

*transcending speed – the culture of motorsport*  
*a facility for the development and promotion of motorsport*

*in memory of my dad whose enthusiasm for racing was instilled  
in me at a very young age, not by force but by choice*

*may he rest in peace 05\_11\_2005*

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*submitted in fulfilment as partial requirement for completion of the degree magister in architecture  
(professional) in the faculty of engineering, the built environment and information technology.  
department of architecture, landscape architecture & interior architecture  
university of pretoria*

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*the facility for the development and promotion of motorsport in South Africa will aim to serve as a precedent for future race track development. It is an exploration into the culture of motor racing and how the culture of architecture is enhanced within this very realm.*

*the aim of this discourse is to establish the criteria required for an improved experience trackside and create a relationship between motor racing and architecture that will exhibit the fundamental purpose of being at the track – the racing.*

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*background*

*points of departure*



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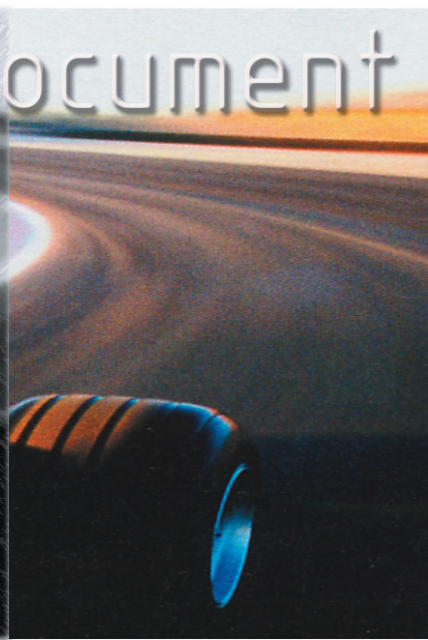
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# briefing document



### *Preliminary*

This section deals with enforcing the purpose of this study and setting the base for things to come. It is an introduction into the theme of the dissertation, the process of inquiry and the needs of a society.

*“A work of architecture is always related to a specific situation, but it also has to transcend this situation and make it appear as part of a more comprehensive, meaningful totality.”*

Norberg-Schulz (Meaning in Western Architecture. 1975: 432)

The purpose of exploration into the field of motor sport deals with the desire for that unachievable aspiration of many to compete against others at a level where the focus is on the relationship between themselves and their cars. To get to the chequered flag before anyone else, travelling at speeds of up to 300kmp/h, is part of man's inbred desire to challenge himself and others.

The relationship between motor racing and architecture is an undefinable one on a purely physical scale. It delves much deeper than that considering those involved in motor racing: the drivers, administrators, mechanics and spectators are there for one reason only – the racing. The purpose of this exercise is to search for the continuity of architecturally enhancing the culture of the track so as to create an atmosphere that will not detract from the racing. The link is in the culture created by both the architecture and motor racing.







University of Pretoria etd – Franco, KR (2005)

What is the meaning of architecture? Other peoples' views and mine. Does architecture influence the way in which society thinks and acts? How does culture affect architecture and vice-versa? The purpose of exploring these questions is to fully understand how and why the contemporary situation is at it is.

According in Lynch (1990:104), in argument of the relationship between normative theory and aesthetic form, when people are pushed into a position regarding aesthetics, they either enforce the artist or the critic or hide behind "I know what I like". I KNOW WHAT I LIKE. That is precisely the point. Society knows what they like and dislike and varying opinions will never be able to formulate a position on the meaning of architecture.

Norberg-Schulz (Meaning in Western Architecture. 1975:428) reiterates Lynch in that by varying situations one implies different meanings to words, objects, processes etc. "... the meaning of any phenomenon is the context in which it appears". Charles Jencks does not relate context to the phenomenon, but emphasises the context in a more general tone, "...each use of meaning is different from any other and the particular case has to be understood from the context" (Semiology and Architecture. *Meaning in Architecture*.1969:13).

Architecture's main objective is a symbolic one. It can be created to symbolise its desired function or appear to be something else (Baker – Design Strategies in Architecture 1996:XV11). Baker also goes on to say that architecture also represents the most important characteristics of a culture in that it brings into existence the framework for national life (1996:XVII) and, according to Lawrence Durrell in "*Meaning in Western Architecture*" (Norberg-Schulz 1975:432), a very important determining factor in creating the spirit of place, is culture. The aspect of culture gets more emphasis from Baker when it forms one of his three key aspects that influence architecture. The others being: site conditions and functional requirements (1996:XV11). These three points by Baker link now again to Norberg-Schulz, the context in which any phenomenon appear, determines its meaning.

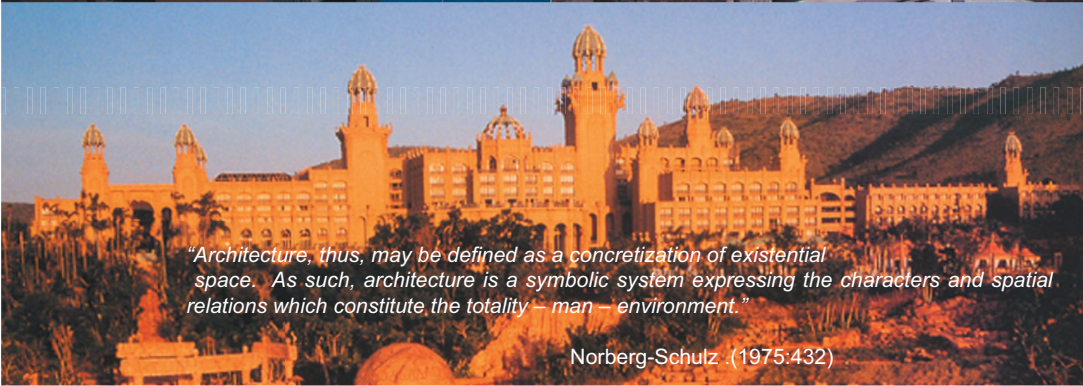
Colin St. John Wilson (architectural critic), in an article in *The Architectural Review*, *The Play of Use and The Use of Play*, (July 1986), also mentions culture. "The limits of an architecture are the limits of the culture that it serves" (1986:18). Throughout the article there are also various references to architecture existing only out of a need, particularly to fulfil the needs in society (1986:18), it is the "transformation of utility into an icon" where this process is likened to a question and answer scenario where the source of the question is use and architecture is the *fact of a way of life* (1986:17).

What is culture then? Norberg-Schulz (*Meaning in Architecture*. *Meaning in Architecture*.1969:220) defines culture as a common order which is developed through education and the constant retrieval of information reliant on "common symbol systems". Culture makes use of distinctive characters in the "ordered" world through valid interactions.

What can be said then from the variety of views presented above? Culture definitely plays a very important role in architecture, in determining the architecture and providing function and aesthetics to suit that specific culture. To mention Norberg-Schulz again, we must bear in mind though that every situation, every site and every response to the problem will differ in different situations.

Culture is very symbolic. Although the meaning derived by the individual, the community or society as a whole will vary from time and place, meaning is still created. Presence and the *Genius Loci* (Spirit of Place) are presented as part of the symbolic meaning, how it makes us feel and what the architecture represents.

Aesthetic and function are linked to all aspects of culture and symbolism. The function could be determined by the form, but most times the form is created by the function. Ensuring the balance of aesthetic and function to the symbol and culture of society (you, me, us, the community) is of extreme importance, the failure of which will have consequences that will affect not only the designer, but the community as well.



"Architecture, thus, may be defined as a concretization of existential space. As such, architecture is a symbolic system expressing the characters and spatial relations which constitute the totality – man – environment."

Norberg-Schulz .(1975:432)

The need for there to be architecture that fulfils cultural, symbolic, aesthetic and practical function is probably the first step in creating a place. Without the need for there to be an element/phenomenon, there is no architecture. As architecture is now defined by the need for a structure that serves on a multitude of levels, if there is no need, there is no architecture.

motor racing – emotions and power on tap

*“The art of being totally at one. Not only with the car, the track, your competitors... but with the race itself. Being in touch with the race as it unfolds... how it began, where it is now, and what is likely to happen in the laps ahead. It is the art of planning. Yet also being able to react instantly to a changing scenario. It is being so on the top of your game that you are able to understand the choices open to you. It is about managing any of your own weaknesses and maximising your opportunities when they arise.”*

Woodcraft advert (Winning!2003/2004:63)

Motor racing in South Africa, and all over the world, is a culture on its own. If you have the privilege of being born into a racing family or have the opportunity (be it financially or with natural ability) of getting involved in motor racing, you are fortunate enough to be involved in an emotional culture that provides for high speed, adrenaline pumping thrills, and spills, that can be found in no other sport and one that is steeped in so much history, it is difficult to know where to begin.

*“From the moment the first fledging ‘horseless carriages’ spluttered into life around the turn of the century, there have always been some ambitious, enterprising and enthusiastic individuals whose overwhelming ambition was to drive faster – and for longer – than any of their rivals”*

Henry (1984:4)

As a spectator, which so many of us are, we can only get a taste of this culture and it is with a inner ambition within the majority of the human race (no pun intended) that motor racing, especially in South Africa, where we are not exposed to a high enough volume of live racing, draws tens of thousands of would-be racers to the circuits. Can you imagine what it is like to be driving a Ford or Chev V8 GT1 that produces 600 hp on the throttle, when just by standing next to them when they are idling is enough to make shivers run up and down your spine and make your skin crawl? As Murray Walker (well known motorsport tv personality) puts it, “motor racing is an action packed and thrilling sport with enormous visual appeal” (Foreword in the Sportsviewers Guide – Motor Racing 1984:3).

Motor sport is about passion, skill and the desire to win - to be the best. Sam Tingle, a driver from the early years of the South African racing scene, writes in his foreword to the book “For the love of it – John Love and an Era of South African Motor Sport”, that when the flag dropped for the start of a race, everyone wanted to win (2005:15).

It does not matter if it is in the most illegal street race or the juniors on the karting track or formula one. Everyone wants to win. Motor racing is culture, it is passion, it is desire, it is history and, like with all sports, it brings people together with one thing in mind - it is about the racing and nothing else. It is not political and it does not discriminate.





figure 1.04\_ image of speed\_ferrari F1



Figure 1.05\_ image of speed\_williams F1

## Speed

Extract- BCN Speed and Friction, The Catalunya Circuit City. 2004. Edited by Oosterhuis, K et. al. SITES Books:New Mexico.

Kas Oosterhuis: Principal ONL, Professor at the Faculty of Architecture TU Delft

### “ Speed and Friction

Writing these lines in the Thalys Train of Grande Vitesse with a speed of nearly 300 km/h I notice that my perception of the world changes with the increasing speed. I feel a different relation between myself, the bullet train and the landscape. It feels like riding extra long waves, navigating a spline curve trajectory, slowly bending up and down the spline, delicately bending the spline sideways right and left. Stitching the sleepy hills of the landscape into an even sleepier sequence of cuddling treatment of the transported human body. Riding the French landscape at high speed feels like a different friction: connected to a new meta-landscape, flying low somewhere between earth and clouds, it kind of feels like being lifted off the tracks.

The Formula 1 driver reaches similar speeds on much narrower tracks and sharper curves than the TGV trajectory. The river accelerates to the speed of the bullet train, in an environment which seems more suited for slow traffic like bicycles. It features similar curves as the winding lanes in public parks, designed for strolling down the lanes at a quiet pace. Speed, curves and hence friction boosted simultaneously, applying G forces to the tossed around driver. Seeing a video of the Formula 1 driver you feel sorry for the guy and admiration at the same time for this heroic behaviour in his narrow torture chamber, challenging the sharp curves, scratching the asphalt, excited about the bold friction his body is going through when navigating the circuit. Now imagine yourself to be the skin of the rubber tire. You feel the friction. You feel the heat. Your rubber skin is scratched by the asphalt due to the speed of the rotation and the power of the traction. Your endurance will be tested while you are rotating with over 40 rotations per second. You leave rubber traces on the asphalt. You inscribe the track. The track, the power of the machine, and the tires all belong to one system. There would not have been asphalt if there were no tires. There would not have been powerful machines if there were no asphalt tracks. Tires, race-car

and track belong to one system. If the tires are hot, so are the inscriptions on the track. Tire and track exchange information in the form of heat and rubber. Speed and friction belong to one system. There is no speed without friction. There is no speed of information without the channels, hubs and wires to regulate the speed of the information flow. There is no heat without materials to transfer the heat to other stuff. There is no traffic flow without tracks, cars drivers and a set of rules operating on the players of the automotive mobility system.

### People in speed

How is speed experienced by an individual person? Imagine yourself walking the streets. You lift your feet one after the other, but you never lose touch with the ground. Now, speed up, and you will find yourself flying during the intervals of your feet touching the ground. You are in another mode of relating to the fixed ground. You are in speed. You see the environment differently, your vision gets blurred, you concentrate more on the process of running than on the environment. Take this to the extreme, and the person in extreme speed delaminates from the speed of daily life. A person in speed is very aware of its own body, (s)he lives in a world of imagination, and eventually loses touch with the immediate environment, (s)he is creating an increasingly isolated situation, only communicating through narrow information bands. People in speed let only limited information into their bodily system. If you on the contrary are slowing down your pace, and you sit (and read the paper or watch TV) you are not aware of your body at all, and the media are taking over the control over your body. You let the information stream freely without much friction into your system.

*Vehicles (operated by people) in speed*

*What if that person takes place behind the steering wheel of a vehicle? Then the vehicle acts as the body – including the driving person, who basically functions as an operator – and takes the body in speed to another extreme. Vehicles in speed lose direct contact with the environment and need instruments and sensing devices to measure and control circumstances as they rapidly change. Vehicles in speed thus develop a specific form of information exchange with the environment. The vehicle body builds up a special relation to the asphalt (in the case of a race car), it wants to leave ground but when speeding up it starts building up a field of attraction. The Formula 1 car is pulled back to the asphalt through downforce created by the speed of the car and builds up a force field between the bottom of the car and the track. Why is the bottom of the traditional car always black like burnt coal, and not designed like the rest of the body? Why does it look like a beetle with colourful wings on the back but with black and flat ugly and dirty bottom? It is black because of the friction between body and earth? Is it black because we are not really going to see it and our eyes do not need visual pampering? Thinking about the dynamic relation between car body and the road one can not treat the bottom as a flat rugged surface; the bottom must be prepared to perform the special relationship.”*



Figure 1.06\_ image of speed\_williams F1

figure 1.07\_figure ground study

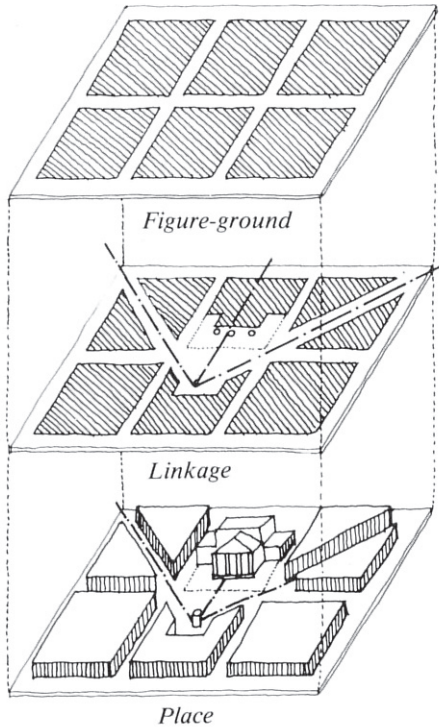
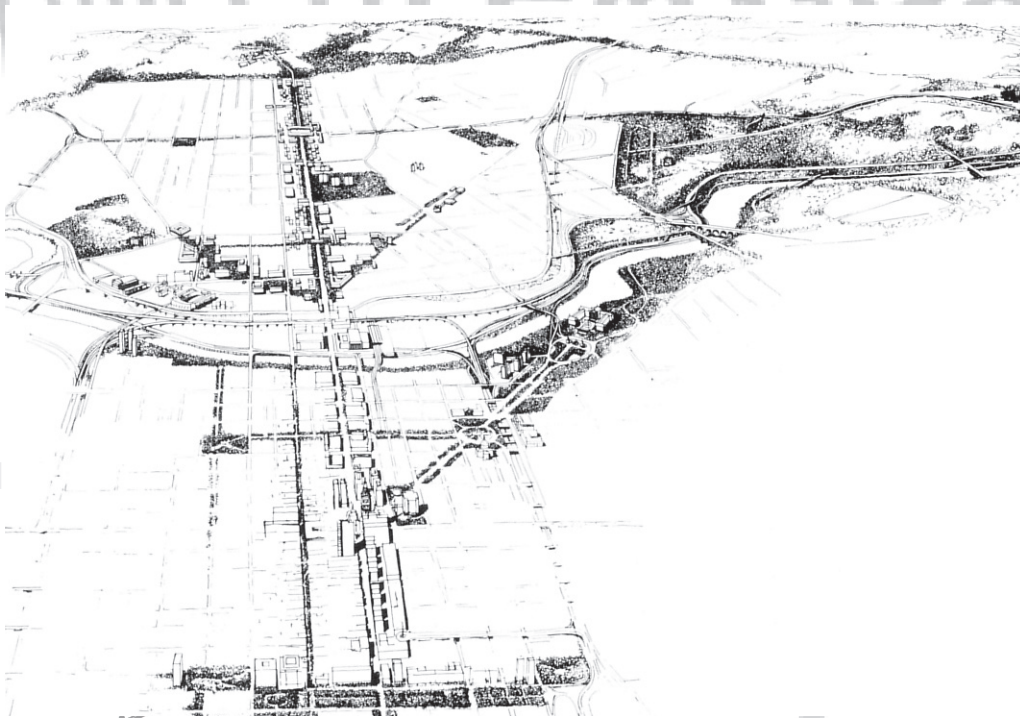


figure 1.08\_Trancik's three theories of urban spatial design

figure 1.09\_downtown Philadelphia showing the linkage theory



As the underlying nature of this dissertation is to create a precedent for future projects of this nature, a question arises: In the creation of a precedent I had to ask myself, is it a style that will prevail or is it a vernacular?

With the setting being around a race track, where the culture is that of the car, the driver and the spectator, is it correct to egocentrically idealise a new style? Is it then possible to force a specific style within this context? When it comes down to it, the driver does not really care about what the architecture looks like trackside – especially travelling at speeds of up to 300km/h, and the feeling of the spectator is the same – they are there to watch the battle unfold on the circuit. It is about the *driving style* and the *architecture of the car*.

In saying that, it is the responsibility of the architect to ensure a pleasurable experience for all involved through the enhancement of the “natural” setting.

*“...architecture is having to respond to the context and culture of a place, and where architects are having to work increasingly within local vernaculars.”*

Thomas Fisher (Escape From Style. Progressive Architecture. September 1994:59)

The article “Escape From Style” is Thomas Fisher’s contribution to the architectural profession in response to the growing confusion among architects with regard to style. Having been written in 1994, the article is a bit outdated, considering its subject matter, but the principles should remain unchanged, especially with relevance to the current South African context.

The theme moves around the principle of creating a vernacular that will suit the context of the environment wherein it is placed – not a style that gets imposed on the specific site and time out of context.

*“...vernaculars are local and contextual, not international and universal”*

Thomas Fisher (Escape From Style. Progressive Architecture. September 1994:100)

With this in mind then, it is not a question of style, it is a statement to the motoracing vernacular, the language and the culture within the high speed context that the project will unfold.

### evolution of place making

In response of the growing need for recognition to the environment as a whole, designers are constantly having to adjust their methods and practices with regard to the social and historical value of the context wherein they are placed. As a process, our attention must be drawn to an approach that is inclusive of all the fundamental aspects of a modern day evolution of modern space.

Broadbent (Design in Architecture.1977:387) refers to a method of architectural design as a coming together of three systems, namely: the human system, the environmental system and the building system. Trancik (Finding Lost Space.1986:97) also has a method, but defines it as three theories of urban spatial design: the figure ground theory, the linkage theory and the place theory.

The figure ground theory (building system) is an exploration of the relationship between the land coverage of buildings as a solid mass and the open voids that surround them with the objective of making clear the hierarchy of spaces of different sizes in the environment and the connection between them (Trancik.1986:97).

As the linkage theory (environmental system) suggests, it is a process of determining the value of connection between elements. The goal is to create a structure for ordering space through the network that is created by the various linkages in the assessment. The emphasis, with this method, is on movement systems, circulation and the efficiency of the infrastructure (Trancik.1986:97).

By incorporating the human factor, cultural, historical and natural contexts into the environment, the place theory (human system). It is a response to context that aims to enhance the relationship between the existing conditions and the contemporary proposal through the inclusion of factors such as history and time. "...social and cultural values, visual perceptions, of users and an individual's control over the immediate public environment..." (Trancik.1986:98). In his book "Genius Loci", Norberg-Schulz devotes his entire exploration to the "spirit of place". The definition of place is a space where life exists, where space has a unique character and feeling and the goal of the architect should be to make meaningful places, to make the *genius loci* visible and to help man dwell (1980:5).

It goes without saying then, that the importance of applying each of these theories, or systems, is crucial in the creation of a modern space. Not in isolation, but together, as they serve each other on more than just a philosophical level.

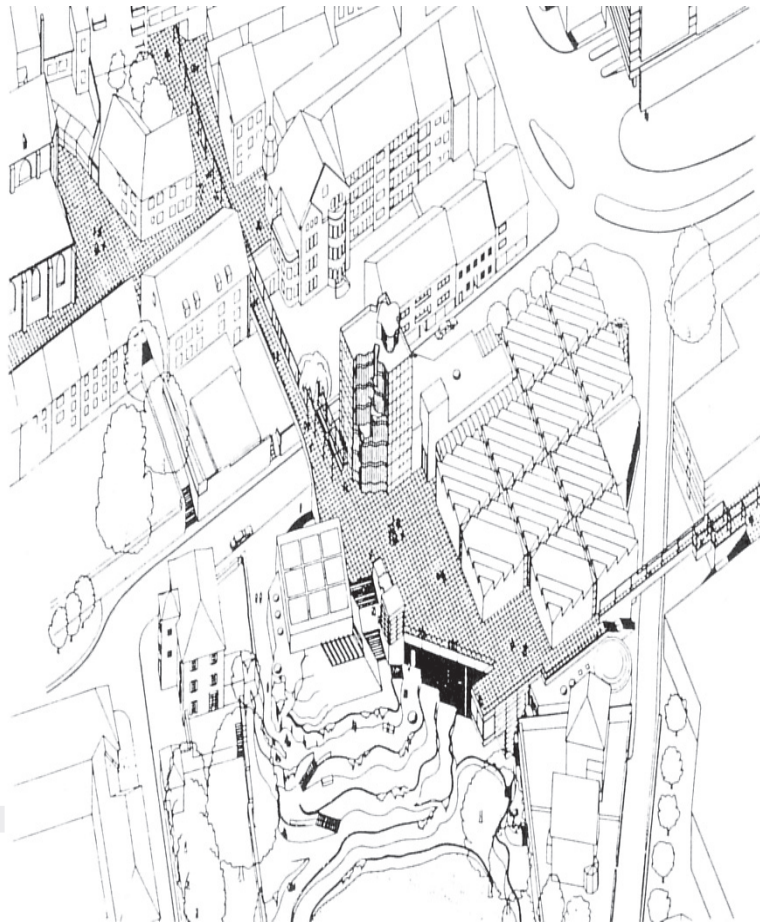


figure 1.10\_Hollein's Municipal museum—a response to historical and physical context

figure 1.11\_development of the youth starts with the youngsters on the karting track



figure 1.12\_Total Toyota South African Rally team



**real world problem \_on a national scale**

*"The organisation of South African sport is set to undergo major restructuring aimed at streamlining responsibilities of stake-holders and improving the potential for success in high performance sport."*

(Restructuring of SA Sport. 15 July 2003. www.srsa.gov.za)

Since the inception of the New South Africa, sport in our country has begun to excel to a level where we, as a nation, can compete without shame in the international arena. Prime examples of this is our country's participation in Cricket, Rugby, Athletics and even Swimming where our sports men and women make us proud and bring home medals on a regular basis. This is mostly thanks to Government and non-governmental organisations (NGOs) whose desire it is to see South African Sports at the forefront of the international competition.

One government department, Sports and Recreation South Africa (SRSA), is of particular mention in the progression and development of South African athletes in all fields. Their mission is to realise government's goals through the "optimisation of sport and recreation delivery" with participation of the public, private and non-governmental areas of society. The objectives that they set to attain these goals are as follows:

- Increasing the levels of participation in sport and recreation activities.
- Raising sports profiles in the face of conflicting priorities.
- Maximizing the probability of success in major events.
- Placing sport in the forefront of efforts to reduce the levels of crime.

(Mission Statement. SRSA. www.srsa.gov.za)

The creation of a new two level system, including a government department and a non-governmental confederation, is the result of findings by a Ministerial Task Team that was appointed in December 2000 with the aim of determining the impact of high performance sport on general sporting codes. The Minister of Sport and Recreation at the time, Nqonde Balfour, said in a press release (Restructuring of SA Sport. 15 July 2003. www.srsa.gov.za) that the plan is now finalised and will lead South African sport into the future.

Part of this resurgence to be competitive internationally in high performance sports must also include motor racing. Since the first ever Grand Prix in South Africa in 1934 (Winning,2004:122), motor racing has experienced a highly successful era on the local scene as well as internationally with a total of 18 South African drivers competing in the F1 World Championship up to and including 1980 (Winning,2004:147). The most famous being of course, Jody Scheckter, the only South African to ever win a Formula One world championship, this occurred in 1979.

figure 1.13\_entrance to Kyalami Grand Prix Circuit



figure 1.14\_ Kyalami on race day



figure 1.15\_ aerial view of Kyalami



Since the last Grand Prix in South Africa in 1985, and then again for a brief two-year stint in 1992 and 1993, the prospect of South Africa competing on the international Formula One circuit has gone in a downward spiral (Winning,2004:216). More recently though the interest and welfare of motor racing has been looked at a little closer and the inclusion of a South African team, backed by local businessman Tokyo Sexwale, in the A1 GP World Cup of Motorsport is definitely giving South Africa a fighting chance.

Kyalami Grand Prix Circuit, once an icon on the international racing circuit, now just a shadow of its former glory with a dilapidating pit complex and overgrown gravel traps makes even the toughest and most competitive racing driver wonder what went wrong with the track and its support structure. Crowd numbers that began to deteriorate at local racing events only made the situation worse, as it is the people who come to watch the racing that actually pay the bills, and sponsors start losing interest.

With the sale of Kyalami to a consortium in mid 2004 and renewed interest in the strengthening of the national racing calendar (with more local racing events being given the nod by the governing body and an increase in exposure), the prospect for the future of Kyalami is certainly looking up. It will also take some help from the government though as the ability to hold a Formula One race takes a huge amount of capital. There is some hope with the general feel of many people in the motoring industry that the future of Kyalami as a valued asset to the motoring world is undeniable. Mario Lupini, writer and technical editor for *Cars in Action* magazine, writes in his article "Where to now?" that a "Metropolis such as Gauteng cannot survive without a track like Kyalami" (May 2005:113).

figure 1.17\_ aerial photograph of Kyalami

figure 1.16\_ Altech two-seater in action at Kyalami



**approach**

To develop a complex that will enhance and be symbolic of what motor racing ultimately represents, is the desired effect. Specific based outcomes will be set and will be used as the design requirements. The results must show an exploration into the culture that is motor sport and the combination of aesthetic and function.

This ideal will be more formalised in the section that follows, but originates from two basic points of departure which summarise the approach to the study:

- Setting of goals that can be worked towards
- Creation of a set of guidelines that will assist in achieving a desired result.



figure 1.18\_ motorsport South Africa logo

**THE PROJECT DEFINED****challenge**

The provision of a core institution that can ensure the future profitability of South African Motorsport through the continuing support of the government and the public, addressing promotion and development as its main cause with a resurgence of Kyalami Grand Prix Circuit to its former glory.

**client profile**

The variety of aspects dealt with in the problem lead to circumstances that must provide for the necessary involvement by all concerned parties. These institutions all contribute most assuredly to the prospect of motor sport in South Africa becoming a major player in the high-performance sporting field among such opponents as rugby and soccer.

msa

Motorsport South Africa (MSA) is the controlling body of all motor racing aspects (from karting to Moto X) in South Africa. They are an autonomous organisation (Beulah Schoeman – foreword in Winning. 2003/2004:3) that has international accreditation by Federation Internationale de l'Automobile (FIA) and Federation Internationale de Motocyclisme (FIM). Both the FIA and the FIM recognize only one National Federation in each country and as such, have transferred their sporting powers to MSA on condition that all motor sporting events are organised and held in accordance with the International sporting codes of both governing bodies (www.msa.co.za).

srsa

Sports and Recreation South Africa (SRSA) is the government department that deals with all sporting aspects and is headed up by the Minister of Sport. With their vision of ensuring the adequate delivery of sport and recreation to the nation of South Africa (www.srsa.gov.za), it seems only fitting that they get involved in a project of this nature. It also provides government backing in a process that would otherwise be futile and also reaffirms the role that government plays in developing the future of South African high-performance sport.

*“But perhaps the most important of all is the rate of sport in fostering national unity.”*  
(White paper on Sport and Recreation.2003:3)

The SRSA believes that, although the approach to sport and recreation must be based on local values and beliefs, the national policy on sport and recreation must respond to the influences on a global scale (White paper on Sport and Recreation.2003:2).



figure 1.19\_ Sport and Recreation South Africa







figure 1.20\_Pole Position Promotions

*"Pole Position Promotions is the leading motorsport management and sponsorship procurement company in South Africa"*

(www.poleposition.co.za)

Pole Position Promotions is a promotions based company that organise and manage all of South Africa's motorsport events under the auspices of MSA (Judy Maharaj. Personal Interview). They deal with the acquisition and management of all sponsorships and are instrumental in maximising the full potential of all opportunities based around motorsport events.

Headed up by a local racing legend, Dave McGregor, the company describe themselves as passionate, with staff experience in the promotions industry of thirty years, and run an event from the initial stages of planning right through to the last chequered flag. They have organised a variety of large scale projects including the South African Formula One Grand Prix and are instrumental in the organisation and management of the Vodacom Power Tour (www.poleposition.co.za).

Part of their core business is the promotion and development of motorsport in South Africa. This department is run by Gugulethu Zulu (www.motorsport.co.za), who is also a graduate of the Isondo Racing Academy, and is a key role player in the Isondo 2000 Development Academy (Winning. 2003/2004: 196) The biggest hurdle in development of the youth is obtaining the financial backing to further the education and enhance their skills. Sponsors play a crucial role in this aspect as they can decide the future of the participants in the development programmes (Gugulethu Zulu. Personal Interview. 25 April 2005).

As a result of the initiation of Gugu, and his experience in the motorsport development programme, the future of motorsport development is taking a turn for the best. Pole Position Promotions has just recently received a grant from the Lotto Board to further the development process and if 2005 is successful, further funding will be available (Gugulethu Zulu. Personal Interview. 25 April 2005).



figure 1.21\_Kyalami motortainment and Kyalami Grand Prix Circuit

#### kyalami grand prix circuit

With the sale of AA Kyalami in 2004 to a consortium comprising of MJF associates, Imperial Bank and Imperial Motor Holdings (Kyalami sale revs up Motorsport. 13 July 2004. www.imperialbank.co.za), the emphasis on preserving Kyalami as the "spiritual home of SA Motorsport" has been recognized (www.formulalibre.co.za). Kyalami has been the institution of motor racing in South Africa for over four decades (Kyalami back on Track. Parks and Ground. January 1992:49) and it is with such a deep heritage in the motor racing field that the promotion and survival of the circuit is explored and utilized.

Kyalami Grand Prix Circuit is currently run and managed by MJF associates, whose intention is to retain Kyalami as a "motor sport icon" (Kyalami sale a green flag for Motorsport. www.joburg.org.za. 26 July 2004). The team works under the banner of Kyalami Motortainment (Kyalami Grand Prix Circuit's own in-house promotional team) whose purpose is to not only promote motor racing, but also to promote Kyalami as a multi-functional facility (Judy Maharaj. Personal interview. 18 March 2005).



To preserve the heritage and culture of motor racing in South Africa for the future generations, a few important criteria must be acknowledged. With the clients in mind, and their variety of needs, a proposal of requirements will be presented.

The facility to be designed should have all the necessary deemed to satisfy requirements of office space for administration purposes as well as areas for display and must, most importantly, represent the symbolic nature of motorsport in South Africa. To be included should be an area for presentation to the press and public and an auditorium for lecture purposes.

A method of "self-regulating" should be explored so as to require as little as possible capital outlay and ongoing costs.

### programme

#### visitors' centre

- \_information kiosk
- \_display/exhibition space
- \_café/coffee shop/bar
- \_office space
- \_storage

#### admin block

- \_auditorium
- \_offices
- \_reception
- \_conference facilities/press room

#### museum

- \_sports car display area
- \_workshop
- \_storage
- \_wash bay
- \_office space
- \_caretaker accommodation

#### for all

- \_security
- \_storage
- \_janitor
- \_parking
- \_toilets
- \_hvac

### site selection

The choice of site should heavily weigh on the context of the situation as presented. The site should represent the nature of ideals and culture of motor racing while also displaying the characteristics of the forward movement of the motor racing industry.

It should be noted that due to the proximity of the current clients to the Kyalami Grand Prix circuit, it would be suggested that the sit fall within the boundaries of the Kyalami Grand Prix Circuit.

The use of precedent study is part of the process in determining the baseline or performance criteria for the project as well as for finding solutions to similar problems encountered by other designers. The result will lead to decision-making that has been well researched and explored and produces an educated and well-informed design.

Certain information is required before a precedent study can take place, and these include the criteria for the precedent study, acquiring the correct precedents and analysing the various materials in terms of the criteria to determine their validity.

The criteria in determining these precedents is the ability to show the exploration by different designers of the link between the architecture and its function and also the relationship between the architecture and function, and the user.

#### Architecture:

- o The BMW Zentrum, USA
- o Nissan Showroom, Menlyn, Pretoria
- o Melrose Arch, SA
- o McLaren Headquarters, UK
- o SAB Visitors' Centre, SA

The motor racing precedents are required for establishing the culture of the motor racing society and the need for further enhancement architecturally.

#### Motor Racing:

- o The Goodwood Festival of Speed and the Goodwood Revival, UK
- o The Vodacom Power Tour, SA
- o The Donnington Collection, UK.







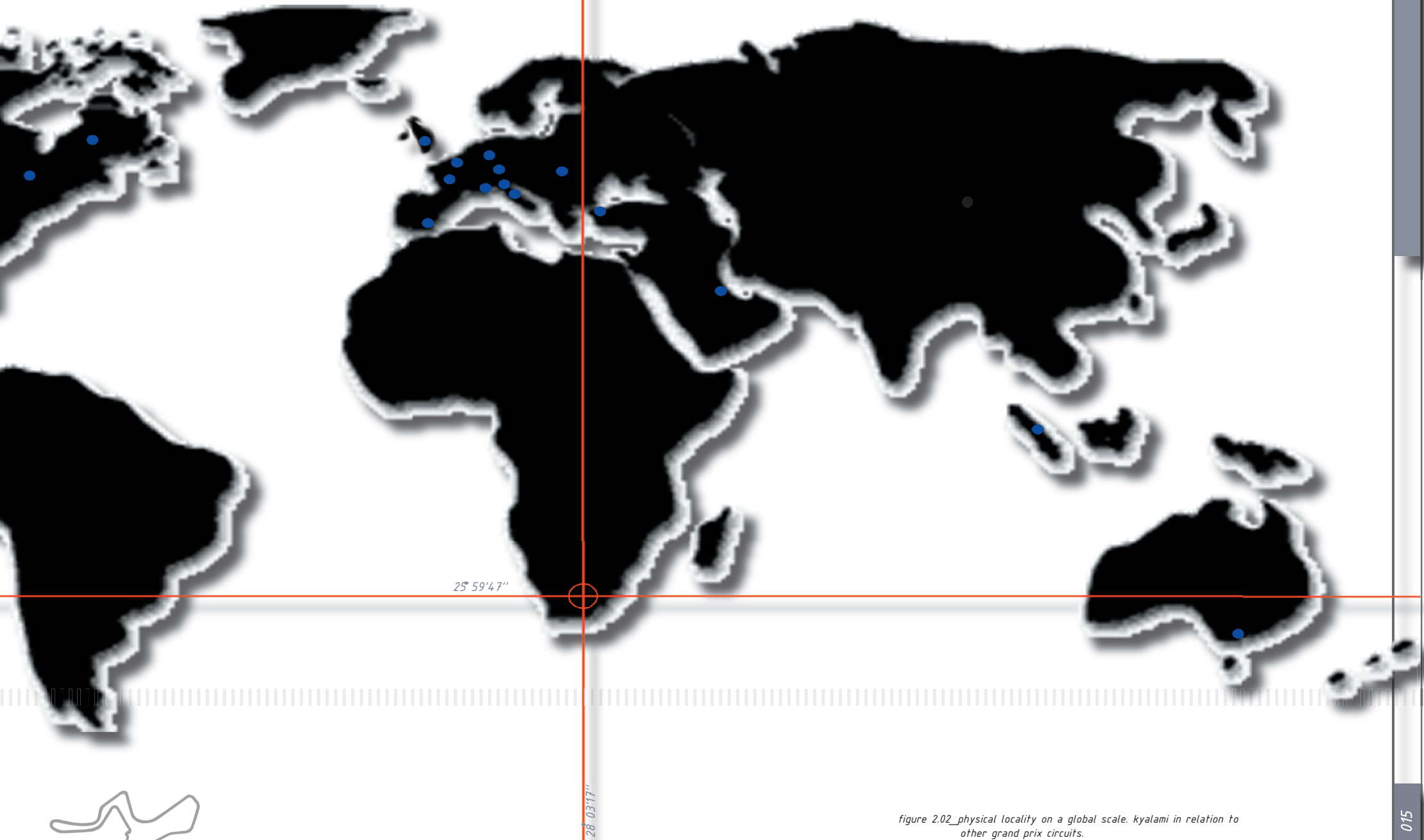


figure 2.02\_physical locality on a global scale. kyalami in relation to other grand prix circuits.

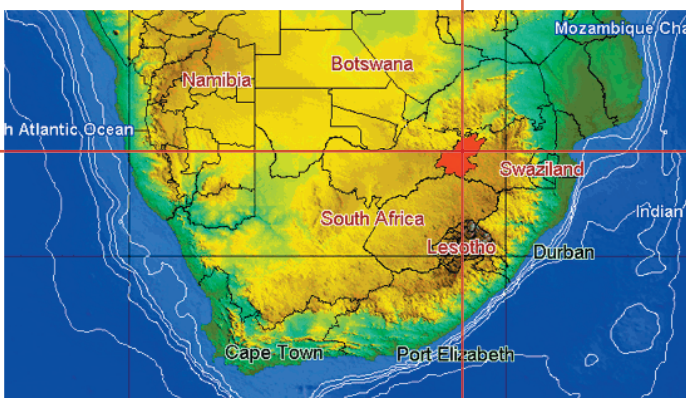


figure 2.03\_physical locality on a national scale

Midrand is situated in South Africa's economic province, Gauteng, and is strategically placed halfway between the nations capital, Pretoria, to the north and its industrial powerhouse, Johannesburg, to the south. Midrand started off during the 1880's as a halfway resting point for the arduous journey many people had to make between Johannesburg and Pretoria and was aptly named Halfway House. Since those days Midrand has exploded into a thriving metropolis with an annual growth rate of over 20% and features amongst the Top Five South African Cities in terms of investment.

The climate for Midrand is characterized by the typical Highveld climate, a summer rainfall region: 60% sunlight during the summer, 80% sunlight during the winter. Average rainfall of between 600mm and 950mm per annum with moderate wind patterns out of the south-west. Average summer temperature range from highs of 25°C - 35°C to lows of 10°C - 15°C. Winter highs are mild and manageable of between 15°C - 20°C with the minimum falling to -5°C - 4°C overnight.

figure 2.04\_physical locality on a provincial scale

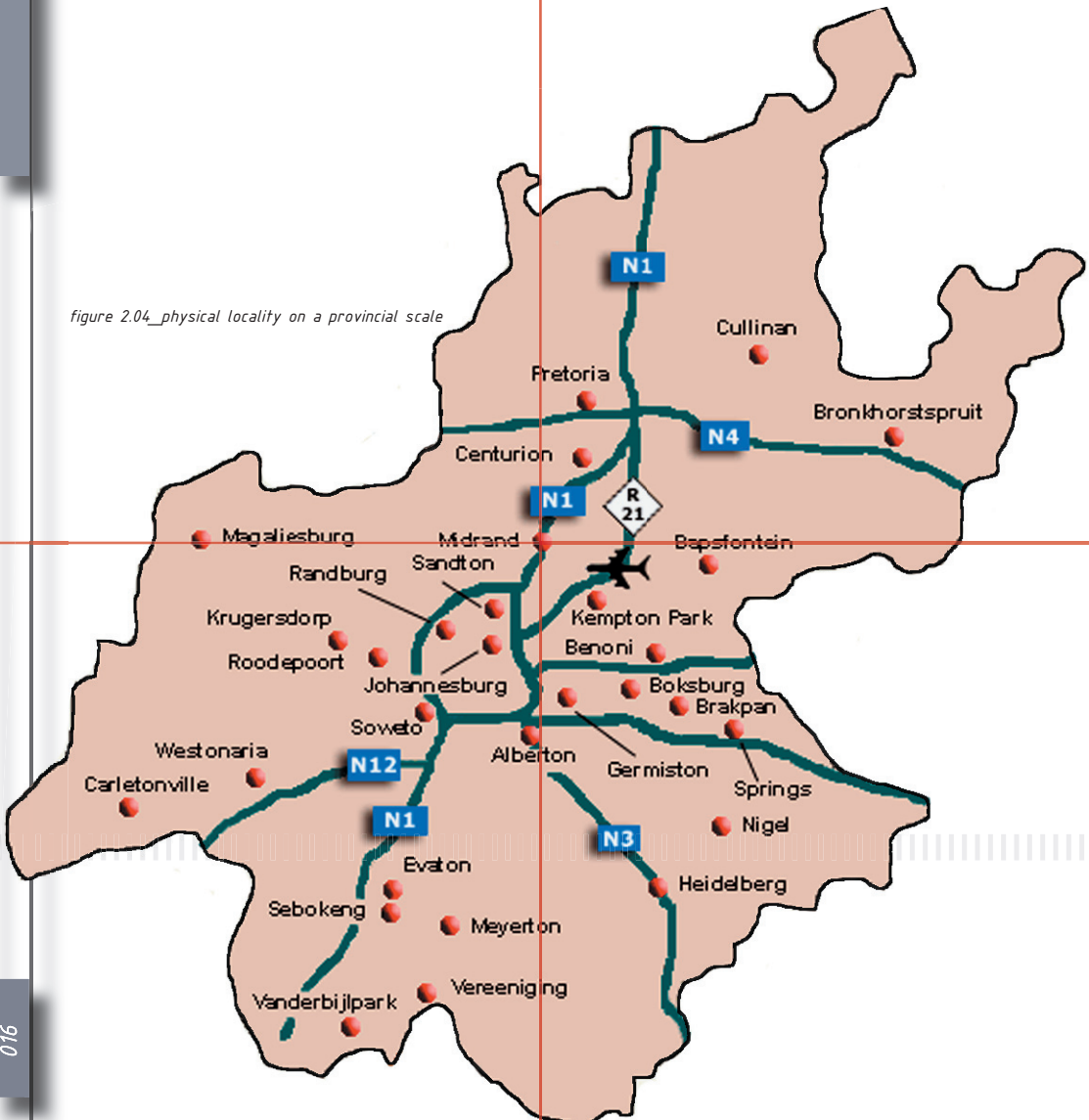
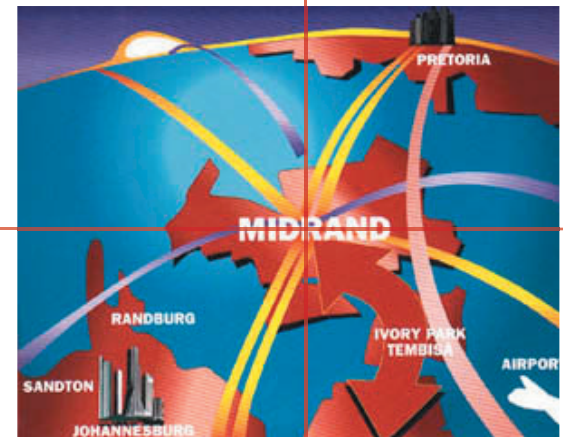


figure 2.05\_midrand in relation to pretoria and johannesburg



Kyalami Grand Prix Circuit lies in the south-western region of Midrand, three kilometres from the Allandale road interchange of the N1 Highway at the intersection of Kyalami main road/R55 and Allandale road. Physical boundaries of the circuit are: Kyalami Business Park on the north, Kyalami Main road/R55 on the east, Leeukop Correctional Services, residential holdings and commercial activities to the south.







figure 2.07 aerial photograph showing kyalami as study area





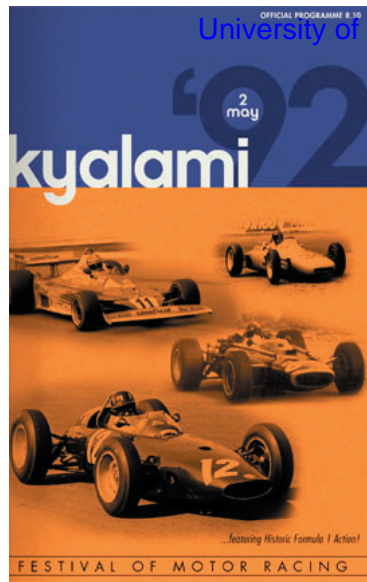


figure 2.08\_cover of programme from 1992 SA Formula One grand  
Pretoria etd – Franco, KR (2005)

## Kyalami Grand Prix Circuit

“In days gone by, Kyalami, South Africa’s Grand Prix Circuit, conjured up images of unlimited speed on the main straight, and cars slithering through the ensuing Crowthorne and Barbeque bends on the very limit of adhesion...”

(Concise Encyclopedia of Formula One.2003:73)

It is with no surprise that the word “Kyalami” is the Zulu word meaning “my home” ([www.formulalibre.co.za](http://www.formulalibre.co.za)) as the Kyalami Grand Prix Circuit has been the home of motor racing in South Africa for over four decades, staging its first event in December 1961 ([www.kyalamiracing.co.za](http://www.kyalamiracing.co.za)) and its first international Formula One grand prix in 1962, taking over from East London (Concise Encyclopedia of Formula One.2003:89).

Over the past 44 years, Kyalami Grand Prix Circuit has changed ownership several times (most recently the acquisition by a consortium of MJF Associates and Imperial Holdings from the Automobile Association of South Africa in 2004 [Kyalami sale revs up Motorsport.13 July 2004. [www.imperialbank.co.za](http://www.imperialbank.co.za)]), sold off a large portion of their land (Kyalami back on Track. Parks and Ground. January 1992:49), which is now Kyalami Business Park, and undergone major reconstructive surgery on a few occasions.

2004 heralded a new era in Kyalami’s existence, with major plans to improve on the presence and profitability of the circuit, through development of the areas trackside into a “multi-faceted motoring estate underpinned by the race track” (Tak Hiemstra. CEO of Imperial Holdings, quoted in *Kyalami’s sale a green flag for Motorsport*. 26 July 2004. [www.joburg.org.za](http://www.joburg.org.za)).

Mike Fogg, MD of MJF Associates, said that the development will be based on a four-fold business plan that includes:

- \_attraction of foreign tourists
- \_extension of motor racing activities
- \_inclusion of the motor industry at the facility by giving them a reason to be there
- \_development of a residential motoring estate

(Kyalami’s new owners see vroom! to grow.13 July 2004.[www.businessreport.com](http://www.businessreport.com))



figure 2.09\_the evolution of kyalami grand prix circuit



figure 2.10\_historic photo of kyalami’s main straight on race day



### Motor Racing

The first official Grand Prix took place in Le Mans in 1906 which saw competitors running 12 laps of a 103km circuit over a space of two days. It was events like these, held under the designation of the Automobile Club de France, that created the emergence of the French pre-eminence in motor racing and the governing body of the sport to create its headquarters in France (Henry.1984:4). In South Africa things got off to an earlier start. Motor Racing was born in Cape Town on the 1<sup>st</sup> October 1900 at the Green Point athletics Stadium when a small field of competitors, only two, took part in a race that was to set the scenes of things to come for a long time after (Open letter by Ken MacLeod in Classic Car Africa. March 2005:50).

East London was the setting for the first-ever Grand Prix to take place outside of Europe and it was thanks to the motoring editor of the East London Daily Dispatch, Brud Bishop, that got the cars rolling. On the 27<sup>th</sup> October 1934 the "Grand Prix of South Africa" took place (Metcalf,J.Winning!2003/2004:122). International stars of the time came out for the race, 18 competitors in total, and crowds totalled 42000, setting a new record for a local sporting event (Metcalf,J.Winning!2003/2004:124). After the success of the first two grand prix in East London, the rest of the country wanted some motoring action, and as a result, circuits were built in Cape Town and Johannesburg. It was on the 31<sup>st</sup> January 1937 that the first Rand Grand Prix took place and the 4<sup>th</sup> South African Grand Prix on the 1<sup>st</sup> January 1938 (Metcalf,J.Winning!2003/2004:125).

The "Golden Years" of South African Motorsport were amazing times. Not anywhere else in the world was there so much pride and glory as there was in South Africa. During the period spanning from the early sixties to the early eighties, South Africa had three simultaneous national championships; a highly respected Driver's Championship based on Formula One; three national bike championships; up to four international Grand Prix races a year; as many as 18 national races around the country and the Springbok Series endurance events, which included the famous Kyalami 9-hour! Rob Emslie (The Golden Years.Winning!2003/2004:128) describes those times with much emotion "...these were vintage times...the birth of Formula Vee and then Formula Ford; world class racers emerging from the ranks in many classes; rallying was robust and rewarding; sponsors were enthusiastic and widely satisfied with their participation"



figure 2.11\_Jody Scheckter in his McLaren F1 car

figure 2.12\_vintage racing



figure 2.13\_Formula One on the track



figure 2.14\_all makes and models used to compete



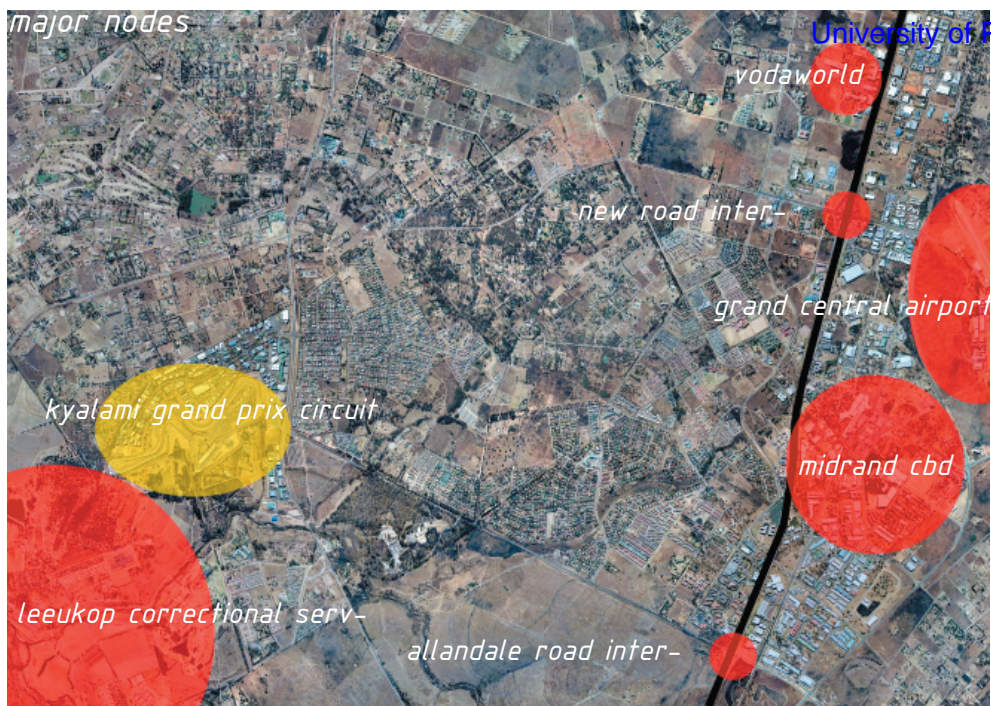


figure 2.15 \_major nodes in midrand

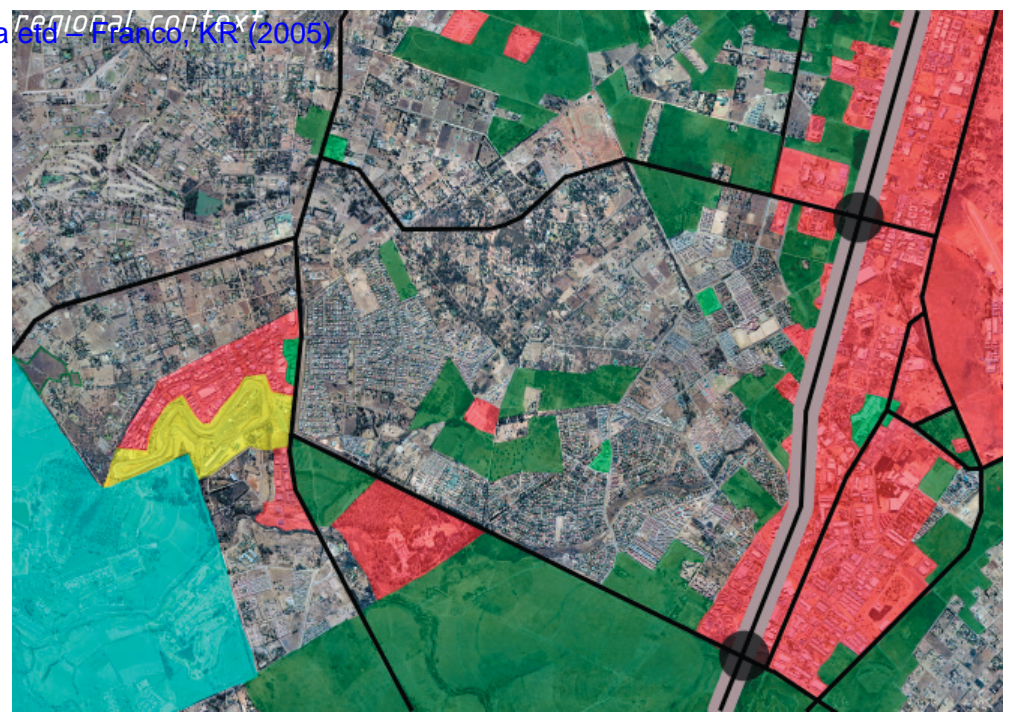


figure 2.17 \_Land use in midrand

figure 2.16 \_Land use around kyalami

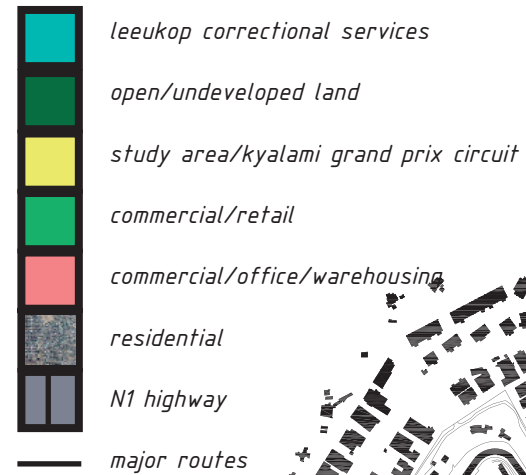
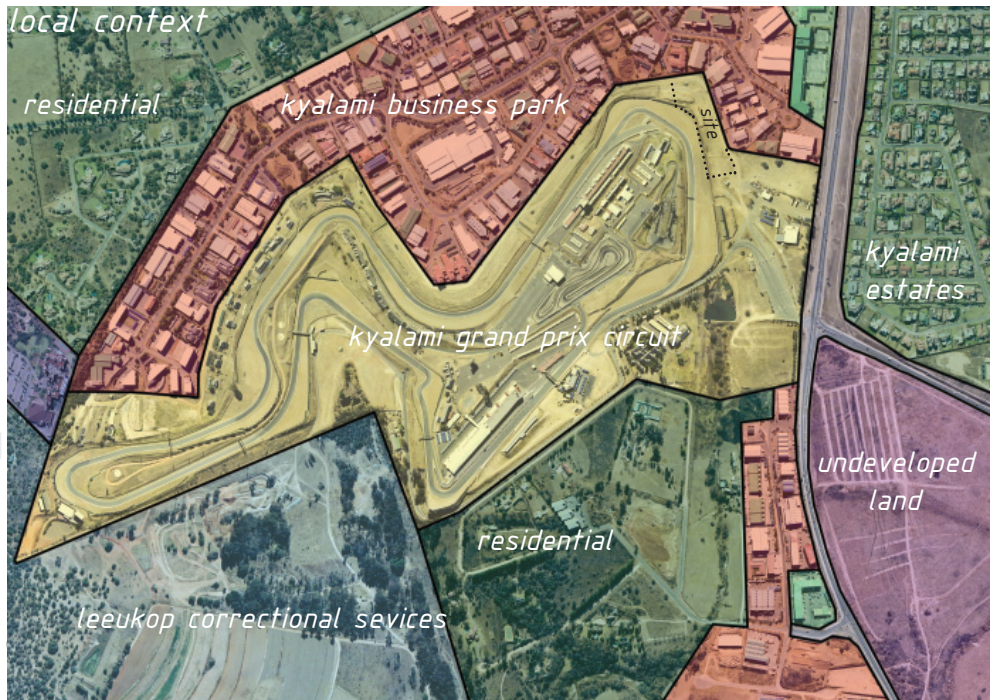


figure 2.18 \_current figure ground of kyalami

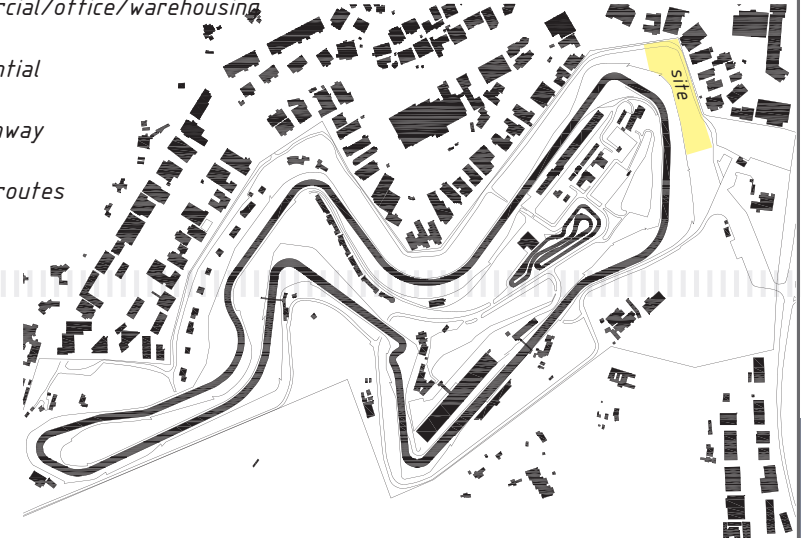
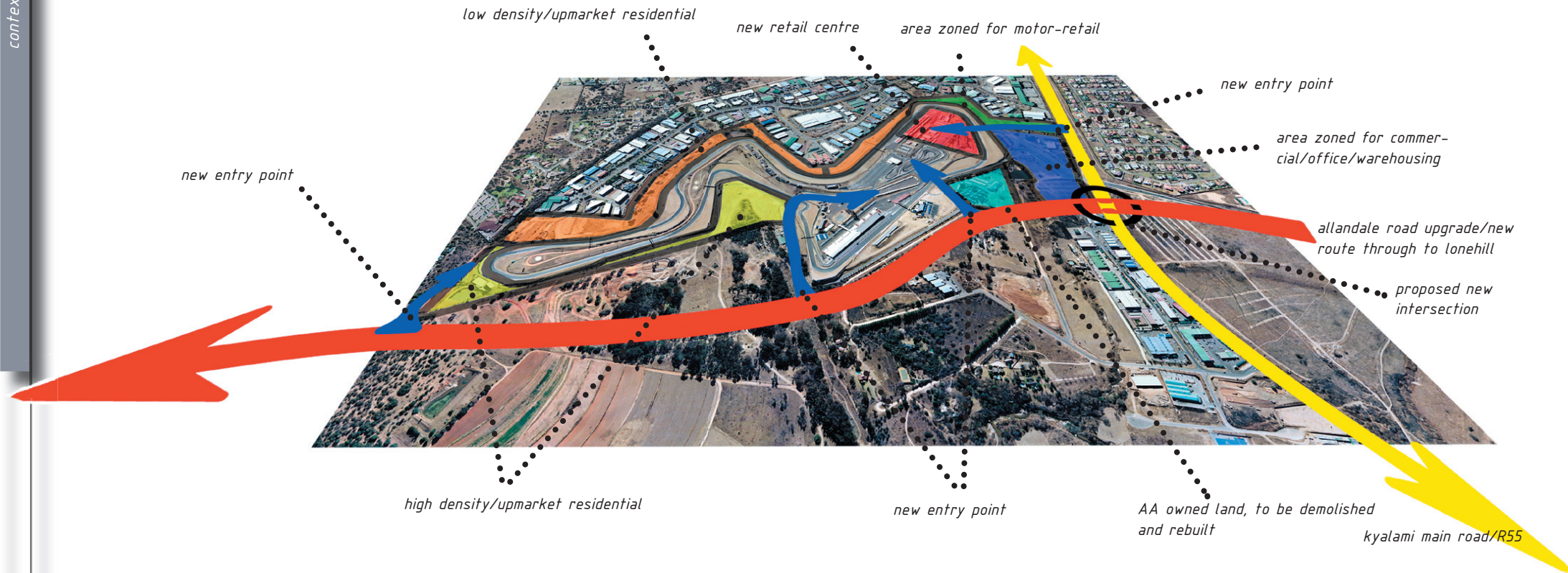


figure 2.19\_proposed framework for kyalami



### The Proposed Framework

In Kyalami Grand Prix Circuit's efforts to establish itself among the worlds' top circuit racing venues, they have worked in conjunction with Bentel Associates ( an architecture and design company) to create a framework would be beneficial in securing the future of the track and motor racing in South Africa. In an interview with Robert Bray, senior architect on the project, he maintains that the proposal for Kyalami Grand Prix Circuit is one that will benefit them economically and establish it, again, as South Africa's premier circuit racing venue by giving it much needed international exposure.

The framework takes into account the extension of Allandale road through to Lonehill, alleviating much of the traffic congestion on the R55. This also provided them with an opportunity to enhance the accessibility of the circuit by creating three new entry points to the track from the south and moving the current main entrance more north, further away from the proposed new pass-over intersection at the junction of the R55 and Allandale road.

Within the property of Kyalami, there are five new proposed areas with differing functions. It is envisaged that the variety of functions created will ensure financial profitability, and hence the future, for the owners of Kyalami. The areas are defined in terms of the graphic presented above:

- \_ the blue area is zoned for commercial/office/warehousing
- \_ the green area is earmarked for a new motor retail "village" with the emphasis on the motor industry these, two areas will be split by the new main entrance to the track which also provides the access to the retail centre, shown here in red
- \_ upmarket/low density residential units will be built in the orange area and upmarket/high density residential apartments will be built on the southern end, pictured here in yellow. The idea is to create a totally unique living experience for people who are passionate about motor racing
- \_ the turquoise area is the land owned by the previous owners of Kyalami, the Automobile Association of South Africa, and existing structures on the site will be demolished and rebuilt.

It must be understood though, that the due to the sensitivity and volatility of the proposed framework (it is unknown to members of the public as to the exact future of the area around Kyalami), for the purposes of this dissertation it will be accepted that the framework is in place and all concerned parties are aware of the proposal.



figure 2.20\_figure ground of current situation at kyalami

University of Pretoria etd – Franco, KR (2005)

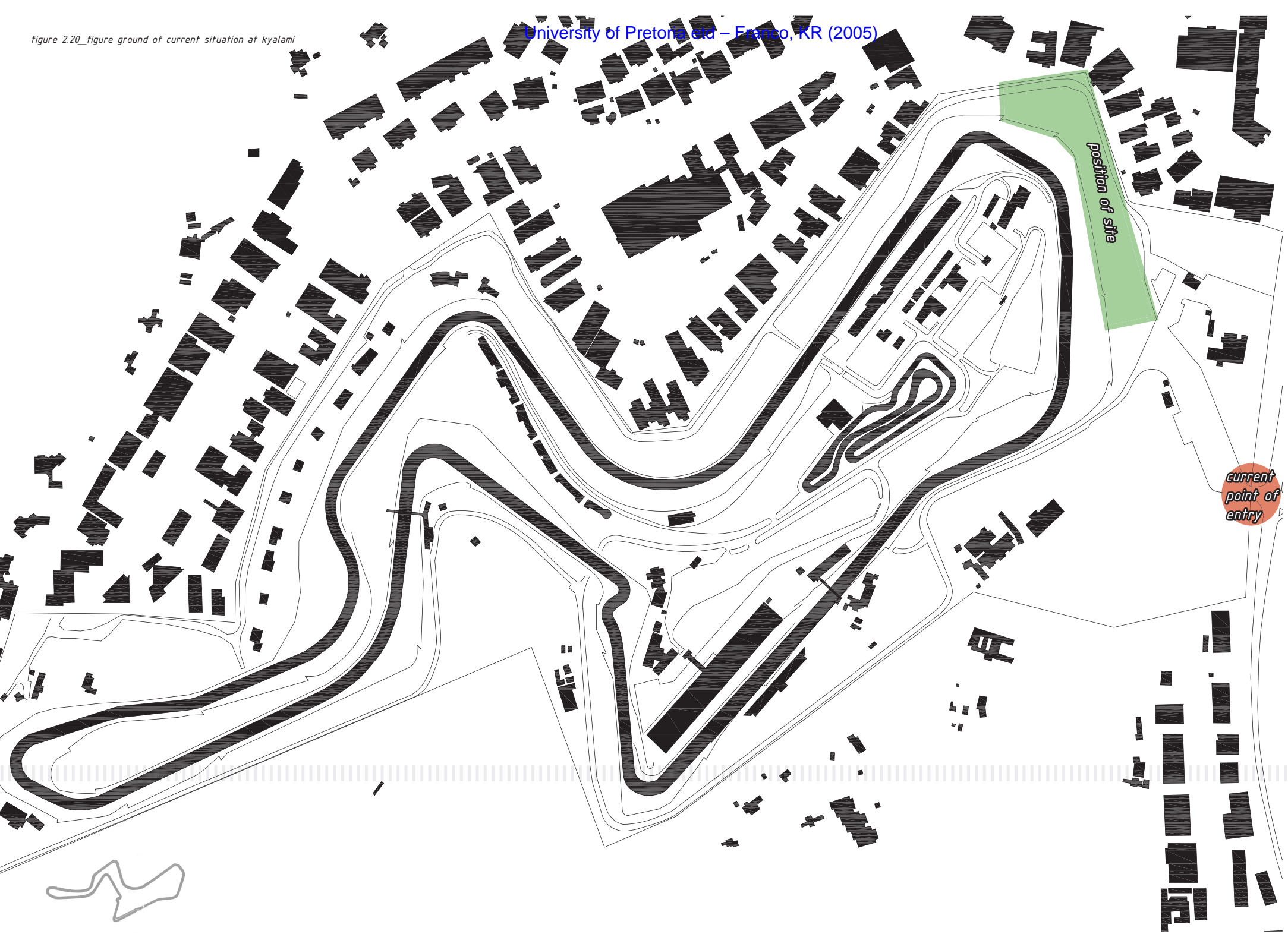


figure 2.21\_portion of proposed framework at main entrance for kyalami

University of Pretoria end – Franco, KR (2005)



figure 2.22\_aerial view of site with contour overlay - interval 1m

The project area is situated on the north-eastern corner of the site at an altitude of between 1474m and 1462m above sea level. In terms of the circuit itself, the chosen site is on an area amongst the highest points on the circuit and is bounded by the track on its western side and Kyalami Business Park on the eastern side. Two defined axis that establish themselves in context of the surroundings are the viewpoints to the Vodacom Straight and the Imperial sweep, both of which provide much action on race day. In terms of the proposed framework, the site falls into the motor retail section and ideally located to establish a link between the culture of motorsport and the culture of architecture.

The fall of the site is a gentle slope from the northern edge to the lowest point on the south. The total area for the site is 17481m<sup>2</sup>.



figure 2.23\_site position in terms of the framework

University of Pretoria etd – Franco, KR (2005)

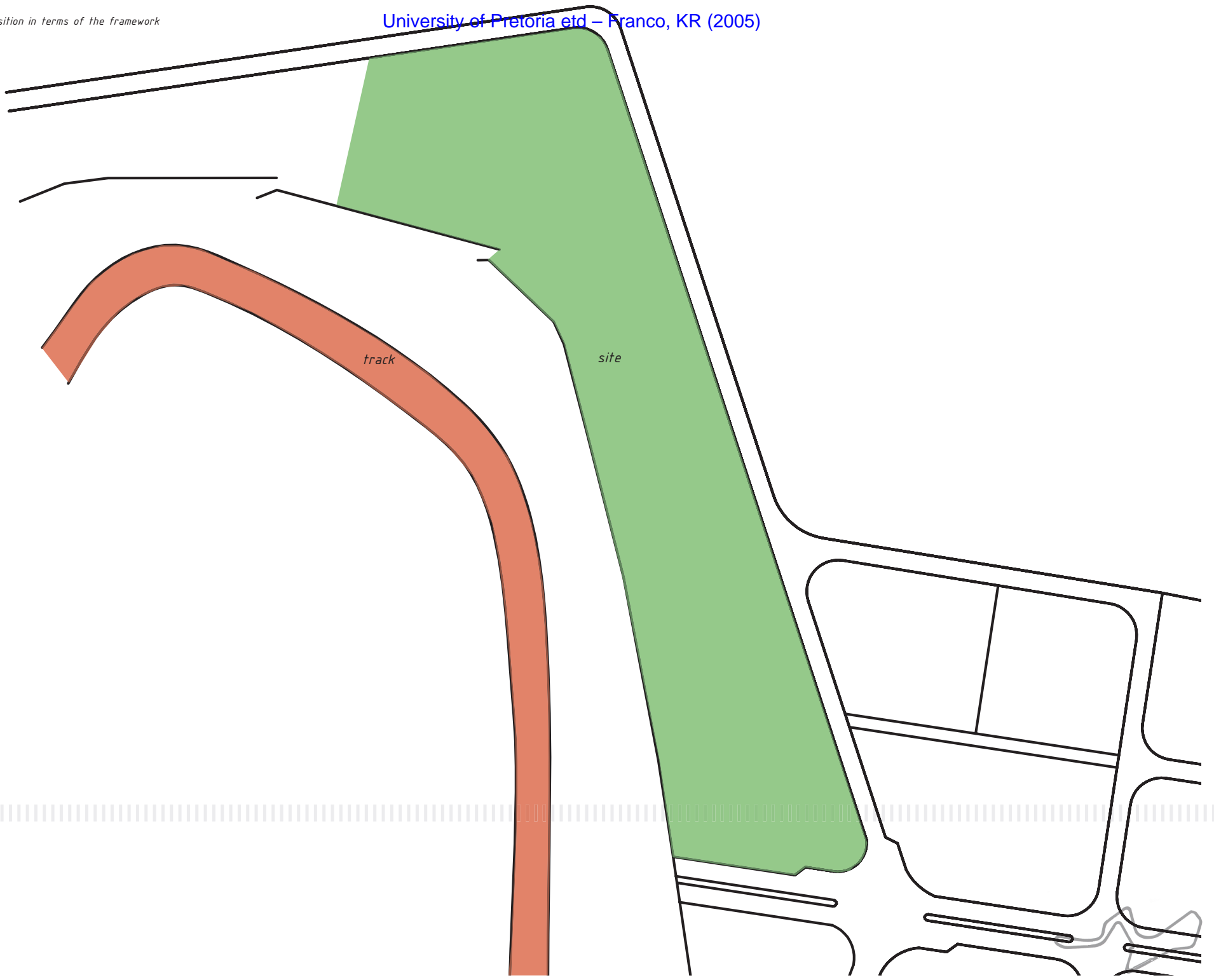






figure 2.24\_sketch of site from south west



figure 2.25\_sketch of site from south



figure 2.26\_sketch of site from northern point

figure 2.27\_sketch of site from west





figure 2.28\_view (1) from the south looking up at the site



figure 2.29\_view (3) from the west to the site



figure 2.31\_view (2) from the south west to the site





figure 2.30\_aerial photo of site with view points



figure 2.32\_view (4) from the northern point looking down the site





### *Preliminary*

This precedent study will aim to serve as a formulation of the culture that is motorsport, and as such, will take the majority form of motorsport events around the world. Architecture precedents will also be presented, and they will also have a link with motorsport in a certain manner, but are merely used to establish the requirements of a facility of the nature as presented in this discourse.

The choice of the various precedents was finalised on the basis that there is no actual precedent for the establishment of a project of this nature and each chosen case study will represent certain characteristics that will be required for successful completion of this dissertation.





### Vodacom Power Tour

Circuit Racing Spectacular, South Africa

2002 - Current

Source: [www.powertour.co.za](http://www.powertour.co.za) & [www.poleposition.co.za](http://www.poleposition.co.za)

South Africa's premier circuit racing road show was initialised in 2002 and has already been labelled as the "Rebirth of South African Circuit Racing" with the marketing objectives set and surpassed in its brief three-year history. The main objective of the Vodacom Power Tour (VPT) is to promote a lifestyle around this extremely thrilling and intensely visual sport with action packed racing on the tar and entertaining promotion trackside.

The Wesbank V8 Championship, the Sahara Production Car Championship, the South African Superbike Championship, the Shelby Can-Am Racing Series, the Engen VW Cup and the South African Formula Ford Championship form the backbone of the VPT with competition that is as tough and as fast as any series around the world.

All the major circuits in South Africa get one showing of the VPT, with South Africa's premier circuit, Kyalami, presenting four rounds spread throughout the year, including the season opener and closer. This provides ample opportunity for the six national championships to compete in a full season and the sponsors remain happy as they get increased exposure.

The VPT is not only a circuit racing spectacular that exposes the public to circuit racing in South Africa, but is also an exhibition of the culture of motorsport in South Africa with large brand name sponsors like Vodacom, MG Rover and Playstation getting involved to ensure a wholesome days' entertainment for both young and old. It is a celebration of motorsport that presents all the personalities and the "real heroes" of racing, the drivers and riders, to the masses.

The growth experienced since inception of the VPT is a testament to the support of circuit racing in South Africa and increases the competitiveness of motorsport in the world of sport in South Africa. It also provides the much-needed stability for the future of circuit racing in South Africa and opens up the opportunities for the youth to experience this highly thrilling sport.



## Goodwood Goodwood Estate, England 1993 - Current

Source: [www.goodwood.co.uk](http://www.goodwood.co.uk)

Goodwood first experienced racing in 1936 when the Duke of Richmond organised a private hillclimb through the grounds of his estate. This was the inspiration of his grandson, the Earl of March, to bring motorsport back to Goodwood with the inaugural Festival of Speed in 1993 and to what is today known as “the garden party of the Gods”.

The Festival of Speed is not only about a hillclimb, but is also the largest celebration of motorsport history in the world. Unlimited access to the paddocks ensures the spectator gets up close and personal with all forms of motor racing from the cars of a bygone era to the current breed motorsport legends and icons. The hustle and bustle of competition are just a mere drop in the tank – you can relax on the lawns of the Goodwood Estate amongst motoring classics, explore the displays on exhibition or come to grips with adrenalin pumping, interactive entertainment.

Coupled with the Festival of Speed, which takes place in the summer, is the autumn attraction at Goodwood – The Goodwood Revival. This is a historic race meeting that takes place at the Goodwood Motor Circuit on the Goodwood Estate with the emphasis being on the glory days of motor racing at the circuit.

“The Goodwood Revival is far more than a series of races for historic cars: it is a magical step back in time and a chance for visitors to revel in the romance and glamour of motor racing as it used to be”.

Part of the atmosphere of the Revival is the fact that no contemporary vehicles are allowed within the perimeter of the circuit and the majority of visitors, with all the competitors and staff, dress in period 1940’s and 1950’s clothing.

The Revival is an event that puts motor racing into a carefully choreographed historical backdrop that together with the Festival of Speed, “an extravaganza of sound and colour,” ensures an unrivalled presence at Goodwood.

figure 3.03\_festival of speed and revival logos



figure 3.04\_vintage car in action during the festival of speed



Source: Mark, M. The Biggest F1 Show on Earth, *CAR Magazine*. March 2005, vol.49, no.2, pg. 120-123.

The Donnington Collection is the realization of a dream by Tom Wheatcroft, an extraordinary motor racing enthusiast whose desire for the sport began when he was a teenager watching the 1937 and 1938 grand prix held at Donnington Park. This culminates in a season that is now spanning eight decades of passion for the sport.

Tom Wheatcroft acquired Donnington Park in the early 1970's and began his collection of grand prix cars on the site adjacent to the circuit in 1973. This was the foundation for what is today known as the Donnington Collection – "...the world's largest collection of grand prix racing cars." More than 130 exhibits make up the collection displaying the history of the sport, from the turn of the previous century to the latest technological masterpieces, all found within five interlinked exhibition halls.

Upon entry to the complex, one feels the emotion that encapsulates you in the phenomenon of motor racing, and this is due to the Juan Manuel Fangio / Ayrton Senna memorial which gives you little indication as to what lay in store for the visitor inside: the largest collection of drivers' helmets in the world (including Jody Sheckter's helmet from his world championship season), the only complete collection of Vanwall racing cars and the largest gathering of McLaren Formula One cars under one roof.

One of the many factors that makes the Donnington Collection so special and so unique is that the majority of exhibits on display are in running order and are often loaned out for shows or for demonstration runs at race day events and with the use of temporary displays, such as the photographic tribute to Ayrton Senna, the Donnington collection is continually attracting new and old visitors to this evolution of motor racing.

"Sensory overload is the feeling most visitors experience after visiting the Donnington Collection, which reveals the development, excitement, achievements and even heartache of the world of grand prix racing"



figure 3.05\_the impressive williams f1 collection

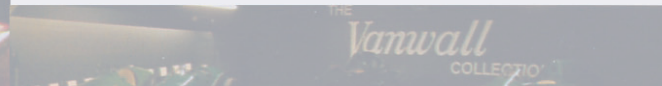


figure 3.06\_the vanwall collection



figure 3.07\_the six wheel tyrrell innovation



figure 3.08\_Fangio/Senna memorial



figure 3.09\_the Jacky Ickx Ferrari 312B



## The National Motor Museum

Beaulieu, England

Source: [www.beaulieu.co.uk/motormuseum](http://www.beaulieu.co.uk/motormuseum)

Situated in the “Heart of the New Forest,” Beaulieu, The National Motor Museum houses the most unique collection of all things to do with motoring and is also home to the renowned Beaulieu International Autojumble and Automart.

The collection at Beaulieu holds a total of 250 vehicles, which range in identity from the earliest examples of motoring to legendary world record breakers like the Bluebird, the Golden Arrow and contemporary Formula One speedsters. Although the museum specialises in cars, it has a large selection of motorbikes, commercial vehicles, motoring eccentricities and motoring memorabilia.

The National Motor Museum is a partner in the Beaulieu Estate and is incorporated into the award-winning educational resource of the entire area. This results in the museum catering for a variety of educational purposes with facilities including a number of interactive exhibits where learners of all ages can enhance their knowledge of all aspects concerned with motoring.

Motorsport also forms a large portion of the museum with dedicated exhibitions to Grand Prix racing (Le Mans and Formula One), a new Motorsport Gallery which celebrates Britain’s achievements in Grand Prix, Le Mans and rallying and a Land Speed record display of a number of new and old record holders.

In an upstairs area of the museum is the Gallery of Motorsport Memorabilia, which features a large collection of motorsport bits and pieces, such as helmets worn by the greatest drivers in motorsport history. The museum also has various themed displays, such as the “James Bond Experience” and “Jack Tucker’s Garage”. No museum can do without a curio shop and the National Motor Museum is no different, they take it one step further though and link the shop directly to an online shop where you can purchase a selection of artefacts and tickets from the museum.



The National  
Motor Museum



figure 3.10\_land speed record display

figure 3.11\_entrance to the circuit



figure 3.12\_the masterplan



figure 3.13\_aerial view of the circuit



figure 3.14\_old track layout



figure 3.15\_modified track layout



The Silverstone Race Circuit, a former World War II hilltop airfield, has been the home of British circuit racing since it was first used as a temporary track, with straw bales marking the course, in 1948. The world Championship for Drivers, now known as Formula One, started in 1950 with its first ever race taking place at the Silverstone circuit.

Silverstone Circuit Vision is the masterplan for the development of the old Silverstone Race Circuit, which has been in the headlines for a couple of years due to its failure rate as Formula One venue, the climax of these failed events occurring in 2000 with a washed out Grand Prix because of an outdated infrastructure. The masterplan for Silverstone was subsequently launched in 2001 as a five-year improvement programme and was deemed necessary by the various governing bodies in motorsport as their interest in the venue was decreasing.

Stuttgart-based architect and engineer Herman Tilke headed up the project with Foster and Partners acting as advisors to the £45 million scheme. The masterplan was designed in phases with improvements to the circuit, its facilities and the surrounding infrastructure being taken into account. The aim of the initial phases of the proposal include the upgrading of existing and creation of new parking areas, the upgrading of infrastructure within the circuit grounds and adjacent to the track, upgrading of existing and creation of spectator areas as well as a variety of circuit revisions.

The long term vision for Silverstone is to create the circuit as a "centre of excellence" through the establishment of educational facilities, an interactive visitors' centre, a karting track and a museum of British motorsport. All in all the aim of the five-year masterplan is to make the home of the British Grand Prix the "best and most sophisticated" Formula One circuit in the world.



# McLaren Technology Centre - University of Pretoria etd - Franco, KR (2005)

Woking, Surrey England

1997 - 2004

Foster and Partners

Source: www.fosterandpartners.com

The McLaren Technology Centre is the result of a complex brief set to Foster and Partners, which required a new headquarters for the TAG McLaren Group and had to combine a wide range of different functions under one roof.

The building's shape is roughly semi-circular with a formal, man-made, lake completing the circle with the relationship of the building to the lake and surrounding environment a key production factor in the design process.

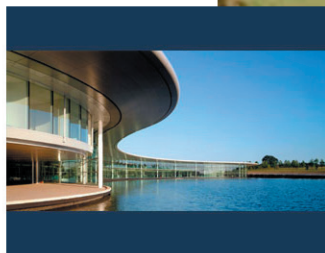
The lake is integral in the design of the structure, as it forms a major part of the building's cooling system. The design team worked with the principles of sustainability to create an environment that required as little as possible mechanical intervention. Apart from the lake and its cooling abilities, natural day lighting was maximised to the interior to "provide all employees with an awareness of the outside."

The site is situated on a 50 hectare greenbelt, which posed sensitivity issues for a structure that had to accommodate 60000m<sup>2</sup> of floor space on a footprint of 20000m<sup>2</sup>. This led to the low, deep plan building that is sunk into the landscape, with the remaining structure being shielded from view by the planting of 100000 new trees.

The technology required in producing high performance sports and Formula One cars is evident in the design of the McLaren Technology Centre with much of the detailing of the building being aided by this technology, such as the tie rods that support the hanging glass façade - they are also used to support the bodywork on the McLaren Mercedes Formula One Racing car.

A new standard of design has been set with the McLaren Technology Centre. It is expected to become a precedent for future workplace design.

figure 3.16\_various views of the centre



**The BMW Zentrum**  
South Carolina, United States  
Source: www.bmwzentrum.com

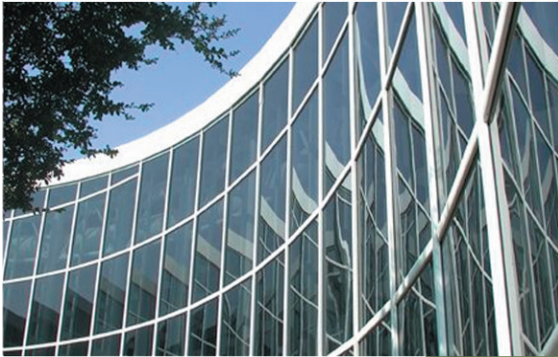
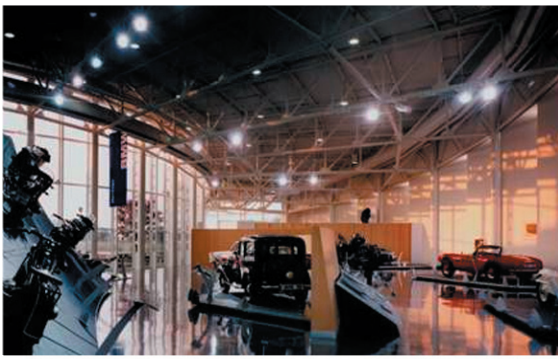


figure 3.17\_views of the zentrum



The BMW Zentrum is an awe-inspiring display of the German car manufacturing giant's extension into the American market. It is the only BMW museum in the United States and is designed to be an essential arm of their only manufacturing plant with a multitude of elements incorporated to have the same look and feel. It is situated 2,5 hours north of Atlanta, in South Carolina on the eastern seaboard.

The Zentrum is "...more than just a space for historical displays of BMW's past," it is placed in such a way so as to be a link between BMW and the community.

The unique crescent design was created to attract travellers' attention on the adjacent highway and to have an open and friendly appearance so that visitors will feel welcome. The architecture is clean and sleek with a monolithic roof supported by a series of angular tubular steel trusses which display the buildings strength. Components include the use of "gill-like" windows on the outer perimeter walls to diffuse the light and create a sense of openness and freshness, large bays of windows on the interior curve to allow the passer-by a brief introduction as to what can be found inside without presenting the full storey and a radiating truss system that eliminates the need for internal support, opening up almost 2000m<sup>2</sup> of floor space for exhibition.

Other features of the Zentrum partake in enhancing the visitor's experience to the centre; they include conference facilities, a 250 seater auditorium and a café with views of the central garden. Part of BMW's support structure is their concern for the environment and it was essential in the design of the facility to incorporate it into the natural surroundings with strong landscaping on the outside and bridging the gap to the interior.

The BMW Zentrum is an exhibition of the company's technology in the design and production of their vehicles through the use of technological and environmental design in the architecture.





### *Preliminary*

In the process of formulating a successful design proposal, a journey through established norms or standards is required. Together with this set of standards are other factors that will influence and inform the design, all of which are crucial, in one way or another, to the process.

The design discourse is this exploration. Like the design of a high performance sports car, all aspects of the vehicle make it work: the aerodynamics, the engine and the breaking system, its how you change and improve on them that makes the car better.



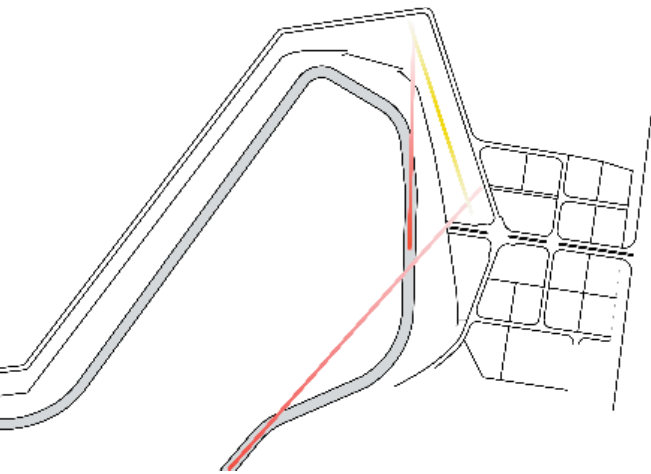


figure 4.02\_creation of an axis

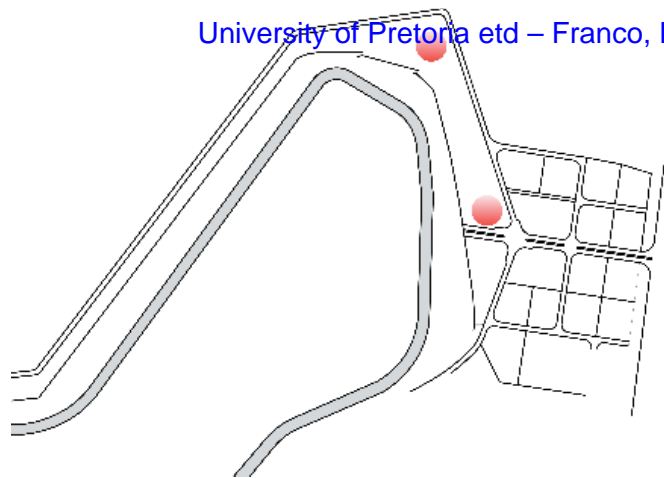


figure 4.03\_nodes presented from the axis

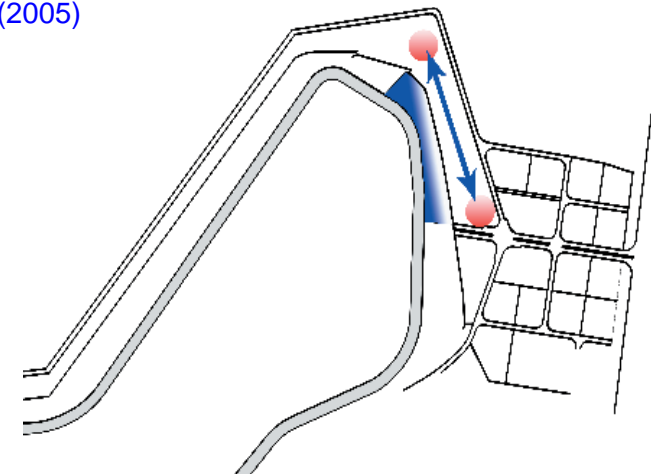


figure 4.04\_establishing the link

### Constructing A Concept

The idea of creating a facility, a series of buildings grouped or clustered together with an overall similarity of purpose, that will serve the multitudes of our growing nation in educating and developing the minds of the future possibilities, past and present included, in motor sport is captivating. The idea of the facility should represent the technological marvel that motor sport is and, just like watching the races, should stir the emotions of all concerned.

What will follow are the factors that are used to create the concept, from the standard set of design “rules” that are well published, to other factors taken into account through interviews and personal opinions of people whose passion is motor cars and motor sport.

### Points of Departure

As already mentioned previously in this document, the sale of Kyalami Grand Prix Circuit came out of a need for re-establishing the circuit in the international arena. Together with this is the realization of the improvement of the facilities and infrastructure of the circuit and its surroundings and as such, a framework for development was put into place. This works ideally with the notion of motor sport development and promotion as part of this framework and will also draw other users to the area that might otherwise go elsewhere.

From the framework and position of the site, within the framework, certain key factors become apparent. Most notable of these are axis, linkage, hierarchy, nodes and views.

Two main axis are created from the circuit itself and a third axis is established between the two points created on these axis lines within the precinct of the site (fig. 4.02). They are as follows:

The axis created from the Vodacom straight to the lower portion of the site, the axis of the short straight, from Imperial sweep to Nashua corner, to the upper section of the site and then the axis linking these two points.

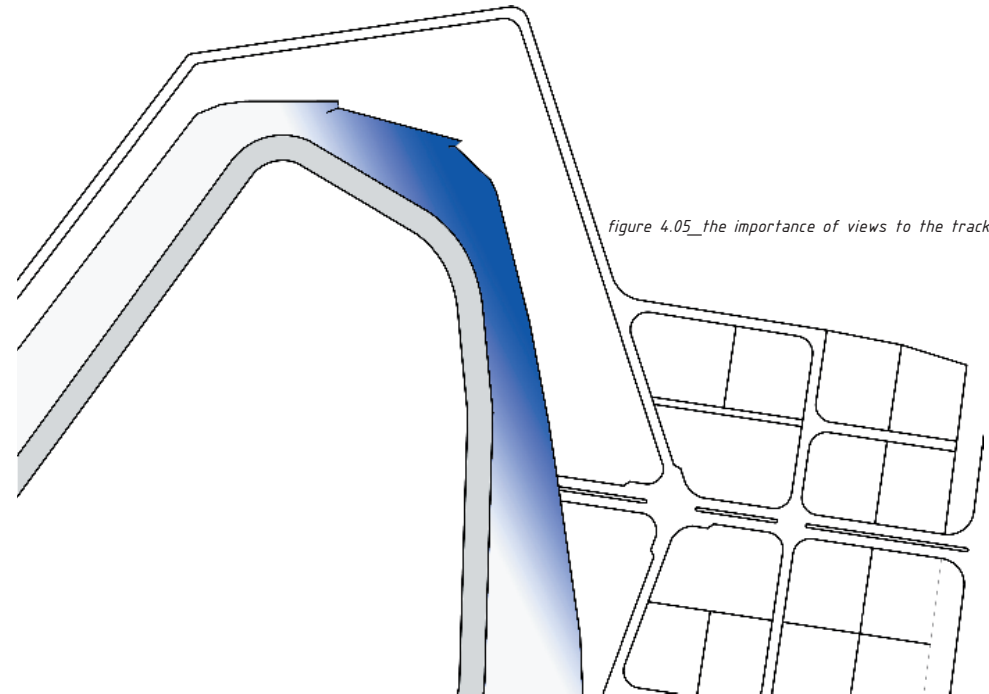


figure 4.05\_the importance of views to the track

The latter axis that runs the length of the site is used as a linkage (fig. 4.04) between the lower portion of the site to the upper portion of the site. This leads to the creation of two major nodal points (fig. 4.03) on either end of the site which must respond adequately in terms of hierarchy and function as well.

The proximity of the site to the track itself lends the opportunity to expose the user to as much track view as possible (fig. 4.05) and the design should maximize the potential of this possibility, keeping in mind that the main façade of the facility is west facing.

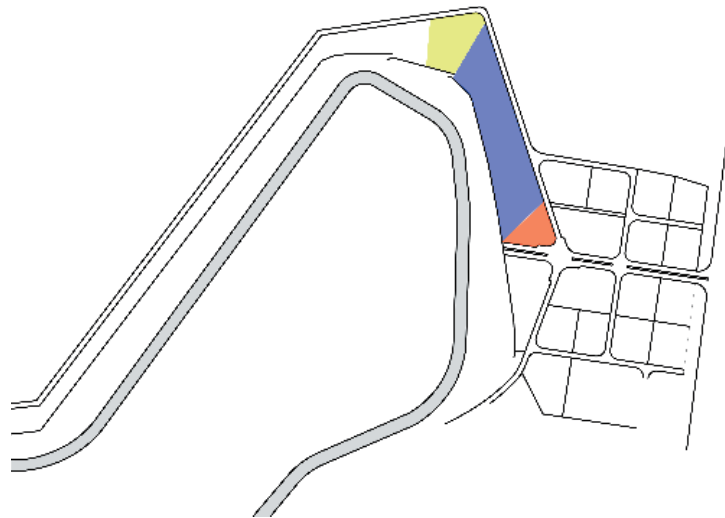


figure 4.06\_establishing the three precincts

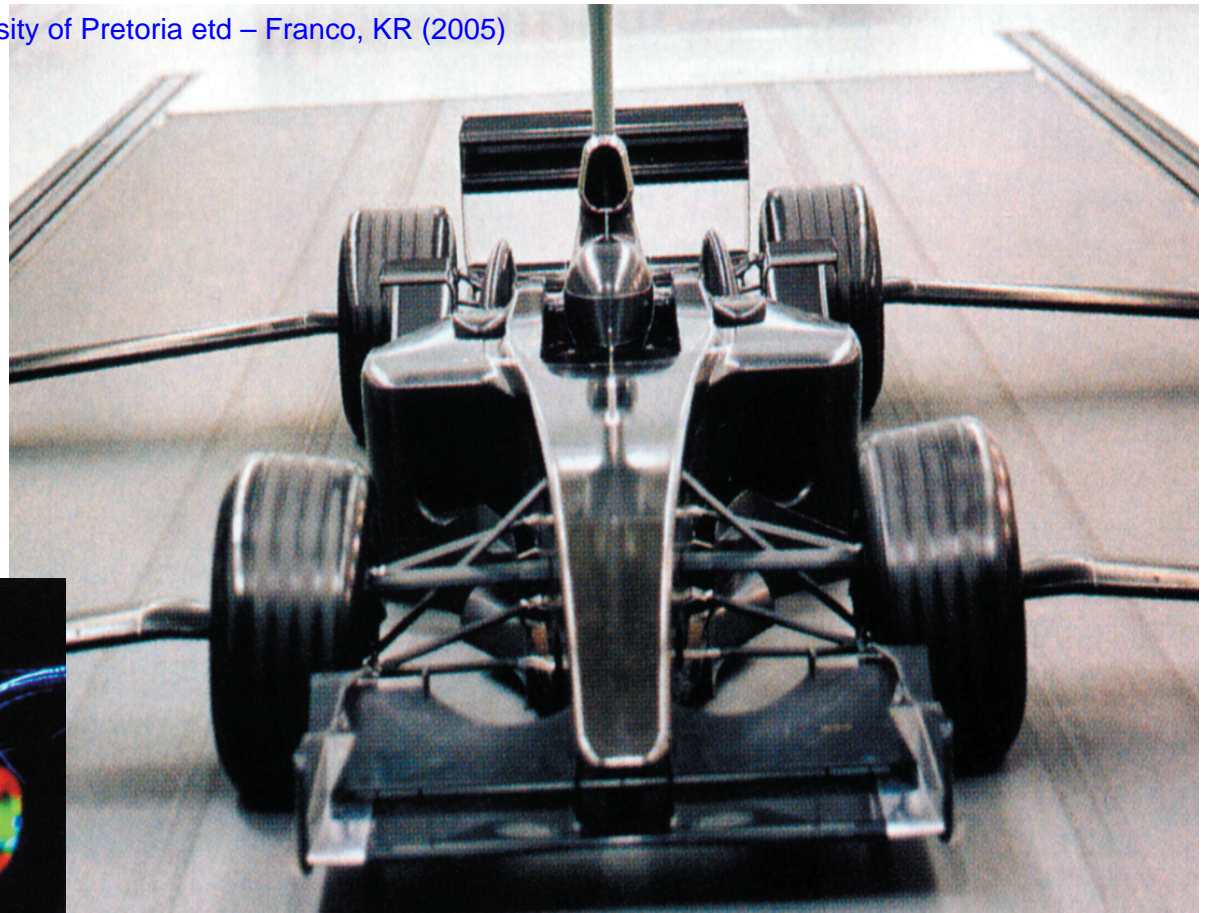


figure 4.08\_wind tunnel technology\_scale 1:2 model

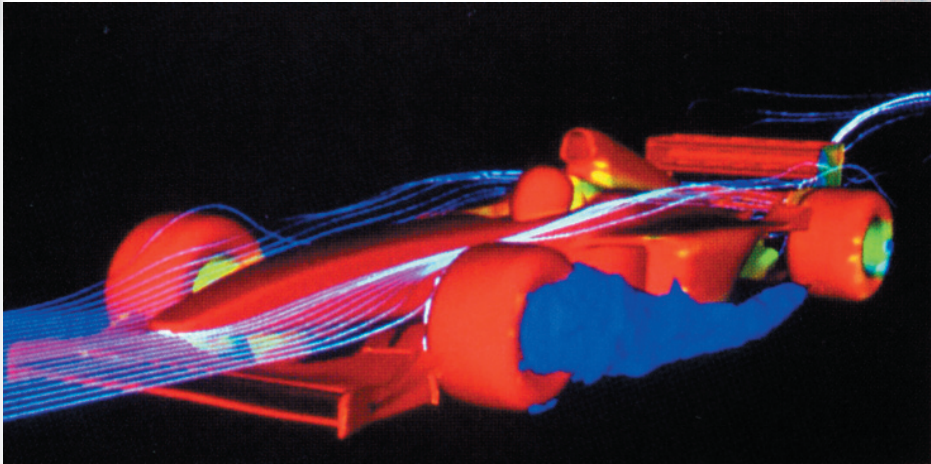


figure 4.07\_wind tunnel technology

Extension of the idea

From the features mentioned above, it can be concluded that the site can be divided into three main areas or precincts (fig. 4.06). Precinct one forms the lower section of site, precinct two the middle section and precinct three the upper section. These precincts will be connected mainly by a path of movement along the created axis between precinct one and precinct three. Movement forms a crucial aspect of the design and can be useful in stirring emotion. Groak (1922:83) refers to this as Kinaesthetics. Character within the complex must be established and should by no means be static. This can be achieved by responding directly to the tract, respecting the slope and creating spaces, specifically within precinct two. A change in levels also helps to add diversity.

Motor cars in general and sports cars more specifically, are technological marvels that are continually being redefined in terms of technology and aesthetic. The nature of this dissertation is so closely related to this technology and aesthetic that the presentation of this facility should represent this. The architecture should be sleek, but not overwhelming and should express the continually driven passion of motor sport and the motor sport enthusiastic.

An enthusiasts opinion

Getting a non-architect and car enthusiast's opinion on the creation of a visitor's centre and museum for South African Motor Sport has been an incredibly valuable source of inspiration for a design of this nature. It allows the passion and emotion created by cars to flow and present the designer with a completely different point of view towards the user's perspective.

Graeme Hurst is an enthusiast of all things to do with cars - classic and vintage cars specifically. He was born in South Africa and completed his degree in Urban Design, but his passion has always been motor cars. With his English heritage, he moved to England and began exploring his passion in greater depths, discarding his university education. He now works as a Journalist for Classic Car in England.

In an interview with Graeme, certain points were raised about the establishment of a facility of this nature and from his perspective. There are a number of key factors that should be created to make this a successful facility from the user's point of view. They are:

- \_ The facility should appeal as a venue people should want to come and visit.
- \_ The museum should be accessible and multi-functional
- \_ Signage needs to be included, where necessary, to let people know what's happening
- \_ Use of small spaces to create atmosphere and to catch attention
- \_ To try and get the public involved and to attract the attention of the people on the street.

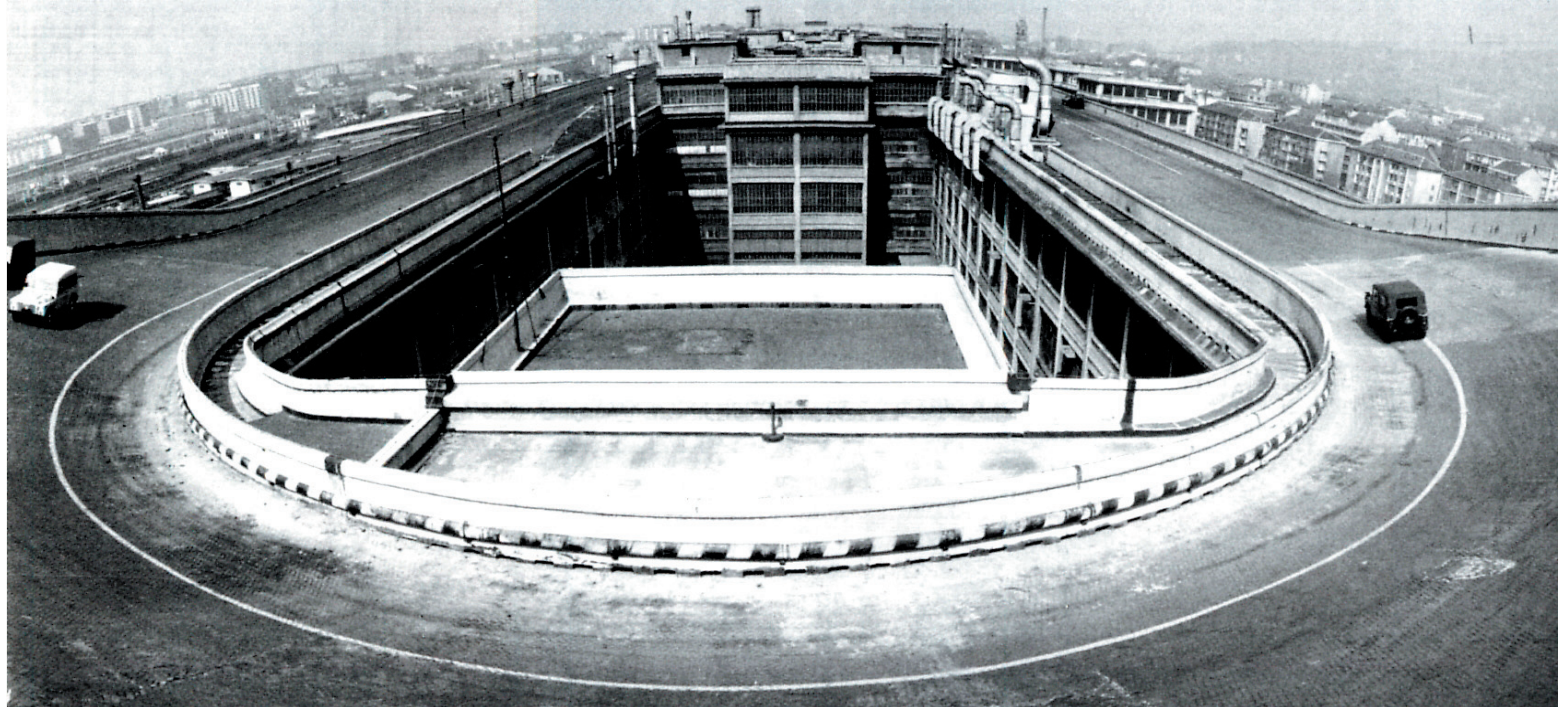




figure 4.09\_traffic congestion



figure 4.10\_Fiat Lingotto Plant in Turin



Design Rationale

Symbolism and the car

The motor vehicle is without doubt a crucial bane of existence in today's society. *Crucial* because in a country like South Africa, where there is an inadequate public transport system and the mindset of the population is one of disregard for the environmental effects of the car, getting to and from must be accomplished by the use of a car, most often by a single person. *Bane* because, despite the necessity of the car, the sky rocketing petrol prices, an inadequate road network and the lack of patience amongst most drivers on the road today, the car is a liability. It only sucks up money and creates dangers for the user, the pedestrian and the environment. It cannot be debated that the motor vehicle is unsustainable, even with the growing trend amongst car manufacturers in exploring alternative methods of energy consumption for use in the engine of a car.

Designing for the car and allowing it to influence design has been in existence since the introduction of the motor vehicle over a century ago, but it only truly came into effect with the mass production of cars during the second quarter of the twentieth century.

Jonathan Glancey writes in his article "Architecture and the Car" (Architectural Review, June 2005) that the evolution of architecture ran parallel to the evolution of the car and greatly influenced each other. It started with architects like Le Corbusier who had a fascination with the technologies and forms of the aircraft and the automobile. While Le Corbusier was exploring his passion through patrons like Gabriel Voison, one architect was revolutionising architecture and the automobile industry, Albert Kahn, and he did this by forming a relationship with Henry Ford.

While Le Corbusier and his European contemporaries were talking about an architecture of mass production with an influence from the aircraft, the automobile and industrial design, Kahn was building it (Architectural Review.2005:6). This evolution led to the outstanding 805m x 400m factory for the production of B-24 bombers in Willow Run, Michigan.

It should be mentioned though that one of the finest examples of the relationship between architecture and the car is the Fiat Lingotto plant in Turin, designed by engineer Giacomo Matte-Trucco and recently remodelled by Renzo Piano into a civic, commercial and arts centre.

The evolution of car design and architecture can best be summarised through an extract from Glancey's article:

"...there was an undoubtedly close connection between early Modern Movement architecture and the car. If the London Georgian terrace of the eighteenth century for example, has been designed, unwittingly, as a kind of mirror image of the well-groomed contemporary pedestrian, and the elongated white stucco Regency terraces of John Nash around Regent's Park designed to reflect the stately, if faster, movement of horse-drawn traffic, determinedly horizontal white Modern Movement architecture surely reflected the speed of the passing car"

Jonathan Glancey (Architectural Review.June 2005:7)

With this statement now in mind, could it possibly be said then that the inclusion of high tech architecture with all the marvels of glass and steel represent the evolution of the technology of the sports' car?



figure 4.11\_Aerial view of Kyalami on race day

Symbolism and the track

Kyalami Grand Prix Circuit is known as the home of South African circuit racing and has been in existence since the 1960's. There is a very strong emotional bond to the track and its surrounds and has witnessed many international stars, the fastest cars ever to be produced in the world and some of the best racing ever to take place world wide. With a history so steeped in emotion it is only fitting that this symbolism of adrenalin and energy be upheld and be reflected in the design proposal.

Future Expansion

By definition, Master Planning is a "scheme of arrangement illustrating the ordered development of building(s) over time" (Billings.1993:2). This definition allows for a varied interpretation in terms of each design process and what effects master planning may have on the final design proposal. According to Billings (Mater Planning for Architecture.1993:10) there are a set of constituent parts in a master plan that need to be understood, each with its own hierarchy.

For all intents and purposes, only the two major elements will be presented for the purpose of this discourse as they are the most important. Two elements are used in the initial process of master planning. First is the forms and shapes representing buildings or functions and second is lines or bands that show movement. These two elements work together to create a character and quality with most important being that of "changeability" (Billings.1993:11). Changeability is the relationship between the forms and movement patterns and how they allow the other to be changed or altered. The crux of the ability for a plan to change in an ordered manner must be evident, with the result that the future expansion (or alteration) is logical.

The movement pattern (fig. 4.12), through examples in history, is usually the dominating feature through the development of a concept to the final design proposal and the recurrence of the same basic generic shape, allows for the extension of the master planning ideal (Billings.1993:40).

The concept of master planning does not only include the rationale of designing for extension or alteration, but could also allow for a "design for change in use" situation (Billings.1993:125).

Master Planning is a crucial design tool that will allow for building sustainability in the future and, where possible, will be implemented in the design process.

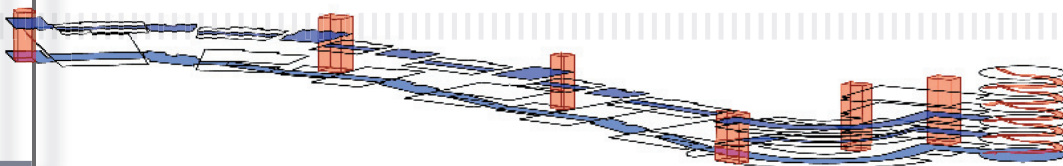


figure 4.12\_Vertical and horizontal movement throughout the facility



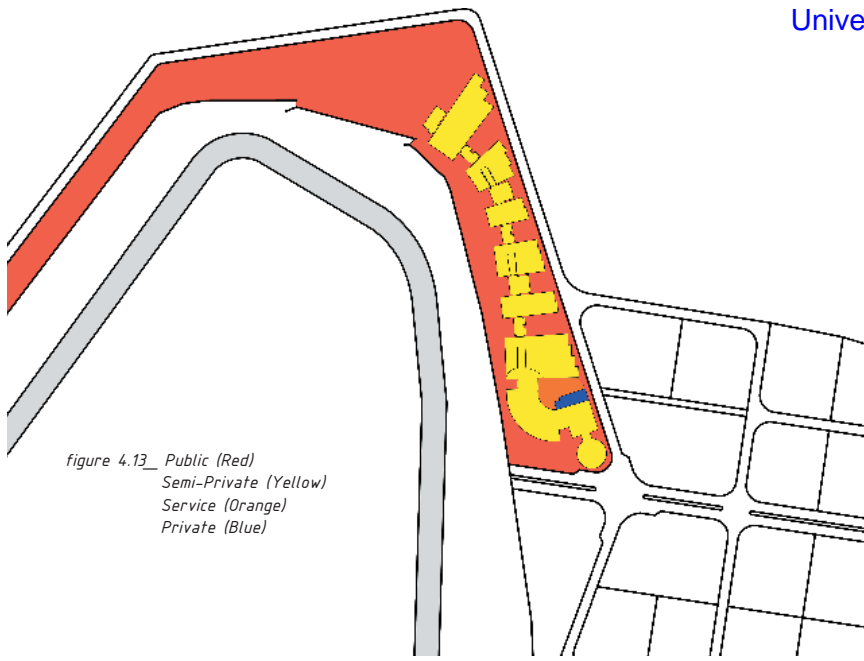


figure 4.13\_ Public (Red)  
Semi-Private (Yellow)  
Service (Orange)  
Private (Blue)

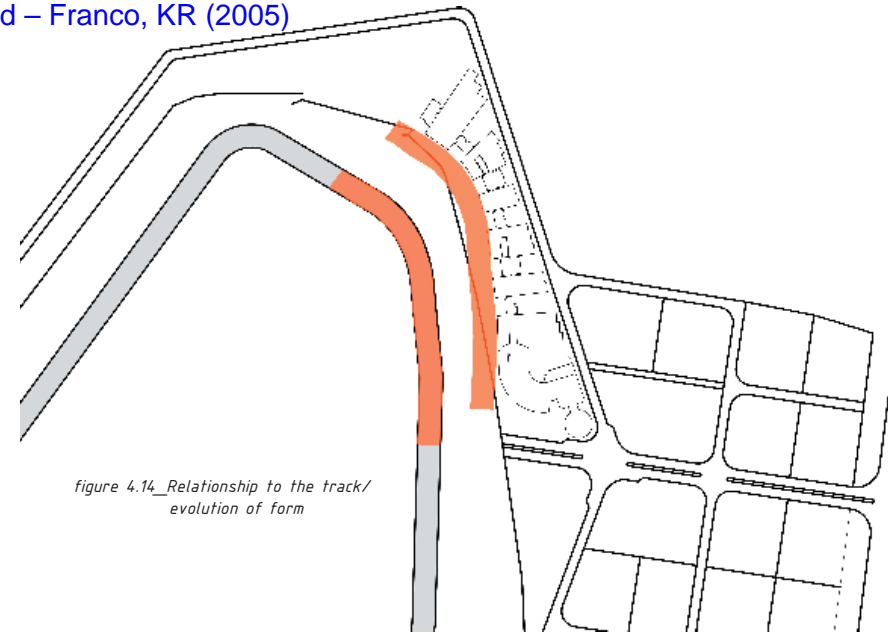


figure 4.14\_Relationship to the track/  
evolution of form

Relationships

“...an essential quality of cities has rested in the coherence of groups of buildings, spaces and infrastructure.”

Steven Groak (The Idea of Building. Thought and Action in the Design and Production of Buildings.1992:39)

The qualities of our cities rely on the relationships between the constituent elements that make up its parts, and as Groak puts it, the elements are groups of buildings, spaces and infrastructure. To a lesser degree, but by no means less in importance, the quality of a building or a group of buildings needs to rely on these same relationships to achieve a higher quality.

The relationships between the building, the spaces inside and outside and the infrastructure (services) (fig. 4.15 & 4.16) should be designed to create an essential quality that will contribute to the users emotional and physical well-being.

Clear definition of served and servant spaces, public and private spaces and production and relaxation spaces (fig. 4.13) must be made so as to create an environment that will be of the highest quality for all involved, with careful attention to the relationship between the elements.

The relationship to the circuit (fig. 4.14) itself is also one of extreme importance. The facility needs to respond to the track in all manners possible and should represent the ideals of the circuit, the racing and the passion that it represents. The relationship that Kyalami Grand Prix Circuit has had with its supporters over the decades has stood the test of time, largely due to the fact that it is South Africa's only international standard circuit, but it is without question that in the hearts and minds of many motorsport fans, Kyalami holds something very dear.

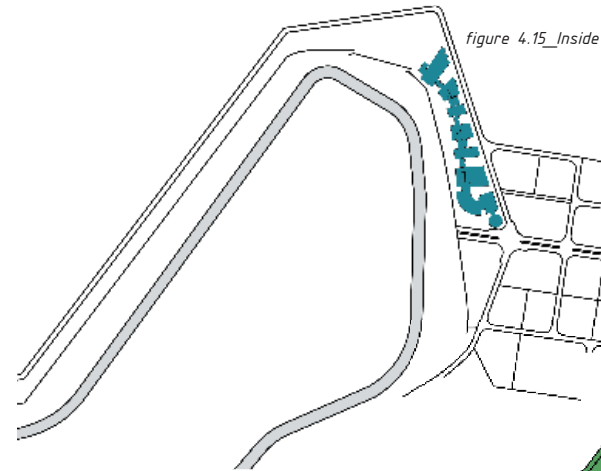


figure 4.15\_Inside spaces



figure 4.16\_Outside spaces



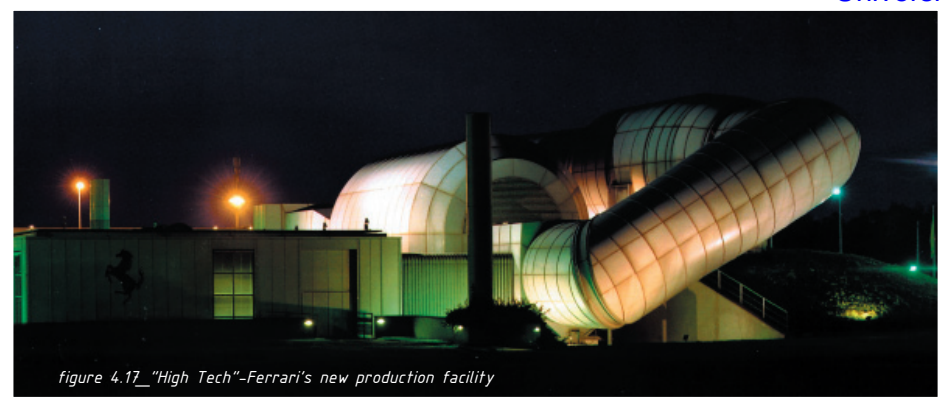


figure 4.17\_ "High Tech"-Ferrari's new production facility



figure 4.18\_Williams F1

Creating and communicating an identity

"The creation of an architecture which incorporates new technologies, entails breaking away from the platonic idea of a static world, expressed by perfect finite objects to which nothing can be added or taken away, a concept which has dominated architecture since its beginning. Instead of Schelling's description of architecture as frozen music, we are looking at an architecture more like some modern music, jazz or poetry where improvisation plays a part, an indeterminate architecture containing both permanence and transformation."

[Richard Rogers (Extract from *Architecture-a Modern View*, 1990:46 in *Eco Tech- Sustainable Architecture and High Technology*) 1997, 7]

The statement that Rogers makes in describing architecture can be broadened to not only include the composition of modern music or contemporary poetry, but also to include the design, construction and running of a race car. It too involves improvisation, permanence and transformation and it is with this idea of speed and technology that the architecture of circuit racing should represent itself, where the only adornments should serve a specific function (like the aerodynamic wings on a Formula One car) and the structure itself is the creation of sculpture.

The high tech style could be used as a starting point for creation of racing architecture (in a sense being the architecture that surrounds the race track and all that is involved in racing, like the design and manufacture facilities). The materials used and the atmosphere created represent all that is racing cars.

According to Davies (High Tech Architecture. 1988:6) the "High Tech architect sees architecture as a branch of industrial technology" and this could symbolise the design and production of racing cars all over the world where technology is a crucial point of putting a race car together. Davies goes on to say that the typical High Tech Building represents and symbolises technology by not only using it in the most cost effective way, but pushing it to its fullest potential and creating an image of the future (Davies. 1988:6).

The balance must now be found between contemporary High Tech and old school shed categorised by steel frames over large spans under which mass production takes place.





### *Preliminary*

The exploration into methods and means of the most important technical aspects of the project will serve as the crux for this section. It must be noted that this project is not of a neutral nature and certain key elements are highlighted while others have just been thought about and presented in totality.

The theme of this dissertation revolves around the experience and culture represented by motorsport, and as such, the technical inquiry follows on this theme.

Think of it this way: a racing car gets finely tuned and set up for a specific race, hours go into the preparation only for someone else taking part in the race to swipe you from the side on the second lap. Into the pits the next time round and thirty seconds later you are back in the race having only lost two positions. Bolt on, bolt off. It is about the connection, being able to change elements quickly and precisely.

Cars are made in sheds, industrial places with hard flooring and a lot of steel. Products that can take the punishment of a manufacturing facility.



The evolution of the private motor vehicle over the past few decades has seen the safety of the occupants become a major role player and, as such, has influenced car sales dramatically: the more safety features, the safer the car and the higher the sales. Likewise for the building industry, except that it is not the safety features that determine the popularity of a building (that should be taken for granted with the various codes enforced on designers nowadays by the regulating authorities), but the sustainability of the building.

Until very recently, motor vehicles have been the furthest thing from being sustainable, but this is slowly changing with the introduction of hybrid vehicles. Although not completely set apart from the traditional car, the blend of the old with new technologies is a dramatic step in the right direction.

This technical inquiry will represent exactly that which was mentioned above, a balance of old ways with new technologies. These are technologies that are a step in the right direction towards sustainability, keeping in mind the industrial theme of the project.

## MATERIALS

Choosing the correct materials for a structure of this nature took inspiration from the traditional industrial warehouse or shed. Steel frames with infill of bricks and mortar, corrugated roof sheeting and cladding and monitor lighting glass forms a large portion of the barrier between inside and outside and comes as a result of trying to obtain as much natural light as possible throughout the entire facility.



figure 5.02\_design perfection, aston martin



figure 5.03\_ steel frame construction



figure 5.04\_ cocobrik horizon satin FBS

University of Pretoria etd – Franco, KR (2005)



figure 5.05\_ high technology glass

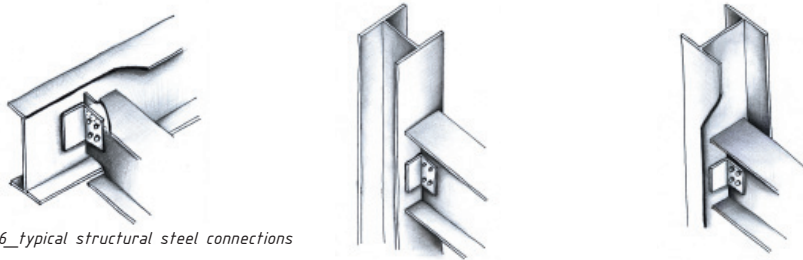


figure 5.06\_ typical structural steel connections

**steel**

For decades steel has been used extensively in the industrial sector, for the simple fact that erection time of the structure is drastically reduced. Most elements are pre-manufactured in the workshop and then transported to site and bonded together, either by bolting, welding or riveting.

Steel is the primary structural material throughout the facility, consisting of a number of 305 x 305 x 158 H - columns that run the required vertical length, fixed at the base by a 20mm plate to a concrete footing in the traditional manner. 305 x 165 x 41 I-beams connect to the H-columns by means of an end plate with bearing bolts on a flush connection and a 10mm thick angle welded to the flange of the H-column for bolting to the flange of the I-column on the recessed connection.

**brick**

Before steel became such a commercial material in the industrial sector, bricks were commonly used in the construction of warehouses and manufacturing facilities. Red brick specifically is reminiscent of these times and can be used effectively in the design as a reminder of the historic car garages and industrial evolution.

The brick infill takes place primarily in the construction of the museum sheds and the servant spaces between the sheds. Typical two-layer (single skin) stretcher bond wall construction (flush mortar joint) with wall-ties every sixth-course, due to the height of the walls on the eastern façade and where the wall connection to the steel H-column takes place, connection will be by pre-welded 2mm steel plate sheeting on H-column, bent down between brick courses, every twelfth course.

**glass**

Although the climate in South Africa is very favourable, the solar radiation can cause extreme heat gain within the building. Glass technologies have revolutionized the building industry with the variety of "energy efficient" glass façade systems available today.

figure 5.07\_ brick wall to H-column connection

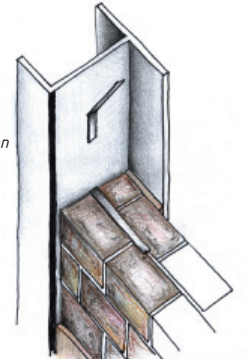


figure 5.08\_ typical glass fixing detail



The use of a high technology glass throughout the facility was based on two important criteria: heat gain, specifically on the eastern and western facades of the admin block and entry rotunda and the parallel between high technology of motor sport today with the high technology of the material.

8mm SmartGlass Armourlam SolarVue Neutral toughened laminated safety glass was chosen due to its excellent solar control capabilities.

End fixing of the glass panels will be by the use of 3mm aluminium angles, inside and out, with neoprene sealing strips and self-tapping stainless steel screws and glass on glass sealing will be provided with a 5mm structural silicone seal.





figure 5.09\_aluminium cladding

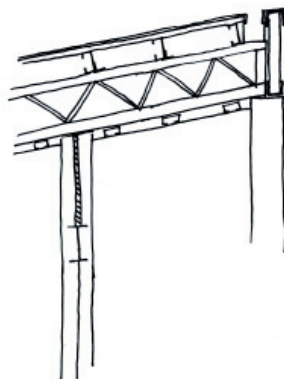


figure 5.11\_rotunda roof edge detail

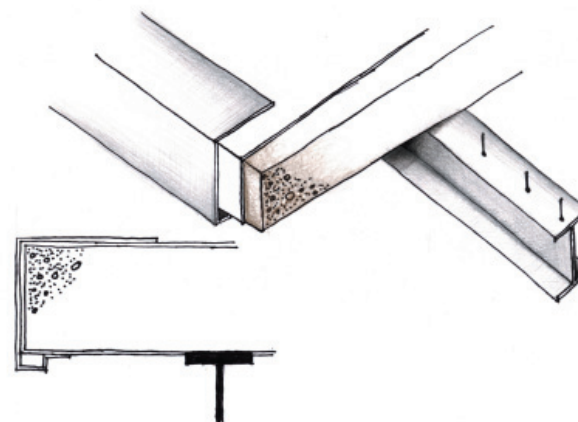


figure 5.12\_admin roof edge detail

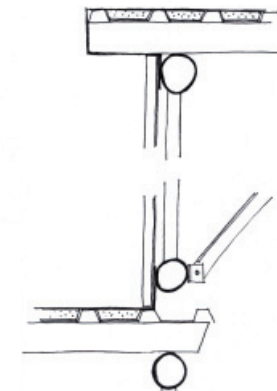


figure 5.13\_museum shed monitor roof edge detail



figure 5.10\_aluminium cladding detail

**aluminium**

Although aluminium has a high-energy consumption during the production process, the possibility for recycling of the material has developed over the past number of years. It is relatively maintenance free and requires little or no preparation. It is easily workable and is aesthetically pleasing, especially in a context of a high tech environment.

Composite 3mm aluminium cladding panels, Hula-Bond in this case, are used selectively throughout the facility, internally and externally and portray the slick high-tech image associated with motor racing. The fixing system is standard for cladding panels of this type: vertical channels bolted to the wall skin, providing support for aluminium round bar running horizontally. The panels are bent and notched accordingly and “hung” onto the bars. Vertical seals are made with structural silicone while top and bottom ends are fixed with cover seals.

Aluminium flat sheeting; 0,7 – 1,6mm thickness, provides the ideal solution for an awkward roof shape that cannot otherwise be solved by concrete. See roof element for fixing detail.

**ELEMENTS**

Certain elements make up the “highlights” of the facility, the most important ones will be explained in more detail, enforcing why they work the way they do and what components make up that specific element.

**roof structure**

The roof structure can be broken down into three different types covering the three different volumes. The roof over the rotunda ( will bare a resemblance to the roof over the museum sheds and raked grand stand seating), the roof over the admin block and the museum shed roofs.

**rotunda roof**

The column set up for the rotunda is based on the fixing for the glass, the 20 sun screening and for support for the ramp. The columns provide for adequate support for the roof structure. Due to the transparency and lightness of the rotunda, it was decided that a lightweight steel roof be used.

The system comprises a round fabricated steel truss resting on top of the outside I-column ring with its apex at the crossroad junction. Connected to this truss is a series of smaller trusses, crossing each other mid-point with support by the inner ring of concrete columns. Lipped mild steel channels run horizontally from the apex as purlins for corrugated mild steel roof sheeting, IBR profile. A purpose made box gutter runs the length inside the outer circular truss with down pipes at strategic points.

The valleys of the IBR are filled with expanded polystyrene as insulation and the entire roof is covered in 1mm aluminium sheeting, starting from the lowest point with 300mm overlap and neoprene seal, fixed to IBR with blind rivets and sealing washer. Ends are folded over into box gutter.

**admin roof**

As a design decision, a concrete roof is chosen for the admin block. Cast in-situ concrete on top of I-beam structure at 3 degrees with ribar welded to top of beam. Sealing of the concrete by means of a torch-on bitumus layer, over the ends and 200mm back on the underside. Flashing is provided for on end details by 1mm aluminium sheeting, bent over ends and back under with a drip. This is fixed by pressure shooting galvanized steel nails into the concrete roof.

**museum sheds**

The roof over the museum sheds and ground stand seating follow the same principle as the rotunda roof. IBR galvanized roof sheeting with expanded polystyrene infill and 1mm aluminium sheeting covering. Support by 102ø x 2.8mm round hollow section purlins at 1200 centres on top of steel trusses at 6m centres. Extra purlin support by strut braces from bottom truss chord to side of purlin, every second row. Added insulation between purlins and IBR by fire rated industrial sisalation.



figure 5.14\_typical roof composition detail

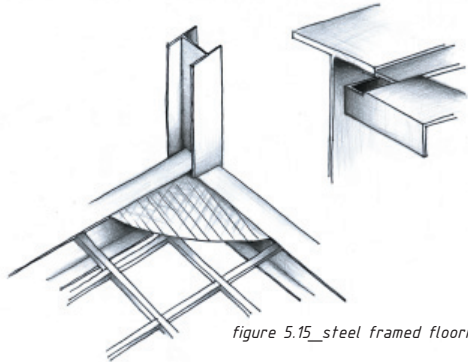


figure 5.15\_steel framed flooring system

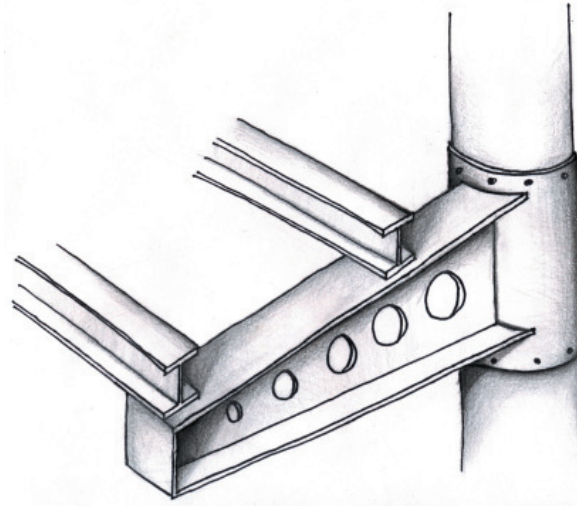


figure 5.16\_ramp support detail

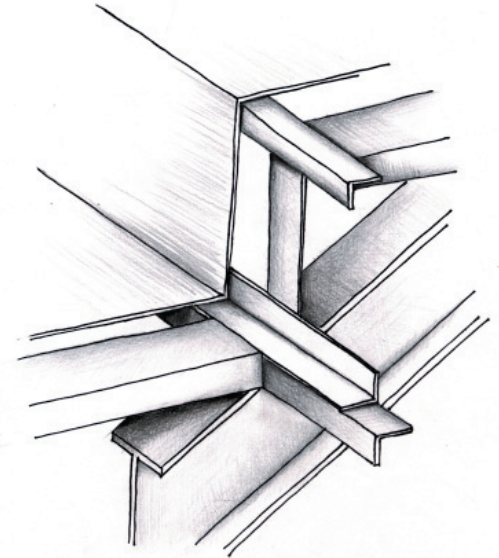


figure 5.17\_steel framed seating

This method of roof covering was chosen due to the outward expansion of the trusses from the centre point out. The aluminium sheeting provides for complete weather proofing and also creating a flush finish on the roof reminiscent of a Formula One racing car.

flooring

Movement patterns can be suggested with changes in floor covering material. The variety in flooring material changes with the floor levels and changes in horizontal spaces and places.

Pedestra vinyl floor tiles are used throughout the facility on ground floor. Changes in pattern and colour will differentiate movement zones. They have a concealed fixing system, are water repellent, non-slip, impact and stain resistant and are easy to clean, ideal for industrial flooring.

“Vastrap” floor plate pays with the industrial theme and is used on all floors above ground where prominent circulation follows and for stair treads, fixed to steel channels by rivets that are countersunk.

Office and private box flooring comprised a mix of steel channel supports between beams and 6mm flat steel covered in Pedestra vinyl floor tiles for sound absorption.

ramp

Free flowing movement is the concept behind the ramp. It allows for unobstructed pedestrian movement within the rotunda and creates exceptional view points out towards the track. It also doubles as exhibition space regarding the evolution of Kyalami Grand Prix Circuit.

The ramp structure itself is constructed out of steel beams and bracing covered in 6mm “vastrap” floor plate. It is supported from one side by large cantilever I-beam sections connected to 500Ø concrete columns clad in 1mm aluminium sheeting.

grand stand seating

The ability to include public seating areas as part of the complex was a crucial benefit to the viability of the project. The inclusive seating manifests in two parts: the public seating area above ground on the retail curve and the private boxes, above ground, on the western facades of the museum sheds.

A prefabricated concrete seating element was out of the question due to the entire structure being steel, so a purpose designed steel frame system that is clad in 6mm “vastrap” floor plate was used. Tread and riser follow stadium viewing ideals of 800 tread and 400 riser. The boxes are separated from each other by a dry walling system that is plastered and painted with a collapsible shop-front glass door system to secure the boxes when not in use.

interior partitioning

All partitioning on the inside of the admin block is provided by a dry walling system that is plastered and painted. This allows for a re-use system to take effect should the building’s function no longer be required.

external seating

As with the necessity to provide for viewing areas and seating as an included element of the structure, it is also necessary to provide for seating on the outside of the building as part of the landscape.

The seating flows in levels as the natural ground line rises and terminates subtly into the landscape. Construction is by red corrobriick retaining walls with neutral pavers up to the dedicated walkways. Sight lines are kept with the traditional tread of 800 and riser of 400.



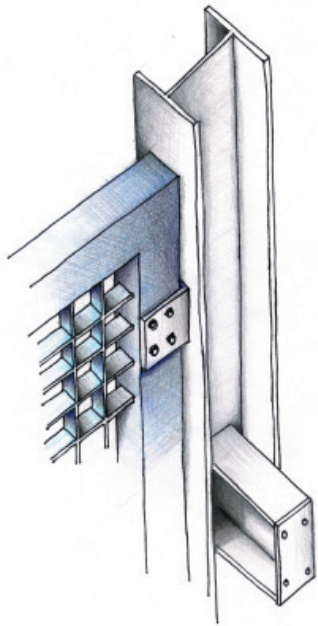


figure 5.18\_'mentis' grid sun shading

figure 5.19\_'mentis' grid sun shading example



figure 5.20\_horizontal aluminium louvres on eastern facade

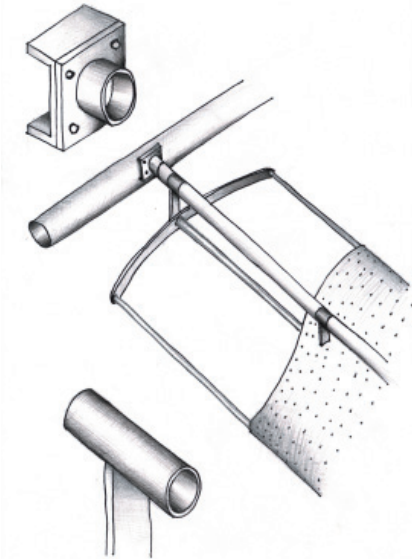


figure 5.21\_punched aluminium west facade sun shading

## SOLAR ATTENUATION

The effects of direct solar gain can be damaging in many ways to the interior spaces of buildings. Permanent destruction of materials housed inside in direct sunlight can take place and spaces can become increasingly uncomfortable to be in if the air temperature is not controlled properly. Problems arise with keeping the sun out and allowing as much natural light in as possible.

The only effective solution is to create a balance between high technology glasses (as mentioned previously) and sun-screening.

mentis grid

70 x 50 x 2mm aluminium expanded "mentis" grid is used as an effective sun-screening device on all northern facades of the museum sheds. They allow ample natural light penetration and prohibit the direct gain of sun. The same profile mentis is used for solar protection around the rotunda and as a secondary skin on the admin block.

The "mentis" panels are welded to a 100x70x3 rectangular frame and then bolted at strategic points to the I-columns.

aluminium louvres

Horizontal aluminium louvres are used solely at the main entrance to highlight that point. Horizontal louvres were chosen as a design decision and do not run parallel to the glass façade entrance, but appear to be falling over forward so as to accommodate for the east and west orientation.

overhangs

Large overhangs are used on the western façade of the museum sheds, both on ground and seating level. The main views are to the west and it is not possible to disrupt them. Punched aluminium sheeting, profiled on a curve, is used as sun screening on the western façade. It is fixed to a frame by rivets and bolted to the top chord of the truss for the seating area and the I-beam for the lower museum.



figure 5.22\_example of monitor lighting

monitor lighting

The museum sheds are spaces for display of racing cars and all aspects of motor sport in South Africa. The industrial theme is carried through and provides for natural lighting by the use of monitors. They are clad in profiled fibreglass sheeting fixed to the open side of the steel truss by self-topping stainless steel screws and sealing washers. The northern side consists of white opaque sheeting and the southern side by transparent sheets.



figure 5.23\_roof monitors for natural lighting and ventilation

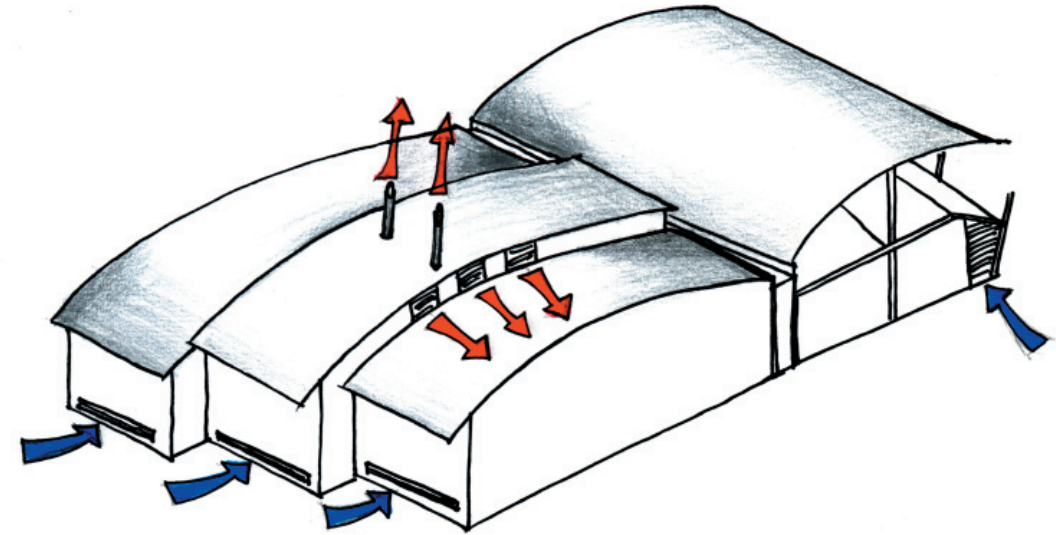


figure 5.24\_ventilation flow diagram through museum shed

**VENTILATION**

The use of air conditioning to cool interior environments is constantly being questioned by those in the sustainability field. Passive technologies are being used all over the world with great success. A combination of features that include passive methods and energy consuming ones is ideal in this situation. The cost of supplying air-conditioning throughout the volumes of the museum spaces is not feasible, as the occupation of the spaces is not constant, therefore, a naturally ventilated system will be put into place in these areas.

A strip of adjustable aluminium louvres runs at floor level on the eastern facades of the museum sheds, with large fixed ventilation louvres on the north and south facades on the eastern corners of each shed. This allows for adequate fresh air flow into the spaces. Warm air extraction will take place by aluminium louvres positioned in the monitors at every fourth fibreglass profiled sheet.

Non-adjustable aluminium louvres are also positioned at the roof cross-over points in the transition spaces.

air-conditioning

For a productive work environment and spaces where computers make up a large percentage, air conditioning is a requirement. The admin block and rotunda will therefore be air-conditioned by a plant on the roof of the building.

This allows for maximum fresh air intake from the height of the building and for the safe expulsion of warm air into the atmosphere.-

All internal ducting will be exposed and will be fixed to the underside of the floor/ceiling beams. All electrical cabling will run likewise and lie in the galvanised steel cable trays.





### *Preliminary*

The culmination of research in the preceding pages lies in the following pages. It is the presentation of the proposed facility for the development and promotion of motorsport in South Africa. It is envisaged that an establishment of this nature will address the needs of a dying interest in motorsport and get the youth more involved in a pastime that provides sheer entertainment to many people around the world.



The facility comprises three connecting, but separate, functioning entities:

First is the rotunda, a glass landmark cylinder positioned at the southern most point on the site where the junction of the major roads is located. It consists of a pedestrian ramp with strategically placed landings to allow maximum views onto the Kyalami business precinct and Kyalami Grand Prix Circuit. It also allows for exhibition of all things to do with Kyalami's evolution and is an important element in flowing vertical circulation. The glass shell of the rotunda sits free of the ramp and is shaded on east, west and north facades.

Connecting off the rotunda in a northerly direction is the flat, concrete roofed admin block, separated by the clearly defined entrance, which allows access to the entire facility (left into rotunda, right into the admin block and museum and straight through to the outside restaurant area). The admin block houses all the necessary office and work spaces for the new Kyalami business precinct through three floors of alternating double and triple volumes.

Flowing out to the west of the admin block is the second element, the retail curve. A quarter circle bending north that consists of retail spaces (clothing and memorabilia shops and a restaurant on ground floor, a motor book shop on first floor and a dedicated bar and fast food outlet on the second floor), circulation and service spaces and a public seating area on the second floor. This seating area is positioned ideally to allow for maximum viewing of the racing with an uninterrupted view from the entry to the Vodacom straight through Imperial sweep and up and around Nashua corner.

Moving north off the retail curve is the motorsport museum, the third element. It is a series of six display, double and triple, volumes connected by smaller, narrower transition spaces on the ground floor. The form on plan of the exhibition areas is generated from the shape of the track adjacent to the proposed facility and allows for ideal viewing of racing from any point along the curved axis. On the track side of the second floor is a succession of private viewing boxes which are hired out by individuals, groups or companies for individual races or as season tickets. These boxes are also connected by the transition and service spaces as well which also allow for vertical circulation on busy race days.

figure 6.02\_south western view of model



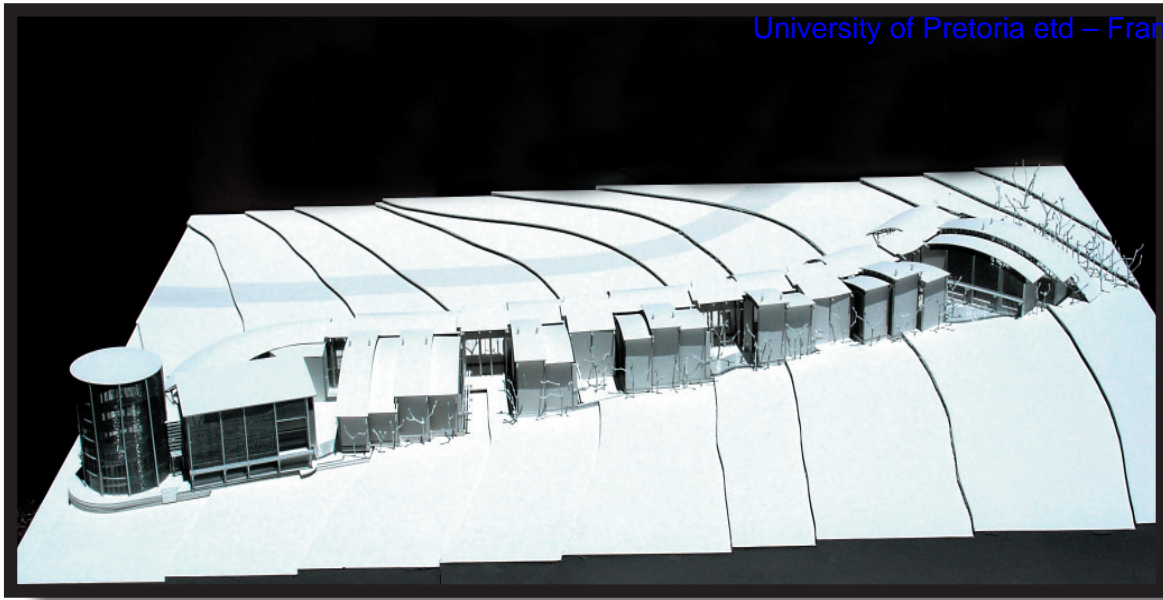


figure 6.03\_eastern view of model

figure 6.04\_north western view of model

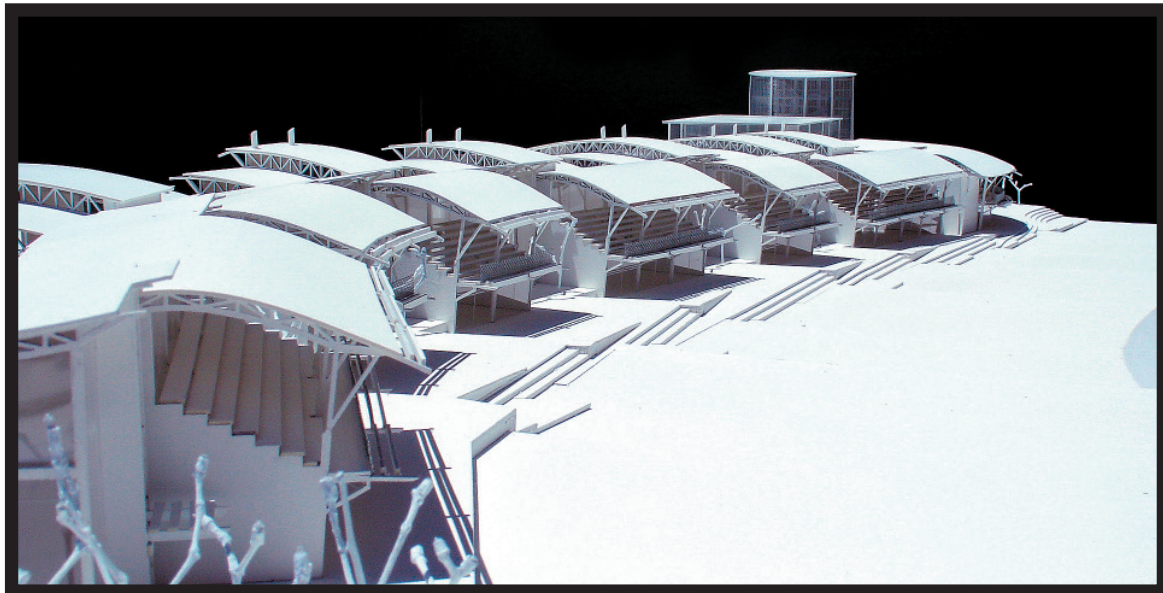


figure 6.05\_aerial view from the north of model



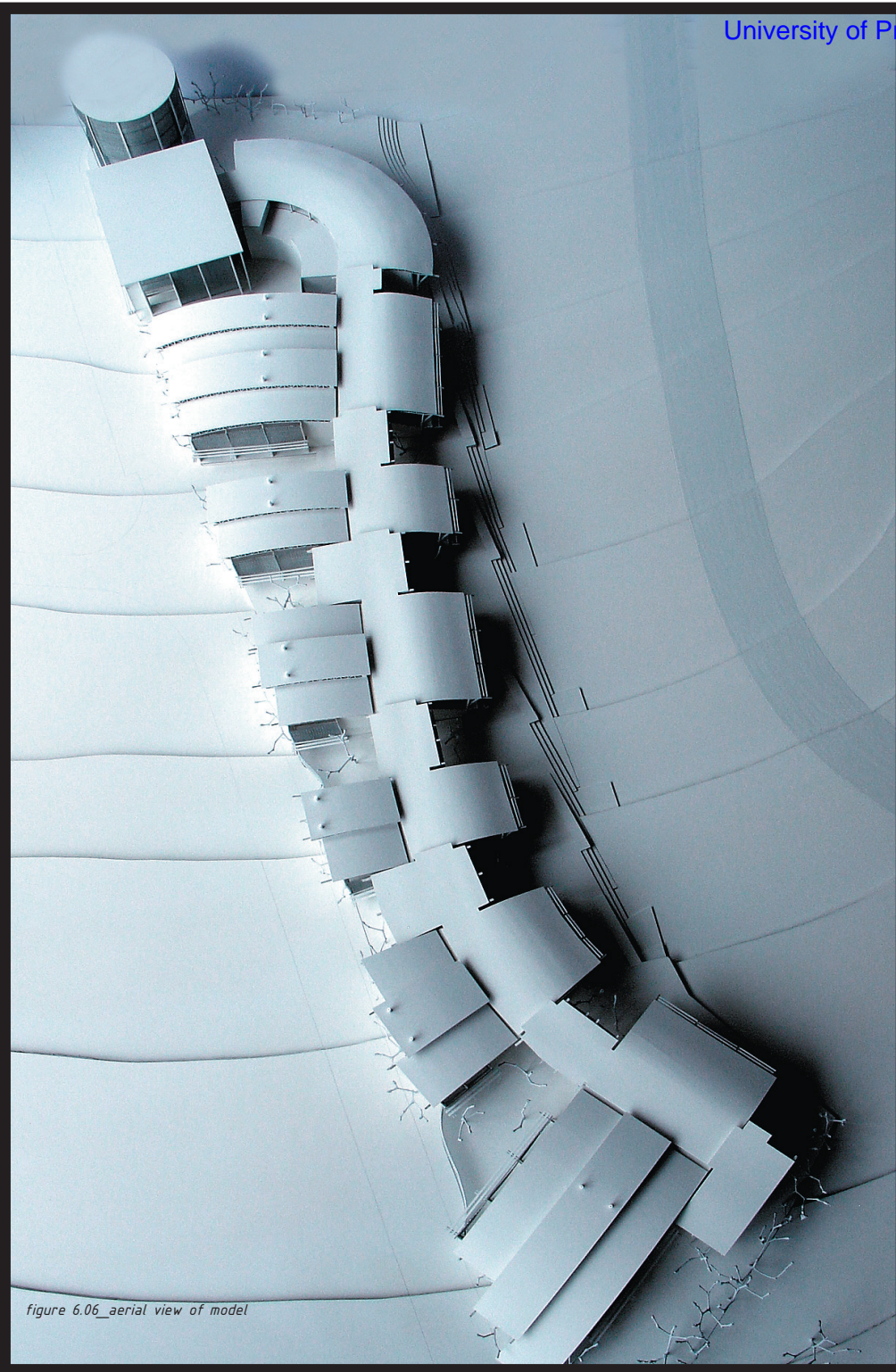


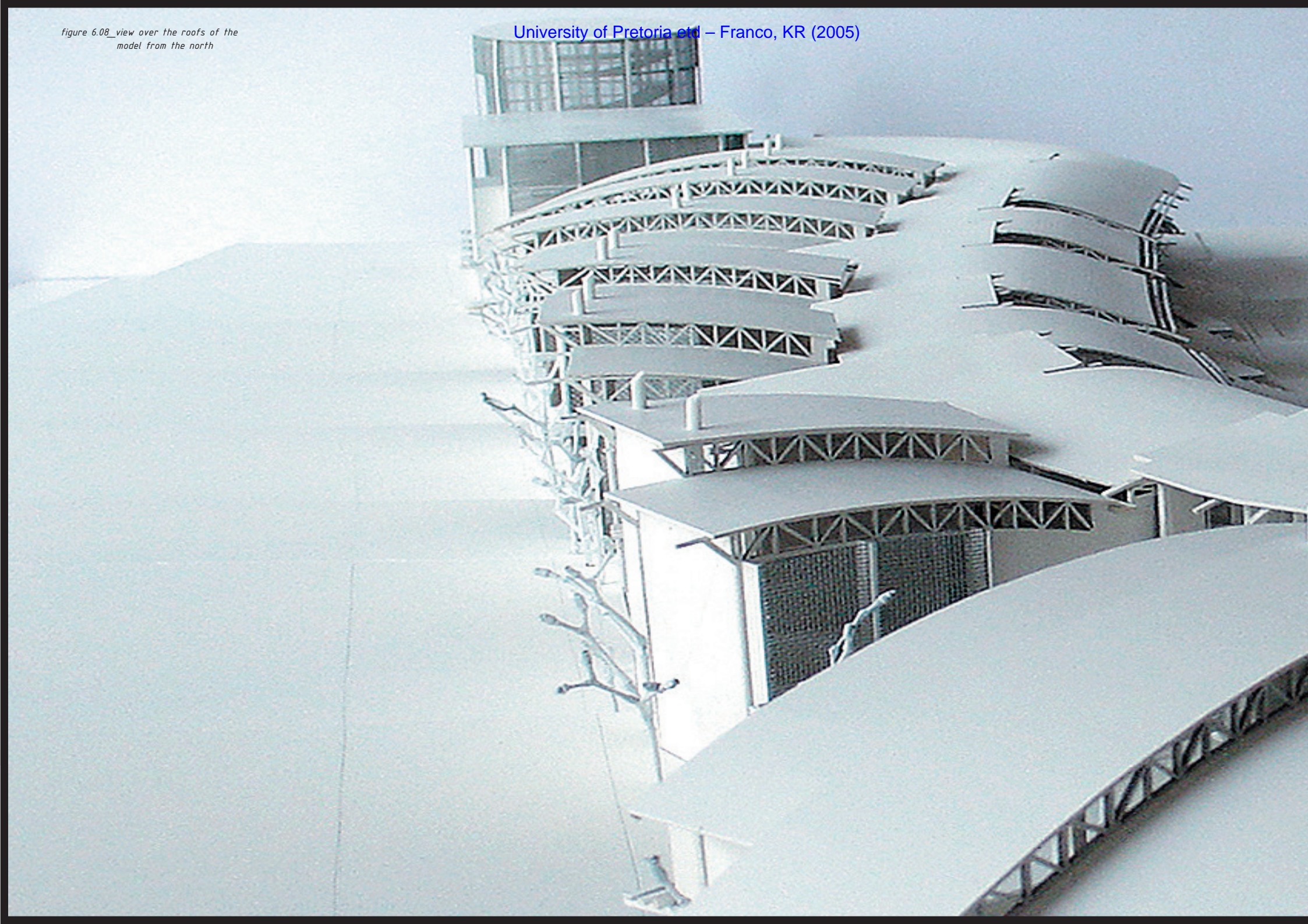
figure 6.06\_aerial view of model



figure 6.07\_aerial view of model  
from the south

figure 6.08\_view over the roofs of the  
model from the north

University of Pretoria and – Franco, KR (2005)



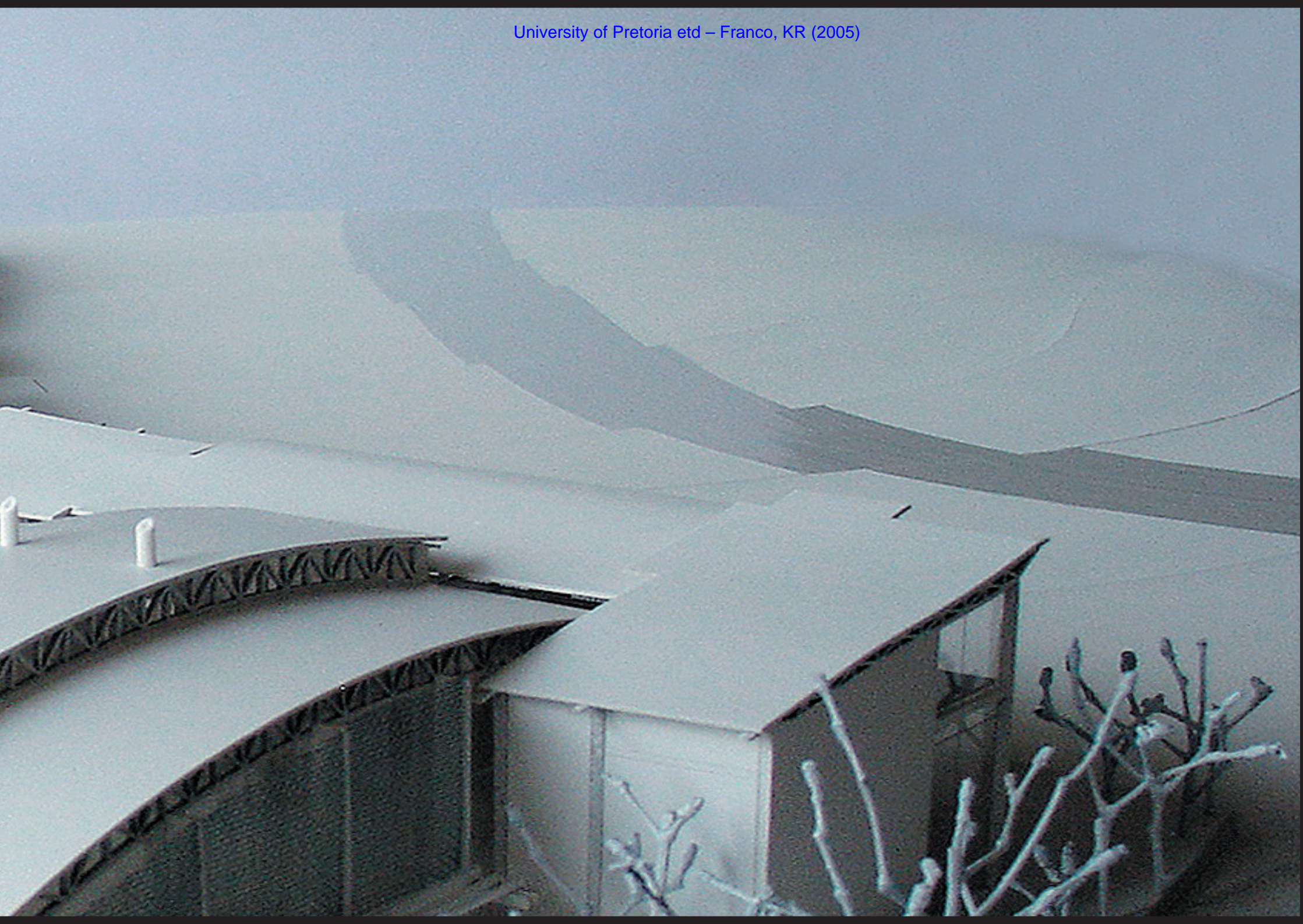


figure 6.09\_evening view of end museum shed on model

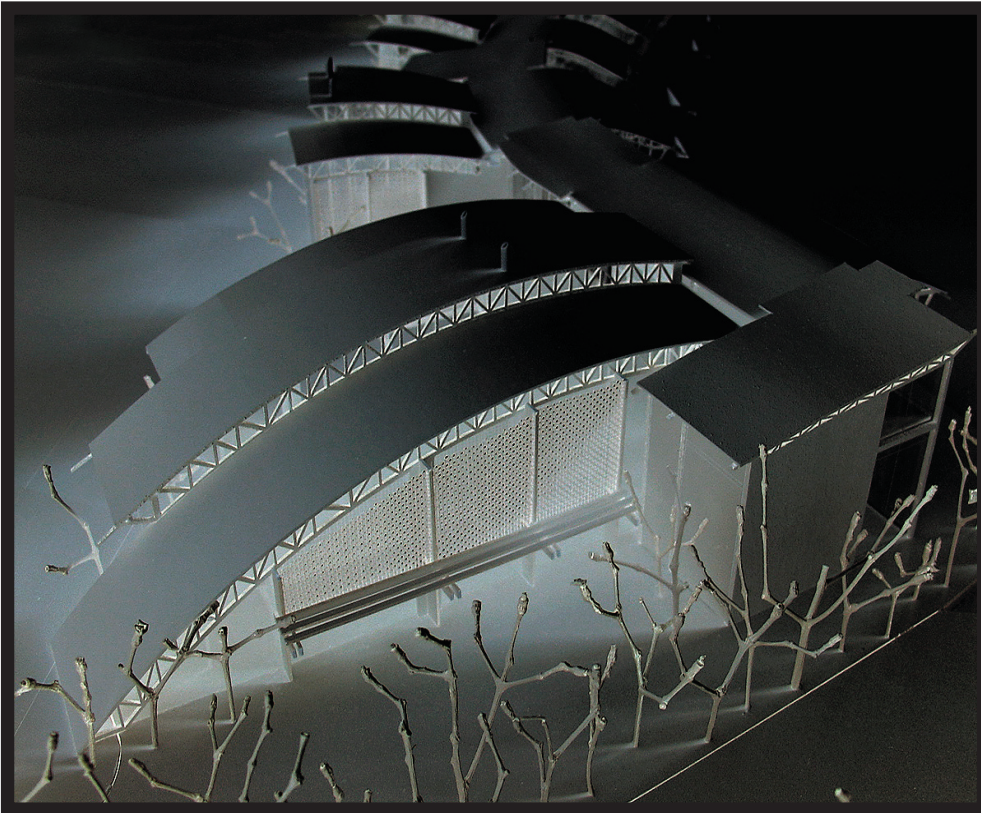


figure 6.10\_evening view of transition space and private seating box on model

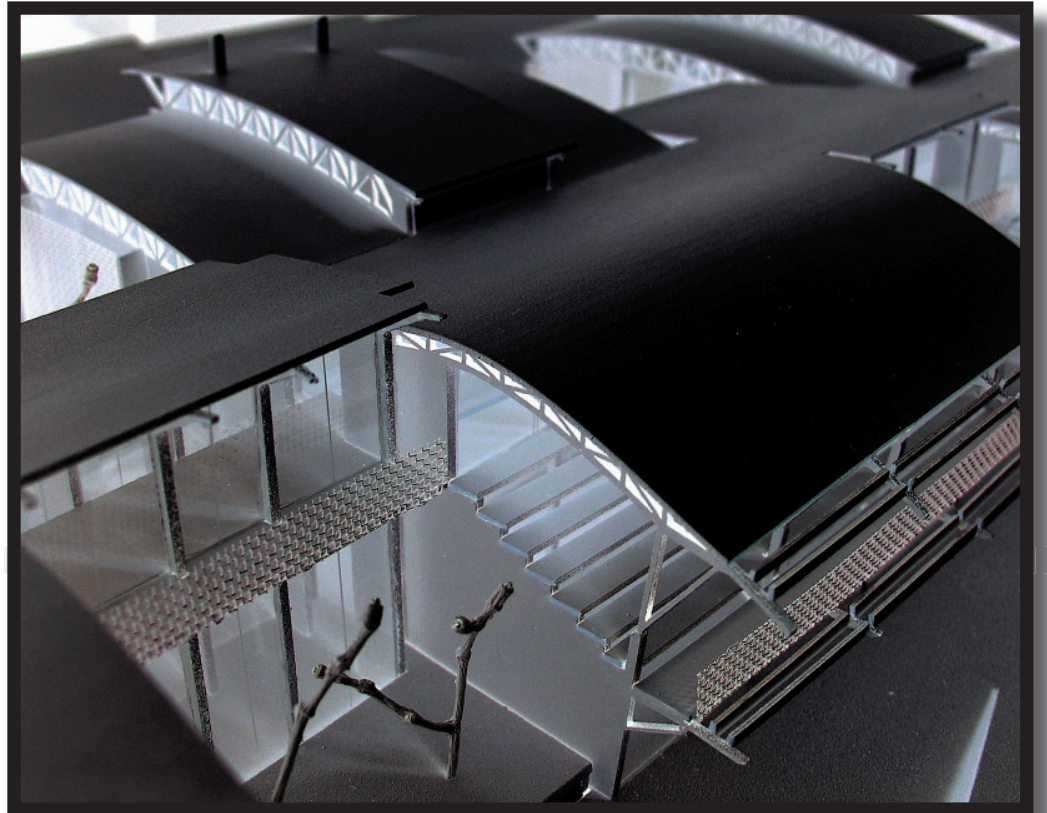


figure 6.11\_evening view of rotunda and admin block on model

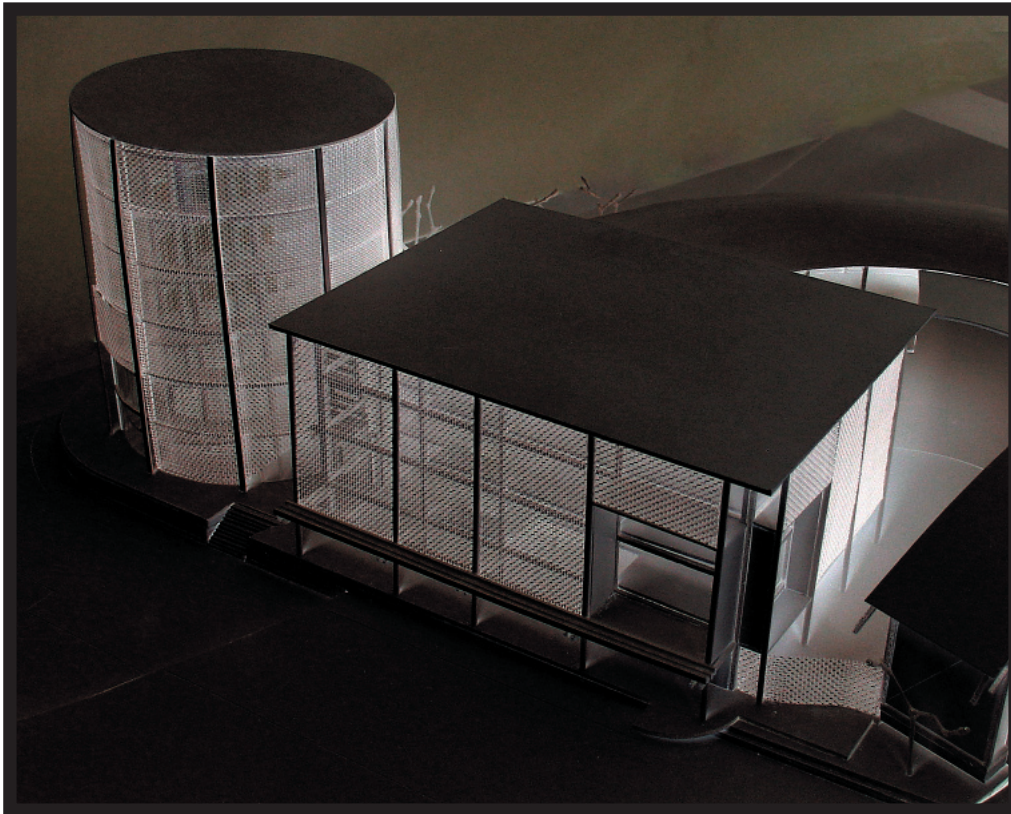


figure 6.12\_evening view of first museum shed on model

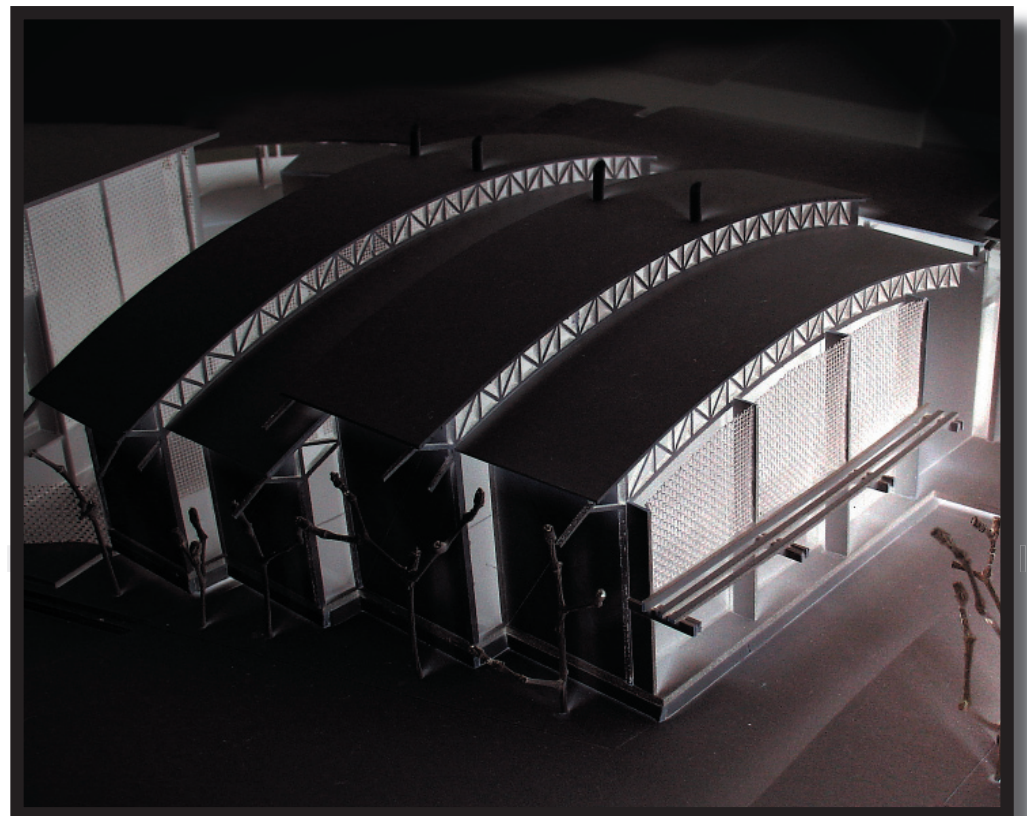


figure 6.13\_aerial evening view of model



figure 6.14\_northerly view of model

figure 6.15\_(bottom)\_view of model from the south showing rotunda and retail curve



figure 6.16\_south eastern view of model with rotunda

figure 6.17\_(bottom)\_view of model from the east showing outside display space

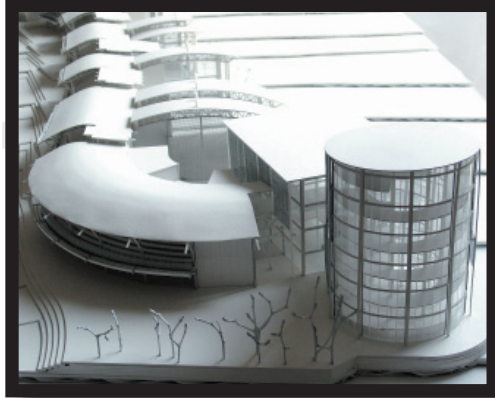
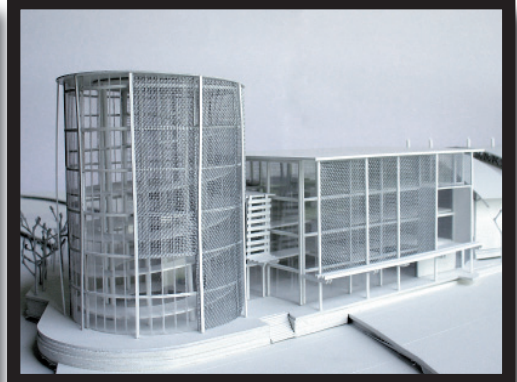


figure 6.18\_structural view of model from the north  
figure 6.19\_(bottom)\_north eastern structural view of model

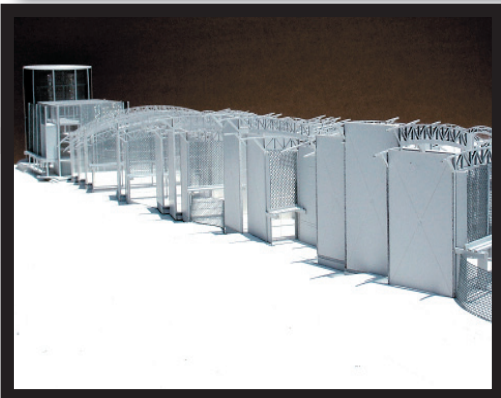
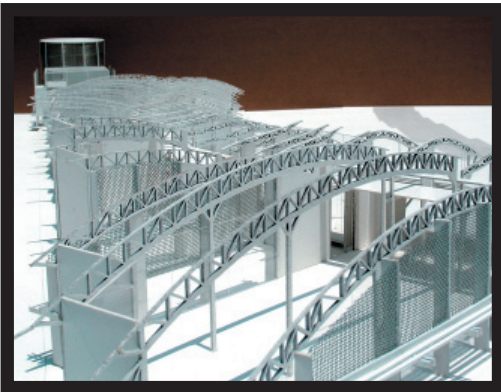


figure 6.20\_structural view of model from the north west  
figure 6.21\_(bottom)\_south west structural view of model showing the public seating area

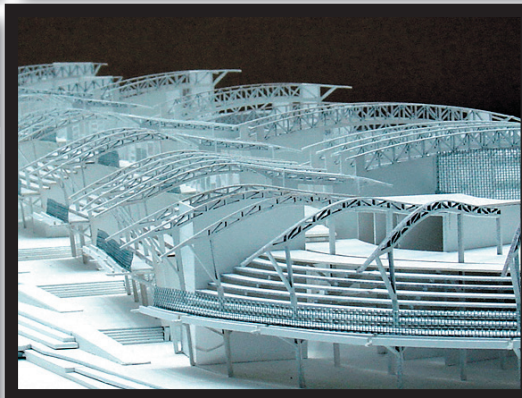
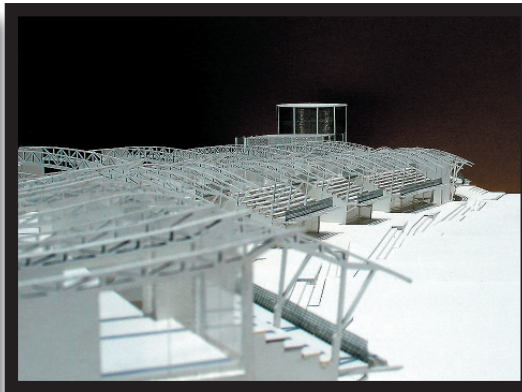


figure 6.22\_structural view of the admin from the north east  
figure 6.23\_(bottom)\_view of the last museum shed and outside display area

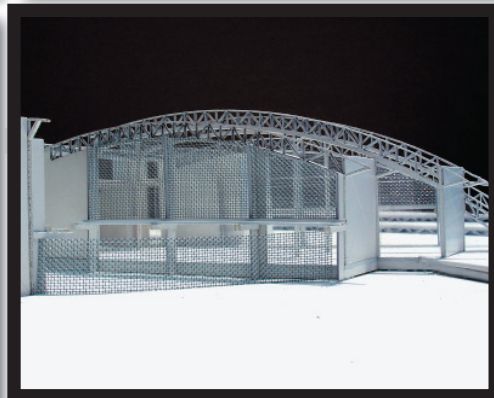
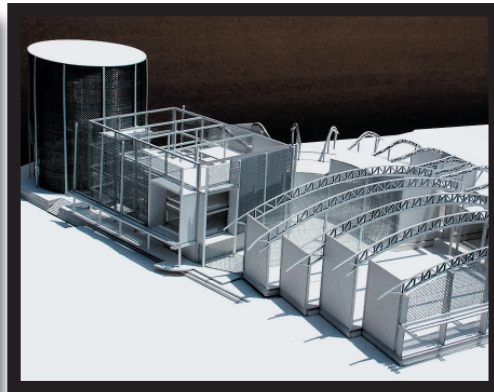


figure 6.24\_aerial structural view of model from the north



figure 6.25\_rendered view of the first museum shed

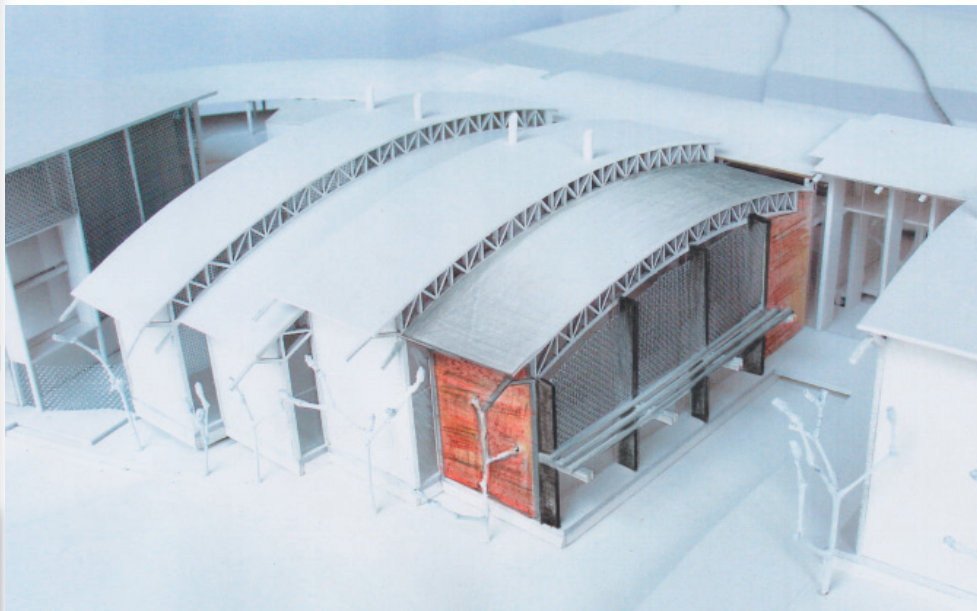


figure 6.26\_rendered view of a private box and transition area

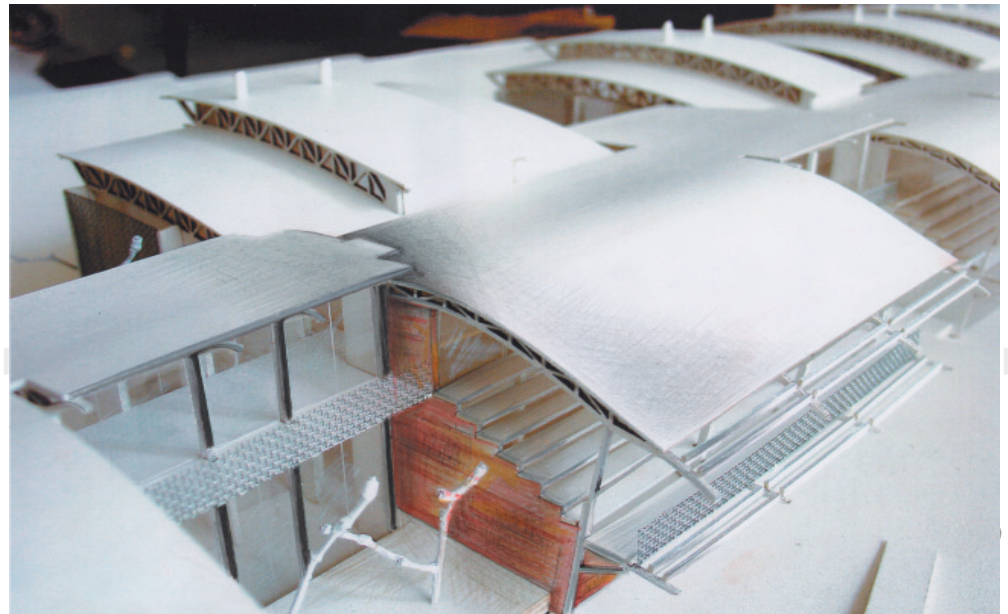
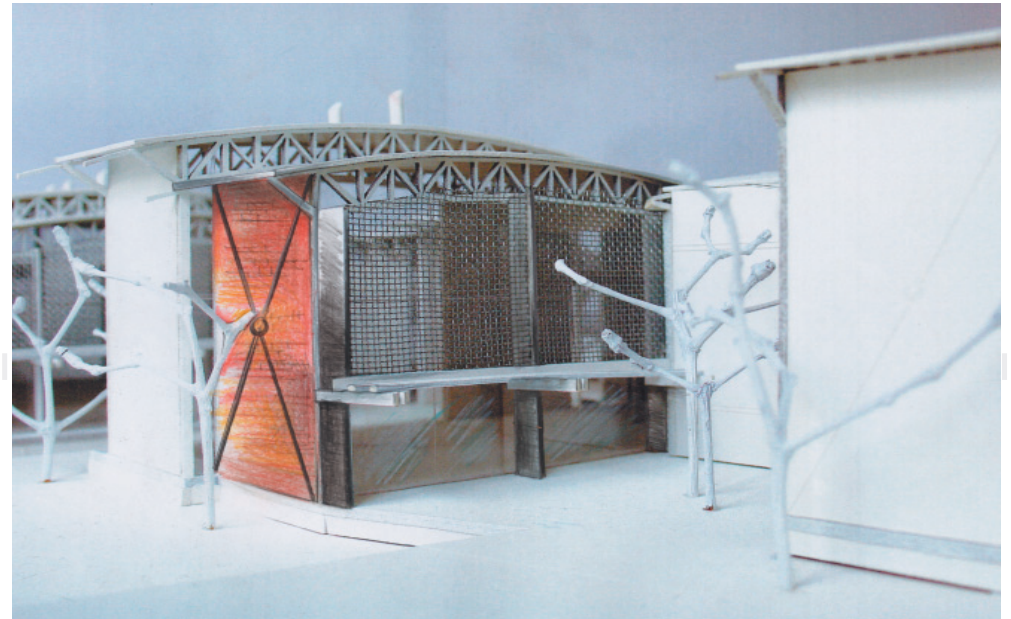




figure 6.27\_rendered view of the last museum shed and vertical circulation shaft



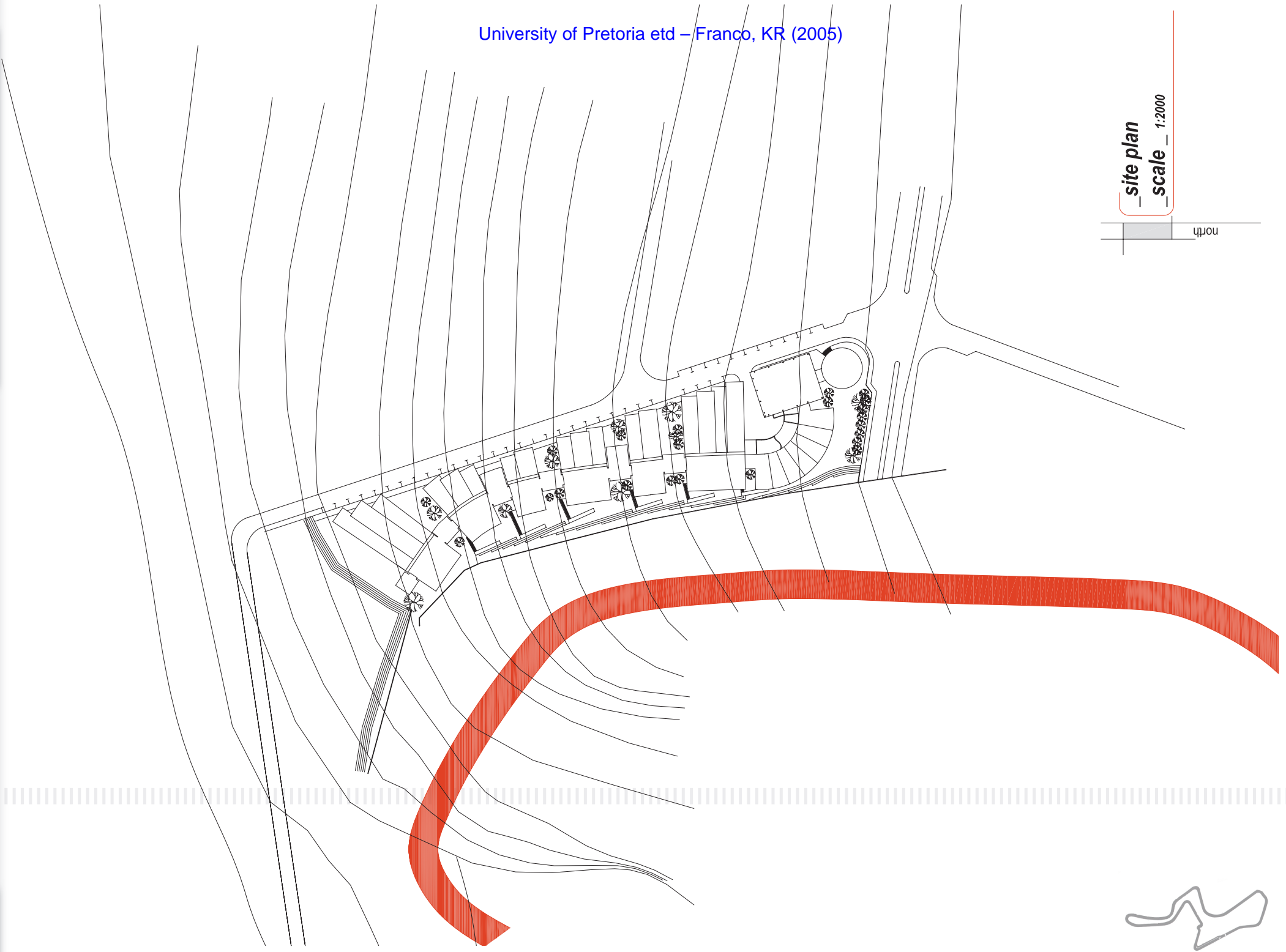
figure 6.28\_rendered view of a museum shed and outside display space

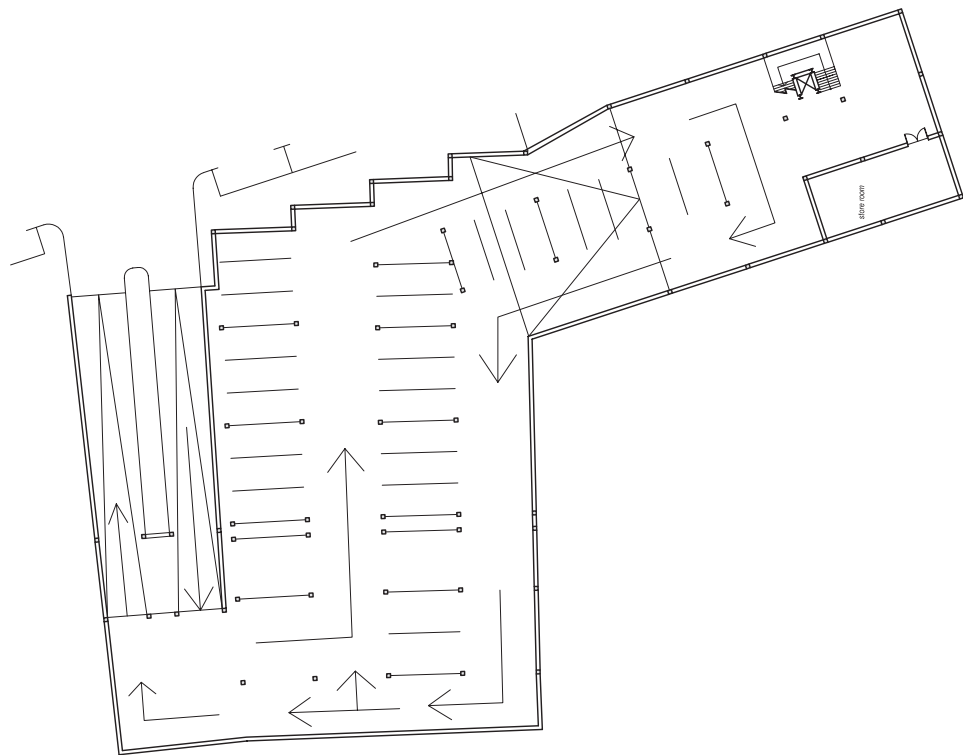


# technical drawings



\_site plan  
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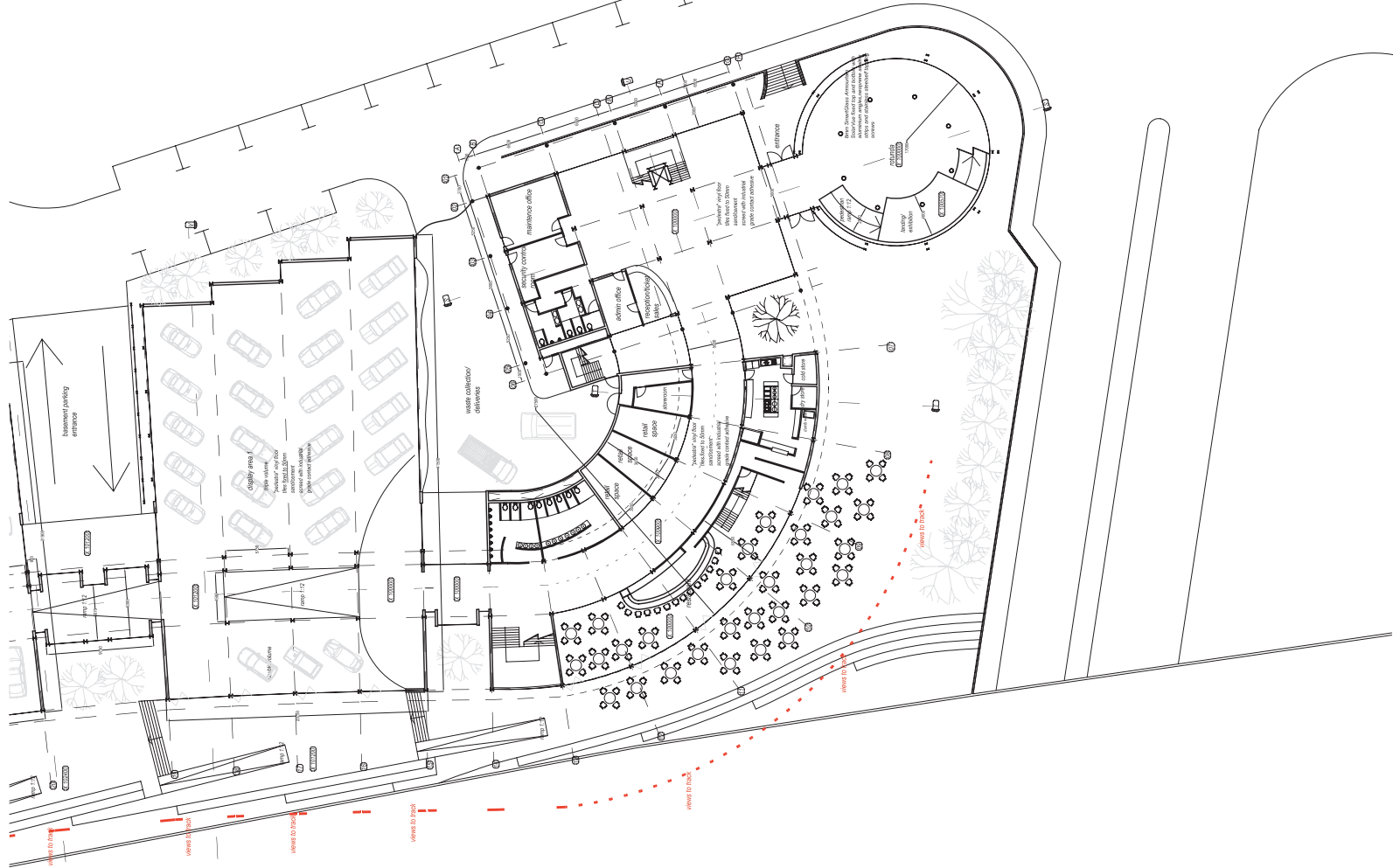




basement plan  
scale 1:600

north

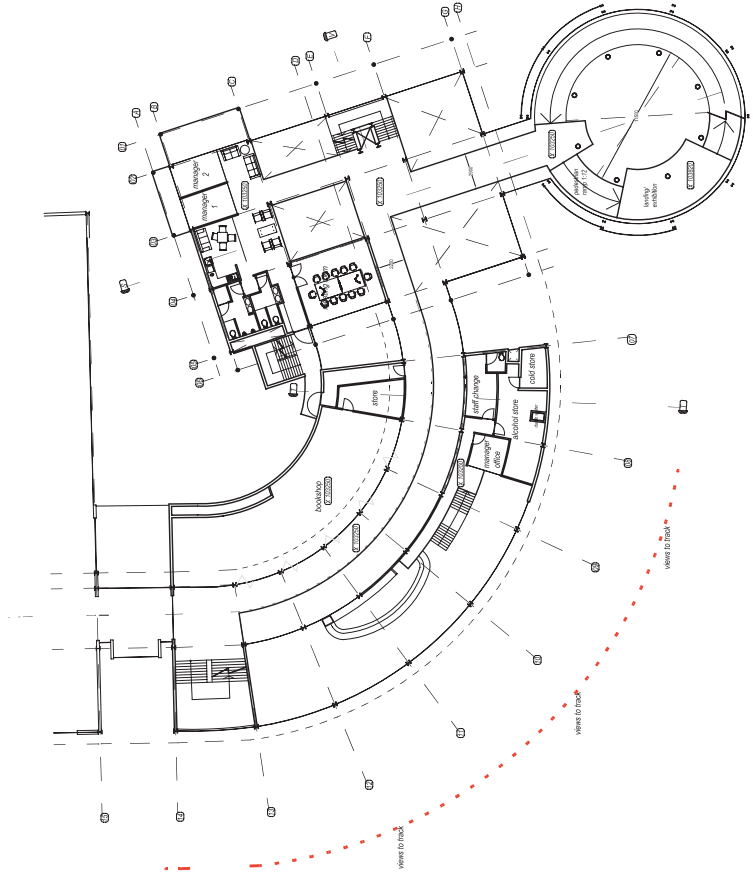




**ground floor plan**  
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north



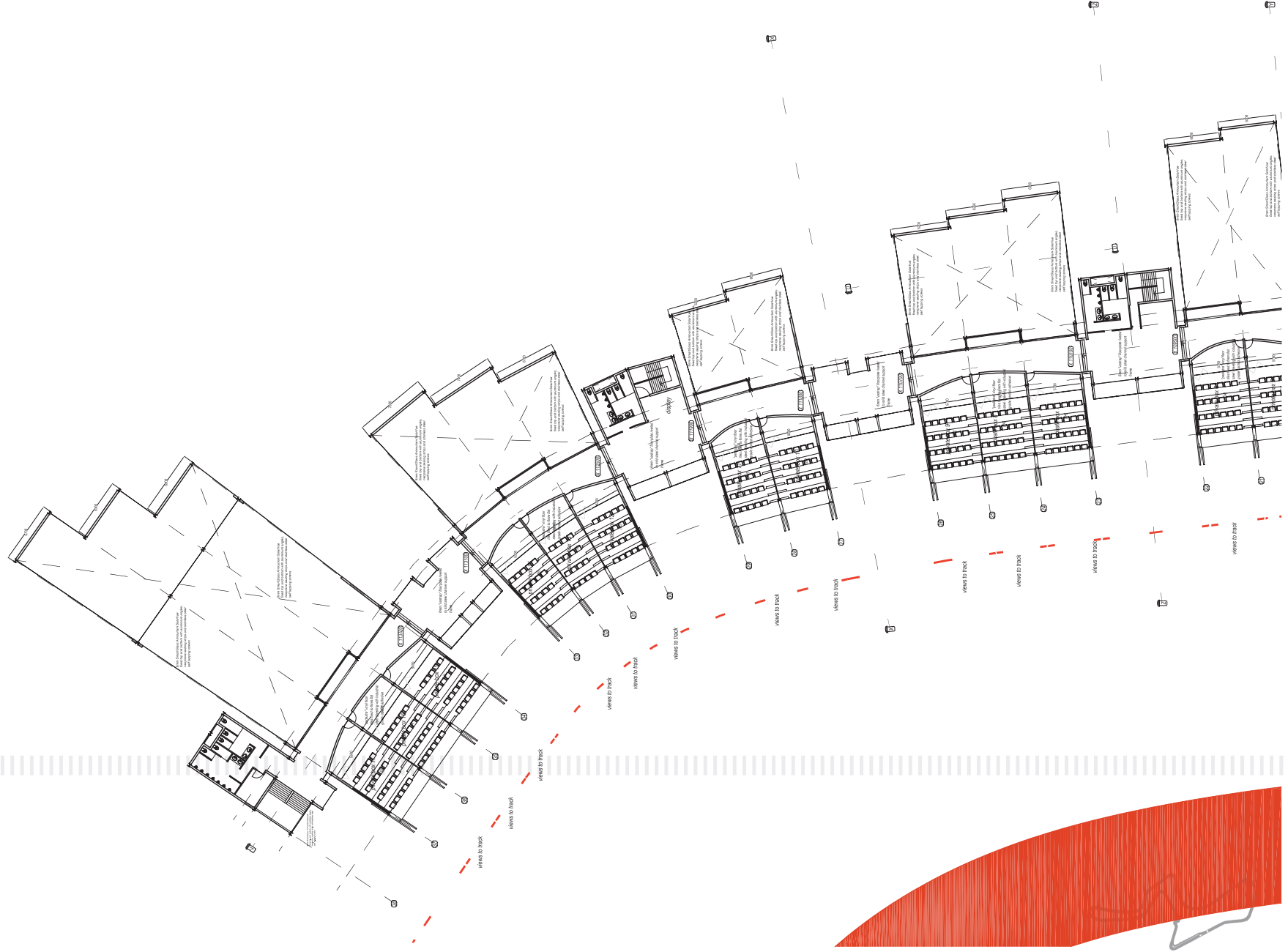


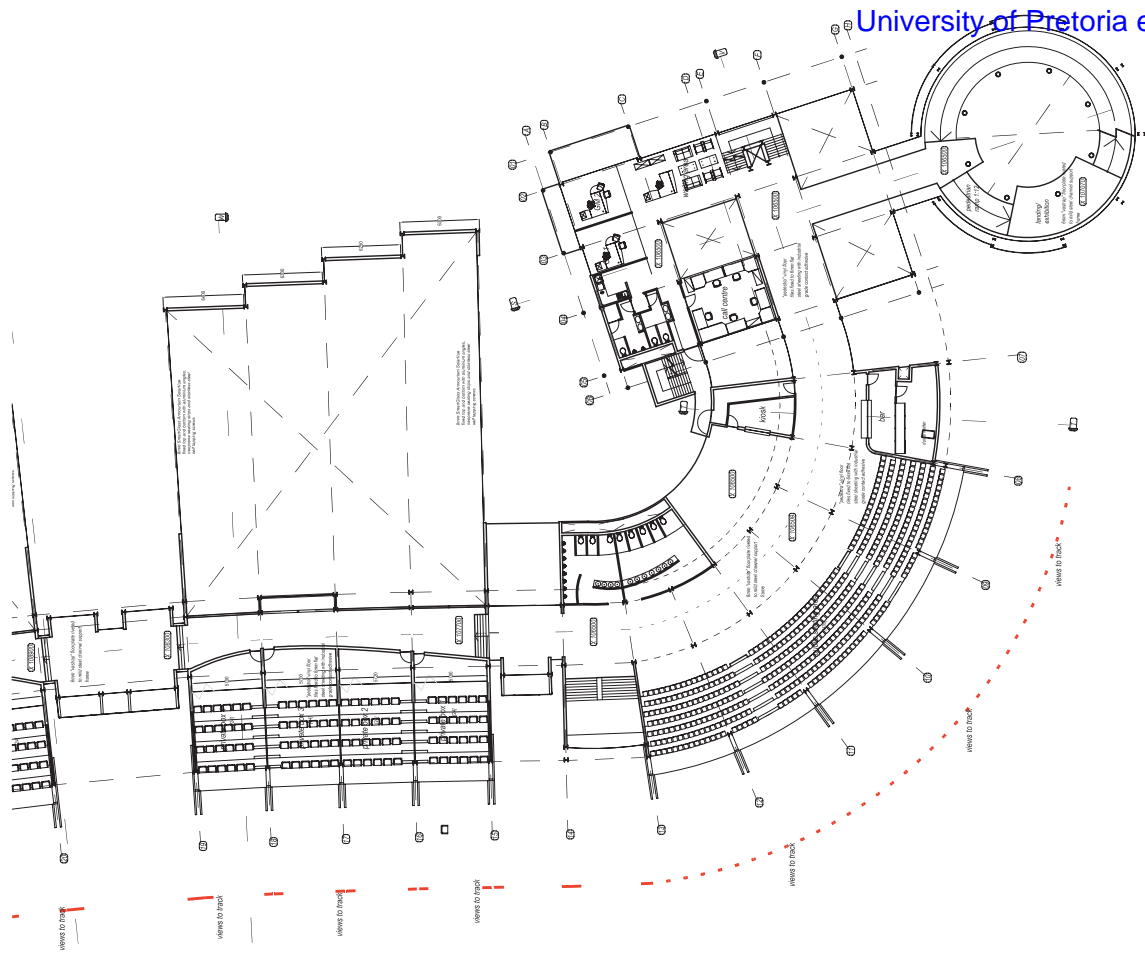
**first floor plan**  
**scale 1:600**

north





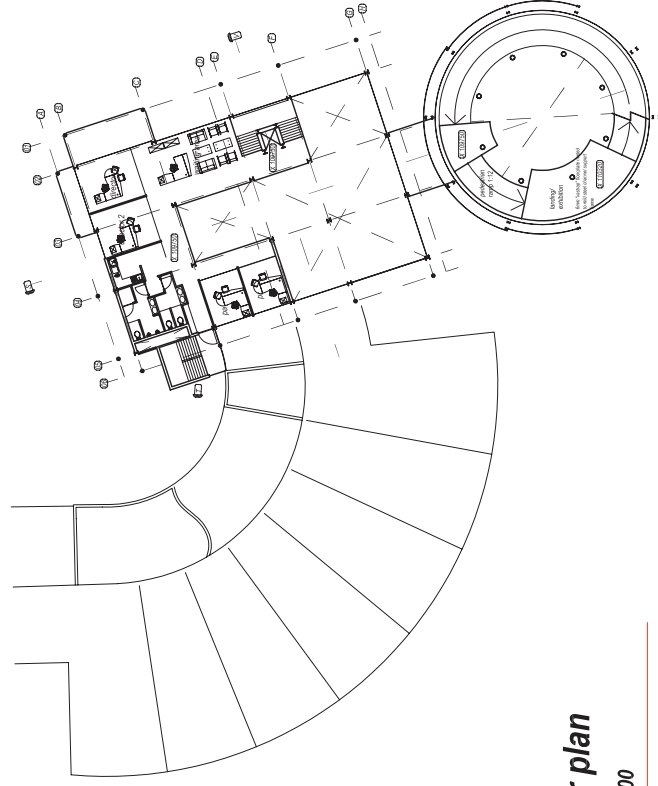




**\_second floor plan**  
**\_scale\_ 1:600**

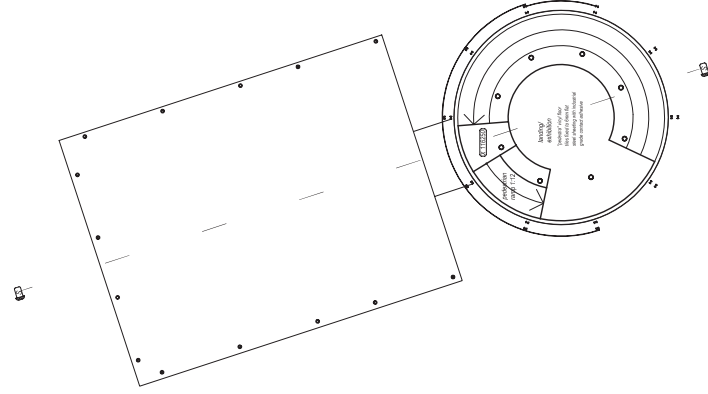
north





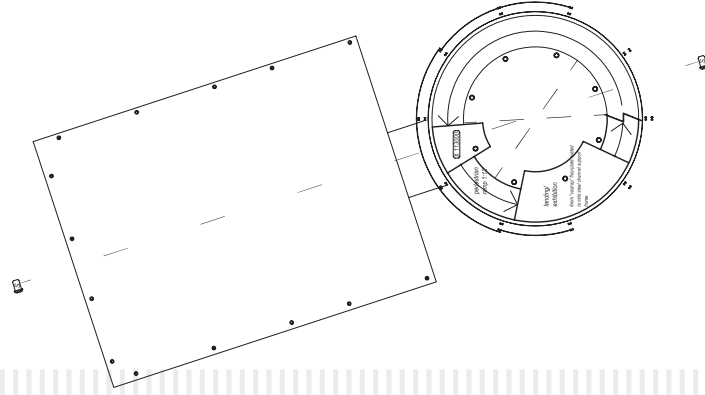
**third floor plan**  
scale 1:600

north



**fifth floor plan**  
scale 1:600

north



**fourth floor plan**  
scale 1:600

north

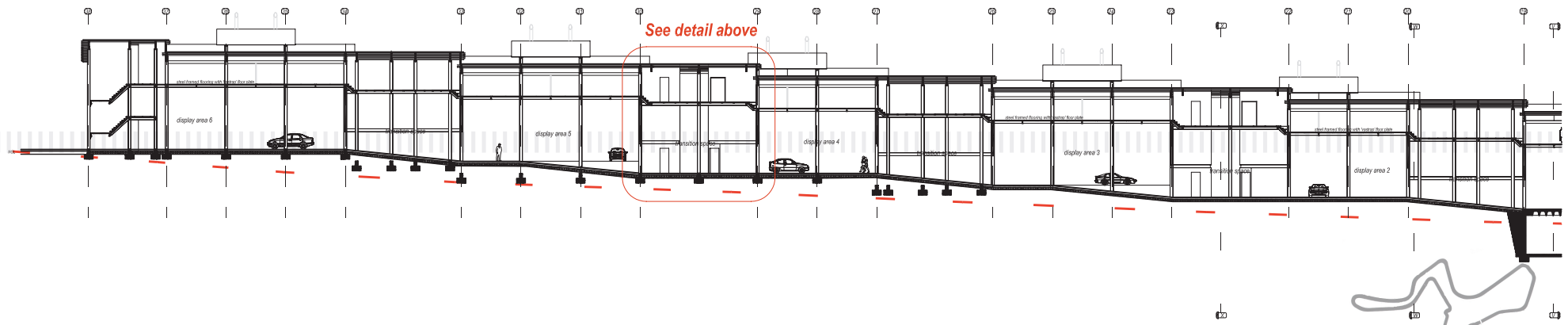
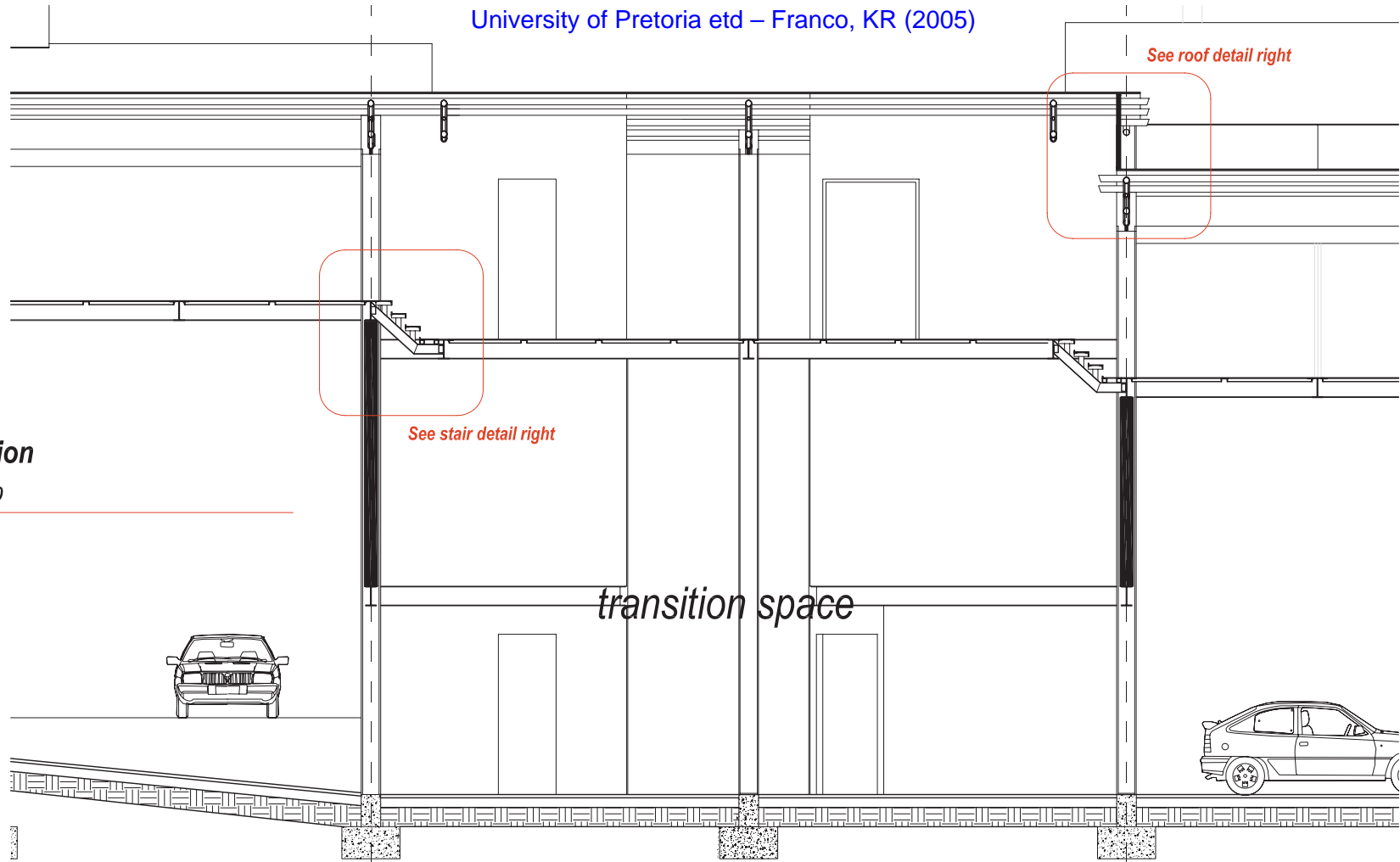
See roof detail right

See stair detail right

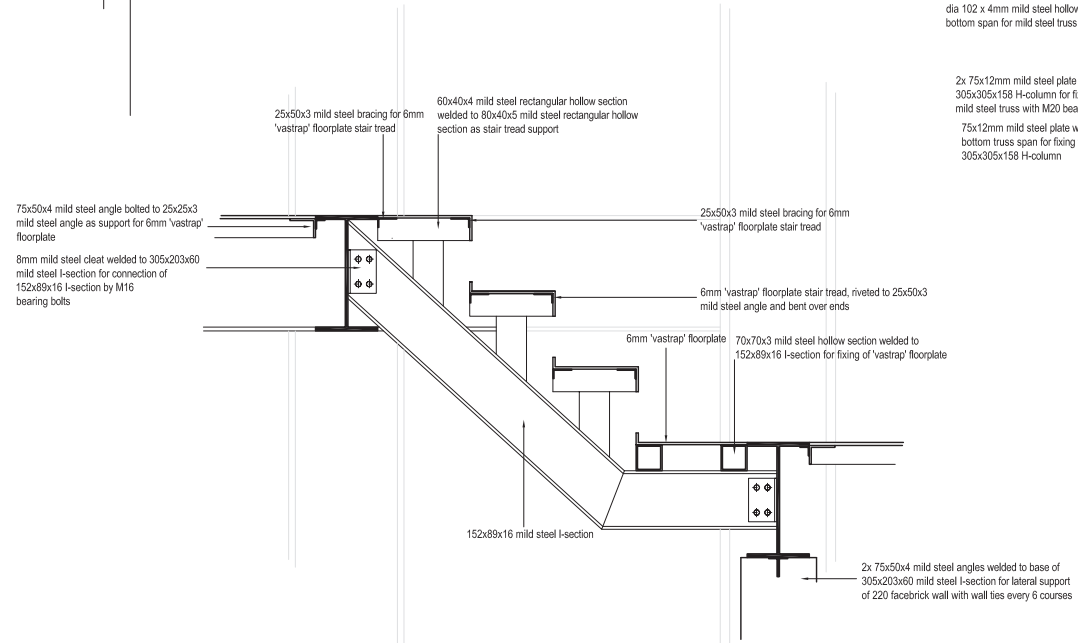
*detail section*  
*scale 1:100*

*transition space*

See detail above



**\_typical stair detail**  
**\_scale \_ 1:20**



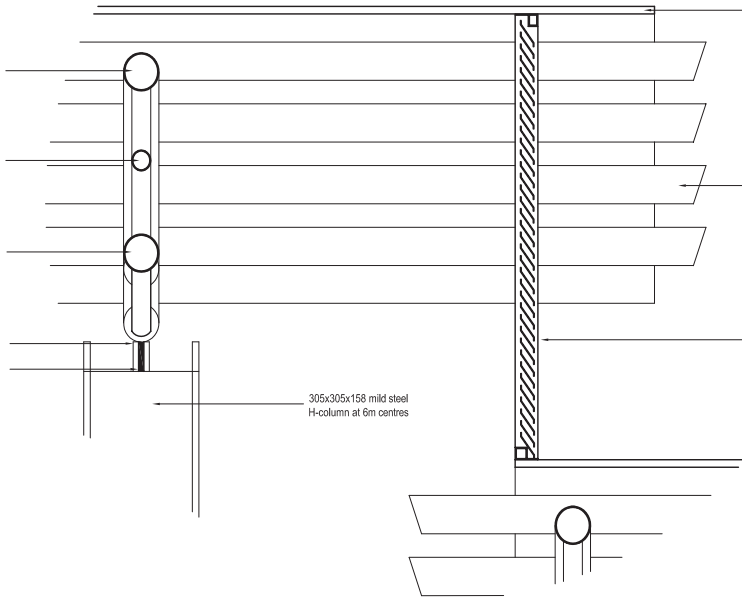
dia 102 x 4mm mild steel hollow section top span for mild steel truss

dia 48 x 3mm mild steel hollow section bracing for mild steel truss

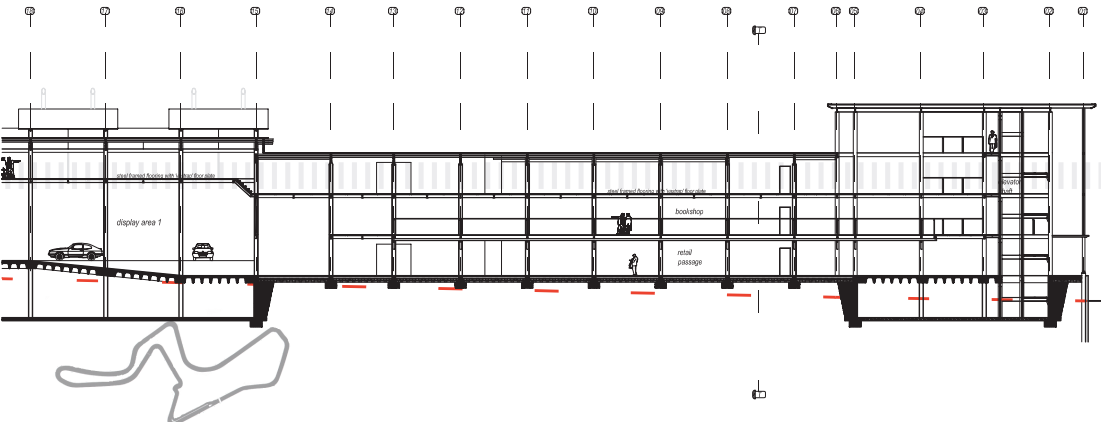
dia 102 x 4mm mild steel hollow section bottom span for mild steel truss

2x 75x12mm mild steel plate welded to 305x305x158 H-column for fixing to mild steel truss with M20 bearing bolt

75x12mm mild steel plate welded to bottom truss span for fixing to 305x305x158 H-column



**\_typical roof edge detail**  
**\_scale \_ 1:20**



13715 top of finished slab  
13602 underside of slab  
13100 underside of beam

9750

6500

3250

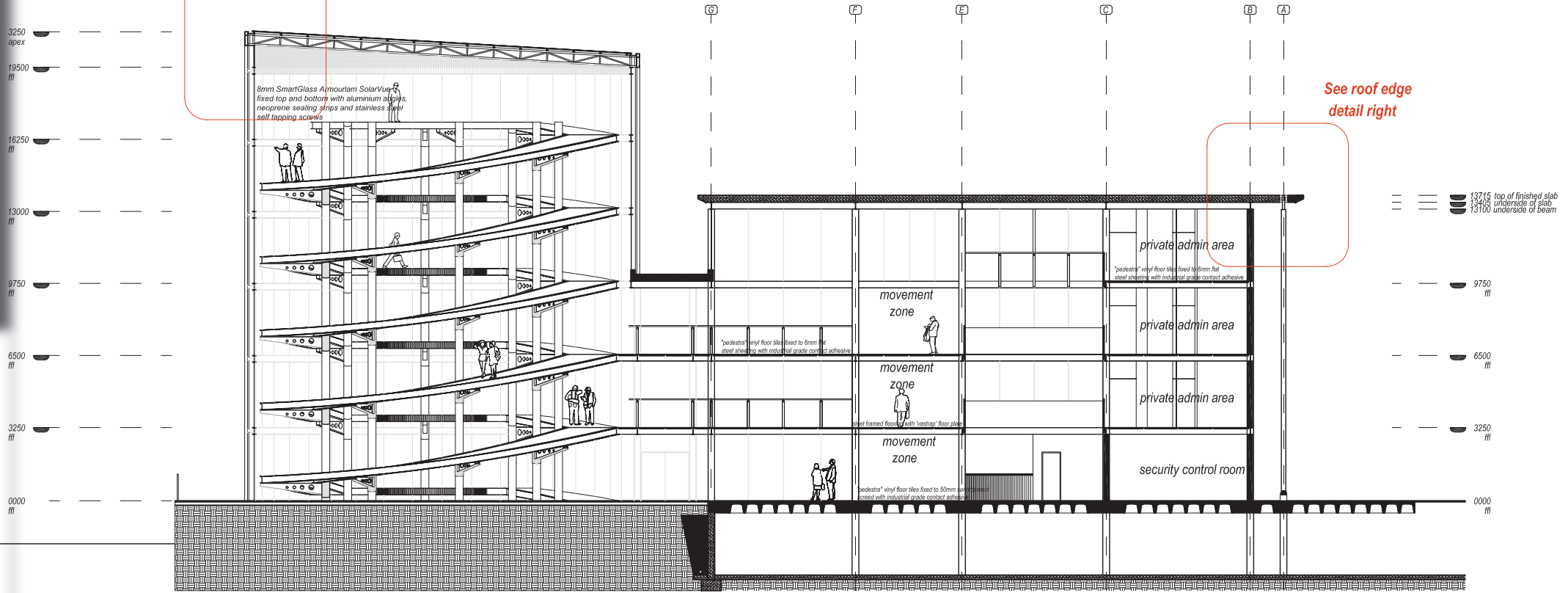
1000

300

**\_longitudinal section v-v exploded**  
**\_scale \_ 1:600**

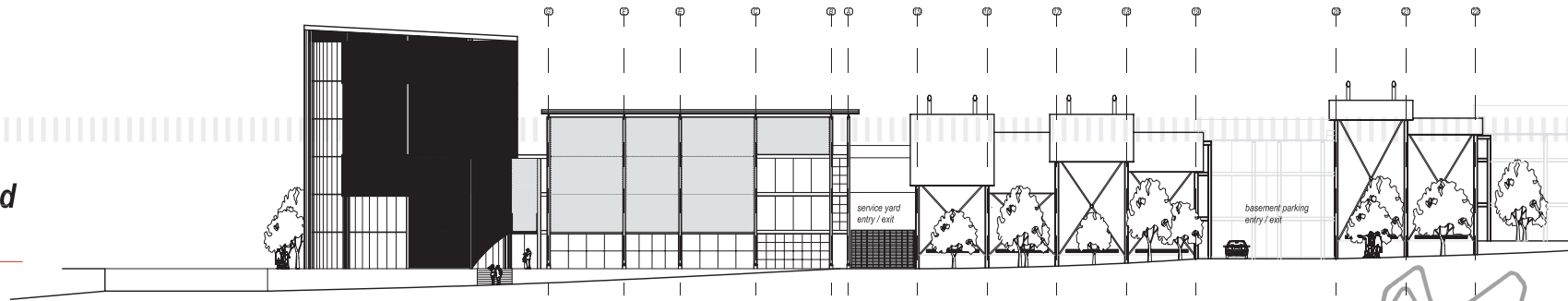
See roof edge detail on following page

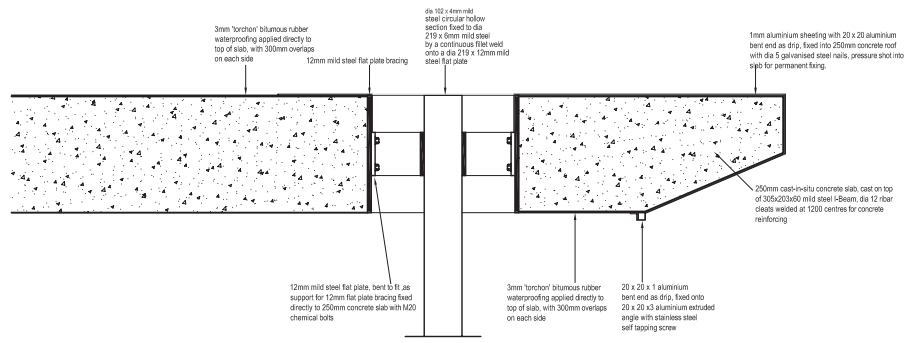
See roof edge detail right



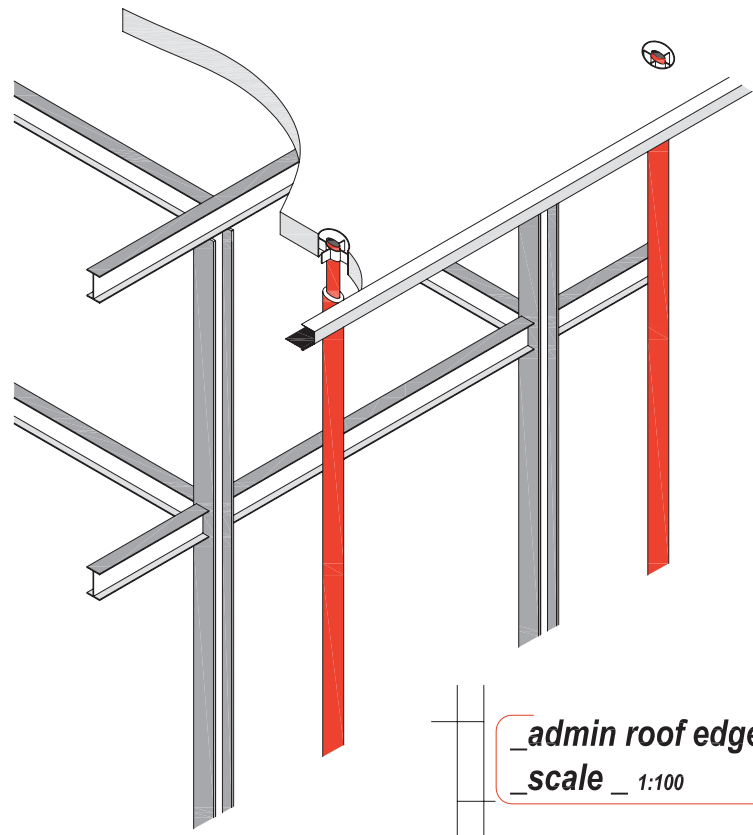
\_section s-s  
\_scale 1:250

\_east elevation\_ exploded  
\_scale 1:600

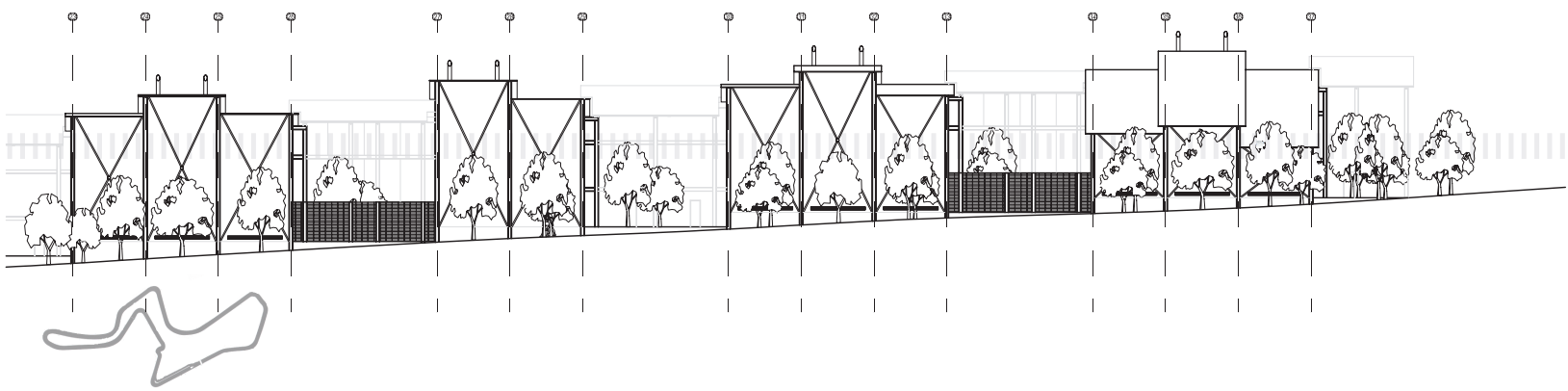




**\_ admin roof edge detail**  
**\_ scale \_ 1:20**



**\_ admin roof edge iso**  
**\_ scale \_ 1:100**







75x50x20x2.5 cold formed lipped steel channel purlins with steel self-tapping screw

152x76x18 mild steel channel top chord of truss

0.6 galvanised steel IBR profile roof sheeting fixed to 75x50x20x2.5 cold formed lipped steel channel purlins with steel self-tapping screw

1mm aluminium sheeting panels for covering IBR and expanded polystyrene, fixed to IBR with aluminium blind rivets and neoprene washer

250x75x20x3 cold-formed lipped channel as rainwater gutter

150x150x5 mild steel hollow section as top chord of circular outer truss

120x55x13 mild steel channel bracing for circular outer truss

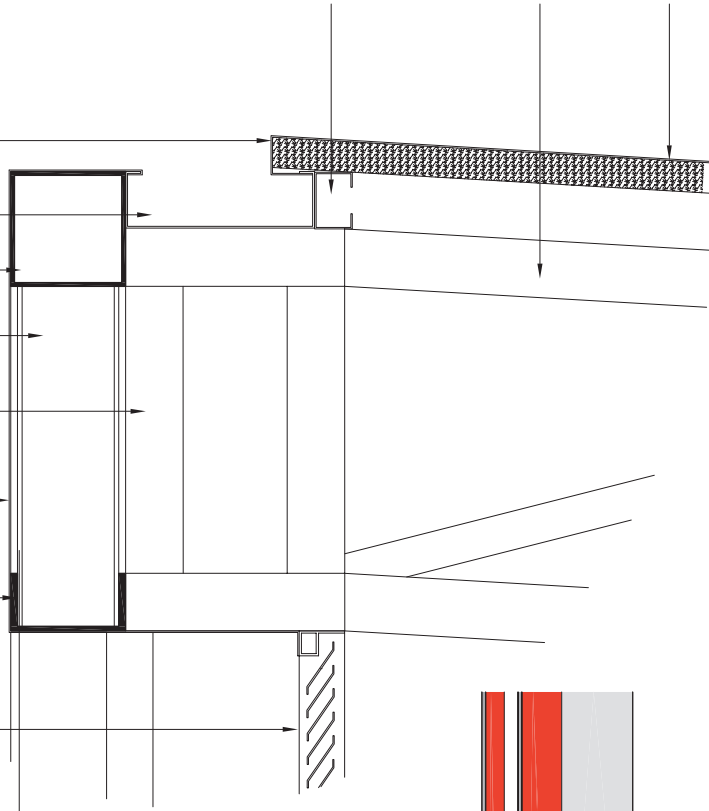
152x76x18 mild steel channel frame for internal crossing trusses

1mm aluminium sheeting panels for cladding of outer circular truss, folded over top and bottom, fixed at 150 centres with aluminium blind rivets and neoprene washer

152x76x18 mild steel channel for bottom chord of circular outer truss

aluminium ventilation louvres fixed to underside of mild steel truss with stainless steel self tapping screws

expanded polystyrene infill in IBR valley for thermal insulation

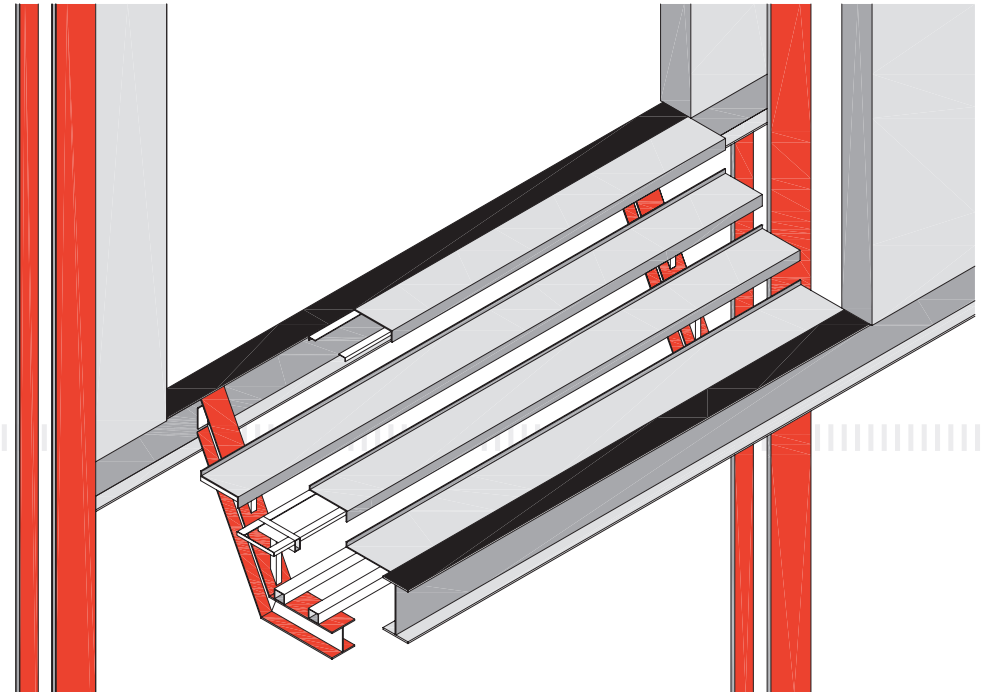


**\_rotunda roof edge detail**

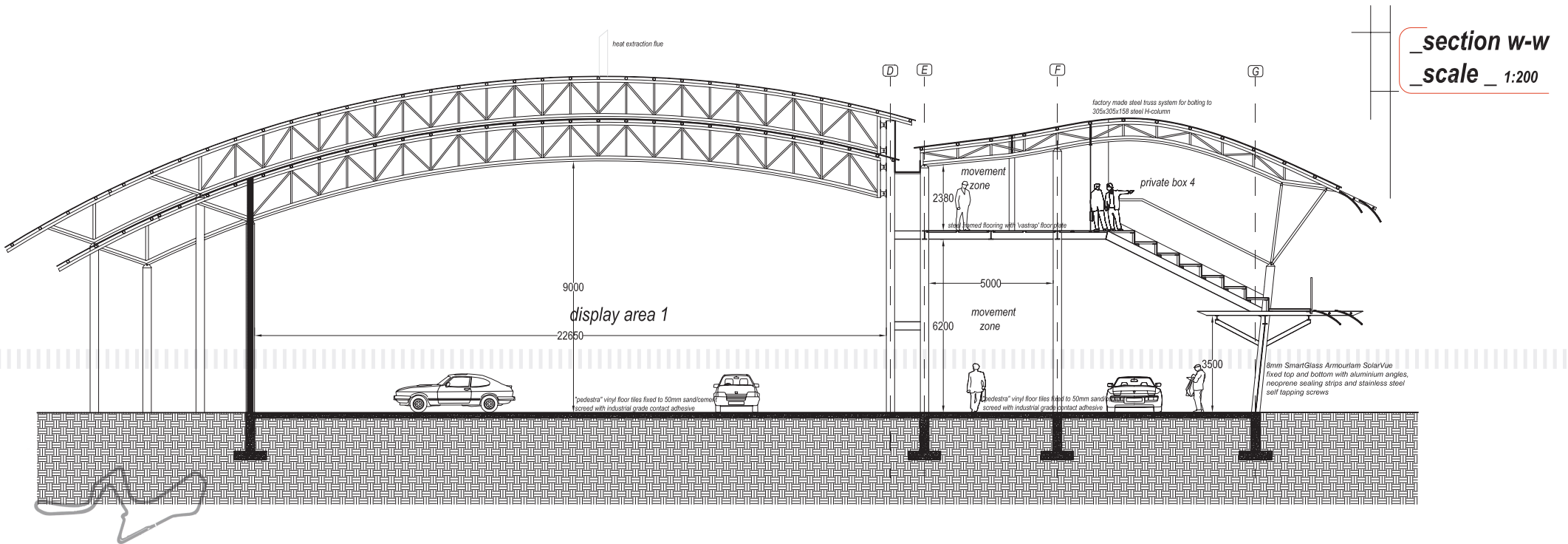
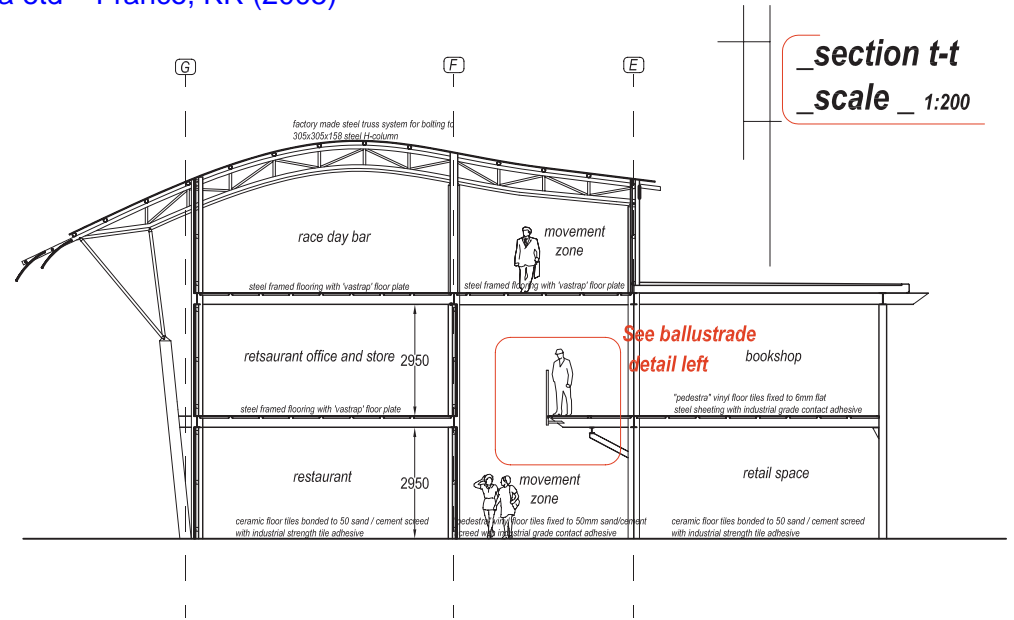
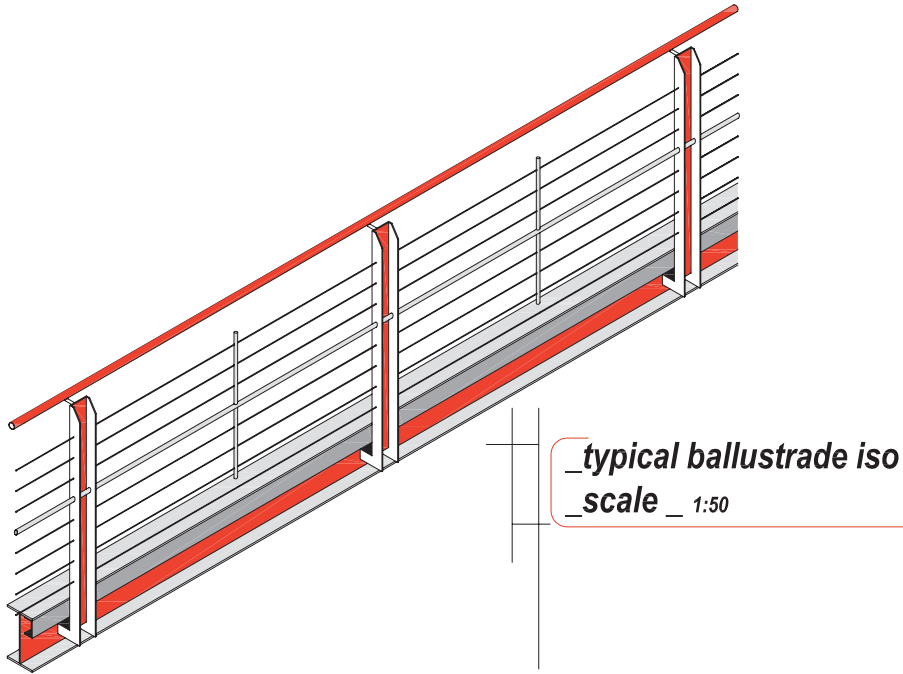
**\_scale \_ 1:10**

**\_typical stair iso**

**\_scale \_ 1:50**

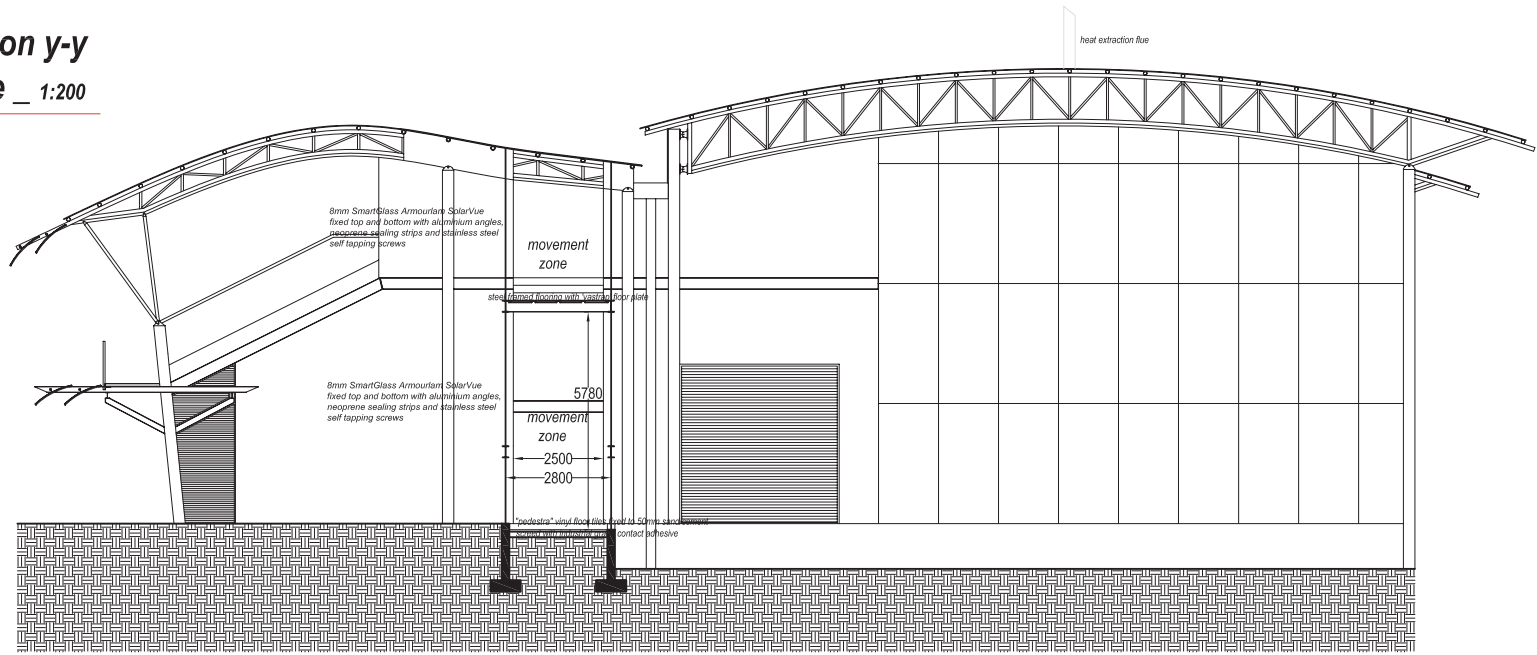




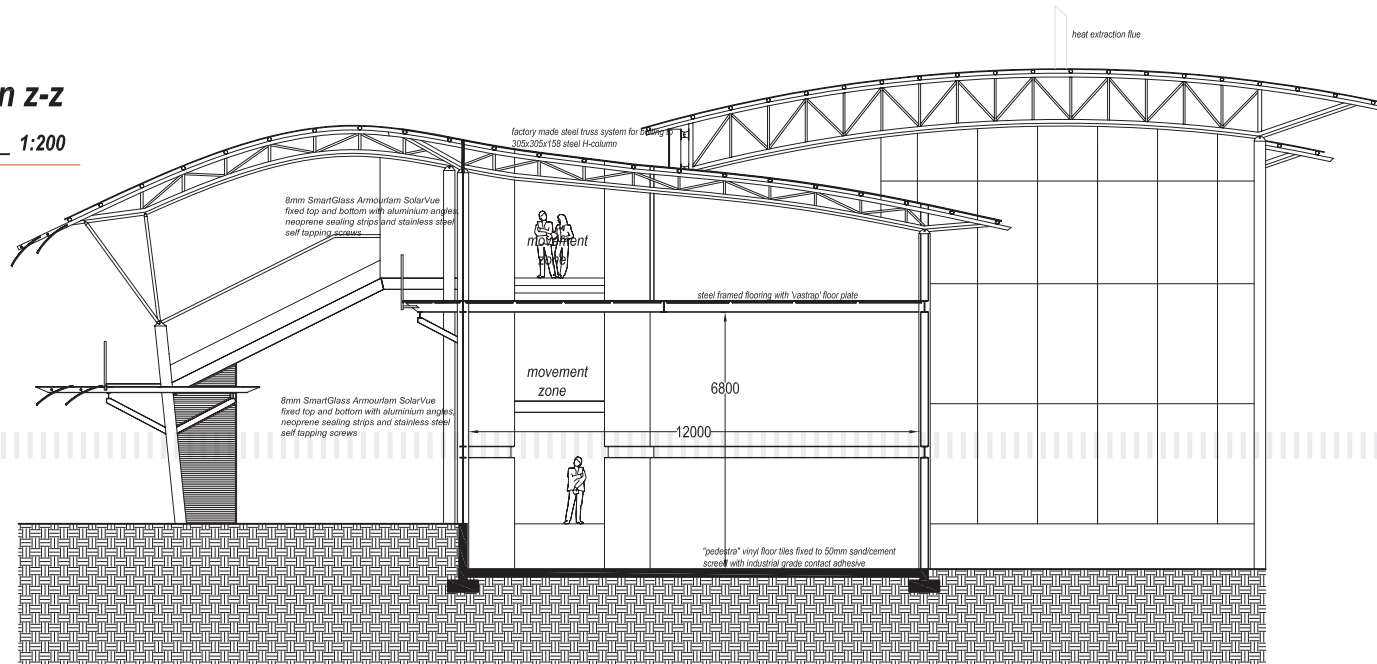




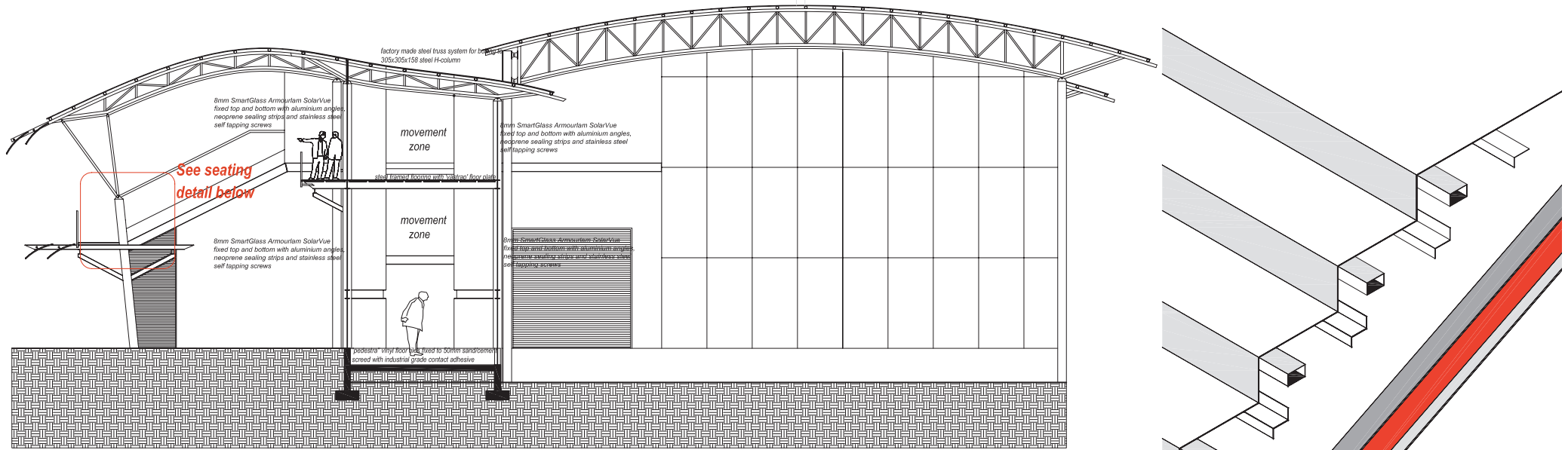
**\_section y-y**  
**\_scale \_ 1:200**



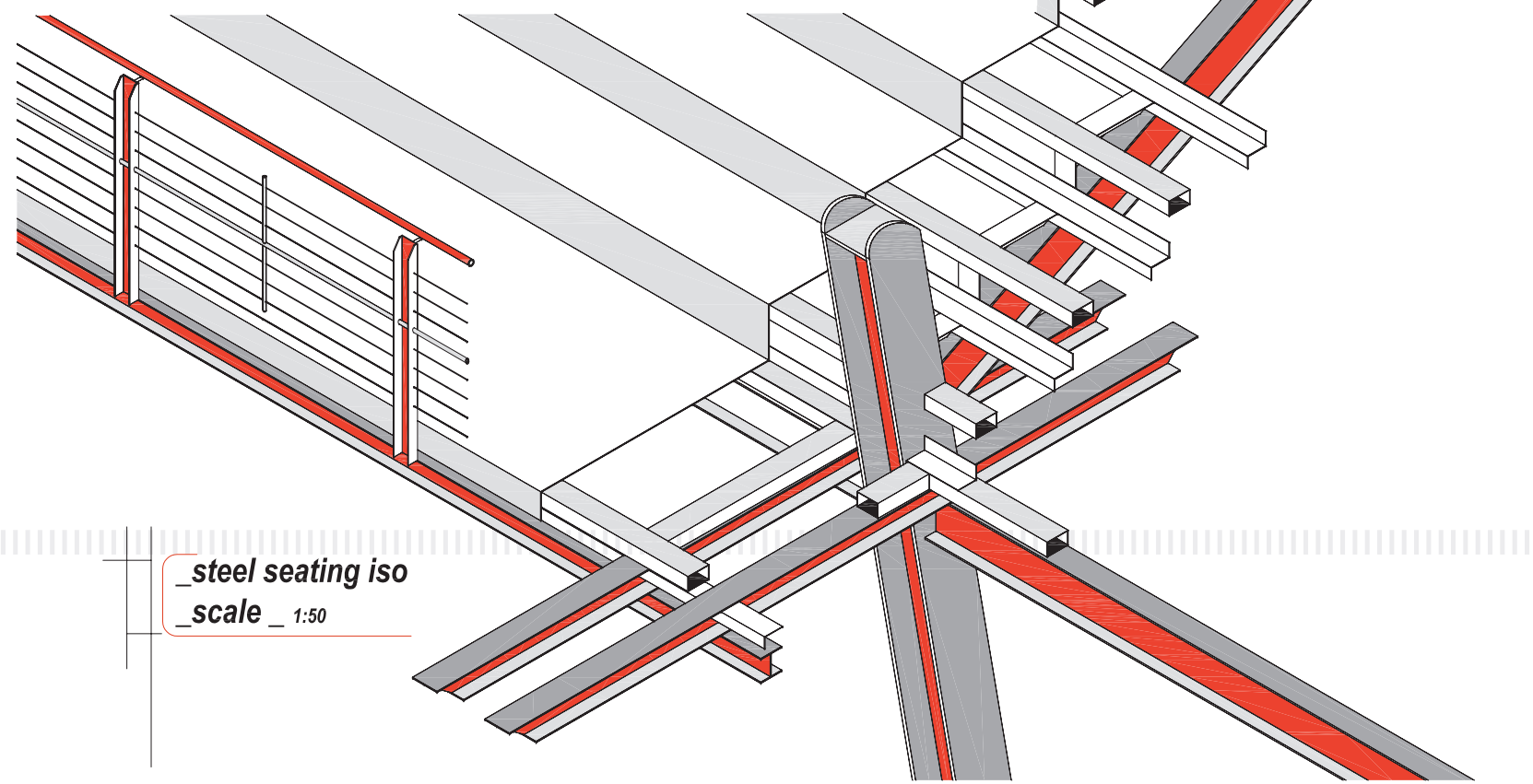
**\_section z-z**  
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**\_section x-x**  
**\_scale \_ 1:200**



**\_steel seating iso**  
**\_scale \_ 1:50**

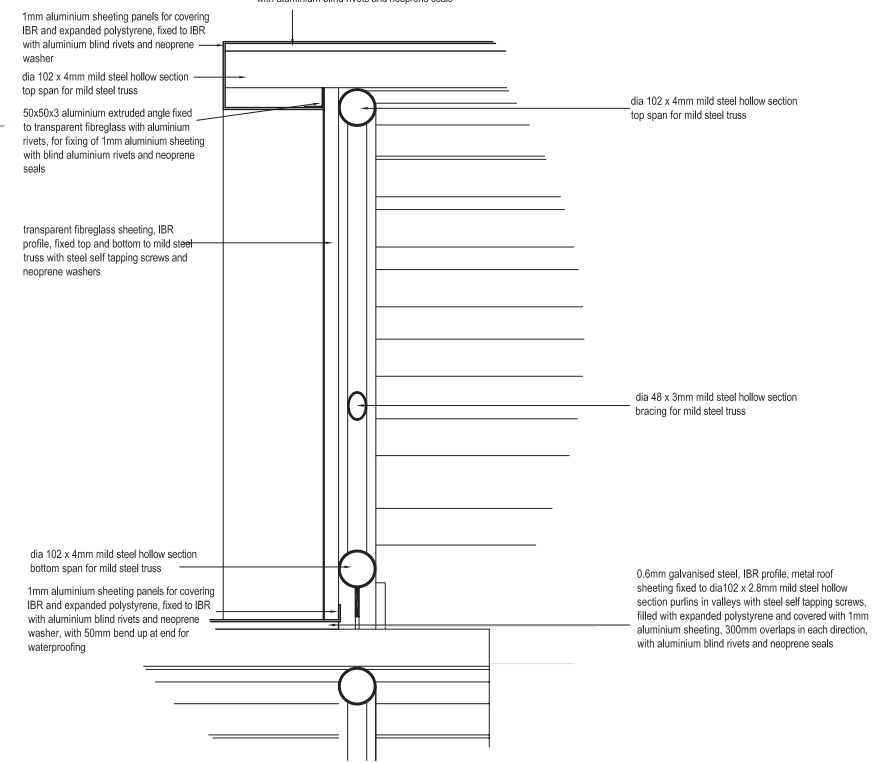




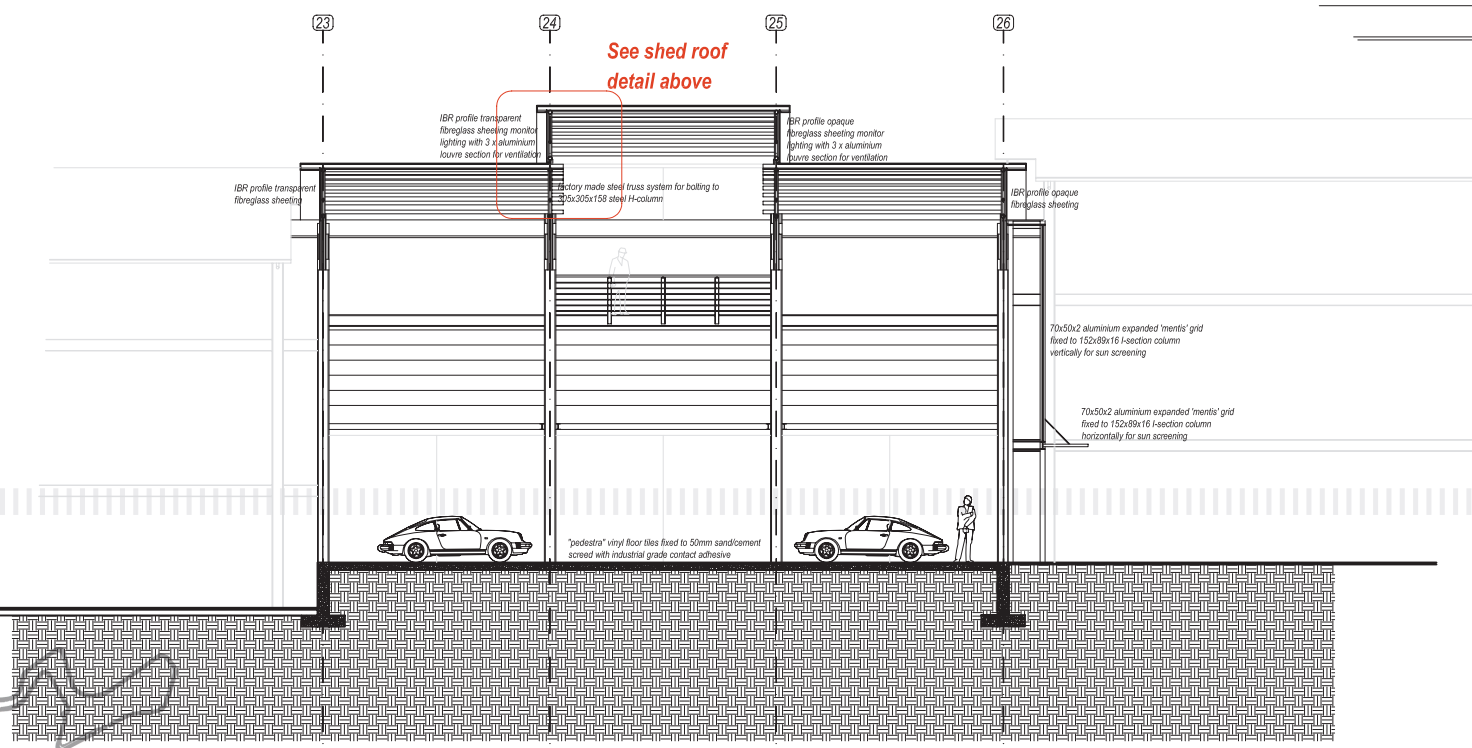


0.6mm galvanised steel, IBR profile, metal roof sheeting fixed to dia102 x 2.8mm mild steel hollow section purlins in valleys with steel self tapping screws, filled with expanded polystyrene and covered with 1mm aluminium sheeting, 300mm overlaps in each direction, with aluminium blind rivets and neoprene seals

**\_museum shed roof detail**  
**\_scale \_ 1:20**



See shed roof detail above



**\_section u-u**  
**\_scale \_ 1:200**





*In conclusion*

The design of a new facility for the development and promotion of motorsport in South Africa grew out of the need for there to be a system in place that will ensure the future of high performance, high speed, adrenalin pumping motorsport while at the same time allowing the passion and legacy of the past to be enjoyed in the present and hopefully the future.

It will establish the link between architecture of the environment and the culture of cars and will be beneficial to both.







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### *Preliminary*

The purpose of setting a baseline for the project is to establish a list of performance criteria needed for the design of the precinct as whole, within the framework, and the individual design proposal. The baseline for this project is based on the Sustainable Building Assessment Tool (SBAT) presented to us by Jeremy Gibberd and a formulation of other goals as determined by the briefing document.

It needs to be understood that the baseline criteria is just a set of guidelines from where to begin the design process and is by no means a final list of requirements for the project. While every effort will be taken to accomplish the goals set in the baseline, certain points will fall away and others will be added as the design progresses.

Due to the nature of the project as set out in the brief, the baseline criteria will be a generalised view of the entire process encompassing the whole project in its entirety as the requirements for the various facilities differ substantially.



### Occupant comfort

The quality of the environment in and around buildings has been shown to have a direct influence on the people who experience this environment. People who are happier have an increased positive effect in the work place. This coincides with sustainability and environmental control. Providing an environment that will aim to enhance the users experience maximizes the likelihood of a sustainable approach succeeding.

#### Lighting

The process of design development will focus on achieving the highest levels of natural lighting for all aspects of the facility as a whole. Where natural lighting is ineffective, direct, source lighting will be used, such as in the museum and the office space. Each aspect of lighting control will be addressed on its own merit and where possible, the end user will have as much control of their direct environment as possible.

#### Ventilation

Natural ventilation of the entire development is to be used to its full potential. This will help with the required air-volume changes and create an internal environment that is free from stale air. The use of mechanical ventilation may be necessary to aid in the extraction of warm air in areas where the velocity of wind flow is inadequate, such as basements, kitchen and toilet facilities.

#### Noise

Due to the nature of the circuit racing environment and the functions that the facility proposes, noise pollution is not of extreme importance. The museum and visitor centre will be spaces that enhance the culture of motor racing and, as such, will use the engine roar as part of this experience. People in the motor racing industry and who are passionate about motor racing will use the office complex. Their involvement in the race meeting is essential to the success of the event and do not generally work in the office on race day.

The zoning for Kyalami is of such a nature that only on sixty-four days of the year, is there allowed to be racing. For the remainder of time the circuit is subdued.

#### Views

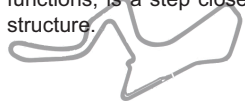
Access to views is of extreme importance to the design development of this proposal. The entire nature of the area, its functions and aesthetic are directed to what occurs on the track. Views will be maximized to the trackside at all interventions and from all vantage points. Public and private spaces will, where possible, share the availability of views to the full potential of both spaces.

#### Access to outside

In the creation of place, the access to the outside environment is crucial in establishing a sense of belonging. The user must feel, at all times, that they are not confined and can move freely from the inside to the outside and back again. Public, semi-private and private spaces must be clearly defined with the access to outside on the trackside fully enhanced.

### Inclusive Environments

Designing inclusive buildings that can be used to accommodate everyone, with a varying degree of functions, is a step closer to environmental change and sustainability and furthers the life span of the structure.



Clearly defined routes throughout the development are to be established and to be created for all users, including the disabled. Finishes of the surface are to be of such a nature that they will not be a danger to the elderly or people in wheelchairs.

#### Changes in Level

The slope of the site dictates that level changes will be necessary. This is beneficial to the design development in that it can be used to create a change in character of the environment, creating places and differentiating between public and private spaces. All changes in level will be designed to accommodate the disabled, either through the use of ramps at an incline of between 1:10 and 1:12 or elevators where ramps are not justifiable.

#### Edges

Definition of edges throughout the facility is important for establishing spaces. This includes the use of different materials at all change in level edges and the creation of an edge on both trackside and roadside, which define the site parameters.

#### Toilet facilities

Public and private toilet facilities must accommodate the maximum amount of users in the different establishments and must cater for the use of the disabled as well. Male and female toilet facilities must be provided and clearly demarcated in public areas, such as in the museum and visitor centre.

#### Public Access

Access to the visitor centre and museum will be completely public access through controlled entry and exit points while the office complex is of a more private nature and access will be through a single reception area. A linkage must be established between the visitor centre and the office complex where the public can experience a movement of progression.

#### Communication

Displaying the function of the facilities is beneficial to the well being of the establishments. This can be done through billboards and well-defined signage, specifically for the museum. It can attract visitors and inform people of new displays and exhibitions. Advertising will play a very crucial role in this regard.

### Participation and control

Decisions regarding the environment of the facilities should be made through participation of the users and the design should assist in user participation. This will ensure the well being of each of the individual's facilities. By being able to control certain aspects of the individual's environment, the user s gain a certain level of satisfaction and personal comfort. For the museum visitor, it could be suggestions for exhibitions or interactive displays. For the office complex it could be being able to open or close a window.

#### Environmental control

The control of the user's immediate environment, specifically in the office complex, will help to ensure a safe and comfortable working environment. This should be done so as to allow the individual ease of access to windows and ventilation openings, at the same time; these personal adjustments should not adversely affect other users. A recycling system should be put into place and the correct areas for the management of this system planned for.

#### User adaptation

Adaptation and flexibility within the entire facility should be catered for. Office space should be manageable and be able to conform to the user's requirements. This could be done through moveable partitioning

and open plan office areas. The museum will cater for a variety of exhibitions and university displays and allow spaces for temporary features, also the opportunity for the user to request specific features.

#### Social spaces

By providing an environment that will exhibit the necessary characteristics of social spaces through a cluster of different units, the user will experience phases of emotion and culture. This can be done with outside gathering areas, specifically designed to group people with like-mindedness. These could be smoking areas in the office complex and open courtyards in the museum where vehicles will be on display outside.

#### Amenities

The provision of a variety of amenities should be catered for to allow for personal taste. These should ideally be located on routes or in social spaces. These could include a coffee shop, a curio shop, vending machines and bar facilities for the user. Provision of parking, on street and basement parking, should be explored for the entire facility.

### Education, health and safety

All facilities need to provide for adequate education, health and safety of their users. Dangers associated with motor sport should be made fully aware to all users.

#### Education

Education is the primary aim of these facilities and through the development and history of motor sport in South Africa and Kyalami itself, will serve the community on a multitude of levels. Emphasis will be on a truly South African motor sport identity.

#### Security

All attempts will be made to ensure that users will not be put in danger and that public users do not disturb private areas. All points will be monitored by visible security and Closed Circuit Television and all private spaces will only be accessed through a car-control management system. In the evenings, all spaces will be well lit and identification of pedestrian routes clearly demarcated.

#### Health

The health and welfare of all users is paramount in the survival of the facilities, particularly the public service areas. As such, all members of staff of the museum and visitor centre should have first-aid training and have easy access to first aid kits. Provision for emergency services parking is crucial and designated spaces for smoking should be clearly defined to the user. All areas inside any building or structure are to be no-smoking zones.

#### Safety

The entire facility will comply with all standards for health and safety a set out by the South African Bureau of Standards.

#### Culture

Many people know of the cultural differentiation of motor sport, but have not been able to experience it completely. This facility will aim to serve that divide by introducing the masses to the culture that is motor sport and the design of the buildings should reflect that culture.

### Local economy

Through the establishment of a new framework for Kyalami Grand Prix Circuit, the possibilities of stimulation for the local economy are far-reaching. This can be sustained through the use and development of local skills and resources.

#### Local Enterprises

These include the use of local contractors and sub-contractors, local building material suppliers and local component manufacturers situated with the Greater Midrand area. All materials for construction will have to be sourced from within Gauteng and, where necessary, specialized aspects of all building work will be outsourced.

#### Outsource opportunity

Through the establishment of the new framework and specifically the Facility for development and promotion of motor sport, the opportunities for outsourcing of various components are created. These components include aspects of cleaning, maintenance and security. Local suppliers from these trades will benefit greatly from the development and only in specialized fields will business from outside Midrand be considered.

#### Repair and Maintenance

With the guided principles of using local enterprises in a majority aspect of the design development, the repair and maintenance components will only benefit. Local enterprises ensure that these features are easily accessible whenever necessary. By using materials and components that are relatively maintenance free, with the inclusion of passive heating and cooling techniques and limiting machinery, problems should not occur.

### Efficiency of use

Effective and efficient use of buildings will not only limit the number of buildings needed, but also aim to serve sustainability, limit costs and reduce resources needed. Efficiency of use ensures the maximum financial gain for the building and support the network that aims to support the community.

#### Useable space

Maximum utilization of space that is beneficial to the nature of the establishment is crucial. Where possible, methods of alternative income gain for the facility should be explored and only the utmost essential space needed for service areas is suggested.

#### Space usage

The provision of areas that could be used for more than one function should be explored. This will eliminate the degradation of certain areas of the building units and also serves as alternative methods of income, such as the café area supporting evening functions and the auditorium in the office complex being used for seminars.

#### Technology

Communication and information technology points must be accessible to all employees to enhance the work productivity and the use of technology in the museum will serve to educate the user of motor sport in other areas around South Africa and the world.

#### Mixed-use development



The nature of the design proposal suggests a mixed-use development that will encompass office space, entertainment, retail space and educational facilities. Many of these areas will also serve to promote other functions as they are required. Areas for housing and high-density apartments are provided for within the larger Kyalami Grand Prix Circuit framework and are not deemed to be necessary for these facilities.

**Adaptability and flexibility**

Buildings that feature adaptability to change and flexibility overtime are instrumental in the sustainability cause. This is an aspect that will ensure a longer life span for the structure and reduces energy requirements over the long term.

Vertical dimensions

All spaces should be designed for the essential requirements of the current functions, but should also cater for future possible functions – floor to ceiling heights for the different facilities are to be guided by the following dimensions:

- Entrance foyers and receptions on ground floor: 4500mm minimum
- Offices: 2700mm minimum
- Museum: 6000mm minimum
- Basement Parking: 2700mm minimum

Internal partitioning

Internal portioning structure will be designed so as to not be load bearing and as such has no influence on future possible functions for the establishment. Within the museum, moveable partitioning will be employed to allow for flexibility of exhibition space. Only specific service areas will not be flexible.

Service areas

Ease of access to hidden service areas such as electrical, sewerage, HVAC and communication zones is essential in allowing for maintenance and alterations if necessary, but should not be of such a way that public users have direct access.

**Ongoing costs**

Even more demanding than capital costs is the effect that ongoing costs have on a building and the design of the buildings should alleviate, where possible, these costs through the correct material selection and management procedures.

Maintenance

Through the correct selection and specification of materials, maintenance can be kept to an absolute minimum and reduce the need for disturbance to all of the facilities. Low-energy, long life elements should be introduced into the design development wherever possible.

Cleaning

Cleaning of the facilities is important in portraying a highly successful image and the chance to promote the local economy can be enhanced in this regard, not only for this specific facility, but also for other establishments within the framework. The choice of materials in the design development should promote low maintenance and high durability with ease of access to all elements that will require cleaning.

Security

The design of the facility should ensure highly visible aspects from a variety of control points and through methods of physical patrol and technology, through the use of CCTV, security will also have a role in the local community upliftment. The environment within the proposed framework for Kyalami Grand Prix Circuit is envisioned as a controlled one and as such the security for the facility will fall within the larger scheme.

Insurance/water/energy/sewerage

These are factors that are largely uncontrollable to a certain degree. The nature of the proposed facility is such that insurance for the museum will be relatively high. Water can be controlled through the use of low flush mechanisms in toilets and automatic cut-off valves on hand basins. Alternative methods of water collection and energy production can be explored. As there are no possibilities for recycling in the proposed framework, sewerage will flow directly into the municipal collection points.

Disruption and downtime

These are aspects that cannot be avoided, but the effects can be minimized through ease of access to all service areas, thereby avoiding maximum disruption to the users. The design of the museum area should include the possibility of closing sections to allow for new exhibitions to be created without disturbing the entire facility.

**Capital costs**

The cost involved in establishing a new building is very high and, as a result, it is often one of the most valuable assets that a person or organization has. By providing a building that is sustainable, or at least partly sustainable, it creates funds in the long run that can be spent in other places, such as development and education of the youth. With an establishment of this nature, the involvement of the Government and NGOs is crucial to its future. The capital outlay for these facilities will be covered by a collaboration of the government, NGOs and sponsors whose passion in the motor sport is evident.

**ENVIRONMENTAL ISSUES**

**Water**

The use of clean, fresh water in today's society is a necessity. It is required by a large number of activities that, more often than not, waste it considerably. Through the use of many techniques, water consumption can be brought down to minimum so as to alleviate the need for excessive municipal supply. Water requirements for this project will, as a standard, be at a minimum, but efforts for the larger framework can reduce the demand.

Rainwater

With the collection of rainwater from the roof systems and storing it in tanks, a large percentage of municipal can be eliminated. The stored water can be used to supply toilet cisterns and for watering the landscape. During the dry, winter period it will be necessary to increase the municipal supply and alternatives like boreholes should be looked into.

Water Usage

The greatest percentage of water consumption in this facility will be in the toilets. With the use of low-flush mechanisms in the toilets and flow restricting taps, this can be brought down to a minimum. The tenants of the coffee shop and bar will be advised on saving water and a possibility of a lowered rental rate could be put into place if the process is successful.

Run-Off

To assist in excessive run-off of water during the wet, summer season, the use of soft landscaping against hard surfacing should be investigated so as to allow the water to penetrate the surface and re-supply the ground water system.



## Planting

Planting of indigenous species is a prerequisite. It not only contributes to the local character of the site, but local species have also got a lower water requirement than the exotics.

**Energy**

With the idea that buildings consume approximately 50% of all energy produced, alternative means of energy production should be researched. This not only decreases the demand on conventional energy supply, but also reduces ongoing costs for the facility.

## HVAC

Passive techniques of air supply and extraction should be researched and implemented and only where necessary will mechanical means be put into place. The use of heating and cooling devices that are required must be specified as low energy and placement within the facility should be designed so as to allow user control over their immediate environment and not to create uncomfortable spaces for other users.

## Renewable Energy

Alternative methods of energy production are a necessity in today's society and through facilities such as these- education of the public can take place. Solar power should be investigated to supply electricity to extraction units within the facility and possible solar geysers for the heating of water.

## Natural Light

Orientation of the site is defined predominantly by a western façade. This is due to the site facing the track on the western side. All possible measures should be taken so as to minimize the effect of western sun in the afternoons through the use of shading devices. Attempts must be made to ensure that the view of the circuit is not interrupted with the inclusion of these shading techniques. Measures will be taken to allow for as much natural lighting as possible throughout the entire facility.

**Materials and Components**

During the construction process, materials and components will be needed to create the facility. Many of these will require large amounts of energy to produce. Through the correct selection and specification of materials and components, the energy demand in creating the facility can be reduced.

## Embodied energy

Criteria for selection of materials will include the embodied energy of that specific material. No targets will be set as the possibility of recycling the material could outweigh the initial embodied energy requirement.

## Components

All components that are specified should be of long life-low energy types and only where there is no other available alternative, can other products take their place. Artificial lighting throughout the facility will be specified with low energy light fittings.

## Recycling

Specifically in the office environment will a recycling programme be put into place. The design should take this into consideration and allow for possible areas of collection of recycled material.

The architectural character of many buildings today does not respond even remotely to the context of its surroundings. Vernaculars of the local context need to be addressed correctly and initiatives need to be put into place that represents the true culture of its location. In this proposal, recognition must be given to motorsport and the motor racing culture as its highest priority. The architecture must be a representation of what motorsport is.

A link between architecture and the culture of motorsport has already been established and needs to respond to the context of the current situation. The goal of the design proposal must be to create an architecture that will display the middle ground between the "old world" grand prix circuit and the "new world" racing formula. It must be an architecture that serves to enhance.

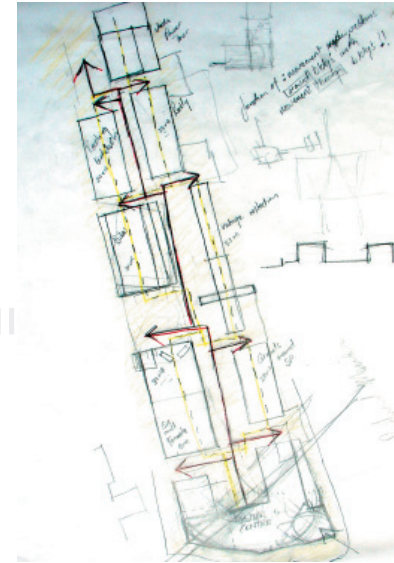
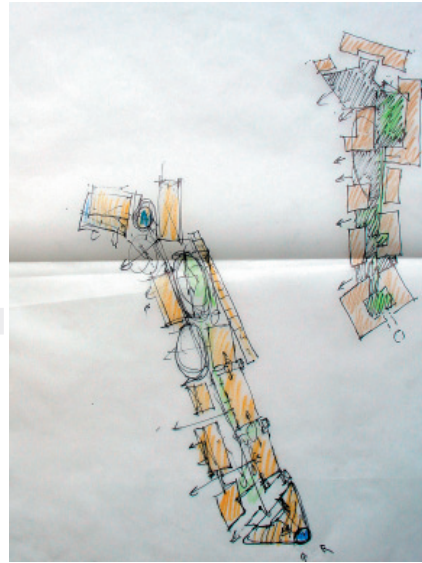
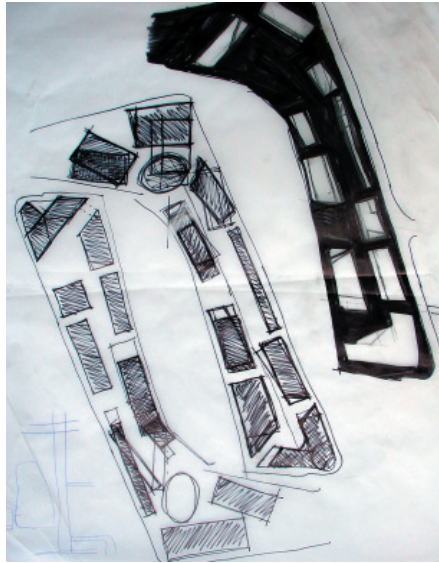
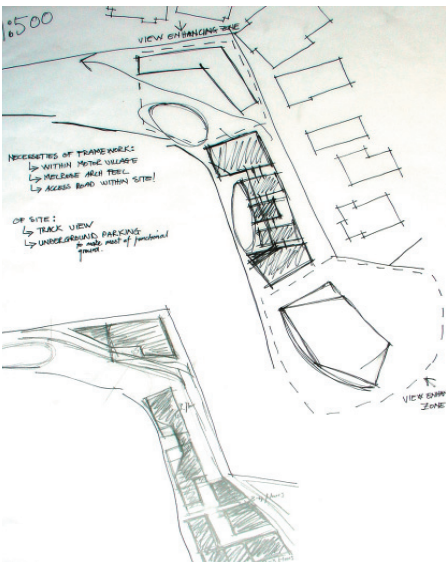
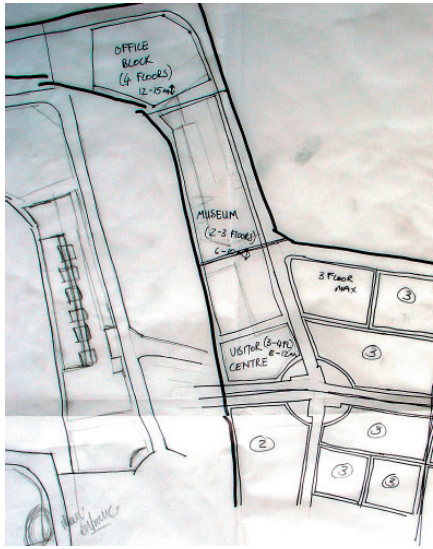
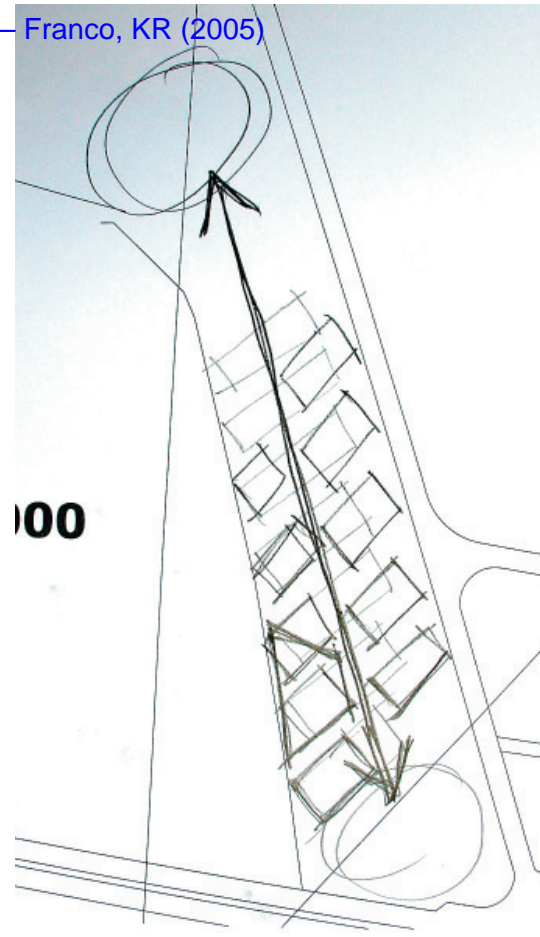
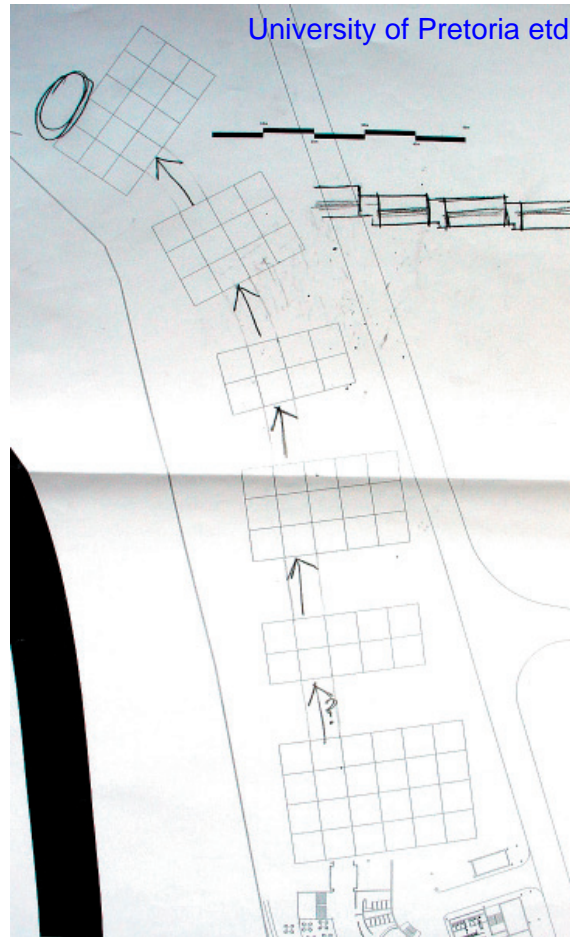
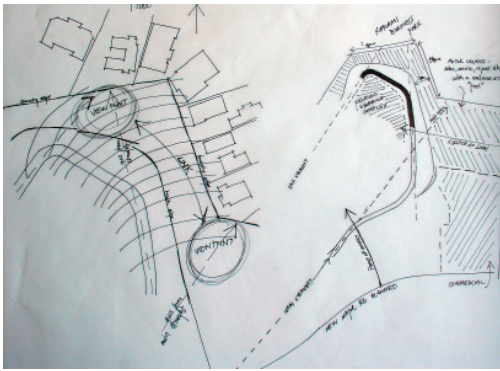


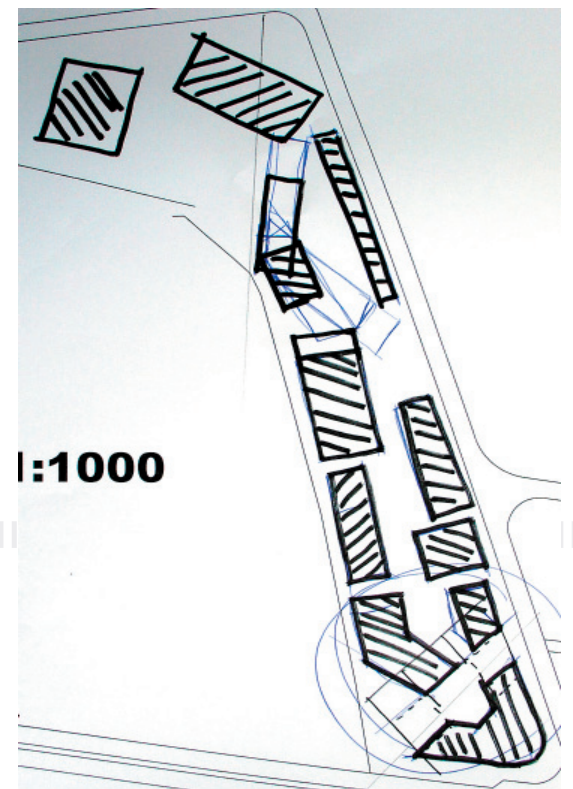
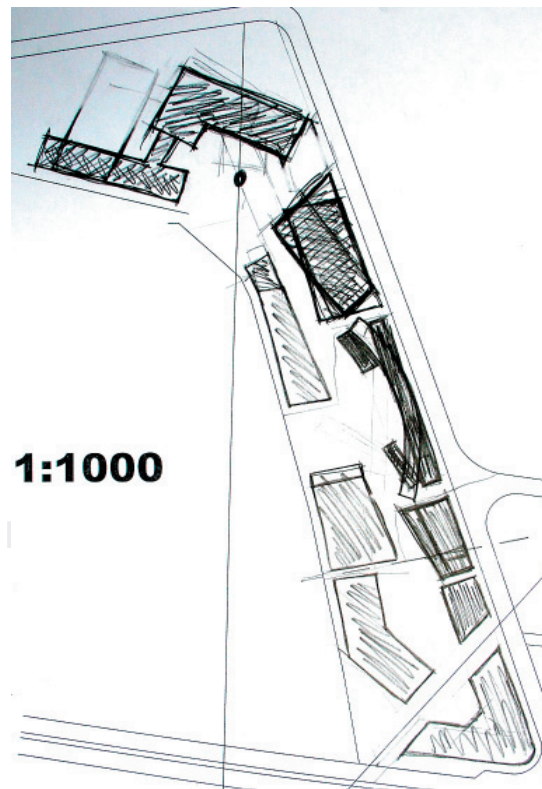
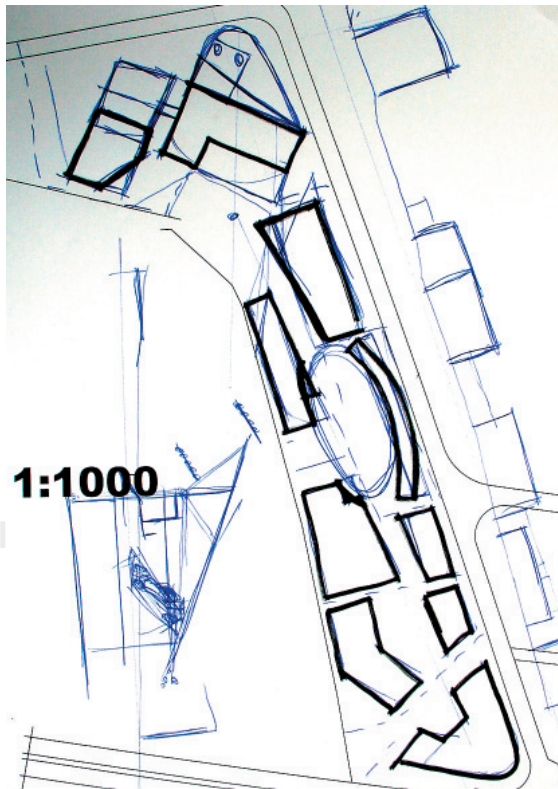
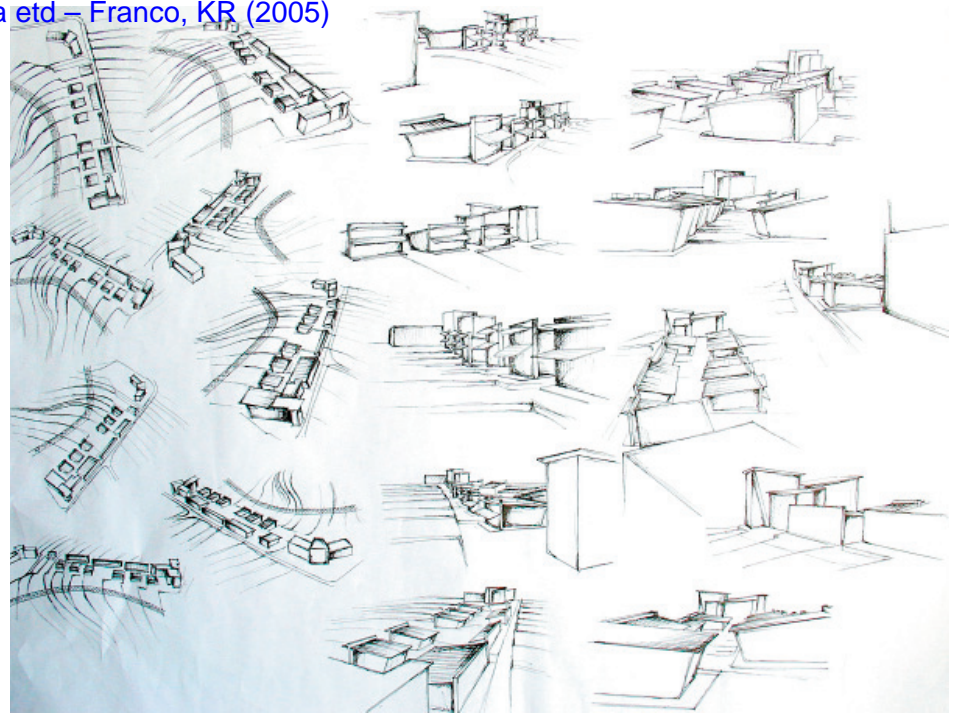
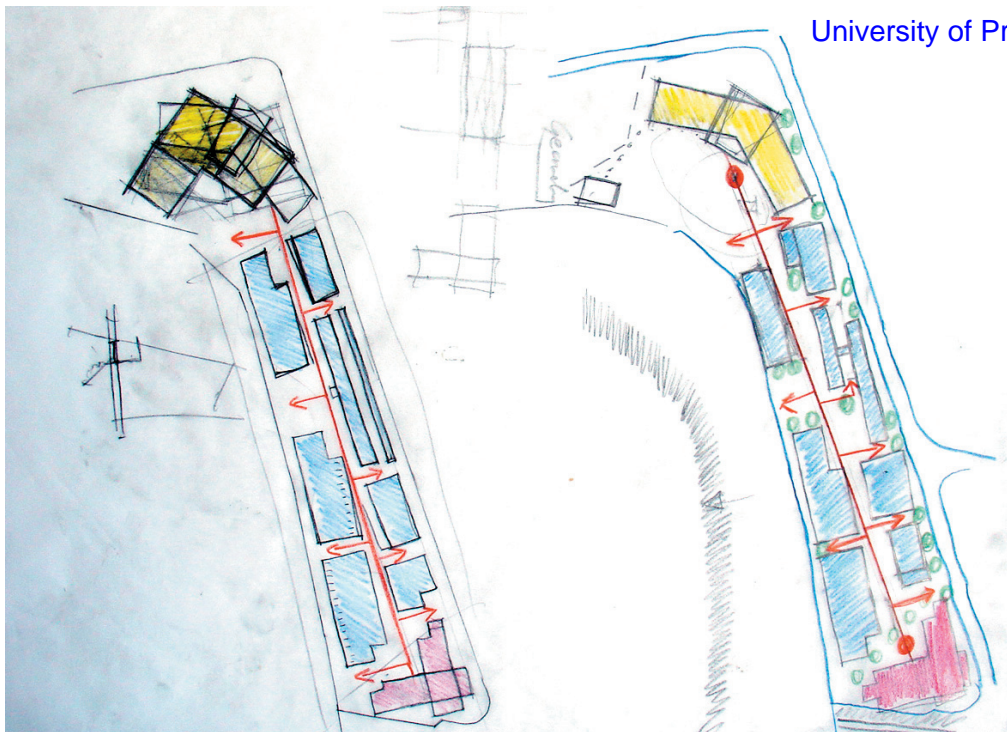
Application	Zone	Quantity	Area/Unit	Total Area	Lighting requirement	Airflow requirement
		unit	Sq/m	Sq/m	lux	L/s
Private office	Private	11	12	132	300	5
Open Plan office	Semi-Private	1	34	34	300	5
Meeting rooms	Semi-Private	1	34	34	300	5
Reception/Waiting area	Semi-Private	4	16	64	200	3.5
Staff lounge area	Private	3	15	45	200	3.5
Retail	Public	12	21	252	300	7.5
Toilet Facilities	Private	15	1.4	21	100	25
_units are number of toilets/urinals _totals include facilities for the disabled	male	9				
	female	6				
	Public	87	1.4	122	100	25
	male	57				
	female	30				
Areas of Movement	Public			2275	100	5
Museum display area_1	Public	49	18	882	200	3.5
_units are per car _area/unit is a module of 6m x 3m per car	2	17	18	306	200	3.5
	3	24	18	432	200	3.5
	4	15	18	270	200	3.5
	5	25	18	450	200	3.5
	6	34	18	612	200	3.5
	Museum Workshop	Semi-Private	15	18	270	300
Private Boxes	Private	17 boxes	15	255	100	
Seating area in box	Private	24 seats/box	0.85	408.85	100	5
_units are per seat _area/unit is a module of .85m <sup>2</sup>		17 boxes				
Public Seating area	Public	430 seats	0.7	301	100	5
Restaurant_ seating area	Public	4ppl/table	0.85	102	200	5
		30 tables				
_Kitchen/wash up/bar	Private			63	500	17.5
_Office/staff area/store	Private			45	300	5

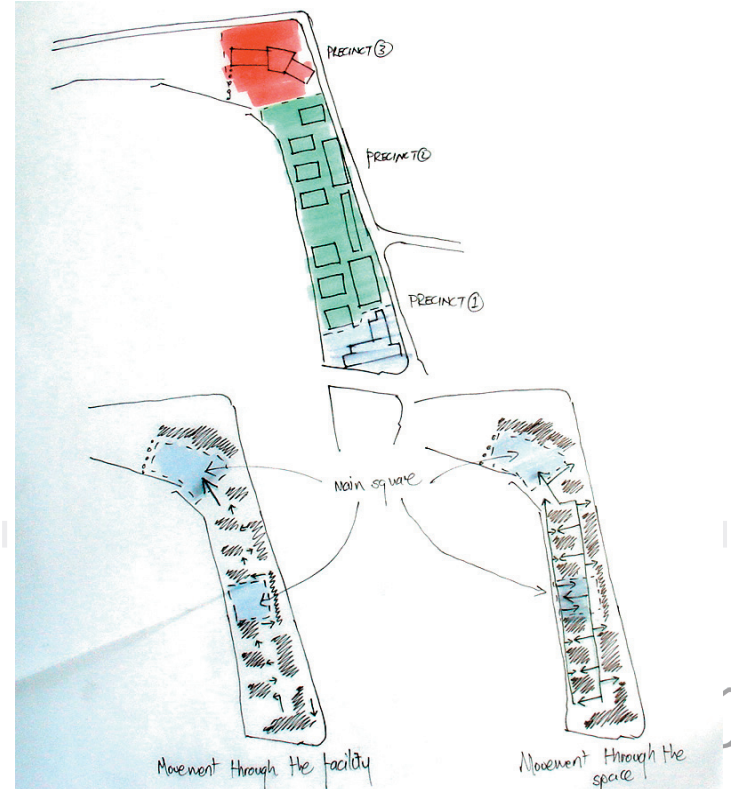
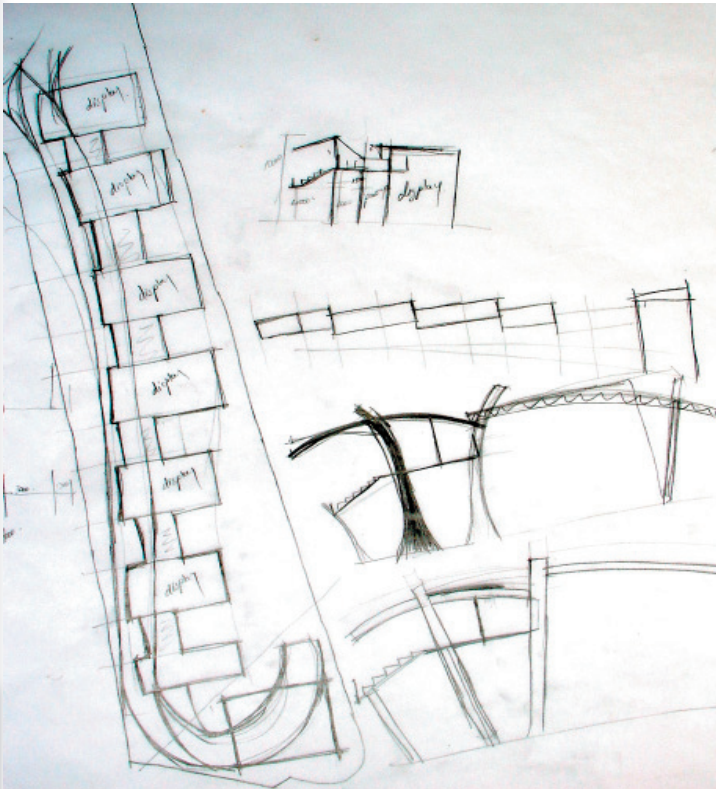
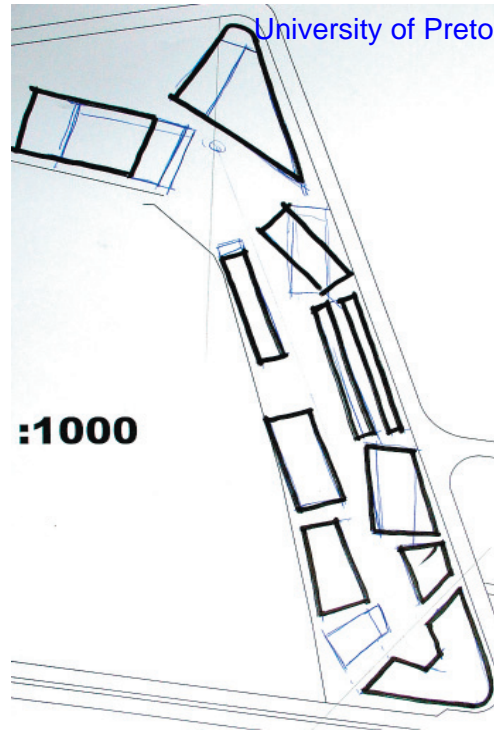
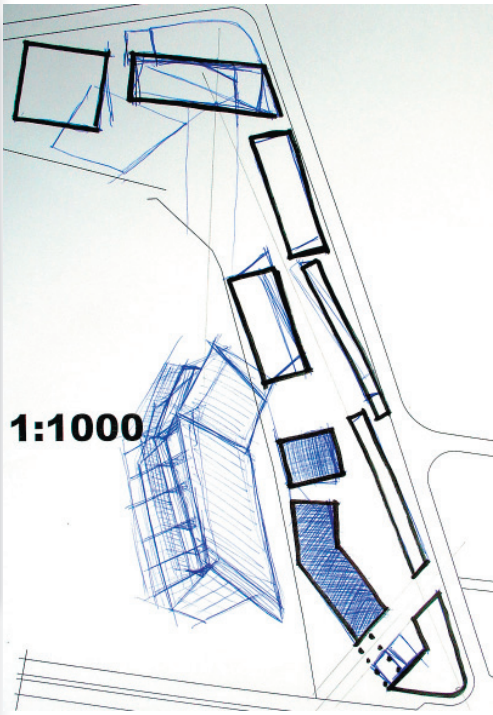
**\_ lighting and ventilation**  
ventilation values were obtained from SABS 0400 [pg112-113],lux lighting values are recommended values obtained in Neufert- Architects' Data (third edition) [pg149]

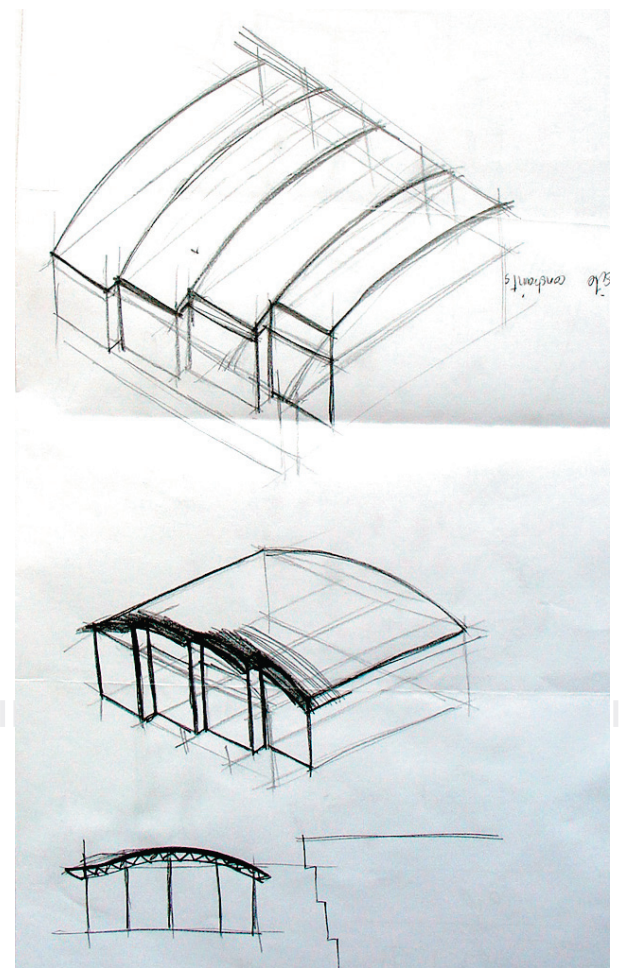
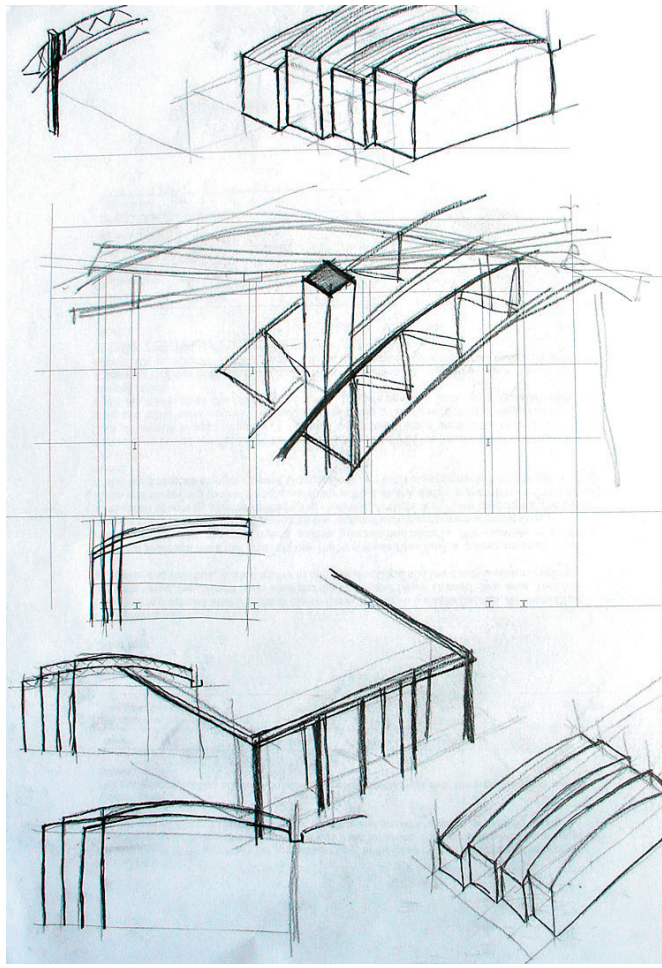
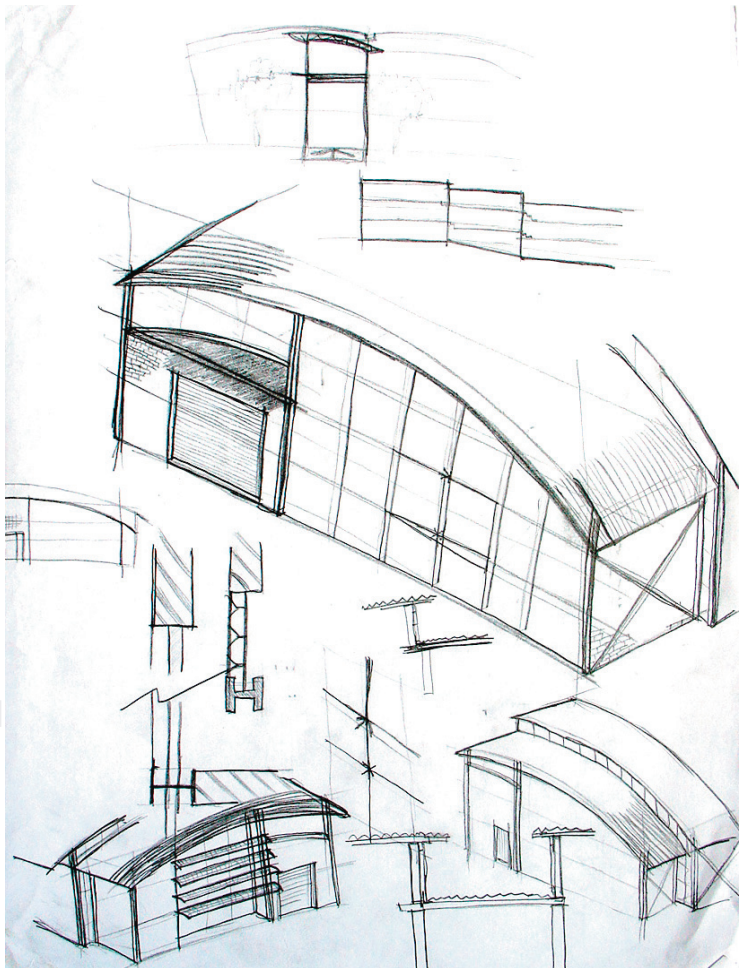
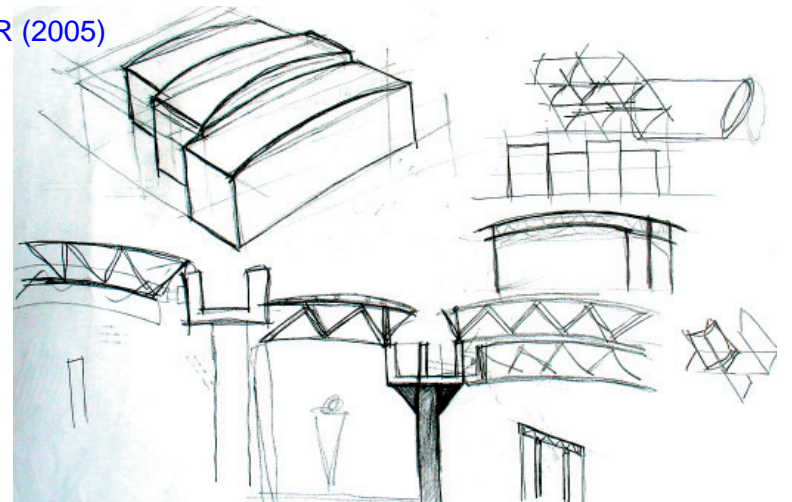
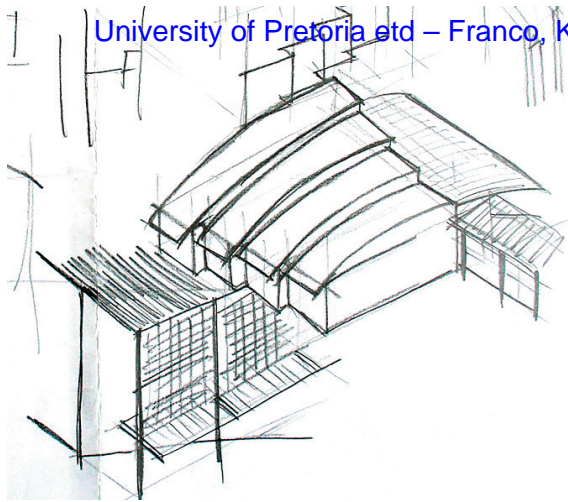
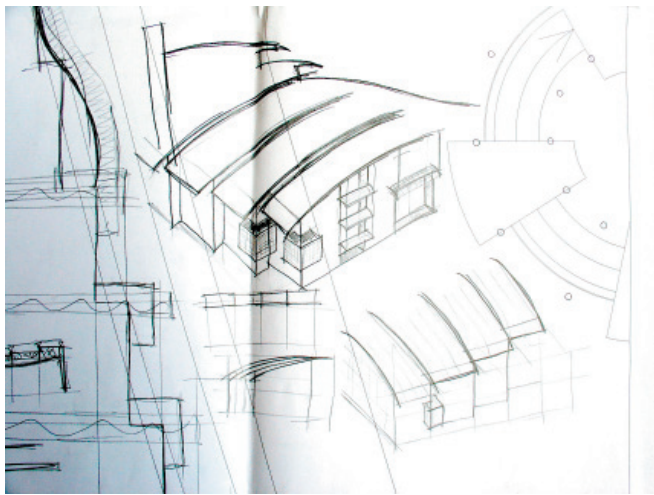


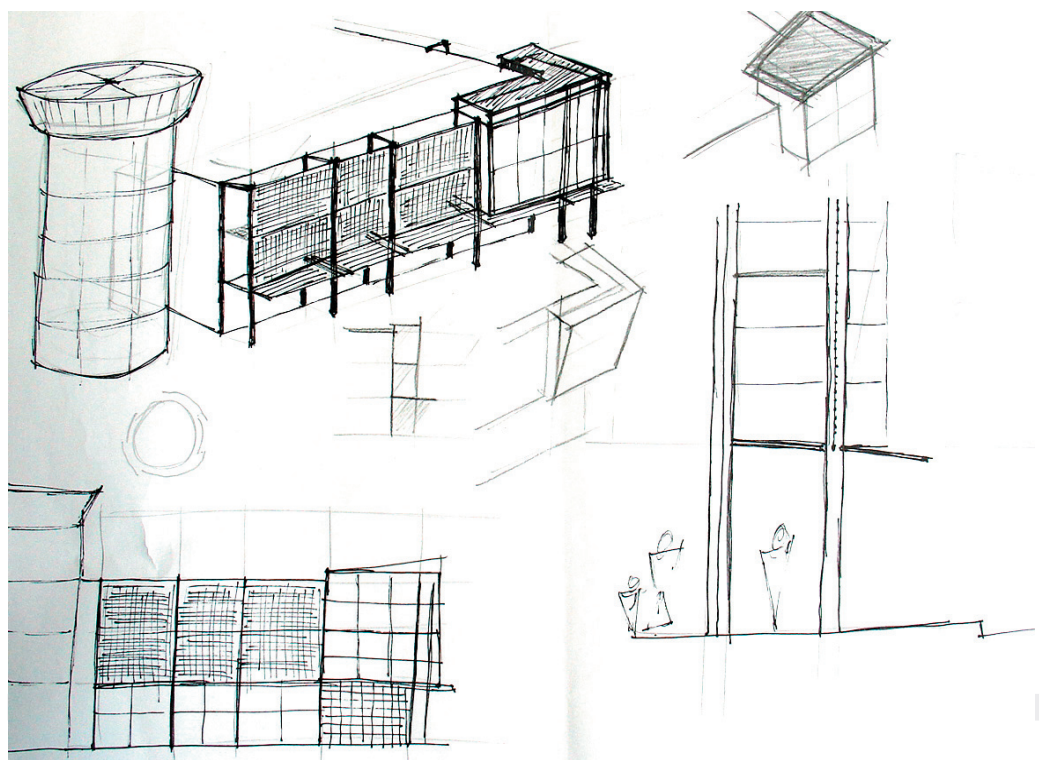
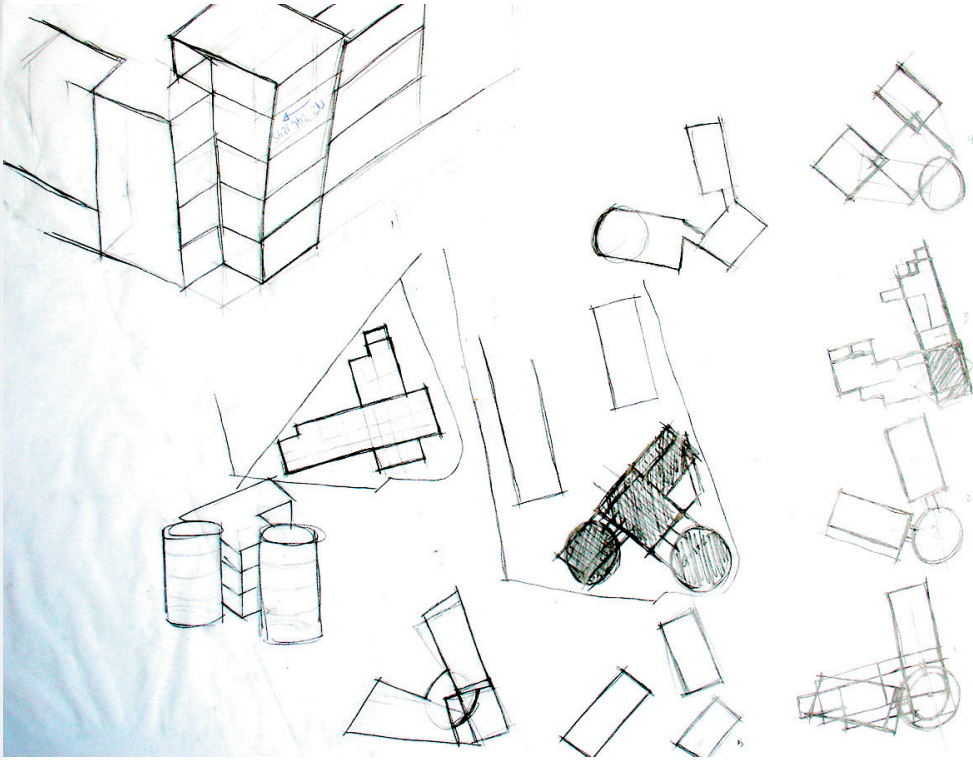
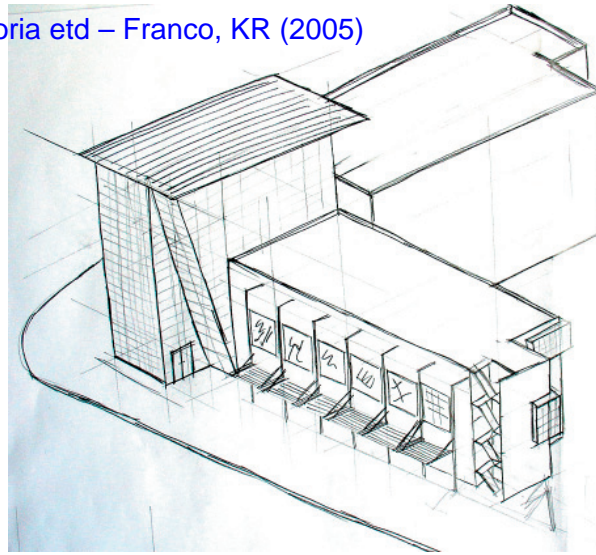
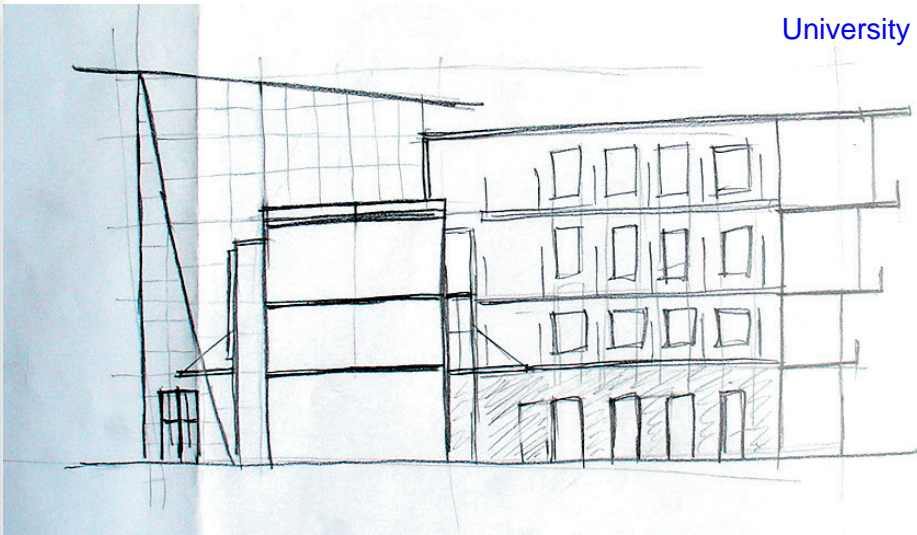
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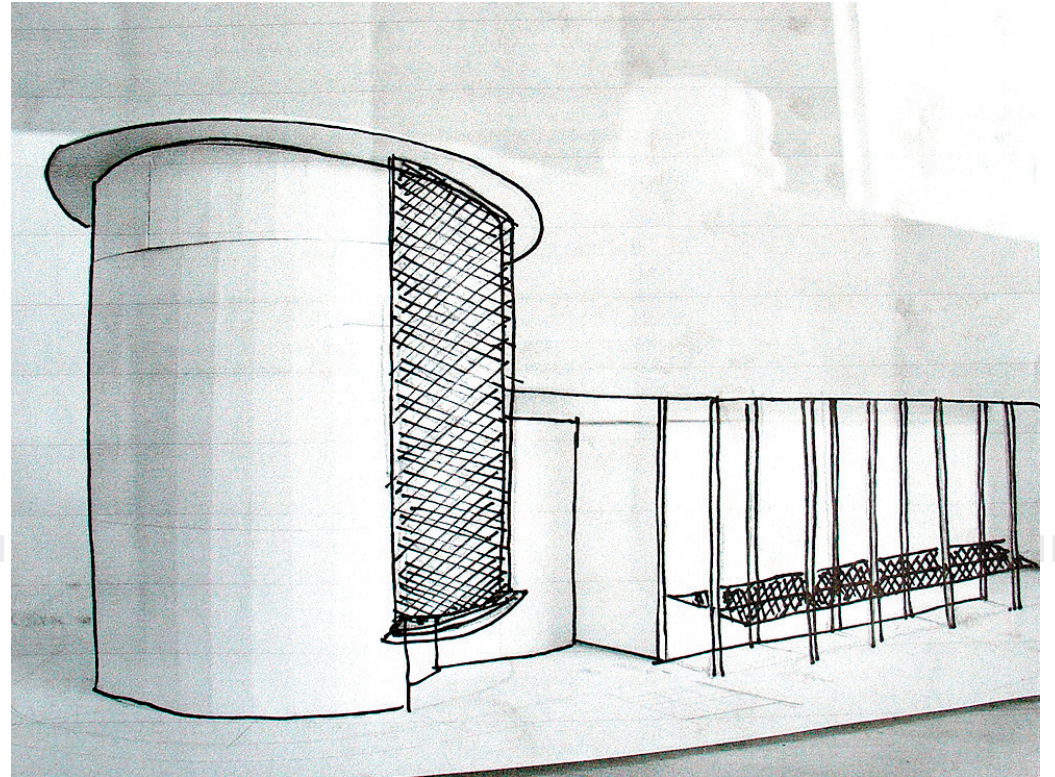
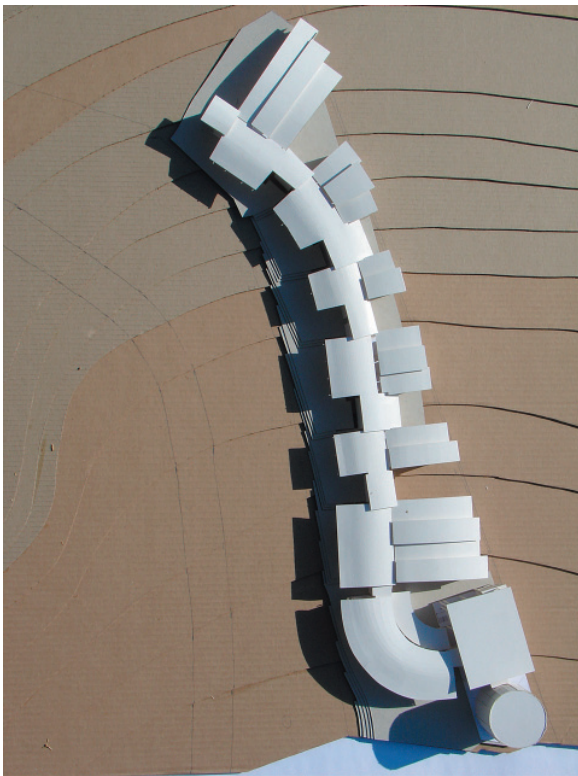
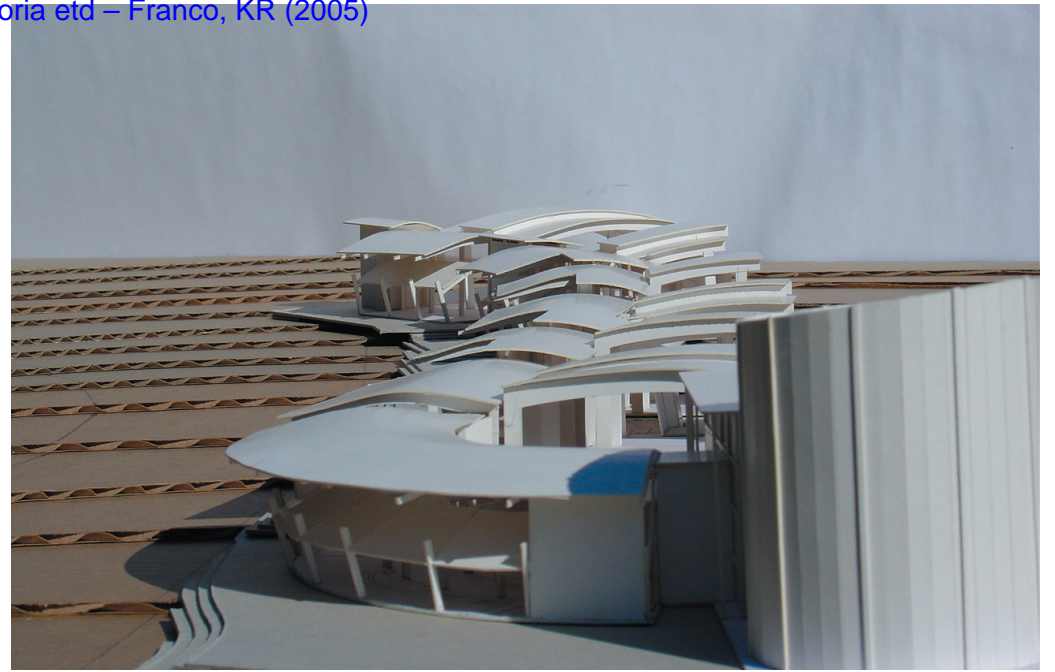
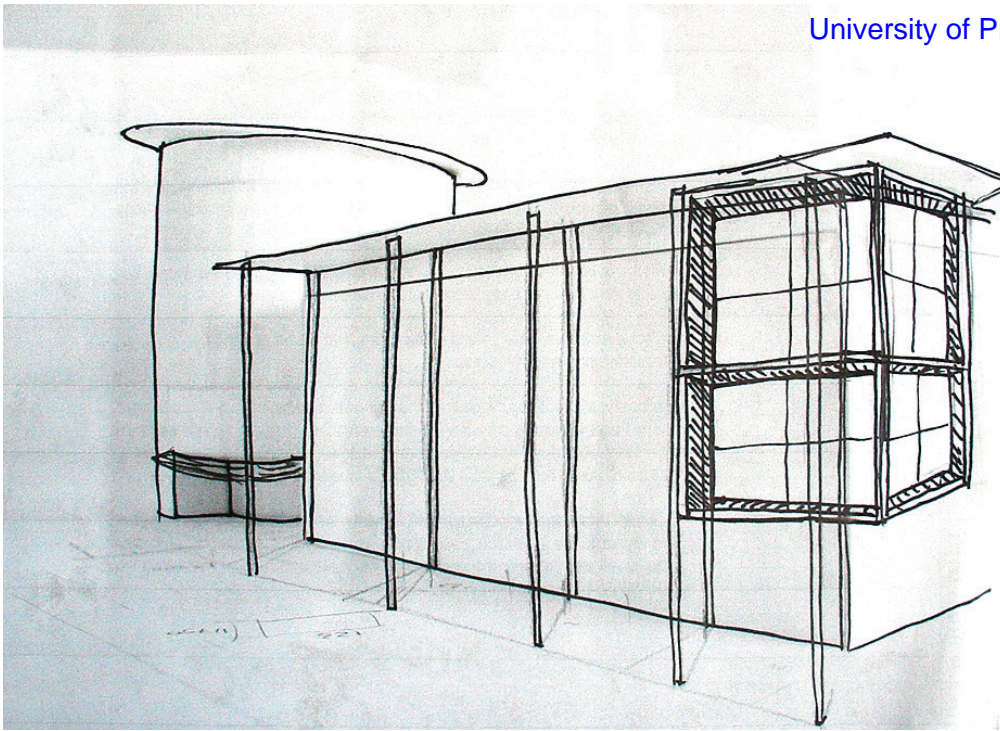














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*Gary, for guiding me through the process that would have otherwise been much more hectic*

*My Mom, because that's what moms are for*

*Nadia, for all the help through this year and for just being there when I needed you, without question  
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