

SPACE TIME MOVEMENT ARCHITECTURE

A CENTRE FOR THE STUDY OF CULTURAL ECONOMICS

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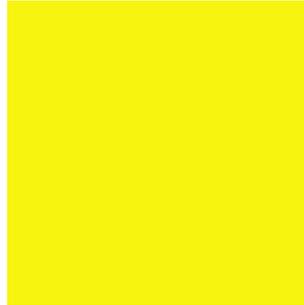
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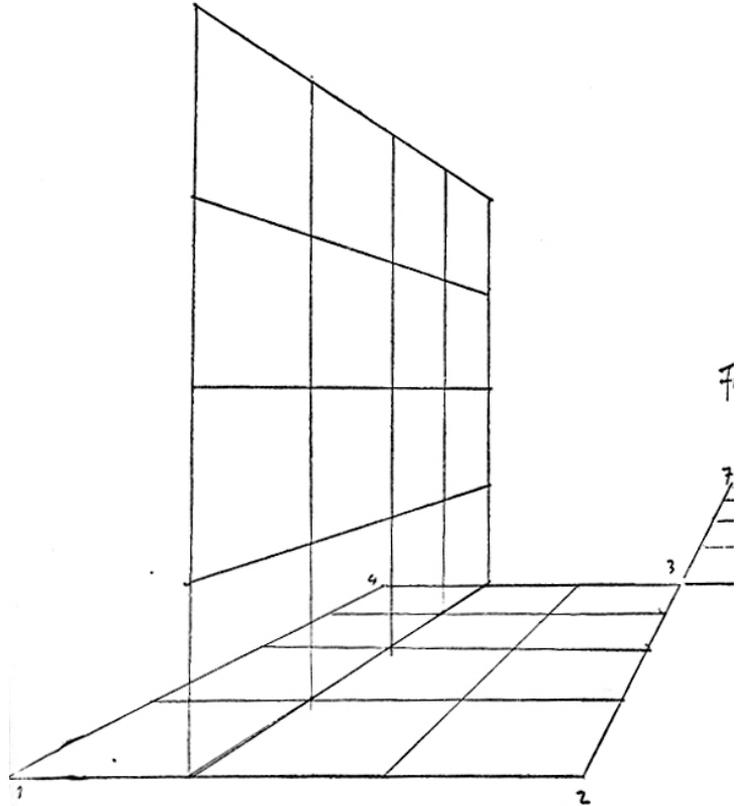
This treatise is an investigation into movement and the author found it impossible to stop the movement of the writing process. Even after careful editing was it not possible to remove personalisations without affecting the character of the whole. The reader's understanding would be appreciated.



1

introduction

“Movement is not simply an unintended by-product of spatial organisation, but its very reason for existence. By its power to generate movement spatial design creates a fundamental pattern of co-presence and co-awareness, and therefore potential co-encounter amongst people, that is the most rudimentary form of our awareness of others” (Hillier: 213).

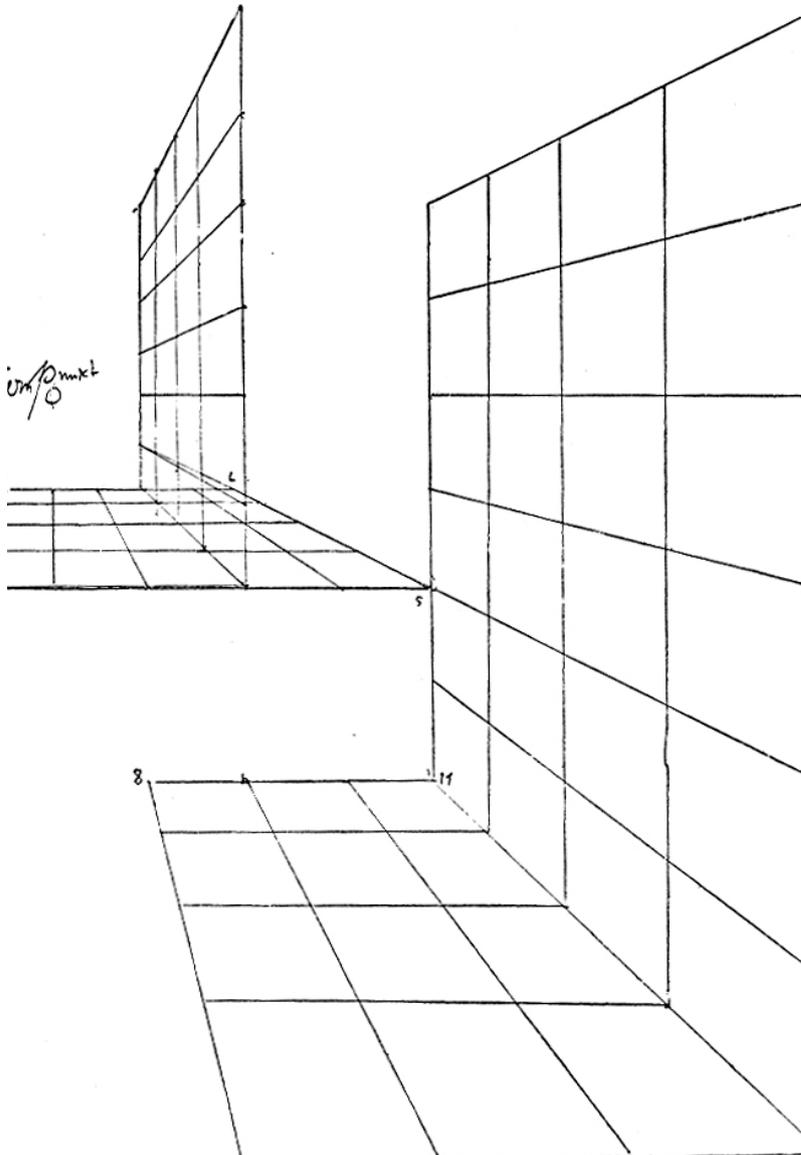


Weyer, R. (2005) This treatise aims to investigate the components of good architecture. Good architecture is appropriate to its contexts, responds to its users and lets its users respond to it. Good architecture is beautiful. Good architecture is brought about by movement and in return it "moves" us.

Good architecture can be produced in a very simple and seemingly direct way. This can be done by reducing architecture to its basic building components, the first component being volume. Volume is in turn brought about by planes being projected vertically or horizontally. Planes are lines that are also projected vertically and horizontally, with lines being nothing else but a series of points. The above concept should be nothing new and has been covered extensively in most elementary architectural literature. Yet it is in this tired concept that lies the potential to produce really good architecture. It will be produced once architecture acknowledges the fact that concepts such as spacemaking, placemaking and moneymaking are not possible without that basic element, a point.

A point responds to its context and can form any type of line, depending on where it comes from, where it goes to and where it passes through. It takes on or responds to the character of the space that surrounds it. This space, which in turn is nothing else but a conglomeration of infinite points, determines the character of the line, the plane and the volume. Yet none of the above would exist without movement. Through movement a space is observed; through movement emotions are set in motion; only when we are truly moved will something meaningful happen; only through the movement of a point will a line be generated, will a plane be formed, will a volume be created. Through movement will we be able to have "moving" architecture. "Moving" architecture is truly good.

But not all movement is good and results in architecture that "moves". The goal of this treatise is to try to establish which factors promote "harmonious movement", which factors strengthen movement and thus, which factors make for good architecture. This treatise will show how music can be used to produce good architecture.

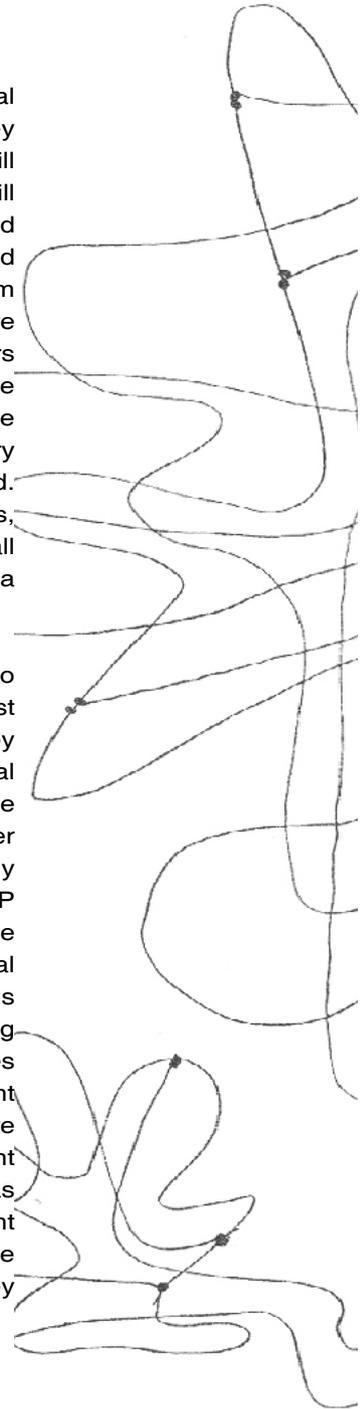


2

function

This building will function as a Centre for the Study of Cultural Economics. The centre will look at how people move (how they walk, how they react, what people like, what people dislike), will look at what makes them move and how this is achieved. It will further be concerned with the study of images (both moving and static) and how people react to these. In some cases, sound will also be added to these images. The centre will be from industry, for industry and conduct research into how culture can be an asset, all the while also educating the managers who are a part of this research. It will look towards including the disciplines of economy, culture and politics and making these work together. True problems are always interdisciplinary and only an interdisciplinary solution should be applied. People from all walks of life, from varying social backgrounds, professional backgrounds and educational backgrounds will all be made a part of the process in the building, in order to give a fair representation of society's movement.

The client in this project can easily be chosen according to certain parameters. He needs to have enough capital to invest in such a building and be interested to make even more by adapting the principles of cultural economics in its managerial strategy. The choice here has fallen on JOHNNY WALKER, the international whiskey manufacturer that has one of the stronger marketing campaigns in the heated liquor market. Johnny Walker's branding of walking and their branding of "KEEP ON WALKING" would be ideal for a centre that deals with the study of people walking. However, any large multi-national company could be sponsoring this building. All multi-nationals are looking towards getting a stronger foot into the emerging economies. In order to do this, they need to know what makes the locals move. Along with this multi-national, the Department of Arts and Culture will have a strong interest in such a venture as it enhances the arts in the country without the government having to invest too much. Once the business fraternity has understood the value of the arts, little centralised government funding will be necessary anymore. Government might also be interested in understanding its citizens and ensuring that they move amongst each other as harmoniously as possible.



University of Pretoria – Meyer, M G (2005)

The program and function of the building respond to various given conditions. Firstly, the site is situated within the “Oeverzicht Art Village”. It has a rich cultural history, with the Breytenbach Theatre and the Moonbox being situated there and a lot of other crafts also calling it their home. The site also houses the former MOTH club, which was recently acquired by the Tshwane University of Technology (TUT) and is being converted into a film school. Secondly, there has recently been a slight increase in interest of business into sponsoring cultural events in Pretoria. Examples of this might be SAPPI’s sponsorship of the “Black Tie Ensemble” operatic group and Vodacom’s sponsorship of the UNISA International Piano Competition. Corporate business is finally seeing the value of supporting the arts and realises that results that are not directly quantifiable can still be of value. This idea has been promoted by the movement of cultural economics, proponents of which are mainly situated in Europe and, to a lesser degree, in Australia.

Cultural economists profess that the classic breed of managers that have been schooled in traditional economics is not equipped to handle contemporary society adequately. A system in which managers are still taught that all people act rationally and make their decisions causally will have no opportunity to write any great gains if it continues to negate the complexities of current societies. A system where there is still a belief in a so-called “Homo Economicus” – that perfectly quantifiable human – can only understand the directly measurable and not see the benefit of the non-quantifiable. There is thus little need to support the arts, invest in human well-being and other philanthropic causes, as the benefits this has to the investor are never directly measurable. This vision has to be overhauled and replaced by something more current and likely to succeed financially. The new breed of manager has to understand that culture and happy people are fundamental to good business. When both clients and employees are moved harmoniously, i.e. they are satisfied and comfortable in their surroundings, they will start to move the company along harmoniously. They will react to their context favourably, work well and/or purchase products. This will have positive financial implications for the company. What needs to be remembered is that government is also run like a business and their interests here are very similar. It should want to move the population along harmoniously in order for the population to react to this context and move the country harmoniously, making a positive contribution to society.



3
program

It needs to be noted that buildings, by the function they contain and the spaces they are constituted of, contain all the social information that already determines to a large degree what happens in and around them. They constitute in themselves a field of potential movement and potential co-presence. A public square has a certain type of movement inherently connected to it, just like that of an arcade or a shopping centre. If a space does not cater for the type of movement it is designed for then this will cause a reaction in the opposite direction. Users will try to force a kind of movement on it, causing the natural balance of the space to be shifted. If a taxi rank is designed that does not have enough parking or places for the taxis to offload their passengers, the taxis will take over pavements and knock down bollards in order to stop.

Buildings and the spatial configuration their function entails either restrict or generate social relations. A strong genotype, as discussed by Hillier, elicits strong behaviour. Although society may be seen as a dematerialised genotype, the way in which it is projected through time and in space is certainly not dematerialised:

“The material form of society as a system of relations at a point in time is not that society and certainly not its structure, but by being a realisation of the underlying genotypes of society. The material form is the means by which the society as an abstraction is realised in space and time and then reproduced. Society is not in itself its material form, but even so only exists through its material form.” (Hillier: 403)

The building also needs to be a space-time realisation of an abstraction, which governs the form of the building. The line of movement, which is an abstraction of human action and perception through different spaces, needs to be accommodated in the form of the building. This building should, by giving form to this abstraction, give it the realisation that enables it to be projected in time.

This brings us to the program of the building, which will be a centre for the study of cultural economics. Going in line with the context of the film school and the principle of movement, it will investigate how images, both static and moving, move people. The purpose of this is to get a better understanding of people and know how they act and why. It will soon be realised that the arts, in this case the visual and to some extent music, have a significant contribution to make in human behaviour. By observing this the managers can understand both their employees and customers better. They will realise that culture, as a non-quantifiable entity, is much more powerful in affecting people than any forced and aggressive management strategy. A “cultural” strategy has the very non-economic effect of actually being meaningful to all without wanting something directly back. When people are understood will one see what makes them move harmoniously, which means they are content and when they are content will they react positively and will the investment show a return more significant than most conventional economic model. There is thus a vital social component without which the whole model cannot exist –once there is invested into society for supposedly self-less reasons will society repay this investment.

Filming will be used both to observe people in their everyday activities and also to observe people observing the film that has been shot in the Centre for the purpose of testing behaviour. It can be observed how the combination of visual art and sound can move or influence people. There will be a constant process of studying people, analysing filmed material, producing new material for testing, studying the behaviour again and then analysing the results in order to produce more film material. The process is one of getting information from the streets, analysing it in the building, producing a response there and getting it out on the streets again to test it. For this purpose there needs to be a big projection screen outside and at the main node of pedestrian movement to test this response. During the entire process the managers/students are involved hands-on in understanding what moves people, how they can be influenced positively, doing something good for society. They will realise what a vital role the arts can play in getting a larger return on investment than most conventional model of economics.



4

components

The different components of the centre and program will be the following:

COMMUNITY WORKSHOPS

The community will be included in the process by letting them take part in the filming process, letting them act, perform, make props and assist in filming. By doing this they are also taught skills of acting, music and filming, which they can take out into the market place. Additionally, this is a perfect ground for studying movement of people as they work. Without this social component the whole process will lose its spontaneity and input from the public.

FORMAL AUDITORIUM

The auditorium will fulfil the role of lecture hall and projection facility. Here the entire team can look at the raw information that is received from the outside and determines its validity and further use. Outcomes and the goals that are striven for will be discussed. All material that seems fit to be sent further will get sent to the next zone.

ARTISAN WORKSHOPS

There will have to be some resident artisans, like painters, metal workers and carpenters that manufacture the props necessary for the filming process. After the session in the formal auditorium they will be told what to manufacture for use in the next filming process. They will also share facilities with the Breytenbach

Theatre, for example, the prop store and workshop. It is also important for a lot of their activities to take place outside in the public square, so that the public can share in the process of making and maybe even learn some new skills. These artisans will also live in the building, to save on transportation cost and to have a permanent, resident staff.

EXPERIMENTAL FILMING AND IMAGING ZONE

The material gathered outside will be analysed and discussed, and decisions are taken on what else can be tried outside. Everybody will take part in this process, from the technicians, to the students to management, as well as temporary students that join on a part-time basis and take part in discussions and workshops. In this part of the process, it is decided what to take further and refine in the dark room or send back outside to do more tests.

DARK ROOM AND BASIC EDITING

A dark room and sound studio are needed to create the perfect conditions for filming more specialised and finer work. In the previous zone it was decided that there is some material that can now be refined even more. This will be filmed under perfect conditions, edited basically and sent back to the previous zone for scrutiny and approval of whether it confers with what was intended there. If it confers, it will get sent to the next zone, if not, it will be redone and sent back and forth

until it gets final approval.

ANALYSIS AND DISCUSSION

The material from the dark room and basic editing that has been approved by the experimental filming and imaging zone will now be analysed and discussed from a movement point of view. This does not mean looking too much at the imagery itself, but rather at the content. It decides whether that material can be used to test movement outside and whether it conforms with the outcomes that were striven for at the briefing session in the formal auditorium. If it does, it gets sent to the next zone, the final editing; if it does not it may be sent back to the dark room and basic editing.

FINAL EDITING

When all the material that has been discussed, filmed and analysed reaches this zone, it is given the final polish and edited in so that it can be sent out to the public. Previous zones were concerned with the content and the proper movement in the film, but this zone is concerned purely with the visual and whether the quality is good enough. Upon completion, it is sent back to the formal auditorium

FORMAL AUDITORIUM

At this point, the final images are sent back to the auditorium and are presented to the entire team. They are tested against the outcomes that were decided on at the beginning and whether they are fit to be sent

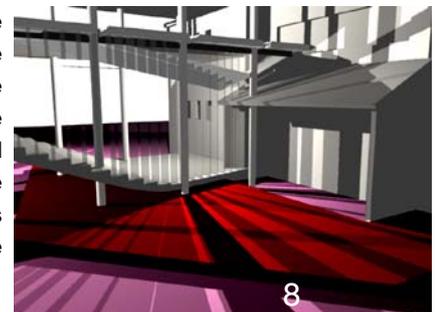
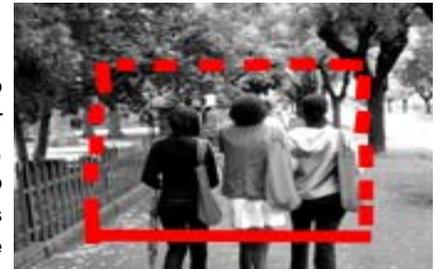
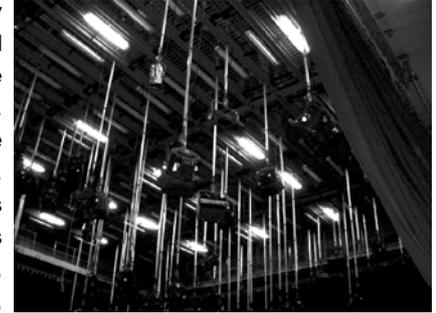
out into the public. Again, as in every zone, the emphasis is to be involved and, by doing this, learn the vital role images can play in moving people. Discussions are vital during every zone and only a hands-on process will work. It is also vital to include team members from as many varied backgrounds as possible, for example, the managers, film crew, editors, actors, artisans, artists, musicians and public.

INFORMAL AUDITORIUM

Before the final material is sent away to the general public, it will be shown for the last time in an informal auditorium, where members of the public will also see it. These will mainly be participants in the community workshops that were involved in the process. From here the information will finally be sent away to the public, mainly to the main projection screen on the public square, but also to other temporary screens. Here it will be shown and used to study the effect of this on the movement of people and create further information to be sent to the formal auditorium again to start another cycle of the program.

OFFICES

There has to be some administrative component and organising structure behind the centre and therefore some offices are needed. This is also where the link to business will be kept and where the implementation of the information and the economic gains this cultural economy has will be discussed.





RESTAURANT/CANTEEN

The restaurant and canteen will fulfil the very pragmatic need of supplying food to the workers, while generating some income by selling food to the public. Beyond that, these will be very important as informal discussion zones, where the different parties can meet to have unforced discussions and to learn about and appreciate each other's roles.

ends, there will be some form of communal or open space, where interaction between people of the different zones can take place. This is between people of different expertise and people of different social standing. Open space should not just happen, but rather be seen as a critical design element that needs just as much attention as other filled spaces of the building.



PERMANENT ACCOMMODATION

The artisans in the workshops will be accommodated in permanent accommodation, the size of which will depend on whether it is for single or double occupation.

TEMPORARY ACCOMMODATION

Temporary accommodation will be for the use of anyone in the building that might have to work longer hours. This is usually the case in the research fields where longer experiments can take place that need to be finished in a certain time period.

OPEN SPACE

In line with the theory of cultural economics, open space is regarded as vital to the process of the building and not as a waste of money. It is an important component and will be placed on the edges of the building and between processes. Wherever two processes overlap or one process

ACCOMODATION SCHEDULE

WORKSHOP: 2 double and 2 single

COMMUNITY WORKSHOP: 3 permanent staff and varying amounts of participants of up to 50

EXPERIMENTAL FILMING AND IMAGING ZONE: 4

DARK AND SOUND ROOM: 6

BASIC EDITING: 3

ANALYSIS AND DISCUSSION: temporary, depending on students

FINAL EDITING: 5

OFFICES: 6 and 3 secretaries

RESTAURANT/CANTEEN: 12

This is just the permanent staff and does not include the temporary students or managers that take part in the processes, the numbers of which may vary over time.

5
schedule

6

zeppelin university

Zeppelin University

The Zeppelin University (ZU) is a privately funded university situated in Friedrichshafen at the Bodensee in Germany. It offers courses in Corporate Management & Economics, Communication & Cultural Management and Public Management & Governance. The goal of the institution is to educate a new generation of managers in and amongst economy, culture and politics so that they can deal with the complexities and contradictions in these changing fields. This can only be done when the cultures, the connections and the inexplicable of the environment of the field of activity of these managers is understood.

Research is often done on-site in businesses, museums, publishing houses, theatres and city halls. Questioning and questions are seen as the centre of scientific inquisitiveness. Innovation is only possible somewhere in-between these disciplines and it is only possible when these disciplines are mixed. Real problems are seen as interdisciplinary.

The university is financed privately, with an increasing number of companies and individuals realising their social responsibility of supporting innovative and efficient education institutions. The ZU has a wide pool of partners in economy, culture and politics, amongst others, BMW, DaimlerChrysler, Deutsche Telekom, CGE&Y, General Electric, Oracle and Porsche.

The ZU is a good example of private funding that has realised the responsibilities it carries in respect of furthering society and investing in culture without needing direct reassurance. A new breed of manager is needed for a new type of society, a manager that understands what moves people and how to tap into this movement.

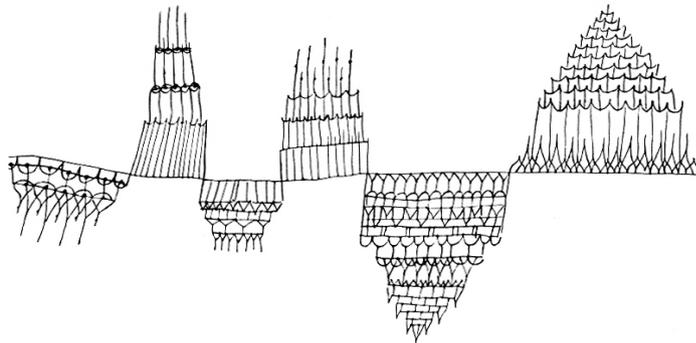
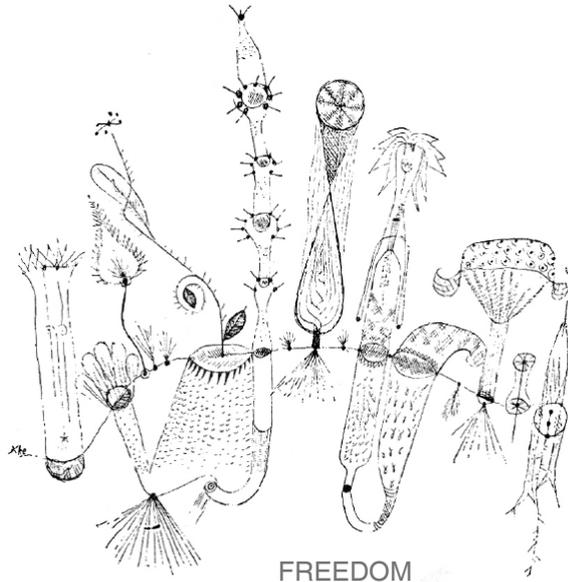


view over the Bodensee



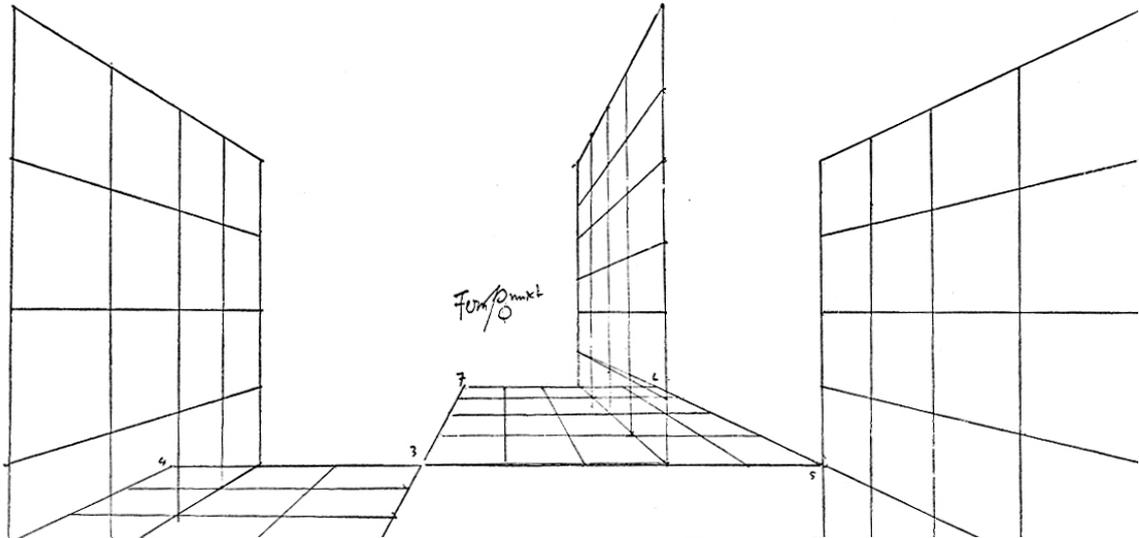
founding president Stephan A. Jansen





Examples of Paul Klee's experiments with points giving birth to other points and forming a line. What is important to remember is that each point must respond to its context and form a line that reflects this character. A point that is disciplined will bear disciplined points and the resulting line will look thuswise. So too will a more free point bear other free points and lines.

The same must count for architecture where the points have to react to their context, like climate, topography, etc and result in lines, planes and volumes that have this character and architecture that is truly contextual.



Both musical analogy and the so-called “constructive principle” - the practical translation of music in architecture - have for years been employed by architects and designers to try and incorporate the spirit and organizing principles of natural law into their art. The designers were trying to infuse their work with the air of freedom, the boundlessness that can only be reached when nature and her governing principles are explored by means of music. E. Morris (1996: 66-74) discusses this eloquently.

The similarities between music and architecture, and thus the roots of art, can be traced back to Pythagoras (582-496 B.C.) and his experiments with chords. He realised that certain “pleasing” chords or intervals can be expressed mathematically by simple ratios. He discovered this by letting hammers of different weights sound at the same time and producing harmonic or dissonant sounds depending on certain ratios of weight. The same was also applied to the ratios of lengths of different strings plucked at the same time. He came up with simple ratios of unison (1:1), octave (1:2), fifth (2:3) and fourth (3:4), which can either be the relation of different weights or string lengths to one another. These intervals are seen as stable and pleasant. The idea of “Harmonic Proportions” was important to Pythagoras and most applicable in terms of his aesthetic idea. He felt that these simple harmonic and strong ratios in music should be transcribed to architecture. He viewed these “Harmonic Proportions” as a

Music is governed by and stems directly from nature. Like the Greek Orders were a reflection of nature, so music has been in search of ultimate harmonic proportions and it is probably the art form that has gotten the closest to achieving this. For this reason, music is often seen as the teacher of the other arts - music, the most divine and free of arts must become the teacher of the worldly and most materially bound art of architecture!

7

background

“[M]usic dominates, reigns actually, harmony; and harmony itself reigns over all things.”

Le Corbusier, 1949

Images from top to bottom: Thanasius Kircher - allegory of the divine principle of harmony, 1650 <> Pythagoras and some of his principles of musical harmony <> musical intervals at Chartres Cathedral as by Loius Charpentier (right) <> architecture as rhythm, Claude Brogdon (left)

“Music, to which architecture responds among the various forms of the plastic arts, is freed from the requirement of portraying actual forms or figures...[It is] separated from matter. Architecture, however...if it is music, then it is frozen music.”

Friedrich Schelling, in “Philosophie der Kunst” (1859)

direct translation of nature into music, that these are the proportions that surround us and that they are the ones that immediately feel pleasant. They formed us and we were used to them from the moment that mother earth received us. Vitruvius Pollio (84 – 14 B.C.) was another significant writer on the desire for building to follow the rules of musical theory, with his “Ten Books on Architecture”.

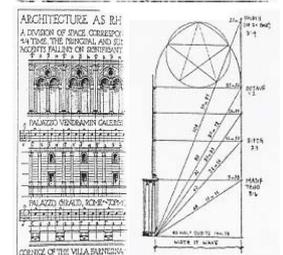
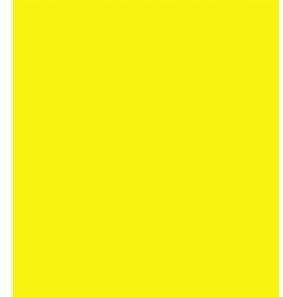
In the ninth century St. Augustine realised that in polyphonic sacred music certain intervals sounded better together than others, and introduced this theory together with the theory of “Harmonic Proportions” into his treatise “De Musica”. He also took the Pythagorean idea of harmonic intervals further and ranked intervals in terms of their degree of consonance and mathematical simplicity. He noted that dissonant (or mathematically complex) chords or intervals had the tendency to be resolved in constant ones. “To contemplate geometry in architecture and music is to lead the

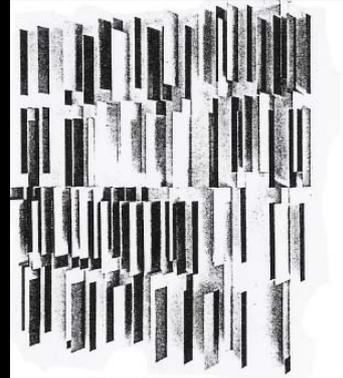
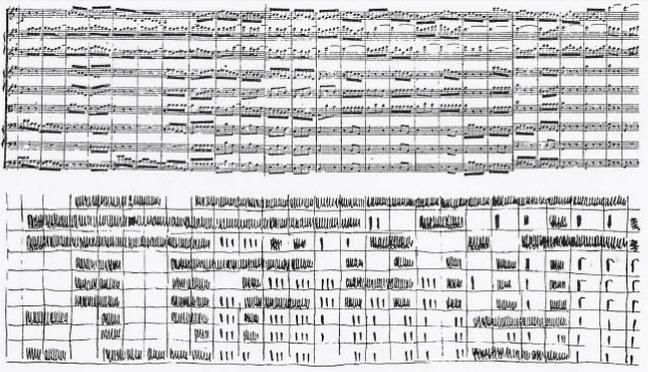
mind from world of appearances to understanding of divine” (Morris,1996: 67).

These harmonic proportions found wide acceptance in Renaissance builders who worked in simple ratios, as in the work of Andrea Palladio (1508-1580). Analysis of facades has been carried out numerous times to prove these points.

The Enlightenment brought about an even stronger desire to explain almost everything. The context for the application of these harmonic principles was adapted to adhere to scientific methods and thus reduced to a merely quantitative context, stripping it of its beautiful quality and becoming a mere curiosity.

This state of affairs prevailed until the German Romantic philosopher Friedrich Schelling (1775-1854) called for a return of rhythm in architecture, and thus the expression of the ideal of nature in art, in his book “Philosophie





left: Claude Charpentier-rhythmic study of J.S.Bach's "Brandenburg Concerto"

right: Joan Sau-grain-graphical translation of a piece from Bela Bartok's "Mikrokosmos"

der Kunst" (1851). Schelling was indeed the first person to coin the phrase "frozen music", and not Goethe, as is generally believed. Romanticism portrayed this return to harmonic proportions, to music and thus to the originator in the form of nature. This can be seen in any field of the arts, be it painting, with its vast landscape paintings, or literature, with long and eloquent descriptions of nature. This was the time of a mature Beethoven, of Bruckner, Brahms and Schubert, with music that bleeds nature. It was thus no wonder when Beethoven called his sixth symphony the "Pastoral" and described the celebration of a storm in it. Bruckner's fourth paints nature and was named the "Romantic" by him. Many other examples could further be mentioned.

In the mid twentieth century, the author Claude Brogdon developed this idealisation of nature even further, when he asserted that all matter wants to be an expression of natural law. It can be concluded that the tool to do this with

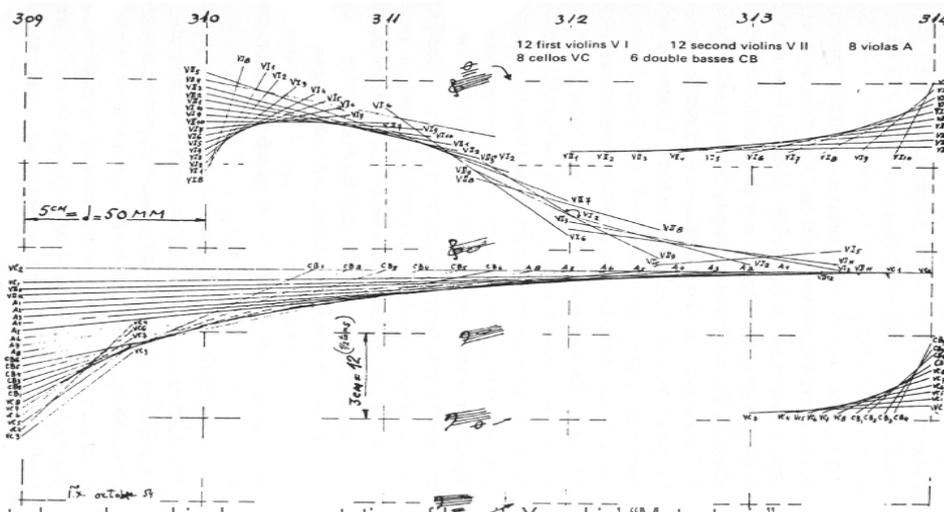
most adequately is music, because it is the source of natural proportions, is not hampered by physical matter and can still express the ideal without inhibitions. Increasingly, artists also felt the need to analyse the graphical qualities of music in their artwork and architecture soon followed suit. In 1952 Claude Charpentier was one of the first to draw abstractions between architecture and music by comparing the elevation to the score and by representing these rhythms in the music as densities of ink on the paper. He differed from the purely analytical mindset and followed a rather romantic view in the sense that he only let the rhythms influence him and did not transcribe them directly into his work.

This is where the Modern finally differed with the stern Enlightenment. The Modern Movement in essence is just an extension of the Romantic and, no matter how analytical and scientific it might have looked on the surface, the only striving was that of living in harmony with nature and thus in harmony with the harmonic

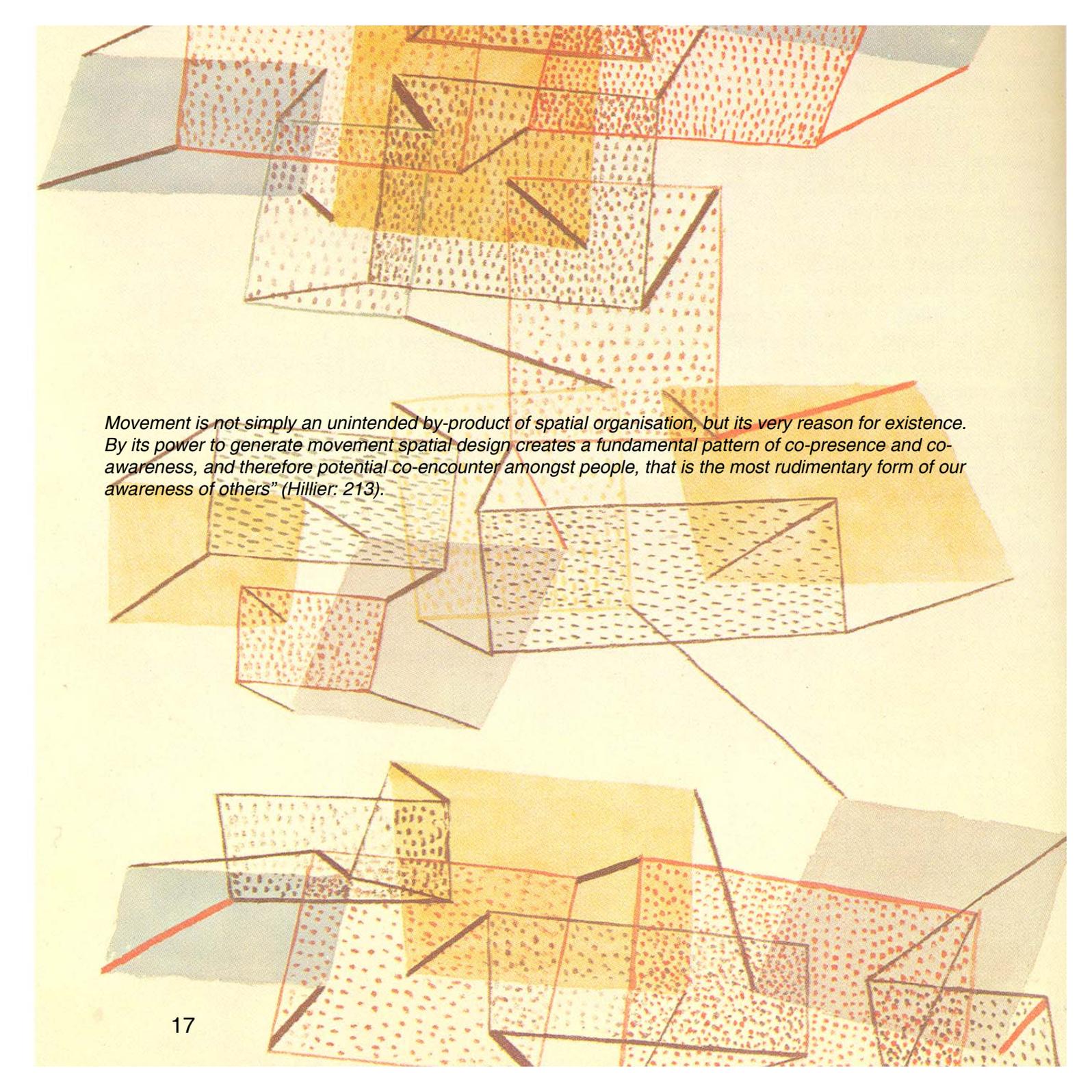
proportions dictated by her. Charpentier was followed by Douglas Haskall in 1960, when he suggested that architecture should take advice from Jazz and introduce off-beat rhythms and dissonant intervals. This came into fruition only later, with the advent of Deconstruction. In the 1940s and 1950s John de Cesare sought to represent music visually in space and developed the “sound unit”, where duration was represented architecturally by scale. In 1964 Joan Saugrain went even further and showed the structure and relations of a piece of music by decomposing it. She used coloured planes (pitch = height and colour; duration = planes in base and treble lines; musical harmony

= reflecting surfaces of horizontal planes) to analyse a piece by Bela Bartók.

The first proper collaboration between an architect and a mathematician\ architect\composer was that of Le Corbusier with Iannis Xenakis, finding its climax in the design of the Phillips Pavilion, where they sought to translate the continuity of space in time in a structure. Frank Lloyd Wright must also be mentioned in this context, as he sought to relive the romantic idea of finding the ideal proportions of nature in an almost romantic manner by looking for “rhythms and syncopations” in his work. The twentieth century architect Bruce Goff also saw music as the key to absolute architecture.



study and graphical representation of Iannis Xenakis' "Metastasis"

An abstract architectural drawing featuring several overlapping, three-dimensional rectangular volumes. The volumes are rendered in various colors and patterns: some are solid yellow, some are light grey, and others are covered in a dense pattern of small red dots. The drawing uses perspective, with lines converging towards a vanishing point, creating a sense of depth and movement. The overall composition is dynamic and layered, suggesting a complex spatial organization.

Movement is not simply an unintended by-product of spatial organisation, but its very reason for existence. By its power to generate movement spatial design creates a fundamental pattern of co-presence and co-awareness, and therefore potential co-encounter amongst people, that is the most rudimentary form of our awareness of others" (Hillier: 213).

The question of what is to be done with the previous section's historical information remains. Is there really a need or place for musical analogy in architecture? Does it serve a purpose other than that in the Enlightenment, where it was used merely as the pinch of salt in the soup of general curiosity in a time of general interest for anything analytical and scientific? In current times, where nearly no trend is left out and anything goes as far as processes in architectural design are concerned, can it still be used as a fundamental tool in the analysis and the making of cities and the architecture within them?

E. Toby Morris introduced the concept of "Constructive Translation", where music is translated in order to include experiential qualities of music into architecture. Very little fundamental research has been done in this field and very few theoreticians have looked at music as a whole, "as an art bound by acoustical perception and consisting of distinctive underlying elements, structures and organizational elements" (Morris, 1996: 70).

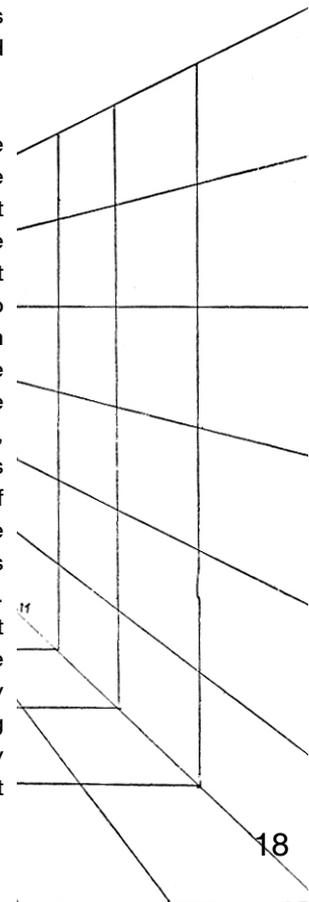
An important element to be introduced at this time is the principle of movement. This is one place where architecture and music can meet most effectively. Movement is still the common ground where time in music and space in architecture meet. Music

is the expression of sound over time, and architecture, according to Le Corbusier, the "correct and masterly play of masses brought together in light" (le Corbusier, 1927: 29). Together with this, music may occur sequentially and spontaneously, with discrete, yet distinct, beginnings and endings. Parallel to this, architecture can also be seen as a sequence of spaces that get moved through and are perceived with a mixture of senses, which makes the perception much more subtle and difficult.

Yet this also makes the impact more powerful. The elements that these two have in common is the fact that they meet over time, change over time and are both dependent on movement in time. Whereas Morris neglects to see time as a unifying factor between both, Siegfried Giedeon notes that the Modern era has bridged the gap of mere space to include time as well (Giedeon, 1976). Movement in art had for years been hampered by the stronghold of the perspective, as the perspective did not allow for movement due to its over-emphasis on space and not time. Depth alluded to visual movement, but that classic idea of space and volume was also limiting the perception to only the visual and not the physical. Feeling and emotive responses were largely ignored and the aspect of time was not taken into consideration.

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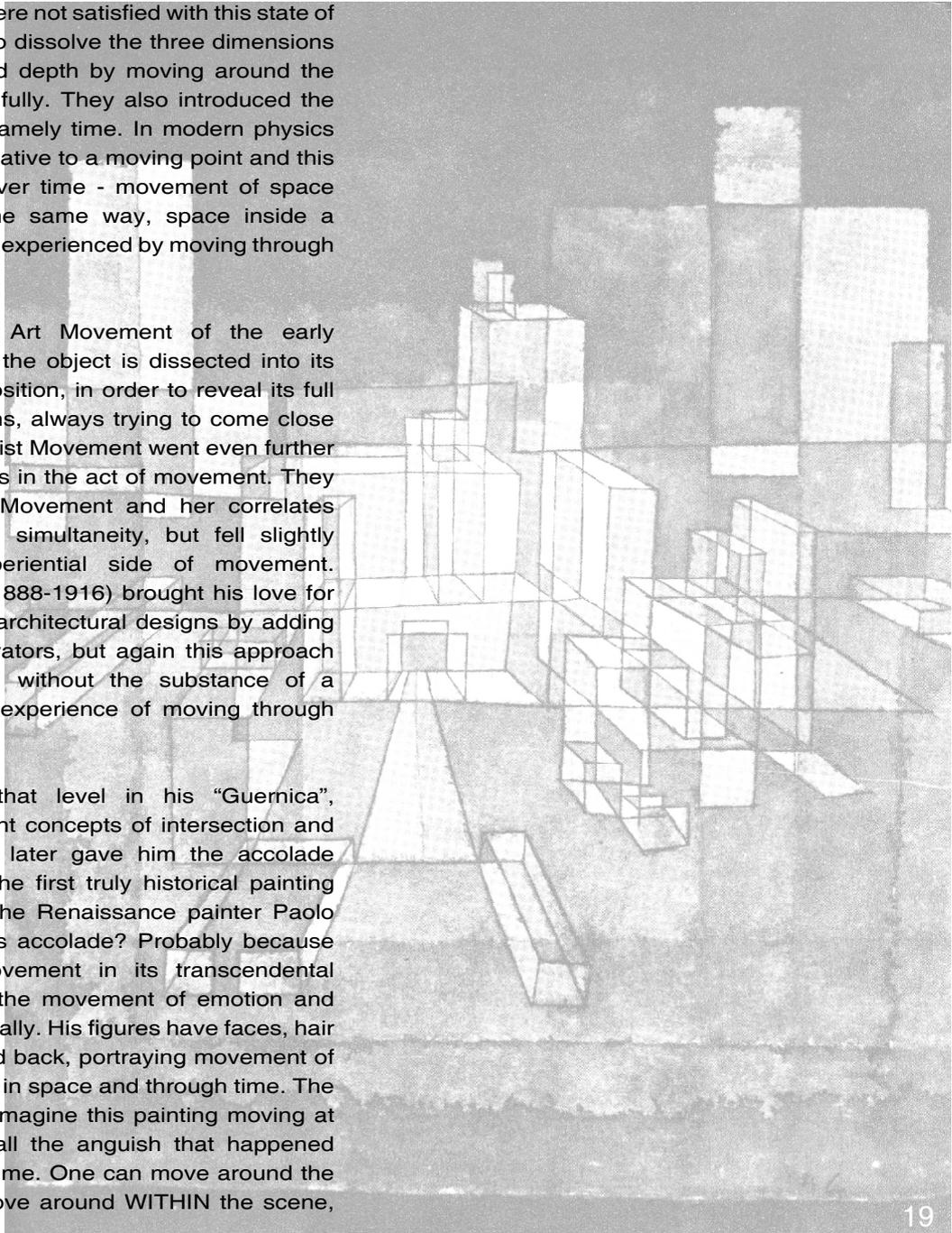
movement



The early Cubists were not satisfied with this state of affairs and sought to dissolve the three dimensions of height, width and depth by moving around the object to explore it fully. They also introduced the fourth dimension, namely time. In modern physics space is seen as relative to a moving point and this can only happen over time - movement of space through time. In the same way, space inside a building can only be experienced by moving through it, through time.

As in the Cubist Art Movement of the early Twentieth Century, the object is dissected into its parts and its composition, in order to reveal its full harmonic proportions, always trying to come close to nature. The Futurist Movement went even further and depicted objects in the act of movement. They wanted to portray Movement and her correlates of intersection and simultaneity, but fell slightly short on the experiential side of movement. Antonio Sant'Elia (1888-1916) brought his love for movement into his architectural designs by adding fast roads and elevators, but again this approach seemed too literal, without the substance of a Cubist call for the experience of moving through space through time.

Picasso reached that level in his "Guernica", relying on movement concepts of intersection and simultaneity, which later gave him the accolade of having painted the first truly historical painting since the work of the Renaissance painter Paolo Ucello. But why this accolade? Probably because he understood movement in its transcendental quality, to capture the movement of emotion and not translating it literally. His figures have faces, hair and neck all swayed back, portraying movement of bodies and emotion in space and through time. The viewer can almost imagine this painting moving at him, experiencing all the anguish that happened in that space over time. One can move around the scene, or rather move around WITHIN the scene,



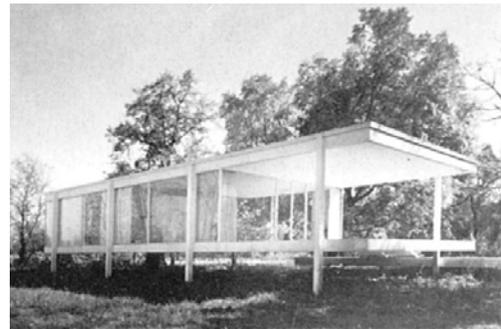
merely because of the fact that that space has been portrayed relative to a moving point.

The effect of this on architecture was amazing. For the first time in a hundred years, Art and Technology started to move parallel to one another again. The findings of the Cubists were proven by science and artists and architects in turn were embracing the new findings in science. Robert Maillart brought back movement into his engineering designs by designing bridges that were both visually moving - through the lines and the planes that were employed - and also structurally moving by employing only the minimum number and size of members needed. This meant that loads and their movement could flow through the whole structure and every member. Every member is now needed to spread the movement of forces and there are no dead and obsolete, lifeless and movement-less members anymore. As Picasso put flowing planes on paper, so Maillart put planes and moving folds into his architecture. Glass was the new material and meant the flowing visual movement inside and out of a building. Fewer structural members were used to increase movement inside a building and make volumes flow into one another.

It must not be forgotten that this Modern form of movement stemmed out of a deep Romantic reverence for nature and the movement within her. When Mies van der Rohe puts his Farnsworth House on stilts to cater for the flooding of the site and when Le Corbusier places his buildings on pilotis, the reasons for these stemmed from a deep understanding of the respective sites, lying within nature and catering for the locally prevalent movement. Working within context and regarding the site and its location means little more than wanting to keep the natural movement of the landscape in harmony. This by letting the site move through the building, letting the eye move through it, reacting emotively to the moving through that space in time. The will to let nature move about freely is to let the harmonic proportions within her move about freely and uninhibitedly. Since music is the closest vessel for the movement of those harmonic proportions, movement in



interior of le Corbusier's Villa Savoye



Mies van der Rohe's Farnsworth House

architecture can become experiential when it starts benefiting from the movement within the space of music, in time. More specifically, it is the **perception** of movement that brings quality to these two disciplines and movement brings change and thus interest. Whereas architecture is often fixed, or rather **perceived** as being fixed, movement might make experience more dynamic.

The fault must not be made of thinking that this movement is always blatantly observable. Movement comes about by the arrangement of spaces in such a way as to elicit certain responses from the visitor, like Le Corbusier had his “promenade architecturale” to arrange spaces along a line of movement and elicit responses by designing volumes, forms, finishes to bring about emotive responses through movement within time. Likewise, the movement within music brings about similar responses over time, where the spatial qualities are arranged in such a manner as to draw the reader and the listener into following the line of movement and responding to those experiences through time.

Heidegger sees being, or rather being in the world (“in-der-Welt-sein”) - which is to be one of those points on the line of movement and perceiving those qualities along the way - as

a state that is always dependent on time. Being always looks ahead at death, looks at its life as a whole and also has historical roots. Perception is also important and Heidegger includes the factor that time has to play in perception. When one walks around a table, for example, one gets different visual impressions that are grouped together systematically and through “Retention” or the remembering and recalling of previously viewed aspects of the table one reaches a synthesis in the form the image of a table should assume: a brown, rectangular plane on four feet. Now this table is not just any table, but THAT table in THIS space, the one I am reading this dissertation at, the one at which I wrote a letter to that difficult client. I see them as defined for me, and space and time fuse and enter into a dialectical nature - through the movement through the space the table sits within the time it happens in.

But time is, as mentioned, also referential both forwards and backwards. It brings about hopes of what will still be done on that table and memories of what has happened on that table in the past. Together with this, the table does not sit in isolation in this space and also refers to objects surrounding it. It is positioned far from the window, the window through which I can see my children playing in the garden, the garden in which I mowed

space is the machine

the lawn this morning. The table is the one I have written the book at that now sits on the shelf that is on the wall next to it. Again, all objects in space refer to one another and only movement in time and through space makes this relationship evident. “Protention” (looking to wards future experiences) and “retention” (recalling of past experiences) are necessary in order to become aware of the flow of time during experiences. To realise that what has been experienced in the past will build on any experiences that are currently being made and that will be made in the future.

A problem occurs, when the user becomes part of the space, without being aware that the everyday is a continual flow of experiences building up to future experiences, from past experiences. The user of a city will stop being aware of his surroundings, aware of the influence he has on the surrounding objects and will eventually become unaware of himself. This is a deplorable state to potentially be in, but it is also not far removed from our daily urban existence.

The only solution to this, is to draw attention to the everyday, point to the unobtrusive and go into a relationship with it. This new kind of perception is only possible by bringing planned movement into the city. Few will disagree that Pretoria has energies

moving through and within it, but this movement is not very ordered and aware of space and time. When someone is situated in, or is part of, a system that has been designed to move about harmoniously, then the pointing out of the everyday and the unobtrusive becomes possible. This makes the experience of the self as part of the city, as part of the surrounding objects, possible and the interacting nature of space and time is restored. As Bill Hillier puts it: *“Movement is not simply an unintended by-product of spatial organisation, but its very reason for existence. By its power to generate movement spatial design creates a fundamental pattern of co-presence and co-awareness, and therefore potential co-encounter amongst people, that is the most rudimentary form of our awareness of others”* (Hillier, 1996: 213).

The consequence of this interaction with others is that movement results in another implication. Although many people might disagree with this fact, architecture has the potential to disease a society, which the people of the society contract from the symptoms of poorly designed spatial configurations. If an area has started to attract a bad name then this has two results: firstly, many people will want to leave that area and, secondly, be replaced by those (and their respective practices) that gave that area the bad

name. This will then start or accelerate social decay.

The French author Honoré de Balzac in his “Comédie Humaine” sees the social species as a product of their milieu. It should be widely accepted that there is a direct relation between behaviour and spatial configurations. Unlike practices in the field of Social Engineering, I cannot share the thought that there is a direct mechanistic relationship between the individual and his environment, something that is directly quantifiable. Humane science, in other words the quantification of the human and effects on him, is in fact an inhuman deception.

Hillier put this aptly in noting that spatial configurations are to be used to have a response “from space to people and from people to space” (Hillier, 1996: 226). There is thus a social effect that architecture has, not in the building itself, but in the space that is created. “Space is the Machine!” (Hillier, 1996)

Hillier (1996) discusses three concepts:

- as spatial elements the parts of a building are difficult to differentiate
- parts of buildings do not move
- people move, independently and impulsively and not prompted by the building

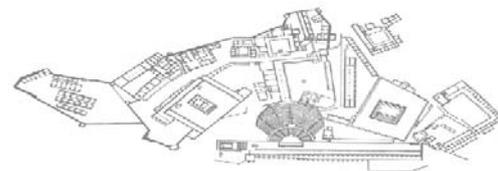
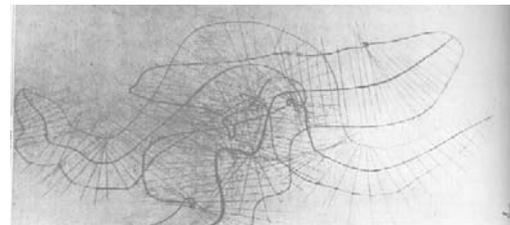
In any building there might be similar spaces, which all seem to have the same effect as the others, but it is the configuration of the different spaces that has a huge effect on the space and the movement through it and

can either stifle this or encourage it. Buildings - by the function they contain and the spaces they are constituted of - contain all the social information that already determines to a large extent what happens in and around them. In themselves they constitute a field of potential movement and potential co-presence.

A public square has a certain type of movement inherently connected to it, just like an arcade or a shopping centre would have one. As mentioned before, if a space does not cater for the type of movement it is designed for, then this will cause users to react in an opposite direction, resulting in a shift of balance. In all these cases, it is not the building that causes this movement in time through space, but rather the space and its spatial configuration that elicits and promotes movement.

On a more practical level, there will be many spaces with underlying functional requirements and these have to be met by the designer, but then any space is composed of certain elements and the dynamic characteristics of musical movement can still be installed in any space by the determined and concerted arrangement of form, space and light. The following should be heeded in order to bring about this form of movement through space along time:

- Architecture needs to suggest music’s metrical accentuation through formal accentuation or distinction. This might be done by the arrangement of windows or columns in a certain rhythmic pattern and



comparison of movement systems in the city of Pergamon

just like music accentuates certain notes in a certain way and at certain intervals, so architectural elements are used to accentuate the path that architecture moves along.

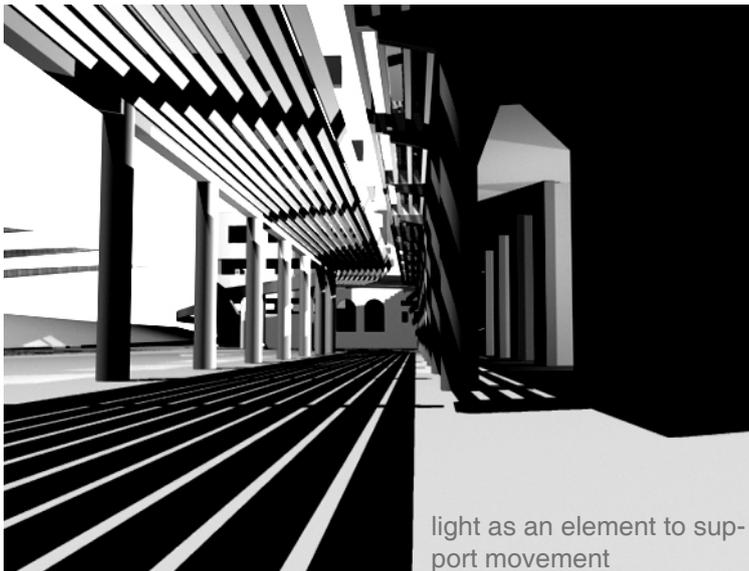
- Architecture needs to simulate movement through the interweaving of spaces and observed form and materials, maybe by changing the size of different spaces that follow upon each other on the promenade, letting them flow into one another, change the balance of a certain room, change the finishing and have a constant play of different scales.

- Light is an important factor in simulating movement in a space, as this is how the space is brought to life and how the feeling moves along

with the changing of natural and artificial light. Changes of light along the line draw the visitor along it and build up to something and it is this kind of movement that is wanted.

- Choice of material and surface treatment are important in creating movement through space. This could include things such as texture, colour, light, acoustic properties.

- Architecture needs to stimulate or attract senses other than sight to bring in an overall response by the visitor of the spaces and make him react to his surroundings. This might include touch, hearing, smell and even taste. Senses are the forces by which experience is moved through space in time.



light as an element to support movement

What must be noted here is that in all of these guidelines there is to be no overpowering of the senses. It is desired that the entire person becomes part of the architecture and reacts to it in his whole being, but this will only be possible if the architecture is also able to stand back and create a simple sheet of music for visitor to read easily. Of course, there might be parts where there will be overpoweringly different forms of movement, but this can only work if there are times of rest, pauses in the score, times to reflect on what is being played in the architecture.

pitch

duration

loudness

9

components

As Morris (Morris, 1996: 70) notes music is composed out of basic acoustical elements. All of these have correlates in architecture.

Pitch: This refers to the highness or the loudness of a sound and the comparison in architecture would be the level of noise a space makes in terms of colour and light. Just as vibrations in sound result in pitch, so do vibrations in light and the more vibrations in light there are the brighter and louder the colour is. To create movement through space pitch must be employed sensibly to either attract or push away the visitor.

Duration: In music this would be the temporal length and spatial length in architecture.

Loudness: This is the intensity of the sound and creates a pattern or story as it changes over time. Like a crescendo, decrescendo, glissando or other music marks change the loudness of a piece over time (be that gradually or instantly), so architecture will be well served with a good balance of loudness. This could be the transition between different volumes, forms and spaces of loud and silent.

Timbre: The same note of music can sound differently by changing the instrumentation. In architecture, colour, texture and finishing are all “instruments” in their own right and have their characteristics to add. When transcribing a piece of music into architecture, such a palate of materials is chosen.

Rhythm: This is a very prominent factor in music and during which the listener is prepared for something to come. Rhythm can build up to a climax or be the stabilising factor behind a composition by creating or releasing tension. An architectural composition will be enriched by the proper employment of rhythm for these purposes. It creates the necessary balance needed. The rhythmic aligning of columns or spaces, varied articulation of forms or components and the hierarchy of elements might do this.

Harmony: Music needs harmony and blending of tones to create musical space, depth of experience and a certain mood. The Platonic idea of

timbre

rhythm

harmony

intervals has been discussed and both consonance and dissonance have parts in the composition. Rhythm and the balance of these factors are important to create tension or to release it. In architecture one must look at the composition of spaces - materials and volumes that make these up. The spaces have to be well balanced and form a harmonious (or in certain cases dis-harmonious) whole to elicit a certain response from the visitor.

Phrasing: Like phrasing in a piece of music, where certain parts are treated in unison, so materials might be grouped together. Openings along a wall or a plane are also grouped into motifs that repeat over time and according to a rhythm. Organization and variation are integrated into architecture for the proper translation of melody, harmony and rhythm.

Orchestration: An understanding of the instruments and their characters is important. Like each instrument has its own character and role it can play,

so certain materials can only perform certain tasks. Materials should be used in a manner that is true to their character.

Proportion: Following through from Greek musical theory to contemporary composition, this is one of the oldest unifying factors between music and architecture. It is also a tool for translation from any art to the other and still have measurables that are quantifiable. Yet, it does not exclude the imaginary and qualitative.

Melody: This is a line consisting of sequences of pitches of distinguishable height and rhythm. The shape of this melody has direction, rises and falls, expands and contracts. A score as a musical line can describe shapes in the minds of the listener. Architecture is no different. It creates forms that rise and fall and evoke feelings of the visitor by creating a melodic horizontality.

phrasing
orchestration

melody

proportion

After it has been established that the common ground where music and architecture meet in time and through space is movement, this movement has to be examined closer. Movement in all its forms occurs only linearly, since there is the factor of a point moving at a certain time in a certain geographical location. Every point has its own characteristics, plays its own note on its own instrument. Every point gives birth to another point, due to the characteristics of the point and thus a line is created.

A line is nothing more than a continuous movement of points, giving birth to more points. The characteristics of these points depend on the characteristics of their parent point, as they will react, be that in rejection or acceptance, to the point that created them.

To understand this architecturally, the process of “arborescences”, a concept introduced by Xenakis in his compositions, must be considered. The city has already been described as a tree (whereby others have asserted the opposite, albeit on completely different grounds) and likewise the movement patterns in a city, when put in as lines of the composition, can branch out and form an intricate form of simultaneous linear movement systems. The process is very simple:

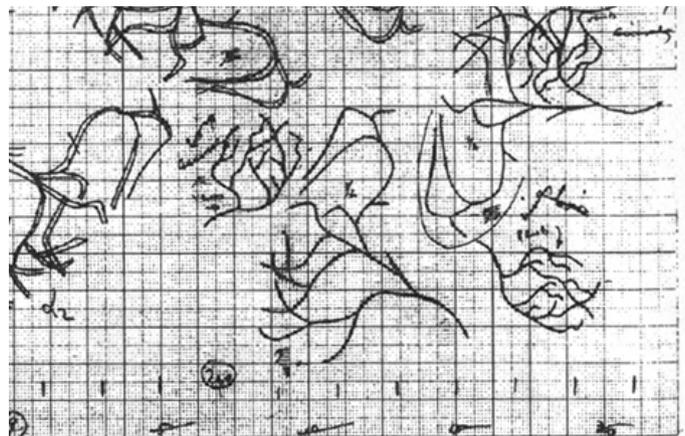
- Start out with a point in space (pitch vs time/space, etc.).

- In order for it to exist, it has to continuously repeat itself – a line of any shape is formed.

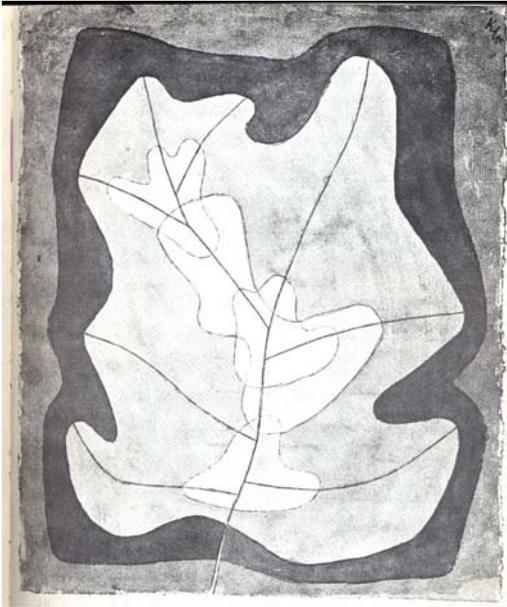
- Any point on the line can also reproduce itself and bring about arborescence – a bush comes about (this can occur freely, but also according to rules).

- Rotate or transform the tree; treat trees as a group. Use the inverse of the melody, its retrograde, retrograde inverse. Many possibilities exist to change this shape and thus the character of the whole.

These points in the line have their character that stems from the context they lie in by moving in time and through space. These consequential points/notes give us a line and this line represents the melody and this melody can now be transformed, rotated to



example of an arborescence of iannis xenakis 27



lines of movement/ melodies branching out to form the total movement system



points becoming lines and lines/ melodies moving simultaneously

give us a new melody. There can also be more than one melody playing simultaneously. This score is made more interesting when these systems are put on a grid, in this case the grid of the city, and we get another process, where the cells are treated in a similar way as the points of the line. This process is called “arbor-grid” and is:

Start with a grid on paper, where the vertical lines represent the time divisions and the horizontal the pitch. Start at any given moment, at any given vertical line, at any given pitch – in other words a cell. This cell has its own character due to the position it takes up in space and time. What is the next moment going to be? What notes? The filled cell (because of the nature it has, just like the point and its nature) gives birth to another one or two adjacent cells. In this way the whole grid of paper can be filled.

Just like the grid on the paper is filled, all these cell blocks are evident in a city and every cell has a certain shape and character. This is because of the cell or cells that lie next to it, just like it exerts an influence on the cells around it. A city -and Pretoria is no exception - sits on a Cartesian grid, with energies flowing through it. Any point exists at a certain time, within a certain spatial context, at a certain pitch, energy level and emotive level. The points form part of lines that are the movement systems existent in the city. These lines flow over the cells and there is an interesting marriage between the points that form part of

the movement systems and the cells through which the movement systems go. Both of them live in an interactive relationship and again, like the points relate to one another, so do the lines and the cells have a constant dynamic exchange. Bacon (1968) refers to the simultaneous movement systems in terms of three concepts, namely the

- **relationship of mass and space** (space is the dominating element - respond to it as a basic element in itself and conceive abstractly in it)

- **continuity of experience** (life is a flow of experiences, an unbroken continuity of individual extensions into space in time, each moment of which is affected by and in turn affects the moments and experiences that precede and follow it)

- **simultaneous continuities** (given the problem of design to take cognisance of the total experience of each individual who lives within the city, it becomes necessary to conceive of the continuity of space experience in terms of a series of movement systems, each based on different rates of speed and different modes of movement, each interrelated with each other and each contributing its part to the total living experience in the city)

Each of these are elements of the greater arbor-grid (arborescence on a grid) of the city. Just like the arbor-grid, the “strength of the plan lies in the ability to influence growth, just as the seed has within it a force that causes the cells to group themselves according to an order without which the organism cannot grow”.

“The trunk of the tree is a clear directive which establishes the path of the movement of thousands of tubes which diverge in the branches and finally deliver the chemicals necessary for growth to the outermost leaves where they are transformed into food. The water acts as the fuel to propel the chemicals to the point of consumption, and it, in turn, evaporates into the air and flows through the cycle of movement systems based on weather phenomena...So in cities, the points of connection between systems should be places of special emphasis and design enrichment.”

“As the movement systems become clearly defined and purposefully established – even though they are modest in extent to begin with – and as they are used by more and more people over time, they become established in the collective psychology of the community. As natural outgrowth, logical extensions, increased continuities, variations and enrichments occur, each related to the central movement system just as surely as the branches and flowers are related to the trunk of the tree.”

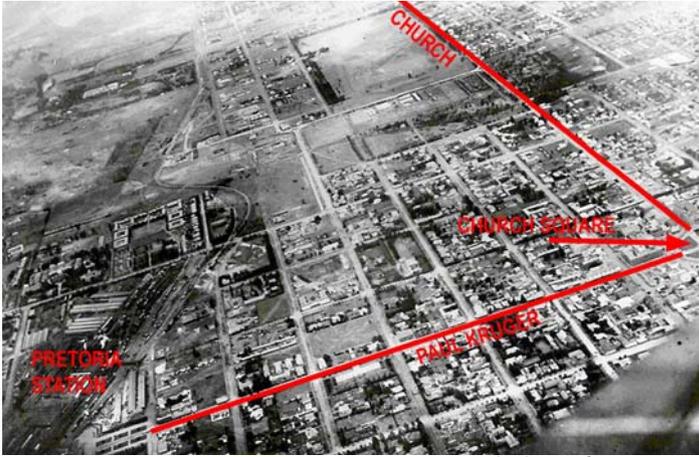
“This simultaneity of various themes brings to mind the great art of music: themes are played against sub-themes, several different themes are played against each other simultaneously and with variations and themes that were played at the beginning are recalled throughout, giving continuity, unity and total form to a composition.”

As John Ciardi says: “The words of a poem, when spoken most meaningfully, must not only speak themselves dramatically, but answer lovingly to the rhythms from which they have emerged, and anticipate as lovingly the rhythms into which they are flowing.”

“The creative process of establishing a movement system is just as difficult, or perhaps even more difficult, than the creative process of writing a piece of music, composing a poem or designing a building. It is not my intention, nor would it be possible, to explain what this process is. It can only be felt by those who have within themselves the quality of being an artist. I am trying to give a frame of reference within which the artistic genius of a designer can be related to the city problem.”

As much as I feel it necessary to design a movement system that takes into account harmonious movement in time through space, a system that creates meaningful perception of experiences, I feel it necessary to bring in the idea of improvisation.

It is important to set up the main theme, the melody, for the score of the city, but just as some serialist composers realised that there is only so much one can do with 12 notes, so we must realise that the nature of the city is far too complex to determine what each instrument will play and how everyone will react to his part of the movement system. The end-user will decide on how he hears the melody - that is the nature of an audience that can filter quite clearly what is received - and will naturally react to what is being heard. This reaction is also in the form of an improvisation on the melody, the line of movement of people. How he perceives the city will depend on how the movement systems support this search for identity through proper perception by harmonious movement in time and through space. The man or woman in the street reacts to this and by doing just that improvises, reacting to his nature of being a human, an improviser to a constantly changing context.



aerial photo from 1931

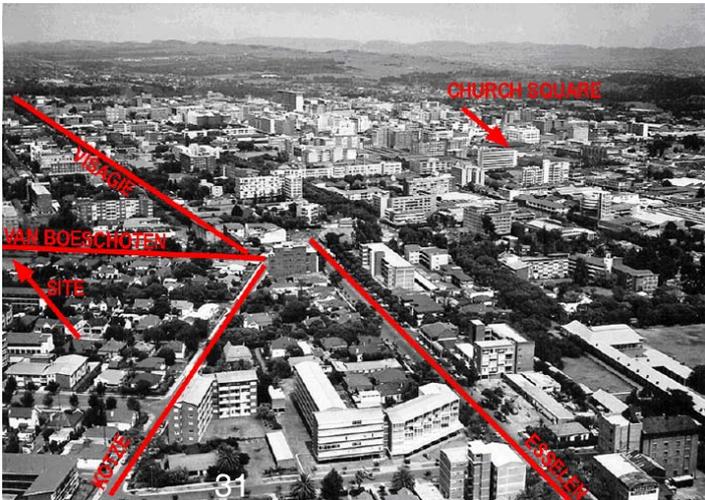
10

history

"[M]usic dominates, reigns actually, harmony; and harmony itself reigns over all things."

Le Corbusier, 1949

aerial photo, including site, from 1950



The establishment and development of Pretoria was also not possible without movement. The first and deciding factor in the layout of Pretoria is the local geography. Flanked in the North by the Daspoort and in the South by the Timeball Hill Mountain ranges, large-scale movement has traditionally been dictated by these two boundaries. The Steenhovenspruit in the West and the Apies River in the East are features that have changed the direction of the city grid.

Ndebele settlements already existed since the 1400s and Afrikaners settled in 1840 to create a service centre for ox wagon. It was proclaimed a town in 1855 and soon after a town grid was established with Church Square at the centre. Church and Market (later Paul Kruger) Streets were the main axis and streets were still wide to allow for the turning of an ox wagon. The city grid presented the opportunity for expansion in all directions and this was initially the case with the 1864 government buildings and the moving of the market East in 1882. This cleared space for the second church on Church Square. When Paul Kruger became the president of the ZAR (Zuid-Afrikaanse Republiek) and the economy was bolstered by the movement of the gold rush on the Witwatersrand, the city grid was densified. After the "Treaty of Vereeniging" in 1902 the British put their stamp on the city by demolishing the church on Church Square in 1904 and strengthening the North-South movement by emphasising the Paul Kruger Axis. In 1908 the Apies River was canalised and lost its natural movement, being used as a storm water channel. 1931 Pretoria was declared a city and the movement along the North-South axis emphasised more with the building of the City Hall to establish Pretorius Square on the extension of Paul Kruger Street from Church Square. This is about the time when the city reached its geographical limits on the North and South and the only solution was for the movement to shift in an East-West direction.

The first act was to declare Marabastad, which had been established West of the Steenhovenspruit, a slum in 1940 and move all the inhabitants further West to Atteridgeville. Segregation continued and another township appeared to

the far east of the city, namely Mamelodi. Even further West the homeland of Bophutatswana appeared. To make sure that this work force would not be lost to the white population, a system of subsidized bus and train transport was established to link Mamelodi in the East and Atteridgeville in the West to the city. Longer distances, like Mabopane in Bophutatswana, were also linked.

Together with the forced movement in an East-West direction, there was an increase in population growth. Increased wealth also meant that suburbanization started. Geographical limitations channelled this expansion in an East-West direction and suburbs and suburban shopping centres flourished. Traditional city functions were suburbanised and moved out of the city. New roads were needed and an extensive highway scheme in 1967 reinforced the East-West movement. The city started to densify in the 1970s and 1980s. There seems to be no stopping this East-West expansion of the greater city and distances seem to increase, cutting off the suburbs from the centre. Pretoria is a well-connected city – with a car; and this main emphasis is only in the fast moving East-West direction.

The traditional North-South movement has been reduced to purely historical. The main artery feeding the city from the South is Nelson Mandela Drive and here the powers-that-be saw the opportunity to re-establish the prominence of the gateway into the city. Urban design frameworks were drawn up by several parties and the current one in use is by Urban Solutions Architects and Urban Designers. The Mandela Development Corridor (MDC) aims at restoring the North-South movement, decreasing the dependency on vehicular transport (especially private car ownership) by focusing on pedestrian movement and link Sunnyside and Arcadia to the inner city. This axis had been neglected and human needs set aside in favour of higher economic gains. Still, the MDC has to be lucrative for investment to ensure its survival, but to keep this survival active the residential component has to be increased in the corridor and this will only happen once there is a balance of amenities, a safe and easily

aerial photo, including site, from 1955



Burghers' Park, 1931



aerial photo from 2005



legible and accessible environment with a strong focus on human proportions and natural forces. Space should be designed along these guidelines and all the movement systems brought together to contribute to the overall harmony.

The site chosen to be the field for this movement lies at the beginning of this MDC. This entry to Pretoria has not been defined well and no proper edges exist to aid orientation and legibility, no landmarks either. The site sits on the boundary of three very different districts or zones. To the east lies the residential and business district of Sunnyside and to the West the old and statuesque Pretoria CBD, with a lot of heritage value. To the south lies an educational district dominated by the premises of UNISA. The North has seen a phase of the MDC framework being implemented with the building of the Department of Trade and Industry (DTI). This building increases the height and edge definition of the corridor and forms a gateway for the movement through it. Furthermore, the site forms part of the Apies River walk – as proposed in the Integrated Spatial Development Framework ISDF for the Pretoria by the Capital Consortium. This ISDF must be taken as a guiding factor, due to constant changing and lack of proper implementation rather standing on its own.

study of maps reveals how Market (later Paul Kruger) and Jacob Mare were always a prominent axis on the grid with government buildings and parks in them. Van Boeschoten (very much later Nelson Mandela) followed the line of the Apies River culvert and was always seen as a promenade with Lovers'Walk and various Apies River schemes over the years trying to romanticise the culvert, none ever

map ca. 1911



map ca. 1918



map ca. 1924



Images from the important axis of Jacob Mare and market, showing how important buildings framed the vistas of these streets at very early stages

A glance at history reveals the significant axis the site borders on. The main source of pedestrian movement is the Pretoria train station. From here commuters will either make use of taxi transport or walk to further destinations. These lie mainly to the North in centre of town or the East towards Sunnyside. A walk from the station to the site takes approximately 15 minutes, which is not much and done by many commuters. To do this, they would first walk North on the important historical axis of Paul Kruger Street, previously known as Market Street. From Paul Kruger Street they would turn right into Jacob Mare Street, another very important historical street, which houses the Melrose House and Burghers' Park across of it. Some well designed Modern residential blocks are on the northern and southern side of Jacob Mare Street. The building edge becomes fragmented towards the East of the Street, until there is a big jump after Prinsloo Street, where the Drie Lelies Building has been erected in the 1980s to house employees of the Post Office. The building sits far from the road edge and does not react to Jacob Mare Street. It now stands vacant. Crossing Nelson Mandela Drive, Jacob Mare becomes Rissik Street, a quieter street and the home of a lot of academic institutions like the old Normal College, Oost-eind School, facilities of the Tshwane University of Technology (TUT) and UNISA.

The project site lies on the corner of Nelson Mandela Drive and Rissik Street and is currently used as parking for the Breytenbach Theatre. The buildings on and around the site date from roughly three building phases in Pretoria. Firstly, there is the Breytenbach theatre, which was initially built as a sports hall, then used as a weaving workshop, a morgue and later became what it is known today. It is a tall brick structure with a pitched corrugated roof painted green. What is of interest here is the prop storeroom and workshop on the western side. These will be incorporated into this project. Secondly, there are

Jacob Mare East from Market (Paul Kruger).1890s



Market Street.1928



Parkzicht, corner of v.d. Walt and Jacob Mare.1959



Kitchener residence (Melrose House),1901



Burghers Park kiosk. 1936



Corner of Rissik and Troye



Victoria bridge, Jacob Mare. 1907



residential houses in the precinct, dating from the 1920s and 1930s and have corrugated iron sheeting roofs and mostly wood window and doorframes. Some of them have wood figure carvings on the stoep. They are currently used for gastronomy and residential. The MOTH club is an example of Modern Movement architecture with very little architectural value. It is in the process of being altered and through the years many alterations have left their mark on the structure. Due to its age it has some heritage value, which will be respected. Thirdly, the apartment blocks are examples of late modern architecture with the ones in the middle well detailed and conducive to better movement. The one on the S-W side of the precinct does exactly the opposite and is probably the biggest problem in bringing across the movement.

JACOB MARE STREET. named after Jacobus Phillipus Mare (1823-1900). Underwent many name changes, initially known as Mare, then in the 1920s as Paul Mare, later Jacob Mare. The folk song "My Sarie Marais" was written by J.P.Toerien for his daughter Susanna Margaretha Mare

VAN BOESCHOTEN LANE (later Nelson Mandela). named after Johannes Gerhardus van Boeschoten, influential in Preroria from 1862 and later became mayor. Fought for the keeping of Church Square. Brother started the first school in Marabastad.

The average annual rainfall varies between 380mm in the North to over 700mm on parts of the Waterberg. The rain season occurs November to March, with the peak in January. 50-80 rainy days may be expected. The rain is unreliable, thus 12% of all years severe drought may be expected.

The average daily maximum temperatures may vary from 32°C in January to 22°C in July, with extremes of 42 and 31 respectively. Average daily minimums range from 18°C in January to 4°C in July, while extremes can reach 8°C and -7°C respectively. Days are often very oppressive in summer, whereas winter nights can be particularly cold. Frost occurs on average between June and August.

Winds are light to moderate and from a N-E direction except during thunderstorms. In early spring or during weather changes the wind has a southerly component.

The duration of bright sunshine exceeds 80% of the possible in winter and 60% of the possible in summer. This has a major influence on how buildings perform regarding comfort, etc.

The total cloud amount (of the macro and mezzo climate) is a minimum during the winter (June). A maximum is reached during the summer, peaking in January. Solar radiation along with the solar intensity influences the orientation of the building mass. An ideal situation would be a mass with a predominantly E-W axis (maximizing the northern and southern façade – where climate control can be achieved most effectively). However, knowing that the site does not allow for this, the use of shading devices becomes a necessity



Some extremes are possible, like snow falling in Jacob Mare in 1930.

11

climate

conclusions:

- harvest rainwater, even if it might not be so reliable
- harvest grey-water
- harvest daylighting
- harvest solar gain for heating of building and water
- harvest winds for cross-ventilation
- harvest shade through external shading devices
- harvest nature...responsibly

Breytenbach Theatre from 1900 through to ca. 1960, starting off as a gymnas-tics hall, a weaving shop, a morgue, until it became the Breytenbach Theatre



back of Breytenbach Theatre, current



aerial photo of site 2005



SITE



aerial view of MOTH Club

N-W showing Nelson Mandela Drive, Drie Lelies building and dip



N from MOTH roof



S from MOTH roof



S facade of MOTH Club



empty site N of MOTH



N fside of MOTH Club



dip in site



HISTORY MOVES IN CIRCLES

APIES RIVER UP-GRADING-1950s, 1970s, 1990s



DEMOLITION OF HERITAGE-1890s continually until present



NAME CHANGE OF JACOB MARE-1900, 1920s, 1950s, 1980s

Jacob Maréstraat: Finale besluit oor naam kom later

DAAR is nog nie 'n finale besluit geneem of Jacob Maréstraat voortaan slegs as Maréstraat bekend sal staan en of die huidige naam behoue sal bly nie.

Dr. Herman Rex, lid van die Stedelike Advieskomitee kumente is van Jacob Maré se nageslag afkomstig. Die raad het besluit dat die aangeleentheid terugverwys word na die Advieskomitee vir uitsluitel. Die Advieskomitee se vorige aanbeveling was dat Jacob Maréstraat voortaan slegs as Maréstraat bekend sal staan. Rissik- en Wal-

Dit is die stadsraad se beleid dat die oudste naam verkieslik behoue bly wanneer 'n naam as gevolg van duplisering of om enige ander rede verander moet word. Dit verseker dat geskiedkundige name nie verlore gaan nie. Devenishstraat in Sunnyside aan die oostelike kant

JAKARANDA April 1980

CONDITION OF PAVEMENTS-1950s, 1970s, 1980s, 1990s, present

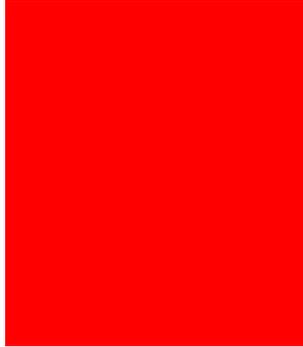


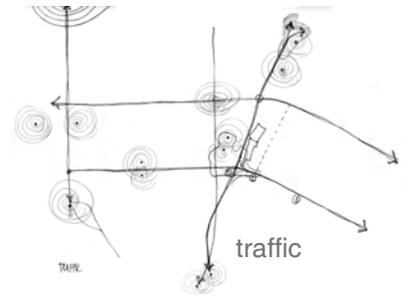
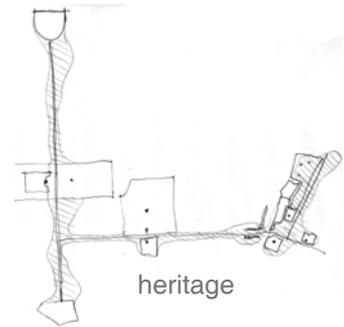
Newspaper articles from all times in Pretoria's history, highlighting that certain issues and problems seem to receive attention every couple of years, without ever really being resolved. Nevertheless, these problems are vital for discussions about the city and its health. Public debate is necessary, no matter what the topic, to make city dwellers take possession of their city once more.

This project will not try to solve these age-old problems (except for that of the pavements), but rather acknowledge the fact that they exist and try and instill possession of the city through proper perception of it. Once the dweller acknowledges his city once more, perceiving himself as being a part of it, will he take possession and care for what is his.



These factors influence the process of translation. All the movement is taken into account, the final goal being a total harmony. The building on the site must reinforce this wish and strive to live in harmony with the total movement, making harmonious dissonances on and around the site. Harmonious movement in time and through the spaces of the building should result in proper perception, legibility and identity.





lines of movement
of flow of processes
in the city and
zones of influence
around these lines



The components we have dealt with so far are:

- Point: it is static and directionless and in order for it to become visually prominent or perceived (and thus add to orientation and movement) it has to be projected linearly and by doing this it becomes a line.
- Line: this is describing the path of a point in motion, the lines we have just analysed that link the points on the line. It is capable of expressing direction, movement and growth.

The first thing to do is to analyse the grid Pretoria has been designed on and how it has changed over time. There are a couple of grids that converge and the topography had the final say in what happened to the grid. The Apies River that flanks the site, could not be moved and thus this is where the orientation of the grids changes and takes on a new appeal and character. The cells each have their own character as part of the score and each cell brings about the character of its surrounding cell by giving birth to the surroundings.

It is against this background that the lines of movement can be added. Again, we start with a point that is distinct on that line. This point is a force that gives rise to movement by either being a landmark that is used for orientation, a point of distribution of commuters, or a goal where someone might be heading. The nature of this driving force is understood and all of these points then give rise to the movement and the resulting line. These lines are represented in the accompanying diagrams. This is illustrated on different scales and starts at a larger scale and then zooms into the finer grain of the movement surrounding the site. The lines are those of movement and the hatched zones around them are those of main influence or the parts that define the character of the system and are to be analysed on a more detailed scale. There is a definite need to distinguish between the roles of all of these systems and the parts they have to play. Yet, one must be able to see where they fit into the greater score and how they can contribute to or how they damage the harmony of the score.

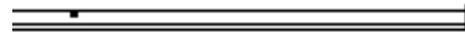
The aim of architecture should be to understand these systems and how they can be changed to make the overall movement and resulting perception more harmonious. All of the points on the line that give birth to other points and thus to the line have also been investigated in detail. Then the scale is reduced to look at the finer movement, the experiential character and the kind of perception. This then leads us to the way in which it will be translated.



grid of streets and
blocks in pretoria

1 2

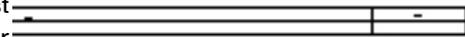
point and
line



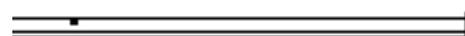
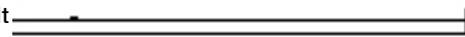
My **first attempt** at translation was one of taking the raw information directly from the source without analysing it. I translated the experience that was derived from the movement in emotive terms without being successful in including many measurables. I tried to lay out the rhythm of the city, the pace at which the city moves and breathes, thus the pace and rhythm at which it had developed and the movement which any observer of the city feels.

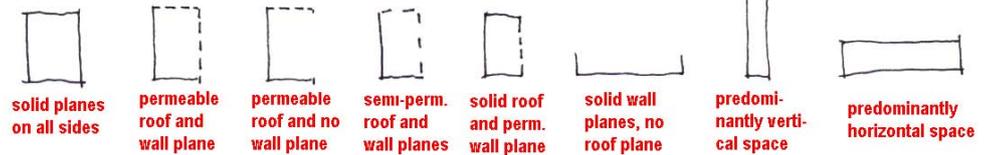


The problem with this is that the process becomes a bit arbitrary and any decision, that is any note, any rhythm, any pause, should be dwelled upon very long in order for it to be correct and absolutely necessary. This can obviously not be done, because such a process destroys the dynamic nature of the act of translating. The flow of movement is stopped. The end-result thus lets itself, and rightly so, be guided by the movement. The problem is that in this movement there is little space for contemplation and many decisions just flow forth and make the result rather arbitrary. The designer loses control over certain aspects of the process. The only solution was for an intermediate step to be added. Traditional musical notation would not work for these purposes and so a different diagrammatic notation had to be developed.



Another problem was that this was a purely analytical theory that tried to develop non-discursive techniques in order to handle matters that are difficult to understand without a fair degree of abstraction. When this abstraction takes place it is assumed that there are objective regularities in architecture, thus in movement in time through space, to bring about perception. But these non-discursive regularities are difficult to pinpoint and this technique can only be used purely analytically and not generate any new findings. Since I did not quite know where the process was heading and what the regularities were, the technique relied on a lot of intuition and experience – something that contradicts this method in its very nature and is thus destined to fail.



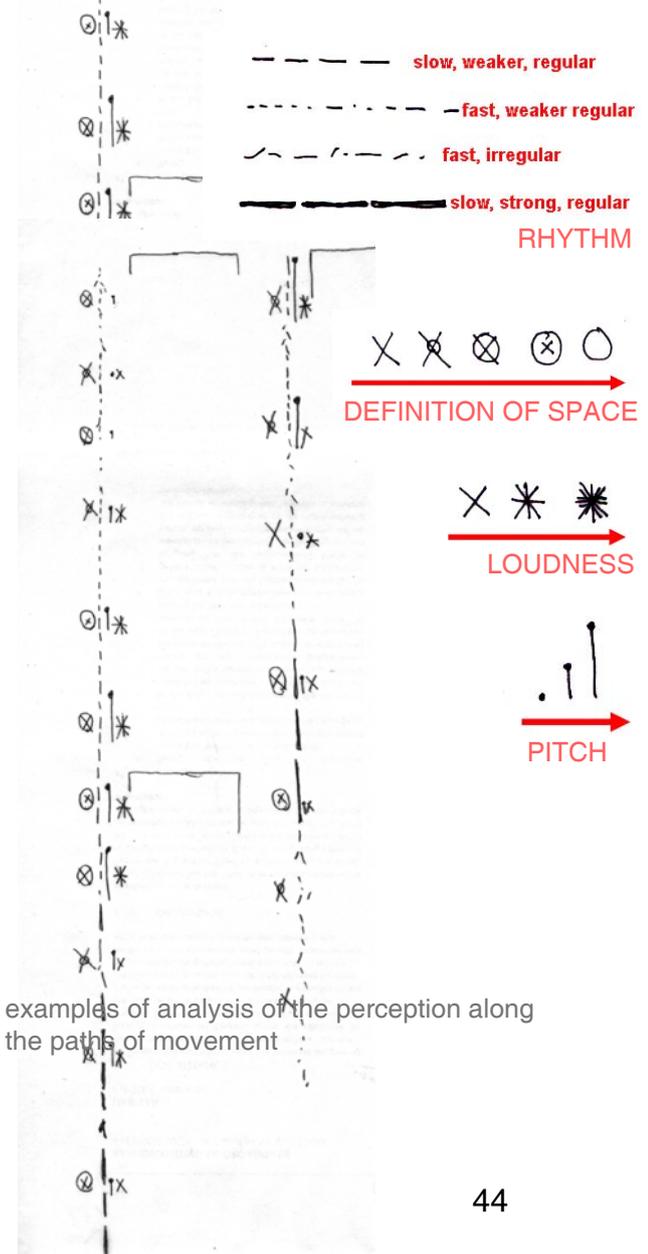


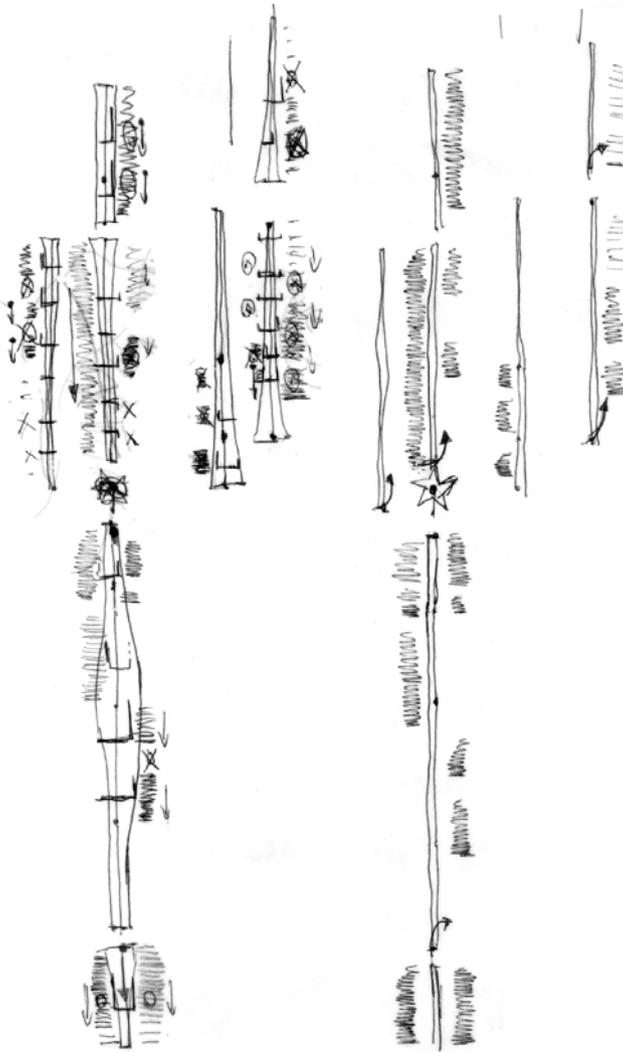
SOLID AND PERMEABLE PLANES AND ORIENTATION OF SPACE

Inspired by some of the work of Donald Appleyard, Kevin Lynch and John Myer, a new notation was developed in the **second attempt**, which took into account the act of moving in time through sequences of space. This ties in well with the statement that has been made of music also occurring sequentially and made up of different points that make up the sequences to compose the line of melody.

The path ahead is interpreted as sequences to follow, anticipation is built up and landmarks are placed along that path. Again, these landmarks are the points that generate movement towards and away from them. The points give birth to other points and thus a line evolves, along which movement is concentrated. The observer moves in time through spaces and his visual field is only observable through this movement and collection of sequences, each building up to the next and being influenced by the one that preceded it.

The only problem with this sequential view is that an observer can enter the line at any point and move in any direction and thus not follow the line prescribed by the analysis. The solution to this would be to follow an approach of magazine-like sequencing, where all the sequences are part of the whole experience along the whole line, but each one of them can also be read and understood in isolation. Should this not work then the striving for the unified whole should be dropped in favour of the articulated or endless composition, where any point on the line can be taken out and changed without having an influence on the whole, but only on its immediate surroundings. The balances and connections of these sequences are not static, but balance over time, where a dissonance or distortion in the harmony will need compensation in later intervals. Two or three progressions are played simultaneously and meet, diverge and react against each other.



space-motion
diagramorientation-legibility
diagram

Two types of diagrams were drawn up, one representing the motion-space relationship and the other dealing with the orientation along the path. The first one looks at the **self-movement** of the subject, how fast he is moving, ascending, descending or turning. Then there is the perceived **movement of the visual field**. Anything that is passed moves past at a certain speed and gets recognised differently. Physically moving objects or very prominent points are of special interest, as they receive more and orientation-bound prominence. **Spatial characteristics** are very important in determining how perception takes place. Whether the space is enclosed or open, well-defined or ill-defined, all has an influence. Together with this, the **proportions** of this space are very important and the quantifiable factor for letting the Harmonic Proportions enter and influence perception. **Light** is also an important factor, although that was one where I could only perform localised investigations, as this is so dependant on time and weather that it is very difficult to do a proper study of it.

The orientation-legibility diagram is one that analyses the points that are used along the **path** to orientate with. These points determine the character of movement and how fast it will be, which in the case of a very prominent **landmark**, that will attract a lot of attention, will make the movement towards it fast and straight-lined. It was investigated for various stages on the line of movement how much of the landmark can be seen and at what rhythm glances are made. **Nodes** were also analysed, as these are the points at which a decision takes place on where to go next. This decision is supported by all of the components that are mentioned here and, dependent on how harmoniously or aggressively they have been employed, they will either pull the person in their direction or push him away from them. **Edges** are another factor that guides movement and orientation along them. The stronger they are, the more focused orientation becomes and harmonious movement is enforced. Again, the rhythm that appears at the edges is also of significance. This rhythm could be one of open and closed, one of accentuation of specific components along the façade of buildings or of elements along the path, like trees, lights or street furniture.

The objectives of this kind of analysis and the subsequent planning of movement to conform to this are the following:

- to present the user of the city with rich and continuous form, a form that has continuity and rhythm, development, provides contrasts, a balance of movement. The tools to be employed include things such as space, proportion, motion, colour, light, texture and detailing. It is the harmonious employment of all of these that is striven for.
- to strengthen the image of the environment, make the user locate himself in the environment and orientate himself according to features within it
- to deepen the grasp of the meaning of the environment, the history, the nature and the symbolism
- to know where one is heading and to understand where one is coming from and gain the identity of the ego as part of the city

This attempt proved to be nearly successful and all the motivation seemed right and justifiable, but intuitively I felt that it still lacked something. I wanted to have something that I can connect with, something with a soul, a plastic representation of all the research of movement in time through space. I almost wanted an answer to a mathematical calculation that added all these components of space into a single and definite answer. I wanted something I can relate to, I can grasp immediately and work with to influence my design and move decisions along.

It finally dawned on me that all of my analysis could be summarised in the visual representation of a line, a melody, passing through these spaces. Just as people move through the sequences, all of them responding to the space and its musical character (with its architectural correlates), so the melody, which is the line of people moving, does the same. This melody has the shape, and character of all the spaces it moves through and is influenced by the character of the spaces. A line is generated, the melody, the plastic representation of movement.

This method is universally applicable. Anywhere, where a human is involved is anywhere where perception is involved, or rather should be involved. Perception, as has been established, is only possible under conditions of movement and quality perception is possible under conditions of harmonious movement. Harmonious movement is only possible under conditions of movement through spaces that have been designed harmoniously.

Perception can occur either by moving through a city and perceiving the city and its context, or it can be by moving through a building, moving between inside and outside, being drawn along by the arrangement of spaces, their material choice and detailing inside the building. Movement can even mean sitting inside a building, working inside a building, but still moving about, either by looking at the arrangements of spaces inside that just call to be moved through, or recalling the harmonious movement that has brought one to this place one is sitting at now. In all of these, the human is a point on the line, a point of the melody. The sole goal of harmonious movement is perception - perception of the context one is in and thus the perception of one-self within that context.

The components that make up the space that aids harmonious movement have been described. These components are the basic building blocks of architecture. Significantly, they all have correlates in music. Whereby movement is seen linearly, being a line, a line that consists of a point that gives birth to other points, a melody is also nothing else than a line. This line consists of points that give birth to other points. What these points are has been discussed elsewhere and will here be used for comparison:

	MUSIC	ARCHITECTURE
PITCH	highness or loudness of sound; vibrations in sound	level of noise of a space, influenced by colour, light; vibrations in light
DURATION	temporal length	spatial length
LOUDNESS	intensity of sound, changes over time	intensity of space in terms of textures, transition of volumes, forms; must also change over time, have a good mixture
TIMBRE	same note played by different instruments has a different effect depending on the palate of instruments	colour, texture and finishing are all instruments in their own right and choice of palate of materials is important
RHYTHM	can build up to a climax, be the stabilising factor behind a composition and create or release tension	has the same effect of stabilising movement, building up or releasing tension along the way; creates balance through rhythmic aligning of columns, varied articulation of forms and hierarchies of elements
HARMONY	needed to blend tones, create musical space, depth of experience and a certain mood	harmonious movement needed for quality perception
PHRASING	certain parts treated in unison to keep order and logic	grouping of materials and openings in a wall or plane into motifs that repeat over time
ORCHESTRATION	each instrument has its own character and can only perform a certain role in the piece that it has been designed to do	use of the material in the way it is intended to be used; understand which materials can be combined with which to give a desired effect
PROPORTION	inherent in any composition and mainly dealing with ratios and intervals	humanization of space and proper perception only possible with the employment of human-friendly proportions

This brings us to the melody. A melody is a line consisting of sequences of pitches of distinguishable height and rhythm. The shape this melody, this line, takes on is determined by the points it consists of. Each point, in turn, is created by the combined use of pitch, duration, loudness, timbre, rhythm, harmony, phrasing, orchestration and proportion. Each person (the point on that line) is influenced by the character of the space he passes through.

Likewise, movement, the line of movement, consists of sequences of spaces that are being moved through. Each sequence of space, or point, is in turn created by the combined use of pitch, duration, loudness, timbre, rhythm, harmony, phrasing, orchestration and proportion. A person is thus a point on this line and the movement he undertakes is as a result of the character of the spaces he moved through.

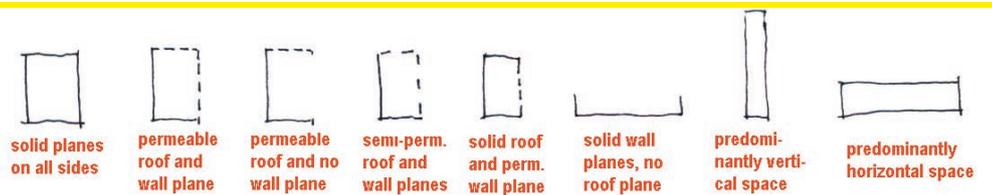
The line of the melody is a result of the sequences of points, but its shape is not important in terms of its literal graphical representation (i.e. drawing it out on paper, where it would maybe be interesting to look at, but arbitrary due to the many shapes it could take on, depending on the drawer's interpretation). The shape of the melody is much more powerful as an imagined line, not translated as something literal, but something plastic that has taken on the character of the sequences of points that constitute it. It can be felt, its character can be analysed, it can aid perception of the experiences of space.

It is here that it can become powerful as a tool for understanding movement. The line of the melody is equated to the line of movement. Just like the melody has the character of the sequences of points that define it, so the line of movement has the character of the sequences of space it passes through. For me, a melody is a powerful tool to aid design, because it is much easier to deduce a melody from all these musical characteristics,

i.e. synthesise the findings into a workable product - the line - than to try and combine all the architectural analysis (texture, materials, volumes, detailing, different planes) directly into a single and universal product that can be used to guide and test design decisions to aid harmonious movement and perception. The architectural language does not possess a word or a symbol that can be seen as this product, the result of an addition of all the factors that constitute architecture – music does, namely the melody.

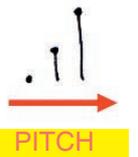
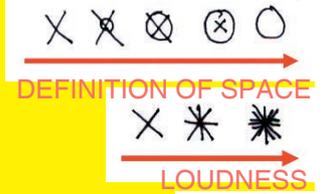
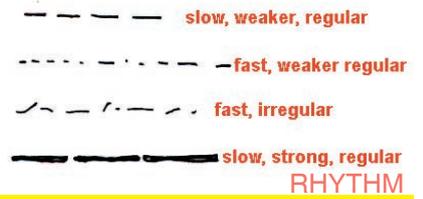
No matter how much time I have spent on evolving this tool, how many times I felt that I wanted to give up in favour of a more conventional approach, how many times I felt that the process was heading to something arbitrary – all of this seems forgotten, when I think of the gains this final solution has brought me. If that is the only thing that I take with me after five years of architectural study, then that is enough.

The implications of this are vast: this melody can be seen in any space, is relevant at any scale. It can be used to understand and design large-scale and function-appropriate movement in a city; it can guide movement on the site to determine where people walk and how you make the walking most meaningful by designing the correct spaces that create this movement; it can be used to design harmonious movement inside a building; it can even be used to design a structure and go into detailing, finishes, arrangement of volumes, light quality and any more of the parameters that go into the equation. The only prerequisite is that a human, his proportions and his perception, are the object. The melody only reacts to the movement of human perception, the movement of a human being in time and through space.

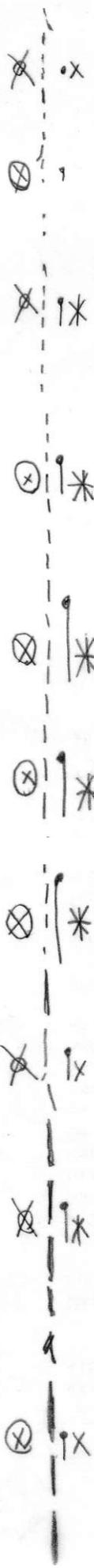
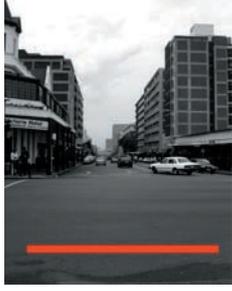


SOLID AND PERMEABLE PLANES AND ORIENTATION OF SPACE

This method can now be applied to an analysis of the route that people take getting to the site. All the spaces are analysed according to those parameters in the table and the resulting melody is formed (in the mind). Areas of problems can quickly be analysed and solutions can be generated to make the melody/line of movement flow harmoniously again. It is also necessary to understand what kind of movement brings people to the site to know what kind of movement must be generated on site to tap into this. The diagrams represent graphically what kind of space exists – where it is enclosed, where the wall or roof planes are permeable, what the main proportions are. Then there is text that describes what further parameters there are and these constitute the character of the melody. Together the text and melody give the vision of what kind of melody flows through what kind of space, how the movement and the space work together.



route analysed from the Pretoria train station, up in Paul Kruger right into Jacob Mare, over Nelson Mandela into Rissik and then around the site



line of **melody** pitches off; no general **rhythm**, can flow in any direction (no metric accentuation of columns or trees, no definite hierarchies, volumes, no edges to channel movement); low **pitched** space (little light intensity, little colour); smooth **shape** of line; **duration** in terms of spatial length does not seem too far (the goals of where to go are near); not very **loud** space (no contrasting volumes or forms, textures); no real sense of **harmony** or disharmony (spatially still undecided); can see goal in distance (firstly Pretorius Square and then Church Square - good magnets for attracting and tunneling movement)

well protected line of **melody** due to roof plane; semi-**loud** space because of colour and complexity of content; faster speed of melody due to channeling of movement; **rhythm** starts off to be established due to increase of space definition and metric accentuation; semi-short **duration**; medium **pitch**

harmoniously proportioned space; **speed** increases due to more space definition and channeling of movement; **loudness** increases (different colour, varied forms and volumes); **pitch** increases (colour intensifies); **rhythm** stabilises (more space definition and metric accentuation)

strong edge on right; line of **melody** compressed in bottom storey and moves along harmoniously and protected; **same parameters** as before

no softening of edges of line of **melody** due to hard edges (hard materials on wall and roof plane); **same parameters** as before

line of **melody** softened (soft roof plane-tree canopy); lower **pitch** (cooler light due to shade and less colour); **speed** decreases (less channelling of movement and wider

taking **pitch**, **speed** and **loudness** with over the road from previous space (due to viewing of goal and seeing the potential thereof or continuing of similar kind of movement); **rhythm** less defined, due to no proper edges and metric accentuation, but not totally destroyed

line of **melody** softened (soft and penetrable roof plane-tree canopy); **harmoniously** proportioned space due to trees; lower **pitch** (softer light, shade); not many jumps in line of **melody**, wider shape and slower; not very **loud** (less harsh textures, good transition of volumes), regular **rhythm** (trees add metric accentuation)

loudness increases a bit (rubbish and ad-hoc building and paving); line of **melody** gets lost a bit due to lack of proper wall plane and permeable fence with bad definition of space behind it

badly **proportioned** and detailed fence (**melody** gets squashed and cut up, only parts of it arrive back on the pavement); **harmonious** flow broken

rhythm gets smoother (better space definition and wall plane); **harmony** increases (drop in scale and the building and the fence work as a unit); low **pitch** (smooth light and shade); not **loud** (less differing texture, smoother transition of volumes and forms)

very well protected **melody** (trees grow over the path); softening and widening of line of **melody** due to increased penetrable roof plane definition; **harmonious** and protected melody; **pitch** and **loudness** get reduced (even softer light, smoother transitions and volumes)

line of **melody** is drawn over road by a strong magnet that offers harmonious movement in all its components

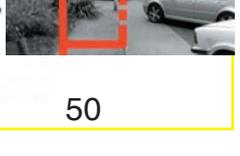
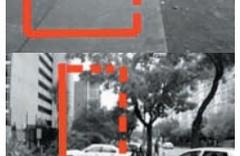
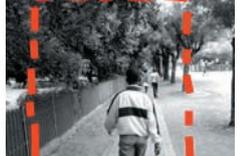
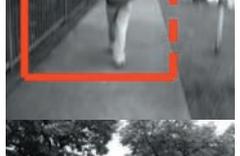
harmonious proportioning of space (tree roof plane); very harmonious **rhythm** (defined volumes, good transition, pavement detailing, open yet defined edge, play of light and dark); soft shape and edge of **melody** line (soft roof and wall plane); low **pitch** and **loudness** (soft light, smooth transitions); low fence makes melody wander off, but still be able to return to main track

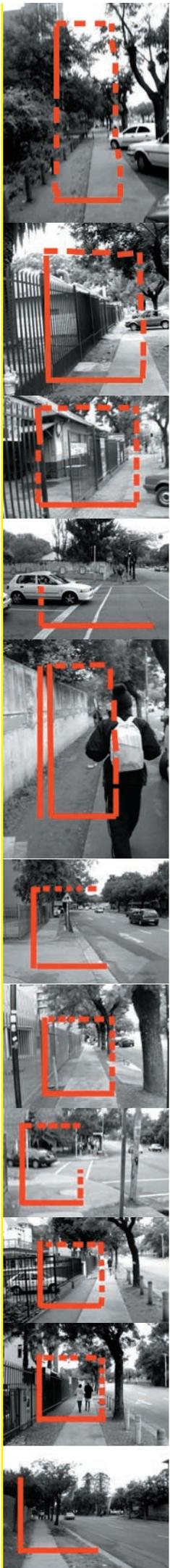
same parameters as before, but **pitch** a bit higher due to trees being pruned and more light passing through

edge of line of **melody** becomes more solid (less permeable roof plane); well **proportioned** space

loudness increases dramatically (movement becomes vertical, hard texture); higher **pitch** (natural light and shade become mechanical); less **harmonious** flow (less defined roof plane, line of **melody** bounces off hard wall plane); less defined **rhythm** (less accentuation on all sides)

loudness increases (verticality and jump in scale); **speed** increases and line of **melody** is harder (hardness of edges and less permeable roof plane); bad **timbre** (materials clash); high **pitch** (hard light and shade)





lack of **rhythm** (no defining edge articulation of forms or volumes); line of **melody** can dwindle off and get lost (permeable wall plane with no definition of space behind it); lack of **pitch** and **loudness** (bad light quality, lack of proper textures, forms and volumes)

Belvoir Flats and shebeen catch the **rhythm** again (good definition of space, employment of varied and harmonious forms); increase of **loudness** (more texture and colour and differing forms); bit higher **pitch** (better quality light and colour)

higher, but soft **pitch** (soft and natural light and shade); harmonious line of **melody** (harmonious proportioning); soft shape and undulating form of **melody** (soft permeable roof plane-trees), good **loudness** (good texture, volmes)

line of **melody** drawn over road (see target in distance-Rissik Street); no **rhythm**, **pitch** or **loudness** created, just retained

rhythm, **pitch** and **loudness** destroyed (wideness of Nelson Mandela Road, lack of magnet on other side, lack of space definition, bad light quality, no metric accentuation or logical and harmonious flow of forms or volumes over the road); line of **melody** becomes weak, fragmented and lost

attempt to start line of **melody** again, but little **rhythm** (hard, solid wall plane without any accentuation - line of **melody** disappears to the right, where better parameters are set); bad quality **pitch** and **loudness** (extreme verticality coming from Theatre Gardens on left, bad **proportioning**, detailing, material choice and definition of volumes and spaces); bad **timbre** (surroundings and materials do not complement each other)

line of **melody** comes back from right (better space definition and proportioning, smooth and permeable roof plane-trees, function that attracts movement-school)

confused shape of line of **melody** (no proper wall plane-permeable fence with no solid edge behind it), broken **rhythm** (little accentuation); low **loudness** (little contrast)

line of **melody** is weak and confused (fence on wall plane and bad space definition behind it make it diffuse and not concentrated any more); little **rhythm** (no accentuation, aligning of trees or columns, transition of spaces and volumes at certain intervals); no defined **pitch** or **loudness** (bad light quality, lack of porper colour intensity or textures); no protection of **melody** (no roof plane)



line of **melody** starts off immediately, due to protecting roof plane (trees-now not only over pavement, but whole street) and **harmonious** proportioning and definition of space; strong **rhythm** (metric aligning of trees, good articulation of forms and volumes; medium **pitch** (good quality natural light and shade); medium **loudness** (good use of textures and transition of volumes); good **timbre** (surroundings and materials complement each other); smooth and wide line of **melody**

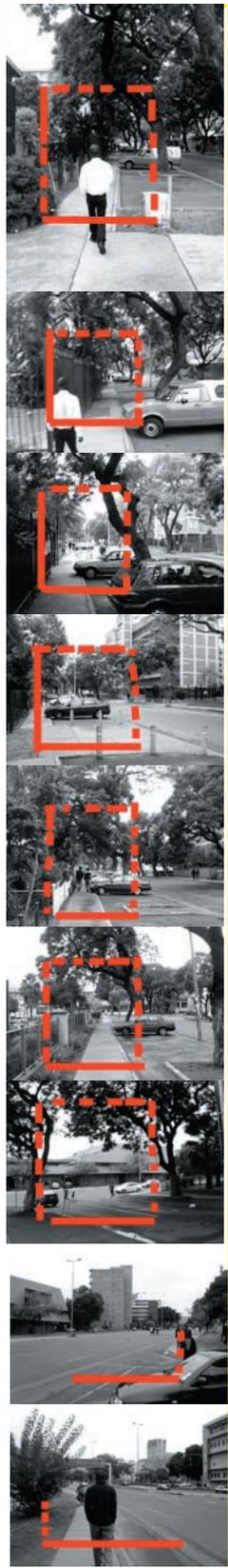
a bit more **pitch** (more light intensity, yet still good quality and well filtered by roof plane); **same parameters** as previously

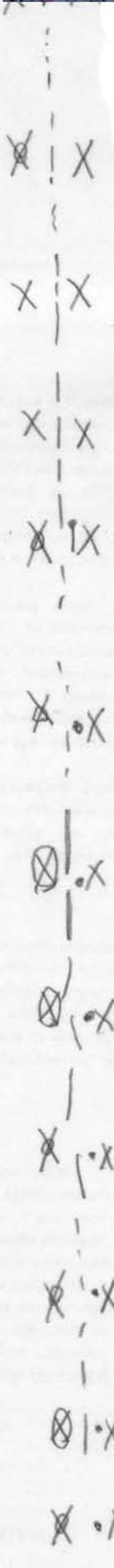
even softer line of **melody** (planting between pavement and building gives a soft wall plane, together with the soft roof plane); **same parameters** as previously

soft and **harmoniously** moving line of **melody**; a bit less pitch (more shading); **same parameters** as previously

harmonious movement stops abruptly and **melody** moves about confusedly (nothing pulling the movement over the road, no distinct landmarks); little **pitch** or **loudness**; line of **melody** becomes broken and weak

line of **melody** open (no roof plane, no proper wall plane or edge definition); no space definition; line of **melody** dwindles and is weak, thin





small **rhythm** (only defined by few small trees); tired **duration** (no goal in sight, nothing pulling movement along); focus of movement only in one direction (paving detail and balustrading all in same linear motion); line of **melody** not protected, no harmonious movement (no roof plane, no wall plane-melody can dwindle off in any direction, nothing to protect it, channel it); harsh **pitch** (single quality light and no shade); almost no **loudness** (no intensity of space in terms of textures, volumes, forms); line of melody becomes very boring, lifeless, without orientation, thin and confused

some protection of line of **melody** (roof plane), but no melody has been created or sustained before to be protected; same parameters as before

opening up of right wall plane (line of **melody** can dwindle out into well defined space); bit of **rhythm** (definition of space); **loudness** increases (good texture and detailing along river); line of **melody** becomes more alive, wider shape, smoother edges, controlled movement)

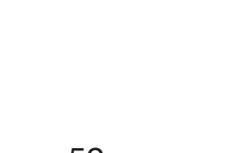
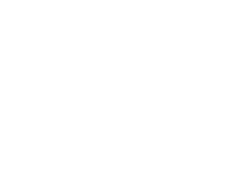
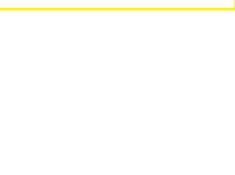
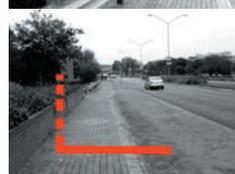
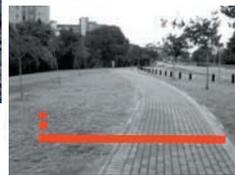
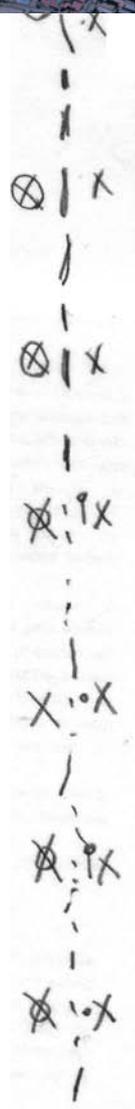
line of **melody** is broken again, becomes confused (no landmark or magnet that pulls it into one direction; no continuity of **rhythm** (no space definition, roof or wall planes, articulation of forms or volumes); low **pitch** (no quality play of light); no **loudness** (too many opposing forces); bad **timbre** (many different components that do not complement each other), weak, thin line of **melody** with rough edges, many broken parts moving in different directions, bit of hectic and goalless movement

good *potential* (when the trees have matured) to catch and protect **melody** and add **rhythm** (trees between pavement and road and not pavement directly next to road); as yet, no proper roof or wall plane to guide line of **melody**; **harmonious** proportion of space (due to trees and future permeable roof plane); little **pitch** (just single quality light and little); some **loudness** (bit of texture and complexity of environment); established, yet weak line of **melody**, dwindling along with a bit of direction

some protection of line of **melody** (bit of roof plane); some parts get lost (drop of scale, left wall plane disintegrates and melody can wander off into mysterious and interesting roads; **same parameters** as previously

increase of **speed** of line of melody (opening of left wall plane and no edge behind that); line of **melody** splits up, dwindles along, still very weak and thin, no real **rhythm**

no **loudness** (too many competing volumes too far away), no **pitch** (no life-giving light); no **rhythm** (nothing close to give any definition); no space definition; line of **melody** barely exists, no heartbeat, many different lines going in many different directions without a common goal, thin line with no real edges



This method is applied to analyse one of the corner stations of Modern Architecture: Le Corbusier's Villa Savoye in Poissy, built in 1929. This example is also easy to analyse, because of the "promenade architecturale", a main line of movement that le Corbusier included in many of his buildings. This line can be followed and the spaces along it analysed. The more harmonious the spaces are the more harmonious the movement through them is.

Note that the graphical analysis is only used outside on the path that people walk. Because of the principle of intersecting volumes and transparency it is sometimes difficult to define distinct borders between spaces.

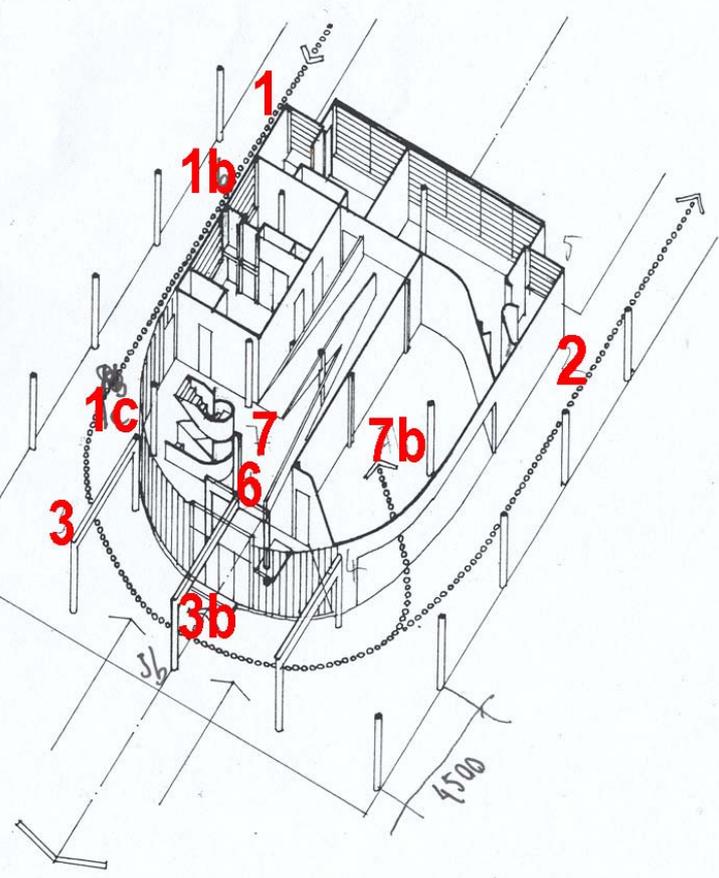
1 strong magnet is needed to draw **melody** from gate over to villa (little support given to melody along the way, little interplay of landscape and building); entrance of villa acts as good magnet and channels melody efficiently (wedged in-between ground and floating roof plate); lower **pitch** (roof casts shadow and little light from the inside – increases as the melody moves around the house); **loudness** increases immediately, but remains gentle (due to different volumes outside and wonderful play of transparency, exposing volumes inside); volumes open up more and more along the way (as transparency increases and the wall curves to free up volume at the bottom; good **timbre** (all the materials have similar machine aesthetic and work well together); **rhythm** established (through columns and window frames); good **harmony** through proper proportioning

1b **same parameters** as previously, but **pitch** and **loudness** increase (as transparency increases to reveal more light and volumes – not open fully though, still wall at bottom)

1c **melody** opens up and moves horizontally (curve frees up volume and full glazing from bottom to top); melody is inquisitive, wants to move around the corner (movement drawn around by curving wall); **speed** increases (denser spacing of window mullions around the corner); **pitch** increases (more light and transparency and landscape is pulled into bigger volume); **loudness** increases (extra overhead plane and increased transparency of volumes behind the glazing)

2 private – no **pitch** or **loudness** (blank wall, no transparency – no melody is drawn there naturally, only locals will go there); from far it might look like 1, but closer no melody is drawn there naturally

3/3b melody very **harmonious** (melody is protected more through an additional overhead plane created by the



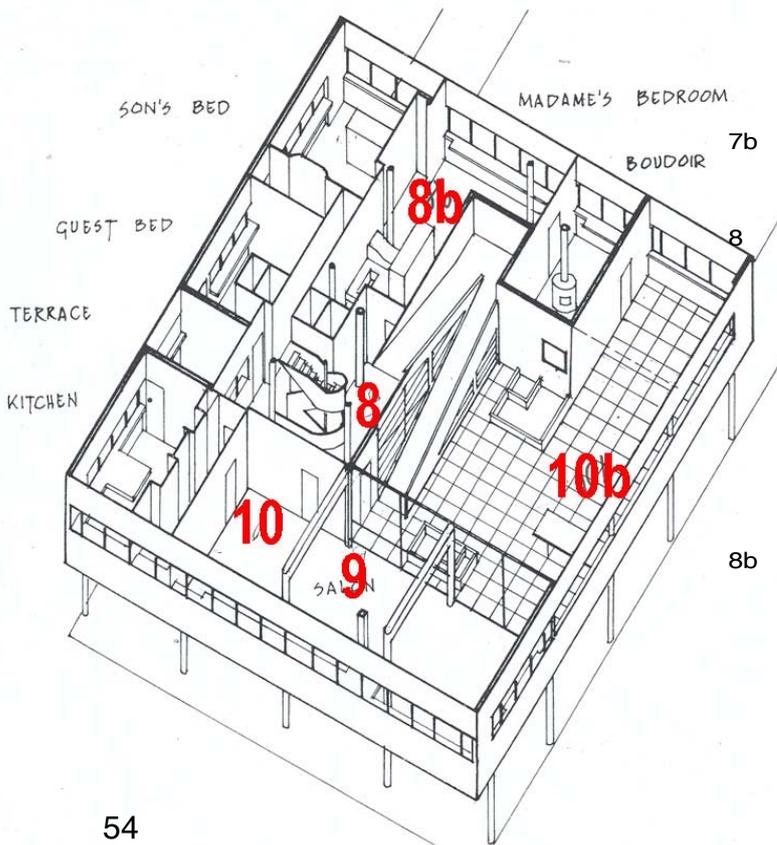
University of Victoria Meyer, M.C. (2005)

beams – protects and catches incursive melody so that it can move inside); **rhythm** very strong (columns, window mullions and overhead beams); **loudness** strong, but gentle (interplay of volumes inside and outside, beam cutting through glass increases space/volume definition and pulls the melody inside); higher **pitch** (strong light/transparency from inside and outside); for the first time the melody sees the inside and the punctured overhead plane and wants to move inside

--- all of this is created **BEFORE** the house is entered – a strong, **loud**, high-**pitched** (but soft), **harmonious** melody with a strong rhythm.

6 melody reaches the inside, but remains partially outside (second overhead plane is part of in and out, transparency shows outside); **pitch** still high and soft, but less contrasting and complex (more interior light, focus on interior transparency); **loudness** similar (many intersecting volumes, interior texture increases); **rhythm** suddenly different (very prominent column that suddenly does not lie on grid – columns not rhythmic element anymore, but the ramp and the surrounding details – smaller scale and closer); **harmonious** proportioning of space

7 public (in the public part) **melody** decides to move up the ramp (that is where it was drawn from outside, where the interest lies and the natural public movement would be. Private and service melodies would move up the staircase); **rhythm** changed to that of the ramp; strong **pitch** (vertical focus of melody and drawn to channel of light); gentle **loudness** (different kind of transparency, lots of intersecting volumes (private and public, where public is the more obvious and enticing))



strongly private – little melody in terms of **loudness** and **pitch** (no transparency, cutting volumes or glass façade)

soft and medium high **pitch** (light from window and top); good **loudness** (doors hint to more volumes behind, see salon through two windows and over verandah); **rhythm** still good (columns, window mullions); **harmonious** proportions; healthy volume (ramp is volume on its own with more light and own roof plane, transition zone is second volume with less **pitch** (less light) and higher roof plane); **melody** is strong and alive and can flow naturally into public zone or upon decision into private

upon entering bedroom, the melody has a different kind of **loudness** (many volumes and more textures and colours on a smaller scale); **pitch** high and soft (different quality light, more intimate, due to general light of strip windows and more focused and higher pitch light of roof lights); **loudness** very high, but **harmonious** (much colour, texture, volumes, forms) - almost too loud for genotype "bathroom", but it is harmonious and thus loudness can be tolerated; bit of disharmonious **loudness** (cold and

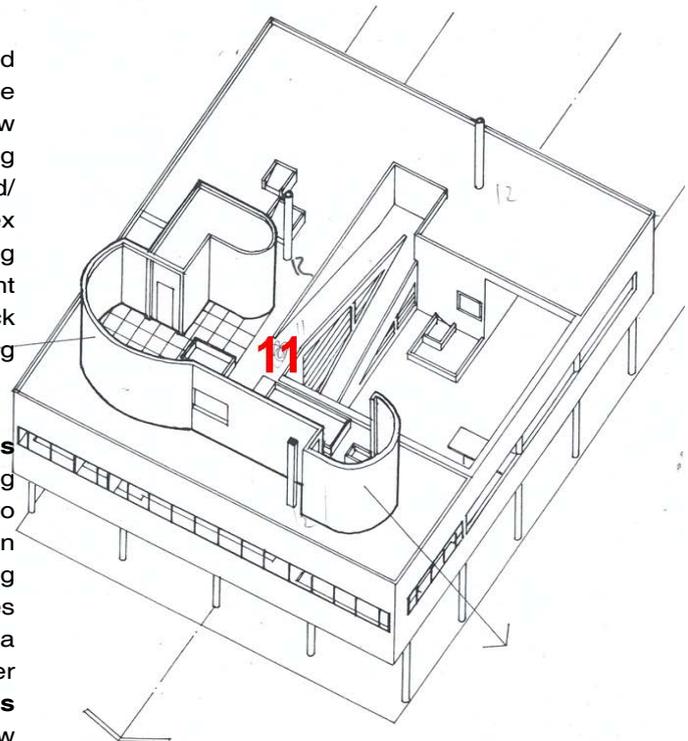
inappropriate toilets and basins for contemporary melody; space between beam and wall plane somewhat disharmonious); high vertical proportions (narrow and high space with secondary roof plane (roof light) and tertiary roof plane (top of cupboard); two zones in bedroom – one of high **pitch**, **loudness** and **velocity** (bathroom) and one quiet (bedroom)

10 This room becomes important as the link between public and private. The private does not lie on the natural line of the melody and little transparency exists to suggest the way to the private area and the melody must decide to either flow naturally into the public salon or, by decision of opening a door, into the private. Once the door has been opened, though, the melody flows naturally into the space.

9 ramp moves into salon (public) and melody follows naturally (good play of transparency – see salon through two windows - then lose view of salon and see it again upon opening the door or entering the room; also adds to **rhythm**); good protection of melody (room within room – second roof plane through beams as on ground floor and 10 separated from 9 creating two rooms); good **phrasing** (horizontal plane of window ledge/window opening mechanism, chimney cutting through slab (non-literal transparency theme), strip window theme); healthy **loudness** (different colour on one wall, unique form of fireplace, 3 different volumes in the room, glass wall for melody to flow out); healthy **pitch** (different qualities of light – artificial light also becomes feature of space); **harmonious** proportioning; **rhythm** continues (columns, beams, window frames)

10b different forms of transparency (views inside and outside with no glazing in opening); **phrasing** (theme of horizontal planes and emphasis on strip window theme by leaving out glazing, theme of planting - this time in containers); **melody** protected by solid/permeable wall plane, but not roof plane; less complex **pitch** with just one light source, a bit of shade coming in from the roof at Madame's bedroom; different **loudness** (new texture through tiles and plants, lack of glazing, little direct volumes, but a lot of surrounding volumes)

11 the end of the melody with good **rhythm** and **loudness** (organic forms at the top echoing flow of movement and holding the melody in the thin wall plane and giving it the opportunity to move about or escape through the openings); **phrasing** (open and closed theme, non-literal transparency (chimney coming through slab), open and closed, solid and open); both melodies meet at the top (private through the decision of opening of a door and the public by natural flow); **rhythm** gets weaker (just ramp, no more columns, mullions get less); **loudness** high (good play of forms and volumes, open and closed, new textures (plants and gravel)); healthy **pitch** (some shading, but no overhead plane)



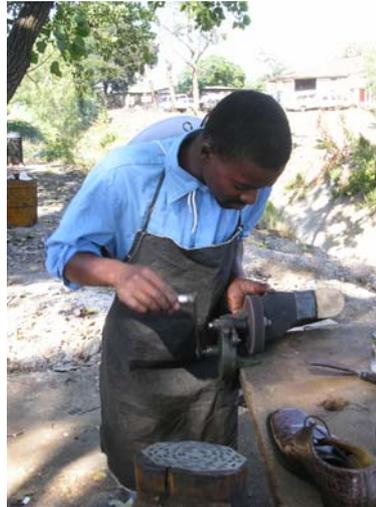
University of Pretoria – Meyer, M G (2005)

Some of the conclusions I have made of what a melody/movement wants to do in the context I have studied it in Pretoria follow now. What has to be noted here is that the melody is always contextual, differing, albeit only slightly, with the geographical, climatic, social, political and cultural practices it passes through. In some areas, movement might be concentrated in covered and protected areas; in other circles the open might be a ground for the melody to move along harmoniously. The research for what a melody/line of movement wants to do, i.e. move about harmoniously, lets me conclude:

- a melody wants to be protected. This means a solid or permeable (but existent) roof plane
- to make the melody even more harmonious, wall planes, preferably at least one of them permeable, are applied
- a soft roof plane (e.g. tree canopy) softens the edges of the melody and decreases the velocity
- it likes to move through naturally proportioned spaces, spaces containing nature's harmonies. Again, the building blocks of nature, like trees and their canopies, provide these proportions without even trying to enforce them.
- a "humanisation of space" is necessary to let it move through a designed space and into a building. Employing a proportioning system that represents these human and natural proportions, like the modulator, can do this.
- softly, rhythmically and naturally filtered light increases the rhythm and softens the melody. This means it moving in shade, but with rhythmic openings (again created by trees or buildings) and not solid building mass with hard edges
- it wants a continuous wall plane on at least one side to bounce off from and guide the movement and not make it disappear in many undefined little corners
- it wants to have a good mixture of volumes, sense that there is some continuity behind the façade without telling it directly where to go.
- it wants a sense of transparency that invites and intrigues without giving away the whole building immediately
- it wants to have logical landmarks from where to come and go and orientate itself according to a distinct hierarchy.
- it wants to follow logical paths along this line and have all entrances and exits sit on the line naturally

MARABASTAD EXAMPLE

Examples of these conclusions have already been seen in the analysis of the walk towards the site, but this can also be seen in many other places in the city. It was thus decided to go to Marabastad, just N-W of the city centre and look for examples of what constitutes harmonious movement, what kind of planes are needed to protect a melody, to make people want to sit and work there. Marabastad also has a fine example of a dip next to the road where melodies/movement flow down and offer a protective wall plane. Lots of activity occurs on the dip and even more on the square behind the dip.



lots of activity will take place under a simple roof plane - in this case the best roof plane of a permeable roof canopy

again, the simplest of roof planes will already ensure the protection of a melody/movement and ensure that people feel comfortable and want to gather there



dip in the site and activities on the slope (with a little roof plane of an umbrella)

roof plane over trading facilities ensures protection of melody/movement and people want to gather there



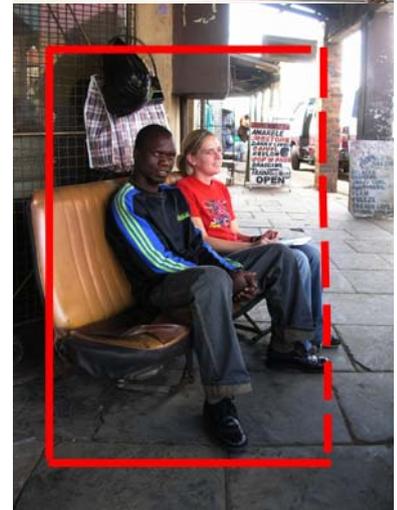
dip in the site and activities on the slope and on the lower level, where another roof plane (collonade and umbrellas on the square) protect the melody/movement and make people gather there

simple roof plane only requirement for protection of melody/movement and people will want to gather there



protected roof plane by means of collonade and trees next to it to protect melody/movement and make people want to walk along there

seating is a requirement under most roof planes to make the comfortable person feel even more inclined to stay there



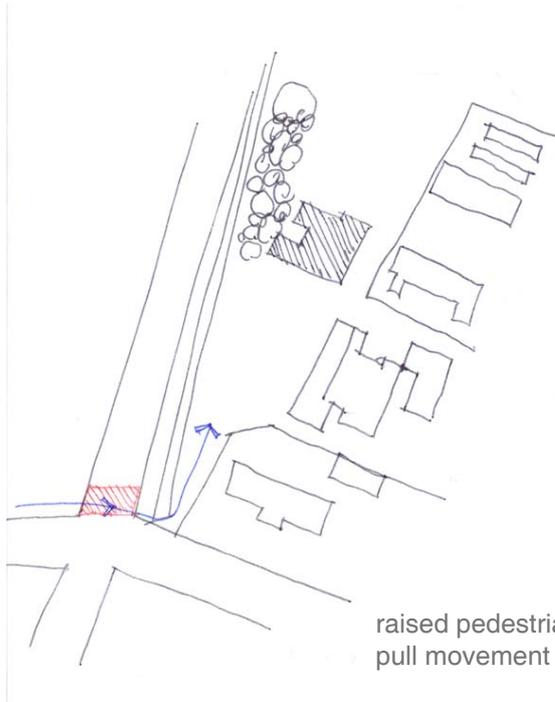
These thus are the characteristics of spaces that aid harmonious movement. A series of spaces that have a balance of these will be a series of spaces that draws people in and makes them want to be in that space.

With this in mind the design of the building can occur. The first step is to set out the movement on and around the site. The spaces around the site have been analysed in their potential to aid or deter movement and now it remains to add to these and look where new systems can be added. The first prerogative is to tap onto the main movement system coming from the station and going down Jacob Mare Street. This is where the main source of pedestrians lies which will feed the site. The melody/line of movement that has been generated was analysed and the spaces identified that make this melody/line of movement rise or fall.

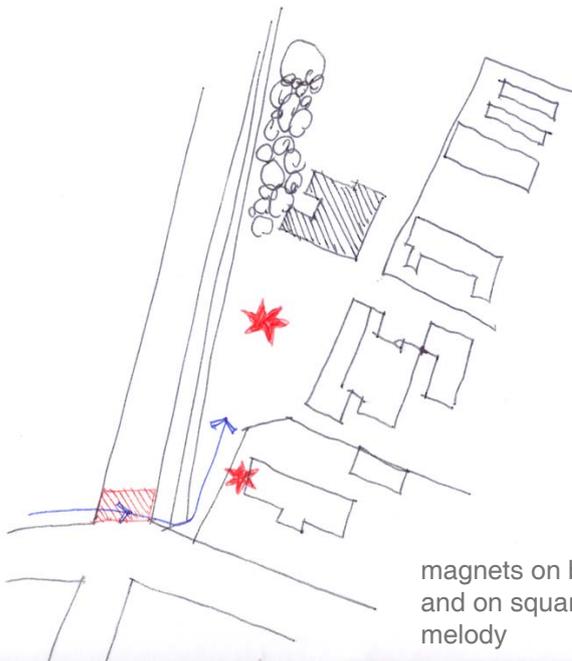
The biggest design problem will be to draw this melody/movement over Nelson Mandela Drive, i.e. to draw pedestrians over that wide street where, at the moment, there seems to be nothing that calls them over to the other side; the huge residential block even pushing many away and leaving them with many possibilities to get to Sunnyside, which is the main goal of most pedestrian movement at that corner. A magnet is needed on the other side to conglomerate movement on that corner. Once the movement has reached that corner, some possibilities still exist of where people are to go.

This is where that natural dip in the road becomes such a feature on the site. It is seen like a threshold of a waterfall with all melodies/movement flowing down and converging on that square. The slope also becomes very important in providing a wall plane along the site, especially important in protecting the melody/movement from the busy Nelson Mandela Drive. Another magnet is thus needed on the square itself to draw this melody/movement down. Again, most movement on that S-W corner wants to exit the block on the N-E corner and so a path has to be found through the precinct.

At the moment most movement takes longer and more meaningless routes, except maybe for the path through Gerard Moerdyk Street, which is already very harmonious and might be tapped into.



raised pedestrian crossing to pull movement over



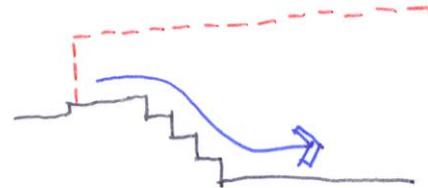
magnets on building facade and on square to attract melody

The following design decisions were taken, while keeping in mind that the melody is nothing else but the line of movement of people and where the melody moves harmoniously is where people feel comfortable:

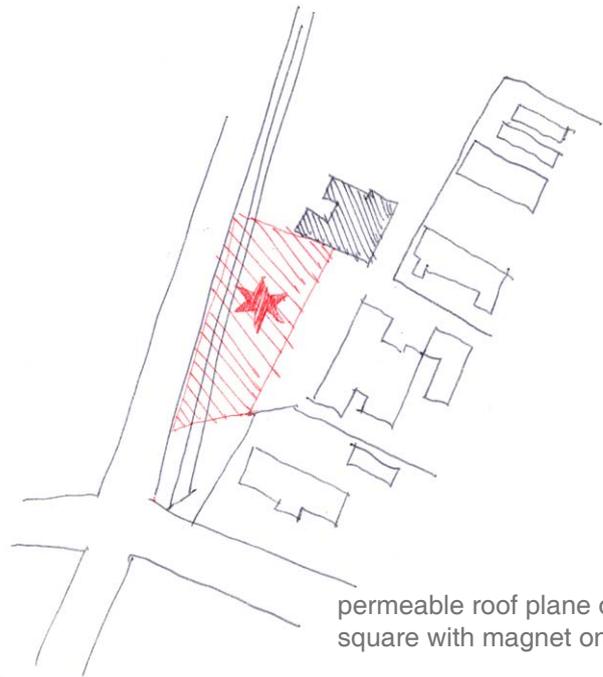
- install a raised pedestrian crossing between the western side of Nelson Mandela Drive and the eastern side to ease the melody over the road more harmoniously. This also goes in line with the MDC framework that envisages raised crossings to enhance pedestrian movement. This crossing would also mark the entrance to the corridor and, similarly to Newtown where an identity is created with the lighting that stays the same throughout, one could see the whole corridor to have a raised road, easing pedestrian movement over and giving that corridor the identity of being the one with the raised road.
- use the Western façade of that difficult block on the S-W corner to become the magnet itself and, in line with the program of the building, fasten a screen on the outside and project the public part of the filming from it. This will create an

extremely high pitch and loudness, all the factors needed to draw the melody over the road and give it some life again.

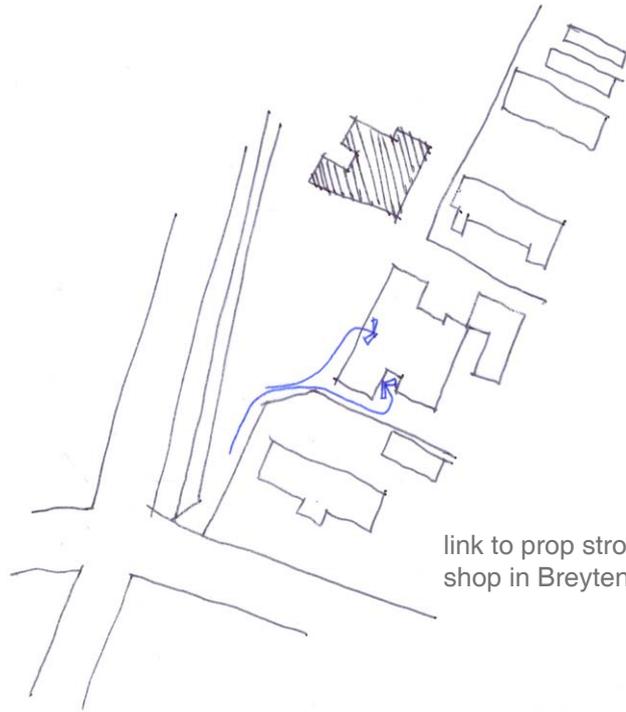
- keep the dip in the site and stay with the submerged floor plane - the perfect site for a melody to converge and be protected by the wall plane all along the W side.
- keep the slope's edge permeable and make the wall plane permeable to still allow any melody passing the site to move over onto the square. This will be done with the addition of seats on the slope and no wall along the top western side of it.
- provide a roof plane that is also permeable over the square, another condition for harmonious movement of a melody. This will be done with some kind of shade net or removable roof structure.
- put lots of movement on the square itself, another good magnet for the melody to be drawn over the road and down the slope. This could be in the form of some public activity or just providing the parameters for something to happen, which then usually will.
- keep some kind of link to the store room and prop



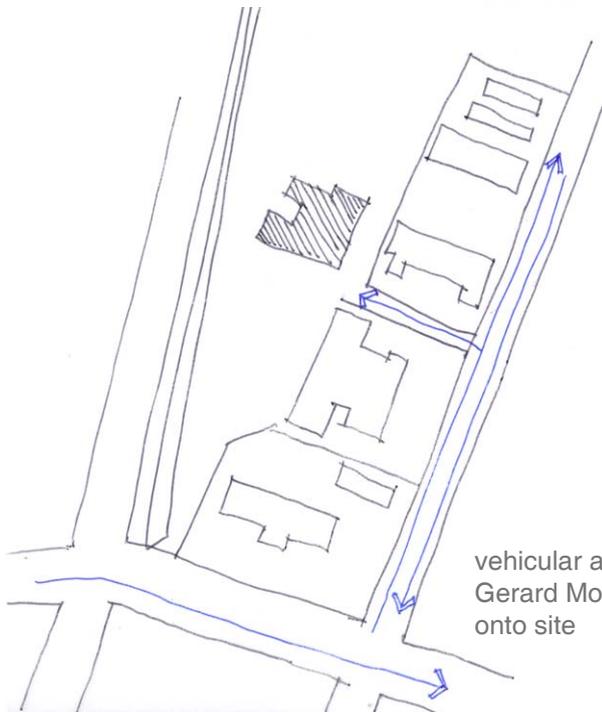
keep natural slope and add seating and permeable roof and wall plane for natural flow of melody down the slope and protection of it



permeable roof plane over square with magnet on it



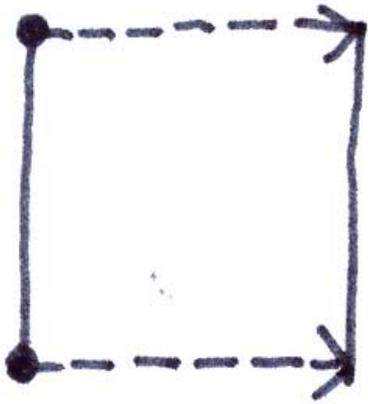
link to prop store and workshop in Breytenbach Theatre



vehicular access from Gerard Moerdyk Street onto site

store of the
Breytenbach
theatre
leave vehicular access on
the current position on the
eastern side with either
the possibility for on-site
or basement parking.





Now that the points on the line have been added and a line, our melody in the making, has been created, they are still lines and might or might not move about harmoniously. At this stage they are just paths that would ideally be used by people to walk along – to have them actually do this these melodies/lines of movement will have to be made harmonious.

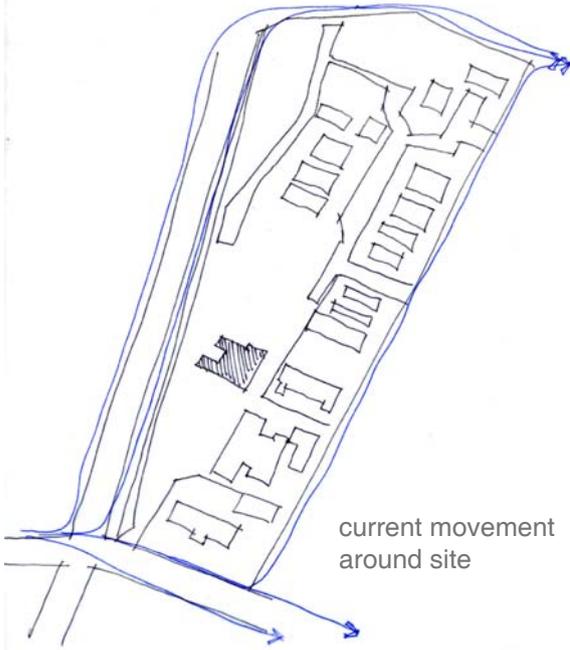
To make a melody/movement harmonious, the spaces it passes through must be harmonious. The more harmonious the movement along these lines, the more chance of people actually walking there and having meaningful and perceptive movement. For just normal walking the magnets, proper roof and wall plane with correct proportioning are enough to ensure harmonious movement along that path. There can be repetition in the type of roof plane, as the type of movement remains the same along that path towards the building and the square and only at deciding points should the roof or wall planes change.

Now that the wanted movement has been laid out on the site and the entrances and exits have been decided on, some kind of plane can be generated from the lines that run through the site. This plane would be the footprint of the building and be generated to take movement, and thus the melody flowing through the site, into account. From this perspective it can be seen that:

- the main building mass will lie on the eastern side of the site to allow an open square on the western side just after the slope
- the MOTH club seems to hamper movement and will have to be bridged or incorporated to make it part of the site and allow the melody to flow on it
- the building itself will have to be open on the southern side of the MOTH wall to aid movement around the club and out of the precinct
- there is already a distinct possibility to distinguish between public and private space, formalised and informalised movement, all with their own requirements of the kind of melody that wants to flow there
- some kind of more solid edge will be necessary towards the N-W side of the slope, around the height of the MOTH club, to give the precinct a strong character and prevent the spilling of the melody down the slope all along the eastern side of Nelson Mandela Drive, thereby creating disorientation

1 3

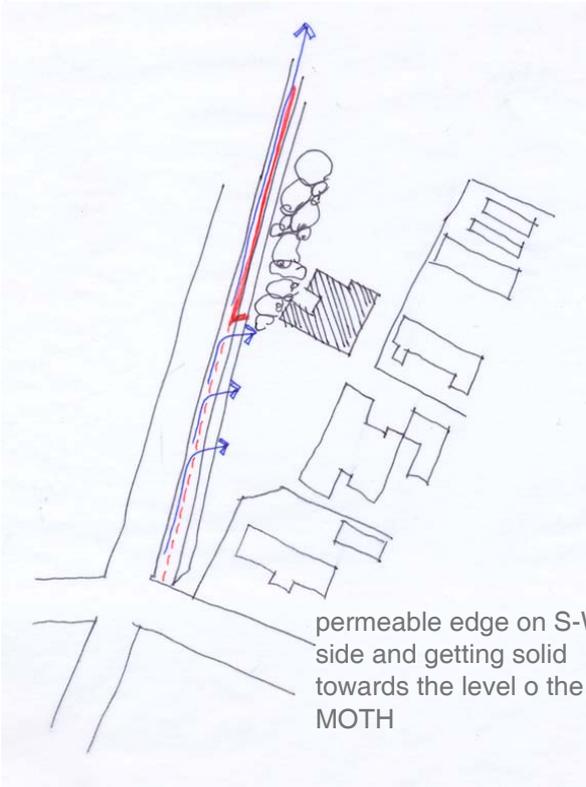
plane



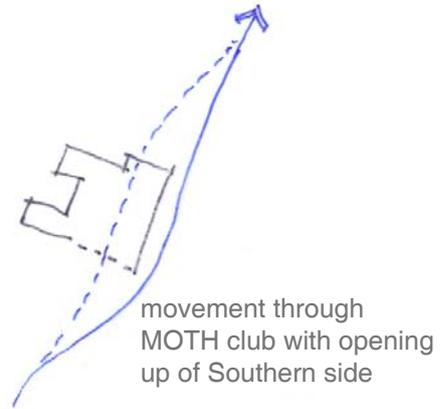
current movement around site



wanted movement through site



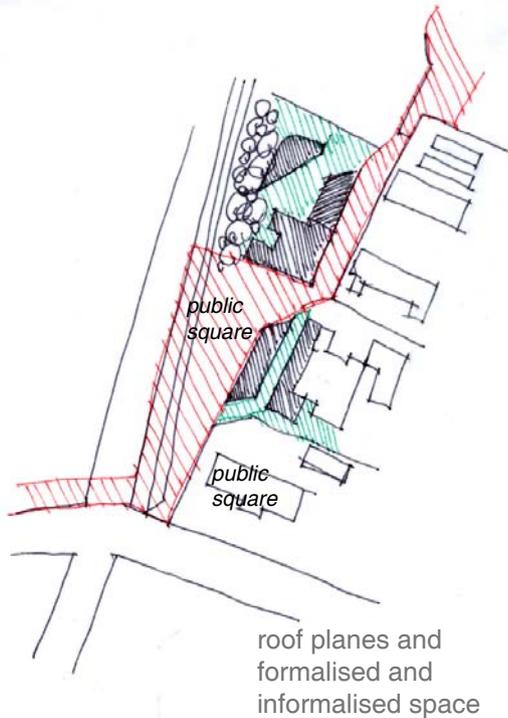
permeable edge on S-W side and getting solid towards the level of the MOTH



movement through MOTH club with opening up of Southern side

The design of the public square is vital for harmonious movement. The movement is drawn harmoniously to the site and there it must be kept harmonious. Public space - and especially in the city - should be of greatest importance in any project that has to respond to the public realm. As Jane Jacobs (Jacobs, 1961: 211) puts it a person needs to feel personally safe and secure on the streets amongst strangers. When people fear the streets they use them less, which makes them more unsafe. There needs to be:

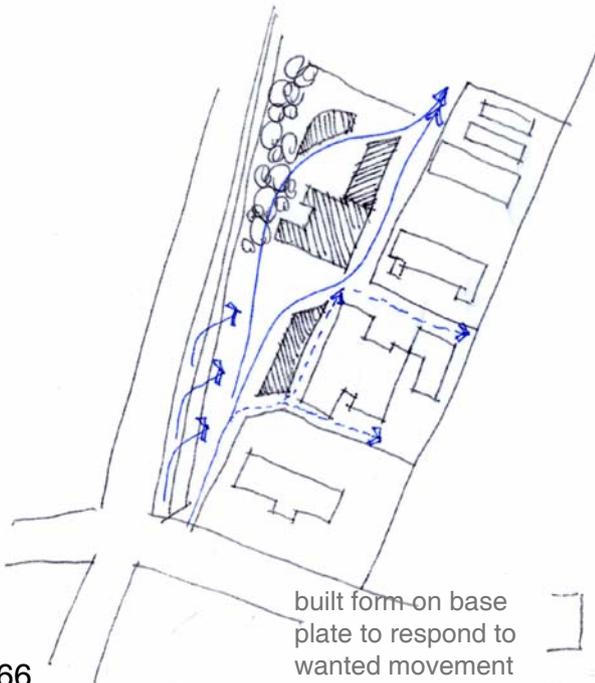
- clear demarcations between public and private
- eyes on the streets (other people or cameras)
- sidewalks with continual flow of users during all times of the day



roof planes and formalised and informalised space

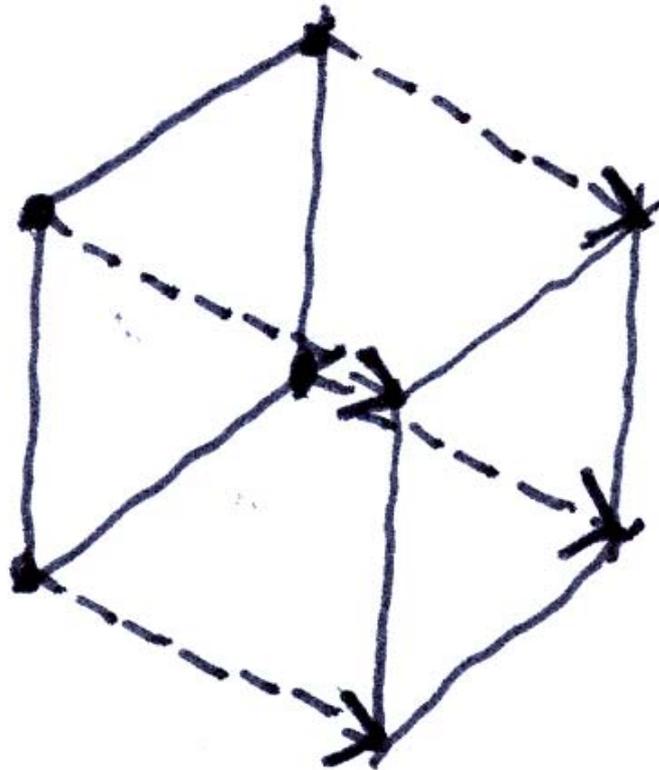
Something must be offered to people to draw them there. This should be some kind of magnet that makes them want to walk past and cross the square on the way to their final destination. Including various types of activities during all times of the day does this. Video projections on the big screen are seen from far away and draw them there. The artisans from the workshops perform work outside, the community workshop attracts people and there are shops, restaurants and space for informal trading.

“Sittable” space is more important than the amount of space or its shape and Whyte asserts that “people tend to sit most where there are places to sit” (Hillier, 1996: 115), meaning that it is difficult to spoil a public space. The depth of the seating is important, which will be around two bums deep. For this purpose steps are the ideal solution and these will be of concrete. Again, people will want a roof plane where they sit, which is a removable shade net running on steel trusses. This gives the square a “stadium atmosphere” with many different activities on the square and enough seating available to watch this activity. Benches are inefficient and do not allow for many people to sit on them. People tend to sit on the ends and seldom will someone want to sit in the middle. Benches are reserved for the semi-private zones on the site.



built form on base plate to respond to wanted movement

Active surveillance is an easy addition, where the big screen on the wall can be used to project offences and make criminals think twice before committing an offence. This makes the type of protection light-hearted, as the screen will be showing people walking, which is either for purposes of the study of movement (the function of the building), or for the purpose of preventing crime. A camera surveillance spells control AND care, proscription AND protection and this balance needs to be kept. Improved detection is one thing, but deterrent qualities are even stronger.



The design is now at a stage where the nature of a point has been discussed, as well as how this character stems directly from the context it sits in. When this point is set in motion, a line is created and this line, this line of movement, is compared to a melody and the character of this melody is a result of the character of the spaces it moves through. The more harmonious the space, the more harmonious the melody and thus the more harmonious the movement of the people passing through the spaces. The more harmonious the movement, the better the perception. These melodies/lines of movement are drawn over the site and represent the ideal movement of people and certain parameters already exist to make this harmonious. From these melodies/lines of movement a plane can be generated, a footprint of the building. Point gave line, line gave plane and now plane will give volume.

14

volume

PROPORTIONS

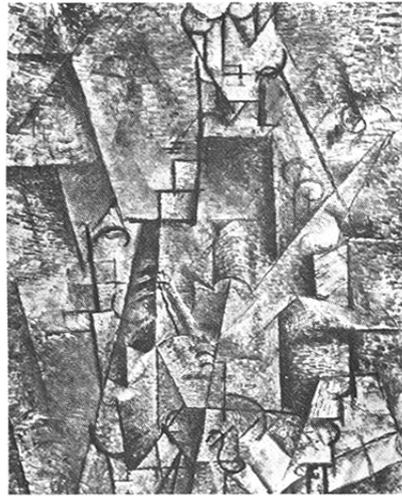


Plate 59 Pablo Picasso, *The Clarinet Player*, 1911.

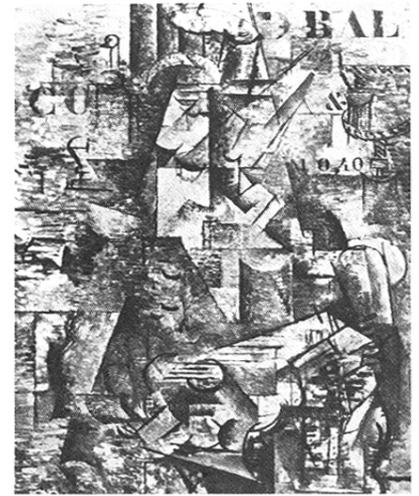


Plate 60 Georges Braque, *The Portuguese*, 1911.

To explain the making of volume, elaboration is needed on an idea that has already appeared in this text. This is the concept of proportion. Many a designer does not understand the freedom that a system of proportioning can offer. Too often it is seen as a formula that is followed and evolves a design without any intervention of the designer. But that is exactly what le Corbusier fought against in his own office, where his staff often let the Modulor do the design for them and not they themselves. Similarly, Karl Jooste used his 13-series Modulor only to finish his design, working as he would design anything and then taking out the series to finalise measurements. What makes the proportioning so important is that it instils the space with the touch of human proportion. The Modulor has not been referred to as a “humanisation of space” in vain, since it is based on the proportions of a human. All the measurements are representative of proportions that are comfortable to a human. This size might have been chosen arbitrarily, in this case the height of an English officer, but it is the relation between the parts of the human body that is important. This makes this system so suitable and universally applicable. It makes the beautiful and comfortable easier to reach.

The way to design space as a vessel for a melody to move through harmoniously, is to make this space take on natural and human proportions. For me the most powerful way to do is to employ a system that aids me in this. Together with this, these spaces also need to have the correct balance of pitch, duration, loudness, timbre, rhythm, harmony, phrasing, and orchestration and here the detailing also becomes important. Whereas in the movement outside there could be a certain amount of repetition, here a more detailed look at the different spaces is needed.

“...but, you may ask, does the visitor actually experience these proportions? The answer is yes – not the exact measurements, but the fundamental idea behind them. You receive an impression of a noble, firmly integrated composition in which each room presents an ideal form within a greater whole, you also feel the rooms are related in size. Nothing is trivial, all is great and whole!”
(Rasmussen in Ching, 1996: 270)

TRANSPARENCY

Another concept that should be a guiding factor in producing a building form that aids harmonious movement is the idea of transparency. As mentioned, the parameters of pitch, duration, loudness, timbre, rhythm, harmony, phrasing, orchestration and proportioning, which determine the character of the spaces, are only applied after the bulk of the design is finished. Before that the building is designed according to some general principles of good design, such as context, technical, acoustics, climate, detailing, energy usage, lighting, services and general functionality. Along with these there are some non-quantifiable principles that should be taken into account, being the intersection of volumes and transparency.

Rowe (1976) distinguishes clearly between two types of transparency, namely literal and phenomenal. He compares Pablo Picasso's *The Clarinet Player* (1911) to Georges Braque's *The Portuguese* (1911) and describes Picasso's painting as a pyramid with strong border, separated from its background and shallow space, not allowing the viewer to go deeper into it. Braque, on the other hand, introduces interlocking horizontal and vertical gridding with gaps and subsiding planes, thereby creating a primarily shallow space, inviting the viewer to be drawn into the painting until the final figure is revealed. When looking at the Bauhaus (1926) by Walter Gropius versus Le Corbusier's Villa at Garches (1927) the first one is seen as an example of literal transparency. The glass curtain wall performs the function of just being a translucent plane without concealing any further series of volumes behind it. The visitor sees the whole building in one without wondering what further depth lies in the planes. Garches, on the other hand, has different planes running parallel to one another, firstly the front glass plane (meeting the slab in such a way without clear mullions so as to wonder whether the slab carries something behind

it), then a narrow slot of space that runs parallel to the glass plane, the rear wall, running parallel to the other two and many smaller planes in between. As Rowe puts it "...transparency is effected not through the agency of a window but rather through our being made conscious of primary concepts which interpenetrate without optical destruction of each other" (Rowe, 1976: :168).

There is a contradiction between spatial dimensions, interaction between fact and implication, between deep and shallow space, between horizontal layers and vertical ones. It is not about just having a succession of spaces, but rather about having contradictions in the spatial dimensions of these. These ideals should be another

"If one sees two or more figures overlapping one another, and each of them claims for them the common overlapped part, then one is confronted with a contradiction of spatial dimensions. To resolve this contradiction one must assume the presence of a new optical quality. The figures are endowed with transparency: that is they are able to interpenetrate without optical destruction of each other. Transparency however implies more than an optical characteristic, it implies a broader spatial order. Transparency means a simultaneous perception of different spatial locations. Space not only recedes but fluctuates in a continuous activity. The position of the transparent figure has equivocal meaning as one sees each figure now as the closer, now as the further one." (Kepes, 1944: 77)

driving factor behind arriving at volume.

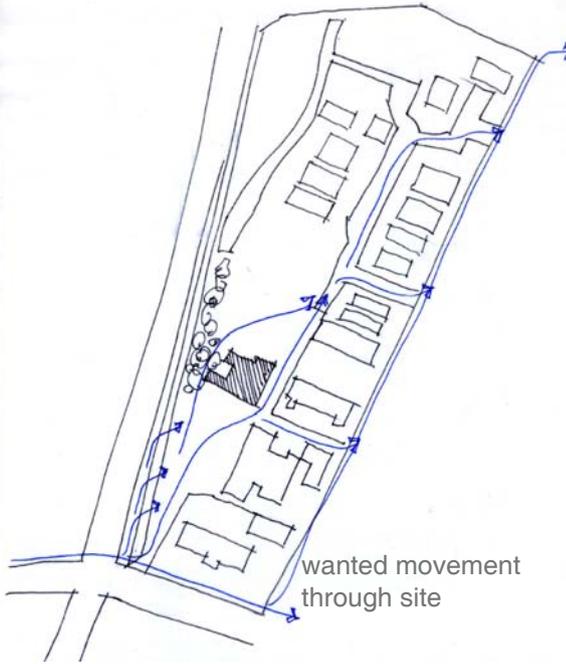
The easiest way to put down movement through a building is to briefly look at the plan, which described the movement on a horizontal level and was the movement on the bottom plane. Once this plane is projected vertically, a section will be the most powerful tool to determine the movement in the volume.

The floor plane still remains important to understand at which points the melody/line crosses the path of the building and from where it can be taken into or through the building. From those points the section will have to tell where the melody/line of movement flows from there.

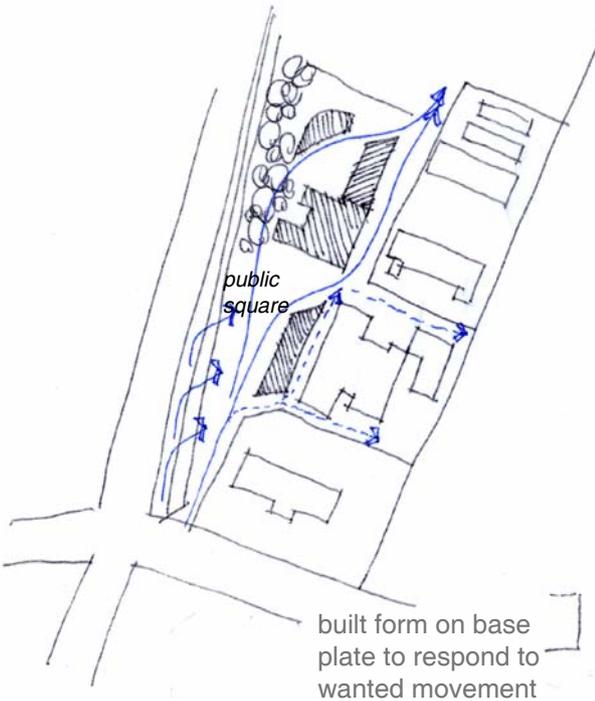
Here, the program of the building becomes the main determining factor in where the melody/line flows.

A look at the initial diagram will help to determine this. From this point onwards, the design process will follow naturally with the building being designed to fulfil all requirements of the program in terms of size of zones and inherent functions and good principles of context, technical, acoustics, climate, detailing, energy usage, lighting, services and general functionality. The guidelines of intersection of volumes and the phenomenal transparency also guide the decisions. These factors are necessary in any building for harmonious movement and cannot be added afterwards, because of the fundamental space and decisions these require. All the rest, the pitch, duration, loudness, timbre, rhythm, harmony, phrasing, orchestration and proportioning are only added later. They are used to finalise the design, used to make normal movement harmonious – a small yet very deciding factor.

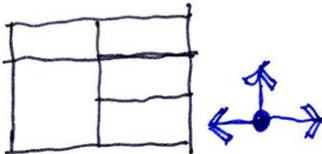
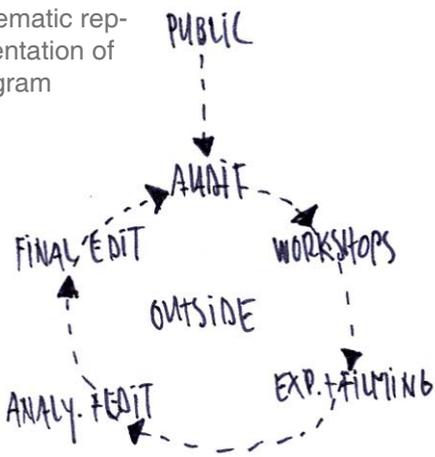
In all of this it must be seen to that the final form of the building still conforms primarily to good design principles and functional requirements. This method of design is just an aid to good design and will never replace skill or intuition, something that was already learnt in the first failed attempt. Just like the proportioning system is used to finalise design and make good design better, only coming in right the end, so this method will be used at the end to



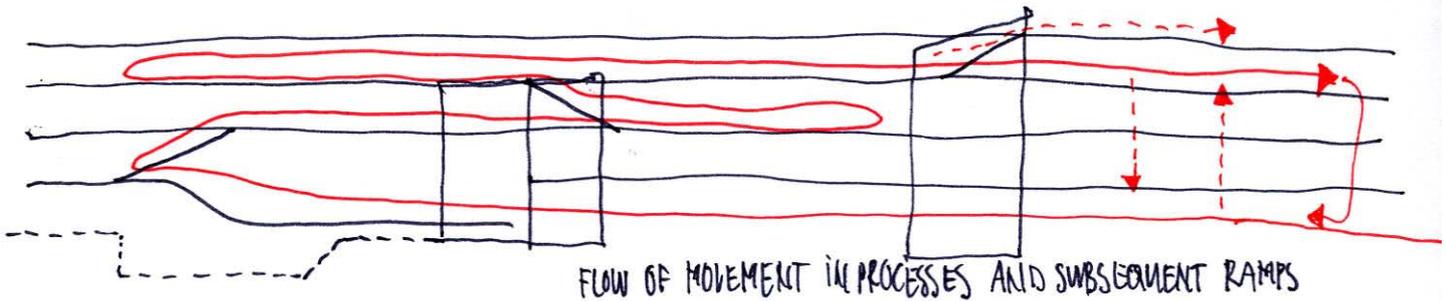
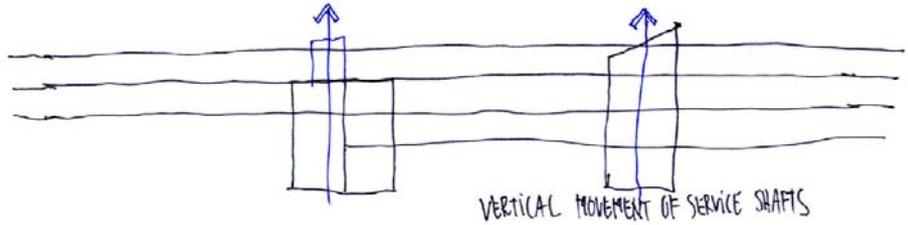
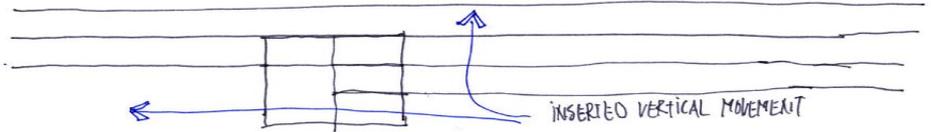
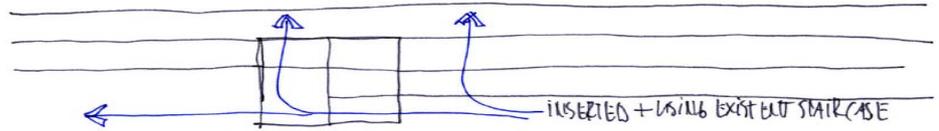
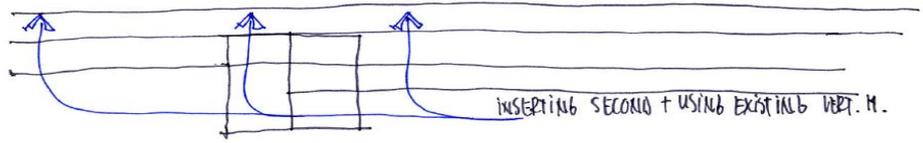
using the floor plane as developed from the existing and wanted movement on the site and having the resulting footprint of the building mass (and open public square) as a starting point from where to project this floor plate vertically and get to volume

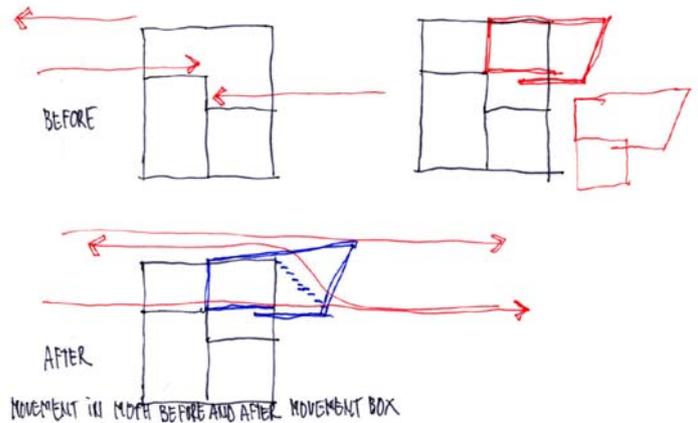
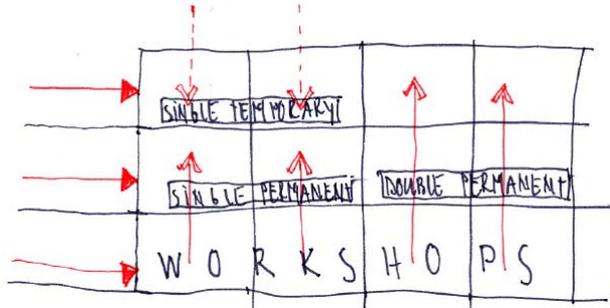
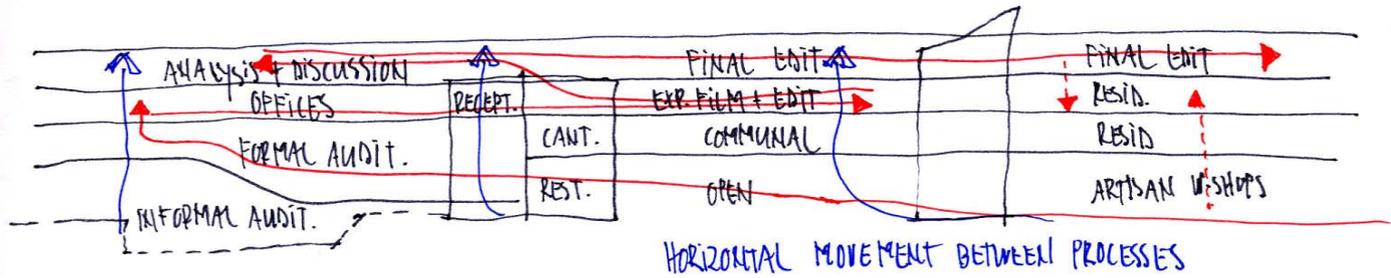
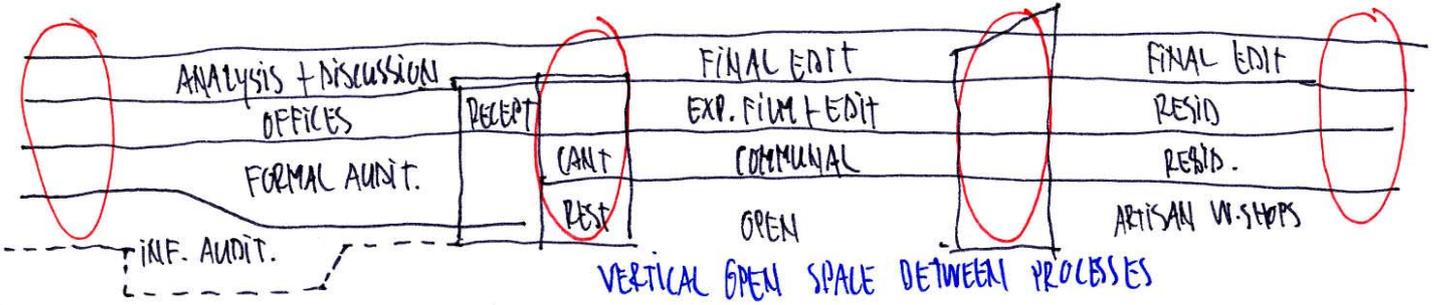


schematic representation of program

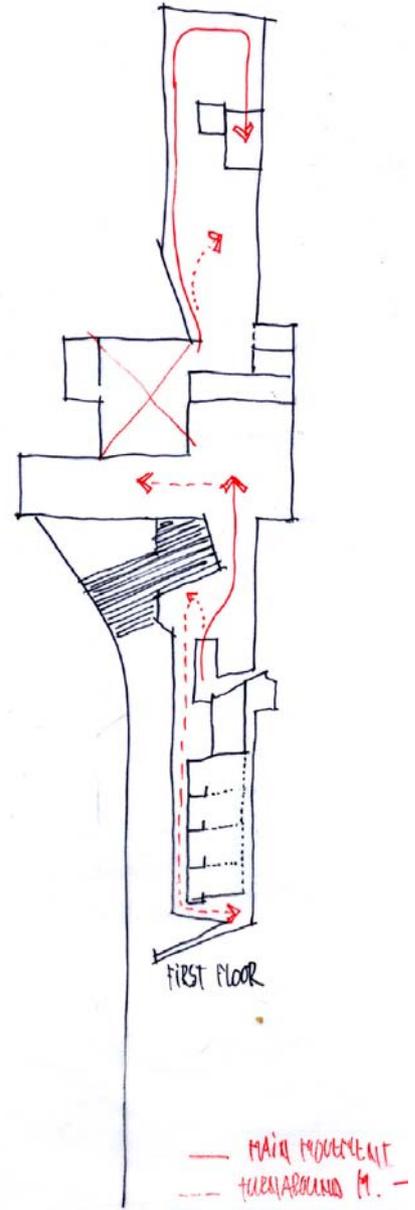
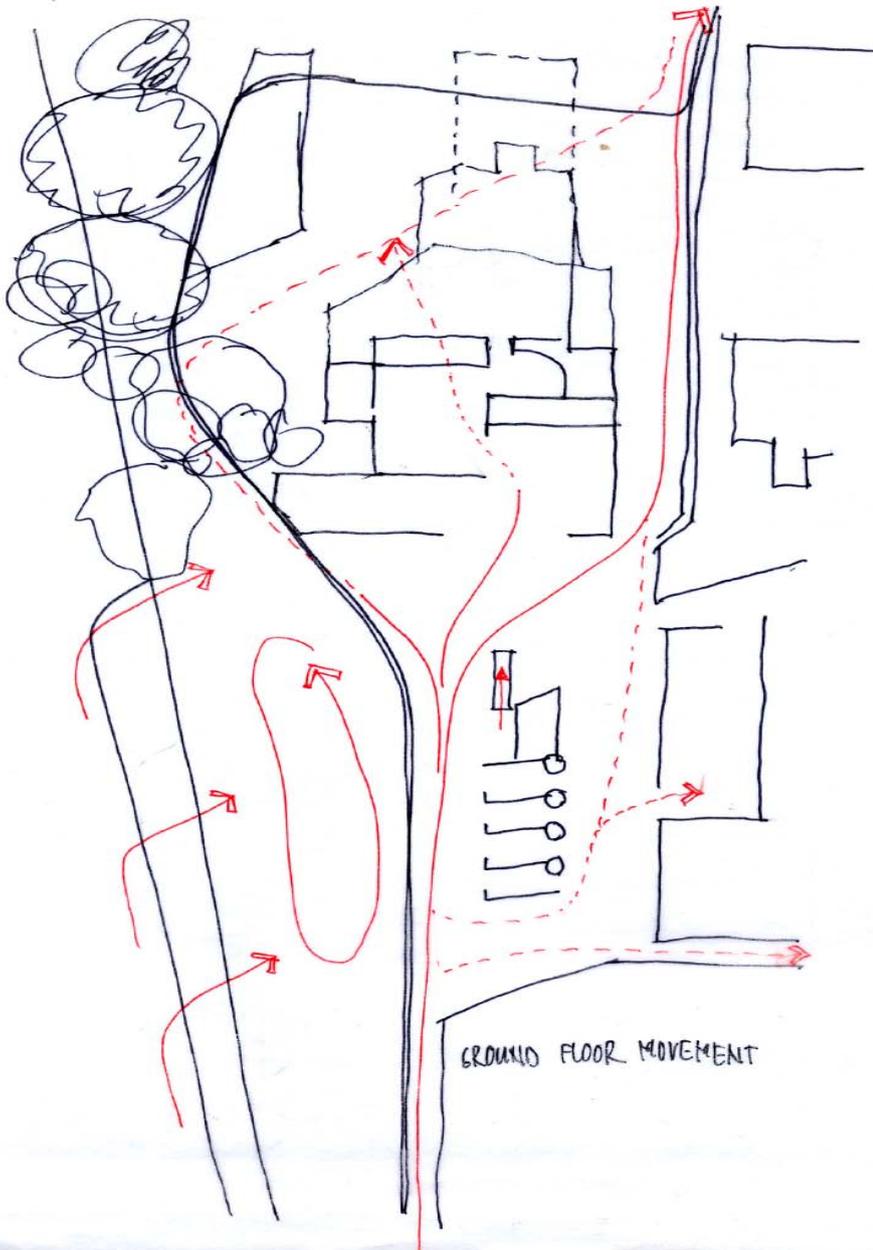


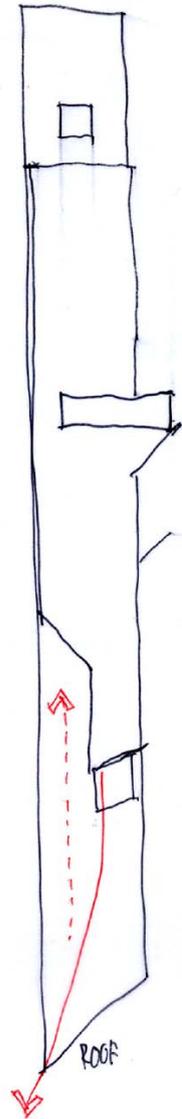
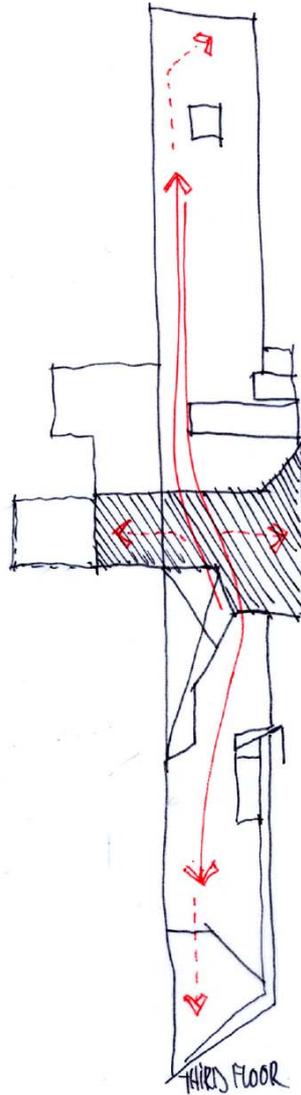
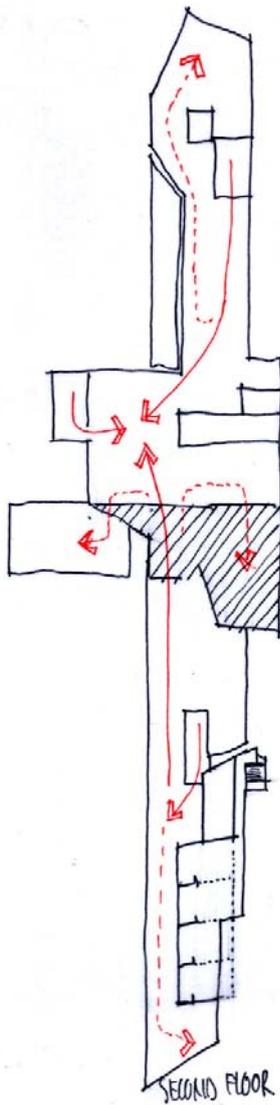
starting point at the foot of the MOTH club from where movement can be drawn vertically



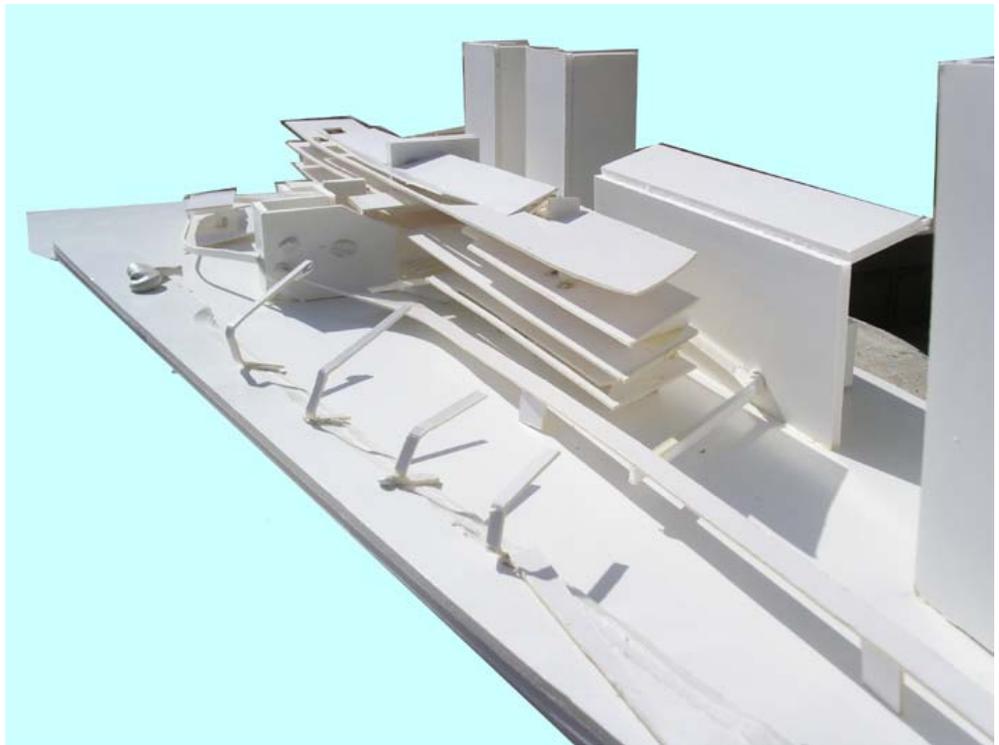


University of Pretoria – Meyer, M G (2005)
melody/movement drawn into building on ground floor, then passing through the other floors. solid lines represent main melody/movement, dashed lines secondary.





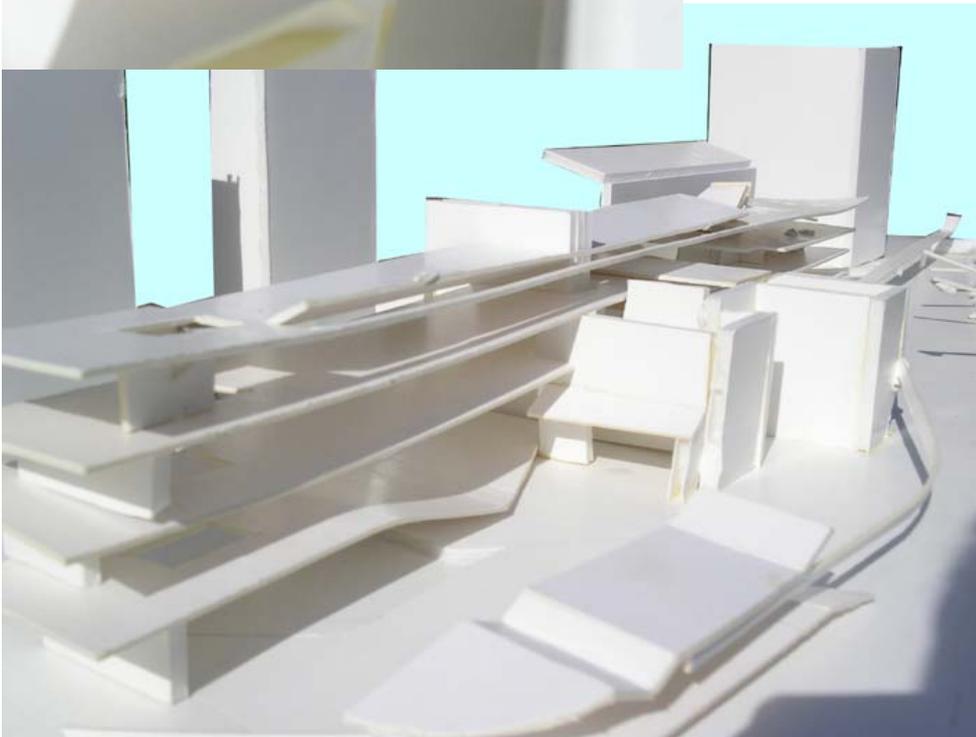
Now it is possible to look at some design principles that were used in the design. Please note that most of these are also dealt with in the chapter on the technical resolution. This should go as no surprise when one considers the technical as an integral part of the design, just as the design resolution is embedded in the technical requirements.



Meyer, M G (2005)

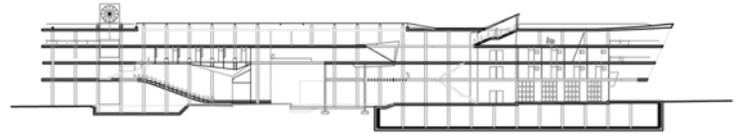


CONCEPT MODEL



TRANSPARENCY/INTERSECTION OF VOLUMES

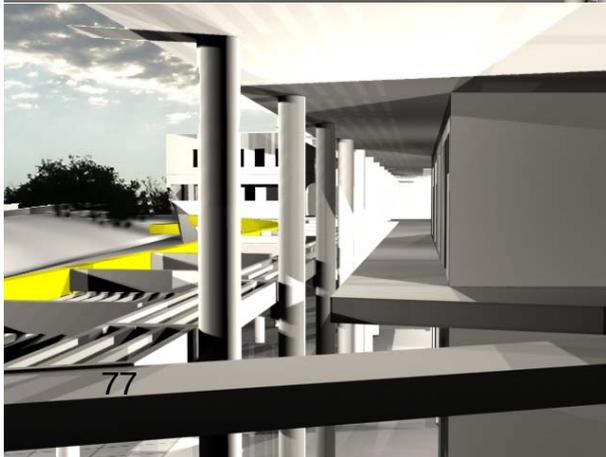
Transparency and the intersection of volumes were one of the main guiding factors during the design to ensure the possibility of harmonious movement before the more specialised analysis gets applied. It is not about just having a succession of spaces, but rather about having contradictions in the spatial dimensions of these. This would mean moving from single to double volume, open to closed, inside to outside, light to dark. It would also mean different planes running parallel to one another, both horizontally and vertically.



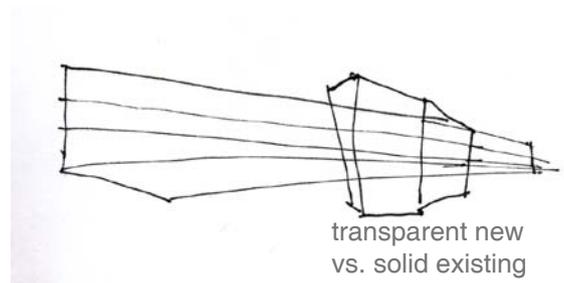
the building itself is also an example of transparency, showcasing the program and the processes going on inside with its structure



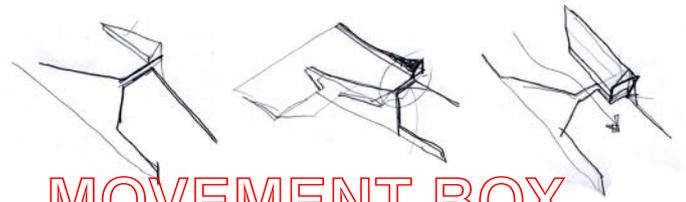
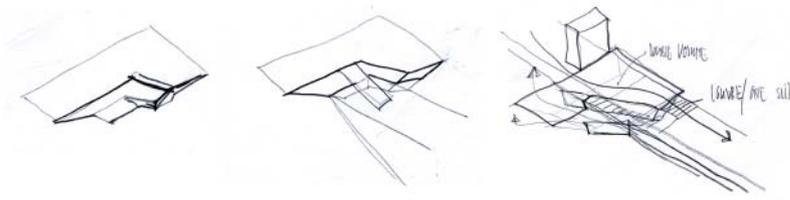
slabs cut back to create open volumes; columns run two storeys; flat concrete roof dipping under sloping wood roof; staircase punctures slabs; large window planes for play of inside and outside



slab opens up to free volume and let columns intersect both floors; play of inside and outside

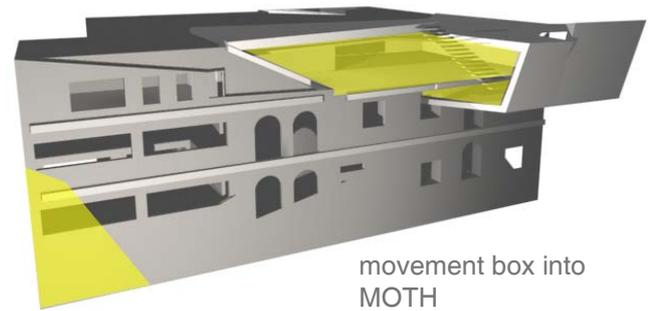


transparent new
vs. solid existing

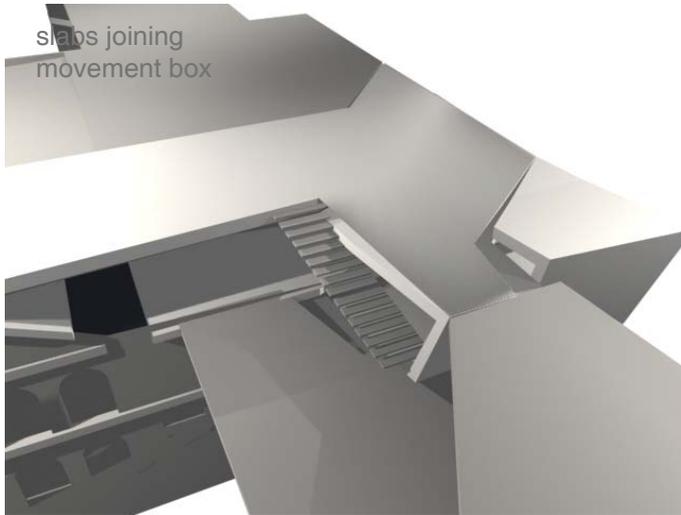


MOVEMENT BOX

After the movement inside the building had been laid out the movement box was one of the first interventions needed to integrate the MOTH club into the building and make the new movement work. The MOTH has been altered over the years and strange floor levels were the result. The movement box looks to address this and not only make the whole building work better, but the MOTH too. Because of its solid nature it is also the perfect position for the sound studio and dark room. More detailed information is in the technical section.



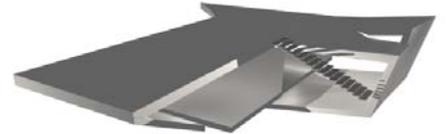
movement box into MOTH



slabs joining movement box



movement box into MOTH

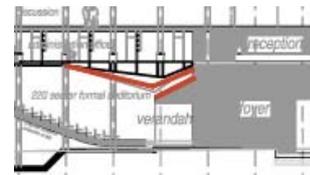
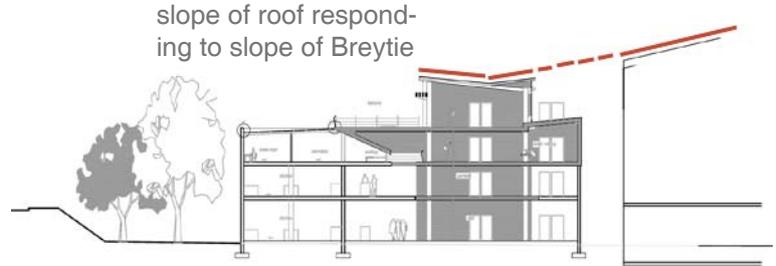


CONTEXT

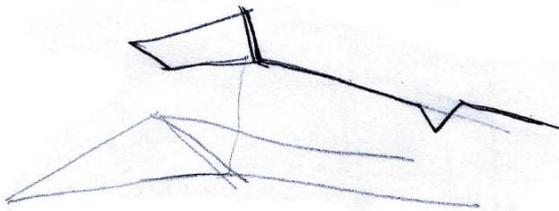
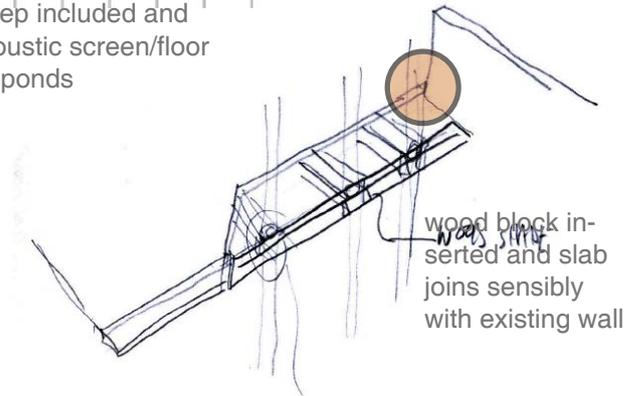
To respond to the existing on the site is vital for the success of any project. It takes too much effort, energy, time and money to try and work against the existing. A point will always want respond to its context and bring about a line, plane, volume that looks like that. It would be wrong to try and force the point into something else. This design responds to planting on the site, to the slope of the dip, the height of surrounding buildings, the existing facilities on and around the site.

It cut the MOTH club where it made sense in terms of windows to be kept, slabs to be joined, made the double volume foyer the entrance hall for the cinema and used the stoep and the roof over it as an integral part. The existing column grid was taken note of and followed, except in one place where this is celebrated with a non-standard roof truss.

The wood block that was inserted into the concrete slab responds to the context of the trees next to it and at the same time ensures that the concrete slab joins the MOTH sensibly to let a wall cut into the building. Its underside doubles as an acoustic screen for the auditorium underneath. More detail in technical section.



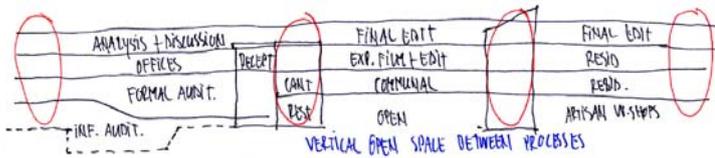
stoep included and acoustic screen/floor responds



community wood workshop responding to context of trees it lies in; made entirely out of wood

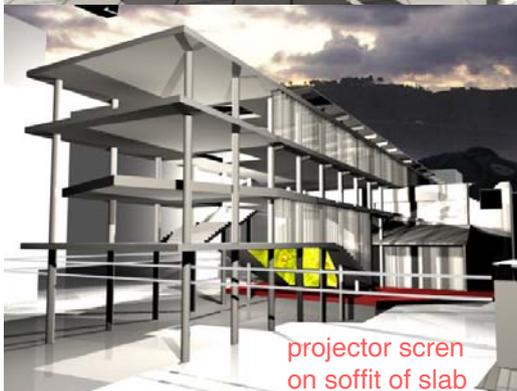


OPEN SPACE



Open space, as already mentioned, performs a vital role in the program of this building. Thus it was seen as a design priority to design these open spaces and make them harmonious. They are designed in terms of what kind of open space they are (who is there and for how long) and then fine tuned to make them harmonious.

DUAL PURPOSE



The multiple use of facilities for more than one purpose becomes integral in the long-term sustainability of a building. Here, underside of the seating in the auditorium becomes the screen for the informal auditorium, the facade of a hampering building becomes another screen, also solving the problem of providing a magnet and doing something with the repulsing facade. The floor of the wood block becomes the acoustic screen for underneath and the dramatic cut in the MOTH becomes the pragmatic service entrance of the restaurant.

CLIMATE

This will be discussed in more detail in the technical section, but it suffices to say that climate is - next to movement - probably the most important component of context. In times of global warming and energy crisis it is unacceptable to negate this issue. A building must be climatically sound, respond to the sun and rain and make these work to one's advantage. This building looks at external shading devices, water reticulation, wind energy, solar energy (both active and passive), existing and new planting, appropriate materials and building practices.

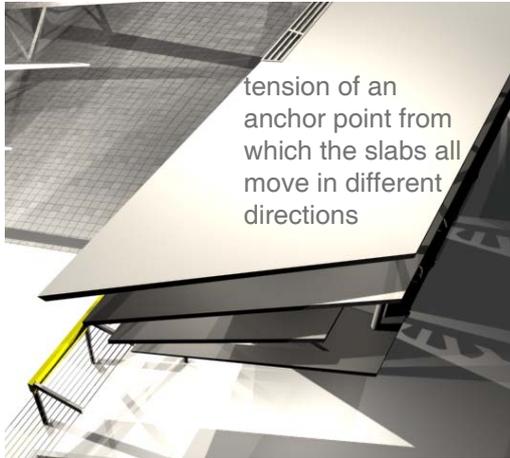
LIGHT

Again, one of the core principles of good design is to understand and employ light correctly. Le Corbusier has already been quoted and it has been made clear how important light is in harmonious movement. This building employs a vast amount of daylighting, the best and most natural form of light. A system of louvres and planes is needed to make this light qualitative and not only existent. Volumes and forms come to life, the building starts to breathe.

Artificial light on the outside for evenings is also important and a system of fluorescent lights and lighting on steel cables runs through the site on the melody/movement path and adds the pitch needed to move along harmoniously.



HONESTY



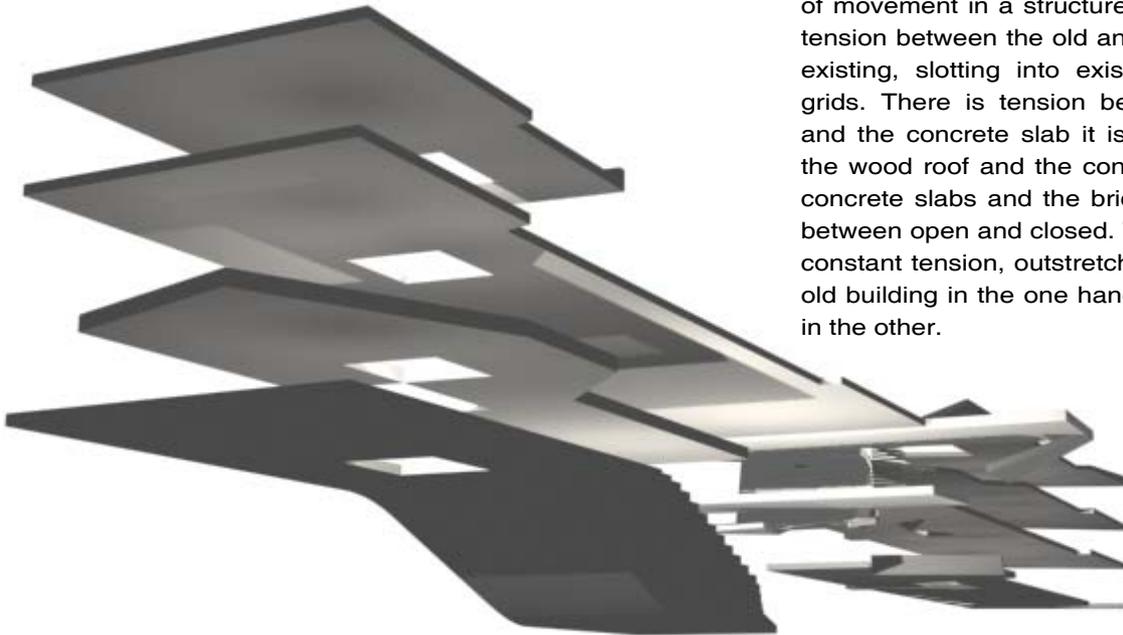
Honesty is similar to transparency in showing what is going on inside the building, The section of the building shows what is going on inside and the structure is exposed - beams are left open, trusses show, columns puncture through the roof and slabs run as the forces are transmitted.

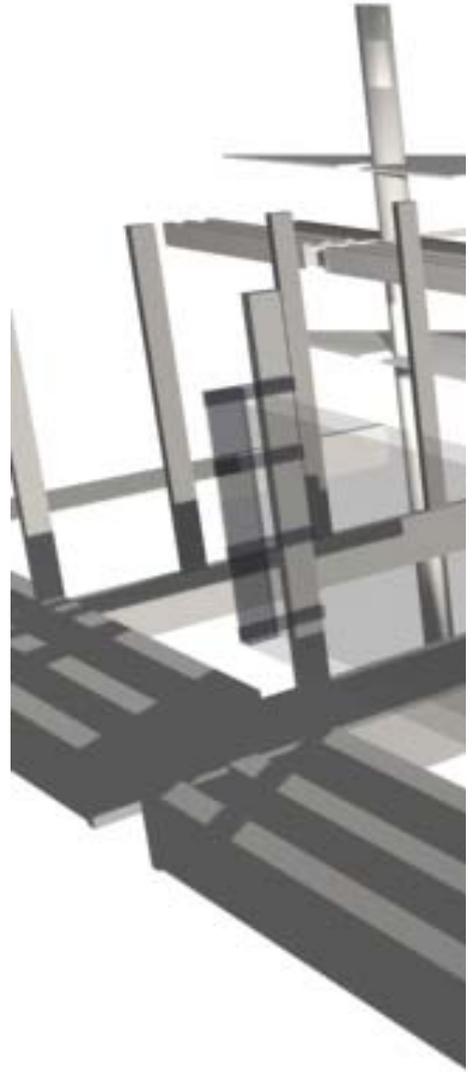
EXPOSE MOVEMENT

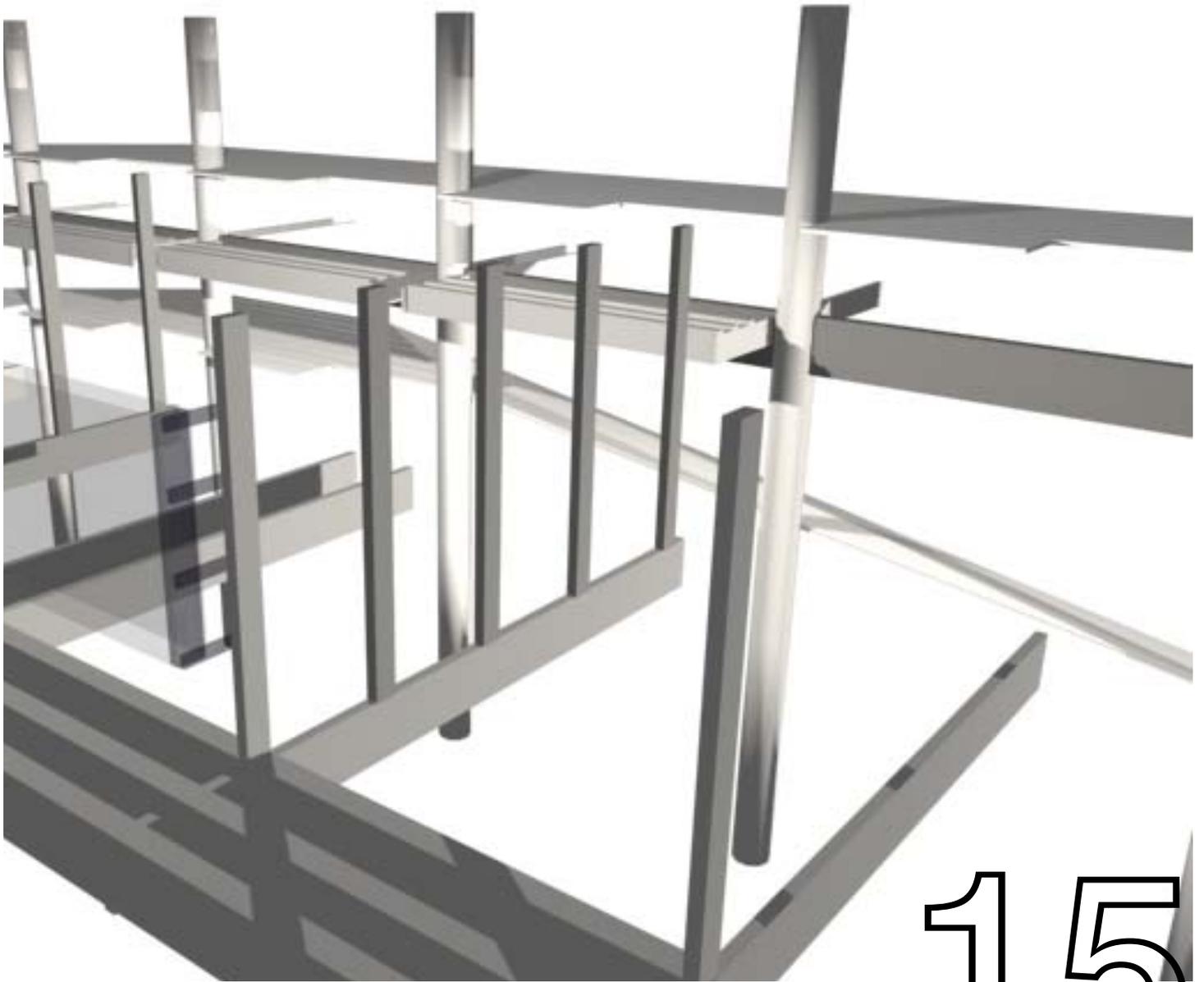
Honesty of movement is also important, the section showing where movement goes, where ramps, staircases, slabs travel and essentially where people, being on the line of the melody, move.

TENSION

Tension is what makes a building interesting, makes parts relate to one another, is the epitome of movement in a structure. In this project there is tension between the old and the new, cutting open existing, slotting into existing slabs and column grids. There is tension between the wood block and the concrete slab it is inserted into, between the wood roof and the concrete roof, between the concrete slabs and the brick shaft that cuts them, between open and closed. The movement box is in constant tension, outstretching its arms to hold the old building in the one hand and the new structure in the other.







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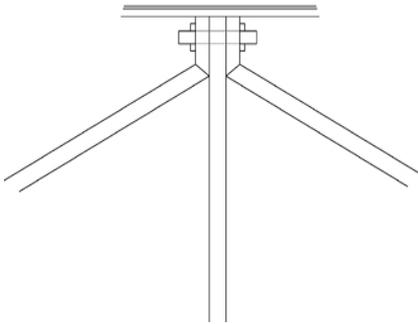
technical

DETAILING

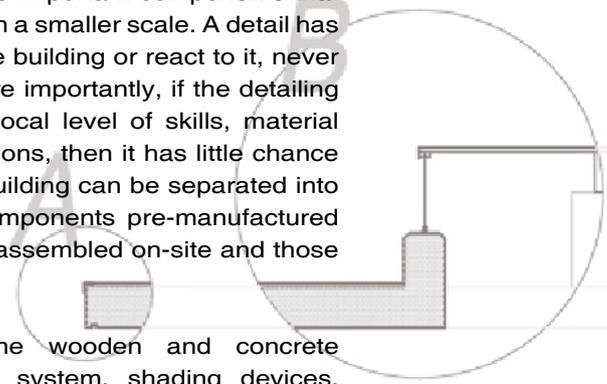
Detailing is the aspect of the product of architecture that warrants that the building survives through its intended life span. Furthermore, it is one of the important components that promote harmonious movement on a smaller scale. A detail has to form part of the language of the building or react to it, never be left open to circumstance. More importantly, if the detailing does not take into account the local level of skills, material availability and weathering conditions, then it has little chance of survival. The detailing in this building can be separated into two categories, namely those components pre-manufactured in controlled conditions and then assembled on-site and those manufactured on-site.

The first category includes the wooden and concrete fins, wooden trusses, bio-glass system, shading devices, balustrading, flat bar connectors, etc. The manufacture of the trusses, for example, might be complicated, but will happen under controlled conditions – what is more important is that the joining on site be as simple as possible. This counts for all the components that are assembled on-site. The simpler the connections, the less chance of mistakes - and proper connections result in the product resisting wear-and-tear for longer. In general, the detailing aims to include as little components as possible, making assembly easier and fewer mistakes possible.

In the second category are the components that are made on-site, like the concrete and brickwork. These skills are less specialised, although some concrete casting, like that of the roof, still remains difficult and needs proper supervision. The good quality of concrete work on the Constitutional Court Building suggests that this is still possible in South Africa. The wooden structures built on-site are designed to have as little cutting and changing of direction as possible. Simple straight beams, columns and floors joined flat to the edge with very simple connections to reduce shear stresses in the wood and ease construction.



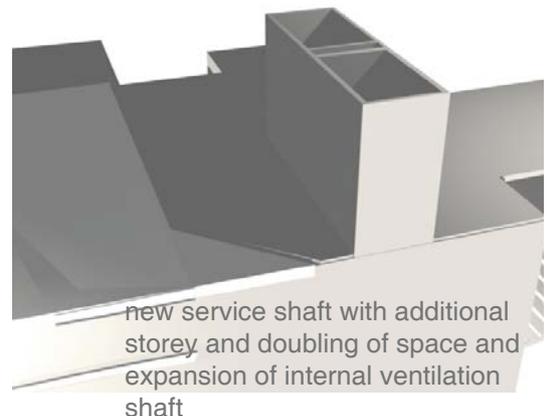
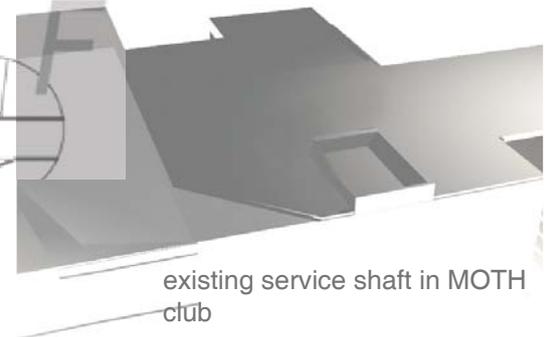
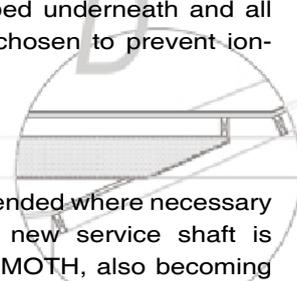
simple on-site connection of complex off-site truss and column with just two wooden staves being pushed through two pre-drilled holes



Weathering also played an important role and materials were chosen that resist corrosion and withstand the intense heat of the South African climate. Wood is shaded where possible and treated. The wooden louvres are manufactured from the pine trees that were removed from the site, treated on site and left exposed to weather with the sun. All external balustrading is lifted from the floor to prevent water from being trapped underneath and all metals and their connectors are chosen to prevent ion-exchange related corrosion.

SERVICES

Existing services are used and extended where necessary to carry additional amenities. A new service shaft is added to the existing shaft in the MOTH, also becoming the ventilation shaft. The stack pipes in the shaft link up to the original sewer connection running East of the MOTH. Water is supplied by a municipal connection on the Eastern border of the site. Electrical connections are also connected to the municipal grid, although the building will be fitted with UPS rooms on the second and third floor. Extensive cabling is essential in terms of server and network cables and this will run horizontally in power skirting along the floor and vertically inside the shaft inside the MOTH.





better than most other architects having practiced in Pretoria, Norman Eaton understood how to fuse Modern ideals with local climate, materials and typology. His work stands a testament for that which seems the goal of any current architecture - to find an appropriate architecture for the African context we live in. And he did this without reverting to any literal pseudo-African typologies.

VERNACULAR/CONTEXT/CLIMATE

Construction has to take local practices and climate into consideration. Construction practices are established out of a direct need, i.e. materials and detailing that respond to local climate and material availability. Material availability has become less critical with the current transportation network, but climatic conditions are still important, although currently many practicing architects seem to negate this fact. This viewpoint is not shared and construction of this building looks at vernacular building practices, such as the roof structure, which conforms to building practices in the 1950s and 1960s in Pretoria. A wooden tongue-and-groove ceiling is fitted directly onto the wooden truss and then waterproofing is applied to the outer surface. The ceiling becomes the beautiful inside skin but also the external structural roof. The roof offers sufficient insulation if painted white on the outside. This type of construction has proved to be virtually leak-proof and outlived many alternatives. The same counts for the louvres, which are typical for Pretoria in dealing with sun influx. Only external shading elements have an effect on the interior conditions. This is done in the form of horizontal elements (the slab overhangs) on the North and vertical louvres on the East and West. In this case no shading is needed on the Eastern façade, as this is shaded completely by the surrounding buildings and trees. Vertical louvres are employed only in the parts where the building is enclosed with glass. This aside the most effective way of shading an external façade is with deciduous trees, which shade in summer and let sun through in winter. This is applied to the workshop by placing it within a forest of trees, needing no shading on the western windows.



LOAD PATHS

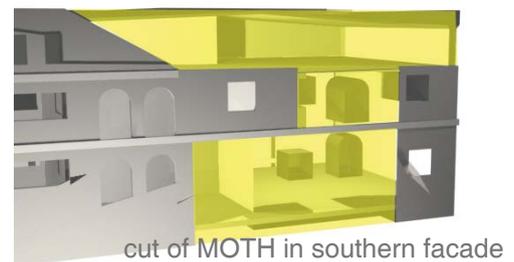
The way in which movement in forces is transmitted inside a building is by flowing the distribution from one structural member to another, i.e. by means of a load path. The importance of just having as many structural members as necessary has already been discussed. The more direct the path is to the foundations the better, both structurally and financially. Vertical load paths are affected architecturally by consideration of column and wall positioning to follow a straight path through the structure. An exception is made on the ground floor, where the shading element's columns rest on the slab of the basement and the path does not move down directly. Because of this fact these columns have been chosen to be thinner and a lighter load has to be spread.

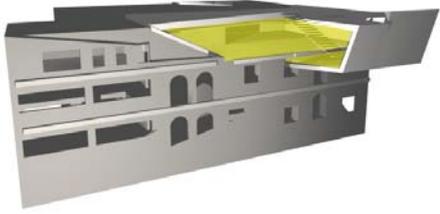


EXISTING

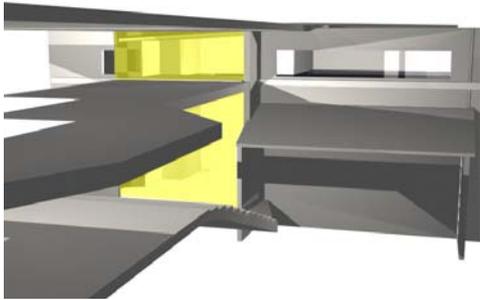
Working within the context of the site remains a prime consideration. Issues such as natural slope, local movement systems, climate, heritage, economy and ecology are all taken into account. Moreover, the tangible aspects of the site - such as existing structures, surrounding structures and services - are incorporated into the design. It is thus integrated in the block in a physical manner by using what exists and sharing it with its neighbours without imposing too much on the existing.

This assimilation starts with the MOTH club - the more detailed incorporation of which is discussed in the design development - where it is employed as an integral structure within the final building. Existing floor slabs line up with new ones. Additional floor slabs are added with the inception of the movement box to improve the rather haphazard circulation of the existing MOTH. Windows



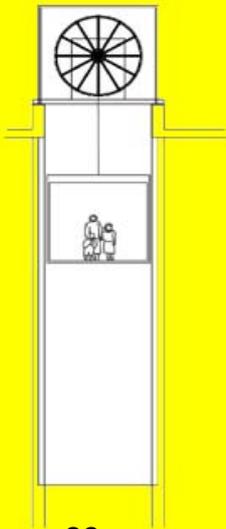


are kept where necessary and adding to the value of the club. The verandah with its distinct roof is incorporated too and becomes the entrance and foyer to the building. The existing service shaft is doubled in size to accommodate the increased service load. The staircase is kept in its position and used to guide movement through the new part. Most of the walls are kept or opened up, none are added.



The Breytenbach Theatre is incorporated by using the back entrance of the prop store and linking it to the function of the workshops of the new building (where props and costumes are made), lying directly next to it. The prop store thus serves as a store for both the Breytenbach and the new building. The same sharing of facilities applies to the new workshops and existing ones at the Breytenbach that are placed close to one another for the purpose of sharing facilities. These decisions to rather work with existing facilities and adding onto and improving these, rather than duplicating and making one or even both obsolete, make financial and tectonic sense.

The tall residential building on the S-W corner of the site with its static western façade is utilised as a screen for the performance of film material, thus obviating the need for a new screen.



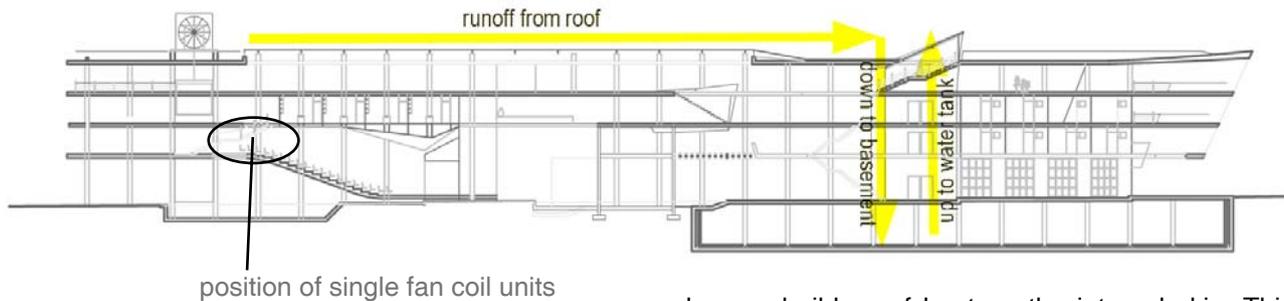
LIFT

Most of the movement inside the building is arranged by means of ramps and staircases, even though an elevator would be necessary to make the building accessible to wheelchair users. The existing MOTH club makes it virtually impossible to fit ramps to an appropriate slope. The elevator also assists movement within the building, all of which is part of the program and inherent process in the building. It thus forms one of the components of this process and aids it in a different way than that of ramps and staircases. The form of this elevator and its shaft echo aspects of the mining history, without which Pretoria probably would never have existed. The cable is wound up on an axle that is connected to a large steel wheel, which in turn is powered by the hydraulic motor. It runs on typical guiding channels on two sides and sits within a glass shaft. The elevator itself is also made out of a steel structure and walls clad in structural glazing, all of which emphasises its role as a light box passing through and lighting up the building vertically.

WATER RETICULATION

For effective rainwater harvesting one would need at least an average of 2000mm per year with two seasons of at least three months without serious drought. The average annual rainfall on this site occurs mainly due to thunderstorms varies between 630mm and 700mm. The rain season falls between November and March, with the peak in January. 50-80 rainy days may be expected, some of which may be hailstorms. The rain is unreliable, thus 12% of all years severe drought may be expected. What this means is that rainwater harvesting is not a sure way of providing continual water supply throughout the

year. Yet, if all conditions exist for proper harvesting without having to add hugely to the structure, then it would be irresponsible not to make use of this. What exists is a large roof area of around 1000m² to gather water, a structural roof area for the storage of a water tank, enough service shafts to take down the gutters into the basement, a basement with enough space to fit a secondary water tank and a sump pump in a pump room to pump the collected water back up to the roof. From here the collected rainwater is put into the grey water cycle and used to flush toilets and water plants.

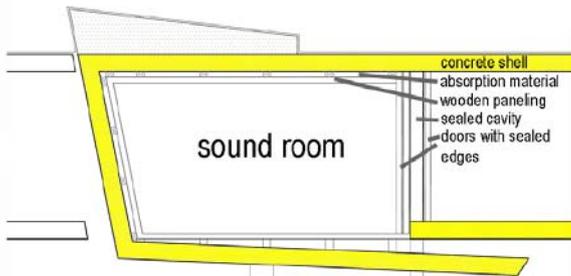


VENTILATION

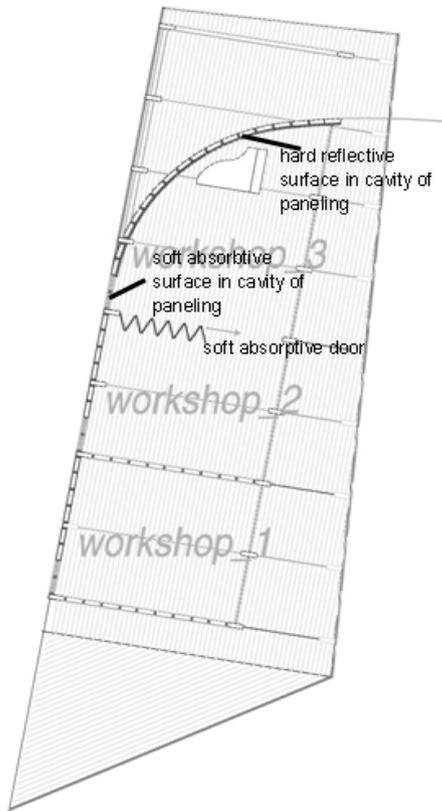
After much contemplation it was decided that little mechanical ventilation will be necessary in the building. External openings are shaded sufficiently to cool down the interior and heating will only occur during short periods of the year and will be regulated locally. The shape of the building aids cross ventilation with a slender E-W direction and windows are placed on those two sides (E and W). By adding those openings on both sides ventilation is increased by 47%. Furthermore, heat-generating processes, such as the filming and computer editing (where the apparatus generate heat) are placed on the S side, which is the colder side of the building. Natural ventilation will occur on the inner side of the W façade windows, where low-e glazing tends to

have a build-up of heat on the internal skin. This heat gathers in the inside leaf of the glazing, is released upwards through the building through the gap in the pre-cast concrete fins and released at the top of the roof.

Mechanical ventilation will be limited to the auditorium only, where windows are largely closed and the biggest number of people gather on one location in the building. Some ventilation will take the form of a single fan coil unit mounted on the E wall of the auditorium, fitting into the grid of curtain wall glazing. In addition, vents are installed on the N side of the auditorium, the highest side of the auditorium and bordering on the outside balcony.



acoustics in sound room



acoustics in workshops

FIRE

New fire regulations allow for something called a “rational solution”. An escape route can thereby be planned logically in terms of whether it is viable and safe, even though it does not conform directly to all fire regulations. The escape route in the building fulfils most regulations with respect to distances towards escape routes to the internal staircase in the MOTH club and the external fire escape with fire breaks and doors at the exits. The position where this rational solution is applied is in the design of the fire door at the fire escape on the S side. Normal carbon fire extinguishers and fire hoses are installed at prescribed distances.

ACOUSTICS

Wherever sound is propagated with a certain quality higher than normal a proper acoustic treatment is necessary. This would apply to the outside workshop, where acting and music are played, the auditorium, where lectures and film performances take place and the small filming studio in the movement box. All the other rooms like the offices and editing rooms and restaurant conform to general acoustic requirements.

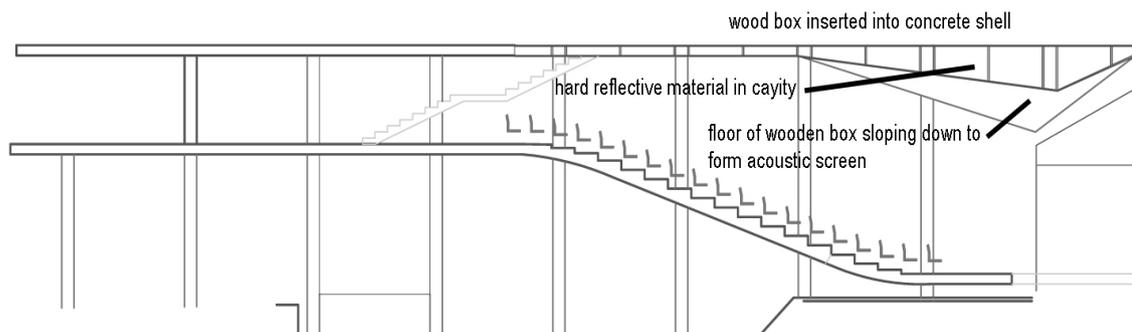
The outside workshop is a wood structure with wooden floors, sloped wooden ceiling and vertical internal cladding. The cavity of the internal cladding will be filled with either soft absorbent material or hard backing, depending in whether reflection or absorbing of sound is wanted. A piano stands in the corner and from here sound is reflected into the room or the extended room if the folding door is opened. The back walls are filled with absorbent material to prevent the wave's interference. Acoustics for this kind of general music and speech prefer a reverberation time of around 2,8 seconds. This room has a volume of 198 m² and absorption of 16,8 Sabines. The calculated time is now 1,9 seconds, which is too little. More absorbing material was thus added, in the form of dissipative absorbers in the folding door and the wall panels. This increases the total absorption to 16,8, which equates to a reverberation time of exactly 2,8 seconds.

The auditorium needs a reverberation time of around 1,2 seconds and is fitted with a reflective screen, which is the wooden floor of the wooden box floor sloping down. This screen reflects the sound outwards and then towards the back. A curtain is drawn during performances to darken the room, also fulfilling the dual purpose of forming the absorbent plane on the E and N side. It also provides a plane that is uneven and non-parallel to the opposite wall. This has the added advantage of breaking any possible standing waves that cause flutter and interference. The same counts for the skew wall at the entrance, which becomes the non-parallel wall from which sound is projected into the room. A quick calculation would reveal the following: reverb. time: $0,161 \times V / A$

The Volume has been calculated at 1044 m² and the total absorption (when the curtain is drawn) is 150 Sabines, which would give us a reverberation time of 1,12 seconds. This is almost the reverberation goal and it is decided that this is close enough (only 0.08 seconds less reverberation) and could easily be changed by increasing the absorption to 150

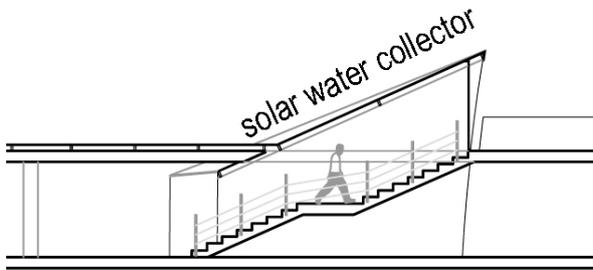
Sabines, which will only be done should a problem arise.

The most specialised of acoustic treatments in the building will occur in the dark room and filming studio. Here, a neutral sound is striven for and very little reverberation time is wanted, around 0,5 seconds. In this design the reverberation time was the starting point and then it was calculated how much total absorption is needed to achieve this time of 0,5 seconds at the 122 m² of that room. The total absorption this needs to be 39 Sabines and the only solution was to install panel absorbers, covering a narrow band of frequencies. A Helmholtz resonator was considered, but the panel absorber seemed more viable. Furthermore, two doors with a cavity of 200 mm were installed and fitted with sealing strips at the edges.



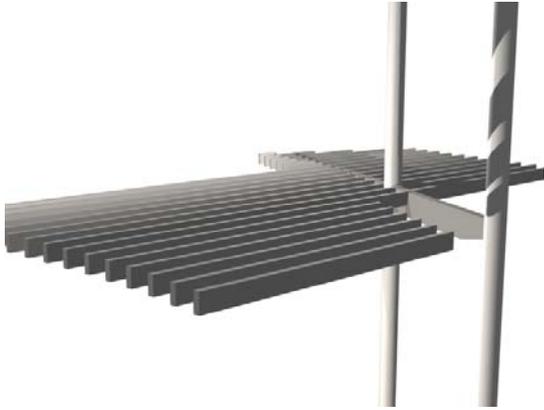
acoustics in auditorium

Climate remains a prime consideration when considering sustainable energy usage. South Africa is the country with the most solar radiation in the world and this has to be used. Many an architect immediately opts for the installation of solar panels, which is always a very easy and short-sighted view. Photo-voltaic cells are still very inefficient and with batteries only 80% effective, only about 12% electricity reaches the end-user. This will probably change soon, which will make most current p-v cells dormant and replaceable, leaving a huge amount of waste. A more efficient way of employing the sun would be passively, as in the louvres and the bio-glass system and actively in terms of the solar hot water collector (which is close to 50% efficient) on the sloped roof of the new service shaft. Its orientation is virtually straight to North, which is ideal and the tilt is at the ideal position for less summer and more winter usage. The collector can heat water up to 70°, but this specific unit will heat 300l (which needs 10kWhr) of water to 43°, which is good for domestic usage. The global irradiation in Pretoria on the absorber is 5kWhr/m² in winter and 7kWhr/m² in summer. The unit produces 60 to 70 l of hot water per m² and for the 300l water this would need an absorber of around 4,5 m². All the hot water feeding in the shaft will come from this source.



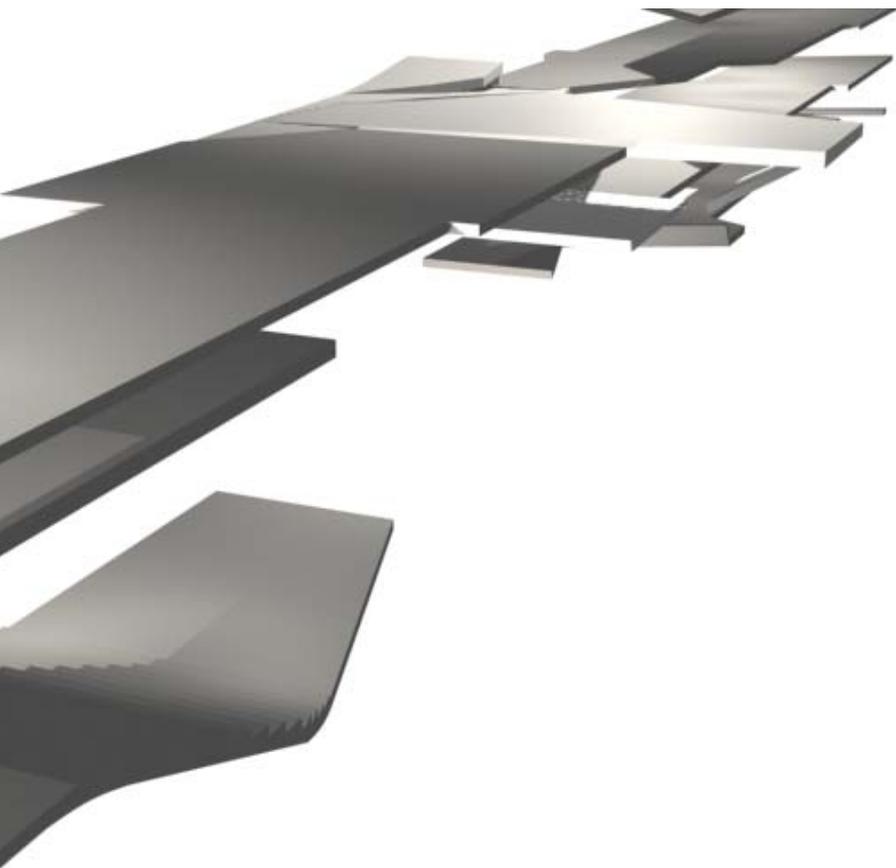
MATERIALS CONCRETE

Pretoria has a rich history of using materials in their natural way. In post-war times, where most building material was scarce, rock was used, joints left as thin as possible to save on mortar, roof slopes left minimum to save space and material (later the butterfly section was introduced, which epitomises this fact) and when bricks were used then very sparingly and efficiently. The properties of the material determined what it is used for and ensuring that very little extra has to be done to make that material work structurally and functionally. The same applies to this building, not so much out of an economy of means, but more out of the belief of working appropriately with a material.

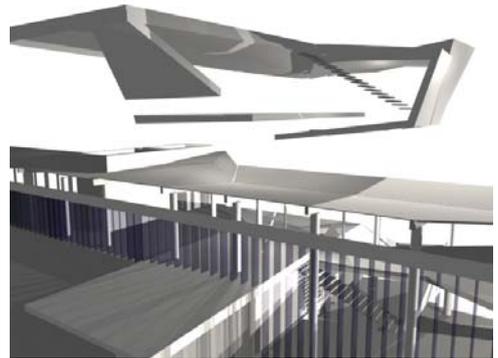


concrete beams

pre-cast concrete fins and haunches

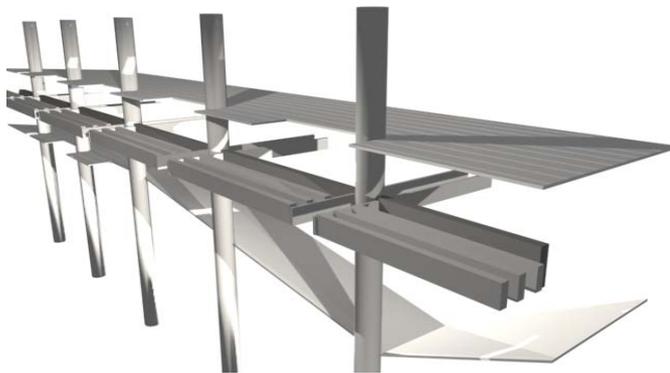


concrete movement box





laminated wooden trusses



wood box inserted into concrete slab

Concrete wants to display its plastic nature, the mouldability, versatile textures, its light carrying capabilities and its structural integrity. All of these are evident in the building. Slabs open and close, rise and dip, ramps and staircases “grow” out of them. They span regular distances and cantilever at important points. Pre-cast concrete panels, such as the haunches and fins ensure high quality. Finishes are off-shutter on the outside parts, studded PVC tiles in the offices, painted epoxy in the passages and open areas.

Brick is used in compression only and joints are exposed. This is evident in the face-brick of the shaft and the workshops. Furthermore, brick has an expressive and plastic nature, such as it curving around the spiralling staircases and the top of the shaft.

Glass is used both as a semi-transparent (as discussed in the part about transparency) agent and structural member. It is the skin that demarcates open and closed and is only employed in the parts that are closed off.

Wood - and in this case laminated wood - can be bent into many shapes and still retain, or even increase, its structural integrity. A laminated wooden beam is a modular unit where laminates are added in modules and the beam itself becomes a module, as in the wooden trusses and columns, where certain parts of the beam react differently to others. The wooden louvres show off the rustic and robust nature of wood, where the trees on the site are roughly sawn and dried on-site and filled into the louvres. The wood-shop is made entirely out of wood and so too the wooden box inserted into the concrete frame with its wooden floor.

Steel is used very sparingly and mostly in connectors. It has very strong tensile strength and this point is exploited by making it the element from which components hang. Trusses, benches, glass and shading all are connected with steel parts.

TREES

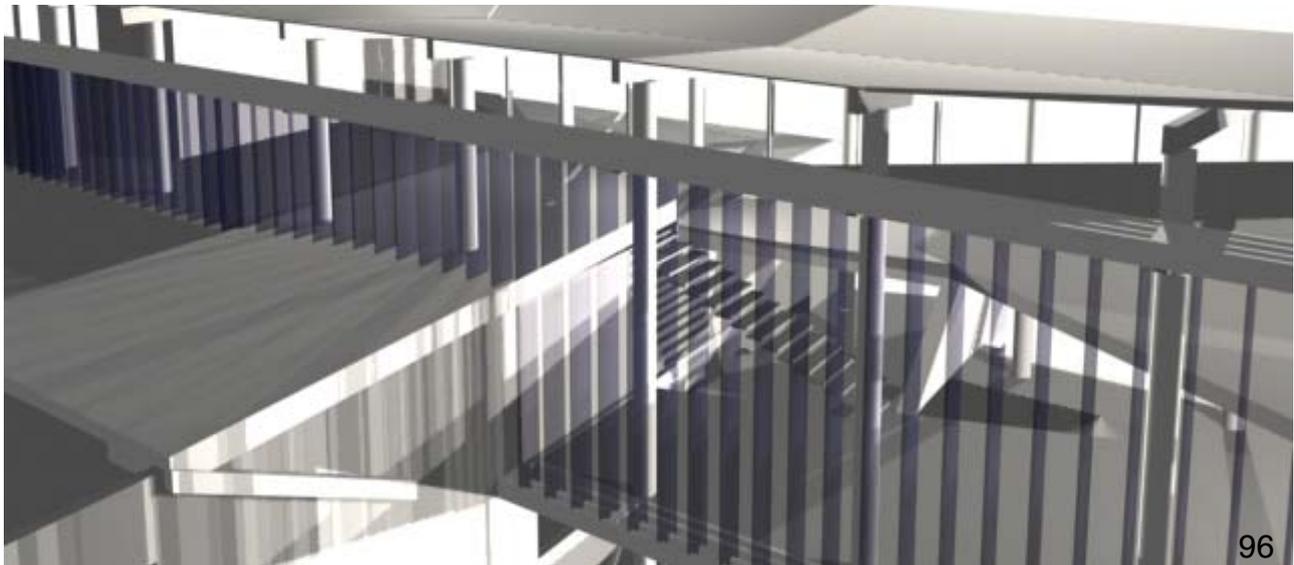
Most trees on the site are retained, some of which are indigenous, such as *Celtis africana* (older ones around the MOTH and new ones along the road) and some tall *Acacia siberiana*. Some foreign trees exist, most of which will be retained around the MOTH to add to the “jungle atmosphere”. One conifer on the S-W corner of the MOTH will be removed, as well as the four pine trees on the W side of the Breytenbach theatre.

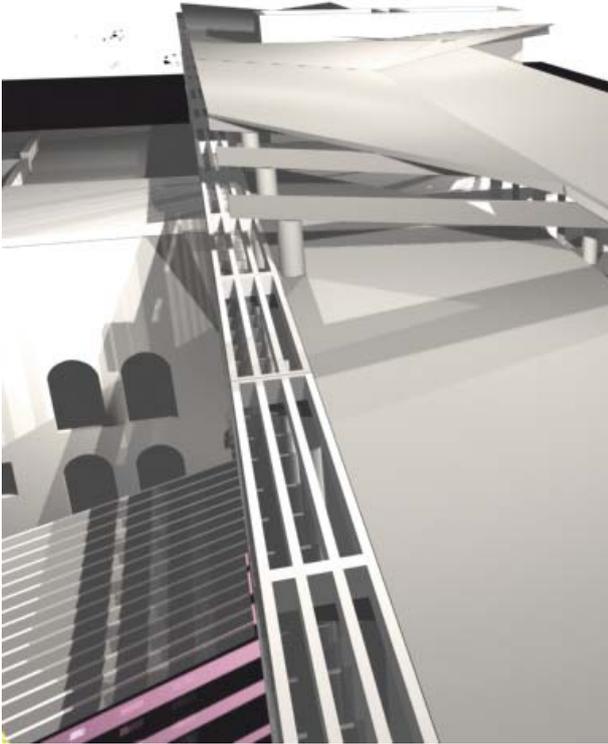
BMS

It was realised at an early stage that a completely passively functioning building would not be acceptable for this kind of scheme. Conditions need to be controllable for specialised kind of work and this is also the reason why an air-conditioning system was included in the auditorium. Passive principles are nevertheless applied wherever possible, such as the bio-glass system and the louvres that need to be managed to function efficiently. A Building Management System (BMS) is installed and placed in the



wooden louvres within facade





same room as the server for the computers. This system monitors the internal and external conditions, opens or closes louvres and windows, switches lights off when a room has not been used for some time. The individual user can still override these actions, but will be warned not to do so by a message or warning tone.

LIGHTING

A large amount of day lighting is necessary for the kind of services that are catered for in the building. The offices and editing area need an internal intensity of 200 to 300 lux and the workshops need 100 to 150 lux for general assembly. Glare is also one of the more problematic occurrences on computer screens and computers are never facing direct light, mostly turned towards the East or the South, where only indirect light will enter. The calculation for this would be:

Required Daylight Factor = Design Daylight
 Factor X External Obstruction Factor / Glass Factor X Dirt Factor
 = 3,5 X 0,9 / 1,1 X 1,5 = 1,9 and
 when working with an average external illuminance of 15 000 lux we get :

internal illuminance = RDF X external illuminance / 100
 = 15 000 X 1,9 / 100
 = 285 lux, which is sufficient, if not almost a bit high (which can be changed with the louvres, this being just the maximum to be expected), without any artificial lighting

For the workshops the calculation would be:

Required Daylight Factor = Design Daylight
 Factor X External Obstruction Factor / Glass Factor X Dirt Factor
 = 2,3 X 0,7 / 1,1 X 1,5 = 0,98 and
 when working with an average external illuminance of 15 000 lux we get :

internal illuminance = RDF X external illuminance / 100

$$= 15\,000 \times 0,98 / 100$$

= 147 lux, which is sufficient without

any artificial lighting

What must be noted here is that in the workshops a lot of outside work is done and here the daylighting calculations do not apply, because of the full solar radiation. The louvres and curtains are also the means to change the internal light, from totally dark as in the auditorium, to a relative darkness in the rest of the building. The louvres can be rotated into any position, the more square they sit, the darker the inside. This is also adjustable with the BMS.

In terms of artificial lighting, external lighting is provided by the fluorescent tubes inside the concrete beam as detailed and the armatures running on the light chain. These provide general lighting for exterior evening conditions, together with the light filled helium balloons, rising on the public square on special occasions. These provide both broad rays of light as well as providing a strong magnet for movement. Interior lighting is provided with fluorescent tubes in general areas and down lights for more specialised work and the residences.

ACCESSIBILITY

Accessibility throughout the building is not only a requirement by law, but just good social practice. Additional wheelchair ramps were not necessary as soon as the elevator became a necessity for the internal movement. The movement through the MOTH still remained the biggest challenge and this was solved by inserting the movement box. Wheelchair access is possible in all areas, except in the internal vertical movement of the workshops, which is private space and is only used by the inhabitants of the workshop.

ACCESSIBILITY

Accessibility throughout the building is not only a requirement by law, but just good practice in terms of social responsibility. Ramps were not necessary as soon as the elevator became a necessity for the internal movement. The movement through the MOTH still remained the biggest challenge and this was solved by inserting the movement box and allowing for lateral movement. Wheelchair access is possible in all areas, except in the internal

“The plastic arts at their most perfect must become music and move us by the immediacy of their sensuous presence...This, precisely, is the mark of the perfect style in each and every art: that it is able to remove the specific limitations of the art in question without thereby destroying its specific qualities, and through a wide use of its individual peculiarities, is able to confer onto it a more general character.”

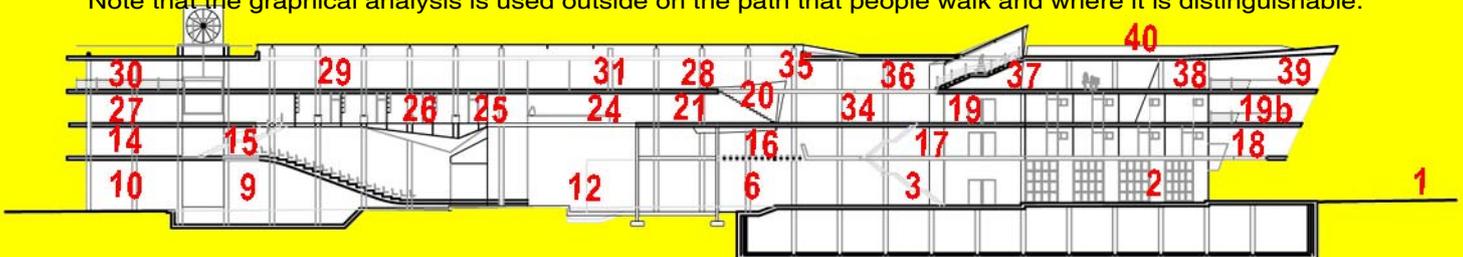
Friedrich Schiller, in “On the Aesthetic Education of Man” (1779)

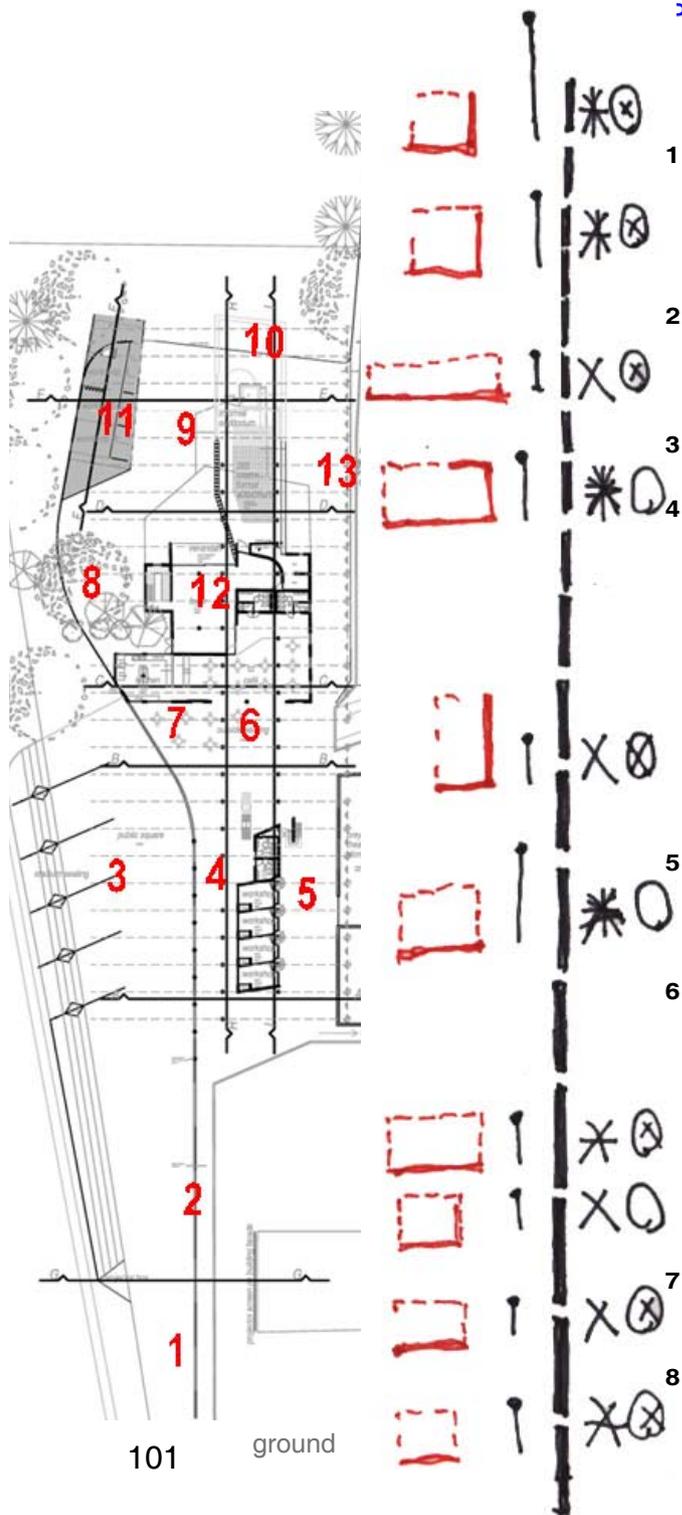
After the building has been designed to fulfil all requirements of the program in terms of size of zones and inherent functions and good principles of context, technical, acoustics, climate, detailing, energy usage, lighting, services and general functionality, the guidelines of intersection of volumes and the phenomenal transparency also guiding the decisions – after all of this the movement inside the building can be made harmonious. Movement already exists and the path through the building has been determined. The spaces the melody/movement passes through need to be made comfortable for humans, need to be well defined and make a good building better.

16

analysis

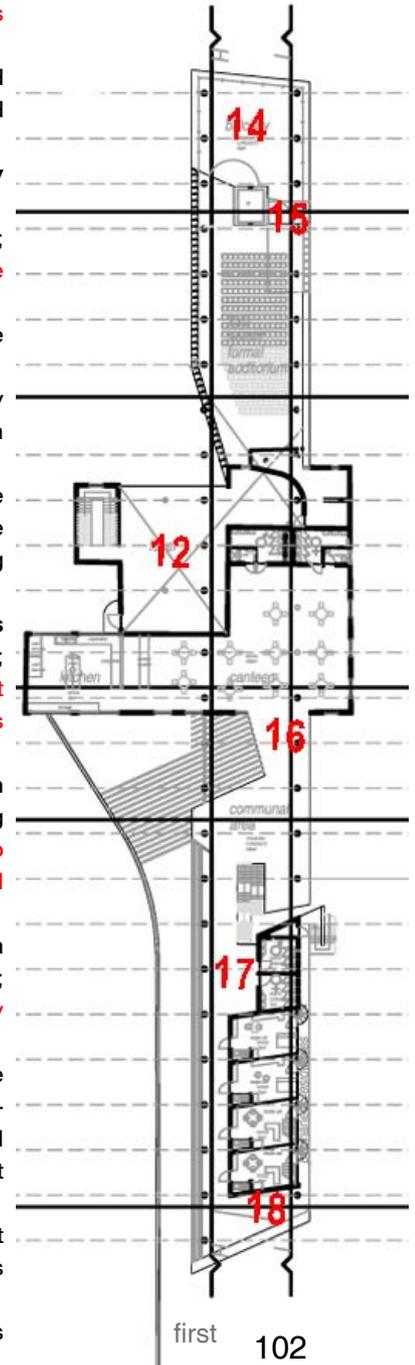
The numbers on the plans and sections correspond to explanations in the text. The red text is an intervention that was taken after the space was decided to still need alterations to make it harmonious. Again, this intervention is a subjective decision. When the author decides that a space needs more loudness then this decision is made according to what the melody/movement seems to need to make it move harmoniously. The same counts for how this intervention looks practically. It can take on different forms and is left to the designer's discretion whether to increase the loudness by cutting open a slab or adding a mezzanine level. Note that the graphical analysis is used outside on the path that people walk and where it is distinguishable.

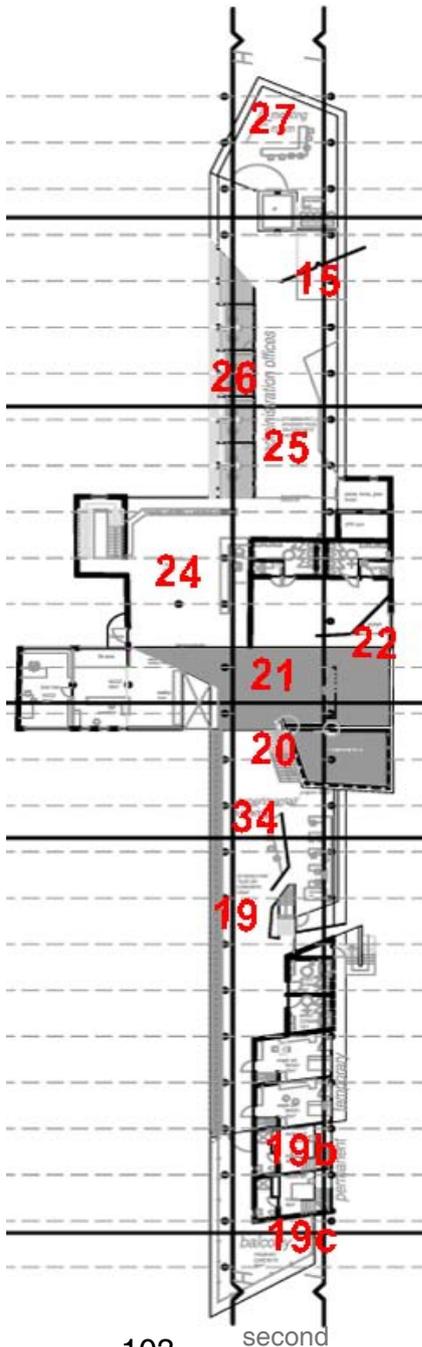




- 1 very high **pitch** due to projection on building façade and **magnet** to pull melody over street; **rhythm** started with shading and beams in overhead roof plane; protection of **melody** by roof plane and wall plane on one side; basic **phrasing** of materials that repeat in differing forms
- 2 softer **pitch** (only filtered light from top) and good **rhythm** (overhead shading and beams); human **proportioning** (proportion system); not too loud (little volume transitions)
- 3 soft **pitch** (overhead shading); protection of **melody** (overhead and wall plane)
- 4 increased **pitch** (two types of overhead shading – normal shading and concrete fins); increased **loudness** (opening of slab into double volume); stronger **rhythm** (two types of shading and columns); harmonious **proportioning**; stronger **phrasing** (concrete in differing forms); protection of **melody** (roof plane and somewhat less defined wall plane); **add to loudness by letting columns pass through cut in slab – accentuate intersection of volumes and vertical movement; better play of orchestration by differing between pre-cast and in-situ concrete.**
- 5 less **pitch** (high amount of shading); vertical space; **melody** protected by extremely high wall planes and no roof plane; good conditions for private and informal movement
- 6 good **pitch** (different types of shaded roof planes); good **loudness** (varying intersecting volumes and different textures, also between old and new); harmonious **proportioning**; good **orchestration** of different types of concrete (using them in the way intended); decision point for different **rhythms** for the different directions to go to; **increase harmony of loudness even more by increasing definition of intersecting volumes (sloping up wall);**
- 7 permeable overhead roof plane for protection of **melody**; soft **pitch** and **loudness**; ideal for sitting down at café
- 8 very harmonious space due to trees; soft **pitch** (shading); soft **loudness**; **add to orchestration by letting materials respond**

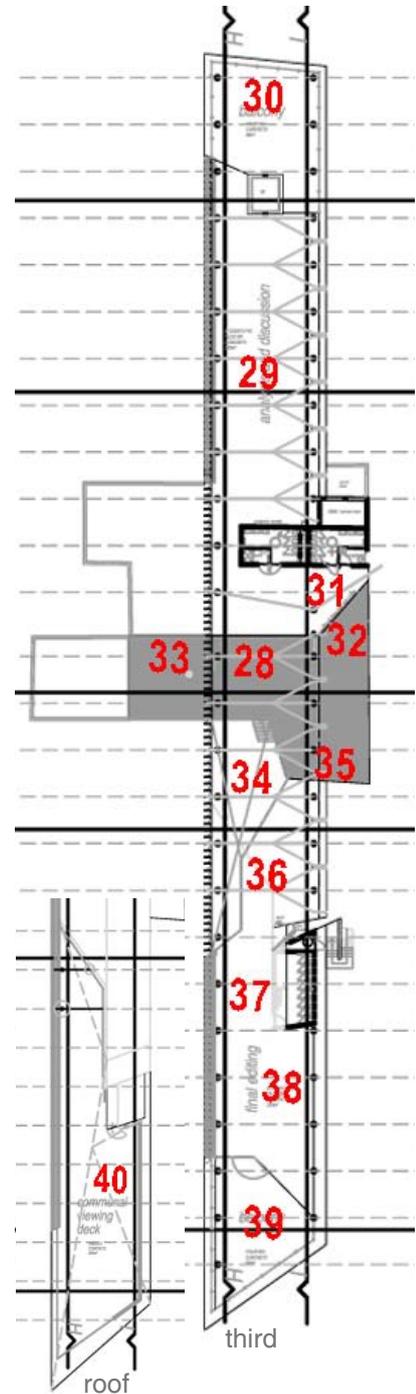
- to context and replace concrete beam with wooden beam as it passes through treed area
- 9 less and softer **pitch** (higher shading by trees); **melody** protected somewhat by overhead plane of trees; conditions good for private and informal square
- 10 increased protection of overhead plane to increase protection of **harmony** and channel **melody** underneath slab
- 11 harmonious **proportioning** inside building and protected overhead plane; add to **orchestration** by letting materials respond to context and make entire structure out of wood within trees
- 12 soft **pitch** (strong light into foyer through glazing); good **loudness** (double volume and intersection of volumes); **rhythm** of columns into building;
- 13 less **pitch** (high amount of shading); vertical space; **melody** protected by extremely high wall planes and no roof plane; wall plane opening up on one side and good conditions for public and formal movement
- 14 higher **pitch** (north facing openings); gentle **loudness** (not much change in volumes); **melody** protected by overhead plane and semi-permeable wall plane; harmonious **proportioning**; general balcony with not too long times of rest intended
- 15 higher **pitch** (light through lift shaft, roof and wall plane); good **loudness** to enliven **melody** (intersection of volumes through ramp cutting through); healthy rhythm through columns; add to **orchestration** by letting ramp cut on shaft and up to end of slab; increase **rhythm** by emphasising columns and choosing more pronounced system of glazing
- 16 high **pitch** (big openings on both wall planes); good **loudness** (intersection of many volumes and opening up of slab); **rhythm** emphasised by letting new grid run onto existing; harmonious **proportioning**; respond to phrasing of existing openings in MOTH club by moving the cut of the wall inside to include last important window
- 17 high **pitch** (big openings on both wall planes); good **loudness** (intersection of many volumes and opening up of slab); **rhythm** aided by concrete grid; harmonious **proportioning**; increase space definition and **loudness** by letting columns pass through gap in slab
- 18 semi-high **pitch** (south facing openings); more **loudness** than 14 (more change in volumes); **melody** protected by overhead plane and semi-permeable wall plane and channelled into opening by walls of residential units; harmonious **proportioning**; private balcony with longer times of rest intended
- 19 good **pitch** (windows with shading on both sides); good **loudness** (different cuts in slabs, intersections of volumes); very strong **rhythm** (both louvres and curtain wall system along the sides); harmonious **proportioning**
- 19c semi-high **pitch** (south facing openings); bit less **loudness** than 18 (less





- cuts in slab and change in volumes); **melody** protected by overhead plane and semi-permeable wall plane and channelled into opening by walls of residential units; harmonious **proportioning**; private balcony with longer times of rest intended
- 20 increased **loudness** (staircase cutting through 2 floors, movement box cutting into space); increased **pitch** (light on both sides and film screen on movement box wall); harmonious **proportioning**; strong **rhythm** through columns, louvres, curtain wall system; very strong parameters to enliven **melody** and increase harmonious movement through MOTH
- 21 less **pitch** (less light and different qualities); good **loudness** (movement box between two differing volumes of the old and new); good **orchestration** (working with existent structure); harmonious **proportioning**; **increase pitch by including window on S side of movement box; increase loudness by leaving gap between movement box and cut in MOTH**
- 22 less **pitch** (less different light), good **loudness** (differing volumes); harmonious **proportioning**; **increase pitch to enliven melody by adding roof light**
- 24 good **pitch** (big window on N side); good **loudness** (internal arrangement of volumes and gathering of many melodies); little **rhythm** (intermediate area, where melodies gather and do not originate); harmonious **proportioning**
- 26 good **pitch** (bio-glass on W side); small **loudness** (to aid a more settled melody and sitting in offices); little **rhythm** (not needed for same reason of providing a more static melody); harmonious **proportioning**; **aid orchestration by letting wood box be inserted and responding to context of trees; aid phrasing by keeping unity of N wall of MOTH and letting new slab join existing wall sensitively**
- 27 high **pitch** (windows on all sides, glass shaft); gentle **loudness** like 14; harmonious **proportioning**; **increase loudness by cutting back slab, creating deeper volumes and letting columns run for 2 storeys**
- 28 high **pitch** (glazing on all sides, strong definition through louvres); healthy **loudness** (double volume close by, differing volumes between new slabs, movement box, MOTH); harmonious **proportioning**; good **phrasing** (different concrete slabs); very strong **rhythm** (louvres, columns, trusses); **different roof truss to increase harmony and orchestration (speak same language as rest of building and not be add-on)**
- 29 high **pitch** (glazing on all sides, strong definition through louvres); healthy **loudness** (roof volume opening up); harmonious **proportioning**; very strong **rhythm** (louvres, columns, trusses); **different roof truss to increase harmony and orchestration (speak same language as rest of building and not be add-on)**
- 30 similar open space as 14; higher **pitch** (north facing openings); gentle **loudness** (not much change in volumes); **melody** protected by overhead plane and semi-permeable wall plane; harmonious **proportioning**;

- 31 general balcony with not too long times of rest intended high **pitch** (glazing on both sides and window opening up); very healthy **loudness** (roof volume opening up); harmonious **proportioning**; different **rhythm** than rest (roof beam different than others due to jump between column grid of new building and MOTH); **different roof truss to increase harmony and orchestration** (emphasis the corner of the existing shaft and the jump between the two column grids)
- 32 strong **pitch** (strong external one-dimensional light); good **loudness** (see all different volumes); **harmonious** proportioning in horizontal direction (no roof plane); no protection of **melody** by roof plane; **ideally there should be a roof plane to protect the melody, but practicalities made that very difficult**
- 33 strong **pitch** (strong external one-dimensional light); good **loudness** (other buildings and own shaft); **harmonious** proportioning in horizontal direction (no roof plane); some protection of **melody** by roof overhang; **unlike 32 some protection of the melody exists due to the roof overhang**
- 34 very strong **pitch** (double volume windows and projection screen); very healthy **loudness** (man intersecting volumes, concrete and wooden roof intersecting at top) harmonious **proportions** and strong vertical emphasis; strong **rhythm** (columns, mullions); strong **timbre** (different textures and materials); good **orchestration** (all different types of concrete on different levels); very harmonious **melody** and lots of opportunities to move to
- 35 high **pitch** (glazing on all sides, strong definition through louvres); healthy **loudness** (double volume close by, differing volumes between new slabs, movement box, MOTH); harmonious **proportioning**; good **phrasing** (different concrete slabs); very strong **rhythm** (louvres, columns, trusses); **different roof truss to increase harmony and orchestration** (speak same language as rest of building and not be add-on)
- 37 high **pitch** (glazing on all sides, strong definition through louvres); healthy **loudness** (roof volume opening up); harmonious **proportioning**; very strong **rhythm** (louvres, columns, trusses); **flat concrete roof again to condense melody again and prevent it from leaving the building, i.e. give the building a finite edge**
- 38 same as 37, just volume opening up a bit again (horizontally and also roof sloping up) to keep condensed melody alive and move it along harmoniously
- 39 semi-high **pitch** (south facing openings); healthy **loudness** (slab sloping up); **melody** protected by overhead plane and semi-permeable wall plane and channelled to point of building by sharp edge of slab; harmonious proportioning; private balcony with longer times of rest intended
- 40 strong pitch (strong external one-dimensional light); good loudness (other buildings and own shaft); harmonious proportioning in horizontal direction (no roof plane); **like 32 there should ideally be a roof plane, but this open space will be used for short times only and thus it is not really necessary to keep the melody too well protected**



General changes to improve the harmony of the spaces in the building - the spaces where the melody/movement passes through - are:

The slope of the roof is changed to have the melody/movement open up towards the W side (where the square and the views are), where it would want to go naturally, and not be forced to go E, where the close buildings offer no magnet).

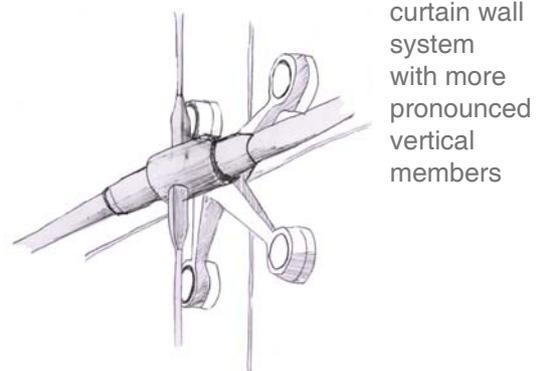
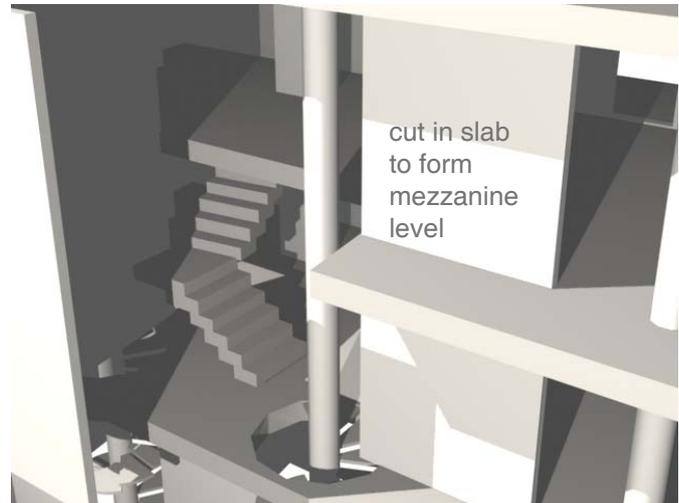
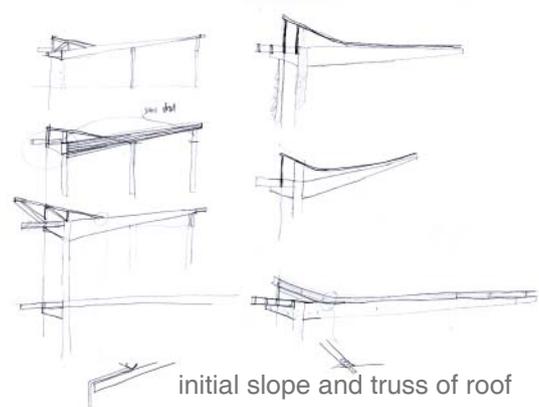
The slab is drawn back in the residential units at 19b to increase the loudness in the double units, where a stronger melody/movement is present. It also has functional advantages of clearing space for the internal staircase.

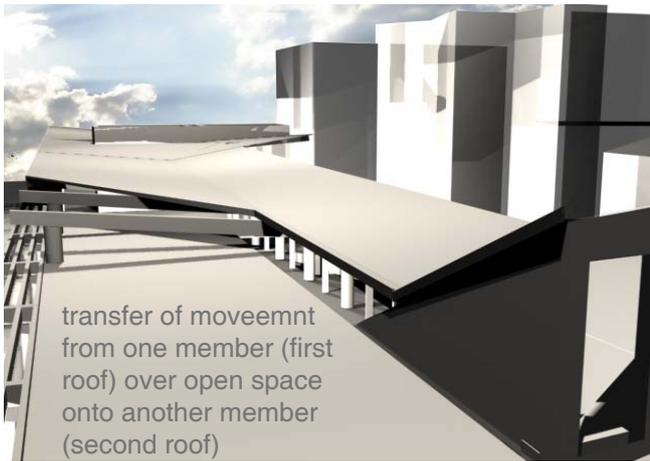
The pitch is increased all along the main covered walkway on Ground floor to create a magnet for faster movement. Putting fluorescent lighting all along where the concrete beam runs does this.

The detailing of the balustrading is chosen to carry the melody/movement that comes from the slab it sits on. For this 3 different types of balustrading have been designed depending on the slab ending.

Surface treatment is chosen for the type of melody/movement passing over it. The faster the melody/movement, the colder the treatment. Wood flooring is used in the offices and residential units where there is mainly static activity, PVC studded flooring in the intermediate zones, such as the editing and analysis, where there is some localised work and walking and concrete in the spaces used only for walking. The PVC tiles come in different colours from cold to warm, depending on the speed of the melody/movement.

The curtain wall system changes from a standard mullion system to the suspended cable structure. It is felt that the latter system would increase the rhythm of the melody/movement by reinforcing the

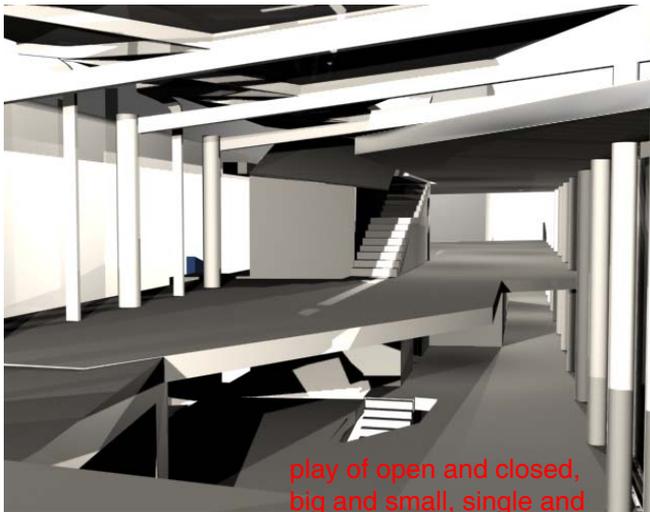




vertical direction. There would be no practical or financial implications with this change.

Initially, the building was glazed virtually all around, but it was decided that glazing should only occur where the melody/movement is internal, where processes go on inside. The open zones are left unglazed. This had great financial benefits.

Open space is designed and not left to spontaneity. All the open space is seen as a unit working together and careful phrasing (where to put open space) will ensure that the melody/movement through the building is harmonious as it passes through those open spaces.



There is a constant play of contrasting volumes – open and closed, small and big, single and double – to give a healthy mix of loudness.

Movement is translated into the structure by letting columns pass through cuts in slabs, by exposing the service shaft wall on the one side with a cut in the slab, by letting the balustrading grow out of the slab, by letting the laminated trusses be an extension of forces from the bottom, by letting one member change directions and perform many different duties (with differing load transfer needs), but still remaining the original.



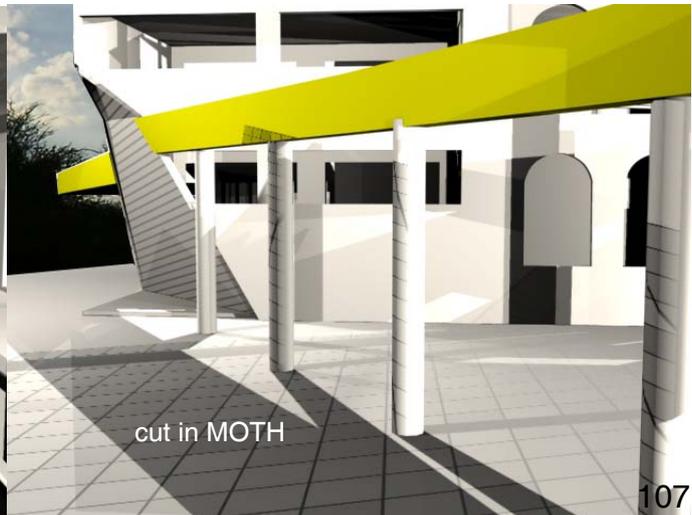
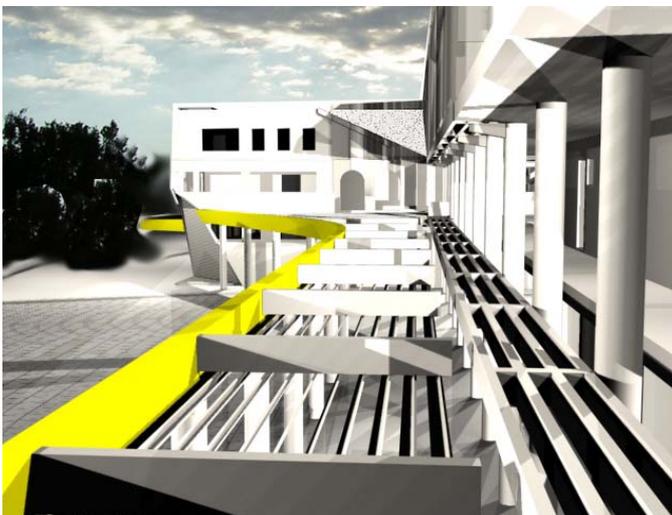
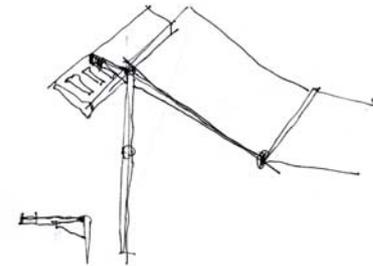
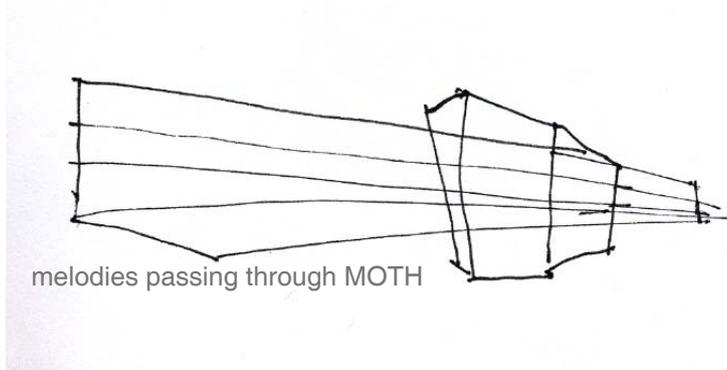
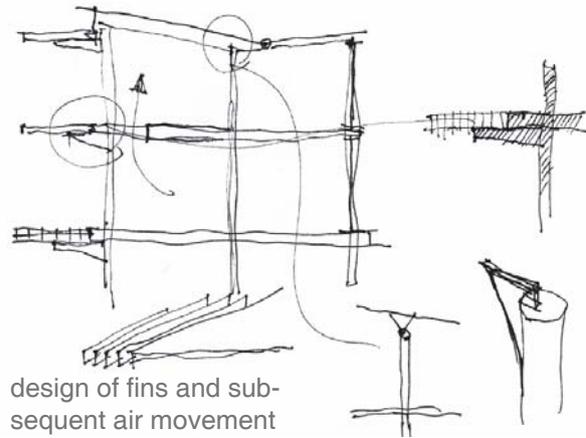
There are many “static points” from which movement spreads. An example is the static point on the S-E corner of the slabs, where all slabs start at that same point, but then flange out at the other corner, the top slab in two directions.

Air movement is very important and the concrete fins have been designed to accommodate this on the inside of the building.

The building concept could be seen as a solid object (MOTH club) that is cast in the middle of melodies/

movement lines that pass through and around it.

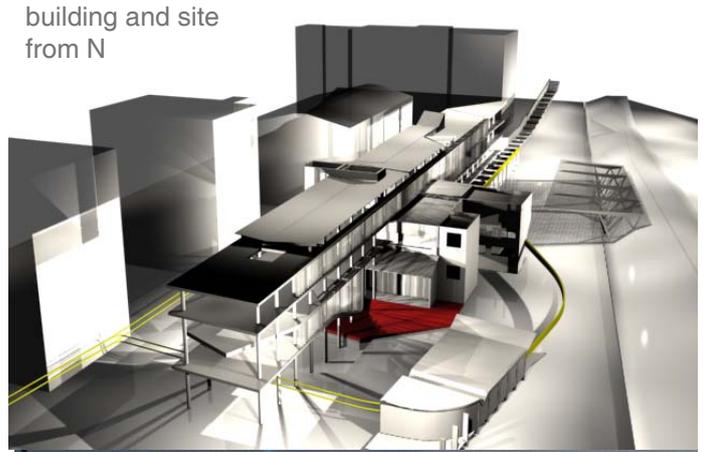
The MOTH club is cut open at different parts, but the S-W corner cut is seen as the cut that announces this. It celebrates the fact that this static building with bad internal circulation is cut into to let movement pass through it. This cut also serves as the servant entrance to the restaurant.



Me



building and site from W



building and site from N



building and square from S



projector room in slope and screen on building facade



building and Breytie corresponding roof heights and slopes

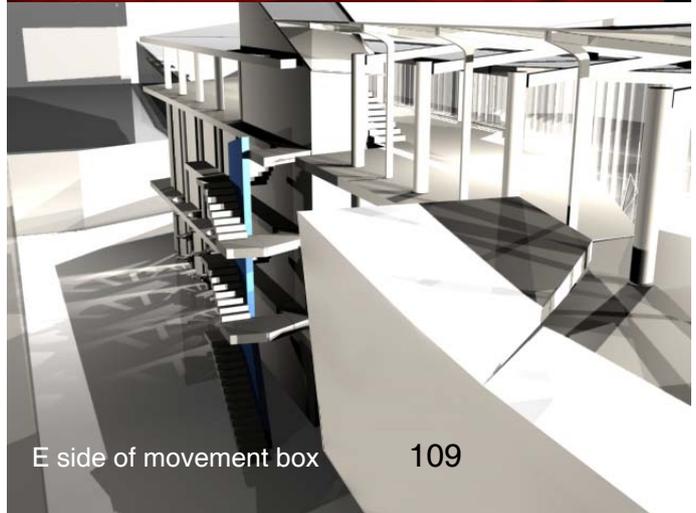
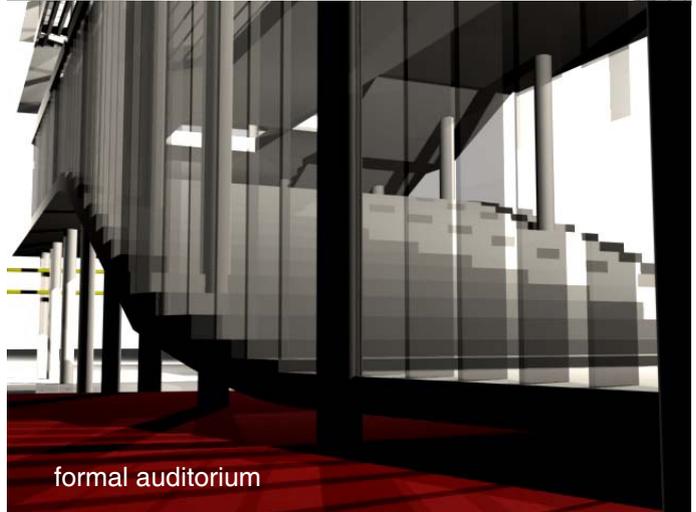
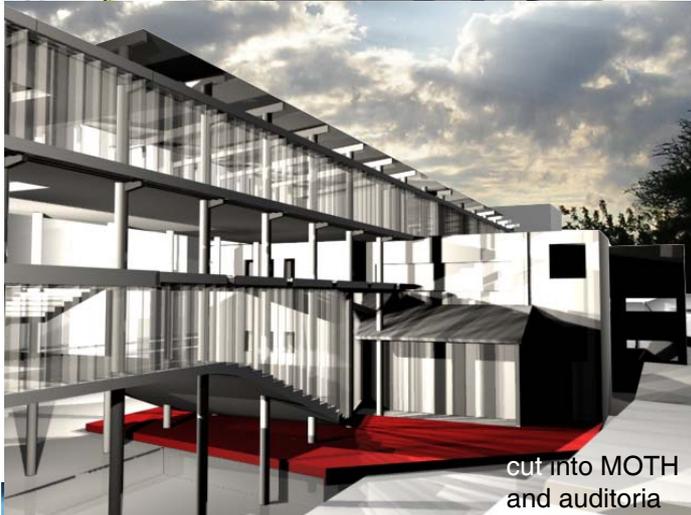
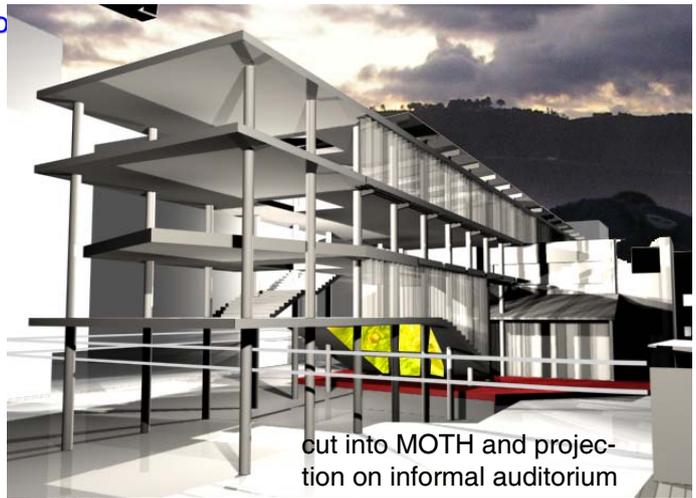
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building and square from S



eto





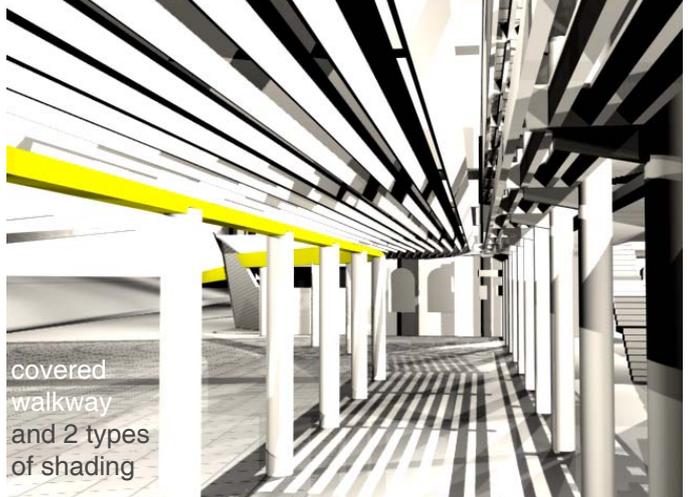
wood and concrete roof and exposed trusses



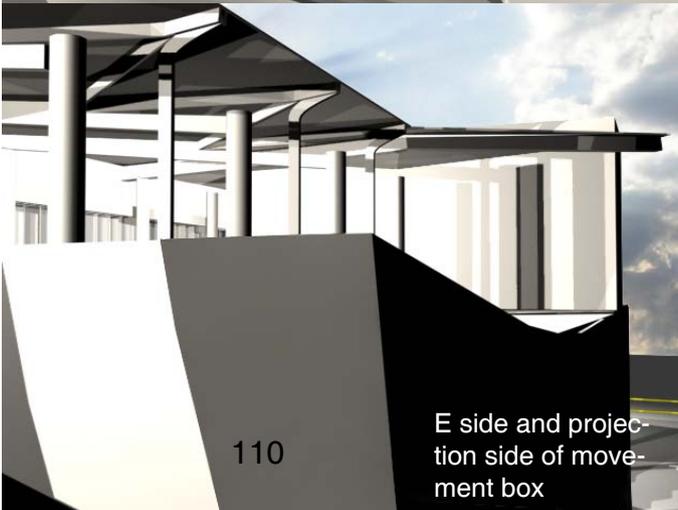
public square, shading on it and seating on slope



jump in two column grids and accentuated roof beam



covered walkway and 2 types of shading



E side and projection side of movement box



roof structure and shaft with exit from underneath

etc



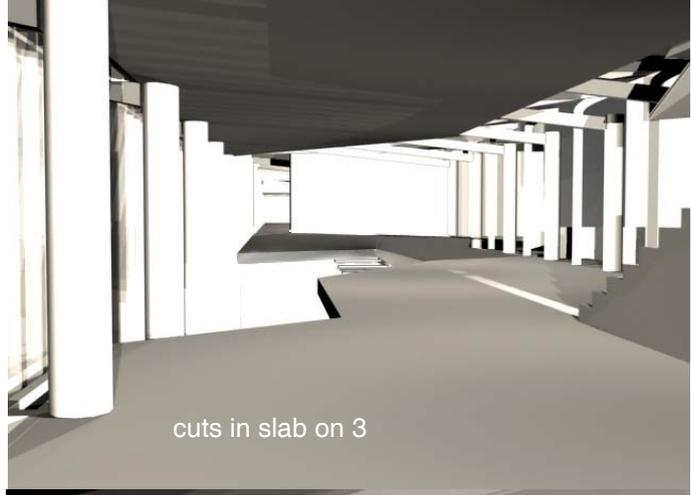
cuts in slab and free columns on floor 1



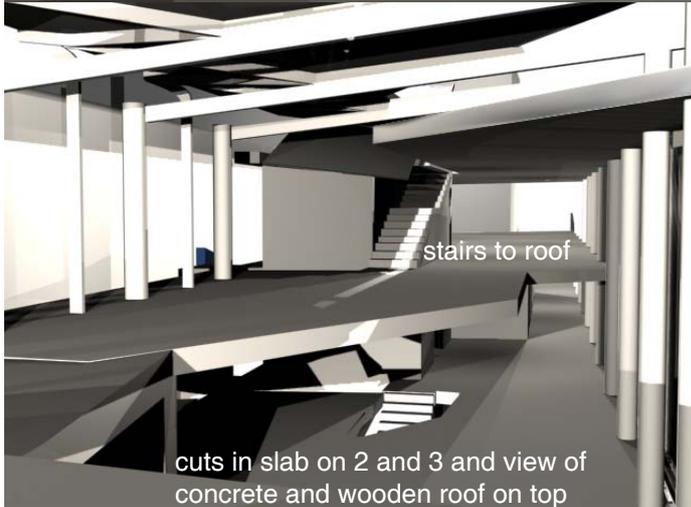
closed floor slab on 2



staircase and cuts in slabs on 1 and soffit of 2



cuts in slab on 3



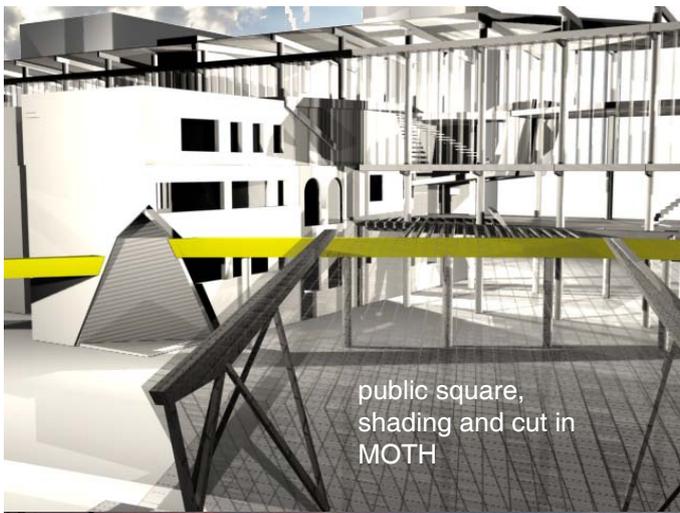
stairs to roof

cuts in slab on 2 and 3 and view of concrete and wooden roof on top



cuts and turning up of slab on 1

nelson



public square,
shading and cut in
MOTH



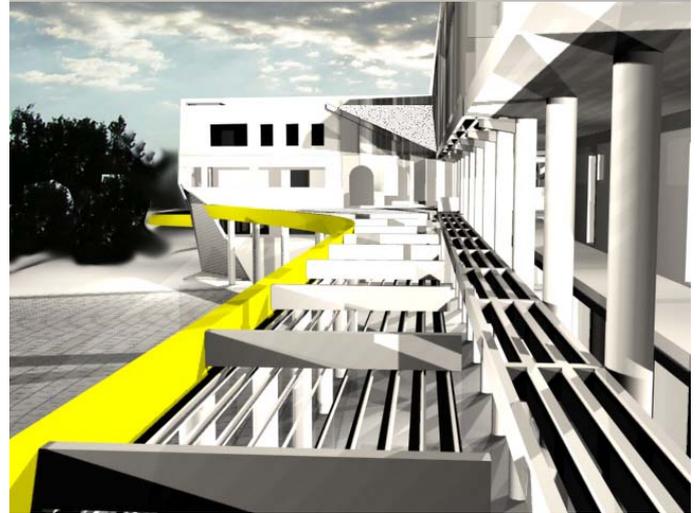
public square, shading
and cut in MOTH



cuts in slab and free
columns and staircase
on 1



cuts in slab and free
columns on floor 1



Architecture, however...if it is music, then it is frozen music."

Friedrich Schelling, in "Philosophie der Kunst" (1859)

CONCLUSION

The aim of this treatise was to produce good architecture, meaningful and relevant to all its contexts, architecture that is moving and in return moves us. This is no new striving and many architects have their own solutions to this problem. This is mine.

I want to make people respond to the city again, make them realise that being is little else than being one of many points on the line of movement through the flow of everyday experiences. This is possible through perception, which in turn is brought about by movement - through harmonious movement in time and through space. Experience through perception and perception through harmonious movement.

This is where the melody evolved as the plastic representation of the movement in time through space. It becomes the answer to the calculation that added all the factors that go into good space-making. And this melody/line of movement is to be made harmonious through making the spaces harmonious that it passes through. This where the skill of each designer comes in. The melody suggests the interventions that could take place, but the way in which these happen remains in the hands of the designer and his ability to synthesize all the requirements into a solution. Intuition and principles of good design take precedence over direct translation in good products.

The melody/line of movement is projected horizontally to give the plane on which movement takes place and this plane is projected vertically to create the volume for the melody/line of movement to move about harmoniously. But yet all of these - line, plane and volume - are composed out of single points, points that react to their context, the space they lie in. All of these spaces that compose the lines, planes and volumes are to be harmonious. Experience through perception, perception through harmonious movement, harmonious movement through harmonious melodies, harmonious melodies through harmonious spaces.

“[M]usic dominates,
reigns actually,
harmony; and
harmony itself
reigns over all
things.”

le Corbusier, 1949

le Corbusier, 1949

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BIBLIOGRAPHY

- Appleyard, D., Lynch, K., Myer, J. 1964. *The View from the Road*. MIT Press
- Bacon, Edmund. 1968. *Design of Cities*. The Viking Press, New York
- Be Boddy, T. 1986. *Underground and Overhead: Building the Analogous City*. Hill+Wang. New York
- Blake, P. 1966. *Le Corbusier, Architecture and Form*. Penguin. Baltimore
- Casciani, S. 2003. *Interview with Renzo Piano: Trio for Piano*. Domus, April 2003, no. 858: 22-25
- Ching, F.D.K. 1996. *Architecture. Form, Space and Order*. Van Nostrand Reinhold. New York
- Ellin, N. 1996. *Postmodern Urbanism*. Blackwell. Oxford
- Fyfe, N. 1998. *Images of the Street*. Routledge. London
- Giedeon, Siegfried. 1976. *Raum Zeit Architektur*. Birkhäuser. Basel
- Harrop-Allin, Clinton. 1975. *Norman Eaton: Architect*. Struik. Cape Town
- Hillier, Bill. 1996. *Space is the Machine*. Cambridge University Press. Cambridge
- Hambidge, Jay. 1967 (1919). *The Elements of Dynamic Symmetry*. Dover. New York
- Inwood, Michael. 1997. *Heidegger*. Verlag Herder. Freiburg
- Jacobs, J.C. 1961. *The Death and Life of Great American Cities*. Penguin. Harmondsworth
- Kepes, Gyorgy. 1944. *Language of Vision*. Chicago
- Le Corbusier. 1927. *Towards a New Architecture*. Dayson and Call. New York

Lyon, D.1994.*The Electronic Eye:The Rise of Surveillance Society*.Polity Press.Cambridge

Morris, E Toby.1996.*Musical Analogies in Architecture* in *Structurist*, Volume 95/96/36, pages 66-74

Pevsner, N.1970.*An Outline of European Architecture*.Penguin.Harmondsworth

Rasmussen, Steen Eilar.1964.*Experiencing Architecture*.Cambridge University Press.Cambridge

Rowe, Colin.1976.*The Mathematics of the Ideal Villa and Other Essays*.The MIT Press.Massachusetts

Scholfield, P.H.1958.*The Theory of Proportion in Architecture*. Cambridge University Press.Cambridge

Wittkower, Rudolf.1971.*Architectural Principles in the Age of Humanism*.M.W. Norton and Co..New York

www.zepelin-university.de, as accessed on 10.10.2005 at 9:30

Varga, Bálint András.1996.*Conversations with Iannis Xenakis*.Faber and Faber.London

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VERMOCHTE
ALLES
DURCH DEN,
DER MICH
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