



Design Analysis



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## Design Analysis

The aim of this design scheme was to create a educational facility which conveys the principles of Water Wise living methods to it's surrounding community without compromising on the principles.

The following design issues will be addressed:

- **PHILOSOPHY**
- **METAPHORS**
- **LINEARITY**
- **SITE CONTEXT**
- **RESPONSE TO CONTOURS**
- **TOPOGRAPHY**
- **CREATING AN EDGE**
- **NOISE BUFFER**
- **ENTRANCE**
- **CONTRAST**
- **TRANSITIONAL SPACE**
- **CONCEPTUALISING**
- **VENTILATION**
- **ROOFING**
- **PEDESTRIAN ROUTE**
- **ROOFING**
- **INFORMAL LABORATORY**
- **LAYOUTS**
- **LANDSCAPE**
- **CIRCULATION AN**
- **EMOTIONAL EXPERIENCE**

## PHILOSOPHY

Through the ages, WATER has been seen as maybe the most important resource available to man. In Africa, and more specifically South Africa, we have limited water resources.

This leads to the universal issue of resource management, to prevent the depletion of our water sources. Educating the community in the essential techniques and methods of working wisely with water is becoming more imperative as time passes.

Rand Water - the main water management body in South Africa - expressed their increasing need for a facility to address these issues. In concurrence with the Department of Education, it is apparent that a centre, purposely designed for this need, would be indispensable. This Water Wise Centre will accommodate the activities needed to achieve the goal of educating the community.

Buildings have become more multi-functional. Buildings have started to act as living organisms. With this in mind, the Water Wise Centre can not house only one function, i.e. administration, but it should be an interactive, living organism which will serve the community in a linear learning process. This learning process teaches people how little water we have, how to gather additional water, and how to purify water for their own use, or to redistribute it for use in the bulk water network of Rand Water.

The three phases of water, liquid, gas and solids play an intricate philosophical part in the design process. Knit together with this, three other aspects of water:

- Dirty undrinkable water
- Cleaner water
- Drinkable water

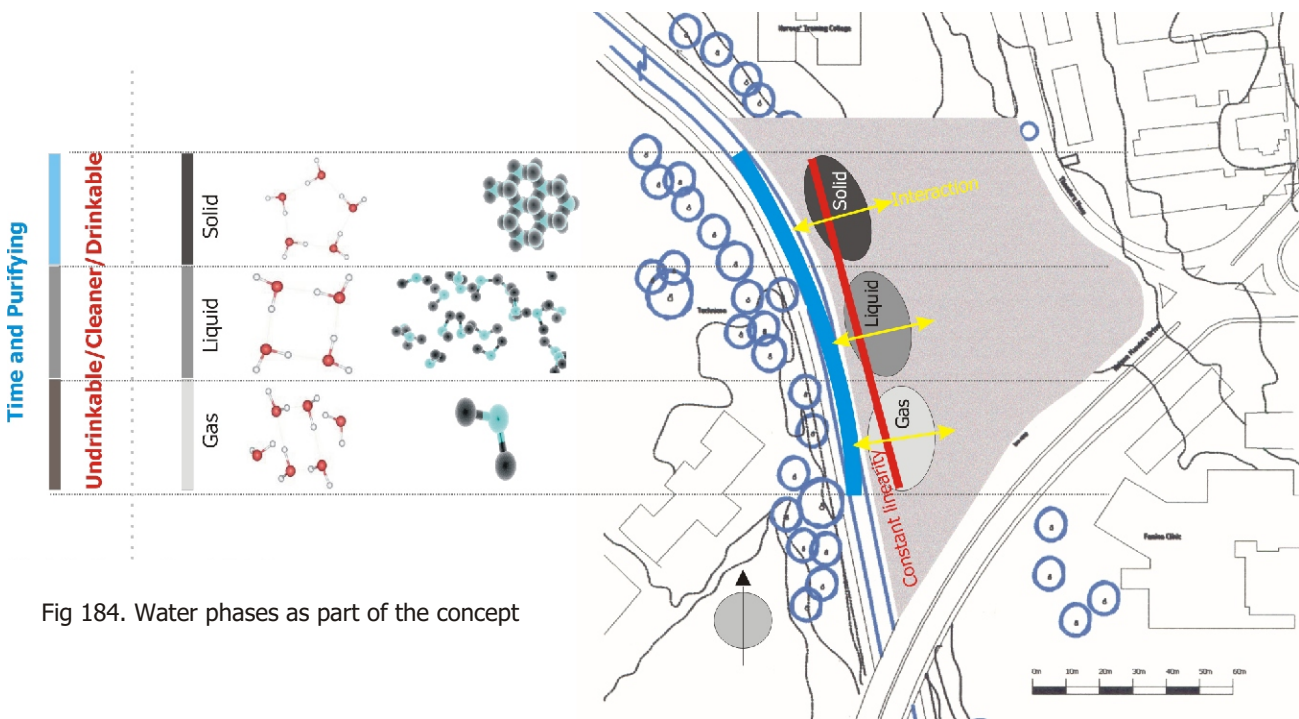


Fig 184. Water phases as part of the concept

In the end, water, in its guises of ice and steam as well as its liquid state, tantalises in its potential as a building component or element and is a reminder of its undeniable presence in the life of each living being.

Architecture, in response to these issues, should create the space for experiencing water.

It is necessary to differentiate between a Water Wise centre, and a building that focuses on water technologies available in the building industry. The challenge in this project is to provide an experience of water, without compromising on Water Wise principles.

A problem concerning urban sustainability arises here. A building that facilitates the functioning of education in water wise living methods, cannot be designed without focussing on sustainable design. In order to achieve this, issues concerning a civil society, improvements in social equity, diversity, opportunities and 'quality of life' need to be addressed. Physical development cannot be dealt with in isolation from the dynamics of the prevailing political and economic environment. The overriding aim of the project is to create an urban educational environment that facilitates and enriches the daily activities of human life. The SBAT/ Sustainable Building Assessment Tool was used in depicting these points of concern.

## METAPHORS

Where the individual is concerned, education of any learner runs parallel to a line which starts at a zero/basic point of knowledge and runs through the stages of obtaining knowledge, to reach an end point where one could say the learner is adequately equipped to make his own inductive vs. deductive decisions concerning what is best for humankind as a whole.

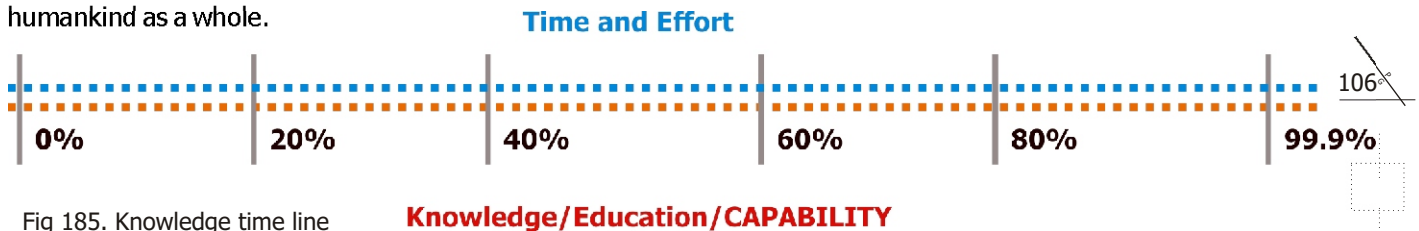


Fig 185. Knowledge time line

The line above shows the natural growth of any person when it comes to obtaining knowledge. Different people arrive at the different stages at different times. This is fortunately not the crux of the problem. If more people can be brought to the capability side of the graph - no matter how long it takes - many more people could be influenced.

Directly linked to the above is the process of cleaning dirty water that has been extracted from a source. This process also follows a linear process of treatments to change water from an undrinkable state into purified drinkable water.

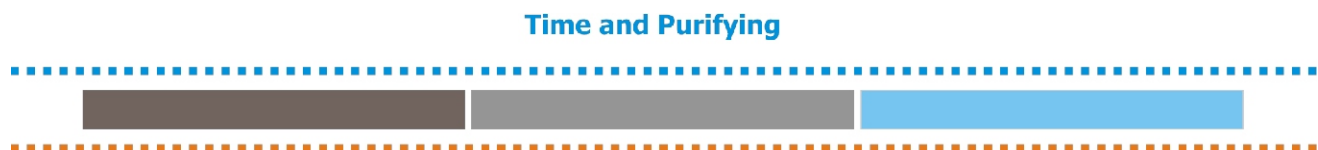


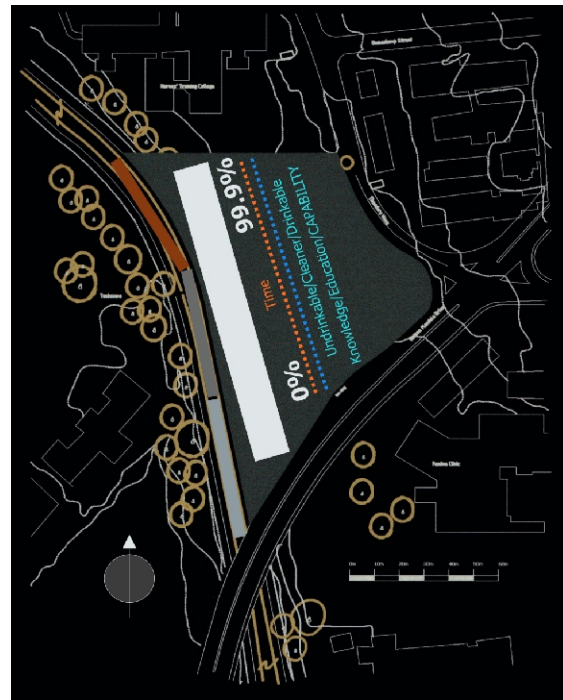
Fig 186. Purification time line

Undrinkable/Cleaner/Drinkable

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**LINEARITY**

Architecture is much more than physical form created by wall, roof and floor. Buildings are living organisms. Being alive means to interact with things or elements around and within one. It is with this knowledge that this Water Wise Centre should be a linear vessel for any learner or visitor to further their path and quest on the time line of knowledge/education/capability. To assist in this process the building should be an interactive, living organism. The linearity of this building takes learners step by step through a learning process. The term linear must not be associated with a straight line with a start and an end point, where the one has no relation to the other.



**Site: 8894.3m<sup>2</sup>**  
**Building: Maximum footprint 5300m<sup>2</sup>**

Fig 187. Linearity of the site

**SITE CONTEXT**

The diagram shows the relationship of the existing buildings relative to the site of the Water Wise Centre.



Fig 188. Existing buildings relative to the site

**RESPONSE TO CONTOURS**

The following diagram shows the contour lines present on the site. Take note how the contours are concentrated on the western part of the site. The greater part of the site, are very flat in comparison.

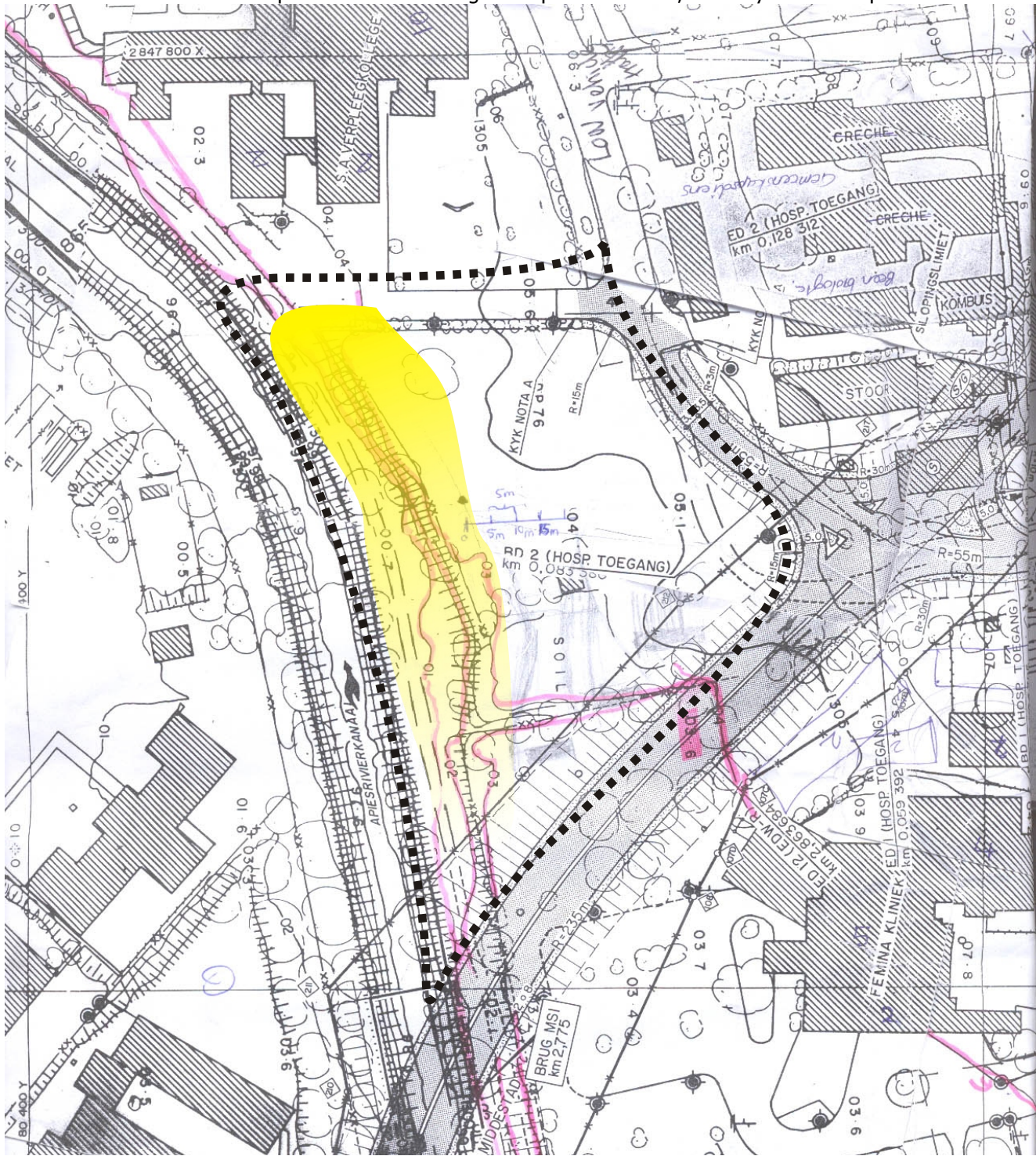


Fig 189. Contours on site - Proposal of city council for the extension of Nelson Mandela Drive

**TOPOGRAPHY**

The shape and form of the Water Wise Centre generates from physical conditions on site. The most prominent changes in level on site is on the wester side with each one increasing in height at 1m intervals as one progresses. The education philosophy, as mentioned above, also plays a part. See section of the topography of the site below.

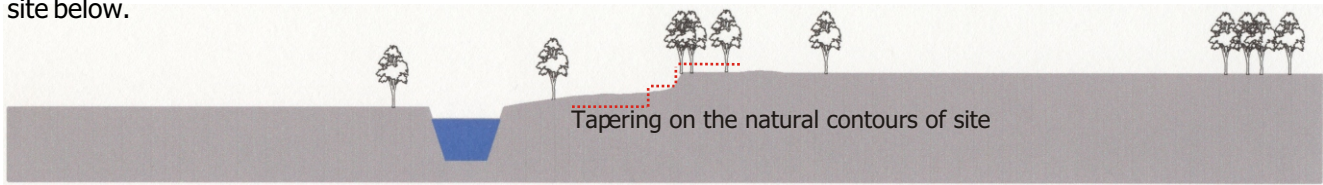


Fig 190. Proposed levels for building floors

The greater part of the site slopes evenly from east to west. The position of the contours on the western side of the site, the traffic concerns on the eastern end of the site, and the dominantly high building on the northern façade had a critical impact on the placement of the building on site.

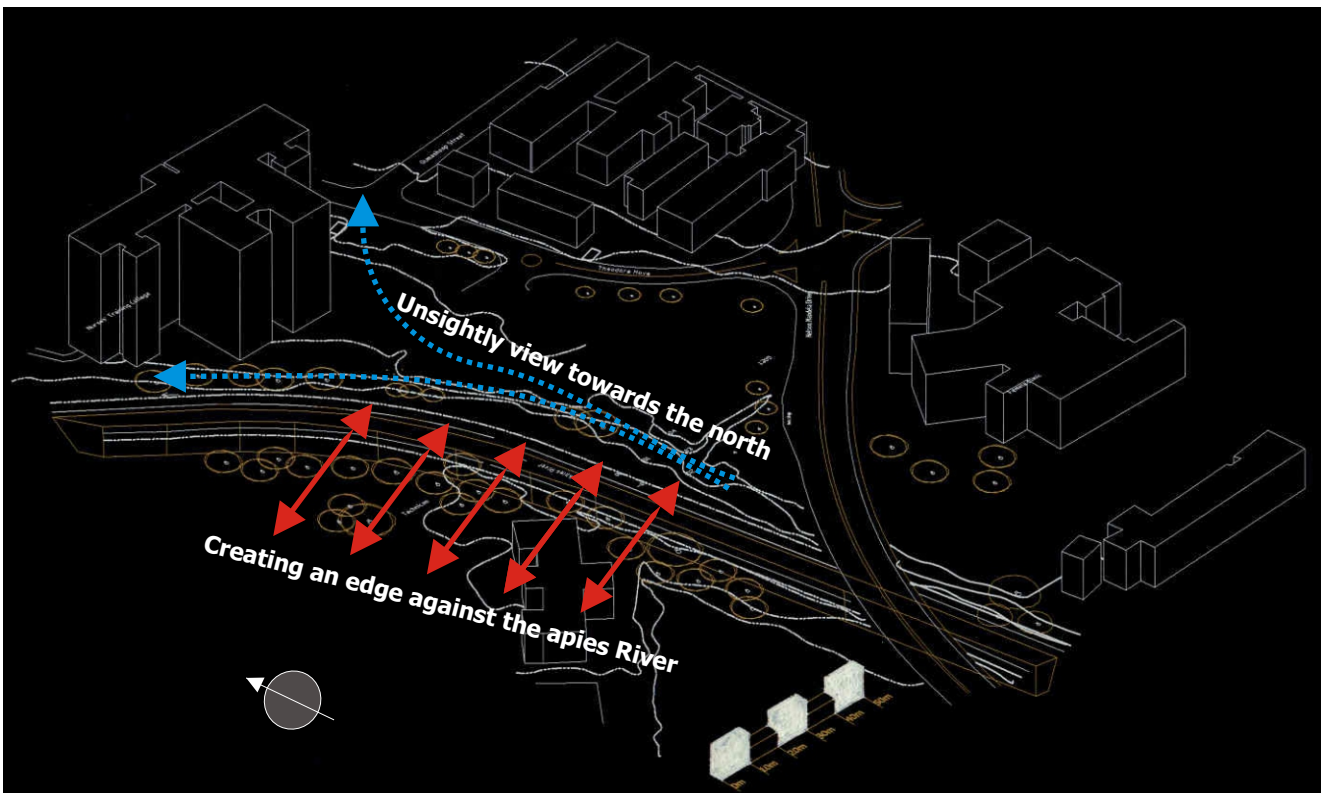


Fig 191. Unsightly views to the north

Making use of the natural fall on the western side of the site, level changes in the building where not only possible, but also much more cost effective, due to the limited excavations needed to achieve these changes in level.



**CREATING AN EDGE**

It made it much easier to define the edge along the Apies River. This edge forces one to be close to the water, and therefore one is confronted by the presence of water as an entity. The more spaces face onto this edge, the more psychological awareness of water is created in the mind of the visitor. As we all know, water has the tendency to make one reflect on one's own life, very much like the gripping power of a camping fire has on one. This is exactly what the aim of this building is, to make people reflect on their ways of using and sometimes abusing water.



Fig 192. Edge along the Apies River

**NOISE BUFFER**

The concentration of the greater part of the building is along the western side of the site, running parallel to the Apies River. On the eastern side of the site, a noise buffer zone is created, by means of a garden with stone walls. This buffer zone minimises the high noise levels that originate from the new intersection at Nelson Mandela Drive and Oumas Hoop Street. It has a dual purpose. A communal space is created that can be used for a multiple of options. Apart from its main purpose of being an educational space, this area serves as a communal and social

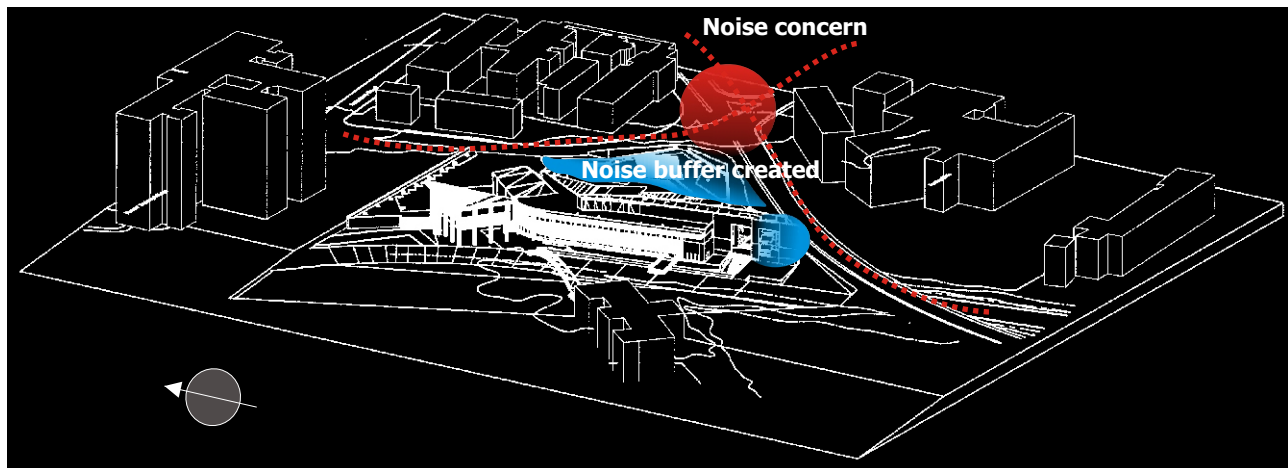


Fig 193. Edge and noise buffer zones

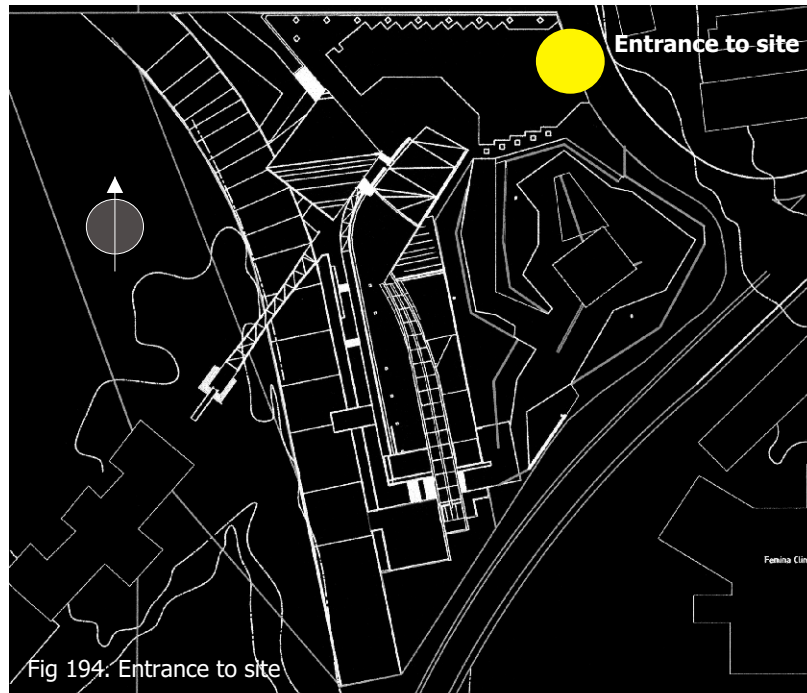
110°  
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## ENTRANCE

Pointers as to where the entrances to the site would be taken from the existing traffic routes, and proposed new routes. A vehicular entrance originated from Oumas Hoop Street. This was apparent due to restrictions and frameworks given by the City Council of Tshwane. An entrance close so close to an intersection is not advisable and it is provisioned that Nelson Mandela Drive would have a high volume of traffic. Therefore, the entrance to the site



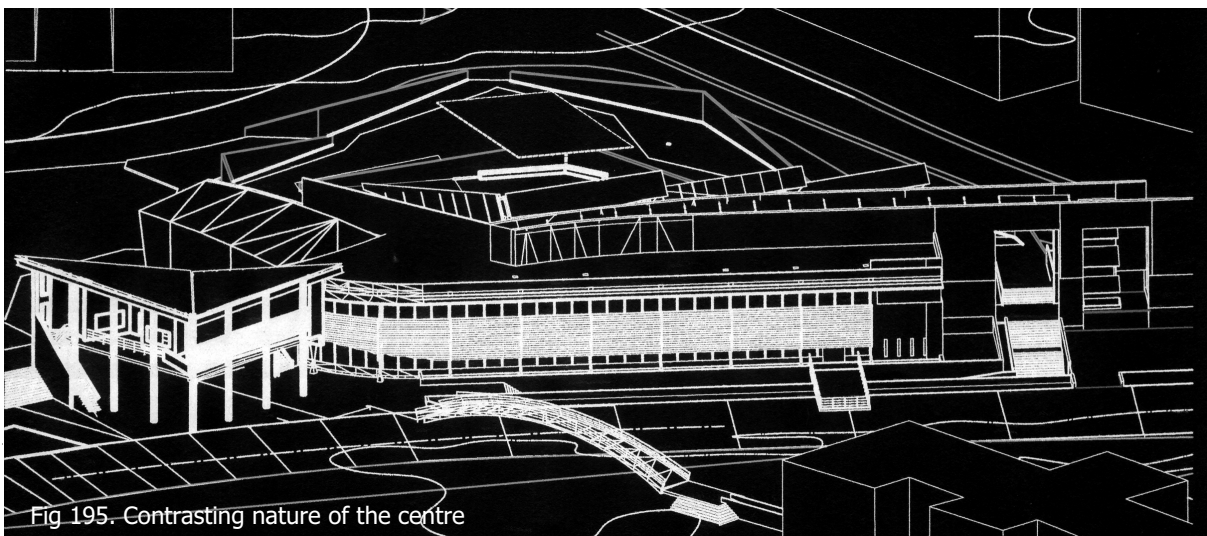
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## CONTRAST

Several critical points were identified after evaluation of the concept. Firstly, Oumas Hoop Street is already well defined as a space by the flanking trees and existing buildings, and therefore the introduction of a street edge is not essential. Accommodating a vehicular entrance at the marked position has practical implications: An entrance from the busy Nelson Mandela Drive is undesirable and it has to be a reasonable distance from the proposed new intersection at the corner of Nelson Mandela Drive and Oumas Hoop Street. This helps preventing traffic congestion at the intersection.

The new development stands in contrast to the surrounding architecture, mainly because its function and status is inherently different to that of the surrounding flats, hospitals and office buildings.





## CONCEPTUALISING

The resulting concept introduced curved shapes to the footprint of the design. These shapes not only give the design a unique quality in contrast to the direct physical context, but it also conceptualise the design with regard to the flexibility of water as an entity. The idea arose to extend the embankment along the Apies River into the site, transforming itself gradually into the hard fibre of the building. Taking this into consideration, it was decided to turn the building "upside down", meaning that the conventional approach was turned around so that the building is entered from the 'back end'. From the parking area the route follows a path running through a gateway, formed by the theatre on the left and the office block on the right. A pedestrian bridge lingers right in front, and when this is reached the route suddenly swerves to the left. The route leads to a path descending to a point below the water level of the river. The river is now out of sight, but a lively reflection of the water, is always visible on the western glass façade on the left. This keeps one attend on the constant presence of water in one's life.

Water cascades down the changes in levels as one proceeds. Water runs across glass panels into a shallow pool, which run the full length of the route. Following this route one is at different intervals exposed to yet another guise of water.

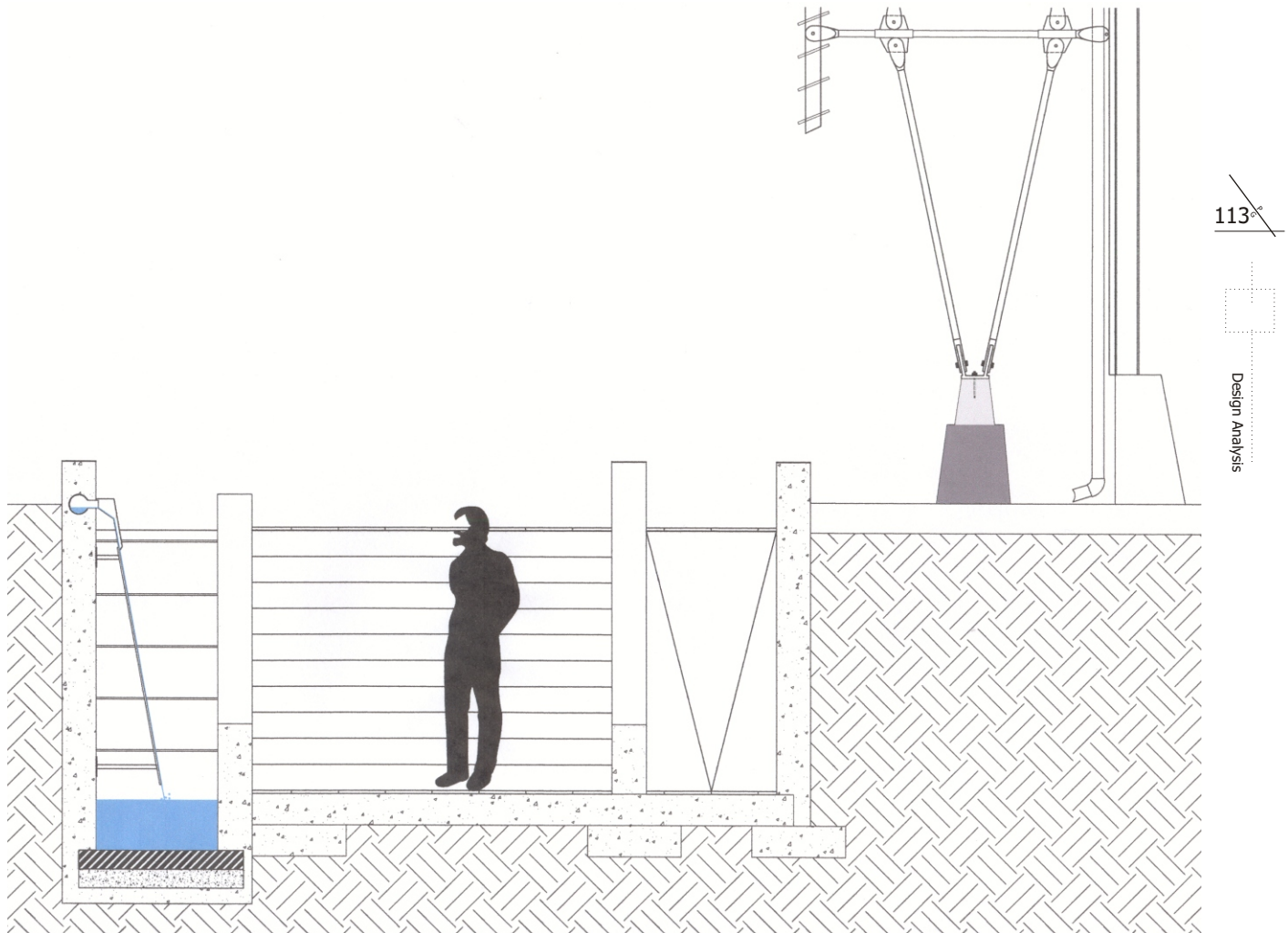


Fig 197. Section through walkway, showing water running over glass panels

Just as one passes the cascading water, one steps into an area covered with a simple glass and steel rooftop. Suddenly one finds oneself in a misty cloud. Nozzles, located in the walls on either side of the walkway, release a fine water mist. The roof covering the space, together with the slope of the floor, encapsulates the water, keeping it in a closed system. This prevents the water/steam from evaporating.

Underneath the pedestrian walkway a space with a lower roof and a different light quality is entered. Cold mist is blown over the body by overhead nozzles. This might take one to the point of discomfort, but just before this point is reached, one exits from underneath the walkway into a space that opens up clear skies. Here, the reflection of the river is still visible on the glass facade.

The next part of the route has no roof. Next to one, four streams of water are shot from nozzles located in the shallow pool. At this point the rumble of cascading water, more forceful than the limpid ripples of the overflowing pool, can be heard. This is the kind of noise generated when water has been provoked. All that can be seen at this stage is a large glass panel located in a blunt concrete wall right in front. This panel reveals the water mass that lies behind, seemingly quiet. The origin of the rumbling water reveals itself only gradually as one walks towards the end of the route. The last few metres lead up a large staircase through a slot cut into the concrete. When this point is reached, one is again above the water level of the river, at the source of the rumbling 'waterfall' and on the threshold of the entrance of the building.

From here one can walk up to the waterfall to experience the sensory palette, provoked by, sight, smell, hearing, touch, and even taste, for if one looks towards the back, a large sand filter is located within the concrete wall. This sand filter is used to clean the water running through the water feature system. It is also part of the educational exhibition, where one can physically see how dirty water is added to the system and clean drinkable water exits the filter. The clean water falls into a metal basin located at the bottom of the filter. From there it fills up, and the overflow falls into the first pool of the water feature. One can even be so bold as to make a bucket with one's hands and drink some of the water in this basin. The proof lies in the tasting!

The next images explain the route mentioned above, running to the reception level within the building.

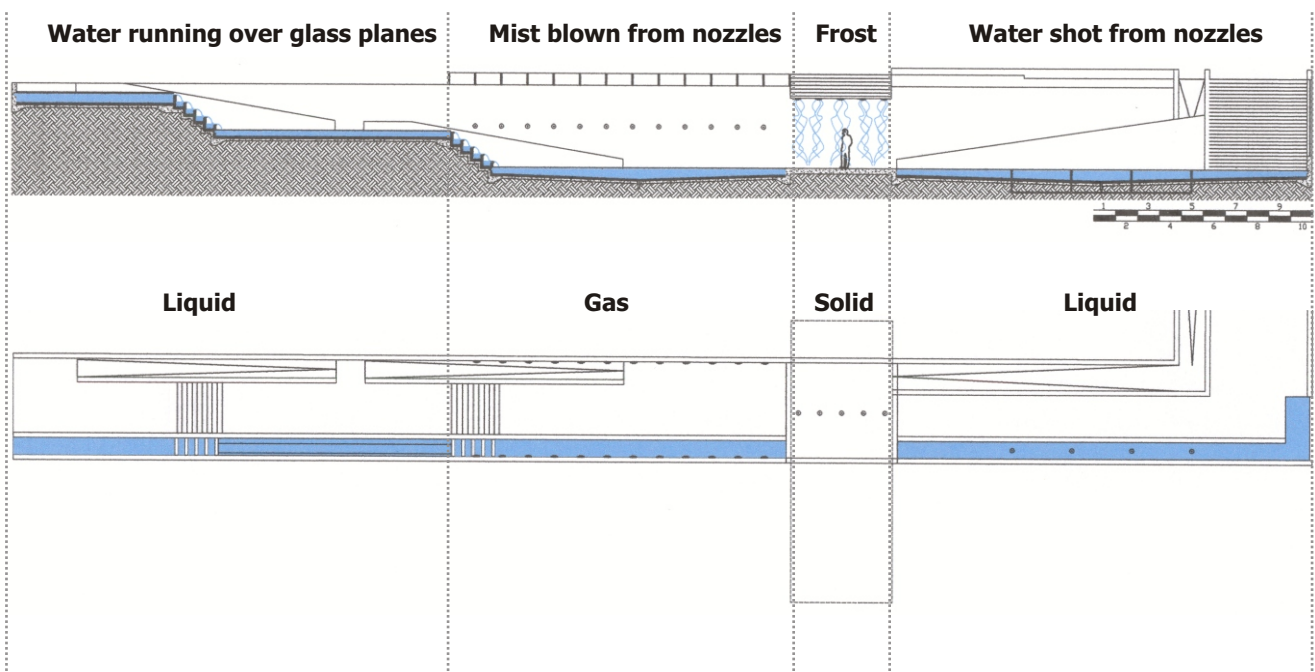


Fig 198. Section through the walkway, showing different guise zones

At this point in the design development the circulation within the building is addressed. The first proposal was to have the exhibition areas one after the other, but this meant that there would have to be an exit on the northern end of the building. This would have had a dramatic impact on the 'forced' route that the visitor is supposed to take. It also would have meant that one will have to backtrack at some stage on the same route followed earlier. A circular route within the exhibition spaces was adapted. After entering the building, an extended ramp within the atrium leads towards the exhibition spaces. On turning left, one follows the circular route down to ground level again. The formal functions are located on the ground level, where the formal functions are located. These functions include theatre/lecture room (for lectures, puppet shows and further educational media), the information centre (including archive, library, reading/study room, and computer station), offices, book and tuck shop, and the dining area. The pedestrian bridge extends over the river, and there one can find time to reflect quietly on what was learned during the visit.

The office block on the northern end of the building is mainly administrative and the laboratory lends the opportunity for doing experiments under strict safety conditions.

The space underneath the office block provides the opportunity for more relaxed interaction with water.

After the functions within the building have been completed, one may exit the building and follow the route through the Water Wise garden. The garden consists of three zones, which represent plant types that are adaptable in their zones: low water use, medium water use, and high water use. The garden serves as an educational tool. The plants are used as props to explain further principles on how to adapt to the three zones of water availability.

If one chooses not to walk through the garden, one can directly follow the route towards the parking area.

This will conclude one's visit to the centre.

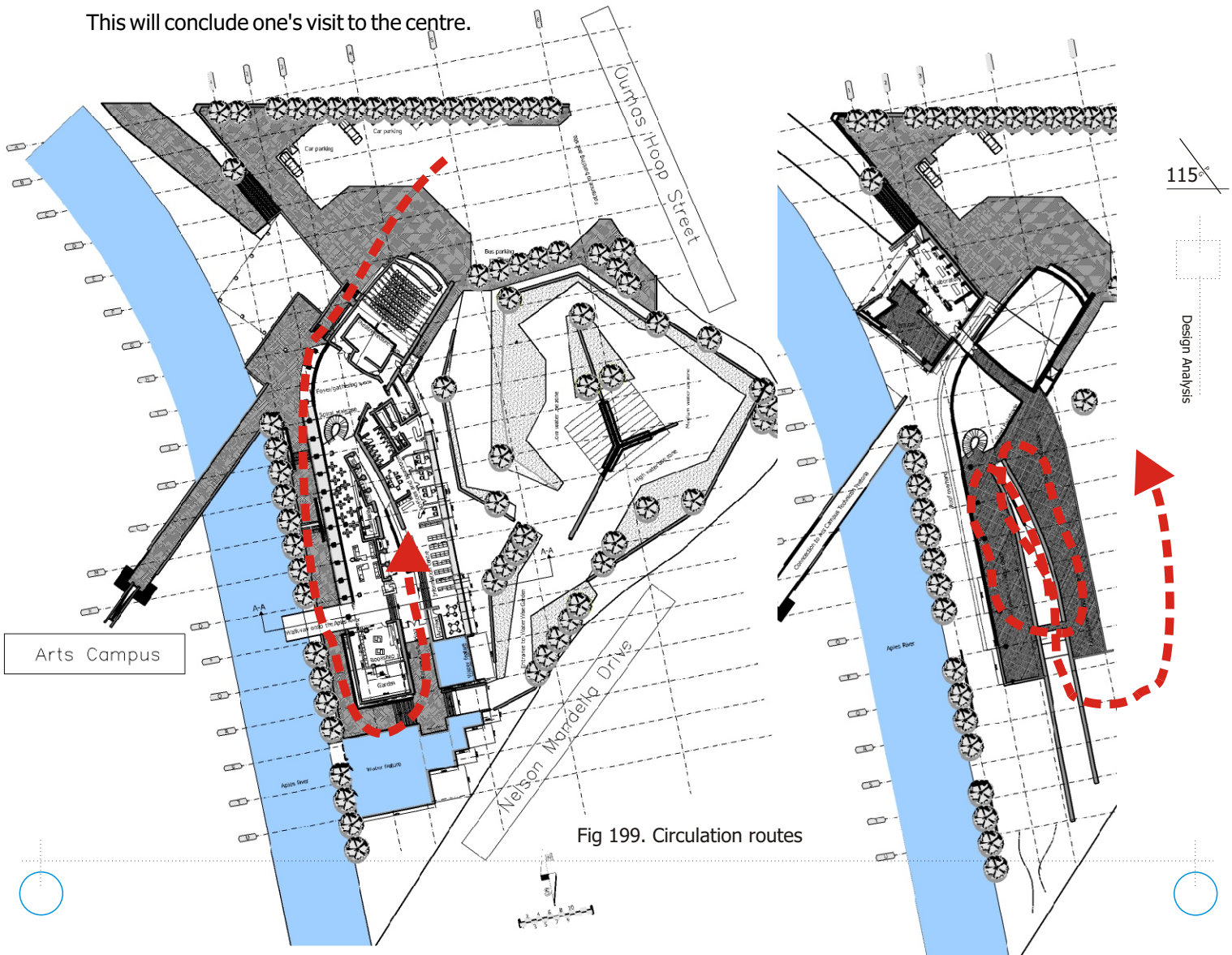


Fig 199. Circulation routes

## VENTILATION

The building is dependent on a natural ventilation system. 20% Openable windows on all facades enhance this system. To ensure the constant inflow of cool air and escape of warm air, an air displacement system is introduced to the building. The three-dimensional quality of the atrium was determined and fixed by thermal considerations. The atrium serves as a stack system, with very high walls that are exposed to direct sunlight. All the adjacent areas are linked to the atrium. The skylight runs at a slope and the atrium is the highest point for warm air to escape from the building.

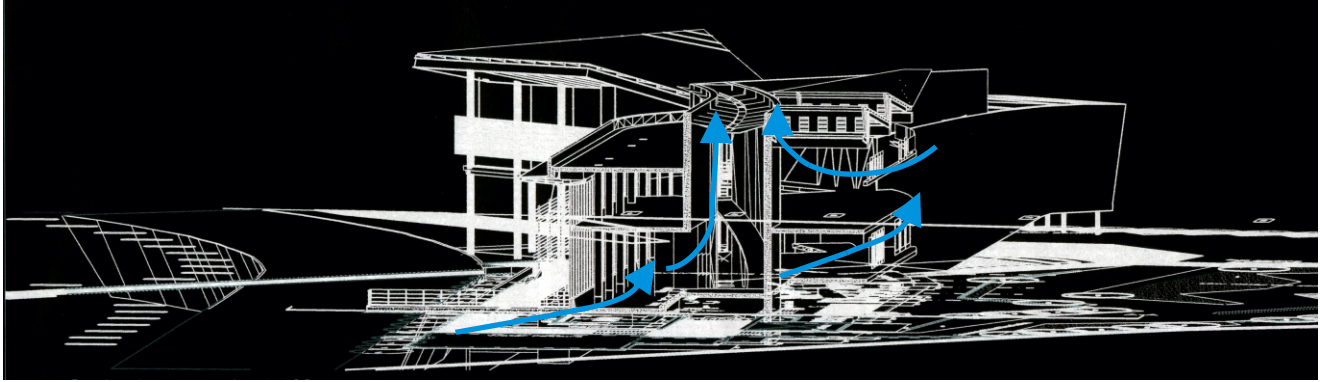


Fig 200. Natural ventilation

## ROOFING

The exhibition areas on the second level of the building need natural light. A system of I-section beams and lipped channel beams create a roof system, which introduces ample southern light to these exhibition areas. Brownbuilt sheeting was implemented at a slope of 6 degrees. It is important to note that the contrasting features of the building emerged as a result of a reaction to the context. This creates variety and tension within the building, while the organic shapes become more striking against an orthogonal backdrop. It was subsequently decided to emphasize the contrast but to refine it to a point where the building expresses unity and variety simultaneously.

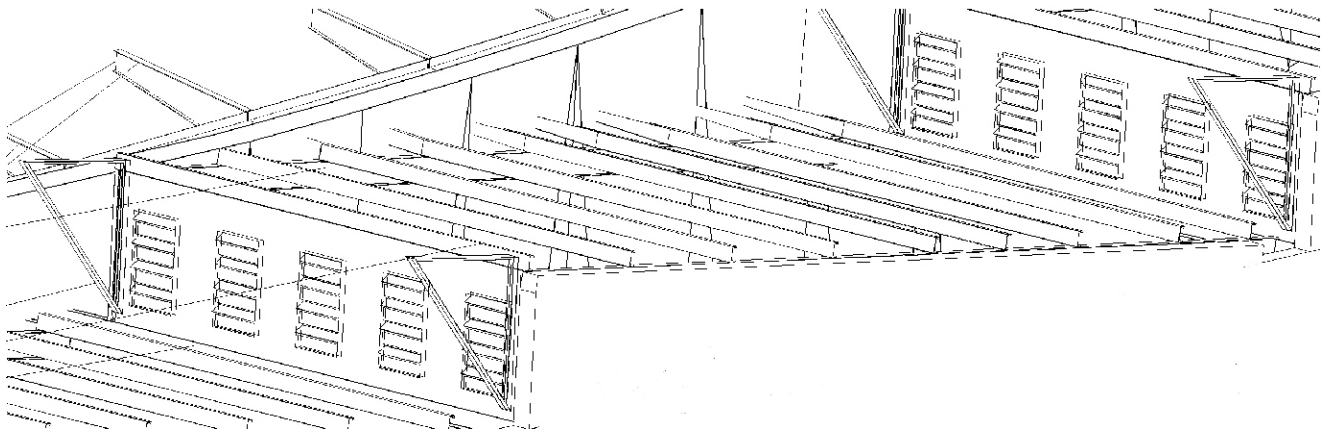


Fig 201. Steel roof structure