THINKing

A Mind Development Centre in Central Pretoria

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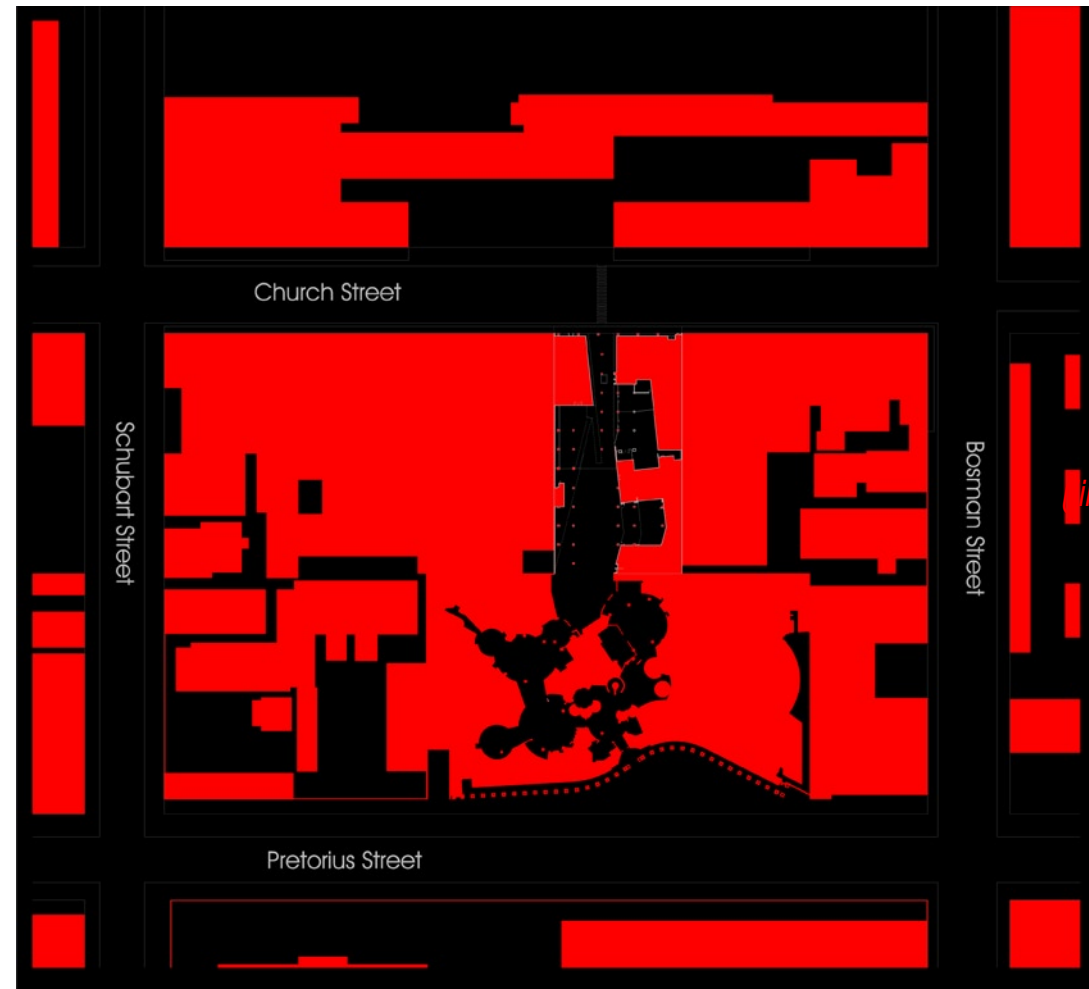Mentor: Prof. Schalk le Roux

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THINKING

A Mixed Development Corridor in Central Pretoria

Contents

Opsomming

In hierdie studie word 'n ondersoek gedoen na die ontwerp van 'n Sentrum vir Verstandelike Ontwikkeling in die middestad van Pretoria.

Die navorsingsprosesse resultate in die velde van die menslike brein en verstand word ondersoek. Ondersoek word ook gedoen na die wyses waardeur denke en verstandelike funksie verbeter kan word.

Die ontwerp van 'n sentrum waar navorsing oor die verstand gedoen en inligting rakende die veld vesprei word, moet gelei word deur die faktore wat 'n invloed het op denke en meta-denke.

Historiese denkmodelle rakende denke speel 'n belangrike rol in ons bestaande uitkyke en opvattings oor die werking van die verstand. Hierdie denkmodelle word kortliks bespreek ten einde 'n meer byderwetse en toepaslike denkmodel daar te stel.

'n Multi-dissiplinêre benadering is 'n voorvereiste vir 'n studie van hierdie aard, daarom word uiteenlopoende velde soos populêre sielkunde, omgewings-sielkunde, opvoeding, gesondheid, neurologie, volhoubaarheid en sosiale heropbou ondersoek.

Die uitgangspunt van die studie is dat denkvaardighede aangeleer en ontwikkel kan word. Alhoewel veskillende mense verskillende vermoëns en aanlegte sal hê, is dit in die belang van die individu en die samelewing dat hierdie vaardighede tot 'n hoë vlak ontwikkel word oor 'n breë snit van die samelewing. Die bou-omgewing lewer 'n belangrike bydrae tot hierdie proses en toepaslike ontwerp kan die taak aanhelp en vergemaklik.

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Summary

This dissertation investigates the requirements and design of a Mind Development Centre in the Pretoria Central Business District.

The investigation touches upon the research done into the human mind and brain and the ways in which it can be improved and supported.

Environmental factors that influence thinking and meta-thinking is investigated and applied in the design of a centre where research of the mind can be conducted and where knowledge gained can be disseminated.

Historical paradigms about thinking play an important part in understanding the way one thinks about thinking. These are briefly discussed and the examination arrives at a contemporary and more appropriate theory of thinking and mind.

Fields touched upon in this investigation include popular psychology, environmental psychology, education, health and fitness, neurology, sustainability issues and social reconstruction.

The history and context of the site is examined in order to design a building that not only responds to its environment, but serves to project the principles it embodies its direct surrounding area.

The normative position throughout the investigation is that thinking is a skill that can be taught and developed. It is accessible to all, but, like physical prowess, some might display a greater proficiency or natural aptitude. It is considered to be in the best interest of individuals and society alike that thinking skills be raised among as broad a base as possible. Through its influence on thinking, the built environment and appropriate design can contribute to this task.

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Introduction

This study consists of several components that together serve to illustrate the design of a Mind Development Centre.

The issues considered and decisions taken have cross-influences one another. Because of this, the contents of the divisions are not clearly delimited. Each investigates the problem from a different perspective, though.

Being smaller wholes contributing to a larger whole, the chapters can be read independently and order is not critical. The argument does unfold more logically, however, if the text is read sequentially. The Design Discussion in particular would be easier to follow after reading the other chapters.

The Design Discussion presents design considerations, technical considerations and precedent studies as parallel text.   Here different approaches are recommended for reading the text.

If the purpose is to obtain an overview of the work, reading the individual text streams would be preferable. Where particular aspects are considered, however, it is recommended that the reader follow the information as presented in the layout.

The design presented in this study makes use of conventional construction techniques.   The functions accommodated are not unusual as such.   In other respects, forms might seem unusual or uncomfortable.

If the prevalent mode of thinking were completely incorrect, all convention would need to be abolished. If the current paradigm was completely correct on the other hand. Existing solutions and approaches would have resulted in the best outcomes.

The attempt was made to provide a solution that embraces what is useful in conventional approaches, but challenge that which inhibits the mind, both functionally and symbolically.

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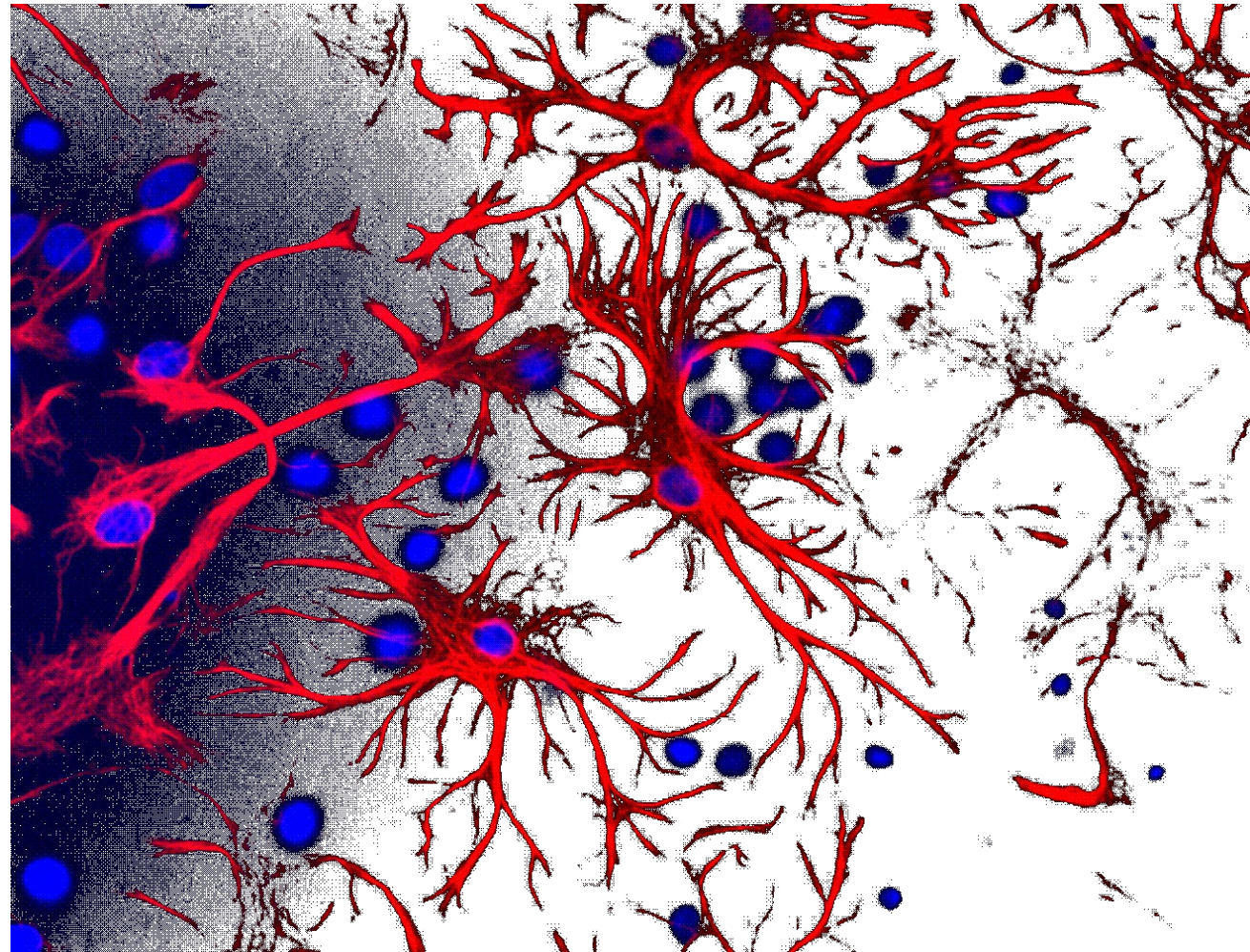
Project Brief

What it is all about

Fig. 1a. Neurons and glial cells.

Project Brief

1.)   Introduction

"The brain regulates all bodily functions; it controls our most primitive behaviour – eating, sleeping, keeping warm; it is responsible for our most sophisticated activities – the creation of civilisation, of music, art, science and language. Our hopes, thoughts, emotions and personality are lodged – somewhere – inside there. After thousands of scientists have studied it for centuries, the only word that remains to describe it remains: 'AMAZING'." (Ornstein quoted in Buzan 2001 p.11)

Research increasingly indicates that the potential of the human brain is much greater than was ever thought (Fig. 1.1). The complexity and power of our brains is one of the bases of our success as species. Many problems faced by the world today can be solved through the correct and powerful use of this amazing organ.

When Rogers states "Humankind's capacity to transmit accumulated knowledge from generation to generation, to anticipate and to solve problems has been its greatest asset." (1997 p.21), he refers only to the faculty of memory (Fig. 1.2 and 1.3). The powers of thinking, imagining, understanding, in fact most of the scope of mental ability, is not even being considered.

Most of what we know about the brain has been discovered in the latter part of the 20th century (Buzan 2001 p.14-15). These discoveries can already be applied to improve the way we interact with the world, with each other and with ourselves. The research continues and much more will be done before we understand the wonder that is our brains.

South Africa's history, and much of that of the world, has been radically impacted by mineral riches and the desire to extract them. The time for the gold rush to the mind has come. This leads to the proposal for a centre where research of the brain can be conducted and where these and other discoveries can be disseminated and applied.

Fig. 1.1. The human brain

Fig. 1.2. and Fig. 1.3 The original Great Library of Alexandria and the reading room of the new Alexandria library: ideas and knowledge can survive many generations.
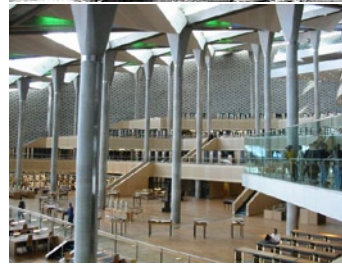
Fig. 1.4   Stonehenge as an artefact of a cosmological culture.

Participants in the research will be the experimental subjects. They will also receive training based on the discoveries made. This knowledge can then be taken back to their families, businesses and communities, increasing the use of the brain, for the betterment of the world in which we live.

Benefits expected from the program affect a wide range of human endeavour and concern. Among the fields touched upon, are health, relationships, entrepreneurship, communication and self-fulfilment.

2.)   The Problem

2.1.)   History of our knowledge of and approach to the brain

The evolution of the brain as we know it today began some 500 million years ago (Buzan 2001 p.13). The modern brain has been around for roughly 50 000 years (*ibid* p.15)

Ancient and cosmic cultures, along with most religions, considered human beings to be part of the environment, functioning as a system (Fig. 1.4). People were aware of the links that existed between each other and those with the environment. These relationships implied certain boundaries, which were respected. The mind was considered to be part of the self, along with the body (Bateson 1979 p.151-3).

Around 2500 years ago, Aristotle concluded that the mind was located in the heart (Buzan 2001 p.13). The Greeks coined the phrase *mens sana in corpore sano* (a healthy mind in a healthy body), recognising the unity. Plato, on the other hand, considered the mind to be something separate and removed from the body (Fig. 1.5).

As with so much else, Plato's view was accepted. Other traditions also reflected this idea. During the mummification rites, the old Egyptians saved the 'important' organs of the deceased, while the brain was scooped out and disposed of. The brain was considered useless – a "structureless, characterless lump of gray matter" (*sic*)(*ibid* p.31).

Fig. 1.5. The School of Athens by Raphael.

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Very little changed in these views until the brain was eventually recognised as the seat of the mind at the time of the Renaissance (*ibid* p.14).

The unexpected complexity of the outer layer of the brain, the cortex, was revealed with the invention of the microscope (*ibid* p.31). The invention of the electron microscope led to the discovery of the neuron (Fig. 1.6), or brain cell, which consists of a centre (nucleus) and many branches (axons and dendrites) radiating from it in three dimensions (*ibid* p.32).

The 20th century saw great developments in our knowledge and understanding of the brain. The first half of the century still held to a very mechanistic worldview. The brain was seen as a simple 'filing system' – messages went in and were sorted into the appropriate 'pigeon-hole' (*ibid* p.14).

The most astounding discoveries are very recent. Buzan states that "95 percent of all that the human race has ever discovered about the internal workings of its own brain has been discovered in the last 10 years!" (2001 p.15).

One of the discoveries of the late 20th century was that the brain consists not of several million brain cells, but of a billion (1×10^{12}) (*ibid* p.15). Many fallacies were disproved and researchers became increasingly aware of the innate potential of the brain.

"At the end of the 20th century the human race made an astounding discovery: that the brain is actually *connected* to the body!" (*ibid* p.xi).

Research shows that in a healthy body with a well-used brain, there is no apparent loss of brain cells due to ageing as was previously believed (*ibid* p.35). In fact, biologists at Princeton University showed that parts of the human brain can generate thousands of new brain cells (Fig. 1.7) every day (*ibid* p.35).

The human brain cell is identical to that of many other animals, including bees. Entomological research has shown that bees only have several thousand brain cells. Amazingly, a single brain cell can take control of the entire complex system (*ibid* p.35-40).

The division in thinking about thinking is set.
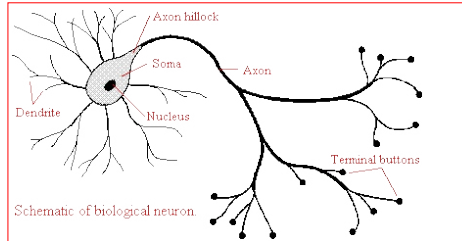
Fig. 1.6 The neuron.

Even the individual brain cell is capable of performing complex acts.

The Max Planck Laboratory managed to isolate a living brain cell and film it under an electron microscope. This video shows the cell, reaching out with its axons and dendrites, searching the space around it for something to connect with (*ibid* p.42). The brain searches for links and relationships, even at the level of its smallest component (Fig. 1.8).

We do not consider the brain to be a simple adding machine anymore, but recognise that is an incredibly complex synergetic system (*ibid* p.4-5).

2.2.) <u>Do we not automatically use our brains in the best way?</u>

The paradigms about thinking that evolved during the last 2 500 years, conditioned us to think about our minds in certain ways. Many of these thoughts have been disproved by recent research. The problem is that we think in ways that seem correct (Buzan 2001 p.9).

Blackmore expands the concept of memes[1] with another analogy to the world of genetics – the memeplex[2]. The hypotheses states that the memes in a memeplex, just like

[1] Meme is the term used for a unit of idea or culture and is analogues to the gene for biological information. It can replicate and be passed on from one system to another.

[2] Memeplex is the idea analogue of a geneplex – a 'co-adapted memetic complex'. Several memes can group and be transferred together due to their increased likelihood of transmission in such a complex.
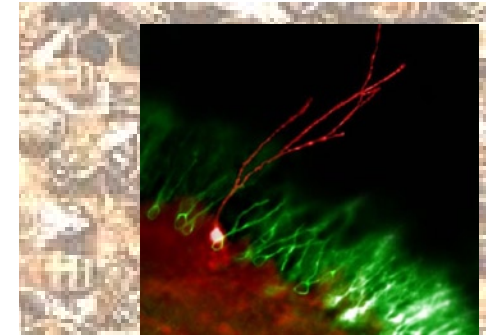
Fig. 1.7. Birth of a neuron.

Fig. 1.8. An electron micrograph of a neuron.
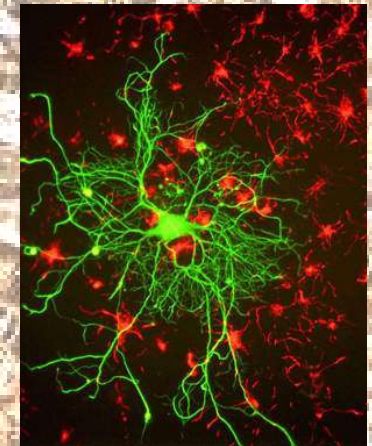
Fig. 1.9. Representation of a gene strand.
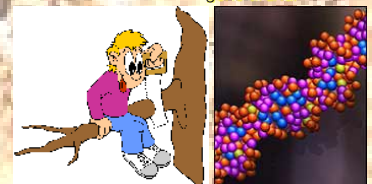
the genes in a geneplex (Fig. 1.9), can 'cooperate' for mutual survival and copying. The survival of the meme is not necessarily in the best interest of the organism carrying that meme (Fig. 1.10). It is in the interest of the meme that the organism believes the meme is good, though. This serves to explain how we can become so attached to a certain way of thinking, even when it can be shown not to be in our best interest.

The way we think, and think about thinking, contains some inherent pitfalls. These problems find expression in the external world. Depression has been described as the disease of the

Fig. 1.11. Social ills

20th Century. The universal rise of violence in contemporary times is a growing crisis, while at the same time, drug abuse, unemployment, poverty and a breakdown in education all cause concern (Fig. 1.11). These are then the cause of more problems, like environmental abuse (Rogers 1997 p.7).

The mind has a built-in tendency that causes it to function counter-productively. "The natural tendency of mind is towards certainty, security and arrogance […]. The mind wants to recognise and identify with certainty as soon as possible […]. Because of this natural tendency of mind we need to devleop a conscious tool." (*sic*) (De Bono 1989 p.26)

There is more reason to change our thinking: "Existing systems produce existing results, if something else is required, the system must be changed" (Sir Christopher Ball in Dryden & Vos 1999 p.278).

The world is facing an ever-increasing rate of change. The continent of Africa is faced with industrialisation, automation, the information age and the move to a service based economy, all at once. Re-engineering our thinking will provide us with the tools to deal with these changes and it will aid us in finding solutions to the challenges that confront us.

Fig. 1.12. Plato.

Fig. 1.13. A Medieval school under ecclesiastic control.

Fig. 1.14 .The clash system.
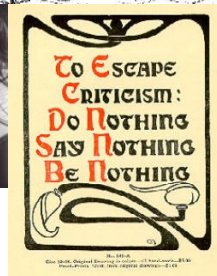
Fig. 1.15. How to avoid criticism.

Fig. 1.16. Critical thinking.

Fig. 1.17. Factory workers during the Industrial Revolution.

Fig. 1.18. Housing in Newcastle built during the Industrial Revolution.

Fig. 1.19. Karl Marx.
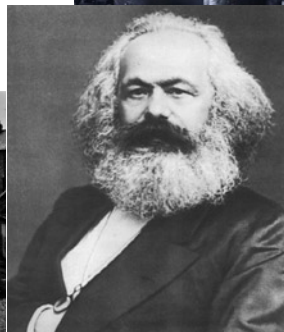
3.)   Where does inefficient thinking come from?

Traditional views of the mind and its place was eventually superseded by the views propagated by Plato (Fig. 1.12). The mind was increasingly seen to be separated from the body. Our collective self-image turned away from the knowledge that we are part of a system and are systems ourselves.

During the Middle Ages, education was under ecclesiastical control (Fig. 1.13). The Academic method was developed with the main aim of keeping down the rise of heretical views (De Bono 1989 p.77).

Unfortunately, this mode of thought spread in use. Its use was not confined to religious debate or serious academic debate alone.   "Western civilisation in its philosophy and its practice has been obsessed with the 'clash' system in which two opposing views fight it out." (*ibid* p.77) (Fig. 1.14). The major disadvantage of this thinking model is its resistance to change: "In most areas the major defect of the clash system is that in order to even begin to think about change, the existing idea must first be attacked. Not only must it be attacked, but it must be shown to be inadequate. […] an idea may have been a good one in its time and may still be a good idea. But this does not preclude the possibility of a much better idea." (*ibid* p.77). The rediscovery of the Socratic dialogue, which share many premises of the academic method, at the end of the Middle Ages, strengthened this way of thinking (*ibid* p.77).

Critical thinking is not bad as such, but it relies on the creation of new ideas and concepts (Fig. 1.15). It is in this respect that it is over used: "It is not as if there was such an ebullience of creative thinking around that we needed the critical thinkers to keep things from running wild." (*ibid* p.79). The method further limits change by abolishing ideas as wholes. A good idea with a minor flaw might be discarded *in toto*. If we were to adapt methods to try to find solutions to these flaws, we stand to gain many useful ideas (*ibid* p.79).

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Critical thinking has some unexpected advantages that contribute to its popularity (Fig.1.16): "Negative criticism offers the opportunity for a great deal of apparent thinking […] it gives an immediate sense of both achievement and superiority." (*ibid* p.79).

Bateson terms the Industrial Revolution (Fig.1.17 and 1.18) "the triumph of engineering over mind" and believes that we, and our thinking, were further separated from the world and the systems we are part of during this process (Bateson 1979 p.20). The social changes that took place, gave rise to Marxism (Fig. 1.19). In its attempt to repair social relations, the relevance of the individual mind was denied (*ibid* p.44). This disconnected the mind from its primary relationship – that of self.

Throughout this period, religion served to maintain some paradigms and thought disciplines. These provided some thought training. The world was becoming secularised, however, and religion was spurned[3]. The mind became directed towards "the 'intellectualising' type of thinking that exists for its own sake. This is the type of thinking […] where thought is used to justify any position." (De Bono, 1989 p.90). We ceased to consider the non-scientific understanding of phenomena and the awareness of relationships as functions of the brain.

4.)   Problems with existing thinking

The current rate of change and technological advance means that we embrace change before we have the chance to consider its consequences thoroughly (Bateson 1979 p.193). We often realise the damage we are doing only after it is done (*ibid* p.242).

Our predominant mode of thinking is not up to the challenge, and it is not changing fast enough (Fig. 1.20 and 1.21). "One of the only places operating largely as it did more than 50 years ago would be the local school." (Numella and Caine quoted in Dryden & Vos 1999 p.78). We need to change our thinking, encourage it and increase its capacity, in order to deal with the global problems we face. If we want to stop destroying our world, and ourselves, we need a greater ability to realise the consequences of our actions, rather than using our thinking to

Fig. 1.20.

Fig. 1.21.

Fig. 1.22.

Fig. 1.24.

Fig. 1.23.

Fig. 1.25.

Fig. 1.26.

[3] "We have lost the core of Christianity. We have lost Shiva, the dancer of Hinduism whose dance at the trivial level is both creation and destruction, but in whole is beauty. We have lost Abraxas, the terrible and beautiful god of both day and night in Gnosticism. We have lost totemism, the sense of parallelism between man's organization and that of the animals and plants. We have lost even the dying God" (Bateson 1979 p.18)

Fig. 1.27.

justify pre-made choices, as we so often do[4].

The change that pervades society is not only a problem, but also part of the solution (Fig. 1.22). According to Rogers:

"Communication technologies are transforming our economies, our ways of learning, our methods of work, our capacity to alter the environment and even our daily chores and pleasures; they are unmistakably reshaping our lives. But they are also at the core of a fundamental new gearing of the human mind." (1997 p.147).

5.)   A change in thinking

The invention of the camera in the 19th century led to the questioning of the relevance of direct representational painting. In an analogue way, the invention of the computer raised questions on the nature and purpose of human thought (De Bono 1989 p.39). This rethinking of the minds' place was aided by the development of psychology, holism and environmental thinking.

It may be argued that training people in thinking will cause them to become self-conscious and thus stifle even the ability that they had before training starts. One learns to walk first through crawling and standing holding on (Fig. 1.23 and 1.24). Cycling is learned through trial and error (Fig. 1.25 and 1.26). Most learning is accompanied by an awkward phase. Once the awkward phase is over, the benefits are much greater than the effort put in or the loss in ability during the learning phase.

When Day discusses artistic ability, he states that commitment is much more important than inborn genius (1990 p.8). It is this commitment that carries one through the awkward phase. The founder of the Alexander technique, Mathias Alexander, states "The (next) great phase in man's development [is] when he passes from subconscious, to conscious control of his mind and body." (Quoted in Buzan 2001 p.xii).

[4] De Bono considers the use of thinking to back up an opinion that has already been formed, to be one of the worst mistakes of thinking (1989 p.19).

6.)   The promise of new thinking

Improved thinking can be profoundly beneficial to the individual. Research shows that health, happiness and even material wealth is a function of the effectiveness of thinking habits.

Many diseases have psychosomatic components and correct thinking can (at least partially) cure them. A patients' chance of recovery from serious diseases like cancer, is directly linked to their mental approach to the disease and the healing process (Buzan 2001 p. xii). Buzan also shows that positive thinking habits alone can strengthen the immune system (2001 p.82). Diseases like Alzheimer's can be significantly affected by brain use patterns. Furthermore, research is increasingly indicating that we choose our own levels of happiness.

On the level of thinking, creativity and understanding, it is useful to remember that the brain is synergetic (Fig 1.27). Use of one part of the brain will not improve only the functions of that part, but will be felt throughout the system. The 'great geniuses' have all used both brain hemispheres (ibid p.23). One example of this would be Albert Einstein (Fig. 1.28), who often came to great insights through daydreaming and visualisation. He, for example, realised that the speed of light is constant for all observers; by imagining what he would see if he travelled on a light particle!

On a societal level, the benefit increases. Bateson explores the concept of mind and sets certain criteria[5] that have to be met for 'mind' to exist (1979 p.97). According to these, it is possible for different peoples' minds to join in the formation of a new mind (Fig. 1.29). The development of this type of meeting holds great promise for organisations. It might even be said to be one of the key objectives of negotiation and democracy.

"Realising the untapped wealth of knowledge and ideas which lie within the citizenry is the key to solving urban problems." (Rogers 1997 p.108).

7.)   The objective

"A Beautiful city, where art, architecture and landscape spark the

imagination and move the spirit." (Rogers 1997 p.167).

A centre has to be created where research and training can be done on human thinking and mental process. This is not solely needed because of the intellectual challenges facing the world, but because "… there is a tragic waste of brilliant minds when we neglect to treat thinking as a skill that can be improved by direct attention." (De Bono 1989 p.15).

Clear relations have been shown between thinking and external factors like music, ventilation, lighting and posture. As the brain links with the world through the body and senses, these interactions should be incorporated by creating sensory spaces. Research and precedents should investigate this.

More importantly, it should be researched whether a relationship exists between the space where one thinks and the thinking done. This is one field of research that will be conducted in the building. The existing knowledge of this field should be incorporated in the design.

The link between space and mental state is often felt, but not so often shown. Day quotes the often-used statement that a good teacher in an ugly shed is better than a poor teacher in a beautiful place. He then responds to this by stating that most people are average and in need of support (1990 p.7). According to him, we feel, think and act differently in different surroundings (*ibid* p.7). The centre should provide a supporting environment. Research and precedents should be found to guide the design in this respect.

Fig. 1.28. Albert Einstein.

Fig. 1.29. Two neurons merging their 'minds'. Note the similarity with urban design sketches.

[5] Batesons' criteria of mind are the following (1979 p.97):

A mind is an aggregate of interacting parts or components.

The interaction between parts of mind is triggered by difference, and difference is a non-substantial phenomena not located in space or time; difference is related to negentropy and entropy rather than to energy.

Mental process requires collateral energy.

Mental process requires circular (or more complex) chains of determination.

In mental process, the effects of difference are to be regarded as transforms (i.e. coded versions) of events that preceded them. The rules of such transformation must be comparatively stable (i.e. more stable than the content) but are themselves subject to transformation.

The description and classification of these processes of transformation disclose a hierarchy of logical types immanent in the phenomena.

Negative examples of place affecting mood are quite common. There are the phenomena of vertigo and claustrophobia, where space and environment instils fear. Albert Speer's work (Fig. 1.30) in Nazi Germany offers a prime example of architecture designed to manipulate feeling in order to facilitate a desired outcome, which might not otherwise be attained. Of the few examples of positive mental state influences, the interior spaces of churches (Fig. 1.31), which aid worshippers in attaining a spiritual state of mind, are probably the most well known. Both positive and negative examples of this will be studied to reveal ways in which it can be utilised

If we accept that buildings are the third skin (Day 1990 p.42) -after clothes and biological skin- we should also accept that they will affect us in similar ways. A building might cause us to feel cold, confident, exposed or secure. It is therefore assumed that a link between building and mood does exist.

These relationships, scientifically proven and internally felt, should be used in the design of the building. This should be done in a manner that it will facilitate and ease the attainment of the goals of the centre – improved thinking.

It should be investigated through research and precedent whether the spaces used and provided for physical exercise in gymnasiums and the like is suitable for mental training, and what the relation between these spaces should be. The possibility of a link is assumed because of the interrelatedness of mind and body.

The approach to the design of the centre should be holanthropic[6]

"Architecture extracts beauty from the application of rational thinking. Architecture is the play between knowledge and intuition, logic and the spirit, the measurable and the unmeasurable." (Rogers 1997 p.67)

Perhaps the most important aspect of the building is its ability to stimulate and maintain links – links between people, people and the building, people with themselves and with the world. This is not in line with most contemporary building – Day identifies the
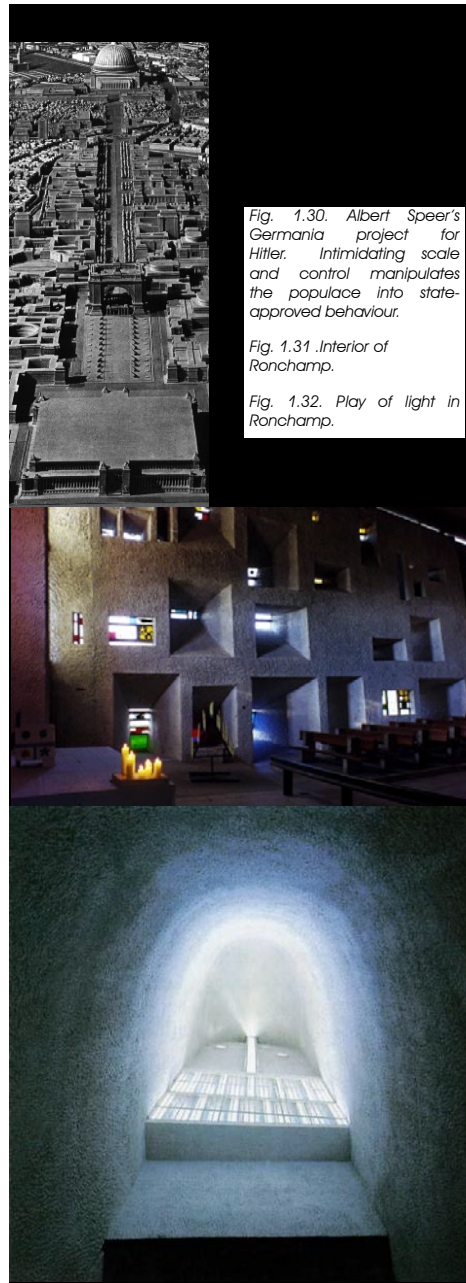
Fig. 1.30. Albert Speer's Germania project for Hitler. Intimidating scale and control manipulates the populace into state-approved behaviour.

Fig. 1.31 .Interior of Ronchamp.

Fig. 1.32. Play of light in Ronchamp.

most common complaints in new buildings to be related to environmental aspects, like anonymity (1990 p.8). A system of proportion is one way in which relationships between different elements can be created. This should not preclude further linking. Spaces for people to meet or experience confrontation should be created to encourage new contacts and interaction.

People can be helped to restore their mental and emotional balance and relationships by spaces that provide calm and stimulation (Fig. 1.32). Relaxing atmospheres, ambiguity and a sense of rootedness contributes to this (Day 1990 p.26). Different scales of spaces with different characters and textures should be provided.

Changing any habit takes time. The same is true for changing thought patterns and behaviours. The centre should provide for follow up and continued contact with participants and for facilities to house these.

Individuals like Edward de Bono, Tony Buzan and many others have proposed techniques for training of the mind. These should be explored as the basis for the training components of the facility. Research will determine the spatial requirements and limitations of these techniques.

Other training should include knowledge of the brain: its structure, different states (brainwave patterns), how to attain these, their relative benefits, and the like. These lead to the need for lecture rooms, auditoria and other similar facilities.

Neuro-science and neurological research also forms part of the scope of the centre, and the requirements for these more clinical functions have to be established through research.

Integration with the city is important. Spatial and functional relationships have to be established with neighbours and related institutions. The centre should not be something separate from its environment as "Cities themselves can be a great tool, a live laboratory for education" (Rogers 1997 p.17-18). Observation

[6] From the Greek *holos* meaning whole and *anthropos* meaning 'human'.

can form a major part of the research and training, therefore the design should allow observation to take place.

8.)   Users

Although the research output of this type of building is applicable to everyone, a limit needs to be placed for operational and logistical reasons.

The centre should not be aimed at any particular level of intellectual development or IQ interval as the aim is to do mind research on a broad basis. Part of the purpose of the building will be to break down the view that intellectual potential[7] determines intellectual success (De Bono states that "… thinking is a skill like driving a car, juggling, cooking, skiing, playing darts or knitting. Some people will be better than others. But everyone can acquire a reasonable amount of skill if he or she wants to." (1989 p.11).

The building might also serve to popularise thinking in the same way that physical achievement is appreciated. It should express the fact that mental achievement is not in some way less deserved than physical achievement[8]. De Bono describes a thinker as somebody who is confident in his/her thinking and can switch it on or off at will, independent of the individuals' latent potential (1989 p.16). The building should aim to add some glamour to the process of thinking.

The centre's users will be drawn through co-operation with educational and research bodies. Organisations that are interested in entering into mutually beneficial strategic partnerships will be invited to send participants. Research into mind/body performance interchange could be undertaken in cooperation with institutions like the High-Performance Centre[9] [10].

Research will also be undertaken in association with the Pretoria Academic Hospital. Much of the equipment needed in mental research is extremely expensive, and is already available at the hospital, without the need for duplication. It has also been proved that many diseases have psychosomatic components. This could lead to research on the impact of thinking on health

Fig. 1.33. Logo of the Buzan Centres.

Fig. 1.34. Logo of the CSIR.

Fig. 1.35 .Logo of the De Bono Institute.

Fig. 1.36 .Logo of the University of Pretoria.

Fig. 1.37. Logo of the HSRC.

[7] "Highly intelligent people may turn out to be rather poor thinkers. They may need as much, or more, training in thinking skills than other people." (De Bono 1989 p.13)

[8] The "Bright people (nerds) are unfit; fit people are thick!" myth (Buzan 2001 p.151)

[9] The High Performance Centre is a centre dedicated to the training and improvement of high performance athletes and sportspersons at the University of Pretoria.

[10] It has been shown by researchers at Manchester Metropolitan University that thinking can increase physical fitness. Through thinking about exercise, the neural pathways between the brain and the muscles are strengthened. This leads to an increase in the amount of muscle power that can be drawn upon (Buzan 2001 p.83).

and the betterment of health. The centre could help patients with mental techniques to aid in their treatment and the effect of these can be monitored. There are also indications that certain uses of the brain can delay the onset and progression of diseases like Alzheimer's'.

9.)   Client profile

The centre will function as a full-blown research/educational institution. Several organisations and groups are available as investors and collaborators. It is suggested that the client be a syndicate consisting of several of these.

9.1.)   The Human Sciences Research Council (HSRC)

"[The HSRC] primarily conducts large-scale, policy-relevant, social-scientific projects for public-sector users, non-governmental organisations and international development agencies." (HSRC 2004)

The HSRC focuses on the following research aspects: "notably poverty reduction through economic development, skills enhancement, job creation, the elimination of discrimination and inequalities, and effective service delivery." (HSRC 2004). Of particular interest to the creation of a Mind Development Centre is the skills enhancement and job creation aspects.

9.2.)   The Department of Education

The Department of Education aims to make lifelong education a reality for all South Africans. It is one of the departments objectives to create a vibrant education system that can confront the challenges of the 21st century (Department of Education 2004). These are objectives shared with the Mind Development Centre.

9.3.)   The Department of Health

The Department of Health has, as one of its main aims, the promotion of preventive and promotive health (Department of Health 2004). The psychosomatic component of many diseases and the mind's power to help combat disease, along with the

physical research conducted, creates a viable link between the Mind Development Centre and the department.

9.4.) The University of Pretoria

The University of Pretoria is a leader in research and education. The University recognises the importance of thinking as a skill, and was the first institution anywhere to appoint someone Professor of Thinking (De Bono 2002). This clear commitment makes them an obvious candidate for a stakeholder of the Mind Development Centre.

9.5.) The CSIR

The CSIR is the largest research organisation in Africa. Innovation, inventiveness and initiative is among its main stated objectives and mandates (CSIR 2004). The CSIR has an existing co-operation agreement with the University of Pretoria.

This commitment and focus is exactly the type of inset needed in the Mind Development Centre.

9.6.) Buzan Centres International

The vision of the Buzan centres is the expansion of the mind (Buzan Centres International 2004). This is done through cooperative partnerships. The focus on the teachings of Tony Buzan means that the Buzan centres is an obvious partner in the Mind Development Centre.

9.7.) The De Bono Institute

The De Bono Institute has among its primary objectives the identification, nurturing and development of thinkers and research into thinking processes (De Bono Institute 2004).

It is clear from the above that all the above organisations have a stake in the development of better thinking and learning skills. There are many shared objectives between these organisations and the Mind Development Centre.

These organisations can be shareholders in the centre, either by capital investment, contribution of experts or any other suitable

means. An independent organisation, The Mind Development Centre will be created, which will be the direct client.

Furthermore, the centre can make use of sponsorships.

10.) Schedule of accommodation

Although a detailed schedule of accommodation would need to be researched, the following broad categories of space should be kept in mind:

10.1.) General spaces

Circulation

Entrance/ Exit

Lavatory facilities

Storage

Parking and drop-off

Bicycle storage

10.2.) Administrative

Offices

Staff area

Maintenance and cleaning

10.3.) Training

Lecture rooms

Interview rooms

Computer centre

Library

10.4.) Research

Laboratories

Equipment rooms

10.5.) <u>Ancillary</u>

Restaurant/ Coffee shop

Bookshop

Relaxation/ meditative areas

10.6.) <u>To be investigated</u>

Conference facility/ discussion areas

EEG Rooms or similar (if required)

Gymnasium

Dormitories

11.) <u>Conclusion</u>

A centre is to be designed that will provide facilities for the research and dissemination of knowledge pertaining to the mind and thinking.

Existing knowledge and research showing the link between the mind and physical space should be found and applied to the design. Research and precedent studies should aid in the understanding of space and its influence on mental states.

Research should aim to understand the currently available techniques used to stimulate thinking and creativity in order to understand its spatial implications.

The understanding that the brain is a connecting machine leads to the need for spaces that will connect, and connect the user, with the larger urban fabric, other users of the building and themselves. Research and precedent should identify projects and ways in which this can be achieved.

Where information on the subject is not available, the approach will be followed of using the brain, the neuron and its functioning as an analogues model on which to base decisions.

Baseline Criteria
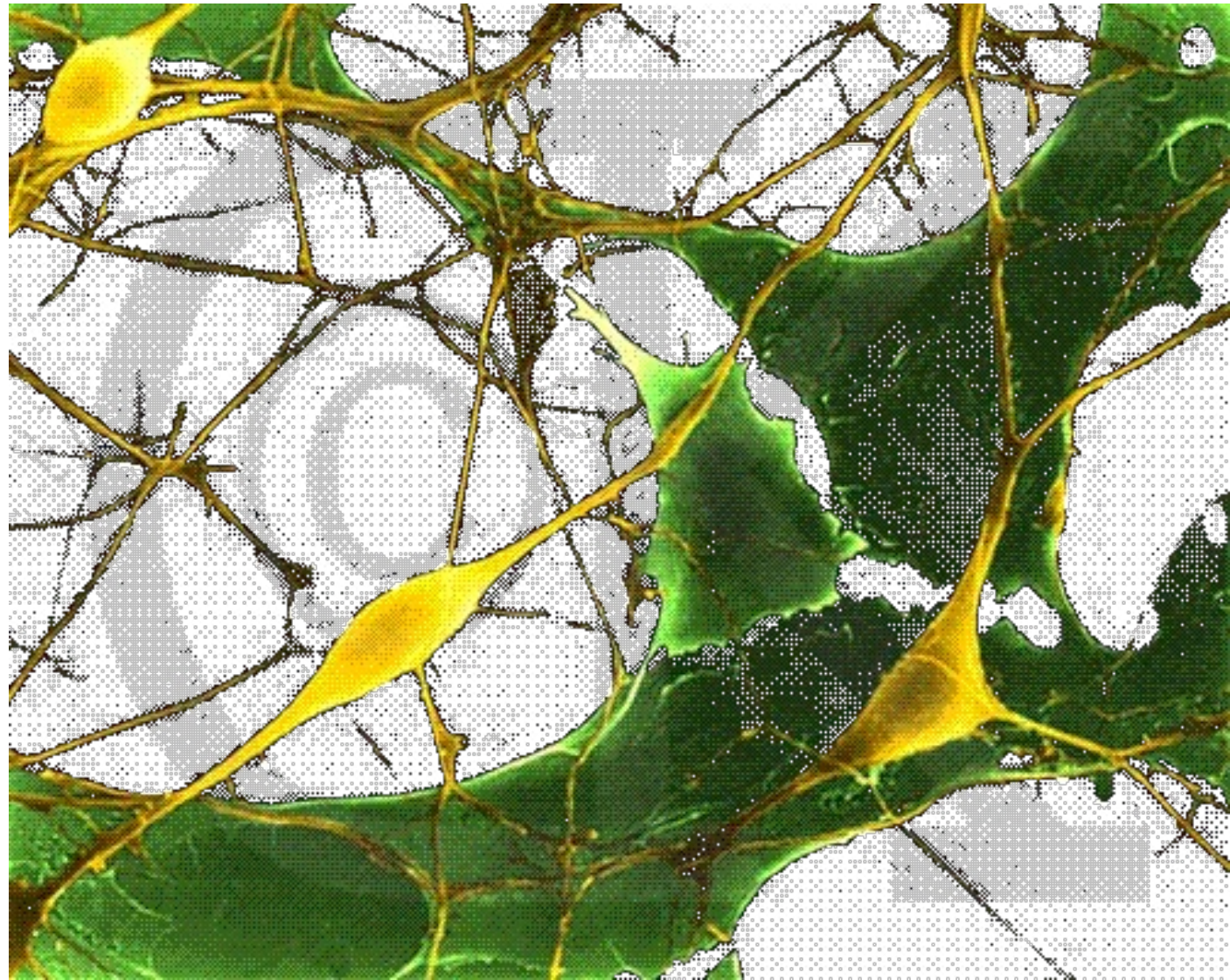
How we go about it

Fig. 2a. Pyramidal Neurons and glial cells.

Baseline Criteria

This report will set out the criteria for the design. It will attempt to ensure a quality product that will fulfil the needs of the client as well as the larger community. It will take account of the social, economic and environmental aspects of building and attempt to strike an optimal balance.

The criteria in the report make use of the Sustainable Building Assessment Tool (SBAT) as promoted by Jeremy Gibbert, and refer to the work of, among others, Christopher Day and Tony Buzan.

All design decisions are considered to have an impact on financial, ecological and social concerns. This is the major deviation from the criteria set out by Gibbert. While the sequence of the discussion broadly follows the form as set out by Gibbert, cross referencing and referral is used throughout to link aspects that are related.

Some aspects dealt with are not criteria as such, but rather commitments to explore particular aspects of the design problem.

1.)   Occupant Comfort

It is clear from the literature surveyed that comfort is an important aspect in mental functioning. In everyday situations, discomfort causes stress, which activates survival instincts and interferes with 'productive' thinking. Day states it quite simply: "…what *feels* better *is* better." (1990:20)

Comfort addresses a broad spectrum of criteria, from the physical to the social and psychological environments.

The importance of environment on comfort can be seen by looking at examples such as individuals suffering from vertigo or claustrophobia. The environments created for the purpose of torture or brainwashing also serve as examples.

Related to comfort is the impact a building has on mental state. Great religious buildings make use of this atmosphere to aid
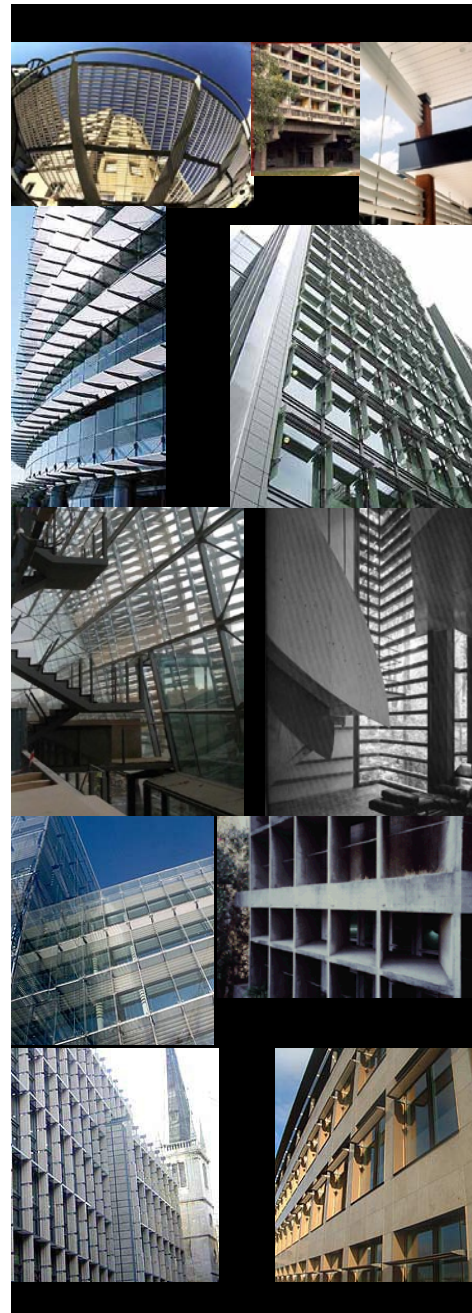
worshippers in achieving a spiritual state. Appropriate principles should be developed to use potential positive influences of the building on the mind in the design.

1.1.)   Lighting

Lighting is of particular importance in a building. Sighted people require it to do their everyday tasks. It influences the atmosphere of a space. If it is provided in the wrong way, people have to strain their eyes to see or have to squint against the glare. Even blind people can enjoy the touch of the sun on their skin, or experience discomfort from its heat.

1.1.1.)   Natural light

Natural light has many benefits over artificial lighting. It is supplied free of charge, reducing the capital and running costs of the building. It does not flicker as fluorescent lighting often does. Colours appear natural and ultra-violet radiation has a disinfecting effect.

Natural light should be used wherever possible. Where views are appropriate or required, this should be combined with the light source. When it is inappropriate to provide views, natural light should still be used in an appropriate manner.

Although South African law does not yet make provision for solar rights (Holm 1996:88), the massing of the building should be considerate in terms of solar access for neighbouring buildings. A recent case in the Natal High Court, regarding view rights, could set a precedent for the growing acceptance of environmental rights in the built environment.

The centres' open or garden areas will require solar access and light. Their placing and the massing of the building should keep this into account.

Solar control devices (Fig. 2.1.-2.10.) shall be provided where needed. These should be functional and not mere aesthetic expression. Horizontal as well as vertical solar angle is to be considered. The design of windows should keep in mind that

Fig. 2.1-2.10 Various solar control devices.

heat is gained and lost through glazing. Diffuse and reflected radiation should be kept in mind.

1.1.2.)   Artificial light

Artificial light will be required for areas where adequate daylight is not available as well as at night. The nature and placing of these have to be carefully considered. Artificial lighting affects maintenance as well as running costs. Fittings should therefore be energy efficient and accessible for maintenance.

The purpose of the space should be considered when selecting light fittings. Compact fluorescent lights are energy efficient when they are left burning over long periods. When being switched on, the capacitor needs to be charged and this consumes large amounts of energy, while the same is true of leaving the light switched on needlessly. Furthermore, the life expectancy of a compact fluorescent is reduced by regularly switching it on and off. In some cases, it will be appropriate to use other forms of lighting.

Artificial lighting contributes significant amount of heat to the building. Ways should be explored in which this heat can be dispersed and re-used.

1.2.)   Ventilation

We need to breathe, as does most living organisms. Air is needed for growth, health, metabolism, and thinking.

The quality of the air we breathe impacts greatly on us. Too little oxygen makes us dizzy while too much acts as a euphoric drug. Excessive carbon dioxide causes lethargy and exhaustion. We are vulnerable to disease and to chemical attack through our breathing.

Through respiration, we use up oxygen in the air and release carbon dioxide. Materials and processes used inside buildings often release toxins that are dangerous to us. All these processes affect our performance and health.

Good ventilation is a basic requirement in a good building.

Fig. 2.11. Openable Louvres.

Fig. 2.12. Water feature at Sony Centre by Peter Walker.

Fig. 2.13. Jasmine

Fig. 2.14. Music powerfully influences mood.

1.2.1.)   Natural ventilation

Natural ventilation is to be used wherever possible. Where natural ventilation is inadequate, convection towers and other passive means should be employed to augment it. The layout and placing of air-intakes should ensure that air is let in at desirable points, and not merely drawn from the cooler toilet and service areas.

Windows should be openable wherever possible (Fig. 2.11). Active systems shall be considered where necessary, but should be restricted to mechanical ventilation. Air conditioning should be avoided, except in those cases discussed in section 1.6.2.

Artificial reverse circulation should be used in winter, to move warm air from higher floors to those below.

1.2.2.)   Water features and gardens

These should be used to cool down, humidify and increase the negative ion content of the air (Fig. 2.12). See planting and landscaping section 1.4. below.

1.2.3.)   Sense of smell

The sense of smell is connected directly to the brain. It has a powerful ability to influence mood and create a sense of place (Fig. 2.13). Air inlets and windows should pick up the smell of fragrant plants in the centre. Other smells should also be utilised to heighten the sensual experience of the building.

1.3.)   Noise

Noise has conscious and unconscious influences on mental state. The power of music to influence the brain wave patterns has been scientifically shown.

A complete absence of sound is not possible in the presence of life. When the environment is very quit, the ears adjust and one starts to hear things like one's heartbeat and blood circulation, which is disconcerting.

The human brain seems to be hardwired to tune in to verbal sounds, drawing attention away from other activities. Different

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activities have different thresholds for noise, and noise at different frequency and volume has different effects. The elimination of sound is not the answer.

1.3.1.) Noise emission

Noise emitted by the building has to be limited. Noisy plant should be placed in such a way as not to affect the functions in the building or that of neighbouring buildings. Sound insulation for particularly noisy functions should be used.

1.3.2.) Background sounds

These should be suited to the environment. Reading rooms and libraries require grey noise at an acceptable level to mask the sounds of activity (Fig. 2.15). Quiet, meditative spaces can benefit from the sound of running water. Social areas like the cafeteria benefits from the buzz of people, while open plan offices should be designed to facilitate dampening of (particularly verbal) sound.

1.3.3.) Layout

The layout of the building should allow less sensitive functions to be placed close to noise sources like the street. Where this is not possible, double-glazing and sound insulation should be used.

1.4.)   Planting/ greenery and water features

Plants use carbon dioxide, give off oxygen, have a cooling effect (mentally and physically), and increases the negative ion content in the air (particularly ferns). Day (1990:35 and 52) and Holm (1996:6) refer to the beneficial effect of negative ion content in the air for human functioning.

Water features have the same benefits, as well as providing soothing background noise.

Further benefit of planting is that the beds absorb rainwater and slow down surface run-off.

1.4.1.) Open-air spaces

Open-air spaces should be created and extensive planting used

Fig. 2.15. An airconditioner diffuser can be used to generate grey noise at the required level.
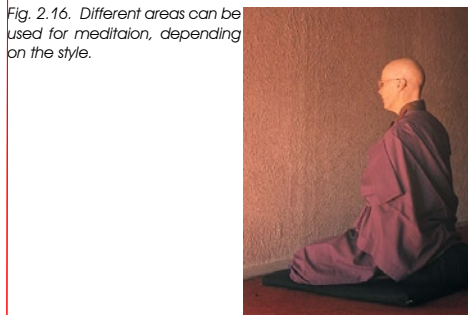
Fig. 2.16. Different areas can be used for meditaion, depending on the style.

Fig. 2.17.   UV disinfection can be used to clean water without hte environmentally detrimental effects of chemicals.

there. The surfacing material should be permeable. Where hard landscaping is required, it should be done in a way that reduces run-off speed, lowering the demand placed on the storm water system.

1.4.2.) Nature in and out

All spaces should be in visual contact with planting or sky-views, except where the function dictates that this is inappropriate.

1.4.3.) Meditative space

Quiet, meditative spaces should contain features that would enhance the nature and atmosphere of the place.

1.4.4.) Wildlife

External areas should accommodate the habitation and migration of animal life as appropriate to the environment. Also, see section 4.3.3.

1.4.5.) Planting

All planting is to be indigenous and preferably local.

1.4.6.) Water feature hygiene

Provision should be made for water disinfection by environmentally responsive technology like UV disinfection (Fig. 2.17).

1.5.)   Accessibility and inclusivity

1.5.1.) Transport

The site is located close to Church Square, which is the central bus terminus for the city. Taxi ranks and the train station are available within walking distance. (See context study). The centre is easily accessible by motorcar, with ample provision for parking in the vicinity. Parking currently provided on the site should be replaced in the design.

1.5.2.) Pedestrians

A pattern of sidewalk canopies exists in Church Street. Conforming to this will make the building more pedestrian friendly. Accessibility

of the building during storms and the harsh summer weather will also be increased in this way.

1.5.3.) Cyclists

Safe storage for bicycles should be provided. Showers and dressing rooms will further encourage participants and employees to use bicycles for transport.

1.5.4.) Childcare

A nursery school/ childcare centre is available close by (see fig. 2.18) for the children of employees. A partnership between the centre and the nursery can be created to accommodate the children of participants.

1.5.5.) Financial services

Some banks are available in the vicinity. A greater range of Automatic Teller Machines could be provided in the area.

1.5.6.) (Dis)ability considerations

The building should allow for use by all persons, regardless of physical ability.

1.5.7.) Changes in level

Changes in level should make accommodation for wheelchair users. The edges of levels should be provided with tactile surfaces and contrasting colours. Ambulant disabled persons often have trouble navigating ramps. Because of this, ramps should not replace other forms of vertical circulation.

1.5.8.) Toilet facilities

Toilet facilities should be provided for disabled persons and special consideration should be made for areas where work with small children might be done.

1.5.9.) Obstructions

Care should be given to door and window swings and other object that might obstruct circulation routes. The placing of switches, taps, window controls and similar devices should be

Fig. 2.18. Childcare facilities close to the site.

sensitive to the needs of both disabled and able-bodied building users.

1.5.10.)   Multi-Culturality

The function of the building implies users from a variety of backgrounds. The building and exhibits should avoid features that might give offence to some user groups. Effort should be made to encourage inclusivity (e.g. in sanitary provisions). It is important to ensure that content of display is appropriate for children.

1.6.)   Participation and Control

Providing users with the ability to control their environment immediately provides a sense of empowerment and comfort in a building. It is also recognised that users often will not go to the effort of exercising this control (Holm 1996: 87). Accommodation should thus be made for user and centralised control.

The centre includes some very specific functions.   In the experimental areas, it is necessary to create particular conditions. In these places participant control would be inappropriate.

1.6.1.) Meditation spaces and offices

In these areas user comfort and control is important. Wherever possible, openable windows should be provided and as much as possible control can be left to users. Music could be provided in these areas and left to user control.

1.6.2.) Comfort Experimentation

Where experimentation is conducted to determine which environmental conditions is preferred for different tasks and to measure personal and cultural preferences, user customisation should be provided in as great a manner as possible. This customisation should be measurable. In these areas, it would even be appropriate to provide facilities like HVAC, in order to ascertain attitudes towards this and measure the impact it has.

1.6.3.) General areas

Employees should be able to adjust blinds and partitions to establish personal comfort. The building should, through its design, encourage participants to interact with and explore it: "What does this button do?"

1.7.)   Social areas

Social interaction is very important in the creation and study of collective mind. The research conducted in the centre is of a multi-disciplinary nature, necessitating interaction between people from different fields.

Rogers refers to the unquantifiable expansion of the human brain through the networking of thinking (1997:148). It is very important that good social spaces are provided in the building and that contact between people is encouraged in the design.

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1.7.1.) <u>Circulation spaces</u>

These should be designed in ways that encourage social meeting and interaction. Functions and departments that would not normally come into contact should be connected in a way that encourages interaction. Circulation space should be explored as multi-functional spaces and should serve a dentritic¹ function.

1.7.2.) <u>Amenities</u>

Along with the circulation, amenities such as vending machines, kitchens and coffee bars should be provided and utilised in a way that would encourage interaction between people. This should also be done with shared facilities, like photocopying machines.

2.) Welfare

2.1.) Safety and Security

In the light of the central city location, security in the building is important. This is verified by the access control at other buildings in the area (see fig. 2.19).

2.1.1.) <u>Entrances</u>

A central, controlled entrance should be provided to the street. Ground floor functions should look out onto the street in order to monitor potentially dangerous activities.

2.1.2.) <u>Links with neighbours</u>

Entrances giving onto other buildings (The HSRC and the parking garage) could be controlled through unmanned doors with access cards.

2.1.3.) <u>Good Neighbouring</u>

Floors above ground should look out onto the street. Occupants should be encouraged to report and act on suspicious activity across the street (The pavement not being visible due to the

¹ The dendrites are the arms that radiate from the neuron (brain cell) and facilitate the contact between different brain cells, creating the pathways along which thoughts pass. The better a brain is used, the more dendrites and connections there are. The better a cell is connected, the better able it is to contribute to new thoughts and memories.

Fig. 2.19. Access control at neighbouring buildings.

Fig. 2.20. Smoking needs to be designed for.

canopy). Contact with neighbours could lead to this policy being expanded to other buildings, providing protection for the development.

2.1.4.) <u>Safety Issues</u>

The building must comply with the National Building Regulations and other statutory standards in order to ensure the safety of the building. Where function requires deviation from these regulations, alternative standards and procedures have to be developed to ensure the safety of users and property.

2.2.) Health

The health of workers and occupants is important to the functioning of the building. Sickness leads to costs due to days off from work. Some health problems might lead to litigation and bad publicity.

2.2.1.) <u>Emergency</u>

First Aid kits should be located on every floor and be positioned close to the emergency exit routes. First Aid officers should be appointed and trained for every floor. Fire Captains should also be selected for every floor.

2.2.2.) <u>Smoking</u>

In order to protect the rights of smokers (Fig.2.20) and non-smokers, smoking areas are to be provided in the building.

These areas are to be provided away from doors, windows or air inlets. Smoking will not be permitted in any public areas.

Designated smoking areas should be fitted with warnings in prominent positions. These should counsel on the dangers of smoking and provide contact details for organisations that help one to give up the habit.

Smoking areas should be designed in a way that will allow for easy conversion to other functions, should the need for smoking areas disappear.

3.) Local Economy and Financial aspects

Buildings can benefit the local economy on the short and long term. Any advantage resulting from this should be maximised

3.1.) Contractors and Labour

3.1.1.) <u>Local Contractors</u>

Contractors from the Tshwane area should be used for general construction work. Specialised work can be sourced from further a-field, but preferably within a 200km radius.

3.1.2.) <u>Small and Medium Enterprises/ Emerging Contractors</u>

Where appropriate skill and capacity exist, small and medium enterprises should be used.

According to Bruce (2003), the South African construction industry does not have a fraction of the necessary capacity to deal with the expected rise in construction. In order to develop this capacity, experienced contractors should be encouraged to enter into partnerships with emerging contractors.

Such a partnership can be used to increase the feasibility of these small businesses through the transfer of management skills and other necessary experience.

3.1.3.) <u>Labour Intensive Design</u>

The design should allow for labour intensive construction to take place. This should not be taken to mean that people should be given jobs that a machine can do better, but rather the choice of technologies and techniques that require a human touch.

Workers should feel free to make suggestions regarding

the design and construction, and leave their stamp on their work.

It is not economically feasible to construct the entire building in this way. Existing possibilities should be identified and, particularly in the public and visible aspects of the building, opportunity should be created for this type of work.

Working in this way, adds more depth to the building and serves to create more meaning and connections in the centre.

3.1.4.) <u>Unskilled Labour:</u>

Unskilled labour should be sourced from unemployed people resident near the development, preferably within walking distance.

The process can be managed in collaboration with local charities, housing associations, churches, the local council and others who work with and among the unemployed. Empowerment projects can be the aim of such an approach. The objective of this should be to transfer skills and knowledge to a level that will allow involved persons to continue in a similar capacity.

3.2.) Materials

3.2.1.) <u>Local Materials</u>

The design should make use of materials that are available within a 100km radius and the use of these should be insisted on during the tender process.

This aids the local economy and reduces the environmental impact through transport. It also results in materials and expertise being readily available for repairs and maintenance.

3.2.2.) <u>Health aspects</u>

See section 5.1.2.) below.

3.3.) Efficiency

3.3.1.) <u>Unproductive Space</u>

Space occupied by plant, circulation and WC's should not exceed 20% of the floor area. See section 1.7.1.) above.

3.3.2.) <u>Use Time</u>

Ways should be explored to use the building for as many hours a day. This will result in a more efficient application of capital outlay.

Using a building in this way reduces the need for separate buildings for every function and decreases the amount of total land that needs to be built upon.

Having the building occupied for longer times also increases the security of the building and increases potential revenue.

This need is further enforced by the Pretoria Inner City Development Framework when it calls for housing in the city to extend the time that there is activity in the city (p.12).

3.4.) Capital Costs

3.4.1.) <u>Value for Money</u>

The selection of materials and construction should be based on a value for money approach. A high quality and standard should be a requirement, while paying a premium for the best products should be avoided.

3.4.2.) <u>Consultants</u>

Consultant fees should reward reduced capital cost with bonuses. The contracts with consultants should ensure that standards are not compromised by lowered cost.

3.4.3.) <u>Adaptability and flexibility</u>

Buildings often have to be adapted during their lifetime.

It is also true that very good adaptations have been done on buildings that have not been designed with alteration in mind.

Rogers draws a relationship between the flexibility of a building and the thinking that can happen there – "Inflexible buildings hinder the evolution of buildings by inhabiting new ideas." (1997:79).

The centre has a very particular function and might lose its effectiveness if too much focus is placed on future occupation.

The neighbouring buildings are in a somewhat unkempt state. The design of the building should keep in mind that these buildings might be replaced in future (or that the current building could be expanded onto these properties.)

These factors call for design decisions that will not prevent future adaptation, rather than trying to anticipate and prepare for it. The design should also keep in mind the effect of construction on organisation and passive environmental features.

Partition walls are to be non-structural. Where structural walls are used, they are to be legible as such.

Services should be easily accessible and maintainable yet discourage tampering. Maintenance should not interfere with building use and occupation.

Vertical Dimensioning: Within the constraints imposed by the need to join with floors in neighbouring buildings, particularly on ground and first floor level, the following vertical dimensions should be used:

Total:	28 000mm (The height
restriction on the site)	
Ground Floor:	4 000-4 500mm
Higher Floors:	3 000mm

3.5.) On-going costs and management

The expenses of a building are not finished when the final accounts are signed off. Energy, maintenance and other operational costs all contribute to these continuing costs. An increase in capital cost that reduces operational costs can be offset many times over the lifetime of the building.

3.5.1.) Materials and building techniques

These should generally be selected to be low maintenance. The maintenance that is required should be available locally.

A building manual should be supplied to the facilities manager. This will ensure that the building is well and correctly maintained and prevent management from making adaptations that will cripple systems in the building.

This manual should include information on the following:

- the types of fittings,
- suppliers and maintenance workers,
- maintenance cycles,
- the use of passive systems
- design decisions that might not be understood by the non-professional and affects the functioning of the building.

3.5.2.) Energy

Energy is a major on-going cost of a building, and has a major impact on the environment. Passive technologies should be used to reduce energy use.

Light fittings should be low energy as discussed in section 1.1.2. above. Movement sensors or timer switches can

be used in areas that are seldom used.

Heat: Solar water heating should be used to supply hand washbasins and showers.

Ways to harvest and use waste heat should be explored. Heat exchangers and convection towers are possible applications. Where heating is required during the winter, waste heat should be the primary source. If this does not provide adequate heating, radiated heat is preferred, but a balance should be struck between financial and environmental cost.

During summer months, nighttime cooling can be used to chill the building. This still uses electricity, but directs it to times of low demand on the supply network, reducing the cost.

Ventilation: See section 1.2.) above.

Alternative energy generation through solar panels, wind turbines or even hydroelectric energy should be investigated and used if appropriate and feasible. These should only be used where they will be effective and should not be applied as gestures.

Water: See section 3.6. below.

3.5.3.) Cleaning

The building should allow for cleaning functions to be outsourced, and accommodation should be provided for this.

Windows and floor areas should be easy to clean. Hard to reach places should be provided with suitable cleaning equipment.

3.5.4.) Measurement of costs

The building management system should allow for continuous measurement of running costs. These should be accessible over the intranet of the centre

and is to be reported at meetings.

3.6.) Water

South Africa is a dry country and relatively poor, resulting in the need for reduced water consumption. Money can be better applied than on building water supply; storm water and sewerage infrastructure.

Using potable water for flushing toilets and washing cars seems excessive when others are dying and getting diseased through the lack of drinkable water.

3.6.1.) Rain

Rainwater is to be harvested and stored in tanks at roof and basement level. Ways should be explored in which rain can be used to wash dirt and dust off windows and walls, minimising the need for cleaning and other cosmetic maintenance.

3.6.2.) Grey Water

Grey water is to be captured and re-used, particularly for watering plants and flushing toilets. Filtering should be provided where necessary.

4.) Site

The location of a building has certain benefits and liabilities.

4.1.) Heritage

The building is near several sensitive buildings, like the Kruger house museum, the Pretoria *Gereformeerde Kerk* and Church Square. The massing and treatments should be sensitive to this and where possible contribute to the cohesion of the area.

4.2.) Location and nature

The building is a Brownfield site. Virgin land does not need to be disturbed for its construction. Its central

location makes it more accessible and public transport is more available.

Creating a high-density building eliminates the need for several low-density buildings outside the city. There is also potential to contribute to the revitalisation of a run-down part of the city.

4.3.) Site Influences

4.3.1.) Height and density

The site is situated between low-rise structures on the sides. Other buildings in this part of Church Street and behind the site range from six to thirty-three storeys.

The assumption is made that the building will be flanked by taller buildings in future. The detailing of the flanks should keep in mind that this is not the case yet.

4.3.2.) Roofscape

Building on a Central Pretoria tradition, the roof should be habitable. A 'pergola' visible from the street can be used as a 'pediment' element to the building. This roof should be landscaped.

4.3.3.) Vermin

This close to Church Square, pigeon problems are likely. Possible solutions would be to create a 'sacrificial' pigeon area, thereby limiting pigeons to predetermined areas. The building could also incorporate functional habitat design that encourages birds of prey to nest on it and control the pigeon population. See section 1.4.4..

5.) Construction

Many aspects of the construction process contribute to the health, cost, comfort and ecological responsibility of the building.

5.1.) Reduce, Re-cycle and Re-use

The construction process is often wasteful. A substantial percentage of material that is brought onto site is removed again as waste. This is an expensive and unnecessary expense. It also takes up large amounts of space in landfill sites.

5.1.1.) Modular Systems

Modular systems and brick dimensioning should be used to reduce the amount of off cutting. This decreases material wastage, and speeds up the construction process.

5.1.2.) Material selection

This should focus on renewable materials. If appropriate recycled material is available in the area, it should be used. The danger of materials to workers (during manufacture, construction and dismantling), to users, and during accidents (e.g. fire) should be kept in mind when selection is done. The toxic, carcinogenic and electrostatic properties of materials are important considerations during this process.

5.1.3.) Recycling

The construction policies should incorporate a recycling policy. This should include not only construction materials, but also incidentals like the waste that results from the meals that workers have on site.

5.1.4.) Dismantling of Building

The building should be designed in such a way as to allow the components to be re-used when the building is taken apart at the end of its useful life

5.2.) Considerate Contractors

The contractors should endorse 'considerate contractor' principals. This regulates noise, waste and storage of

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building materials during construction. The aim is to prevent obstruction and nuisance to existing businesses and residents and prevent accidents.

5.3.) Phasing

The construction should allow subsequent processes to start as soon as possible.

Functions that operate semi-independently from the rest of the building, for instance the parking garage, should be completed as soon as possible. This will allow these areas to go into operation as soon as possible, earning revenue for the project. It also reduces the disruption to those currently using the site for parking.

6.) Communications

As the brain works on links, it is important for a building of this nature to be provided with good communication, internally and externally.

6.1.) Information

The building should be well linked up via internet, intranet, fax, telephone, even radio and television. "New technologies are enabling us to expand the use of our most valuable and most particularly human resource: creative imagination, or brain power. The increase or even prolific consumptions of this resource is subject to no limiting factors and has no downside; it is people- and environment-friendly." (Rogers 1997:147)

6.2.) Neighbouring

The building should link with other buildings and organisations. These links can be cooperation agreements, physical links, or merely the support of local businesses by the users of the building.

6.3.) Art

Day believes that art brings us to a threshold experience

of inner change that sets in motion healing connections (1990:25). According to De Bono,"One of the purposes of art is to help us stock our mind with further patterns" (1989:50). Art connects us with our feelings, with worlds and experiences outside ourselves, and with life and people outside our circumstances. Art establishes relationships. This makes the extensive use of art in the building appropriate and the design should accommodate it.

7.) Table quantifying priorities for baseline issues

The table indicates the different issues given in the baseline document. To each aspect a value is accorded, indicating whether it is beneficial (>0 to 2), detrimental (<0 to -2) or neutral (0) to the economic, environmental or social aspects.

These three aspects are totalled up to provide a priority. The higher the priority, the more important this particular technique is.

Each heading is allocated the average values for the items under it.

Fig. 2.21. Baseline graph. The graph indicates the influence each decision (on the outside of the wheel) has on environmental, social and financial aspects. The red circle is the zero-line: anything inside has a detrimental effect, anything outside is positive. The outer blue circle indicates the priority of each decision as a total of the priorities in social, environmental and financial aspects.

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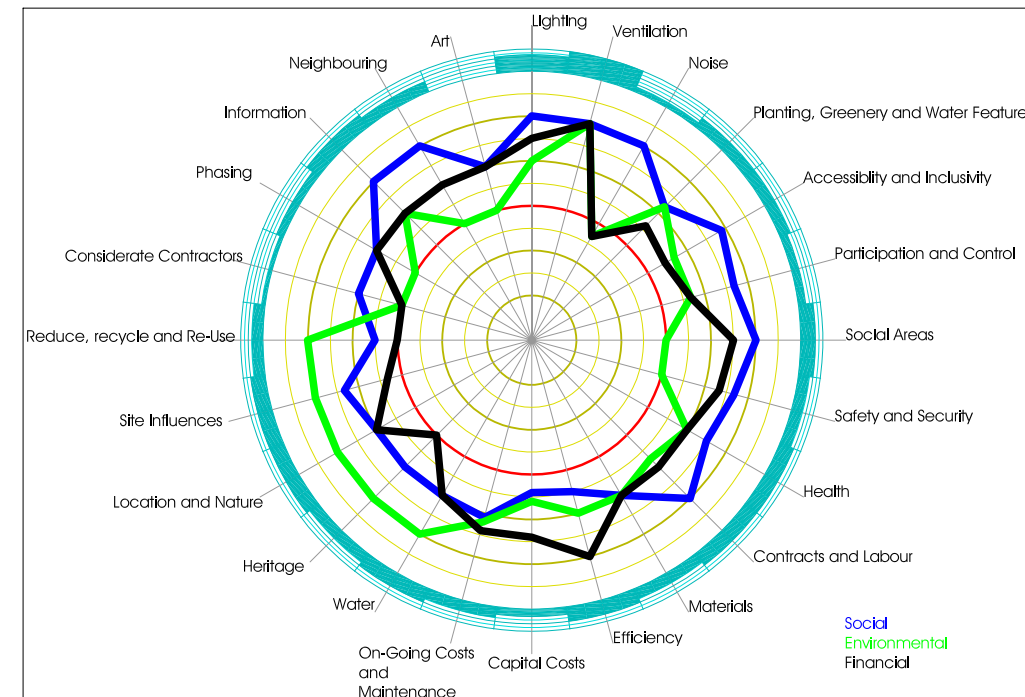
		Relative cost				
	Item	Economic	Environmental	Social	Priority	
1	**Occupant Comfort**					
1.1	**Lighting**	1.50	1.00	2.00	4.50	
1.1.1	Natural Lighting	2	2	2	6	
1.1.2	Artificial Lighting	1	0	2	3	
1.2	**Ventilation**	2.00	2.00	2.00	6.00	
1.2.1	Natural Ventilation	2	2	2	6	
1.2.2	Water features and gardens (see 1.6.2)					
1.3	**Noise**	-0.33	-0.33	2.00	1.33	
1.3.1	Noise Emission	-1	-1	2	0	
1.3.2	Background Sounds	0	0	2	2	
1.3.3	Layout	0	0	2	2	
1.4	**Planting, greenery and water features**	0.60	1.20	1.20	3.00	
1.4.1	Open Air spaces	1	1	1	3	
1.4.2	Nature in and out	0	1	2	3	
1.4.3	Meditative space	0	0	2	2	
1.4.4	Wildlife (See 5.3.3)					
1.4.5	Planting	1	2	1	4	
1.4.6	Water feature hygiene	1	2	0	3	
1.5	**Accessibility and inclusivity**	0.44	0.67	1.89	3.00	
1.5.1	Transport	1	2	2	5	
1.5.2	Pedestrians	2	1	2	5	cost savings

1.5.3	Cyclists	2	2	2	6	
1.5.4	Childcare	0	0	2	2	
1.5.5	Financial Services	0	0	1	1	
1.5.6	(Dis)ability Considerations					
1.5.6.1	Changes in level	-1	0	2	1	
1.5.6.2	Toilets	-1	0	2	1	
1.5.6.3	Obstructions	0	1	2	3	
1.5.7	Multi-Culturality	1	0	2	3	
1.6	**Participation and Control**	0.67	0.67	0.67	2.00	
1.6.1	Meditation Spaces and Offices	1	2	2	5	
1.6.2	Comfort Experimentation	0	-1	0	-1	
1.6.3	General Areas	1	1	0	2	
1.7	**Social Areas**	1.50	0.00	2.00	3.50	
1.7.1	Circulation Spaces	2	0	2	4	
1.7.2	Amenities	1	0	2	3	
2	**Welfare**					
2.1	**Safety and Security**	1.33	0.00	1.67	3.00	
2.1.1	Entrances	1	0	1	2	
2.1.2	Good Neighbouring	1	0	2	3	
2.1.3	Safety Issues	2	0	2	4	
2.2	**Health**	1.00	1.00	1.50	3.50	
2.2.1	Emergency	1	0	2	3	
2.2.2	Smoking	1	2	1	4	
3	**Local Economy and Financial Aspects**					
3.1	**Contracts and Labour**	1.00	0.75	2.00	3.75	
3.1.1	Local Contractors	1	1	2	4	
3.1.2	Small and Medium Enterprises/ Emerging Contractors	0	0	2	2	

3.1.3	Labour Intensive Design	1	1	2	4		4	**Site**				
3.1.4	Unskilled Labour	2	1	2	5		4.1	Heritage	**0.00**	**2.00**	**1.00**	**3.00**
3.2	**Materials**	**1.00**	**1.00**	**1.00**	**3.00**		4.2	Location and Nature	**1.00**	**2.00**	**1.00**	**4.00**
3.2.1	Local Materials	1	1	1	3		4.3	Site Influences	**0.33**	**2.00**	**1.33**	**3.67**
3.2.2	*Health Aspects (See 6.1.2)*						4.3.1	Height and Density	1	2	1	4
3.3	**Efficiency**	**2.00**	**1.00**	**0.50**	**3.50**		4.3.2	Roofscape	-1	2	1	2
3.3.1	Unproductive Spaces	2	1	0	3		4.3.3	Vermin	1	2	2	5
3.3.2	Use Time	2	1	1	4		5	**Construction**				
3.4	**Capital Costs**	**1.40**	**0.60**	**0.40**	**2.40**		5.1	Reduce, Recycle and Re-use	**0.00**	**2.00**	**0.50**	**2.50**
3.4.1	Value for Money	2	1	0	3		5.1.1	Modular Systems	0	2	0	2
3.4.2	Consultants	2	0	0	2		5.1.2	Material Selection	-1	2	2	3
3.4.3	Adaptability and Flexibility						5.1.3	Recycle	-1	2	0	1
3.4.3.1	Partition Walls	1	1	1	3		5.1.4	Dismantling of Building	2	2	0	4
3.4.3.2	Services	1	1	1	3		5.2	Considerate Contractors	**0.00**	**0.00**	**1.00**	**1.00**
3.4.3.3	Vertical Dimensioning	1	0	0	1		5.3	Phasing	**1.00**	**0.00**	**1.00**	**2.00**
3.5	**On-going Costs and Maintenance**	**1.40**	**1.20**	**0.60**	**3.20**		6	**Communications**				
3.5.1	Materials and Building Techniques	2	1	0	3		6.1	Information	**1.00**	**1.00**	**2.00**	**4.00**
3.5.2	Energy						6.2	Neighbouring	**1.00**	**0.00**	**2.00**	**3.00**
3.5.2.1	*Light Fittings (See Section 1.1.2)*						7	**Art**	**-1.00**	**0.00**	**1.00**	**0.00**
3.5.2.2	Heat	2	2	1	5							
3.5.2.3	*Ventilation (See Section 1.2)*								**67.84**	**73.75**	**103.26**	
3.5.2.4	Alternative Energy	1	2	0	3				53.84%	58.53%	81.95%	
3.5.2.5	*Water (See Section 4.1)*											
3.5.3	Cleaning	1	0	1	2							
3.5.4	Measurement of Costs	1	1	1	3							
3.6	**Water**	**1.00**	**2.00**	**1.00**	**4.00**							
3.6.1	Rain	1	2	1	4							
3.6.2	Grey Water	1	2	1	4							

Site Investigation

Where it is done

Fig. 3a. Church Square and environs

Fig. 3.1

Fig. 3.3

Fig. 3.2

Fig. 3.5

Fig. 3.4

Site Investigation

1.)   Introduction

A building exists in a particular time, place and paradigm. The purpose of this chapter is to investigate these factors as they pertain to the development of the Mind Development Centre.

Several factors are considered:

- The site and the reasons for choosing it.
- The neighbourhood and broader urban context.
- The history of the city and the area.
- The biophysical characteristics of the area.

All of these are investigated with the aim of informing the design and guiding design decisions.

2.)   Site

2.1.)   Location

"Tshwane exhibits the richest collection of high-level institutions in the country, including educational, medical and research institutions." (City of Tshwane 2004 p.28). Pretoria provides a dense concentration of educational and research institutions. The city is the base for three universities, as well as the headquarters of major organisations dealing with research and thinking, i.e. the HSRC, the CSIR, SABS and others. As capital city of the Republic, it is also a centre of high-level thinking and decision-making.

These considerations make the city an ideal choice to locate a mind development centre. The possibility of cooperation and sharing of facilities exists and a base of highly educated researchers and employees exist in the area.

This has led to the decision to base the centre in Pretoria. Sites close to existing research facilities were considered and the decision was made to base the centre at 125 Church Street, between Bosman and Schubart Streets. It is situated on the northern side of the road, to the west of Church Square.

The site is located in the area identified as CBD Central, between the Church Square and Marabastad precincts (Capitol Consortium *s.a.* p.12). It is also halfway between Church Square and a proposed civic square bordering Kruger House and Kruger Church (Fig.3.6) (ibid p. 13, 14 and 45)

The Integrated Spatial Development Framework (ISDF) makes a proposal for the accommodation of Parliament on Church Square as shown in Fig.3.7 (see Section 3.4.3.2). The site lies on, or very near to, the boundary of the proposed Parliament and Marabastad precincts (ISDF p.46). Although the gateway is indicated to be at the Bosman and Church Street intersection, the site can be used as a significant boundary, especially when integrated with the courtyard of the Poynton Building, shown in Fig.3.8 (See Section 2.2).

The area of the site is identifies by the Pretoria Inner City Spatial Development Framework as an area in which diversity is to be developed (p.11) (Fig.3.9).

2.2.)   The property

The property is currently used as a parking area. There is quite a proliferation of parking areas in the vicinity (see Fig.3.10), indicating that there is a need for parking facilities[1].

Fig. 3.6

Fig. 3.7

Fig. 3.11

[1] Speaking with users of the parking on site, it became apparent that the lower price of open parking is a benefit. The users also feel safer leaving their cars in an area where a supervisor is constantly watching the area, compared to the parking garages in the area where only the entrance is monitored. Parking tariffs in the area reveals that operators focus on short stay customers, while persons who park in the open areas work in the area and park for the day. Tenancy agreements might thus be possible.
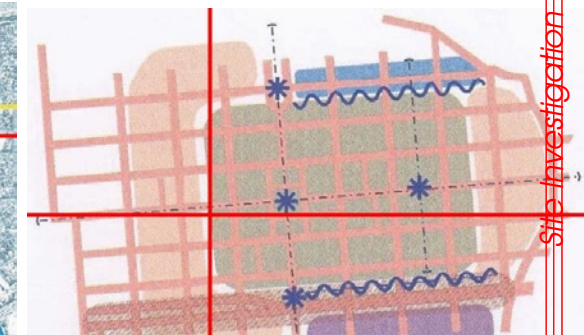

Fig. 3.9
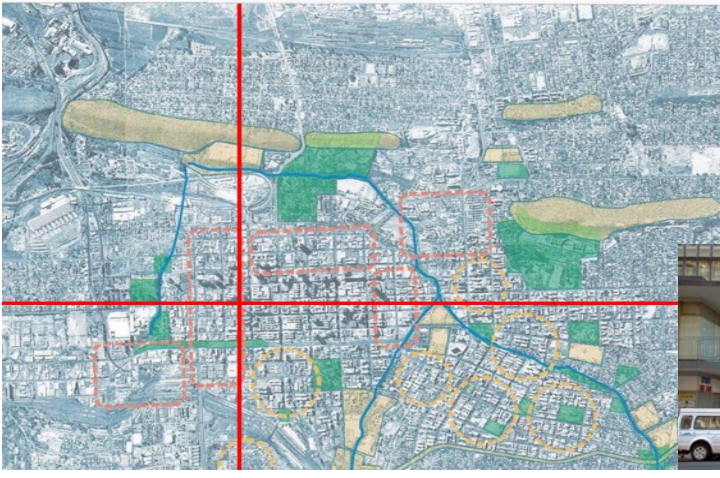
Fig. 3.10

Fig. 3.8

A lane of trees used to exist on the site. Most of the trees have been removed or were damaged during storms. Fig.3.11 shows the trees that remain. Observation on site reveals that the podium building (Fig.3.8) of the Poynton Centre (See Section 2.1) was lined up with one line of these trees

Several buildings have existed on the site over the years and have been demolished. No documentary evidence of what these buildings were could be found. Investigation of the foundations reveal at least three periods of development, including a courtyard with veranda to the rear.

The original burgher erf was subdivided very early on as the deed of August 1875 already indicates no 123 Church Street separated from the main erf.

The site belongs to the Tshwane Municipality (Fig.3.12). As the proposal is in line with the City's vision (see Section 2.1), it should be possible to obtain the site for such a development without too much difficulty.

3.)   The neighbourhood

3.1.)   Neighbouring buildings

3.1.1.) Poynton Building – Oscar Hurwitz Murray and Pokroy – 1969

This building (seen in Fig.3.13 in the background) forms the northern neighbour of the site, across the street. It consists of a main block of 33 storeys, a western block of nine storeys and a central courtyard with double storey podiums (Fig.3.8) on Church Street. It was the first high-rise building in Pretoria (Le Roux and Botes 1992 p.78-9).

Brittan identifies the Phönix-Rheinrohr Building in Düsseldorf, Germany, by Hentrich as the model used in the design for the Poynton Building (1989:23-4).

3.1.2.) Human Sciences Research Council – Pretorius Street 134 – 1987 – Samuel Pauw

The building (shown in the background on Fig.3.14) is the southern

Fig. 3.12

neighbour of the site. It consists of two wings, the southern nine storeys tall and the northern (bordering the site) fourteen. It is one of the prime examples of Post-Modernism in Pretoria (Le Roux and Botes 1993 p.11).

The curved façade of the block was influenced by the curved wall of 268 Bosman Street, around the corner of the site. It was also motivated by the desire to provide an interesting experience for pedestrians and as a reaction against the grid system displayed by early computer draughting systems [2](Pauw 2004). The architects intended creating an arcade to link up with the arcade in the Nedbank building on the northwestern corner of the block. The client decided against this due to security concerns (ibid).

3.2.)   The street

Church Street predates Pretoria, as it was part of a trade route between Potchefstroom and Delagoa Bay (s.a. 1995 p.17).

West of Bosman Street, the street character dissipates into an ad hoc mixture of sizes, styles, periods, quality and state of repair. Several of the old, small commercial buildings remain, but the relations between buildings have been destroyed by the sporadic occurrence of larger buildings and open spaces (Le Roux 1993 p.5).

It is important that a design in this area attempt to draw together the different elements and relate to a variety of clues in the environment.   This consideration is strengthened by the need to use Church Street as a ceremonial way that links ceremonial spaces(ISDF p.17) and a high level (Fig.3.15), inter-precinct urban link (ibid p16,17).   For this spatial continuity is very important (ibid p.16)

Fig. 3.15

3.3.)   Land use

The land use of the area, as of the street, is inconsistent and sporadic.   Several open sites occur in the area (See Fig.3.16). Some offices have been converted into apartments (Fig.3.17), but other spaces remain vacant (Fig.3.18).

As seen in Fig.3.10, open sites are often used for parking, but even this is not always the case.

The functions operating in the area include the following:

• Bakeries	• Pool halls
• Bottle stores	• Clothing shops
• Hairdressers	• Muti shops
• Doctors	• A jeweller
• Furniture shops	

3.4.)   Infrastructure and public services

3.4.1.) Transport

3.4.1.1.)   Public transport

The site is located within 350m from Church Square, which serves as central bus terminus for the city. The Pretoria Central Station is 1 600m from there, with bus connections. The Belle Ombre Station is also within walking distance of the site at 1450m.

The area is served by taxis and major taxi ranks occur at the corner of Van der Walt and Proes Streets (1 200m) and on the Skinner Street island at Schubart Street (600m) (Fig.3.20).

The proposed Gautrain station at Pretoria Central Station will link the area with distant areas of the city and with the rest of the province.

3.4.1.2.)   Pedestrians

Pedestrians are accommodated by wide pavements, usually with canopies sheltering from rain and sun. Well-functioning traffic lights provide opportunity for pedestrians to cross streets safely at intersections. The long street blocks often make it easier to cross in the middle of the block. Although traffic lights in Pretorius Street accommodate this, the same is not done for Church Street.

Fig. 3.17

Fig. 3.16

Fig. 3.18

Fig. 3.14
Fig. 3.13

Fig. 3.19

² The HSRC was the first commercially designed building in South Africa to be designed on a computer system. This system cost approximately R500 000 and occupied an entire room (Schutte 2004).

The Pretoria Inner City Spatial Development Framework describes the need for mid block pedestrian crossing, showing ways in which this might be achieved (Fig.3.21).

The streets of Pretoria are often tree lined. Although it can be seen (Fig 2.22) that this used to be the case for Church Street, this is not true in this part of the street anymore.

3.4.1.3.) Bicycles

No bicycle lanes exist in the area, neither are there any bicycle racks to witness in the vicinity or any cyclists in evidence. It can only be speculated whether the cyclists are absent due to a lack of facilities or vice versa.

Fig. 3.21

3.4.1.4.) Cars

The area is very accessible by road. It is located on Church Street, the main east-west connector in the city. It is respectively one and two blocks away from the Pretorius and Schoeman Street one-way system and links with the ring road system at Potgieter Street, one and a half blocks to the west.

Many parking facilities are provided in the area as seen in figure 2.10. The number of open sites being used for parking indicates that there is a need for more, or different, facilities.

3.4.2.) Social and environmental infrastructure

See Figure 2.24.

3.4.2.1.) Safety

The Pretoria Central Police Station is located on the corner of Pretorius and Bosman Streets, one block away from the site. The security arrangements as seen in Fig.3.23 make it clear that the area still suffers from security problems.

The Fire Station is located on the corner of Jacob Mare and Bosman Streets.

Fig. 3.22

Pedestrian Facility
Bus Routes
Taxi Ranks

Fig. 3.23

Fig. 3.20

3.4.2.2.) Health

Doctors' and dental surgeries exist in the Nedbank and Poynton buildings. The Pretoria Academic Hospital is located in Soutpansberg Road.

The Sunnyside Clinic is located in Leyds Street.

From Prinsloo Street and eastward many private hospitals and clinics exist.

It is clear that healthcare is available in the area and that any emergency can be dealt with.

3.4.2.3.) Education

The area is adequately provided with educational

Parks and Civic space
Churches
Courts
Post Offices
Educational facilities
Health
Safety

Fig. 3.24

facilities.

A Nursery School exists in Pretorius Street between Schubart and Potgieter Streets.

Schools exist on the corner of Bosman and Proes Streets, at Loreto Convent in Skinner Street, in Paul Kruger Street between Skinner and Visagie Streets and on the corner of Schoeman and Schubart Streets.

The Tshwane College for Further Education is located on Church Street between Du Toit Street and Nelson Mandela Boulevard.

Public Library facilities are available at Sammy Marks Square and the State Library is located on the corner of Vermeulen and Andries Streets.

The area houses a significant amount of museums and other heritage sites. These will not be mentioned individually.

3.4.2.4.) Community facilities

The central Post Office is located on Church Square, less than 300m away, providing the associated facilities.

The area contains the Magistrates Court and the Transvaal Branch of the High Court, both within walking distance of the site.

The area caters for a variety of religious needs. The Dutch Reformed *Grootte Kerk* is located on the corner of Bosman and Vermeulen Streets; the Paul Kruger Reformed Church is down the street in Church street; The *Nederduitsch Hervormde Kerk* is on Vermeulen street between Prinsloo and Du Toit Streets; The Catholic Cathedral is on the corner of Bosman and Skinner Streets and the Anglican Cathedral on the corner of Schoeman and Andries Streets.

There is a mosque on Queen Street. Several small, independent churches and congregations are situated in the area.

The area is served by several parks. These include Burgers' Park, Prince's Park[a] and the National Zoological Gardens. Civic spaces in the vicinity includes Church Square, Strijdom square and Sammy Marks Square.

The Pretoria West Cemetery is also close by and provides some relief from the bustle of the city.

3.4.2.5.) Culture

Theatre is provided by the Little Theatre on the corner of Andries and Skinner Streets, the Breytenbach Theatre on the corner of Rissik Street and Nelson Mandela Boulevard and the State Theatre on Strijdom Square.

Cinema complexes are available at Sunnypark in Beatrix Street and Sunnypark in Jeppe Street.

3.4.2.6.) Shops and financial

The area is well provided with shops and the majority of needs can be filled within walking distance. Groceries are mostly provided by small cafés. The large chain supermarkets are not present in the area though.

[a] The ISDF proposes that Prince's Park be developed as a public open space (p.45).

Fig. 3.27

There is a thriving informal trade sector active in the area. These small business people deal in anything from fruit, sweets, cigarettes, and lunches to private cellular phone 'booths'.

All the major banks have branches within walking distance and an A.T.M. is available across the street.

Several food outlets, mainly of a take-away or cafeteria nature exist in the area. There is, however a lack of more formal dining establishments.

3.4.3.) Proposals

The revitalisation of the Church Square precinct is identified as a priority. The ISDF makes several proposals for the achievement of this end.

Two of these proposals are likely to have a significant impact on the site identified for the Mind Development centre.

3.4.3.1.) Extension of the Church Street Mall (Fig. 3.25)

The proposal calls for the Church Street Mall to be extended

Fig. 3.25
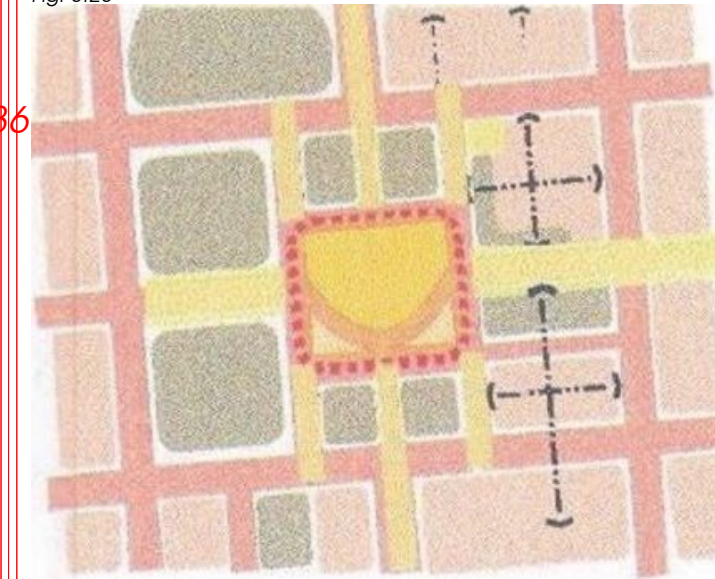
into the part of Church Street West between Church Square and Bosman Street (ISDF p.18).

This area is currently a dead space used to park buses. The private vehicular traffic making use of this stretch of road is insignificant. The street is underutilised and impairs the functioning of shops and café's on this part of the street.

The implementation of the proposal shall not only benefit the square and the functions bordering it, but will also have a beneficial effect on the design by bringing the pedestrian domain closer to the site and creating a more direct spatial link with the arcades to the east. This same topological structure will be utilised in the design.

3.4.3.2.) Parliament on the Square

This proposal (see also section 2.1.) suggests that Parliament be constructed around Church Square, through re-use of buildings and new construction. The proposal includes large parking facilities under the square.

This proposal will bring many people into the area and will be of significant benefit through job creation, crime control and the increase of land value and desirability.

If the decision was to be made to base Parliament on the Square, the Mind Development Centre will significantly increase its exposure and prestige. The ceremonial nature of Church Street will become much more important.

This proposal implies that the urban nature of the design becomes much more important.

4.)   City vision

The idea of a mind development centre fits in with the city of Tshwane's commitment to strengthen

the economic cluster comprising research, development, teaching and knowledge based institutions. (City of Tshwane 2004 p.43)

Church Street west is considered an important potential urban linkage between the Inner City and Atteridgeville, as well as to the developments to the east (City of Tshwane 2004 p.70). Paul Kruger Street is envisioned as a urban linkage to the Northern towns and suburbs (*ibid* p.71)

5.)   Historical context

5.1.) A Brief history of Pretoria

Considering the location of the site, in the oldest part of Pretoria, and so close to the centre of events, as well as the number of important historical buildings in the vicinity, a brief history of the city is appropriate.

5.1.1.) Founding

Marthinus Wessel Pretorius bought the farms Elandspoort and Daspoort, on the banks of the Apies River. In 1853, he petitioned parliament to allow the layout of a town on these farms. The request was refused. In 1854, Ds. Dirk van der Hoff founded a congregation in the Pretoria valley. When Pretorius again petitioned Parliament in 1855, he had the support of the church. This time, the decision was approved, on 16 November 1855. The town was named for General Andries Pretorius (Marthinus' father) (Allen 1971:8 and South African Municipal Handbook 1974:225). Several versions of the name were considered, and Pretoria was finally settled on. (*Ibid*)

The town became the capital of the Z.A.R. on the 1st of May 1860 (South African Municipal Handbook 1974 p.225).

The first church (Fig.3.26) on Church Square was inaugurated in 1857. The church was a thatched building, which burned down and was replaced by a spired church in 1885. This church, in turn, was demolished in 1905 (Greyling 2000:19-20).

The first plan of the city was surveyed and drawn by Andries du Toit in 1857-9 (Allen 1971:7-9). This map had to be redrawn in 1870 because the system used to number the erven provided problems and there were many disputes over boundaries (Unknown). It is generally accepted that Pretoria's layout is based on that of Graaff-Reinet (Jordaan 1989:28).

Sir Theophilus Shepstone annexed the city for Britain in January 1877. This led to the first Anglo-Boer War in 1880-1. Paul Kruger was inaugurated as the president of the new republic in 1882.

5.1.2.) The Kruger years

During the inter-war period, the Republic strove to increase its stature. The discovery of gold on the Witwatersrand and in the Eastern Transvaal also necessitated a much increased administration (Allen 1971:39). The thatched parliament building was replaced in 1889 with the *Goewermentsgebouw*, currently known as the *Ou Raadsaal*.

The Palace of Justice followed between 1896 and 1900. The British occupying forces used it as a military hospital during the war.

The first Anglican church (Fig.3.27) was constructed in 1872, at Church street 119 (Greyling 2000:54). It would thus have been a close neighbour to the site. In 1879, the congregation moved to Schoeman Street.

5.1.3.) The Second Anglo-Boer War

On the 11th October 1899, parliament heard that the British Empire refused to comply with the conditions

Fig. 3.26

Fig. 3.27

Fig. 3.28
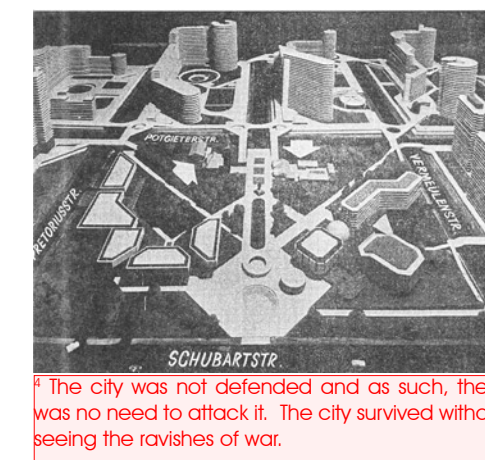
of the Republics' ultimatum, issued two days earlier. War was declared (Greyling 2000:26)

The British forces entered Pretoria on the morning of the 5th of June 1900 (Greyling 2000:16). The Transvaal government left them an open city[ii] (South African Municipal Handbook 1974: 227). Roberts annexed the ZAR on 1 September 1900 as British territory, believing the war was over (Greyling 2000:17). It was to be almost two years before the peace treaty was signed though. During this period, the city was under military occupation and governance.

5.1.4.) The twentieth century

The Pretoria Municipality was founded in 1903 (after several false starts) and in 1910, Pretoria became the administrative capital of the Union of South Africa. The sewerage system was started in 1904. On 14 October 1931, the Municipality of Innesdale was incorporated into Pretoria, which was declared a city on the same day. The Hercules Municipality was incorporated in 1949. 1964 saw the incorporation of Silverton, Pretoria-North and more than 50 peri-urban areas (South African Municipal Handbook 1974:227-230).

The city's industrial development was given a major boost in 1928, when Parliament approved the construction of ISCOR in Pretoria (*Ibid*). Industry has since played an important part in the city.

The city centre saw great development after the Nationalist government came to power, particularly in the '60's and '70's. High-rise towers were constructed, the State Theatre was built and the great political squares were given form (Strijdom Square and Verwoerd Square, now Sammy Marks Square). Most of these developments had a degrading effect on the urban nature of the city. The arterial roads running through it, particularly Skinner Street, Potgieter Street and Nelson Mandela Drive, dissect the city. Some proposals were fortunately averted. Among these were the plans for the Kruger Square (Fig.3.28), bordered by Potgieter, Pretorius, Vermeulen and Schubart streets and environs (s.a. 1973). Of the scheme, only the Schubart Park

housing scheme was completed and this is riddled with social problems, as in many modernist housing schemes.

The ridges surrounding the city have had an important influence on the formation of the city, directing an East-West direction of growth. The eastward expansion of the city has continued unabated and many residents and businesses moved out of the city. This led to a decline of the inner city.

5.1.5.) Recent history

In 1994, the Republic was re-divided into nine provinces and the Transvaal ceased to exist. Pretoria now fell in the Gauteng province. After the 1994 elections, the decision was made to move the provincial capital to Johannesburg. Pretoria retained its status as administrative capital of the Republic.

Moving the provincial administration out of the city has led to a loss of tenants in the already pressured inner city. A large amount of office space was left vacant. Many of these are currently being converted into flats and apartments.

For a while, it was argued that the country should have a single capital. There was much debate whether it should be Cape Town, Pretoria or somewhere else altogether. The decision has been placed on hold though. When the country was divided into metro-councils, Pretoria became part of the City of Tshwane.

Currently a heated debate is raging on the topic of Pretoria's name. The executive Mayor of the City of Tshwane, Father Smangaliso Mkhatshwa, is a proponent of the idea that the name Pretoria should be changed to Tshwane. The idea is being fiercely contested, and a commission has been appointed to investigate the issue.

5.2.) History of the area

5.3.) Buildings of note and worthy of conservation

5.3.1.) Kruger House – 60 Church Street – Tom Claridge

This private residence (Fig.3.29) of President Kruger was built in 1883-'84 (Greyling 2000:31). It was one of the first houses in the

Fig. 3.29

Fig. 3.30

5.3.2.) Reformed Church – corner of Church and Potgieter Streets – K van Rijsse

The church was constructed 1896-1897. President Kruger attended this church and even gave sermons here (Greyling 2000:33).

5.3.3.) Church Square

The heart of Pretoria and the former Z.A.R., it is surrounded by significant historic buildings. The first churches stood on the square, where burghers got together for the quarterly *Nagmaal*. It was also the market square and the centre of government. It was also the only piece of flat open ground, and as such was used for cricket (Allen 1971:35-6). It therefore also constitutes Pretoria's' first sports ground. The multi-use character of the square led to some light conflict: regular hostilities arose between boys wanting to play cricket and burghers attending *nagmaal* (*ibid*). The 1910 redesign turned the square into the tram terminus (Allen 1971: 36). It still serves as the bus terminus for the city. The statue of Paul Kruger was moved to the Square in 1954 (Allen 1971:153).

5.3.4.) Bantu Affairs Building – Church Street 70 – 1939

The building (Fig.3.30) was constructed for the erstwhile Commissioner of natives. Later the South African Police Murder and Robbery and vehicle branch used the building (Le Roux and Botes 1992 p.79).

5.3.5.) Church Street 143-149

The buildings have typological value as a group and relate to similar groups further west in Church Street (Le Roux 1993 p.5). Early in June 2004, the colonnade and pavement canopy was demolished and replaced with a brick colonnade rather resembling the 'value mall' style.

6.) Biophysical Considerations

6.1.) Climate

Pretoria is located in the Northern Transvaal climatic region. Both the diurnal cycle and the passage of seasons result in large

city to have electricity and telephone. The lions in front of the house were a birthday gift from mine-magnate Barney Barnato in 1896(Greyling 2000: 31-32; Allen 1971:16). It seems certain that the house itself was a gift from Alois Hugo Nellmapius (Allen 1971:14 and Le Roux 1992 p.80). The trees on the street front have since been removed.

climatic variation. Humidity in the area is moderate while solar radiation is strong (Holm 1996 p.69)

6.1.1.) Temperature:

The average maximum temperature for Pretoria is 24.81 ˚C and the average minimum 12.13˚C. The average diurnal variation is 12.68K.

The highest temperature is in January, with an average 28.6˚C. The lowest temperature occurs in July, at 4.5˚C.

February has the lowest diurnal swing at 10.8K and July the highest at 15.1K. Humidity averages 53.83%, with a March high (60%) and a September low (45%) (Holm 1996 p.69).

6.1.2.) Rainfall:

The total annual rainfall is 674mm. The maximum monthly rainfall is in January (136mm) and the minimum in July (3mm) (Holm 1996 p.69)

6.2.) Geology

Assumed acceptable due to nature of surrounding structures

Spatial form: Pretoria was an east west city. The city of Tshwane is more north south, with limited access across the ridges. The site is located close to a north south corridor and on the main east west.

7.) Design influences

7.1.) Arcades

The lane of trees (Fig.3.31), the intent of Samuel Pauw and Associates to create an arcade through the block as well as the tradition of arcades in Pretoria influenced

Fig. 3.31

the decision to create an arcade through the block with a mid block urban space.

This decision was further verified by the Pretoria Inner City Spatial Development Framework that asks for the promotion of walkability through shorter block lengths (p.11) and calls for the creation of pocket parks (p.16).

These criteria were enforced by the needs for open space and greenery as set out n the baseline document and the fact that the site is fronted by a proposed green route to the front (Church Street) and the rear of the block in Pretorius Street (ibid p.16)(See Fig.3.).

The Arcades also serve to accommodate the need of horizontal diversity as set out in the ISDF (p.12) through creating the opportunity to place restaurants and a variety of other functions at ground level.

The ISDF calls for the strengthening of the arcade tradition. It does include, however, some warnings

about the design of such spaces.

One risk that might result from improper design is that the arcade might turn into an entrapment spot, where a person cannot escape from trouble. The design has to address this and increase safety by eliminating hidden or dark corners and increasing legibility and view.

7.2.) Nature

The green spaces as defined above and the functional need for contact with nature will influence many decisions in the design.

The Baseline Document describes the presence of urban pigeons and their associated problems. The ISDF proposes that African Fauna and Flora be used to create the image of an African Capital City (p.16). The use of endemic birds of prey as a pest control mechanism is thus in accordance with this principle.

7.3.) Neighbouring buildings

The neighbouring buildings are currently low structures, built up to the edges of the site. If the area is revitalised, they will most certainly be redeveloped as bigger structures. As the nature of these future developments cannot be foreseen, the neighbours are treated as if they were already tall structures built up to the edge of the side with blank sidewalls.

7.4.) Street canopies

The city and the neighbouring buildings have a tradition of providing pavement canopies. The ISDF encourages the continuation of this tradition through the call for a buffer area between pedestrian and vehicular zones (p.11).

THINKinG?
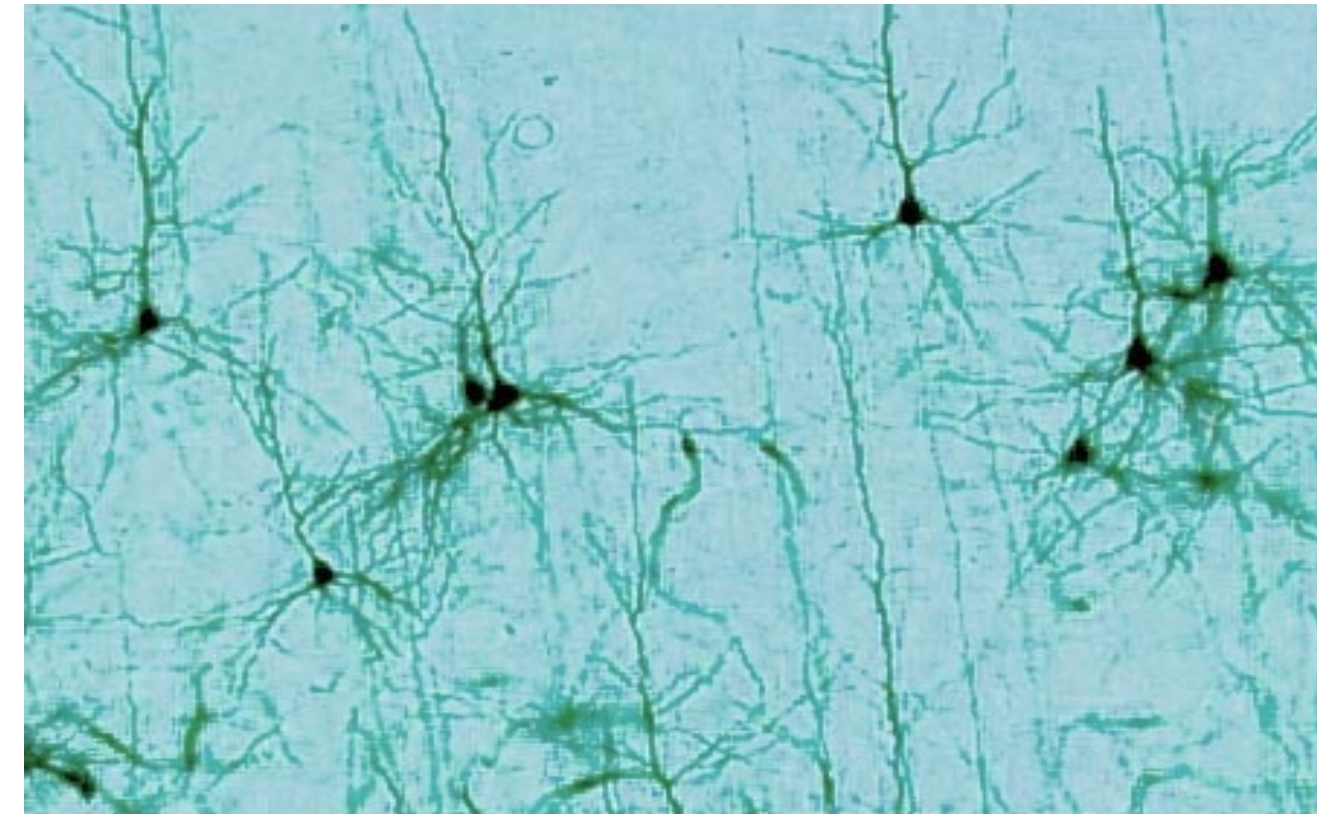
What we need to know

Fig. 4a: A group of neurons

Thinking?

1.)   Introduction

This section will discuss the research and paradigms that affect thinking and the mind. As an introduction the history of thinking and the mind is considered, which also serves to explain the place such a centre might have in society. Research and activities such as environmental psychology, neuroscience and healthy lifestyles will be described and conclusions will be drawn about their impact on the design of a Mind Development Centre.

2.)   Factors in mind development

2.1.)   The mind in society and the workplace

As the world changes, the importance attached to different skills and abilities change to meet new demands. Currently the mind is becoming a significant topic in research and there is an increasing realisation of the importance of well developed mental skills.

The mind took humankind from hunting-gathering and turned it into an agrarian society (Fig.4.1). Cities evolved and civilisations sprang up (Fig.4.2). Surplus production allowed specialisation and new trades to develop, providing ever more tools for ever more complicated tasks.

Early fireside thinking about the nature of the stars and the gods evolved into philosophy and gave rise to the sciences (Fig.4.3). Eventually, thinking and learning became a pursuit in its own right. Lyceums, schools, academies and universities gradually emerged (Fig.4.4 and 4.5). Initially these were the privilege of the few.

As we came to understand more of the world, its laws and principles, the Renaissance occurred. Knowledge came to be valued and families like the De Medici built a reputation on their quest for and collection of knowledge. This pool grew and soon the Industrial Revolution shook the world.
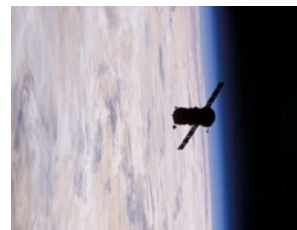

Fig: 4.1

Fig: 4.2
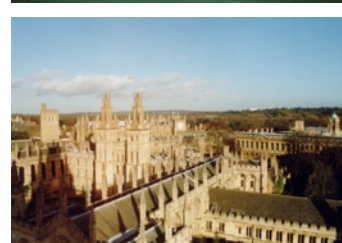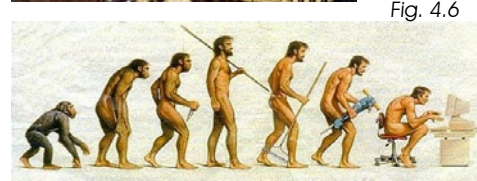

Fig: 4.3

Fig. 4.4

Fig. 4.5

Fig. 4.6

Steam power and machines supplied power unattainable by human muscle. The nature of labour changed from primarily muscle power to operator. Specialisation increased and with it, knowledge grew more abundant.

The ability to remember and to acquire new skills became more important. Newspapers disseminated news and ideas on a massive scale. Long distance communication developed, allowing the effortless exchange of ideas among geographically separated people. Technology developed further and gave rise to electronics and the transformer, evolving into computers.

Learning new skills became ever more important, but the storage capacity of the new electronic devices that became available challenged the role of the brain as the primary vessel for knowledge (Fig.4.6).

The fast pace of change and the requirements for acquiring new skills continually, combined with standardisation due to industrial practices, led many corporations to implement procedures. By following a specified set of instructions, a large number of employees could perform the required tasks with minimum effort. A few 'thinking' individuals came up with recipes to guide the work of the other employees. Efficiency was raised and the system worked well, but the brain was back to muscle power – not thinking, just doing. In Duffy, Laing and Crisp this is discussed as one of the basic premises of Fordist management and manufacturing practises (1993 p.33).

Many companies have now realised that procedures are useful and serve a purpose, but only up to a point. Change not only often requires procedures to be adapted, but the variety of challenges confronting employees make it impossible to write procedures general enough to cover all eventualities, yet be specific enough to be easily applicable. In many parts of the world, multi-national corporations are realising that the procedures developed in their country of origin does not translate well into other countries, because of cultural, geographic and other factors. These principles are in line with Post-Fordist theories (*ibid* p.33).

A further attribute of procedures is that it constitutes an algorithm.

It is an easy task to write a computer program from an algorithm, resulting in computers taking over these tasks. Humans need to find a new function in the workplace.

These factors lead to the need for a principle-based approach. If employees understand the how's, the why's and what's, they can apply reasoning to any situation they might be confronted with. People will be empowered to manage the situations that arise. Moving from procedures to principles seems like a simple solution. Several factors serve, however, to complicate this:

2.1.1.) Inadequate education in reasoning and application

Society has so far required a few exceptional people to do the thinking for everyone else. The majority of people just had to be able to follow a procedure. Radical development of skill in reasoning and general education will be needed.

2.1.2.) Resistance from the workforce

Procedures provide a safe place from which to operate. If an employee follows the procedure and something goes wrong, the procedure is to blame, not him or her. De Bono states that the purpose of thinking is to eliminate the need for further thinking. The mind will not do more than the bare necessities automatically.

2.1.3.) Lack of management skills

Doing quality control in a standardised, procedurised workforce is relatively easy and does not require much leadership or vision. Management can, in fact, be procedurised in an adequately procedurised environment. The shift from boss to leader in management attitude is needed and many managers might fear for their positions and status if this shift was to occur.

2.1.4.) Educational facilities

As more high-level skills are needed, more and more people attend institutes of higher learning. This leads to many high-level institutions embracing an education for all policy. A void is left on the high-level end of the scale.

As the work environment continually expects more than just primary and secondary education, schools are increasingly buffered from the need to provide adequate education by institutes of further education. This is especially true in a situation where primary and secondary education is under financial and other pressures, as is a problem in many parts of the world.

According to Professor Pieter Kachelhoffer, there is a universal trend towards universities taking on the nature of primary and secondary education ("*Universiteite raak al meer skools.*") (2003). The high-level skills needed in the world today are the first to be jeopardised by this change.

2.1.5.) Fear of mistakes

Society is exceptionally success driven and failures are seldom tolerated. Mistakes are costly, but they also provide great learning opportunities. A person who is not willing to risk making a mistake is also unlikely to achieve or invent anything of consequence. A radical rethink of failures and mistakes are needed in societal thinking and corporate/ institutional policies.

Several quotes will serve to illustrate the important effect that fear of mistakes have on our functioning:

- "For more people to become entrepreneurs, we have to change our attitude towards those who fail." – Lee Kuan Yew, former Prime Minister of Singapore, quoted in Buzan (2001 p.125).

- "A man's errors are his portals of discovery." - James Joyce (*ibid* p.127).

- "We became uncompetitive by not being tolerant of mistakes … you can stumble only if you're moving." [Ellipses in used text] – Roberto Goizueta, CEO, Coca-Cola Inc. (*ibid* p.133).

- "The person who never made a mistake never tried anything new." Albert Einstein (*ibid* p.133).

Current research and scientific philosophy continues to battle with an understanding of the nature, function and mechanics of the mind. Many benefits can be gained from such an understanding in fields as diverse as medicine, psychology, sociology and artificial intelligence.

An interesting contemporary theory (Hameroff 1998 p.119) holds that the mind might be a function of the cerebrum as well as a function of fundamental reality. This theory combines the two dominant Greek views of the mind, which have influenced most of our own understanding thereof.

Challenging the brain as computer view, Hameroff describes the complex activities in which single celled organisms engage in, without the presence of nerve cells. Following this is a discussion of the enormous abilities of the neuron (*ibid* p.119) and he asks whether the neuron, being alive, might influence consciousness.

He then describes and challenges some of the 'mind-as-fundamental-reality' theories. Through an explanation of quantum phenomena, it is described how the two theories could be combined through the inclusion of quantum mechanics in the functioning of consciousness (*ibid* p.120-124).

This theory is highly controversial and cannot currently be proved or disproved. It is, however, interesting for its combination of theories as well as the suggestions of a greater mind that emerges from this view.

2.2.) Environmental psychology

Thinking and the effective use of the mind is affected by more than societal influences. Environmental psychology is a branch of psychology devoted to the study of the influence that environments have on people on a psychological level as well as a study of the way people think about environments.

The field overlaps with the disciplines of psychology, the built-environment professions, medical science, environmentalism and the study of productivity.

Environmental psychology is defined by Bell, Greene, Fisher and Baum as "the study of the molar relationships between behaviour and experience and the built and natural environments" (2001 p.6). It therefore takes a holistic approach, with a recognition that the same phenomenon could lead to different behaviours in different contexts. This leads to the field relying only somewhat on laboratory experiments.

An example of the variation in consequences within different environments, is Kuo and Sullivan's study of vegetation and crime in inner city areas (2001a p. 345-6 and 348). In non-residential areas, vegetation is associated with crime and fear thereof. In residential areas, on the other hand, vegetation is associated with a reduction in crime and a greater feeling of safety.

The difficulty in conducting laboratory experiments is explained through the example of crowding. "Because residential crowding is a *chronic* condition lasting for months or years, it is unrealistic to assume that one could reproduce it in the laboratory with human research participants." (Bell et al 2001 p.7) [italics in original].

2.2.1.) Theories

One of the theories of environmental psychology is Attention Restoration Theory (ART) (Fig.4.7). "[M]any settings, stimuli, and tasks in modern life draw on the capacity to deliberately direct attention or pay attention. The information processing demands of everyday life […] all take their toll, resulting in mental fatigue." (Kuo and Sullivan 2001b p.543).

Directed Attention   Effortless Attention

Restored Attention

Fig. 4.7

Bell, et al refers to mental fatigue more specifically as directed attention fatigue (2001 p.50), the phrase which will be used in this text. In order to recover directed attention, it is necessary that involuntary attention be given to something different (see Fig. XA) through the vehicle of fascination (*ibid* p.50).

Natural settings provide the opportunity for fascination (*ibid* p.50) and effortlessly engage our attention (Kuo and Sullivan 2001b p.543). Furthermore, they are compatible with human wants and needs and provides the opportunity for reflection (Bell et al 2001 p.50).

According to Kuo and Sullivan, interaction between people is more considered when effortful mental processing, requiring directed attention, is used. As directed attention fatigue increases, behaviour becomes less considered, finding expression through thoughtlessness, tactlessness and unstrategic behaviour (2001b p.546.) They also point out that directed attention fatigue leads to a lowering of control over impulses. The potential impact of this in the workplace could be quite significant, particularly in the modern South African context where charges of sexual harassment and racism abound.

It has been shown that even small amounts of nature can have significant positive attention restoration effects (*ibid* p.566). People in greener areas have better attentional functioning (*ibid* p.562-563) and these areas sustain stronger social ties and support networks (*ibid* p.549 and Bell et al 2001 p.2).

2.2.2.) Findings

Noise: Environmental noise causes both emotional responses and activity disruptions in people, the first being more common (Grimwood 1993 p.). This must be in part related to the definition of noise, which includes, according to Bell et al, that it is unwanted sound (2001 p138-142).

Rafaello and Maas cites research that found the following effects of long-term exposure to noise (2002 p.652):

- Hearing loss
- Cardiovascular diseases
- Sleep disturbance
- Annoyance
- Decrease in job satisfaction and psychological well-being
- Difficulties in communication
- Increase in aggression
- Interference with prosocial behaviour
- Impairment of motor tasks
- Impairment of reading comprehension
- Impairment of problem solving

Some results show that noise might cause an improvement in work performance, but these are short-lived (*ibid* p.652).

Of the environmental noises, traffic noise is the most common. The noises with the greatest emotional impacts are those that are considered malicious or inconsiderate (*ibid* p.3). Activity disruptions are normally experienced when trying to read or write and neighbour-noise is present (Grimwood 1993 p.4).

It has been shown that the human brain is hardwired to respond to voices. Attempts to ignore it merely drain mental energy and resources that can be used more constructively.   One-sided telephone conversations are particularly disruptive (nature article).   Rafaello and Maas refers to research, which found that more than 50 percent of office workers are disturbed by noise, and in particular telephone and background conversations (2002 p.653). The same study shows that communication in an organisation is aided through noise control.

While job satisfaction and employee motivation is increased by natural light entering an office, it is decreased by noise, which consequently increases the probability that an employee will leave the firm (*ibid* p.653).

2.3.) Neurological research

Since the mid 1980's it has been known that more complex environments lead to more complex brains (Wilson 2004). It was speculated that a process termed "long-term potentiation" was responsible for changes to individual brain cells. Scientists at the University of Geneva have discovered that long-term potentiation works through the duplication of connectors on brain cells, making links and communication between cells easier (*ibid*). The conclusion is that environments that are more complex can lead to an increase in mental ability.

Research indicates that environmental factors contribute to the formation of Alzheimer's' Disease (Holroyd and Shepherd 2001 p.517). Although the particular factors remain largely unknown, indications are that lower educational levels and a history of depression contributes to the development of the condition (*ibid* p.517). As the neuronal changes that lead to Alzheimer's' in old age occur years before clinical symptoms are presented and because definitive diagnosis can only be made during autopsy (*ibid* p.516-7), preventative measures are a critical factor, particularly in an ageing population. Through its stimulation of interest in learning and education, this project might contribute to the delay and slowing of this disease.

2.4.) Healthy lifestyles

Many external and neurological factors that affect the ability of the mind to perform properly have been considered. Another extremely important factor is a healthy lifestyle.

2.4.1.) Exercise

Exercise in moderation aids not only general health, but aids the functioning of the brain. Physically active people perform better on all mental tests than those that are unfit, and those that are more skilled mentally, tend to be fitter (Buzan 2001 p.147)

There are some indications that exercise might be a factor that leads to the formation of new brain cells in adults (Epstein 2001).

There are however, some indications that one can over-exercise, which impairs the functioning of the brain (Lurie 2003). Buzan states that a workout should last between 20 minutes and an hour to reduce the strain on the body and the mind (2001 p.152).

Fitness consists of several parts (*ibid* p.151):

2.4.1.1.) Aerobics

Aerobic fitness is related to cardiovascular fitness. Aerobic exercise increases the flow of blood and oxygen to the brain while improving the body's ability to use oxygen effectively, enhancing mental performance. Aerobic fitness reduces the chance of cardio-vascular diseases, some cancers and increases life expectancy.

Aerobic exercises lead to the formation of extra blood vessels in the brain, combat the effects of ageing and increase memory. Sleep is improved and a reduction in sleep requirement is observed by many people (this serves as an antithesis to noise pollution, which reduces the quality of sleep).

Leadership, which was shown to be in high demand in the discussion of the mind in the workplace, is correlated to aerobic fitness, as is mental outlook (*ibid* p. 171-184).

2.4.1.2.)   Poise

This is usually defined as graceful and elegant bearing. It is a state in which the individual is in balance. People are generally so accustomed to their carriage that it feels right and proper, even though it might be far from it.

Poise affects the proper functioning of the body as it influences the organisation and function of internal organs.   Lung capacity is reduced and blood-flow restricted. Nerves might become pinched and muscles need to work harder to maintain ones' position if ones' balance is wrong.

Proper poise reduces injury among athletes and ensures that the body can function properly, affecting performance and mental states.   There is a positive relationship between poise and positive thinking. Research even indicates that people with proper poise are less likely to be the victims of pickpockets (Fig.4.9)! One of the best methods to develop proper poise is through the Alexander technique (Fig.4.8)(*ibid* p.153-164).

2.4.1.3.)   Flexibility

Flexibility refers to the ability of the body's joints to move in all the directions for which they were created. Nerves are less likely to be pinched by areas of muscular rigidity or tension. The stretching impulse is natural in humans and other animals, while the disciplines of dance, yoga, gymnastics and Aikido provides formal stretching and flexibility exercise (*ibid* p. 184-187).

2.4.1.4.)   Strength

Strength refers to the ability of ones muscles and muscle systems to lift, pull, push and rotate. Increasing strength has several benefits.   Among those, most important to mental ability is increased self-confidence and the projection of a better outward appearance. Strength
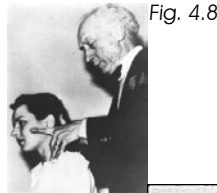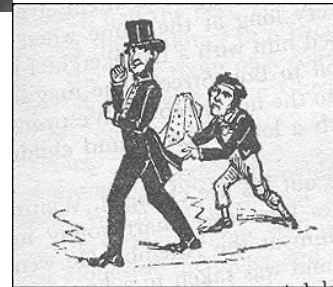

Fig. 4.8

Fig. 4.9

training is generally gained through weigh-lifting workouts (*ibid* p.187-192).

2.4.2.) Diet

What one chooses to eat or drink has a vast impact on ones health and performance. Dietary myths abound and for those who seek optimal mental and physical performance, it is important to follow a correct and balanced diet.

2.4.3.) Stress

The body responds to stress in a biochemical way. This means that the changed chemical composition of the body due to stress effects the entire body (*ibid* p.235). Research indicates a positive correlation between stress and the development of heart diseases (*ibid* p.241).

Stress, in and of itself, is a positive and necessary function – if it is short-lived and temporary, it aids us in dealing with particularly difficult or challenging situations. The problem arises from the tendency of people in modern society to be in a constant state of stress (*ibid* p.242). Stress affects the immune system, therefore those under constant or intense stress are more prone to infections

(*ibid* p.242)(considering the proportion of the South African population infected by HIV, trying to extend the quality of their lives, this is something of particular importance in our society).

Stress is reduced significantly through aerobic exercise (*ibid* p.240).   There are also some other techniques available for reducing stress:

2.4.3.1.)   Visualisation

Visualisation is a technique used to focus the mind on calming, pleasant or beneficial images. This aids in reducing the sensory overload and disjointed thought milling around ones head.   Buzan (2001 p.245-246) describes a five-step process:

- Stage 1 – Eyes closed with eyeballs rolled upward and inward.

- Stage 2 – Fill internal visual field with a colour of ones choosing. This is followed with the visualisation of different geometric shapes and colours. When this has been achieved, movement is added to the shapes.

- Stage 3 – An object that forms in the mind unforced, and which is pleasant is maintained for as long and/or as regularly as possible.

- Stage 4 – At this stage, visualisations of abstract concepts are formed. This can be augmented with stories or allegories about the topic.

- Stage 5 – During this stage, visual manifestations of giant, overall feelings of peace and well-being is created.

2.4.3.2.)   Autogenic training

Autogenic training is a method of self-hypnosis, which aids communication between the conscious and unconscious minds. It is done on a comfortable couch or bed; or in a comfortable supporting chair. Slow and

deep breathing is initiated, followed by closing and rolling the eyes upward and inward, as above.   From this point, each part of the body is 'visited' mentally and ordered to relax, starting with the toes and working upward. This creates a relaxed and calm state during which the mind is particularly open to autosuggestion or self-programming. In this state, specific goals can be reinforced or affirmative messages given to the unconscious (*ibid* p.247-8).

2.4.3.3.)   Meditation

Meditation is a mental exercise to focus the attention. This exercise serves to remove conscious thought from reality and the brain enters a state of calm and peaceful awareness dominated by alpha waves. Meditation is normally performed in a seated position on a firm surface, either a chair or the floor. Thoughts are focused on an internal topic of meditation, for instance ones' breathing, or on an external object, such as a leaf or flower. The aim is to absorb the essence of the object, not just to see it (*ibid* p.249-250).

2.4.3.4.)   Rest and sleep

Rest is a necessary part of mental and bodily functioning. One is often most creative while at rest and this is the best time to review memories.   When one engages in active learning and assimilation of knowledge, one needs rest to sort and integrate that information. During sleep, the process of dreaming serves to integrate the experiences of the waking hours. The mind also focuses on problem solving. Research has shown that a greater awareness of dreams and dreaming increases creativity, well-being and self-image, as well as provide major insights, all of which are important to mental development (*ibid* p.251-253).

Fig. 4.10

2.5.)   Techniques

Some general techniques are relevant to mind development:

2.5.1.) Reduced Environmental Stimulation Therapy (REST)

During REST (Fig.4.10) treatment, a person floats in a tank filled with water in which a large concentration of salts have been dissolved. The water is kept at body temperature. A door or lid to the tank is closed, blocking out sounds and light from the outside world.

Cooper and Adams have found that REST can have the effect of producing superlearning (a highly efficient learning process in which information is more likely to be retained and to influence behaviour) and optimal physiological and psychological behaviour (1988 p.69).

Bell *et al* also mention benefits for hypertension, addiction treatment and creativity (2001 p.109).

This technique shows promise for use in the Mind Development Centre.

2.5.2.) Mind mapping

Mind mapping involves the non-linear representation of information in a "spider-diagram." Colours, images and key-words are used. The form of the map is similar to that of a brain cell and information is linked in similar ways to the connections in the mind.

Using mind maps has the benefit of involving both the left and right hemispheres of the brain in the thinking tasks at hand. This harnesses much more of the brains innate potential than would have been used in a linear fashion.

2.5.3.) Speed reading

Due to the high volumes of material people are confronted with, the benefit of increasing reading speed along with comprehension is obvious. Courses in speed reading should be presented in the centre.

2.6.)   International trends

Jackson states (2003 p.376) that the priorities for CEO's in creating productive workspaces are:

- Human Resources
- People Performance
- Technology
- Designed Environments
- Workflow.

An important factor is that the workplace is experiencing change and needs to be more flexible.   Workplace design is complicated by the fact that the main consideration in development is reducing capital cost, while an estimated 80 percent of performance inhibitors reside in the workplace (*ibid* p. 376).

Duffy, Laing and Crisp cite developer and institutional conservatism as a major limitation on the development of workplace design. They state that old models of office

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design have become obsolescent due to the following (1993 p.xiii):

- Conventional office design is unsympathetic to environmental concerns, yet fails to provide increasingly discriminating; ordinary office workers with a satisfactory work environment

- Conventional design is not flexible enough to meet the needs of advanced information technology and its continual changes.

Several changes have started to take shape in the workplace environment (Jackson 2003 p.382). These include:

- Shared offices (or hot-desking): Different people use desks, offices or workstations at different times.

- Satellite offices: Smaller offices away from the main office that reduce travel distance, fits ride sharing and other considerations.

- Collaborative environments: Areas for group work or places where employees can interact (Fig.4.11 and 4.13).

- Mobile working (Fig.4.12).

Jackson believes that good design can serve to communicate an organisation's respect for its employees and establish better relations with the workforce (2003 p.390).

As communication technology makes it easier for employees to work from home, the role of the office as a place for interaction and co-operation is becoming increasingly important (*ibid* p.392).

Duffy *et al* discuss some general trends that are suggested by their research. Among the concerns that relate to layout of workspace, is the anticipation of a move in the balances between cellular office and open plan; individual and group working; more diversity to accommodate different working styles and an increase in mobility (1993 p.14).

Fig. 4.11

Fig. 4.12

Fig. 4.13

Workers in uncomfortable surroundings might leave earlier, be less productive or leave the organisation (*ibid* p.20). Bell *et al* confirm this when they refer to research that indicates that sunlight entering an office is related to higher job satisfaction and less intention to resign from a particular job (2001 p.2).

Workplace allocation is mostly done by staff category. The professional core of the form is most likely to have customised, dedicated workstations, while flexible and contractual labour work in open plan offices with standard furniture. They are also more likely to use multiple workstations in the office (*ibid* p.23-4).

Offices are often assigned on the basis of hierarchy and perceived need. Therefore, managers are likely to have larger offices with a view as a sign of status, in spite of the fact that they are seldom in their offices. The contractual fringe is often placed in less desirable area of the office space, even though they spend most of the time at their workstations. This is expected to change with a better understanding of the environmental impact on productivity (*ibid* p.23-4). In fact, in some firm managers have started to break away from private offices and locate themselves in open areas (Fig.4.14) where they are more accessible (Jackson p.392). This trend is often justified by the need to be accessible to employees but clearly serves to improve the general allocation of space.)

Fig. 4.14

These studies suggest that the focus should be shifted from maximising the effective floor area to accommodating greater productivity and integration of communications infrastructure.

2.7.) Research shortcomings

The study of emotion has been neglected in research in spite of the fact that they pervade our lives. Emotion serves to focus attention and the brain processes it before the onset of conscious thought. Visual stimuli directly lead to emotional responses, making it very important to designers and managers of the built environment (Adolphs 2001).

3.) Conclusions

3.1.) Greenery

From the above discussions, it is clear that ART is an important consideration in any design and that planting should be incorporated where possible.

As discussed earlier, planting is often associated with crime and fear thereof in urban areas. Kuo and Sullivan speculate that this is because of the concealment that planting provides to malefactors and suggests that planting which does not obstruct views would not have this effect (2001a p.345).

In this same discussion, they go further and propose that planting might reduce crime through two mechanisms. First, they cite evidence that greener areas are more likely to be used by inhabitants, which increases eyes on the street and implied surveillance. This then serves as a deterrent to crime (*ibid* p.346).

The second mechanism is the mitigating effect greenery has on the precursors of violent crime through the mediation of directed attention fatigue (*ibid* p.347). Further research of a similar nature describes the reduction of aggression through exposure to nearby nature, in the form of grassy areas or trees (Kuo and Sullivan 2001b p.544).

These conclusions lead to the requirement that greenery in the design not obstruct visibility. This can be achieved by choosing trees with high canopies and through the arrangement of planters and landscaping.

3.2.) Light and views

Laying out office spaces in a way that allows sunlight to enter the spaces and which provides users with views is likely to increase productivity and performance as well as lift the moods of occupants.

3.3.) Emotions

While sufficient scientific research of emotions has not been done yet, an intuitive approach should be taken in providing for a suitable environment.

3.4.) Communication

As the office increasingly becomes a place for communication, factors that improve communication are important. This results in the need for good noise control and places where groups can interact without affecting individual workers.

3.5.) Retention of qualified staff

When the shortage of highly educated staff and the increasing demands on performance is considered, it is clear that firms that want to survive need to retain their quality staff. Losing staff involves recruitment cost, loss of production while staff is sourced and trained and a shifting corporate culture. As this void grows bigger, the cost of staff turnover in comparison to the capital cost of construction will continue to grow.

Creating an environment that will satisfy staff and encourage them to work to the best of their ability is becoming critical.

Design Discussion
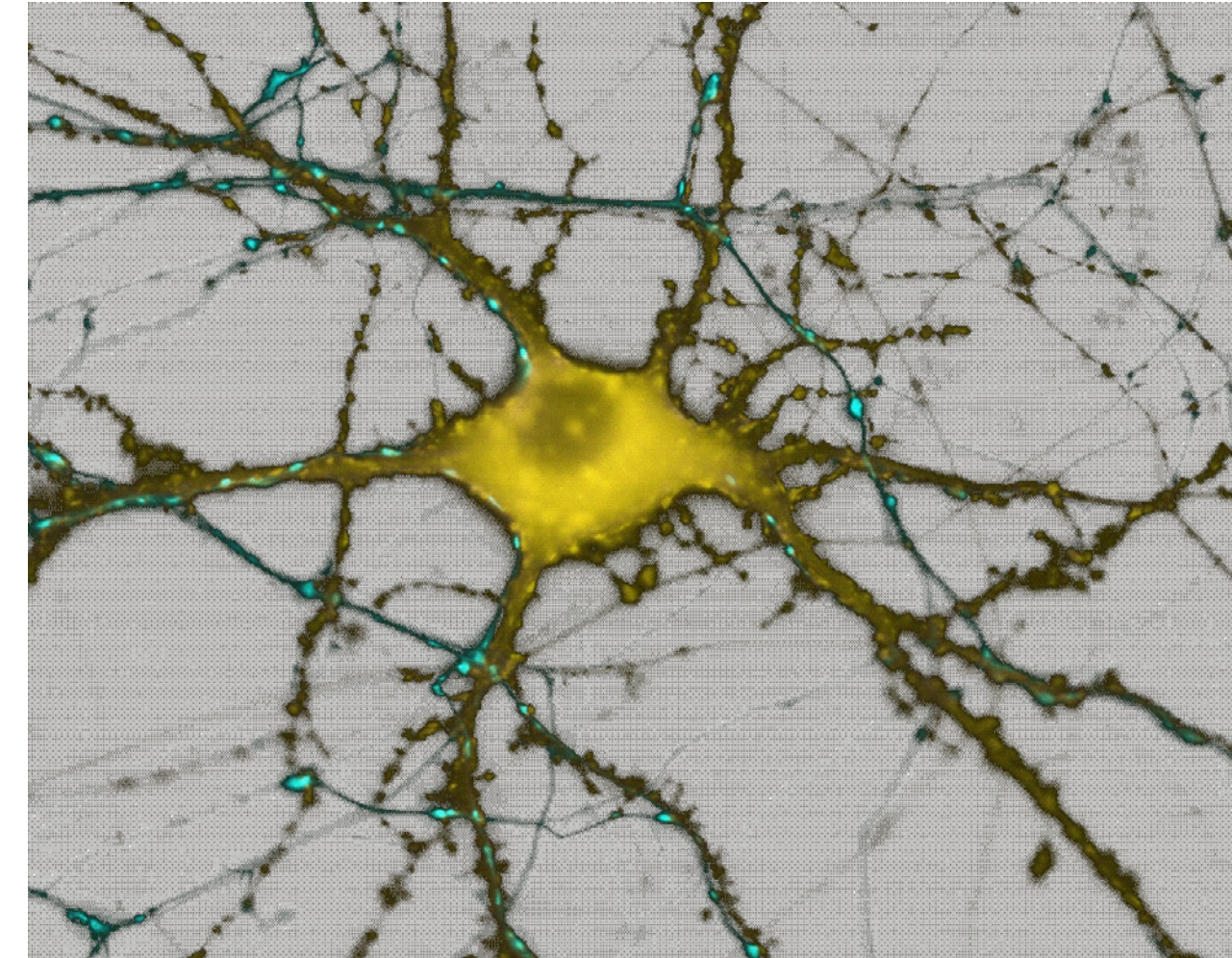
What was done and why

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Fig. 5a. A neuron with connections.

Design Discussion

The design of a Mind Development Centre requires consideration of several factors. The unity of mind and body, as proved by modern science, is critical. The principle of holanthropy, or the study of the whole human being, is central to this.

Design Aspects

1.)   Normative position

Because the brain functions as an integrating, linking tool, providing an environment in which various different aspects of human life can be integrated, is essential. Designing within an urban environment provides fantastic opportunity for this linking, but increases the demands on the design.

The approach followed in this design was to integrate the programmatic requirements of the design with the nature and functioning of the mind. This was to be done within an urban context, taking into account the various external factors, like climate and physical context. The focus was on creating a unity that is whole in itself, yet forms part of a greater whole and contributes to the unity thereof.

2.)   Site selection

Initially, it was considered to base the Mind Development Centre in the disused synagogue in Pretorius Street (Fig.5.1). This would have entailed mainly an addition and alteration project. The site was discarded as an option due to the following reasons:

- Scale of site and building in relation to programmatic requirements.
- Lack of associated functions in the direct vicinity.

The nature of the spaces in the synagogue is such that the entire spatial character would have had to be changed in order to accommodate the required functions. Destroying these spaces was considered inappropriate if the site was chosen in part from heritage considerations.

Fig. 5.1

In this section, the design discourse is presented in parallel with the technical investigation. These two texts will also be interspersed with precedent studies which impacted on the design. Technical aspects will have a frame around them and appear in red, while precedent studies will be shaded.

Technical Aspects

1.)   Technical goals

The aim during the design process was to resolve as many of the issues stated in the brief, factors that arose from the baseline study and other requirements that emerges from the study of thinking within a design that is practicable and pleasing.

The integrated nature of the problem meant that technical aspects and construction could not be separated from the design or functional aspects – everything is part of a whole.

During the design process it became apparent that certain goals set in the brief and baseline document are not feasible or practicable. These will be discussed.

After this, a systematic approach was taken for site selection. It was decided that the design should be based close to an existing research/ educational facility. An urban location was preferred because of the presence of public transport and other infrastructures and the desire to utilise a brownfield site.

2.1.)   Sites Considered

Several possible localities were considered:

2.1.1.) The CSIR

The CSIR provided an established campus with a great amount of research activity taking place.

Library, information, security and other infrastructure exists on site. The campus is not located in a very central location, however, and the open areas are managed as an ecological conservancy. Development would have had to be done on virgin land.

2.1.2.) University of Pretoria

The U.P. main campus provides a developed infrastructure within a research environment, located next to the Hatfield urban village. The site is more central than the CSIR and is in close proximity to the Brooklyn development node. The site is unfortunately riddled with traffic and parking problems and public

transport could be improved (the proposed Gautrain station in Hatfield would have served to make the area more accessible to long distance users. It is not clear whether the local transport infrastructure would be improved and in what way).

The medical faculties of the university are not based on the main campus and it was believed that the centre would benefit more from a location where an individual identity could be created.

2.1.3.) Pretoria Academic Hospital

The site provided access to advanced medical equipment and knowledge. It was again felt that individual identity should be considered. Potential building users might also be tempted to think that the centre is intended for people 'with something wrong' if it is associated too directly with the hospital.

2.1.4.) The HSRC

The site to the north of the HSRC provided a central urban location in close proximity to an established research body, whose work is incidentally closely related to the main fields of study at the Mind Development Centre. The area has very good public transport (Fig.5.2). and other infrastructure. The opportunity exits to create an individual identity for the centre. The site is a brownfield site. Developing this site would also give an economic injection to the area to the west of Church square and contribute to a revitalisation of the area. It was therefore decided to develop this site.

3.)   Topological decisions

3.1.)   Arcade

Several design and contextual indicators led to the decision to create an arcade running through the site.

Due to the length of the street blocks in Pretoria in an east-west direction, a tradition of arcades has evolved.

Courtyards to the north of the HSRC building and to the south of the Poyntons Building provided the opportunity to create a link between them (Fig.5.3 and 5.4.), integrating these open spaces and adding to the public realm.

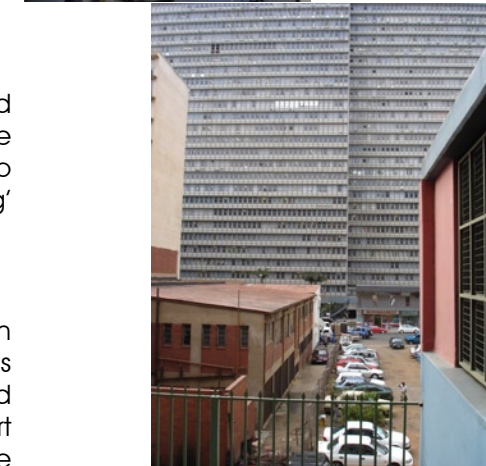*Fig. 5.2. Excellent transport facilities close to the site.*

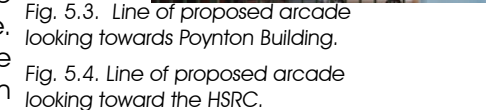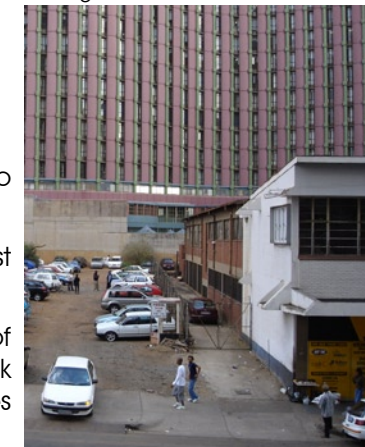*Fig. 5.3. Line of proposed arcade looking towards Poynton Building.*

Fig. 5.4. Line of proposed arcade looking toward the HSRC.

2.)   Technical aspects of site-selection

The choice of site has several implications for a design. Availability of public transport affects the range of people that can reach the site and influences parking requirements. Provision of services and infrastructure needs to be considered, as well as zoning and land-use regulations.

The site chosen for the development is an urban brownfield site. Virgin land will not be disturbed for the construction, services and infrastructure exist in the area and public transport reduces the dependency on the polluting automobile.

These factors combine with urban zoning regulations to allow higher densities.

This site satisfies the requirements set in the baseline study for transport and access to amenities like childcare, banks and shops.

Sites are seldom perfect. The site chosen has limitations in terms of solar access. The central city location means that noise is a much bigger concern than it would have been in a suburban area. The urban climate and the topology dictated by the site made it clear very soon that air conditioner would be required. The aim changed to minimising the impact of HVAC.

Contractors, maintenance and labourers are all available well within the distances required by the baseline study.

3.)   Topological factors

3.1.)   Arcade and public open space

Using an arcade topology addresses several issues. More areas are provided with light, views and the opportunity for openable windows.

Linking parking garages would have meant that people using the parking garage and working at the Poyntons Building would have had to exit the garage through the HSRC in Pretorius Street and walk around the block to get to work. Alternatively, they would have had to move through the centre.

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A lane of trees existed on the site in the past. Some remnants of these trees still exist, as seen in the context study. Providing an arcade serves to remember this historical feature.

During the first phases of design development, the existing building on the site was retained. The arcade would have been respectful to the glazed eastern façade of this building. Although the decision was later made to remove this structure, the rationale for providing an arcade was strong enough to continue with this decision.

3.2.) Public open space

It was decided to provide a public open space to the rear of the site. This could be integrated with the courtyard to the north of the HSRC building (Fig. 5.7) to create a larger, mid-block

Fig. 5.6. Late afternoon wintersun on the site.

Fig. 5.7. The HSRC Courtyard.

Fig. 5.8. The Poynton Building blocks out most of the sun to the site, particularly in winter.
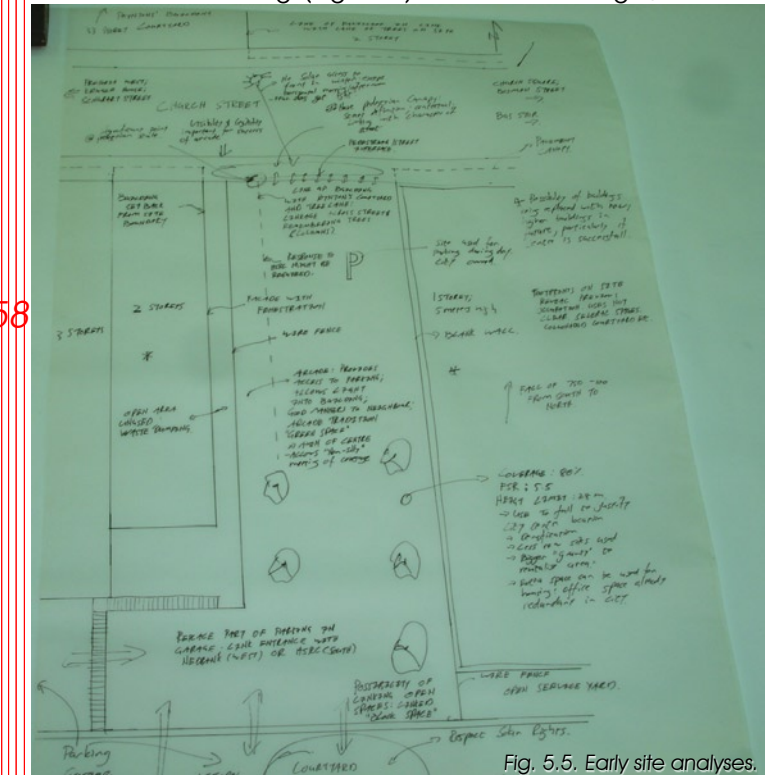
Fig. 5.5. Early site analyses.

courtyard.

This decision allows the use of sunlight to provide an area of greenery and respite in a busy urban environment. In line with the Integrated Spatial Development Framework for the Pretoria central area, a micro park could be created, improving the quality of the area in which the centre is located.

This decision was further motivated by the theories of Attention Restoration Theory (ART) as discussed before and the generally beneficial effects of being able to see natural features from ones workplace.

3.3.) Parking

In spite of the provision of good public transport facilities in the area, a centre of this nature would still require the provision of parking areas. This need is further strengthened by the existing use as a parking area, reflecting the need for parking in the area.

The need for parking in relation to the program that needs to be accommodated on the site made it clear that surface parking would not be adequate. Maintaining an urban character with well-defined public space also made surface parking inappropriate.

These factors made it clear that a parking garage will need to be provided. The site does have a relatively narrow street aspect, however, which could be better used in the provision of public functions and the definition of the street wall.

Parking facilities exist in the Nedbank building to the west of the site and in the HSRC building to the south. Both these facilities have existing access facilities and are managed by Interpark.

It was recognised that parking could be considered urban infrastructure, like streets and sidewalks. This insight led to the decision to combine the parking facilities of the Mind Development Centre with that of one of the neighbouring buildings.

This decision frees the street frontage from motor access and eliminates the need for added access facilities to the centre. It does bind the design, however, to the floor and plate heights of

The arcade provides the opportunity for these people to use the arcade, which creates exposure for the centre. People attending the Magistrate's Court who need to get to the High Court or Advocate's chambers, as well as other pedestrians would make use of the arcade as a shortcut. This would lead, in turn, to increased viability for small shop- and business tenants of the centre.

The site is very deep, making it difficult to get light and air into all parts of the site (Fig. 5.6). The height of the Poynton Building (Fig. 5.8) to the north complicates this further by cutting off direct sunlight onto all but the rear of the site during winter. Providing an arcade allows light and air into deep areas of the site while allowing the creation of a public open space at the southern side of the site and respecting the solar access the HSRC courtyard currently enjoys.

From the investigation of mental states, we know that the presence of natural elements and greenery adds to a sense of well-being, with associated positive effects. Many plants require at least some sunlight, and all water plants do.

Simulated sunlight can be used to cultivate plants. Natural light is cheaper, however, and it contributes to the psychological well-being of users.

The arcade and open space allows sunlight into the rear of the site, making plant cultivation possible. It also serves to respect the solar rights the HSRC currently enjoy on their courtyard.

3.2.) Parking

The Mind Development Centre will require parking to be provided. This need is increased through the current use of the site as a parking area.

Providing parking sets certain limitations on the design of the building:

3.2.1.) Size of structural bays

In order to provide an efficient parking garage that can financially support the cost of construction, it has to be optimised for the maximum number of cars.

This results in structural bays at 5 000mm or 7 500mm clear between columns. In the perpendicular direction, a 5 000 – 7 000 – 5000 rhythm would be needed.

In order to obtain the clear distance between columns yet minimise the centre to centre distance, rectangular columns oriented along with the parking bays will be required.

These requirements imply that a grid should be used to lay out the columns (unlike the HSRC Building that has no orthogonal grid). There is great risk that such a grid might restrict the design decision of the above-ground building in an undesired way.

In order to avoid these limitations, the design of the superstructure was done first, keeping in mind the requirements of basement parking. Thereafter a grid was superposed on the design and an iterative process of amendments to the grid and the superstructure followed to optimise the parking within the limits set by the design.

3.2.2.) Need for ventilation

According to the National Building Regulations, parking areas have to be provided with 7.5l/s/m² of ventilation. Not only does fresh air need to be provided, but carbon monoxide has to be extracted from the basement.

A series of vertical ducts, both for the supply of fresh air and air extraction was designed. Obstructions in the way of airflow, like vertical circulation shafts had to be kept in mind.

Air inlet is provided at the south-west corner from the public open area; in the middle of the site under the

stairs leading up to the public open area and in the north through a raised air-inlet in the arcade (which also serves as seating on ground level).

Extraction is provided at the northeast in a custom duct, which lets stale air out above head-level on the sidewalk.   A duct runs from the basement to the roof at the south-eastern corner and an extraction duct was fitted into the main eastern service duct. This lets the stale air out above head level on the public open space.

3.2.3.) Linking with existing

The decision to link the parking garage with that of the HSRC tied the floor-plate heights to that of the HSRC building (Fig. 5.9). This was considered beneficial as it makes a shared courtyard on top of the basement parking easier.

3.2.4.) Separate lift

The parking garage requires a separate lift to serve it.

Fig. 5.9. Rear view of the HSRC Building. The design needs to connect with the courtyard 2 850mm above ground level and the basement parking 450mm below natural ground.

the neighbour with which the garage is shared.

The decision was made to join with the parking garage of the HSRC. This decision was informed by the following:

- The public open space provided to link with the HSRC courtyard already tied the plate heights of the developments.

- The proposed arcade will run through the HSRC building, next to the pay station for that garage.

- Having the HSRC as a partner in the joint venture managing the Mind Development Centre makes it easier in management terms to run a joint operation.

- Access to the parking garage as well as management of the garage would therefore be operated from the HSRC (Fig. 5.10).

3.4.) Building form

The existing buildings in the vicinity utilise several techniques to avoid overly deep plans and allow light into the interiors.

3.4.1.) Tower on a podium

The Merino Building on the northeastern corner of the block is the exception in the area being designed as a tower on a podium (Fig. 5.11).

This solution was eliminated from consideration for several reasons:

The scale of neighbouring buildings requires that a tower be significantly larger than the site or the program allowed to be read as a tower (Fig.5.12).

If future developments would occur on the neighbouring sites, the tower could end up looking into the blank sidewalls of adjacent developments.

A tower would not contribute as much to the character of the area or the street-space as other options would.

Fig. 5.10. Interior of the HSRC parking garage.

Fig. 5.11. The Merino Building can be seen in the background.

Fig. 5.12. The scale of the Poynton Building and the HSRC Building would have made an eight storey tower in-between look ridicilous.

Fig. 5.13. View down Church street showing several slab buildings and the predominant grain of the development.

Fig. 5.14. The Department of Public Works block is organised around courtyards.

3.4.2.) Slabs

The HSRC, Poyntons building and the Nedbank building are essentially slab buildings. Spanning multiple erven in an east-west direction, this allows ample north and south facing facades with access to light and air. This approach is unsuitable for the site chosen, as the long sides of the erf face east and west, with the potential for tall development to either side.

Applying a slab solution would have led to a building not oriented to the dominant grain of development (Fig. 5.13). Future development on neighbouring buildings would mean that the light and views considered in the design might be changed in a way that cannot be accounted for at the current time.

The western block of the design functions as a slab to a certain extent. The design approach makes this a one-sided slab and determines the views and light that will be experienced from this building.

3.4.3.) Courtyards

The Department of Public Works Building and the Pretoria Magistrates Court both occupy large sections of the blocks on which they are situated. Both have three street fronts and span the entire width of their blocks (Fig. 5.14).

In both these cases, courtyards have been used to allow light and air into the buildings and reduce the depth of the plan.

In spite of the difference in the scale of the site chosen for the design and the sites these buildings occupy, this approach was considered sensible and applicable to the problems of this site.

3.4.4.) Block development

The Transvaal Provincial Administration building was designed with several east-west blocks with linking section joining them (Fig. 5.20). This created open areas in between that are too narrow to be considered courtyards, yet allows the penetration of light and air. This option was initially considered viable and was used in conjunction with the courtyard approach. As the design developed, it was replaced by the courtyard approach.

With the exception of the tower on a podium topology, all the other forms influenced the design at various stages of development and to different degrees.

3.4.5.) Full site development

The decision was made to design the building up to the edges of the site. The uncertainty of development on the neighbouring buildings and the desire to create a well-defined street space were the main contributing factors. It is in effect, a pre-emptive infill development.

This approach further allows a more efficient use of the site while permitting suitable open air spaces. Because of this decision, windows cannot be provided in the side walls of the envelope.

Fig. 5.20. The blocks of the Transvaal Provincial Administration Building.

Fig. 5.15-5.19. Early investigations into the placement and massing of the centre on the site.

Fig. 5.21-5.25. Initial Concept Models
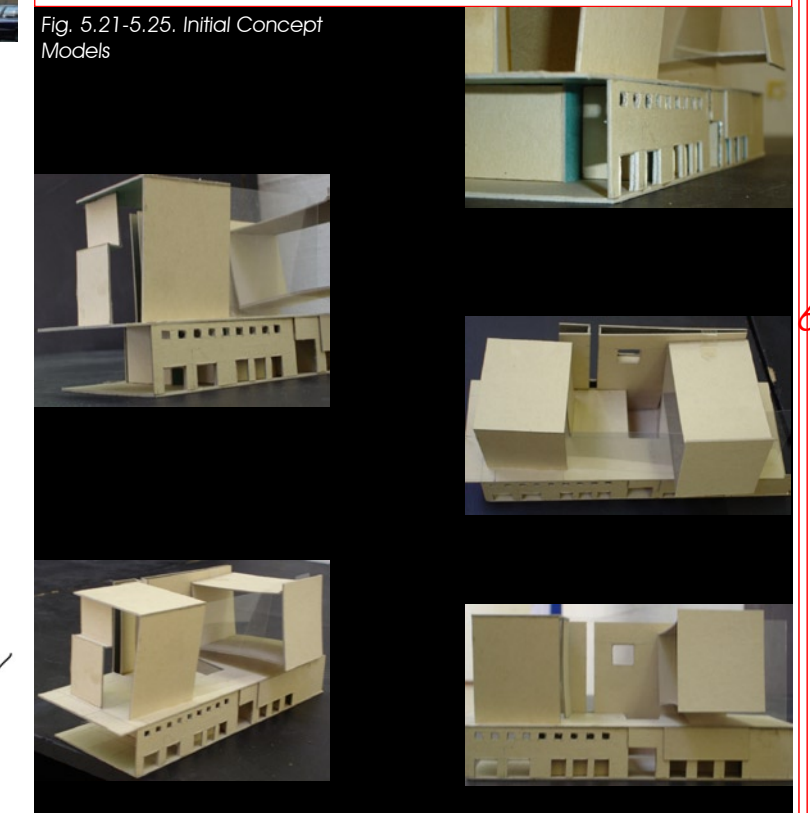
4.) Massing and geometry

The considerations as discussed above dictates that the parking area link with the parking-garage of the HSRC at the rear of the site, and that a raised open area be provided to link up with the courtyard of the HSRC.

On order to add to the streetscape, development up to the front edge of the site would be required.

4.1.) Initial concept

During the first design stages, these decisions combined with the courtyard approach as shown in Fig.5.15-5.19 and 5.21-5.25).

The arcade was formed by the furniture shop on the western portion of the site. The eastern edge was defined by a solid two-storey block containing shops and the entrance to the Mind Development Centre.

A single-storey parking block was provided at the rear with rooftop landscaping.

The solid two-storey block was topped by a continuous block at the northern end with an additional block midway down the block, raised by a storey to allow the courtyard garden formed between the blocks to link with the open space to the rear of
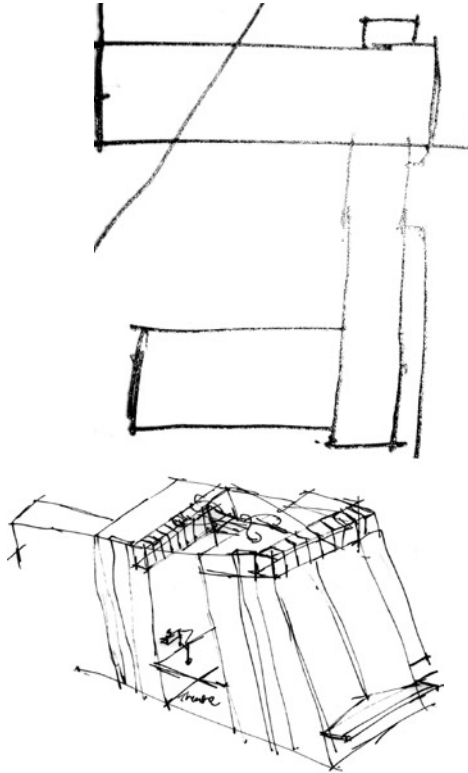
the site.

The two blocks were linked by a glazed bridge block along the arcade. This defined the western edge of the courtyard garden. The eastern edge of this garden was defined by a water tank forming a continuous wall along the eastern edge for the full height of the building (Fig. 5.26-5.31).

This solution made use of the courtyard and block topologies to create a design solution. The solution was rather fragmented and the programmatic functions could not be fully accommodated. The relationship between the design and the furniture shop on the western edge was unsatisfactory.

This led to the decision to incorporate the western portion of the site into the design and demolish the existing structure.

4.2.) Revised concept

After merging the sites, the design approach was revisited. The initial decisions were maintained and the approach changed.

Designing an arcade through the combined site required that the design be split into two blocks.

From this point, the approach was to carve the arcade out of the site (Fig.5.40-5.44). Of prime importance in this process was the
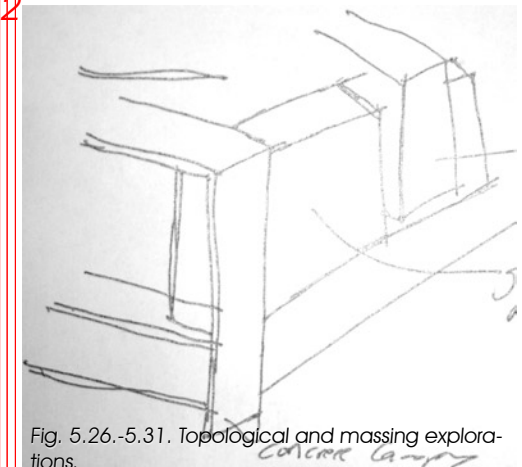
Fig. 5.26.-5.31. Topological and massing explorations.
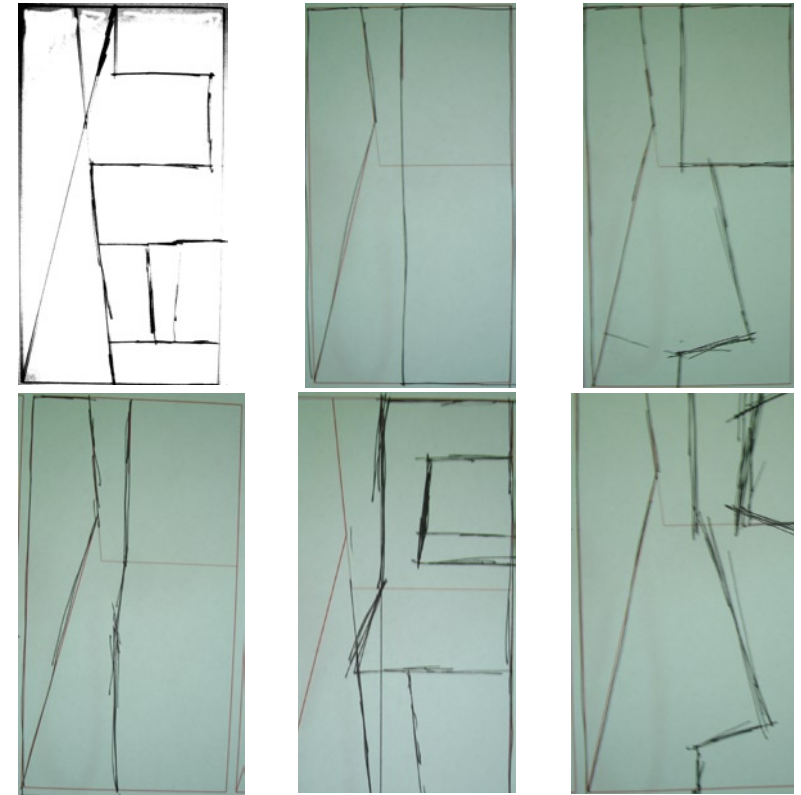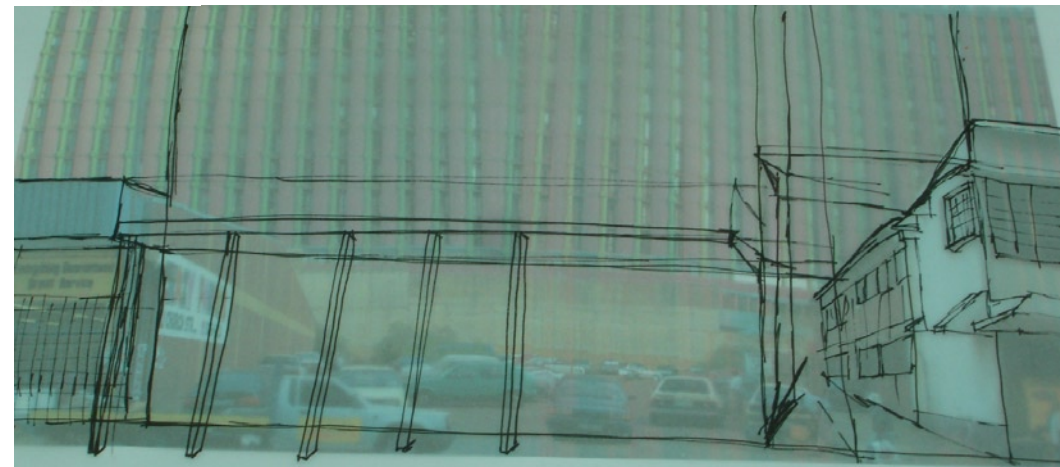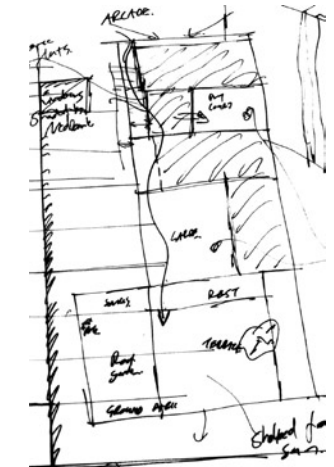
Fig. 5.32-5.39. Plan-form generated through the use of sightlines.
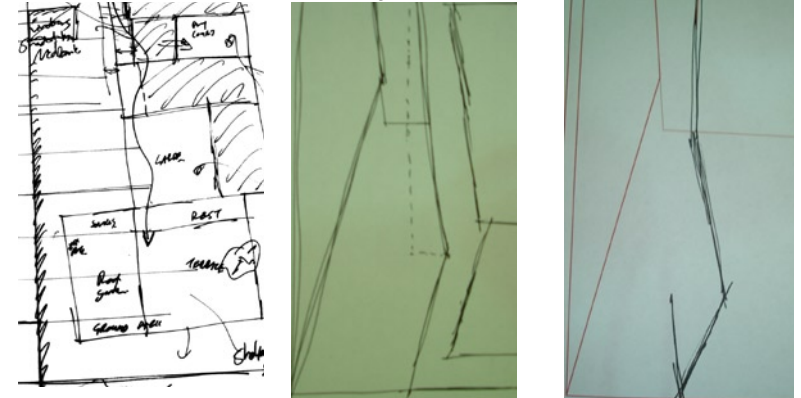
Fig. 5.40-5.44. Third model showing the arcade passing through the building.
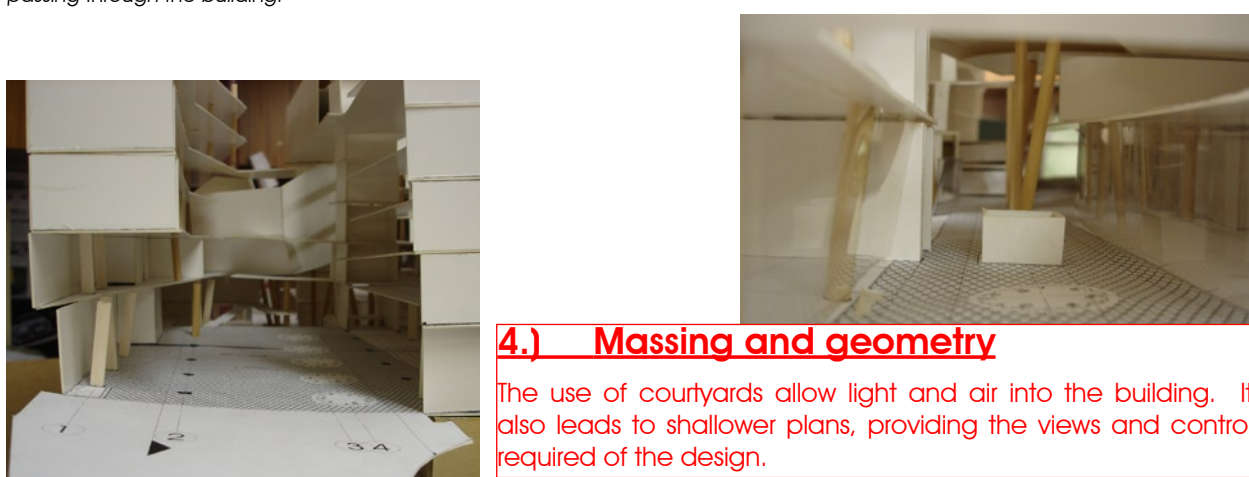
4.) Massing and geometry

The use of courtyards allow light and air into the building. It also leads to shallower plans, providing the views and control required of the design.

concept of sightlines. The theory underlying this is that people are more likely to use the arcade when they can see what it contains, where it leads and where threats might come from.

The arcade was lined up with the courtyard at the Poyntons building and linked to the HSRC courtyard to the south. It was deemed necessary to provide views from the entrance of the courtyard to the corners of the courtyard on the site boundary.

These sightlines were used as controlling lines for the building and a grid was generated consisting of the orthogonal lines, the diagonal sightlines and the perpendicular of the eastern sightline.

Several organisations based on this grid were considered (Fig.5.32-5.39). The layout chosen allowed the necessary views and made for a balanced and aesthetically pleasing composition.

Precedent 1.

Centro Kursaal – Rafael Moneo – San Sebastián – Spain – 2000

The building consists of a conference centre and auditorium on the site of an old casino in the resort city of San Sebastián.

The building is made up out of two blocks sitting on a podium, with the main entrances situated between the two blocks.

The building proved informative to the design in several ways. First among these is the route to the entrance, passing between the two blocks while changing level. This confirmed the possibility of creating a successful space between two large objects while navigating a change in level, as occurs in the arcade of the Mind Development Centre.

The Kursaal presents negative precedents as well. Very poor linkage exists between the internal and external spaces of the Kursaal, in spite of the fact that the atrium spaces do not require privacy or visual isolation. The focus on integration within the Mind Development Centre called for the maximising of views from and into the building.

The layout allowed spaces that require privacy to be moved further from the visible envelope of the building.. The functions on the lower floors are public in nature, as are the restaurants placed in the podium of the Kursaal. In the case of the Mind Development Centre, the decision was, however, made to design these as public facilities, rather than burying them.

Moneo placed the auditoria as objects inside the space of the glass box. Using different materials and geometry, they are expressed as independent objects. This effect is diminished, however, by the rather solid junctions they make with the floors and ceiling of the atrium spaces.

The object within a space is a precedent for the auditoriums penetrating the main atrium and functioning as a freestanding object. The change in geometry is used in order to distinguish it from the surrounding functions.

Lifting the auditorium off the ground and having a separate roof to it further enhances this separation, avoiding the heavy meeting of elements present in the Moneo design. The use of *beton brut* for the auditorium echoes the heavy concrete structural elements of the main building inside the auditorium, while it contrasts with the light-structured bridges that abut and cut through it.

Fig. 5.45

Fig. 5.46

Fig. 5.47

Fig. 5.48. Auditorium in a space.

It was considered to enter into a dialogue with the HSRC building to the south by using curved facades along the arcade (Fig.5.49-5.50). Using the principle expounded by Day that it is easier to create a firm curve from straight lines (1990 p.67), along with the practical rationalisation of design and construction through the use of straight lines, it was decided to rather use the implied curve generated by the grid.

The grid was next used to carve out courtyards and atria (Fig.5.55-5.56). The broad layout principles of the first concept was maintained, but changed drastically in the details.

Locating the auditoria within the organisation of the whole provided several alternatives.

4.2.1.) Burying in the base

The auditoria, which need to be separated from outside light and sound, could be placed in the basement or in the lower floors where deeper plans occur.

4.2.2.) Enclosure within the atrium

The atrium could be treated as an independent object enclosed within the atrium space (Fig. 5.64).

4.2.3.) Independent building

A larger space could be carved out of the arcade space to accommodate the auditoria as an independent, freestanding structure on the site.

4.2.4.) Central connector

The auditoria could be placed over the arcade, protruding into the atrium and penetrating the western block (Fig.5.57-5.60). In this way, it could be an object in space, have an individual identity and form a link between the eastern and western blocks of the design.

The placement of the auditorium was done in the fourth way. Separate organising lines were created for its form in order to create a separate identity and give integrity to the form.

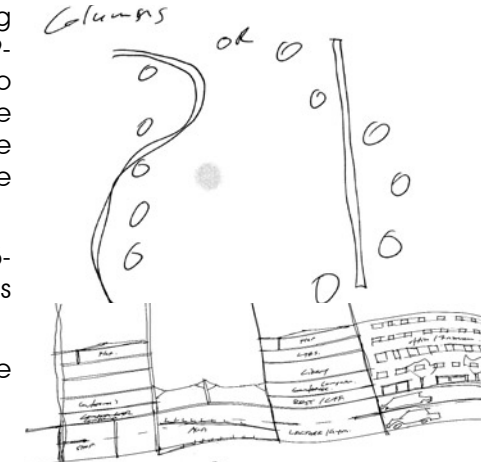The positioning of the auditoria makes used of the orthogonal

Fig. 5.49-5.50. Ways in which curves could be used in the atrium.

Fig. 5.51-5.54. Many curves can be found within the general orthogonal layout of Pretoria.
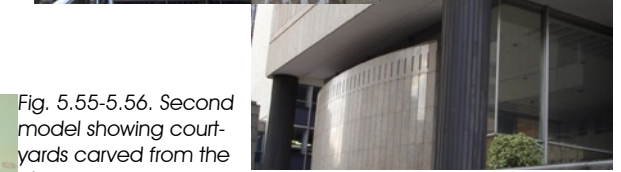
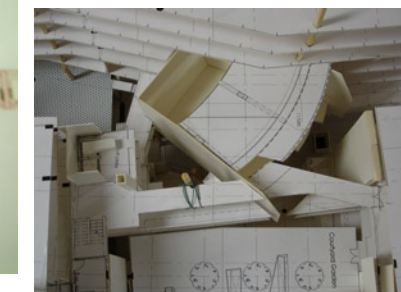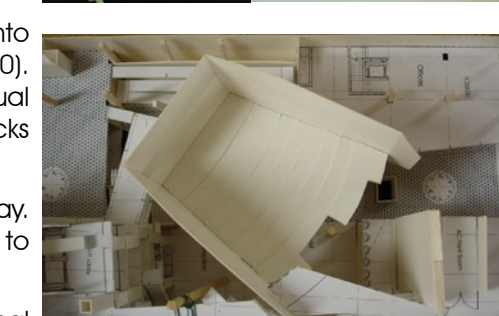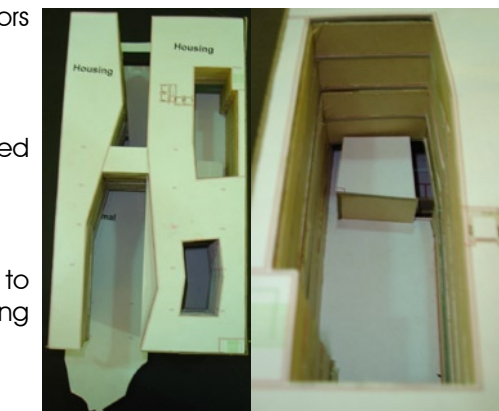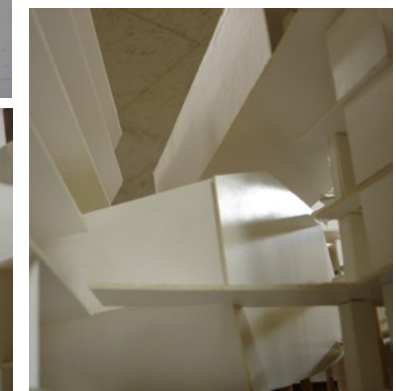Fig. 5.55-5.56. Second model showing court-yards carved from the site.

Fig. 5.57-5.60. Third model showing atrium in relation to the other components of the building.

64

65

grid of the main building in the most effective manner in spite of contrasting with it. The positioning allowed three of the corners of the auditorium to be visible from the outside, making legible its form.

The fact that this block is part of the design yet forms an independent entity is expressed through its disconnectedness with the spaces surrounding the atrium and its embedded junction with the western block.

A somewhat more comfortable junction of forms might have been possible, at the expense of the integrity of the elements. The auditorium could have been a mere appendix to the western block. It might also have been swallowed up by the eastern block.

Rather than compromising for a slightly more comfortable solution, it was decided to use the positioning of the auditoriums to highlight the individual components making up the centre.

Fig. 5.61. Raised podium of the Transvaal Provincial Administration Building.

Fig. 5.62-5.63. The atrium seen in relation to the courtyard garden and the external circulation spaces.
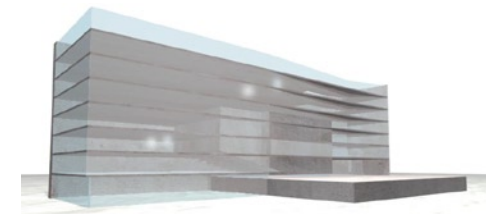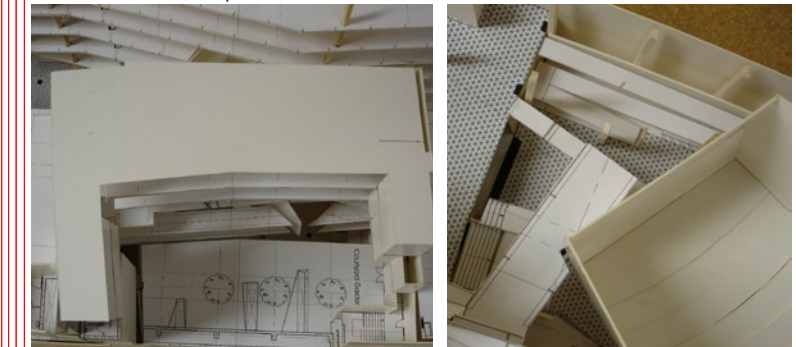
Fig. 5.64-5.65. 3D renderings showing the auditorium contained in the atrium and partially protruding from the building.
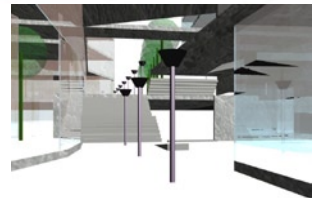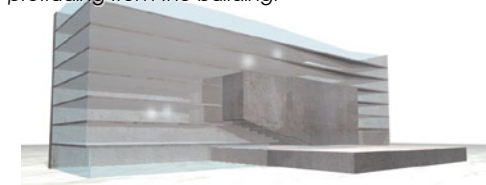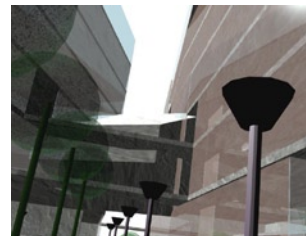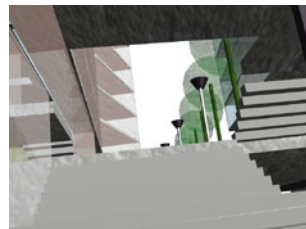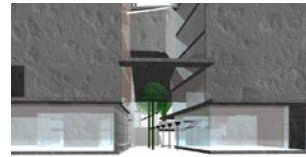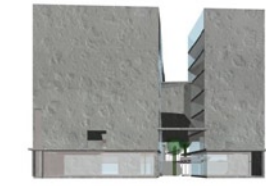
Fig. 5.66-5.76. Exploratory 3D renderings showing the auditorium in relation to the arcade.

Fig. 5.76. An internet café in Soshanguve - something that seems to be lacking in central Pretoria.
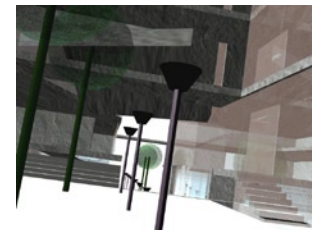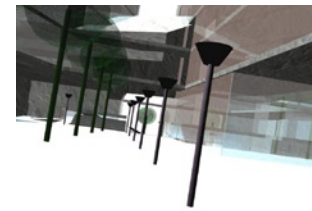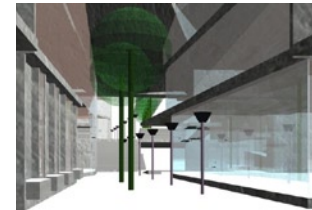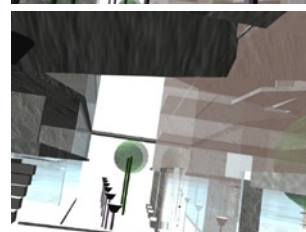
5.) Multi-use of building

Most non-residential buildings are used for eight or nine hours a day, leading to an inefficient use of facilities.

Several functions incorporated into the Mind Development Centre could be used by private individuals out of office hours. These include the gym, the computer lab (which can be operated as an internet café, Fig. 5.76)), as well as the auditoria and lecture rooms, (which can be used for discussions, performances, religious gatherings and the like).

Operating the building in this way provides a means of generating income for the centre. The presence of people in the building after business hours can help to deter crime through surveillance. Such an approach also serves to integrate the centre with the community in which it operates. This is not only socially responsible, but gains a sense of loyalty from the community, again increasing security. Avoiding the need for the duplication of facilities, this decision aids the environment and the wider economy.

In order for such an approach to operate effectively, facilities that will be used out of office hours need to be located closer to entrances and be more controlled. The more public functions of the building are placed on street level. Functions become more private and dedicated as one moves up in the building. This layout allows quiet and control in the upper floors, while allowing the independent operation of the appropriate facilities.

The floors that will be operated after normal working hours can be closed off from the rest of the building and be managed separately during those times.

6.) Contextual indicators

Several decisions were taken in order to link the design with the existing fabric of the area.

6.1.) Rhythm on the street front

The facades of central Pretoria buildings usually consist of modular, repetitive bays or panels (Fig. 5.77). The compositions normally

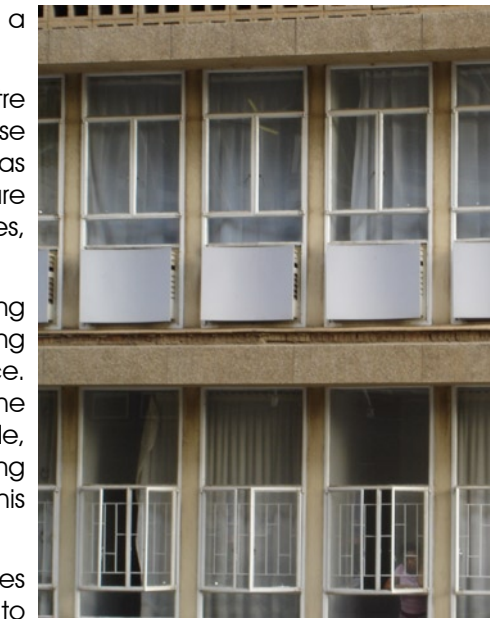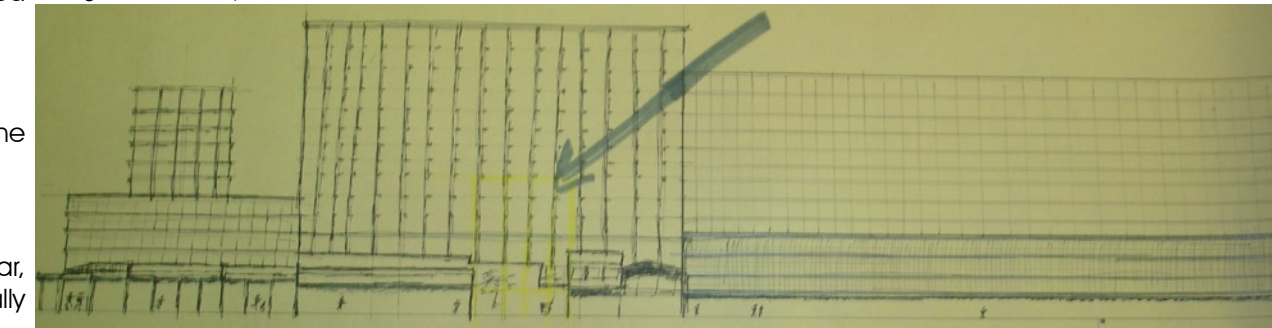Fig. 5.77. Modular panels on the Nedbank Building.

Fig. 5.78. First drawing of the site. At this early stage, the rhythm of the facades was already recognised to be important.

consist of a primary horizontal emphasis and a secondary vertical expression (Fig. 5.78).

As part of the environmental system, a second skin has been added to the front of this. This skin also consists of horizontal and vertical banding. The composition is based, however, not on regular bays, but on a random arrangement of horizontal and vertical elements. The distance between consecutive elements is calculated on the golden ratio.

The base rectangle from which these intervals were calculated, is the rectangle covering the area between the sidewalk canopy and the roof, and the two edges of the site, which is a golden rectangle.

The random arrangement derives from the statement that 'randomness is the highest form of order.' It was further inspired by Hameroffs' theory of the functioning of the mind, which includes quantum effects in the brain. Quantum effects are unpredictable and random.

The decision to use the golden section's is based on this ratio's association with life and growth. It also serves to make explicit the order possible in randomness.

6.2.) Pavement canopy

Providing a canopy over the sidewalk is another Pretoria tradition (Fig. 5.79). The canopy provides protection from rain and the harsh summer sun to pedestrians passing below.

Such a canopy further establishes continuity along the street front and creates a direct relationship between buildings.

From the perspective of the building user, the canopy is beneficial in that it somewhat shelters the upper floors from noise on the sidewalk and to a certain extent traffic noise.

This feature has been included in the design.

Fig. 5.79. The pavement canopy shelters pe-destrians from the elements.

Precedent 1 (cont.)

The exterior relates rather poorly to the urban fabric. Contrast with the existing is not a problem as such and the scale of the centre is well suited to the neighbouring buildings, yet there seems to be very little dialogue, through form, elements, rhythm or proportion. Creating a unity with the existing fabric and adopting elements from the environs was important in the design of the Mind Development Centre. This finds expression in the rhythm of the interior skin of the front façade, the continuity of the pedestrian canopy, the rhythmic structural expression relating to the HSRC building to the south, the vertical scaling of the building and the use of roof-level elements.

Precedent 2

Smithfield Buildings – Stephenson Bell – Manchester – England – 1998

The buildings are a collection of nine buildings making up a city block in Manchesters' northern quarter. The buildings have been renovated and altered to accommodate a mix of retail, office and residential tenancies.

The project explored the existing fabric and used what was there to create a new, integrated complex out of the disparate and run down elements and adding some new-build infill.

The design successfully integrates various styles and periods into a successful whole. It can be seen that sensitivity and coherence can be created through simple rhythms and reflection of proportions of the context. This approach has been followed in the design of the Mind Development Centre.

Fig. 5.80. The Smithfield buildings find harmony in different materials and expression.

Fig. 5.83-5.85. Rooftop pergolas and living areas are a common feature in Pretoria.

Precedent 1 (cont.)

The custom cast aluminium framing of the glazing informed the decision to use custom cast aluminium framing for the construction of the sunshield/ convection tower double skin façade on the buildings street front. Several techniques were considered and Moneo's detailing made clear the versatility of aluminium to achieve the desired functional and aesthetic result.

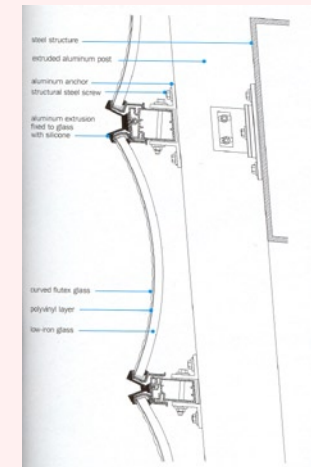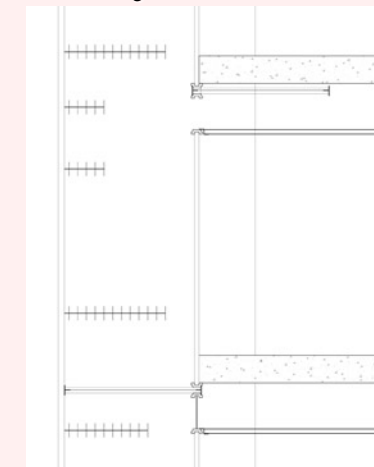*Fig. 5.81. Aluminium framing for the Kursaal facade.*

Fig. 5.82. Double facade making use of custom aluminium elements in the design.

6.1.1.) Climatic factors

The front façade is exposed to direct sunlight during the summer months, especially over the midday hours, when the heat is most intense. If this is allowed to enter the building, it will lead to significant heat gains and cause a very unpleasant zone just inside the window.

This heat could be used, however, to create a stack effect between the façade and the second skin. Because of these consideration, the solar shielding fins are placed behind the glass wall and in front of the windows. Solar heat enters the cavity, warming the air and setting in motion the stack effect, while being blocked from the windows by the louvres.

The negative pressure caused by rising air in the cavity is used to extract hot air from the ceiling voids inside the building. Of particular benefit is the ability to remove air heated by artificial lighting. This serves to reduce the cooling load on the HVAC system.

The 12m deep plans adjoining this façade requires large windows if it is to make use of natural light to a meaningful degree. The bulk of the Poyntons Building completely shades the façade during the winter. Combined with the large glazed areas, this will lead to a massive heat loss through the windows.

The double skin creates a buffer area between the outside and the building, effectively functioning as double-glazing. The openings between the ceilings and the cavity can be shut in order to avoid warm air escaping into the buffer zone. In order to prevent convection from extracting the warmer-than-outside buffer air, dividers are moved into the cavity during winter to cut off vertical air movement.

The design of these dividers allow light to pass through into the building. They can also be used by the cleaning staff to access the inside of the cavity (where rain does not wash off the dust) and for maintenance. To facilitate this, louvres that project too deep into the cavity for a person to pass, can be folded away when access is needed.

6.1.2.) Sound control

The northern façade edges on Church Street with street and traffic noise. The double skin will dampen this noise, improving the quality and usability of the interior spaces.

6.1.3.) Sense of privacy

The random arrangement of framing used for the skin will contribute to a sense of privacy inside the spaces, without interfering with views or light.

6.2.) Pavement canopy

The pavement canopy serves to make the building more user-friendly. It makes it easier to manage water at thresholds protected by it.

Such a canopy aids in the deflection of sound from the upper levels. This pertains particularly to the noise arising from the interaction of pedestrians.

6.3.) Architrave on arcade frontage

Many buildings in Pretoria have a pergola that serves apartments or offices on the roof (Fig. 5.83-5.85). It provides another feature of identity among these designs.

The design of the Mind Development Centre did not include any functions at roof level that might benefit from such a feature.

The centre requires sun shading to the upper floors facing the arcade, as these will have the most solar exposure.

A mobile sculpture is displayed over the public open space on the south side of the centre. Structure needs to be provided for this.

These considerations led to the design of the structural fins attached to the upper floors. These support the sun shading devices as well as the sculpture while referencing the pergolas on other buildings in the city.

7.) Structure

The structure is left exposed in the atrium and the external areas. Internal areas have received treatments as appropriate. The exposed elements are designed as heavy elements and the off shutter finish adds to this. This contrasts with the glazed curtain walling and the light steel structure of the bridges crossing the atrium.

All the columns have a square section in the basement floors. In the upper floors, round columns are often more appropriate. Where the shape of a column changes in an open space, like the atrium or the arcade, the change

is made not in the floor slab, but is lifted beyond it in order to make users of the spaces aware of the change happening (See Fig. 5.86). This also serves to promote an understanding of or, at least a questioning of, the change and expose something of the nature or function of the spaces contained in adjacent floors.

The bridges linking across the atrium is made of steel and is visually light. If the bridges were heavy, concrete elements, they would read as part of the main building and the auditorium, destroying the separate identities created for these.

Designing the bridges in this way allows them to be objects crossing the void of the atrium, providing links to the separate functions. They symbolically become the neurochemicals transmitting signals between the synapses of brain cells (Fig. 5.87). Should concrete construction have been used, the void would disappear and become merely holes

Fig. 5.86. Columns changing profile at the HSRC Building.

Fig. 5.87. Neurotransmitters in the synapse of a brain cell.
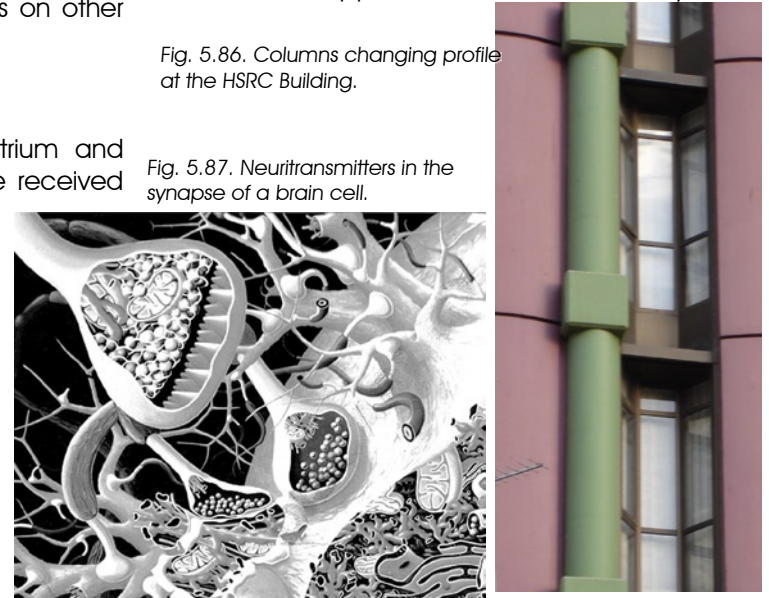
Precedent 3

Baumschulenweg Crematorium – Axel Schultes – Berlin.

The crematorium is set in an early 20th century cemetery in the suburbs of Berlin. Massive concrete elements combine with glass and light screens to provide a dignified building where the grief of mourning can be shared.

The building illustrates the importance of dealing with intimidating vertical scales in an appropriate manner. The slit in the slab over the entrance canopy provides a connection with the sky and the external environment that transforms a potentially threatening space into one that is pleasant, yet dignified. The decision to include an external architrave-element on the arcade facades of the Mind Development Centre was motivated in part by the definition of the space it provides and the connection with the sky in an adaptation of the principle applied by Schultes.

The successful combination of very heavy and very light construction into a coherent whole inspired the use of these very different approaches in the design. Just like the crematorium brings together the apparently opposite nature of life and death, the contrast of materials show on contradiction in function and use even within a building housing a relatively simple program.

These aspects have found expression in the heavy, *beton brut*

Fig. 5.88. The crematorium at night.
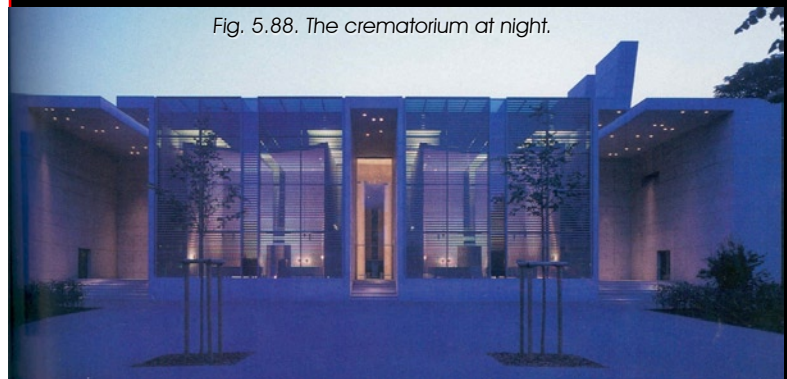
columns, structural walls and the volume of the auditoriums on the heavy side, contrasted with lightweight curtain walling, the bridges and stairs in the atrium space and the architrave on the arcade facades, supporting up shading and mobile sculpture.

On a symbolic level, these contrasts reflect the seemingly contradictory natures exhibited by thinking and creativity, and become an expression of the hemispheric specialisation in the human brain. The processes of analyses and integration, creativity and acceptance, even male and female, can be shown to work together for a bigger purpose, in spite of the superficial conflicts.
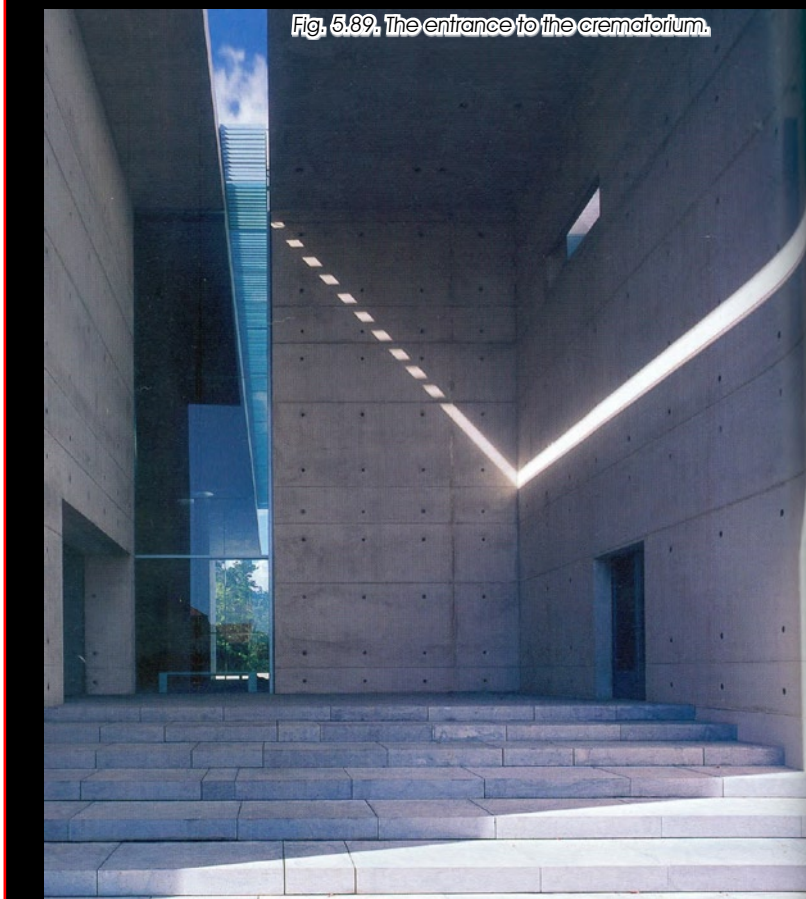
Fig. 5.89. The entrance to the crematorium.

The particularly distracting nature of the human voice when trying to concentrate has already been discussed.

6.3.) Architrave sun shading and structure

The architrave addresses both the need to provide solar shading to the upper floors as well as an opportunity to support the mobile sculpture without additional supports.

As the architrave connects to two slabs, the forces of this sculpture can be distributed over more supports, allowing a visually lighter solution.

7.) Structure

The structural grid was aimed at optimising the amount of parking in the basement levels without jeopardising the design of the aboveground building.

A reinforced concrete frame has been used throughout the design. The atrium is spanned by a double storey box-beam supported on a massive concrete wall at the northern end and two large

columns in front of the lifts to the south. A single column provides some support along the beam. This box beam is expressed internally and to the arcade as an element that functions differently form the rest.

The requirements of the functions housed in this box calls for spaces that are separated from the outside, like audio and olfactory laboratories.

The western wall of the auditoria acts as a beam, which supports the footplates of the sixth and seventh floors. This wall supports floors adjoining the auditoria as well.

All the columns that run the full height of the building, with the exception of those in the atrium space, become smaller in section on the higher floors. This is revealed in the columns on the eastern side of the public open space, where the entire length of the column is visible. In this way, users of the space can gain an understanding of the construction and functioning of the building, i.e. creating a link between the designers and users of the building through revelation of thought.

Precedent 1 (cont.)

Moneo's use of stairs and walkways in the atrium spaces articulates the need to animate an atrium at the higher levels. Although the linking bridges and staircases in the atrium would have been a functional necessity, the decision to express these as sculptural entities rather than repetitive flights and corridors was at least in part informed by Moneo's example.

Fig. 5.90. The atrium of the Kursaal.

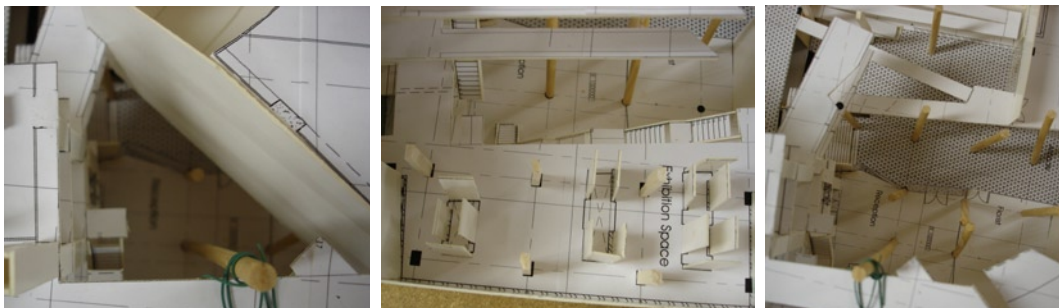Fig. 5.92-5.94. Various views of the atrium in the design.
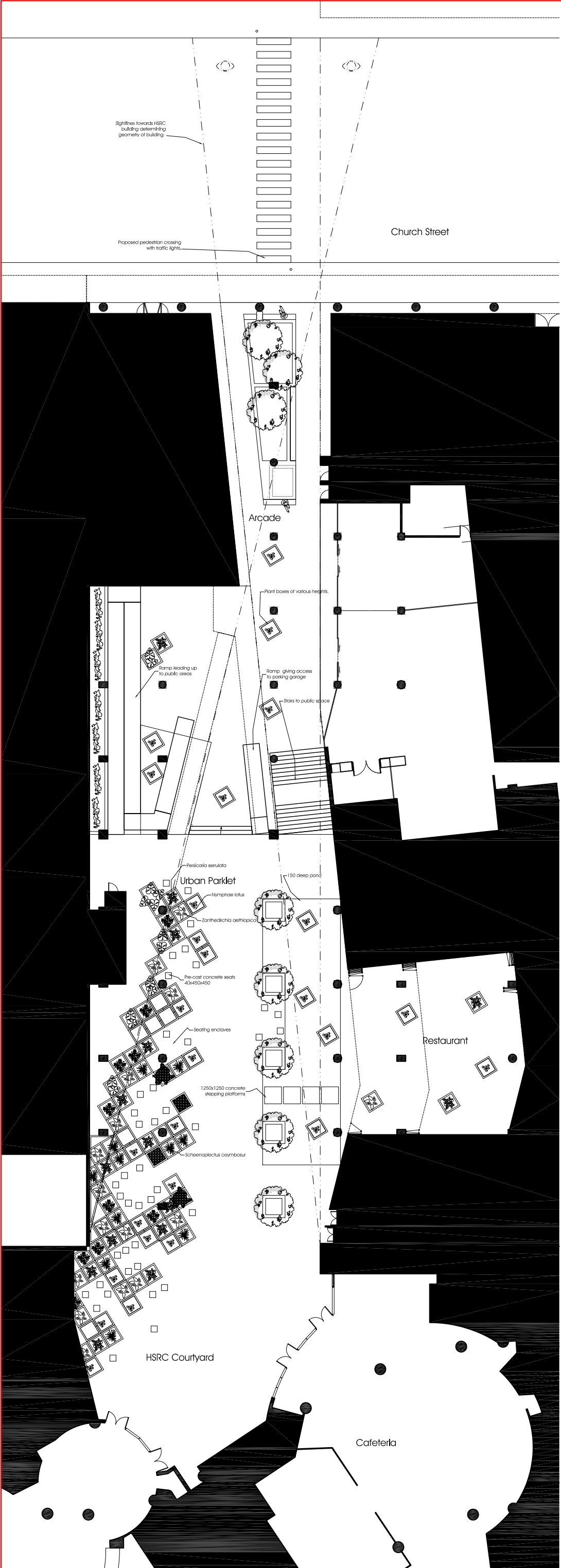

Precedent 2 (cont.)

Stephenson Bell utilised an existing light well in the centre of the block to create a top-lit atrium space, which allows the residential units a dual aspect and gives interior views to the functions adjoining it. This atrium is linked with a small, existing atrium. This approach is used in the Mind Development Centre to avoid deep plan areas without access to light and views. The main atrium is linked with the courtyard garden on the third floor in order to provide a flowing space and serve as a stack tower.

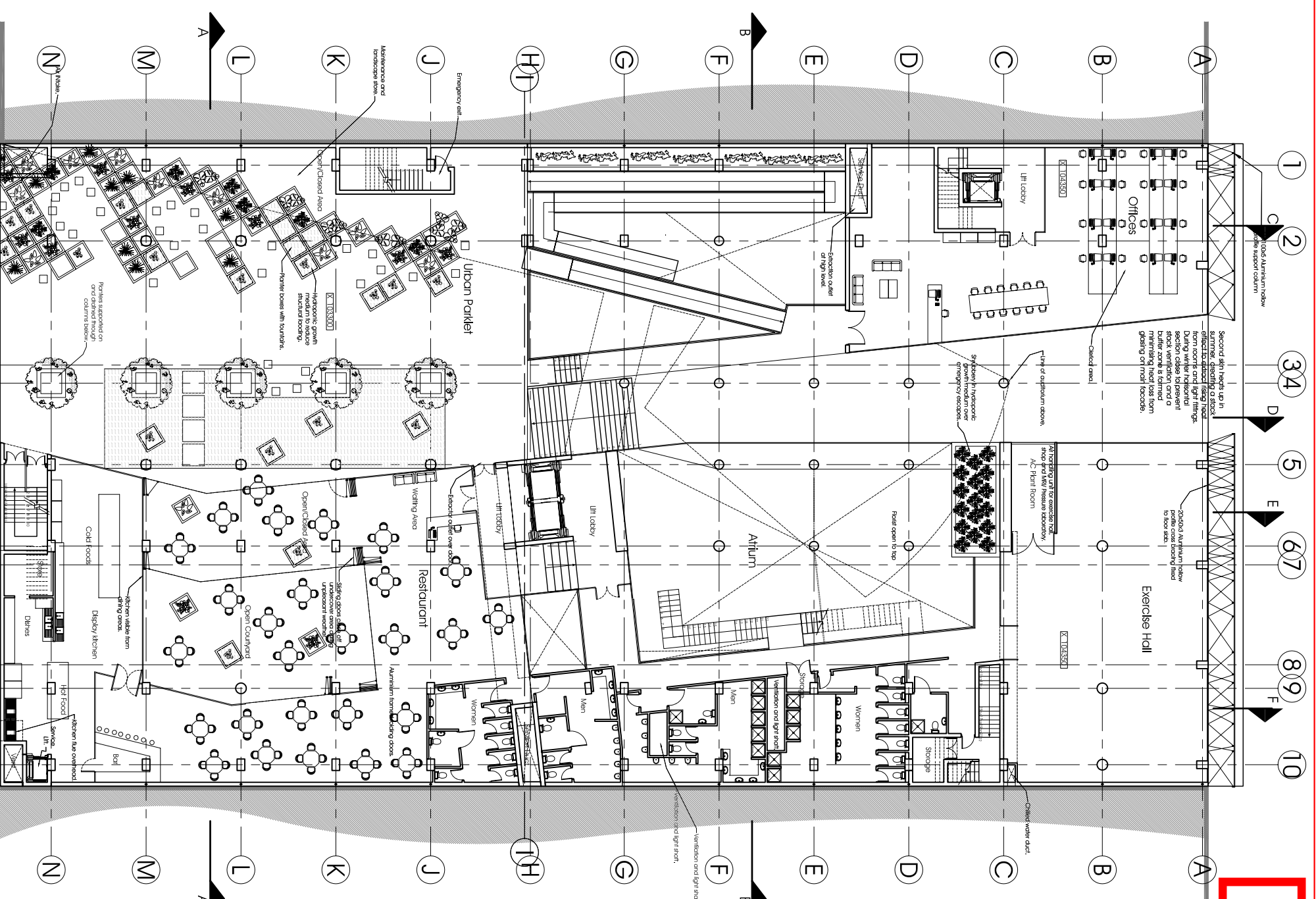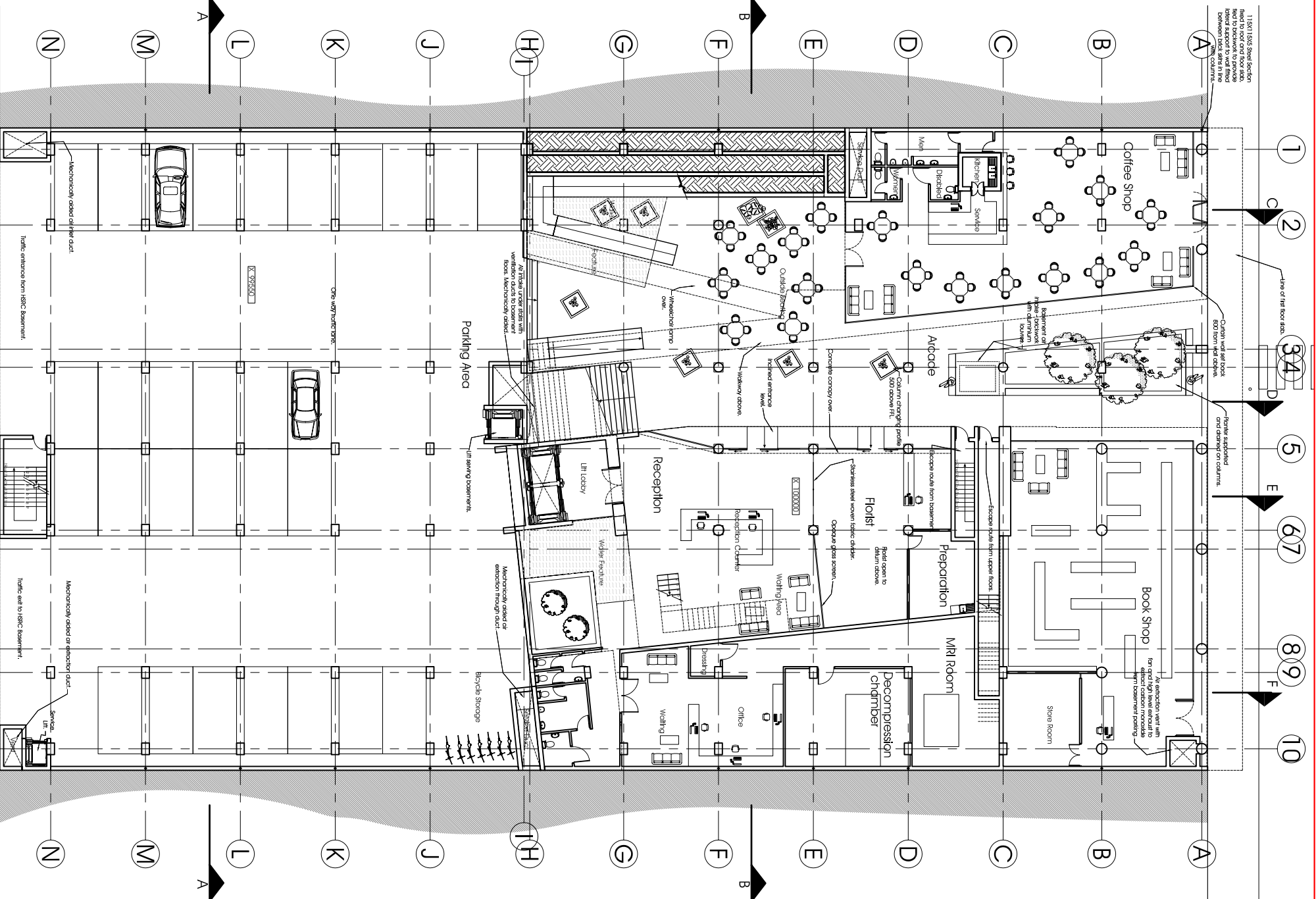Fig. 5.91. The atrium in the Smithfield Buildings.

Church Street

Sightlines towards HSRC
building determining
geometry of building.

Proposed pedestrian crossing
with traffic lights.

Arcade

Plant boxes of various heights.

Ramp leading up
to public areas

Ramp giving access
to parking garage

Stairs to public space

Persicaria serrulata

Urban Parklet

150 deep pond

Nymphae lotus

Zanthedichia aethiopica

Pre-cast concrete seats
40x450x450

Seating enclaves

1250x1250 concrete
stepping platforms

Schoenoplectus ceymbosur

HSRC Courtyard

Restaurant

Cafeteria

Location Plan
Scale 1:1000

Church Street

Schubart Street

Bosman Street

Pretorius Street

Site and Landscaping Plan
Scale 1:100

Mind
THINKinG

Jean Grové
94070734
November 2004

Ground Floor Plan
Scale 1:100

First Floor Plan
Scale 1:100

Coffee Shop
Arcade
Parking Area
Reception
Lift Lobby
Florist
Preparation
Book Shop
MRI Room
Decompression chamber
Office
Store Room
Water Feature
Bicycle Storage

Offices
Lift Lobby
Urban Parklet
Restaurant
Atrium
Exercise Hall
AC Plant Room
Cold Room
Hot Food
Display Kitchen
Open/Closed Area
Waiting Area
Men
Women
Storage

THINKinG

Dev

Second Floor Plan
Scale 1:100

Third Floor Plan
Scale 1:100

THINKinG

elop

AC Plant Room
Exhibition & Waiting
Conference Hall
Offices
Men
Women
Lift Lobby
Conference Foyer
Atrium
Gym
Exhibition Space
Service Area
Glass work Office
Lift Lobby

AC Plant Room
Offices
Men
Women
Lift Lobby
Conference Hall
Atrium
Discussion Room
Discussion Room
Class Room
Courtyard Garden
Test Hall
Contemplation Space
Lift Lobby
Men
Women
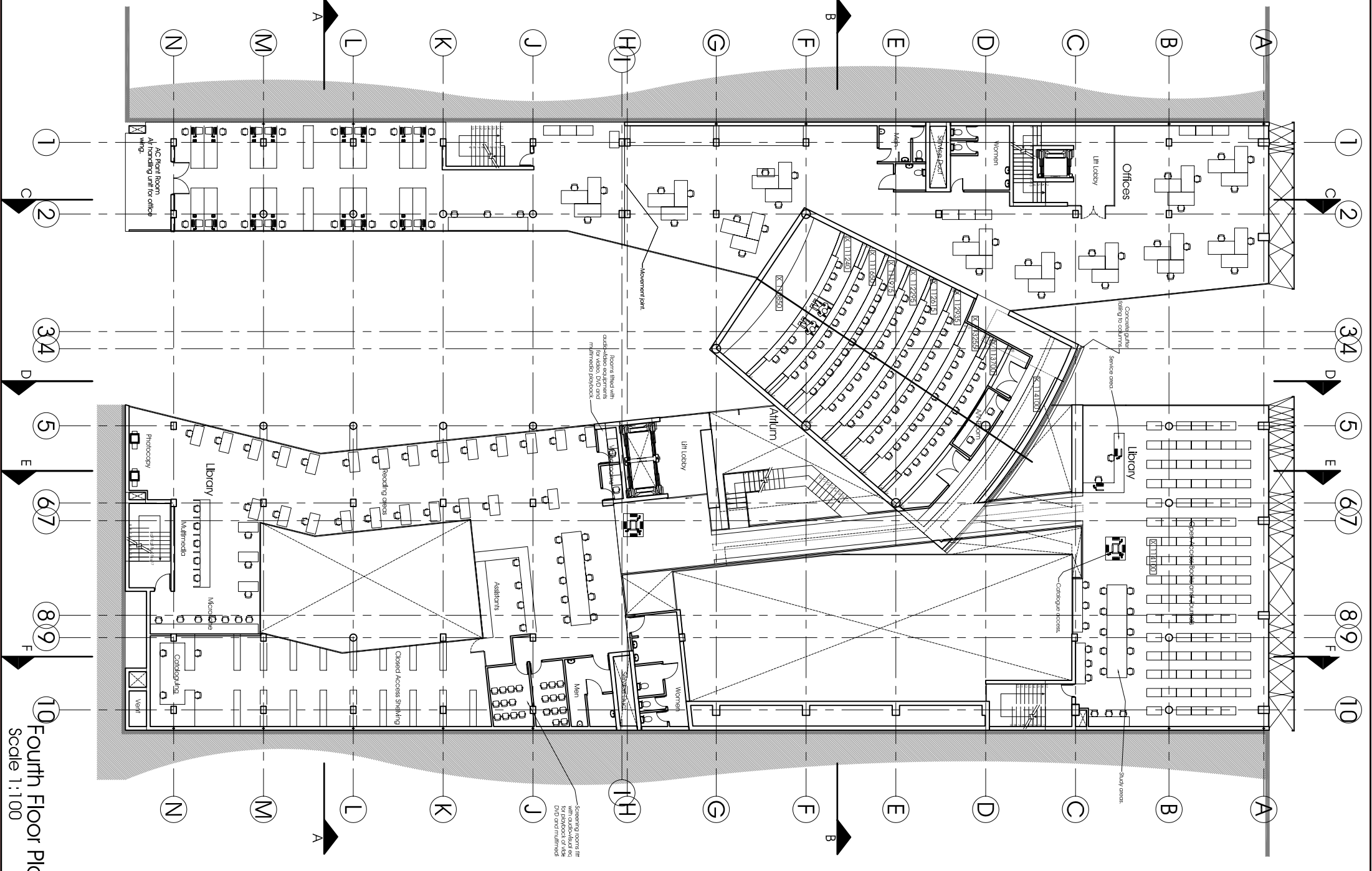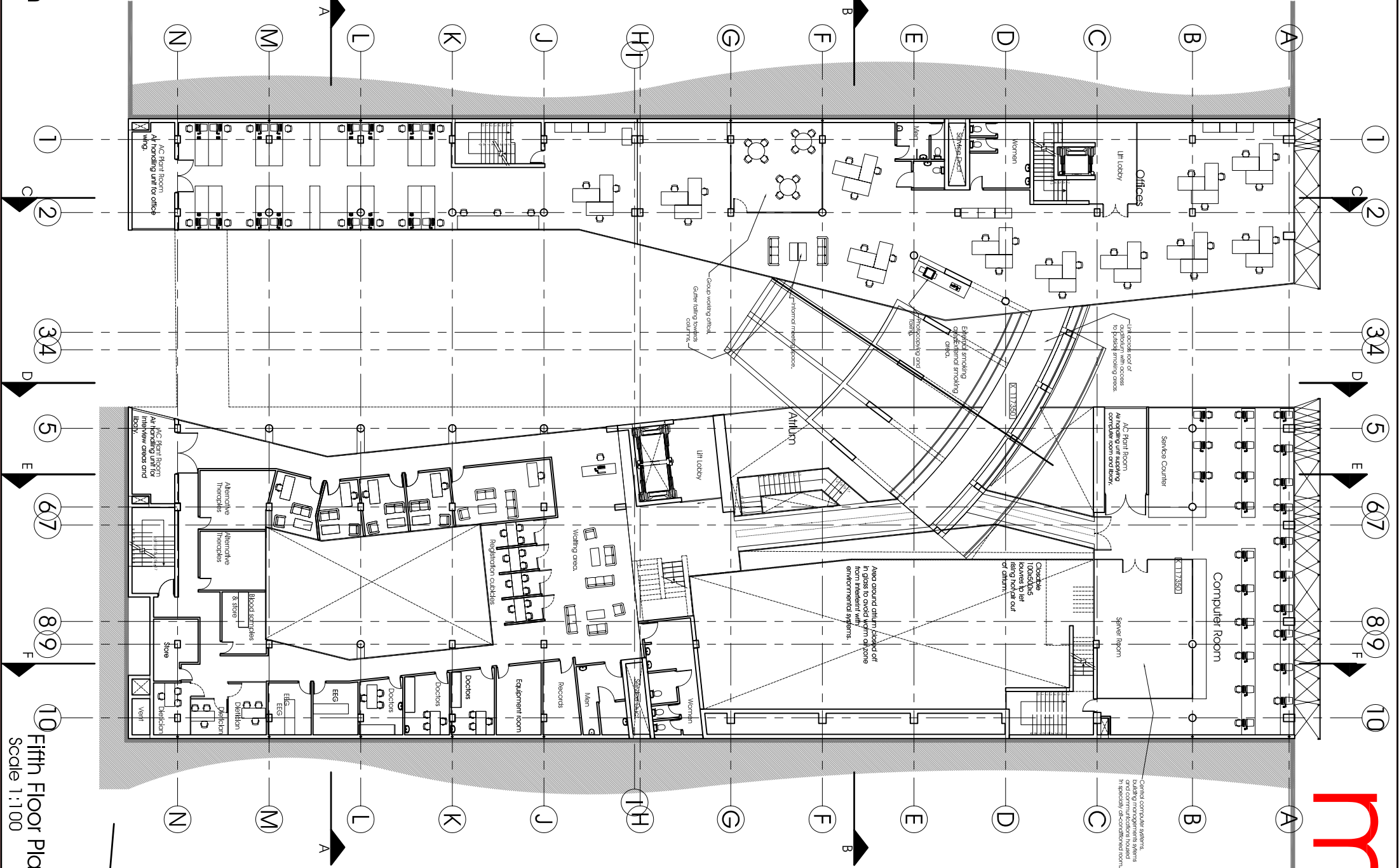
Fourth Floor Plan
Scale 1:100

Fifth Floor Plan
Scale 1:100

THINKinG

men
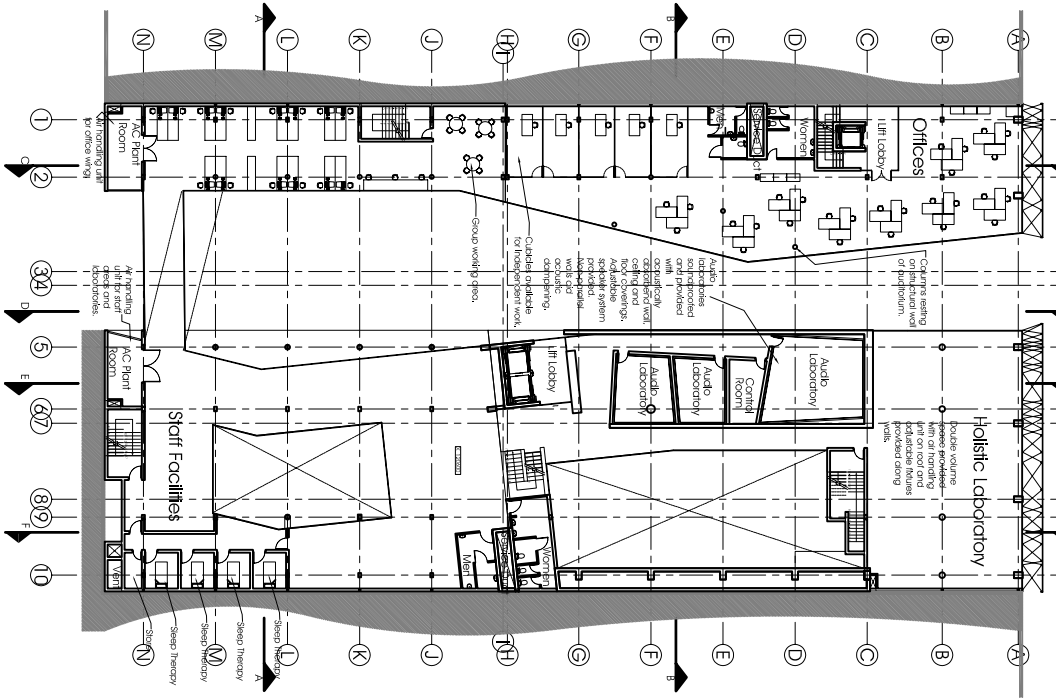
Sixth Floor Plan
Scale 1:200
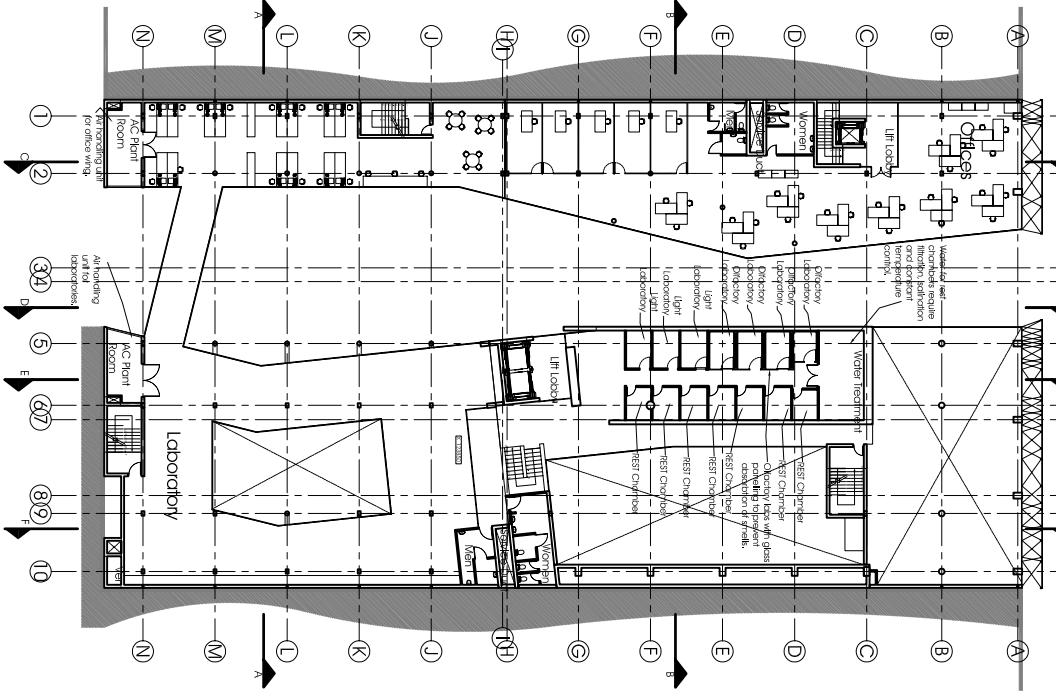
Seventh Floor Plan
Scale 1:200
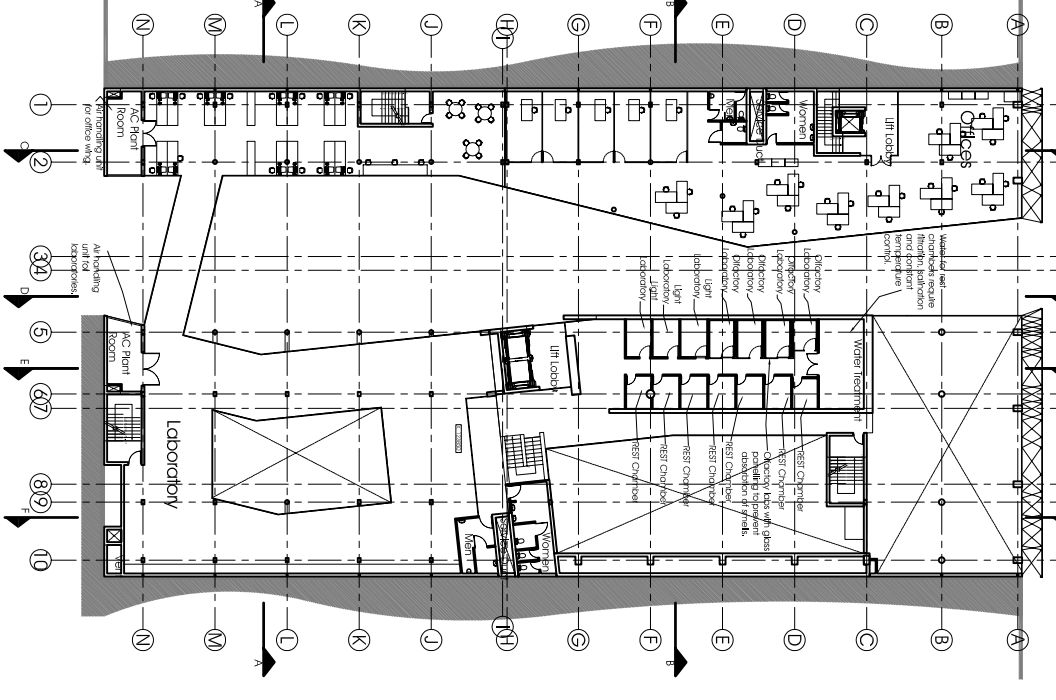
Roof Plan
Scale 1:200

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