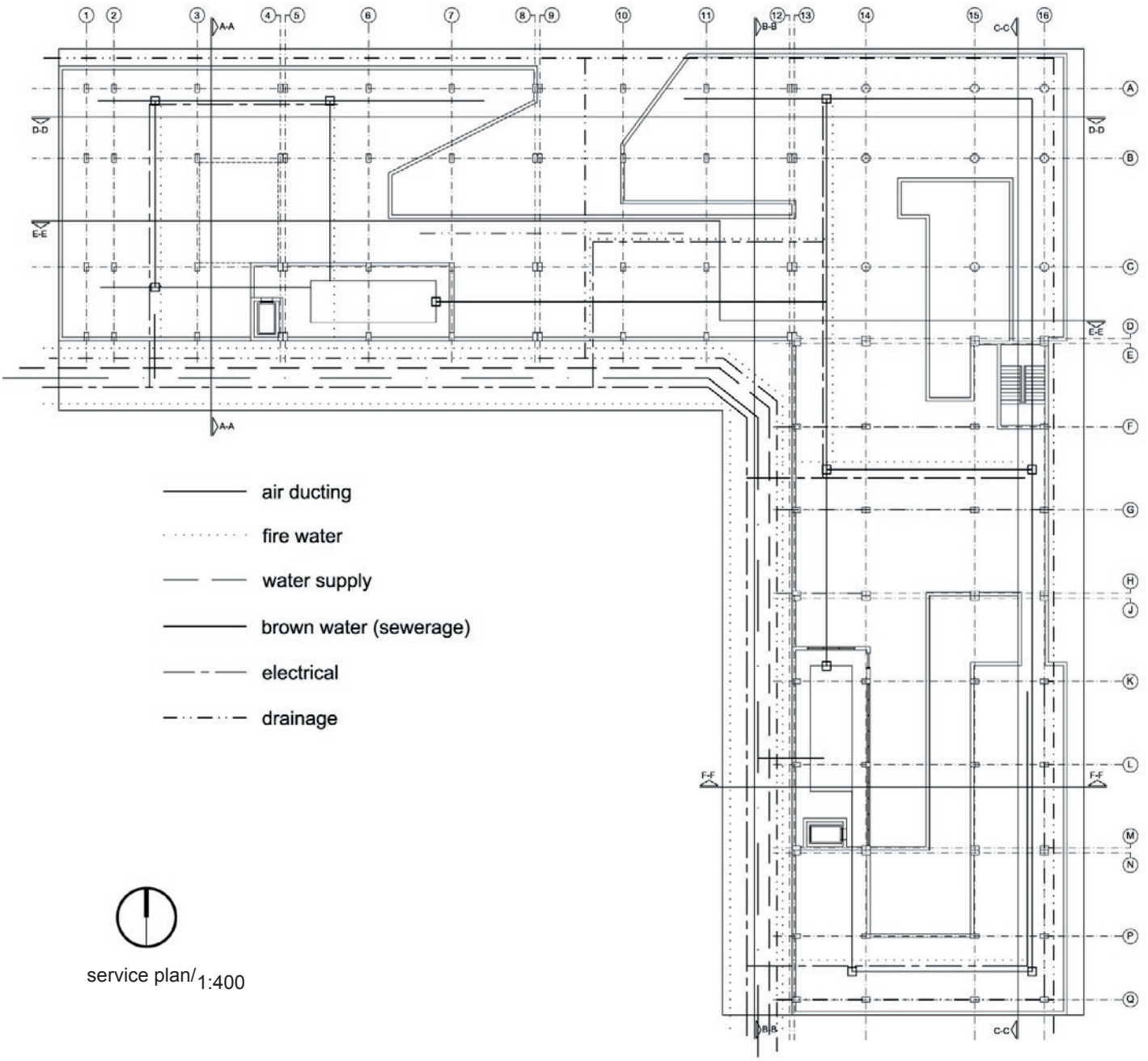
second floor plan/ 1:400



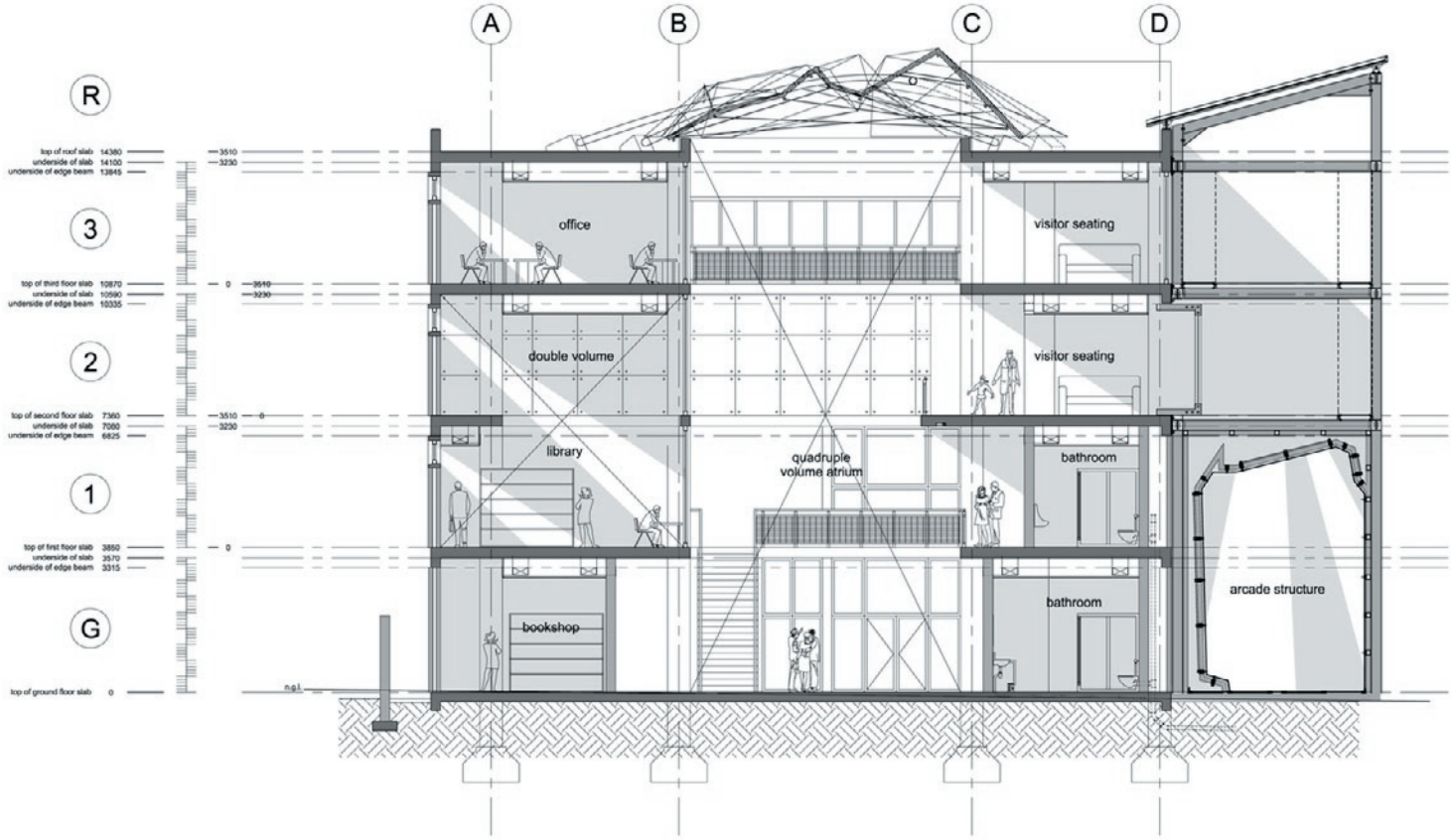
third floor plan/1:400



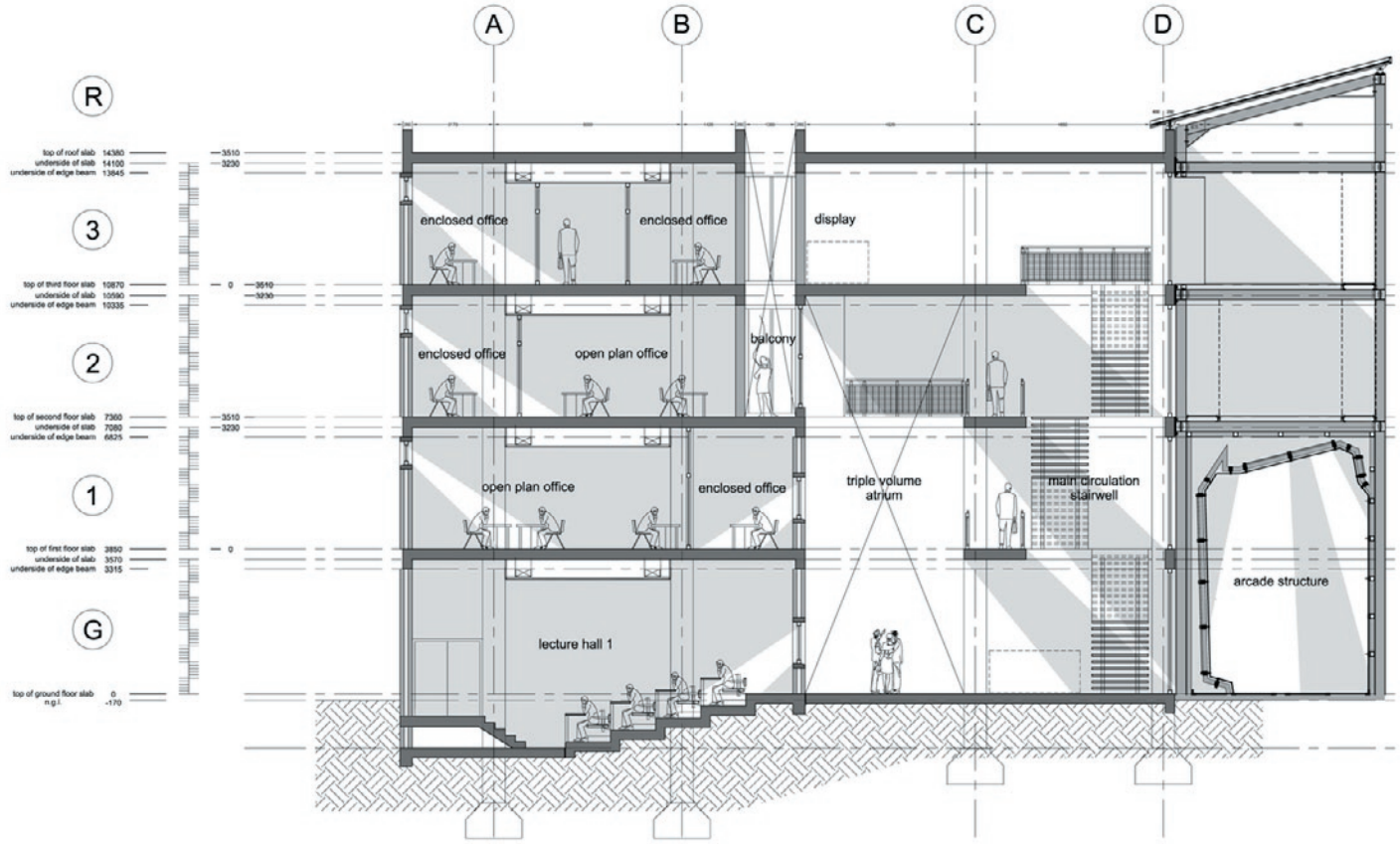
roof plan/ 1:400



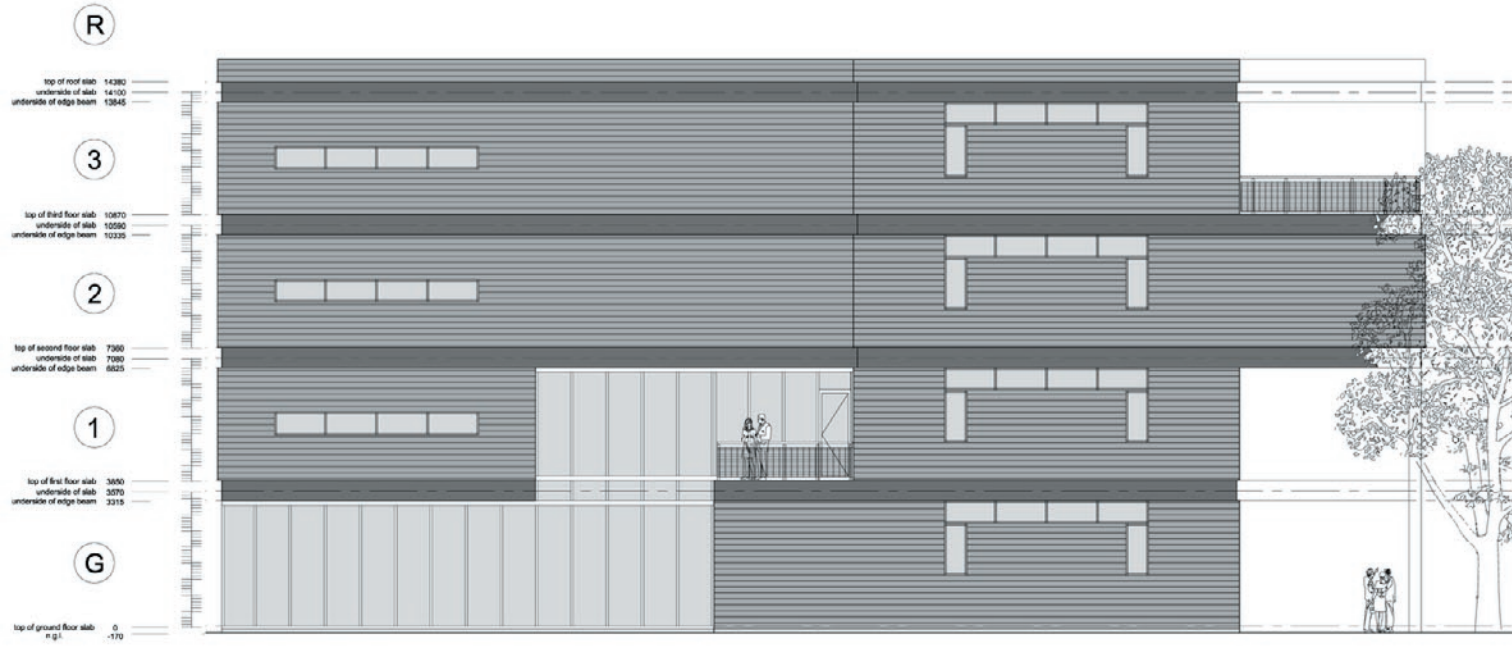
service plan/1:400



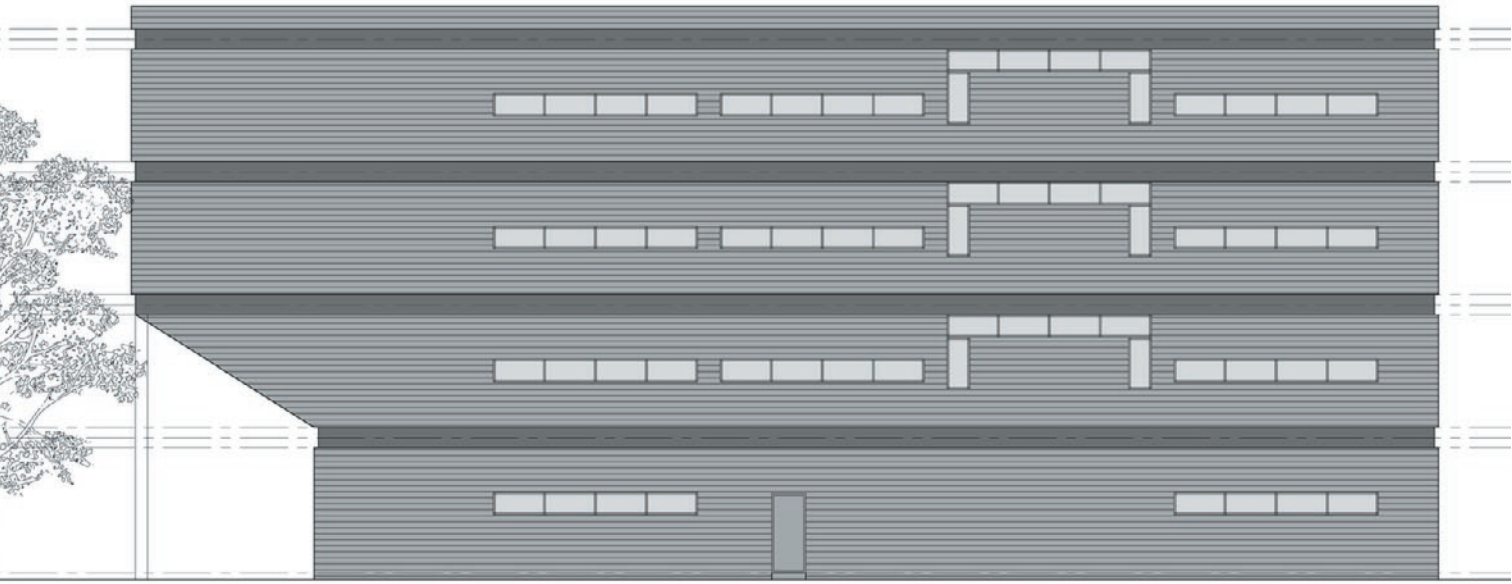
section A-A/ 1:200



section B-B/ 1:200



C.U.B.E. north elevation/ 1:20



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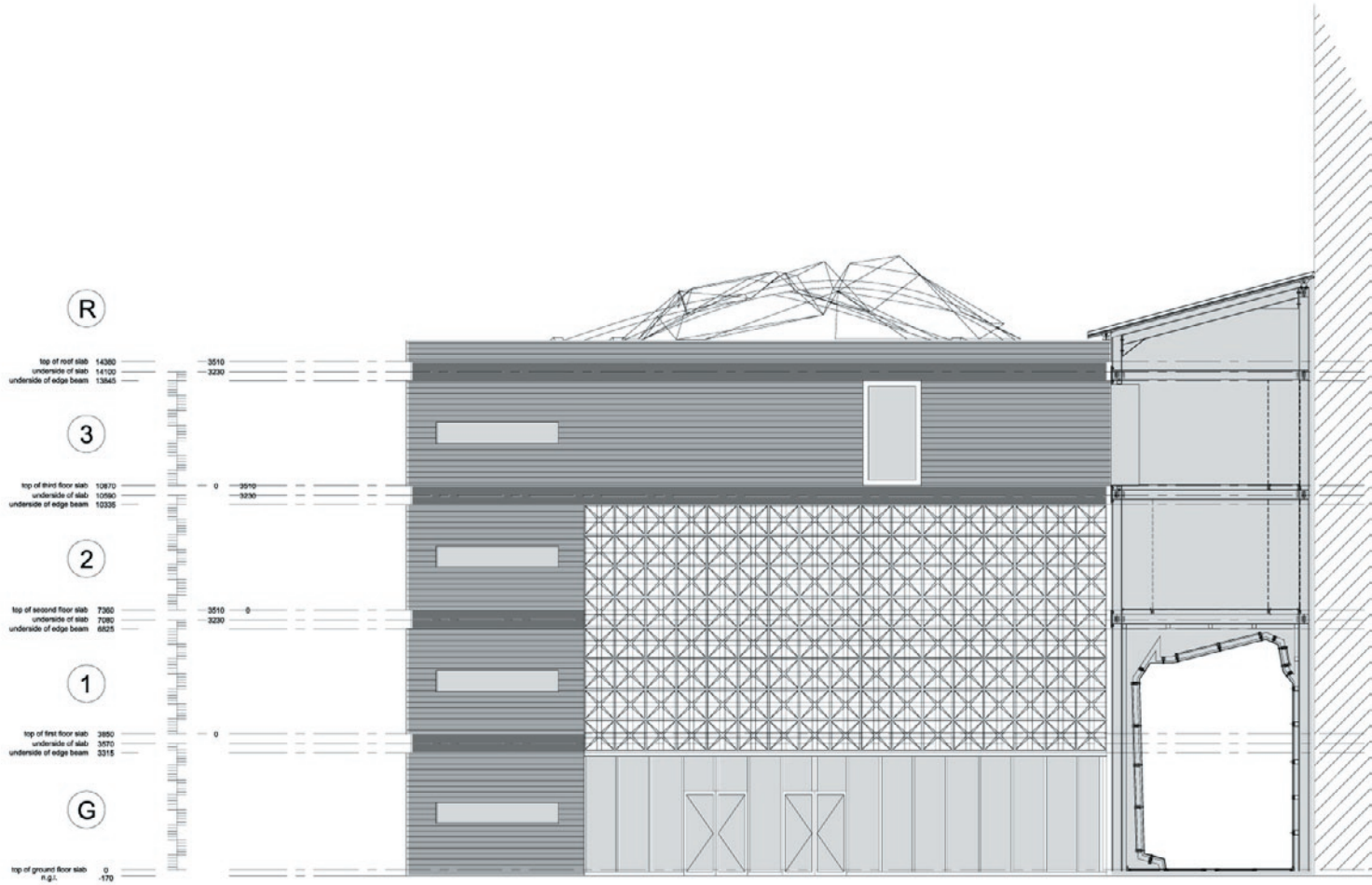
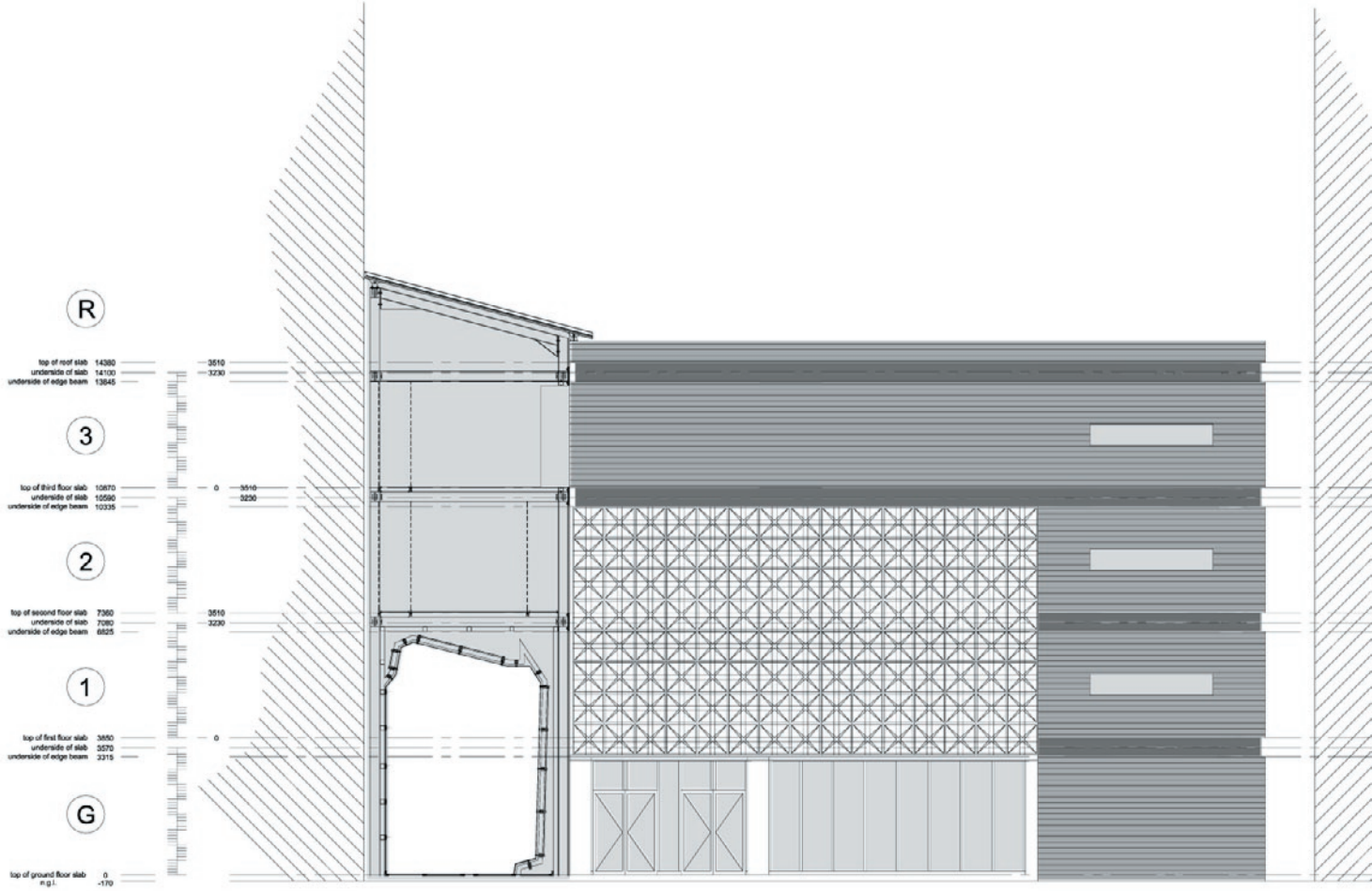
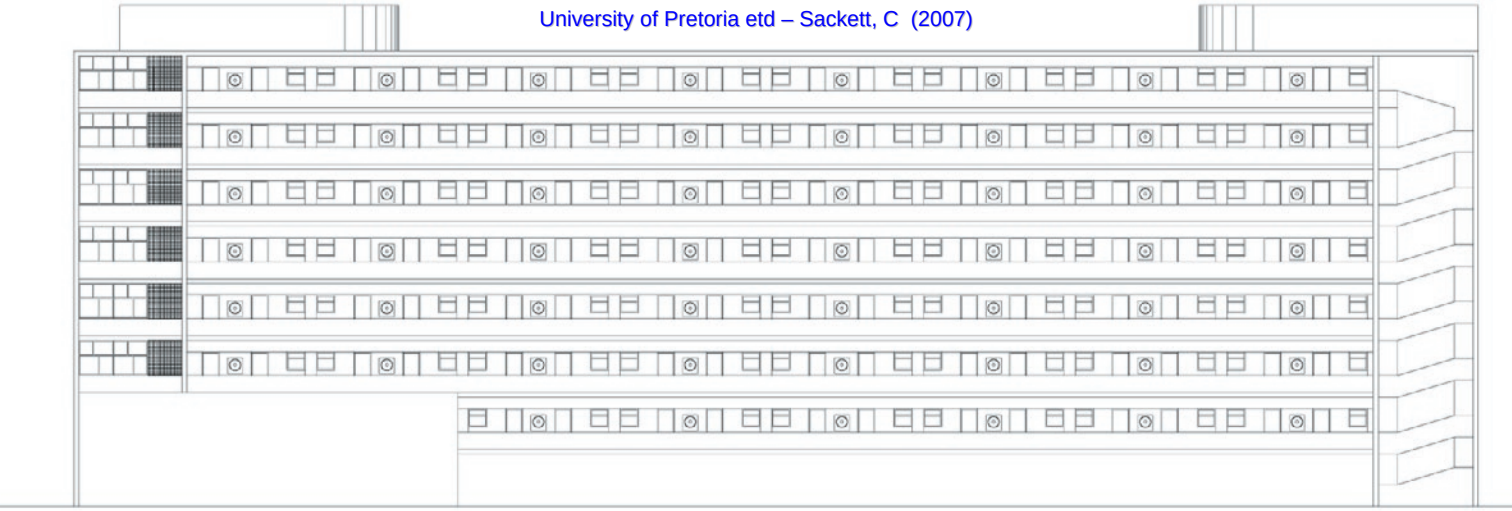


C.U.B.E. west elevation/ 1:100

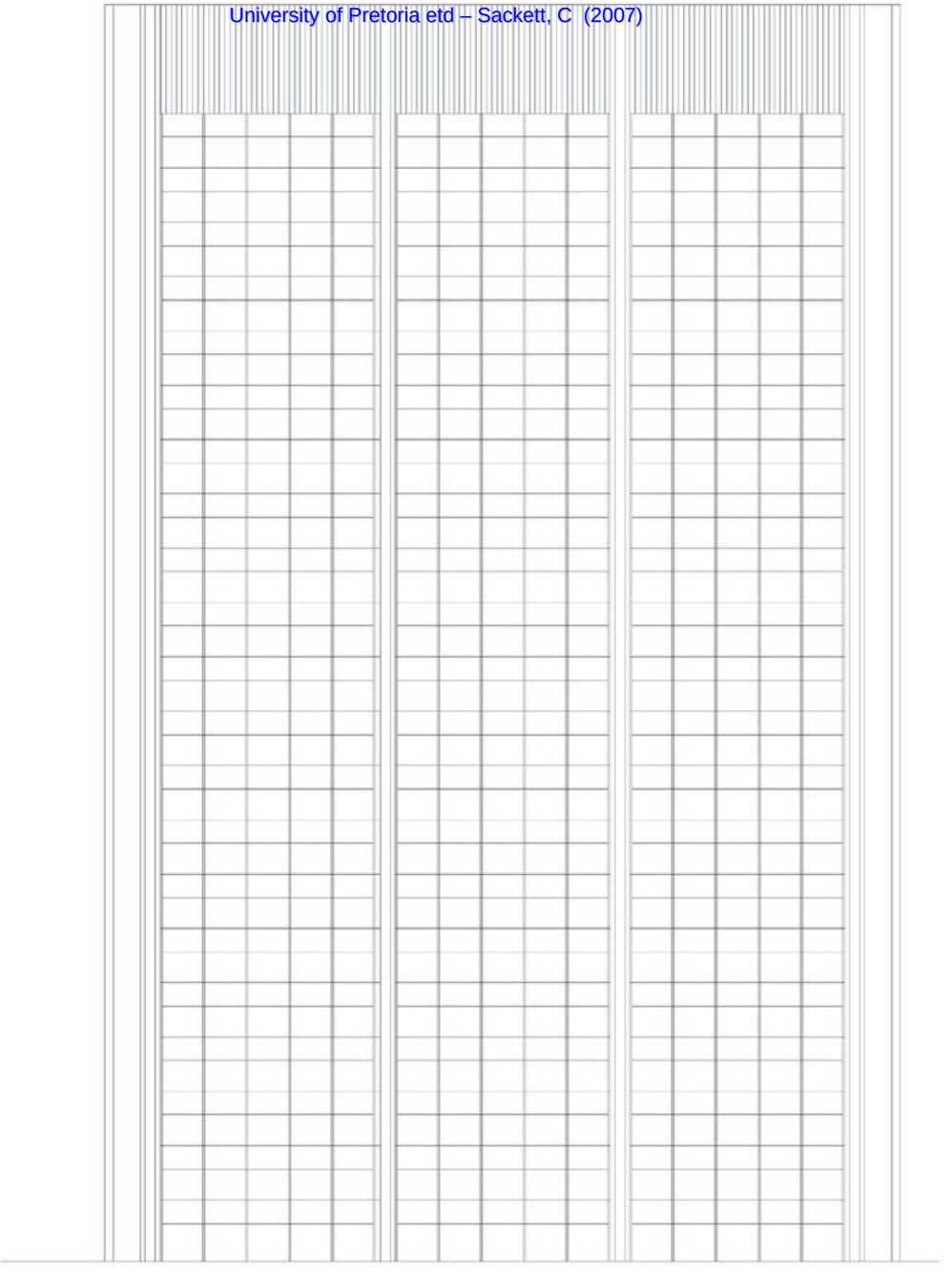


C.U.B.E. south elevation/ 1:100

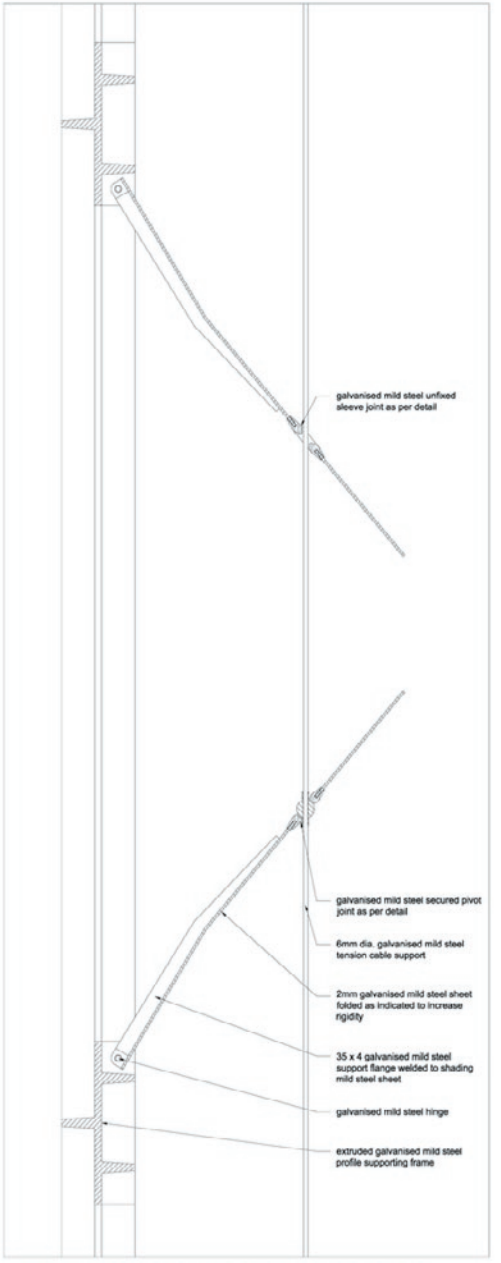


woltemadegebou south elevation/ 1:200

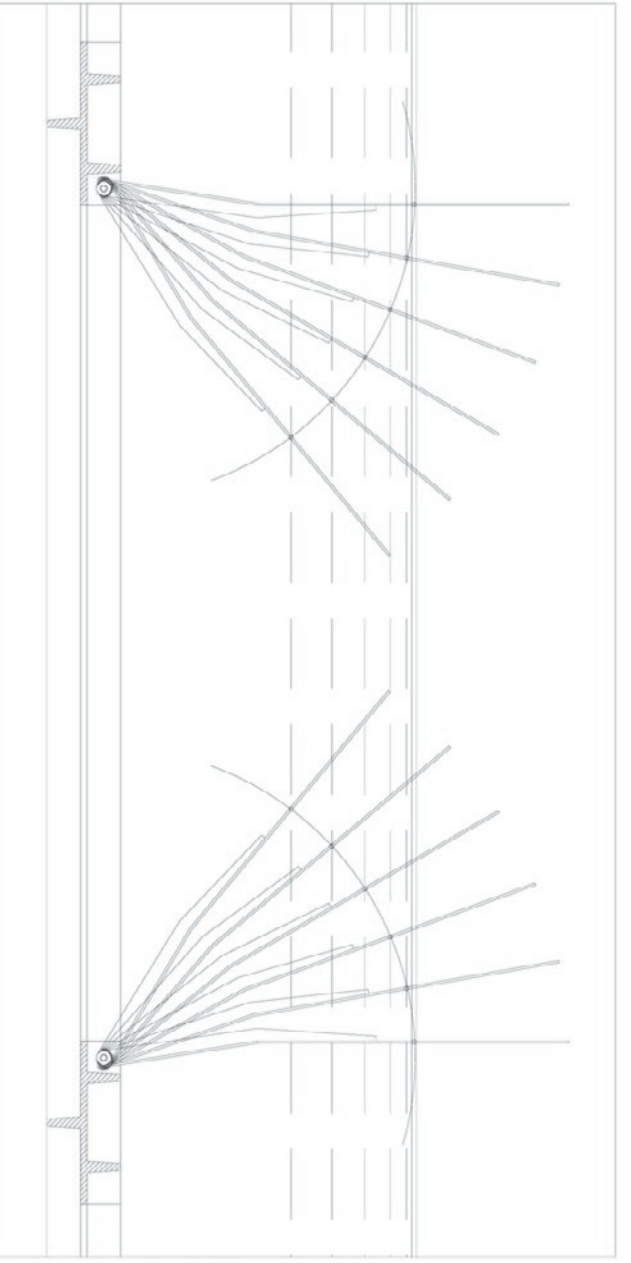
pretoria news building west elevation/ 1:200



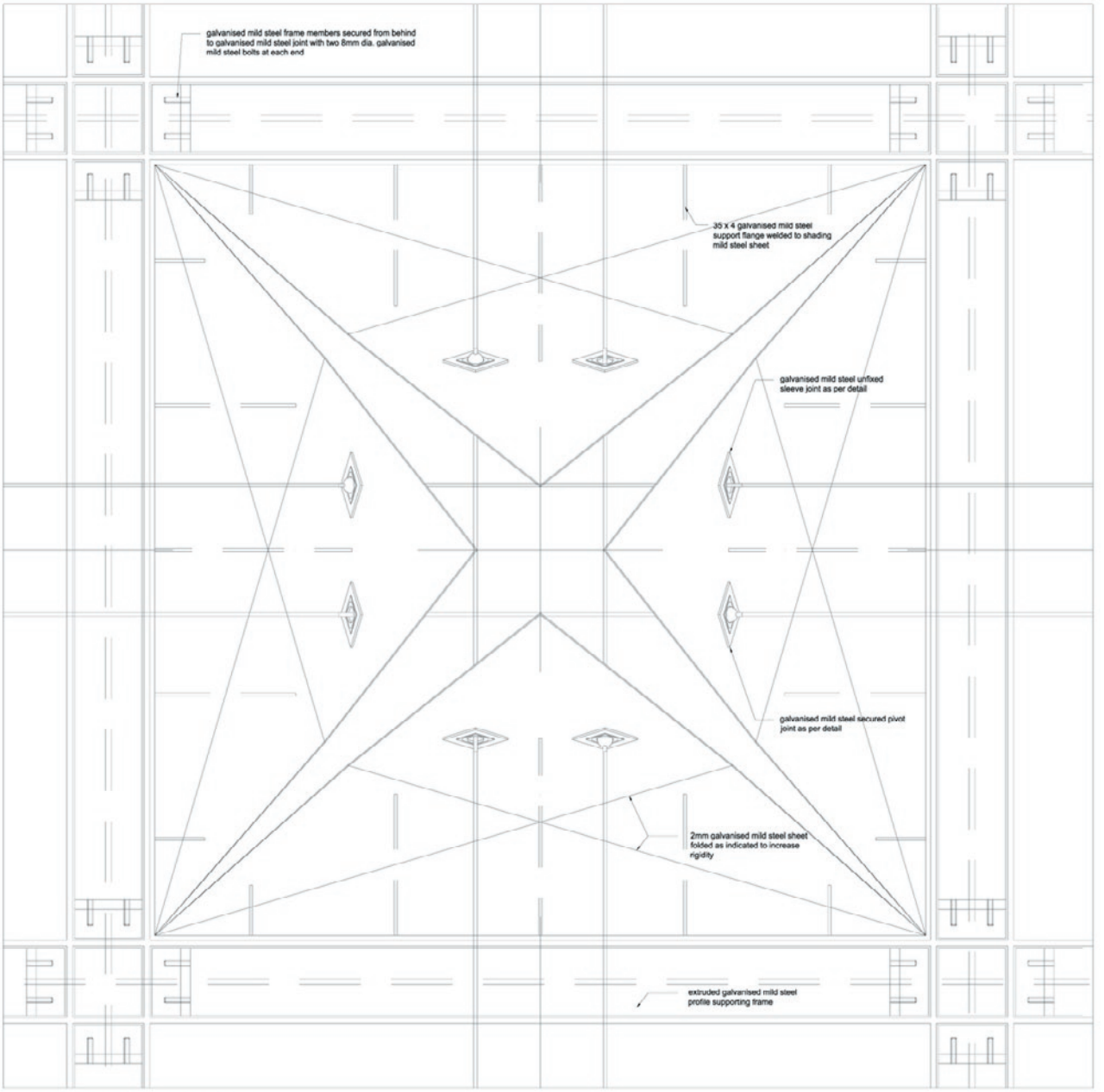
VWL sentrum building north + east elevation/ 1:200



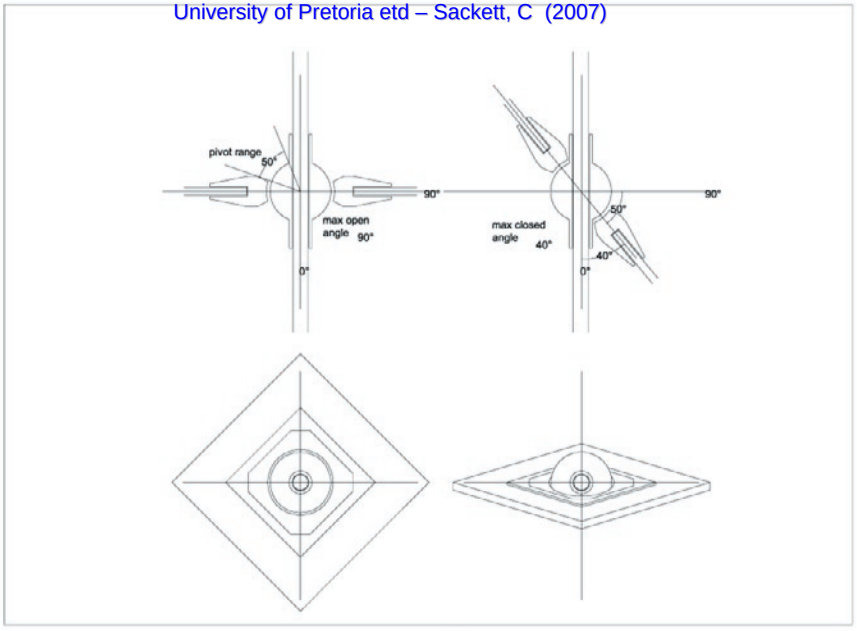
single unit in closed position/ 1:2



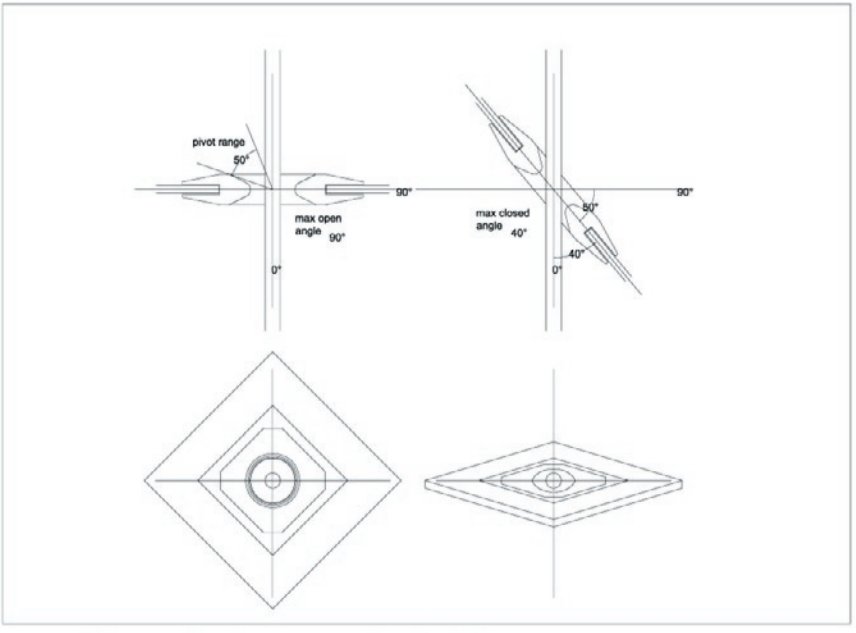
single unit in open position/ 1:2



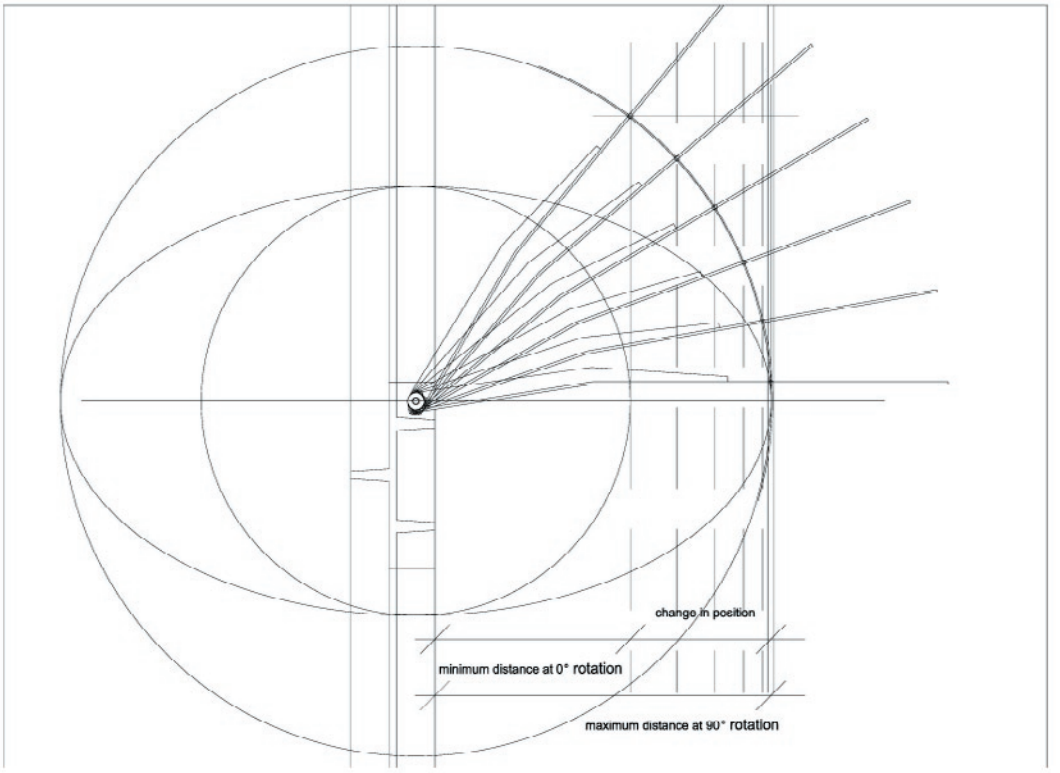
single unit elevation/ 1:2



secured pivot joint/ 1:1

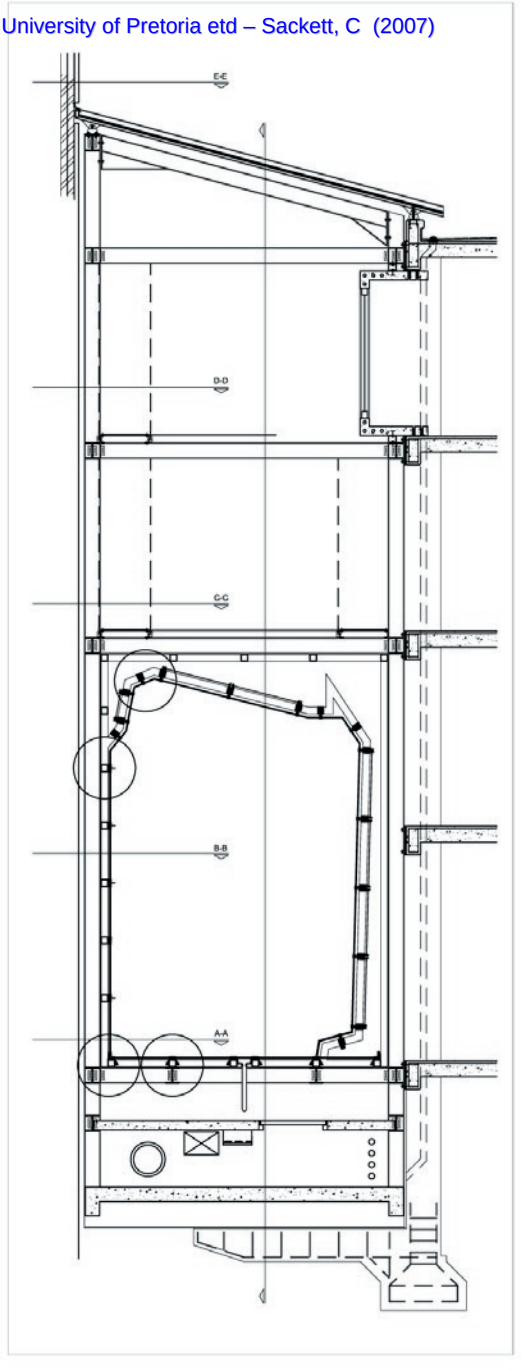


unfixed sleeve joint/ 1:1

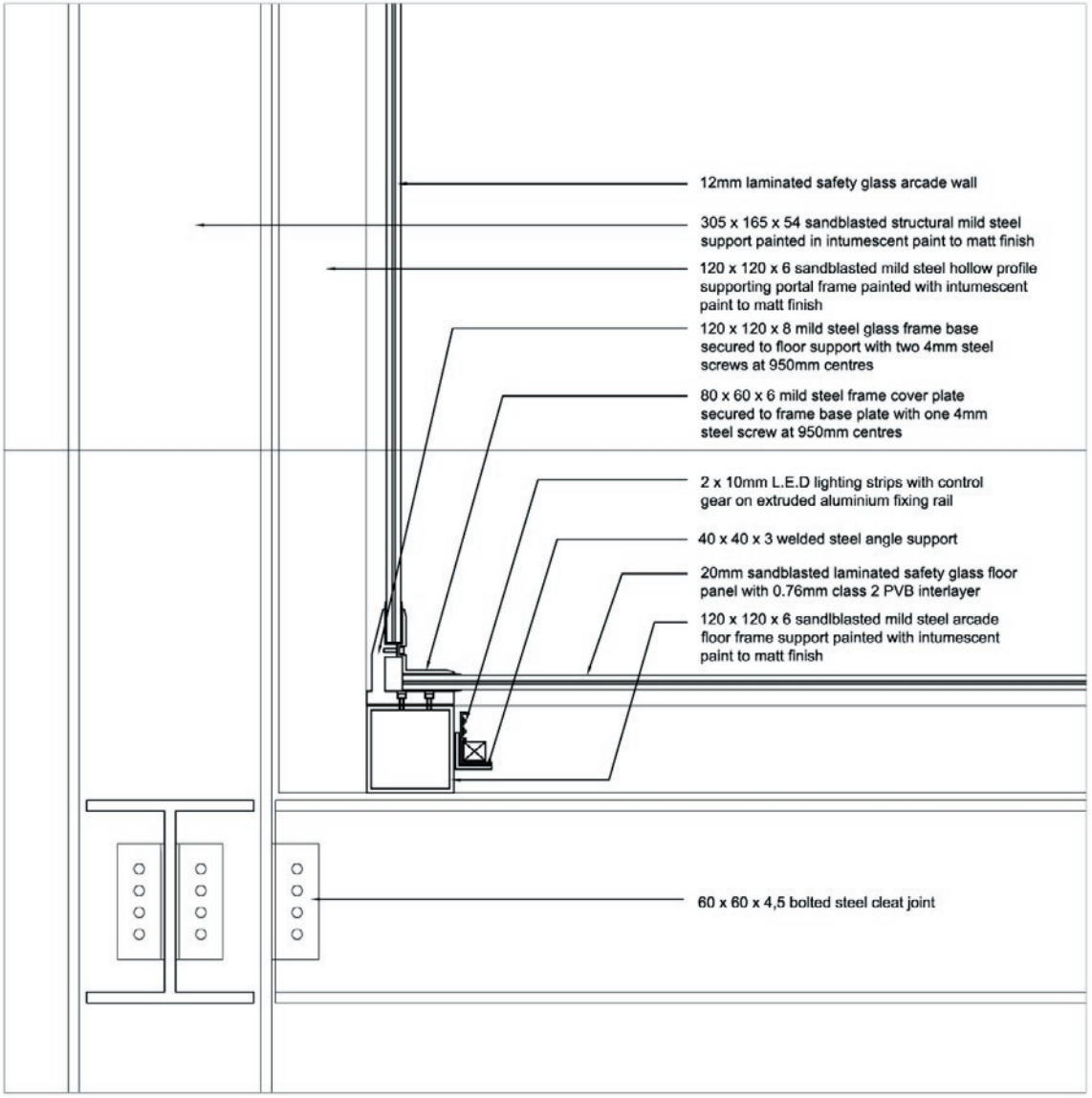


cable movement analysis/

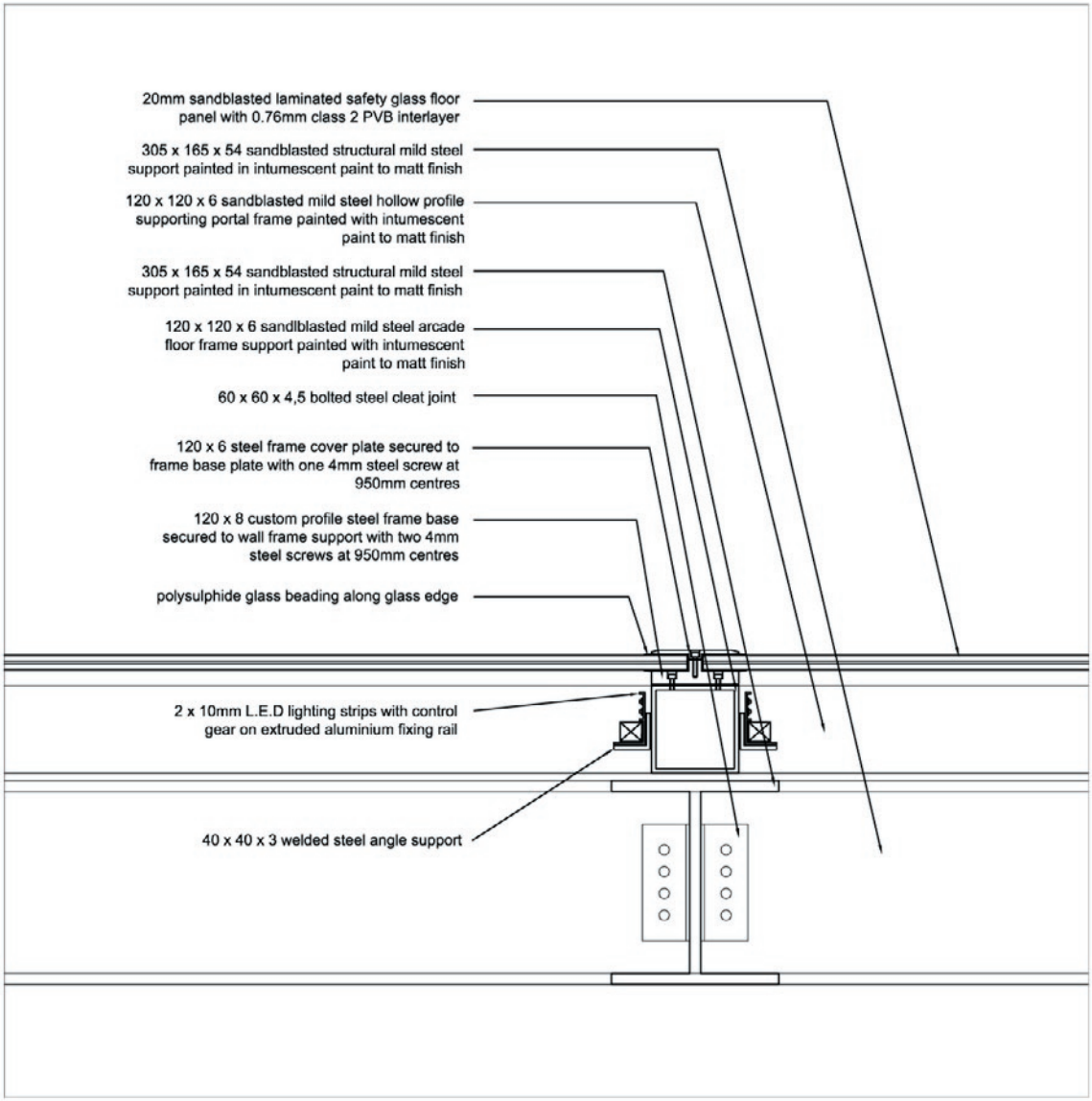
due to the circular movement arc of the metal panels, the tensile cables will move forward and back in position as the panels open and close. this can lead to operating problems should this movement not be designed for. however with the use of a simple elliptical rotation element this problem can be solved.
since the panel movement centres about the hinge, so too will the position of the cable. but since the rotation of a circular element will not induce horizontal position change, an elliptical element must be designed according to the ratio of position change about the hinge.



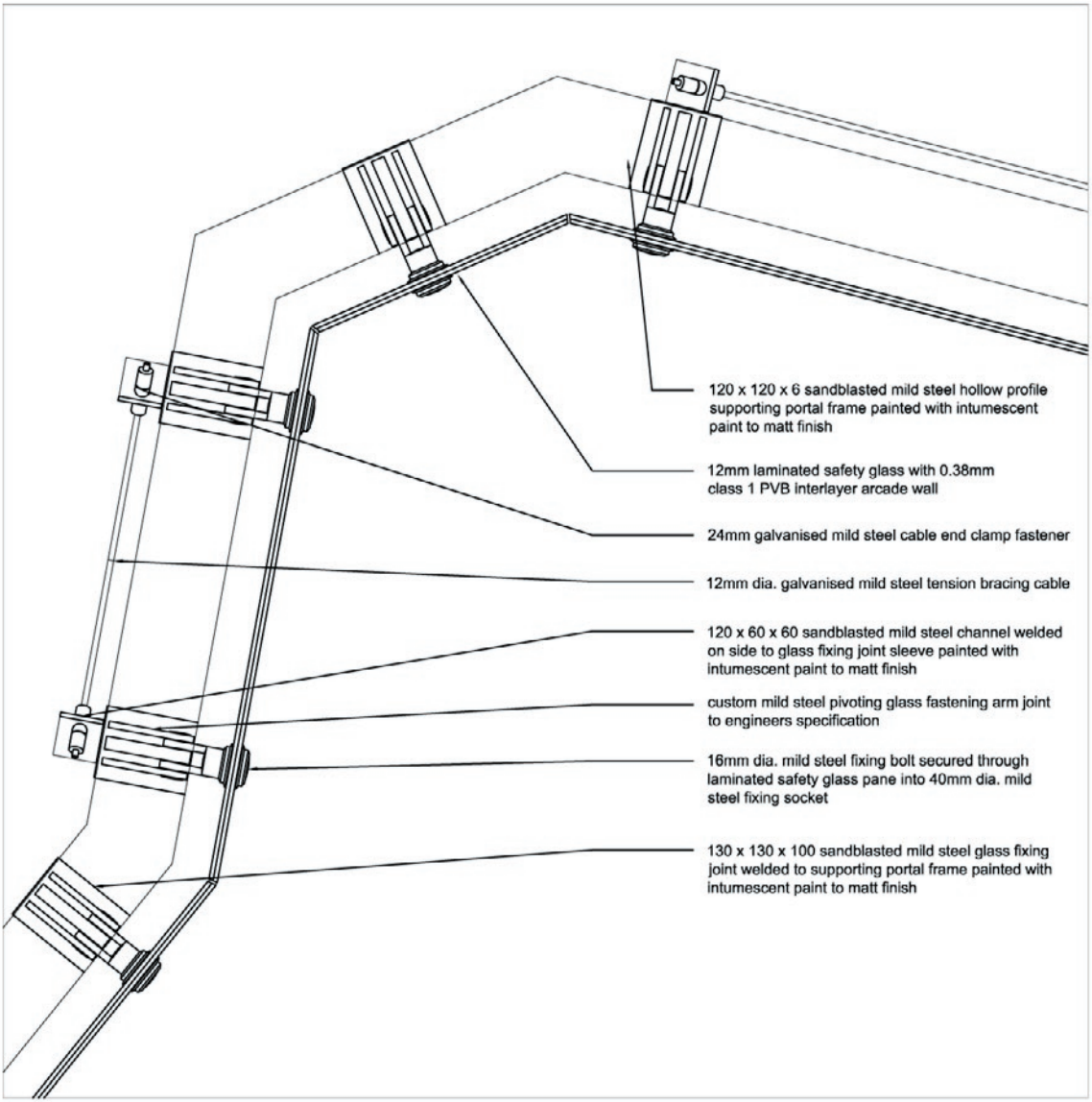
arcade section/ 1:100



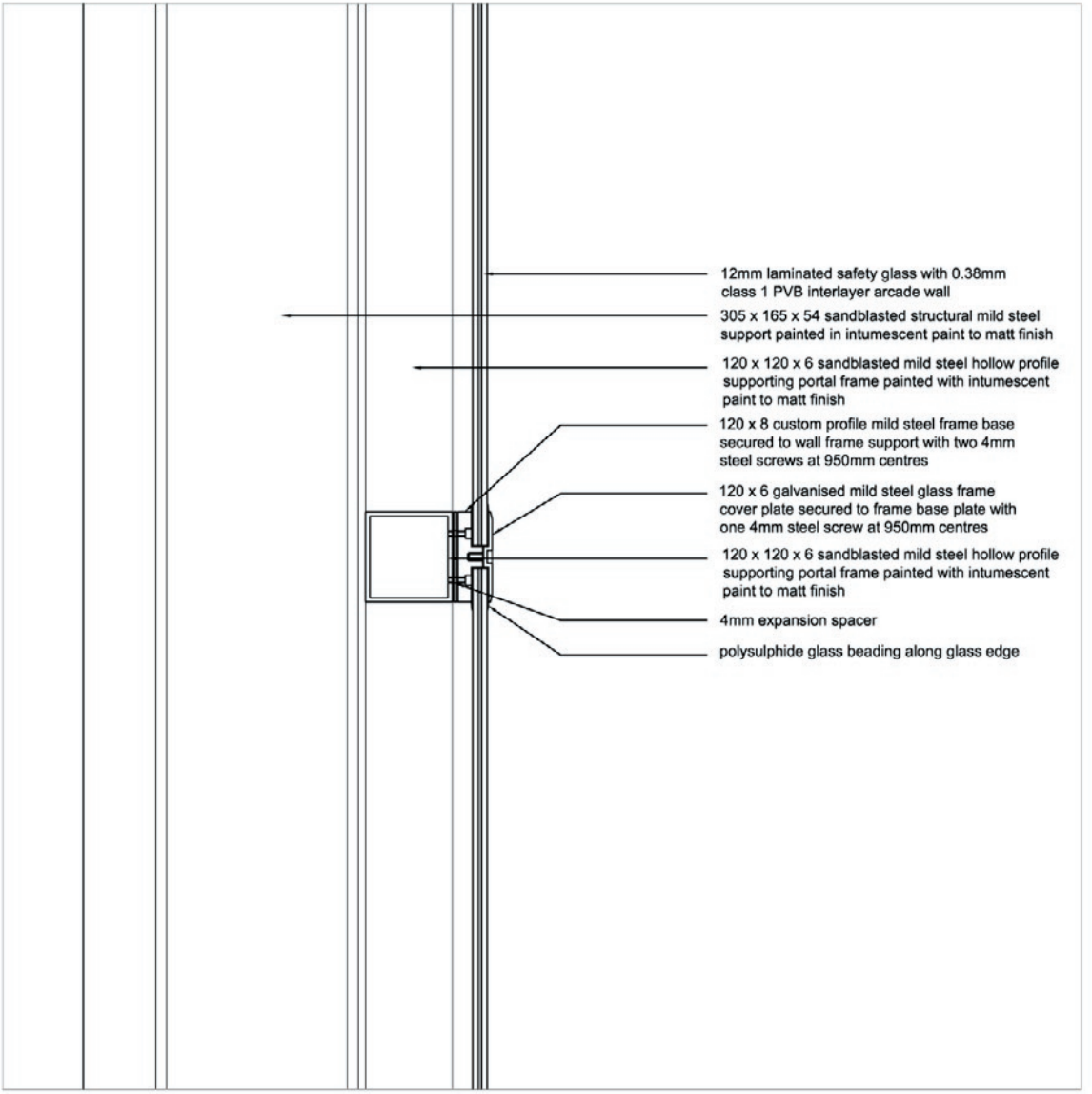
arcade glass floor and wall joint/ 1:10



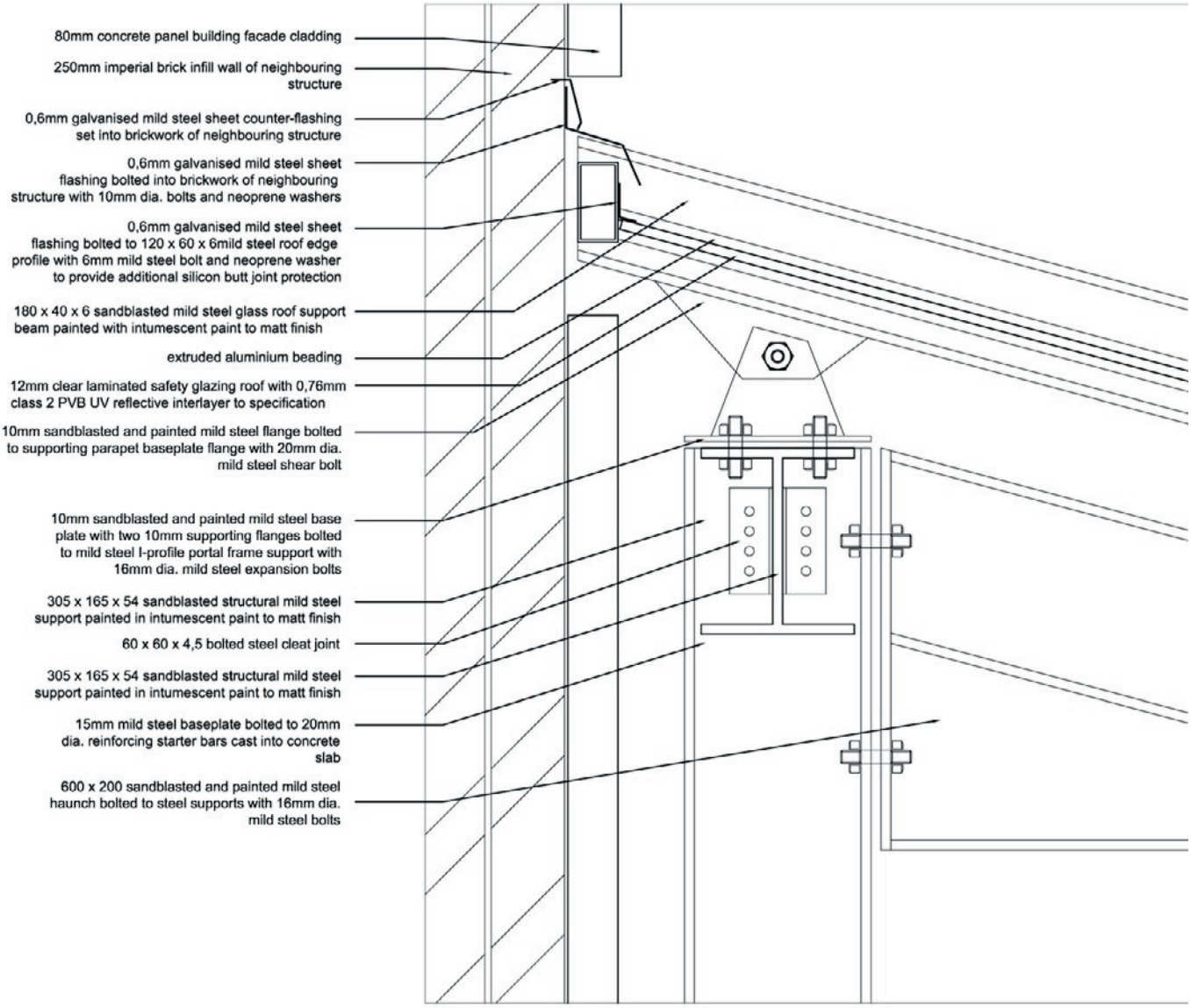
arcade glass floor frame detail/ 1:10



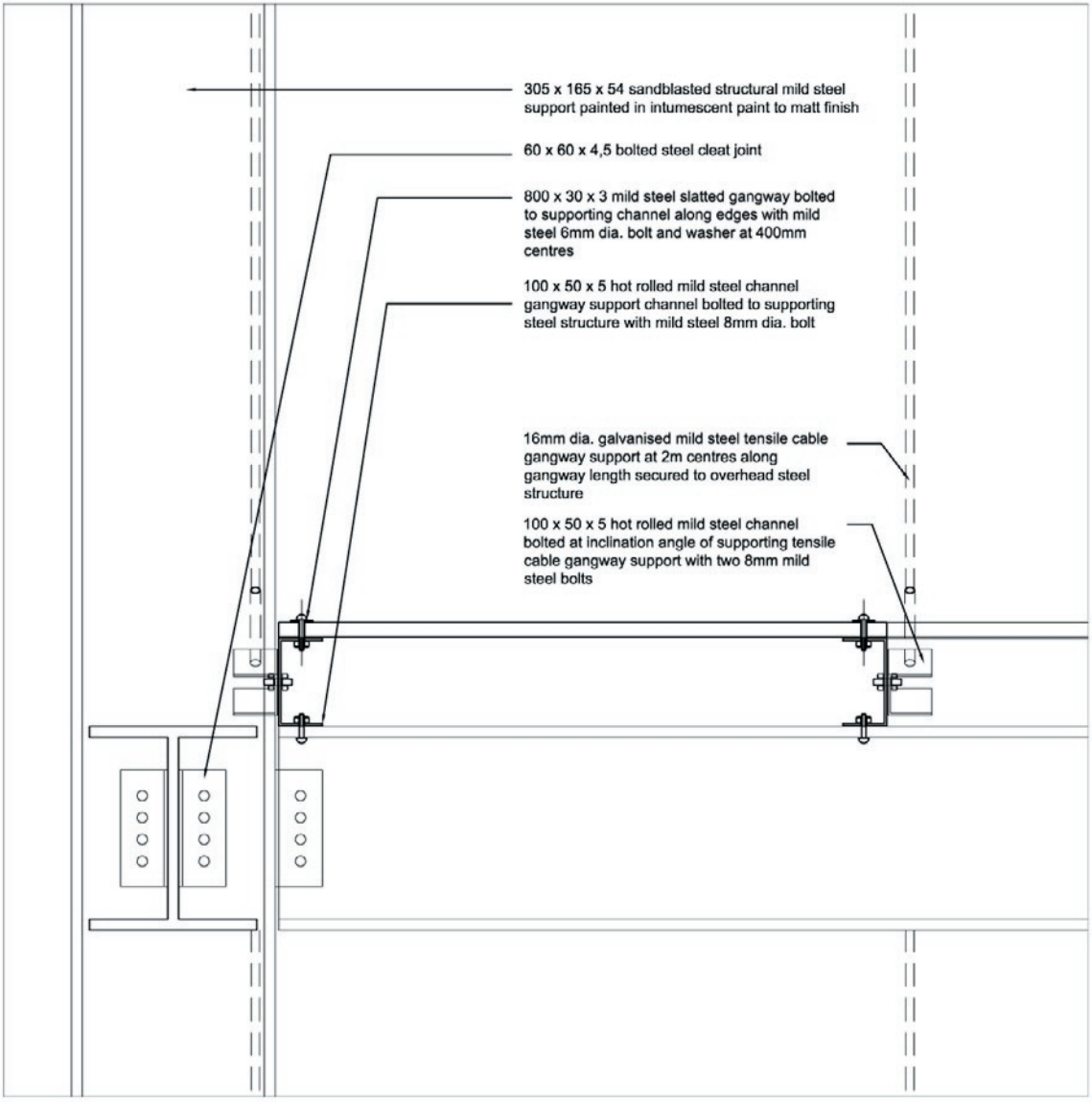
arcade steel portal joints/ 1:10



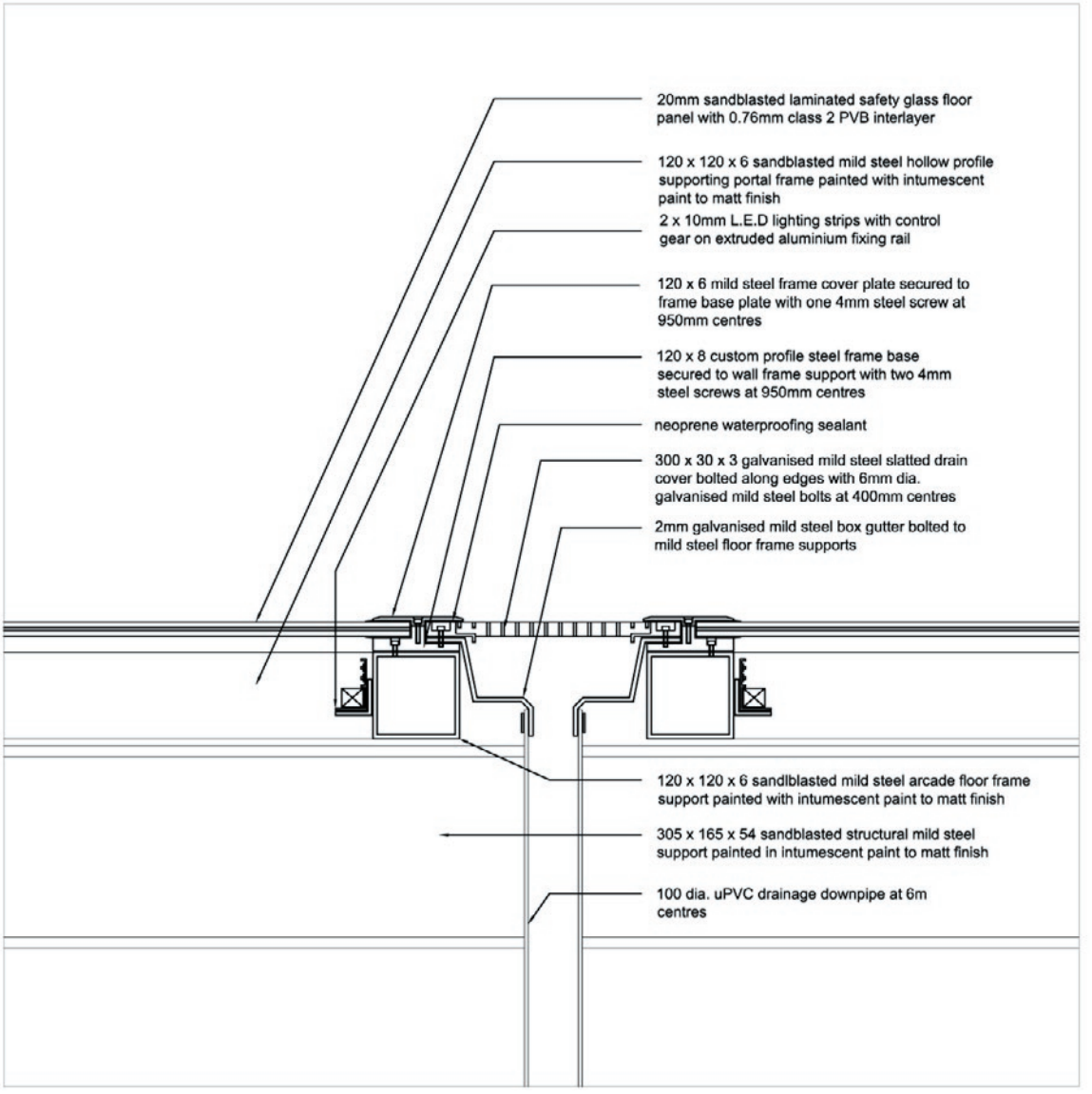
arcade glass wall frame detail/ 1:10



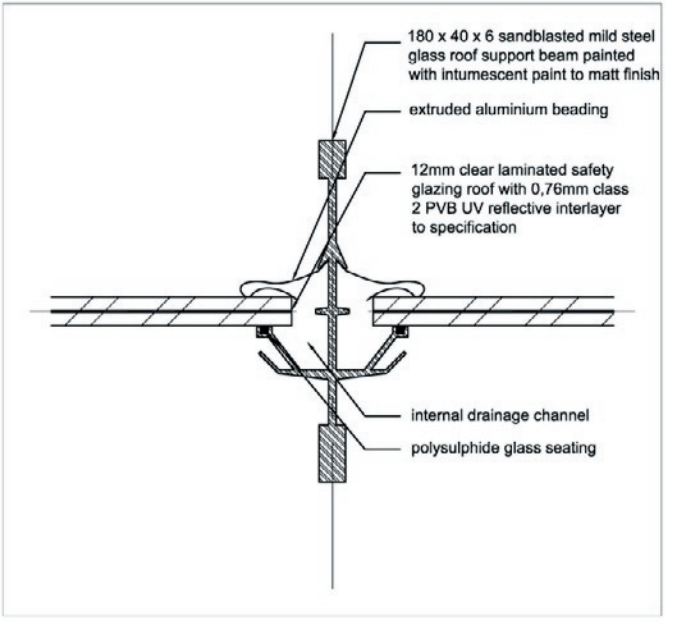
glass arcade roof apex detail/ 1:10



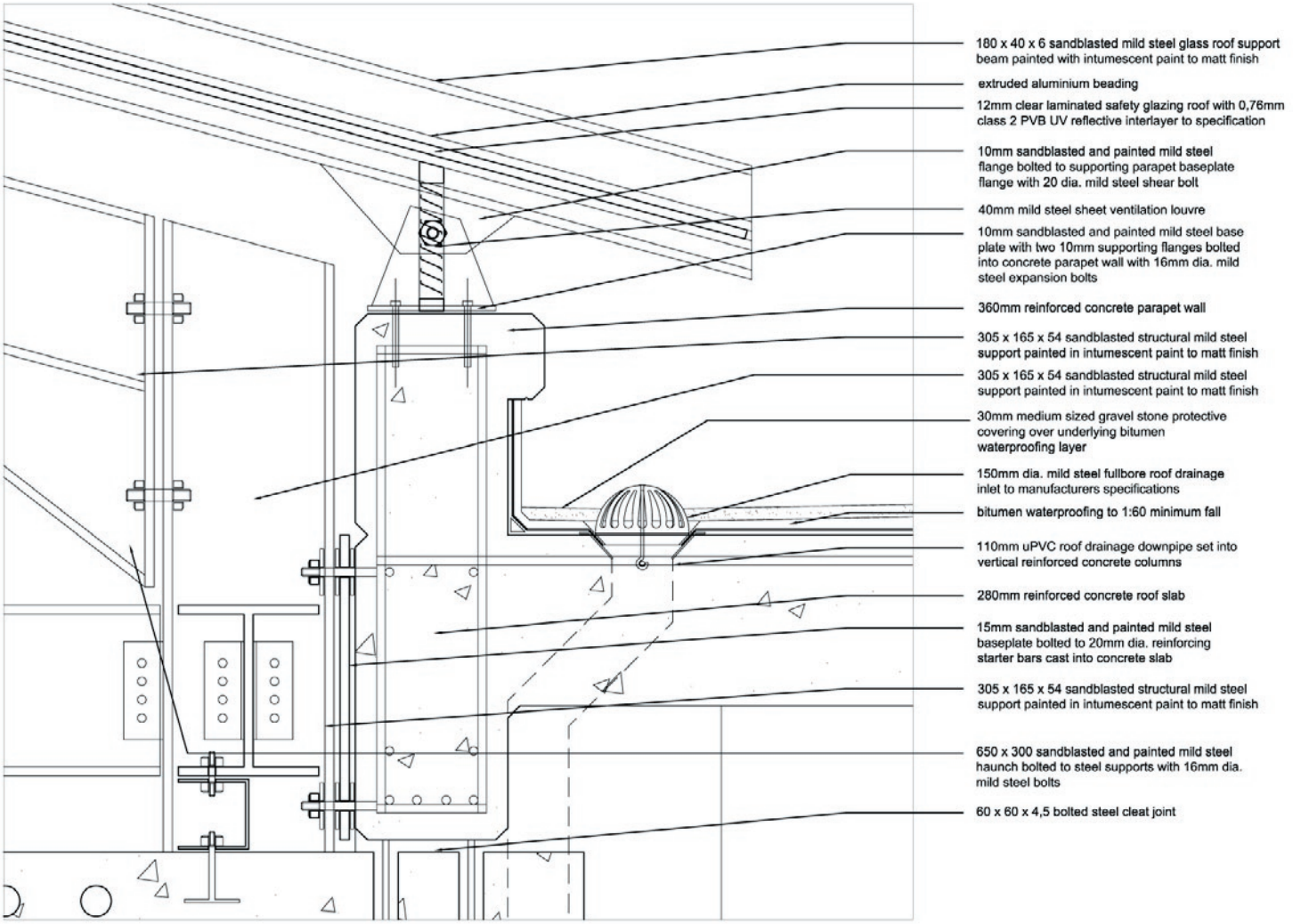
internal arcade gangplank detail/ 1:10



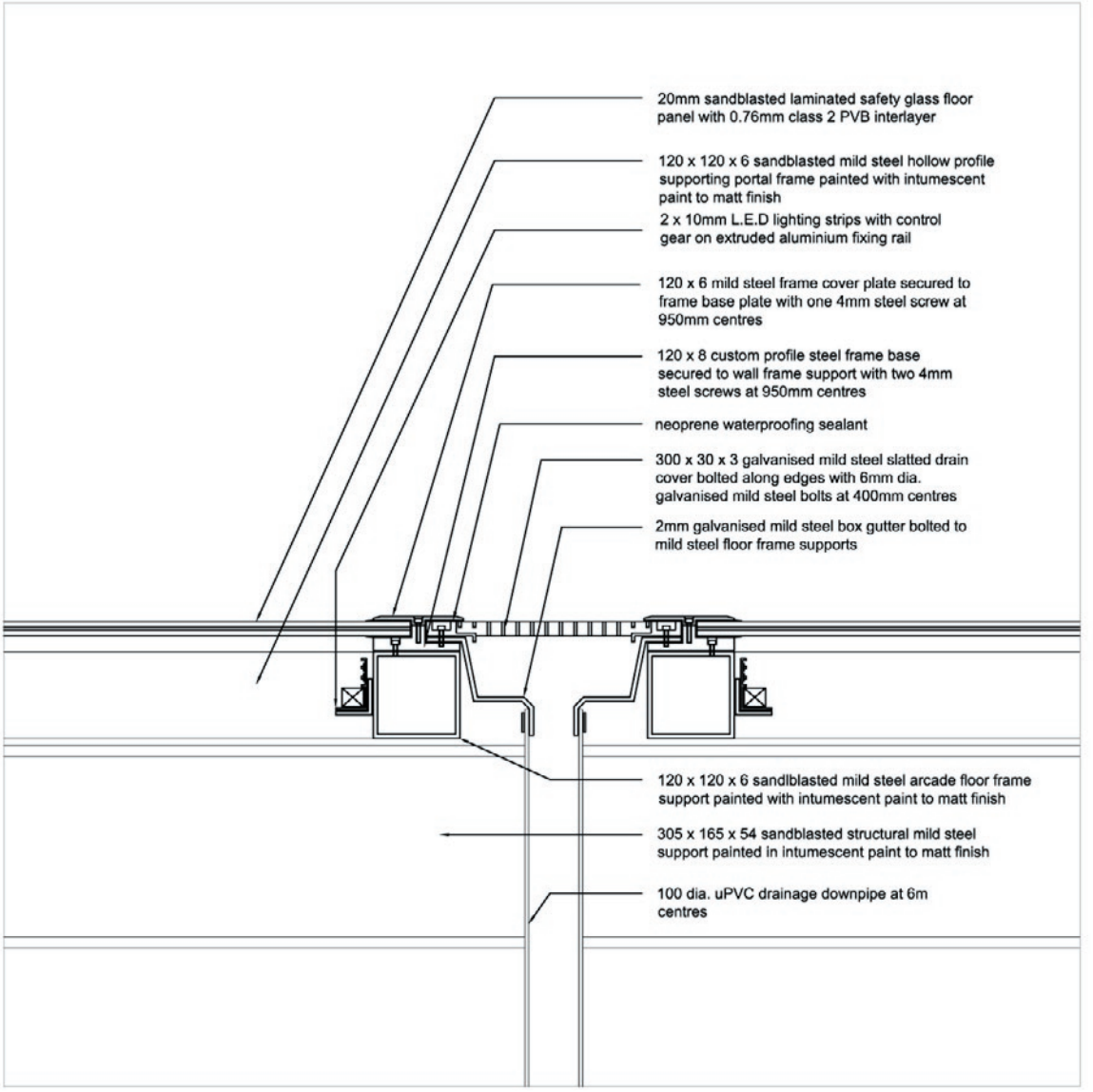
arcade floor drain detail/ 1:10



glass roof support detail F-F/ 1:4

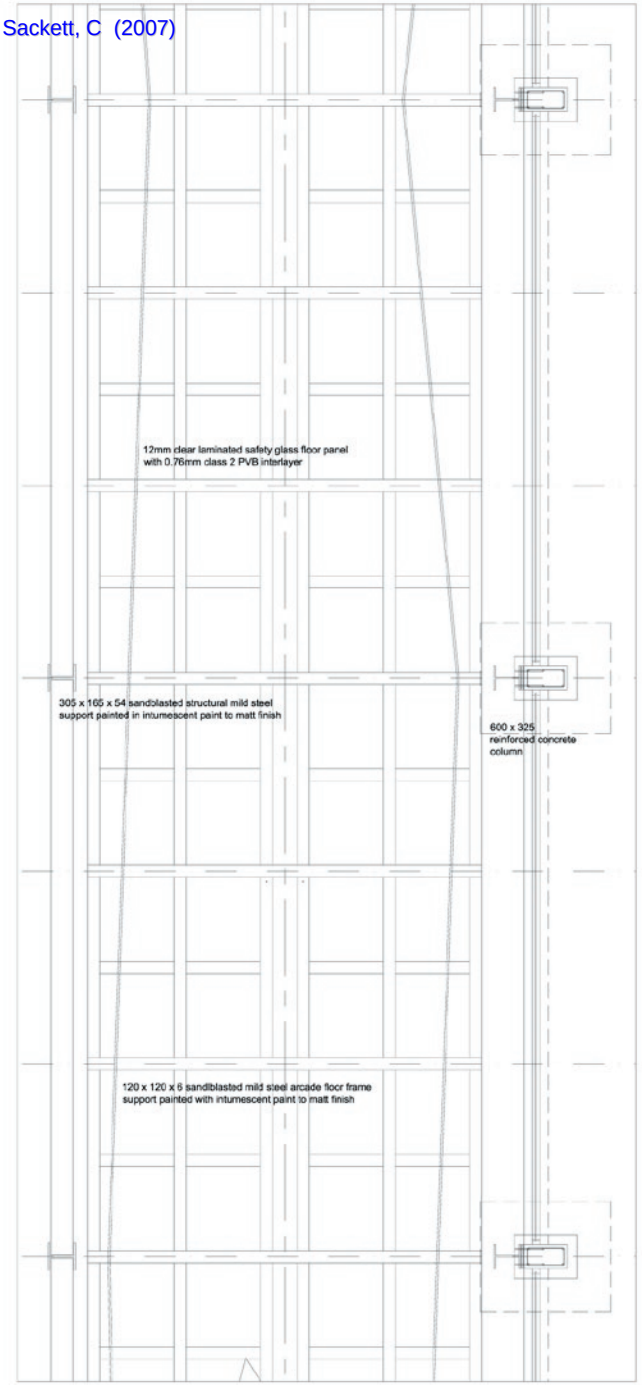


glass arcade roof edge detail/ 1:10

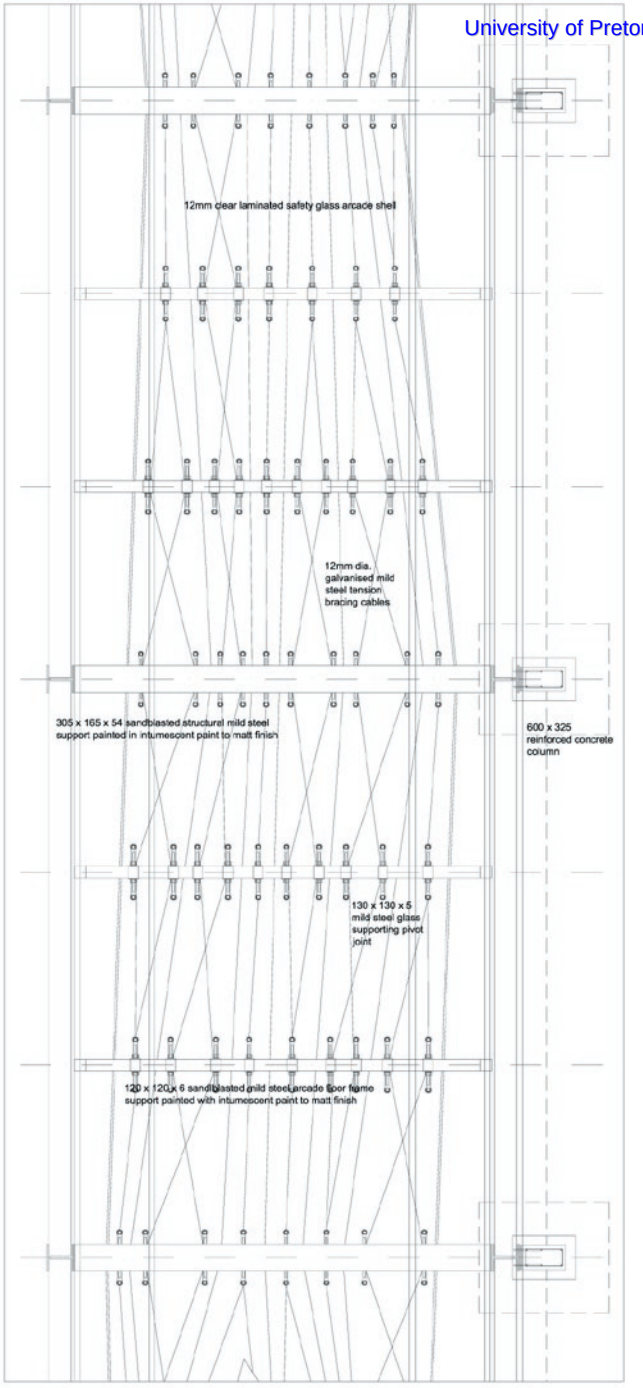


arcade floor drain detail/ 1:10

plan A-A/1:100



plan B-B/1:100



plan C-C/1:100

TECHNICAL DEVELOPMENT

Technical focus for this project was placed upon the arcade and the structural design which required various alterations and changes to arrive at the final solution.

01_SEGMENTED FRAME

Initial investigations into the construction of the supporting portal frames required a method of construction which allowed for the unique profile of each portal whilst adhering to some form of standardisation for ease of fabrication and assemblage by workers.

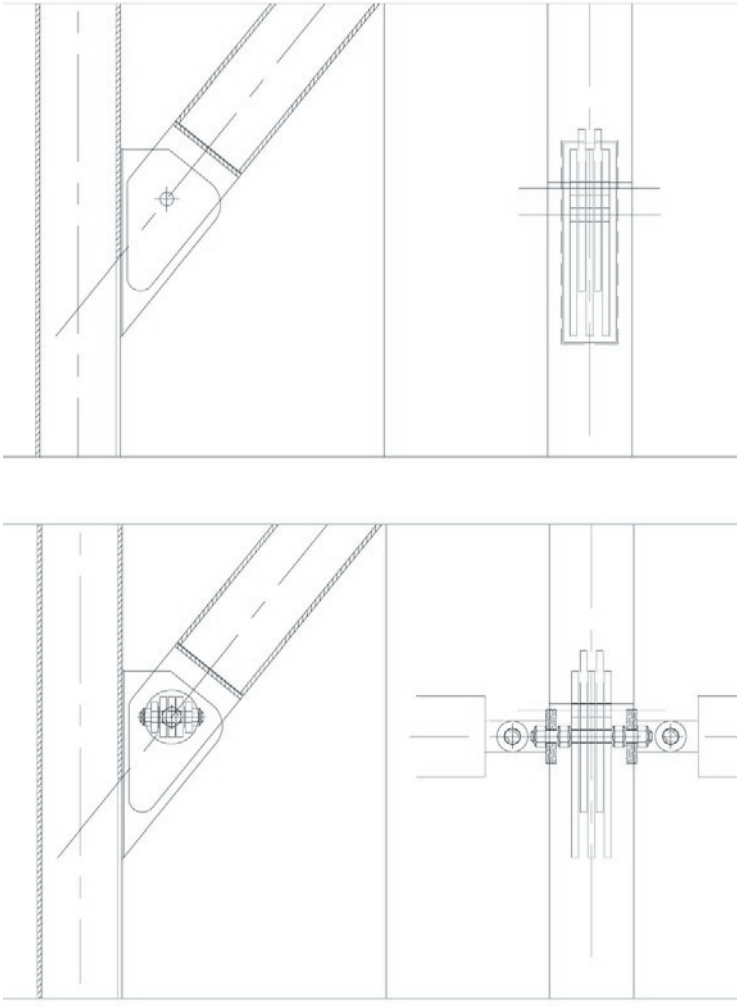
A square outer frame which housed the various arcade profiles became the starting point for a solution. The inner unique profile would be constructed from segments joined together with flange 'fingers' and bolted together to allow the individual segments to be orientated according to design prior to fixing.

The problem of lateral support between portal frames which differ in profile was solved through the development of a pivotable joint which secured into the joints of the unique portal profile. In a similar fashion to the main joints but with the ability to allow 3-dimensional adjustment through rotation of the pivotable joint and the rotation of the flanges securing the lateral supports, the problem of 3-dimensional fluctuations between portal profiles was solved.

02_PREFABRICATED FRAME

Concerns with structural strength however promted the redesign of each of the unique arcade portals. In order to achieve greater strength the decision was taken to have each portal fabricated into profile from a single mild steel hollow.

The incorporation of the lateral pivoting joints could



segmented frame joint/ 1:10

then be bolted at the neccessary points around the frame to give the required lateral support. Lateral support members between the portal frames would be similar hollow steel profiles in compression connected at each end with the bi-pivoting joints.

03_FIXED JOINT

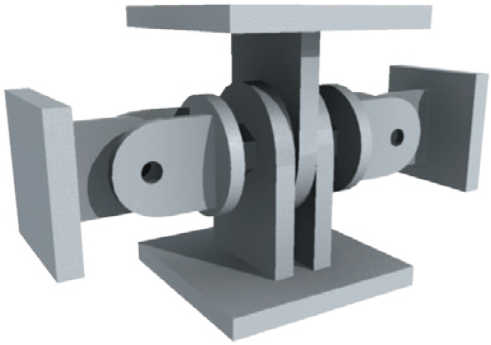
Focus however shifted then into the manner in which the glass would be fixed and supported by the structure. Due to the density of glass and the required thicknesses, large weights are required to be supported. Utilising the designed pivoting joint system generated concerns of the ability of the portal frames to support this large weight due to the large shear stresses that would be places on the bolts in each joint.

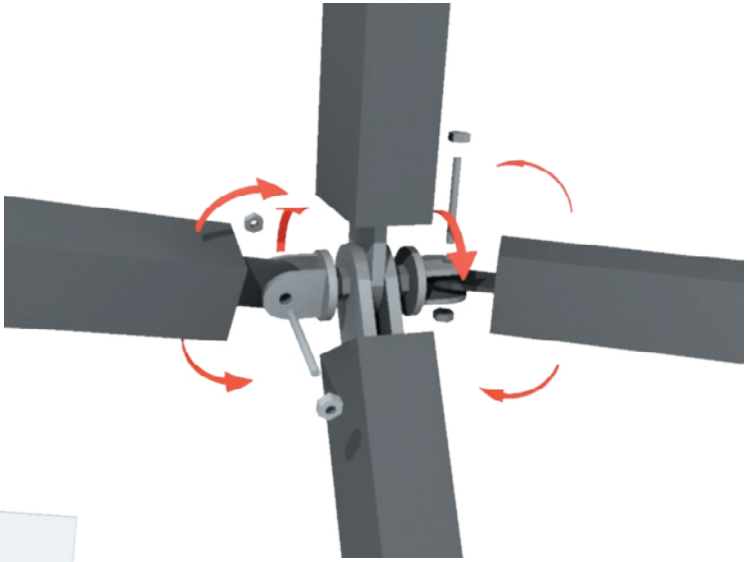
Thus a solution was sought that incorporated the manner of fixing the glass as well as enhancing structural intergrity. The third stage solution was a mild steel channel sleeve which slides over the portal support and attaches to the glass on the inside of the frame. In this manner the added weight of the glasswork would place further compression on the portal frame and due to its enclosed nature, would increase its rigidity and integrity.

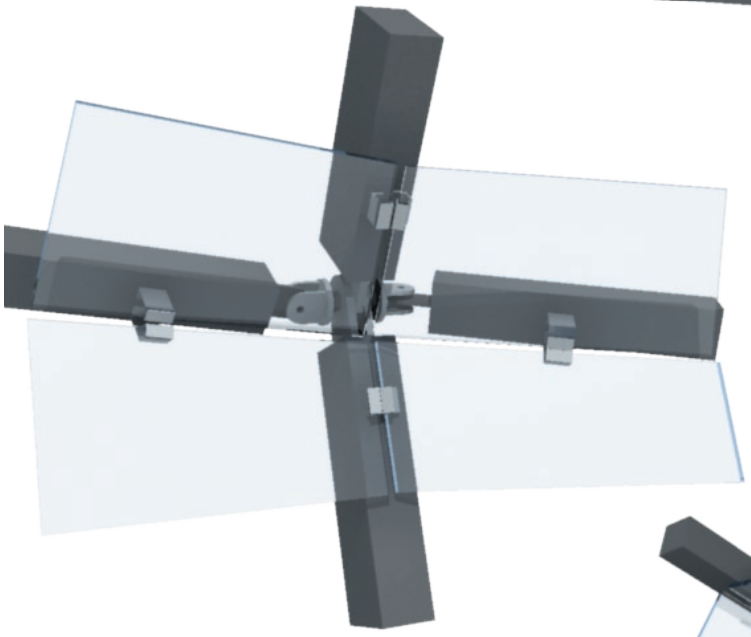
04_PIVOT JOINT

Final design of this technical aspect required attention be paid to the design of the arcade. In particular its fluctuating surface which requires the ability of the joint to adapt to various angles of the glass panes. However with the triangular sleeve joints previously mentioned there was no allowance for adjustability of the joint arm to secure onto glass panes that were supported at an angle.

The final solution thus sees the incorporation of a shear bolt into the structure of the arm support which will allow movement of the arm to orientate itself with any angle the glass pane may require.







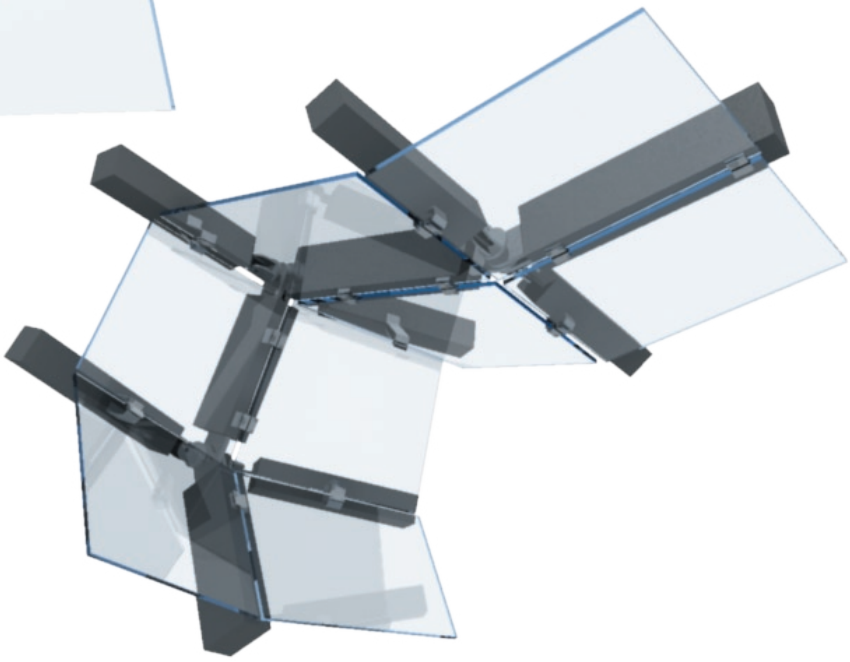
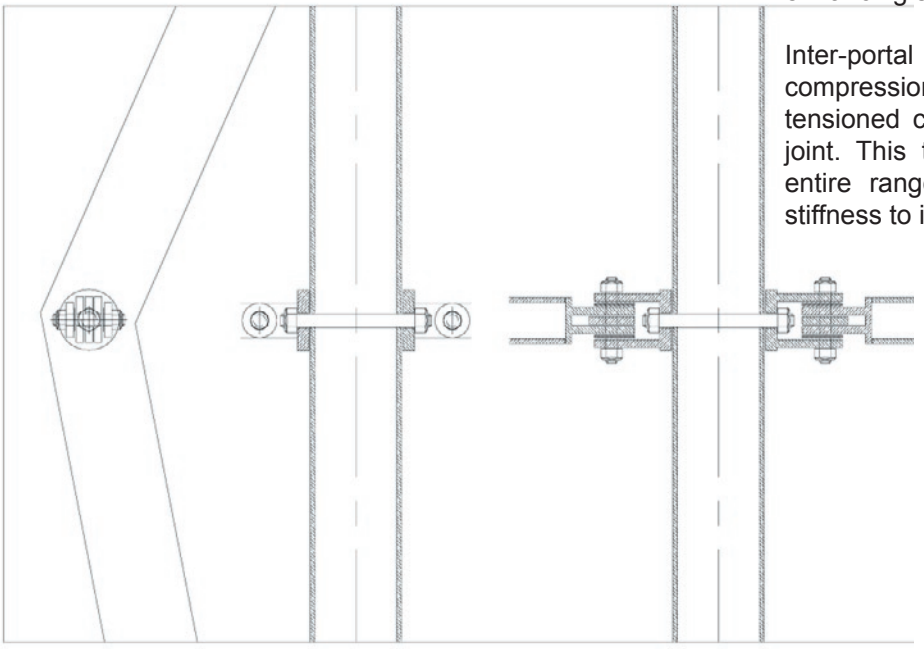


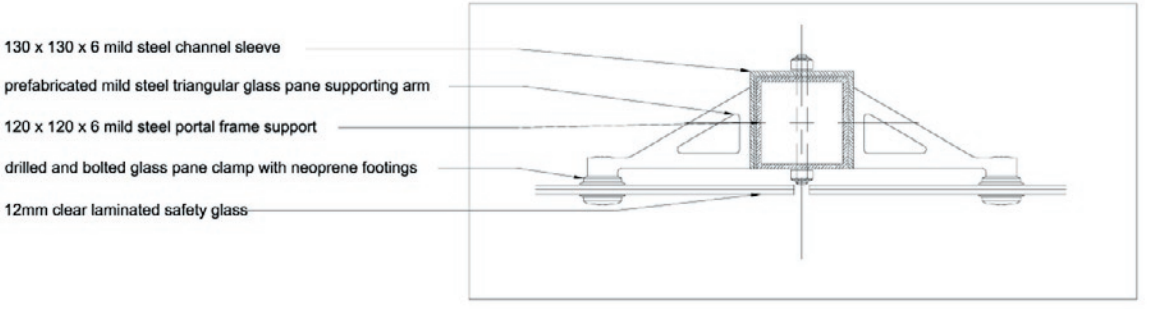
Fig.12_01.Portal frame joint (top left)
Fig.12_02.Movement analysis (top right)
Fig.12_03.Glass pane assembly (above)
Fig.12_04.Portal frame assembly (right)

Under the weight of the glass the tendency would be for the arm to sag inwards, placing it in tension, pulling the sleeve around the portal frame inwards and placing the frame into further compression, enhancing structural stifness.

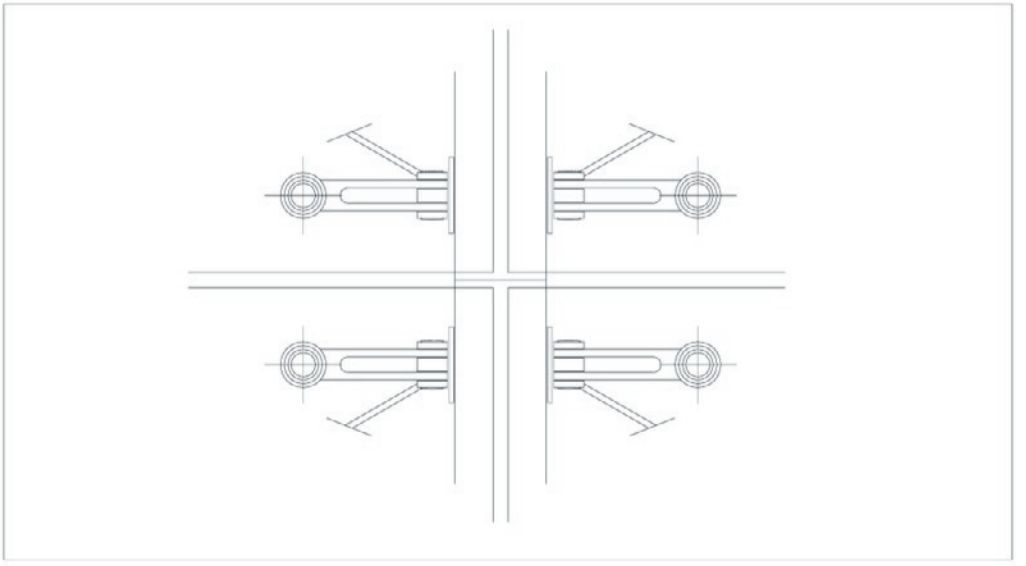
Inter-portal bracing was also replaces from compression members between the frames to tensioned cables which secure to the glass fixture joint. This tension establishes rigidity through the entire range of portal frames and added lateral stiffness to individual portal frames.



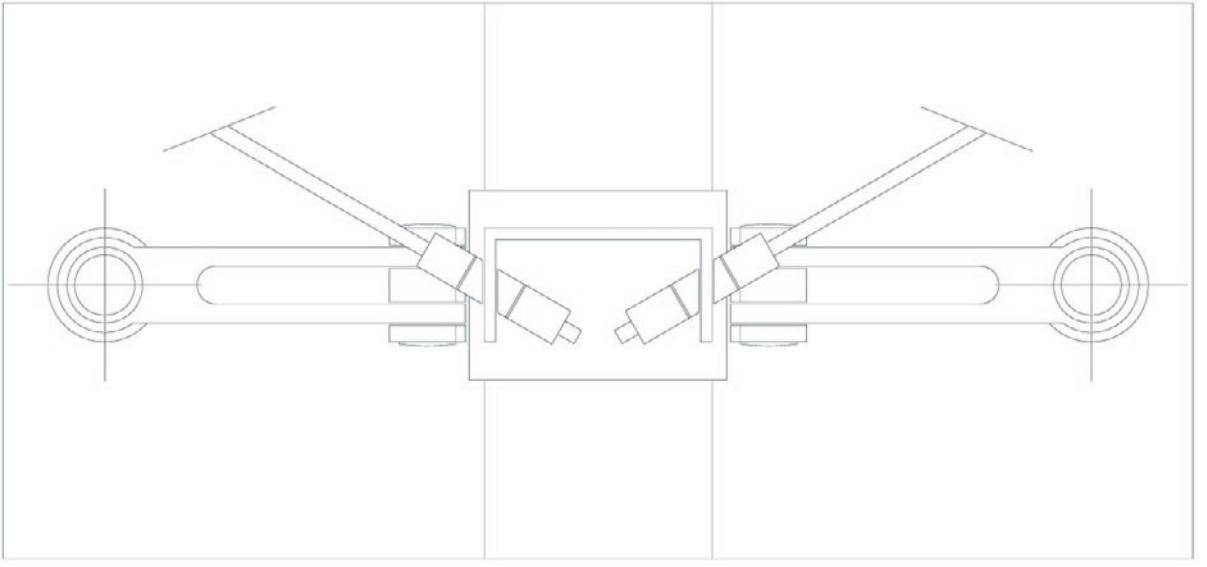
prefabricated frame joint/ 1:10



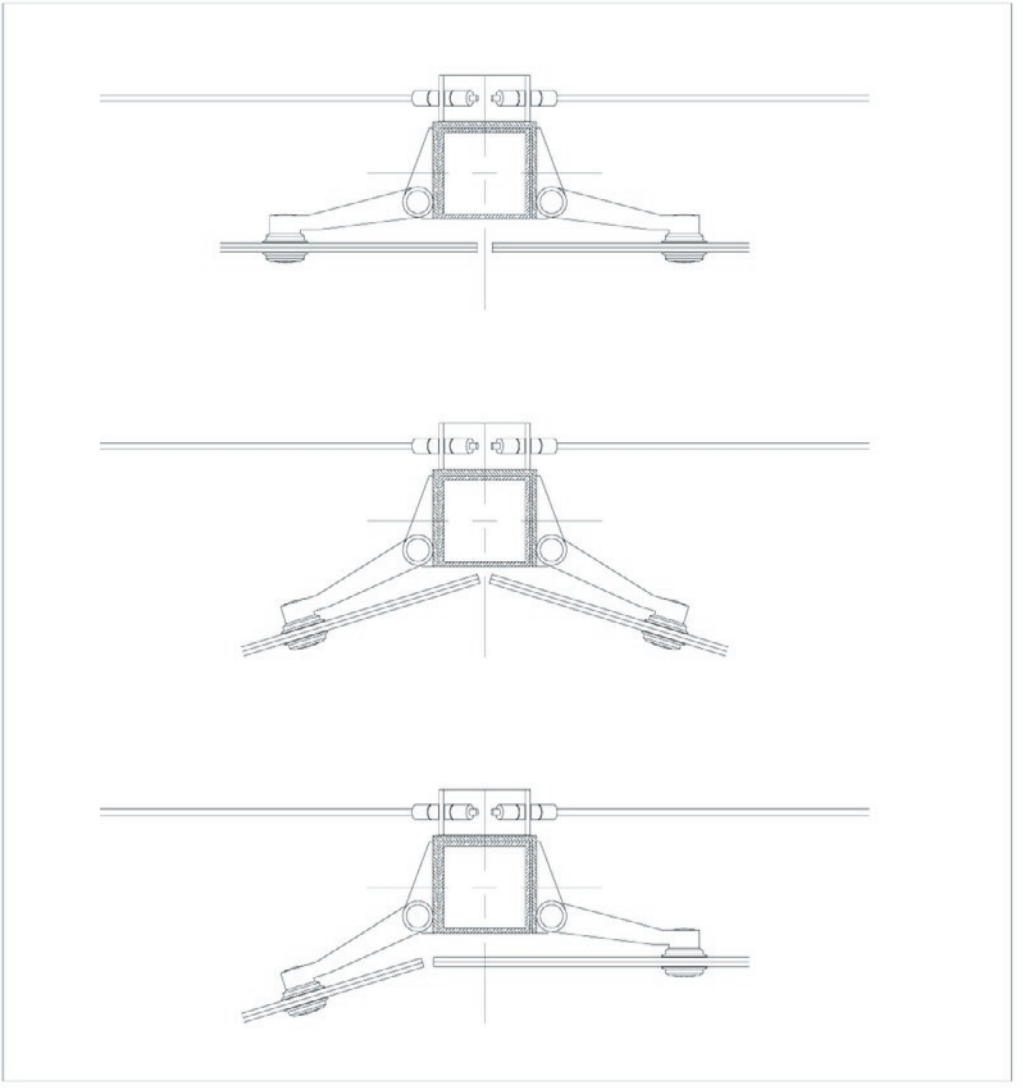
fixed joint section/ 1:10



internal elevation of pivot joint/ 1:10



external elevation of pivot joint/ 1:4



possible pivot joint sections/ 1:10

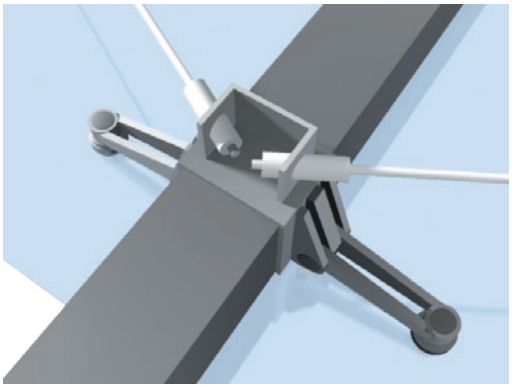


Fig.12_05.Joint detail model

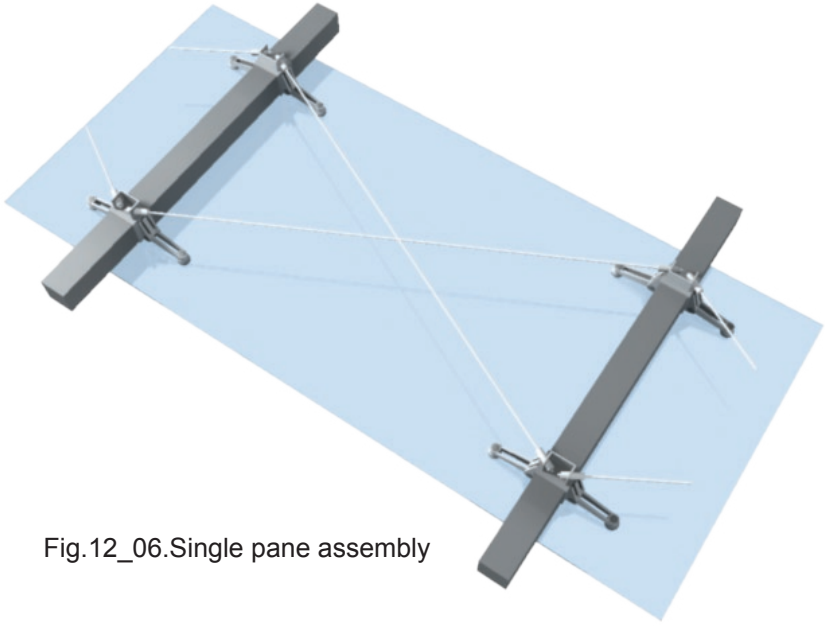


Fig.12_06.Single pane assembly

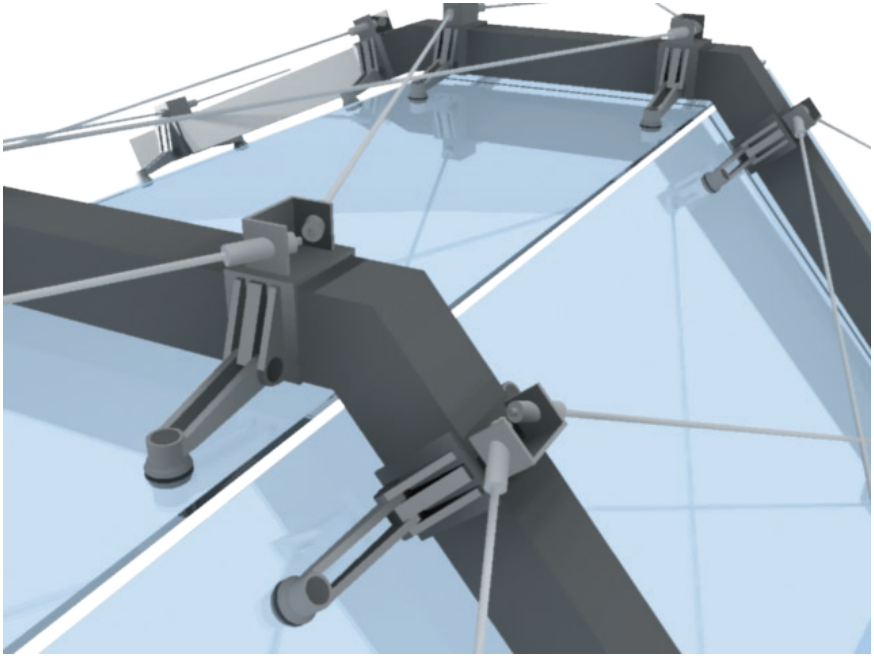


Fig.12_07.Portal detail assembly

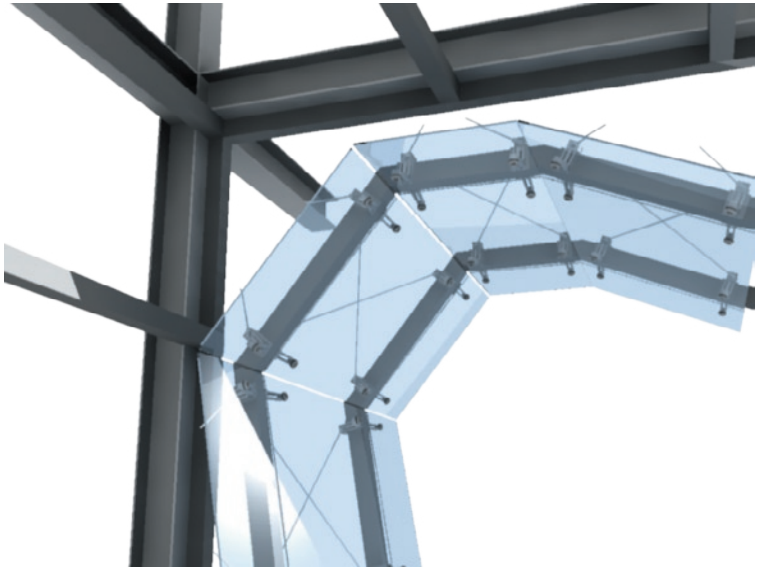
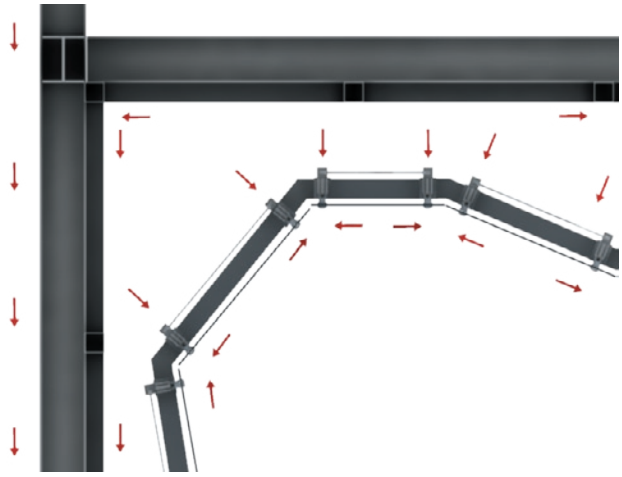


Fig.12_08.Detail Arcade construction

Fig.12_09.Arcade load analysis



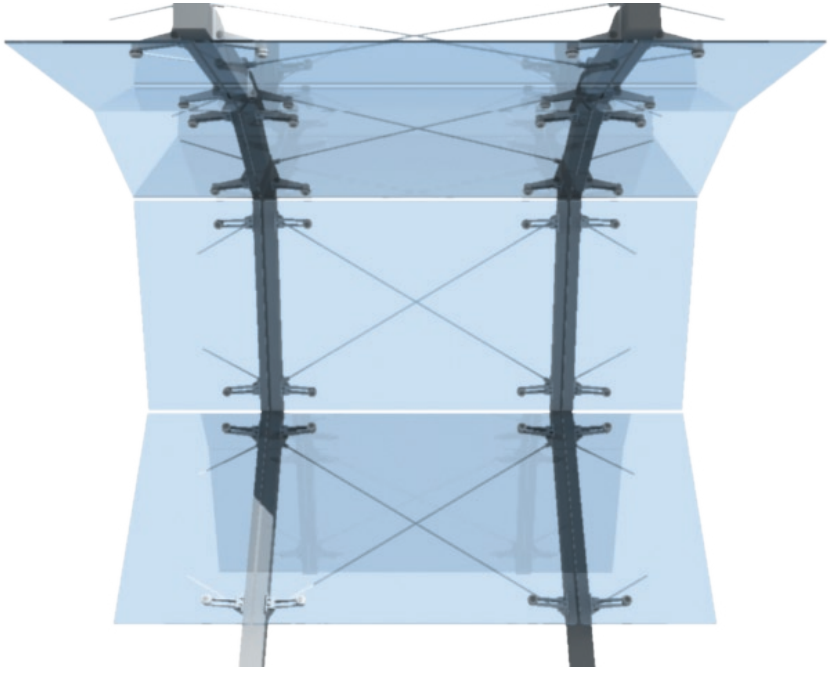
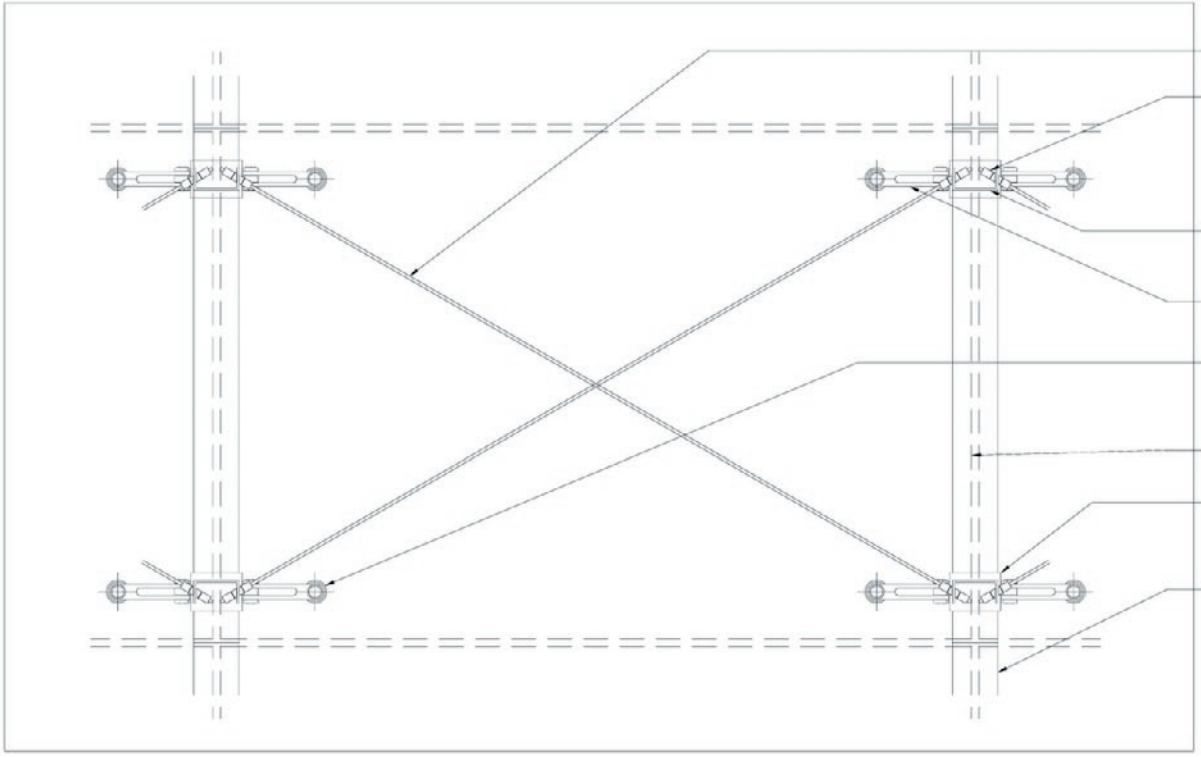


Fig.12_10.Multi-pane assembly



single pane assembly/ 1:20

12mm dia. galvanised mild steel tension bracing cable

24mm galvanised mild steel cable end clamp fastener

120 x 60 x 60 sandblasted mild steel channel welded on side to glass fixing joint sleeve painted with intumescent paint to matt finish

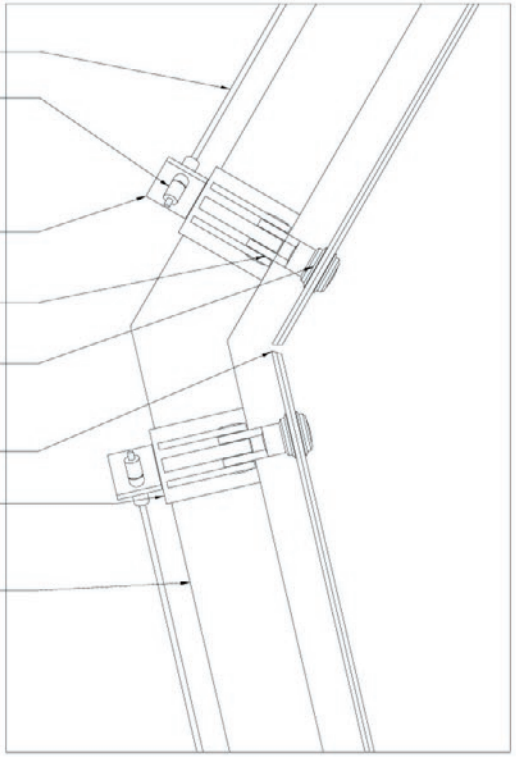
custom mild steel pivoting glass fastening arm joint to engineers specification

16mm dia. mild steel fixing bolt secured through laminated safety glass pane into 40mm dia. mild steel fixing socket

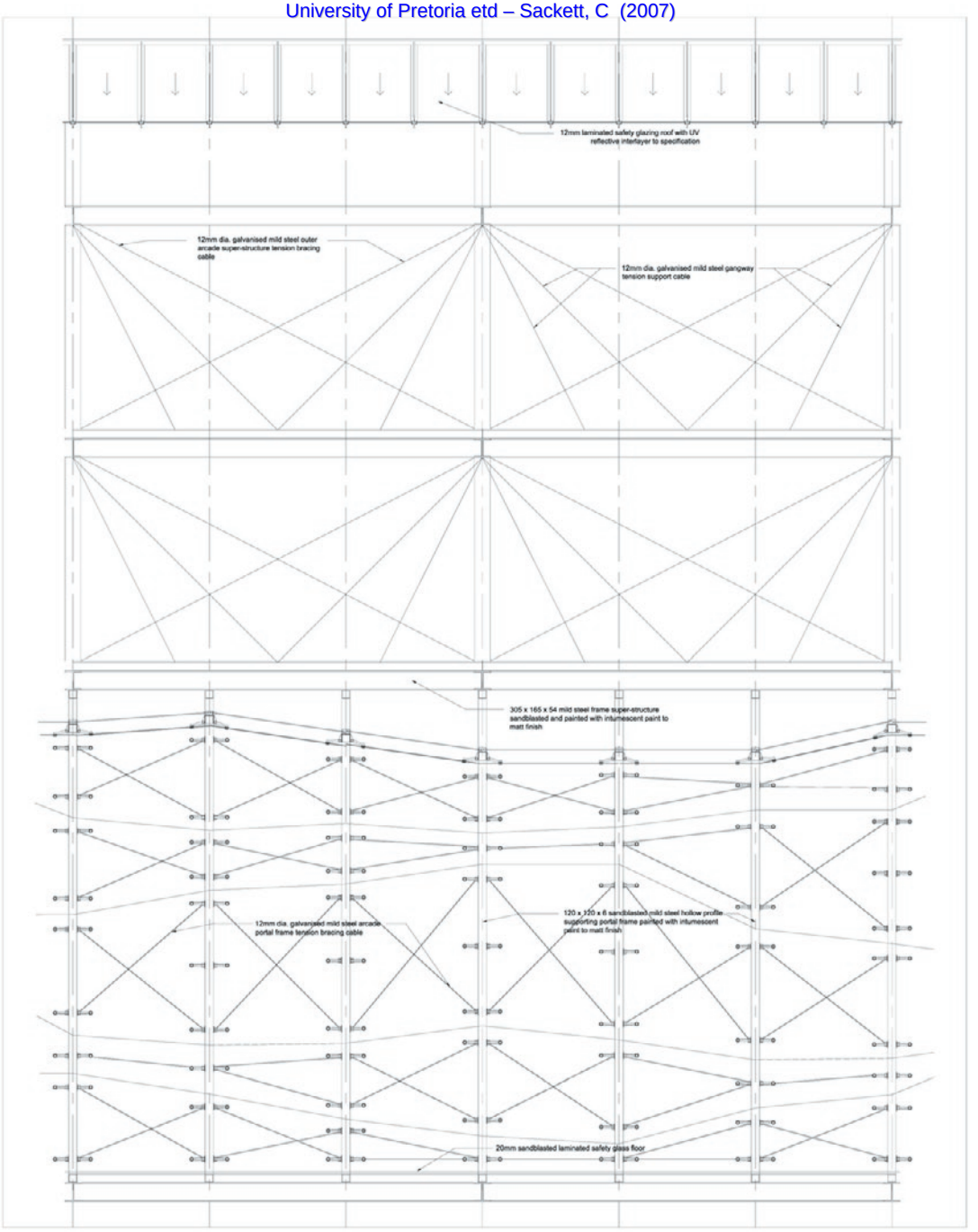
12mm clear laminated safety glass drilled and bolted

130 x 130 x 100 sandblasted mild steel glass fixing joint welded to supporting portal frame painted with intumescent paint to matt finish

120 x 120 x 6 sandblasted mild steel hollow profile supporting portal frame painted with intumescent paint to matt finish



side profile/ 1:10



longitudinal arcade section + internal elevation/ 1:100

C O N C L U S I O N

Our cities remain in a state of constant flux, influenced through cultural, political, social and economic forces. The ability of the city to act as a social centre and serve it's people is in turn altered through the constant changes in these forces.

In order that the city remain the social nexus which belied its establishment in the first place, the people of the city must actively participate in its evolution. Without the involvement of the public as the ultimate end user, the potential for the city to become an unresponsive and disused environment is greatly increased.

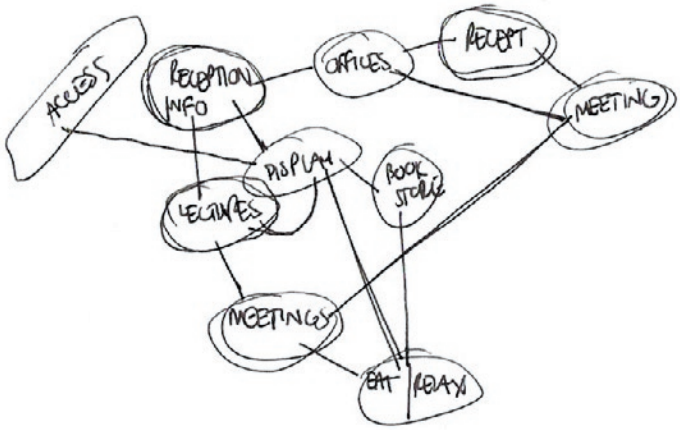
This project has thus attempted to reconnect the people with their city by fostering an interest in the development occurring within it. By establishing a centralised location from where the people can peruse and discuss the ideas for the city, see development plans and put forward comment, the future of the city is shared between all.

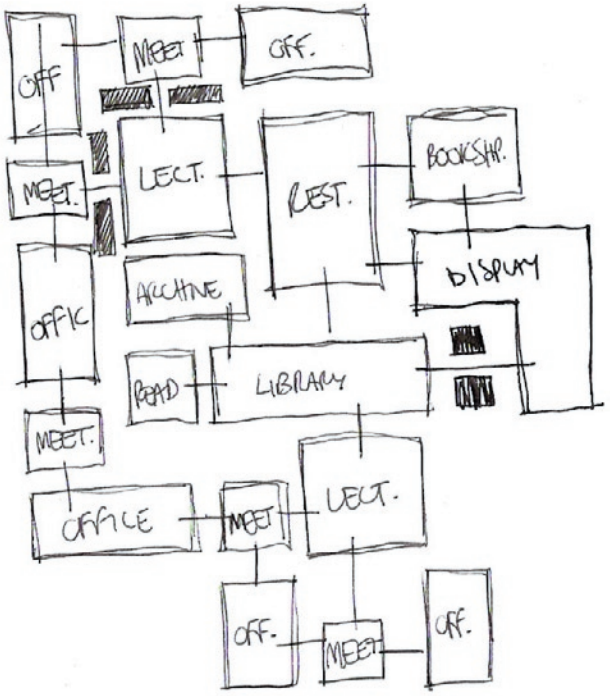
The focus throughout this design project has dealt with pragmatic responses to real world problems and scenarios. Specific focus has been placed on the translation of a theoretical and factual base into a physical design, the development of which must, in the author's opinion, remain as transparent, logical and readable as possible.

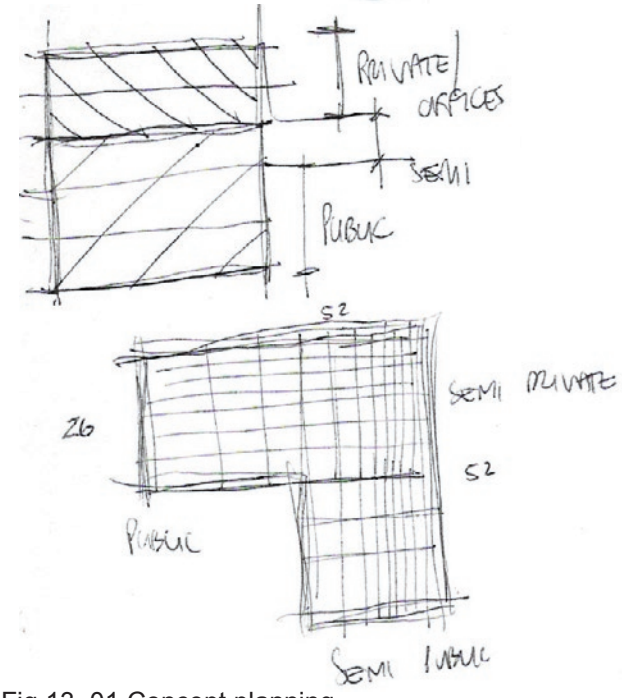
The relationship between the people and their city does however ultimately remain the responsibility of the people. Hopefully the future development of a project similar in nature to this dissertation design will become reality and provide the ideal location for the development of this relationship.

A D D E N D U M

C O N C E P T U A L / W O R K I N G S K E T C H E S







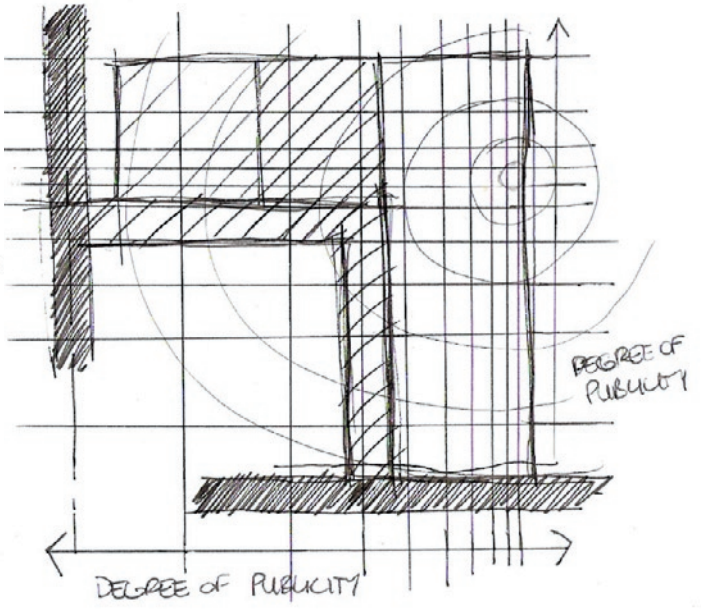


Fig.13_01.Concept planning

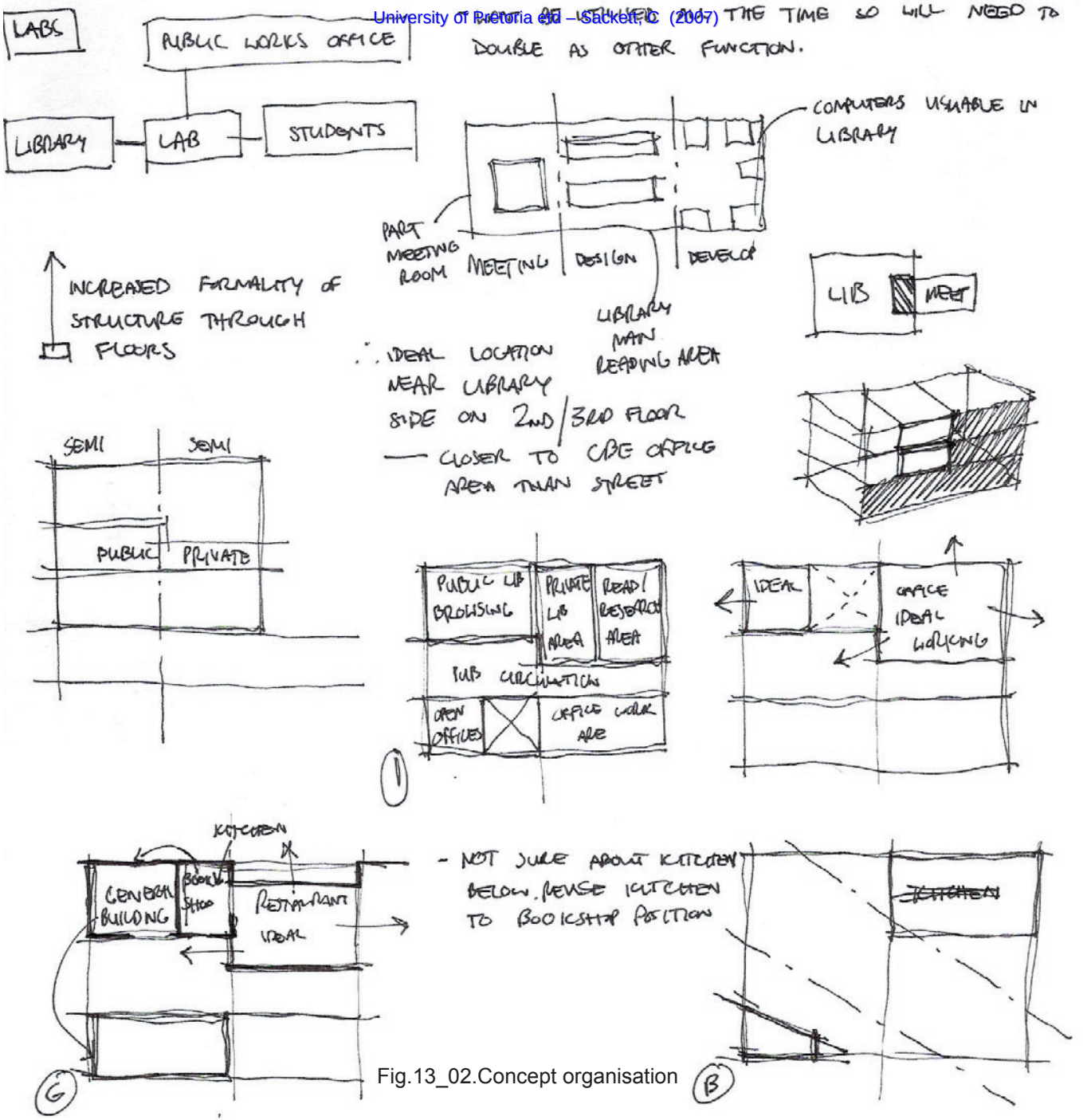


Fig.13_02.Concept organisation

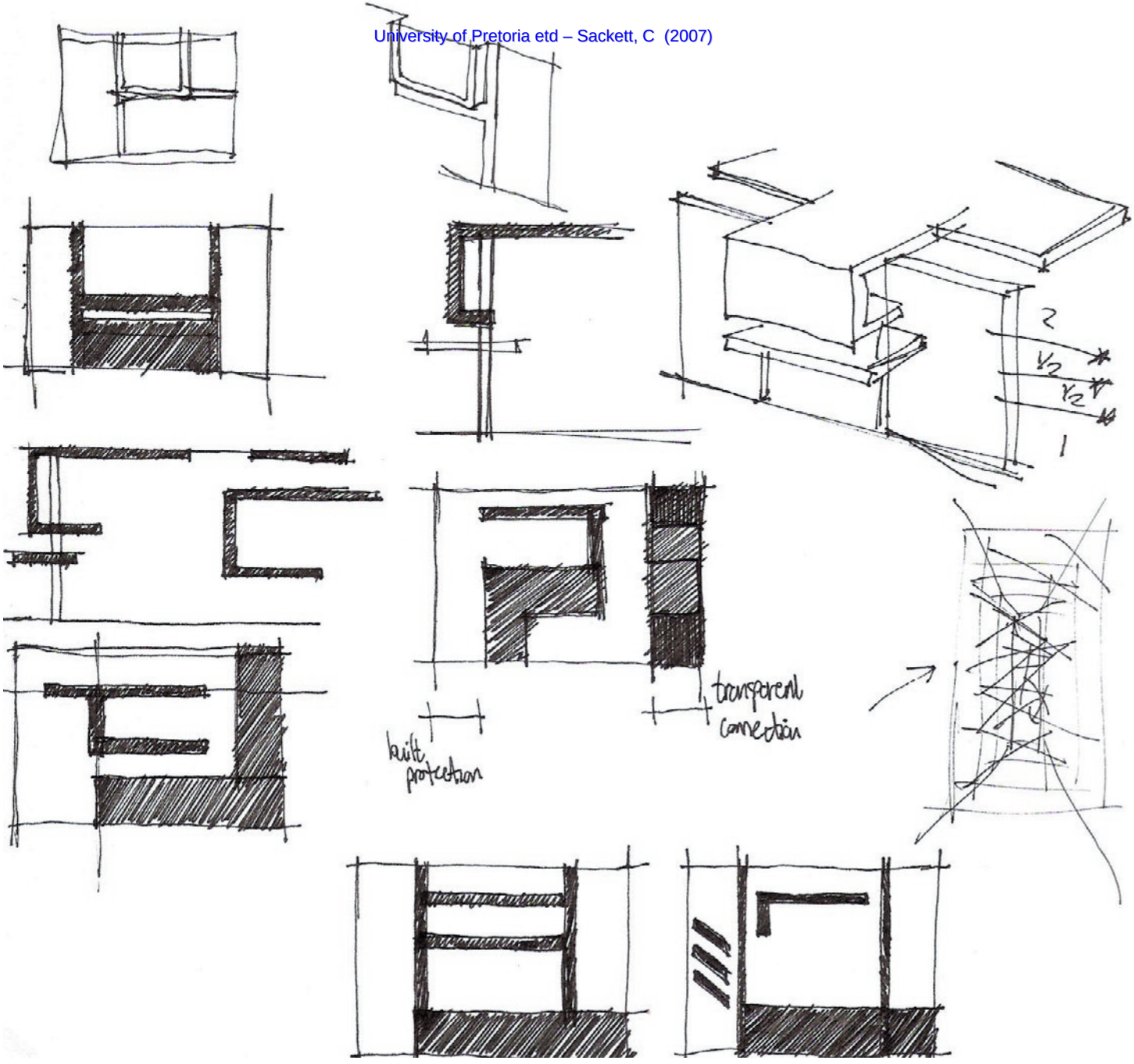


Fig.13_03.Facade development

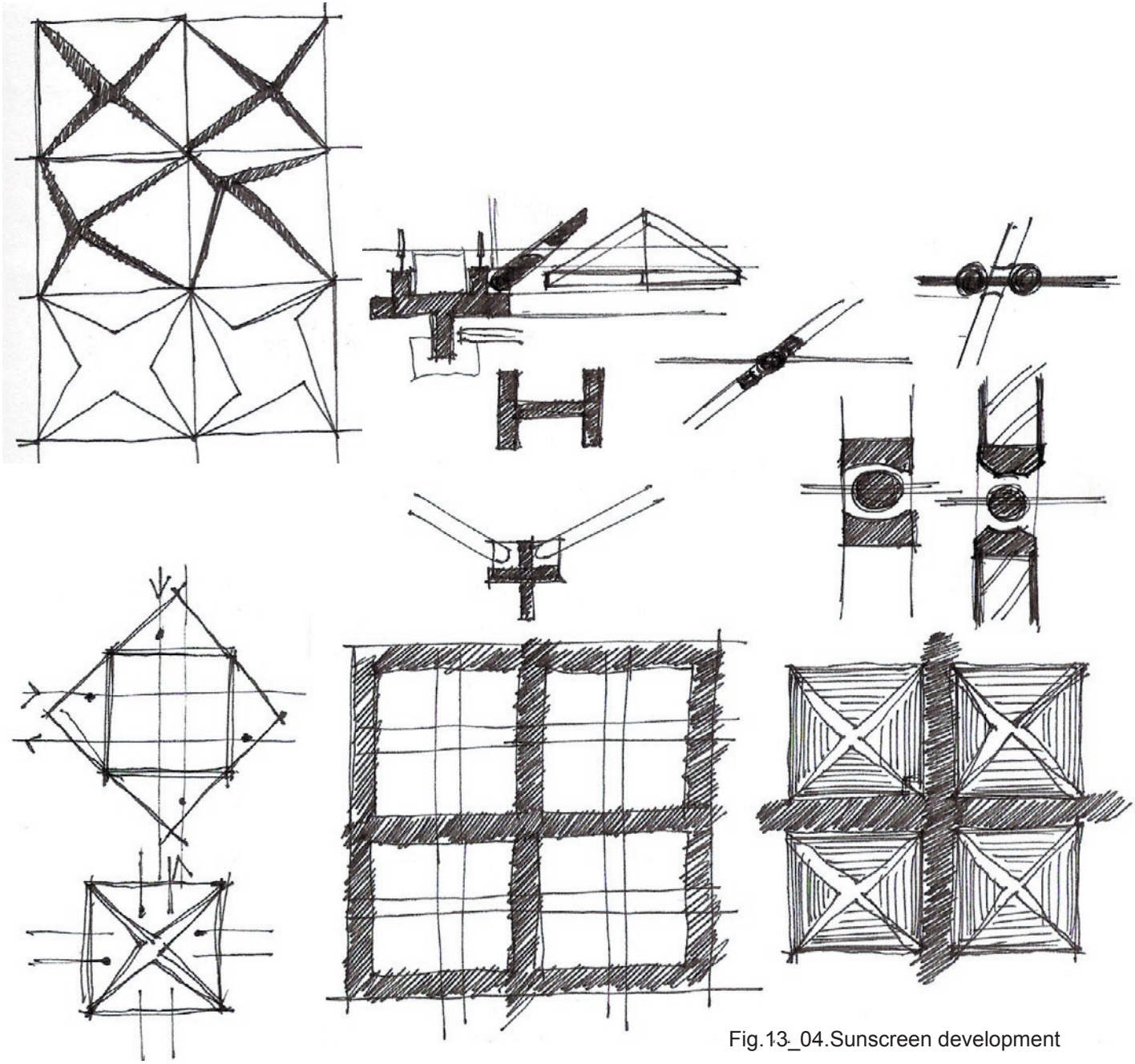


Fig.13_04.Sunscreen development

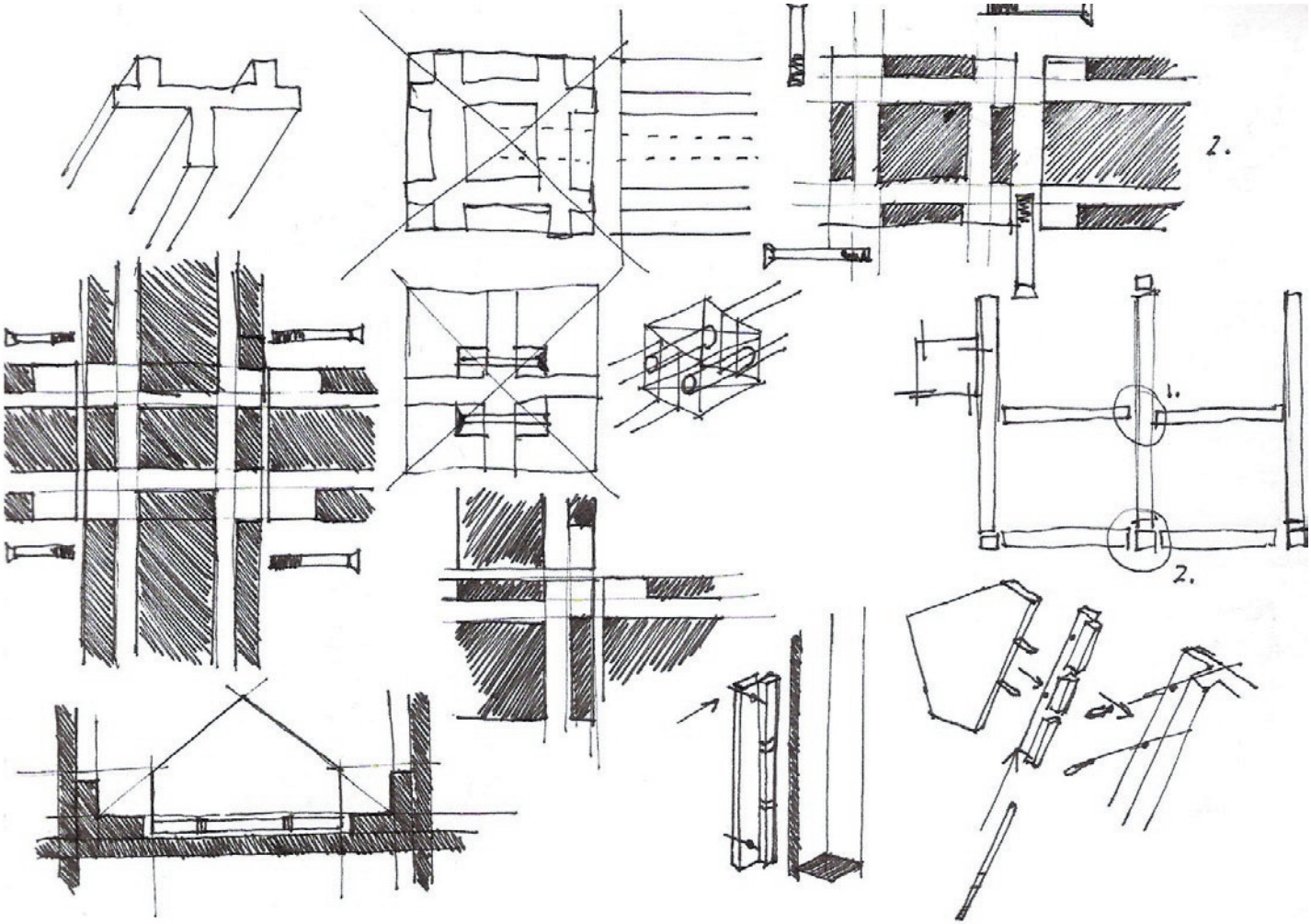


Fig.13_05.Sunscreen detailing

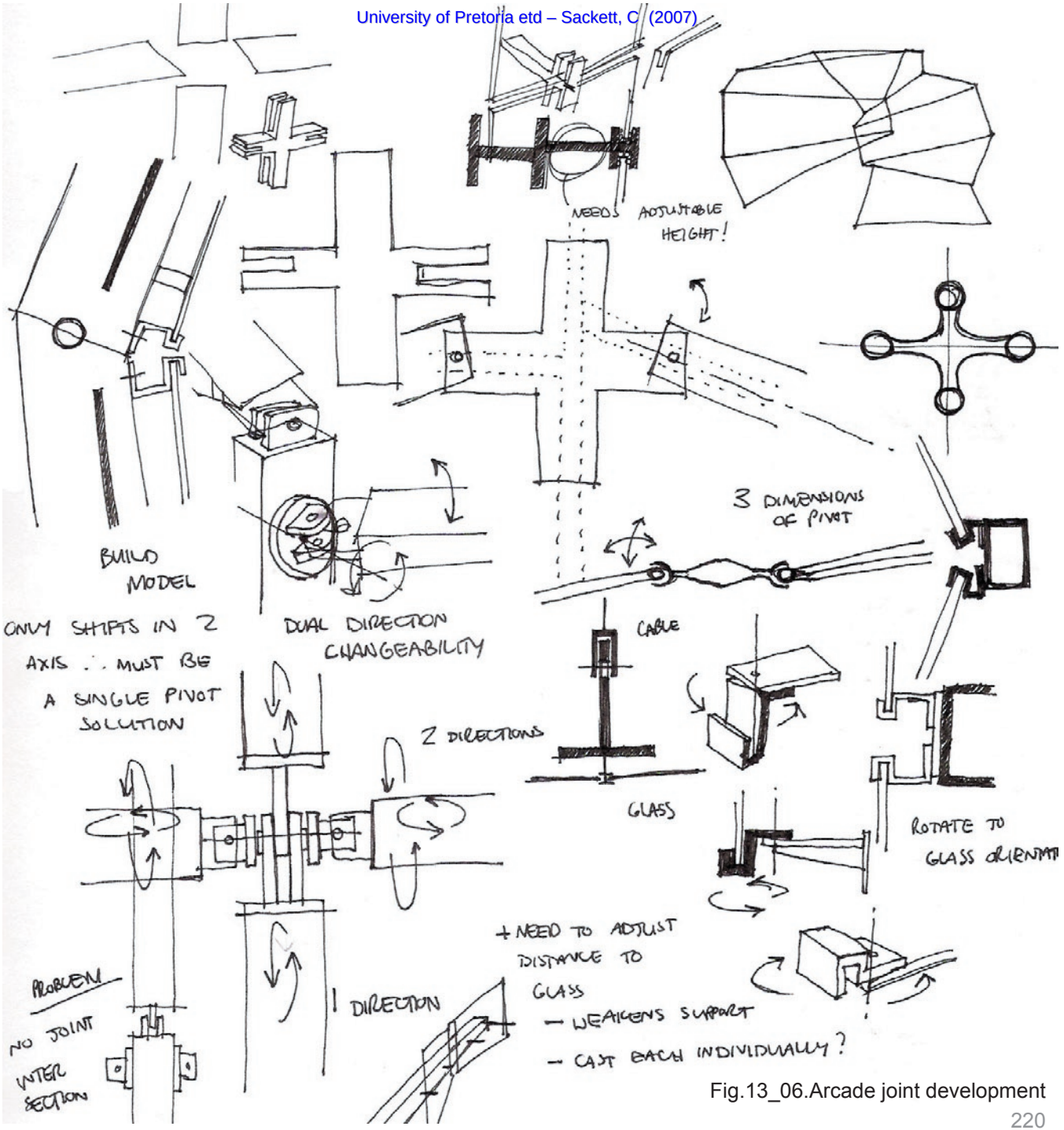


Fig.13_06.Arcade joint development

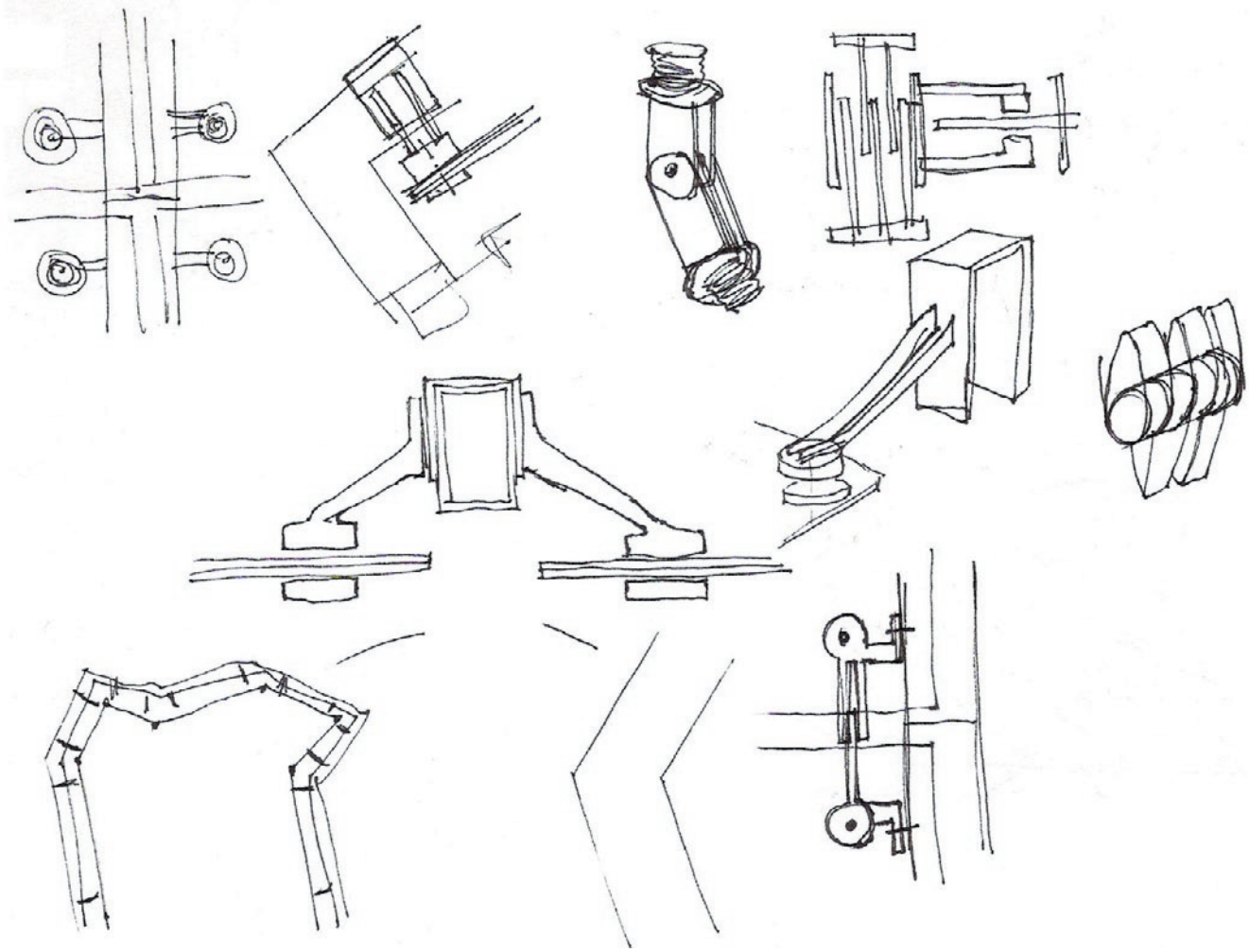


Fig.13_07.Arcade glass detailing 1

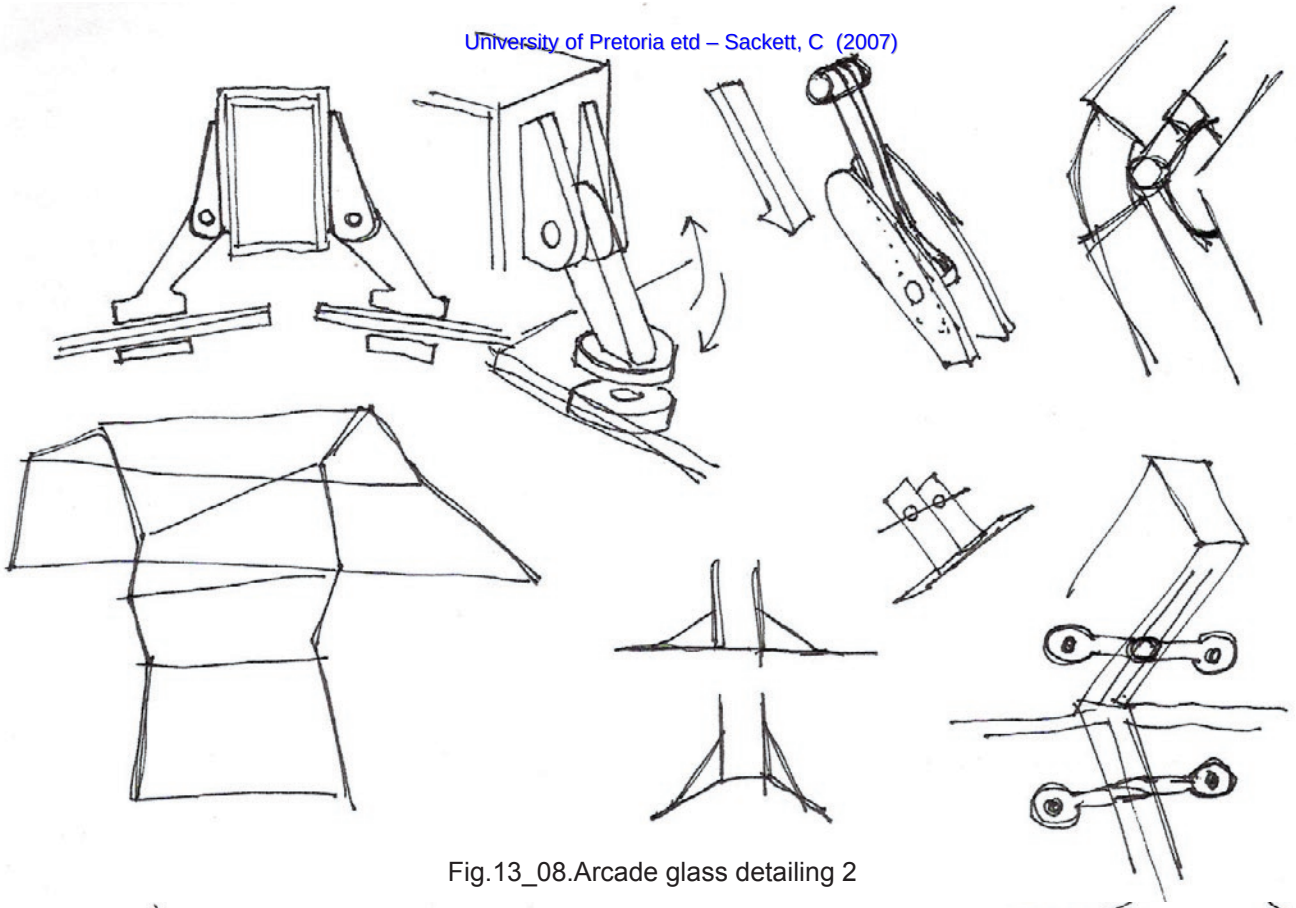
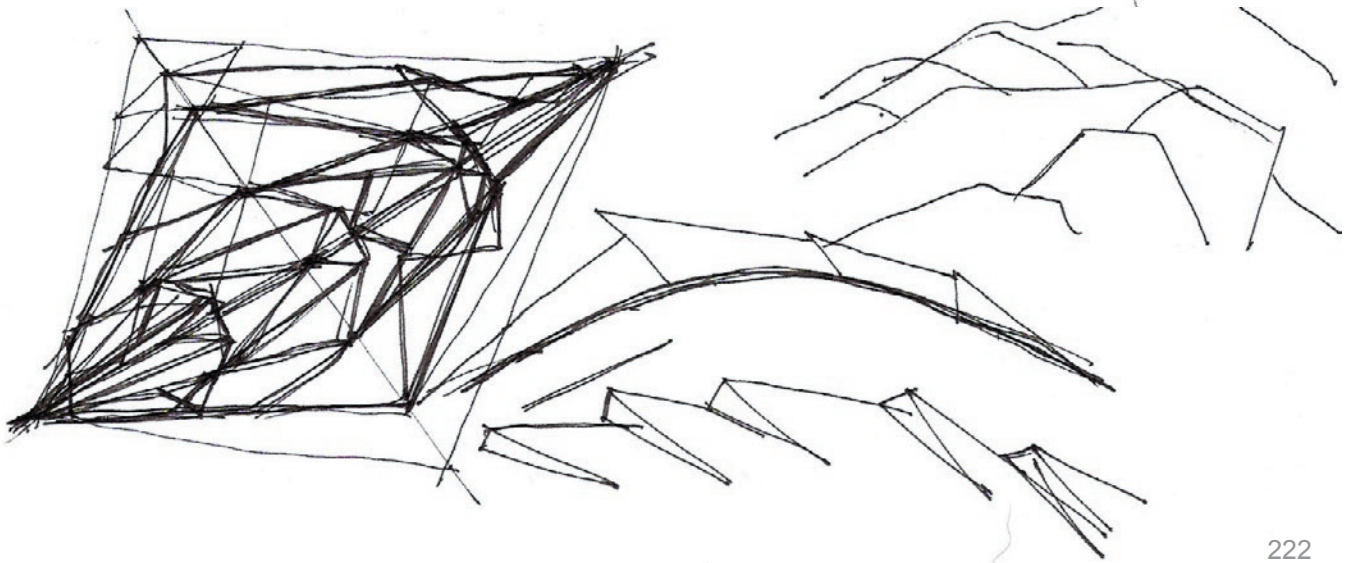


Fig.13_08.Arcade glass detailing 2



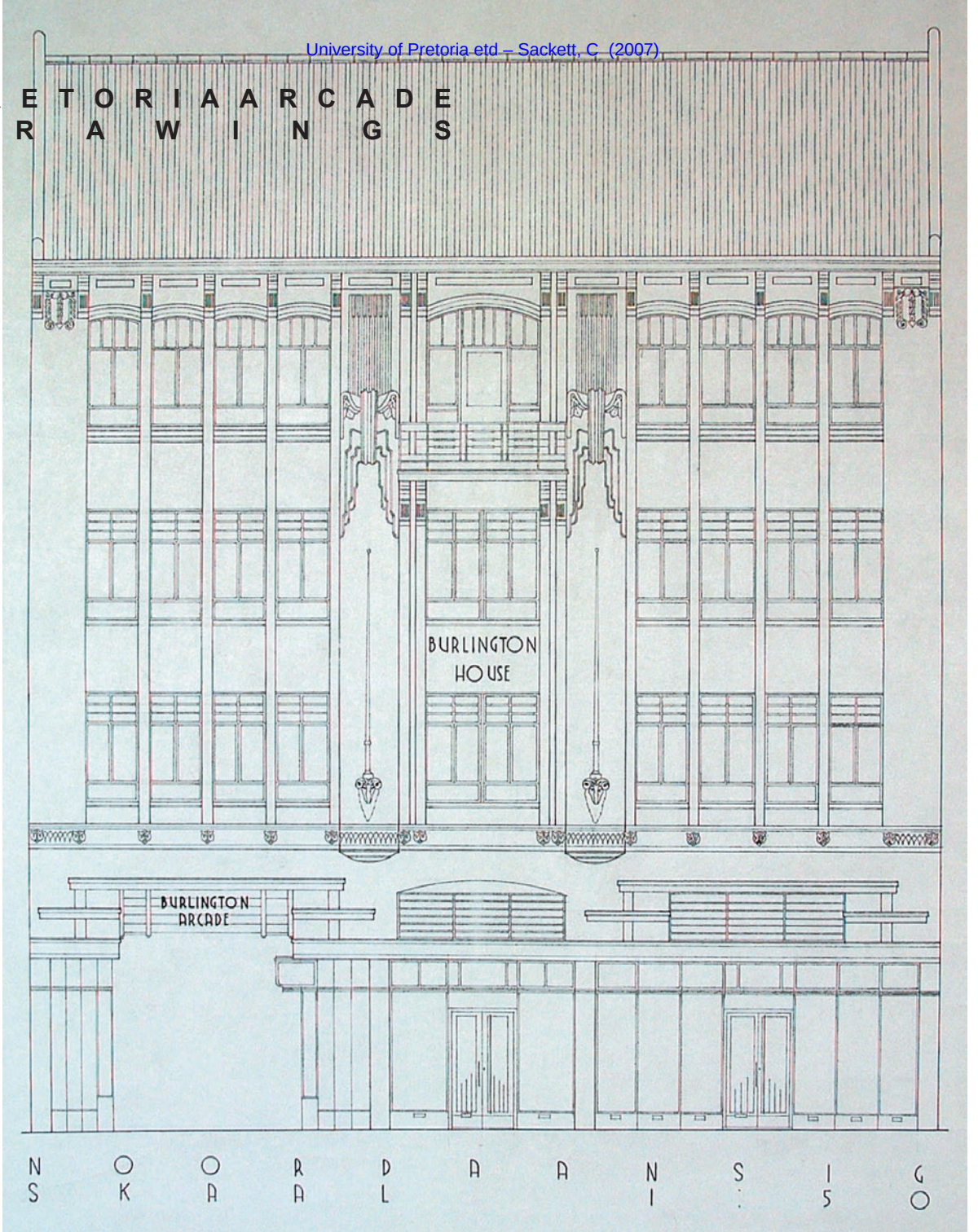
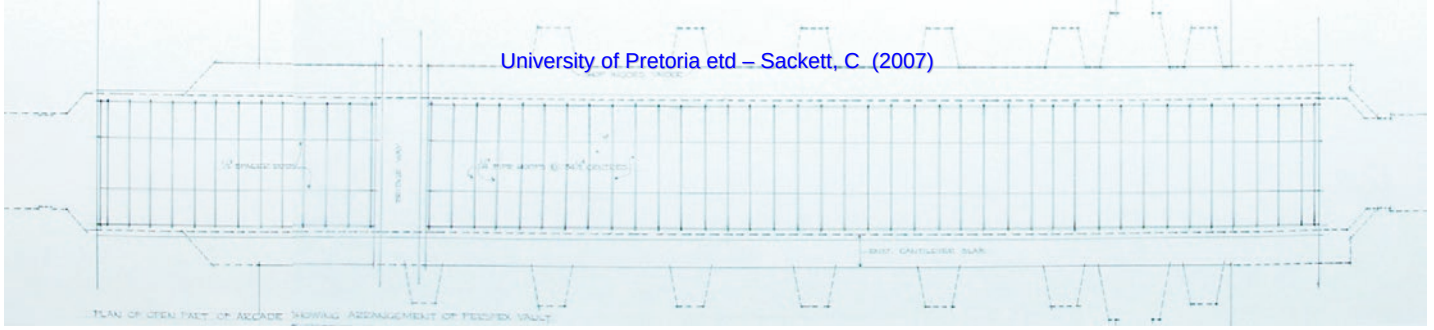
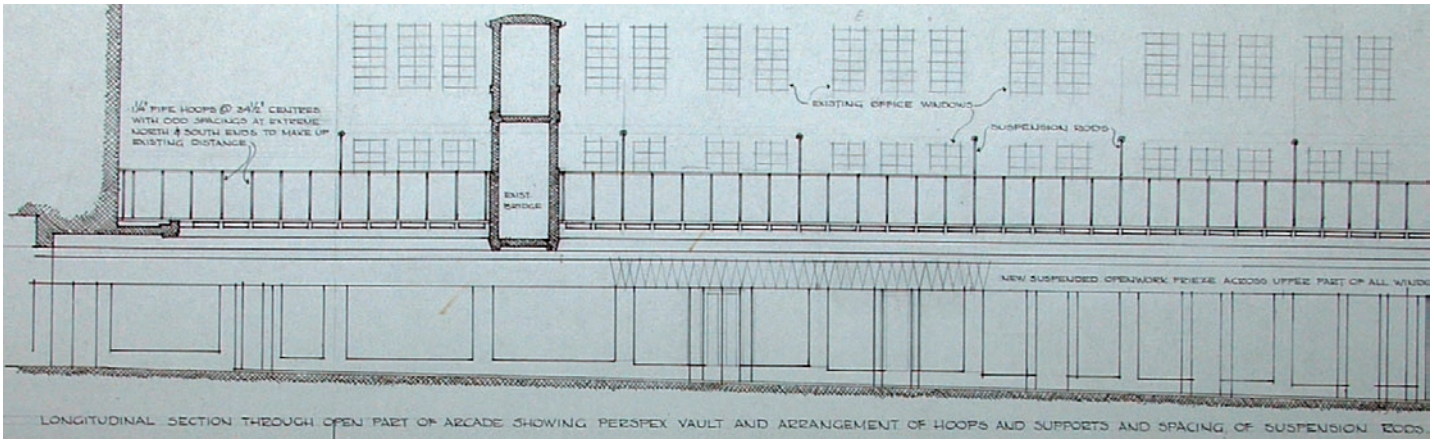
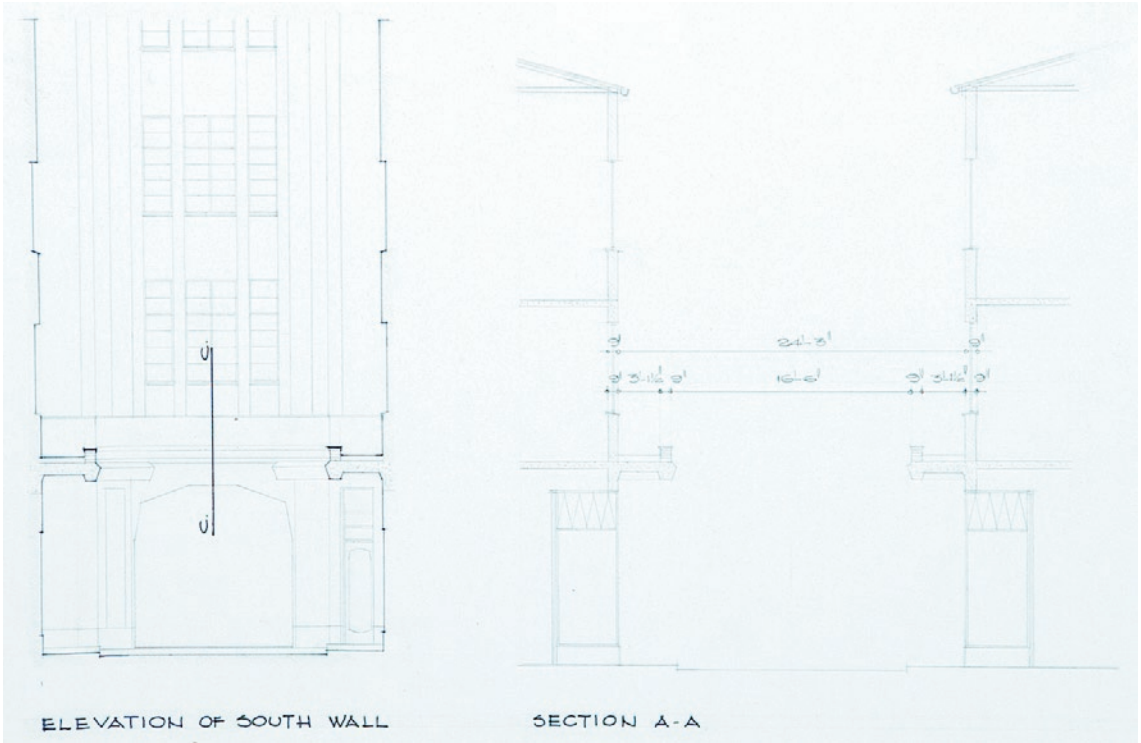


Fig.13_09.Burlington House elevation





LONGITUDINAL SECTION THROUGH OPEN PART OF ARCADE SHOWING PERSPEX VAULT AND ARRANGEMENT OF HOOPS AND SUPPORTS AND SPACING OF SUSPENSION RODS



ELEVATION OF SOUTH WALL

SECTION A-A

Fig.13_10.Burlington Arcade sections

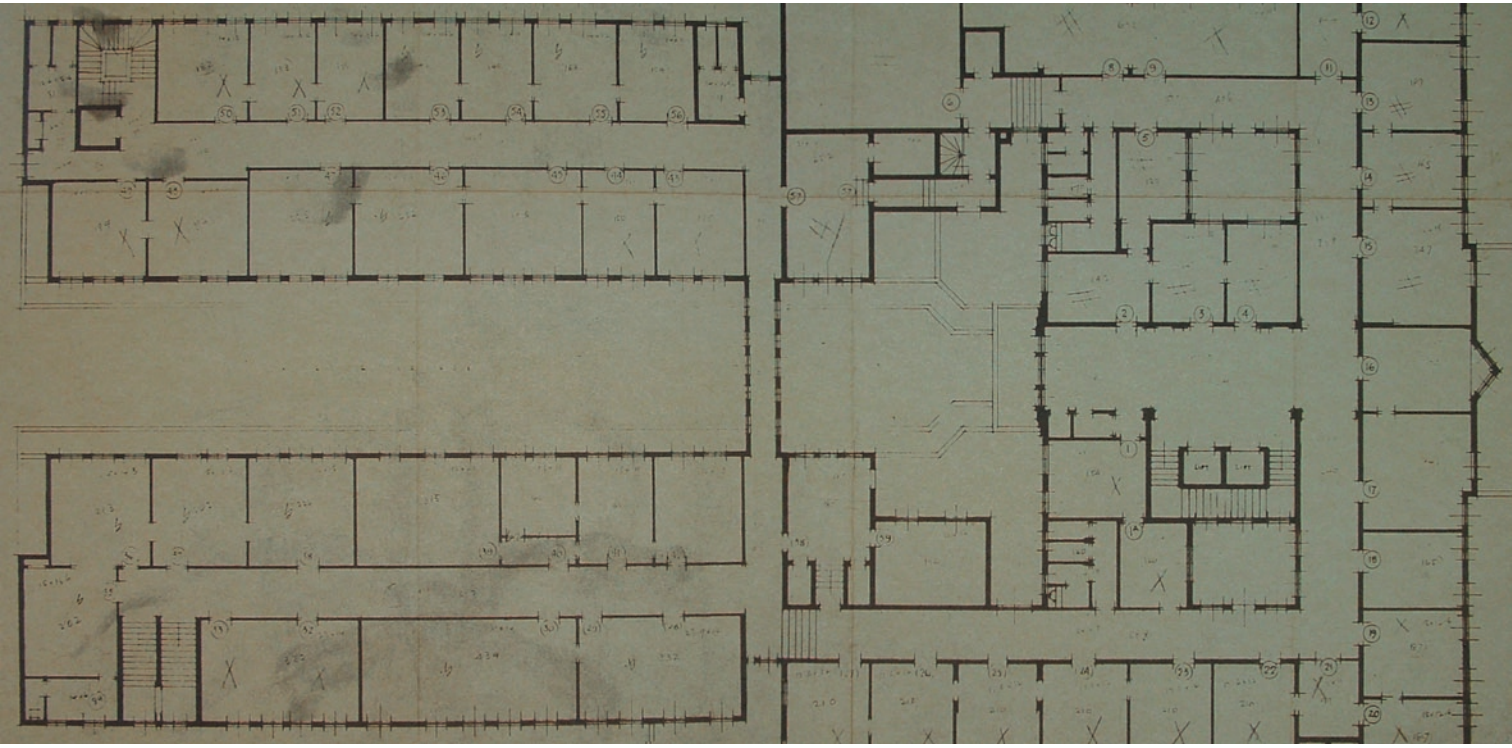


Fig.13_11.Koedoe Arcade plan

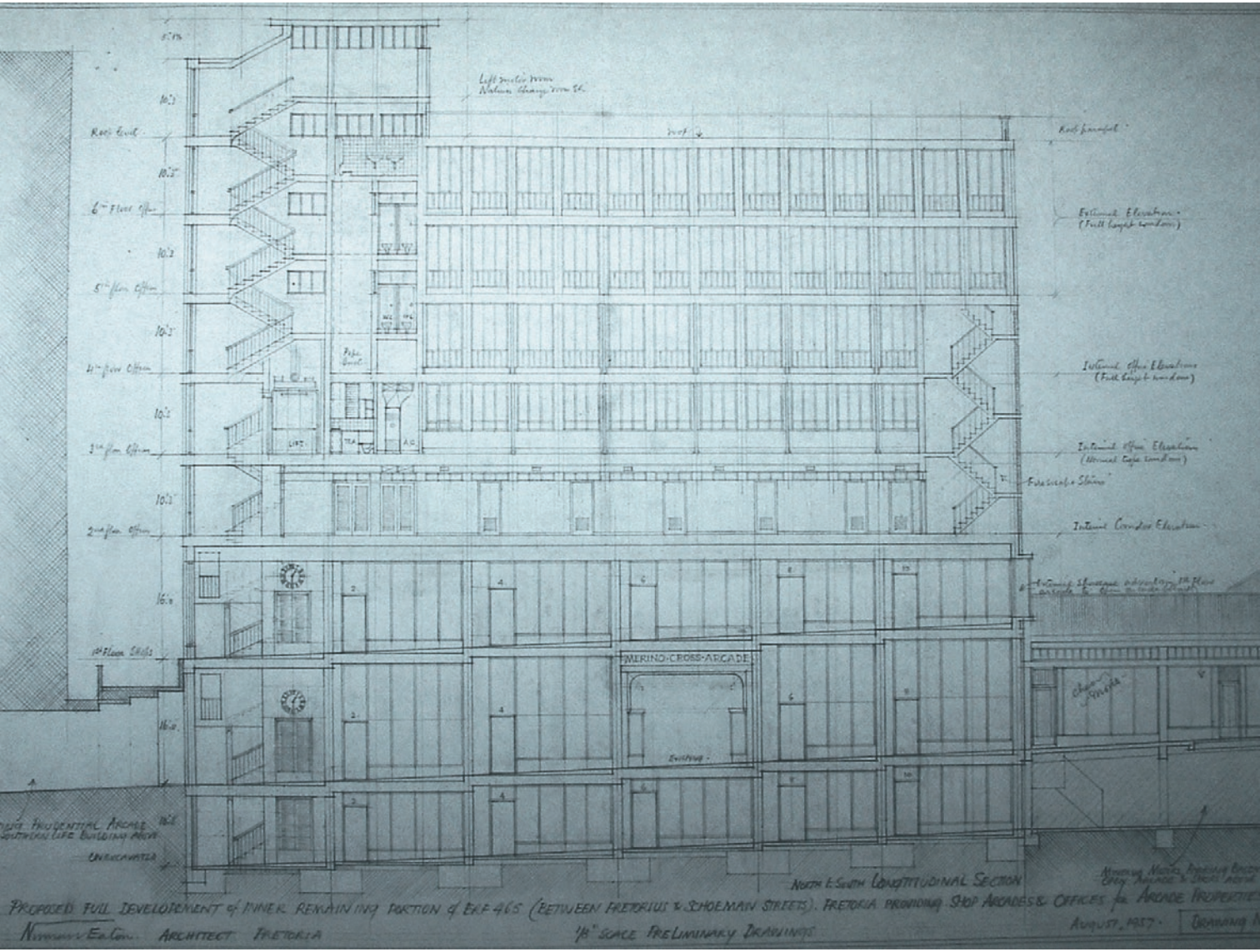


Fig.13_12.Merino House section

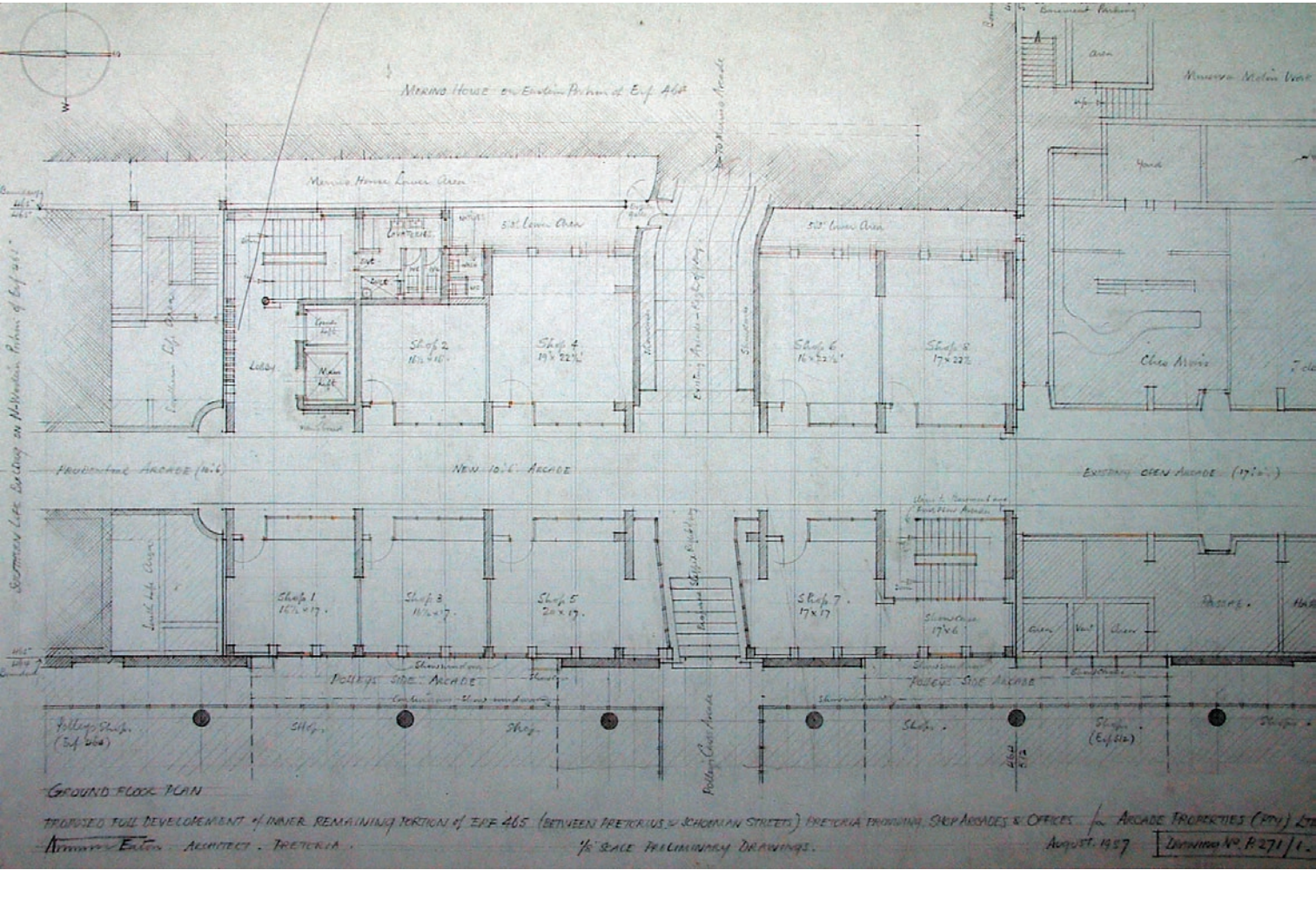


Fig.13_13.Prudence Arcade plan

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Toronto Project - Tadashi Kawamata

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Mount Tindaya - Eduardo ChillidaJuantegui

OCAS - Samyn and Partners

ING Bank - Erick van Egeraat

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C O M M U N I C A T I O N

Interview with Prof. A. De Villiers on 27th July, 2006 on the topic of council operation and the CIDB.

Email correspondance with Mrs J. C. Hambly, registrar of SACAP on the topic of SACAP's role in the built environment professions.