Metamorphosis_

Transforming Architecture through the realm of Mixed-use typologies,
with a bias to sports culture and lifestyle.

Ruben van Biljon

Supervised by Scott Johnston

APG5079W

Design Dissertation

Master of Architecture (professional)

School of Architecture, Planning & Geomatics

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Preface_

Humans generate and process research and information through opinions, personal values, pre-understandings and biases. For this exact reason, I make this explicitly my own. My interest in this topic stems from being involved in sports for most of my life, from amateur to highly competitive and semi-professional. I have always been intrigued by the disconnect between sports, participating or spectating, and everyday life. This is evident in the various sports facilities seen all over Cape Town. They are primarily disconnected and isolated from their communities, with most only having a singular purpose. I have been fortunate enough to participate in various such facilities; one element of such facilities is the life of such spaces.

This inquiry is grounded in one such facility, The Velodrome in Bellville, Cape Town, South Africa. A Facility with both an indoor cycle track and an outdoor synthetic athletics track. This facility was constructed in 1997 in a bid for the Olympic games. Since completion, the facility has been under-maintained, with various speculative developments being brought forward. This site has become increasingly abandoned due to maintenance neglect over the years. I have participated in athletics for numerous years in this space. The facility sits on an 11-hectare Site in the Northern suburbs. It has significant potential to form a network of similar developments, as my inquiry would focus on and relate to this site.

This paper has no aim to critique the Velodrome facility nor the process or principle of current Mixed-use typologies but rather an inquiry of potentially where Mixed-use and Sport meet, with a bias to sport and its inclusion and the connection between architectural decay and retrofitting.

Introduction_

This inquiry revolves around the concept of Mixed-use typologies, with the introduction of a sports bias program. Incorporating sport into such a mixed-use development is one of the various uses and programs.

I have first-hand 'lived' experience of sport's impact on human lives, and numerous benefits exist. I am involved in both coaching and practising sports. Since my youth, I have been involved with sports, from team to individual sports, with most of my focus shifting to Field hockey later.

My interest in this inquiry of sport in the mixed-use typology stems from the need for more importance given to a sports program, especially in such mixed-use developments. This inquiry is part of a groundbreaking position of providing sport and an activated lifestyle equal importance to the other typical industrial, residential or commercial programs in such developments, hence my interest in this inquiry.

Throughout 'Professional careers', there is an absolute separation between sports and the integration of everyday life. Sport no longer has the importance it has had. A significant emphasis is still placed on children playing and participating in sports as part of physical and cognitive development. However, as we age, participation in sports has become an inferior element of everyday life. This Inquiry revolves around altering current beliefs and practices, separating sport and daily life, thus integrating sport into mixed-use developments and subsequently back into everyday life.

Sport has the power to change the world. It has the power to inspire, the power to unite people in a way that little else does. It speaks to Youth in a language they understand. Sports can create hope where there was once despair. It is more powerful than governments in breaking down racial barriers. It laughs in the face of all types of discrimination.

_Nelson Mandela. (2000)

Theory_

History_

Origin of Sport-

Sport has a history dating back to the ancient world, originating as variations of warfare and entertainment. In the early years of 7 0000 BC, Sport has been noted to take its first form through hunters having to train their spear-throwing to ensure adequate hunting and providing skills for their communities. Although there are some mentions of earlier forms, Sport has been around for quite some time.

During the Ancient Greek times of 776 BC, the first form of the Ancient Greek Olympic games formed. Everyone was considered eligible to join and partake, except females; the majority had been soldiers. These games lasted five days, with spectators ranging in the 40,000. The sport had been the method of determining one's physical capabilities, hence being connected to the military aspect of life since early ages. These events took place in ancient Greece every four years. There were events such as running, wrestling, javelin and chariot racing. During the times when these 'games' were held, there was unrest among nations hence, a truce had been called for all involved to allow free passage to partake and attend these 'games', which in its earliest forms indicate the social aspects of sport does have on our human race.

Throughout the Middle Ages, Sports continued developing by creating new versions of sports as time passed. This also brought forward a new problem for the time: the ruling class had less control over the 'peasants', and hence subsequent bans had to be put in place. Further, various tournaments had formed, furthering the Entertainment and competitive aspects of sports.

Fast forward to the modern sports era (i.e., current During the 19th century, most Team sports had been created under the Western Culture and were subsequently spread throughout the British empire, with aid from the European colonialism movement. This also brought forward the current Olympic games as a form of standardising sports, ensuring an "equal" level of expectation and judgement could be performed. European countries initially dominated these gatherings. Subsequently, the new interest in the sport for entertainment brought forward the issue of the desire to win, which caused the concept of cheating to become much more common. During these times, there had also been a shift to perform these various sports outdoors, consequently creating the opportunity for the involvement of both genders, thus boosting both participation and popularity. This inclusion of females in the sports world for the time had been groundbreaking in its own right. (Steiner, 1995)

Sport in South Africa, Then-Now

Then_

South Africa under its Apartheid regime, led by the National Party (NP) as introduced in 1948. This introduced system had numerous Boycotts placed in South Africa, both economically and socially, in terms of sports boycotts. On top of this, the NP placed sport-specific restrictions to further the 'Grip' of apartheid on the people. These restrictions included the inhibition of inter-rational sports conduct. These were put in place in the late 1950s, as well as restrictions on international travel. These restrictions, set in place, further brought forward sanctions against South African sports. (Lapchick, 1975)

Although these sanctions and the ban on South Africa raised other issues within the rest of the world's sports scene, i.e., Racism within sports, South Africa became the Poster of how not to be within the sporting scene due to the apartheid era. During these Times, South Africa always had world-class athletes being able to compete with the best in the world. However, many of these stars would never receive recognition for their achievements or abilities. These sanctions and boycotts only worsened, resulting in subpar development and exposure for athletes and sports nationwide. Luckily, as the 1990s started, apartheid was nearing its end, as well as the negotiations for the imminent release of Nelson Mandela from Prison. This allowed many of these Boycotts placed on South Africa to be lifted throughout 1991-1994 as South Africa began transforming from apartheid to Equality, especially within the Sports realm.

After the 1994 first democratic elections, where Nelson Mandela was elected as the country's new president, he utilised sport throughout to unite the nation whilst dismantling the principles set in place by the NP apartheid era. However, there are two significant events, the 1996 Africa Cup of Nations and the 1995 Rugby World Cup, both Hosted in South Africa. The Later (1995 Rugby World Cup) is a prime example of how sports can create a platform where people can come together and support their team, not to mention the significant beneficial financial impacts hosting such events has on society. Sport has played a crucial role in developing the identity of post-apartheid South Africa.

Now_

Currently, within South Africa, there is the most significant variety in sports and the number of participants. This is thanks to the ever-developing country and certain concepts set in place for the post-apartheid development of sport. Although these plans might have stagnated somewhat, there is still positive growth, even If it might be minuscule. Although the modern sports era is not without its disruptions, with the latest being the Pandemic of Covid-19. The pandemic hit South African shores in 2020, bringing government-orchestrated lockdowns into effect causing a significant disruption throughout sporting developments and calendars. As some events had to be cancelled and others postponed until further notice, these had been some of the most disruptive effects on sports since World War II. () No amateur or professional athletes were allowed to partake in South Africa due to Lockdowns. Sporting activities had to be stopped immediately whilst the lockdown was active. This created an environment where people were not allowed or able to partake in most active activities, from going to the Gym or taking a walk in the park to the more professional level of training, resulting in being confined to mostly singular and indoor spaces without the ability to do any form of physical exercise. This has a significant impact on one's mental health and physical healthcare. Luckily, in this particular disaster's current state, most sporting activities have returned to normal in a post-Covid world.

Sport Phenomenology_

Being Physically active impacts development and psychological well-being_

Sport describes the human activity of being physically active in a personal or team environment. This can be at various intensity levels, from recreational to social to professional. As mentioned, sports can be competitive and monitored and managed by their respective governing bodies or casual through temporal fields of play. This allows for the duality between informal and formal as sports could, at the same time, be social and competitive, depending on the participants and environment. This allows for sports, through its informal and temporality, to have a greater reach in terms of social impact. Moreover, sports' competitive and professional side has entertainment purposes within our social construct.

Physical Activity (PA) significantly influences a society's physical, mental, and social welfare. However, there are discrepancies in defining the term sport. As a sport, physical activity and movement could all be seen as a form of sport. Still, for the purpose of this inquiry, these different means of physical activity will be seen as the same, as the following theory and concept further attempt to understand the connection between our human well-being and such physical activity and the necessity, therefore.

Research conducted into this concept of the relationship between physical activity and the state of mental health, quality of life and well-being of humans shows that they are directly related, as mentioned by the World Health Organisation. (World Health Organization, 2022) Physical activity is a preventative measure and, in some cases, a cure for non-communicable diseases. Furthermore, being physically active promotes mental development and well-being, also known as Emotional intelligence.

This presents a decrease in anxiety and depressive notions, and this is because of the release of Dopamine (the Feel-good hormone) when one is done with any form of exercise. As seen, there is a necessity for the inclusion of sport into everyday life (Stubbs et al., 2018), especially to take a crucial role in new developments such as mixed-use developments.

Mixed-use Developments_

This team of 'Mixed-use' began to emerge from within the urban planning department during the 1960s-1970's. At the time, it was idealised as a method of urban revitalisation. Ever since, similar to the development of sports, it has been ever-changing and evolving to the desires and needs of the users and society surrounding such developments.

There are various understandings and definitions for the term Mixed-use development. One such definition is the mixture between urban development and urban design, as both are incorporated into such an architectural development. Mixed-use developments also have multiple uses/users, typically residential, office, retail, entertainment, etc. These various uses are incorporated into one pedestrian-orientated development to create a live-work-play environment. (BOMA, IREM, NAHB, NMHC, 2009) The four leading property associations in the US (2006) are BOMA International, the International Council of Shopping Centres, the National Association of Industrial and Office Properties and the National Multi-housing Council. Another such definition is by the City of Cape Town government, which states that mixed-use developments can utilise multiple zonings in one space, including industrial, residential and business. Such mixed-use zonings are divided further into sub-zoning with three varieties, each having a discrepancy in the scale of such development. I.e. Height limitations vary from 15.0m Above the Ground floor to 38.0 m above the ground floor.

My understanding of mixed-use is much more modest, with much more attention to the human scale, ensuring a community connection. This could be achieved by limiting heights to 6 stories above ground. Ensuring that there is adequate natural lighting and ventilation, as well as providing a communal connection throughout, allows for the socio-economic growth of such a community. All whilst emphasising the combination of uses in one space, allowing transdisciplinary spaces to be created. Regarding access, the focus shifts to pedestrianised transport, limiting the need for vehicular infrastructure and creating the potential for temporal spaces for such temporal fields of play.

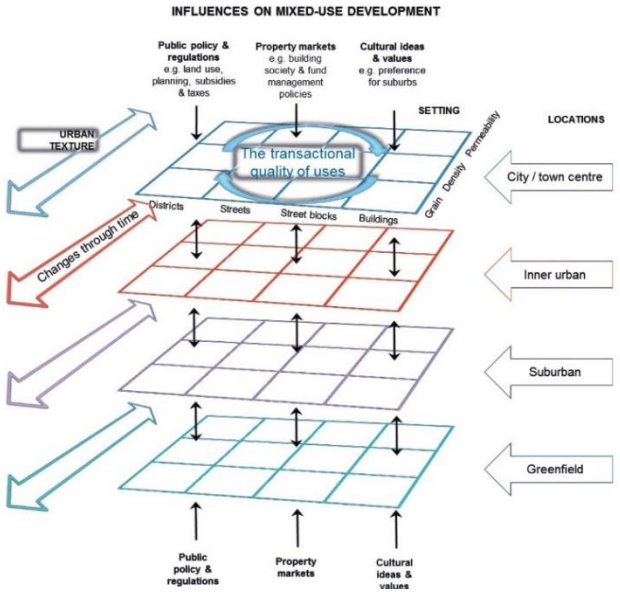


Figure 1 Influences on mixed-use developments. (Source Rowley 1996 p. 86)

"A mixed-use development is a real estate project with planned integration of some combination of retail, office, residential, hotel, recreation or other functions. It is pedestrian-oriented and contains elements of a live-work-play environment. It maximises space usage, has amenities and architectural expression, and mitigates traffic and sprawl." (Niemira 2007, p. 54)

Mixed-use, as Described by Niemira, is still open to interpretation. However, some aspects are mentioned, such as the programmatic combination and the 'live-work-play' environment, which I agree with and have included in my understanding of Mixed-use developments.

Such developments are characterised by a variety of variable factors within their design. These variables include aspects such as Density, Diversity, and integration. Other determining factors of such developments have the site location and intended use. A mixed-use development can be seen as a directly related equation, where if one aspect changes, it influences the rest of the equation and alters the solution. These factors could be influenced from within such development or from the surrounding conditions as such developments could form part of a network of numerous such developments. Although this Inquiry focuses on the singularity of such a development, the importance of integrating into the more significant contexts and potential network of developments needs to be mentioned. An example of this can be seen in Figure 1. Rowley's (1996) Diagram illustrates these transitional elements through the various alternating aspects. It is also a great example of the complexity and different factors involved in such a mixed-use development.

In Figure 1, as drawn by Rowley, we can see an attempt to include the various interchangeable influencing elements that comprise the characteristics of such a new mixed-use development.

Mixed-use developments have increased urban quality by creating more attractive, memorable and liveable spaces. (Rabianski, J et al. 2009) Furthermore, because within a mixed-use development, there is a mixture of programs and a focus on pedestrian accessibility, there is both an economic and environmental impact through the creation of such a development. The typical time lost stuck in traffic can be utilised for monetary gain and minimising air pollution through vehicular transport. Regarding Pedestrian infrastructure, an emphasis is placed on optimising pedestrian accessibility in and around such a development. Conversely, vehicular infrastructure and parking concerns can be answered within one concentrated space due to optimising pedestrian access. Rogers (1998)

Within the typologies of Mixed-use developments, there are various typologies. However, with the interest of my inquiry in mind, three typologies are of interest: Vertical mixed-use, horizontal Mixed-use and Mixed-use walkable. Although there is a common misconception that mixed-use refers to having a shopfront on the bottom floor and having residential space above, this is not mixed-use. As mentioned, mixed-use refers to a mixture of programs and users within one concentrated space.

Vertical Mixed-use, this space creation method incorporates and combines various uses into a singular building, although there is usually not only one building but multiple. In this example, lower floors are utilised for public activity, whereas upper floors have more private use, following a hierarchy of privacy escalating as the building grows taller.

Whereas Horizontal mixed-use refers more to the concept of Blocks. A combination of single-use buildings is arranged into a specific use pattern within one such block. This method allows for a hassle-free approach when it comes to the layering of uses, as there is no real need for vertical layering whilst still achieving the same goal of placemaking whilst combining various uses and users. As for Walkable Mixed-use, this concept aligns more with the Neighbourhood/community creation as there is an infinite variety of combinations of vertical and horizontal methods of space and place-making. Within such a method of development and the other, a significant emphasis is placed on pedestrian access. Typically, the Walkable mixed-use typology occupies a more substantial amount of space due to the nature of the elements involved.

For this inquiry, I will focus on a mixture of these three typologies, potentially creating an optimised version of the Walkable Mixed-use development with elements of the other two.

“Defining mixed-use is not a straightforward task.” (Hiroshi Okubo, 2006)

As Hiroshi Okubo mentioned, defining Mixed-use is a complex task. However, the reason for setting up specific parameters and thus defining them to a certain extent within this inquiry is due to the nature of the inquiry being dependent on the understanding of mixed-use developments.

As with any architectural intervention, there are advantages and disadvantages, and mixed-use developments are no strangers to this. Advantages include the concept of Live, Work & and play, as mentioned prior, increased safety (aligning with the eyes on the street concept), Pedestrian orientated infrastructure and creating a community culture and social identity. Most of these have been explained prior, the most crucial being community and social identity creation. They are especially considering the inquiry into the inclusion of sport into such a development, considering sports' social characteristics and impacts.

Some disadvantages include the amount of planning and consideration needed to create a thriving community is abnormally high, resulting in a potentially higher development cost. Because of the complexity of these developments, there can be some issues around the maintenance and management of buildings, spaces and places. In some instances, there can be limiting factors, such as infrastructure or even services, simply because the nature of the development is not one of a singular use but rather multiple.

The sustainability of mixed-use developments is essential in determining effectiveness for future progression. Mixed-use developments align with some guidelines for mitigating environmental impact and being more sustainable with construction methods. The mixed-use typology utilises the concept of reduced carbon emissions when occupied homes and workspaces are nearby, allowing for pedestrianised access instead of utilising personal transport as well as the efficient use of land through either re-using spaces and transforming them into a different use or just the combination of multiple uses in one space as is the nature of Mixed-use developments.

Architectural Decay_

Architectural Decay, in some instances referred to as Urban Decay, Urban Rot or Urban Blight, refers to a sociological process through which a once functioning space, structure or even city falls into a state of disrepair and decrepitude. Although there might be many examples of these, there is no one singular process as the cause of such occurrences that leads to such decay. As this term encapsulates multiple aspects, these include (but are not limited to) Counter urbanisation, Deindustrialization and Counter preservation (Sandler, D. 2016).

These phenomena of abandoning facilities, resulting in them starting to decay over time, have multiple reasons depending on the circumstances, although more times than not, because of either Socioeconomic, urban planning decisions, or depopulation by suburbanisation. (Vigdor, 2010)

There might be different phenomena when this type of urban rot occurs. However, one example that interests me and this inquiry is sports facilities' abandonment and inevitable decay. Sports facilities serve a unique and niche purpose, namely, to serve a particular sports group. Although some facilities can adapt and serve more than one sport, they are usually not optimised for more than one sport. Due to the nature of such facilities being quite programmatic specific, they are prone to becoming obsolete, especially considering that the average sports facility currently has a life span of 27 years. (Cocco et al., 2022) There is either opportunity to move to a new or more modern facility catering to the needs of the developed sport or to revamp such facility by spending large amounts of money. Sports facilities can have significant economic impacts on the government as they are responsible for the maintenance and upkeep of such facilities due to the nature of the use and the program they do require tenuous maintenance. Whilst allowing for a positive impact by generating potential economic gain for the surrounding community.

All over the world, there are examples of such facilities. More times than not, they were part of an Olympic (multinational) gathering. These facilities range in size from small to amphitheatres. These facilities are all abandoned and are in a state of decay, although something unique has started to happen in some of these extreme instances of Pripyat. The Town of Pripyat had been abandoned after the Chornobyl Nuclear disaster in 1986, causing these spaces to be deserted and void of human interaction for 37 years. As time has passed by over the years, nature has returned to be the sole inhabitant of these once human-occupied spaces. Within the Chornobyl exclusion zone, there is a dense woodland of 6 km2. This forest became known as the red forest because, just after the Chornobyl disaster, a massive patch of coniferous trees turned a vivid red and subsequently died due to high radiation levels. Over time this forest has wholly regenerated and houses more indigenous deciduous trees than ever. (Thompson & Gray, 2022) This lush greenery has not only been flourishing within the forest surrounding, but also nature has reclaimed the built structure in and around this exclusion zone of Chornobyl. This is a Prime example of urban decay with natural reclamation at the end of the scale due to unforeseen surcomes3tances caused by a nuclear disaster. Buildings and facilities placed within a natural habitat, if left unmaintained, will experience the resilience of nature as nature finds a way to thrive within any circumstances.

Figure 2 An abandoned building in Pripyat, reclaimed by lush greenery. (Source RoelvanWanrooy 2020).

Figure 2 portrays this concept of Urban decay and natural reclamation. In this image, we see one of the facilities built for the Pripyat community, which had been constructed for the workers of the Chornobyl powerplant. As one can imagine, the building is rundown, as there has not been any human activity in this area for 37 years. Similar to this example is an abandoned power station Figure 3 based in Kleinbrak, South Africa, another principal example of urban decay accompanied by natural reclamation. In this instance, the cost involved to demolish and remove this abandoned facility is not feasible. Furthermore, in the meantime, people have taken up residence in and around this old, abandoned facility.

Figure 3 Kleinbrak abandoned power station, with natural reclamation occupying the insides. (Source Drone Fanatics 2022)

These are two extreme examples of urban decay accompanied by natural reclamation. However, this happens worldwide when sports facilities become abandoned due to a lack of maintenance and planning for the 'What If?' Scenario.

Another example of neglected maintenance is the Site of my Inquiry, as seen in Figure 4. This sports facility has not seen much maintenance since the day of its completion. This caused the facility to decay over time, reaching a point where the repair cost was absurdly high. This Site is a prime example of Urban Decay as it is 27 years old and is seen by the governments as obsolete, making it an excellent site for this inquiry of a Mixed-use development to be retrofitted into an architecturally decayed existing facility.

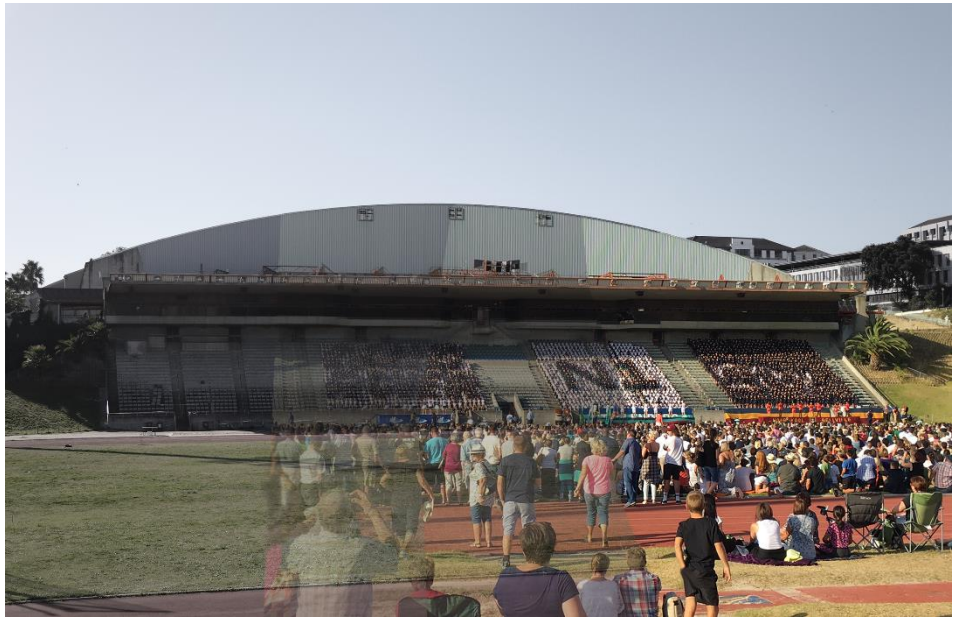


Figure 4 Bellville velodrome athletics track, showing the historic major events that used to take place, compared to its current empty state. (Source Digital Artwork by Ruben van Biljon 2023)

[Re]tro-Fit

Retrofitting describes a process where an existing facility or space is changed and adapted by fitting new systems or altering the structure. This is intended to improve the performance of such a building and, in some cases, to revitalise and reactivate spaces. The result of such retrofitting process is somewhat open-ended, as there is no set outcome. In some instances, the program of the building changes. In others, it is an abandoned facility being breathed new life into. Another outcome could be ensuring better building sustainability through less water and electricity usage as technology continuously develops and evolves.

Re-using previously abandoned rundown buildings allows for a significant sustainable and cost-effective method of space creation, as the structure already exists. These once-abandoned buildings receive a new life and meaning within their surrounding community, with the added benefit of being a much faster process than constructing a new building from scratch. This process of re-using and retrofitting does not go without some hurdles to overcome, as often, these older buildings do not have the proper documentation or plans. Furthermore, typically occupied with old and barely functional equipment, like HVAC systems, this equipment can create some headaches as removing them can be quite costly, leaving you to lose operational space. Another issue is the method of design, as they typically have been designed with a mono perspective (Ferrante et al., 2011) with singular usage in mind; altering such a program benefits a community by creating potential social and economic gain.

Regarding sustainability, retrofitting has become a game changer, especially in terms of the reduction in carbon footprint/emissions and overall project costs. Retrofitting any building has a twofold responsibility for its owners, one being toward the occupants and the other toward the surrounding community; thus, this process is of the utmost importance throughout the built environment. (Saleem, 2020)

Summative theoretical thoughts_

Sport has had a significant impact on who we, as human beings, are today. Furthermore, sport and physical activity have and will always have a significant impact on the well-being of human beings, whether that be for spectators or, for the people partaking or even just the people doing some form of physical activity to enhance their mental well-being. Throughout South African History, Sport has played a significant role in the influence of culture and the development and forming of identities in a somewhat stricken country. Sport has played the role of nation-building after some tough times of apartheid, allowing people to believe in and support one team. As Mandela said, “It (Sport) has the power to unite people in a way that little else does.”

As society advances, so do our needs, and we are increasingly aware of the importance of preserving our planet. Mixed-use developments are an excellent example of integrating these values into the design as potential solutions for diverse scenarios. Mixed-use developments ensure a more sustainable design by limiting vehicular dependency and instead focusing on pedestrian access; it also allows for optimal land usage. Mixed-use developments are a concept with the Live, Work & and play principles worked in proximity, thus allowing for new and robust communities to be established.

Something is only new once; after that, it decays and disintegrates slowly. Along with the abandoning and urban decay of facilities, we see the resilience of nature and how human interaction with nature is often harsh and disruptive rather than sensitive and caring. Whatever reason there might be for the abandonment or urban decay of any facility, it creates the opportunity for such facility to become retrofitted and reuse such facility. This allows such facilities to become relevant once again whilst creating sustainable space by re-using existing facilities.

My inquiry aims to incorporate all these principles into a singular mixed-use development. One with groundbreaking intent where sport at all levels of the discipline (amateur – professional) has a significant influence and importance in the design, as it has in human well-being and development. Thus, this inquiry aims to find common ground and connection between these various concepts and try to enforce sport and physical activity as one of the main concepts in design and decision-making, juxtaposing to its typical position of being either a sport-specific project or an afterthought. I aim to incorporate it as one of the main concerns.

Technology_

Following is a selection of examples portraying these concepts discussed inbuilt and physical form. These built forms are to become a point of reference for the currently available technologies and concepts for sports facilities, mixed-use and repurposed, as this inquiry attempts to weave a connection between these respective variable facilities and to explore the possibility of combining all into one at the chosen site of the Bellville Velodrome and Athletics track.

Furthermore, to show some technical aspects in further detail and discussion connecting to the inquiry, three topics are Surfaces and surface treatments, Natural light and Old new.

The following examples demonstrate these concepts in a tangible form, providing a valuable resource for the latest technologies and ideas available for sports facilities, mixed-use spaces, and repurposed buildings. The ultimate objective of this inquiry is to interconnect these various types of facilities and explore the potential of integrating them at the Bellville Velodrome and Athletics track Site.

A thorough analysis and discussion regarding the technical inquiry must be conducted, focusing on three distinct aspects: Surfaces and Surface Treatments, Natural Light, and Old and New.

Overview of Precedent projects_

_Thusong Service Centre – Khayelitsha [Makeke Design Works]

This ‘Sports community centre’ serves Khayelitsha's social and athletic community. Unlike typical sports facilities, which can be monolithic and inward-looking structures, the Thusong Centre is an enlightened and fluid design. Furthermore, this project aims to connect to its surrounding community whilst enriching its surroundings. This centre is aimed to become a backdrop, as this building does stand out, with its 2-storey presence over the typical low-rise surroundings. Although many aspects apply to my enquiry, the crucial ones would be enabling a sports centre to be open and inviting.

It creates a space where all feel welcome and invited, which can be utilised formally and informally. This Building is designed to be dignified and respected whilst speaking to the desire to form an architecture that genuinely connects, integrates and serves everyone. Furthermore, such a project might be seen as a drop in the ocean compared to the challenge/problem it might be confronting, but with future similar concepts, a network could start to form, and collectively, there could be a solution. (Slessor, 2010)

Figure 5 Thusong Service Centre in Khayelitsha, Cape Flats, South Africa (Dennis Gilbert, 2010)

_Multi-Purpose sports hall - Sydney [PTW Architects]

This Facility forms part of the University of Technology of Sydney, and its purpose is to serve as a multi-purpose Sports hall. This Facility serves a variety of programs, from various sports being able to utilise the court, institutional space and a separate space housing a gymnasium and dance studio. The facility operates a functional green roof, as the entire facility is situated underneath a green park. The green roof lets it capture and store water used to irrigate the green park overhead. The method of design construction had been to connect to the natural surrounding elements, such as exposing the natural sandstone along the outer walls. (Furuto, 2011) Biophilia involves incorporating nature and natural elements into the built environment to promote human connection and interaction with nature.

This Sports facility utilises elements from this concept by having a 'Sunken' Garden, allowing natural light to enter the space whilst aiding with natural air ventilation. This Facility had been designed with the university's sustainable campus initiatives in mind by utilising sustainable materials such as bamboo flooring. Furthermore, fewer materials are used due to the nature of the site excavation and the lowered level of the facility's placement. The efficient use of lighting in this building is highly regarded and achieved through an innovative up-lighting technique, as described by Furuto in 2011. It is a testament to its versatility that it can accommodate different programs while maintaining optimal lighting levels. The design has successfully achieved its goal of multi-purpose functionality, demonstrating its ability to maximise the use of a single space.

Figure 6 Central court of the multi-purpose sports facility in Sydney Australia, image showing potential inhabitation of set space. (PTW Architects, 2011)

_Calvia Running Track - Spain [Niu Architects]

This project is sports-focused as it consists of a running track and a service building with a grandstand. The service building has a lower level allocated to the athletes with various locker rooms, multi-purpose spaces, and an indoor partial track, visible in Figure 7. The service building is divided, creating a public edge on the higher level and a private side on the lower level, as it is exclusively for the athletes. This project allows for the seating of 900 spectators undercover. The facility houses a typical sport-specific program, in this case, athletics. (Sánchez, 2013)

Although, there is no multifunctionality within this project as it does not immensely cater for mixed-use. This project gives insight into my inquiry concerning the surfacing of sport-specific requirements whilst also providing insight into the restrictive nature of the elite exclusivity that creating such sport-specific spaces creates.

Figure 7 Basement level of the Calvia Running track in Spain. This image gives a good understanding of the conditions of the indoor spaces. This section forms part of a warmup track for athletes. (Jose Hevia 2010)

_Fenix I Warehouse Renovations - Rotterdam [Mei Architects]

This mixed-use facility is located in Rotterdam, Netherlands. This project gives insight into mixed-use, repurposing and retrofitting, as the project is housed in an old warehouse constructed during the 1920s. This version of the building on display today was completed in 2019. The new building is 'Fenix 1', which boasts an astonishing 45 000 m2 of space that any variety of uses could utilise. This building consists of a combination of different programs, with the two floors of the existing renovated warehouse of 140 x 40m space for various mixed-use activities along the public edge. Another is the residential volume on top of the renovated warehouse, consisting of 214 Lofts, rentals and privately owned spaces. This facility forms part of a bigger scheme involving the surrounding community, creating and re-activating the currently present spaces. (Block, 2020)

This project provides insight into my inquiry about combining concepts such as mixed-use developments, repurposing, and retrofitting space. Regarding retrofitting, sustainability is a crucial factor that drives the concept forward. Luckily, Fenix 1 was designed with sustainability in mind. The building used the existing structure, reducing the need for new construction and minimising lost time. Additionally, the spaces are future-proof and can be adapted through partitioning as needed. The facility features several roof gardens and a vertical green courtyard that help offset CO2 emissions while providing a natural connection for residents. The green roofs also collect rainwater, which is stored for reuse. (Block, 2020)

Figure 8 Fenix 1 as seen from the Rotterdam Harbour. (Marc Goodwin, 2019)

Zeitz MOCAA - Cape Town [Heatherwick Studio]

The once tallest building in Cape Town (South Africa), these silos used to form part of the industrial side of the Cape Town harbour, with the original structure being constructed in 1921 and operated until 2001. A new mixed-use facility was completed in 2017. The facility boasts an impressive 6500 square meter art museum, educational spaces, and a hotel. (Taylor-Foster, 2014) The main hall of the art museum boasts a void that carves out a majestic cathedral-like atmosphere on the premises. This exceptional structure flawlessly blends the typical old industrial typology, high-end hotel, and modern art museum, serving as a benchmark for upcoming projects to emulate. (Taylor-Foster, 2014)

The architects designed this building with the limitations of the existing fixed structural dimension in mind, which required certain elements to remain in place for both structural integrity and aesthetic reasons. The unique 'kaleidoscope' windows in some rooms and restaurants create a lightweight and airy atmosphere. My inquiry relates to being constrained by an outer shell or structure while allowing for flexibility in the internal elements that can be changed.

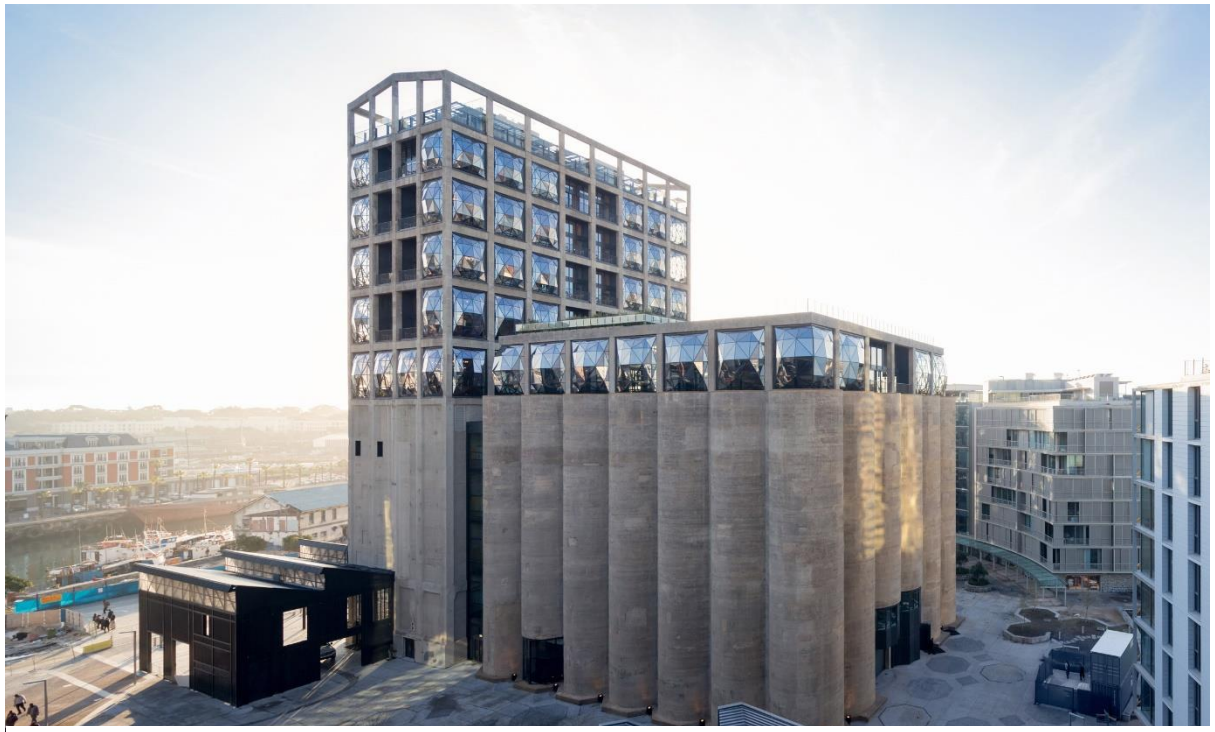


Figure 9 Heatherwick's Zeits MOCAA in the V&A Waterfront Cape Town, South Africa. (Iwan Baan, 2017)

Casa Rex - Sao Paulo [FGMF]

Casa Rex is based in Sao Paulo, Brazil, and was initially constructed in 1940 as a residence. Since it has undergone multiple reforms and reworks, this caused the building to lose its original characteristic and identity over time. As seen today, the retrofitted building is used as office space and was intentionally designed and equipped to fulfil this purpose. This project incorporated the concept of 'Architectural Decay'. The existing structure was stripped to its bare minimum resulting in a juxtaposition of old vs new. Throughout the project, there was a construction process by creating a delicate balance between Demolition and new construction.

Demolition of certain elements excluding structural and service elements such as the staircase or loadbearing walls. The new addition had been designed around these existing elements. Toward the rear of the property, there had been constructed a new studio space, which is double volume. (Fracalossi, 2013). This project is interesting to my inquiry because it involved retrofitting and adding new elements, requiring a delicate balance between the existing and the new. This was achieved through surface treatments and reusing existing infrastructure while clearly distinguishing between what was already there and what was added.

Figure 10 The reception area of Casa Rex in Brazil. A Retrofit project with an intentional harsh approach toward connecting existing and new. (Rafaela Netto, 2013)

LOOM Ferreteria Pere IV Renovation - Barcelona [Daniel Modol]

This repurposing and retrofitting project was housed in a building built in the 1970s. Preserving the metal structure and the Catalan vault has maintained elements from the original building's character and identity. The renovation project had been designed with a flexible program to create 1 756 m2 for hybrid coworking space with various overlapping spaces. (Blanco, 2023) This project focuses on sustainability, Using locally sourced materials easily accessible near the site. The project allows for a 10% reliance on photovoltaic cells present on site. (Blanco, 2023) Ensuring the sustainable demands are met.

This building is a great example of retrofitting with a focus on sustainability. (Zapico, 2023) It is also part of a larger effort to renew old structures in the community. The project showcases the relationship between new and existing structures, paying tribute to the old. This project is interesting because it houses a transdisciplinary program, is a retrofit project, and forms part of the larger community network.

Figure 11 Renovation project LOOM in Spain. An Adaptive reuse project with a bias toward sustainability and uplifting in accordance with the initiative of the surrounding community. (Jordi Bernardo, 2023)

Structural Systems of Inquiry.

_Surfaces

Multi-Purpose sports hall (Sydney) – PTW Architect

Sports facilities have precise requirements regarding the surface, both for their physical performance attributes and the lighting effect they could have. Furthermore, in enclosed sporting facilities, ventilation is of utmost importance.

Although this facility is a multi-purpose sports facility, the surface of the central court is a Bamboo Floor, as seen in Figure 12, an innovative solution. Although this might be more restrictive than hardwood flooring, it has other benefactors for the project. More rugged material is utilised throughout the facility to handle the numerous spectators and foot traffic. Bamboo flooring aligns with the university's sustainable goals set to use renewable materials in construction. Throughout the project, the design intent was to use natural surfaces and renewable sources.

One feature of the project is that it is half-sunken underground, thus causing an exposed natural Sandstone on either end of the central court. This creates an internal façade with aesthetic appeal and a physical natural connection between the inside of the building and the surrounding site conditions. This element also further aids the temperature control systems due to its high thermal mass. It reduces the need for Year-round HVAC systems and, in turn, allows for a more efficient and sustainable facility.

The Roof soffit and the sunken garden next to the space allow natural light to enter and be captured inside this space. The roof, being used as a green roof for a garden on top, also has the role of light diffusion and distribution, as there are no services or ducts in the soffit. A technique called 'Up-lighting' is utilised. This technique requires the smooth white soffit to allow subsequent light reflection back onto the play area without causing glare. (Figure 13) This Facility's surfaces are all specifically designed for the sports facility's purpose and serve as a good point of reference for surface treatments.

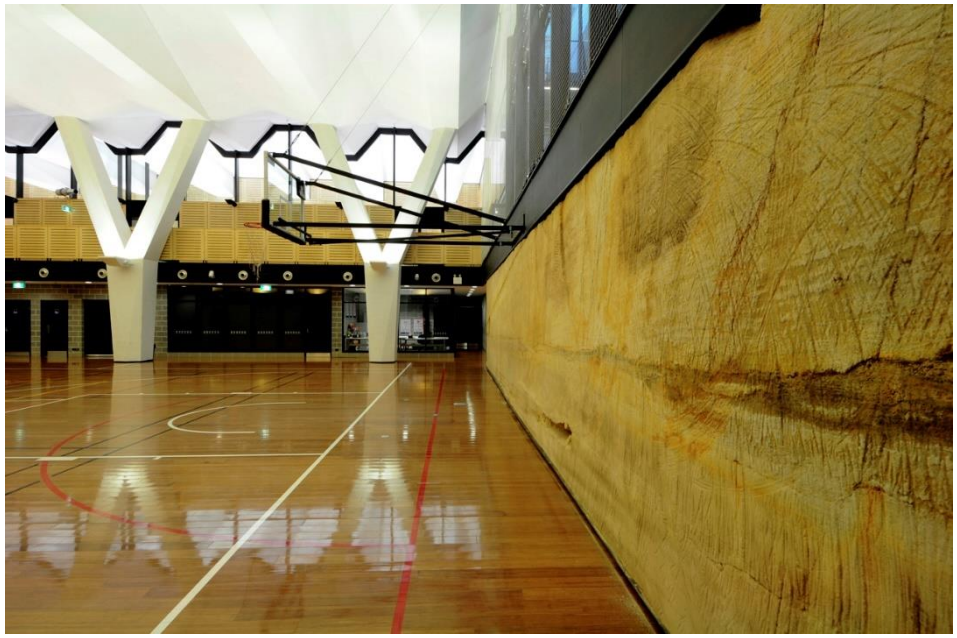


Figure 12 Central Court area, showing the various surface treatments present in this facility. Focusing on the Court timber finish in conjunction with the raw sandstone wall. (PTW Architects, 2011)

Figure 13 Central Court Area, focusing on the efficiency of the up-lighting technique, with the minimal amount of Glare. (PTW Architects, 2011)

Calvia Running Track (Spain) – Niu Architects

Sports facilities that cater to specific sports tend to prioritise the needs of athletes, which can sometimes lead to challenges in accommodating the needs of spectators. Managing sudden surges in spectator numbers can put much strain on the infrastructure and its capacity. This facility hosts national and international competitions, making the surfaces' quality critical and non-negotiable.

The service building is simplistic in shape, although it serves more than one purpose of providing undercover seating for spectators. The building has a basement level constructed using concrete, allowing for a more industrial long-lasting surface that could handle the influx of people. On the ground level is a much more lightweight construction using cellular polycarbonate, allowing light to filter into the spaces. On the Basement level, one would also find a piece of an indoor running track similar to the outdoors. This similarity between indoor and outdoor creates a connection and allows these athletes to prepare adequately. Figure 14 shows a continuous surface treatment from the track down to the basement level, where the warmup space is.

Within this Basement level are also locker rooms and studio/gym spaces; these are separated with glass curtain walls or timber boarding, allowing for a slightly less harsh feel than the concrete. A change in surface typically signifies a change in program or use. Hence, this example shows the grass between the stands and the running track. Similarly, there is a continuous artificial running track for athletes to connect inside and outside. Surface and surface alterations have mental connections to a programmatic change. Thus, if used effectively, as in this example, it could create positive connections between performance and spectating. (Sánchez, 2013)

These artificial surfaces on which athletes perform have various regulations and requirements. This facility is a prime example of successful surface treatment, as it caters to the exclusively elite and the spectator's needs. The use of different materials ensures the allocation of different users to their refined space. Furthermore, as seen in Figure 15, non-harsh transitional materials serve as in-between spaces, which are crucial to the success of such a facility.

Figure 14 The synthetic running track connected to the indoor warm-up portion in the basement via the ramp down seen in this image. Also, the supporting facility becomes a beacon of light during nighttime. (Jose Havia, 2013)

Figure 15 The view along the service building, showing the various layering of surface treatments present in this project. (Jose Havia, 2013)

Figure 16 shows a site plan, allowing one to understand the scale of set spaces. Figure 16 shows a plan view of the uninterrupted surface treatment present for athletes.

The rules and guidelines for athlete performance surfaces are specific and non-negotiable. This facility sets a prime example of successful surface treatment by catering to the requirements of both elite athletes and spectators alike. Different materials are strategically employed to ensure users are assigned to appropriate areas. Furthermore, transitional materials are judiciously utilised to create intermediate spaces, vital to the facility's triumph.

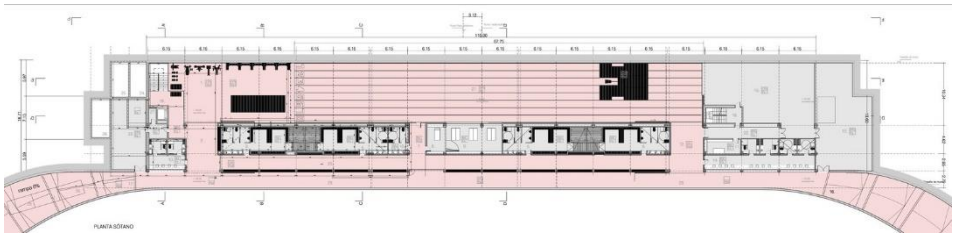


Figure 16 Calvia Running Track Basement level plan. (Niu Architects, 2013)

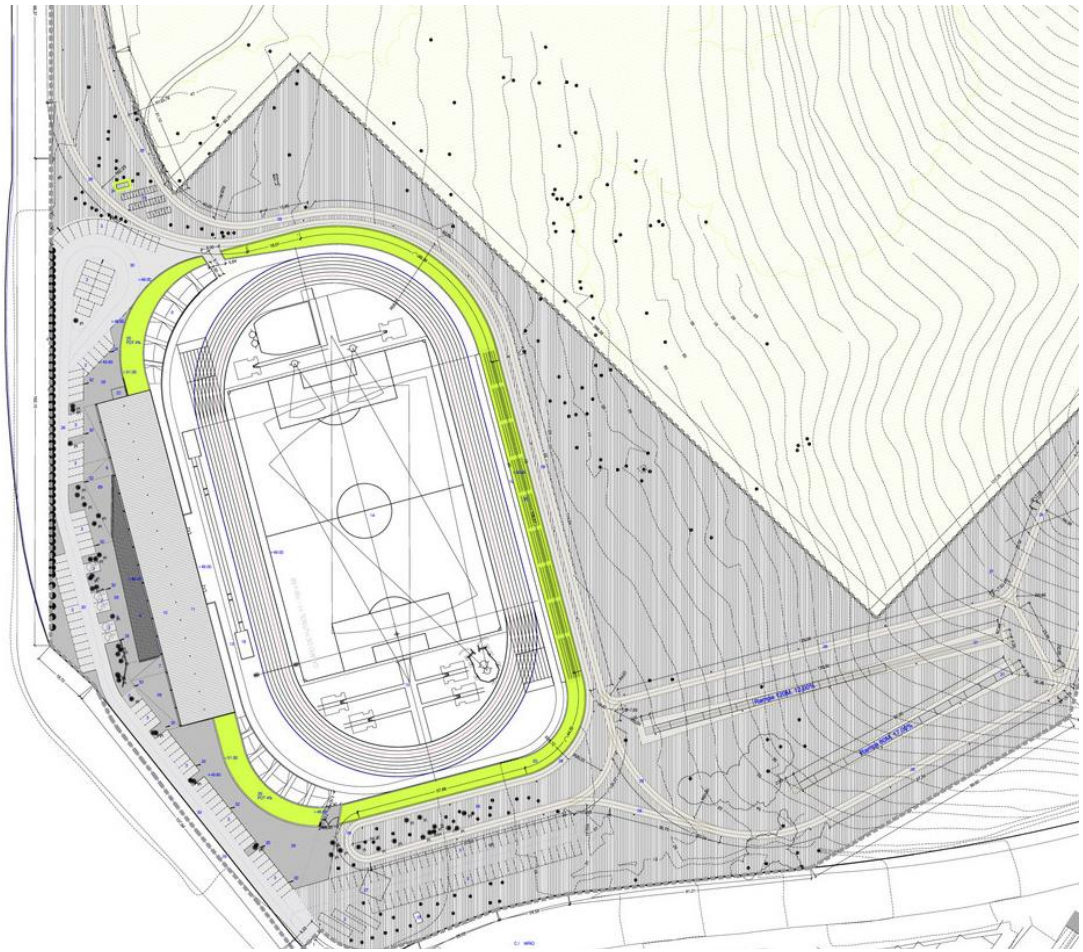


Figure 17 Site Plan of Calvia Running track. Showing the scale of this typology of facility. (Niu Architects, 2013)

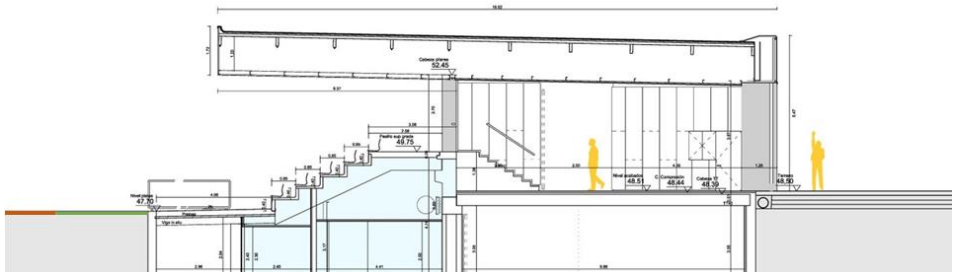


Figure 18 Cross section of the service building found at Calvia running Track. Marked in red is the synthetic running track with green being grass. (Niu Architects, 2013)

Fenix I Warehouse Renovations (Rotterdam) – Mei Architects

As a mixed-use project, the Fenix faces various challenges regarding the choice of surface, on top of which the project is of a renovation and retrofit nature. The previous warehouse structure had a harsh industrial, exposed surface, seen in Figure 19 as the exposed brickwork of the lower level, which had to be embraced and create a balance.

Program and users determine the required surface treatment. In this case, the lower levels of the building are more commercial. Resulting in receiving significant amounts of users, enforcing a more industrial-type surface treatment. Whereas the upper levels are more private and intimate, these spaces typically have a gentler surface finish. Whilst surface treatment determines how we interact with a space, the property of such surface, i.e. finish, also determines how light interacts. Either reflecting or being absorbed. Such surface has a direct influence on our interpretation of both the quality and quantity of space present. (Brink, 2015)

Colour in spaces greatly influences our interpretation and experience of such spaces. Colour affects the mood and atmosphere of space. Our perception of space is also influenced by colour. If lighter colours are used, space is perceived as more extensive. Furthermore, creating a separation within the built/man-made and creating space for nature to connect to such spaces allow for a change in surface, which is ideal for human well-being. In Figure 20, we see the internal courtyard with numerous vertical planters, allowing for the inclusion of a natural element throughout the space.

Figure 19 Fenix 1 as seen from the public edge, giving insight into the typical use of set space, in contrast with the more quiet and private upper part of the facility. (Marc Goodwin, 2020)

Figure 20 The Internal courtyard and walkways of fenix 1, showing the material use and surface treatments used in the more private spaces. (Mei Architects, 2019)

Different materials are utilised in this facility to achieve the desired surface treatments. Due to their low maintenance requirements and durability, harsh surface treatments such as exposed brick or Cast in situ concrete are implemented in public areas. For private spaces, timber and synthetic materials are used to establish a more intimate atmosphere for the users. The surface treatments employed in this project have successfully met this mixed-use facility's requirements and contributed to its success.

Figure 21 depicts the standard walkways in the residential section of the facility. These are usually made of both concrete supports and wooden walkways. It is essential to note the scale as it significantly affects the surface treatment's outcome and determination.

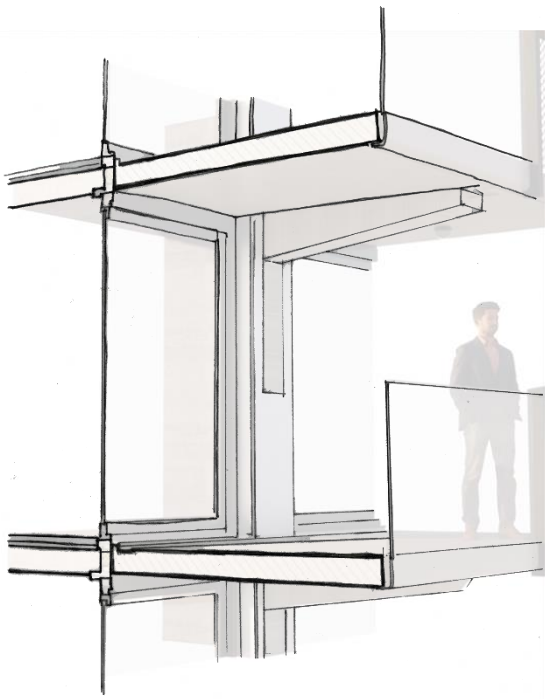


Figure 21 Typical domestic Walkway diagram of the Fenix 1, (Ruben van Biljon, 2023)

Structural Systems of Inquiry.

_Natural light.

Thusong Service Centre (Khayelitsha) - Makeke Design Works

This project is based in the fragile community of Khayelitsha, South Africa. In this project, significant emphasis is placed on utilising natural light, especially in the central court area. Due to the nature of the project being a sports facility, there are some requirements for the quality and quantity of light required for various levels of sport to be played. For this reason, the central court mainly uses natural light refined and distributed through polycarbonate sheeting. To ensure this facility is operable after the sun sets, the space is fitted with artificial lighting as well, which, if needed, can assist to that of the natural lighting system.

Externally reflected light enters the space via large operable doors (also constructed of polycarbonate), as seen on the right of Figure 23, as natural light reflects off the ground outside. The facility also uses numerous amounts of glazing to affect the need for natural ventilation. Although this facility has adequate natural ventilation, the concrete's thermal mass is relatively high, keeping the space at the optimum temperature. This secondary light assists in the ambient lighting of the area through the reflected light. These doors also help in the process of natural ventilation of the space.

In this project, the objective of natural light is two-fold: to light up a sports space and ensure that such a sports facility has a lightweight and functional aura, as seen in Figure 22. This is achieved by optimising glazing and translucent polycarbonate throughout the facility, allowing natural light to enter the facility in various ways. (Slessor, 2010) This desired lightweight aura is the opposite of what is found in the typical sports facility, typically artificially lit and utilising a heavy and dampening construction method. Although the Thusong Centre similarly used concrete, its effects become less when natural light enters the space.

Figure 23 External view of the Thusong Service Centre, Standing outside the Central court and operable doors. (Ruben van Biljon, 2019)

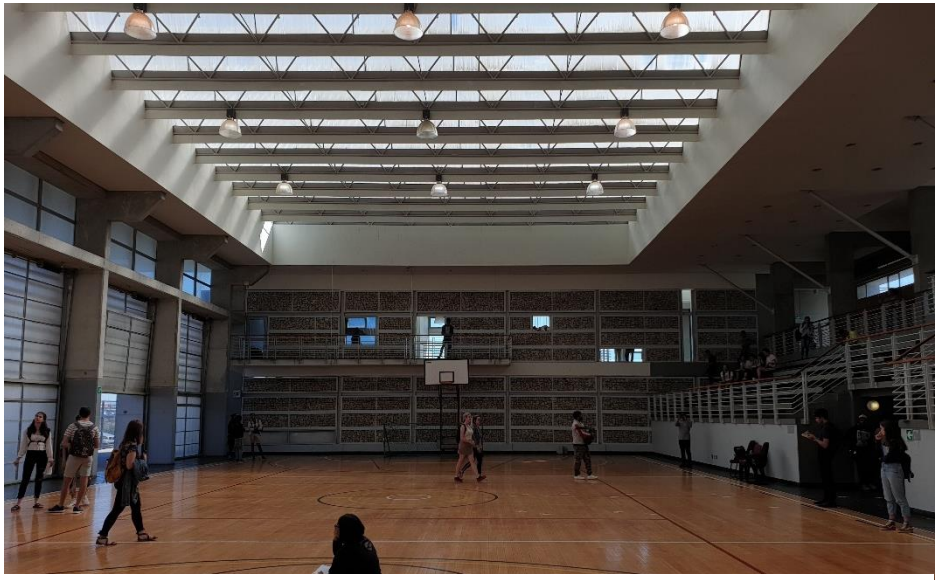


Figure 22 Internal view of the central court, with the polycarbonate roof allowing natural light to enter the space. With the seating to the right of the image. (Ruben van Biljon, 2019)

Casa Rex (Sao Paulo) – FGMF

As individuals, our understanding of space is influenced by several factors, including natural light. Natural light tends to create a feeling of comfort and hospitality towards those occupying the space. Generally, how humans interact with light, particularly natural light and space, significantly shapes our architectural encounters. For this reason, this example finds relevance in my inquiry as there is an emphasis on natural light in occupied spaces.

In the case of the Casa Rex office building, renovation and addition, there is a delicate balance between creating new light sources and enclosing previous openings. The additional part of the project is a double-volume working space. Creating a double-volume space with adequate natural lighting gives the space a lightweight sensation for the occupants. The creation of open-plan spaces also aids in the process of natural light filtering through spaces. As in this project, there is a meeting room overlooking the studio space, which also benefits from the large glazing panels (as seen on the left in Figure 25), allowing a large amount of natural light to enter both spaces, even if a glass panel might not be in direct line of sight.

The reflection of natural light is an important phenomenon which aids in lighting up an internal space. Due to the nature of the project, there is an emphasis placed on the surface treatments of new and old, allowing for an allocation of white reflective surfaces, which further spreads the path of natural light throughout. This effect is seen in Figure 24.

Natural light is optimal for illuminating a space due to its benefit of minimising energy consumption and its psychological effect on the inhabitants. However, natural light is not without its negatives, as it can be harsh if not treated with various possible disruptors or filters. Some of which are evident in this project are planting trees to filter the light (as seen in Figure 25 beyond the glazing panels on the left.) and creating ambient lighting through reflections, also known as secondary light. Another element is the reliability of natural light, causing the combination of natural and artificial lighting to be utilised. This further emphasises the concept of connection through disconnect present in the other elements of this retrofit project.

Figure 25 Double volume space in Casa Rex, with the meeting room beyond the glazing panel on the right-hand side. (Rafael Netto, 2013)

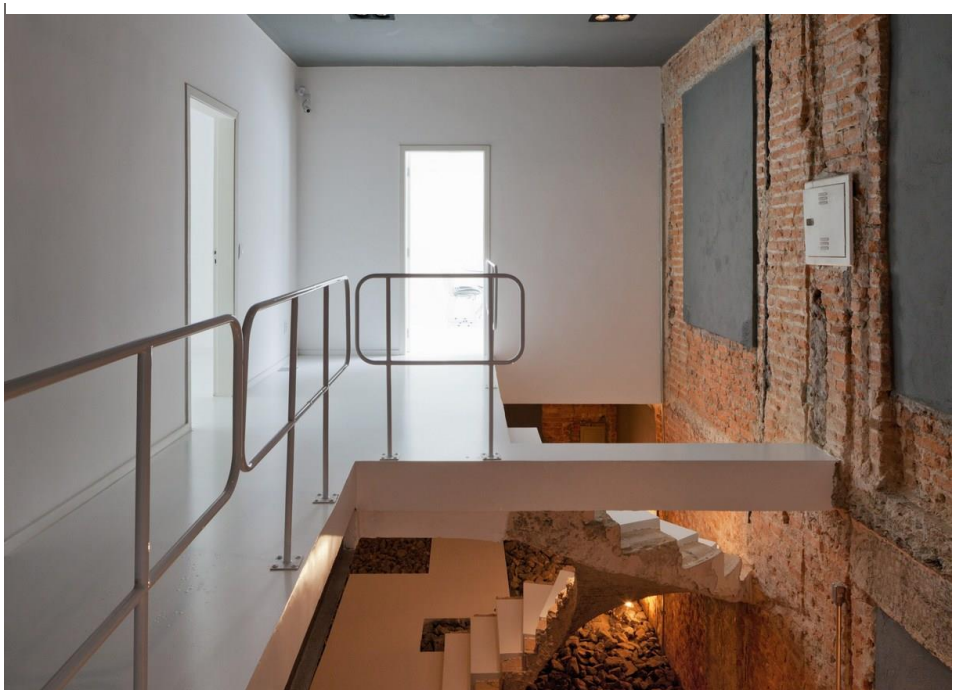


Figure 24 First floor of Casa Rex, looking at the hallway above reception. Showing the various surface treatments and their importance in contributing to natural light distribution. (Rafael Netto, 2013)

Fenix I Warehouse Renovations (Rotterdam) – Mei Architects

As mentioned, natural light significantly influences our perceptions of any given space. Natural light also influences the program of set space, as different amounts are desired for various programs. This example of a mixed-use building with public consumer space on the lower levels and private residential space on the higher levels.

The residential spaces surround an internal courtyard with various green walls, as seen on the right-hand side of the service walkway in Figure 27. They allow for a filtered light source. This creates a somewhat ambiguous relationship between the interior and exterior space. Whilst on the outer edges, a more direct natural light enters these spaces. We find outdoor balconies along the outer edge of these spaces, allowing for some solar shading restricting the direct natural light into set space. Instead, a secondary reflected light enters these spaces, creating ambient lighting, as seen in Figure 27.

Typically, structures that become such semi-high-rise facilities struggle with the level of natural light in their core. This project is an excellent example for this specific reason as it creates this massive void space in the centre, on top of the reconstructed warehouse, allowing ample natural light to enter the residential spaces. Although this problem persists in the lower warehouse levels, the solution ensures that consumer-based spaces are placed on the outer edges. This allows these outer spaces to capture as much natural light as possible, whilst the spaces in the centres are typically artificially lit. In this case, skylights have been incorporated at certain strategic places, allowing light to filter into the spaces below. In this case, these central spaces have recreational spaces, but to counter the lack of sufficient natural light, these spaces are double-volume, roughly 12m floor to soffit, as seen in Figure 26. This project displays intuitive methods of dealing with the desire for natural light throughout a mixed-use facility.

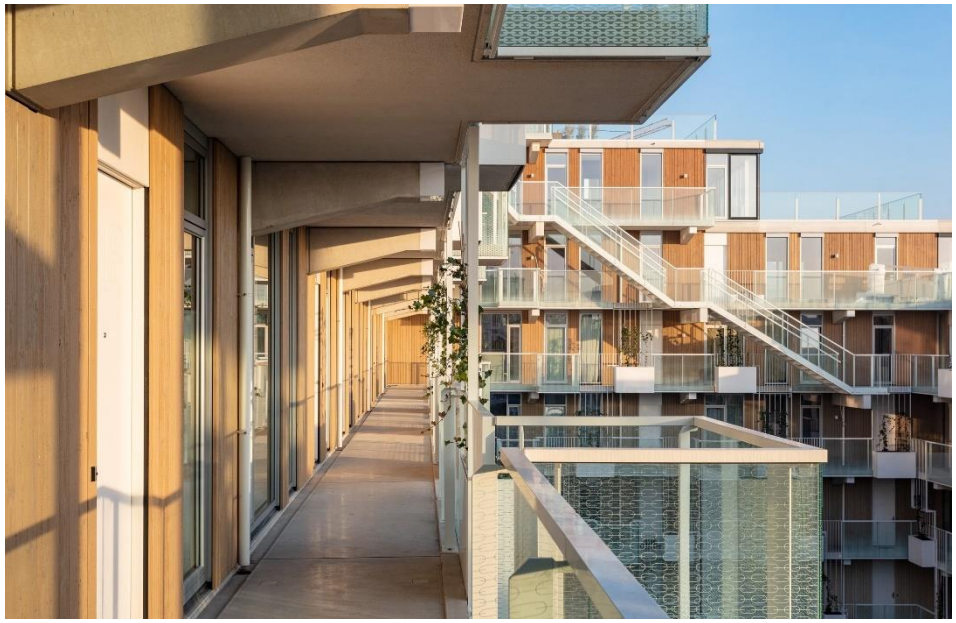


Figure 27 The Internal Courtyard walkway of Fenix 1, portraying the effect and efficiency of natural light in the facility. (Mei Architects, 2019)

Figure 26 Diagrammatic section of the Fenix 1 exploring the relationship between mass and void, Allowing for insight into depth and overhangs. (Ruben van Biljon, 2023)

Figure 29 is a diagram that gives insight into the rationale and method used by Mei Architects to include the central courtyard space. Considering the depth of such a typical unit, we can see from Figure 29 that there is an efficient relationship between Bulk and the void. This image also further gives insight into the concern of natural ventilation, which, if achieved optimally, aid the sustainability goals of such a project. Natural light is crucial to the success of any space, and this project does achieve ample amounts thereof, especially if one looks at the typical residential unit in Figure 28.

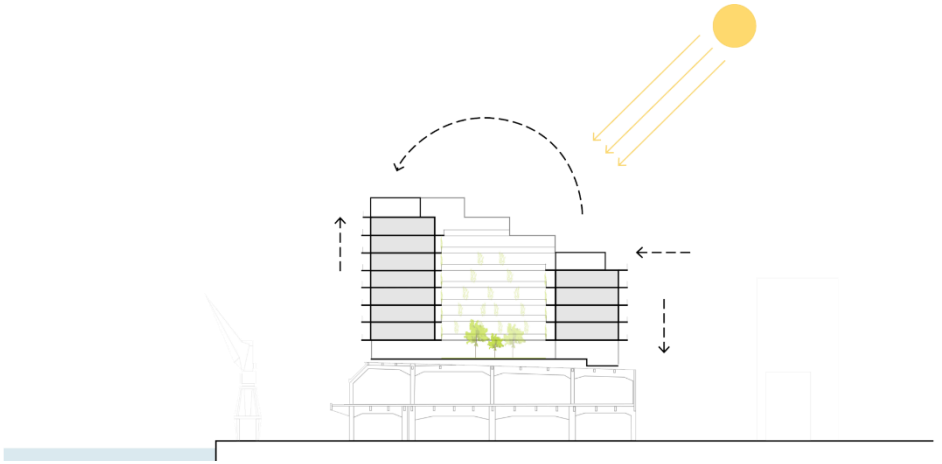


Figure 29 Diagram of Fenix 1 Shows the typical sun path and, subsequently the necessity and success of the internal courtyard. (Mei Architects, 2020)

Figure 28 Internal photograph of a typical apartment in Fenix 1. Alluding to the natural light presence in set space via reflection and direct. (Marc Goodwin, 2021)

Structural Systems of Inquiry.

_Old vs New

LOOM Ferreteria Pere IV Renovation (Barcelona) – Daniel Modol

Taking an existing building, repurposing, and retrofitting is a process that deals with layers of complicated concerns, especially the concern of heritage. It becomes a fundamentally successful project if handled with the right amount of respect and due diligence. This example emphasises connections between old and new, how to create such connections, and optimal places to do so.

This project is an excellent example of retaining some old whilst incorporating new technologies. This building forms part of a renewal incentive, where the old industrial buildings transform into modern spaces. This building is constructed using a metal structure with Catalan vault infill. As seen in Figure 30. The metal structure had been identified as a characteristic that contributed to the identity of this building, maintaining it fosters the relationship between existing and new whilst also paying homage to the previous version.

The inbreeding concept of such connections is intentionally expressed in this project as a new program, and various new modern technology elements are added to the space. This is part of the retrofitting and future-proofing of set buildings, as the aim is to increase the new space's sustainable performance drastically. (Zapico, 2023)

Regarding the facade of this building, if one looks at the green metal structure, it becomes a glimpse of what it was, paying homage to the history of what it once was. This is aided by the glazed building envelope on the street façade, allowing for a lightweight perception. Retrofitting and renewing buildings is vital in its own right. Relative respect is needed to coherently create a new facility out of the old. This example is achieved by maintaining the existing structural and aesthetic elements but ensuring the ability to differentiate through material use.

Figure 30 Image of the Original steelworks present on site of LOOM Coworking space that had been restored to become the green steelworks. (Daniel Modol, 2022)

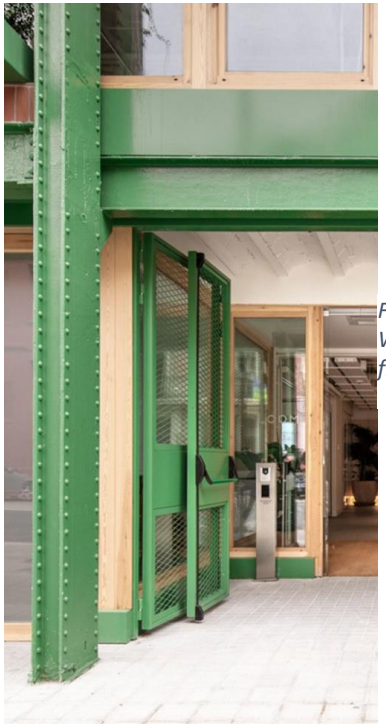


Figure 31 The entrance space into LOOM Coworking space. With the distinct green steelwork preserved and restored from the original building. (Jordi Bernardo, 2022)

Looking at Figure 32, we can see more detail of the Restored steelworks on the facility. Furthermore, the exploded Axonometric gives insight into the connections of the new Façade becoming an addition into a set parameter. If we look at the section on the left, we can see there is no major setback between the envelope and the steel façade structure, although when looking from street level, this does give depth to the facility.

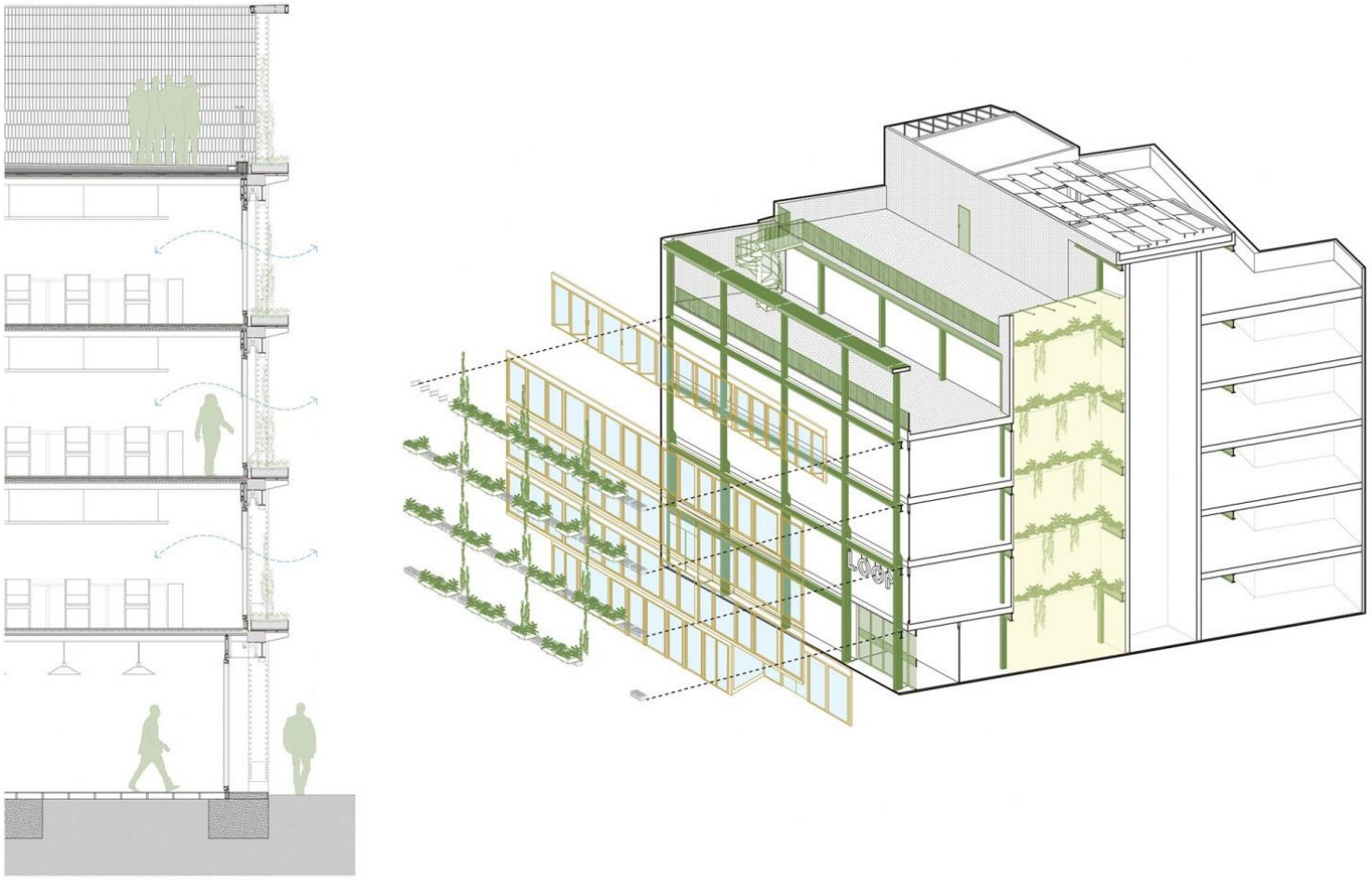


Figure 32 Sectional Axonometric of LOOM Coworking space, focusing on the new façade structure. (Daniel Modol, 2022)

Zeitz MOCAA (Cape Town) – Heatherwick Studio

This Project is based in Cape Town, South Africa, in the famous V&A waterfront complex. In its previous life, the building housed multiple grain silos and an elevator building used to displace the grain.

This Retrofit project underwent significant construction to transform this industrial building into a modern art gallery, hotel and restaurant space. As mentioned, the existing building was constructed with pure functionality in mind. This building is a concrete frame construction. This allowed various elevator tower infill panels to be removed and replaced with kaleidoscope glazing panels.

Although there are various significant alterations that the existing building has undergone, one such alteration is the void cut into the existing concrete silos to create a grand atrium space (Figure 36). During any retrofitting project, there must be a delicate balance between demolition and addition. In this case, the building was abandoned, and the new program had been altered to the opposite of its former version. The Atrium space is one of the most predominant spaces to see this connection between existing and new. In Figure 33, in the middle is where the atrium space is excavated. The silos had been Cut and chiselled away, sawing equipment as seen in Figure 34. The critical point is that if there had not been any of the existing left over, the newly excavated atrium space would not have the same aura and significance. It emphasises the importance of the relationship between existing and new, as typically, one can not exist without the other.

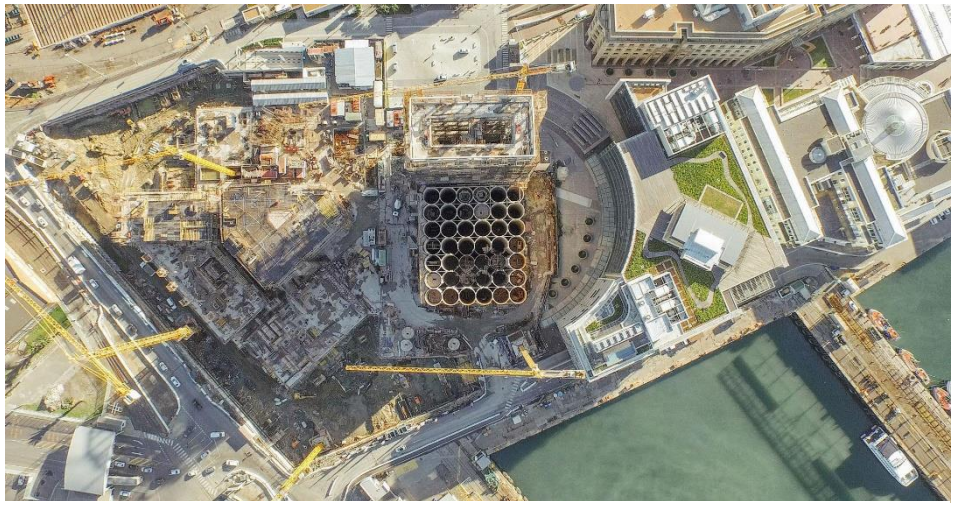


Figure 33 Heatherwick studio's Zeitz MOCAA, in the middle of the excavation process. (Heatherwick Studio, 2017)

Figure 34 Zeitz MOCAA saw blades used to cut away the concrete silo tubes. (Heatherwick Studio, 2017)

This once-abandoned building became the perfect opportunity for such a retrofit project as it would already supply the structural integrity. This project shows how the connection between new and old can vary between harsh and subtle depending on the necessity. The prominent atrium space created by cutting a void into several silos similarly pays homage to what it once was while creating a new space inside the old (Figure 35). This project has various juxta positioning of the new vs. old surfaces. Regarding the new, there is always a consensus regarding aesthetic choices.

Figure 35 Zeitz MOCAA while placing the new stairs inside the existing silo tubes. (Heatherwick Studio, 2017)

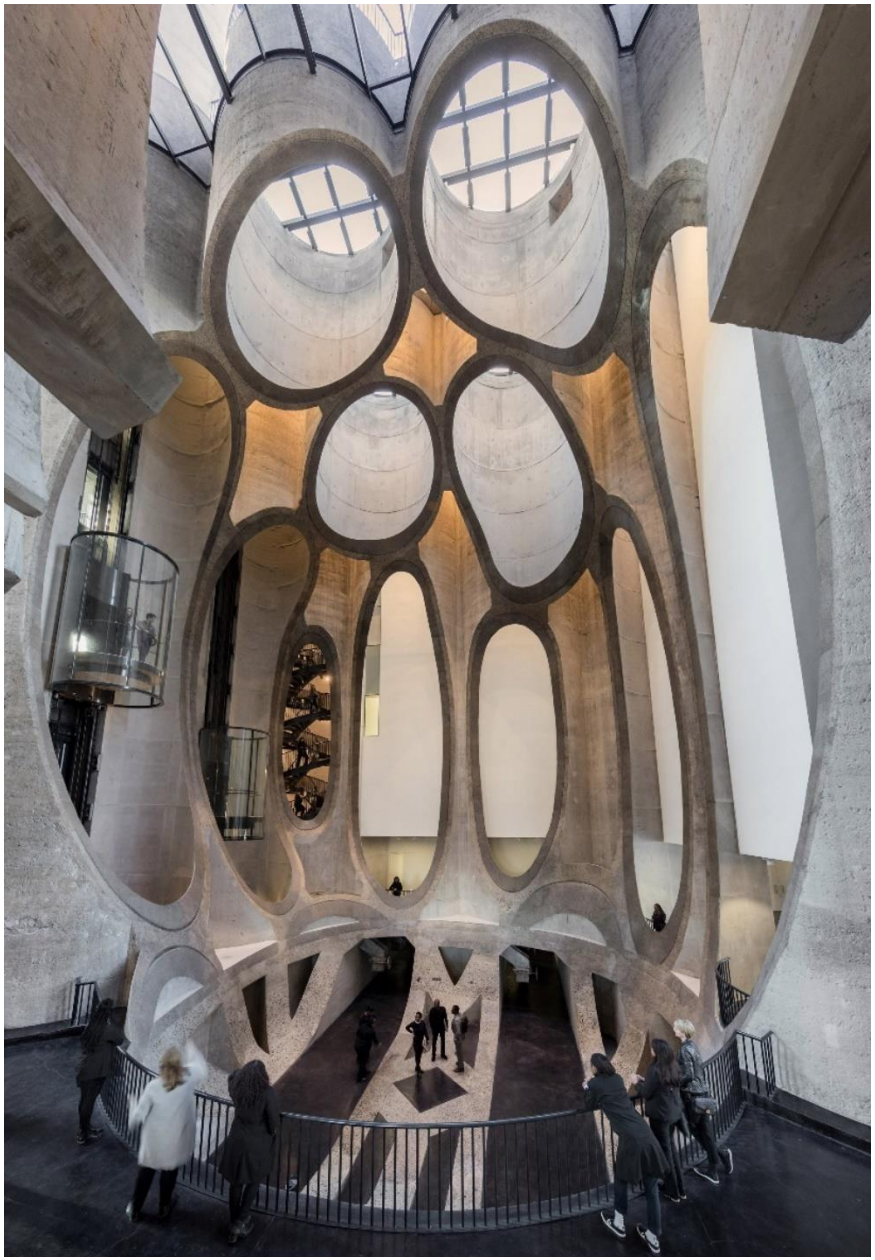


Figure 36 Zeitz MOCAA Atrium space, internal view of the cutaway Silo tubes. (Heatherwick Studio, 2017)

Transitional Thoughts

As per my inquiry, I am attempting to create a narrative through association and combination of the various aspects in forming a mixed-use development with a strong focus on sport and physical activity. Creating such a development is challenging as one needs to focus on a mixed-use typology whilst including a sports typology, and, depending on the site, it is typically concerned with retrofitting a space to achieve it all.

This is why during the technical focus of this enquiry, there has been a strong alignment with human interaction of such spaces and places. These illuded to the concepts of making space and the importance of balance, especially considering the involvement of mixed-use. There is not only one singular concern but multiple, as such developments typically have more than two different programs and users. This inquiry is necessary for mental well-being and mental and physical development theory. For this reason, this inquiry is needed and substantial.

Through the technological approach of finding a corresponding narrative aligning with the principles from set theories, I aim to engage with the Velodrome site. However, this site will be approached with a network of similar potential developments in mind and not be to be seen as individuality. This inquiry focused on research into mixed-use modalities combined with concepts of reuse and retrofitting through the lenses of sustainable practice, social interface and accessibility in an attempt to reimagine the status quo, especially concerning mixed-use.

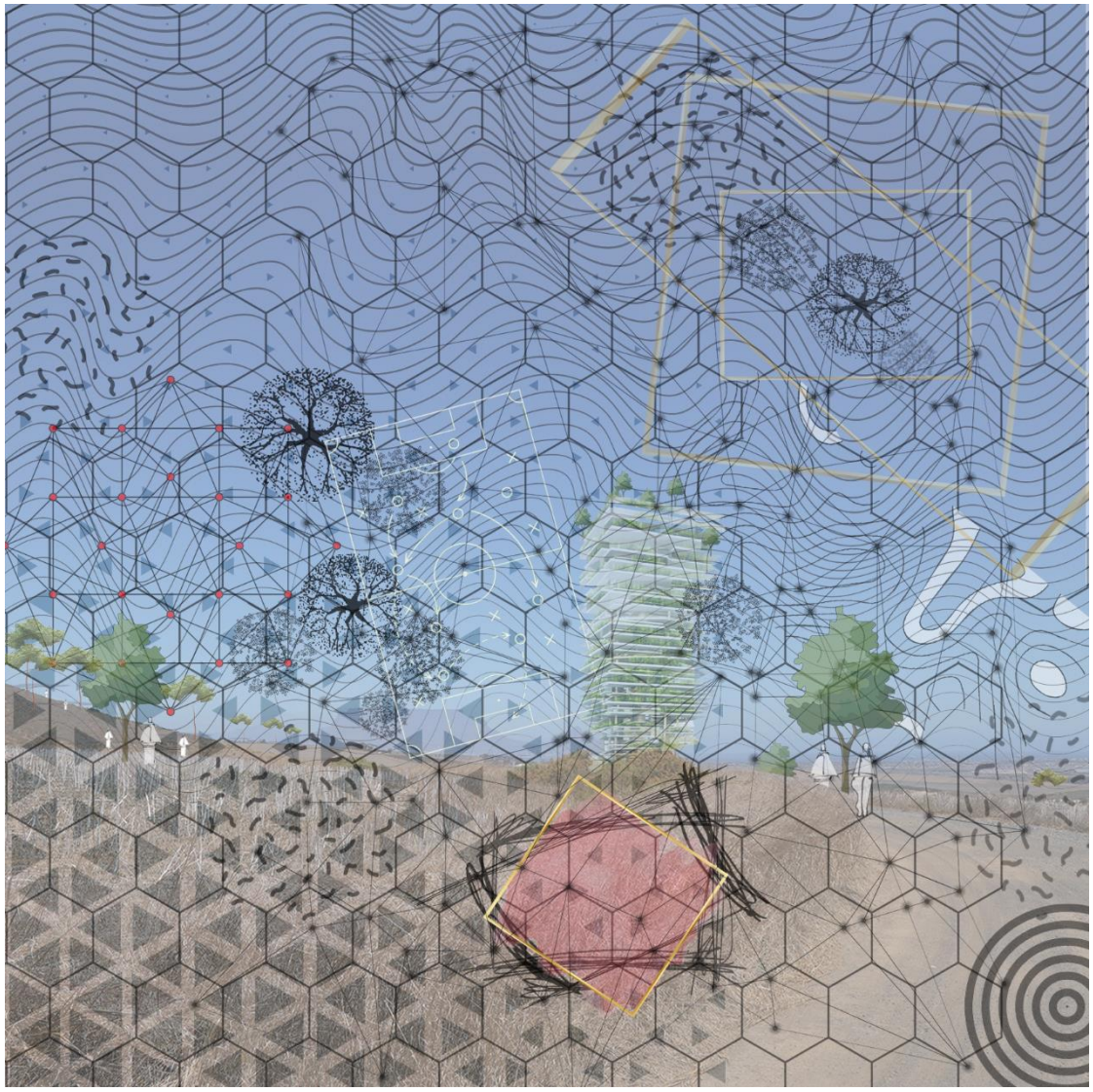
It is necessary to understand the role of sports in everyday life through all its (sports) shapes. Therefore, introducing and including sport into the spatial syntax of the architectural perception of everyday life is of utmost importance.

_Brief

To Design a Mixed-use development with a particular bias toward sport. A development which is set to blur the boundaries between sport, work and living. One of the critical design aspects is the focus on creating a community interlaced with various sports possibilities. Emphasis should be placed on the mixture of the three crucial aspects of mixed-use: residential, commercial and Sports. Within the design, there is an emphasis on the ‘internal’ community, whilst there is also a focus on a connection to a more extensive network of potential similar developments, allowing for a broader ‘community’ connection.

_Concept Development

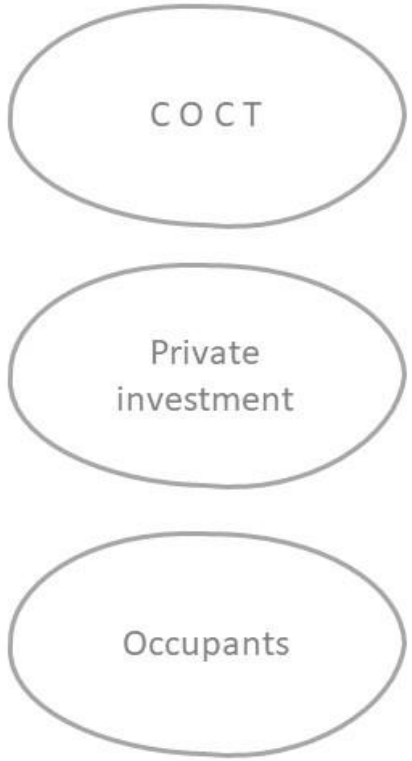
Initial concept development, exploring the nature of layered grids and various infrastructures. This piece also explores the impact of natural landscape on such layering whilst simultaneously looking at plan and elevation. There is a constant comparison between rigid and fluid patterns that form through layering. This gives insight into the Metamorphosis principle of an everchanging and developing space.



_Stakeholders

There are various Stakeholders present in this project. These can be categorised into three categories: Private (Private investments), Public (Occupants) and Governmental (City of Cape Town). COCT is involved due to the ownership of the site being a municipally owned facility and property. Private investment is one method of finding a solution to the issue regarding funding. As such, a development offers private investment opportunities through various spaces potentially available for specific economic gain if the need is met. Occupants in this section can be divided into three further groups, namely, live(resident), work(commercial) and play(sport). The occupant group becomes the new life of such development as they determine its success and effectiveness.

Typically, these variations in the groups of stakeholders all have a certain amount of flexibility as they are all connected and dependent on one another. Although each of these similarly has different requirements regarding their needs and desires, this development is to create a space where all stakeholders are satisfied. With this said, there is a certain degree of bias toward the occupants as they are inevitably the users of set space; thus, they get to set the standard.

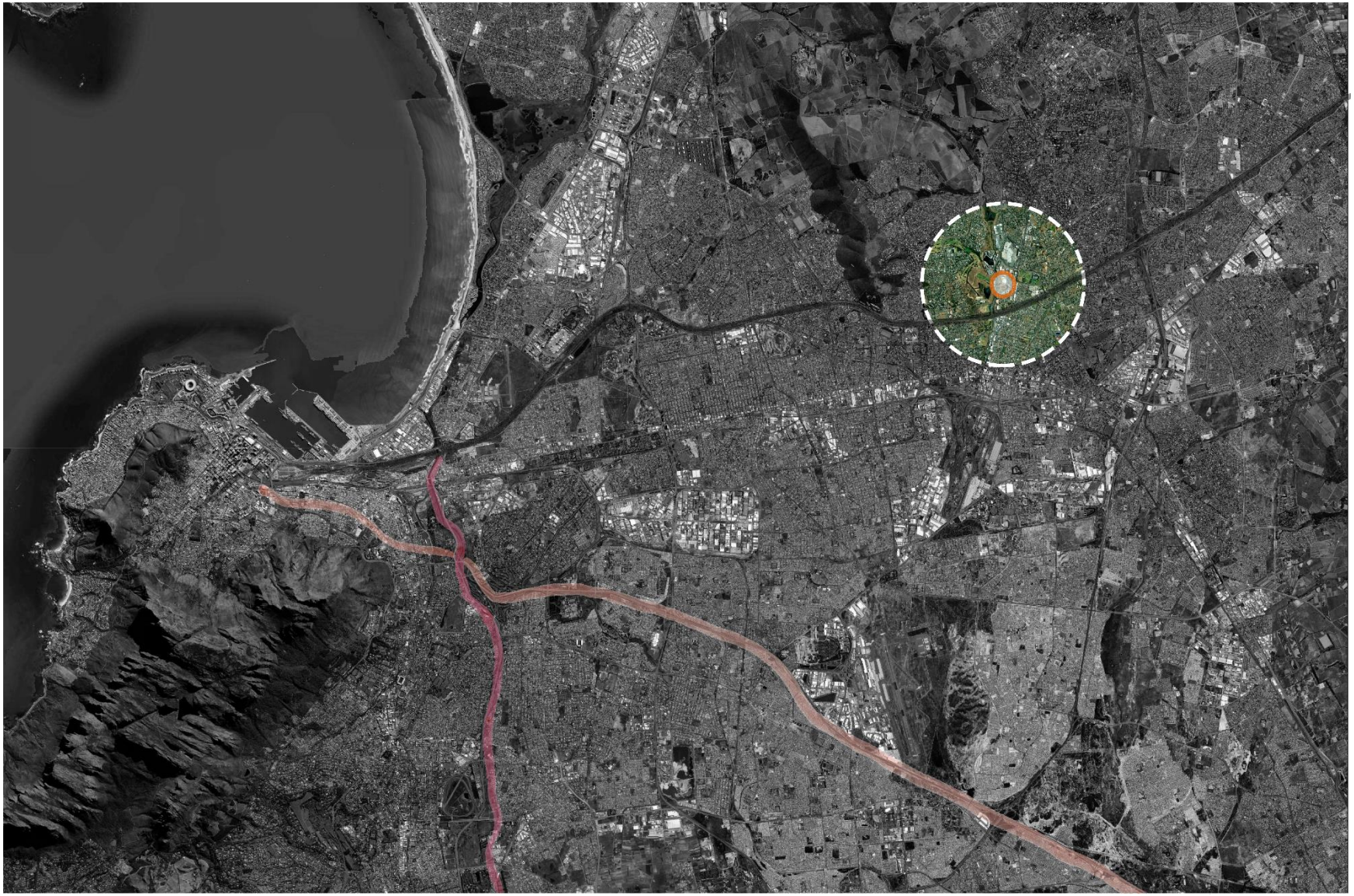


_Site documentation

Site Location

In the Northern Suburbs of Bellville, 23 km northeast of Cape Town, South Africa. Just off The N1 Highway, along the Tygerberg nature reserve, with various shopping centres nearby.

The Site is an existing sports facility known as the Bellville Velodrome.

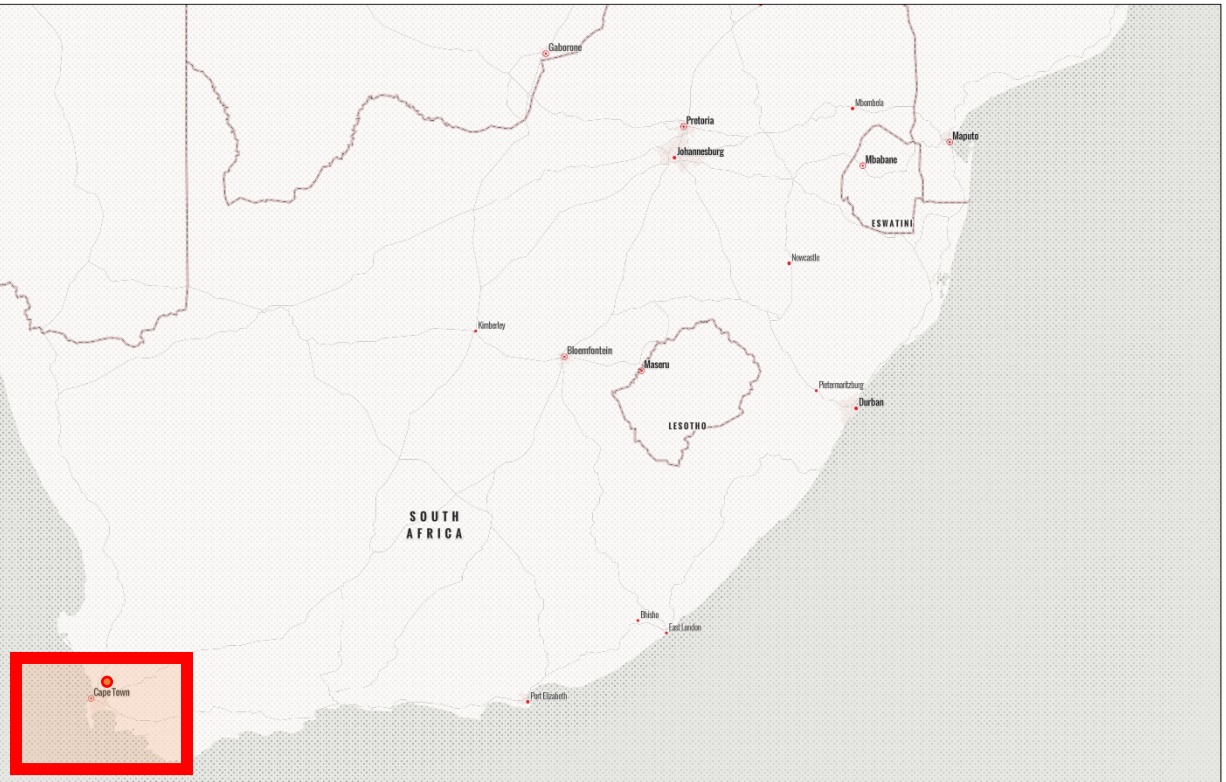


_Site documentation

Site Location

1 : 5 000 000 on A1

South Africa.

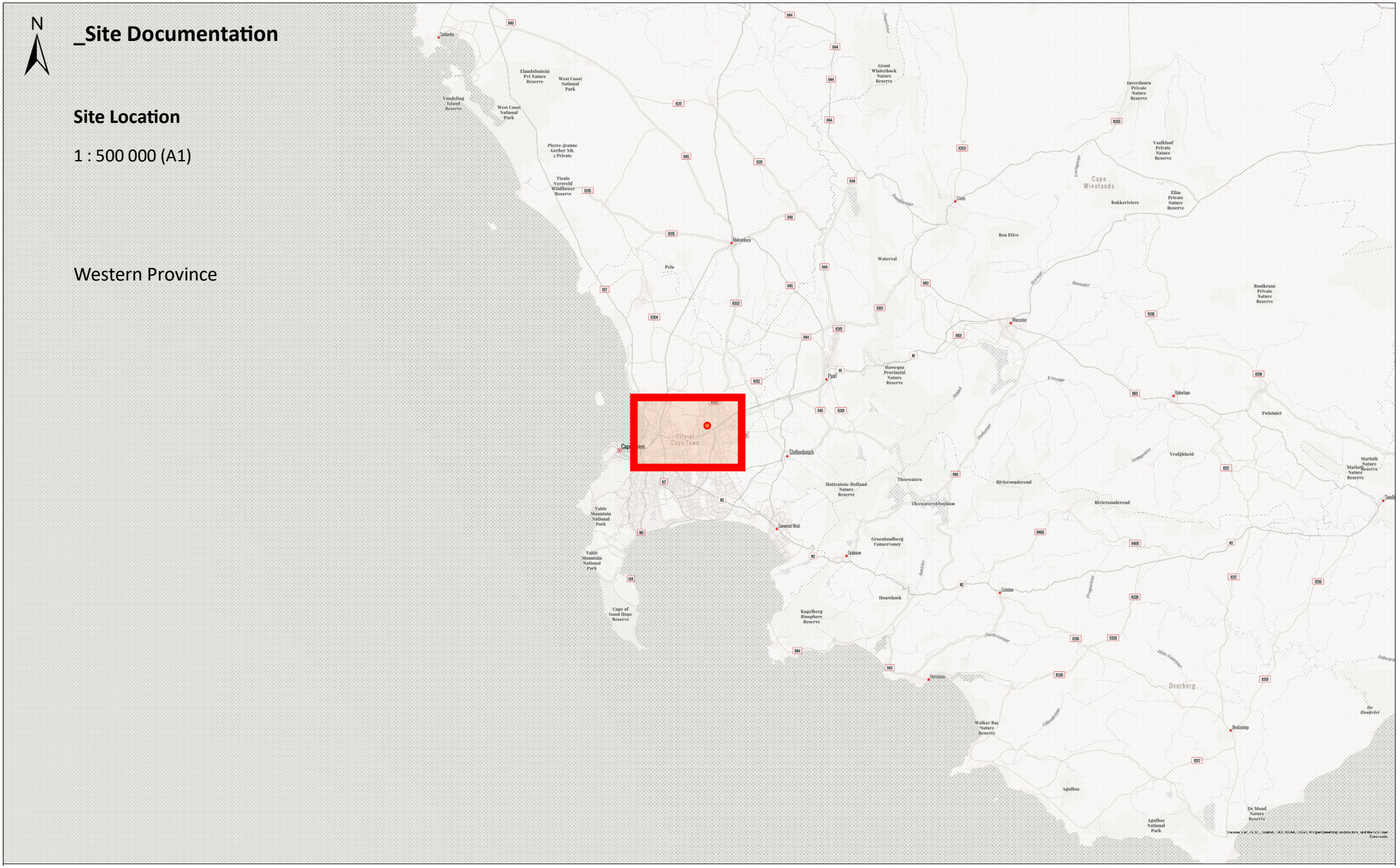


_Site Documentation

Site Location

1 : 500 000 (A1)

Western Province

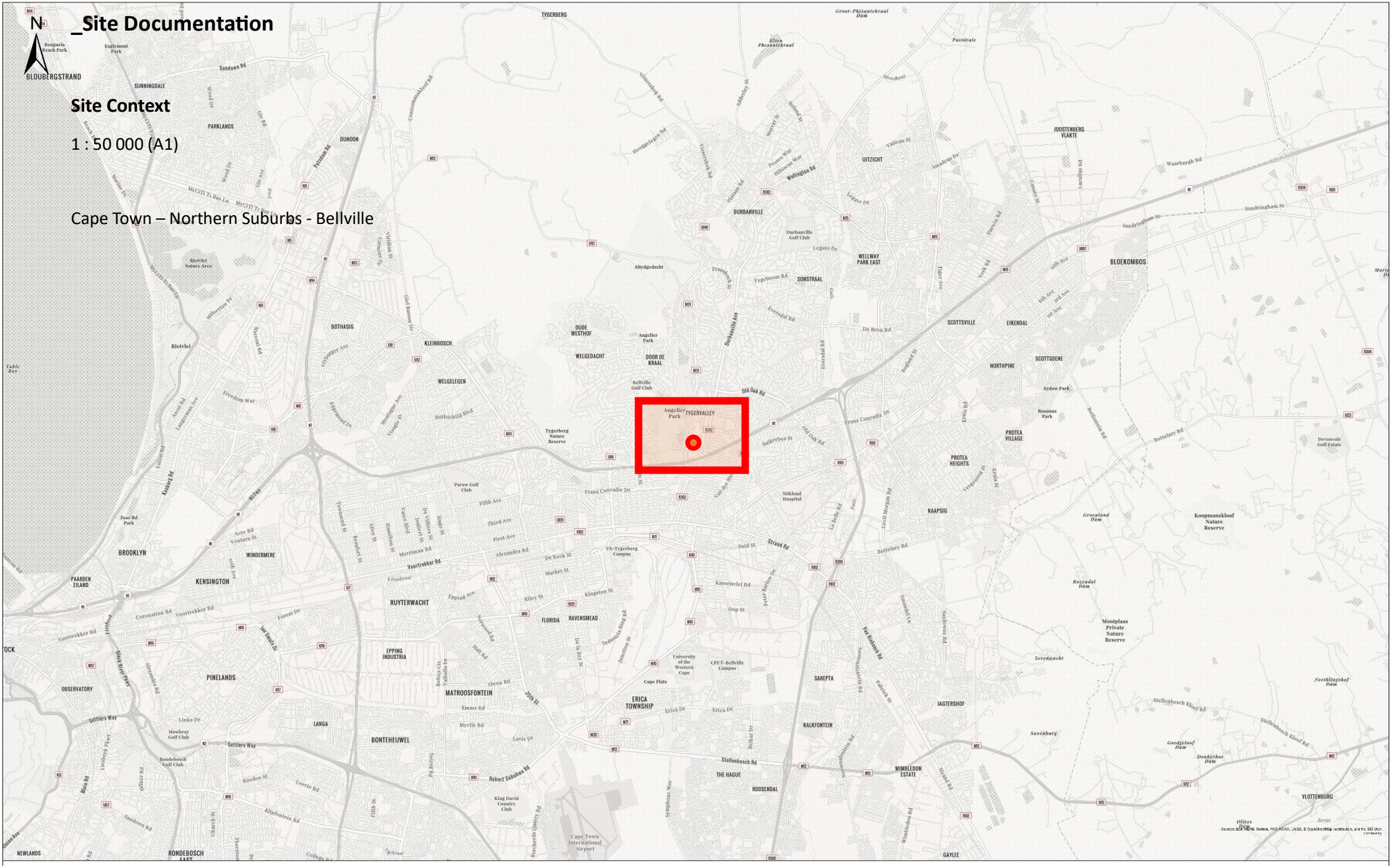


_Site Documentation

Site Context

1 : 50 000 (A1)

Cape Town – Northern Suburbs - Bellville



_Site Documentation

Site Context

Completed in 1992, in correlation with the Olympic bid for South Africa. This 11.5-hectare site is surrounded by various commercial facilities, except for an old, abandoned quarry across the road.

This Facility consists of 3 elements: a 250m indoor cycling track called the velodrome. A full-length athletics synthetic track and a grandstand facing the athletics track further housing some admin spaces. This Facility is surrounded by various primary and High schools, which have all used the facility, although this is no longer the case as maintenance has not been kept up for quite some time. As a result, the Velodrome space has been utilised for various concerts, other sporting activities and functions, creating a much broader catchment area, although still underperforming in terms of its intended design.

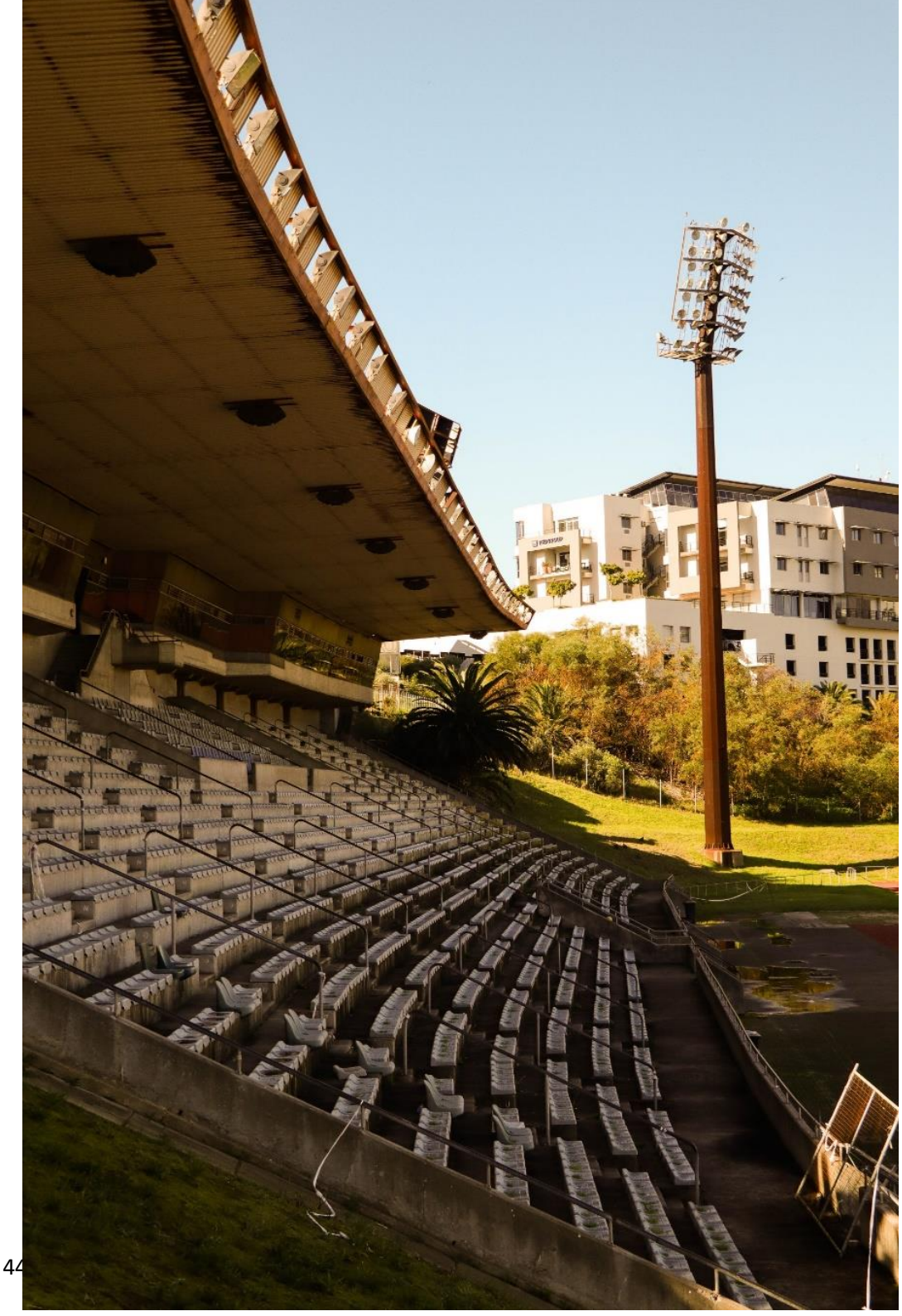
As seen in both these images, this Velodrome site is within a commercial corridor surrounded by two boulevard-style streets (Willie van Schoor Ave. & Carl Cronje Dr.) This strip has little to no residential space for a kilometre either way.

_Site documentation

Existing Photographs

The existing built masses have been constructed using mainly Concrete with elements of steel cladding. This image presents the grandstand facing west over the synthetic athletics track. Due to the steep slope on-site, the grandstand utilises the oblique spaces sublimely as the raked seating follows the site's slope.

This grandstand can house an impressive 3200-seating capacity, which is unique in the Northern suburbs of Bellville. This grandstand is a transitional space between the athletics track and the administrative side of the facility between the Grandstand and the Velodrome. The facility can cater for athletics during nighttime as sufficient floodlights are on site, although they are no longer operable due to a lack of maintenance.



_Site documentation

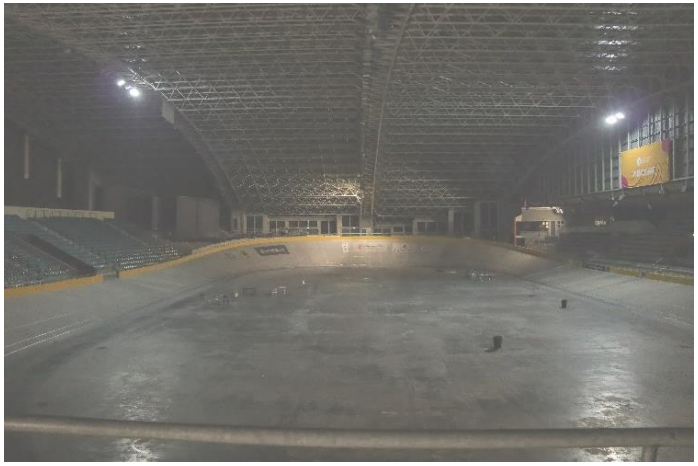
Existing Photographs

This is the existing Athletics running track and Bellville stadium on the right. This image is taken from east Looking to West across the site.

_Site documentation

Existing Photographs

These images represent the existing facility from its surroundings, at its entrance and inside the enclosed velodrome space. These images allow one to understand the scale and sensation when visiting this facility, a sensation of abandonment with potential.



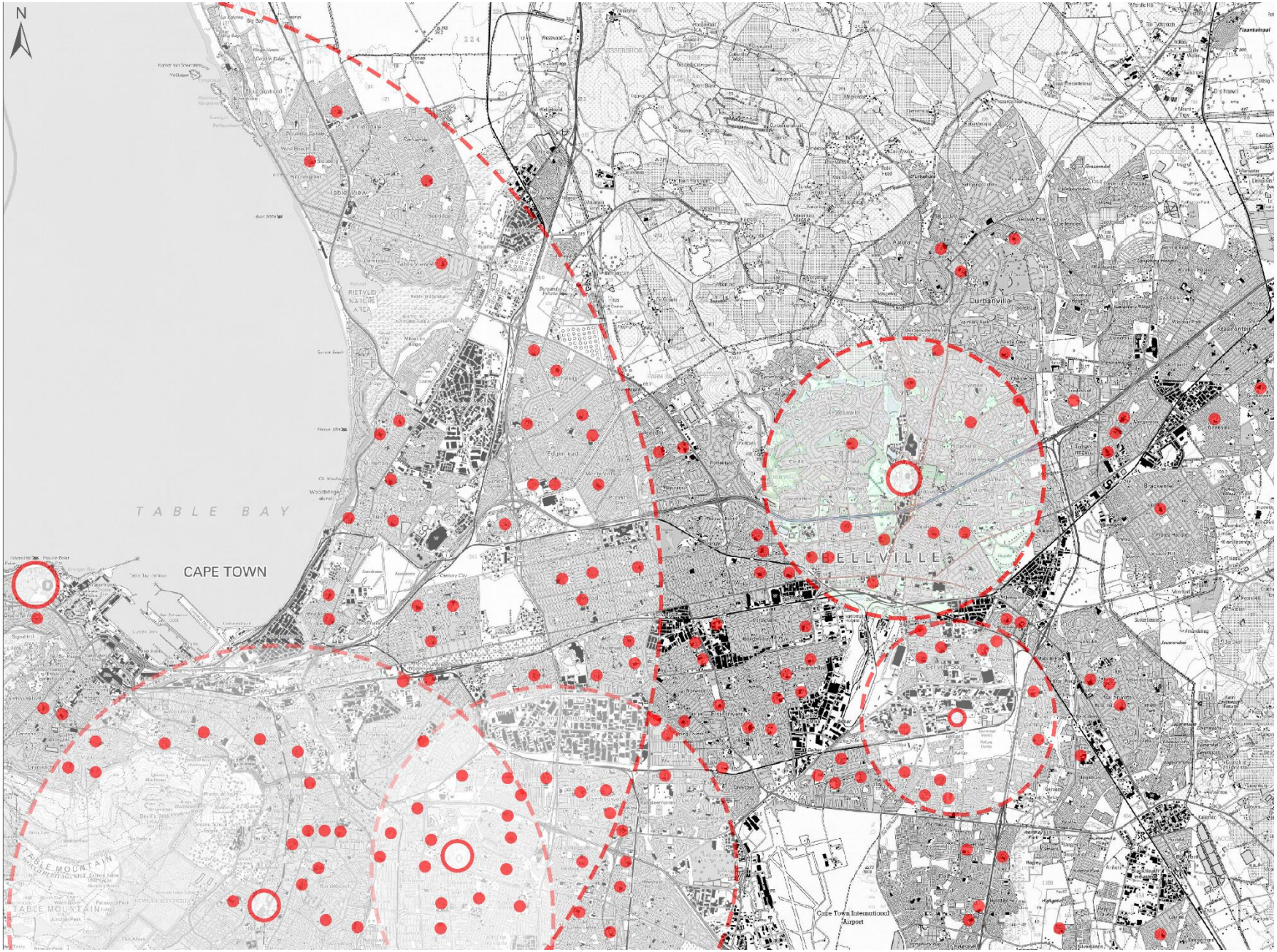
_Site documentation

Network of facilities.

1: 50 000 (A1)

A map exploring the network of various schools and sports facilities. This map aims to extrapolate the interconnected web of catchment areas of the various sports facilities such as Greenpoint, Athlone Stadia and the Bellville Velodrome, to name a few examples.

These facilities are all in a similar category as they typically only have a singular primary function to serve a particular elect group, with fluctuations of occupants in the form of spectators.

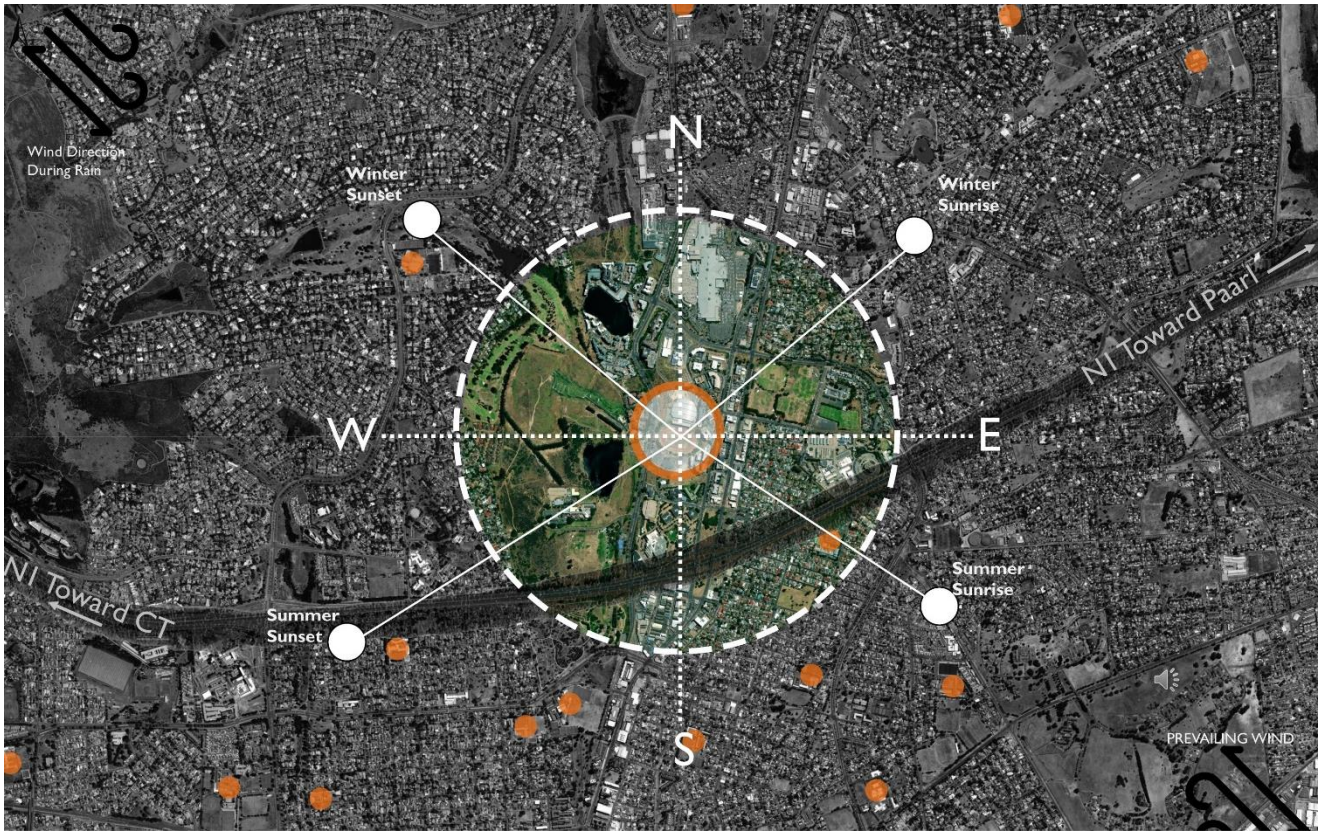


_Site documentation

Site Analysis

This map gives insight into the potential orientations and placement of interventions on the site. It further gives insight into the existing Precinct of the site, with the eastern side being a mixture of various commercialised spaces, with a golf course and abandoned Quarry on the Western Side. To the Northern side, we find Tyger Valley shopping centre, with the N1 Highway on the southern side of the site. Beyond the Dotted 1.5 km Radius of the site, there are various residential spaces from low – High-density housing.

The Orange Dots on this map refer to the various surrounding Schools, which multiple used to utilise this facility for various athletics meets. This is no longer possible due to the neglect of maintenance of the built structures and the required surfaces.



_Site documentation

Figure Ground

1 : 5 000 (A3)

This Figure Ground map Clearly enables us to understand the relationship between built and open space in and around the chosen site. The map has a Red dotted line representing the site boundaries.

A low concentration of built mass is present on this site and within its immediate surroundings. With higher concentrations toward the eastern side, the low-rise residential partially comes into view.

This low concentration gives insight into the site's potential while simultaneously supplying insight into the potential challenges. This low concentration instinctively would want to be preserved, which generates issues regarding the habitation of such space. The figure-ground and contour maps supply ample information regarding master planning for the set site within its precinct.

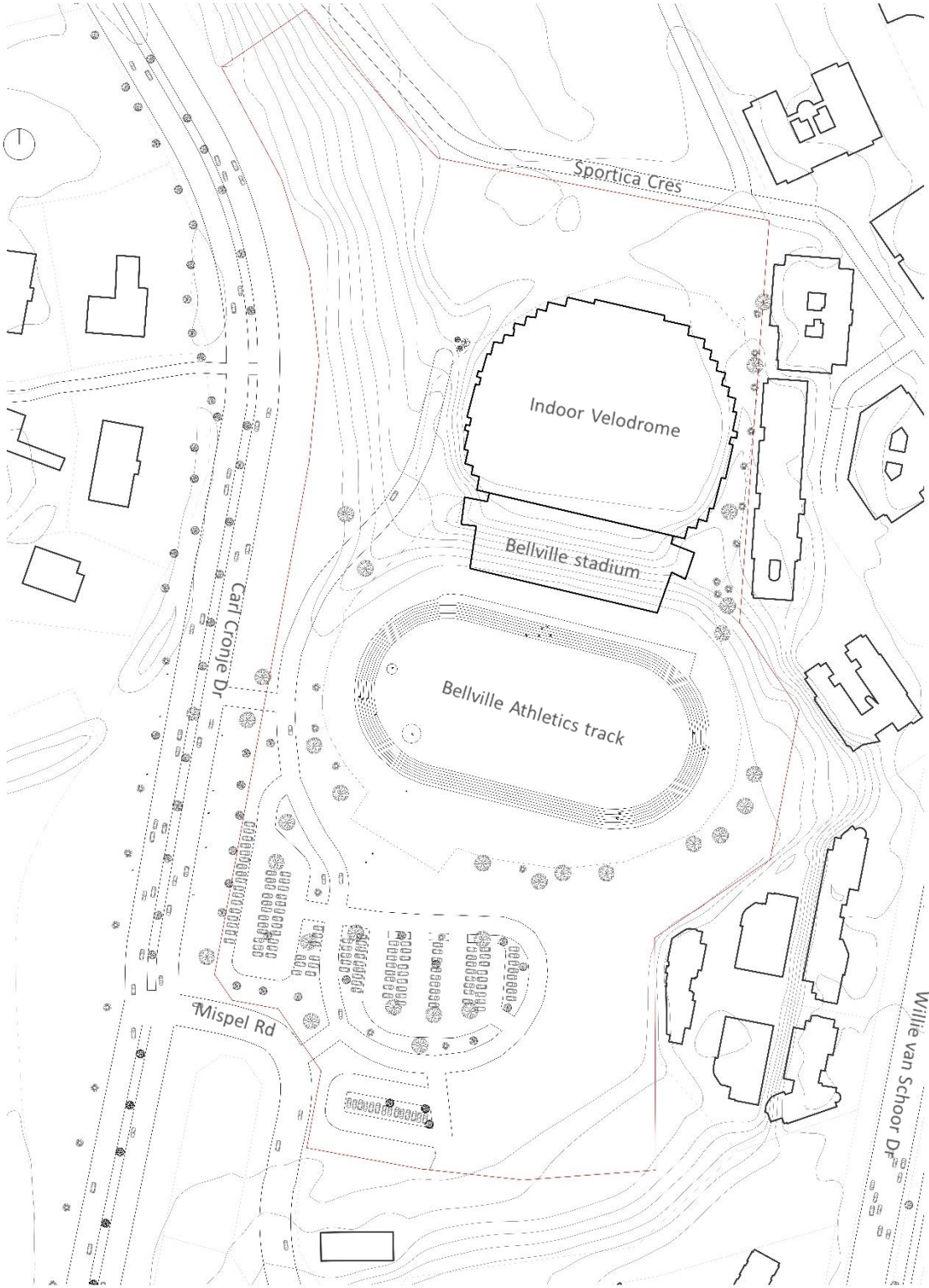
_Site documentation

Existing Site Plan

1 : 500 (A0)

The existing site leaves much up to the imagination as not much occupation is happening across the significant site. Apart from the Velodrome, Stadium, and athletics track, there is only a limited amount of Parking, which causes major issues in the event of a significant event happening in either of these spaces.

Accessibility is also an issue, as there is only limited vehicular access from one side of the site, with minimal recognition of pedestrian movement. The site's Northern edge is deserted and used as parking for nearby commercial properties. Due to the neglect in maintenance, there has not been a sustainable upgrade of specific issues present on this site over time. Resulting in being a partially abandoned facility with significant potential, which is explored through this project.



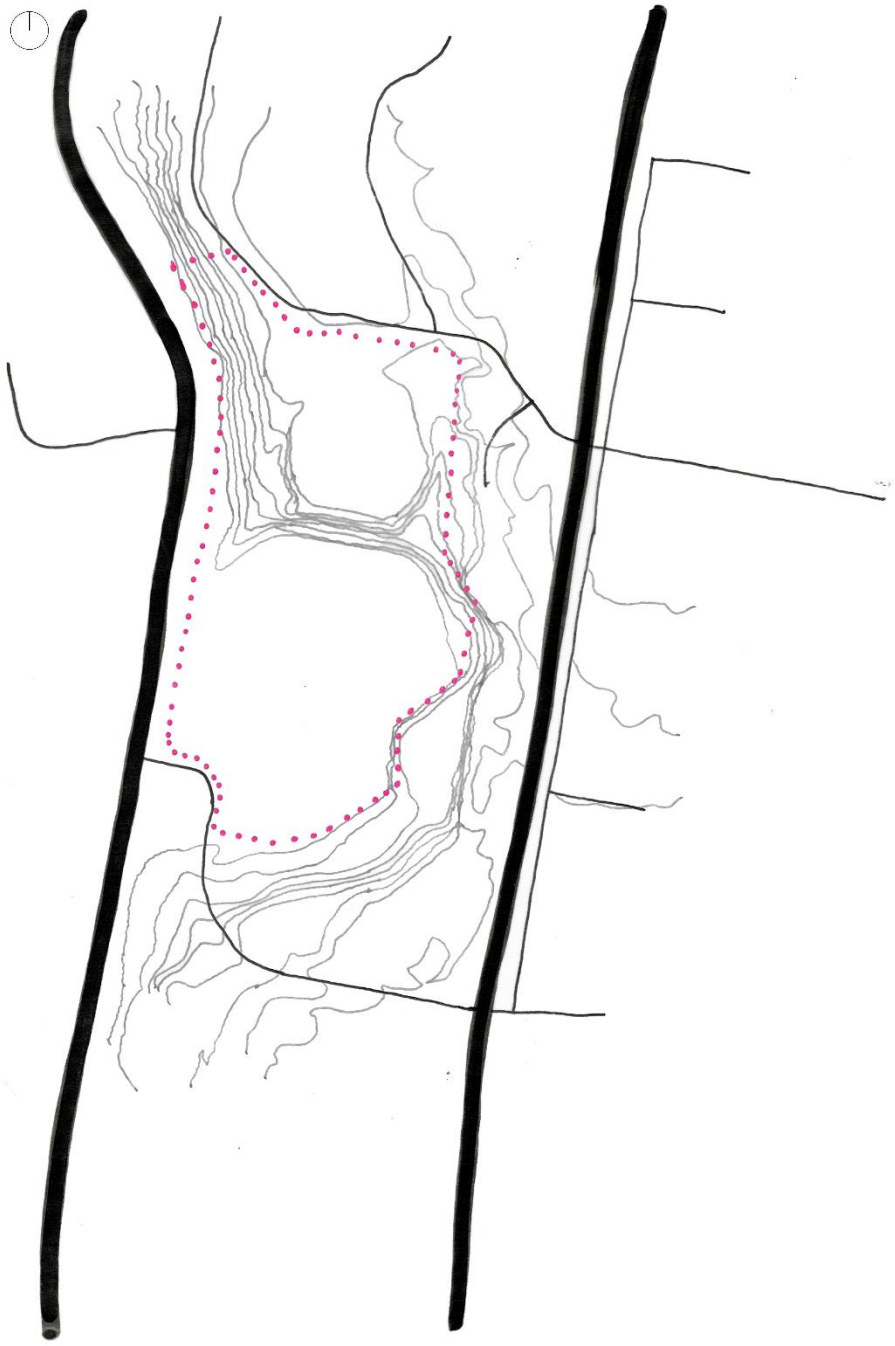
_Site documentation

Site Challenges

A slope on the site creates a height difference between the lowest point (western side) and the highest level of 18 meters. This creates a challenge as the concept of a walkable mixed-use development typically sufferers if the slopes present are too harsh. Some mitigation within this challenge is that the level changes are concentrated, forming ridges.

Another challenge present is the issue around accessibility, as the depth of the side (West to East) is upward of 200 meters. We are seeing that the western primary is the main connection to infrastructure.

The scale could pose a potential challenge as the site is 11.5 hectares. This poses potential issues for inhabiting such a site. However, this creates an optimal opportunity to incorporate mixed-use and sport into one development.

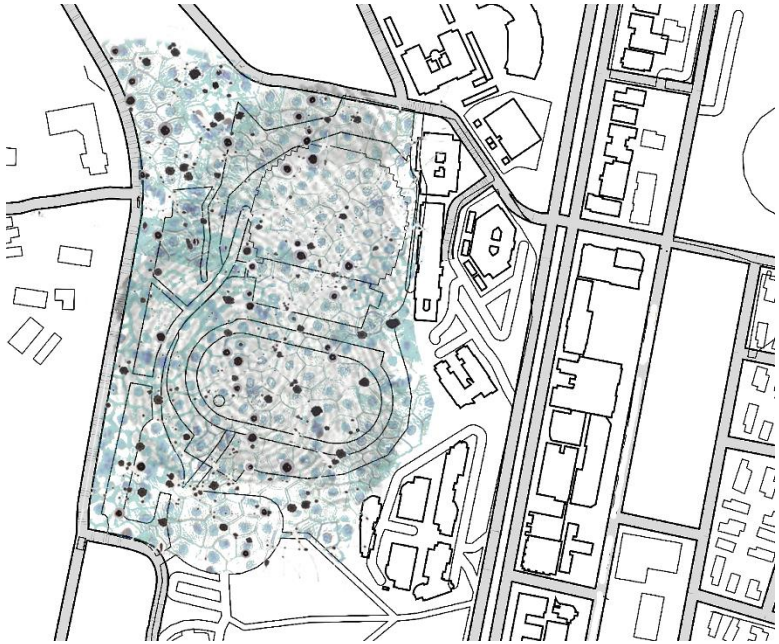


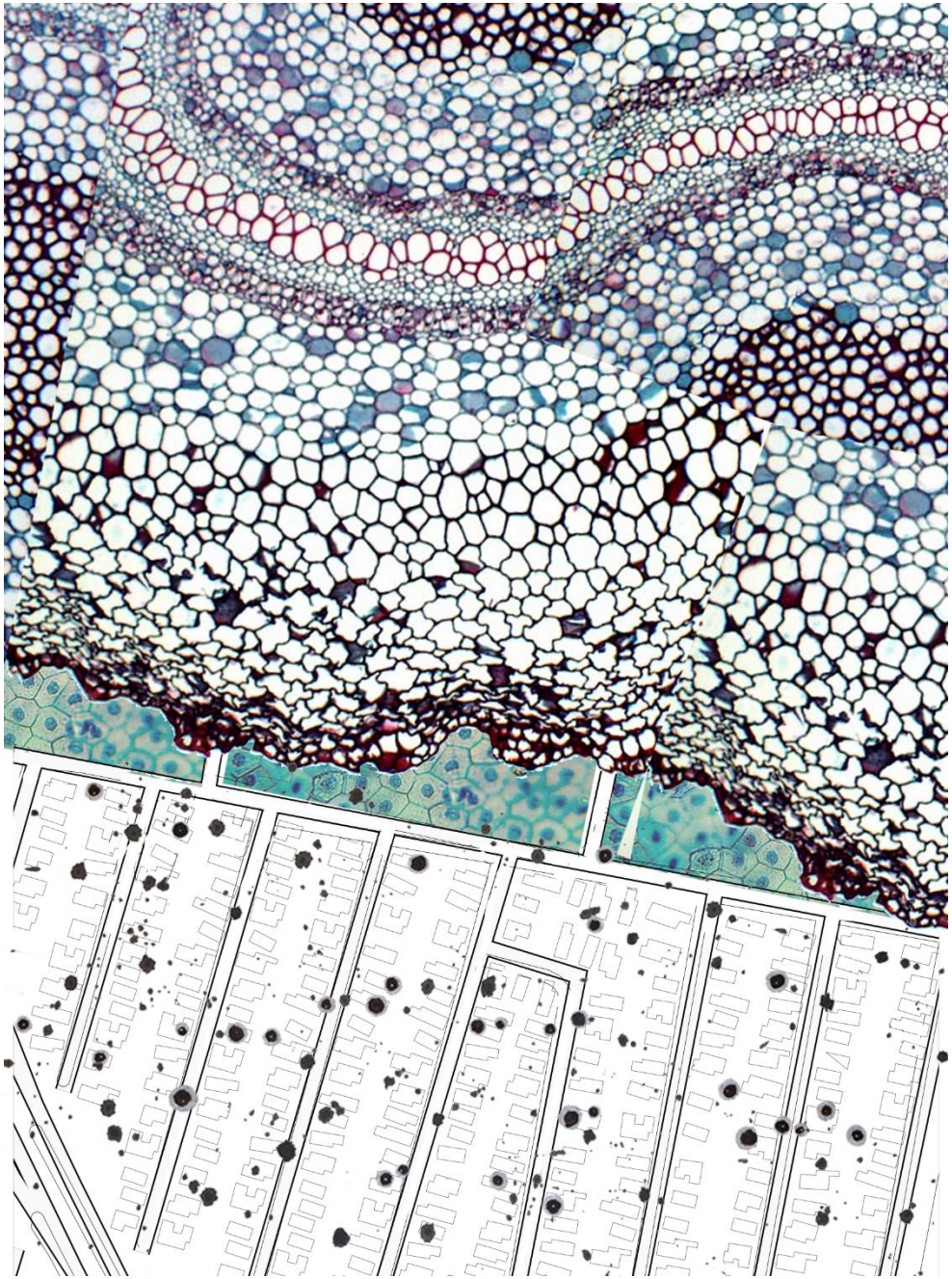
_Site documentation

Site opportunities

This site finds itself amid a typical orthogonal layout; thus, there is an opportunity for a metamorphic way of rationalising the site layout. This is achieved by overlaying a cellular organic layout onto the site and attempting to find a specific rationale. As seen on the right-hand side.

However, this overlay gives insight into the potential for an organic layout within the surrounding cartesian formatting method. As seen in the image below, there is a potential for form-making through nodes of interest, with circulation potentially following the paths of the cellular elements.



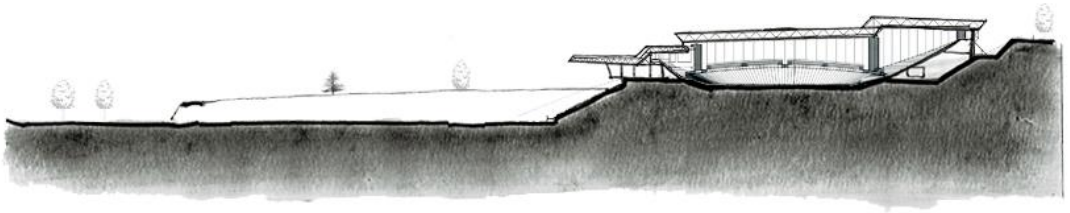


_Site documentation

Site opportunities

The facility spans a height difference of 18 Meters, as evident in the section. This section explores this immense height difference and the juxtaposition of built mass vs. open space, as seen in the figure-ground map. This site section gives an insight into the potential opportunity of creating an anchor/bottom end to this site, especially seeing as this section cuts through the transitional space of the grandstand. One can see the need for another such a transitional space.

The abstracted version of this site section, in the form of a noise section, looks into the typical occupied space noise generation. Like the as-built section, one sees a concentration toward one side instead of a balanced diagram. This further emphasises the notion of the need for balance to be installed across the site through another transitional space and, ultimately, the creation of an ‘anchor’.



_Site documentation

Site memory

This site used to Function as a gathering space for various schools from the surrounding area and a high-end indoor cycle track. However, over the years, as new facilities have presented themselves and this one relaxed in terms of maintenance, fewer and fewer users utilised the space, bringing into effect its current state of a ghost facility with some minor activity but a far shout.

From its prior glory. This project aims to re-activate such an essential node in the community. Both through the addition and retrofitting of the existing, to ensure a much more adaptable use and hence longer lifespan.

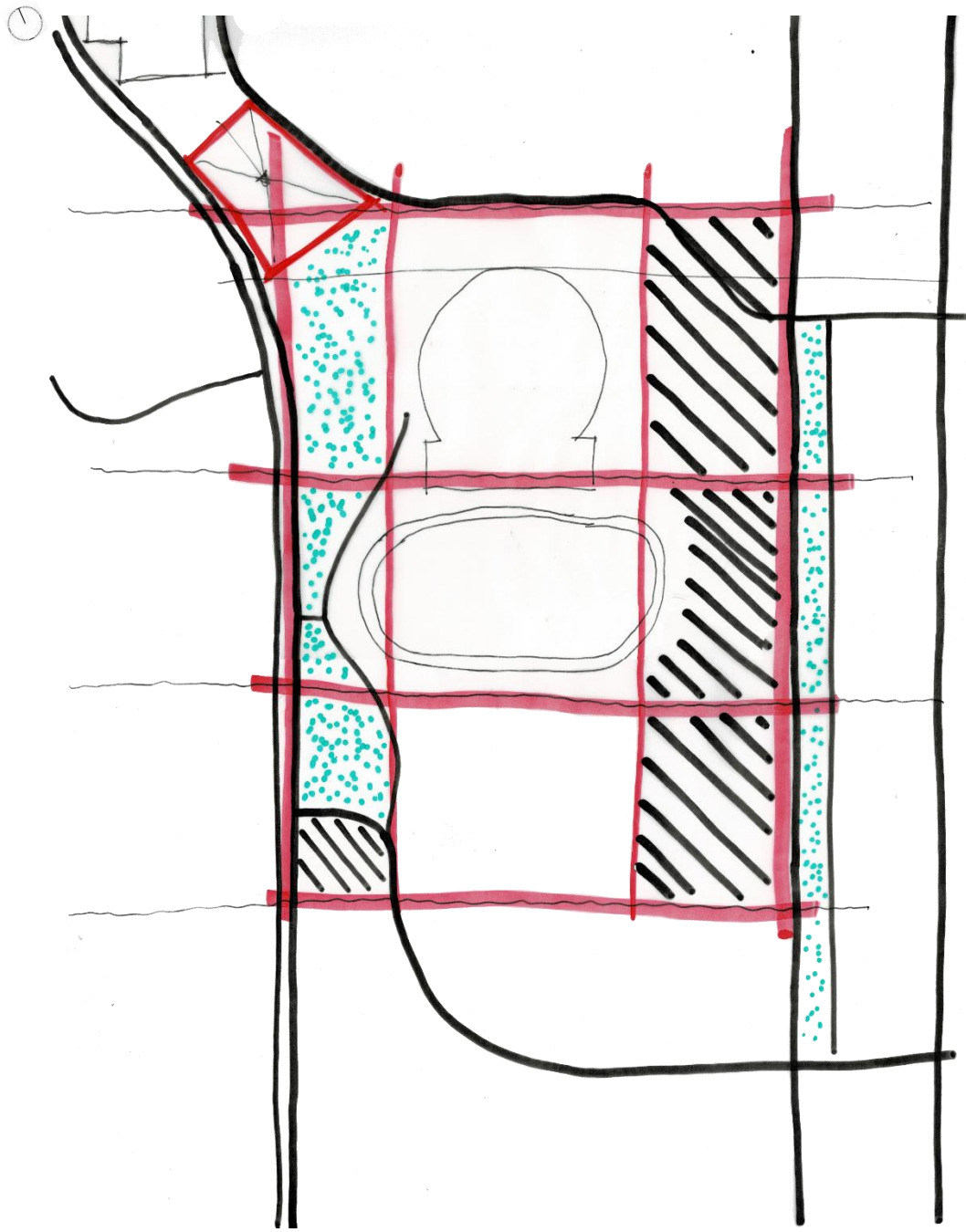
_Site documentation

Site rationalised

This is an attempt to rationalise the site, exposing the possible focus areas of the site. This segment of the precinct has been selected and divided into nine identifiable segments, with three on the eastern side being the existing commercial space next to the site. Creating a central focus spine balances commercial and potential green spaces.

The central spine of focus allows insight into the need for the sight toward the southern side, creating an anchor node to attempt to bind all the elements on site together.

The cartesian rationalisation is imposed due to the relation to the contour map and connecting to the boulevards surrounding the precinct on both sides. This method enables identifying and certifying the potential needs and their locality on the site.



_Site documentation

Site focus

Within this development, three distinct development zones present themselves through the site rationalisation across the site. These zones can be interpreted as the three stages of development and the three different needs across the site.

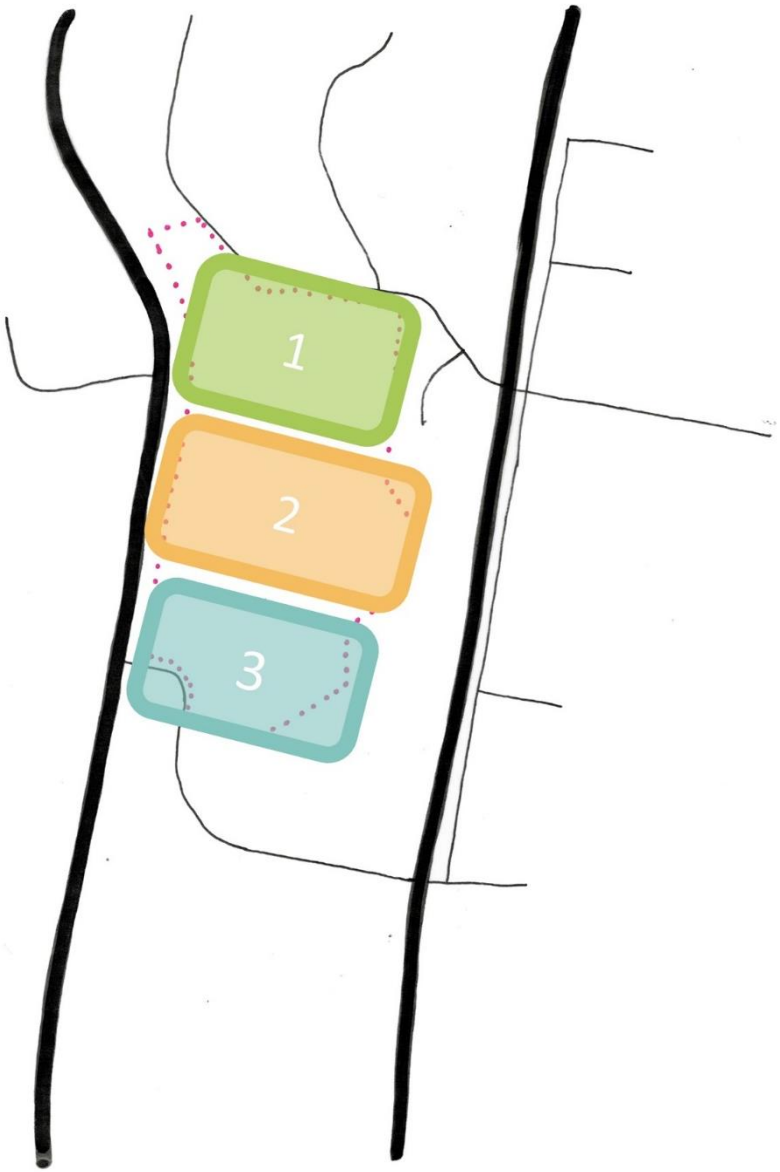
Even though there are three zones within a singular development, there must still be a holistic approach toward a mixed-use development with a sports bias across the entire site. This mixed-use development is set to emphasise pedestrian movement and pedestrian infrastructure across all three zones.

Furthermore, throughout the development, there are three main concepts to be implemented:

_Circulation

_Bufer spaces

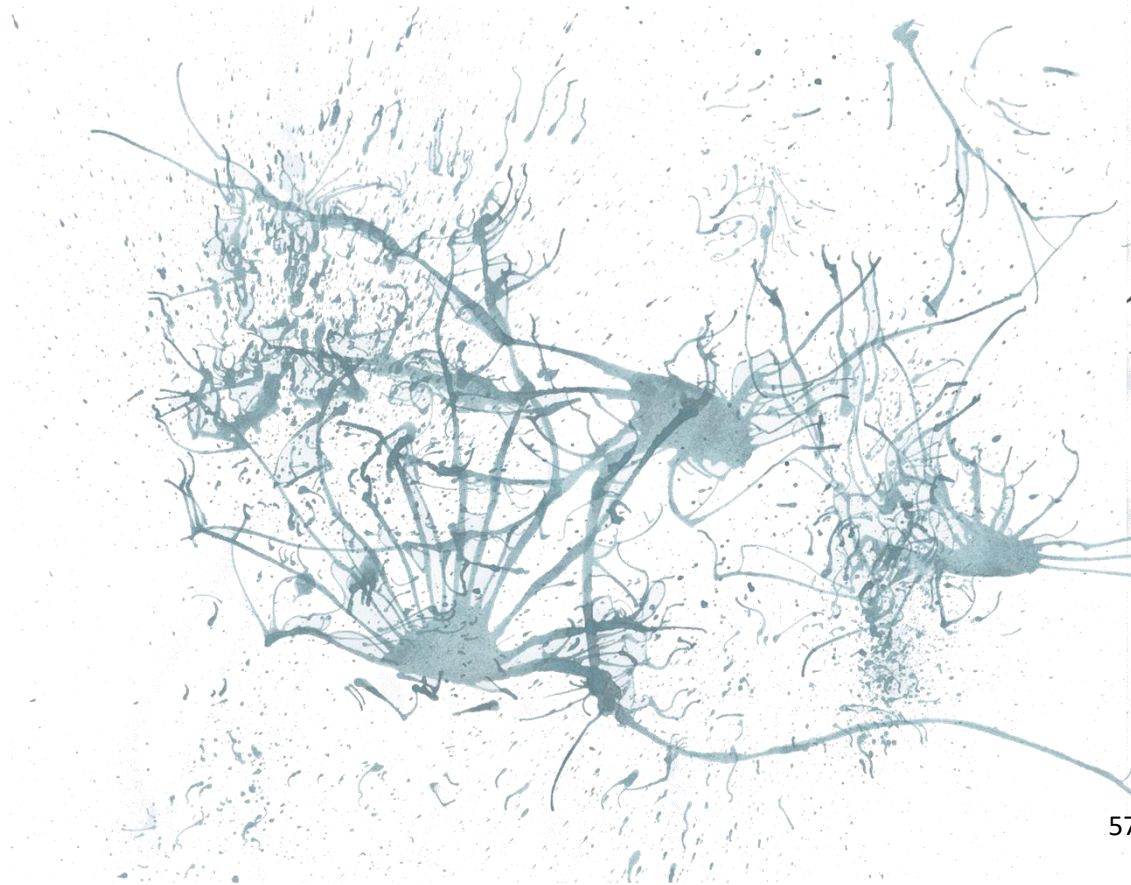
_ Recreational relationship

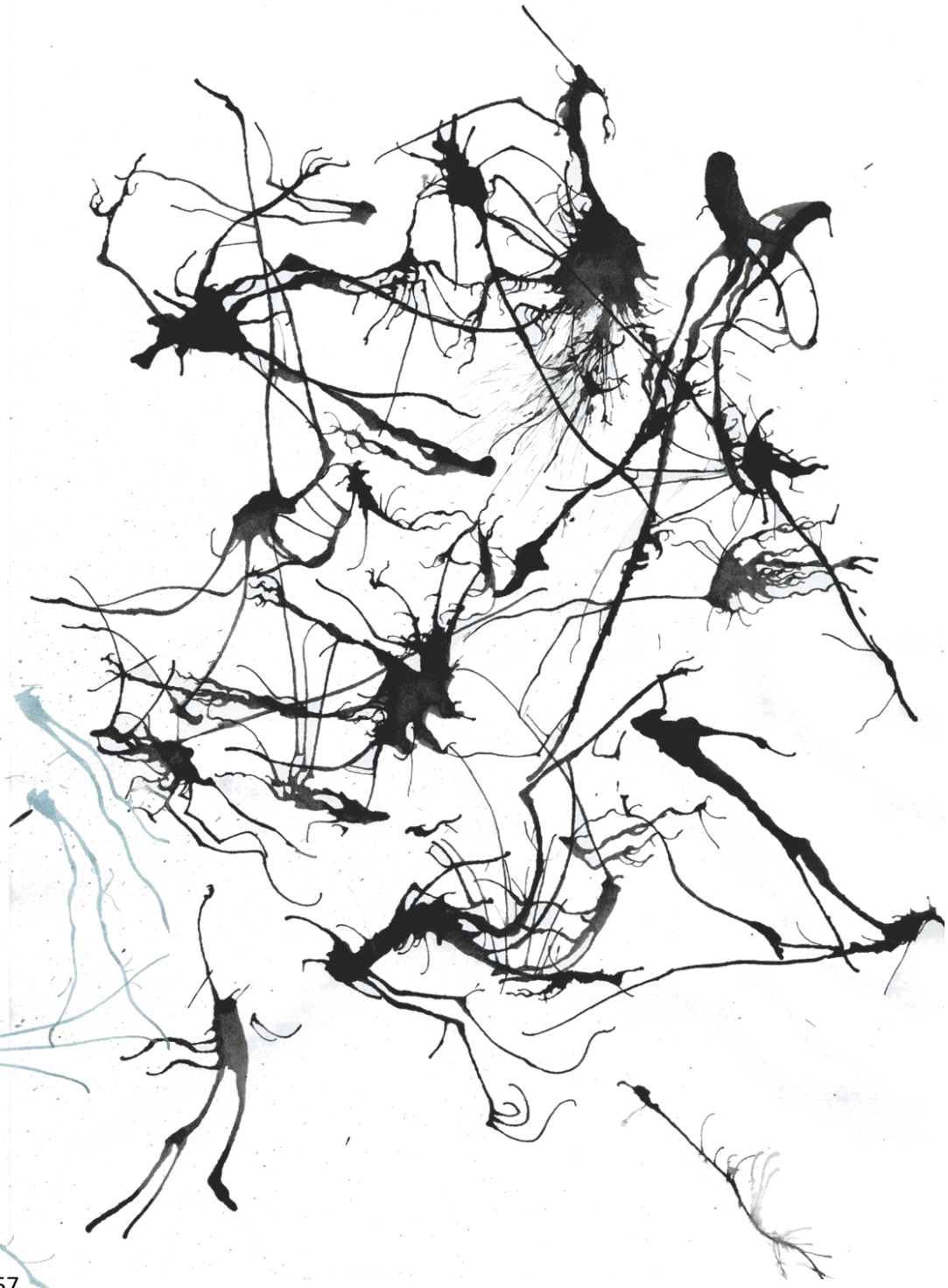


_Site documentation

Site Development Plan exploration

Aligned with initial conceptual explorations of weaved connections and interlinked connections. These abstract pieces explore the fluidity of movement and their subsequent connections.

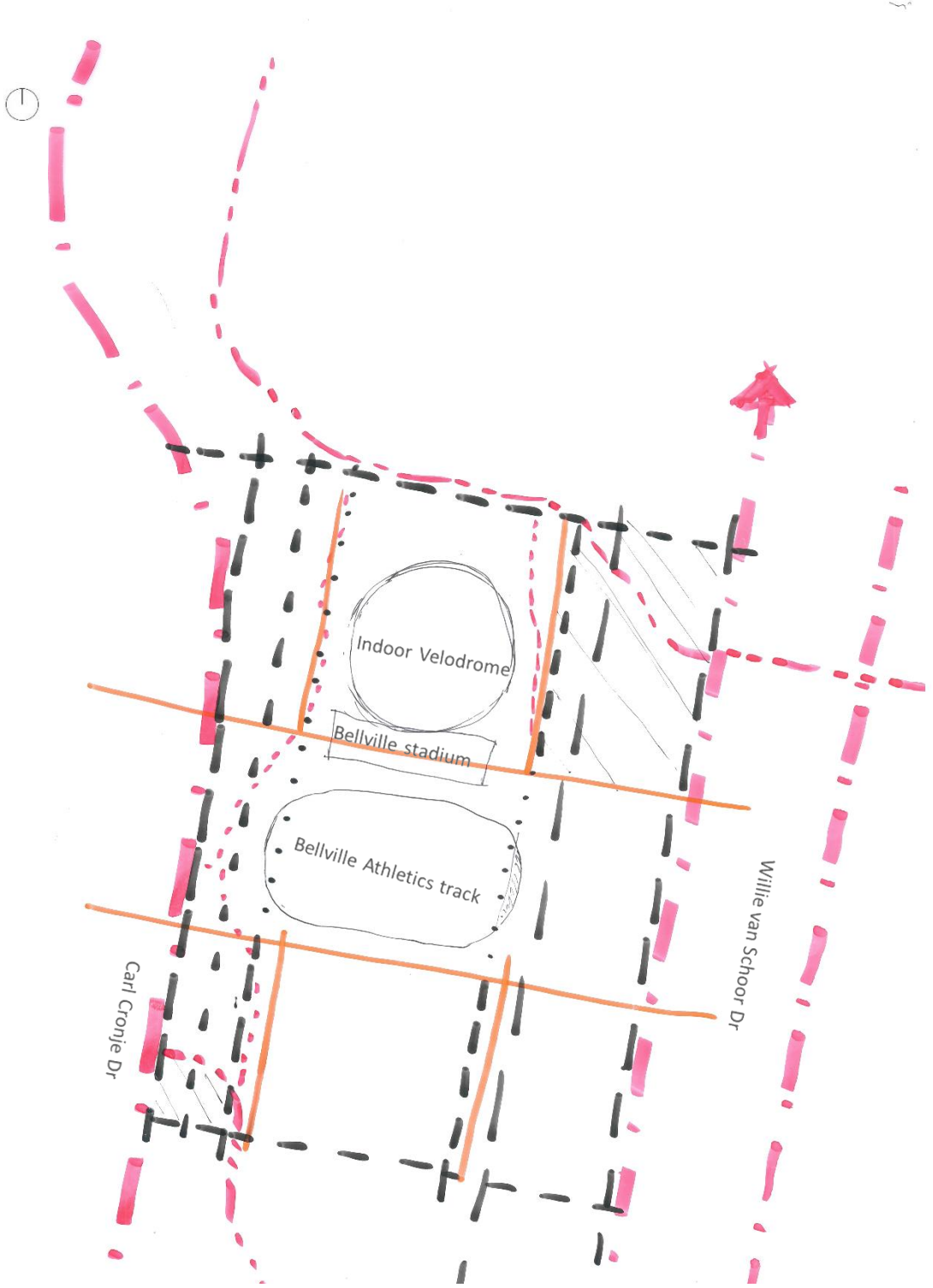




_Site documentation

Site Development Plan

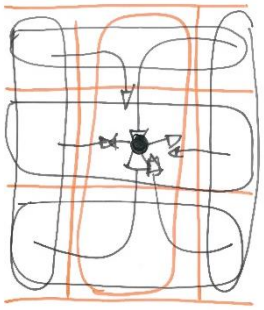
Further understanding of the Site gives insight into potential development. The Willie van Schoor dr. Passing the site connects to the Bellville train station. This site is in a prime location for a centralised sporting community, facilitating and serving a vast community, ensuring the enrichment of all its surrounding communities. We see the need for a green 'buffer' space on the site for the boulevard-style road population.

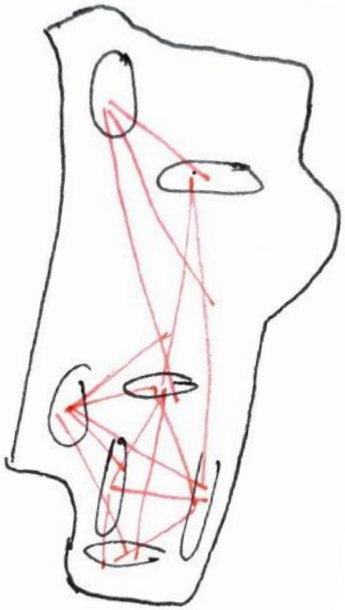


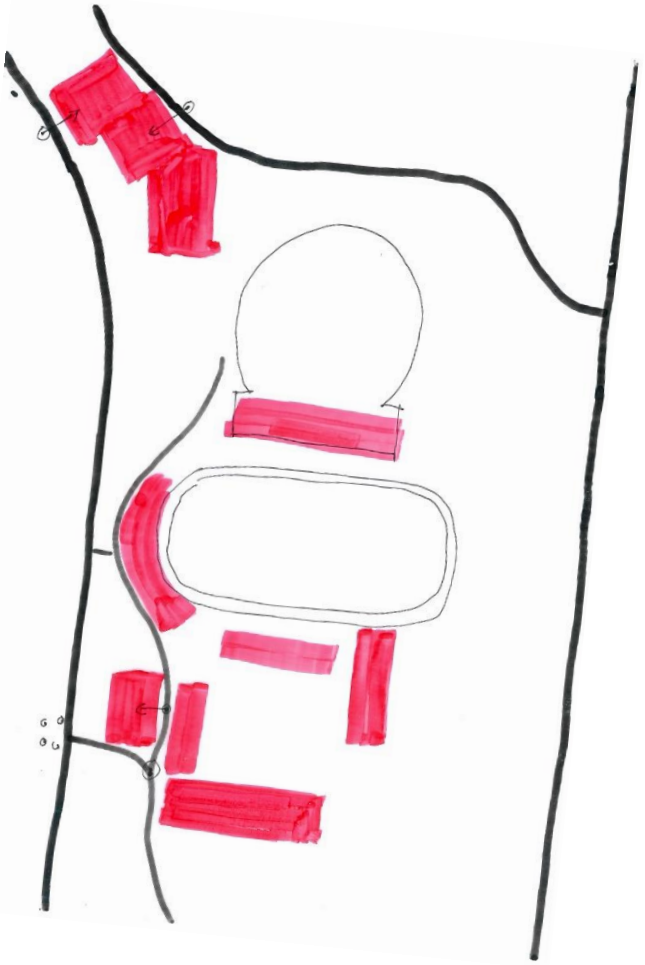
_Site documentation

Site Development Plan

The Development on the site is one focused on pedestrian accessibility. This ensures an interdependent development, as some programs might be centralised and dependent on the workings of another facility based on the site. Due to the various focus points across the site, a scattered approach is needed. These diagrams explore the potential scattered nature of such a development and a possible layout of built fabric across the site.





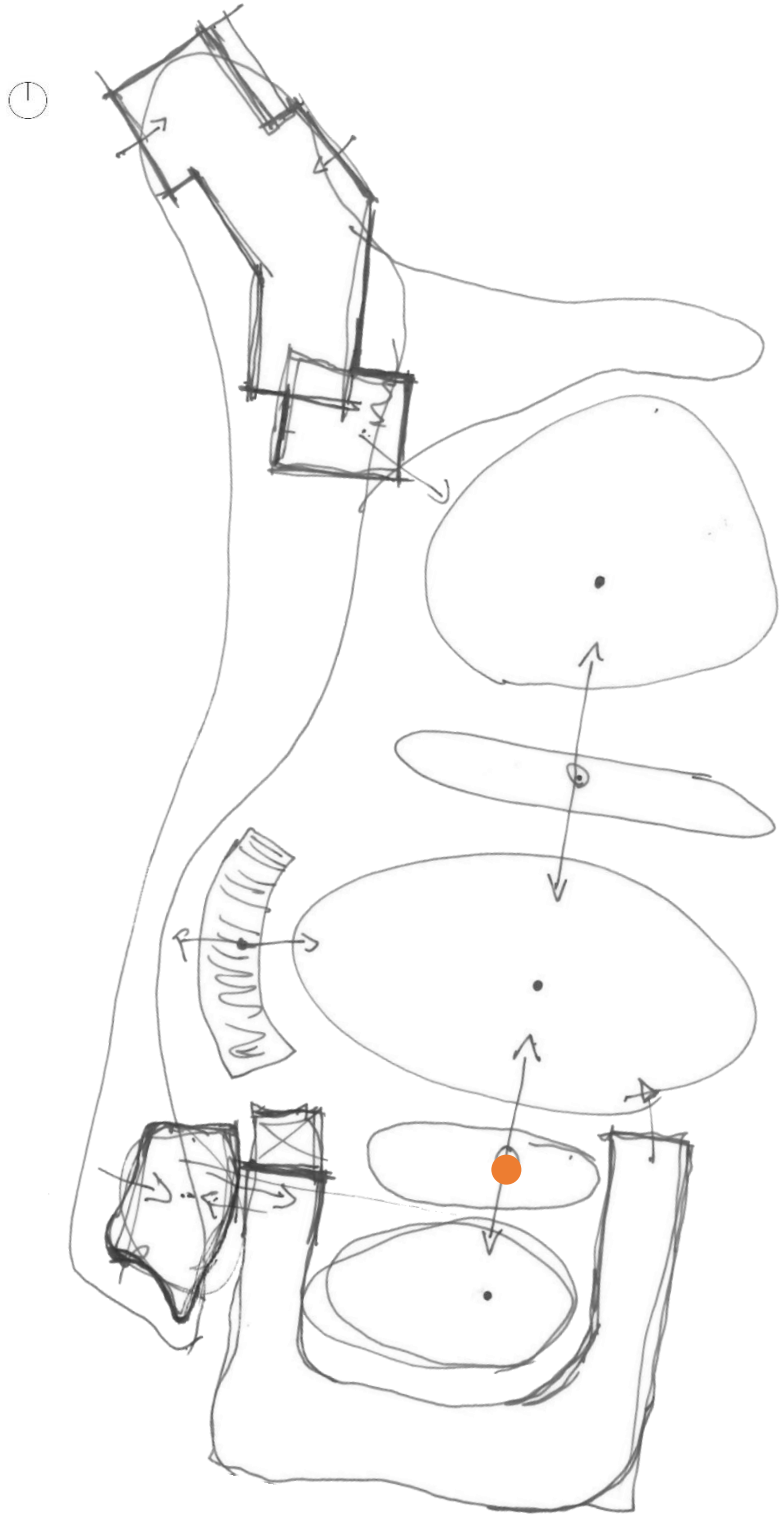


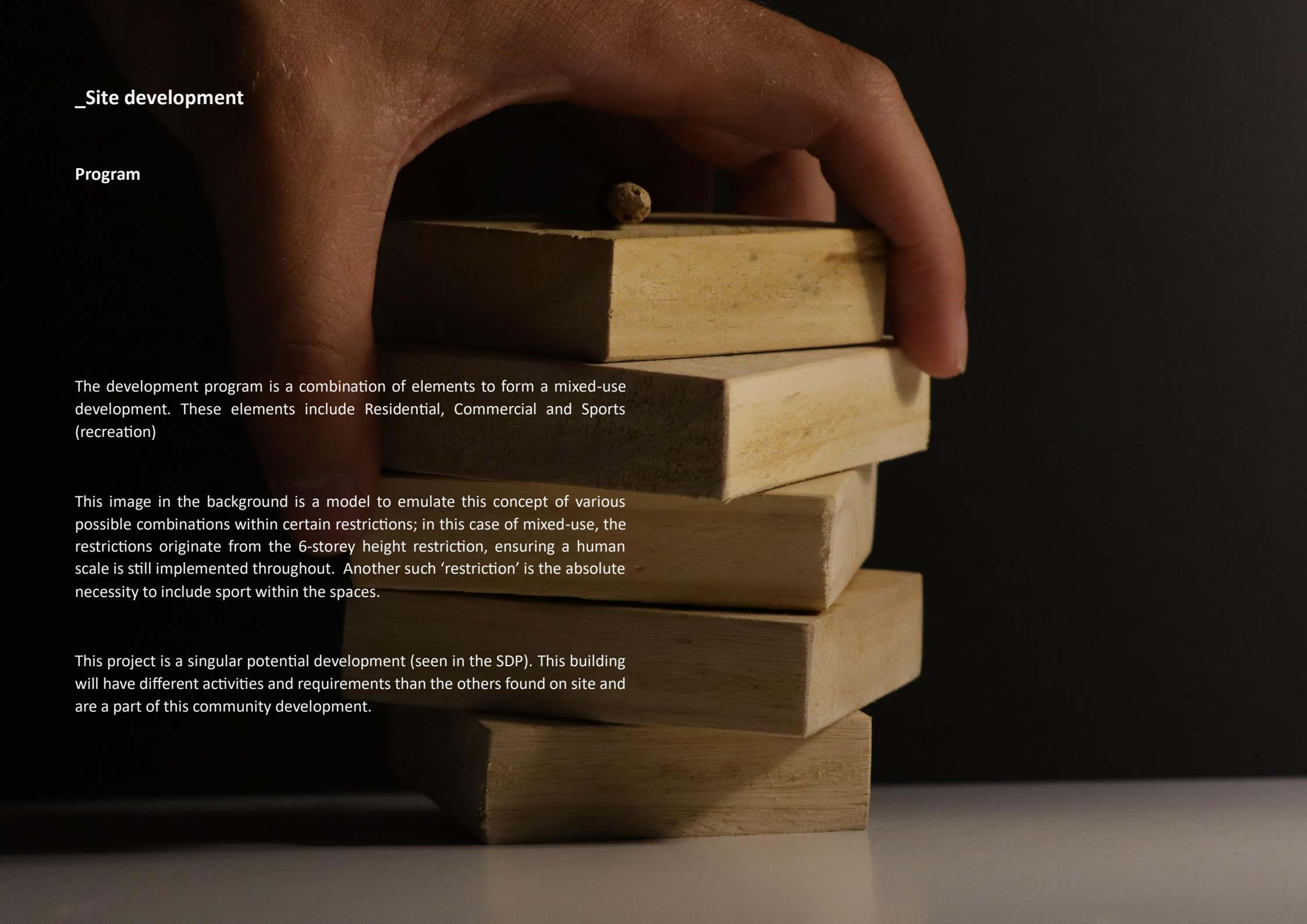
_Site documentation

Transitional space

Transitional spaces foster and provide a connection between the various focus zones. This is set to be achieved through visual and/or physical connections. The existing facility already has one such transitional space in the form of the grandstand; thus, further activity toward the southern end of the site requires a transitional space connecting the existing and new.

Such transitional spaces can also be seen as disruptors, disrupting connections. On the image on the right, one can see the notion of a potential site masterplan emphasising these transitional spaces and their importance in enforcing the central spine of the site.





_Site development

Program

The development program is a combination of elements to form a mixed-use development. These elements include Residential, Commercial and Sports (recreation)

This image in the background is a model to emulate this concept of various possible combinations within certain restrictions; in this case of mixed-use, the restrictions originate from the 6-storey height restriction, ensuring a human scale is still implemented throughout. Another such ‘restriction’ is the absolute necessity to include sport within the spaces.

This project is a singular potential development (seen in the SDP). This building will have different activities and requirements than the others found on site and are a part of this community development.

_Site development

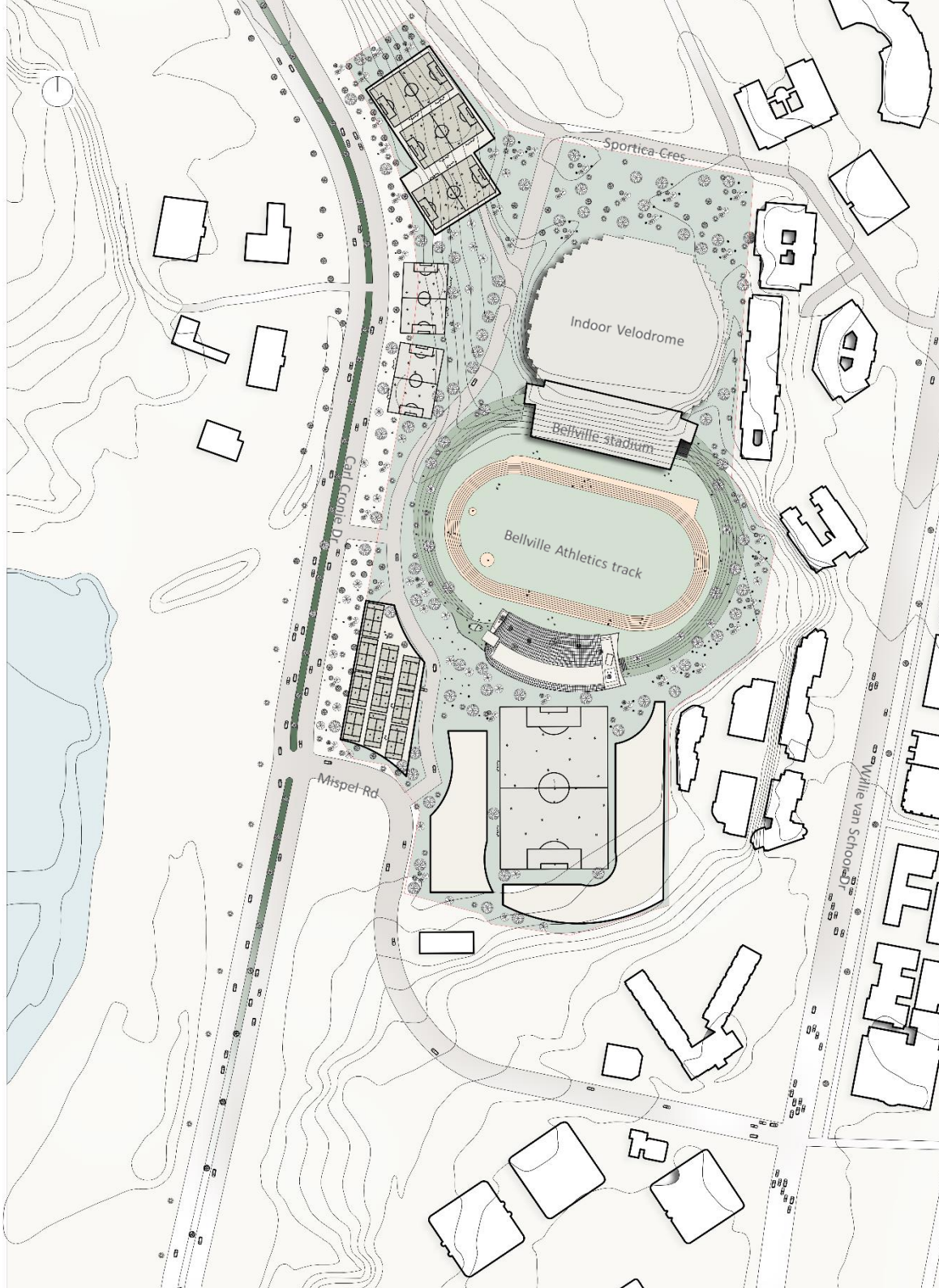
Site Development Plan

1: 500 (A0)

The SDP Shows the activation of such mixed-use development across the site through various interventions. Due to the Focus on a pedestrian-activated space, there is an allocation for 2 Parking garages on site, although this is only sufficient for everyday use. In the case of an event, which typically happens over weekends, this development integrates into the neighbouring community to supply vehicular parking as these office parks and parking garages are empty over these periods.

The sports bias is present throughout the entire site development, as seen through the introduction of various outdoor sports spaces. (five football, padel tennis, and outdoor soccer) Various other sporting codes are addressed in the remaining new and existing facility spaces.

The Introduction of a green ‘Buffer’ between the site and Carl Cronje Dr. allows for further sporting codes to occupy such space, allowing an inviting space for human activity whilst potentially decreasing the speed of adjacent roads.



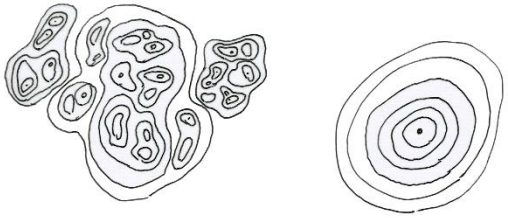
_Site development

Spatial development

Mixed-use in this project refers to a medium-rise building no more than six stories in height. Within such a building, there needs to be a minimum of 2 programs of use, with a strong emphasis on community connection.

These sectional explorations allowed me to test set parameters while conforming to the desired standard. These diagrams give insight into the desired scale and relationship of wall to floor ratio. These simultaneously ensure a communal connection between occupants and the surrounding community.

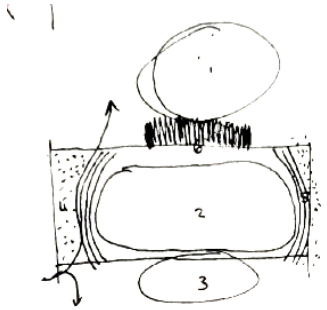
This development forms a more extensive community, forming part of a potentially more significant network of similar programmatic orientation developments. However, this project focuses on a singular element of such a development.

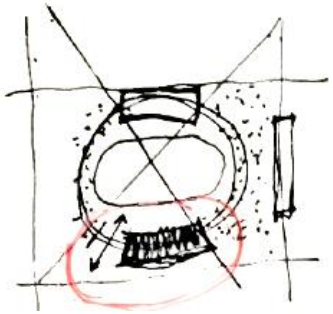


_Focus development

Conceptual placement

As this is only a piece of the more considerable development, the focus of creating a transitional space is explored through Ink paintings, as seen below. This painting explores the fluid movement within and through spaces, exploring methods of expansion and threshold spaces. These transitional spaces act both as an anchor and the beginning of something new if one looks at the focus development zones. The diagrams below explore the concept of an answer to the existing Bellville Stadium.



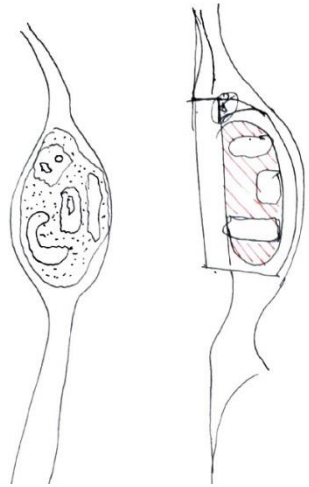


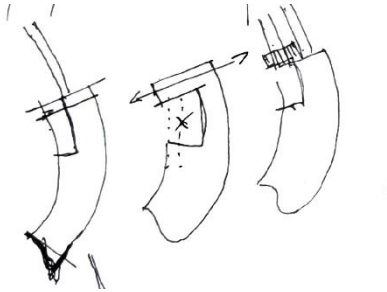
_Focus development

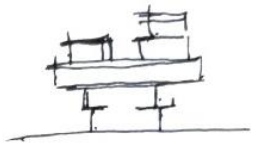
Spatial development

As this project is titled ‘Metamorphosis’, I explored the idea of cellular organisation and form-making. This Building is placed within a Berm structure, resulting in finding a connection between a cellular development and that present in the project.

More formal form-making led to an understanding of the minimal use of square lines and angles, as this contrasts with the Cellular explorations. However, exceptions to this rule are the emphasised spaces being amplified through its alternative methods. The curved forms connect to the sport as a sport is a motion-filled activity, typically in a fluid manner. This movement theory further gave insight into overall layouts and specific decision-making.





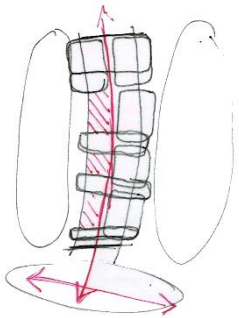
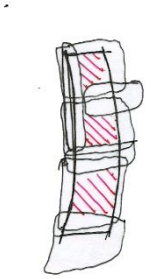
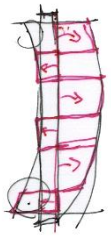
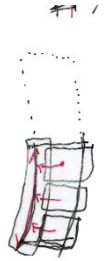


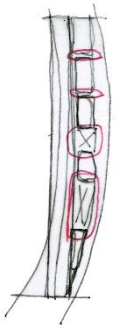
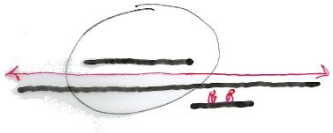
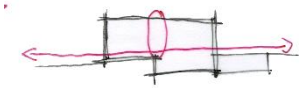
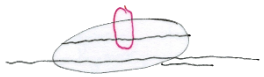
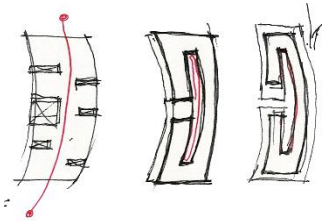
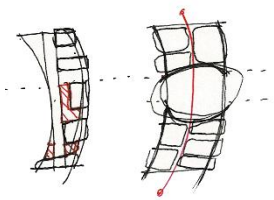
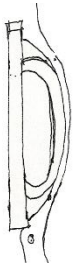
_Focus development

Spatial development

The occupation schedule determines spatial layouts and organisations. Although there are still various layout methods as explored through these various sketches. Within the Building, there is also some variation in terms of the implementation of set organisational techniques. A ‘spine with limbs’ method has been used throughout this project, where one has a central spine of circulation with various spaces attached to either side.

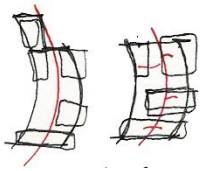
This typology within this site supplies a further challenge in the form of the creation of a second and third ground plane. This idea is also further explored through the diagrams below, as these three ground planes work in different directions and connect to different elements of the more extensive contexts.



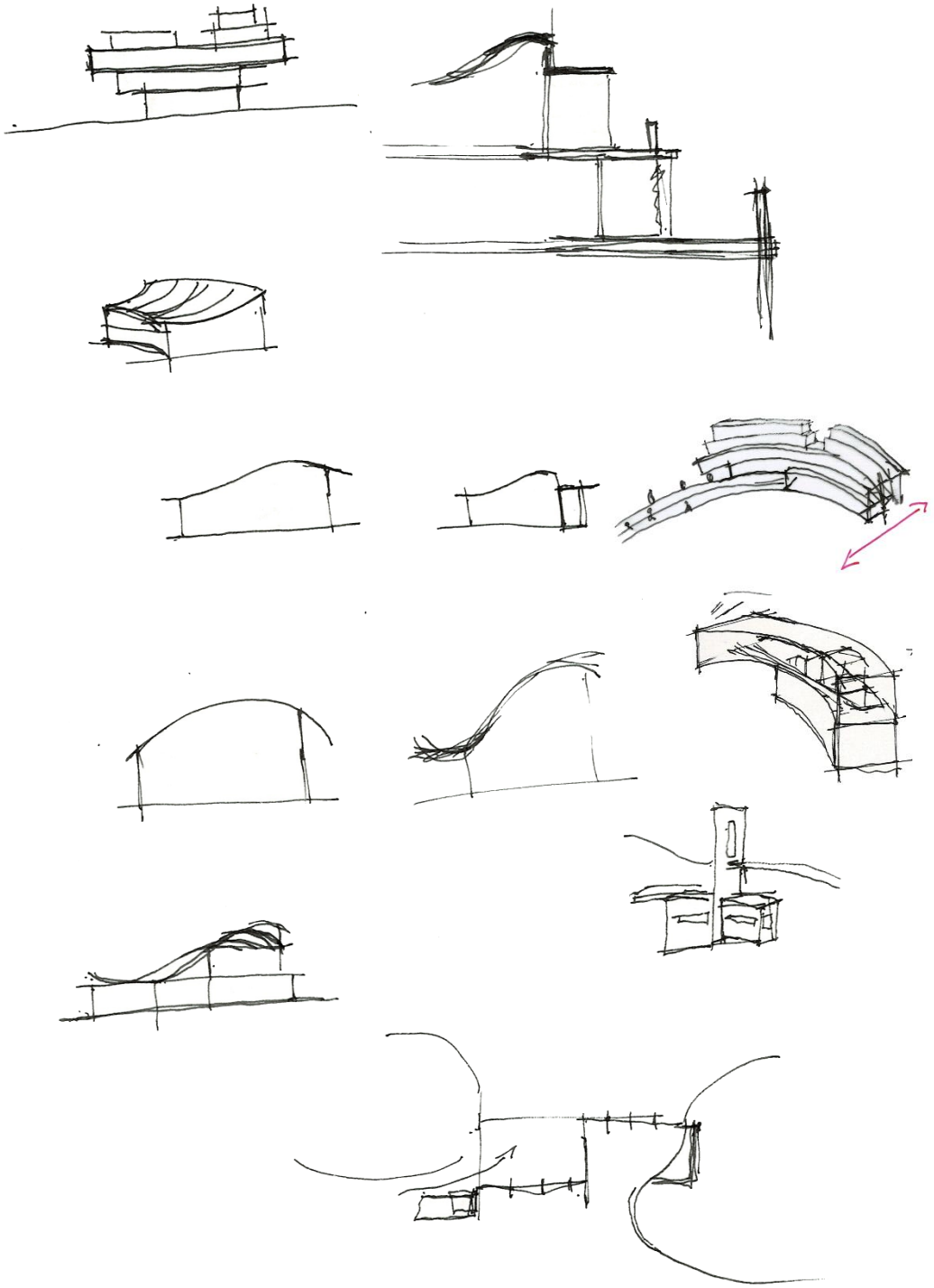




_Focus development

Spatial development

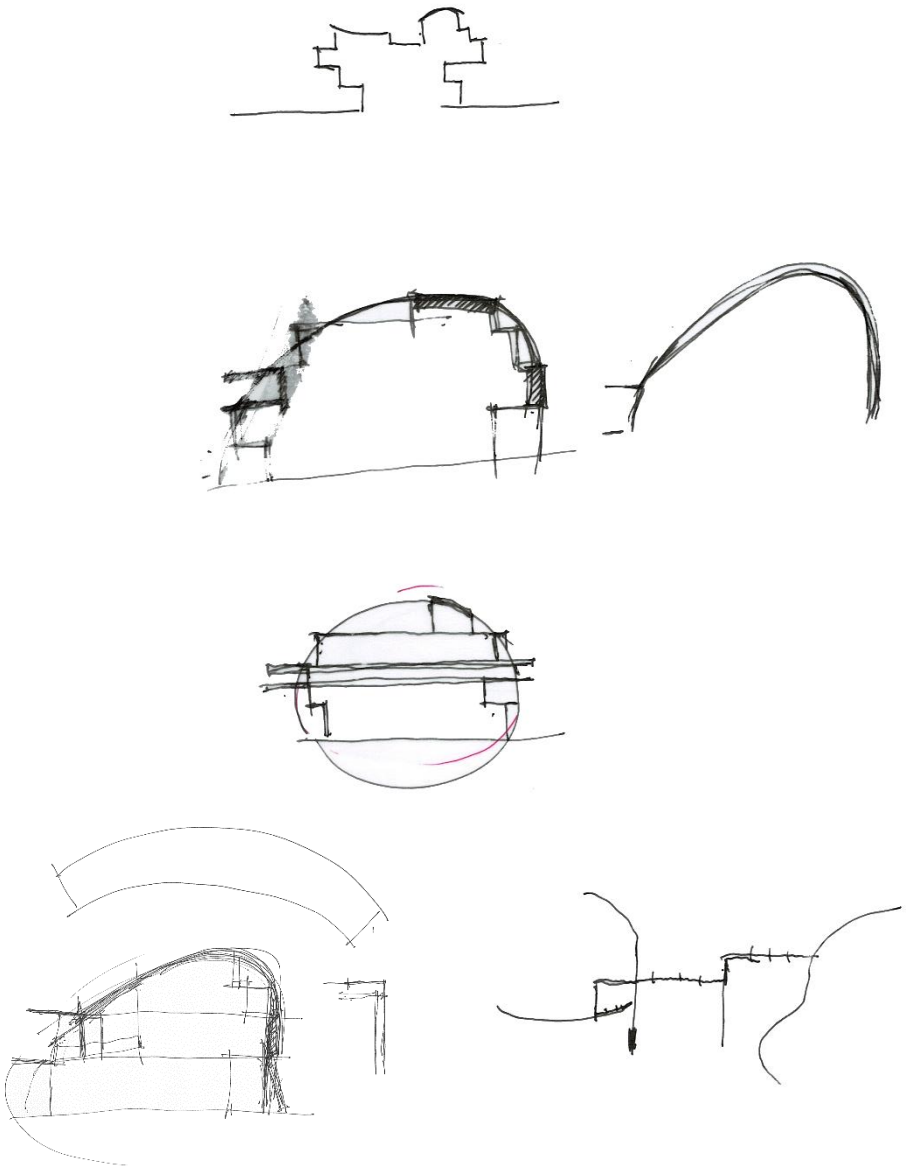
As mentioned, the building is placed within an existing berm structure surrounding the athletics track. This provoked further exploration of the shape of the overall building. As the building sits within the berm, similarly to a wedge, these diagrams explore the potential to elevate the shadow line of the berm to pass over the building through the roof structure. The existing berm inspires the roof line shape, with some vertical elements to ensure a break where there is a new element.



_Focus development

Spatial development

The Diagrams on the right further explore this idea of ‘Metamorphosis’ in elevation. This exploration of the cellular element of this building in section whilst also incorporating the existing berm structure. The need to include the concept of the berm furthers the transitional space concept of set building, as it pays homage to what it once was while incorporating the desired design's new principles.

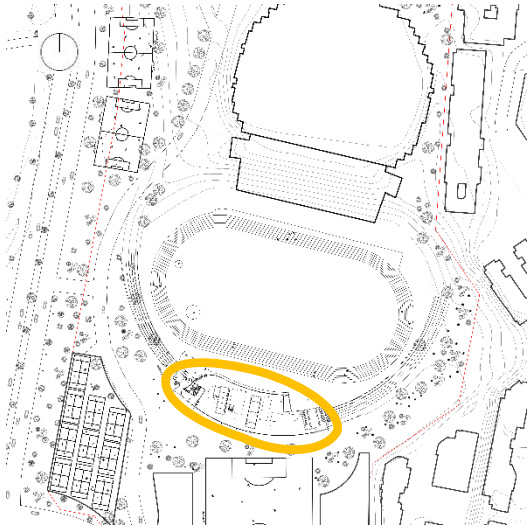


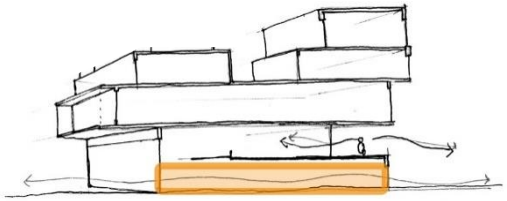
_Focus development

Building Plans

High-performance training

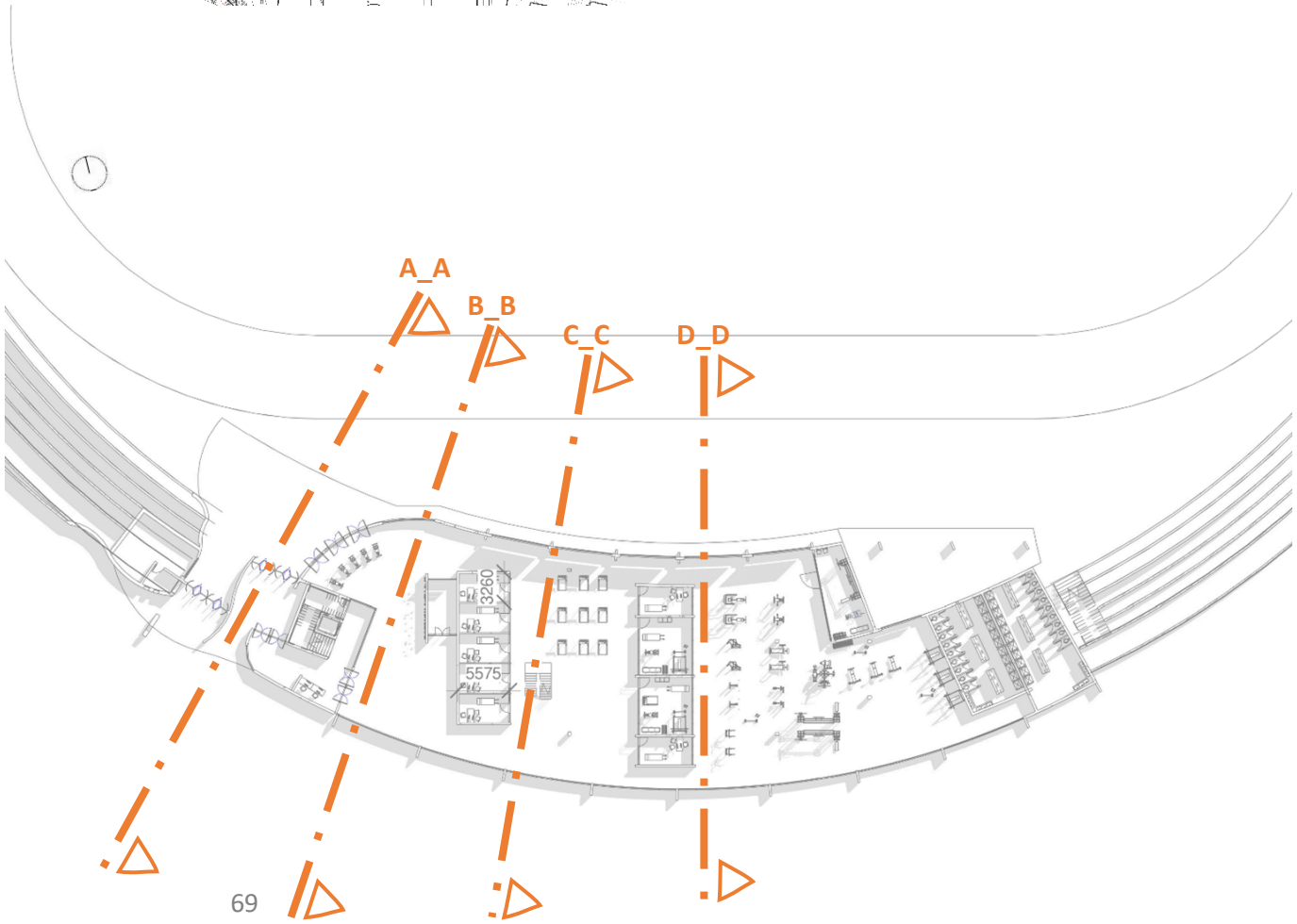
1:500 (A3)



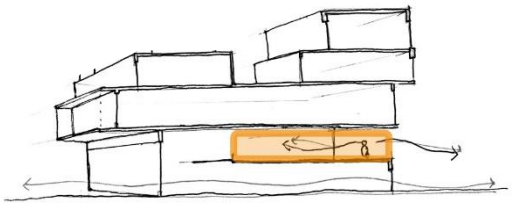


The Transitional space between the Athletics track and the new additions will be my focus within the more extensive development. The building houses a high-performance athletics space, hybrid space, change rooms, an indoor running track of 60m, and a co-working space – allowing for a mixture of users. Lastly, there are residential, single, two- and three-bedroom apartments.

On the Ground floor, one finds the High-performance athletics training facility, with various spaces and users. This space is fitted with large operable doors that allow for light but enable the building to be fully integrated into the existing athletics track when an event requires it. Visual connection is crucial, resulting in the focus on fenestration, allowing for visual connection through the building from north-south.



_Focus development



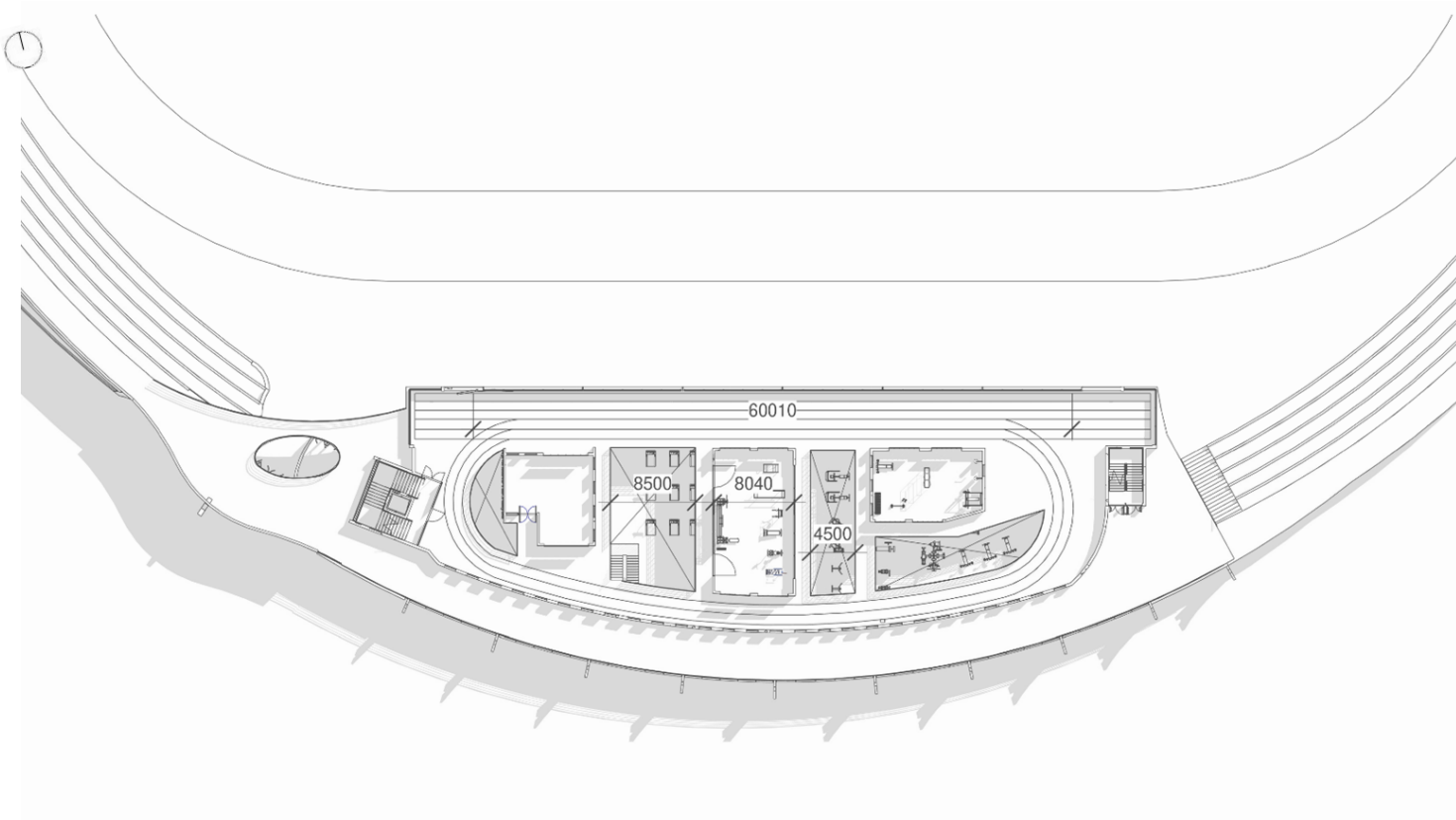
Building Plans

Indoor Running track

1:500 (A3)

The First Floor Houses the Indoor Running track with a straight of 60 m. The First floor and ground floor are connected as they have similar programs. Further, there are internal staircases connecting the two levels. double volumes enhance the concept of lightweight translucency desired for the ground and first floors.

This is also the top level of the Berm surrounding the Athletics track. This pathway runs around this level and has viewports into and beyond the space. This berm has been transformed with terracing to allow for ample extra seating on event days whilst in its everyday use, creating a space for inhabitants to occupy outdoor space and reconnect with nature.



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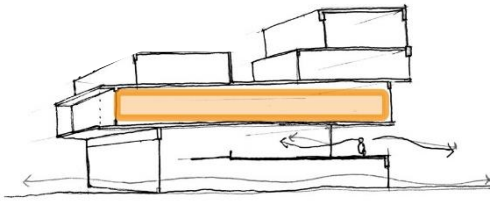
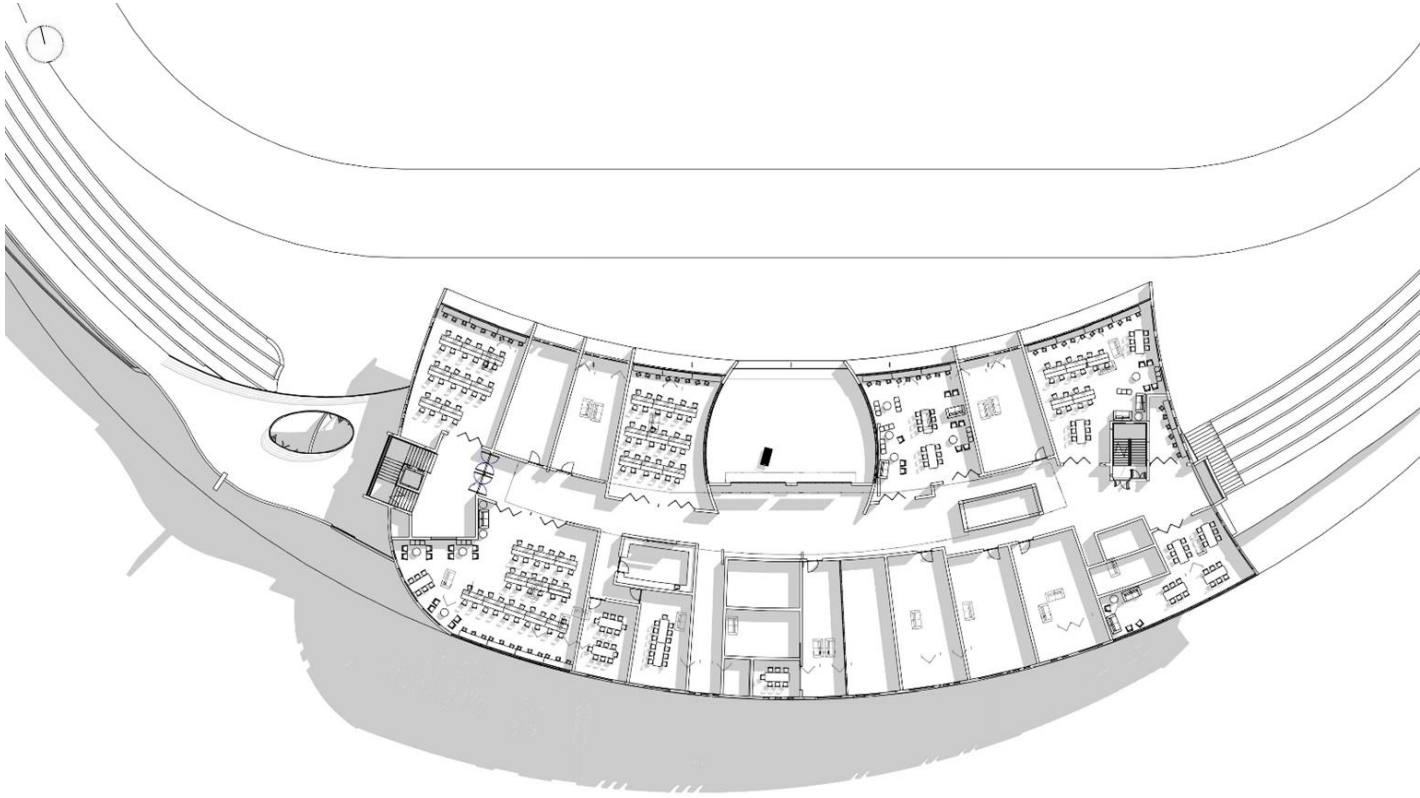


Building Plans

Co-working Hub

1:500 (A3)

The Second Floor houses the Co-Working Hub. This floor is a mixture of Co-working space, seminar rooms and small office spaces. This mixture of users allows for the spaces to come alive as their occupations will most likely vary through their weekly cycle. These spaces are crucial in today's world, where working from home is the norm more than the exception. These types of Co workspaces allow for working-from-home residents found throughout the entire development and neighbouring residences to have a change of scenery and, whilst occupying the space, still be connected to sport. (visually) This space has a crucial role in the effectiveness of such a building as it typically generates general income and allows for a second set of ‘temporary’ users.



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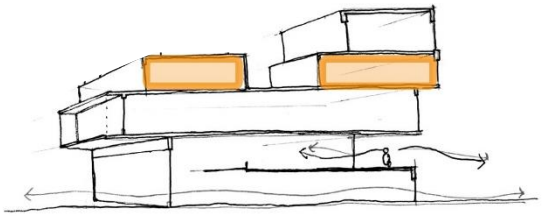
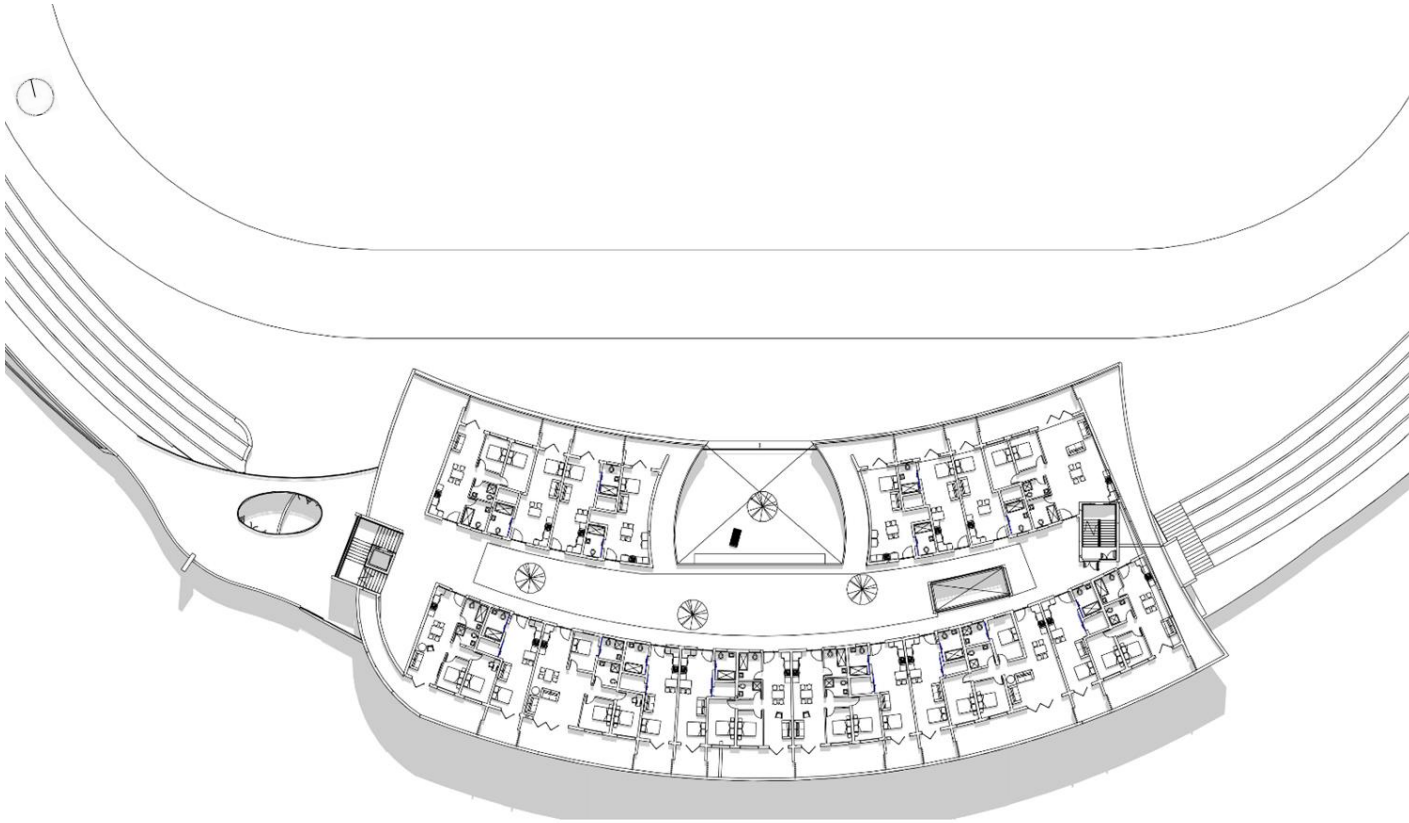


Building Plans

Residential 1

1:500 (A3)

This third floor is the first of two residential floors in this building. Here, one also finds the third ground plane, in between the living units, an outdoor space occupiable by all. The units face North and South, each having a view over a sports event. Access control is maintained through the immediate separation and exclusive access at the circulation core. The mixture of living units also allows for a mix in society, allowing and enhancing the lifecycle of the daily building.



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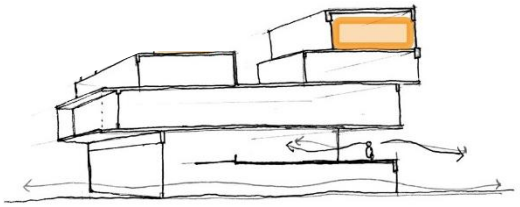
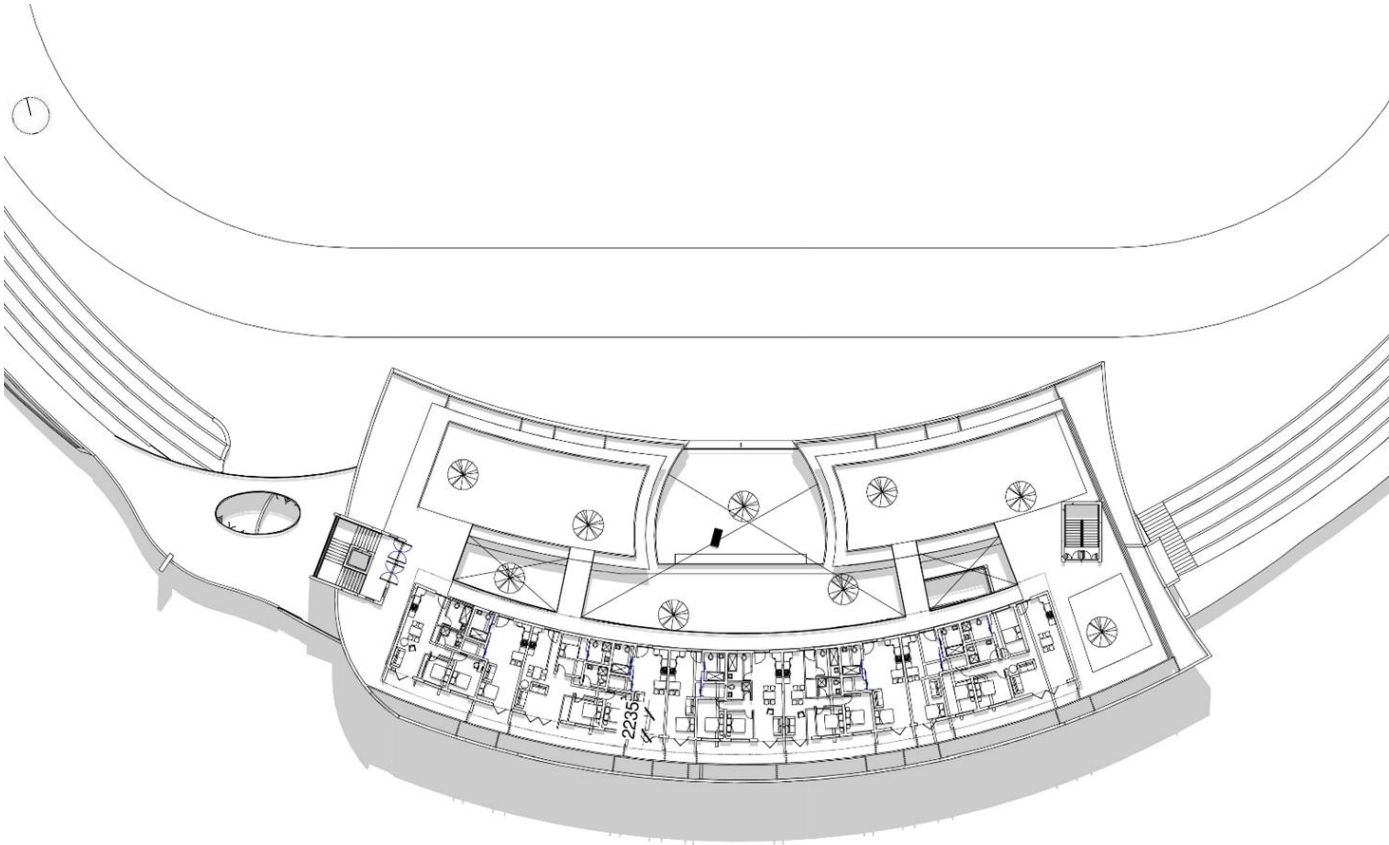


Building Plans

Residential 2

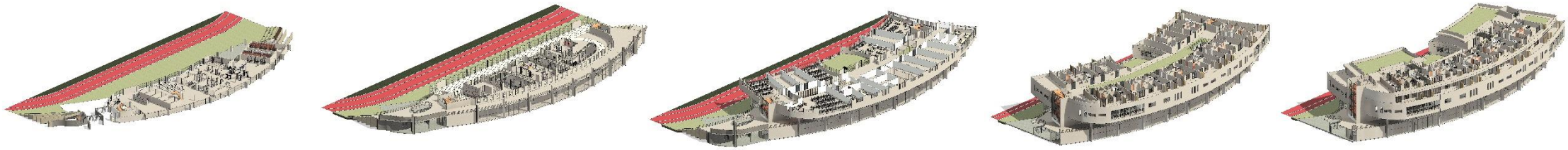
1:500 (A3)

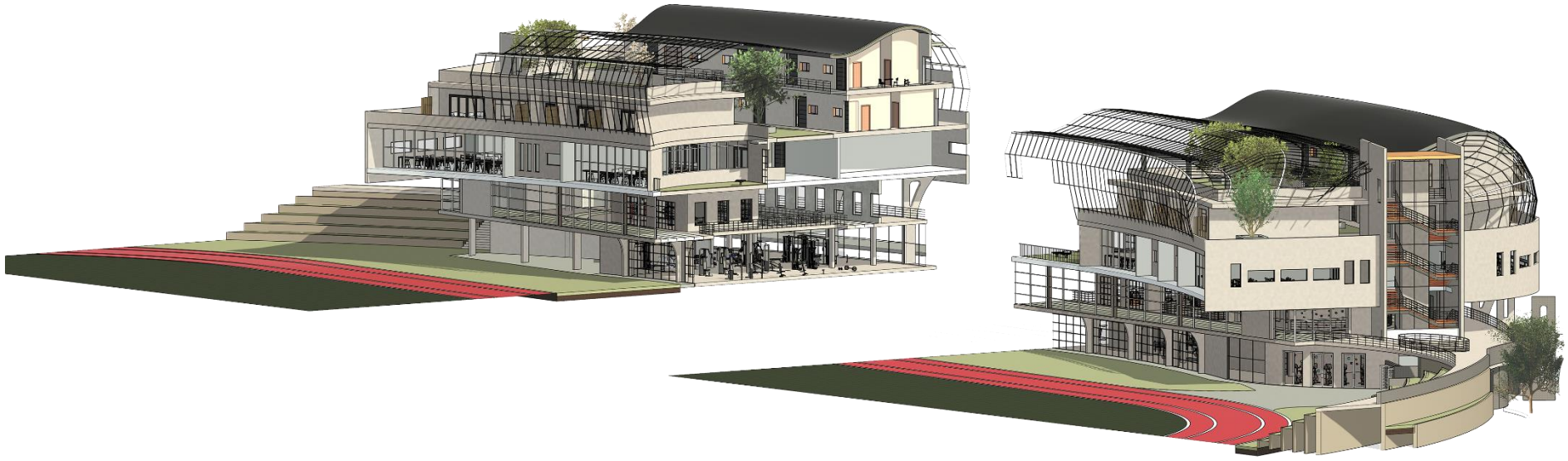
The fourth floor Is the second residential level, with units only on the southern side of the building. The Northern side of the building is occupied by outdoor rooftop gardens, allowing for ample semi-private space for both residential levels. There are various double volumes to be found on this level so far down as to the Co-Working hubs outdoor courtyard.



_Focus development

3D's (NTS)

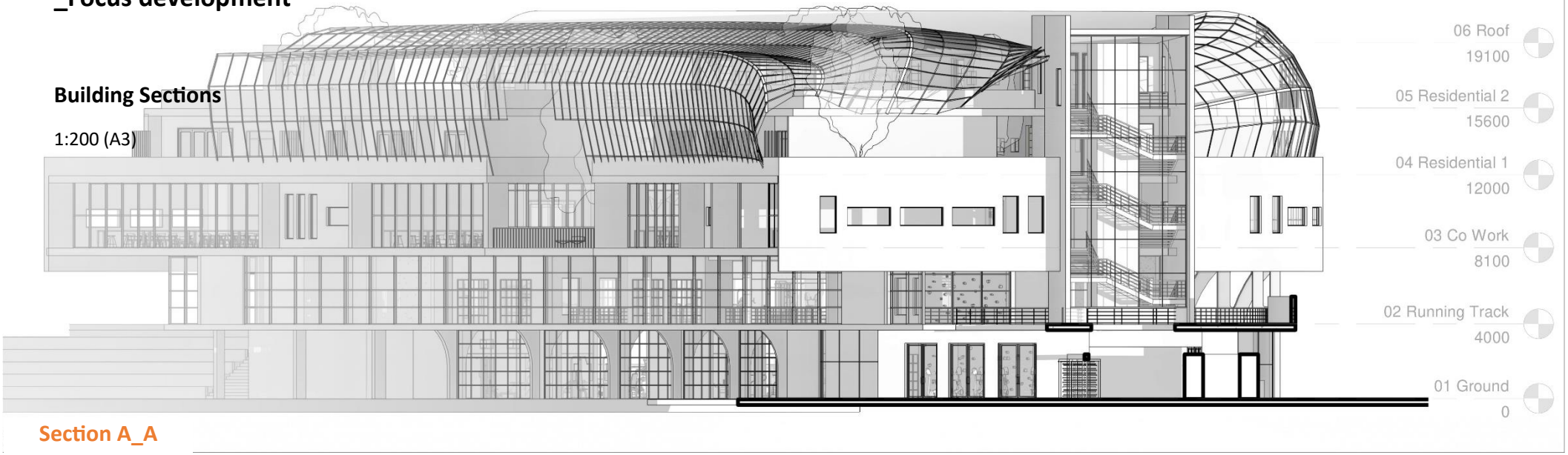




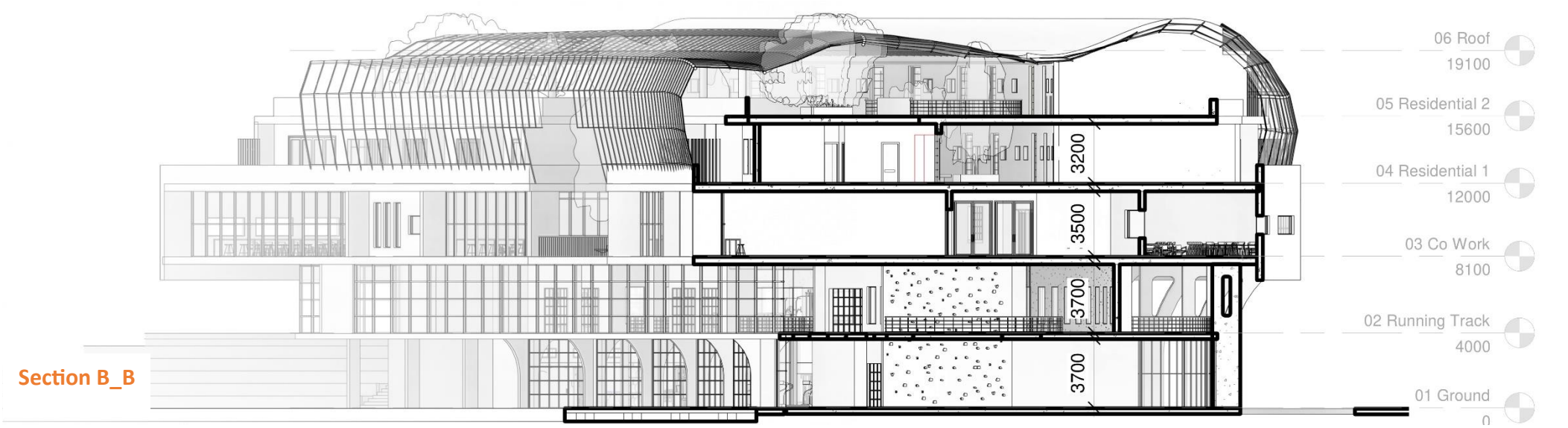
_Focus development

Building Sections

1:200 (A3)



Section A_A



Section B_B

_Focus development

Building Sections

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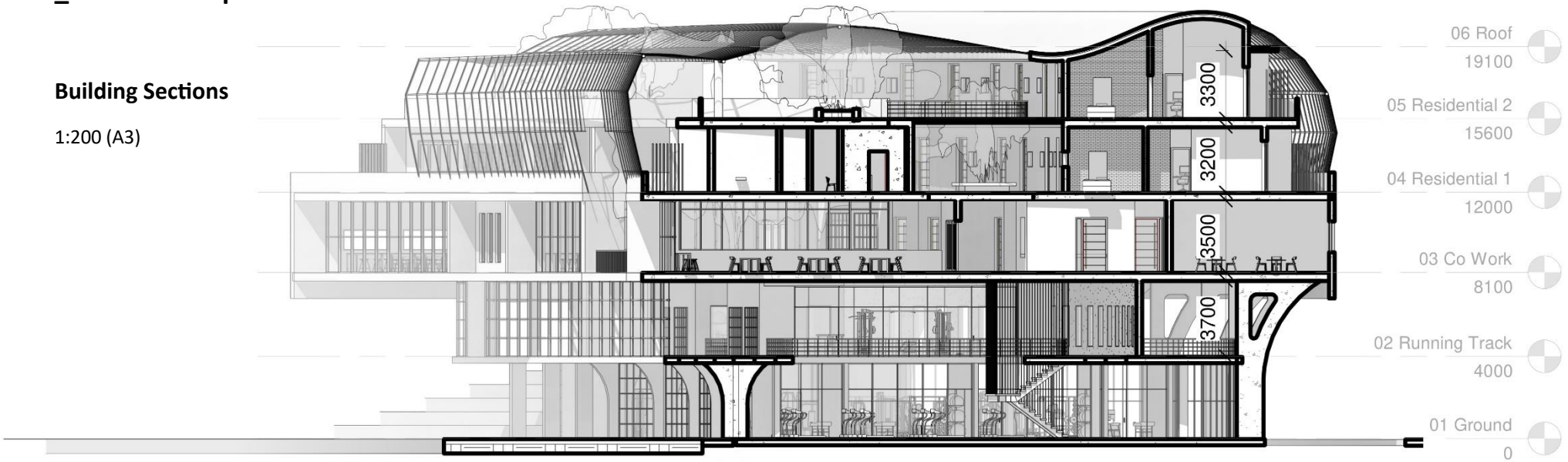
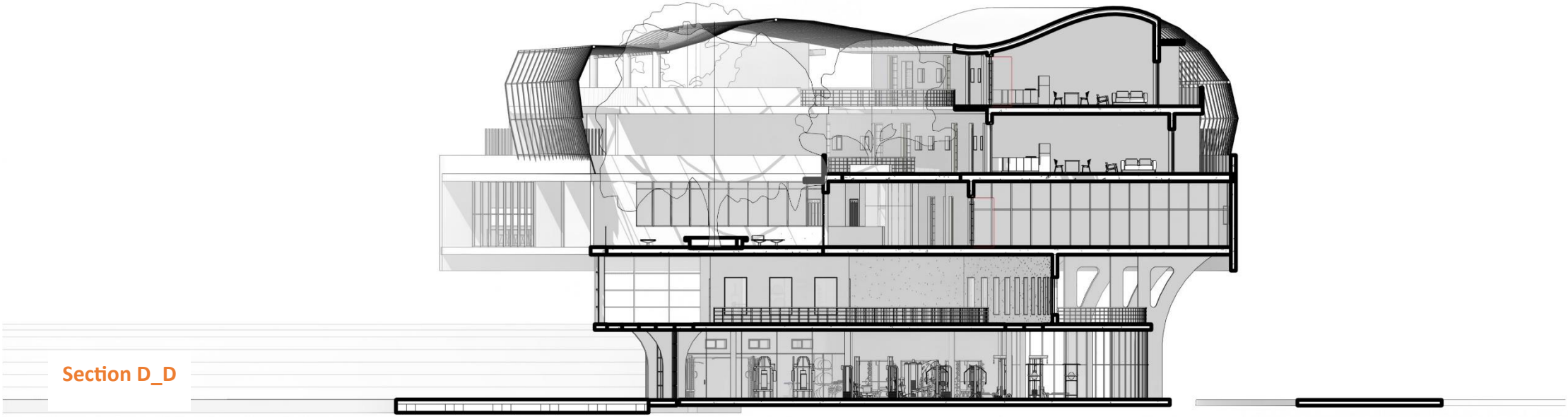


Section C_C



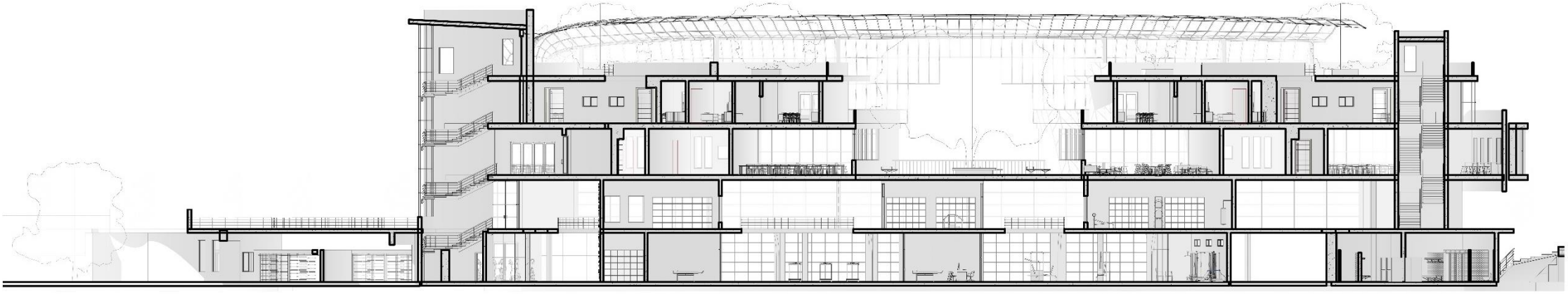
Section D_D

_Focus development

Building Sections

1:500 (A4)

In the Longitudinal section, one can see the emphasis on fenestration on the ground and first floors, ensuring visual transparency through the spaces.



_Focus development

Building 3-D's (NTS)

_Conclusion

This research has proven the need for the incorporation of sport into Mixed-use spaces to assist in restoring and maintaining the connections humans have with various sport disciplines. Whilst also emphasising the need for typical singular-use sports facilities to adapt and change to allow them to become more sustainable and, in turn, to form their own network of connections.

The Process of this dissertation has clearly presented that forming architecture with a mixture of these specific programs requires a deep understanding of Sport and its various psychological impacts on our lives whilst ensuring that the typical spaces can still function in their desired manner.

This topic presents a new challenge of incorporating worlds vastly different in their workings, yet they depend on one another to co-exist. Although this topic has a sports bias, this is not sports architecture in the conventional sense, but rather a holistic approach to a sustainable method of inclusion of all.

Metamorphosis in this topic becomes a fluid term that emphasises flexibility and change, similar to a living organism changing to its needs, desires and surrounding environments.

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_Plagiarism Declaration

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PRE-SCREENING QUESTIONNAIRE OUTCOME LETTER

STU-EBE-2023-PSQ000689

2023/09/14

Dear Ruben Van Biljon,

Your Ethics pre-screening questionnaire (PSQ) has been evaluated by your departmental ethics representative. Based on the information supplied in your PSQ, it has been determined that you do not need to make a full ethics application for the research project in question.

You may proceed with your research project titled:

Metamorphosis.
Transforming Architecture through the realm of Mixed-use typologies, with a bias to sports culture and lifestyle.

Please note that should aspect(s) of your current project change, you should submit a new PSQ in order to determine whether the changed aspects increase the ethical risks of your project. It may be the case that project changes could require a full ethics application and review process.

Regards,

Faculty Research Ethics Committee

Addendum A –

Design Dissertation Document: Title, Declaration and Plagiarism Pages

DISSERTATION TITLE: Metamorphosis
STUDENT NAME: Ruben van Biljon
SUPERVISOR NAME: Scott Johnston

This dissertation is presented as part fulfilment of the degree of Master of Architecture (Professional) in the School of Architecture, Planning and Geomatics, University of Cape Town
Date: 2023/10/26

"I hereby:
a. grant the University free license to reproduce the above dissertation in whole or in part, for the purpose of research.
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(ii) Except as stated below, neither the substance or any part of the dissertation has been submitted for a degree in the University or any other university:

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1. I know that plagiarism is wrong. Plagiarism is to use another's work and pretend that it is one's own.
2. I have used the Chicago / Harvard convention for citation and referencing. Each contribution to, and quotation in, this report from the work(s) of other people has been attributed, and has been cited and referenced.
3. This report is my own work.
4. I have not allowed, and will not allow, anyone to copy my work with the intention of passing it off as his or her own work.

Signature _____ Signed by candidate

_Addendum

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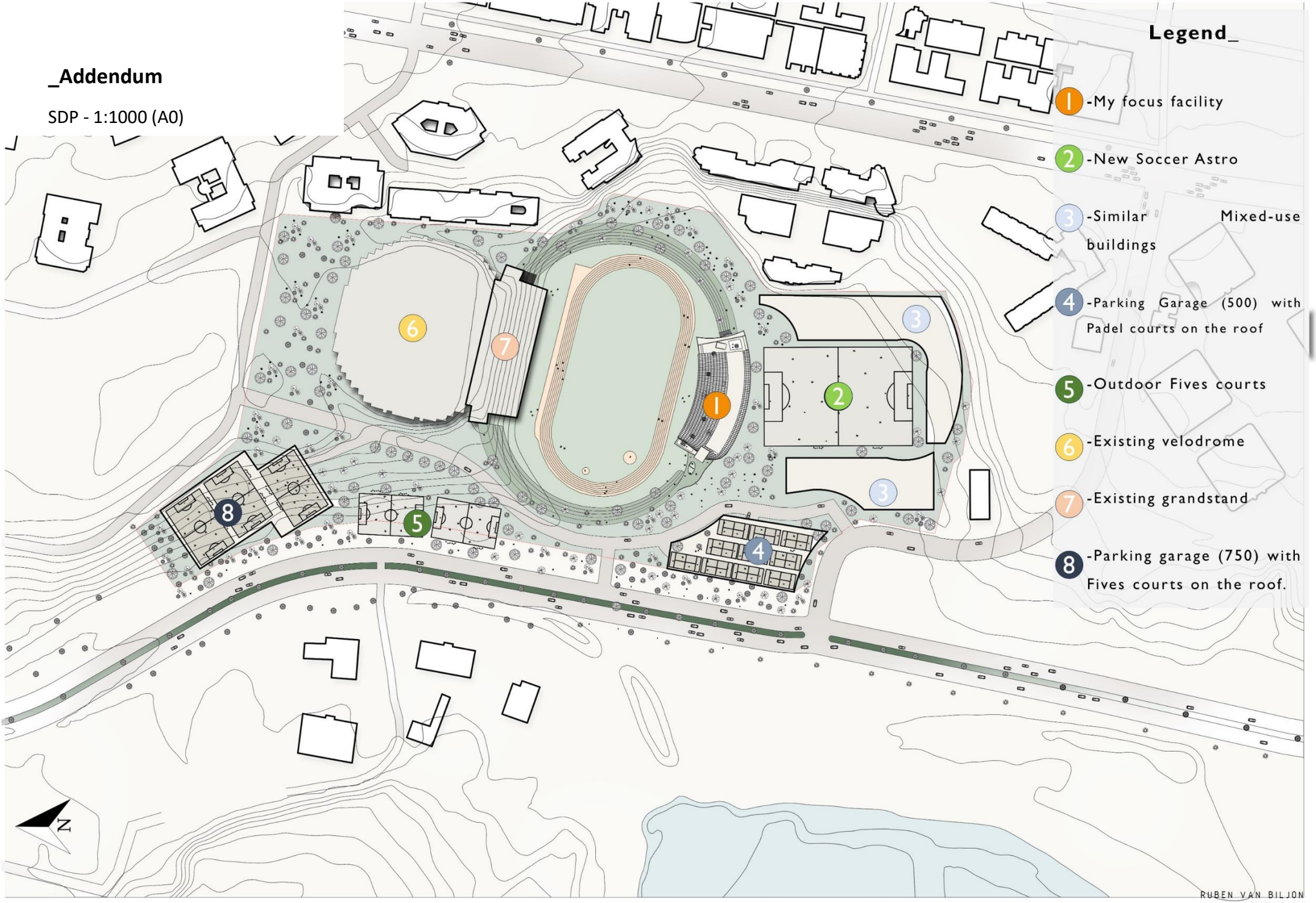

RUBEN VAN BILJON
VBLRUB003
METAMORPHOSIS

_Addendum

Exploded Longitudinal section N.T.S

_Addendum

Conceptual Render N.T.S

_Addendum

Render Entrance N.T.S

_Addendum

Render Walkway N.T.S

_Addendum

Internal render Running Track N.T.S

_Addendum

Render Ground level N.T.S

_Addendum

Render Sunset Entrance Ground level N.T.S