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THE SPEED GATEWAY :

A Facility for the Upliftment and Promotion of South Africa's Motorsport Culture



RICARDO ANDRADE [2016]

THE SPEED GATEWAY :

A Facility for the Upliftment and Promotion of South Africa's Motorsport Culture

This document is submitted in partial fulfilment for the degree:

Masters of Architecture (Professional)

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South Africa,
2015

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DECLARATION

I, ***Ricardo Miguel Gois Andrade [442541]*** am a student registered for the course Master of Architecture [Professional] in the year 2015. I hereby declare the following:

I am aware that plagiarism [the use of someone else's work without permission and/or without acknowledging the original sources] is wrong. I confirm that the work submitted for assessment for the above course is my own unaided work except where I have stated explicitly otherwise. I have followed the required conventions in referencing thoughts, ideas, and visual materials of others. For this purpose, I have referred to the Graduate School of Engineering and the Built Environment style guide. I understand that the University of the Witwatersrand may take disciplinary action against me if there is a belief that this is not my unaided work or that I have failed to acknowledge the source of the ideas or words in my own work.

RICARDO ANDRADE: _____ **DATE:** **15/ 01/ 2016**

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ABSTRACT

Globally people are at the edge of their seats wide-eyed with passion and awe for the spectacular and entertaining world of motor racing, admiring the world's most powerful machines and talented drivers battling through the race tracks with lightning speed and outstanding agility. Due to lack of public support, poor management and funding the motorsport culture is rapidly dying out and race tracks are becoming exceedingly underutilized in South Africa. **Through Architectural intervention, the aim is to transform the underutilized Kyalami race track into a vibrant and entertaining motorsport venue that will integrate motorsport back into society and preserve this iconic race track that maintains the national motorsport culture alive.**

Apart from the shear entertainment value motorsport provides it has always united people from around the globe and enabled the production of some of the most technologically advanced machines of our time. Recognising the tremendous value motor racing had, the iconic Kyalami race track was built in South Africa, situated between Johannesburg and Pretoria, which hosted a great number of International Grand Prix events. Motorsport soon gained a major cultural, political, social, economic and spatial presence in South Africa. After almost three decades the race track was removed from the Formula 1 Grand Prix calendar, among other major motorsport calendars, due to sanctions. The poor entertainment value over recent years has led to a major decline in public and sponsor interest in local motorsport. In return Kyalami has become unsustainable which, in the past year, nearly led to the loss of the iconic race track which would have further rendered the local motorsport culture extinct. **This recurring scenario around the country becomes the vital point of enquiry for this thesis; the role of Architecture in promoting the motorsport culture; the long-standing relationship between the automobile and Man and its influence on the urban fabric and architecture that is part of our everyday experience.**

Sited on the Kyalami race track, the architectural design will include an urban framework that will better integrate the current isolated race track with its surrounding context. The framework will include outdoor public activity spaces as well as research, training and workshop facilities that will accommodate the public's needs and interests at the same time uplift and promote both the automobile and motorsport industry. The primary Kyalami Motorsport Centre sited by the existing southern pit complex will not only offer an enhanced trackside and racing experience to both spectators and race teams but the necessary auto-tecture that will host thrilling motorsport events and promote the nation's young talented drivers.

THESIS COMPOSITION

THE SPEED GATEWAY
National and International Motor Racing origin, importance and situation.

AUTOMOBILE'S RELATIONSHIP
Exploring the symbiotic relationship of the automobile with mankind and architecture

BRAIN STORMING THE MOTOR RACING CULTURE & INDUSTRY

CULTURE & ARCHITECTUTRE
Analysing architecture's role in enhancing and promoting a culture.

MAPPING KYALAMI
Contextualizing Kyalami in terms of what it can offer to the fans, public, its residents and industry.

PROGRAMME
Generating a programme based on the research data and Precedent analysis.

VIABILITY
Exploration of a financial business model to ensure the successful running of the motor racing facility.

RESEARCH

DESIGN

RESEARCH TO DESIGN TRANSITION

PRECEDENT
Analysis and implementation of design principles from specific buildings related to my intended design.

CONCEPT DEVELOPMENT
Massing exploration based on race car aerodynamic mobility.

ARCHITECTURAL INTERVENTION

DETAILED DESIGN
Final Design of the facility based on research and conceptual explorations.

TECHNICAL DETAILS
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CHAPTER 01

THE SPEED GATEWAY

1.1) Introduction

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"We declare that the splendour of the world has been enriched by a new beauty; the beauty of speed. A racing automobile with its bonnet adorned with great tubes like serpents with explosive breath…a roaring motor car which seems to run on machine-gun fire, is more beautiful than the Victory of Samothrace." (F.T. Marinetti, 1909)

This statement cannot be more precise and expressive of the relationship and true passion Man has for the automobile. The introduction of the automobile into the world has greatly altered the way we perceive space and has brought about the possibility of new discoveries. Through recent times the automobile has evolved from a means of mobility to being part of our way of life. This is observed in the way we inhabit and socialise in it. The automobile is a symbol of our modern culture; it is part of our attire, our daily interaction with others and even takes on some of our characteristics. As a result of this long-standing relationship the globally renowned and influential motor racing culture emerged. Whether it be to satisfy our obsession for shear speed and power, to demonstrate our admiration for automobile engineering brilliance, to allow the automobile industry to achieve greater heights and uplift the economy or create supreme athletes of the nation's young talented drivers, this culture is vital to our society. However, in South Africa it is rapidly diminishing. The fact that some of the famous and iconic race tracks have been or are on the verge of being demolished, not only demonstrates a negative attitude towards this culture but is further rendering it extinct. The chapters that follow will shed some light on the reason the motorsport culture in South Africa is diminishing and uncover how architectural intervention can integrate motorsport back into society and enhance the motorsport culture to create an atmosphere that does not detract from racing.

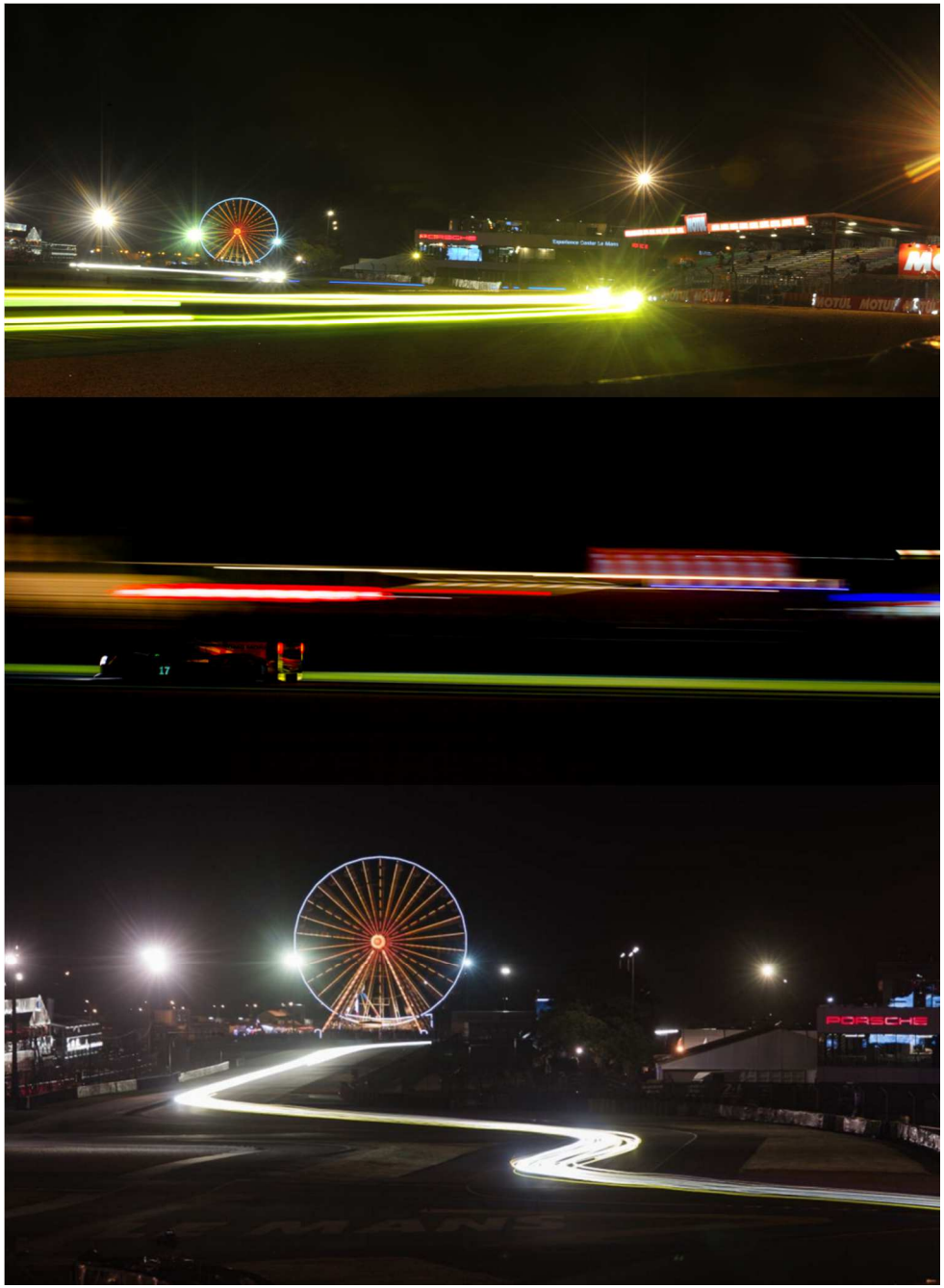


Figure 01. Race car light streams captured during the 24 Hours Le Mans, world's greatest motor race event. (2015)



Figure 02. World's first official race event held in France. Image captured by the press. (2015)

In the second half of the 19th century the first automobile was invented and marked the beginning of a modern era of mobility that would revolutionise the world. At the time France had the largest automobile industry in the world, which resulted in the establishment of motor racing as a marketing device and later for technical research and development. A combination of passion, competition, superior skill and long open roads led to the origin of motor racing, which spread throughout the world with the help of the press. As the only country to have legalised racing, France hosted the first recorded motor race as a game of who had the fastest machine. The competition included various modes of transport such as cars and bicycles. Global attention soon shifted towards these race events which brought about a great spike in the automobile industry. Racing became a means of *"promoting the automobile"* (Rendall. I. 1993. P.20) in benefit of the automobile industry. Having noticed the great economic and industrial upliftment in France, Both America and Britain decided to use motor racing as a marketing device to uplift their automobile industry and hosted their first races. With the need for better racing organisation the American Motor League as well as the Automobile Club de France (ACF) was initiated to look after motor racing. Racing was a massive media event hosted on long routes between selected cities in Europe, mainly from France to neighbouring countries and back. At that time the racing laws stated that countries competing could only make use of cars and drivers from the respective countries. Competition intensified as car manufacturers realized that with each win, sales drastically improved and the company brand obtained greater public recognition. It was believed that the brand of the *"fastest cars were the best"* (Rendall. I. 1993. p.20). With their focus on winning and uplifting the company image, manufacturers invested in automobile engineering in an attempt to improve them. The high level of competition and ingenuity led to drastic improvements not only to race cars but in return to the cars being manufactured in terms of engine performance and safety. In 1900 the ACF decided to host the first ever international race to aid with improvements on the automobile and increase competition as well as publicity. Before and after World War 2 Germany, Italy and Britain took France's place as being the most powerful and successful racing nations in Europe as a result of their advanced automobile technological advances. The main race events included a variety of Grand Prixes from each country using specialised race cars. After World War 2 European countries had little money to produce new race cars to boost the economy so racing came to a halt. The idea came about to motivate manufacturers to reuse old race cars to compete in race competitions (which became known as the "Junk Formula") to re-introduce competitive motor racing. This soon led to the introduction of Formula A (Today known as Formula 1, introduced by the International motor racing competition governing body) to fit the specifications of reused race cars for a new type of race competition. To date this Formula is still internationally the most influential and renowned race event. America as opposed to Europe remained consistently successful with both their automobile and racing industries, which proceeded to grow their economy tremendously. The Indianapolis 500 and Daytona 500 have always been the most influential and one of the most commercial motor racing events in America, which consist of races between stock cars. This type of racing has been the longest form of racing established since 1909 and is still running to date.

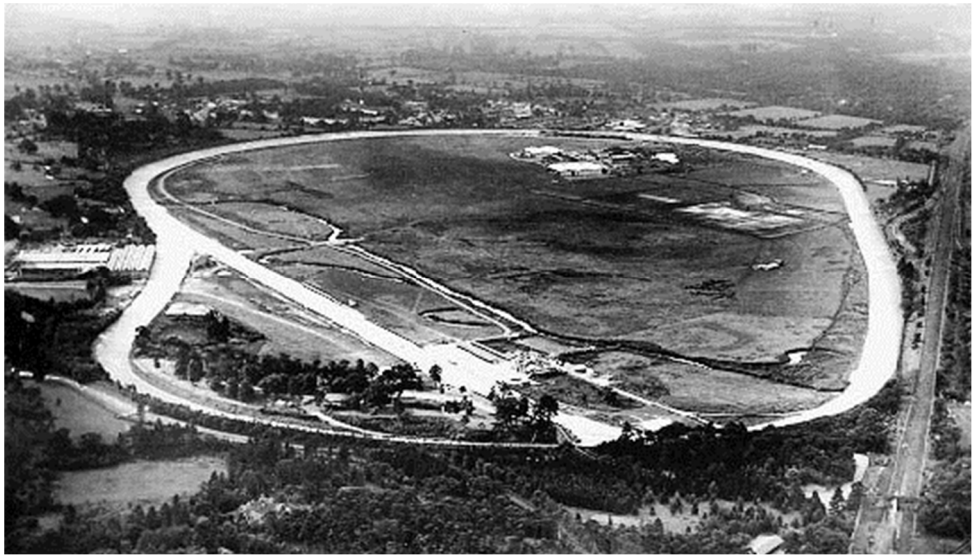


Figure 03. First official race event held at the Brooklands race track in America in 1909. (2015)



Figure 04. Motor racing technological contributions to automobile (Left - economic BMW i8 automobile) and aviation technology (Right - BMW aeroplane propeller engine). (2015)

Race Track Origin

The first recorded race on a circuit was hosted using a horse race track in America and for the first time the public was able to experience a race event from start to finish. With strong opposition in Europe against street racing (as a result of public safety) more emphasis was placed on track racing. This brought about greater competitive racing (as there was more overtaking involved), it was much safer being in an isolated circuit, attracted larger spectator attendance and the advantage of hosting an event in a closed track meant that the public could be charged for entrance fees to assist with funding and money prizes for the drivers. As public safety became more of an issue the adopted long distance racing style from city-to-city was abandoned and race events were hosted in more *"purpose-built tracks"* (Rendall. I. 1993. P.36) around Europe. *"Motor racing provided entertainment and an escape from the miseries of the depression"* (Rendall. I. 1993. p.136) and was a huge source of entertainment that gave the public the opportunity to admire the latest cars and racing heroes.

Contributions

Apart from the entertainment factor, many economic and technological contributions were made. During World War 1 and 2 all knowledge of the automobile was used and improved upon for the production of aero engines for war planes and then later for civil aviation. In return all advancements gained in the design and production of aero engines and airplane technology was used in the future development of race cars and the automobile. These technological advancements can be observed in modern race cars with advanced braking, steering, engine and aerodynamic technology. One of the greatest uses of motor racing since it was founded has always been for the publicity it creates. Adolf Hitler recognised this and funded racing for propaganda purposes for the Nazi Party as well as to demonstrate Germany's engineering as being superior. German engineers not only produced better performing cars but also more attractive cars with their focus shifted much towards the design of the car's exterior.

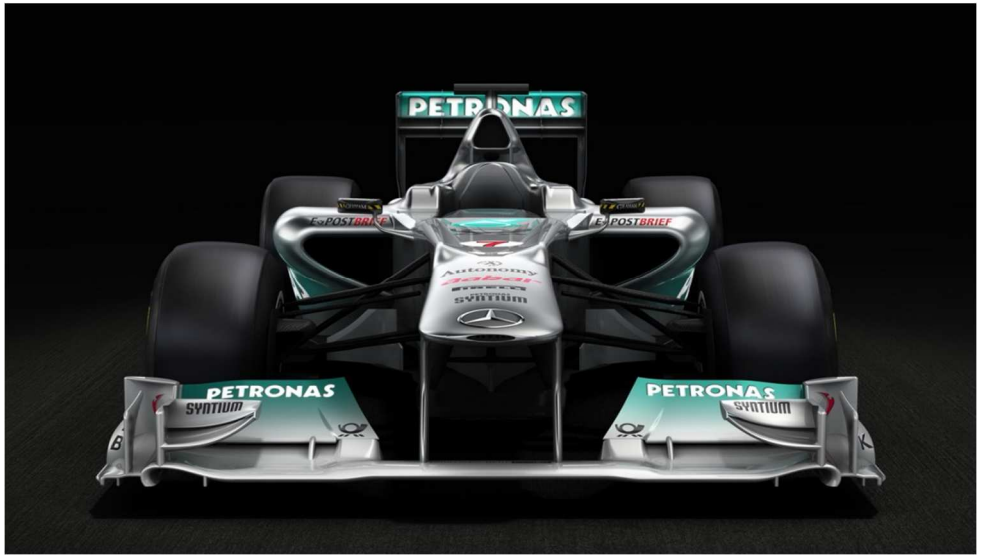


Figure 05. Costly technologically advanced Formula 1 Petronas racing car. (2015)



Figure 06. Costly race car and driver gear required by FIA. (2015)

Funding

Racing costs are extremely high as a result of all the technology required in racing regulations for competing cars today. As race cars adopted aerodynamic and advanced electrical and mechanical technology, by 1980 racing costs drastically increased and if race teams could not afford the technology they would be left far behind rendering it unprofitable to compete. At that time it cost a single race team ≈R300 million a year to afford to compete and with these enormous costs sponsorship is the only way to afford to compete. Safety regulations require new racing suits and equipment to be replaced annually, which further intensifies the costs.



Figure 07. Red Bull Formula 1 racing car fully decorated by sponsor logos to cover for racing costs. (2015)

Sponsorship

The 60's was a time of major change in terms of music, fashion as well as business and motor racing was on the same trajectory. In the past car advertising was banned in racing but with the influence of the younger attitude in the motor racing governing body a decision was made to use racing as a publicity tool not only for the car brand but for other commercial groups as well. As a result of this change racing teams received more funding from sponsorship and were better able to support themselves. Over the years there have been many changes to motor racing but these advancements have always been based on the initial principles since the first race in 1894 where spectators have witnessed amazing cars and drivers compete on some of the most challenging circuits. It is the passion for speed, risk and thrilling racing that brought people to the events and kept them at the edge of their seats. The price of winning has always remained the same with manufacturers paying whatever necessary to reduce mere milliseconds to be the best.



Figure 08. First South African race cars, raced on the Cape Town and East London circuits. (2011)

Not long after the first combustion engine was invented the automobile had immediately appeared in South Africa. That period marked the start of the on-going relationship with the automobile. South Africa hosted its first race event in 1903 at Green Point Cycle Track in Cape Town. Motor racing was under the control of the Royal Automobile Club (RAC) working under the Fédération Internacionale de l'Automobile (FIA, still in in control of international motorsport today). The country staged its first international Grand Prix (GP) event in 1934 at the East London new Marine Drive Circuit. The race event featured 18 drivers of which 4 were from overseas and gained an attendance of 42 000 spectators. That event marked the start of a racing tradition that has diminished since 1993 where the last GP was hosted. In an attempt to establish and develop the motor racing industry in the country the Earl Howe Circuit was built between Johannesburg and Pretoria. The first Rand GP was successfully hosted there in 1937 with one more event at the end of the year. World War 2 commenced and the international focus was shifted away from racing momentarily and at that stage the site was turned into the Kelvin Housing Estate. During the war many local racing events were hosted along the coast in Cape Town and East London. As a result of the war Europe suffered a lag in racing automobile development and when international racing was re-established in South Africa in the 1950's many international competitors struggled to keep up with the nation's more technologically advanced race cars. "*Many international followers could not understand how a country on the southern tip of Africa… was able to indulge in such a luxury*" (Loubser. A. 2011 p. 28-29). Having hosted 7 post-war and 5 pre-war GP's, racing relocated permanently to the new Kyalami race track as the costs of hosting race events were escalating and the East London Motor Club could not afford to host anymore events.

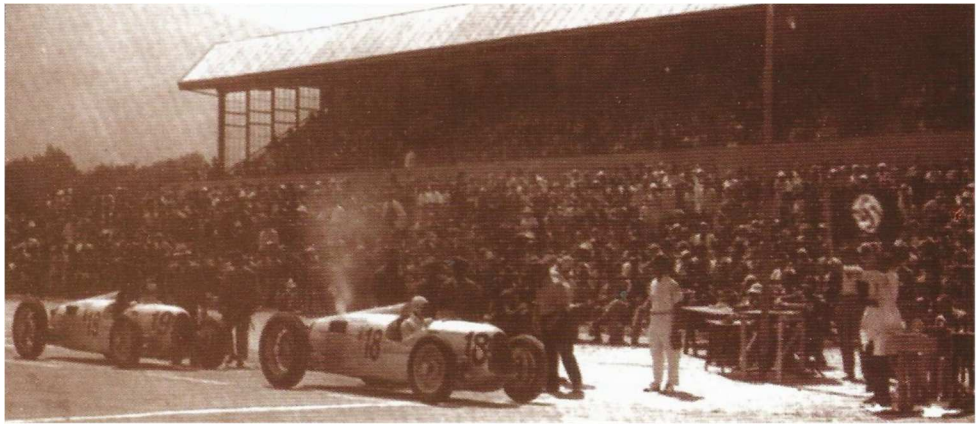


Figure 09. First South African Grand Prix at the East London's Marine Drive circuit in 1934. (2011)



Figure 10. Start of the sixth South African Grand Prix. (2011)



Figure 11. Last Grand Prix hosted at East London's Marine Drive circuit before its relocation to Kyalami. (2011)



Figure 12. Formula 1 podium celebration at the Monza circuit in Italy, uniting fans from around the world. (2015)

"It isn't just a sport - It is dangerous, it is exciting, it is a competition that brings man and machine to the limit. Only the best can drive those race cars around all challenging tracks in the world. Every time we hear the engine noise it doubles our heart rate. Adrenalin excitement is pumping through our veins. Your heart and your mind both are involved. We see moments which at times seem scripted. Wheel to wheel racing, drivers on the edge, emotional victories and thrilling championships. Those moments we keep in ourselves over decades. When the performance takes place on the legendary race tracks, with everything it offers to the senses, the mind, the imagination and the memory of tradition. We say to ourselves, this isn't just a sport. This is our passion" (Boris Sljivic 2015)

In motor racing there is a close relationship between every single member of a race team ranging from the drivers, team manager, chief engineers and mechanics; not to mention the bond the driver has with his fans. Famous Formula 1 driver, Lewis Hamilton, states that he feels for his fans as he himself cheered for his own motorsport heroes at a young age. Every member understands that with every task they perform, lives are involved and so great respect and trust exists between them and if that is not the case complete failure emerges.



Figure 13. Valentino Rossi - Moto GP. (2015)



Figure 14. Lewis Hamilton – Formula 1. (2015)

Race car drivers are exceptional athletes that require a number of skills that include fast reaction times and extreme ability to perform under tremendous pressure. Psychological tests conducted demonstrate that drivers, more than any athlete or person, have the ability to perform under high levels of stress where this ability improves over time. They are so deeply involved in racing as a result of their highly competitive nature, passion and desire for what they do. Their desire to outperform is expressed in the words of former F1 driver Ayrton Senna: *"You think you have a limit. As soon as you touch this limit something happens and you suddenly can go a little bit further."* It is the element of danger and the uncertain race outcome that drives them and makes every race interesting regardless of their preparation. The difference between a car and a race car are worlds apart, they may be related in terms of automobile principles but the sensory response a driver has to his car is beyond that of any car owner. To an expert driver every vibration and noise has great significance in terms of the car's performance and the way it should be driven. Racing is a challenging profession as a result of the limited positions available in the industry. If in a split second they crash or make a mistake they can easily lose the race. The cost at times is death and it is a price they are prepared to pay for following their true passion as stated by F1 driver Jenson Button: *"I'll never be able to replace the incredible feeling I get when I'm driving a F1 car"*. The relationship between the driver and the spectators is always present, whether it is before the race socialising with fanatics or observing the cheer of the crowd during a race it always serves as incentive and creates a sense of accomplishment.

The team manager carries great responsibility as it is his duty to ensure that the team is well prepared for each race event and to properly organise the drivers and cars necessary. A manager must not only be an expert organiser but understand how drivers, mechanics and sponsors react in certain situations and to decide who will be hired, fired or upgraded. He must ensure that the engineers have prepared the cars, that drivers are well combined for endurance races, everything is booked and that all contracts are resolved on time. He must also manage and ensure that there are enough sponsors to keep the team in competition. If drivers are behind 1 or 2 seconds in a race the team is out of business. It is a stressful job to keep the drivers under control, although at times there is an air of playfulness as a result of the deepened friendship that exists amongst them.

Figure 15. 24 Hours Le Mans Nissan technical team. (2015)



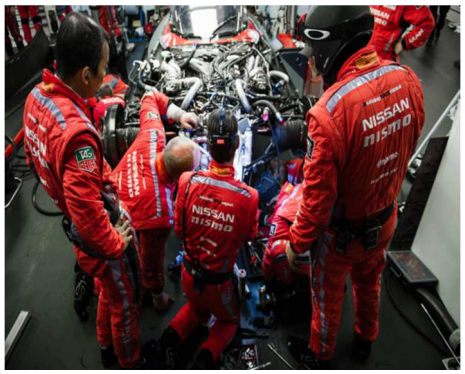


Figure 16. Nissan mechanical team. (2015)

The mechanics spend weeks and hours preparing the cars for the events. The job only ends for them when the cars are ready, even if repairs are being done up to the last minute before the race start. If there is any fault in the car during the race they immediately gain a sense of failure. There is a strong relationship between the driver and mechanic, as the driver recognises that without the mechanic his race success would not be possible and in return a mechanic respects a driver that looks after the car.

It is more than just friendship involved, there are lives at stake. The culture and character of the teams varies from nationality, where some are more enthusiastic and open to opinions and other more reserved and serious. There are also the engineers and designers that are constantly observing the performance of the cars for improvements as well as the support from family members who often assist with minor tasks like time keeping.





Figure 17. Renowned Moto GP rider Valentino Rossi's close friendship with his technical team members. (2005)

Race teams are often factory-backed (being sponsored by the represented automobile manufacturer as the owner of the team) or partially-backed/independent team (who is sponsored by the manufacturers who have none or partial ownership of the team). The larger tri relationship that exists is between the race team, sponsoring company and the sponsoring company's advertising agency. Where the team is focused on the business of racing, the advertising agency is in the business of advertising the sponsor and the sponsor is concerned with selling at an efficient cost to profit ratio. Each member has a financial understanding of what it expects to invest and gain from the project.



Figure 18. Renowned factory-backed sponsors for most motorsport racing categories. (2015)

Race events are organised by the local racing organisations such as the SCC motor racing organisation in South Africa, where Motorsport South Africa (MSA) is responsible for the issuing of licenses to drivers, organising the insurances and the racing calendar. The SCC's duty is to prepare a supplementary regulations document of the rules for the race event whereby MSA issues a race event permit in confirmation of the event. Race teams of the different categories are then selected, the race track is then hired for the event according to the racing calendar and advertising is organised for the event. Along with the hiring of the track are the race marshals, medical team, public facilities, security, prizes and trophies. A member of the Sports Car Club (2015) in South Africa, stated that *"Organising a regional event can cost anywhere around R267 000 – R300 000 alone"*.

Many will say that the experience one gains from watching most sport events live or on television does not vary much, however the same cannot be said about motorsport. The trembling and thundering sound of the V8 and V12 engines, the scent and smoke of the burning tires and jet fuel, the loud bursts of the flaming exhausts places one in a completely different world. The race cars are the spirit of the race tracks. Being on the race track removes one from the rest of the world, you are only focused on your immediate surroundings and the thrill of the moment. Even when the cars are not on the track their presence is still felt through the high velocity tire marks, worn gravel track, scraped off car paint on the track barriers from all the "close calls" and leftover scent from the burning tires and engine fluids. No other sport on the planet engages with so many of your sense. It is for this reason that race tracks worldwide draw great spectator crowds from all over. These crowds will return over and over again because motor racing leaves them with that unforgettable experience. As a result of the shear skill and talent the drivers have and risks they take, they are heroes to their fans.

For drivers motorsport is their passion, it is about skill and the desire to outperform and become the best as expressed by Moto GP champion Valentino Rossi (2015): *"I race to win. If I am on the bike or in a car it will always be the same"*. It is a sport that unites people that demonstrate a common passion, interest and desire. This culture is purely about the racing.



Figure 19. Passionate fans from around the world cheering for Moto GP hero, Valentino Rossi. (2005)



Figure 20. Valentino Rossi demonstrating his gratitude to his close fans. (2005)

Spectators

The spectators are the core of motor racing. The industry has always excelled because of the shear entertainment it provides for the public. In the United States of America the Indi 500 and Daytona 500 races are a very successful market attracting at least 250 000 spectators, if not more, per race event. It has strongly become part of their culture, where fans flock to the race stands to enjoy the competitive sport and crowd around the pits to socialize with their favourite drivers and teams. In the past South Africa used to obtain an attendance of at least 150 000 spectators per race event. I have personally attended a few race events and each time I could count the number of spectators ranging between 20 and 50 people on a good race day. The lack of spectator support has always been an issue since international racing left the country. Having spoken to many fanatics, the topic that always arises is the lack of quality racing and poor spectator atmosphere on race days that is still missed to date. Local motor racing that has been embedded in South Africa's culture and way of life is now fading away. A member from the SCC (2015) stated: *"There isn't enough advertising and television exposure. So much money goes into hosting the actual event that there is hardly any available for advertising. Motorsport has lost television exposure and so the public has lost its interest. The public isn't as exposed to live racing as they used to be. In the past there used to be race commentators that heightened the atmosphere of the event, which we don't have anymore."* Well Known South African race car driver Sarel Van Der Merwe stated that there is not enough close, competitive racing. Local race teams are too afraid to take risks and race competitively because if anything happens to the cars they won't be able to recover the costs and if that is the case, spectators stay away. Sarel states that *"Fans want to see the big names and the factory teams"* (Smith. S. 2012 p.188) like those in Formula 1 and Le Mans and further states *"I just wish we had something exciting to watch in South African motor racing"*(Smith. S. 2012 p.187).

This is an indication that there is a lack in the entertainment aspect of the nation's professional motor racing. The cultural link with local motor racing has mostly disappeared.



Figure 21. 150 000 spectators gathered at the Kyalami race track, as it used to be up until 1993. (2011)



Figure 22. Empty spectator grandstands in the background during major regional Kyalami race event. (2015)

Management

Since motor racing has been in the management of Motorsport South Africa (MSA) the sport has been poorly managed in the country. Sarel stated that there are many talented drivers in the country but unfortunately they "*are just being managed so badly by MSA*" (Smith. S. 2012 p.191). The young talent in South Africa is cut short as there are no higher levels of racing to progress to and MSA has done nothing to further the talented young drivers into a professional career. The reason why Jody Scheckter (Former South African Formula 1 Champion) had a successful international professional racing career was because drivers that won national racing championships like Formula Ford (still run today) were automatically guaranteed a place in international motor racing like Formula 1, which is not the case today. Instead of regulating the sport, MSA's numerous strict regulations are actually punishing the drivers for their outstanding performance and in turn offering little opportunity to showcase their talent. With the lack of national professional racing heroes like Jody Scheckter and John Love, young drivers have "*no role models to aspire to.*" (Smith. S. 2012 p.191). In contrast to rugby and soccer that have representatives in sport management organizations to voice their opinions, there are no representatives in MSA to deal with and tackle the issues. Instead of supporting the racing industry; the manufacturers are more interested in fighting for their own benefits rather than for the collective interests. MSA has also done nothing to bring international racing back into the country and the "*dwindling crowds at the race tracks bear testimony to the fact*" (Smith. S. 2012 p.196). Motorsport had greater value when other nations were involved as in the past when South African race car legends would battle against famous international drivers. This brought about greater competitive, thrilling racing and brought exposure to the young South African talented drivers, which is missing today. This emerges as a result of the dilapidated state of the country's neglected race tracks that are not up to standard to host quality international race events.



Figure 23. 1979 Formula 1 SA champion Jody Scheckter. (2011)



Figure 24. Beginning of Jody's career in Formula Ford, a national race event still taking place today. (2015)



Figure 25. A1 Grand Prix at Kyalami before it folded in 2009 due to poor management and funding. (2015)

Sponsorship

The other major issue facing motor racing in the country *"is lack of sponsorship"* (MPC Driver 2015). If spectators are not watching the race events the sponsors will not fund the teams especially with the high costs of running a race team. If that occurs, race competitors drop out and events become less competitive and entertaining. In return the public loses interest and the spectator attendance becomes poor as it has in the country. The problem is that there are many categories of race cars throughout which sponsorship is spread instead of having fewer formulae (like in the USA) where sponsors can focus their attention to better support the teams financially. As part of the racing tradition local race drivers have always received cash prizes for their performance at race events. MSA however have *"grown fatter and fatter on fees of its members"* (Smith. S. 2012 p.190) as well as contributors and in return have not invested much into the sport. This demotivates drivers, resulting in poor competitiveness. Excessive amount of money is also spent on the "N Production" racing class that requires much money to produce a single car. The result, a race with a maximum of 10 competing cars offering less exciting and competitive racing. The same amount could be spent on producing less costly cars that will increase the number of competitors and make racing more entertaining. A large amount of money has also been poorly utilized in the past years in an attempt to revive the motorsport in the country. The government had put aside R600 million for the motorsport industry alone. Of that money R150 million was invested in the international A1 GP that was unsuccessful and folded in 2009, R444 million was supposed to be spent over seven years for the World Superbike Championship that was only hosted in 2009 and 2010 as well as R39 million on the V8 Superstar Series with cars that drove slower than the local teams. A further R30 million was spent on the F1 Renault road show (where no racing was involved) and R65 million to put a "GO-GP.org" on a BMW-Sauber F1 (in an attempt to uplift the local motorsport) which was also unsuccessful. To date no one knows the breakdown of how the exact amount was spent. Sarel's reply to the findings was: *"The whole set-up is so crooked, it's a joke."* (Smith. S. 2012 p.195). This is an indication that lack of money to support motor racing is not the issue. An SCC member (2015) stated that *"the issue doesn't lie with the sum of money required to bring international motor racing back in South Africa, but rather that it won't provide any financial return unless the public is as engaged as it used to be"*.



Figure 26. Lack of sponsor logos on race cars leaves young national drivers with littlie financial support. (2015)

NSRP

Up until 1994 local motor racing had attracted many spectators and was constantly being broadcast on television. It was successful because the rest of the nation's sport was banned from participating in international events as a result of the world's opposition against the Apartheid system. At the commencement of the New Democratic South Africa the rest of the national sport became reintroduced into the international sport calendar. At that stage the country was obtaining gold medals and trophies from the various sport categories and much attention was shifted away from motor racing to a variety of entertaining events hosted and broadcast on television. Sarel stated that MSA stood by and did not react at all to compete for the *"fan's attention and sponsor's budgets"* (Smith. S. 2012 p.193) and eventually interest in motor racing was lost. Since the inception of the "New South Africa" many of the nation's athletes have performed outstandingly and special commendation with this regard can be attributed to government and non-governmental organizations that have put measures in place to ensure that the nation is constantly in the top rankings of world sport. Evidence of this can be seen in the way the country is excelling in rugby, cricket and athletics. The National Sport and Recreation Plan (NSRP) is put in place to ensure the continuous development and upliftment of the nation's sport and recreation industry. The aim is to build *"An Active and Winning Sporting Nation"* (SRSA. 2011 p.18). As part of their mission statement some of the goals that are expected to be reached by 2020 is to: transform South Africa into a destination choice for major events and sport tourism with adequate spectator support and access to sporting events, provide sufficient and accessible sport facilities, identify and develop the young talent, provide career opportunities for athletes, have 80% of priority sport federations achieving top 3 positions in world rankings, include sport in economic development plans and as being one of the major contributors to the country's GDP and acknowledge the achievements of athletes. Motor racing apart from the rest of the national sport is far from achieving any of the goals set out in the NSRP. With few years left to meet these goals by 2020, a vast amount of work needs to be implemented in order to save motor racing from its total collapse.



Figure 27. Local young talented drivers trying to make a motorsport career from national race events. (2015)





Figure 28. The great need to develop the nations young, passionate and talented drivers. (2015)

CHAPTER 02

AUTOMOBILE'S RELATIONSHIP

2.1) The Automobile's Relationship to Man

2.2) The Automobile's Relationship to Architecture

The race tracks, the endless roads and automobile architecture (auto-tecture) are the unifying medium that links the automobile to architecture, where they are a celebration of movement, culture and commerce. It is spaces like these that give us an indication that there is still an on-going relationship between Man and the automobile. It is the automobile that enriches the architecture of our time.

The automobile like architecture is the common ground between art and technology. As such an influential machine, it was not long before artists began to demonstrate an interest in the automobile. As a demonstration of the long established relationship with the automobile, the BMW Art Car collection was born. The idea came about in 1975 when a famous race car driver Hervé Poulain, who was passionate about art and racing, came up with the idea of having his race car painted by one of his favourite artists Alexander Calder for the 24 Hour Le Mans major race event. BMW enthusiastically embraced the idea and from then onwards many BMW race cars were painted with powerful vibrant colours and shapes by famous artists. These colours and shapes did not conform to the geometry of the car but rather represented the curves and lines of the cars seen in motion. The art of the race cars were a representation of the culture and atmosphere of the race track, a celebration of movement, the character of the driver and what the automobile and brand symbolised for the public. To date no other race car art work has truly captured a similar expression and symbolism. The artwork on the cars viewed in motion further enhanced the beauty and motion of the cars and even blended with the spectators surrounding the race track. Having been very successful with the Art Car campaign, in 1986 BMW decided to move into a more corporate direction by having their production cars painted rather than the racing cars. One of the famous cars in the collection included the 5 Series BMW that was painted by South African artist Esther Mahlangu. The car is painted in the traditional Ndebele patterns of her tribe with each colour and pattern having a certain cultural meaning. The artwork demonstrates the relationship between culture and the automobile. The collection reflects the cultural historical development of art, design and technology and demonstrates what the automobile brand does when engaged culturally. These art cars are a true expression of our long standing relationship with the automobile and motor racing culture that enabled us to push the limits of what was thought impossible and motivates mankind to keep achieving greater heights.



Figure 29. Traditional Ndebele patterns painted by South African artist Esther Mahlangu. (2002)



Figure 30. 5 Series BMW painted in traditional Ndebele patterns by Esther Mahlangu. (2002)

Next to architecture the automobile is one of Man's greatest obsessions, such that from its existence it has become one of the primary factors that define our spaces and urban fabric. This can be observed through the endless highways, parking lots and the auto-tecture that it is associated with – the service stations, drive-though's, dealerships and workshops. The relationship between the automobile and architecture is symbiotic and through time they have inspired one another. As a result of this, the automobile has improved its aesthetics and has gained habitable traits and in return architecture has become more dynamic. Architecture has played a vital role in the evolution of the automobile, if it were not for the improved automobile infrastructures such as the testing stations (like that of the Toyota Testing Facility), test tracks, research facilities, workshops and fabrication plants the automobile would not have evolved to its current technologically advanced state to become the most influential industrial product ever produced. Like architecture the car is about symbolism and image. They are alike in that they are both adapted to human scale and proportions. An excellent example of this symbiotic relationship is portrayed in the example of the Las Vegas Strip. The book "Learning from Las Vegas" (Venturi. R, Brown. D. S,) demonstrates that the placement of signs and buildings, their scale and angles were all oriented to be seen by the people traveling through the Vegas strip in their cars. On the Vegas strip the architecture becomes the advertisement, the attraction for the driver. The Vegas strip was designed in this manner as a result of the great influence of the automobile.

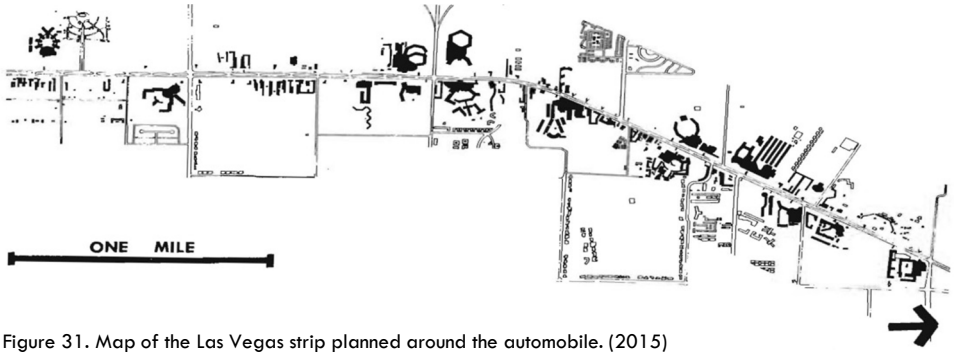


Figure 31. Map of the Las Vegas strip planned around the automobile. (2015)



Figure 32. Los Angeles interchange demonstrates the Influence of the automobile on the urban fabric. (2015)



Figure 33. Las Vegas architecture as the advertisement and attraction for drivers passing through the strip. (2015)



Figure 34. The Lingotto Fiat Factory roof test track (used to develop fabricated cars), is a demonstration of the vast contributions of architecture in the development of the automobile . (2015)



Figure 35. The BMW building in Munich is a demonstration of the influence of the automobile in producing architecture that is expressive of mobility . (2015)

An example of the unity that exists between man, art and the automobile can be further observed in the work of Italian architect and designer, Carlo Mollino. After his father's death Carlo left architecture for motor racing another great passion of his. Having lived in an era when motor racing was at its peak he started competing professionally with his own race car designs and prototypes. Apart from setting winning records in the world's most important and most famous race, the 24 Hour Le Mans, he also patented special racing parts later used in many race cars. His passion for the automobile, racing and design could be seen in many of the sketches and drawings he produced. That obsession that he carried with him was translated in to many of the buildings he designed later in his life. His buildings had a strong relationship to the outline and movement of the automobile. One of his famous buildings includes the Turin Chamber of Commerce that became a full drive-in structure with parking and direct connection to the street. He designed other drive-in buildings where all services were conducted through the car. This example further confirms the great influence of the automobile on architecture in that buildings are obtaining dynamic traits and are becoming expressive of motion and our obsession for mobility.

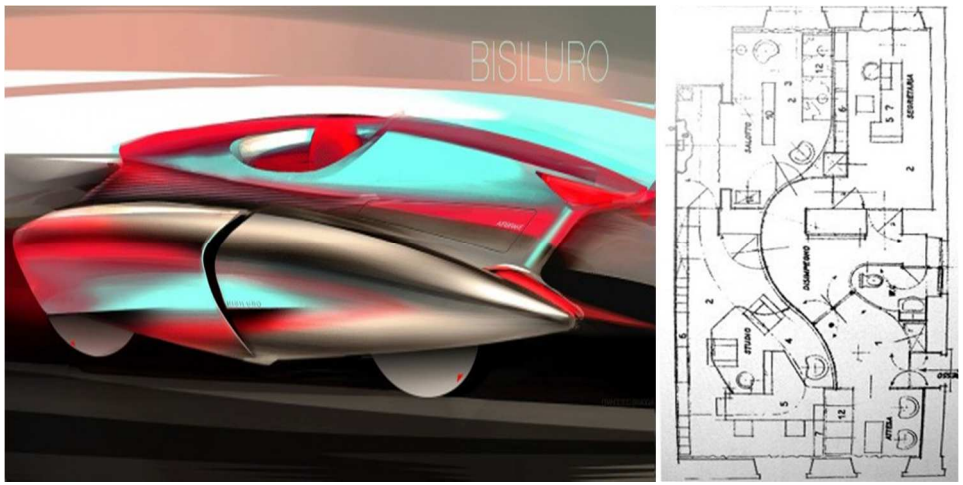


Figure 36. Through Mollino's work one can observe the influence of his race car streamlines(Left) on the fluid design of the internals spaces of his building floor plans(Right) orientated around the automobile. (2015)

CHAPTER 03

CULTURE AND ARCHITECTURE

3.1) Culture and Architecture

3.2) Conclusion

Culture, as defined by Norberg Schulz, exists as a result of mankind's tendency to establish a certain order which is developed through the constant retrieval of information and education and is dependent on the development of "common symbol-systems". Culture makes use of unique characters in an "ordered" world dependant on their significant interactions. (Norberg 1969: 220)

Architecture's primary role is a **symbolic** one. Baker states that "It creates the framework for national life and represents the prime characteristics of a culture."(Baker) He further states that architecture is a demonstration of "the interests of society and the attitude towards technology and the arts."(Baker) He emphasises the importance of culture in architecture listing it as one of the three primary factors that influence architecture, the others being site conditions and functional requirements. Architecture, as a cultural object, "responds to and shapes social discourse to accommodate changes in cultural, commercial, personal and political issues."(Bell. J 2001: P.18)

Meaning in architecture is created in its function to accommodate for the needs of a culture. Architecture is a physical representation of a culture's character in terms of its place, function and aesthetics. Architecture gives meaning to our existence and is a celebration of our way of life. This is confirmed by St. John Wilson where he states that the "limits of an architecture are the limits of the culture that it serves. The cathedral did not invent religion!" Wittgenstein further confirms this statement saying "Where there is nothing to glorify there can be no architecture." (Wittgenstein Date p.69)

The character of a place is created by culture and in turn is enhanced through architecture where it highlights the qualities that exist within its landscape and culture. However Norberg also states that a place cannot be understood in isolation as he states "…the meaning of any Phenomenon is the context in which it appears."(Norberg Schulz 1975: 428) This statement links back to the three primary factors mentioned by Baker being culture, site conditions and functional requirements.

The points of view above demonstrate a clear link between culture and architecture and the importance of their coexistence. Culture plays a vital role in Architecture as it determines the aesthetic and function of the building without which architecture cannot exist. Architecture in return enhances and represents culture as well as gives meaning to our existence adapting to cultural changes. Through architectural intervention it is possible to enhance a culture to not only promote its many functions and importance but also create an auto-tecture that celebrates its true identity and purpose.



Figure 37. Norberg-Schulz (1975) defines architecture as the "concretization of existential space" and is created in its function to accommodate for the needs of a culture. (2015)

The introduction of the automobile into the world became a major part of our way of life and mentality. Its influence can be observed in the urban fabric in terms of the endless roads and parking lots as well as the auto-tecture (buildings and infrastructure for the automobile) that it is associated with. Its relationship to architecture is symbiotic where one influences and develops the other. This lifelong relationship and obsession with the automobile soon led to the most influential and renowned car culture known as motor racing. It emerged as a competitive sport between the different automobile brands of the time, but was soon recognised for its countless contributions including technological advancements, industrial, economic and social upliftment as well as entertainment value. This culture was well apart of the South African way of life for many decades until the late 1980's when South Africa was excluded from the international racing calendar due to the worlds opposition to the Apartheid situation. Ever since the country has not been able to fully revive this culture and re-establish itself on the international racing calendar. Its failure emerges as a result of the poor public support, funding and management. The public are no longer as exposed to live motorsport as they used to be due to the diminished motor racing entertainment and atmosphere. **Exposing the nation to live motor racing is the most vital step in reintroducing motorsport back into society.** If the public is as engaged with motorsport as it used to be, sponsors will obtain the exposure required and will offer the necessary funding for quality entertaining motor racing. In return management will be required to take more action and responsibility in managing the motorsport in the country as they will be under much more vigilance from sponsors, international motorsport clubs including the FIA as well as the NSRP. As architecture's primary role is symbolic (as a physical representation of culture) and with its function to accommodate the needs of a culture, it can be stated that through architectural intervention it is possible to enhance the motorsport culture to not only promote its many functions and importance to the nation but also create an auto-tecture that celebrates its true identity and purpose **- The racing.**





Figure 38. South African motor racing in its glory days (Pictures above captured in 1985). (2011)

CHAPTER 04

MAPPING KYALAMI

4.1) Locating Kyalami Race Track

4.2) Why Kyalami Race Track

4.3) Kyalami Race Track History

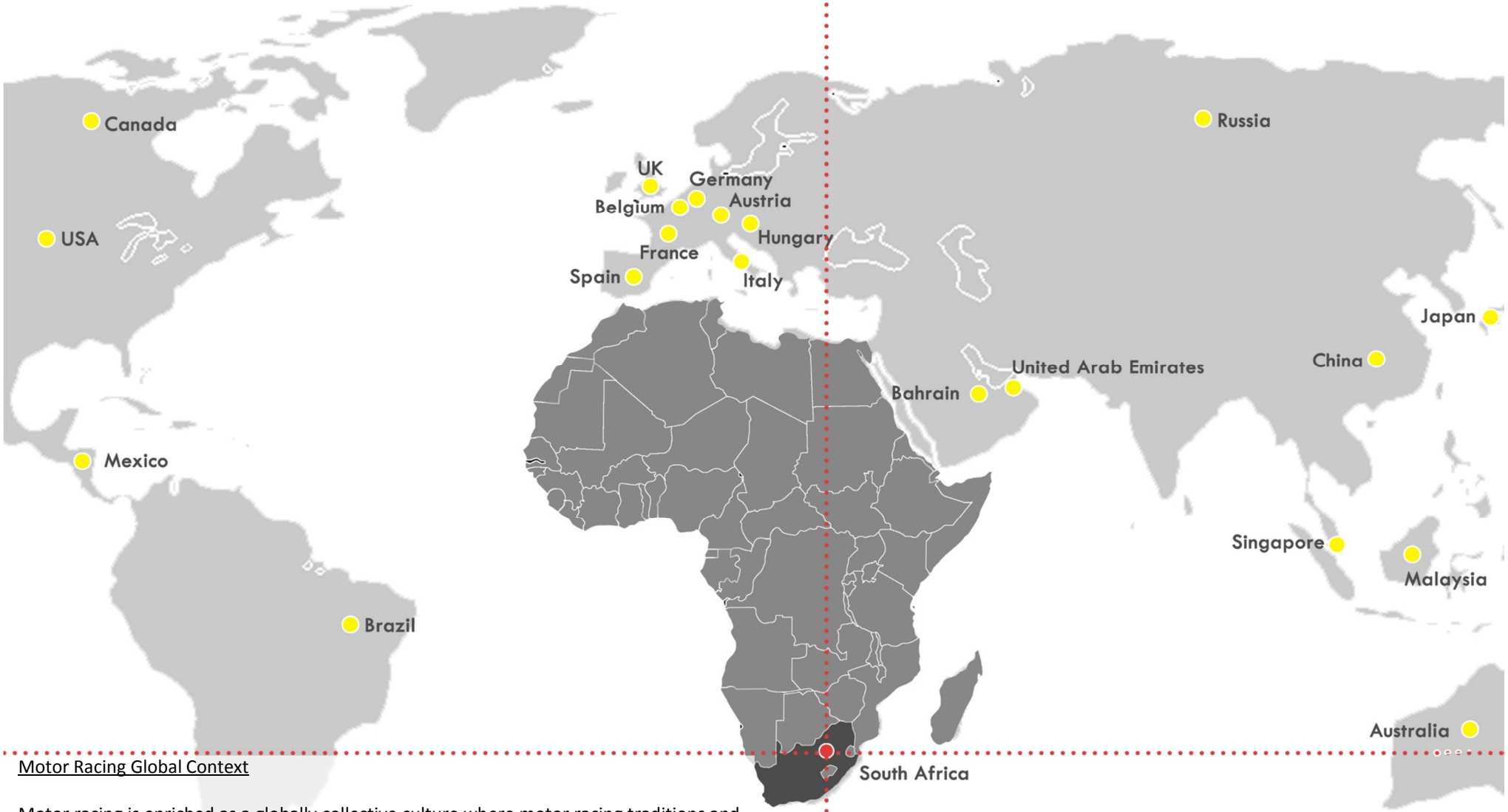
4.4) Kyalami Race Track Site History

4.5) Mapping Kyalami Race Track

4.6) Kyalami Race Track Today

4.7) Kyalami Race Track Site Selection

LOCATING KYALAMI RACE TRACK



Motor Racing Global Context

Motor racing is enriched as a globally collective culture where motor racing traditions and characters from different parts of the world are exhibited and enhance the racing atmosphere. The map above locates all the places where the motor racing culture is most prominent with Europe (as the origin of motor racing) being the most lively motor racing centre of the world. As the only international motor racing venue on the African continent Kyalami's importance is highlighted as it is the continent's only link to the rest of the global motor racing culture.

LOCATING KYALAMI RACE TRACK



Locating Kyalami Race Track

The Kyalami Race track is located within the Midrand region with the Midrand CBD located east of the race track. It is centred between Pretoria and Johannesburg and is the ideal location for the track as a result of its central position that is accessible to spectators from within and around the two main cities.

Midrand Region

Midrand was established in 1881as the mid resting point for the long journey people had to make between Pretoria and Johannesburg and was thus named Halfway House. Midrand has ever since expanded exponentially into a metropolis with an annual growth rate of 20% per annum as one of the top investment cities in the Gauteng economic centre.

The site selected for the purpose of this thesis is the Kyalami race track, which is the only track in the entire African continent to have ever hosted the F1 Grand Prix among other major motorsport events since 1960. It has ever since been the gateway to motor racing in South Africa and has a rich historical and cultural background of motorsport associated with it. It is remembered internationally for the numerous valued moments in the global history of motorsport. It featured the longest straight in Formula 1 racing that brought about much overtaking and entertainment to the sport.

On the 24th July 2014 the race track went on auction for the first time in South Africa's history. With all interested property developers keen on demolishing the race track for development purposes, it was believed that the end of the historic race track had appeared which would in return bury the national motorsport culture with it. "A collective sigh of relief around the country" (JOHNSTON. S. 2015: 116) emerged as Mr Venter (current Kyalami race track owner and Porsche SA CEO) purchased the track. The purchase of the track has great significance for him as it is the venue where he won the Porsche Turbo Cup in 1988. With his passion for cars and racing he couldn't bear to see the track demolished as part of another residential development and his comment was: "Kyalami is saved and that was the main reason I bought it, and yes for SA Motorsport too." (Wheels 24. 2014). Many around the country were comforted in knowing that the iconic track would be preserved for its intended motor racing purpose.

As the success or failure of South African motorsport is directly associated with the Kyalami race track (main host of national and international race events), it is imperative that this much valued race track is revived and re-established back into society. The fate of the passionate fans and future of the young national race car drivers and team members rests on the survival of the Kyalami race track.



Figure 39. Motor racing fans and drivers expressing their relief and excitement as the Kyalami race track is preserved and refurbished for its true purpose – The racing. (2015)

Kyalami means “My Home” in Zulu. The site for the race track was purchased by its first owners SAMRAC. This group was formed between different motor clubs from Johannesburg including the Sports Car Club (SCC) who are the current organisers of race events in South Africa.

The 337 acre site is located 24 kilometres from Johannesburg. At that time little information was known about race track building and international guidelines were implemented along with much experimentation. The first races run there in 1961 featured the Rand Daily Mail 9 hour endurance race, Motorcycle and Car Club spring races. In that year RAC withdrew their organisation as the controlling motorsport body to Automobile Association (AA).

Having been built and approved for Formula 1 racing, the track hosted its first world championship in 1967. Kyalami at that stage had become one of the fastest and safest tracks on the international racing calendar. Famous international drivers like Mario Andretti were attracted to the spectator atmosphere around the track. The South African Grand Prixes became an escape from the cold European climate where the drivers would enjoy the warm beach-like climate.

As the costs for hosting race events escalated SAMRAC was forced to sell the track in 1979 to Bernie Ecclestone, the current chief executive of Formula 1. The track was then sold again to Bobby Hartslief who sold certain portions of the track to automobile manufacturers and other companies, as a business model, to fund the track. South Africa produced many famous drivers that won numerous international titles such as Jody Scheckter (the only local driver with a F1 title in 1979). Chief designers from the country were also employed by Ferrari, Brabham and McLaren the biggest global racing companies at the time.

In 1985 motor racing turned its back on the country as part of the anti-Apartheid campaign, although local racing still progressed. The track soon became too costly to sustain and in 1988 half the site was sold for development. The money obtained was used to build a new track on the cheaper southern portion of the land.

Formula 1 returned to the curvier and slower track in 1992 and 93 but as a result of financial issues and the arrest of the race promoter on fraud charges, it was never hosted again. The government had provided funding in an attempted to revive motor racing by hosting certain international races, but was unsuccessful due to the failure of the events and recession in 2009. To date no other international race event has been hosted at the thrilling and entertaining motor racing gateway of South Africa.

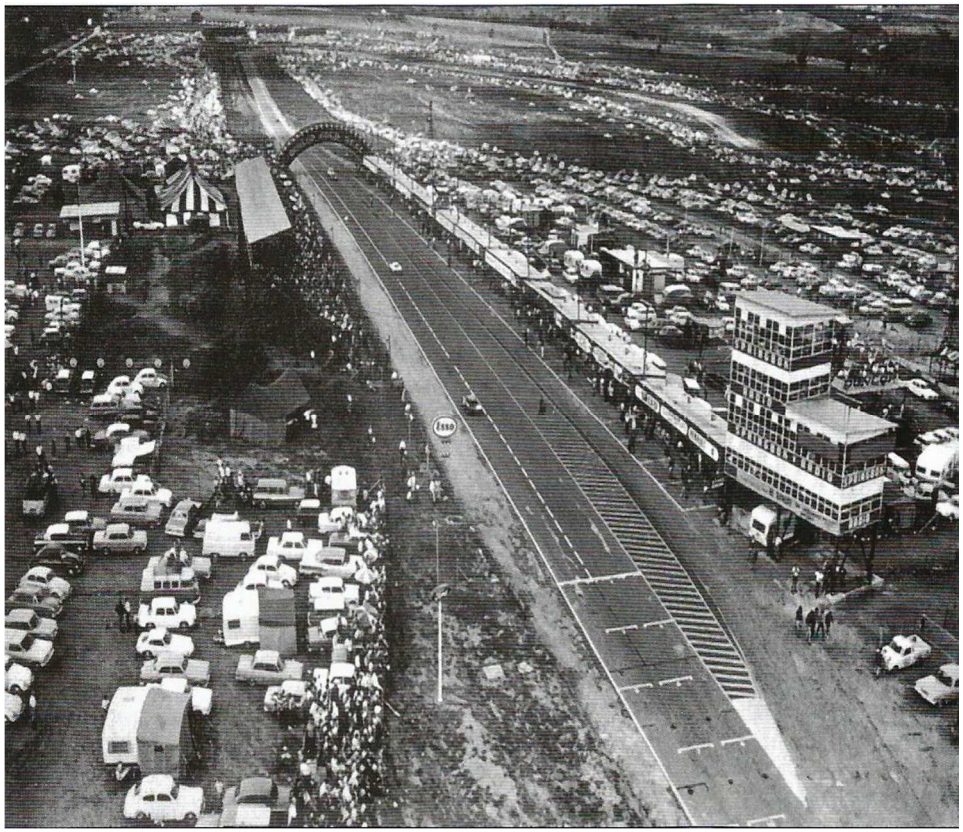


Figure 40. The Kyalami race track was famous for its longest straight were drivers topped high speeds. (2011)

1960

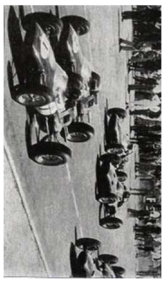
1960 Commencement of race track construction



1961 Kyalami race track grand opening with 9 hour endurance race and First Rand Grand Prix hosted.



1962 Rand Grand Prix & Nine Hour endurance race



1963 Rand Grand Prix & Nine Hour Endurance race.

1964 Rand Grand Prix & Nine Hour Endurance race.



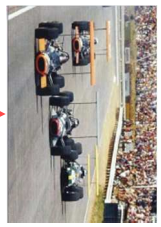
1965 Rand Grand Prix & Nine Hour Endurance race.

1966 Rand Grand Prix & Nine Hour Endurance race.



1967 SA Grand Prix & Nine Hour Endurance race.

1968 SA Grand Prix & Nine Hour Endurance race.



1969 SA Grand Prix & Nine Hour Endurance race.

1970 SA Grand Prix & Nine Hour Endurance race.



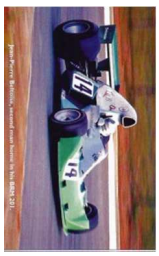
1971 SA Grand Prix & Nine Hour Endurance race.

1972 SA Grand Prix & Nine Hour Endurance race.



1973 SA Grand Prix & Nine Hour Endurance race.

1974 SA Grand Prix & Six Hour Endurance race.



1975 SA Grand Prix & Wynns 1000

1976 SA Grand Prix & Wynns 1000



1977 SA Grand Prix. Driver Tom Pryce and marshal Frederick Jansen van Vuuren die in an accident.



1978 SA Grand Prix & Wynns 1000



1979 SA Grand Prix. Jody Scheckter wins the Grand Prix title for the first time in South African history.

1980 SA Grand Prix



1981 SA Grand Prix & Castrol Nine Hour endurance race.

1982 SA Grand Prix & Castrol Nine Hour endurance race.



1983 SA Grand Prix, Castrol 1000 race & Nashua Motorcycle GP.

1984 SA Grand Prix, Kyalami 1000 race & Technics Motorcycle GP.



1985 Last SA Grand Prix hosted. The event was a financial disaster due to Apartheid boycotts.

KYALAMI RACE TRACK HISTORY - TIMELINE







1988 Kyalami race track rebuilt for national motor racing and to survive as a business model.

1992 Formula 1 Grand Prix returns to South Africa.

1993 Last time Formula 1 Grand Prix was hosted

1994 Kyalami race track changed to accommodate other international events.

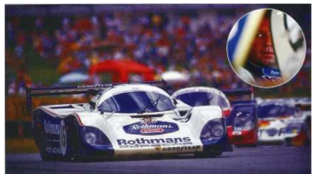
2008 First time Kyalami hosted the A1 Grand Prix.

2009 Last time the A1 Grand Prix was hosted and all international motor racing events are stopped due to the recession.

2009 - 2010 Firs time World Superbike Championship was hosted but never returned.

2015 The Kyalami race track is auctioned and the race track is upgraded to host international events.

2015









The Kyalami race track bounded by the Witkoppen and Woodmead main routes and the Maid Road secondary route is centred between Pretoria and Johannesburg. It is the ideal location for the track as a result of its central position that brought spectators from within and around the two main cities. The original track was built within a vast piece of land densely covered with vegetation and included the Jukskei River running south of the site which served as a buffer from the roaring race car engines during race events. Before the track's existence there were 3 main routes linking Johannesburg to Pretoria: William Nicol passing through Randburg and Bryanston, Woodmead Drive (central route) passing through Kyalami and Old Pretoria Road passing through Midrand. Witkoppen Road as a main link between the north-eastern and western suburbs intersected the 3 main routes. As a result of urban sprawl, suburban densification occurred along these main routes which was expanding northward from Johannesburg where Randburg and Bryanston where experiencing major development. As a secondary route, Allandale Road was later introduced to form a link from Midrand and the north-eastern suburbs to Woodmead Drive where Kyalami was established.

With its vast green backdrop, high value entertainment and tourism the area gained much value. With increasing urban sprawl the once green backdrop transformed into low density residential properties and eventually high density properties. This is explained by the "linkage theory" (TRANCIK. R. 1986: 107), where group form results from an accumulation of structures around communal spaces from which linkage routes naturally evolve and is how most historic towns have developed. Kyalami now found itself nesting uncomfortably within its context, poorly integrated and without any relationship to the track.

With international motor racing turning its back on the iconic site as a result of the Apartheid system, financial issues arose which led to the major transformation of the track. Half the site was sold for development to cover the costs of the new track built on the cheaper southern portion of the land. The periphery of the site, seen as a business opportunity for the wealthy people it attracted, was densely developed with warehouse, office and retail buildings that although have a strong visual relationship with the site, still remain physically disconnected. The race venue that once had significance to its siting has altered its form and space to a narrow and twisty site over time (as a result of political and financial issues) and is at risk of being taken over by its context if its space is poorly utilized for the purpose it is intended for. In the past the enormous track served its purpose accommodating a great number of spectators and families that camped around the track as part of the tradition of the race events hosted. Although the track is currently smaller than it used to be, there is vast green areas around the track that are underutilized "lost space" (TRANCIK. R. 1986: 1) that have potential to be redesigned to establish a link to its surrounding context at the same time accommodate the spectators for the racing entertainment purpose it is intended for.

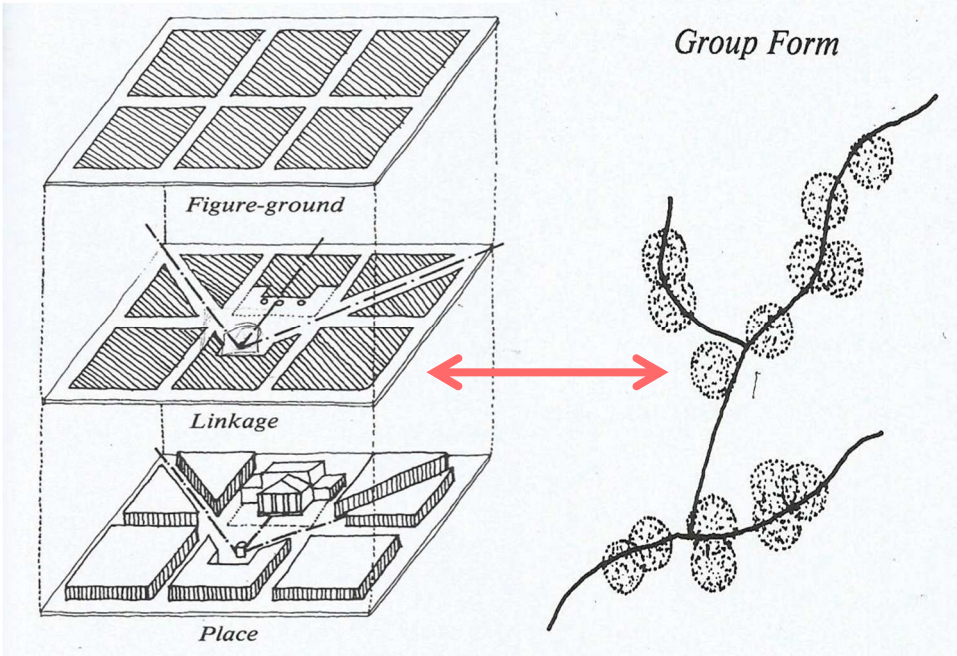
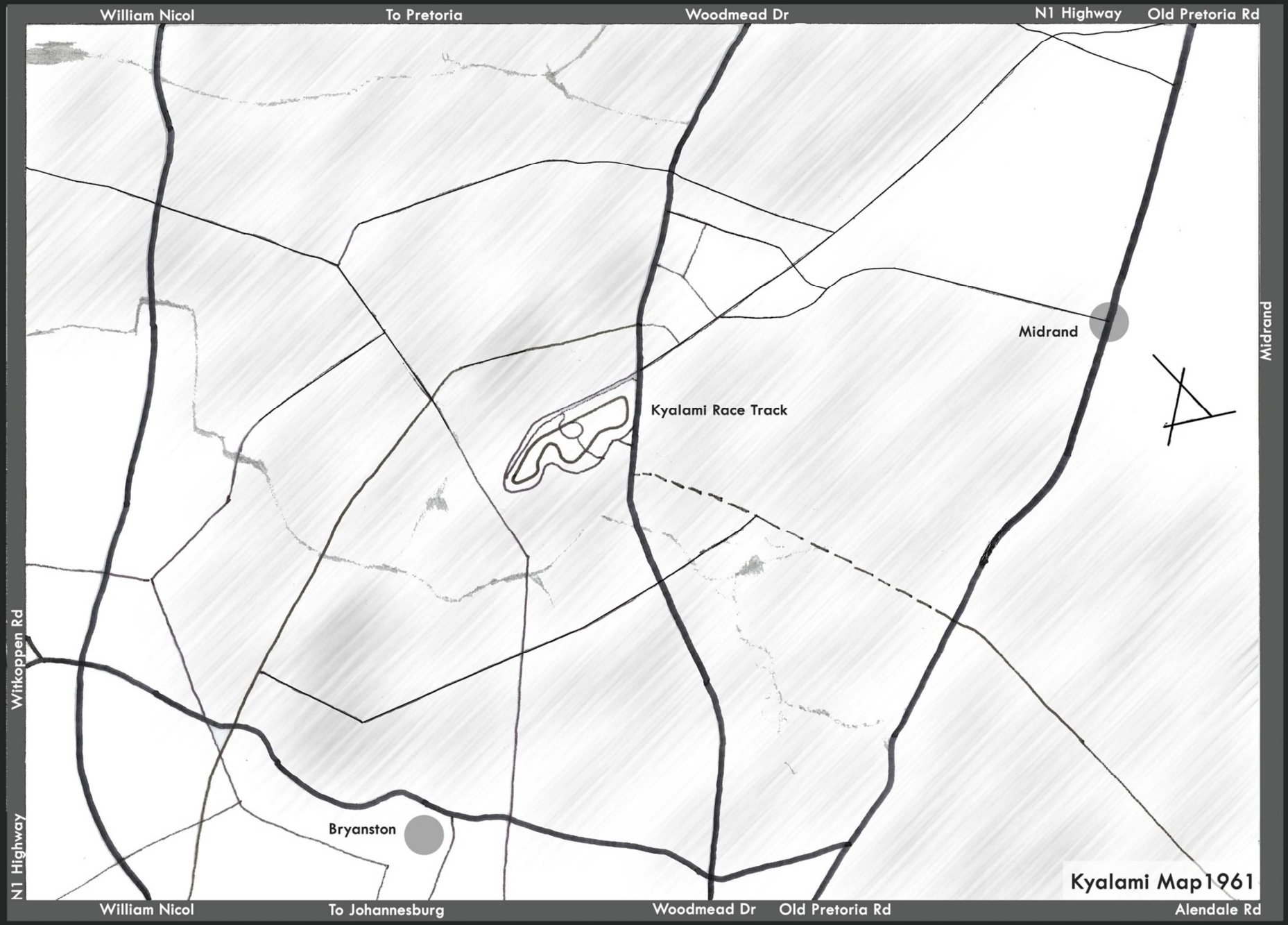


Figure 41. The establishment of the Kyalami node as explained by the group form linkage theory. (1986)



Kyalami Historical Mapping 1961, 1985, 2015



Figure 42. The opening of the Kyalami race track in 1961 with the Nine Hour endurance race. (2011)



Figure 43. The Kyalami race track before upgrades commenced in mid 2015 . (2015)

Timeline of the Kyalami race track overlaid on its existing context as a comparison of its transformation over time

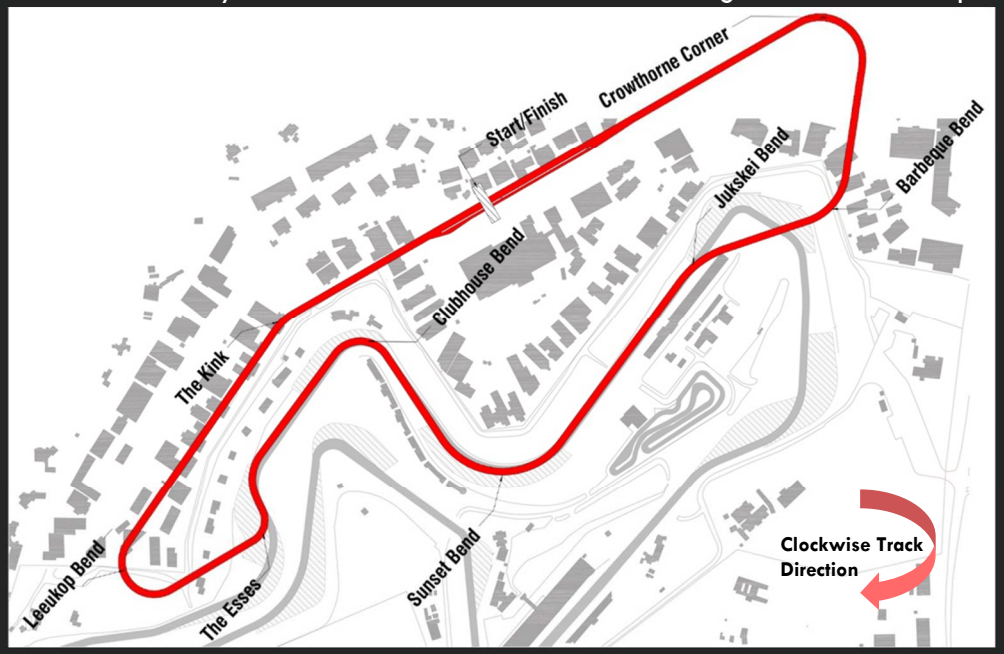


Figure 44. The first Kyalami race track from 1961 – 1987. (2015)

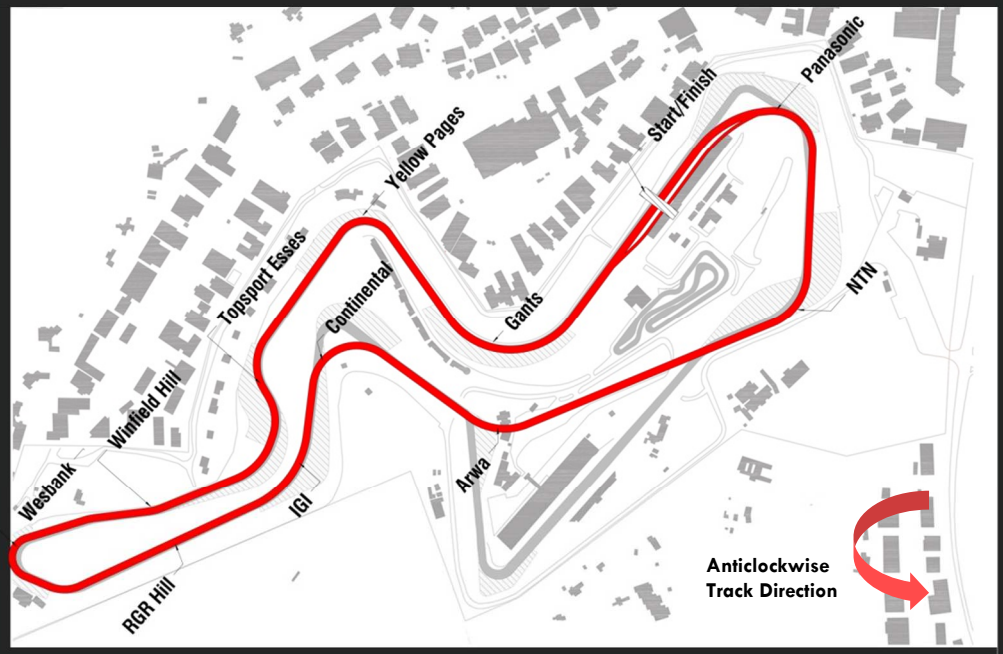


Figure 45. The Kyalami race track rebuilt for national motor racing form 1988 - 1991. (2015)

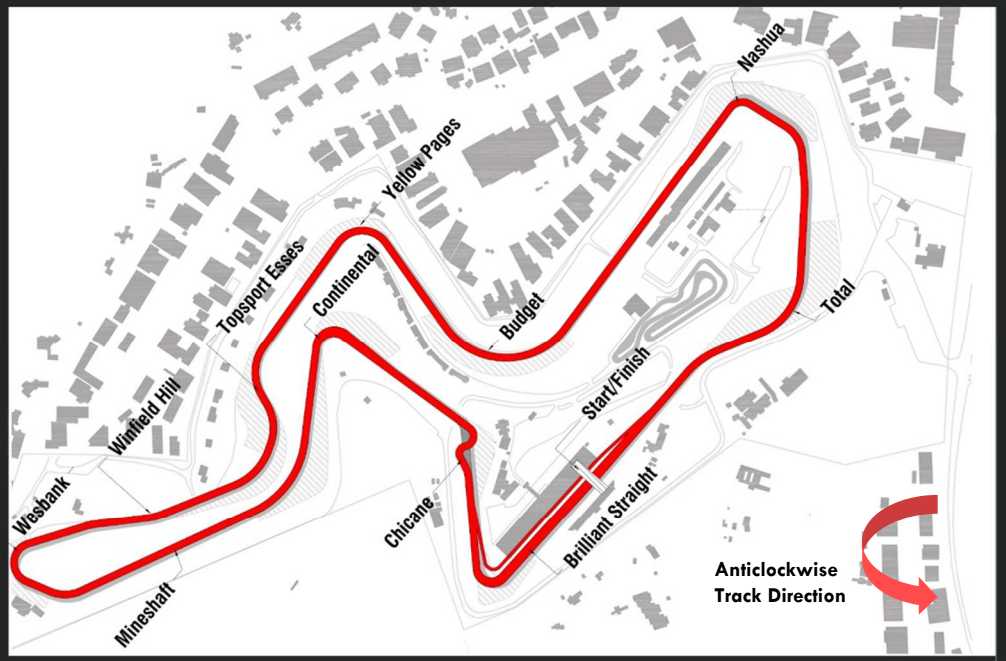


Figure 46. The Kyalami race track changed to accommodate other international events from 1994 – 2008. (2015)

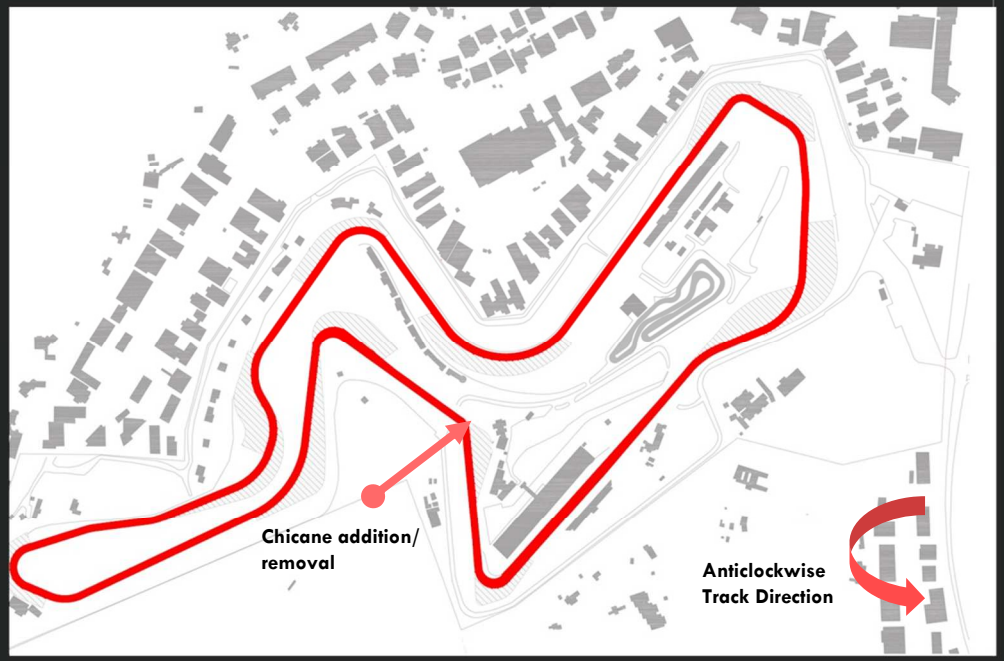
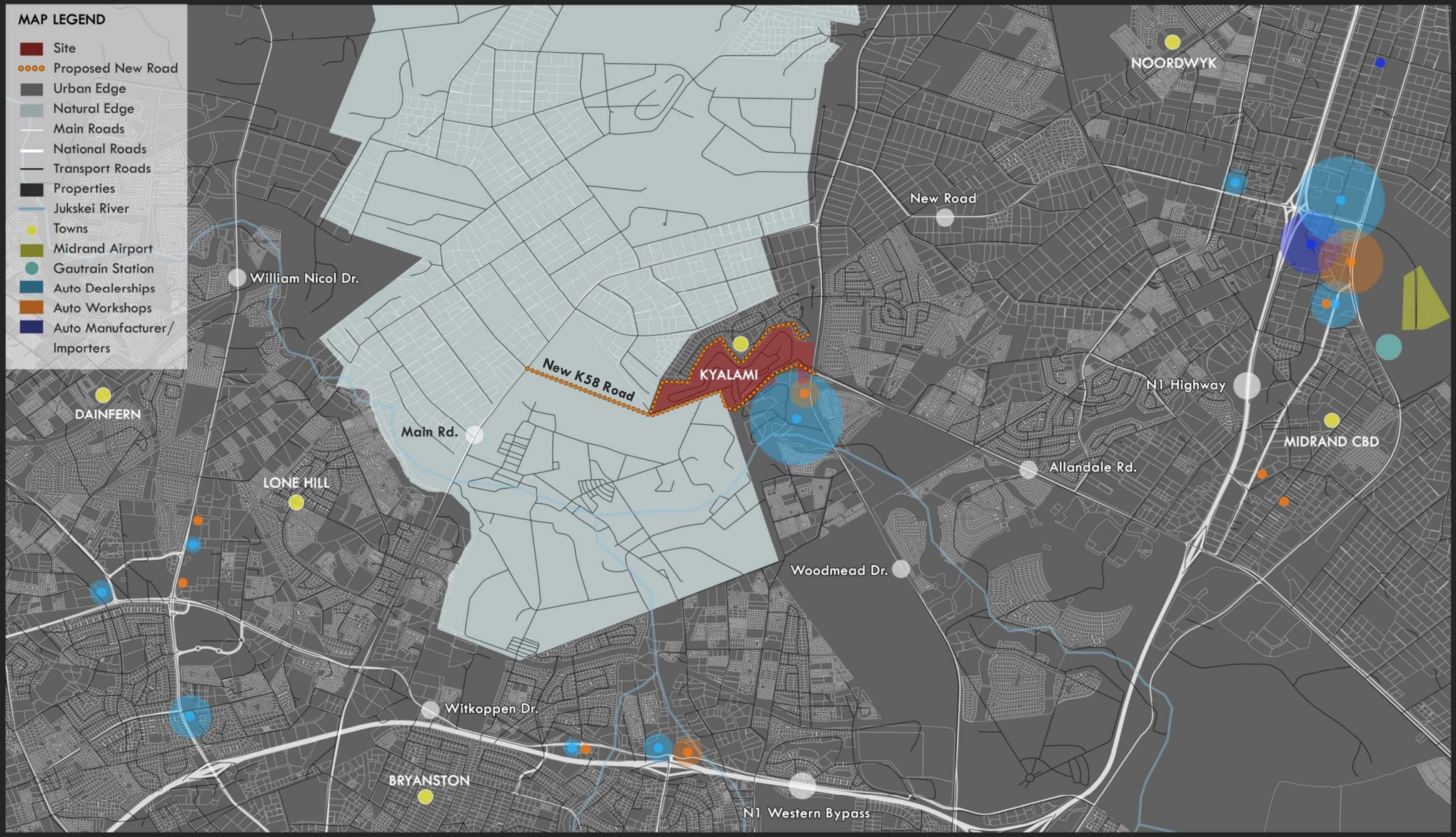


Figure 47. The Kyalami race track addition and removal of the chicane 1992 – 1993, 2009 – mid 2015. (2015)

MAPPING KYALAMI RACE TRACK - BROADER CONTEXT



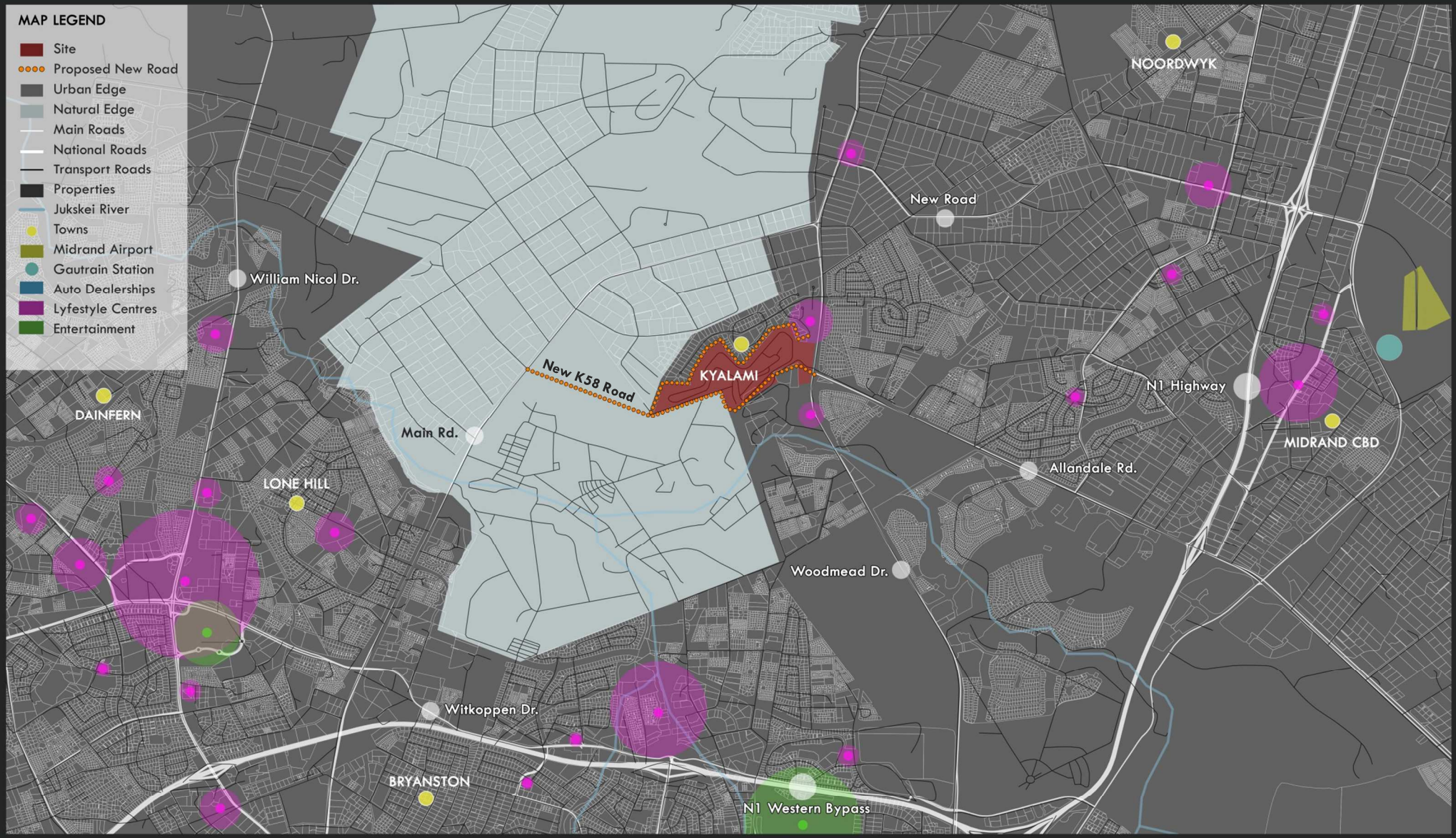
General Mapping Information

The extents of the map include all areas within and along the N1 highway that runs past Bryanston and Midrand as well as the William Nicol Drive main road. The thickness of all travel routes gives an indication of the intensity of vehicular activity, with the most activity associated with the N1 highways. An extension to the Allandale road is being planned and will pass below the Kyalami race track and connect to the existing Main Road. This new road will be advantageous to the race track as it will bring its users closer to the track at the same time alleviating traffic around the precinct.

Mapping Automobile Industry Nodes

Through the analysis of the automobile industrial nodes, the Kyalami's presence is highlighted as the second greatest automobile service node in the northern part of Johannesburg; with Midrand being the most sizeable. In comparison to the Midrand nodes, Kyalami has further potential to incorporate automobile service workshops as well as automobile importation and manufacturing facilities. These facilities would be best located on the northern portion of the race track where there is no automobile industry activates and would link well with the automobile dealerships to the south of the race track. The inclusion of these facilities would accommodate the car owners within the densely populated context of Kyalami and Bryanston.

MAPPING KYALAMI RACE TRACK - BROADER CONTEXT



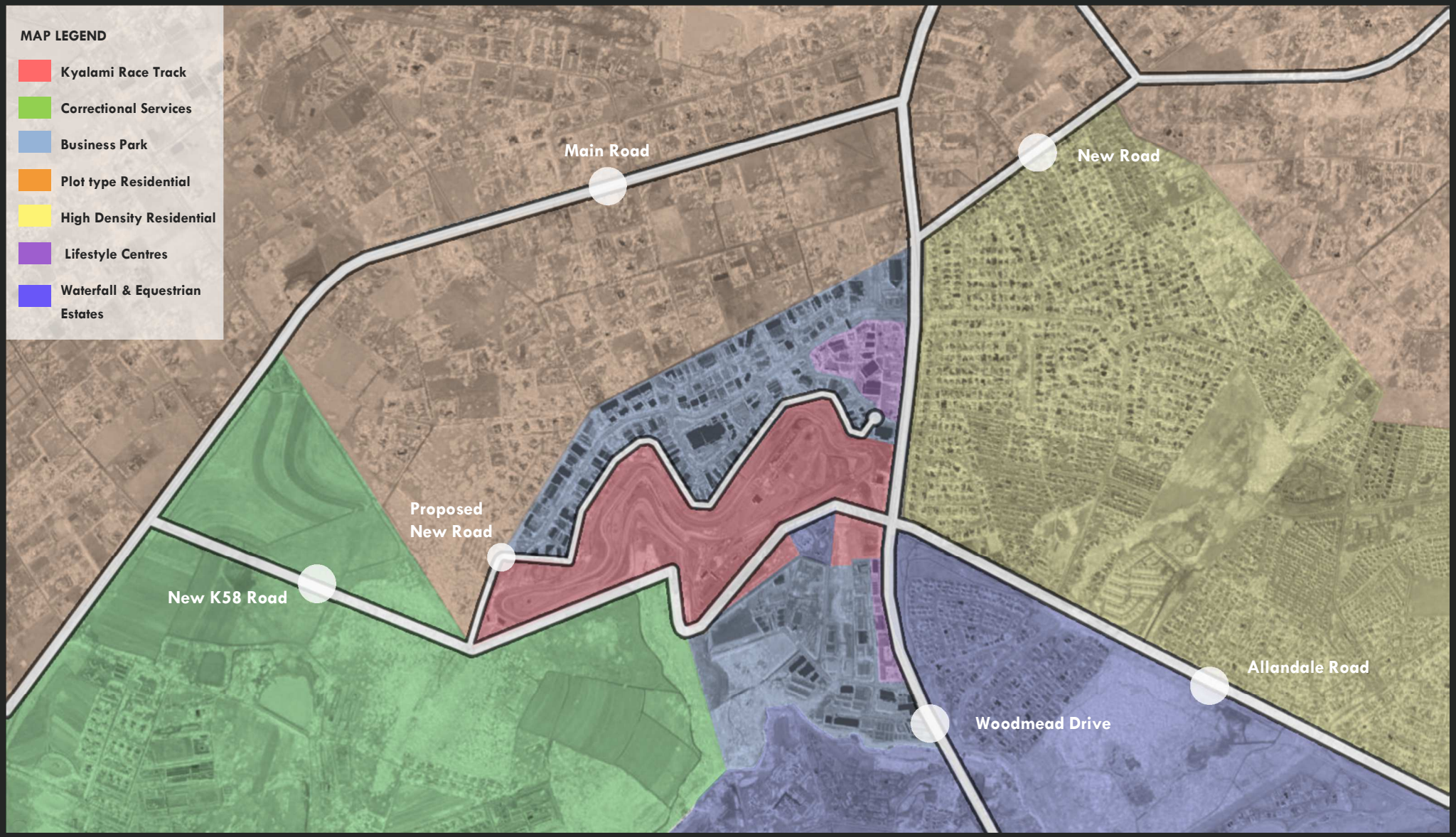
General Mapping Information

Natural features around the site include the Jukskei River that passes south of the Kyalami race track as well as the natural edge to the west of the race track with dense vegetation. The property boundaries in the dark grey region represents either housing, open land, business, warehouse or industrial properties around the site with the vast majority being dense residential properties.

Mapping Lifestyle Centres and Entertainment Nodes

The analysis of the Lifestyle centre and entertainment nodes highlights Kyalami's importance as the only sizeable entertainment node that is supposed to serve the Kyalami and Midrand regions, with the only other entertainment venues including a golf estate in Bryanston and Monte Casino on William Nicol Drive. This not only serves as motivation to preserve the iconic race track but is also an indication of the real entertainment potential the Kyalami race track has to offer to Johannesburg and Pretoria. Furthermore, being located in a vast green area, could allow the race track to accommodate a number of outdoor entertainment activities that could accommodate for the interests and needs of the public that would otherwise have to travel great distances to enjoy those activities.

MAPPING KYALAMI RACE TRACK - IMMEDIATE CONTEXT



Kyalami Race Track Immediate Context Zones

The zones surrounding the Kyalami precinct includes a correctional services facility surrounded by dense greenery, business parks (consisting of office, retail and industrial buildings) as well as residential zones (where the North Western portion contains more plot type units, the North Eastern portion containing high density units and the Southern Waterfall and Equestrian estates containing upper class units). This places tremendous pressure on an enormous and costly site like Kyalami that is increasingly becoming underutilized and the focus of many developers who are keen on redeveloping the site.


KYALAMI
WELCOMES YOU
FOR ENQUIRES PLEASE CONTACT - 082 767 7243 OR 082 371 1452
R55 Pretoria WEST
R55 Sandton

The iconic track is currently found in a dilapidating state with the "*pit complex requiring major renovation, worn race track requiring repairs, Bomas (hospitality suites) being structurally unstable and gravel traps found with overgrown weeds" (Kyalami Management 2015)*. With the race track still up to national motorsport standards it hosted a few regional events attracting little spectator support where spectator stands remain empty, apart from a dozen fans that occasionally attend the major race day events. As confirmed by SCC member the track is utilized much for the hosting of other unrelated motorsport events, such as conferences and driver training, rather than actual race events.

The race track owner, Mr Venter, has many plans to revive the track and wants "*to bring the old spirit of the track back where you can park alongside it and have a braai." (SA Property News 2014)*. In an attempt to revive the race venue, renovations to the race track initiated in June 2015 and are expected to be complete by the end of the year. According to discussions with Kyalami general manager (2015) the initial aim is for the race track to obtain a FIA safety grade 2/B licence accommodating all motor racing events except for Formula 1 and Moto GP. Phase 1 renovations to be completed by the end of the year includes the resurfacing of the race track, new underpass for direct parking access, extension of the race track to create a longer straight (as on the first race track), the widening of the iconic Bowl corner, upgrades to safety barriers, upgrades to venue security and the planting of trees to offset the carbon footprint. In the past, hospitality suits were built on the best viewing spots of the race track for the rich sponsors. These buildings have now been demolished to accommodate future upgraded spectator areas as a priority. Upgrades to the existing pit complex have also commenced according to FIA requirements for hosting international events. Mr Venter's goal is to re-introduce international motor racing, starting with the Porsche Cup, and if the financial situation and spectator support improves, consider improving the facility for high class Formula 1 and Moto GP events that will promote and inspire the nation's young talented drivers.



Figure 48. Aerial photograph of the upgrades that are taking place on the Kyalami race track. (2015)


Figure 49. Rendering of the newly upgraded race track to be completed at the end of 2015. (2015)



Figure 50. New layout of the Kyalami race track to be expected by the end of 2015, featuring a longer straight, new vehicular underpass, wider corner at The Crocodile and extended Crowthorne corner. (2015)



Figure 51. New vehicular underpass for ease of accessibility to parking facilities. (2015)



Figure 52. “Bommas” (Hospitality suits) that are being demolished for new spectator facilities. (2015)



Figure 53. Resurfacing of the race track according to motor racing international standards. (2015)



Figure 54. Upgrades to motor racing safety barriers and public security fencing. (2015)

Existing Structures and Services – The site for the motorsport centre will be located on the area of the existing pit complex and spectator stands. The motorsport centre will replace these existing facilities but will integrate part of their structure and municipal services (electricity, water and sewerage) into the new facility to save on building costs.

Start and Finish Line – To fully experience a motor racing event one has to be present during the pre-race build-up and post-race podium celebration, as these are the most treasured moments in motorsport. For this reason the facility will be located around start and finish line of the race track by the existing pits and spectator stand to allow the public to gain a full experience of the events.

Entry corner action – Included on the site is the Ingwe entry corner to the start and finish line which offers thrilling racing as much overtaking occurs at this point with race cars sprinting past the length of the site.

New proposed K58 road – The site will be bounded by the new K58 road which will bring its users past the site and exhibit the race track's motorsport atmosphere and activities to stimulate the public's interest for national and international motor racing.

Views – The location of the site not only offers great views to the entire race track but to its surrounding natural veld context that will enhance the experience of being at the race track.

Ease of Accessibility – The site will be located by a new proposed entrance offering access to the parking area on the race track. This will offer direct and easy access for team transportation and general service trucks to the pit complex. Weekly visitors as well as staff will also be able to use of this entrance for quick access to the main facility.

Land Fall – The site is fairly level as a result of the requirements for the start and finish line. This will be advantageous as costs for excavations will be much less for the total project cost.

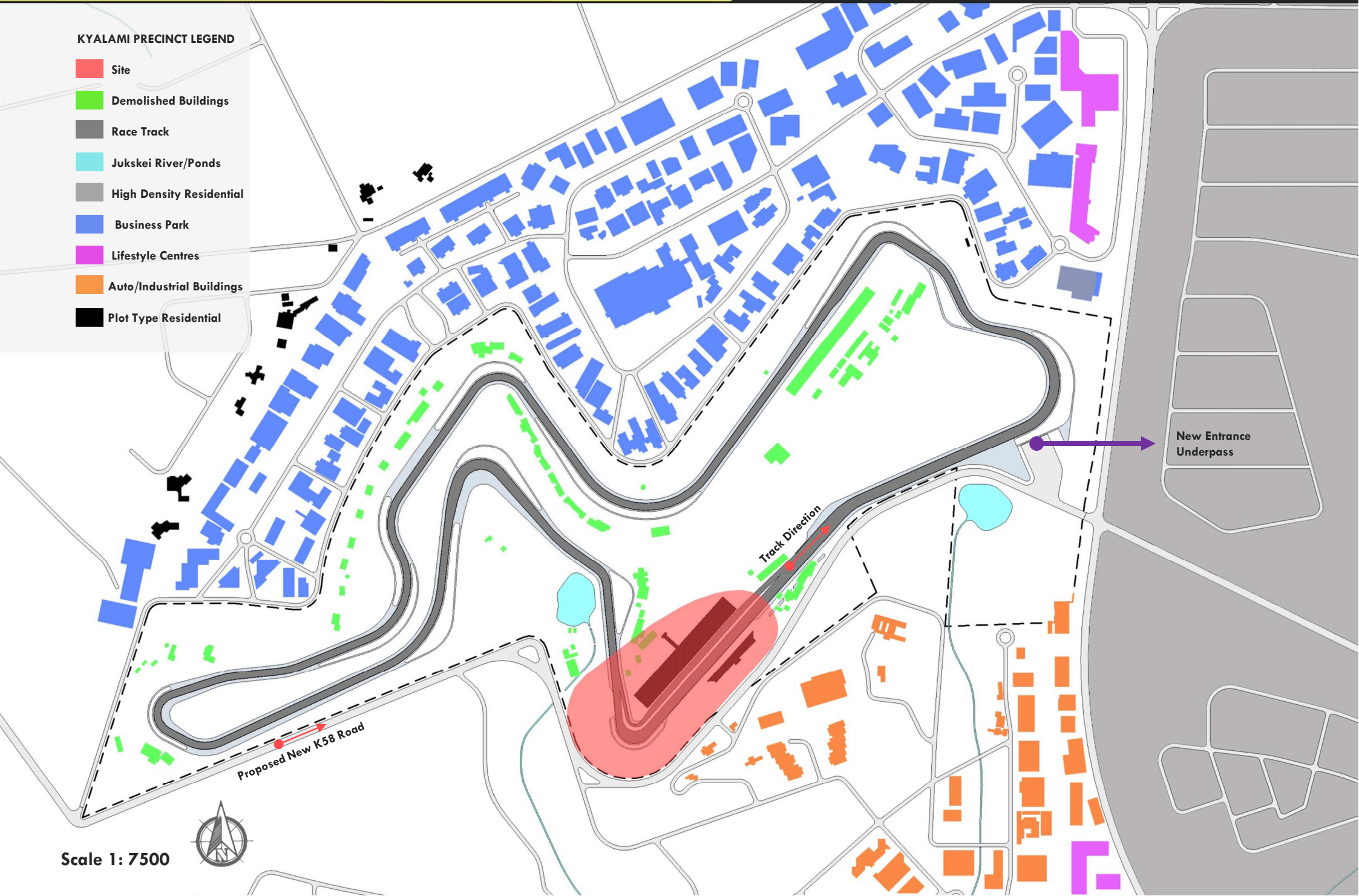
Facility Requirements – As upgrades to the existing pit complex are required for both motor racing standards and to help sustain the race track as a business model, the new proposed motorsport centre will accommodate for these upgrades and ensure it meets all the necessary requirements proposed for the existing facilities.

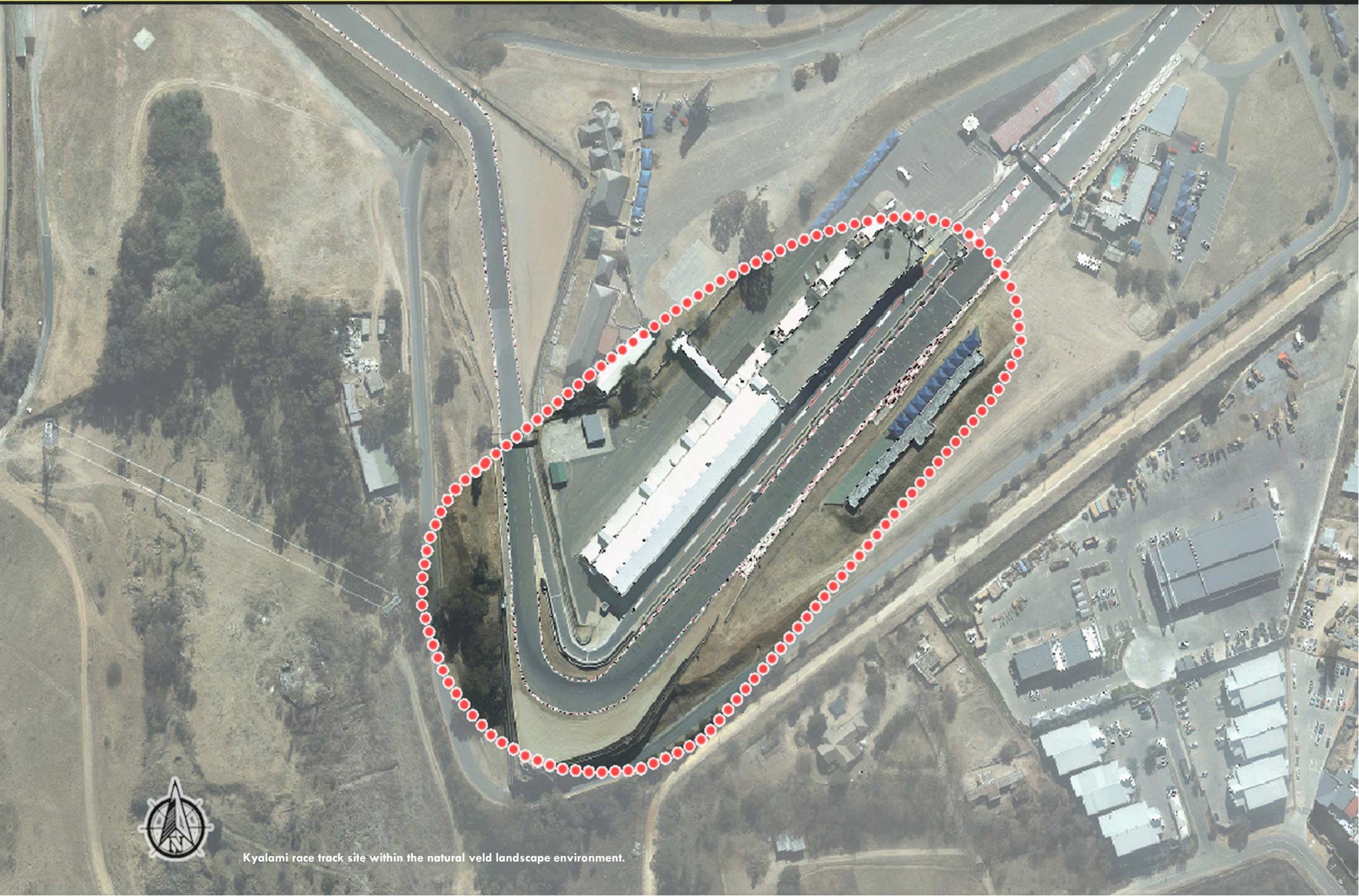
Zoning Requirements – The race track is zoned for special use for the following uses:

- All building facilities related to motor racing.
- Restaurant, refreshment stalls, bars and beer garden
- Places of amusement and instruction
- A driving and motor racing school
- The testing and development of motor vehicles
- A public garage, hotel, flea market, sport and recreation, conference and exhibition facilities

The race track can accommodate all forms of motor racing including rallying, motorcycle races, endurance races, stunt driving, race practice, demonstrations, testing, development and exhibition of vehicles. It excludes drag racing and motocross race events with exception to motocross in the form of trail-biking.

KYALAMI RACE TRACK SITE SELECTION – GRAIN & LAND USE





Kyalami race track site within the natural veld landscape environment.

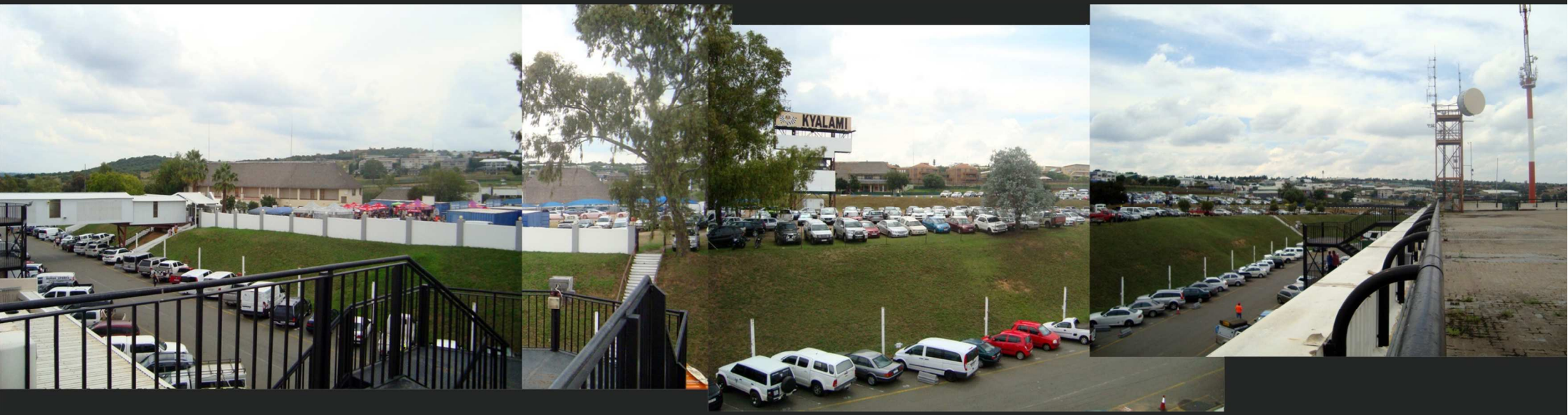


Figure 55. North perspective of the site seen from the top of the pit complex, overlooking the rest of the race track. (2015)

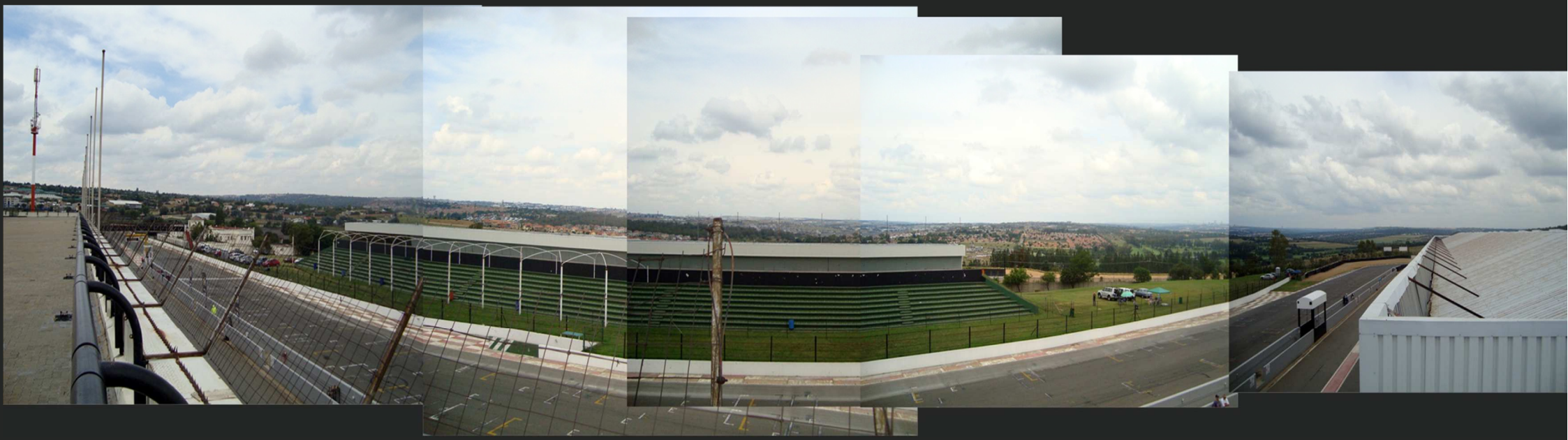


Figure 56. South perspective of the site seen from the top of the pit complex, overlooking existing grandstands and natural veld landscape of the Leeuwkop Correctional Facility. (2015)



Figure 57. East view of the Kyalami straight and pit complex. (2015)



Figure 58. North west view of the Kyalami race track Ingwe corner and pit complex. (2015)



Figure 59. View of the existing pit complex during a regional race day event. (2015)



Figure 60. View of the existing spectator grandstands during a regional race day event. (2015)



Figure 61. View of The Crocodiles corner(Right) leading into Cheetah turn (Left), seen from the "Bommas" that will be demolished to accommodate new spectator facilities. (2015)



Figure 62. Long straight leading from the pit complex and start/ finish line currently being extended. (2015)

CHAPTER 05

PROGRAMME

5.1) Outdoor Event Matrix

5.2) Building Programme Matrix

OUTDOOR EVENT MATRIX

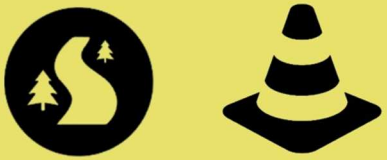
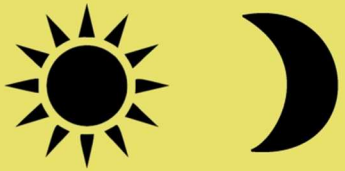
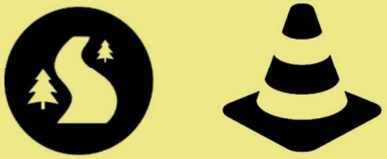
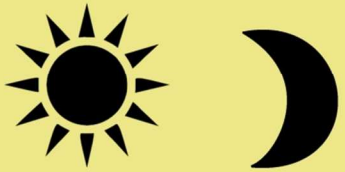
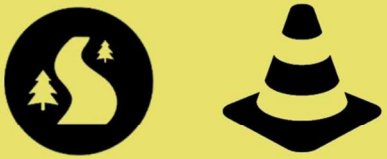
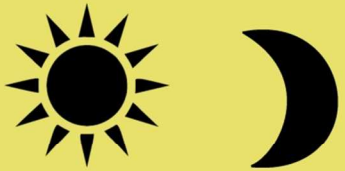
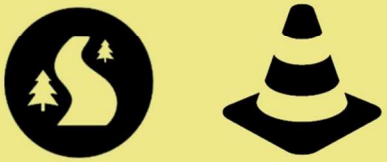
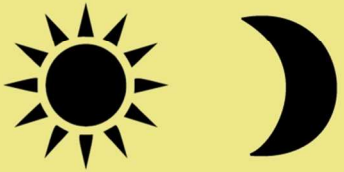
ACTIVITY	SPATIAL REQUIREMENTS	PURPOSE	TIME
Racing	Race Track & Pit Facilities	Competition Event	
Mountain Biking			
4x4	Off-Road Obstacle Course	Training	
Horse Trail			
Rally	Obstacle Course Trail	Team Building & Family Event	
Obstacle Run			
Motocross	Trail		
Trail Running			
Quad Biking	Off-Road Track		
Tree Climbing			
Go-Karting	Forest		
Rock Climbing			
Gravel Karting	Rocky Hill		
Paintball			
Bakkie Skiing			

<u>Outdoor Event Space Matrix</u>

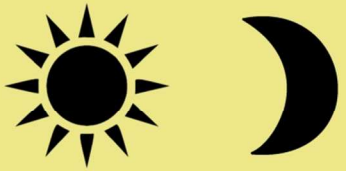
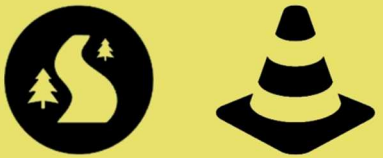
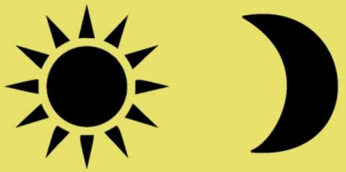
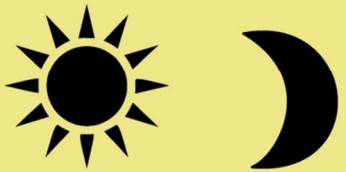
With much of the public's interest being orientated towards outdoor events, the natural Kyalami race track precinct poses itself as a potential venue to incorporate these events. These spaces will offer the same experience to the public, at a much closer location. The Kyalami race track will be able to maintain its original natural identity (famous to many race car drivers and tourists around the world) at the same time generate a portion of the required revenue from these outdoor events. Furthermore it will allow the public to enjoy these activities in the motor racing atmosphere of the race track and stimulate other people's interest to the sport.

A matrix of outdoor events has been compiled to accommodate the most well-known outdoor events that the public participate in and enjoy. These events will be managed by the respective companies associated with each event. As these events will be sharing similar spaces they will take place at different time slots.

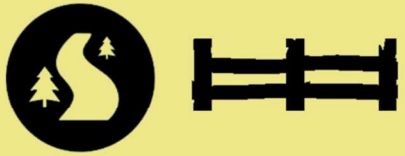
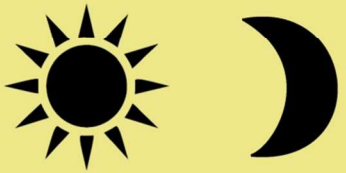
OUTDOOR EVENT MATRIX

ASSOCIATED EVENT	ACTIVITY	SPATIAL REQUIREMENTS	PURPOSE	TIME
FANTASTIC RACING	 Racing	 Race Track & Pit Facilities		 Weekends
ADA 	 4 x 4	 Off-Road Obstacle Course		 18:00 – 21:00
ADA 	 Rally	 Off-Road Obstacle Course		 15:00 – 18:00
ADA 	 Motocross	 Off-Road Obstacle Course		 06:00 – 09:00
ADA 	 Quad Biking	 Off-Road Obstacle Course		 09:00 – 12:00

OUTDOOR EVENT MATRIX

ASSOCIATED EVENT	ACTIVITY	SPATIAL REQUIREMENTS	PURPOSE	TIME
FANTASTIC RACING OUTDOOR KARTS	 Go-Karting	 Off-Road Track		 Weekly
GRAVEL KARTS	 Gravel Karting	 Off-Road Obstacle Course		 12:00 – 15:00
THOTA LODGE	 Bakkie Skiing	 Isolated Trail		 Weekly
JOHANNESBURG MOUNTAIN BICYCLE CLUB	 Mountain Biking	 Trail		 12:00 – 15:00
SA TRAILS	 Horse Trail	 Trail		 15:00 – 18:00

OUTDOOR EVENT MATRIX

ASSOCIATED EVENT	ACTIVITY	SPATIAL REQUIREMENTS	PURPOSE	TIME
Jeep WARRIOR RACE FOR THE BRAVE	 Obstacle Run	 Obstacle Course Trail		 09:00 – 12:00
Spur Trail Series	 Trail Running	 Trail		 06:00 – 09:00
ACROBRANCH	 Tree Climbing	 Forest		 Weekly
SOUL ADVENTURES	 Rock Climbing	 Rocky Hill		 Weekly
PLAY PAINTBALL PAINTBALL CITY	 Paintball	 Forest		 Weekly

Building Programme

A building programme has been compiled based on the FIA international motor racing event facility requirements as well as the necessary facilities that will assist with the generation of the required revenue to allow the race venue to survive as a business model. Apart from the programme requirements much focus has been given to the incorporation of public and spectator facilities that will exhibit motor racing and enhance the racing experience and culture, at the same time ensure its functionality.

Spaces	Area m²	Use Description
Pits		
Garages x 42	4 500	Race Teams/All Purpose
Kitchens x 6	200	Race Teams/All Purpose
Briefing Rooms x 20	600	Race Teams/All Purpose
Canteen	300	Race Teams/All Purpose
Emergency Personnel	300	Driver Emergency
General Storage	100	All Purpose
Motorsport/ Automobile Retail		
Retail Space	3 000	Public/ Spectators
Open-air Entertainment Court	1 000	Public/ Spectators
Public Gathering/ Food Courts	1 500	Public/ Spectators
Restaurants	1 500	Public/ Spectators

Spaces	Area m²	Use Description
Motor Racing Museum		
Exhibition Space	5 000	Visitors
Foyer	500	Visitors
Bag Drop-off	20	Security
Security Office	20	Security
Reception	20	Museum Staff
Cashier's Office	20	Museum Staff
Archive	250	Museum Staff
Archive Office	20	Museum Staff
Assistants Office	20	Museum Staff
Visiting Researchers	20	Visitors
Seminar Spaces	50	Visitors
Study/ Research	50	Visitors
Storage	500	Museum Staff
Museum Assembly	250	Museum Staff
Canteen	30	Museum Staff
Formal Spaces		
Auditoriums x 4	3 200	All purpose
Dining Area	1 000	All Purpose
Foyers x 2	3 500	All Purpose
Meeting/ Boardrooms	4 000	All Purpose
Offices	3 000	Staff
Viewing Decks x 4	600	Visitors/ Staff

Spaces	Area m²	Use Description
Spectator Areas		
Grandstands	(10 000 seats) 4 000	Public/ Spectators
Spectator Zones	6 000	Public/ Spectators
Kitchens/Bars x 16	1 000	Public/ Spectators
Public Viewing Decks x 2	800	Public/ Spectators
Services		
HT Room	20	Electrical
LT Room	20	Electrical
Generator	20	Electrical Backup
UPS	20	Computer Backup
Communication Sub.	20	Computer Data
Water Storage	30	Building Supply/ Fire
HVAC	20	Heating and Cooling
Emergency Room	50	Spectators
Parking		
Internal Parking	2 500	Spectators/Visitors/Staff
External Parking	300	Visitors
Truck Parking	40	Race Teams/Services

Male Ablutions	
WHB	84
WC	54
Urinals	108

Female Ablutions	
WHB	84
WC	130

Disabled Ablutions	
WHB	32
WC	32

CHAPTER 06

VIABILITY

6.1) Financial Influences

6.2) Funding Proposal

6.3) Project Cost Proposal

6.4) Construction Methodology

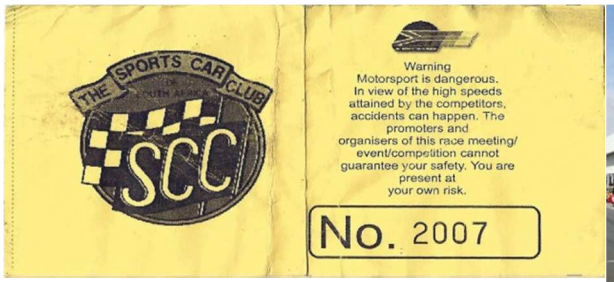
6.5) Project Motivation

6.6) Conclusion

With international motor racing turning its back on the Kyalami race track as a result of the Apartheid system, motor racing experienced a great descent in entertainment value. This resulted in a of period low financial support from sponsors and spectators. Further financial strain arose from the ever escalating costs of race events and maintenance of the race track to national and international standards which resulted in SAMRAC (the track's first owners) being forced to sell the track. The transformation of the race track over the years is testimony to the various business schemes implemented to maintain the race venue, which are no longer viable business models as the race track is failing to obtain the necessary funding. Kyalami general manager (2015) stated that *"Motorsport is not the revenue generator here. We need motorsport because it is part of our heritage and we love motorsport, but it needs to survive as a business model."* International race tracks like Silverstone have found themselves in a similar situation and the owners have recognised that without additional revenue sources race tracks cannot be funded. The Independent news article stated that:

"Circuits generally do not get any revenue from the television broadcasts or corporate hospitality and advertising hoardings during the race. Money from this goes to the F1 Group leaving the circuits with ticket sales as their sole source of income from the sport. This usually barely covers the annual hosting fee with running costs often covered by investment from governments. The British Grand Prix gets no state subsidies so to compensate for this it has some of the highest ticket prices in F1. They started at £145 this year making them more expensive than tickets to the men's final at Wimbledon." (Sylt. C & Reid. C. 2013)

Internationally the escalation of ticket prices is one of the factors that are driving people away from major race events, where events like Formula 1 are seen as exclusively for the rich or true fanatics. This is the case as tickets sales are the main income source to account for the high quality and entertaining race events. However, in South Africa the ticket prices are affordable but the quality of race events is average and thus draws little attention from the public. I have personally been to a regional race event at Kyalami this year where I only paid an entrance fee of R50 (including parking) for a full day of race events commencing at 07:00 and ending at 17:00. This is a minute fee for an entire day of racing entertainment in comparison to what you would expect internationally, but this is what motorsport in the country has resorted to in order to keep itself alive. Unfortunately it does not matter how much you reduce the entry fee or how much money you put into advertising, the base number of spectators will always remain the same. Kyalami general manager (2015) stated that *"if we want to expand on the spectator base we have to change the show"* and to do so the race track requires a solid business model to fund quality race events. The idea of the business model is to make motorsport accessible and affordable for both the public and race teams and revive the great interest the country once had for motorsport.



(R 50 Entrance ticket for the SCC Autumn Trophy)



Mr Venter is the current race track owner, who purchased the track on auction last year for R205 million. The track has great significance for him as it is the venue where he won the Porsche Turbo Cup in 1988. With his passion for cars and racing he couldn't bear to see the track demolished as part of another residential development and his comment was: *"Kyalami is saved and that was the main reason I bought it, and yes for SA Motorsport too. We'll be integrating some of Porsche SA's business units with the racetrack, but other manufacturers are most welcome too."(Wheels 24 2014)*.

The Venter family are the majority stock holder LSM group and hold the rights to import Porsche into the country. The brand's focus has always been on the people, the aim to produce the perfect sports car and motor racing. Traditionally any decisions made regarding the Porsche corporate network is first proposed by the company CEO together with advice from the CFO, property manager and other managers functioning under the CEO which is then assessed and approved by the international board of directors. They ensure the best decisions are made regarding the investors' capital by overseeing the financial strategy and performance of Porsche SA.

The idea for the proposal of the Kyalami Motorsport Centre is for Mr Venter to form a partnership with Porsche SA, which is a perfect fit for this major sports car company. Mr Venter would invest 25% and Porsche SA 75% of its capital (Generated from sales/service profits as well as investor capital) into the first phase of the development (Motorsport Entertainment Centre). The partnership would later incorporate other auto dealers like BMW, Mercedes, VW and Land Rover to assist with the costs for the Kyalami Framework at large. This will reduce any financial strain on Mr Venter and Porsche SA thus offering an investment opportunity for those automobile companies. It is expected that this strategy will ensure the affordability and profitability of the costly motorsport industry admired by many.

Phase 1 - Motorsport Centre



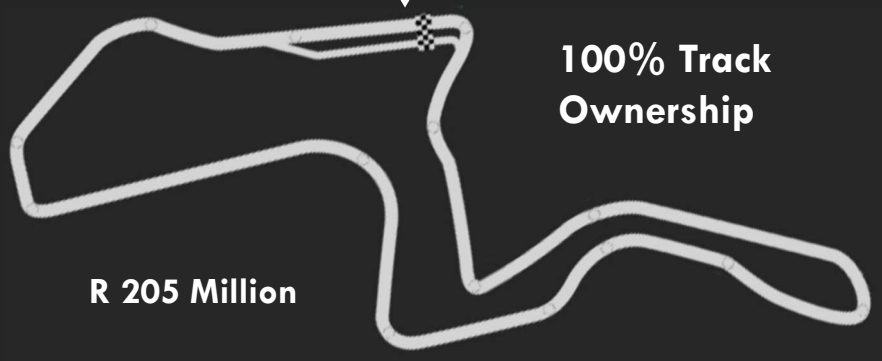
25% Investment

(Kyalami Track Owner)

75% Investment

Porsche SA
(Development Partner)

PARTNERSHIP



100% Track Ownership

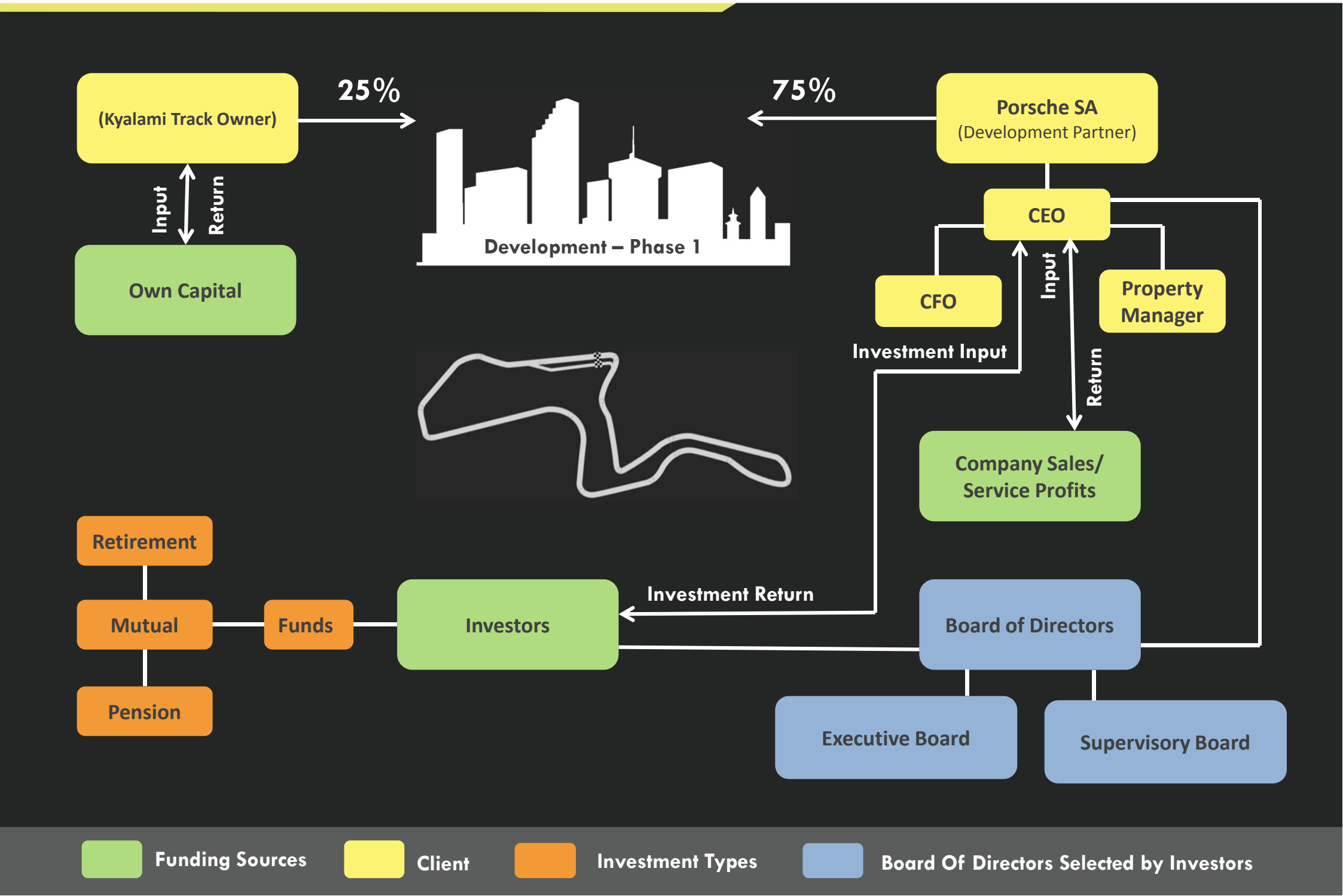
R 205 Million

CEO

CFO

Property Manager

FUNDING PROPOSAL - STRUCTURE



Future Development Phase 2-6



75% Contribution

15% Land Rover (Development Partner)

15% VW (Development Partner)

15% Porsche SA (Development Partner)

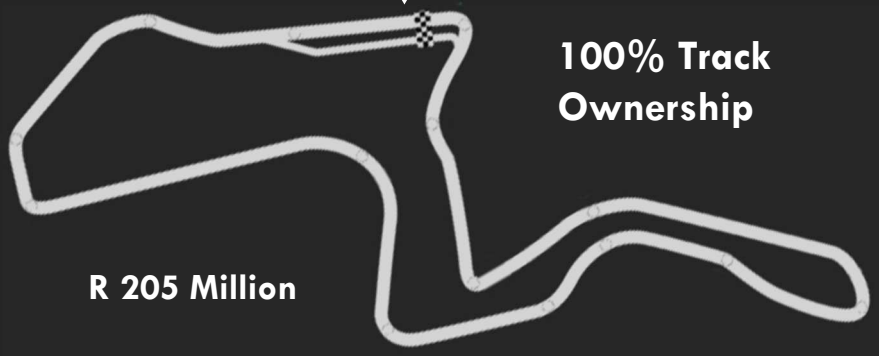
15% BMW (Development Partner)

15% Mercedes (Development Partner)

25% Contribution

(Kyalami Track Owner)

PARTNERSHIP



100% Track Ownership

R 205 Million

RENTABLE – PIT COMPLEX PROGRAM REQUIRENMENTS	Auditoriums/ Boardrooms	10 000 m²
	Administration Offices	2 000 m²
	Spectator Stands	10 000 m²
	Pit Complex	5 000 m²
RENTABLE - PUBLIC/ SPECTATOR FACILITIES	Motorsport Retail	7 000 m²
	Racing Simulation/ Performance Space/ Spectator Zones	10 000 m²
	Motorsport Museum	5 000 m²
NON - RENTABLE	Ablutions/ Services/ Storage	8 000 m²

Based on the discussion with the Kyalami general manager and taking into account the necessary building program requirements for race events, the approach is to provide the primary revenue sources and incorporate the additional revenue sources obtained from the spectator and public facilities. This will help balance out the costs and make quality race events more affordable to the public as well as for competing race teams.



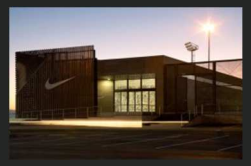
Project 1: Greenpoint Soccer Stadium (Cape Town) - Abakali (QS)



Project 2: Silverstone Pit Complex (Northamptonshire) – AECOM (QS)



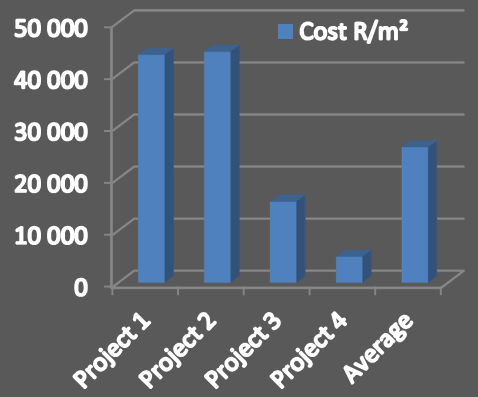
Project 3: BMW HQ (Midrand) - Schoombie Hartmann (QS)



Project 4: Nike Soccer Complex (Soweto)

An average project cost of R 26 000/m² was established from project costs of sports complexes including: The Greenpoint Stadium, Silverstone pit Complex, BMW HQ and Nike Soccer Complex. Each of the proposed project areas were costed based on the quality of finishes, materials and specialised labour required, which resulted in a total project cost of R 1 167 Billion.

Project	1	2	3	4
Project Size(m²)	80 000	11 600	5 200	13 000
Project Cost(R)	3 500 000 000	514 506 126	81 000 000	65 000 000
Cost R/m²	43 750	44 354	15 577	5 000



Average Project Cost: (P1+P2+P3+P4)/4= R26 000/m²

TOTAL PROJECT COST		**R 1 167 Billion**
Auditoriums/ Boardrooms	R 260 Million	Areas @ R 26 000/m² (More costly labour, finishes and material)
Administration Offices	R 52 Million	
Spectator Stands	R 260 Million	Open-air performance space (2 000m²) costed @ R 5 000/m² (Less costly labour, finishes and material)
Motorsport Retail	R 182 Million	
Racing Simulation/ Performance Space/ Spectator Zones	R 218 Million	
Motorsport Museum	R 130 Million	**Total: R 1 102 Billion**
Pit Complex	R 25 Million	Areas @ R 5 000/m² (Less costly labour, finishes and material)
Ablutions/ Services/ Storage	R 40 Million	**Total: R 65 Million**

Race Track Operational Costs and Revenue Requirements



- Track maintenance
- Building Maintenance
- Municipal Services
- Investment Recoupment

Track Cost – R 205 Million

Revenue Required:

R 100 000 – R 300 000/ Day

Race Track Rental Recoupment (SCC)

Administration Offices	R 52 Million
Auditoriums/ Boardrooms	R 260 Million
Spectator Stands	R 260 Million
Pit Complex	R 25 Million

Project Cost: R 597 Million

Rental Rate/ Event: R267 000
Rental rate/ Annum:
= 9 Million (34 Events)

(66 years to recover costs)

X Not Feasible

Spectator Facility Rental Recoupment

Retail Space Monthly rental @ R 300/m² (Rode's Retail Rates)
Total = R 2.1 Million (7 000m²)

Simulation/ Performance Space Monthly rental @ R 500/m²
Total = R 5 Million (10 000m²)

Project Cost: R 400 Million

Rental Rate/ Annum
= R 85.2 Million

(4.7 years to recover costs)

√ Feasible

Expo/ Conference/ Training Rental Recoupment



Pits Exhibition Space @ R 400/ 25m² (SCC Rates)
Total = R 4.2 Million (52 Events)



Conference, Meetings, Training @ R 300/ Guest (CTICC Rates)
Total = R 75 Million/ Annum (250 000 Guests)

Project Cost: R 285 Million

Rental Rate/ Annum
= R 79.2 Million

(3.6 years to recover costs)

√ Feasible

Administration Offices Rental Recoupment



Monthly Office rental @ R 250/m² (Abland Rates)
Total = R 500 000/ Month

Project Cost: R 52 Million

Rental Rate/ Annum:
= 6 Million

(8.7 years to recover costs)

√ Feasible

Motorsport Museum Income Source



Ticket Sales Entry Fee @ R 50/ Person (Porsche Museum Rates)
= R 4 Million/ Annum (80 000 Visitors)

Guided Tour Fee @ R 200/ Person (Porsche Museum Rates)
= R 10 Million/ Annum (50 000 Visitors)

Project Cost: R 130 Million

Rental Rate/ Annum
= R 14 Million

(9.3 years to recover costs)

√ Feasible

TOTAL PROJECT COST	**R 1 167 Billion**
Race Track Rental	**R 9 Million/ Annum**
Spectator Facility Rental	**R 85.2 Million/ Annum**
Expo/ Conference/ Training Rental	**R 79.2 Million/ Annum**
Administration Offices Rental	**R 6 Million/ Annum**
Motorsport Museum Income	**R 14 Million/ Annum**
Total Annual Revenue:	**R 193.4 Million**

According to market research conducted by Mr Venter and Porsche SA the race track needs to generate between R 100 – 300 000/ day to become profitable as well as cover building and operational. Hiring of the venue for race events alone will not recover these costs as it only generates R 9 Million/ Annum with a requirement of 66 years to recoup the investment. With the implementation of spectator facilities generating R 85.2 Million/ Annum, Conferencing facilities generating R 79.2 Million/ Annum, Offices generating R 6 Million/ Annum and Museum generating R 14 Million/ Annum it will require 6 years to recoup the building and operational costs, and fund the Kyalami race venue with regards to hosting better quality and entertaining race events.

Daily Revenue Generated:
= R 529 863 > R 300 000
(6 years to recover costs)

√ Feasible



LABOUR

- 19% (R 21 000/m²)

- South African Materials
  - -Less Transportation Costs –No Import Charges
- Pit & Spectator Stand Recycling
  - -Reuse of Concrete/ Steel Structure & Foundations-



MATERIALS

- Equipment
  - - Less Transportation Charges

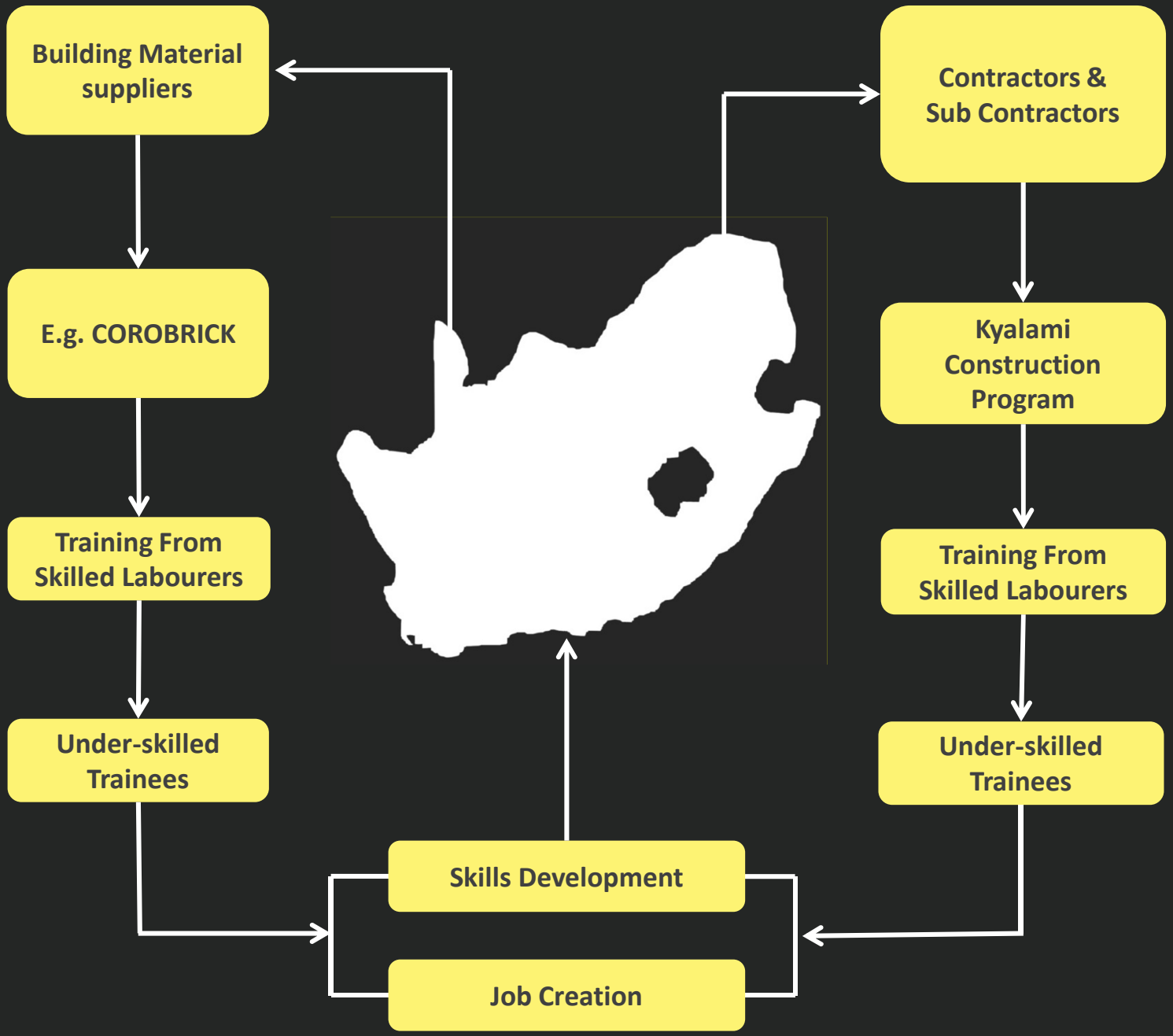


BUILDING

- 8% /Annum

- Efficient Technologies Reducing operation Costs
  - Solar power
  - Radiant Heating/ Cooling
  - Ventilated Façade
  - Storm Water Recycling

South African building material suppliers will be utilised which will result in more affordable material costs due to less transportation and importation charges. Such a project would require specialist professionals. Potential project team members could be drawn up based on their background, experience, quality, reliability, efficiency and timeous work flow on similar building type projects selected from the: Greenpoint Stadium, Soccer City Stadium, Moses Mabhida Stadium and Nike Soccer Complex projects. In addition, the foundations, concrete and steel structure of the existing pit and spectator stands will be reused thus saving on building costs, where the cost of these areas were reduced by 19% (R 5 000/m²). Efficient building technology sources such as solar power, heating/ cooling implemented will save on the building operational costs over its life span by an estimated 8%/ Annum.



In terms of construction methodology the aim will be to uplift the nation's construction industry in terms of skills development and job creation for under-skilled labourers and youth. A Kyalami Construction Program will be put in place where the under-skilled trainees will be trained by qualified labourers of the various contractor and sub-contractor companies hired for the various building project packages. Some of these including brick & wet works, screed & waterproofing, ceilings, roofing, Finishes and landscaping. South African manufactured building materials will be utilized to support initiatives such as training programs that COROBRICK has put in place to train underprivileged labourers and youth to operate in certain areas of their production line, which has guaranteed these trainees jobs to support themselves.

Project Motivation

Through the development of this project it is envisaged that it could:

- Revive and uplift the motorsport culture by means of the Kyalami Motorsport Centre intended to enhance the motorsport entertainment value as well as make it more accessible and affordable to the public.
- Become a prototype that can serve as precedent to local and international race venues that are on the verge of collapse.
- Uplift the automobile industry and economy by means of the automobile training and research facility. This facility can contribute to global automobile technological advancements by producing more efficient automobiles, as well as assist with the training of engineers, fabricators and mechanics in the country.
- Provide jobs and uplift the economy by means of the provision of - automobile workshops and dealerships included in the race track framework.
- Make optimal use of a massive site like Kyalami to the benefit of the public and surrounding context that would otherwise be closed off to them completely.
- Meet the goals that the NSRP have put in place to build an active and winning sporting nation.
- Promote the local young talented drivers and provide opportunities for them to compete in the international motor racing calendar to become successful drivers like national F1 champion Jody Scheckter.
- Place South Africa back onto the international motorsport calendar.

Conclusion

As stated by the Kyalami general manager, motorsport in the country cannot survive without a solid business model, which is required if one wants to host quality entertaining motorsport events and attract the public's attention. A means of obtaining the required revenue to run the race venue can be achieved through the development of the Kyalami Motorsport Centre. At first glance costs for the development can be overwhelming, however by analysing the revenue that the building will generate it can be seen as a viable solution as it will only require 6 years to recover the invested capital after which will become profitable and sustain the race venue. Furthermore, these cost can be seen as a minimum in comparison to the vast contributions this development will offer to the national motorsport culture, automobile industry, society and the economy. Development costs can be balanced out by means of a partnership with other local automobile companies thus eliminating any financial strain on the owner. It is envisaged that through this business model the iconic race track and motorsport culture will be preserved for years to come.

CHAPTER 07

PRECEDENT

7.1) Introduction

7.2) Park Design

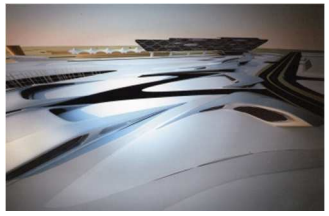
7.3) Programme

7.4) Form and Space














Introduction

This chapter deals with research that was conducted on various project types ranging from urban design to building scale. These precedents were selected according to six categories namely: Programme, Park design, Form and Space, Structure and Space, Technical Requirements, and Technology. The approach is to extract the relevant design principles from each of the precedents in each category that will be able to be applied to the design of my own Kyalami Motorsport Centre as a prototype to other motor racing tracks in the country. This chapter will only deal with the first three categories (Park design, Programme, Form and Space) where the last three categories (Structure and Space, Technical Requirements, Technology) will be discussed in the technical study chapter.

Precedent Structure

Programme - This category examines the type of programme used in various automotive buildings adapted to modern use.
Park Design - Focuses on urban threshold and space principles in dealing with the public and vehicular interface.
Form and Space - These precedents deal with the relationship between building form and its relationship to its internal and external spaces and how it is used to contextualise and give meaning to the building.
Structure and Space - Is an observation of the structural approaches and systems used in airports and motorsport buildings to create fluid, airy spaces and achieve a purposeful and elegant design.
Technical Requirements - Is a study into stadium design that will provide the necessary technical building principles in designing for spectator areas and ensuring its functionality.
Technology - This category examines a technological approach that can be implemented in the architectural design of the Kyalami Motorsport Centre.



Figure 63. Envisaged interior perspective of the Automotive Complex. (2015)

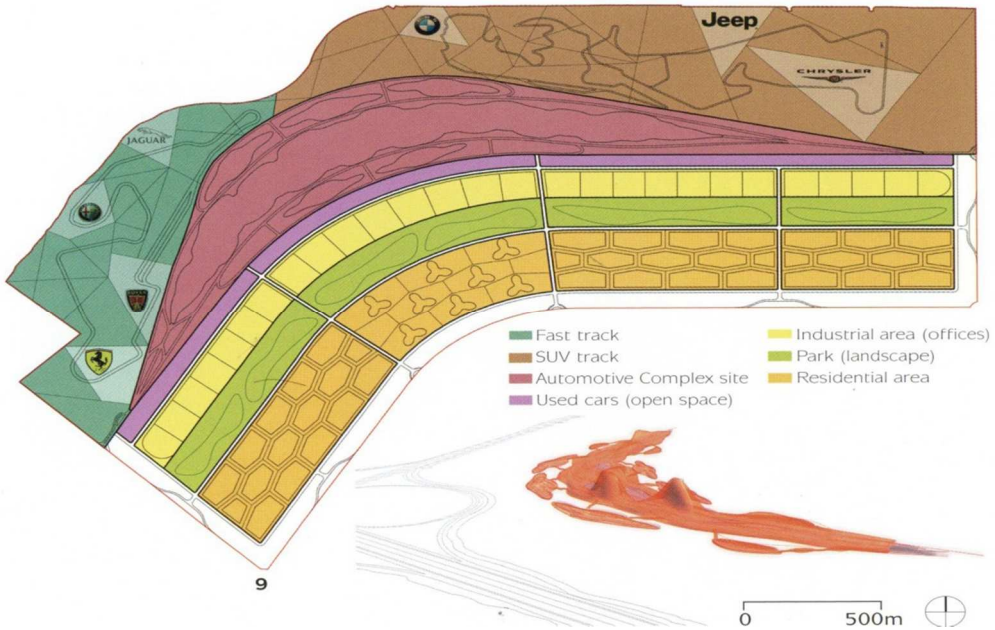


Figure 64. Automotive Complex overall framework. (2015)

Project: Automotive Complex for GCC
Location: United Arab Emirates, Abu Dhabi
Architect: ONL
Completed: On-going
Size: 6 Km²

Description

The complex consists of a 2.5 Km long terminal building that includes automobile testing facilities, entertainment facilities and accommodation. It is designed to provide services for car customers, family entertainment and those passionate about the latest automobile technology. The concept for the building is based on the themes of speed and friction which is an expression of people's obsession for speed which is balanced out in reality by the presence of friction.

Precedent Relevance

In relation to my approach for the framework of the Kyalami race track, this complex is relevant in the manner in which it incorporates a variety of automobile services to accommodate for the various public's need. Rather than including a single test track, the complex has included a variety of different tracks to accommodate for different vehicle testing and events, which allows for optimal use of the site. The complex is of further relevance in terms of its incorporated program including an interactive automobile museum, automobile expositions and demonstrations, automobile retail and theme park. This facility not only serves to entertain the visitors but allows them to experience the automobile from an educational and enhanced interactive manner.



Figure 65. Envisaged perspective of the Daytona Rising upgrade. (2015)

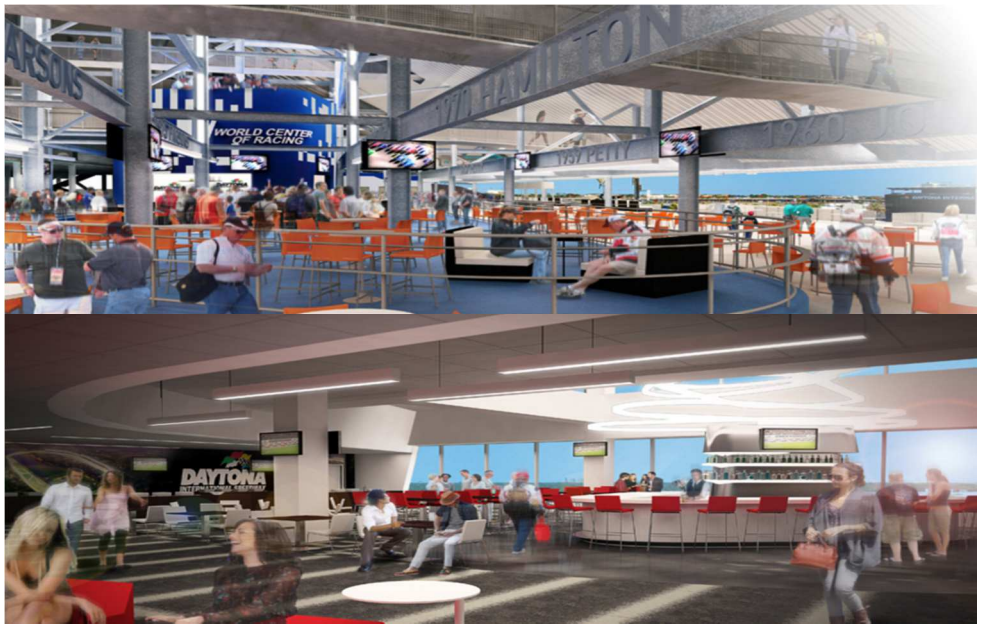


Figure 66. Enhancement of the motorsport culture through the newly implemented facilities. (2015)

Project: Daytona Rising
Location: USA_Daytona Beach_Florida
Architect: ROSSETTI and Barton Malow
Completed: 2016

Description

To create an enhanced motorsport experience the Daytona International Speedway President made a decision to upgrade the existing grandstands to a brand new experience for fans, media, sponsors, drivers and employees. The decision was to upgrade the venue for modern use for the next 50 years. In place of the current grandstand will be a modern, 120-feet high structure that spans nearly a mile along the front straightaway. The design creates a modern stadium-like atmosphere by using contemporary forms and materials.

Precedent Relevance

The modern spectator facilities that will be included in the upgraded facility will include:

- Spectator zones with snacks, refreshment and seating spaces.
- Wi-Fi lounges and digital interactive areas with the latest media to keep fans up-to-date with latest motorsport highlights.
- Social Leisure, VIP lounges and hospitality areas with high-end drinks and food options.

The incorporation of these modern amenities is integral in the design of an architectural intervention pertaining to motorsport as it will contribute to creating an enhanced and interactive experience for the modern motorsport culture and requirements of modern society.



Figure 67. Perspective of the Silverstone Wing pit complex. (2015)

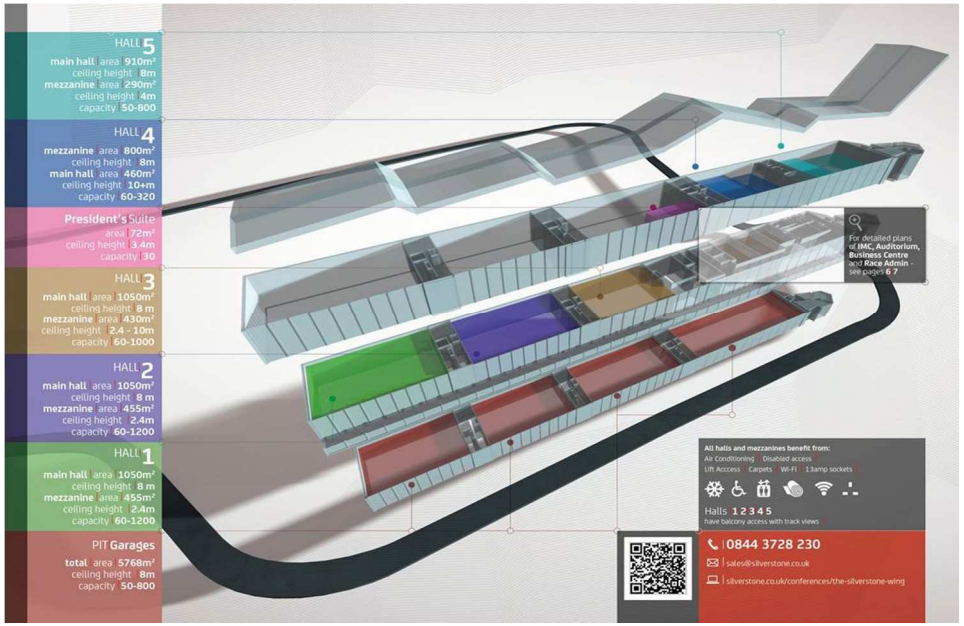


Figure 68. Accommodation schedule according to FIA and building use requirements. (2015)

Project: Silverstone Wing
Location: England_ Northamptonshire
Architect: Populous
Completed: 2011
Size: 11 600 m²

Description

As a requirement to upgrade the existing Silverstone Pit Complex to FIA motorsport standards the Design of "The Wing" immerged. It consists of a 390m long and 30m high complex. The building is designed with a dramatic and continually changing roofline which is associated with the speed and tension inherent in racing and is symbolic of the site's historic identity where it was once a World War 2 airfield.

Precedent Relevance

As the main Kyalami motorsport centre will be hosting international race events, it will have to incorporate all the necessary programmatic requirements of that included in the Silverstone Wing. Having further consulted with the Kyalami general manager (2015) with regards to these requirements it was stated that these programmatic requirements are a necessity as it forms part of the revenue generating income for the maintenance of the facility and race track. The Silverstone Wing Includes:

- International media centre for reporters and press (693 m²)
- Look and listen Auditorium for interviews, meetings and lectures (104 seats)
- Reception, banquet and event halls (5 030 m²)
- Pit garages doubled as exhibition space (5 768 m²)



Figure 69. Perspective of the Olympic Sculpture Park building. (2015)

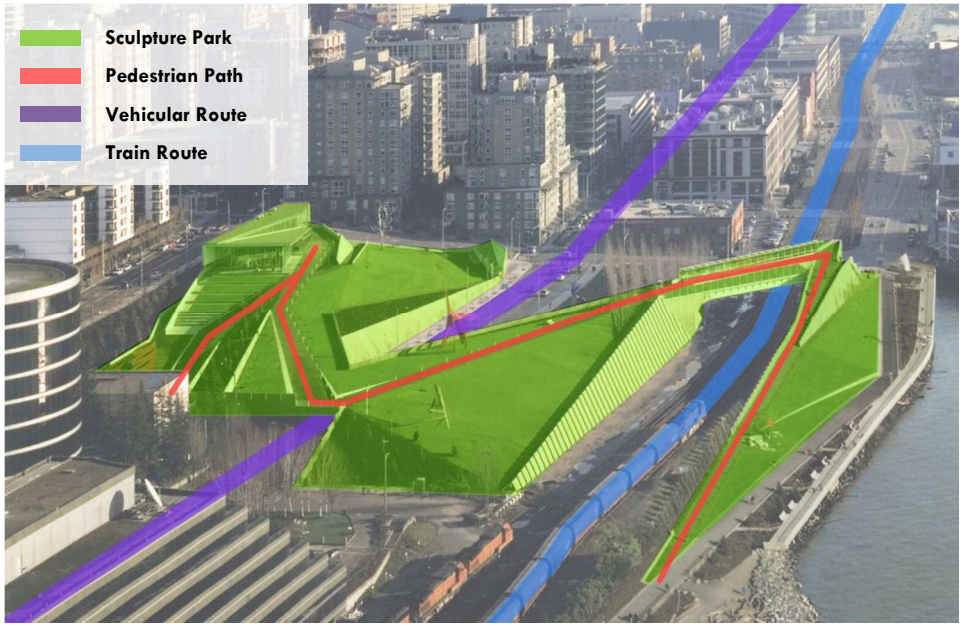


Figure 70. Diagram of the concept for the design of the Sculpture Park. (2015)

Project: Olympic Sculpture Park
Size: 36 000 m²
Location: USA_Seattle_Washington
Architect: WEISS/Manfredi Architects
Completed: 2007

Description

The park was designed and built on an abandoned fuel storage site. The concept for the project was to create a park that linked the urban core to the Olympic Mountains thus establishing a mountain-shore relationship. The design of the park consists of a landscape platform that traverses the city roads and railroad. The platform becomes a landscape for sculptures of all sizes and thus creates a relationship between sculpture landscape and architecture.

Precedent Relevance

This precedent is exemplary in the manner in which it makes use of the landscaped platform to establish a pedestrian path and zone while being intersected by the busy city streets and railway. This strategy will enable me to create a series of over and underpasses that will intersect the Kyalami race track and vehicular routes to establish a pedestrian friendly threshold. Also relevant is how the landscaped platform has a dual use in that it becomes the sculpture garden at the same time applying the ”hide and reveal” concept where the full garden is gradually revealed the further you walk. This approach would enable me to introduce a public platform that could include functions related to motorsport and accommodate the public’s interests and needs. The manner in which the park makes use of different topographical elevations, retaining wall thresholds and different landscape textures to establish different thresholds can also be of relevance in dealing with the public, private and vehicular thresholds of the Kyalami race track.



Figure 71. Aerial view of the proposed public platform for the Slussen node. (2015)

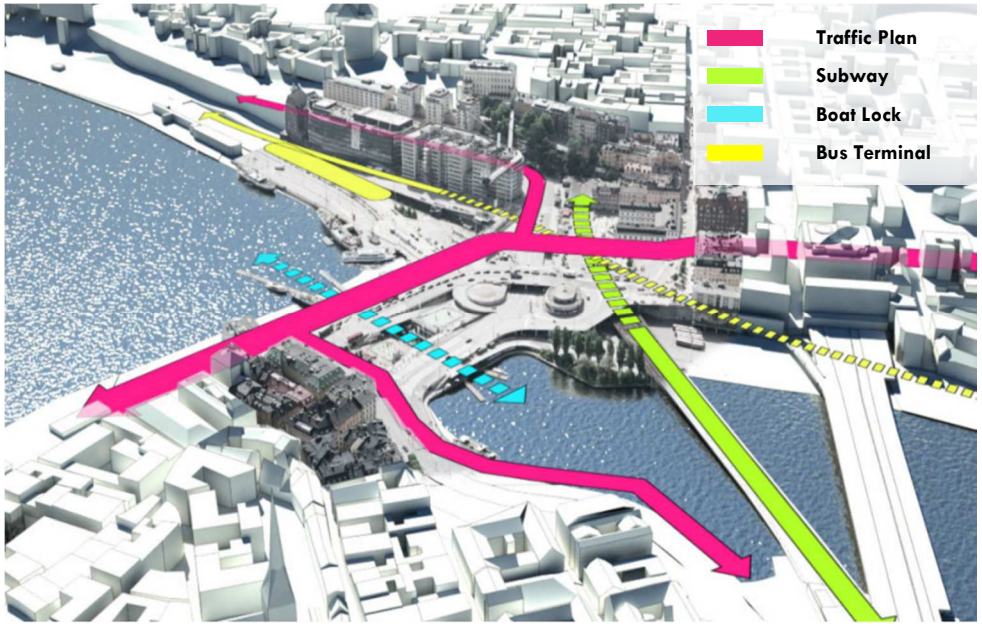


Figure 72. Traffic plan of the various transport links running beneath the public platform. (2015)

Project: Slussen
Size: 74 000 m²
Location: Stockholm_ Sweden
Architect: Bjarke Ingels
Completed: Conceptual

Description

As the central traffic node and centre point of Stockholm's development, the Slussen connects Stockholm by means of it roadways, pedestrian paths and transport terminals. However, these transport terminals are congesting this node and is making the waterfront inaccessible to the people of the city. The framework introduced by Bjarke is designed to do the opposite by creating an elevated public level above the transport terminals and re-establishing the public link to the attractive water front.

Precedent Relevance

Like the Olympic Sculpture Park, Bjarke introduces a public platform with a series of gradual ramps creating the sensation that it is being "peeled out of the ground" to establish a fluid public transition from the transport terminal level. Although the pedestrian level covers the transport terminals completely, a visual link is maintained between both levels by means of skylight openings found throughout the platform. Views to the waterfront from underneath the pedestrian level remain unobstructed as the edge ramps frame the views rather than obstruct them. Of great notice is how the pedestrian level blends in with the rest of the cityscape and frames the pedestrian flow through its form. These are useful principles that can be considered for the Kyalami race track framework, however with the introduction of overpasses and platforms one must be cautious not to obstruct important view from the race track itself.



Figure 73. Highway perspective of the Mercedes Benz museum. (2015)

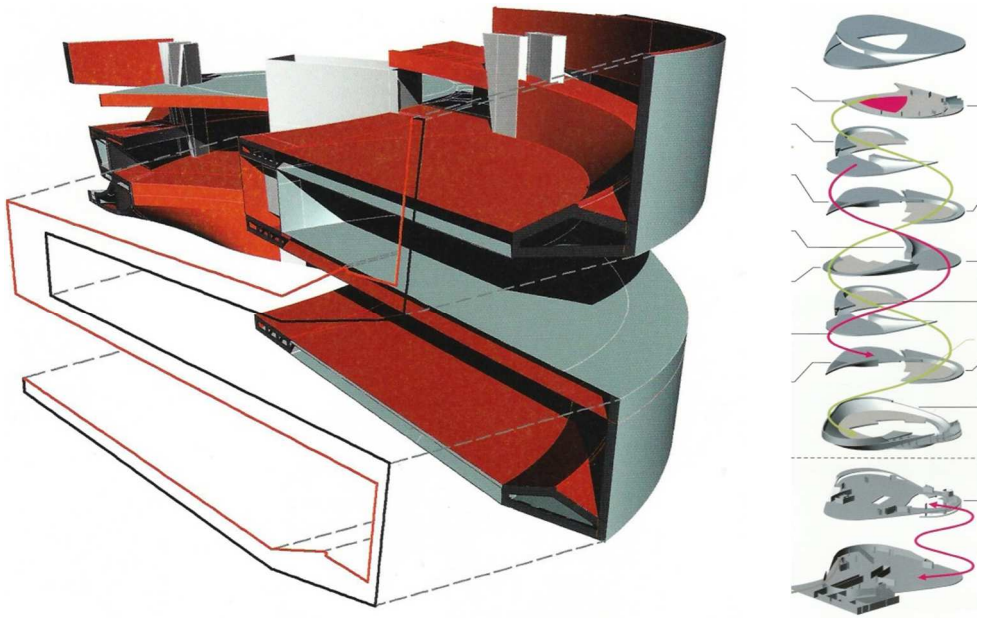


Figure 74. Modelling of the Mercedes Benz museum's internal and external form expressive of mobility. (2015)

Project: Mercedes Benz Museum
Location: Stuttgart_ Germany
Architect: UNStudio
Completed: 2001-2006
Size: 53 000 m²

Description

The Board of Management of DaimlerChrysler AG made the decision to build a new building for Mercedes Benz in Unterturkheim. The idea was to develop a museum that would exhibit 120 years of the historical automobile brand and its achievements. The building becomes a new museum typology in the unique manner in which visitors experience the museum. Unlike common museums the visitor commences the tour from the top of the building where they have a choice of two tours, during which they descend to the levels below. Both tours meet on each of the 9 levels allowing the visitors to switch between them.

Precedent Relevance

Of considerable relevance is the manner in which the building as an automotive museum expresses mobility, not only through its external form and facade but especially its internal spaces. With its design based on the geometry of a clover and spaces connected by two helical ramps, a fluid circulation flow is created throughout the building and enhances the theme of mobility. The museum's internal spaces peel off from the floors and façade to become the pedestals and backdrop for the exhibitions. This is further enhanced with the façade that frames the view to the nearby highway making direct reference to mobility and the automobile's accomplishments. The arrangement of the programme follows the helical from of the building to emphasise the theme of mobility. Although the building consists of 9 levels, its dynamic internal spaces create a sense that the building is more planar than it is actually experienced from its exterior. These design principles can be applied to the design of my architectural intervention to express its identity as motor racing venue.

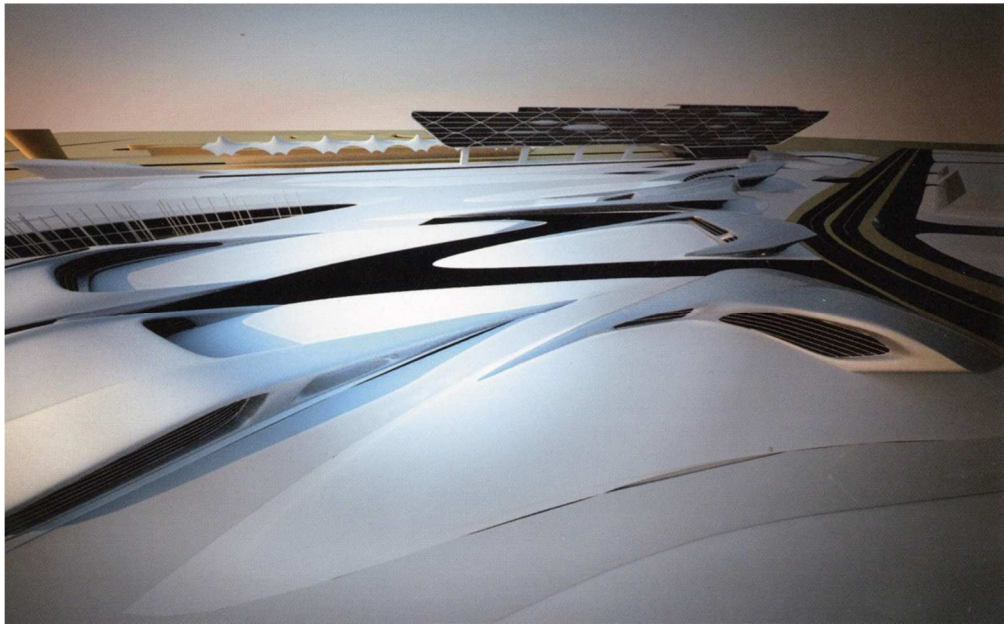
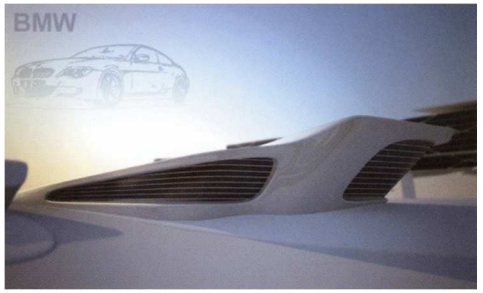


Figure 75. Envisaged perspective of the upgraded facilities for the Bahrain International Circuit. (2015)



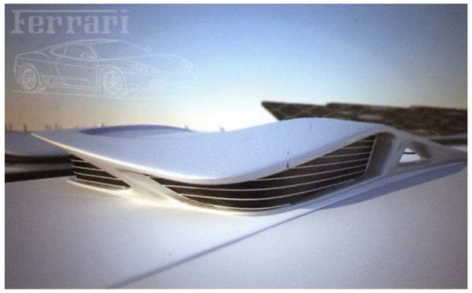


Figure 76. Modelling of the aerodynamic forms of the proposed automobile facilities. (2015)

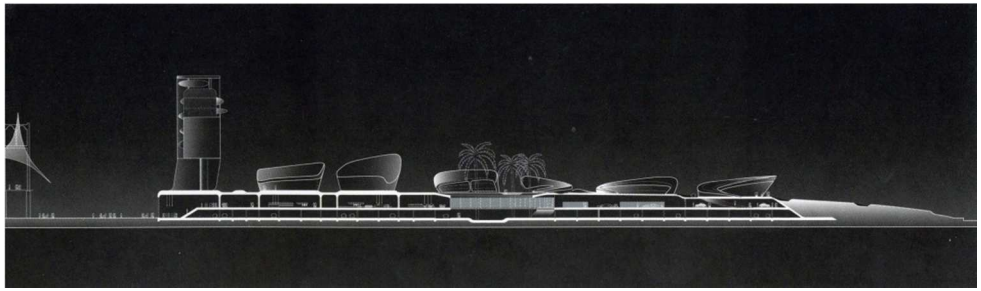


Figure 77. Cross section of the framework emphasising its fluid relationship to the landscape. (2015)

Project: Bahrain International Circuit
Location: Manama, Kingdom of Bahrain (Desert)
Architect: Zaha Hadid
Completed: On-going
Size: 1 000 hectares

Description

To ensure the optimal use of the existing Formula 1 race track a framework for the site was developed to include hotels, research facilities, car manufacturing plants and a university among other facilities around the race track. The concept for the framework originates as choreographed “dance” between the car and the architecture through the desert landscape.

Precedent Relevance

The significance of the project emerges from the design of its dynamic form which resembles the movement of the race cars. The forms of the buildings create the sensation that the buildings are fluidly emerging out of the landscape, unifying both the race cars and landscape to the architecture itself. In this manner the forms contextualize the architecture and establish a relationship with the motorsport culture.

CHAPTER 08

CONCEPT DEVELOPMENT

8.1) Urban Framework Exploration

8.2) Building Concept Exploration

The first stage of my design was to produce an urban design framework for the Kyalami circuit precinct my exploration commenced with a series of analytical sketches. The sketches produced were mainly focused on the site precinct, which was designed based on the visual analysis of the urban context as well as the initially proposed building programme. The aim was to obtain an understanding of the arrangement of the buildings and programme within the precinct; the relationship between the various programmes/buildings as well as their relationship to the landscape and surrounding context; the allocation of pedestrian and vehicular routes within the precinct and their relationship to the buildings; the heights and density of the proposed buildings and how it affects views and acoustics into and around the site, as well as generate an overall massing language that can be applied through the entire precinct that has a strong relationship and is representative of the motor racing culture.

From the sketches produced, a model was then constructed out of various car parts as an exploration into the building and programme arrangement on site, heights, density, routes and massing as mentioned. A wind tunnel was then produced as a massing exercise on each proposed component for the urban framework to obtain an overall aesthetic language for the site and to better integrate these components within the natural landscape. A model of the urban design framework was then produced according to the individually shaped models, which was tested and shaped in the same process to achieve a unified massing language throughout the precinct. The drawing of the urban framework were further refined and developed from the outcome of the final wind tunnel model.

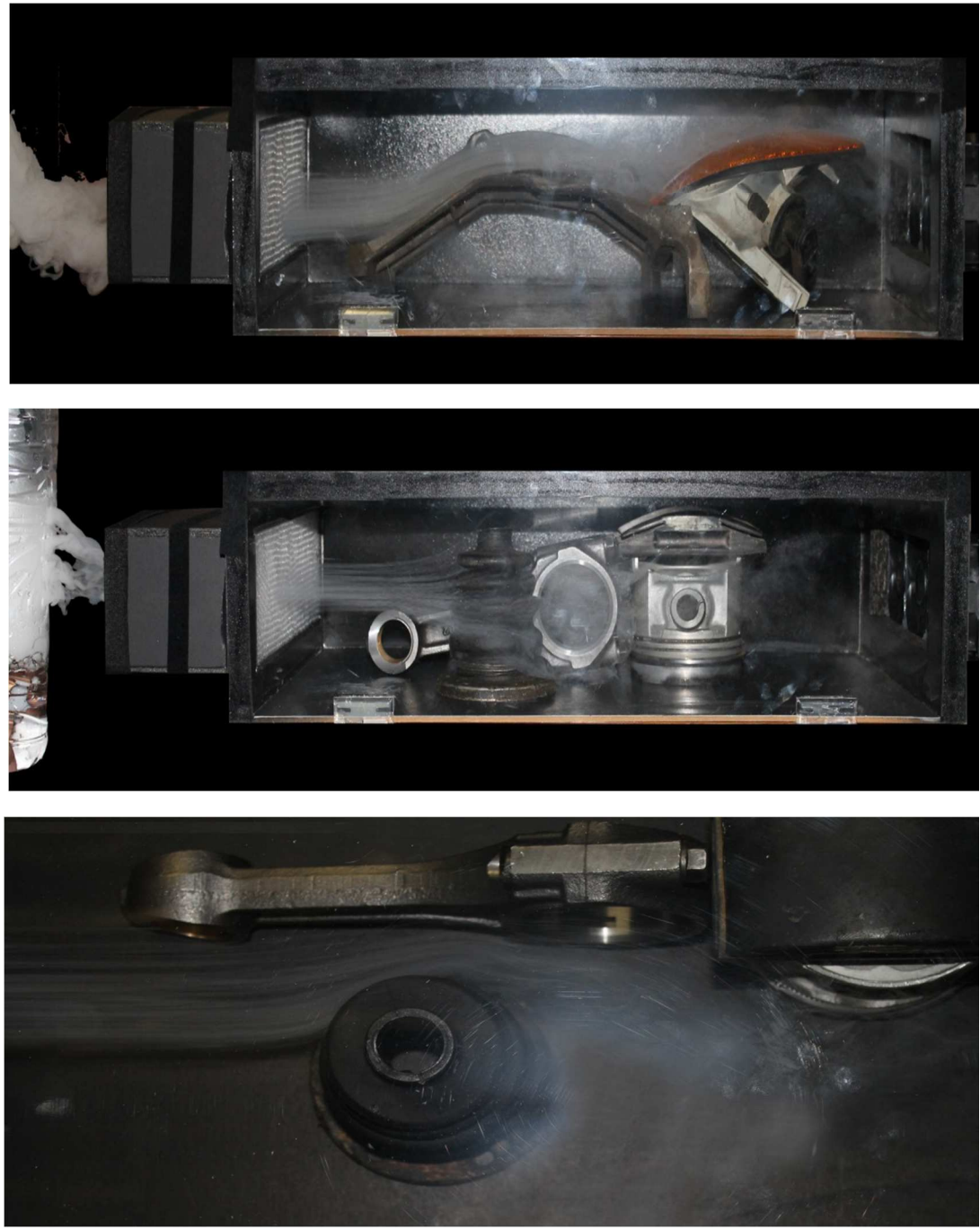


Figure 78. Wind tunnel exploration with car parts as an initial form finding and massing exploration. (2015)

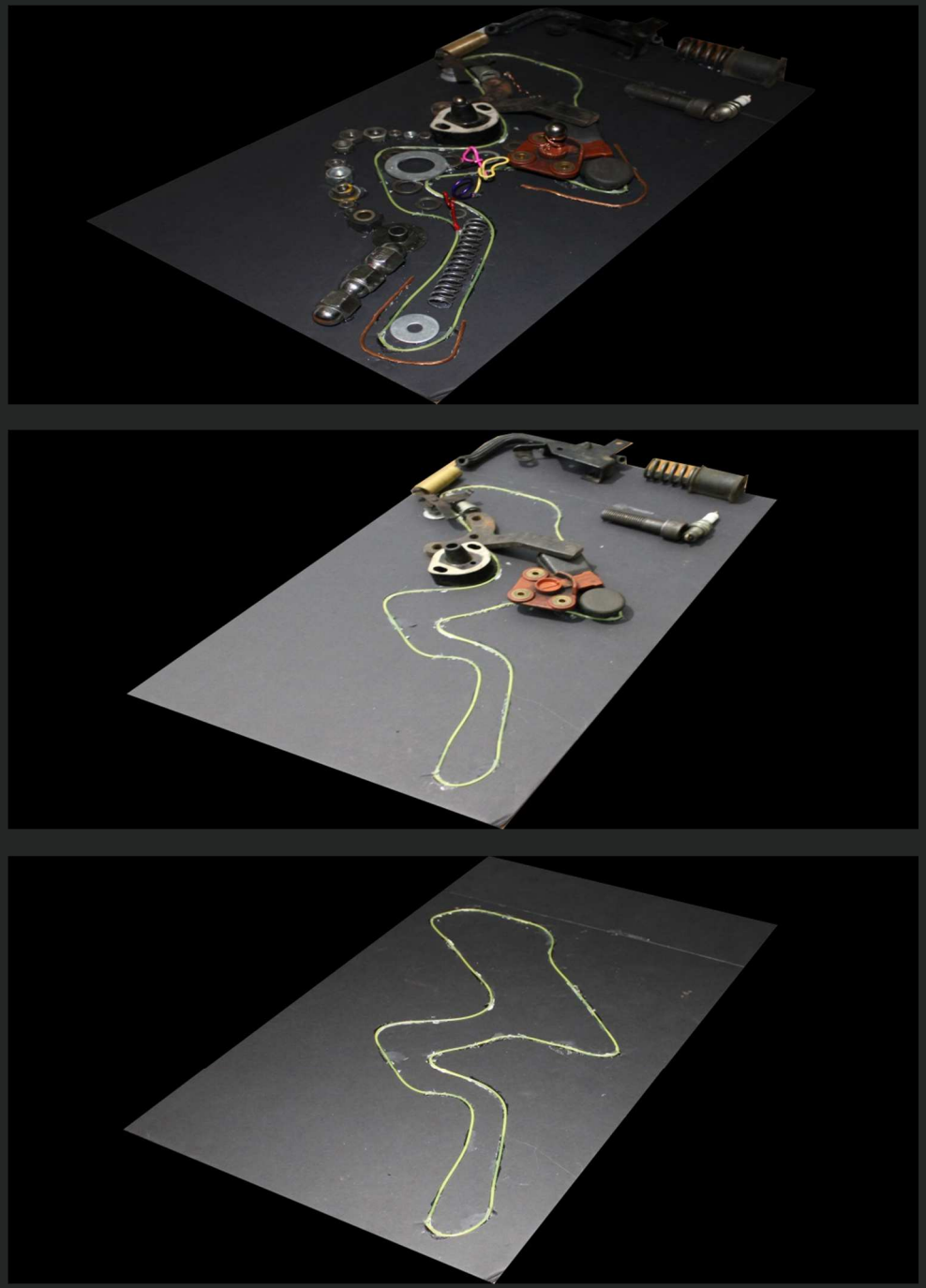


Figure 79. Massing model exploration with various car components. (2015)



Figure 80. Wind tunnel massing exploration with car components. (2015)



Figure 81. Wind tunnel massing exploration with polystyrene models. (2015)

URBAN FRAMEWORK EXPLORATION

URBAN FRAMEWORK CONCEPT LEGEND

- **COMPONENT 1 – PIT COMPLEX AND ENTERTAINMET CENTRE**
- **COMPONENT 2 – AUTO SPORT DEALERS/ RETAIL/ SHOWROOMS**
- **COMPONENT 3 – AUTO INDUSTRIAL/ WORKSHOPS/ RESEARCH/ TRAINING**
- **COMPONENT 4 – SPORTS/ LEISURE COMPLEX**
- **COMPONENT 5 – AUTO THEME PARK/ 4X4 AND MOTOCRSS**
- **COMPONENT 6 – PARK LANDSCAPE**

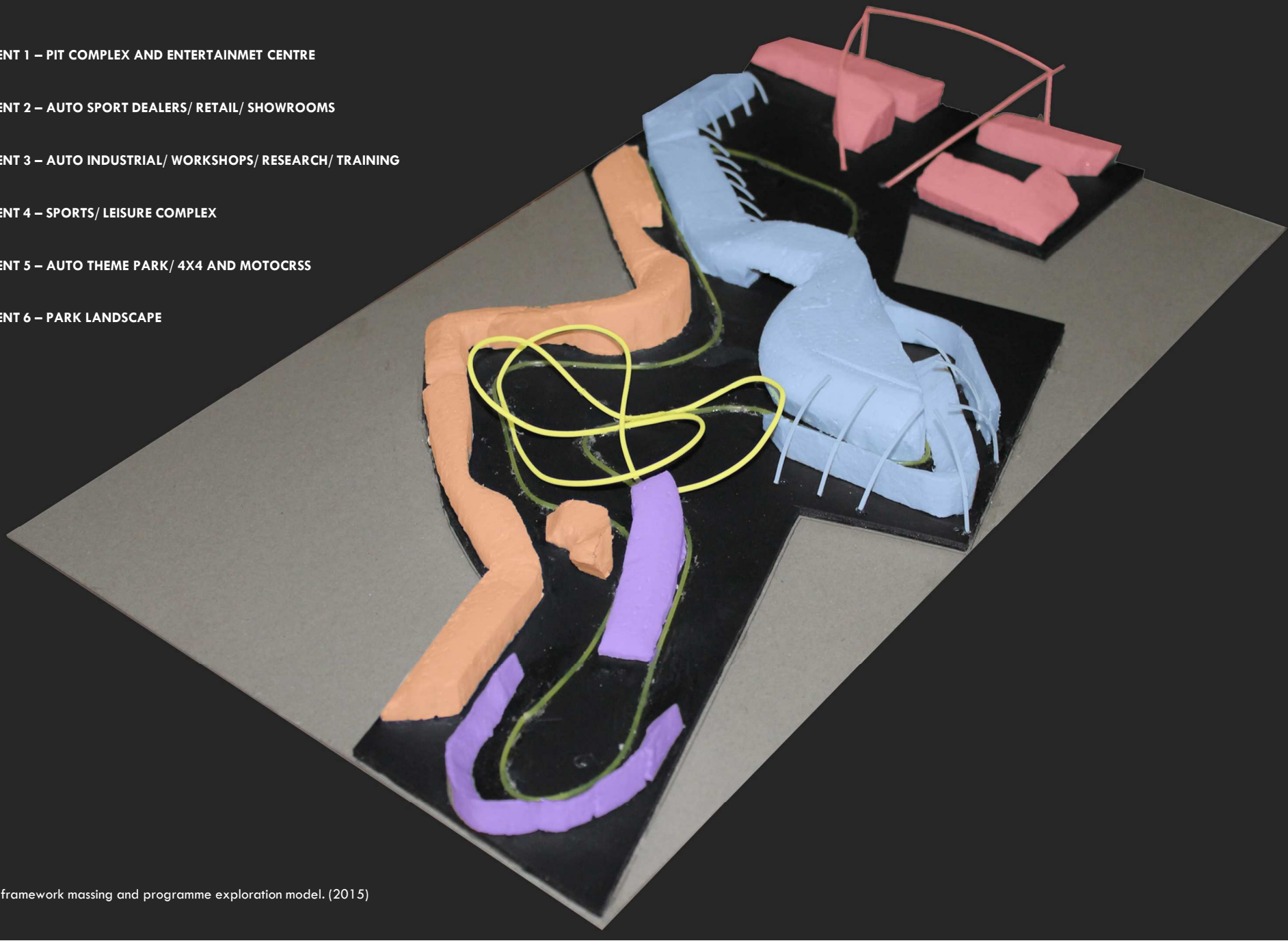


Figure 82. Urban framework massing and programme exploration model. (2015)

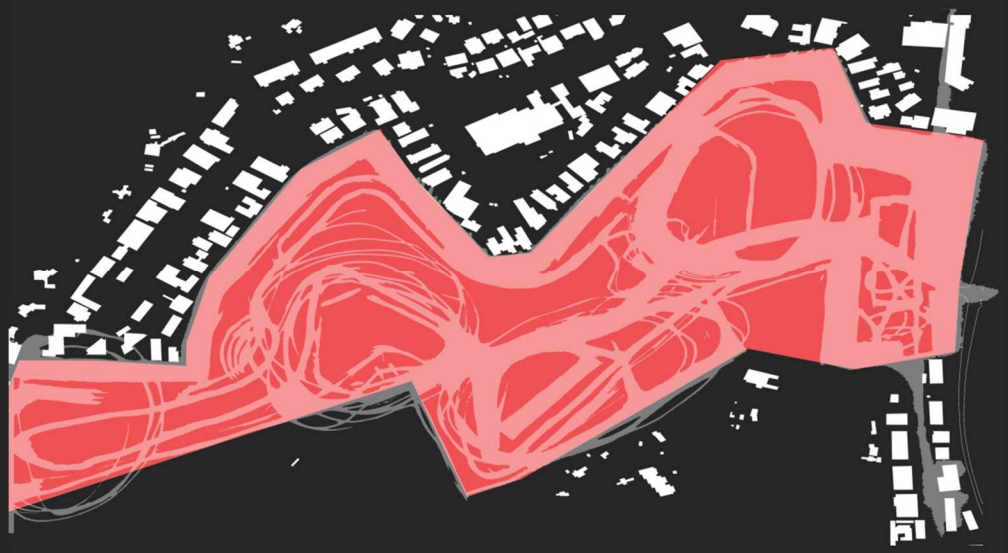


Figure 83. Initial sketch of urban framework spaces. (2015)



Figure 84. Allocation of programme to the generated spaces. (2015)



Figure 85. Initial urban framework developed. (2015)



Figure 86. Inclusion of circulation routes throughout the site and proposed programme. (2015)

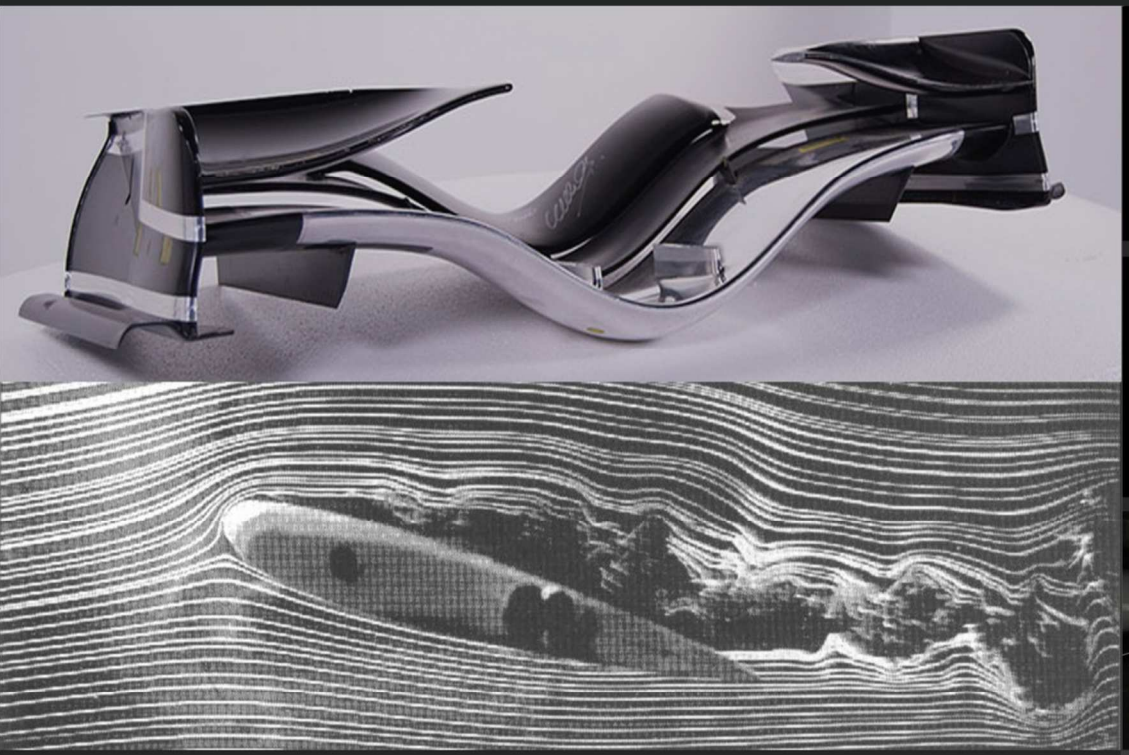
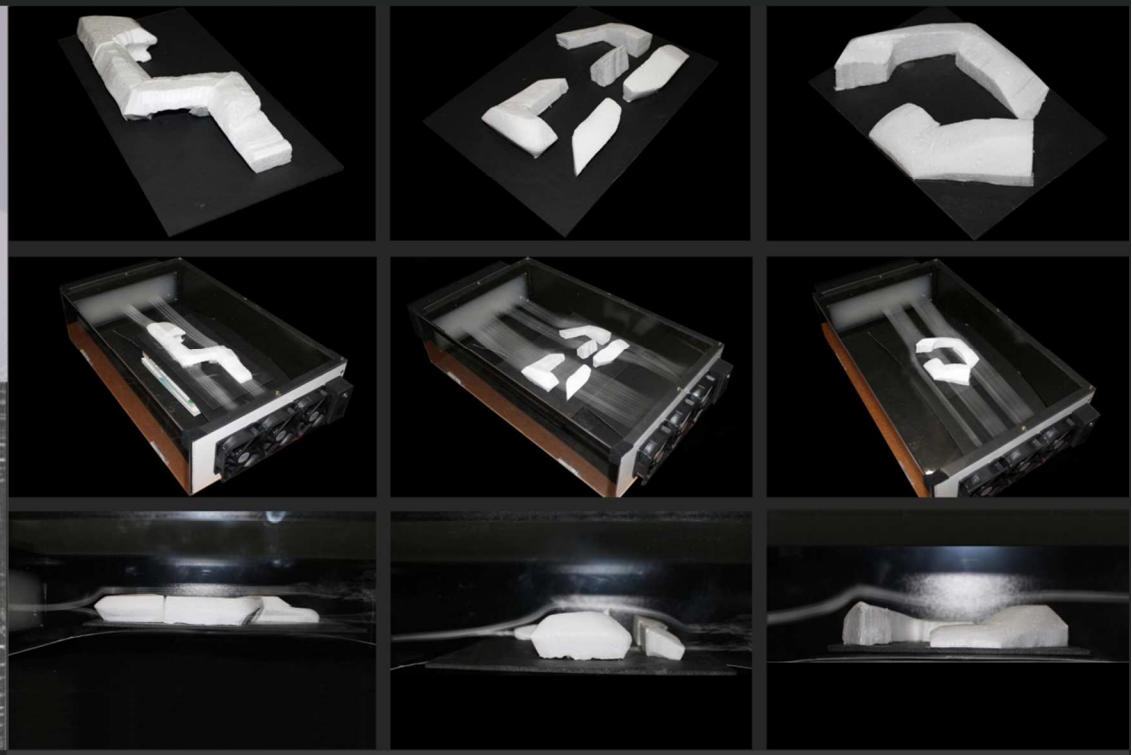
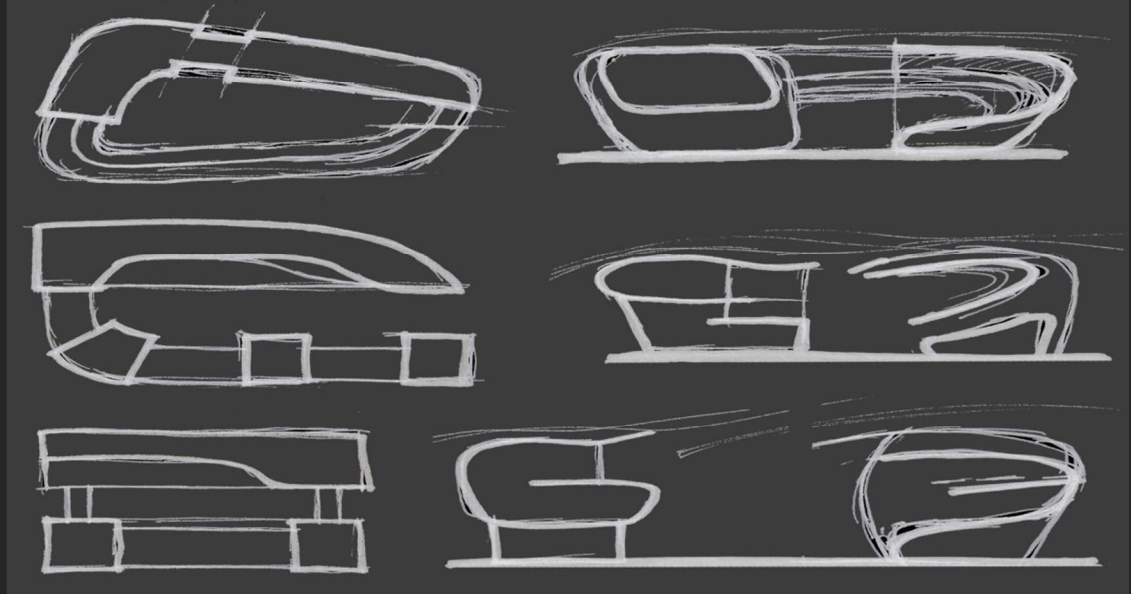


Figure 87. Race car aerofoil design concept. (2015)

Wind Tunnel Form Finding



Form Finding Concept Sketches



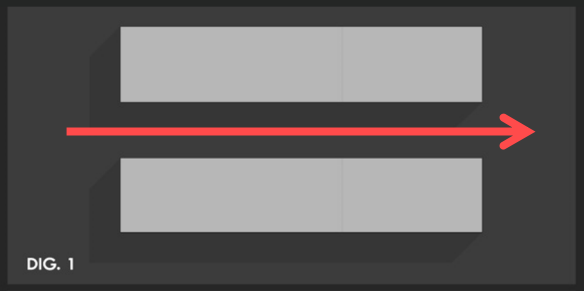
Building Concept

The approach for the building component of this thesis was to generate a form for the building that is reminiscent of the aerodynamically designed aerofoil of racing cars, which becomes an aesthetic language that can be translated in both plan and section view of the building. The generated building form will contribute for a better motor racing experience for visitors and spectators and allow the building to be better integrated into the iconic Kyalami race track venue.

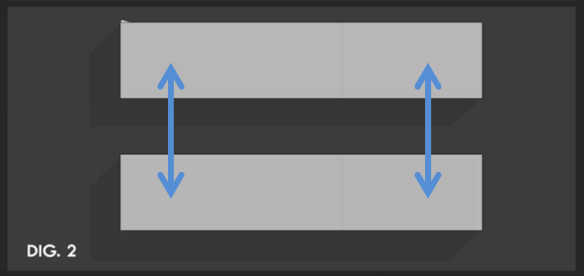
My exploration commenced with the proposed building programme of which a series of analytical sketches were produced to obtain and initial sense of the form of the building. Having had an idea of the building program and areas allowed me to gain a sense of the actual scale and proportion of the building form, which was experimented with the use of a physical wind tunnel. As a tool closely related to the building and automobile industries, the wind tunnel was utilized to obtain various building forms that convey an aesthetic that is dynamic, energetic, light, low-lying and is reminiscent of motor racing and the race car. A series of polystyrene models were produced and tested in the wind tunnel and shaped according to the smoke streamlines formed on the models. The models and streamlines produced were captured through photographs of which sketches were produced to obtain a sense of the forms that would then be reproduced using digital software.

BUILDING CONCEPT EXPLORATION – FIRST MASS

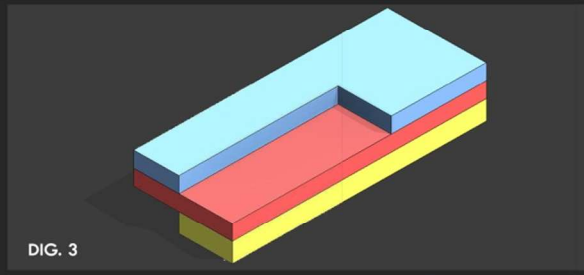
The modelling process commenced as a solid mass that is intercepted by the existing race track route that cuts through the building which is divided into the main facility on the North and spectator area on the South. (Dig. 1)


DIG. 1

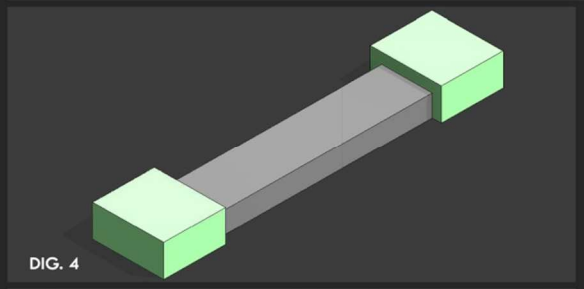
The two building components are then linked through two bridge links on either side of the building that bridges across the race track forming a fluid spectator link between the two components. (Dig. 2)


DIG. 2

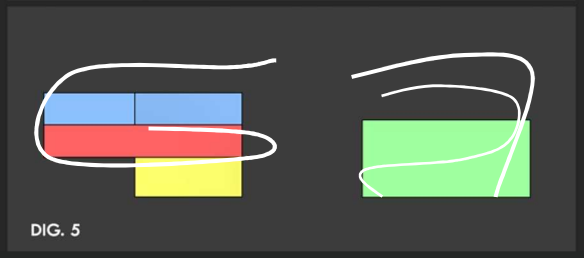
The Northern building component will consist of an existing pit facility on ground floor, an entertainment facility on the first floor as well as conference and administration facilities on second floor, which is peeled back to form an open air entertainment area above the entertainment floor. (Dig. 3)

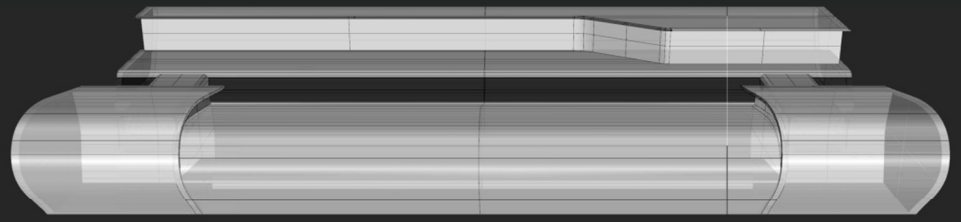

DIG. 3

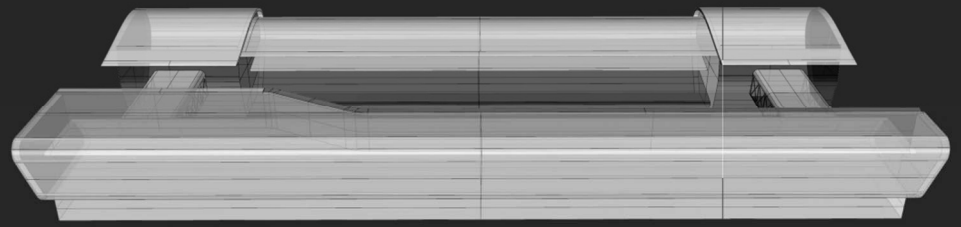
The Southern Building Component will consist of a strip of spectator stands intercepted by two spectator zones on either side, which become a transition point between the main building and stands. (Dig. 4)

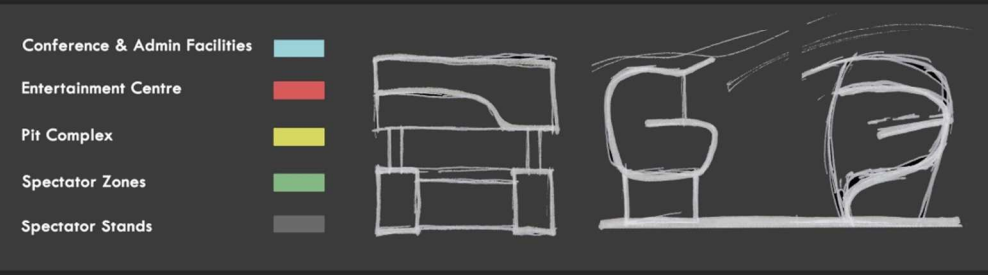

DIG. 4

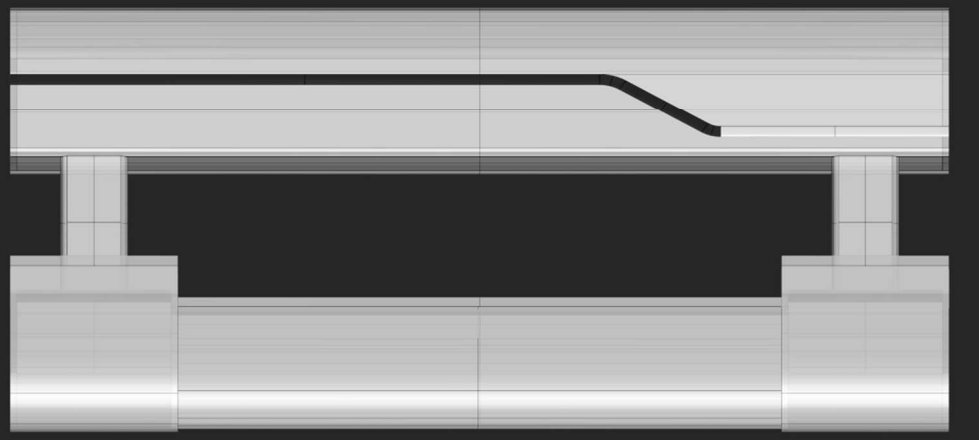
The concept for the section of the building is to create an aerofoil like form that will be carved out of the solid building mass, which expresses lightness, streamline and fluidity through all levels of the building. (Dig. 5)


DIG. 5


South Elevation Perspective

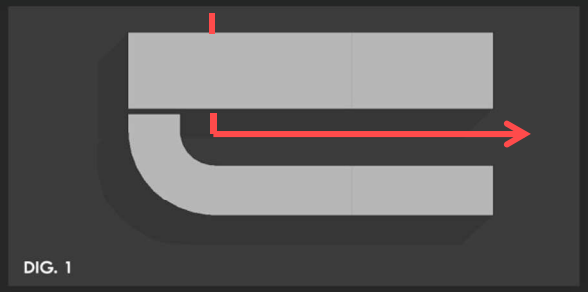

North Elevation Perspective



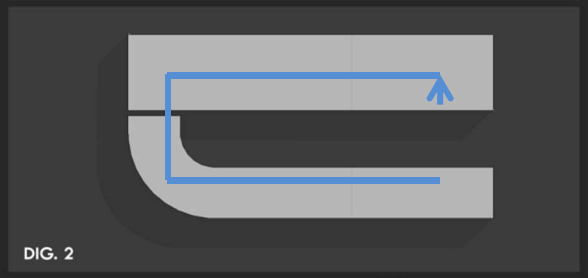

Mass 1 Plan

BUILDING CONCEPT EXPLORATION – SECOND MASS

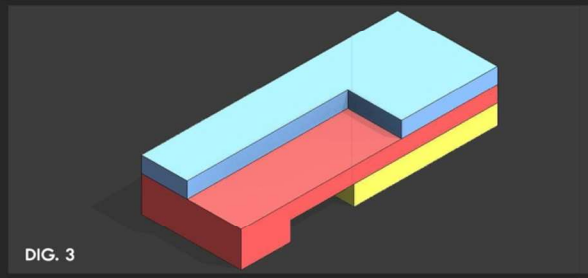
The modelling process commenced as a solid mass that is intercepted by the existing race track route that cuts through the building with an underpass on the Northern component. The building is divided into the main facility on the North and spectator area curving along the track on the South. (Dig. 1)


DIG. 1

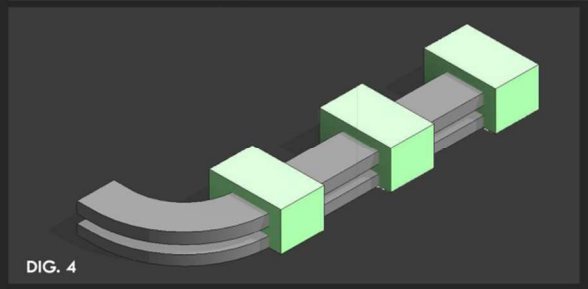
The spectator strip is directly linked to the main facility on the west wing and an underground underpass on the east forming a fluid spectator link between the two components. (Dig. 2)


DIG. 2

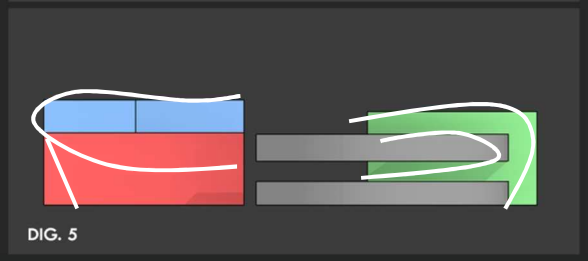
The Northern building component will consist of an existing pit facility on ground floor intercepted by the race track, an entertainment facility on the first and ground floor as well as conference and administration facilities on second floor, which is peeled back to form an open air entertainment area above the entertainment floor. (Dig. 3)

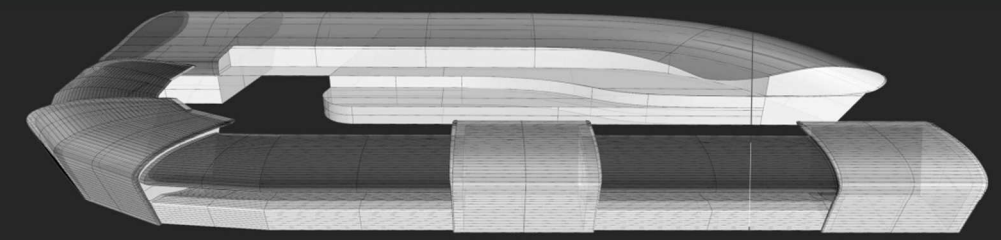

DIG. 3

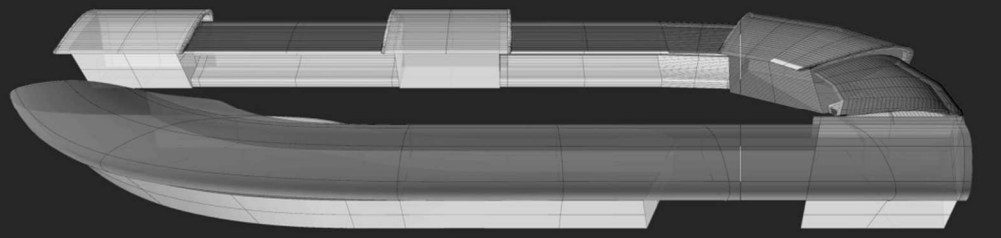
The Southern Building Component will consist of a two tier strip of spectator stands intercepted by three spectator zones along the south side, which become a transition point between both tiers of stands. (Dig. 4)

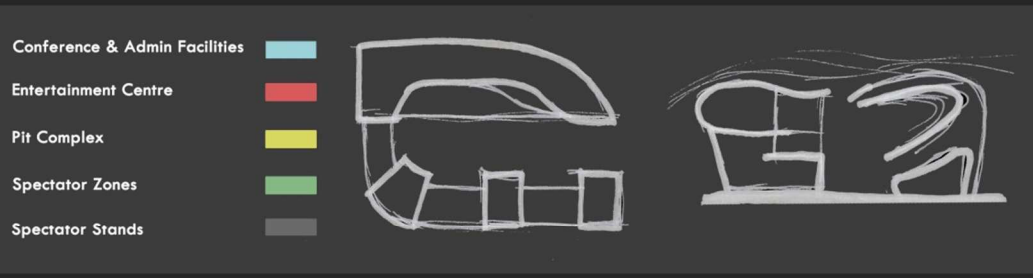

DIG. 4

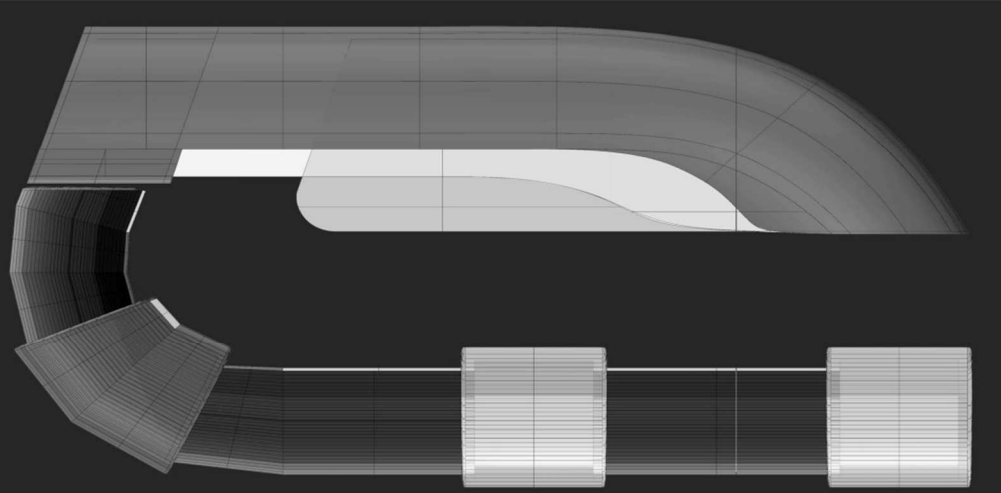
The concept for the section of the building is to create an aerofoil like form that will be carved out of the solid building mass, which expresses lightness, streamline and fluidity through all levels of the building. (Dig. 5)


DIG. 5


South Elevation Perspective

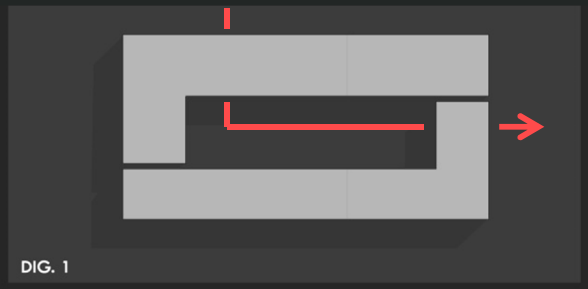

North Elevation Perspective



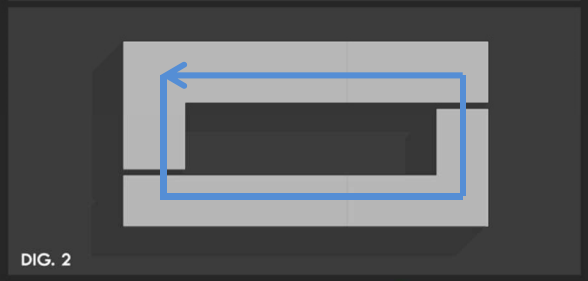

Mass 2 Plan

BUILDING CONCEPT EXPLORATION – THIRD MASS

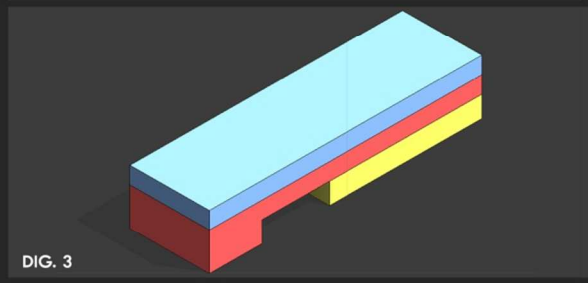
The modelling process commenced as a solid mass that is intercepted by the existing race track route that forms an underpass through the building, which will consist of the main enclosed facility on the North and open-air Spectator area on the South designed as a unified building skin. (Dig. 1)


DIG. 1

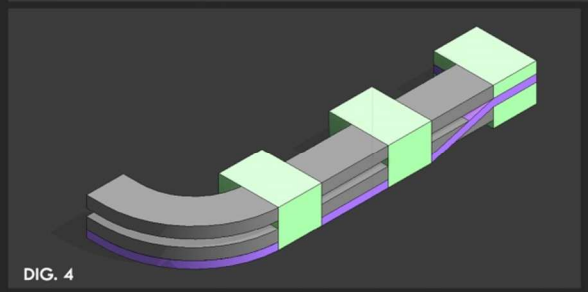
The spectator strip and main facility will be directly linked forming a fluid spectator link between the two components. (Dig. 2)


DIG. 2

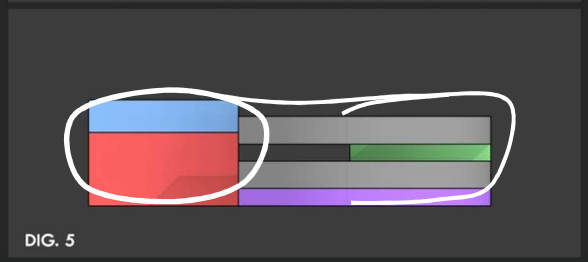
The Northern building component will consist of an existing pit facility on ground floor intercepted by the race track, an entertainment facility on the first and ground floor as well as conference and administration facilities on second floor with roof garden areas above. (Dig. 3)

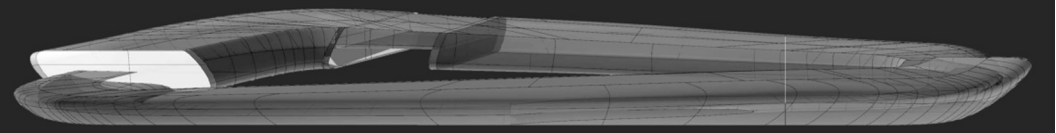

DIG. 3

The Southern Building Component will consist of an auto museum on ground floor with a fluid transition from both sides of the main facility, a two tier strip of spectator stands intercepted by three spectator zones, which become a transition point between both tiers of stands as well as the museum below. (Dig. 4)

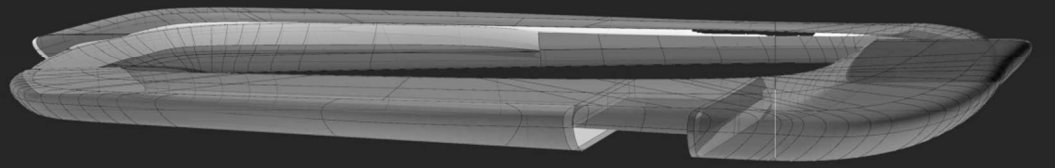

DIG. 4

The concept for the section of the building is to create an aerofoil like form that will be carved out of the solid building mass, which expresses lightness, streamline and fluidity through all levels of the building. (Dig. 5)

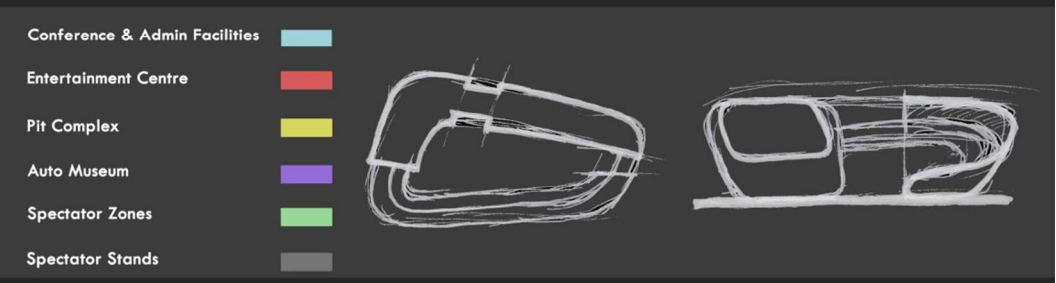

DIG. 5

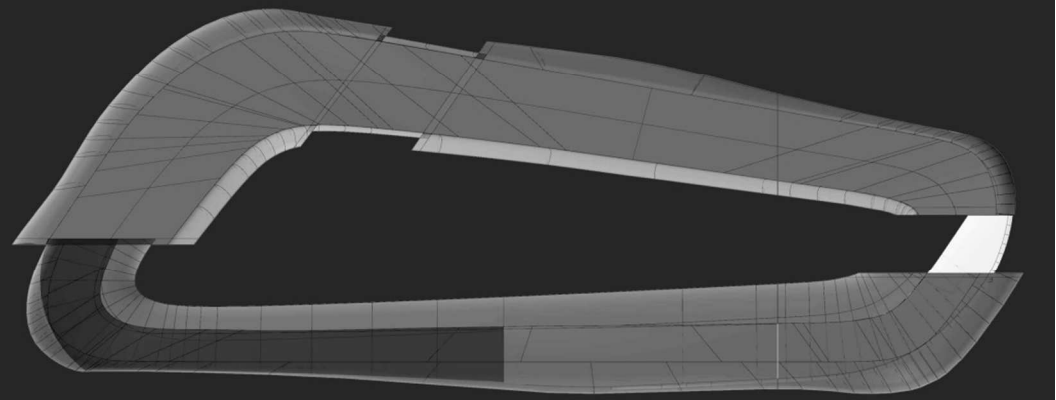


South Elevation Perspective



North Elevation Perspective





Mass 3 Plan

CHAPTER 09

DETAILED DESIGN

9.1) Kyalami Urban Framework

9.2) Detailed Design Motorsport Centre

KYALAMI URBAN FRAMEWORK – ECOLOGICAL APPROACH

KYALAMI URBAN FRAMEWORK LEGEND

Trees indigenous to the Kyalami natural landscape will be planted throughout the race track, especially on the western natural edge. This will offset the carbon footprint produced by the race cars.

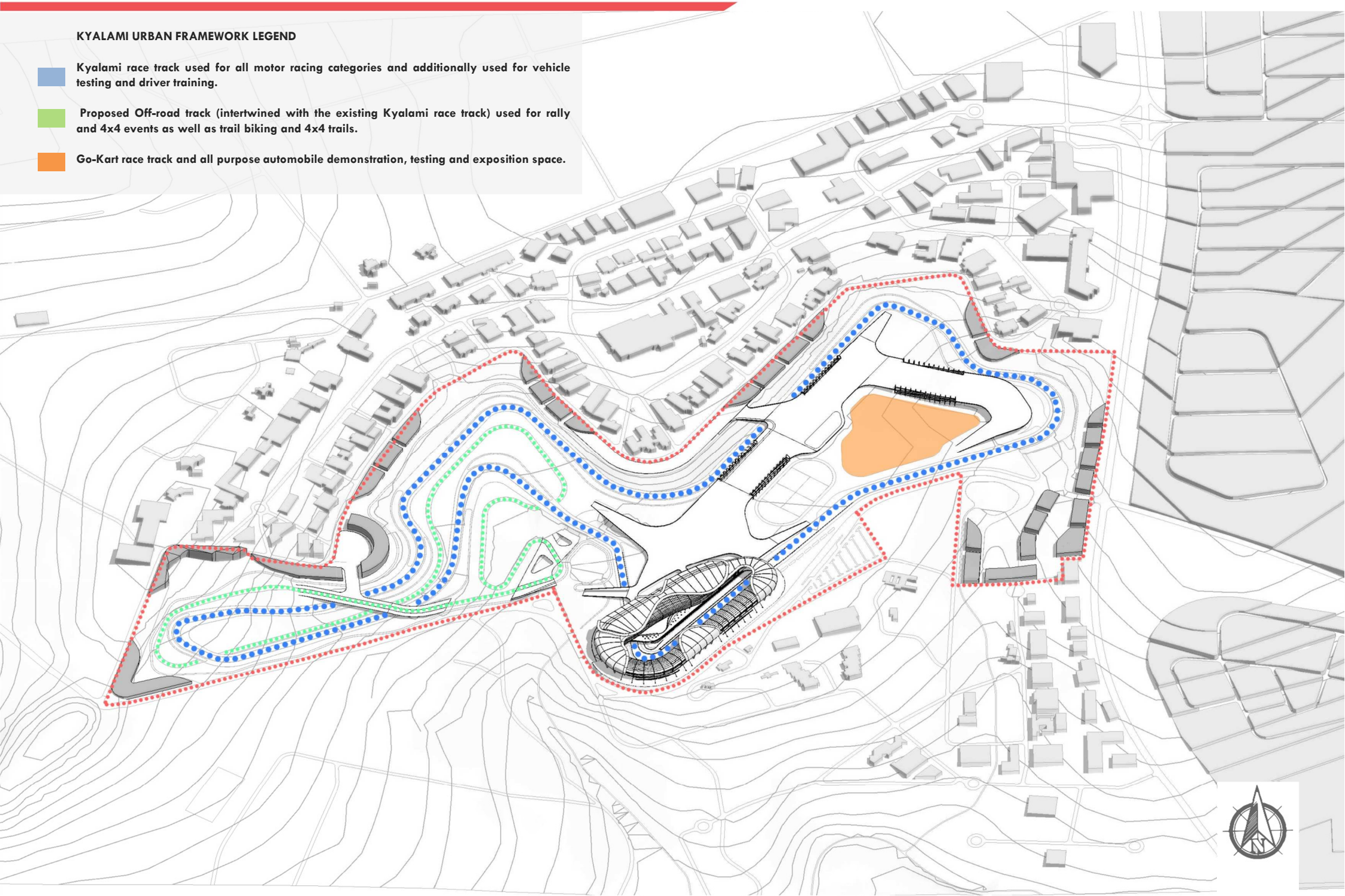
Existing ponds on the Kyalami race track will be used to collect rainwater, where it will be filtered naturally through a facultative process. This water can be used for irrigation and race track cleaning purposes, thus saving on the overall water costs



KYALAMI URBAN FRAMEWORK – MOTOR RACING TRACKS AND SPACES

KYALAMI URBAN FRAMEWORK LEGEND

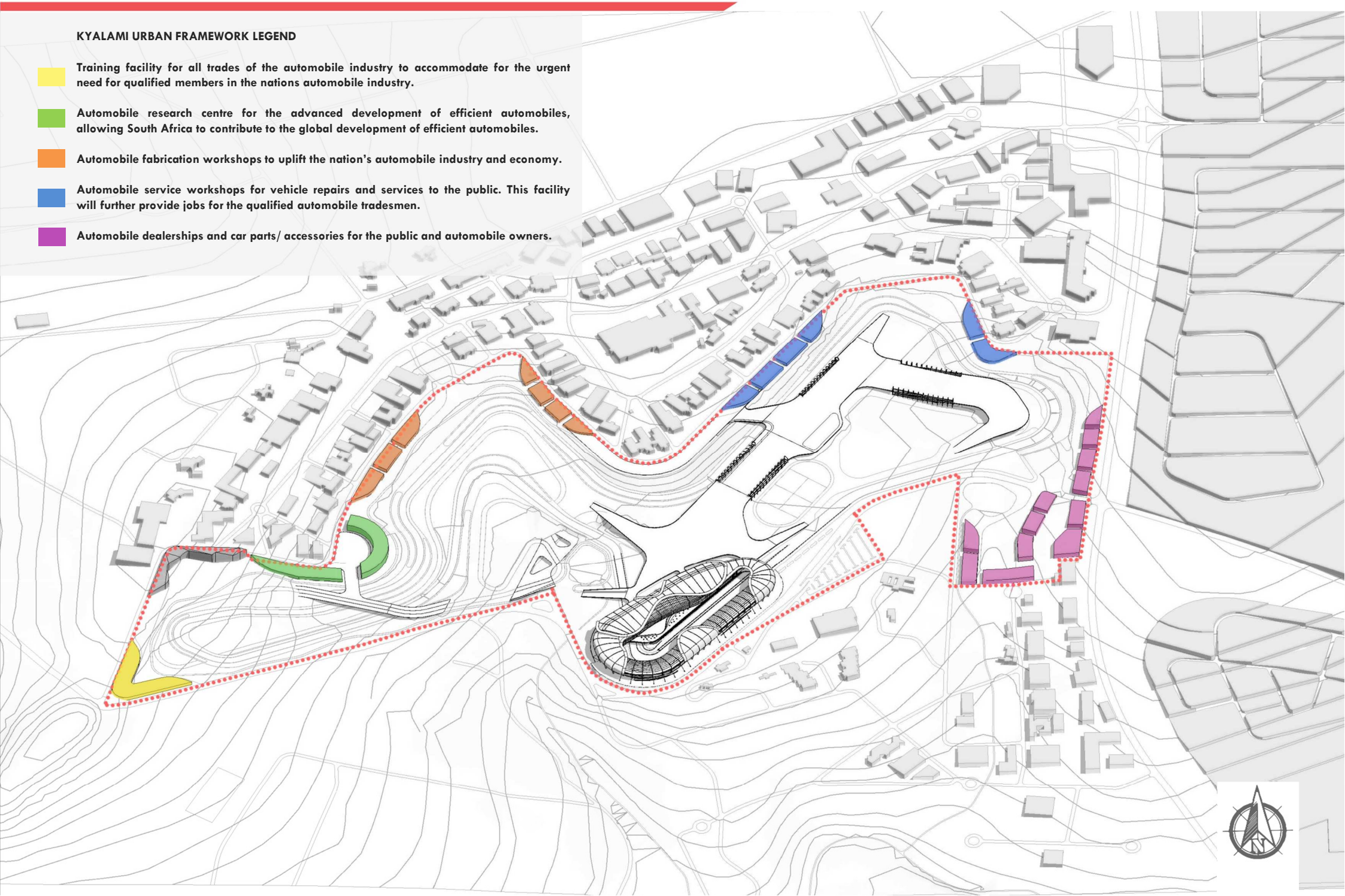
- **Kyalami race track used for all motor racing categories and additionally used for vehicle testing and driver training.**
- **Proposed Off-road track (intertwined with the existing Kyalami race track) used for rally and 4x4 events as well as trail biking and 4x4 trails.**
- **Go-Kart race track and all purpose automobile demonstration, testing and exposition space.**



KYALAMI URBAN FRAMEWORK – AUTOMOBILE INDUSTRY STRIP

KYALAMI URBAN FRAMEWORK LEGEND

- Training facility for all trades of the automobile industry to accommodate for the urgent need for qualified members in the nations automobile industry.
- Automobile research centre for the advanced development of efficient automobiles, allowing South Africa to contribute to the global development of efficient automobiles.
- Automobile fabrication workshops to uplift the nation's automobile industry and economy.
- Automobile service workshops for vehicle repairs and services to the public. This facility will further provide jobs for the qualified automobile tradesmen.
- Automobile dealerships and car parts/ accessories for the public and automobile owners.



KYALAMI URBAN FRAMEWORK – VEHICULAR CIRCULATION AND SPACES

KYALAMI URBAN FRAMEWORK LEGEND

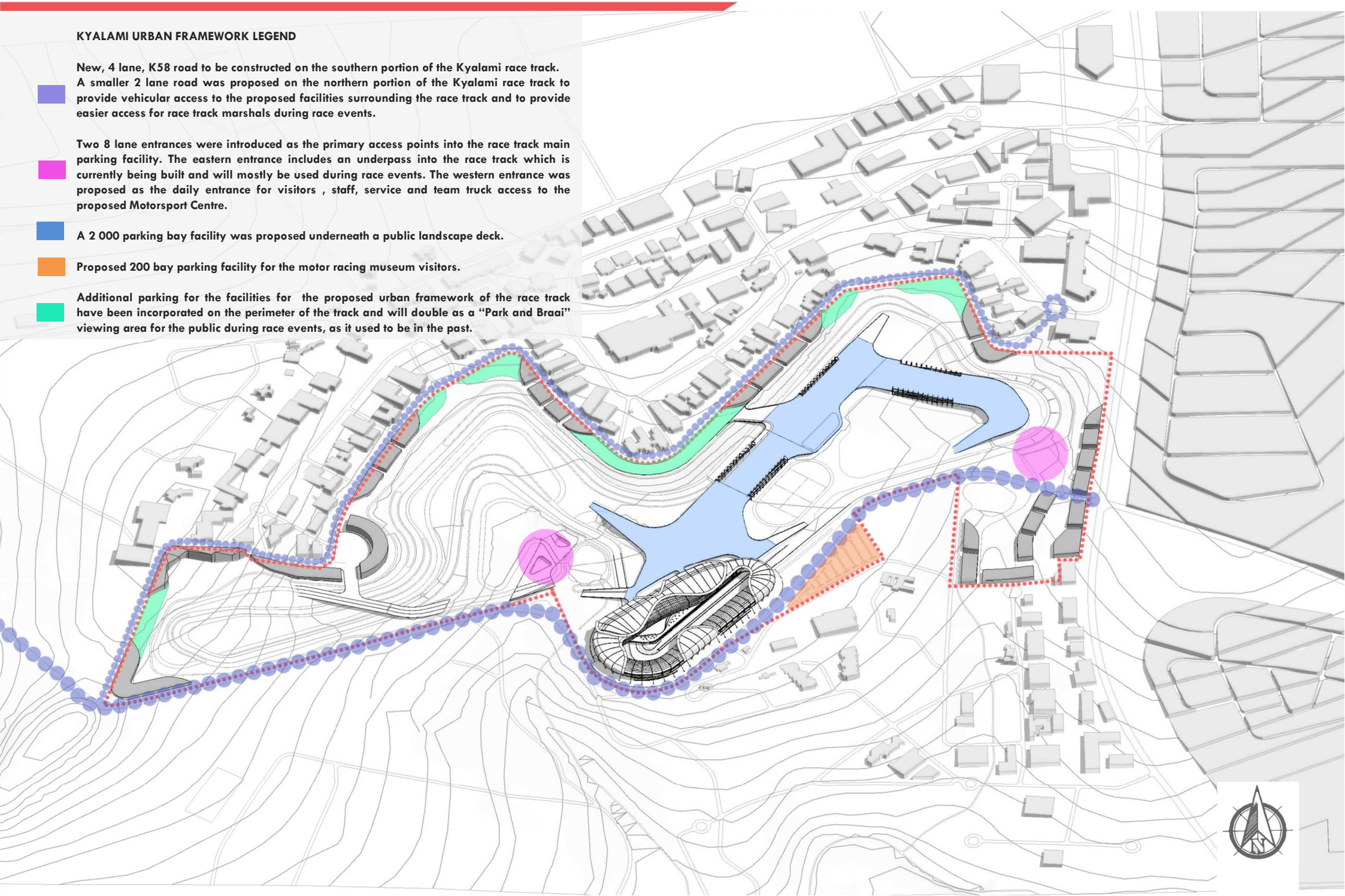
New, 4 lane, K58 road to be constructed on the southern portion of the Kyalami race track. A smaller 2 lane road was proposed on the northern portion of the Kyalami race track to provide vehicular access to the proposed facilities surrounding the race track and to provide easier access for race track marshals during race events.

Two 8 lane entrances were introduced as the primary access points into the race track main parking facility. The eastern entrance includes an underpass into the race track which is currently being built and will mostly be used during race events. The western entrance was proposed as the daily entrance for visitors , staff, service and team truck access to the proposed Motorsport Centre.

A 2 000 parking bay facility was proposed underneath a public landscape deck.

Proposed 200 bay parking facility for the motor racing museum visitors.

Additional parking for the facilities for the proposed urban framework of the race track have been incorporated on the perimeter of the track and will double as a "Park and Braai" viewing area for the public during race events, as it used to be in the past.



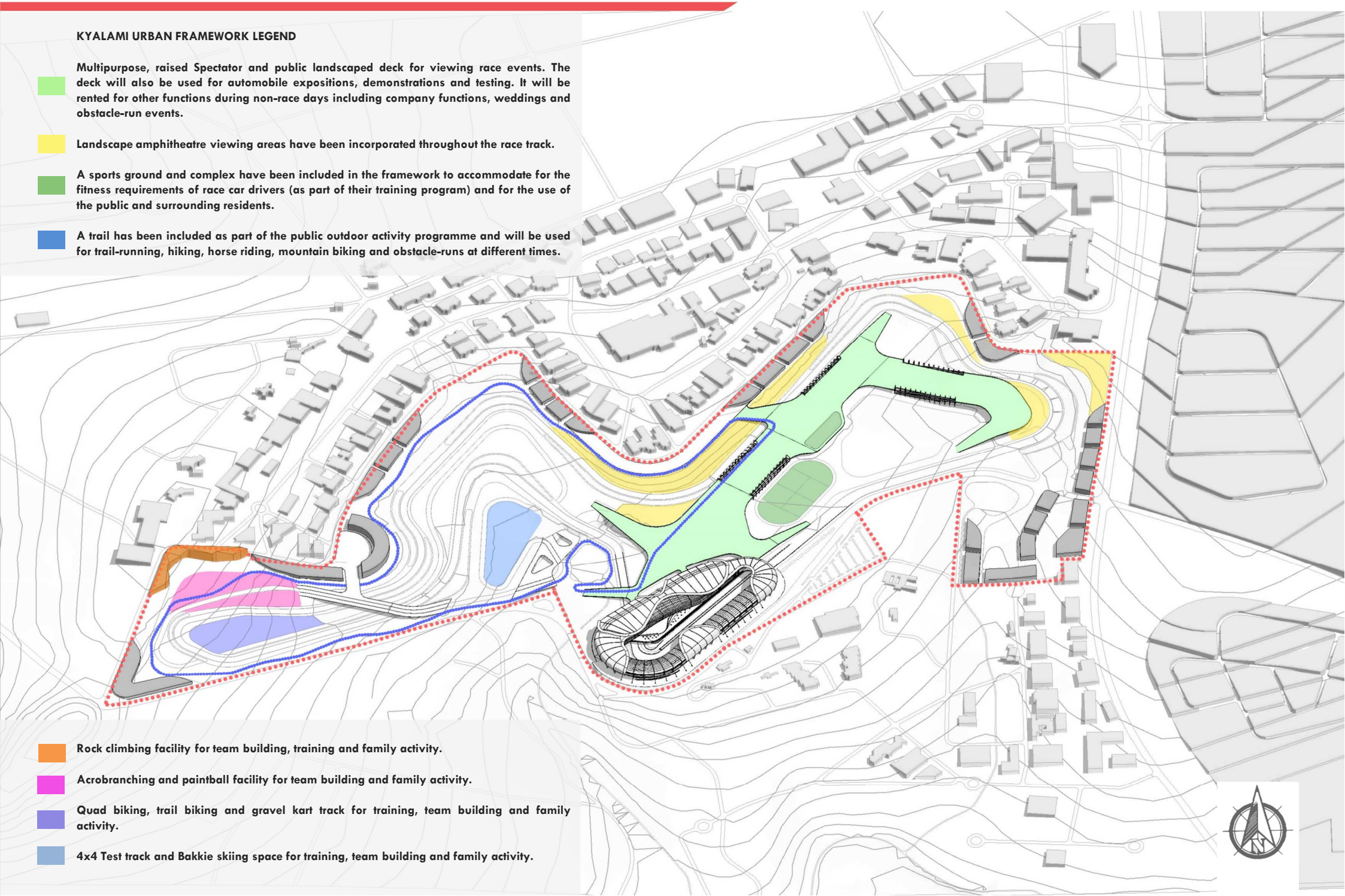
KYALAMI URBAN FRAMEWORK LEGEND

Multipurpose, raised Spectator and public landscaped deck for viewing race events. The deck will also be used for automobile expositions, demonstrations and testing. It will be rented for other functions during non-race days including company functions, weddings and obstacle-run events.

Landscape amphitheatre viewing areas have been incorporated throughout the race track.

A sports ground and complex have been included in the framework to accommodate for the fitness requirements of race car drivers (as part of their training program) and for the use of the public and surrounding residents.

A trail has been included as part of the public outdoor activity programme and will be used for trail-running, hiking, horse riding, mountain biking and obstacle-runs at different times.



Rock climbing facility for team building, training and family activity.

Acrobranching and paintball facility for team building and family activity.

Quad biking, trail biking and gravel kart track for training, team building and family activity.

4x4 Test track and Bakkie skiing space for training, team building and family activity.

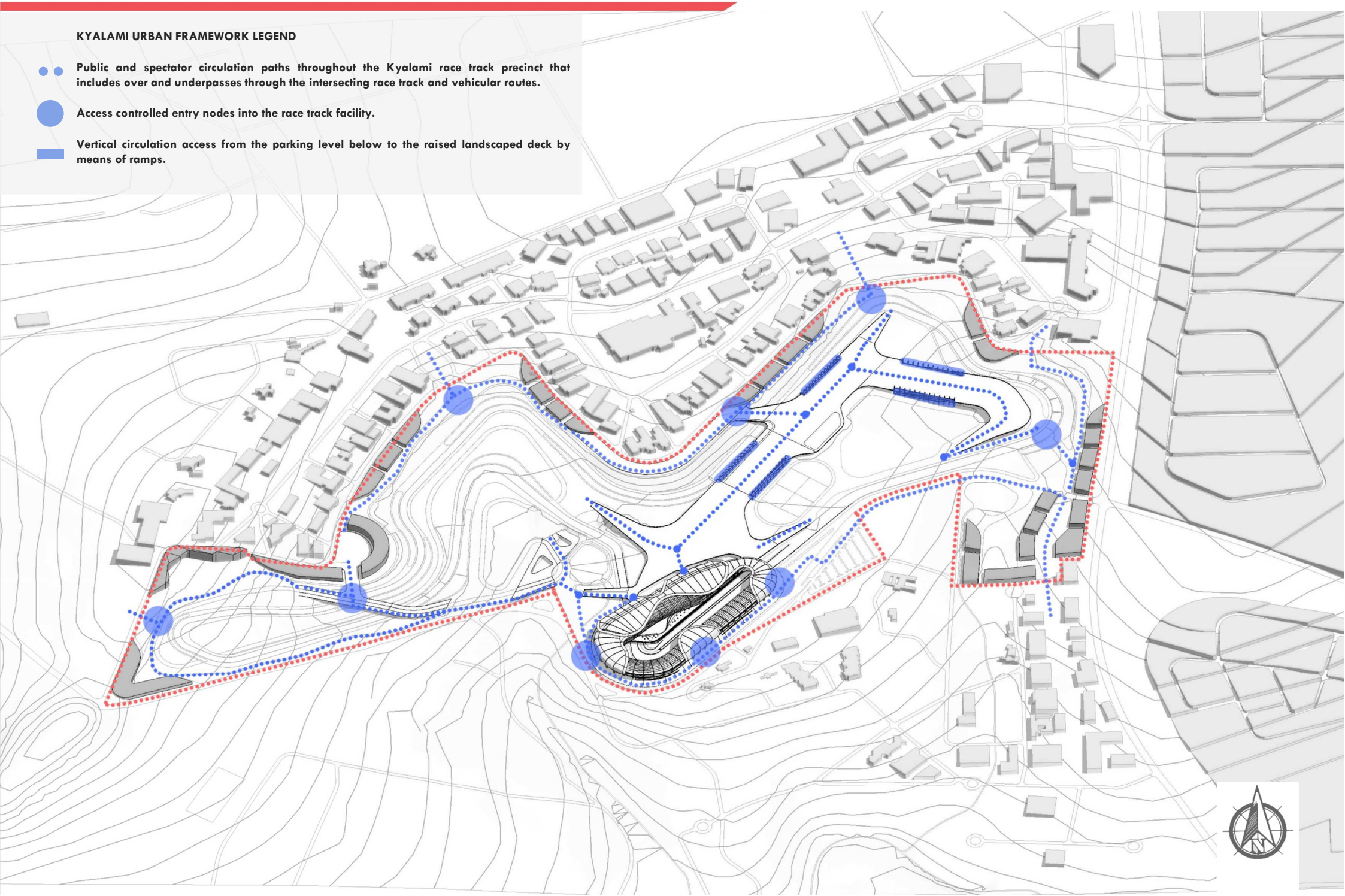
KYALAMI URBAN FRAMEWORK – PUBLIC AND SPECTATOR CIRCULATION

KYALAMI URBAN FRAMEWORK LEGEND

Public and spectator circulation paths throughout the Kyalami race track precinct that includes over and underpasses through the intersecting race track and vehicular routes.

Access controlled entry nodes into the race track facility.

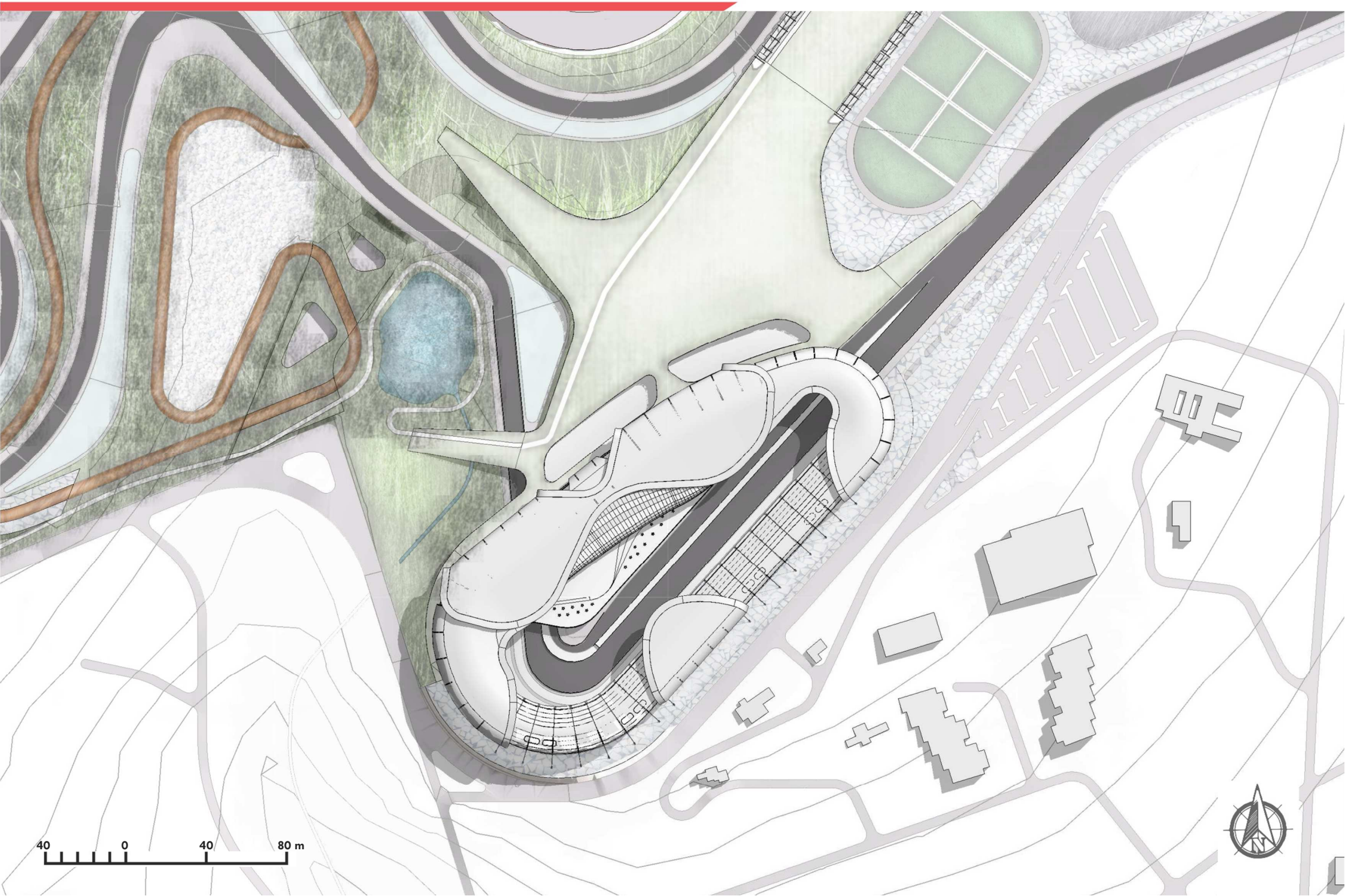
Vertical circulation access from the parking level below to the raised landscaped deck by means of ramps.





Scale 1: 7500

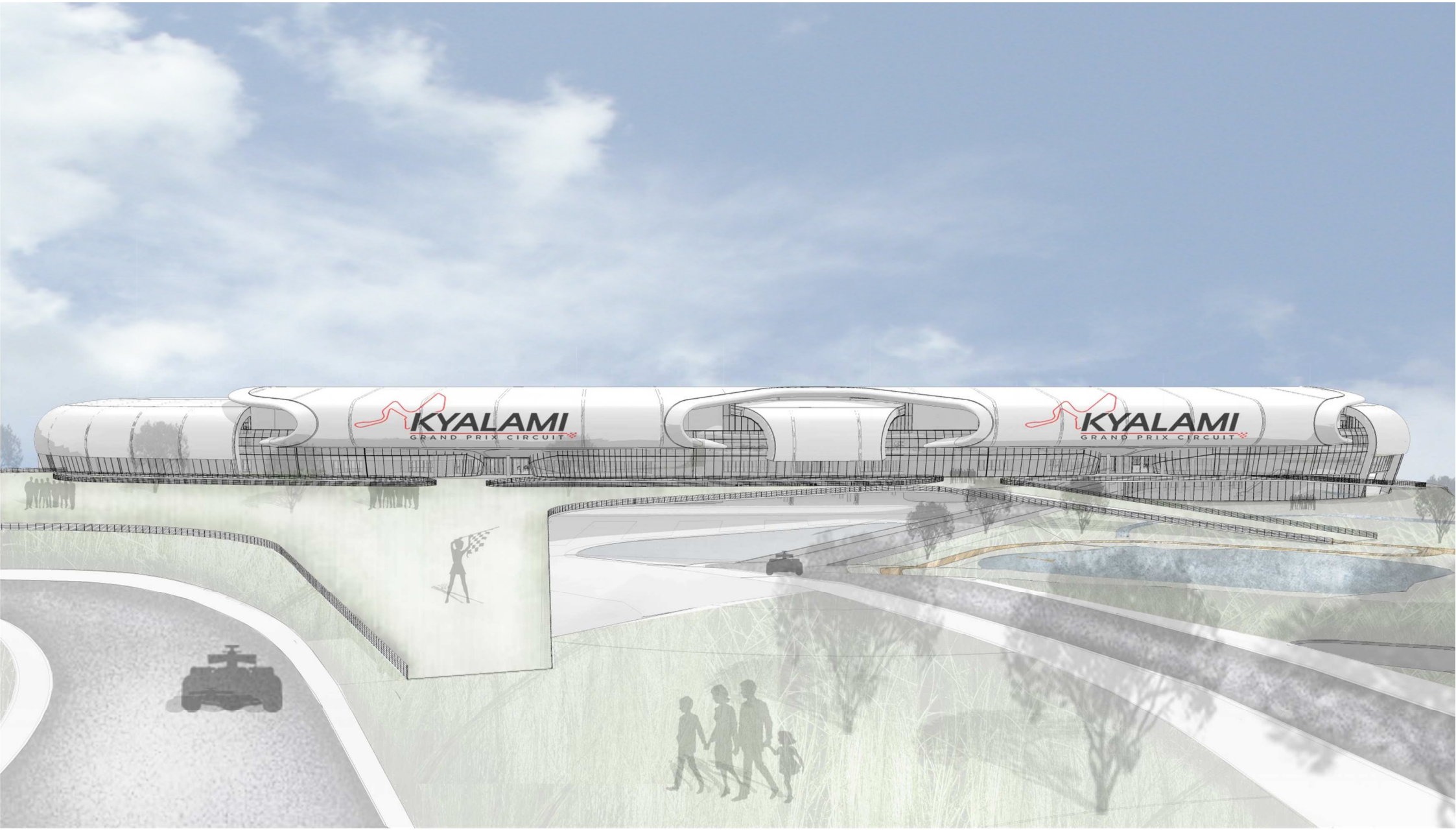
MOTORSPORT CENTRE – SITE PLAN




CONTEXT MODEL
Scale 1:5000


CONTEXT MODEL
Scale 1:5000

MOTORSPORT CENTRE – NORTH ENTRANCE PERSPECTIVE

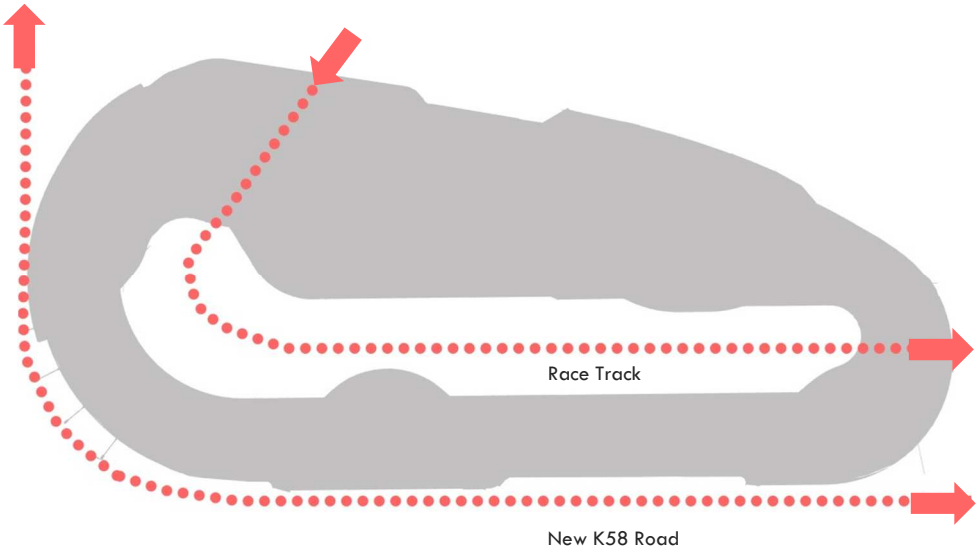


The proposed landscaped deck is designed to lead spectators and visitors directly to the main building entrance on the first floor, which includes a triple volume atrium (offering views to the grandstand and race track atmosphere), a retail component (for the sale of branded racing and automobile clothing, gadgets, books and memorabilia), an internal food court (for spectators and visitors), an open-air entertainment and performance space that can be viewed from the spectator stands during non-race days.

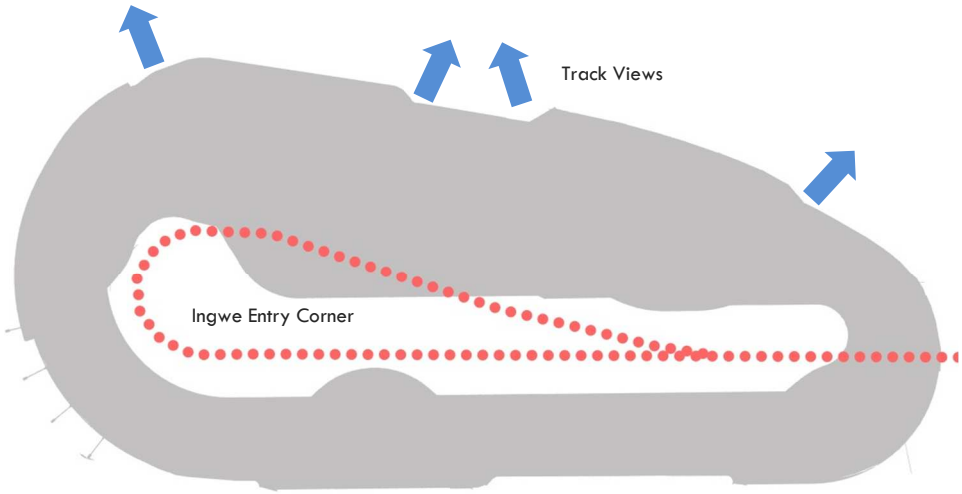
The ground floor will consist of the existing pits (located beneath the retail and entertainment level), double volume racing simulation area for both public entertainment and driver training (including live simulations of various types of motor racing) accessed from ground floor. A motor racing museum of the national motor racing history will run beneath the first tear of grandstands which will offer direct views to the track and will be accessed from the south eastern side of the building. Public viewing decks with coffee shops and restaurants have been included to accommodate pedestrians passing by the new K58 road and will expose them to the motor racing atmosphere and racing to stimulate their interest in the sport.

The second and third floors of the building will contain more formal facilities including rentable auditoriums (that can double as racing movie cinemas), foyer spaces feeding into the auditoriums (additionally used as function spaces), dining area accommodating the visitors, landscaped balconies offering views onto the rest of the track, rentable boardrooms (used for race event interviews and staff meetings) and track management administration offices. These spaces will be accessed by staff through the main cores and visitors through scenic lifts and escalators throughout the building.

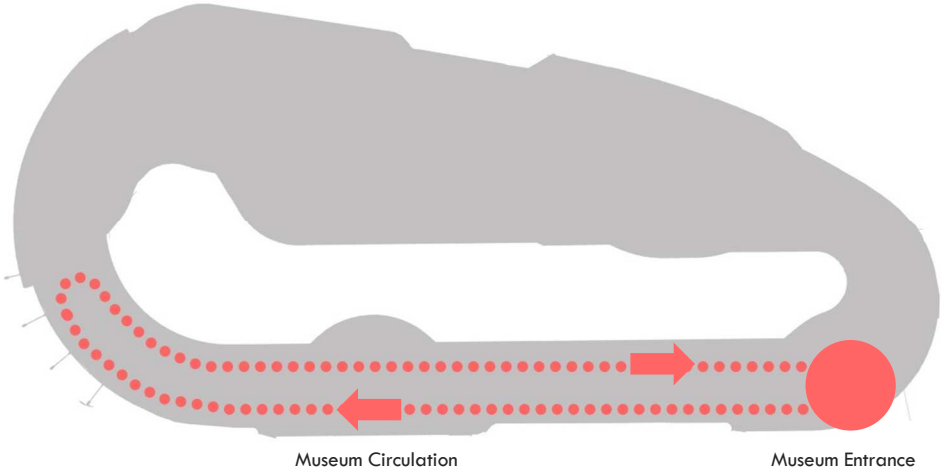
Three main spectator zones will be located through both tiers of the spectator stands and will include food and drinks bar, social lounge spaces, Wi-Fi areas with access to the latest motorsport highlights and information for a better spectator experience. These zones will allow vertical access onto the second tier of spectator stands for a better view of the motor racing events.



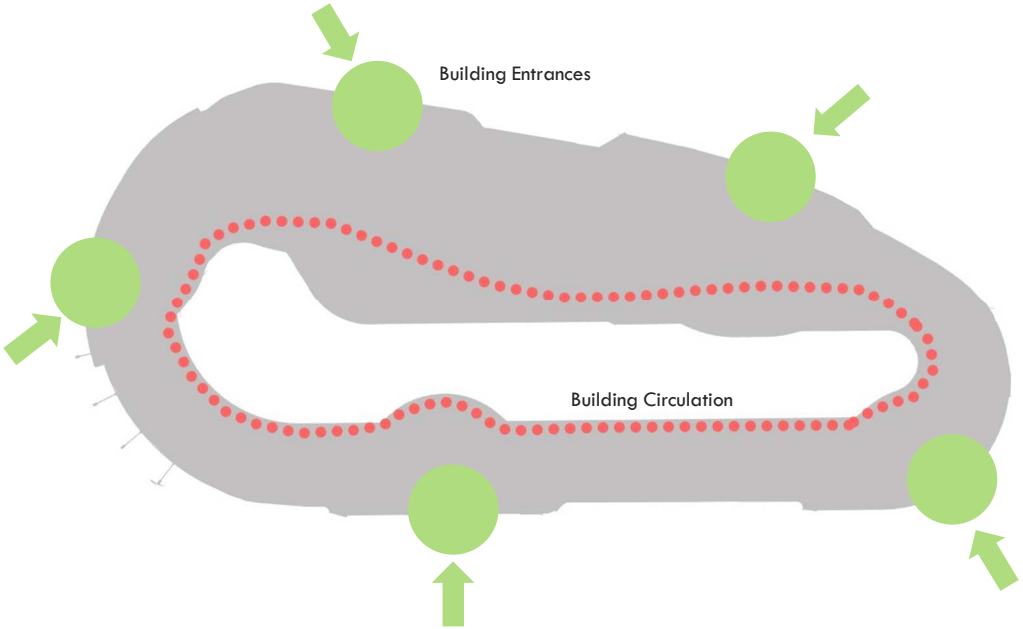
Building shaped by site edge and the new K58 road on the south as well as the race track that intersects intersecting the building at either end.



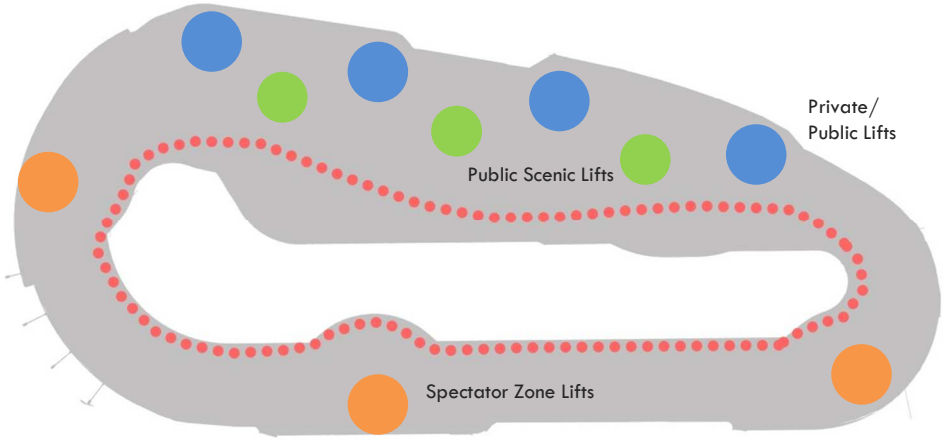
The Internal building space opens up to the Ingwe entry corner and is inclined on the eastern edge to allow maximum views to the overall race track.



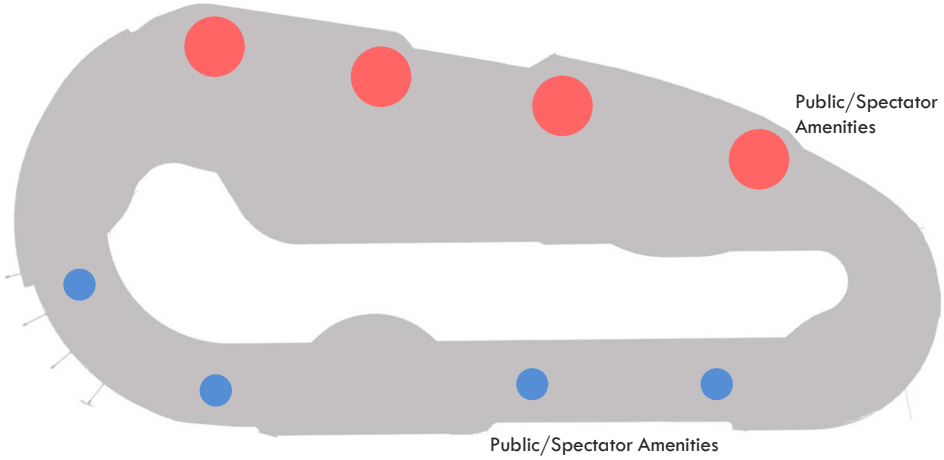
The motor racing museum is accessed on the south eastern portion of the building and follows a clockwise direction back to the main entrance.



Circulation on the first floor occurs on the internal façade of the building allowing view to the race track and is accessed through 5 perimeter entrances.

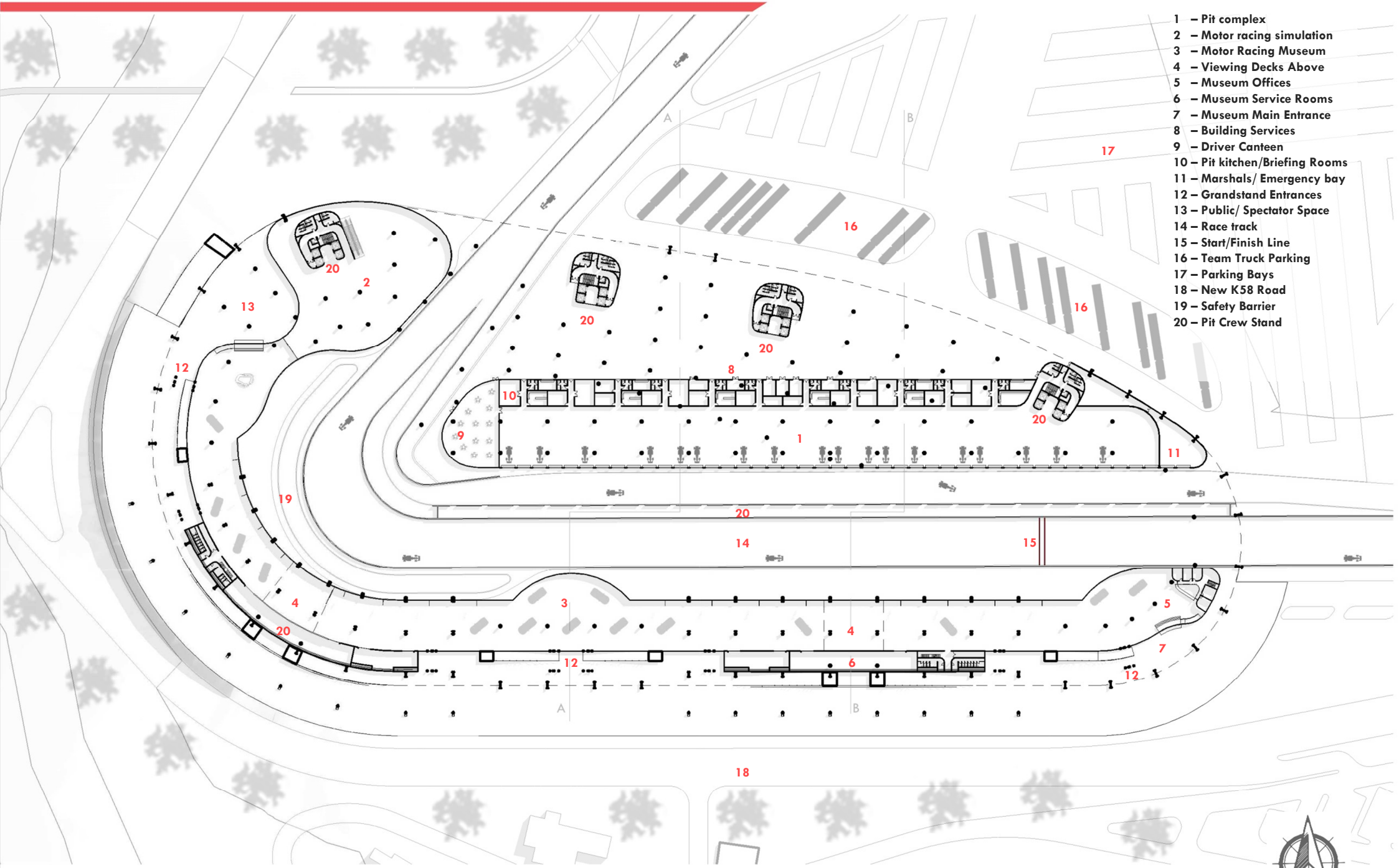


Ramps located in the spectator zones as well as scenic lifts and circulation cores allow access onto the various level of the building.

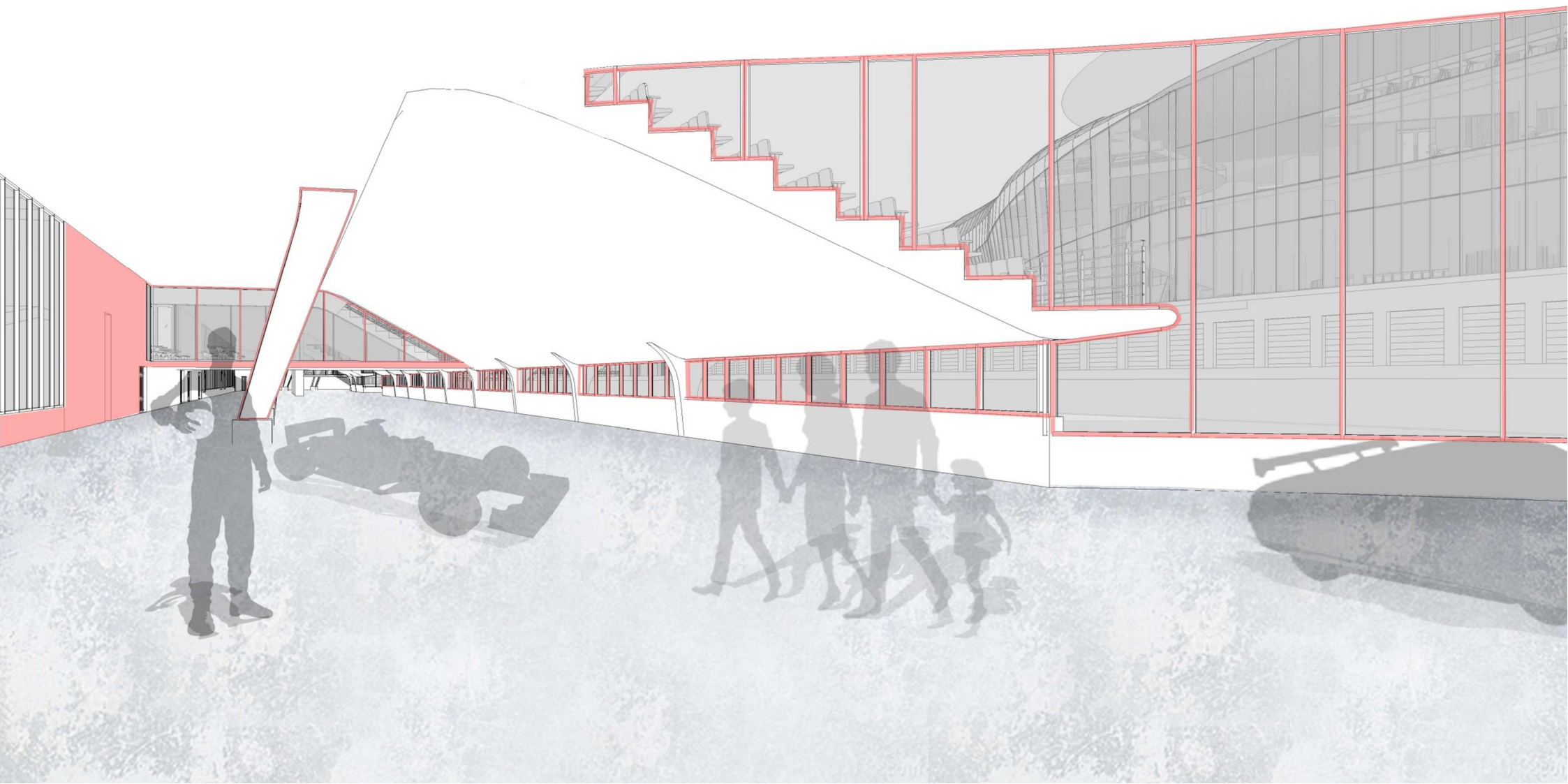


Public and spectator amenities are located within the building cores throughout the building.

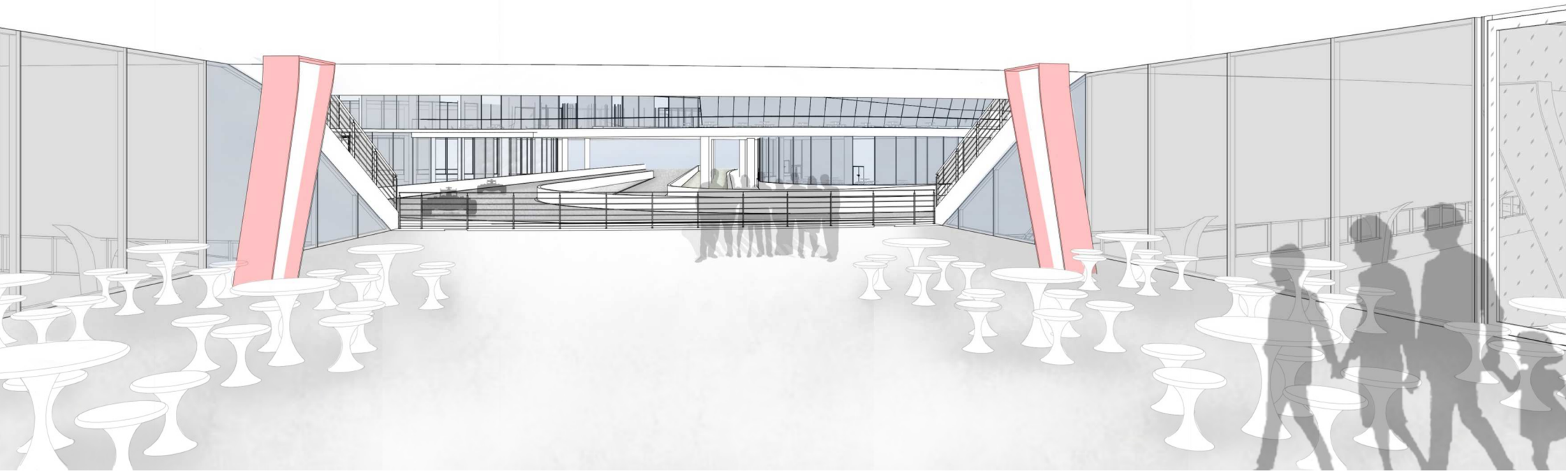
MOTORSPORT CENTRE – GROUND FLOOR PLAN



MOTORSPORT CENTRE – MOTOR RACING MUSEUM PERSPECTIVE

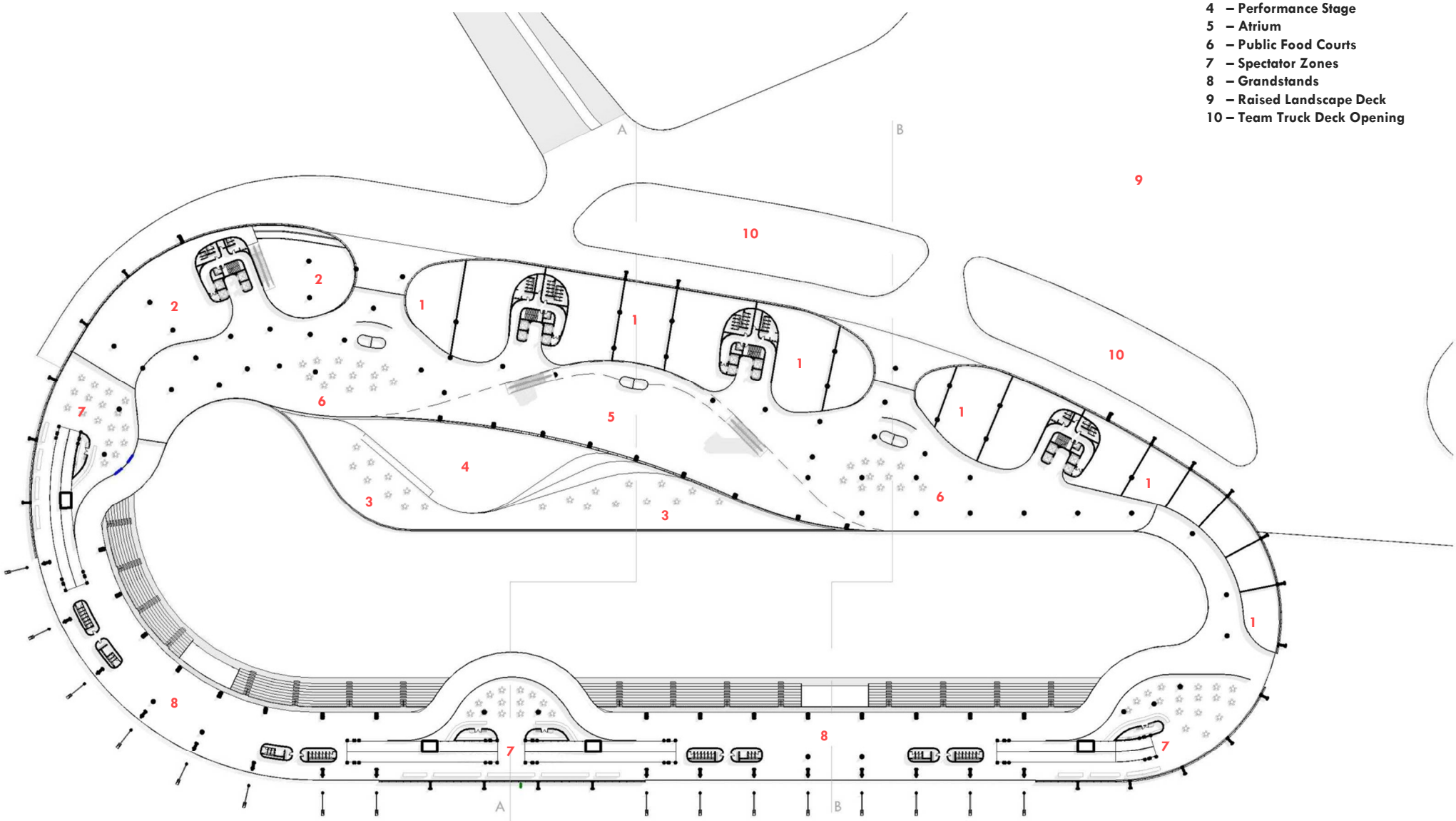


MOTORSPORT CENTRE – SOUTH PUBLIC VIEWING DECK PERSPECTIVE



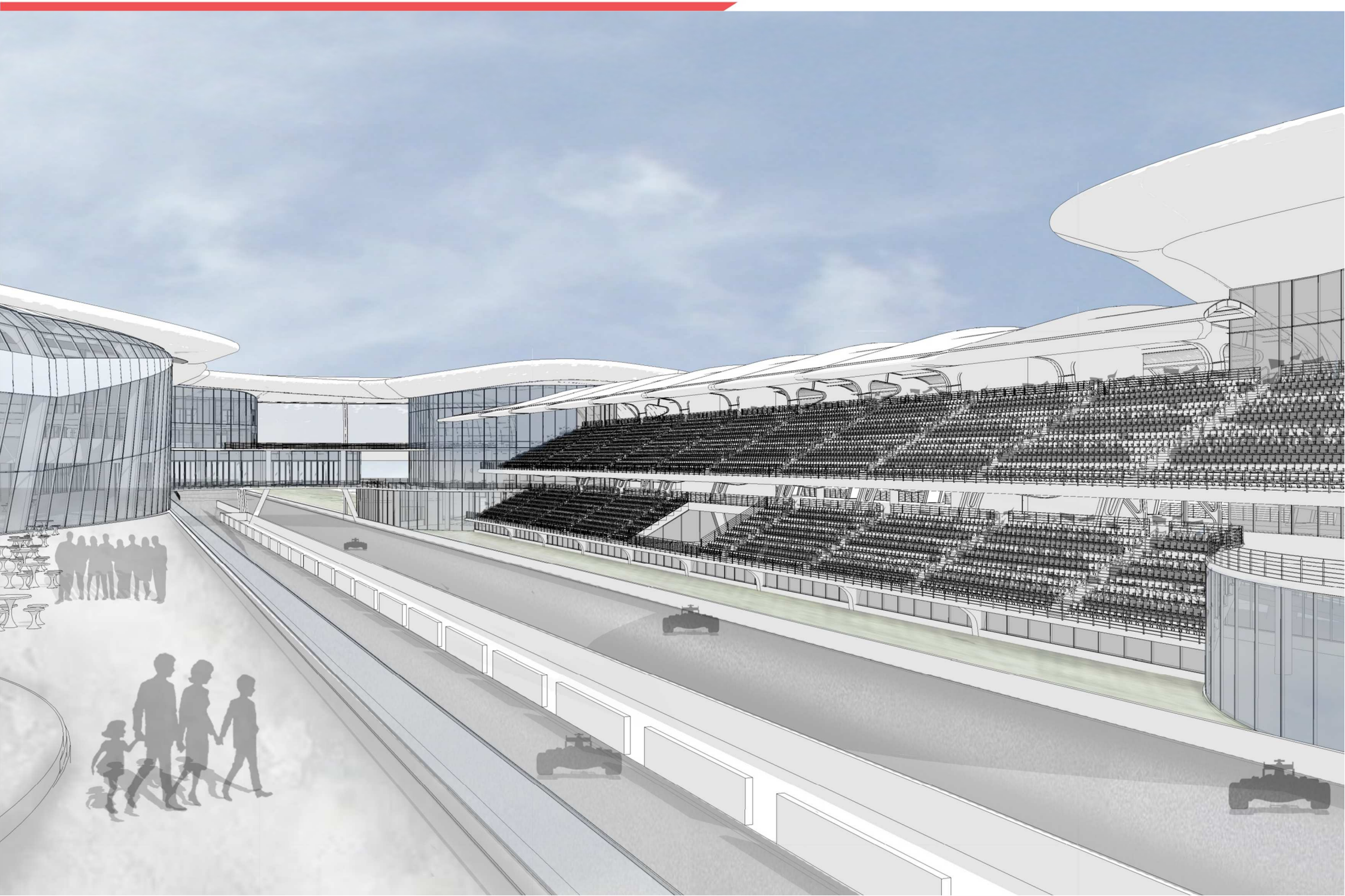
MOTORSPORT CENTRE – FIRST FLOOR

1 – Motorsport/ Automobile Retail
2 – Racing Simulation
3 – Open-Air Seating Area
4 – Performance Stage
5 – Atrium
6 – Public Food Courts
7 – Spectator Zones
8 – Grandstands
9 – Raised Landscape Deck
10 – Team Truck Deck Opening



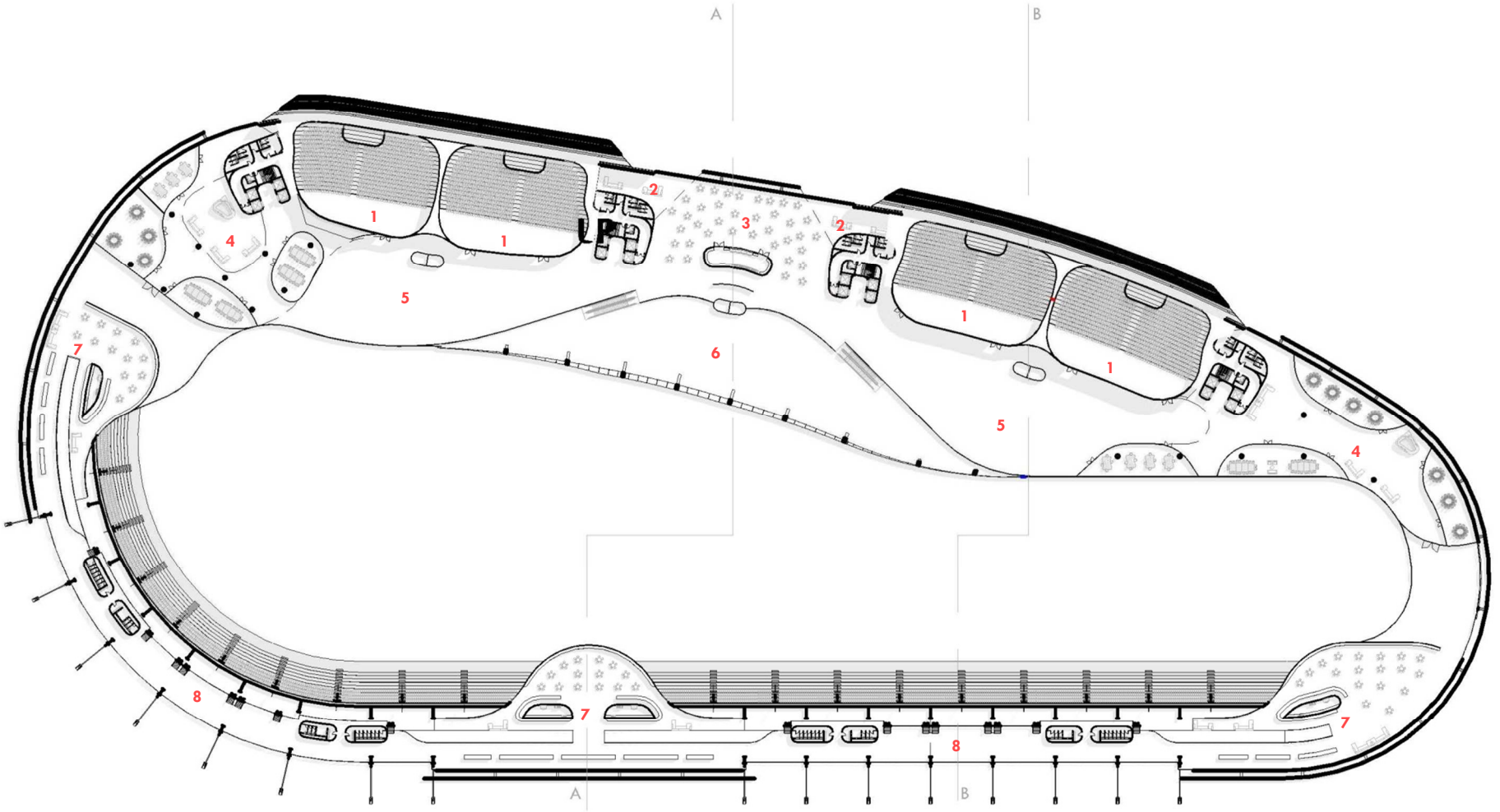
20 0 20 40 m

MOTORSPORT CENTRE – PERSPECTIVE FROM OPEN-AIR ENTERTAINMENT SPACE



MOTORSPORT CENTRE – SECOND FLOOR PLAN

1 – Auditoriums
2 – Social Lounges
3 – Dining Area
4 – Boardrooms/ Meeting Rooms
5 – Foyer
6 – Atrium
7 – Spectator Zones
8 – Grandstands



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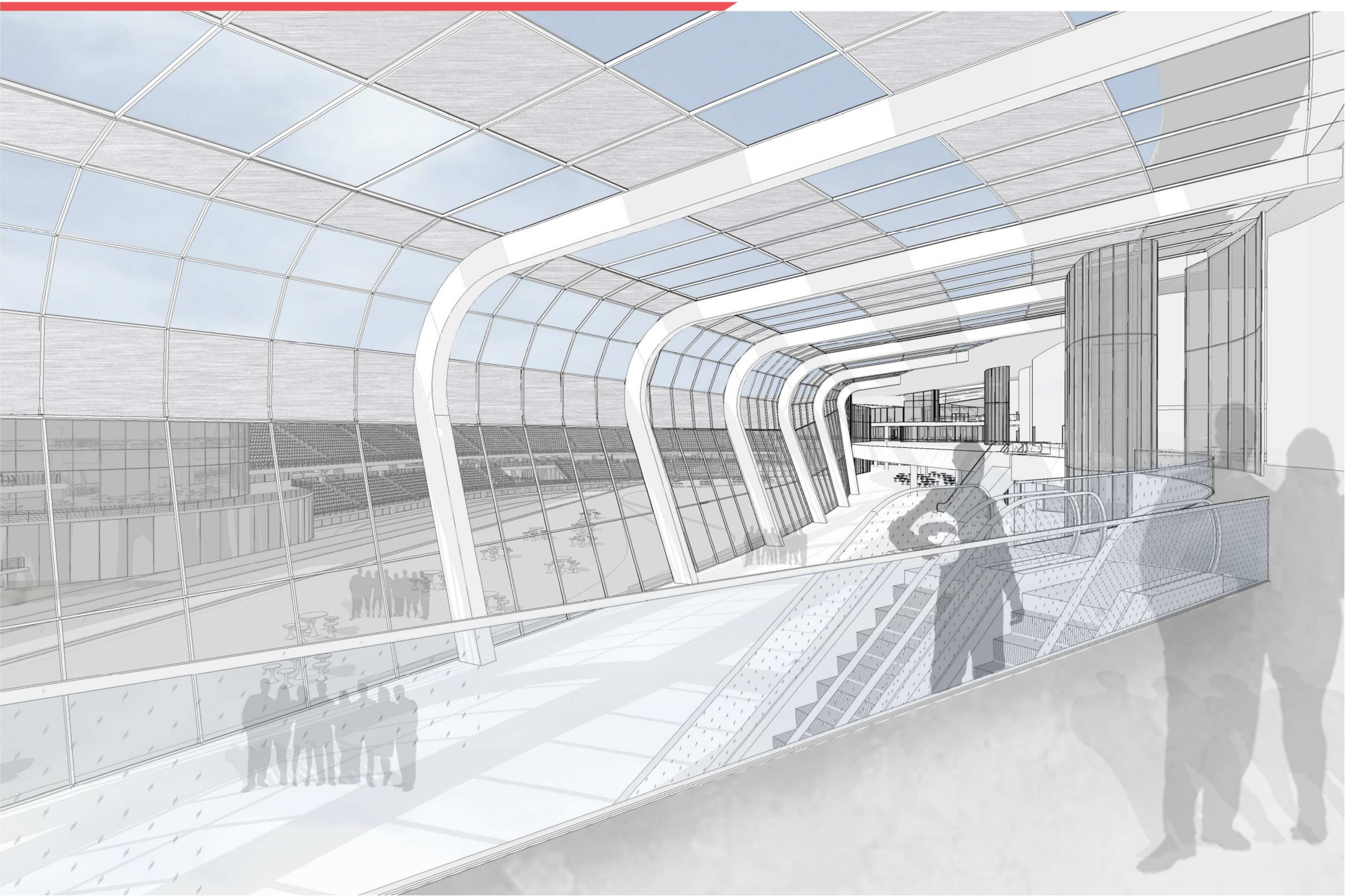
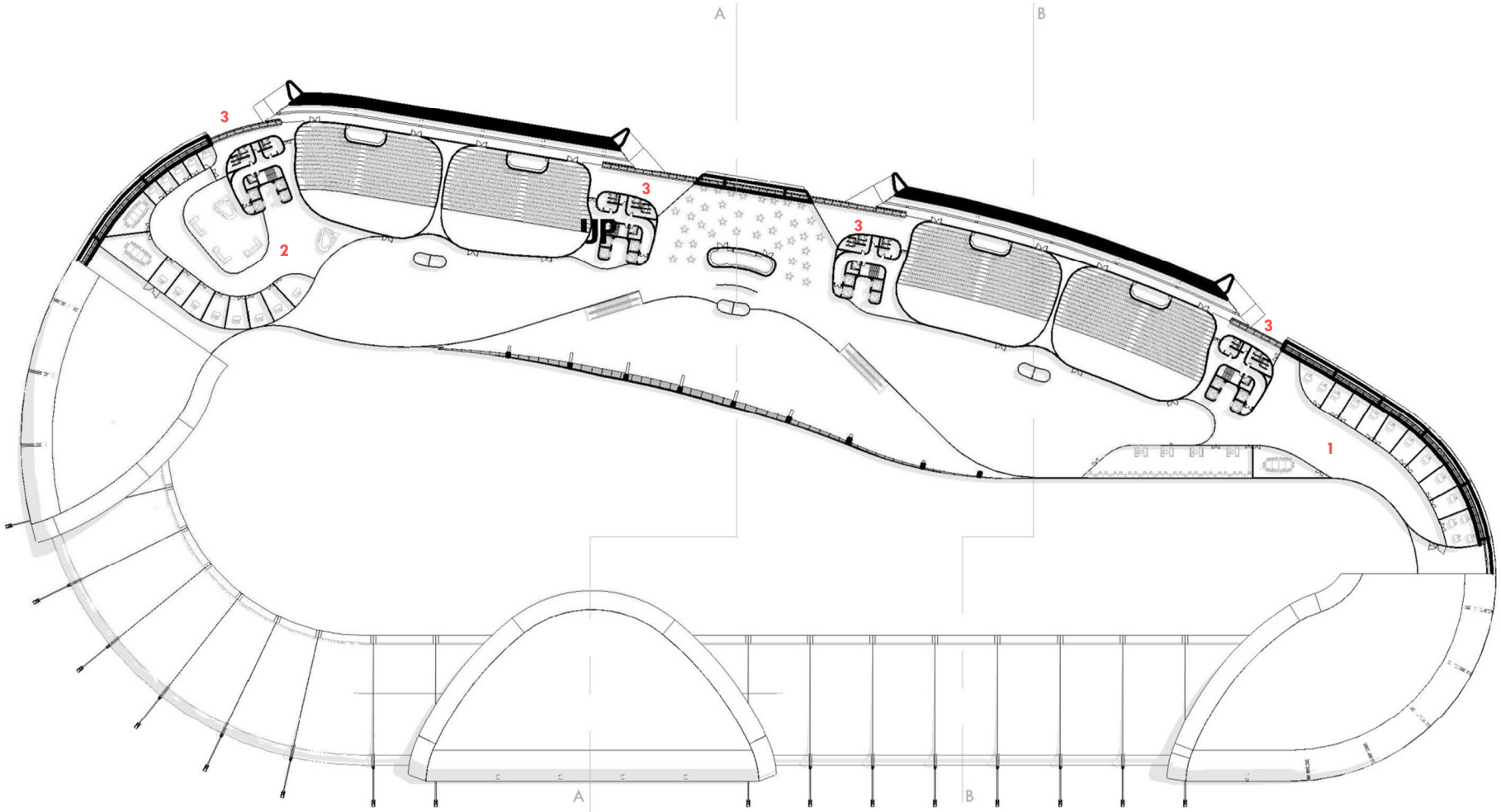
MOTORSPORT CENTRE – BUILDING ATRIUM PERSPECTIVE



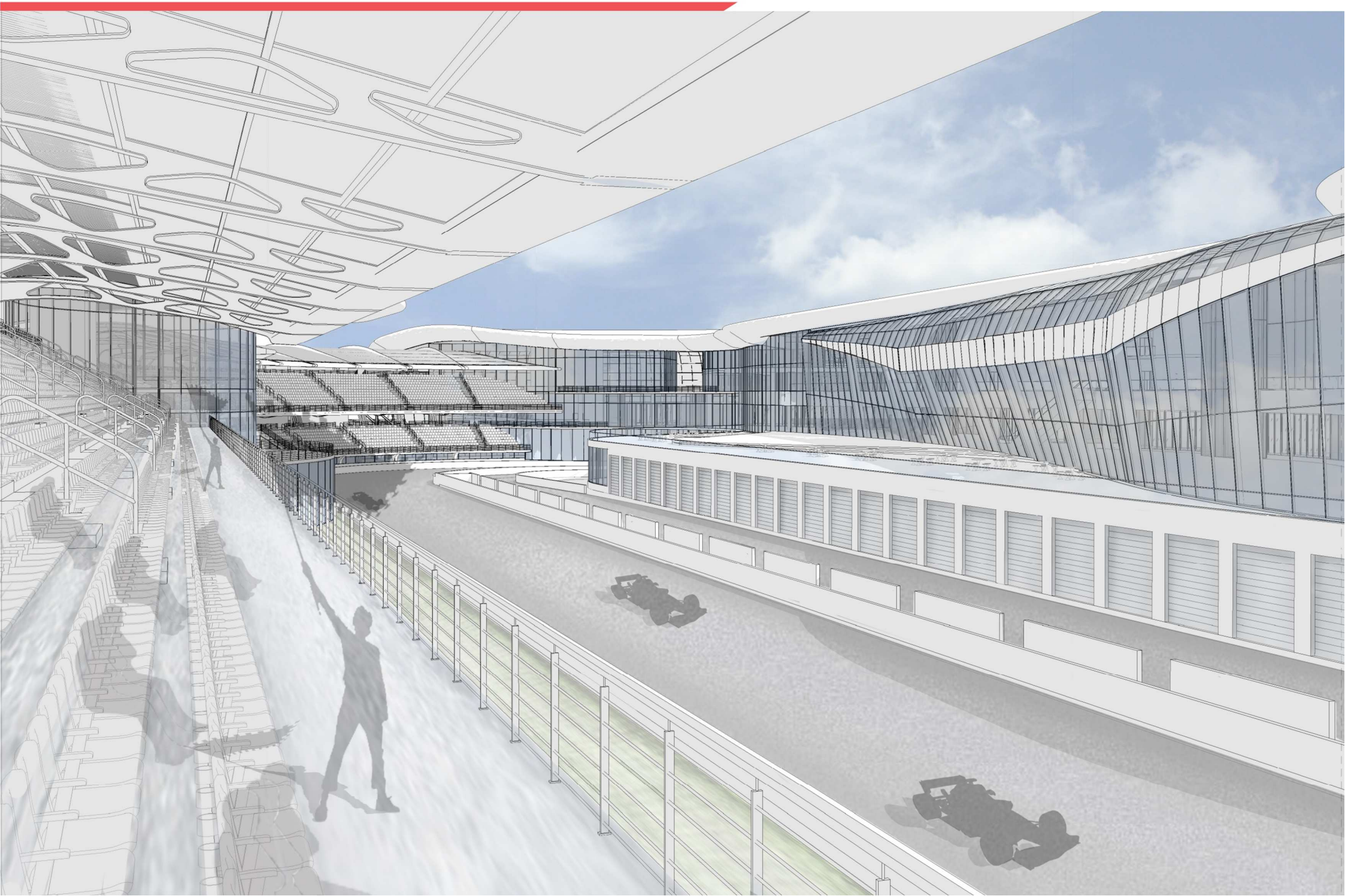
MOTORSPORT CENTRE – THIRD FLOOR PLAN

1 – Commentary Boxes/ Management Offices
2 – Museum/ General Offices
3 – Track Viewing Decks



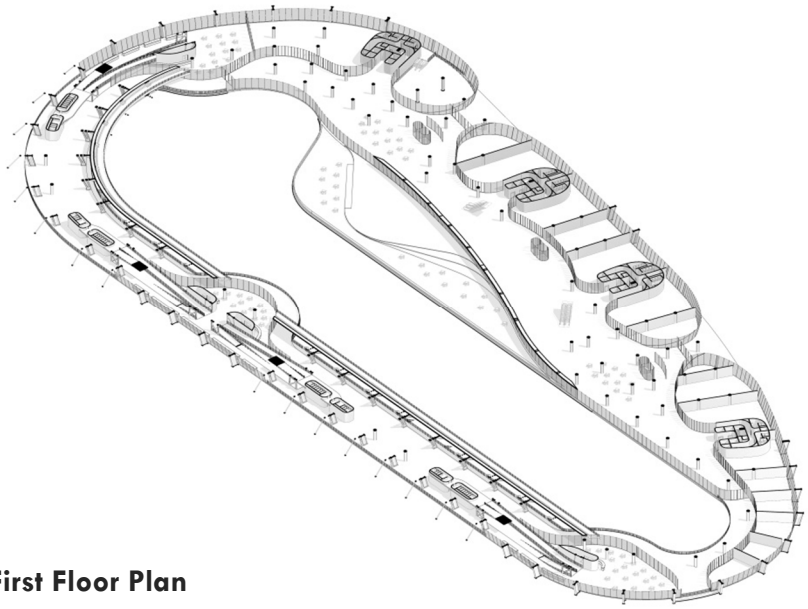
20 0 20 40 m

MOTORSPORT CENTRE – VIEW FROM SECOND TIER GRANDSTANDS

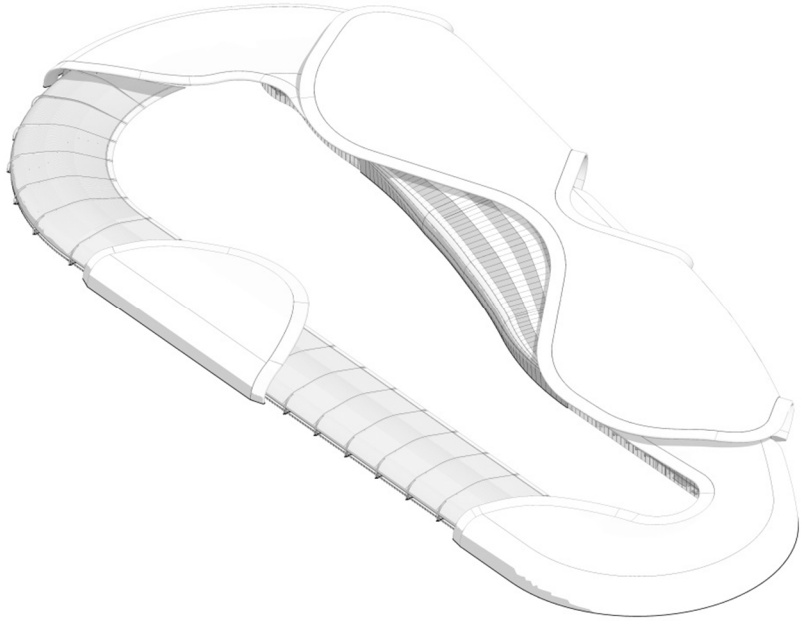


MOTORSPORT CENTRE – SECOND TIER SPECTATOR ZONE PERSPECTIVE

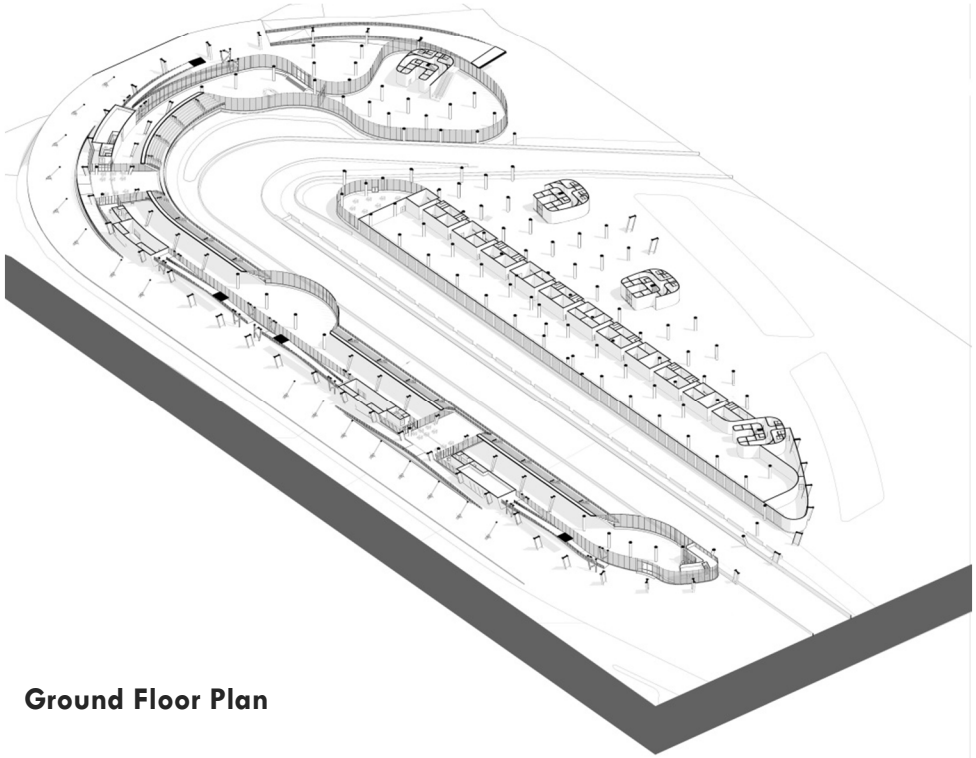




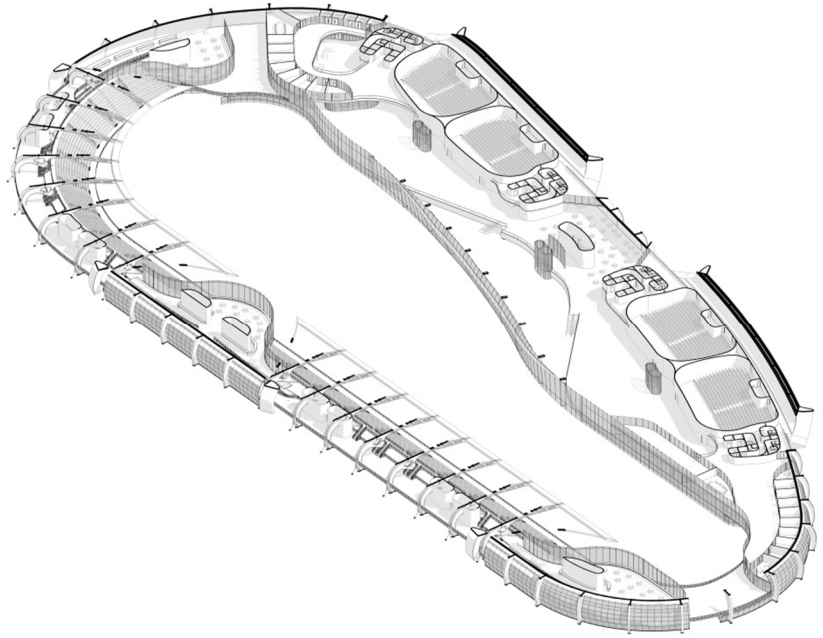
First Floor Plan



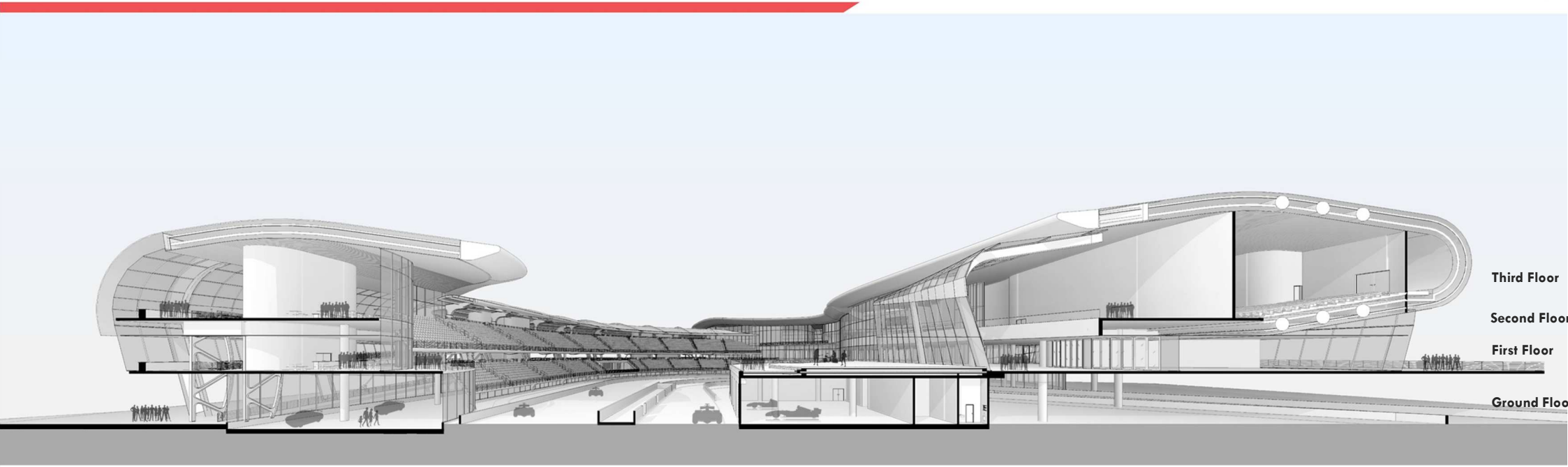
Roof



Ground Floor Plan

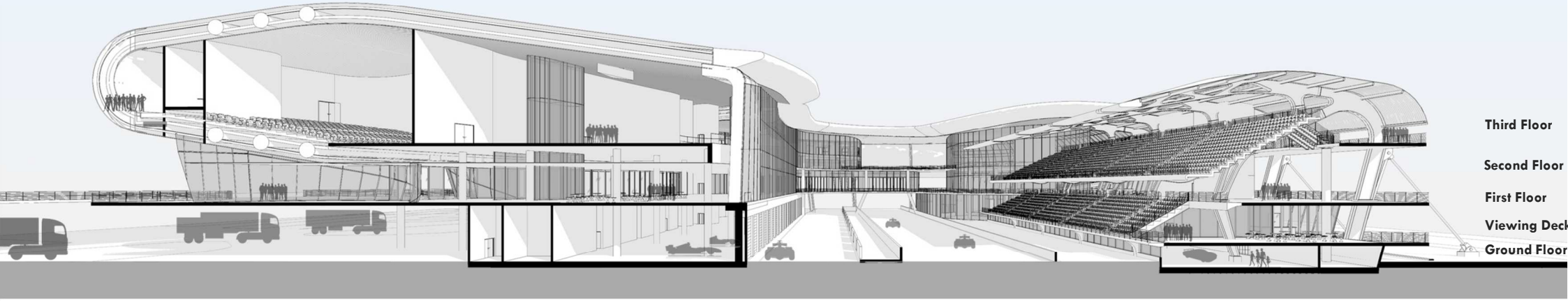


Second & Third Floor Plan



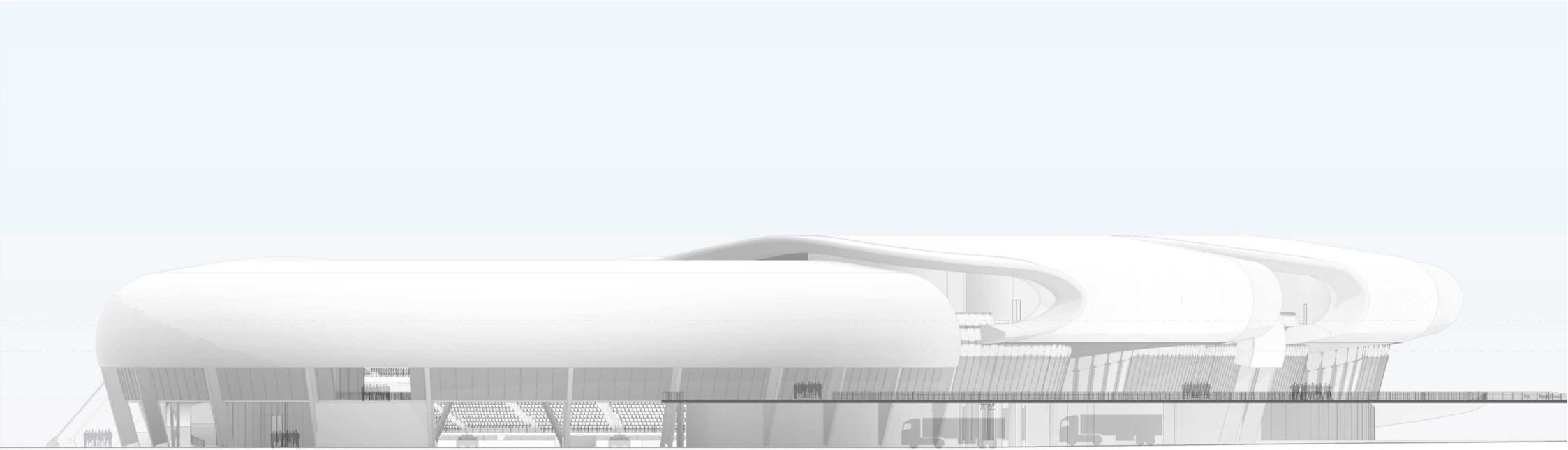
Section A - A

10 0 10 20 m



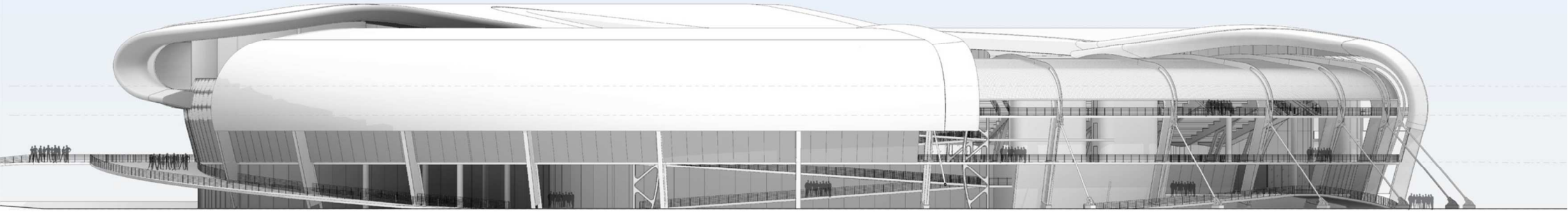
Section B - B

10 0 10 20 m



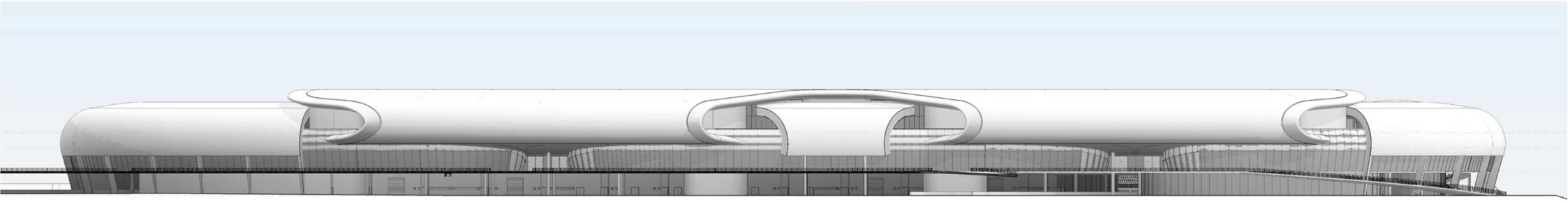
West Elevation

10 0 10 20 m

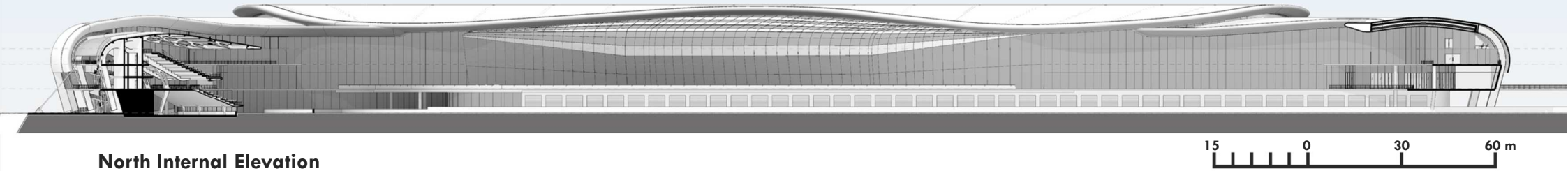


East Elevation

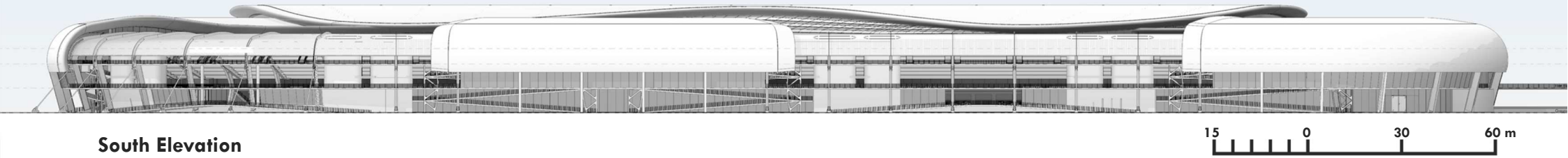
10 0 10 20 m



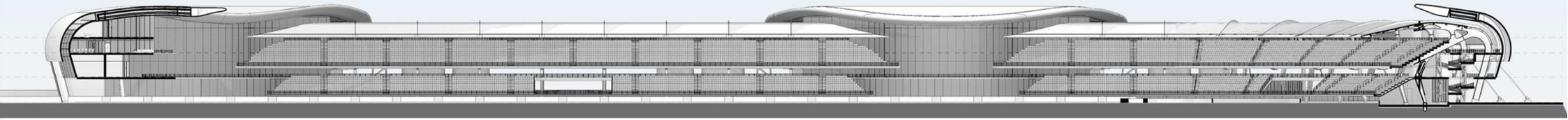
North Elevation



North Internal Elevation

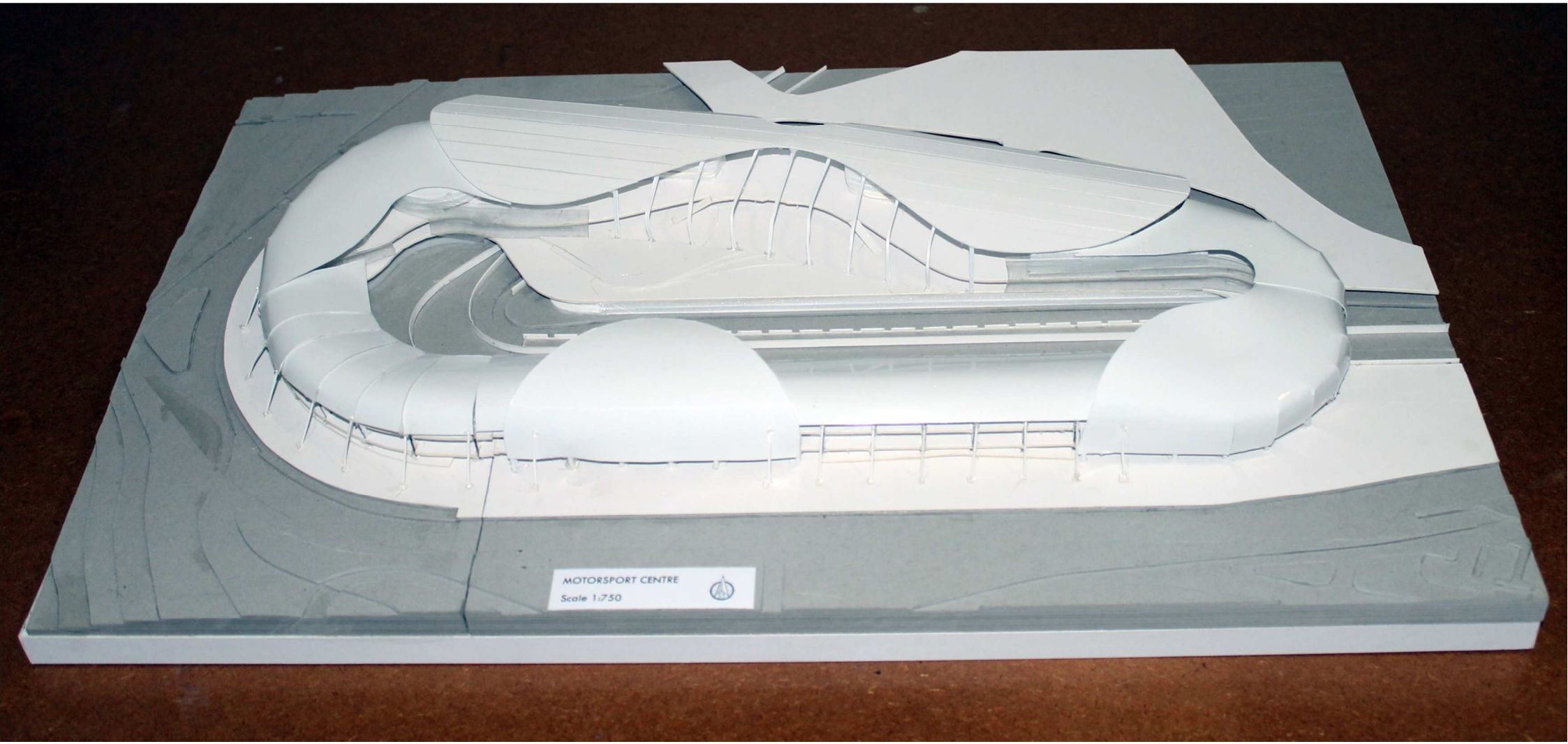


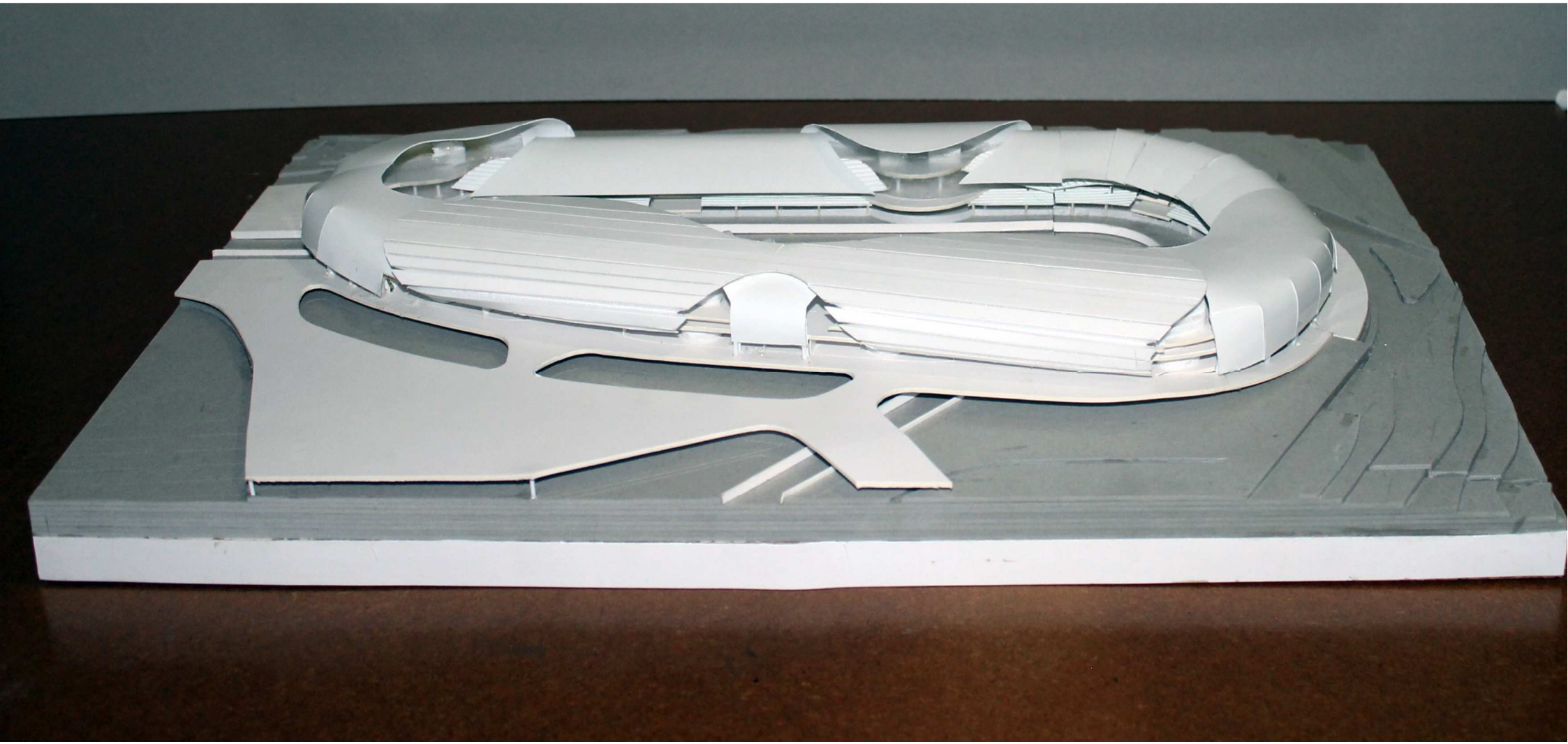
South Elevation

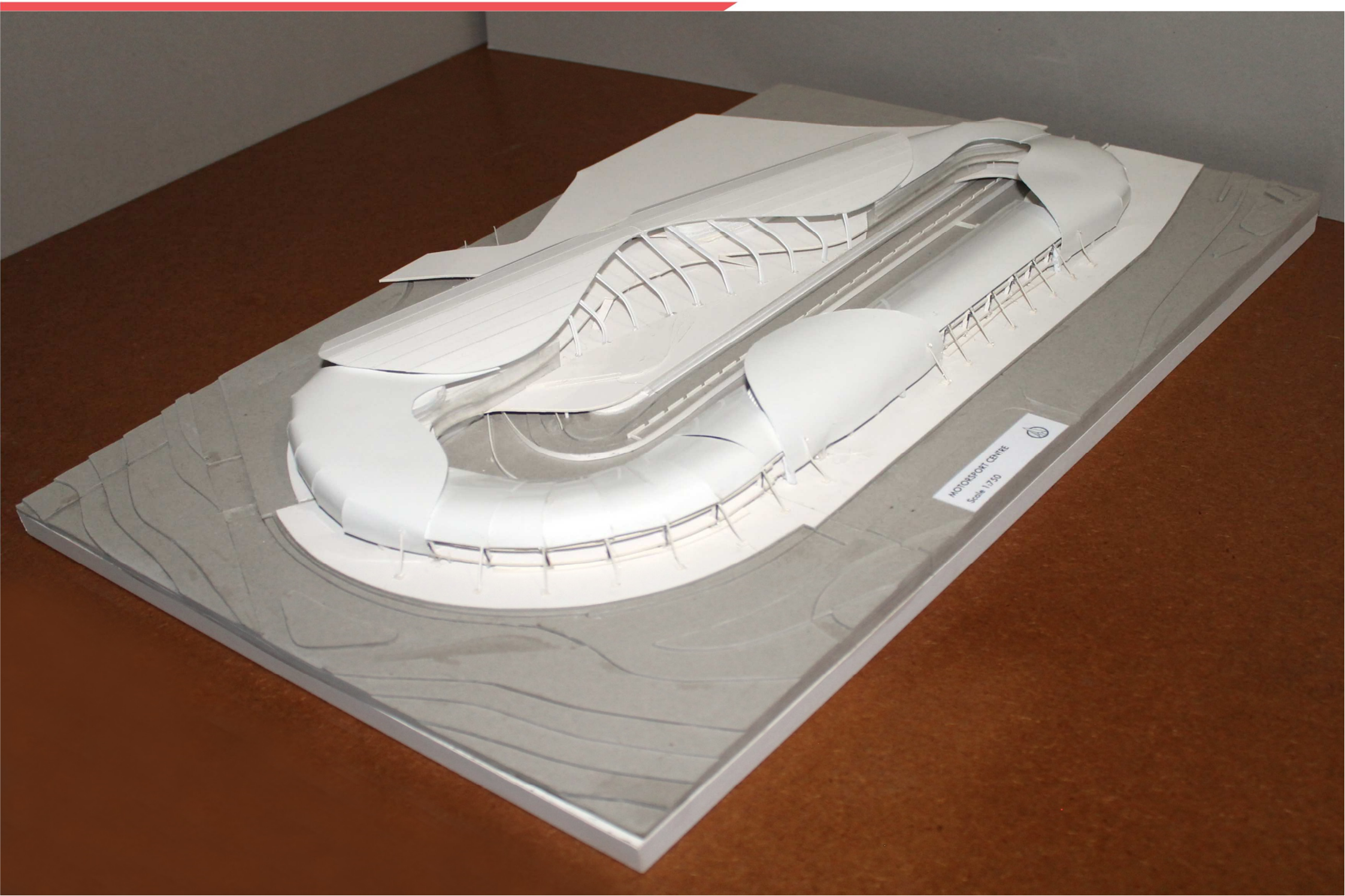


South Internal Elevation




MOTORSPORT CENTRE
Scale 1:750




MOTORSPORT CENTRE
Scale 1:750

CHAPTER 10

TECHNICAL DETAILS

10.1) Technical Requirements

10.2) Structure and Space

10.3) Technology & Sustainability

10.4) Building Structure and Technology



Figure 88. Perspective of the FNB Stadium and concept for the skin of the building. (2015)

Project: FNB Stadium
Location: Nasrec_ Johannesburg
Architect: Populous/Boogertman
Completed: 2009
Size: 80 000 m²

Description

The FNB Stadium (also known as Soccer City) was designed as the primary stadium for the hosting of the FIFA 2010 World Cup. It is considered the largest stadium in Africa with a capacity of 94 736. The stadium exterior has the appearance of a calabash (African pot) containing earthy and fire colours that resemble a pot on a fire, which is expressive of the native African culture. The stadium stands contain 9 vertical black lines that make geographical reference to the other stadiums involved in the hosing of the South African World Cup.

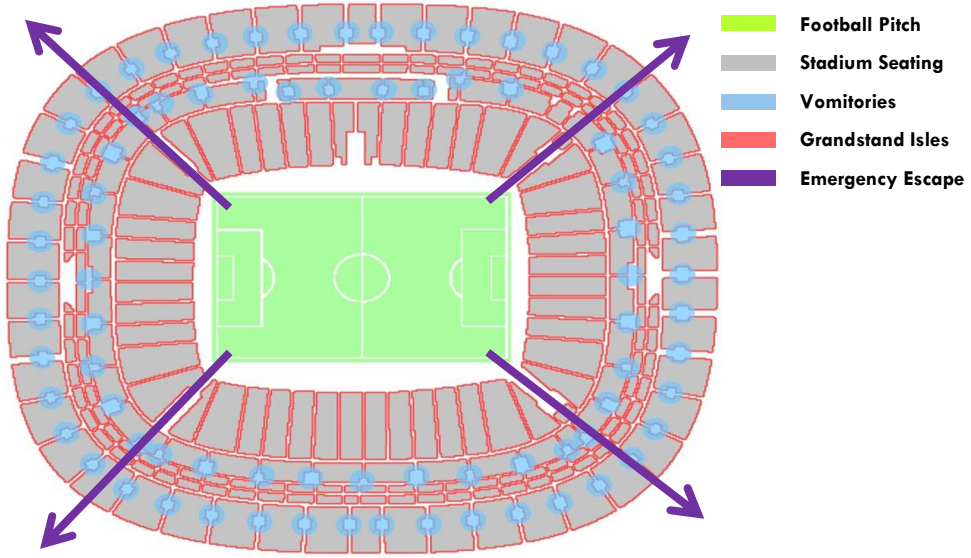


Figure 89. Circulation and seating layout of the stadium. (2015)

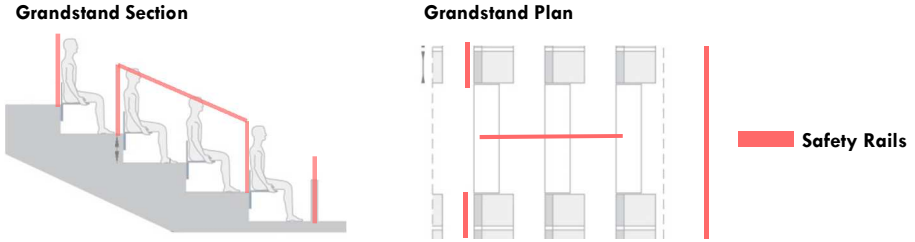


Figure 90. Safety rail FIA requirements for the design of the grandstands. (2015)

Precedent Relevance

As part of my design approach is to incorporate a motor racing spectator facility to enhance the spectator experience, I decided to conduct research pertaining to stadium design in terms of circulation, services, concessions, safety and technical requirements to ensure its functionality. Through consultation with Boogertman architects (2015) and the application of the FIFA stadium guidelines (2007) much information was obtained in establishing design principles that could be adapted to the design of the spectator areas for the motorsport facility.

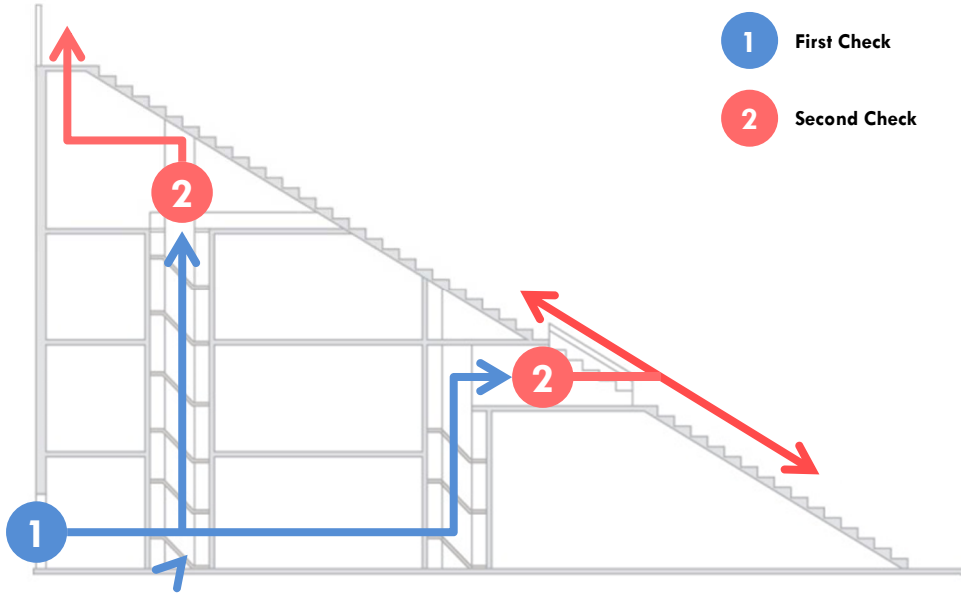


Figure 91. FIA requirements for access control into the grandstand facility. (2015)

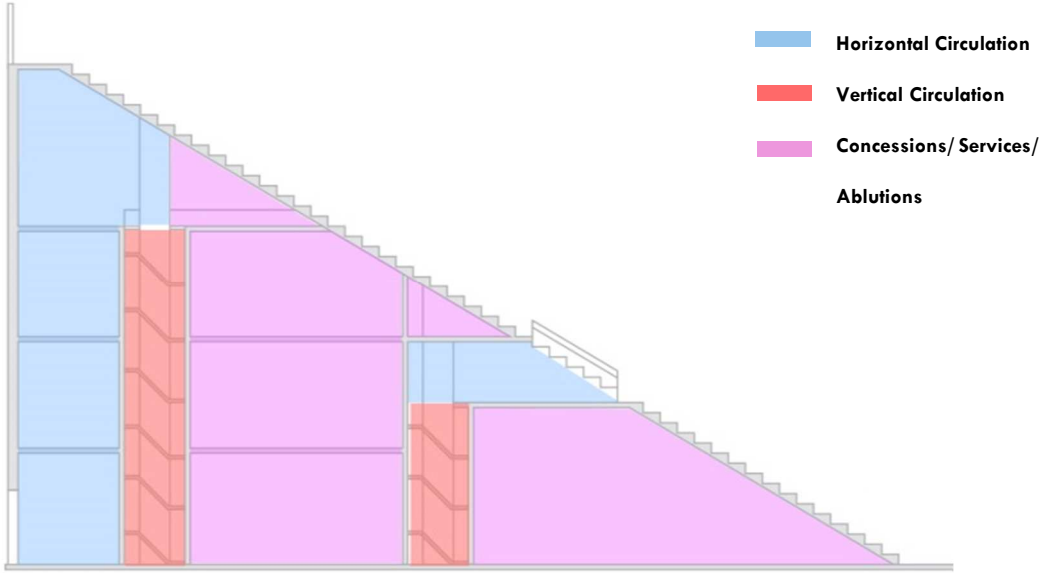


Figure 92. FIA approach to the allocation of services and optimal circulation flow. (2015)

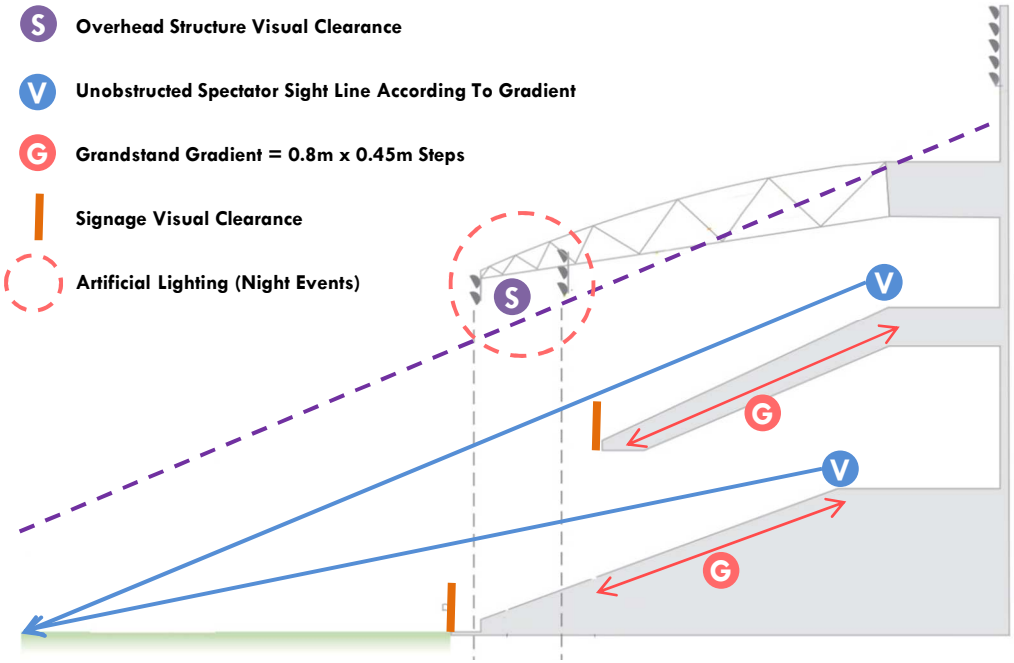
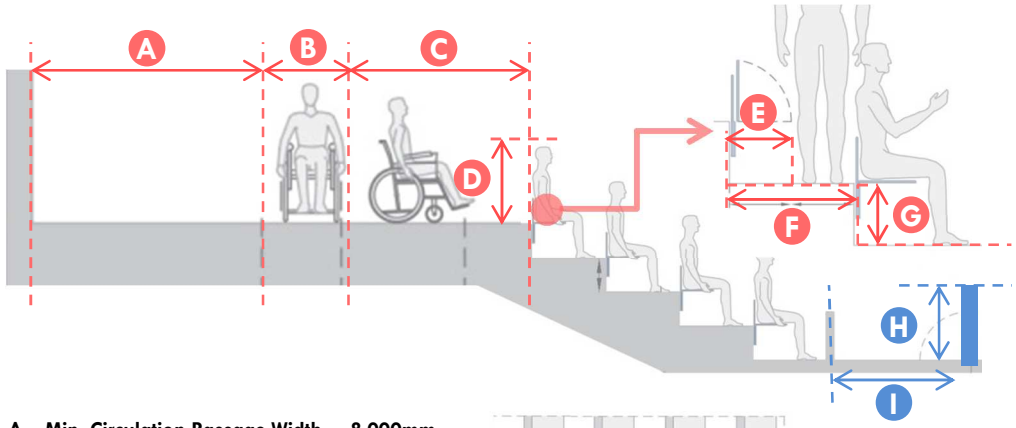


Figure 93. FIA sightline requirements for grandstand design. (2015)



A – Min. Circulation Passage Width	8 000mm
B – Min. Disabled Circulation Width	915mm
C – Min. Standing /Disabled Length	1 200mm
D - Min. Safety Rail Height	1 000mm
E - Min. Spectator Seat Depth	400mm
F - Min. Spectator Isle Width	800mm
G - Min. Spectator Seat Height	450mm
H - Min. Signage Height	1 000mm
I - Min. Signage Distance	2 000mm
J – Spectator Seat Width Min.	500mm
K – Grandstand Isle Min.	1 200 mm

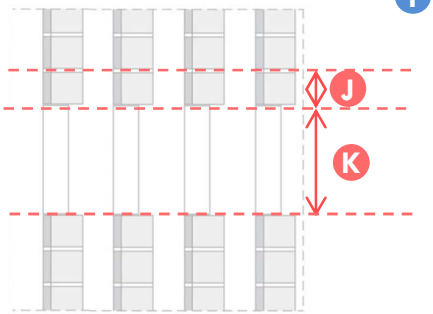


Figure 94. FIA dimensions for spectator seating, circulation isle widths and signage positioning. (2015)

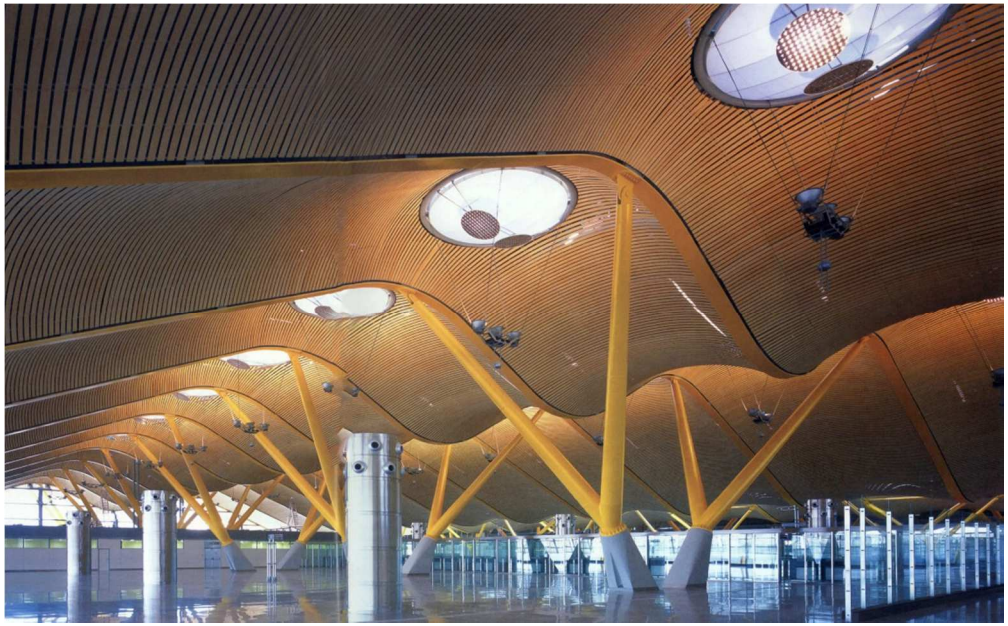


Figure 95. Interior perspective of Barajas Airport shaped through lightweight undulating roof structure. (2015)

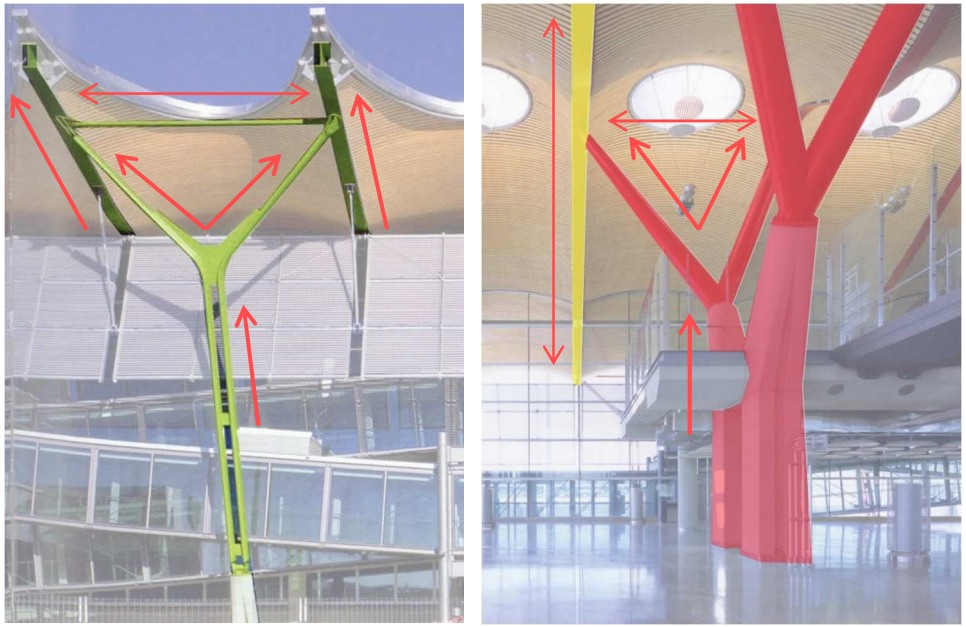


Figure 96. Elegant structural members and design for the forces exhibited on the structure. (2015)

Project: Madrid Barajas Airport
Location: Madrid_ Spain
Architect: Richard Rogers Partnership
Completed: 2004
Size: 120 000 m²

Description

The Barajas airport is the largest in Spain and serves 35 million passengers annually. The building consists of a series of colour coded terminals connected by light canyons, each serving a particular function. These terminals were designed with an elegant undulating winged roof that is expressive of flight and gives this airport its unique form.

Precedent Relevance

The approach for the structure of the motorsport centre is to incorporate a similar structural system of that utilized in the construction of airports. These structural systems allow for greater spans that strongly express motion and fluidity. Of structural relevance is the Barajas airport, where its three levels (primarily supported on pairs of concrete columns) split into radiating steel arms on the third level to form the support structure for the lightweight swooping roof structure. Canted steel columns are used on the extremities of the roof each supporting two wing tips. The slim and elegant design of the structural members enhances both the internal and external aesthetics of the building, at the same time creating an airy and spacious atmosphere for passengers walking through the building.

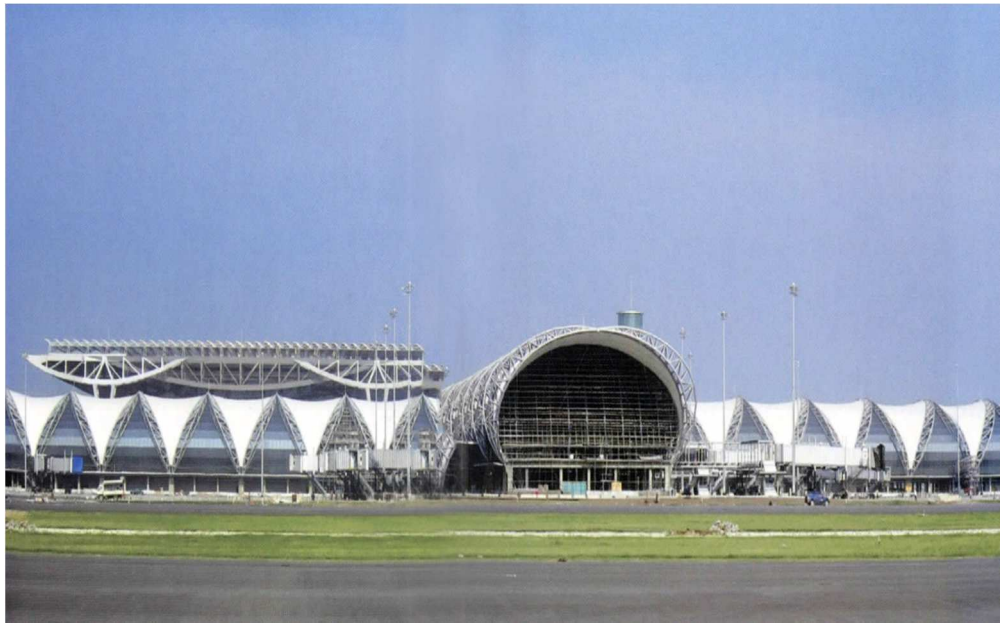


Figure 97. Entrance perspective of the Bangkok airport exhibiting its elegant structural form. (2015)

Project: Bangkok International Airport
Location: Bangkok, Thailand
Architect: Murphy Jahn Architects
Completed: 2006
Size: 563 000 m²

Description

Made up of a collection of separate buildings, the complex is covered by a grand roof trellis. The trellis not only becomes the aesthetic of the complex but allows for shading and maximum airflow to cool the building. As the airport would accommodate 100 million passengers annually, Priority was given to minimize walking distances through its compact design. The complex displays cultural artefacts thus linking the terminal to the beliefs and traditions of the country.

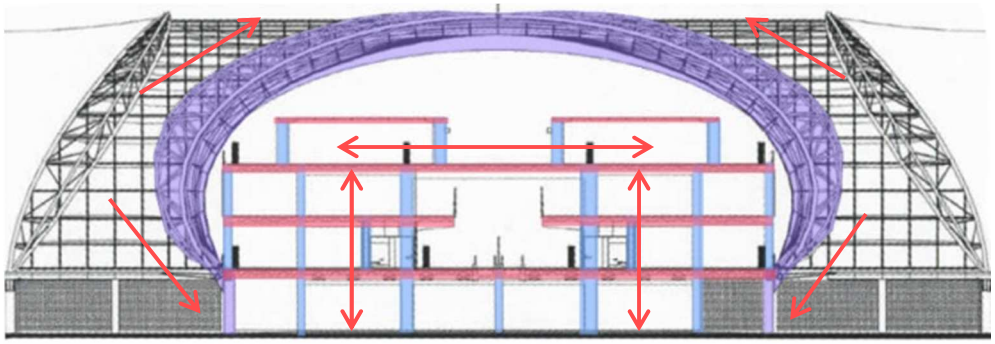


Figure 00. (2015)



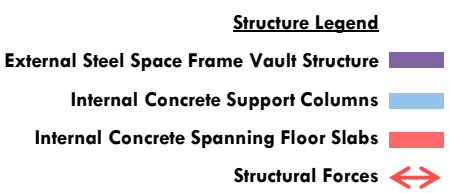


Figure 99. Structural principles for the design of the Bangkok airport. (2015)

Precedent Relevance

The relevance of this precedent lies in the structural systems it has incorporated which could be applied in the design of the motorsport centre. Firstly, the use of steel, glass and tensile fabric has allowed the architect to create an exterior lightweight structure that forms the overall elegant exterior of the building. Secondly, the seven storey floor plates are constructed independent of its external structure and are supported on long span concrete columns. This allows for the upper-most parts of the floor slabs to be free of any structural members creating an overall fluid and airy space enhanced by the long spanning concrete columns. Furthermore, as the external structural façade becomes the dominant structure of the building, the individual's vision is diverted from the concrete columns emphasising the openness of the terminal space. The architect has ingeniously designed a structural modular system which further allows the structure to be replicable and extended if necessary.



Figure 100. Rear perspective of the Catalunya circuit's main grandstand exhibiting its aerodynamic form. (2015)

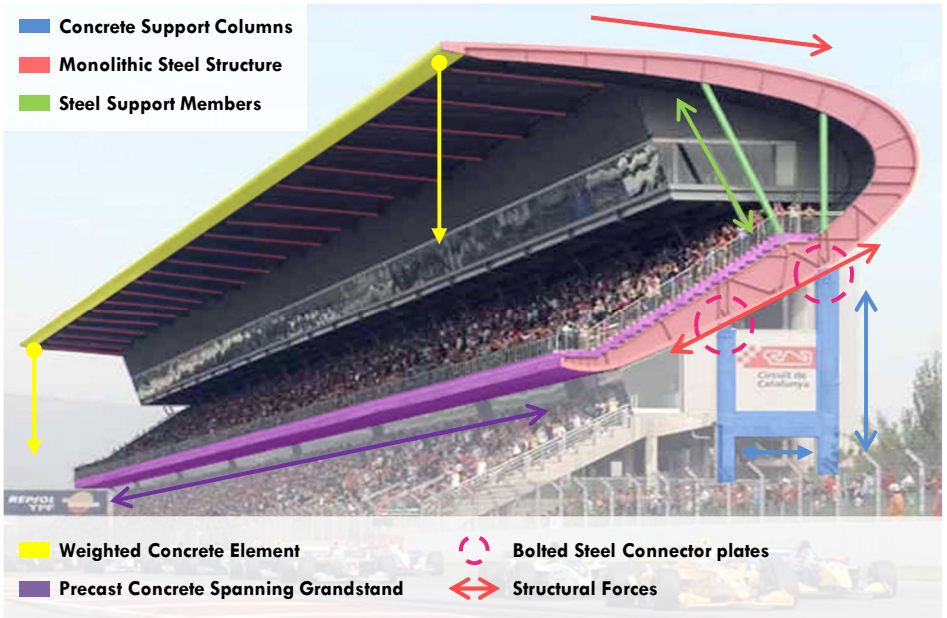


Figure 101. Structural principles of the Catalunya circuit's main grandstand. (2015)

Project: Circuit de Barcelona-Catalunya Main Grandstands
Location: Barcelona_ Spain
Completed: 1991

Description

The main grandstand of the Catalunya circuit is positioned directly opposite the pit complex and offers a spectacular view of the start/Finish line. Apart from the other spectator stands located throughout the race track, the main grandstand is shaded from the rain and sun adding to a better spectator experience. It is the most popular seating area as all the race drama including pre-race build up and post-race podium ceremony

Precedent Relevance

Of considerable relevance is the design of the grandstand structure. The top tier of the grandstand is constructed of a monolithic steel structure that not only offers support to the precast concrete stands but acts as a tension member for the roof structure aided by the slim steel support members. This structure is further held up by robust concrete columns connected to it through bolted steel connector plates. The roof edge of the structure has been designed as an elegant aerofoil finish but also acts as a weighted element against the upward wind forces in order to keep the structure in place. The grandstand is built of interlocking precast concrete members that span the main steel structural sections.

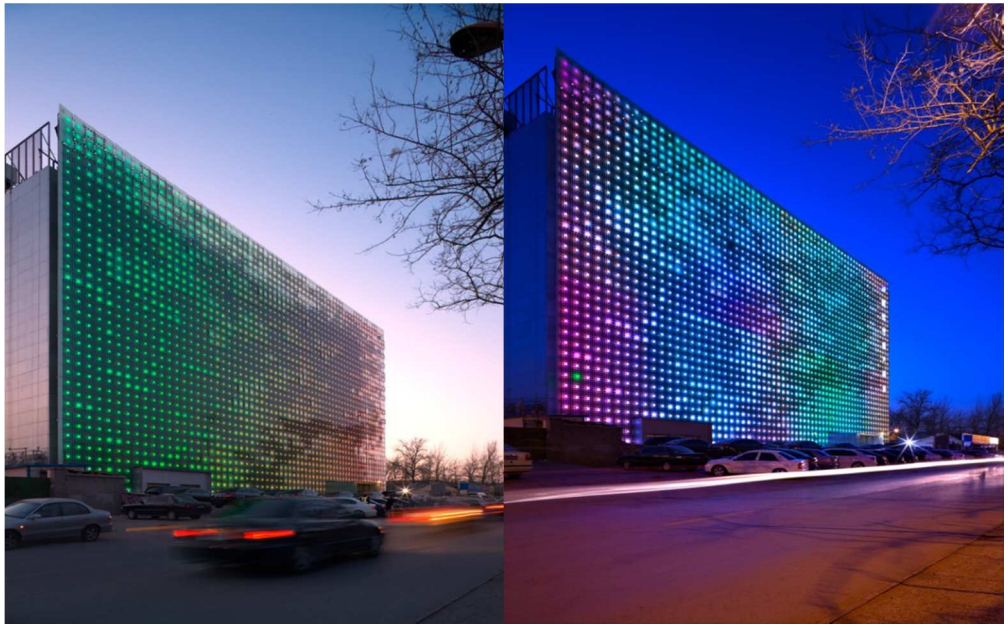


Figure 102. Perspective of the Greenpix: Zero Energy Media Wall displaying the work of the digital artist. (2015)



Figure 103. Construction of the Solar LED panels of the Greenpix: Zero Energy Media Wall. (2015)

Project: Greenpix: Zero Energy Media Wall
Location: Beijing, China
Architect: Simone Giostra and Partners/ARUP
Completed: 2008
Size: 2 000 m² Façade

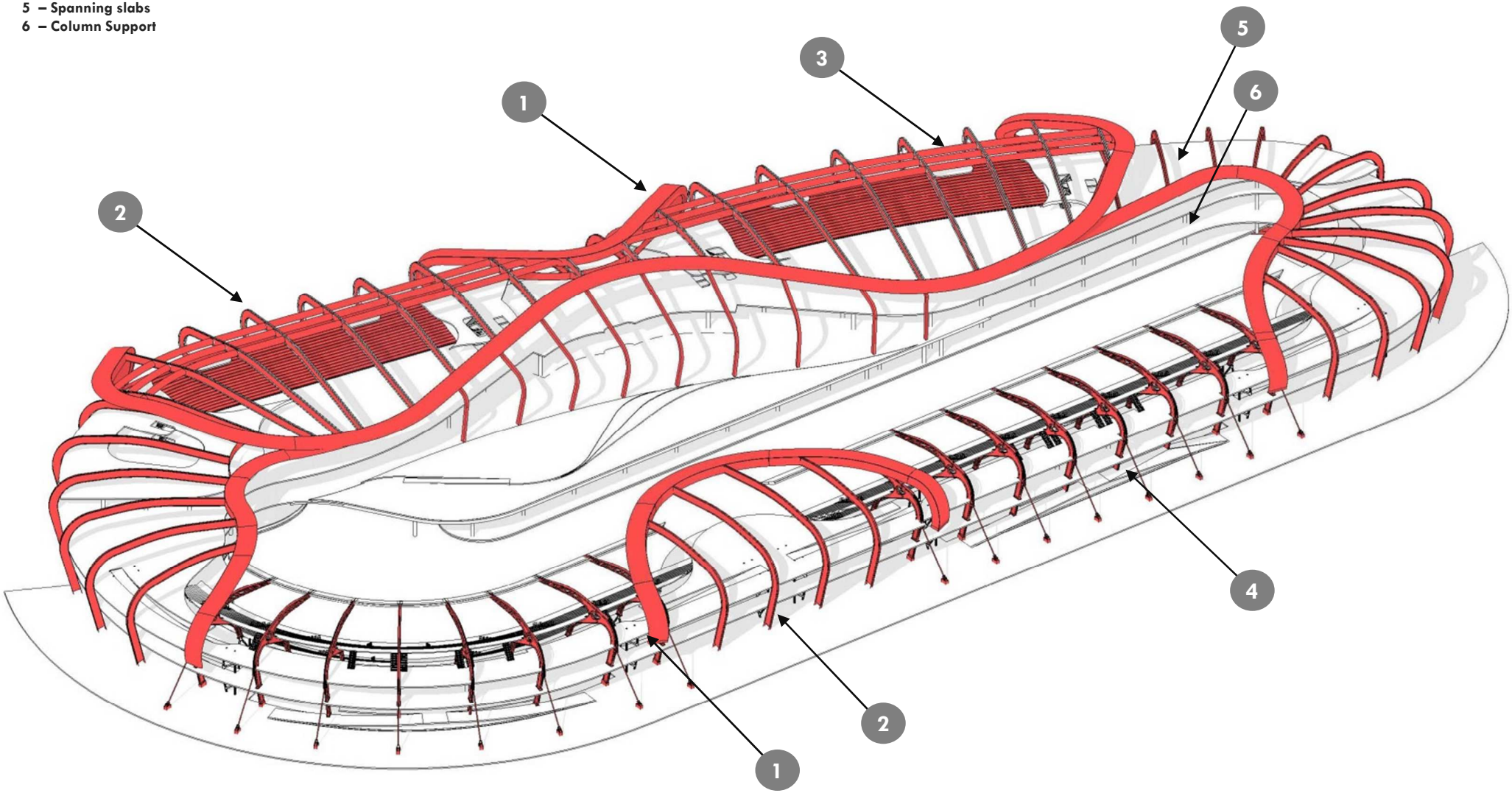
Description

The project consists of an LED and photovoltaic digital screen that forms part of the glass curtain wall of the Xicui Entertainment Centre. This digital screen stores sunlight energy produced by the photovoltaic cells during the day and used to light the screen from dusk by means of the LEDs. The screen interacts with both the exterior and interior of the building and turns the façade into a responsive environment for public engagement and entertainment.

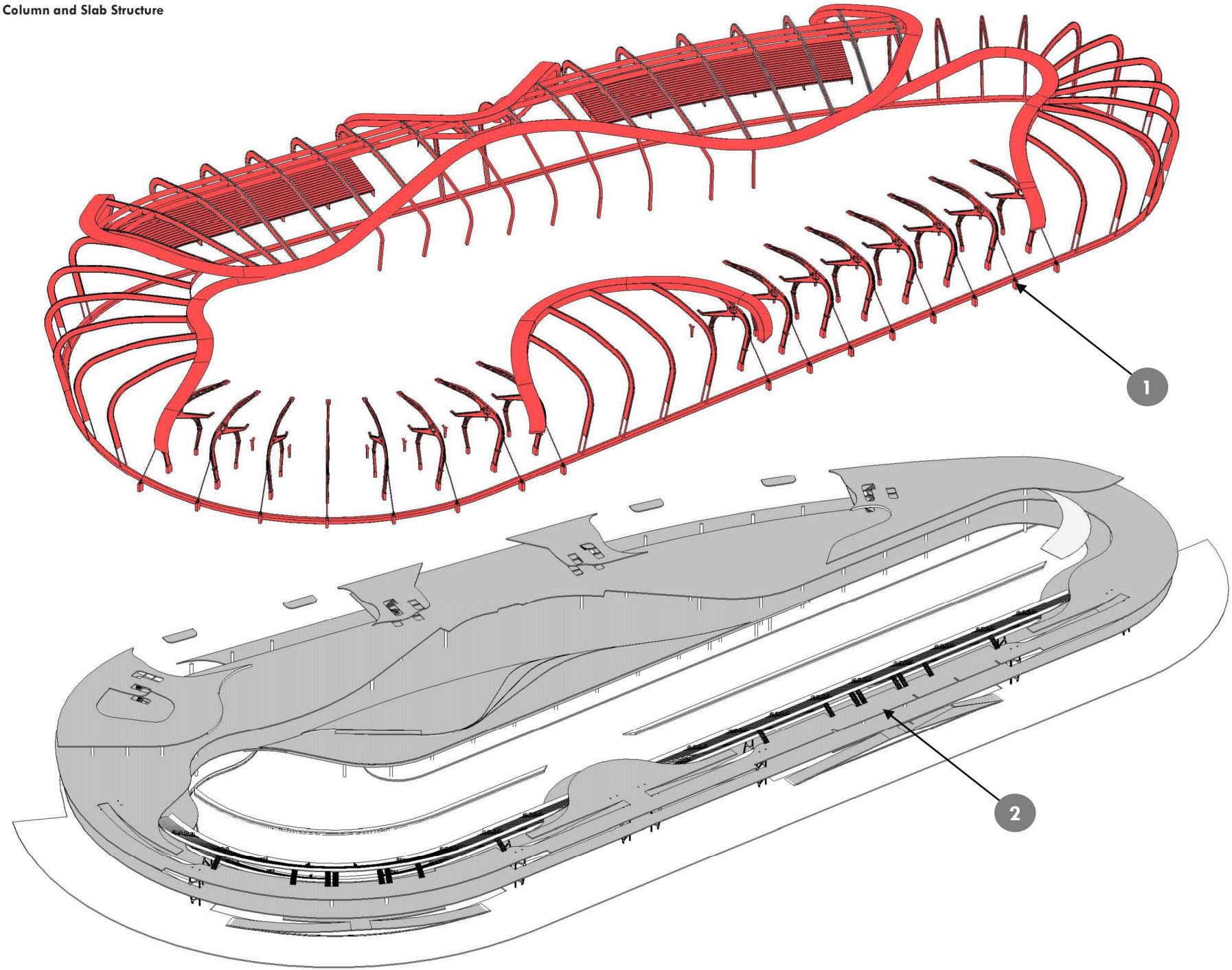
Precedent Relevance

This technology is of significant relevance in several ways. Firstly, it could be implemented on parts of the motorsport centre façade to advertise and promote local motorsport and provide the funding sponsors the necessary advertising exposure in return. This way it can engage with the public and stimulate their interest in the sport. Secondly, as it produces twice the amount of energy required to power the LED screen, half the solar energy generated could be transferred back into the Leeuwkop grid to the needs of the correctional services department. Thirdly, by means of the density pattern, the screen would be able to control the amount of solar radiation hitting the surface of the building and will reduce any unnecessary heat gain. This will allow the building to save on heating and cooling as well as energy costs.

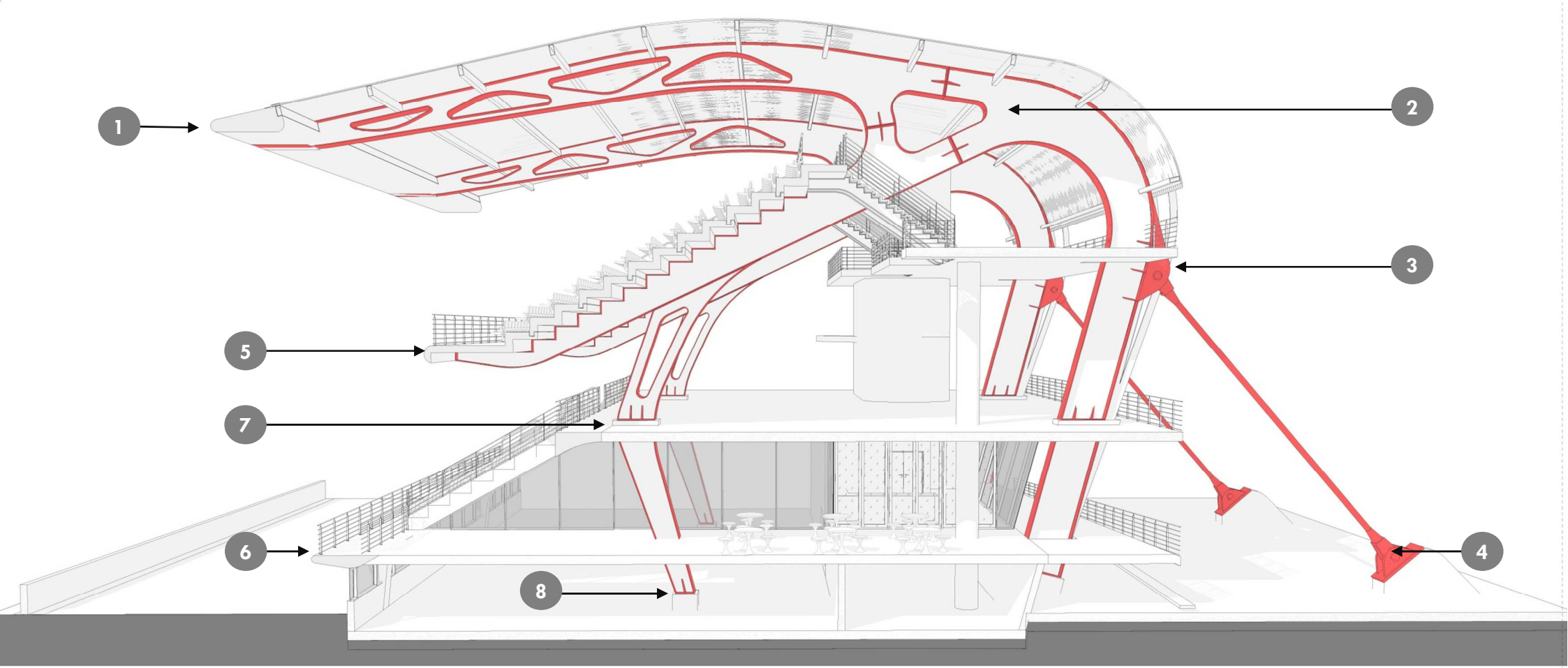
1 – Binding and weighted structural member
2 – Vault Structural members
3 – Support structure tubes spanning between structural cores for overall structural support.
4 – Unified grandstand structural members
5 – Spanning slabs
6 – Column Support



1 – Outer Vault Structure
2 – Inner Column and Slab Structure



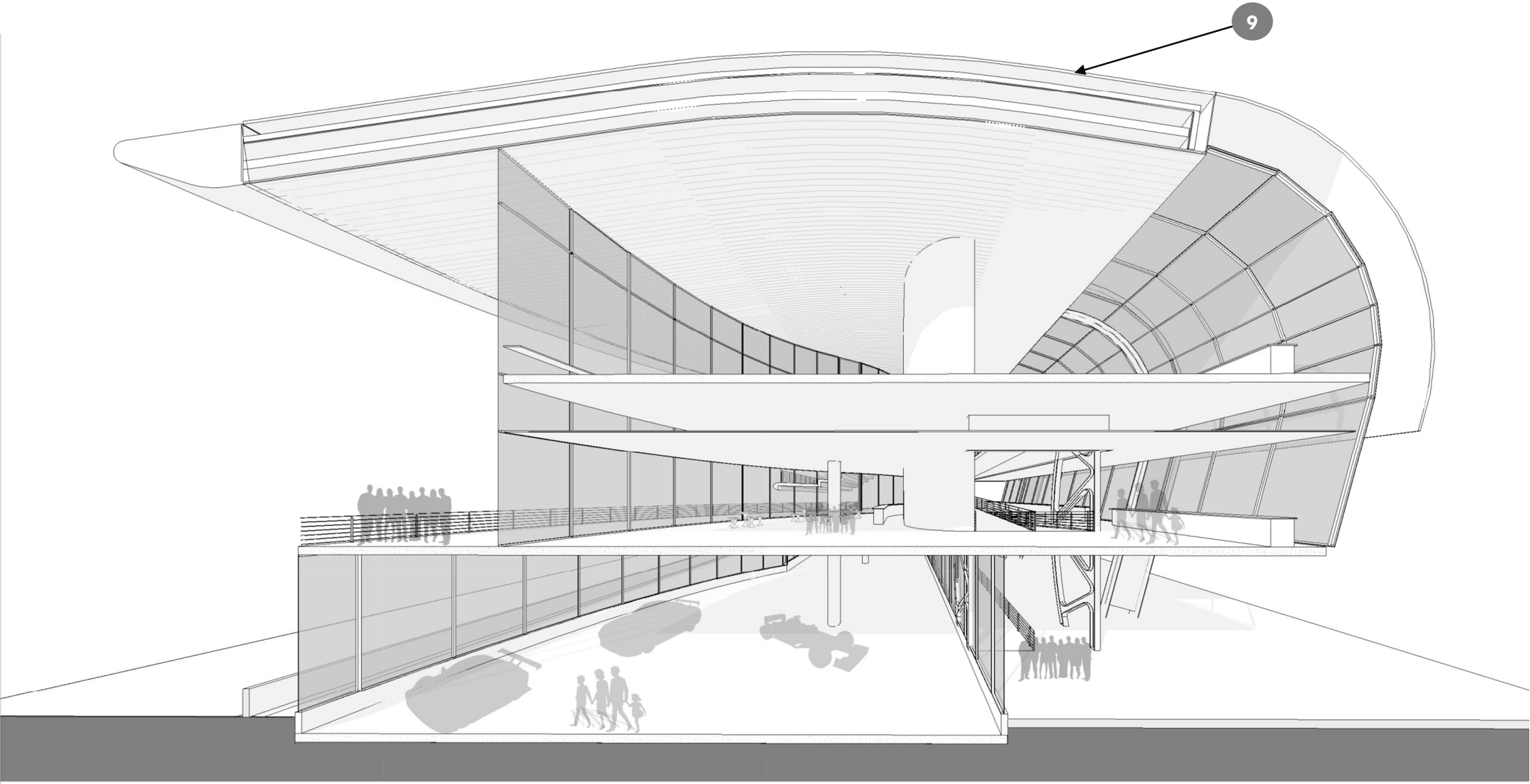
Detail 1 – Grandstand Roof Edge Weighted Element
Detail 2 – Main Structural Member Connections
Detail 3 – Tension Structure Top Connection
Detail 4 – Tension Structure Base Connection
Detail 5 – Precast Grandstand
Detail 6 – Cast-in Grandstands
Detail 7 – Main Structural Member to Slab Connection
Detail 8 – Main Structural Member to Base Connection



Grandstand Perspective Section

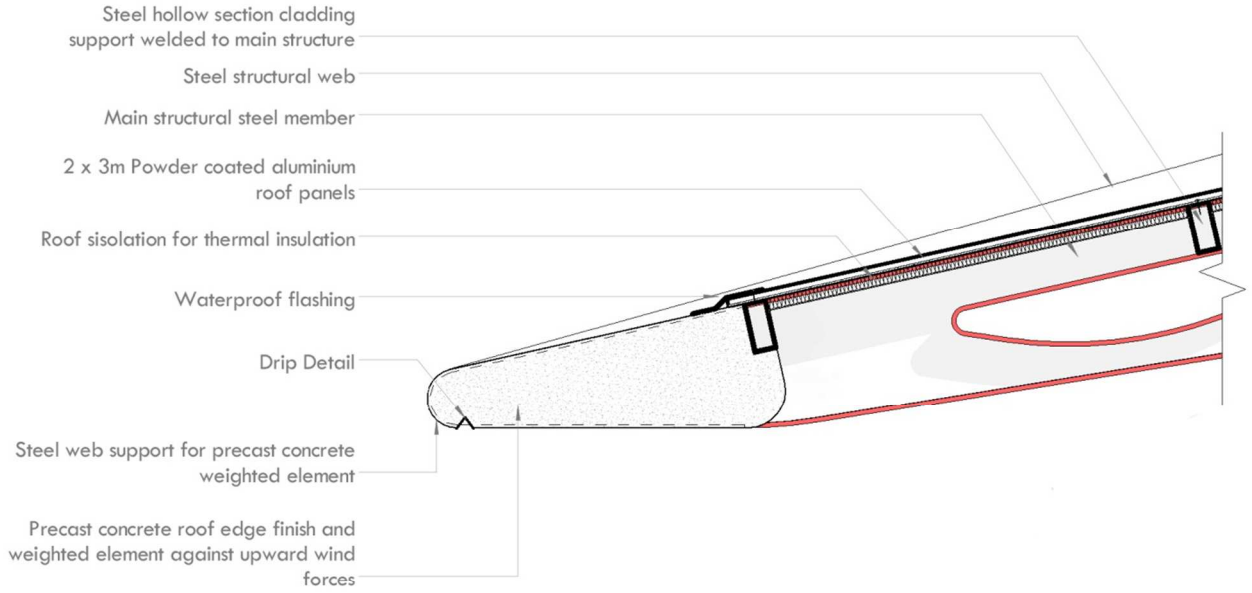
4 0 4 8 m

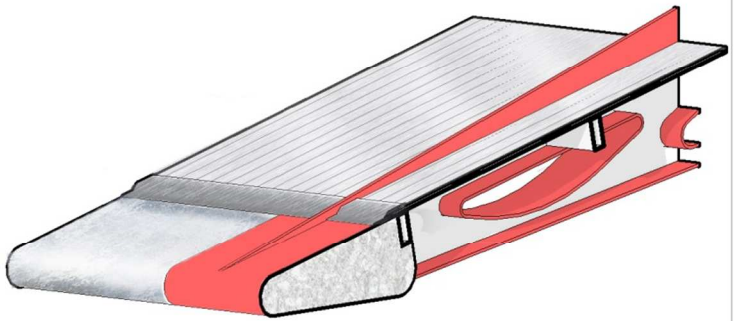
Detail 9 – Digital Roof Solar LED Screen



Spectator Zone Perspective Section

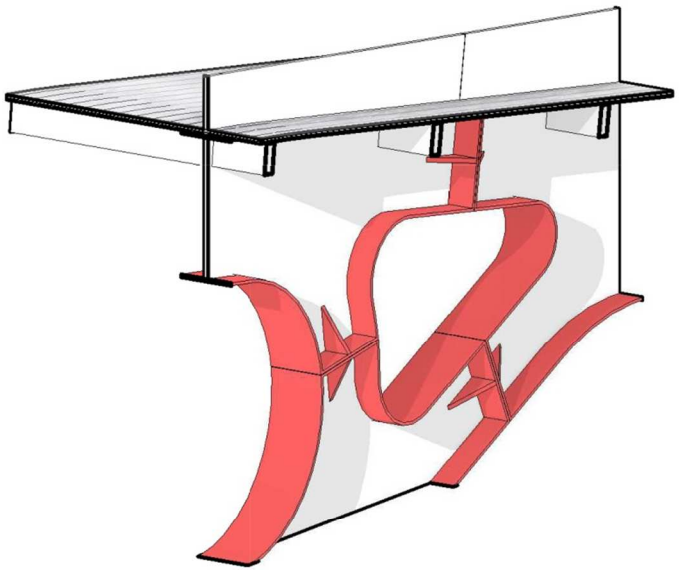
4 0 4 8 m



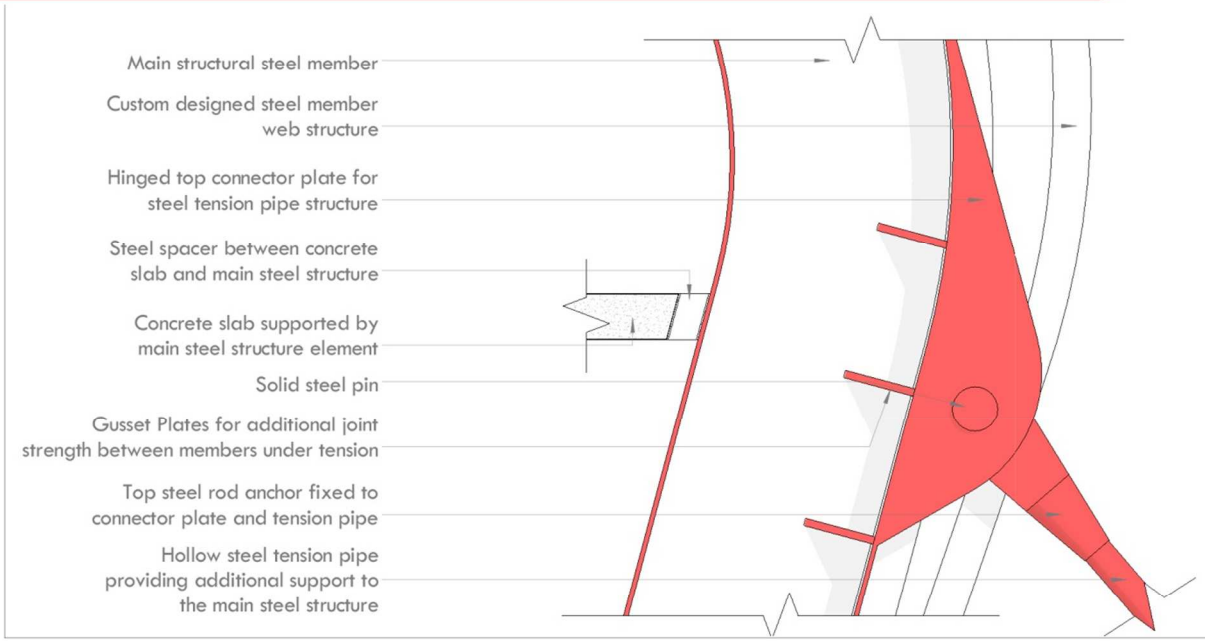


Detail 1 **Scale 1 : 50**

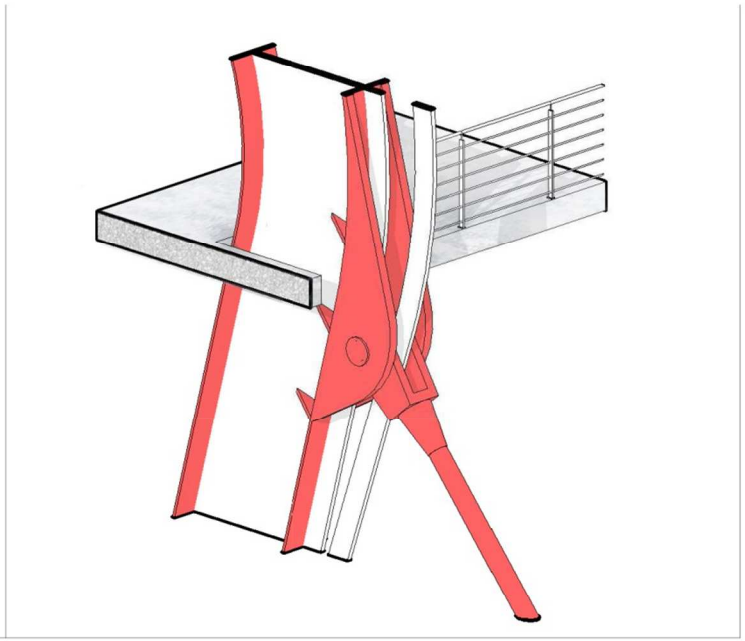




Detail 2 **Scale 1 : 50**



Detail 3



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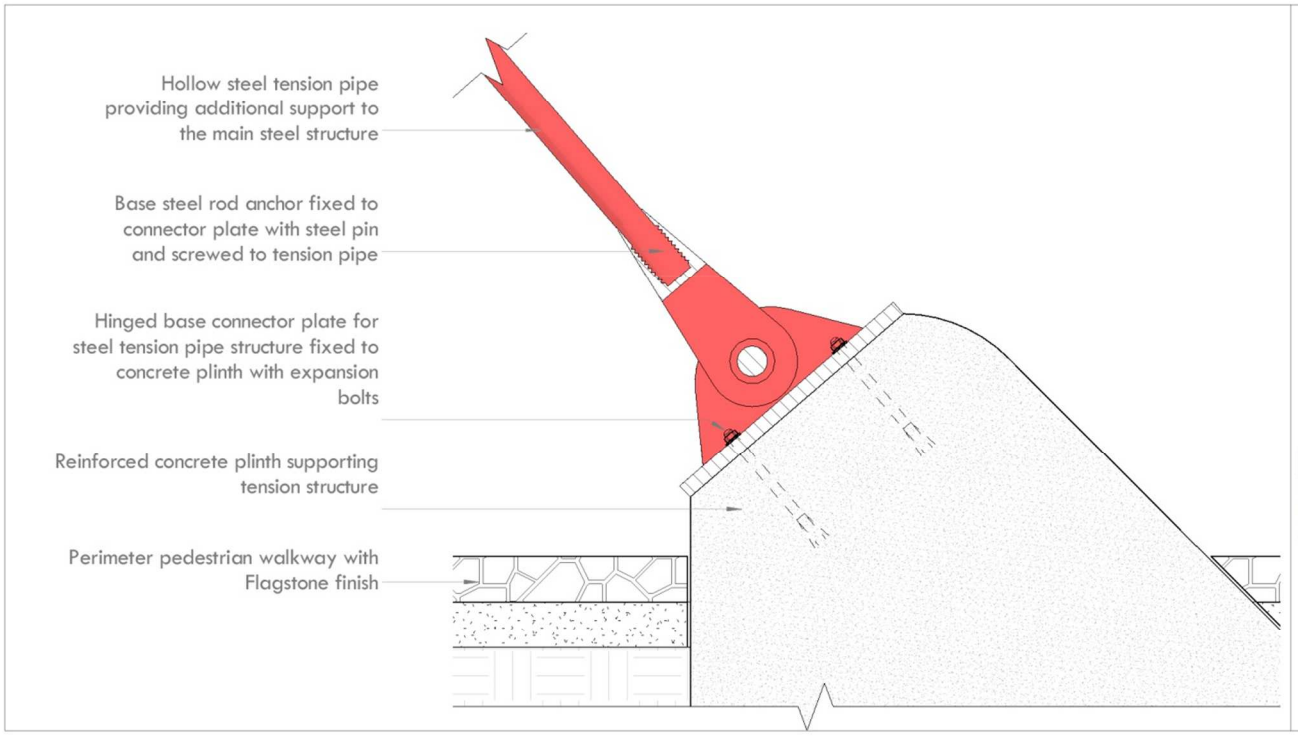
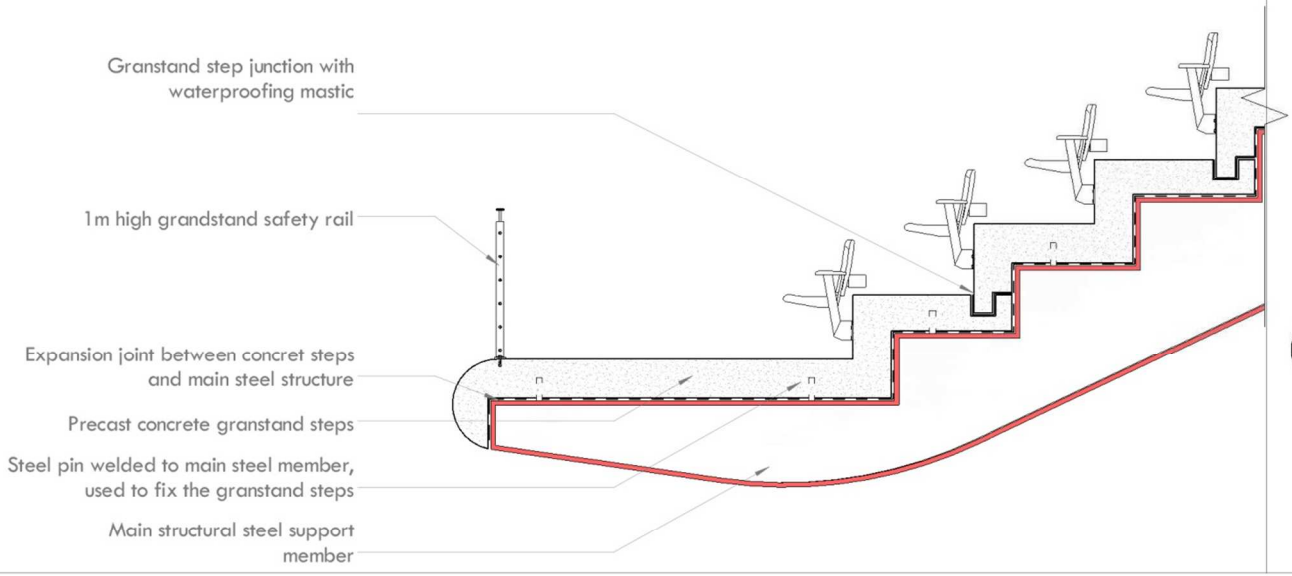
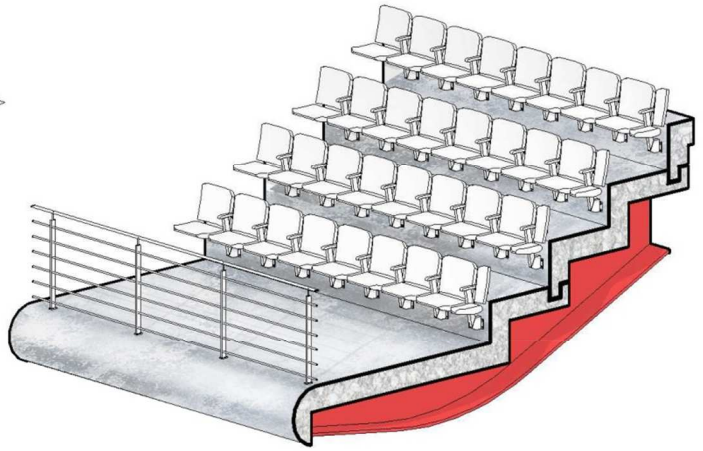


Detail 4

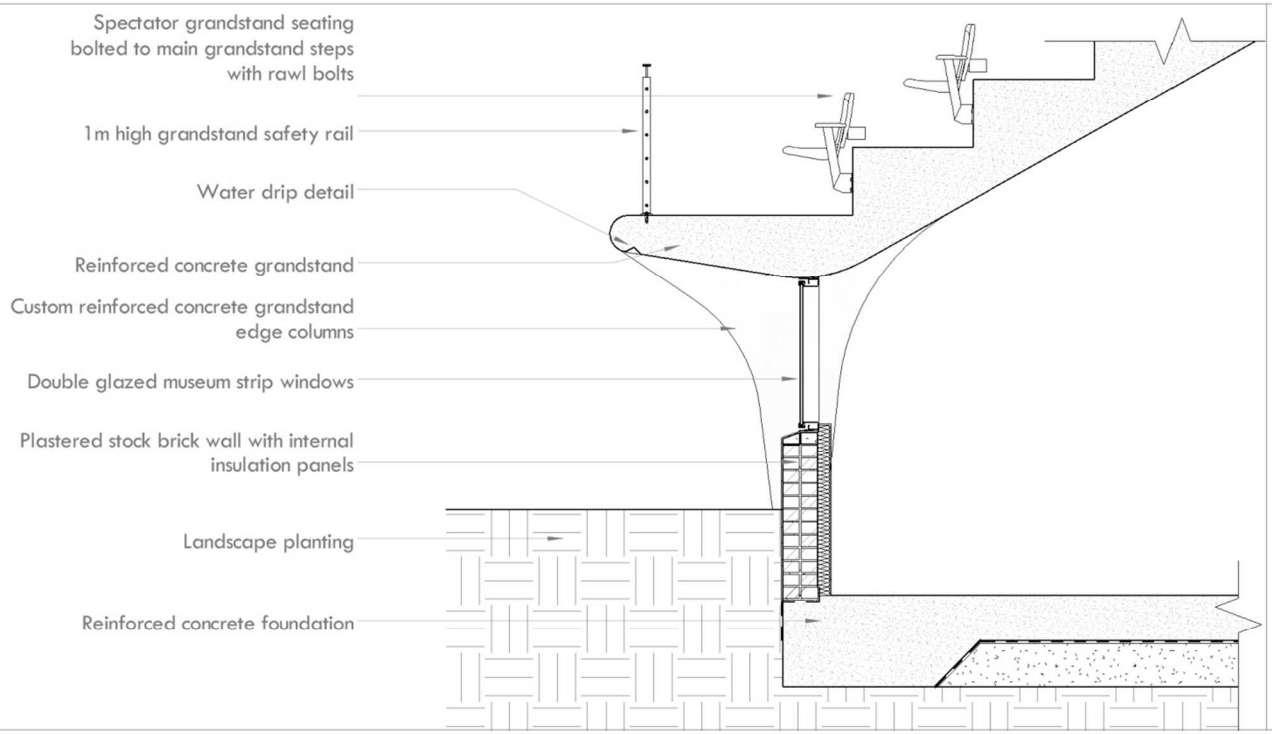


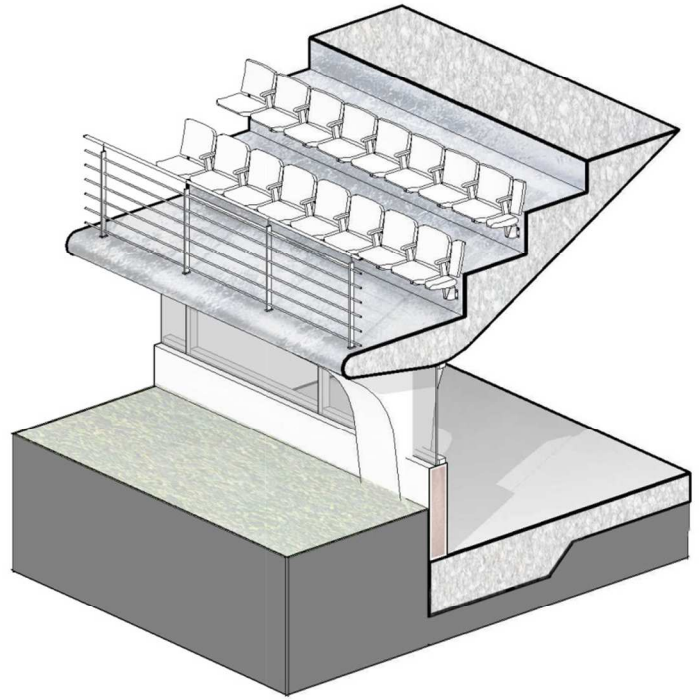
Scale 1 : 50



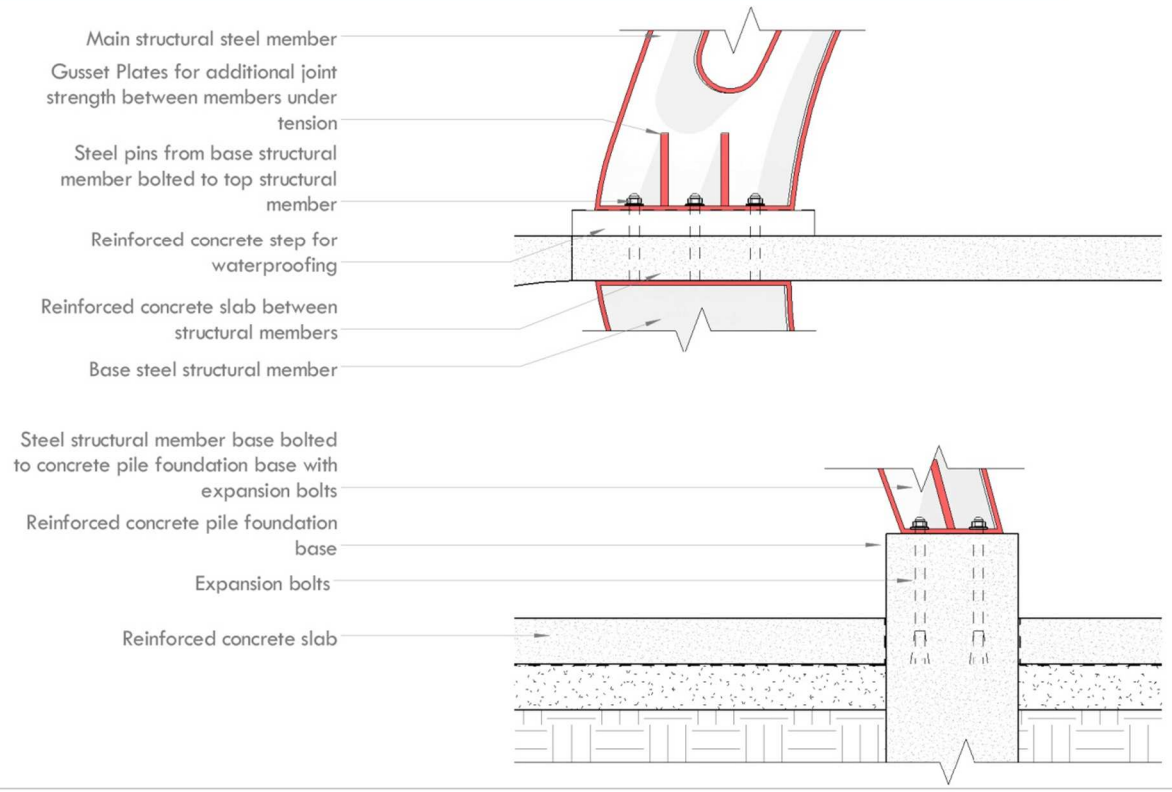


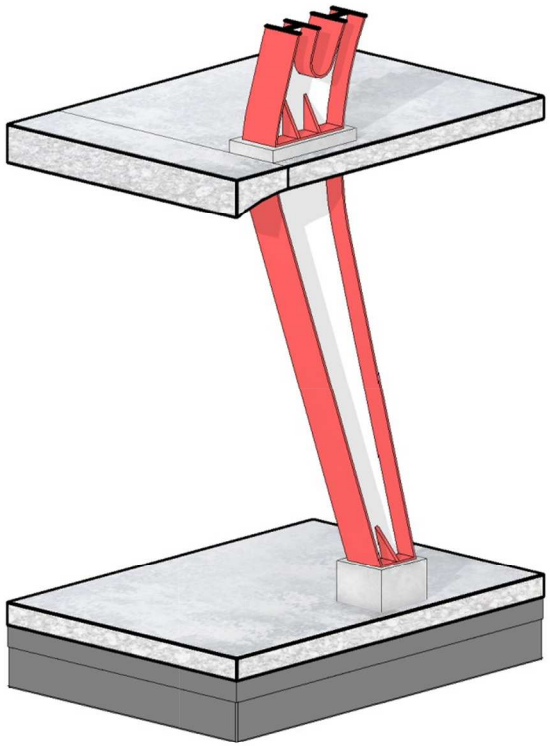
Detail 5 **Scale 1 : 50**



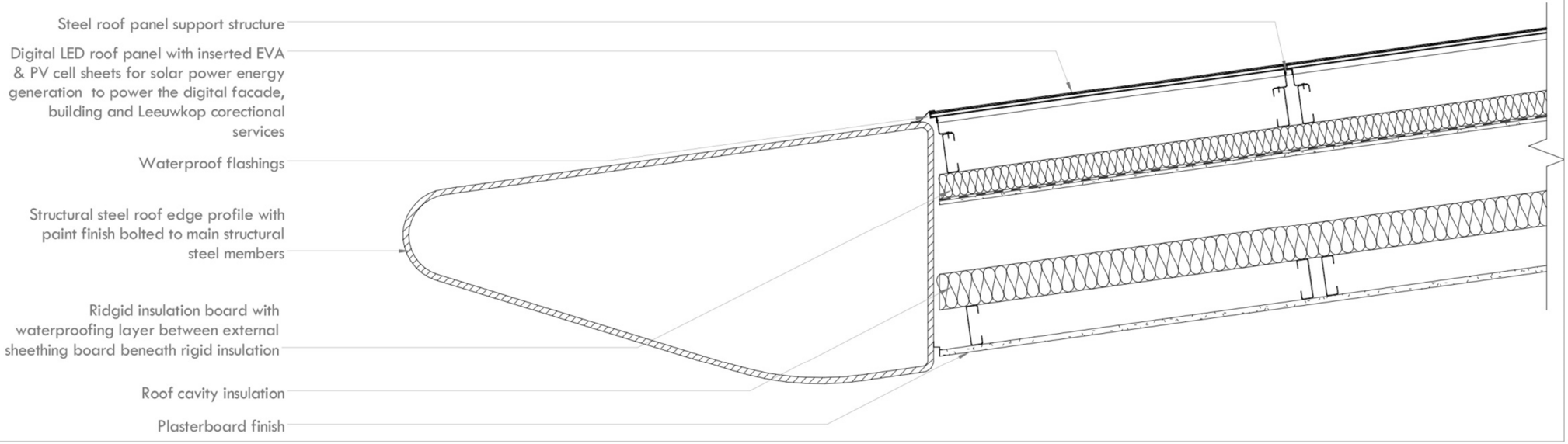


Detail 6 **Scale 1 : 50**

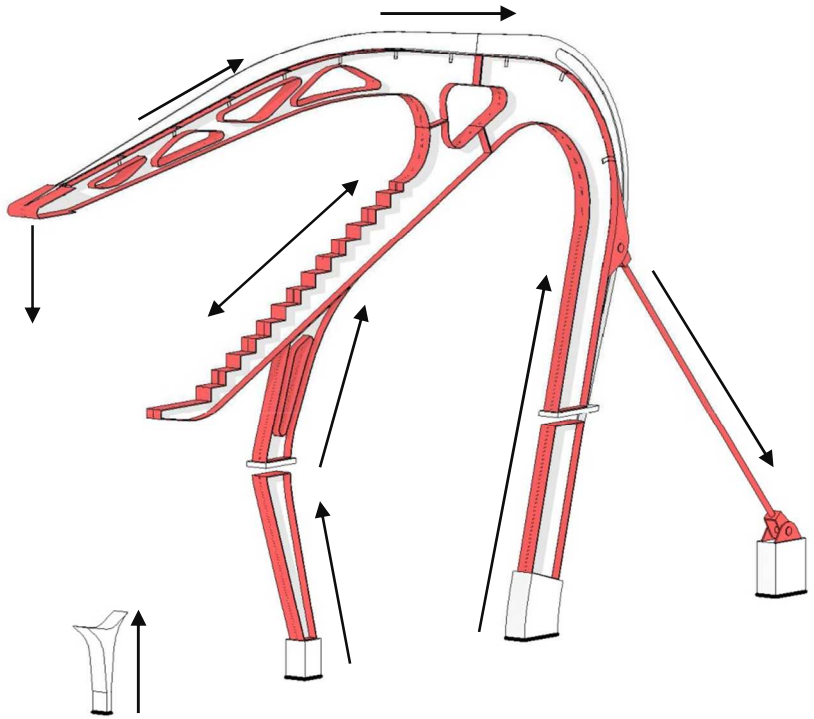




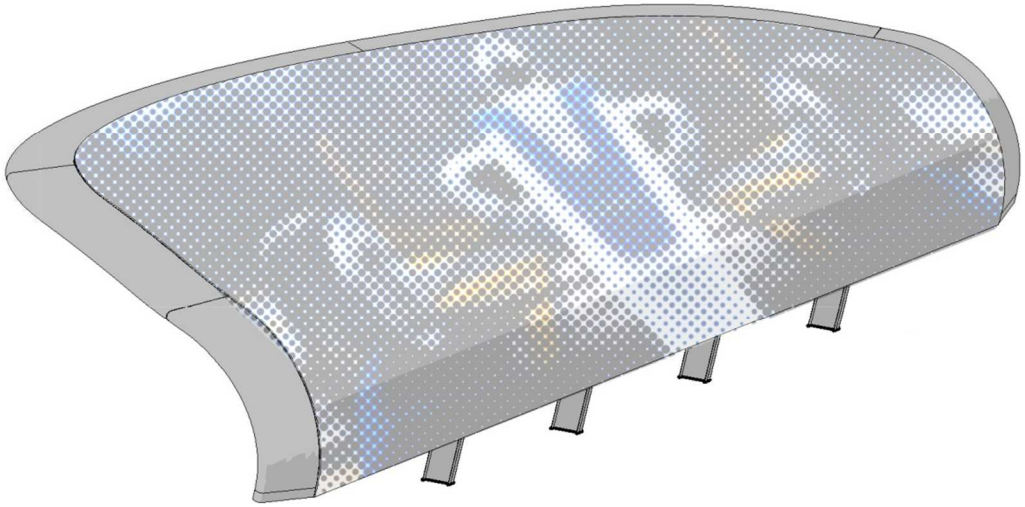
Detail 7 & 8 **Scale 1 : 50**



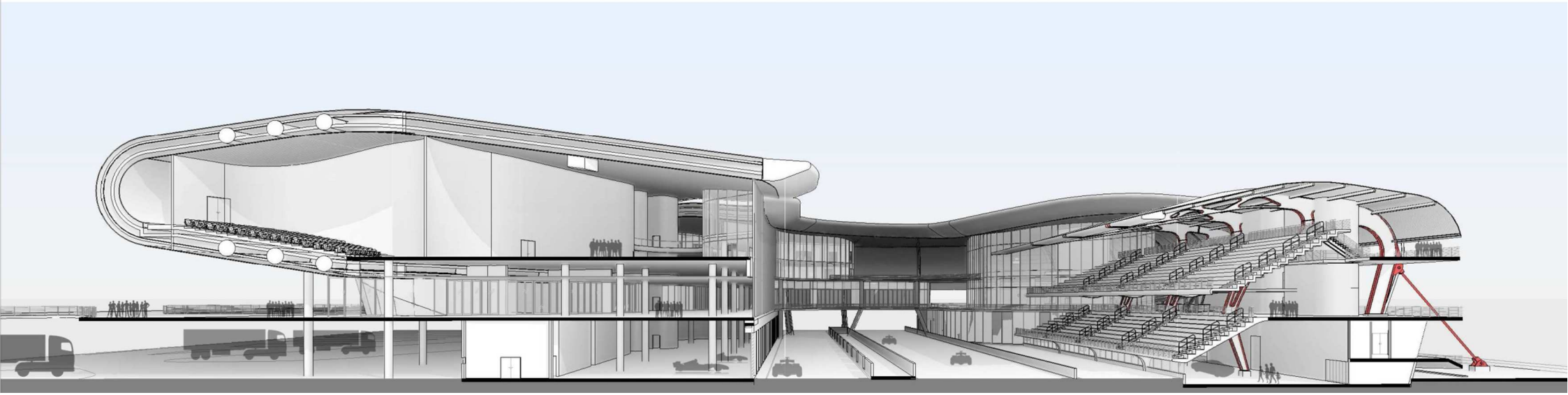
Detail 9 **Scale 1 : 50**



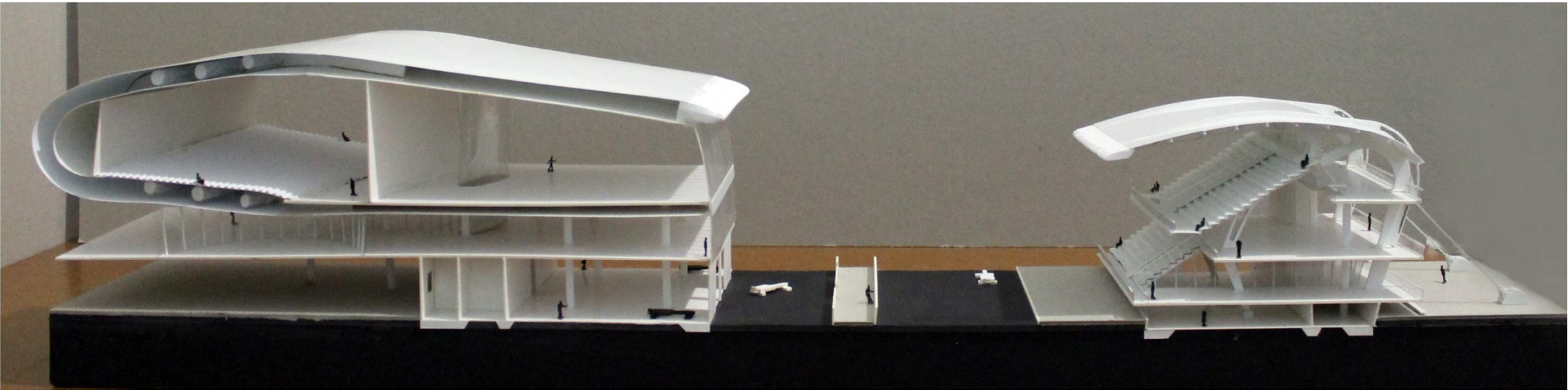
Grandstand Structural Element Forces Diagram

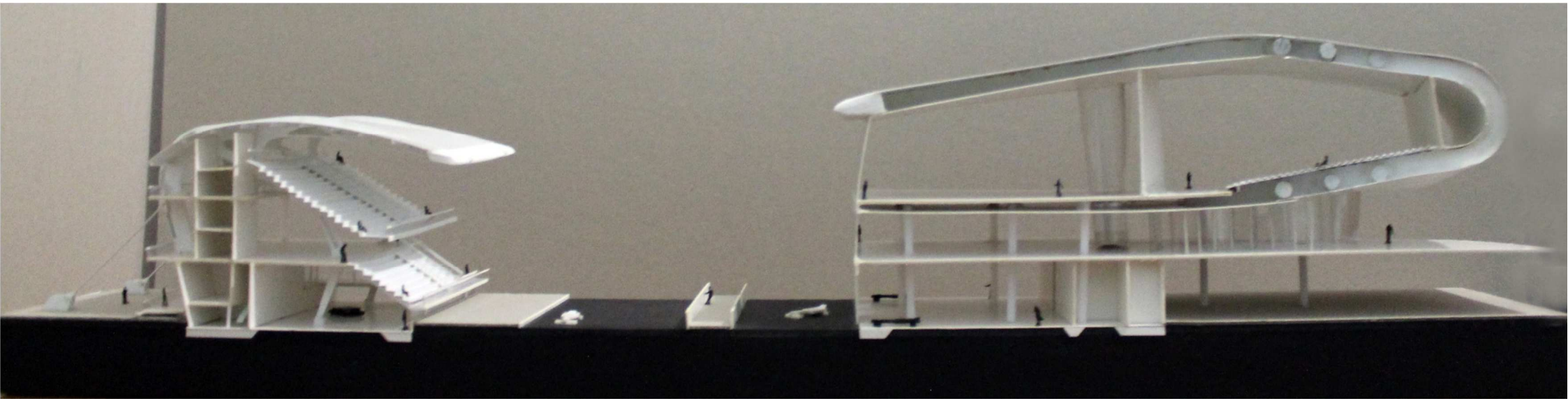


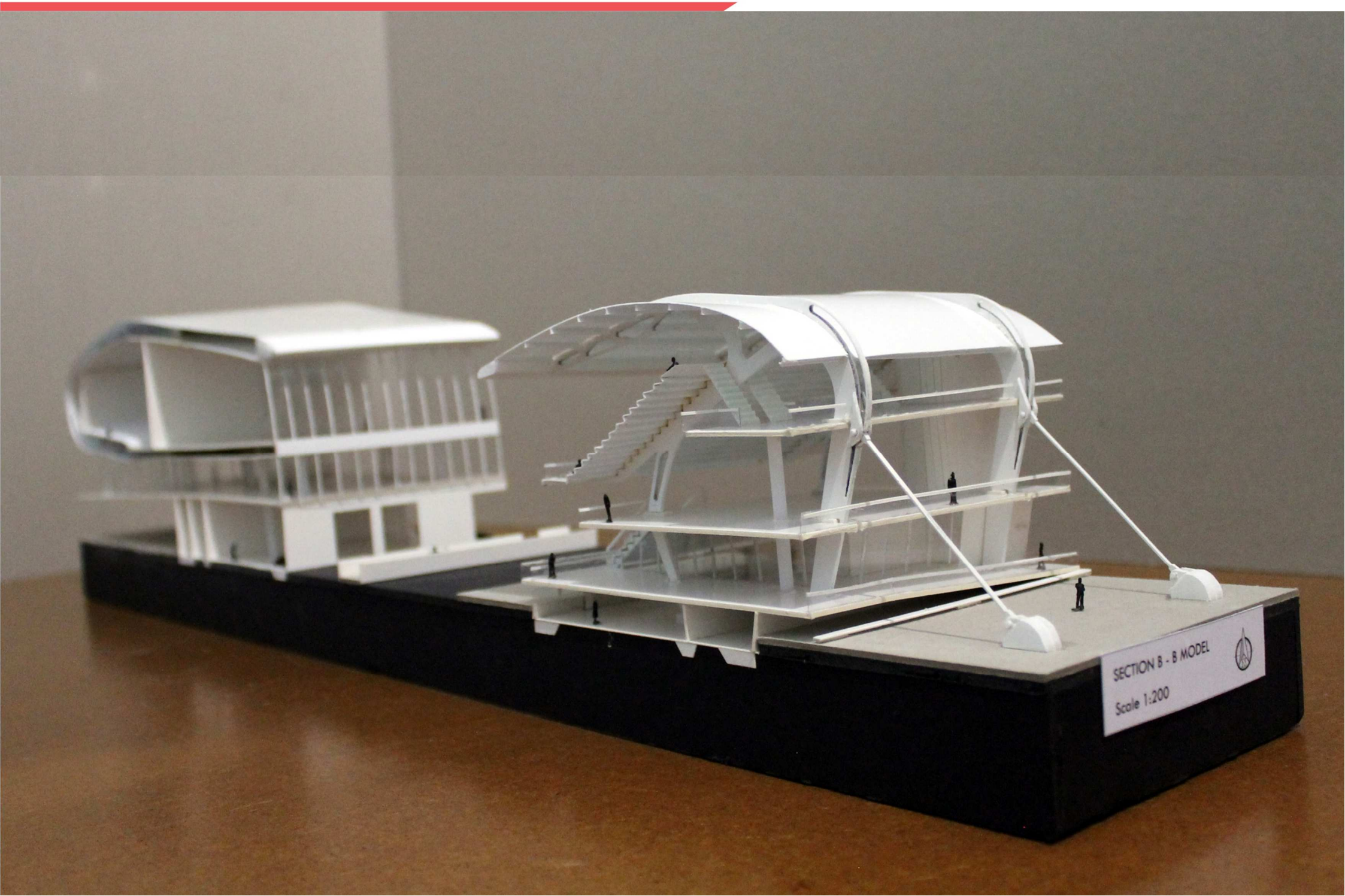
Digital Roof Solar LED Screen

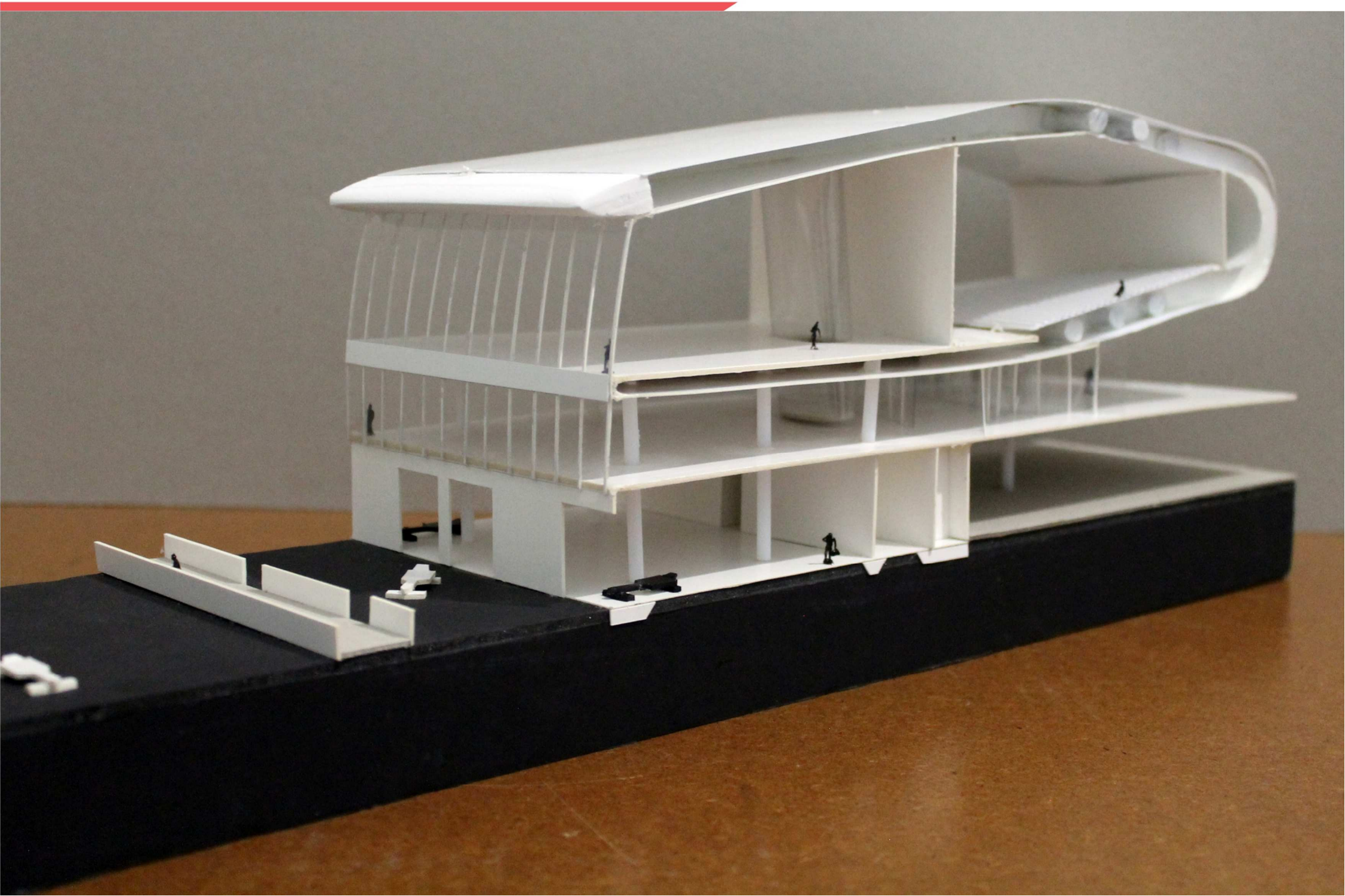


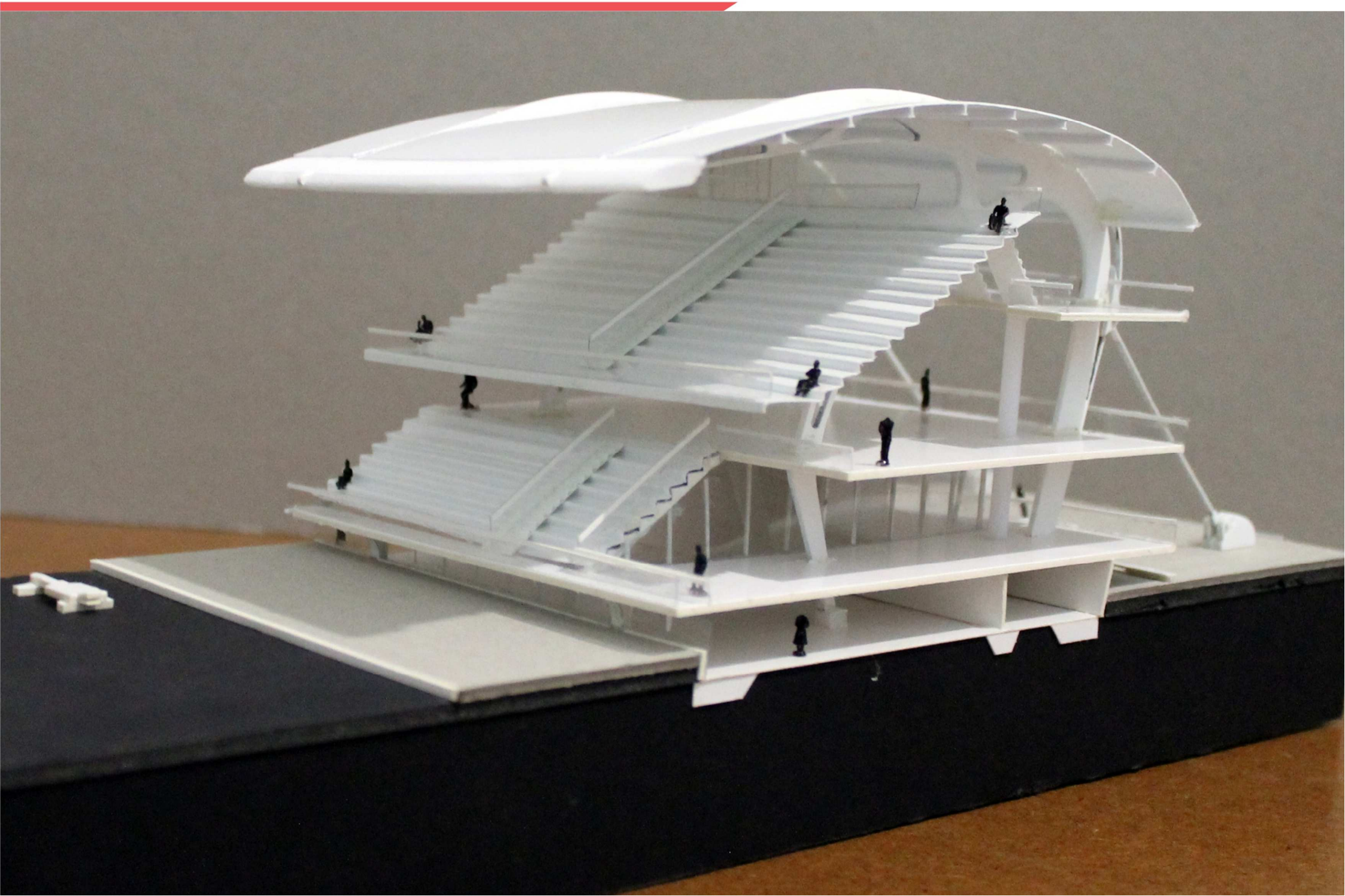
Overall Structure Perspective Section






SECTION B - B MODEL
Scale 1:200





The facility for the upliftment and promotion of motorsport emerged from the need to preserve and re-establish the long-standing motor racing culture in South Africa that the fans, young talented drivers and motorsport members are so passionate about. The aim is to re-establish South Africa on the international motor racing calendar, uplift the automobile industry, promote the nation's young talented drivers, unite the country with the rest of global motorsport culture and promote tourism by means of the motorsport events it will host. It is envisaged that this facility will address the needs of a dying interest in motorsport and get the nation more involved in a historical pastime that provides sheer entertainment to many people around the world.

Figure 01. Race car light streams captured during the 24 Hours Le Mans, world's greatest motor race event. [online image] Available at: http://www.speedcafe.com/2015/06/14/gallery-night-time-at-le-mans-24-hours/ [2015].

Figure 02. World's first official race event held in France. Image captured by the press. [online image] Available at: http://www.teara.govt.nz/en/photograph/39903/first-stand-alone-motor-race-1905 [2015].

Figure 03. First official race event held at the Brooklands race track in America in 1909. [online image] Available at: http://luiscezar.blogspot.co.za/2006/07/surgimento-e-desemvolvimento-de-um.html [2015].

Figure 04. Motor racing technological contributions to automobile (Left - economic BMW i8 automobile) and aviation technology (Right - BMW aeroplane propeller engine). [online image] Available at: http://www.kipchatov.ru/blog/?p=1174&cpage=1 (Aeroplane) [2015].

Figure 05. Costly technologically advanced Formula 1 Petronas racing car. [online image] Available at: http://www.Formula1.com [2015].

Figure 06. Costly race car and driver gear required by FIA. [online image] Available at: http://www.Formula1.com [2015].

Figure 07. Red Bull Formula 1 racing car fully decorated by sponsor logos to cover for racing costs. [online image] Available at: http://www.Formula1.com [2015].

Figure 08. First South African race cars, raced on the Cape Town and East London circuits. Loubser, A. (2011)

Figure 09. First South African Grand Prix at the East London's Marine Drive circuit in 1934. Loubser, A. (2011)

Figure 10. Start of the sixth South African Grand Prix. Loubser, A. (2011)

Figure 11. Last Grand Prix hosted at East London's Marine Drive circuit before its relocation to Kyalami. Loubser, A. (2011)

Figure 12. Formula 1 podium celebration at the Monza circuit in Italy, uniting fans from around the world. [online image] Available at: http://www.Formula1.com [2015].

Figure 13. Valentino Rossi - Moto GP. [online image] Available at: http://www.webbikeworld.com/books/valentino-rossi-photographs.htm [2015].

Figure 14. Lewis Hamilton – Formula 1. [online image] Available at: http://www.Formula1.com [2015].

Figure 15. 24 Hours Le Mans Nissan technical team. [online image] Available at: http://www.speedcafe.com/2015/06/14/gallery-night-time-at-le-mans-24-hours/ [2015].

Figure 16. Nissan mechanical team. [online image] Available at: http://www.speedcafe.com/2015/06/14/gallery-night-time-at-le-mans-24-hours/ [2015].

Figure 17. Renowned Moto GP rider Valentino Rossi's close friendship with his technical team members. [online image] Available at: http://www.webbikeworld.com/books/valentino-rossi-photographs.htm [2015].

Figure 18. Renowned factory-backed sponsors for most motorsport racing categories. (2015)

Figure 19. Passionate fans from around the world cheering for Moto GP hero, Valentino Rossi. [online image] Available at: http://www.webbikeworld.com/books/valentino-rossi-photographs.htm [2015].

Figure 20. Valentino Rossi demonstrating his gratitude to his close fans. [online image] Available at: http://www.webbikeworld.com/books/valentino-rossi-photographs.htm [2015].

Figure 21. 150 000 spectators gathered at the Kyalami race track, as it used to be up until 1993. Loubser, A. (2011)

Figure 22. Empty spectator grandstands in the background during major regional Kyalami race event. (2015)

Figure 23. 1979 Formula 1 SA champion Jody Scheckter. Loubser, A. (2011)

Figure 24. Beginning of Jody's career in Formula Ford, a national race event still taking place today. (2015)

Figure 25. A1 Grand Prix at Kyalami before it folded in 2009 due to poor management and funding. [online image] Available at: http://www.motorsport.com/a1gp/photo/main-gallery/zahir-ali-driver-of-a1-team-27/?&i=690&id=792593&sz=8&s=-6/ [2015].

Figure 26. Lack of sponsor logos on race cars leaves young national drivers with littlie financial support. (2015)

Figure 27. Local young talented drivers trying to make a motorsport career from national race events. (2015)

Figure 28. The great need to develop the nations young, passionate and talented drivers. (2015)

Figure 29. Traditional Ndebele patterns painted by South African artist Esther Mahlangu. BMW. (2002)

Figure 30. 5 Series BMW painted in traditional Ndebele patterns by Esther Mahlangu. BMW. (2002)

Figure 31. Map of the Las Vegas strip planned around the automobile. VENTURI. R. (1997)

Figure 32. Los Angeles interchange demonstrates the Influence of the automobile on the urban fabric. [online image] Available at: https://jbkan.wordpress.com/2013/06/24/conditions-los-angeles-mega-infrastructure-and-transit/ [2015].

Figure 33. Las Vegas architecture as the advertisement and attraction for drivers passing through the strip. VENTURI. R. (1997)

Figure 34. The Lingotto Fiat Factory roof test track (used to develop fabricated cars), is a demonstration of the vast contributions of architecture in the development of the automobile. [online image] Available at: http://verte8.rssing.com/chan-8222787/all_p2.html [2015].

Figure 35. The BMW building in Munich is a demonstration of the influence of the automobile in producing architecture that is expressive of mobility. [online image] Available at: http://www.pension-hostel-muenchen.de/sehenswuerdigkeiten/bmw-welt-muenchen/ [2015].

Figure 36. Through Mollino's work one can observe the influence of his race car streamlines(Left) on the fluid design of the internals spaces of his building floor plans(Right) orientated around the automobile. BRINO. G. (2005)

Figure 37. Norberg-Schulz (1975) defines architecture as the "concretization of existential space" and is created in its function to accommodate for the needs of a culture. [online image] Available at: http://sandraespinet.com/wordpress/2012/05/28/iconic-city-architecture/ [2015].

Figure 38. South African motor racing in its glory days (Pictures above captured in 1985). Loubser, A. (2011)

Figure 39. Motor racing fans and drivers expressing their relief and excitement as the Kyalami race track is preserved and refurbished for its true purpose – The racing. [online image] Available at: https://www.facebook.com/TheKyalamiGrandPrixCircuit [2015].

Figure 40. The Kyalami race track was famous for its longest straight were drivers topped high speeds. Loubser, A. (2011)

Figure 41. The establishment of the Kyalami node as explained by the group form linkage theory. TRANCIK. R. (1986)

Figure 42. The opening of the Kyalami race track in 1961 with the Nine Hour endurance race. Loubser, A. (2011)

Figure 43. The Kyalami race track before upgrades commenced in mid-2015. Kyalami Management (2015)

Figure 44. The first Kyalami race track from 1961 – 1987. (2015)

Figure 45. The Kyalami race track rebuilt for national motor racing form 1988 - 1991. (2015

Figure 46. The Kyalami race track changed to accommodate other international events from 1994 – 2008. (2015)

Figure 47. The Kyalami race track addition and removal of the chicane 1992 – 1993, 2009 – mid 2015. (2015)

Figure 48. Aerial photograph of the upgrades that are taking place on the Kyalami race track. Kyalami Management (2015)

Figure 49. Rendering of the newly upgraded race track to be completed at the end of 2015. Kyalami Management (2015)

Figure 50. New layout of the Kyalami race track to be expected by the end of 2015, featuring a longer straight, new vehicular underpass, wider corner at The Crocodile and extended Crowthorne corner. Kyalami Management (2015)

Figure 51. New vehicular underpass for ease of accessibility to parking facilities. Kyalami Management (2015)

Figure 52. "Bommas" (Hospitality suits) that are being demolished for new spectator facilities. Kyalami Management (2015)

Figure 53. Resurfacing of the race track according to motor racing international standards. Kyalami Management (2015)

Figure 54. Upgrades to motor racing safety barriers and public security fencing. Kyalami Management (2015)

Figure 55. North perspective of the site seen from the top of the pit complex, overlooking the rest of the race track. (2015)

Figure 56. South perspective of the site seen from the top of the pit complex, overlooking existing grandstands and natural veld landscape of the Leeuwkop Correctional Facility. (2015)

Figure 57. East view of the Kyalami straight and pit complex. (2015)

Figure 58. North west view of the Kyalami race track Ingwe corner and pit complex. (2015)

Figure 59. View of the existing pit complex during a regional race day event. (2015)

Figure 60. View of the existing spectator grandstands during a regional race day event. (2015)

Figure 61. View of The Crocodiles corner(Right) leading into Cheetah turn (Left), seen from the "Bommas" that will be demolished to accommodate new spectator facilities. (2015)

Figure 62. Long straight leading from the pit complex and start/ finish line currently being extended. (2015)

Figure 63. Envisaged interior perspective of the Automotive Complex. Jodidio. P. (2011)

Figure 64. Automotive Complex overall framework. Jodidio. P. (2011)

Figure 65. Envisaged perspective of the Daytona Rising upgrade. [online image] Available at: http://www.daytonainternationalspeedway.com/Vanity-Pages/2013/Daytona-Rising/DAYTONA-RISING.aspx/ [2015].

Figure 66. Enhancement of the motorsport culture through the newly implemented facilities. [online image] Available at: http://www.daytonainternationalspeedway.com/Vanity-Pages/2013/Daytona-Rising/DAYTONA-RISING.aspx [2015].

Figure 67. Perspective of the Silverstone Wing pit complex. [online image] Available at: http://www.silverstone.co.uk/venue-track/the-silverstone-wing/ [2015].

Figure 68. Accommodation schedule according to FIA and building use requirements. [online image] Available at: http://www.silverstone.co.uk/venue-track/the-silverstone-wing/ [2015].

Figure 69. Perspective of the Olympic Sculpture Park building. [online image] Available at: http://www.e-architect.co.uk/architects/weiss-manfredi [2015].

Figure 70. Diagram of the concept for the design of the Sculpture Park. [online image] Available at: http://www.e-architect.co.uk/architects/weiss-manfredi [2015].

Figure 71. Aerial view of the proposed public platform for the Slussen node. [online image] Available at: http://www.big.dk/#projects-slu [2015].

Figure 72. Traffic plan of the various transport links running beneath the public platform. [online image] Available at: http://www.big.dk/#projects-slu [2015].

Figure 73. Highway perspective of the Mercedes Benz museum. BERKEL. B. V. (2006)

Figure 74. Modelling of the Mercedes Benz museum's internal and external form expressive of mobility. BERKEL. B. V. (2006)

Figure 75. Envisaged perspective of the upgraded facilities for the Bahrain International Circuit. Jodidio. P. (2011)

Figure 76. Modelling of the aerodynamic forms of the proposed automobile facilities. Jodidio. P. (2011)

Figure 77. Cross section of the framework emphasising its fluid relationship to the landscape. Jodidio. P. (2011)

Figure 78. Wind tunnel exploration with car parts as an initial form finding and massing exploration. (2015)

Figure 79. Massing model exploration with various car components. (2015)

Figure 80. Wind tunnel massing exploration with car components. (2015

Figure 81. Wind tunnel massing exploration with polystyrene models. (2015)

Figure 82. Urban framework massing and programme exploration model. (2015)

Figure 83. Initial sketch of urban framework spaces. (2015)

Figure 84. Allocation of programme to the generated spaces. (2015)

Figure 85. Initial urban framework developed. (2015)

Figure 86. Inclusion of circulation routes throughout the site and proposed programme. (2015)

Figure 87. Race car aerofoil design concept. [online image] Available at: https://www.pinterest.com/pin/394065036117704892/ [2015].

Figure 88. Perspective of the FNB Stadium and concept for the skin of the building. [online image] Available at: https://www.google.com/fusiontables/DataSource?docid=1Qhi01pA-Nx5GKkbYV2AXUDUangMI8JUZ-AGo-Ucj#rows:id=1 [2015].

Figure 89. Circulation and seating layout of the stadium. [Modified] FIFA. (2007)

Figure 90. Safety rail FIA requirements for the design of the grandstands. [Modified] FIFA. (2007)

Figure 91. FIA requirements for access control into the grandstand facility. [Modified] FIFA. (2007)

Figure 92. FIA approach to the allocation of services and optimal circulation flow. [Modified] FIFA. (2007)

Figure 93. FIA sightline requirements for grandstand design. [Modified] FIFA. (2007)

Figure 94. FIA dimensions for spectator seating, circulation isle widths and signage positioning. [Modified] FIFA. (2007)

Figure 95. Interior perspective of Barajas Airport shaped through lightweight undulating roof structure. JONES. W. (2006)

Figure 96. Elegant structural members and design for the forces exhibited on the structure. [Modified] JONES. W. (2006)

Figure 97. Entrance perspective of the Bangkok airport exhibiting its elegant structural form. JONES. W. (2006)

Figure 98. Structural principles for the design of the Bangkok airport. [Modified] JONES. W. (2006)

Figure 99. Rear perspective of the Catalunya circuit's main grandstand exhibiting its aerodynamic form. [online image] Available at: http://f1destinations.com/tickets-spanish-f1-grand-prix/main-grandstand-circuit-catalunya/ [2015].

Figure 100. Structural principles of the Catalunya circuit's main grandstand. [online modified image] Available at: http://f1destinations.com/tickets-spanish-f1-grand-prix/main-grandstand-circuit-catalunya/ [2015].

Figure 101. Perspective of the Greenpix: Zero Energy Media Wall displaying the work of the digital artist. [online image] Available at: http://www.arup.com/Projects/GreenPix_Zero_Energy_Media_Wall.aspx [2015].

Figure 102. Construction of the Solar LED panels of the Greenpix: Zero Energy Media Wall. [online modified image] Available at: http://www.arup.com/Projects/GreenPix_Zero_Energy_Media_Wall.aspx [2015].

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