

A research report proposal submitted to the Faculty of Engineering and the Built Environment, University of the Witwatersrand, in partial fulfillment of the requirements for the degree of **MASTER OF ARCHITECTURE (PROFESSIONAL)**.

University of the Witwatersrand, Johannesburg, South Africa
2020

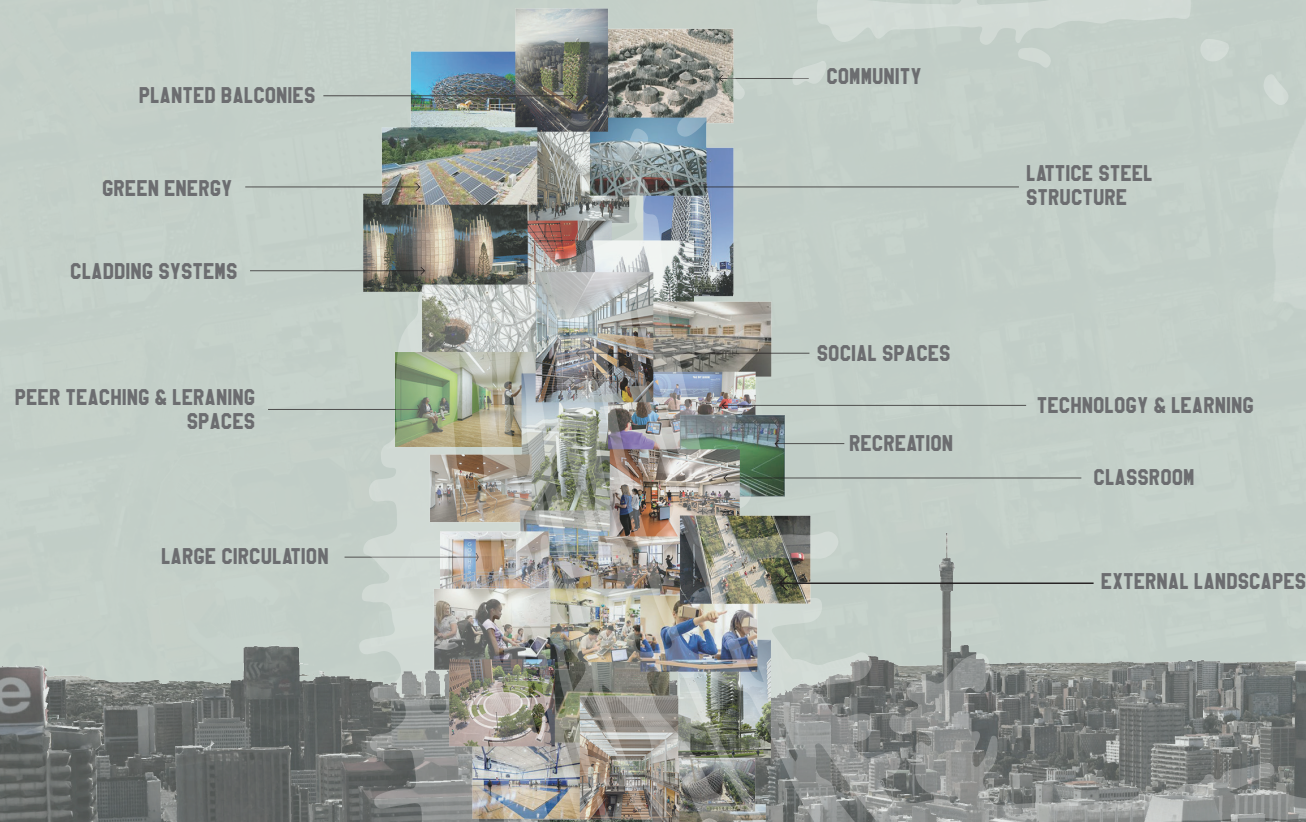
DENSEdUCATION

Re-imagining the typology of a learning environment in the dense inner city of Johannesburg

Lichumile Monakali

THE LEARNING TOWER:

Imagining a new school typology for the growing population of the dense Johannesburg inner-city.

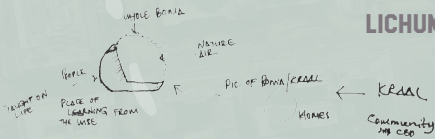


This project examines the lack of adequate schools in the Johannesburg inner-city and aims to research and design a new vertical typology which provides a fully equipped and adequate school with all necessary facilities. The school is developed to accommodate the growing residential community in the Johannesburg CBD where children are being raised in the many residential developments that are scattered throughout the inner-city.

For teaching and learning to happen successfully, the environment in which this happens ought to be sufficient. The children being raised in the Johannesburg inner-city deserve the sought of education that every other learner gets at more established schools. The lack of facilities at schools limits the academic potential of learners as they have limited to no access to resources such as library books, textbooks and computer literacy.

An adequate school will provide better teaching and learning spaces for these learners and social and recreational spaces, which most of the inner-city schools lack, will provide social and recreational benefits, forcing the learners off the streets as they will have extra curricular activities to get involved with.

LICHUMILE MONAKALI



DENSEdUCATION

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Lichumile Monakali
Master of Architecture (Professional)
University of the Witwatersrand, Johannesburg



Figure 01: A continuous line drawing illustrating teamwork (Adobe Stock)

lichumile **MONAKALI**

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Supervisor: Gustavo Triana-Martinez



acknowledgments

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I appreciate the time you took to offer guidance and advice in order to produce an end product I can be happy about.

I also want to thank our course convenor, Hilton Judin, for his dedication and for always keeping us on our feet during this entire year.

Lastly, I would like to thank my friends for their continued support and understanding during the course of the past two years of honours and masters studies. You guys kept me from losing my mind.

declaration

I, **LICHUMILE MONAKALI** (1061768), am a student registered for the course ARPL7003 in the year 2012 at the University of the Witwatersrand. I hereby declare the following:

I am aware that plagiarism (i.e. the use of someone else's work without permission and/or without acknowledging the original sources) is wrong. I confirm that the work submitted for assessment for the above course is my own unaided work except where I have stated explicitly otherwise. I have followed the required conventions in referencing thoughts, ideas, and visual materials of others.

I understand that the University of the Witwatersrand may take disciplinary action against me if there is a belief that this is not my unaided work or that I have failed to acknowledge the source of the ideas or words in my own work.


(Signature of Candidate)

On the 10th day of Feb in the year 2020
(day) (month) (year)

PLEASE NOTE: all un-referenced photos, sketches, diagrammes and phrases have been constructed based on the research undertaken by the investigator personally.

abstract

“The biggest issue I could think about before I even started visiting the schools was that I could not comprehend how a school could be effective in offering quality education if it was lacking several crucial academic and recreational facilities.”

- (Investigator, 2019)

Over the past two and a half decades, following the fall of the Apartheid regime, inner city Johannesburg has experienced significant population changes that saw the major businesses moving out and the working class moving into new residential developments to be closer to work and the urban lifestyle.

A growing amount of buildings originally built as office buildings have been repurposed over the years to serve as residential developments in response to the high numbers of young Johannesburg residents moving into the city from outlying suburbs/townships, some South African citizens from other parts of the country, and African citizens from other countries of the continent.

This has resulted in many children being raised in the inner city with very inadequate schools that have been being born into existing buildings built for different purposes in Johannesburg’s past.

This research report suggests that a new typology is required to deal with rising numbers of students to be catered for due to rising numbers of young families moving into the inner city, and as a response to inadequate schools with no facilities required to provide quality education. As a result of limited space within the inner city, the nature of this learning centre would make sense if it were to be vertical in order to accommodate the program of a traditional horizontal school and a wider, more inclusive program.

The conducted research aims to give light on the influence of educational environments on the quality of education, the benefits of school-community relationships and the importance of having recreational spaces within the setting of a learning environment for both the learning centre and the community.

Keywords: Inner City, Inadequate Schools, Education, Learning Spaces, Learning Centre, Recreational Spaces, Community

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PART A THEORY

chapter one **relevance**

relevance

project **BACKGROUND**

The idea of addressing this issue came about as a result of a personal observation made by the investigator when he was residing in the Johannesburg CBD in his first year of employment in 2016. He had noticed that there were a lot of children being raised in the CBD which, at the time, he thought was rather sad and unfortunate as the normal experience of growing up playing on the streets was no longer possible for them, and he always wondered where they attended school as he had not yet identified any building which closely resembled a school.

The investigator then later started identifying several repurposed buildings operating as schools and his next concern was where the recreational activities possibly took place. He realised that the only thing that was possibly happening at the schools was teaching in classrooms fitted into these buildings and that the learners had a very different and restricted experience at school compared to the more traditional forms of schools most of us attended.

Physical and social development at school is just as important as the academic development and as a result, the investigator has remained passionate about this topic. It is his belief that government and the private sector have a responsibility to create possibilities where the learners attending these schools can have a more rounded schooling experience; whilst providing a safe environment for them in contrast to the greater context of the Johannesburg inner city.



Figure 1.1: Young children on their way to school in the CBD (TimesLive, 2015)

problem **DEFINITION** research question

Main Design Problem (Main Research Question)

How can the design of a new learning environment start addressing the issue of inadequate schools within the inner city of Johannesburg and contribute towards providing more adequate and effective teaching and learning spaces for greater academic success, social and recreational development of the learners who are based in the inner city community?

Can the centre offer facilities that can be used by other existing schools?

How can the involvement of the community be accommodated in the facility to get the community committed to looking after the centre and all that it will try to achieve for the community development?

Sub-Design Problems (Sub Questions)

What type of typology can be introduced in order to make this learning environment a success?

What sort of new spaces can be introduced in order to enhance greater teaching and learning success?

How can the lack of recreational activities and facilities at the schools be solved in order to encourage sports participation amongst the learners?



Figure 1.2: A classroom inside an inner city school (Mail&Guardian, 2017)

research **METHODOLOGY**

Creative research through design is a combination of inductive reasoning, interpretation and imagination linked to various themes, constraints (such as technological considerations, building site, client and user groups) and precedents (urban and architectural).

The creative research process in terms of discourse and design alike, take on an iterative (inductive-deductive), nonlinear, cumulative, cyclical, and open-ended exploration to achieve its creative outcomes. The research combines qualitative and quantitative approaches to knowledge and argumentation, whilst the creative component translates the same into a defensible architectural proposition.

The investigator has read books, journals and thesis dissertations related to this research topic in order to understand what has been done and what hasn't been done in addressing the issue of rising inner city populations that create demands for schools. The aim of the reading was to inform the type of centre that would eventually be designed, including

different spaces required.

In addition, the City of Johannesburg website was consulted for certain statistical information and information regarding developmental projects across the inner city and that helped to choose the research site.

The investigator then moved on to conducting analysis on the site illuminating an understanding in terms of the pedestrian and vehicular movement framework around the site which affected certain considerations such as noise pollution, general traffic, safety and security. He also determined the climatic factors impacting the site such as solar studies to determine natural light and wind patterns to experiment with natural ventilation possibilities.

The envisioned topography of the site was a huge informant for the actual building as to how it would be grounded on the site. This was all achieved through several mapping exercises.

inner city **INTRODUCTION**

Economy

The Johannesburg inner city is situated within Region F and has the highest generation of GDP even compared to Region E where Sandton is situated. The inner city also employs the highest amount of people in Johannesburg with a R308k GDP per employee.

Vibrancy

Cultural Hub

CBD, Newtown Precinct & Braamfontein
History, culture, jazz, festivals

Trendy artisan markets

Maboneng Precinct, 1Fox & Braamfontein
Art, design, fashion, food, coffee

Cross border trading

Estimated 10 000 street traders = R4.2 billion annually
500-600 cross border shoppers = R10-R17 billion annually

Home to:

1. The banking sector, the mining sector and many other major corporations.
2. The headquarters of provincial government municipal government, political parties, trade unions & GOs. It also houses universities, art galleries & theatres.
3. A vibrant mix of formal and informal economies. Major wholesale and retail trade outlets, street traders and cross border shoppers.
4. The biggest transport interchange in SA. Trains, buses and up to 4 000 taxi's bustle through the city on a daily basis on route to Park Station and Ghandi Square.
5. Many new residents to the city. Who help to increase residential development and raise property values.

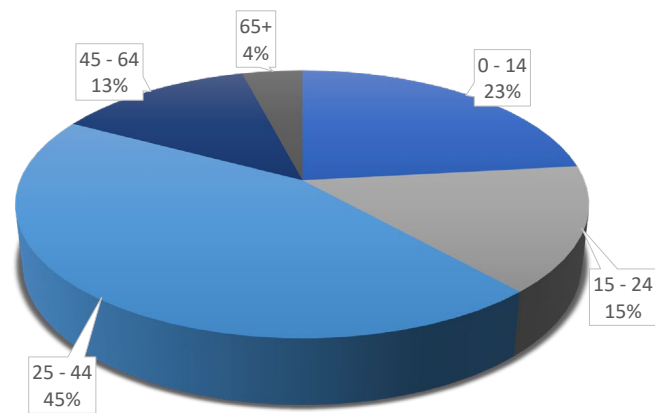


Figure 1.3 Population of inner city Johannesburg by age group (City of Johannesburg, 2018)

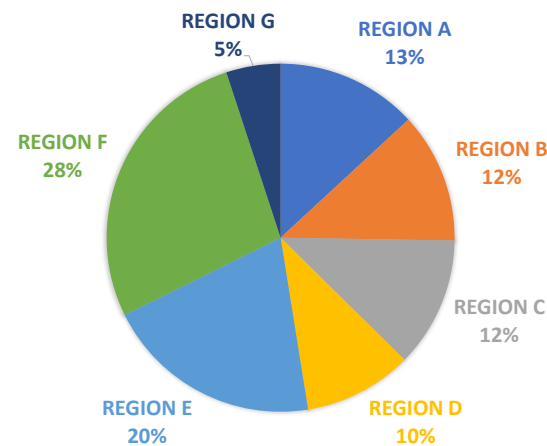


Figure 1.5: Highest GDP producing region in Johannesburg (City of Johannesburg, 2018)

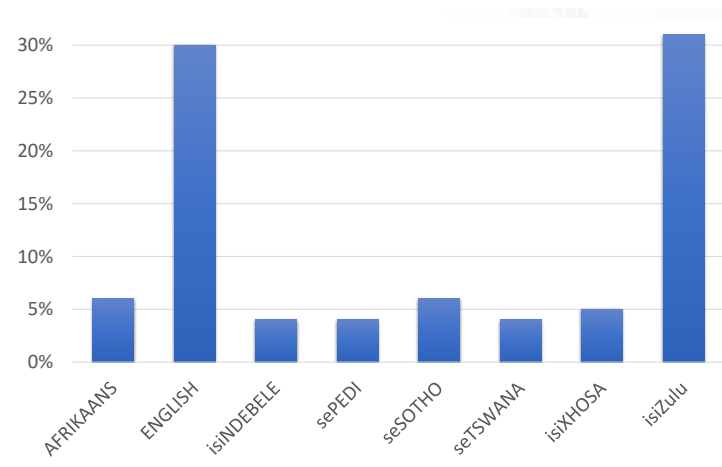


Figure 1.4: Diversity of SA first languages in the inner city (City of Johannesburg, 2018)

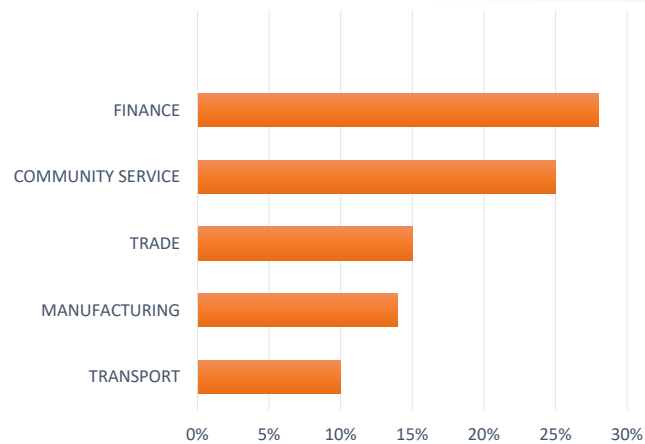


Figure 1.6: Top GVA contribution sectors within inner city (City of Johannesburg, 2018)

NOTE: Only the statistical information has been sourced. Charts by Investigator.



chapter two
the issue

ISSUE

INTRODUCTION

With a history of racial segregation, South Africa's education system has been tainted with the ideals of the apartheid regime, meaning that, at least since the establishment of apartheid, quality education in the country, especially at primary and high school level, has always been exclusively available to a white demographic population of the country.

With the collapse of the apartheid regime and the establishment of democracy, this has only fractionally changed. Instead of quality education being all-inclusive to the non-white demographic, the exclusion is experienced by the lower-class demographic. The truth is, this still impacts non-white South African communities more than any other, even though this is no longer the intention of the present government. Ironically, 25 years after the advent of democracy.

The legacy of apartheid on education in the country has meant that hundreds of schools in the country still lack in many of the facilities they were intended

to lack in during the apartheid era. This lack of adequate facilities carries with it, certain academic and social implications which impact the students who attend the schools. Twenty-five years later, it is still extremely difficult to understand why schools in the country are still underdeveloped. The current government continues to make strides, but they don't appear effective enough; especially with the new threat of corruption at all levels of government.

With rising numbers of South Africans continuously moving into cities for purposes related to education and employment, the country's inner-cities, such as the Johannesburg inner city, continue to densify. More South Africans are finding it attractive to move away from townships and rural settings into the city to make a living and to get a taste of the urban lifestyle portrayed all over television and social media today. Young adults are moving into the city to experience the urban life, i.e. "around the clock street life, café sociability, wider selection of urban activities and closer access to urban amenities and sense of place" (Swinburn and Hadley, 2017). However; with inner city life comes many implications. These include factors such as space limitations,

higher vehicular and pedestrian traffic, noise pollution, air pollution, safety concerns, and more.

The young families moving into the inner-cities are doing so willing to "trade space for convenience" (Swinburn and Hadley, 2017), because everyone appreciates convenience over difficulty nowadays. The easy way out. Why not? Convenience makes sense. Especially to young people who are constantly on the move. Having to travel from the outskirts of the city everyday to make it to work takes time and as the saying goes, "time is money".

As an immediate result to the increasing population of young families, in the inner city, more children are now being raised in the densely populated and extremely busy and unsafe environment. From 2016, the investigator experienced life within the inner city of Johannesburg as he had relocated from East London in the Eastern Cape.

This was a major transition in terms of moving from a relatively less dense and busy city, to a major, densely populated, unsafe and quite intimidating "concrete jungle". He observed these children in the building in which he was residing

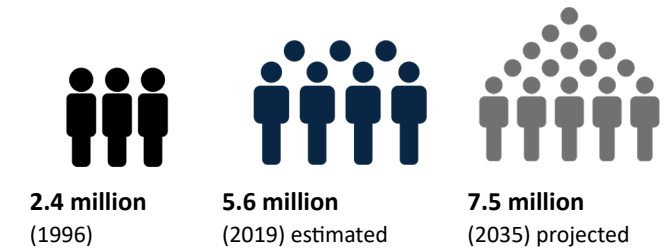


Figure 2.1: Rate of Urbanisation in Johannesburg (% of the population living in Johannesburg) [World Population Review, 2019]

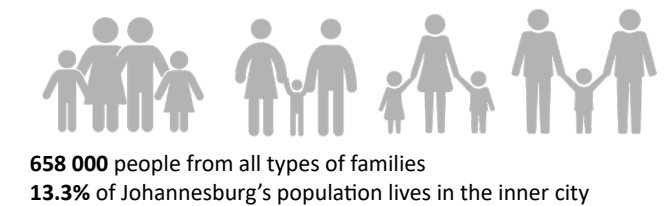


Figure 2.2: Population of the Johannesburg Inner City (City of Johannesburg, 2018)

and the many other buildings around the city and he always wondered what growing up in that environment felt like- as it felt so harsh living there for him as a young adult.

Clearly there were actually a lot of buildings within the inner city which had been abandoned over time as businesses started moving out towards the north and a number of these buildings had been converted into low-cost residential establishments and schools, to cater for the growing population of the inner city.

As part of the trading of space for convenience mentioned above, having your children going to school within the same area in which you work is extremely convenient. It then would make sense that young families would move into the inner city to enjoy the convenience and less costly expenses of having their children travel in and out of the city to attend school daily. Living, working and having your children attend school all within the inner city is far convenient and cost-effective. Therefore; the birth of these less conventional schools has been both a necessity and a blessing for these families – allowing them to save on every expense that they can capitalise on. Although the investigator has identified these schools within the inner city which do play an important part in offering opportunities for the children being raised

within the inner city, it is also important to examine the adequacy of the schools in order to determine whether or not they are in fact successful in delivering quality education to the learners who attend them. The biggest issue he could think about before he started visiting the schools was that he could not comprehend how a school could be effective in offering quality education if it was lacking several crucial academic and recreational facilities.

However; most of the schools in the inner city are based within repurposed office buildings, meaning that the spaces were not created for teaching and learning purposes, which does introduce a collection of challenges. This also means that a large majority of these schools lack important recreational spaces as there is no way in which these spaces could possibly have been introduced into these existing buildings.

Throughout this report the investigator makes suggestions on why a new learning environment within the inner city is needed to cater for the community, providing many of the important facilities that most of the existing schools lack. This, not only for those who will be enrolled in the facility, but also trying to make provisions for the entire community, including the other existing schools, to utilise some of these facilities to further enhance their

teaching and learning capabilities.

This facility's purpose is to introduce models of the spaces and programs illustrating what educational facilities built within the inner city should be aiming for in order to provide adequate and effective education.

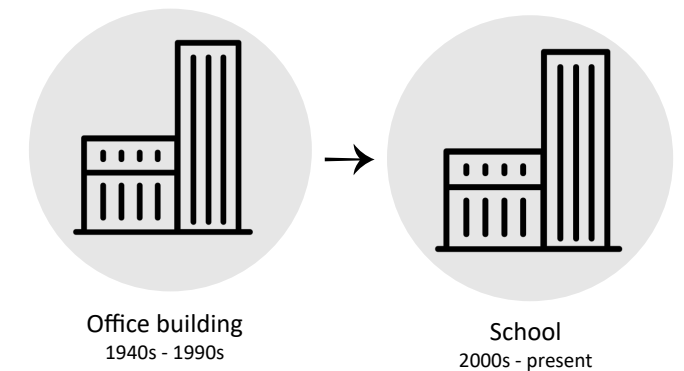


Figure 2.3 The entrance to a school in a Johannesburg CBD building (SowetanLive, 2018)



Figure 2.4: Johannesburg CBD from above looking towards Rissik Street and Newtown (John Mason International, 2017)

adequate **LEARNING ENVIRONMENTS** and the effects they have on scholastic performance

The spaces which create the existence of a learning environment are extremely important. They determine whether the learning environment is effective enough or not. Special consideration must be paid towards the design and planning of these spaces as they have an influence on the quality of education that the students obtain. They have the ability to control how a student learns and the effectiveness of whatever it is that is being taught to them by the educator. “Learning spaces can be defined as the spaces created to support, facilitate, stimulate, or enhance learning and teaching” (Unge et al., 2018 as cited in Zainuddin, Idrus and Jamal, 2018).

There are numerous factors within a single space that the architect, and even the teacher - who designs the interior of most learning spaces such as classrooms - must be specific and deliberate about. “The best form of learning takes place within an integrated environment of architecture, technology and teaching” (Kim, 2017),

therefore; spaces that are created by the architect must have the appropriate technology that is used by the educator strategically installed to provide the effective teaching possibilities and none of these (architecture and technology) should be taken for granted by the educators. Accordingly, “active classroom designs that facilitate interaction between faculty and students have been successful in improving student learning outcomes” (Cox, 2011 as cited in Zainuddin, Idrus and Jamal, 2018). This is true for spaces which facilitate interaction between students and other students.

Schools have always had an “emphasis on individualism in the way they educate children” (Clark Jr., 2012), especially at primary and high school level. Perhaps most schools than others. They have always had a way in which they “stress individualism rather than focus on the common vision” which encourages individual success and achievement instead of the collective/common alternative. “We are taught mostly to learn to be alone, to compete, to achieve, to succeed” (Clark Jr., 2012). Reading these passages from Edward T. Clark’s ‘Designing Schools as Learning Communities’ reminds the investigator about his own experience at his former high school learning.

There were systems that seemed to be rather focused on the individual’s success rather than on teaching students to motivate and educate each other to improve each other’s weaknesses. For an example, from grade 10 to matric, we had two separate classes for Mathematics – the stronger class and the weaker class. They separated us according to our strengths and weaknesses instead of combining us in order to encourage peer learning. On top of that, the stronger class was then given the head mathematics teacher at the school who was the only one who set test and exam papers, and the weaker class got a teacher who had just returned from a career in interior design and had not taught Mathematics in years.

The investigator believes that this system failed the students who were placed in the weaker class, and as a result, many of those students ended up dropping Mathematics for Mathematics Literacy. He was one of these students who was placed in the weaker class. Had he not been extremely motivated by his desire to study architecture which required him to obtain 50% or more for the subject, he probably would have found himself giving up as well. Luckily, by the end of the matric year, he had obtained 68%. The only thing that got you through was self-determination and extreme dedication.

Strategies to encourage effective learning are considerations that architects, in particular, have to incorporate into their designs when planning learning spaces. Patterns of movement and circulation and natural daylighting may possibly have an effective impact on the achievement of students. In his ‘Effects of School Design on Student Outcomes’, Kenneth Tanner states that: “special attention should be given to circulation classifications that permit student traffic flow quality from one part of the building to another.

This is echoed by (Tanner, 2009) when he states that: “movement within a school may be an important supporter of learning. Pathways free of obstructions between activity areas and classrooms improve utilization of learning spaces”.

The investigator argues that circulation and movement patterns within learning environments should be allocated large amounts of space to allow ease of flow between spaces to prevent congestion and slow progression between classes. These spaces should also be treated as spaces with educational qualities and potentials where installations such as exhibitions and student work can be displayed and viewed without creating obstructions along the way. It is also important to incorporate some exterior views within the movement patterns in order to bring

the outside inside, allowing the students to experience the environment which could help place them at ease and could even help with distressing as they walk from one space to another. This could be achieved through the creation of courtyard spaces and large glazed spaces along pathways and corridors.

The orientation of the building is also of great importance and needs to be carefully planned out by the architect. Natural daylight is something that needs to be capitalised on when it comes to creating learning spaces as the natural “light is the most important environmental input, after food and water, in controlling bodily functions” (Tanner, 2009). Natural lighting, as opposed to artificial lighting, stimulates the brain and keeps it active. “Poorly lit and windowless classrooms can cause students to experience a daily form of jet lag...” (Tanner, 2009). Lighting patterns are said to “provide a necessary relief for students” which “is associated with window gazing and is less consuming than the focused attention used to draw pictures or doodle in a notebook. It is much easier for students to refocus their attention back on the teacher when engaged in tasks requiring soft attention (such as window gazing) rather than those requiring more focused attention” (Tanner, 2009). Also, according to Tanner, studies conducted in three U.S. states

have found that “students with the most day lighting in their classroom progressed 20 percent (%) faster on mathematics and 26 percent (%) faster on reading tests over a period of one year...”

In light of the above scholarly statements and personal experience, the investigator concludes that natural daylight does indeed have a positive effect on the academic outcome of students and should be introduced in a strategic way into learning spaces where it also doesn’t interfere with teaching and learning at the same time, for example, through glare. Necessary innovative systems and materials should be employed to control the amount of daylight entering such spaces.

“Active learning experience can reinforce the social development and learning experiences of children who are engaged in the world around them.”

(Kim, 2017)

school-community
RELATIONSHIPS: why are these
 so important for the longevity of the
 school?

We have determined that the quality and general nature of the spaces within an educational facility such as a school are of the utmost importance and can have an extremely effective influence on the academic performance of the students. High performance amongst students also means that the school is performing well environmentally as well as is its immediate relationship with the community in which it is situated.

Schools are one of the extremely important public institutions within a community, along with churches, community halls and clinics. Accordingly, “creating a sense of community through a school is important because it is a place where people gather, is where parents do things, where sport happens and where you meet your neighbours” (Swinburn and Hadley, 2017). In essence, schools are part of the backbone of communities and in turn,

communities are the backbone or support system of schools. In contrast, “communities, especially those that are small and rural, are said to suffer socially and economically from the absence of a school” (Sipple, Casto and McCabe, 2015). This is why it is in the best interest of both the school and the community to have a relationship in order to create an environment of social, economic and academic cohesion where each party is supporting the other.

For example, schools have the ability to open themselves up to communities by offering their facilities for several community activities, and in turn, communities have the ability of making some of their facilities or locations available for learning activities for the students. Some community members might also be available to go into schools to spread knowledge on topics they may be experts in.

The authors of ‘A Typology of School-Community Relationships: Partnering and Universal Prekindergarten Policy’ have come up with a way of understanding the possible relationships between a school and its community. They state that: “the boundaries between a school and its community can be viewed as impermeable or permeable” (Sipple, Casto and McCabe, 2015). So as an example, the school could have a permeable attitude towards parent participation but can also be completely impermeable towards the greater community by not opening up its facilities for use by the community.

They further explain these two ideas as follows:

Impermeable Boundaries

“First, institutional theories suggest that as institutions, schools strive to “buffer” themselves from external forces, in part to maintain their legitimacy and to provide their service without disruption (J. W. Meyer & Rowan, 1977, 1978; H. D. Meyer & Rowan, 2006). Second, there is evidence that schools may avoid connections with communities, including parents and community-

based organizations (CBOs), due to the professionalized nature of schools (Tyack, 1974). In other words, the experts reside in the school and should function separately from the community as an isolated institution” (Sipple, Casto and McCabe, 2015).

Permeable Boundaries

“Schools and communities may partner to create enriched academic experiences for children, where either students go out into their own communities for learning activities or members of the community come into schools to enhance a topic of study (Israel & Ilvento, 1995; Sanders 2001, 2003; Seidl, Mulkey, & Blanton, 1999). In another example, schools act as community centers in many areas by serving as a place for events, for adult education opportunities, or where a school library or health clinic is open to the public (Cummings, Dyson, & Todd, 2011; Dryfoos, Quinn, & Barkin, 2005; MacKinnon, 2001). Schools and communities can also connect with one another to serve economic goals, such as entrepreneurial development or shared municipal services (Mulkey, 1992; Schafft, Alter, & Bridger, 2006)” (Sipple, Casto and McCabe, 2015).

For the purpose of this proposal, it is argued that permeable boundaries exist between the community and the new learning environment. Further argument is that this should be the type of relationship every single school or learning institution should have with its community – including universities. There is so much more to benefit from by having a permeable boundary relationship. For example, not all communities have recreational facilities, and partnering up with schools in order to have access to such facilities would benefit the community.

To make this relationship more efficient, these spaces could be utilised after hours and on weekends to avoid interfering with teaching and learning at the schools. Supporting this view, the (Public Health Law Center, 2013) states that “making indoor and outdoor school spaces available helps the community stay active, creates community support for schools, and allows for a community gathering place”.

Another way that schools could create relationships within the community is by providing employment opportunities for members of the community. In many schools, especially those in small and rural communities

such as the ones the investigator visited last year in KwaThema in the East Rand for his research project, members of the community have been employed as grounds staff, security staff and cleaning staff. Some of the schools have even employed some of the parents of the students who attend the schools as kitchen staff to cook meals for the children feeding scheme. Something that was evident is that this results in a sense of pride and ownership of the school for the community, meaning that the community is encouraged to support and look after the school in whatever possible way they can, as the school is looking after them by providing them with employment opportunities.

Finally, another type of relationship that a school can engage in is with the corporate community within its larger context. Schools constantly need funding for various and endless reasons, and although they do host several events such as bake sales, theatre shows, sports derby events and others in order to raise some funds, this can never be enough to fund the requirements of the school. There are always opportunities for schools to enter into partnerships with community-based organizations (CBOs) which in turn could partner

up with various corporate companies that have the potential of becoming sources of funding as part of their corporate social investment and responsibility programs.

This funding could be for textbooks, sports equipment or even for maintenance purpose for the sustainability and longevity of the school. This is something that government can also get involved with by initiating some of these relationships with some of its own private partners.

In conclusion, there are countless reasons why it is important for schools to have open or permeable relationships with their communities. These relationships benefit both the school and the community and therefore should always be explored in order to enhance the quality of education and facilities at the schools and the quality of life within the community.

schools and recreational
SPACES: the reasoning and
benefits

Schools have the responsibility of keeping their students physically active through physical education classes, that take place during school hours and form part of the academic curriculum as well as physical sports activities that take place when the school day ends and over weekends when competing against other schools.

As a prerequisite for these activities to take place, schools must have recreational facilities such as sports fields, tennis courts, basketball and netball courts, indoor sports halls, swimming pools and sometimes, more. What is of great concern with the inner city is that because many of the schools have been accommodated into buildings that were initially designed as office buildings, as a result these schools do not have any of these facilities.

However, and more importantly, staying active keeps the students healthy and in good shape and this

also has a positive effect on their academic performance. Physical activity stimulates the brain and helps with the development of the brain and the body as a whole. This is why it is important to have physical education as part of the school academic curriculum in my opinion; especially from primary school level where the students are still young and developing in all aspects. To support this view (University of Exeter, 2016) states that “physical activity and cardiorespiratory fitness are good for children’s and young people’s brain development and function as well as their intellect”.

In then author’s observation, all students, even at university level, need a break from the classroom during the day. A break to focus on something else other than academic work, and a break to allow the brain to breathe and relax outside whilst the student gets fresh air. This also helps the students to reconfigure their concentration as long endless

teaching sessions are ineffective when students start losing concentration. Physical education classes are the best way of doing this as the students are kept busy with activities that stimulate the brain and challenge their bodies at the same time.

School is most definitely the first place where many children start getting physically active. This, at this early stage, is a good strategy at getting children to enjoy being active in order to promote a healthy lifestyle from a young age. The aim is that they get used to it and hopefully stick to the routine of being physically active well into their adulthood. Being moderately active from this young age has been proven to have long-term effects on the overall health of the students as they grow older. Accordingly, the (University of Exeter, 2016) states that “...frequent moderate intensity and, to a lesser extent, low intensity exercise will still help improve kids’ heart health and their metabolism, while physical activity is a key component of the treatment of many long term conditions in 6-18 year olds”.

In contrast, “Physical inactivity is a health risk” (Solmon, 2015). Therefore, the more inactive you are, the more you expose yourself to potential health risks such as heart disease and

type 2 diabetes. Therefore; remaining active has long-term health benefits and schools have the responsibility of enforcing it as part of the daily routine for students.

When you start being physically active and competitive as a student, you start recognising certain strengths within yourself that you had no idea you had. For some students, this is when some hidden talents manifest themselves and the inner sportsmanship and sportswoman-ship are unleashed.

Remaining physically active on a regular basis also brings other benefits other than long-term health benefits and talent manifestation. According to the University of Exeter’s ‘Physical Activity Boosts Kids Brain Power, and Academic Prowess’ states that within even the most regular students, “regular physical activity can help develop important life skills, and boost self-esteem, motivation, confidence and wellbeing. Also, it can strengthen/foster relationships with peers, parents, and coaches and just as importantly, it can promote social inclusion for those from different backgrounds, ethnicities, sexual orientation, skill levels and physical capacity.”

Another form of recreational space that schools should have is in the form of relaxing and contemplative spaces. These are spaces such as gardens, roof gardens, parks, courtyards, etc. They are spaces to which students can go to get some fresh air in-between classes or during breaks to relax or even socialise in small groups. They can be used as peer-learning and individual learning spaces during breaks and after school as well as they are quieter and more tranquil.

By providing recreational spaces at schools, the psychological well-being of the students is also strengthened. “Physical activity-based positive youth development programmes that have an intentional curriculum and deliberate training are effective at promoting life skills (eg, interpersonal, self-regulation skills) and core values (eg, respect and social responsibility) in children and youth” (Bangsbo et al., 2016).

In summary, ensuring that recreational spaces within school settings are present is therefore extremely important and valuable to the students, the schools and even the community. They carry many opportunities for students to develop and grow in many ways. They promote

health and fitness from an early age, and they have also been proven to promote scholastic performance when students engage with the spaces in a physical manner.

Through school-community relationships, communities can also benefit from these spaces as they have access and can boost the overall health and fitness of the community, whilst improving the social connections and boosting morale within the community.

“Whole school approaches and the provision of physical activity-conducive environments such as bike lanes, parks and playgrounds, are both effective strategies for providing equitable access to, and enhancing physical activity for, children and youth.”

(Bangsbo et al., 2016)



legend

- repurposed schools
- “model c” schools
- tertiary institutions



A number of schools have been visited before and during the course of this research within the Braamfontein/CBD areas of the inner city where the majority of the vertical schools can be found.

As these are spaces located in a dense inner city setting, the security at most of the schools has been strict and the investigator has not always been allowed to take photographs of the school, and in some cases, could not get time with the principals in order to ask some question.

However, the setting at most of these schools is evidently similar. More or less the same amount of learners is enrolled and most of the schools lack basic facilities which schools at primary and high school level should have.

The schools generally do not have any sort of fixed relationships with the communities they inhabit. Spatially or otherwise. Parents/guardians usually drop their children off (many learners get themselves to the schools) and pick them up again after school and that sums it up. This could possibly be because these communities are not similar to most communities inhabited by schools in the country which are

usually residential communities.

These communities are mixed with residential, retail, transport and commercial spaces and schools are not the focus. They do not seem to have the usual care and concern for the schools, but rather the concern of making business or getting from point A to point B as efficiently as possible.

A harsh environment for schools.

The following is a criteria focused on when visiting schools:

General information (incl. number of students enrolled, type of school (primary , high or combined, number of grades, etc)#

General Spaces/facilities:

circulation
canteens
gathering/assembly
libraries
computer labs
science labs
classroom configuration



Year Founded: **2005 (high school), 2017 (primary school)**
 Grades: **1 - 12**
 Number of Habitable Levels: **6**
 School Type: **Primary and High School**
 Student Population: **987 (total)**



circulationspaces

The circulation spaces within the building are extremely compacted for the number of students at the school. This is felt at most during the times when students are not in class such as before and after school as well as during breaks. This is also a problem at the front of the school as this is the only entrance used by most students and staff as is often congested. There are security features such as gates and turnstiles to prohibit members of the public from wondering off into the rest of the school. The corridors are not wide enough for ease of flow.

canteenspaces

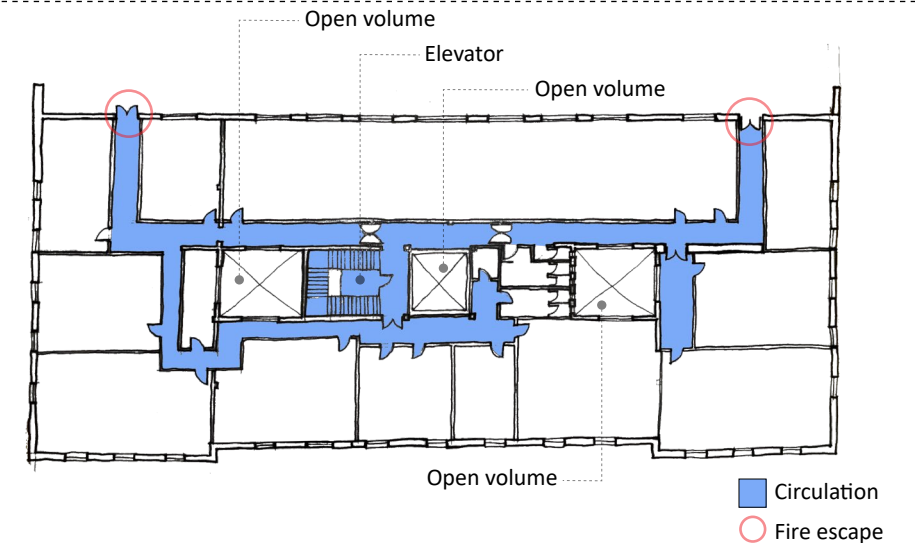
The canteen is located in the basement level of the school and is a shared space for all the students. The location of the canteen is not ideal as it has windows which sit high up, preventing the students from connecting with the outdoors (sun, air, vegetation, etc) whilst sitting down to have lunch. There is always a sense of enclosure which also traps the loud noise produced by the students.



gatheringspaces

There are certain spaces which are available for students to interact at during their break times. These aren't official spaces. One is a courtyard space which is actually a circulation space for vehicles going to the parking level below the school and one is a fenced off space to the west of the school which sits between a street market and the school building.

Due to the amount of people that occupy this building on a daily basis, it is clear that more vertical circulation is needed for this school. One central staircase is not close to enough. The elevator is old and does not work most of the times. Fire escape should only be used in the event of an emergency, therefore ruling them out of bounds at any other time. The corridors are narrow, making them insufficient for this type of program.



schoolhall

Surprisingly and unlike many schools in the inner city, this school has a hall which is perfect for assemblies as opposed to outdoor assemblies witnessed at a nearby school (not permitted to take photographs). This hall is also used for examinations. It is currently setup for the matric trial examinations. The gallery is perfect to prevent overcrowding on the main floor. The hall also has a full school hall stage and several emergency exits.



CONCLUSION: what does it all mean for the future of learning environments?

The duty and responsibility of a school or learning environment is to create a suitable and effective environment in which students are encouraged, motivated and inspired to learn. The need and desire to learn must be generated within the students otherwise it doesn't really exist, because they end up going to school only because they are instructed to do so by their families and sometimes under-perform academically as a result.

As a community and as a country, we need to start ensuring that schools are teaching and learning environments for the best interest of the students, their families, our communities, the country and its economy. Educated students grow up to become participants in the country's economy and a future of inadequately educated students is not where we should be heading. "An educated community is a wealthy community" (unknown).

The country is populated with a large

sum of inadequate schools at the moment as a result of many factors – some of which are mentioned throughout this chapter. Many of the schools in the inner city of Johannesburg struggle to offer adequate facilities for the effective training and education required by their students. One of the issues that are preventing these schools from offering effective facilities is space and existing infrastructure.

There is close to no space in the inner city of Johannesburg for the development of the usual spacious academic environments we are used to seeing in the country. Developments spanning over large portions of land have become unheard of in this community, and new alternatives need to be explored.

Many schools throughout the country have established relationships with all types of businesses in the private sector and they have made meaningful and sustainable contributions towards the schools and continue to. It should also be general responsibility practice for these businesses to identify such schools that they would like to support for the better future of the youth and the country.

There is a need to start introducing spaces which are of an effective nature towards the scholastic performance of students, not only in the inner city, but in the poorer communities of the country as well. Students can easily be motivated and inspired by their environments as much as they can also be uninspired and uninterested. When designing schools, even those that are accommodated into existing buildings, we need to design them with that idea in mind.

We should design spaces that are relevant and significant towards the teaching and learning experiences. We shouldn't just create spaces that can accommodate large enough numbers of students and desks. They need to be interactive and should allow as much interaction amongst students as that between educators and students. Movement and circulation spaces should also be used in creative and effective ways to further enhance the quality of education and should be experiential spaces – not just dead spaces used to get from one part of the building to another.

As mentioned above, the recreational spaces have a very important role that they play, not only on the scholastic performance of students, but on their

long-term health, psychological well-being as well as their social and life skills development over time. These recreational spaces are also good opportunities for schools to establish relationships with their communities and every school that has these spaces should really make an effort of opening them up to the community to use. There are benefits on both sides of the fence. The community has access to recreational spaces for the overall social cohesion and physical well-being of the community and schools are supported in numerous ways by the community which feels a greater need to protect the school and look after it as a result.

In conclusion, we need to start looking at alternative ways of achieving the above. We need to be willing to go to extents that developers of schools haven't reached in this country to develop innovative ways of creating effective learning environments for tomorrow. We need to look at what has been done in the past, but only in passing, in order to inform the ideas of the future and to avoid making the same mistakes of the past. It will be a trial and error process, but eventually we will achieve the perfect conditions for effective learning environments that are beneficial to students, schools and their communities.

PART B ANALYSES

chapter two **site analysis**

site



The chosen site is ERF RE/4353 which is located in Braamfontein along Smit Street. The site has been chosen because it is central to a greater residential context in the heart of the city and this is the community for which this development is the target. This is the location of the former Johannesburg Trades School which was a school for artisan training in several skills and had several workshops throughout the site. One building which was originally part of the school still stands on the northern portion of the site and this could potentially be restored as a trades training workshop.

zoning**INFORMATION:**

- ERF: RE/4353 @ ±12 111m2
- Use Zone: Educational
- Height Zone: C
- Owner: Tegniese Kollege Johannesburg
- Coverage: 100%
- Registered Market Value: R0.00
- Region: F

site**FEATURES:**

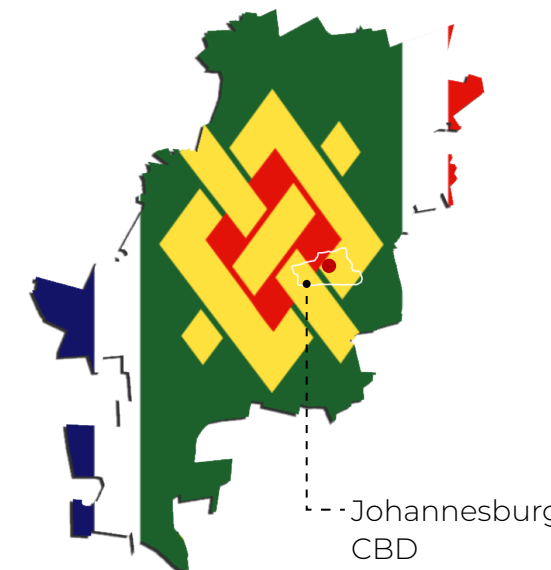
- Workshop building of the former Johannesburg Trades School
- An old mechanical shed probably used during the construction of the Gautrain tunnels
- Apparent substation or another services structure for the Gautrain
- Parking carport structure (north of site)



Gauteng Province



City of
Johannesburg



Johannesburg
CBD

AFRICA

Population: 1, 287 billion (2018)
Area: 30, 370, 000 km²
Density: 36.4/km²

SOUTH AFRICA

Population: 57, 73 million (2018)
Area: 1, 221, 037 km²
Density: 42.4/km²

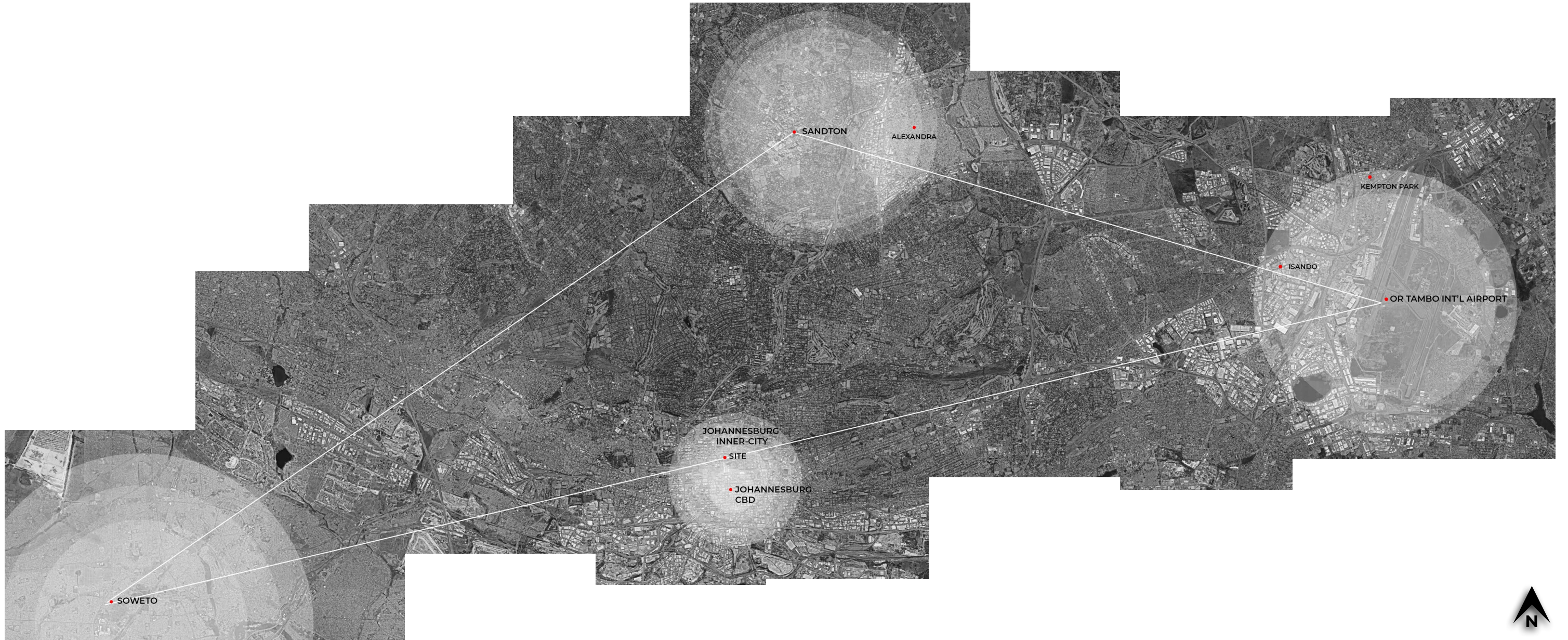
GAUTENG PROVINCE

Population: 12, 272, 263 (2011)
Area: 18, 176 km²
Density: 680/km²

CITY OF JOHANNESBURG

Population: 4, 434, 827 (2011)
Area: 1, 645 km²
Density: 2, 700/km²

LOCATION





Predominantly residential neighbourhoods consisting of apartment blocks such as the iconic Ponte City Apartment building, the Yeoville Market and bungalow-style housing in Yeoville and Bellevue. Areas that are usually considered unsafe and consist of both local black and African immigrant low to middle-class families. Berea is next to Hillbrow and has the same type of low to middle-rise residential buildings

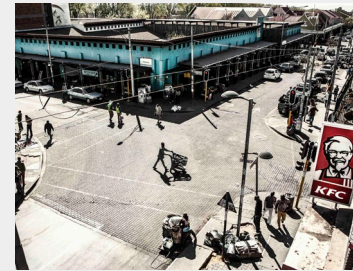
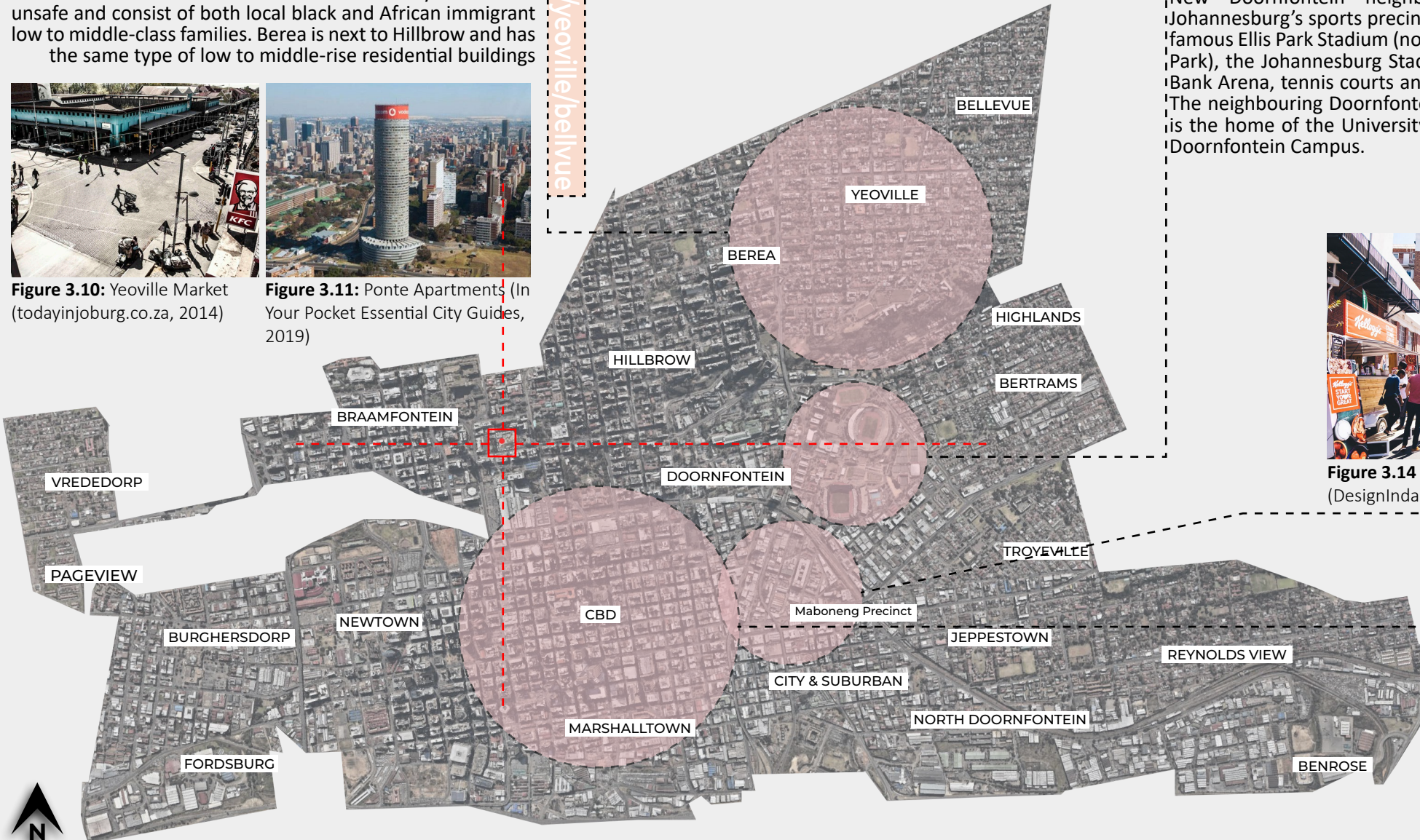


Figure 3.10: Yeoville Market (todayinjoburg.co.za, 2014)



Figure 3.11: Ponte Apartments (In Your Pocket Essential City Guides, 2019)



ellis park world of sports precinct

This area of the inner city is part of the New Doornfontein neighbourhood and is Johannesburg's sports precinct consisting of the famous Ellis Park Stadium (now Emirates Airlines Park), the Johannesburg Stadium, the Standard Bank Arena, tennis courts and swimming pools. The neighbouring Doornfontein neighbourhood is the home of the University of Johannesburg, Doornfontein Campus.

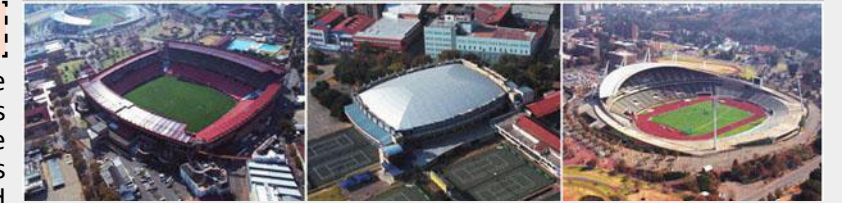


Figure 3.12: Ellis Park Sports Precinct (showme.co.za, unknown year)



Figure 3.13: Ellis Park Sports Precinct master plan (MMA Architects, 2009)



Figure 3.14 Maboneng Precinct (DesignIndaba, 2019)

maboneng precinct

The Maboneng Precinct is a gentrification project surrounded by the Jeppestown, New Doornfontein and City and Suburban neighbourhoods within the inner city where a number of existing buildings have been converted into retail, restaurant, residential, cultural and nightlife spots. This part of town is young and vibrant and is home to the visual arts, Arts on Main and Market on Main. To the west of Maboneng is Jewel City which is currently undergoing gentrification as well.

cbd/marshalltown

The CBD is the lifeline of the inner city. This is where the majority of the businesses in the inner city are based and this area has also become an important residential neighbourhood where a lot of existing buildings have been and continue to be converted into residential developments. This is also the home of the many inadequate schools within the inner city.



Figure 3.15: Johannesburg CBD (Flickr, 2009)



inner city**DENSITY**

The Johannesburg inner city is densely populated with buildings, resulting in a small amount of vacant land for further new developments. This suggests that any future developments to occur in the inner city will be restricted by the small sizes of the existing vacant plots, will be developed within existing buildings or will replace existing buildings which would have to be demolished to make way for the new development.



BRAAMFONTEIN/BRAAMFONTEIN WERF



DOORNFONTEIN



HILLBROW



REYNOLDS VIEW



YEOVILLE



CBD



TROYEVILLE



JEPPESTOWN



BEREA

legend

- repurposed schools
- “model c” schools
- tertiary institutions





Figure 3.16: Proximity of key locations (Investigator, 2019). See list of figures for references.

Children from the targeted areas populated with residential developments within the inner city would have less than 2km to travel to the learning centre. The underlay map contains the extent of the major residential developments within the inner city.

legend

- railway track
- primary routes
- secondary routes
- site



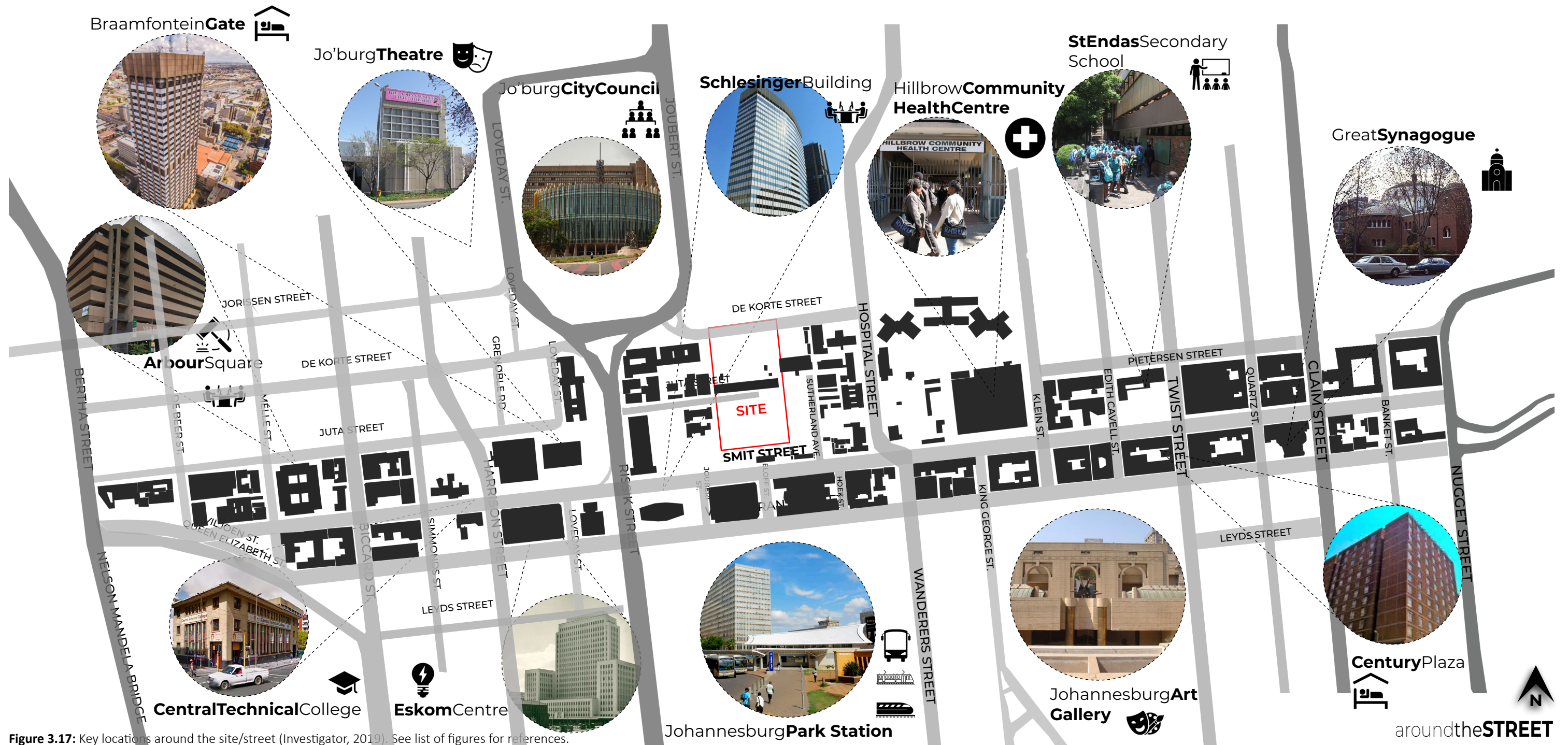
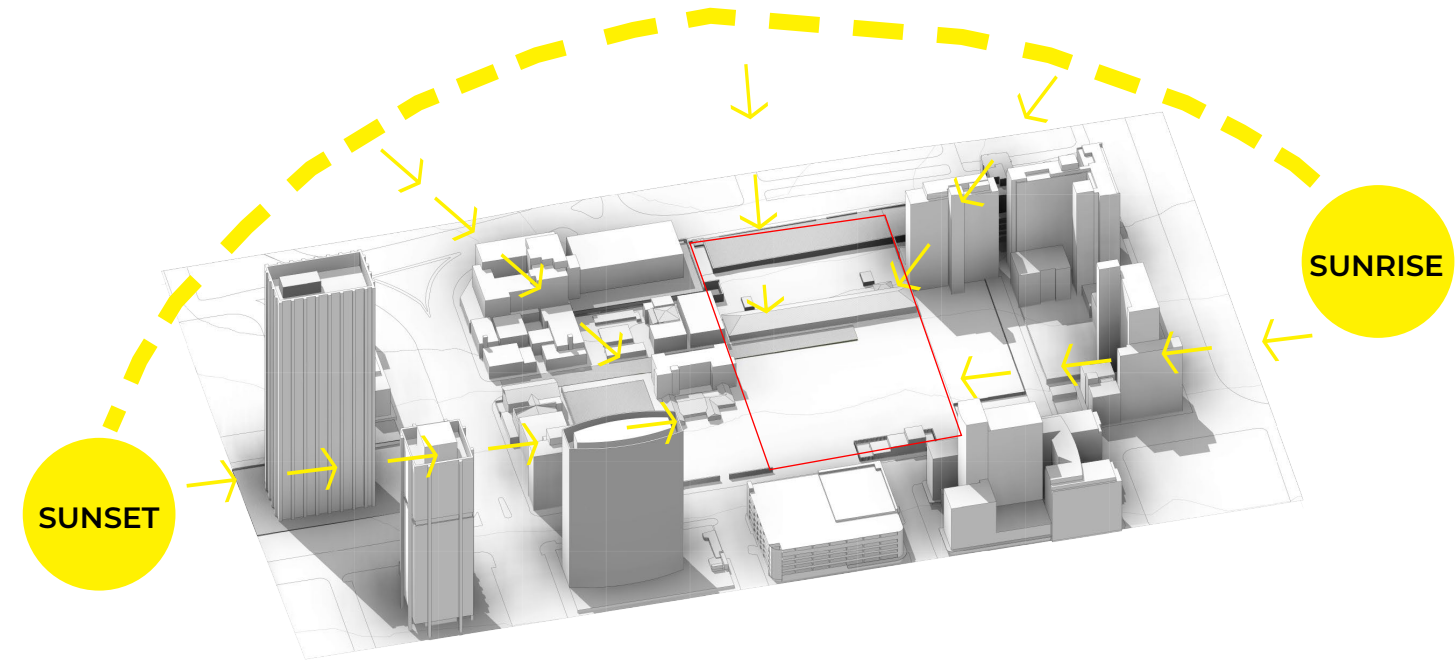


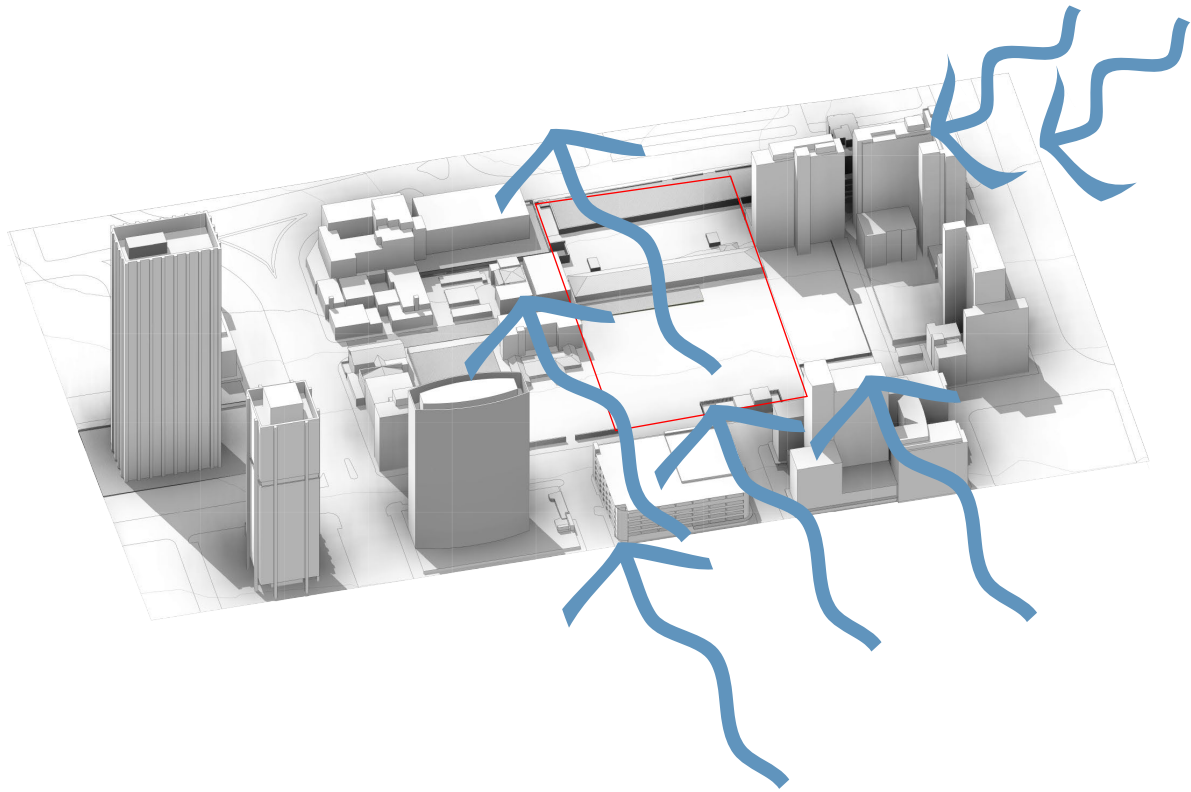
Figure 3.17: Key locations around the site/street (Investigator, 2019). See list of figures for references.

Month of year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
	01	02	03	04	05	06	07	08	09	10	11	12	1-12
Dominant wind direction	↖	↙	↙	↙	↙	↙	↙	↘	↘	↘	↘	↘	↘
Wind probability >= 4 Beaufort (%)	24	19	18	22	19	25	25	39	45	48	50	37	30
Average Wind speed (kts)	9	8	8	8	8	9	9	10	11	11	11	10	9
Average air temp. (°C)	23	23	23	23	17	14	14	17	21	22	23	23	19

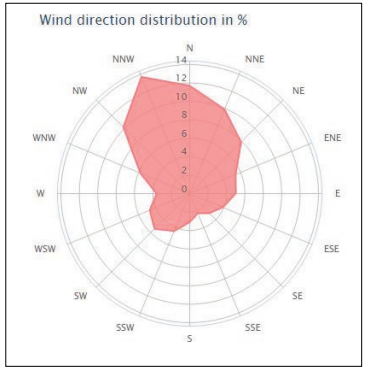
MIDDAY

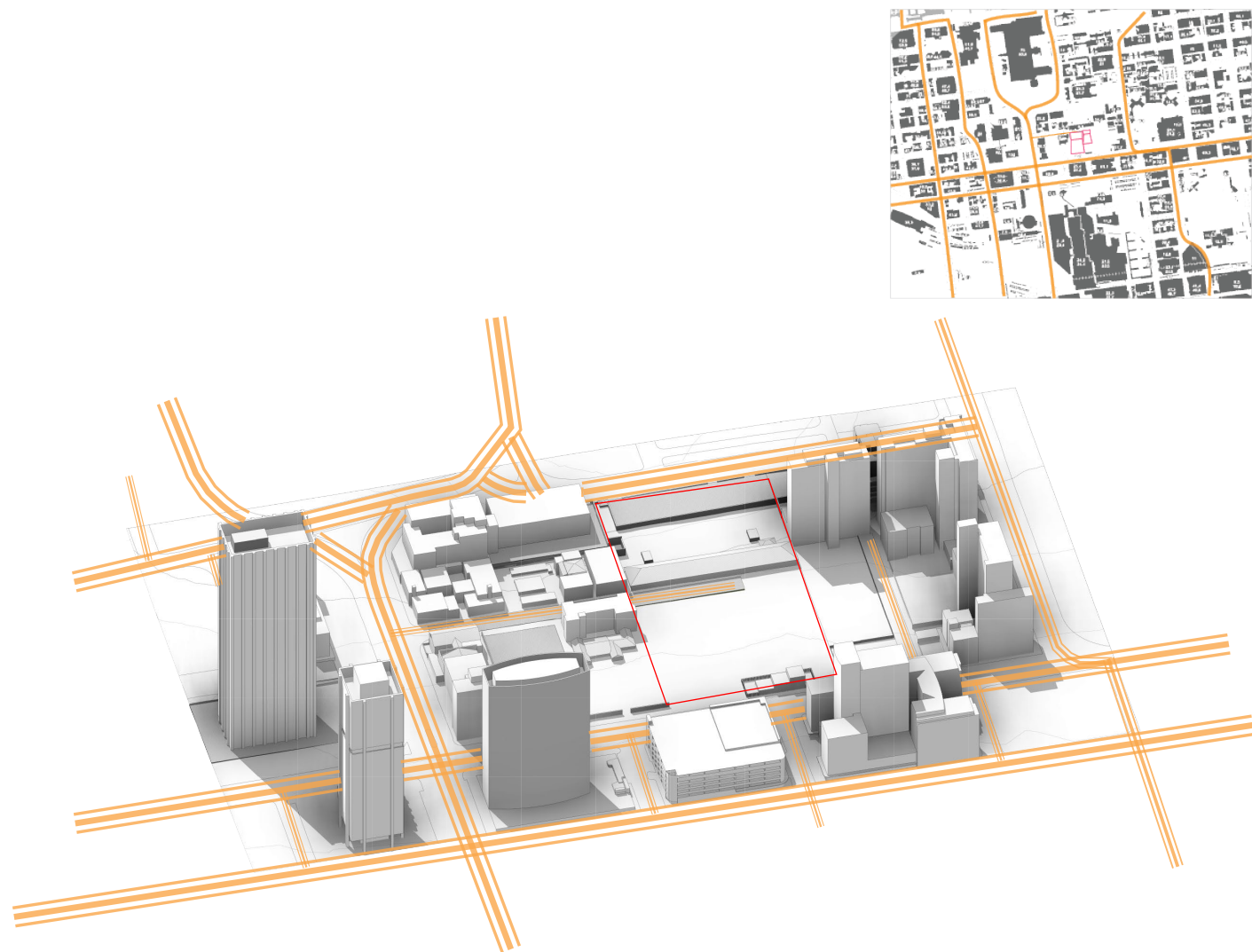


site SOLAR PATH



site WIND PATH

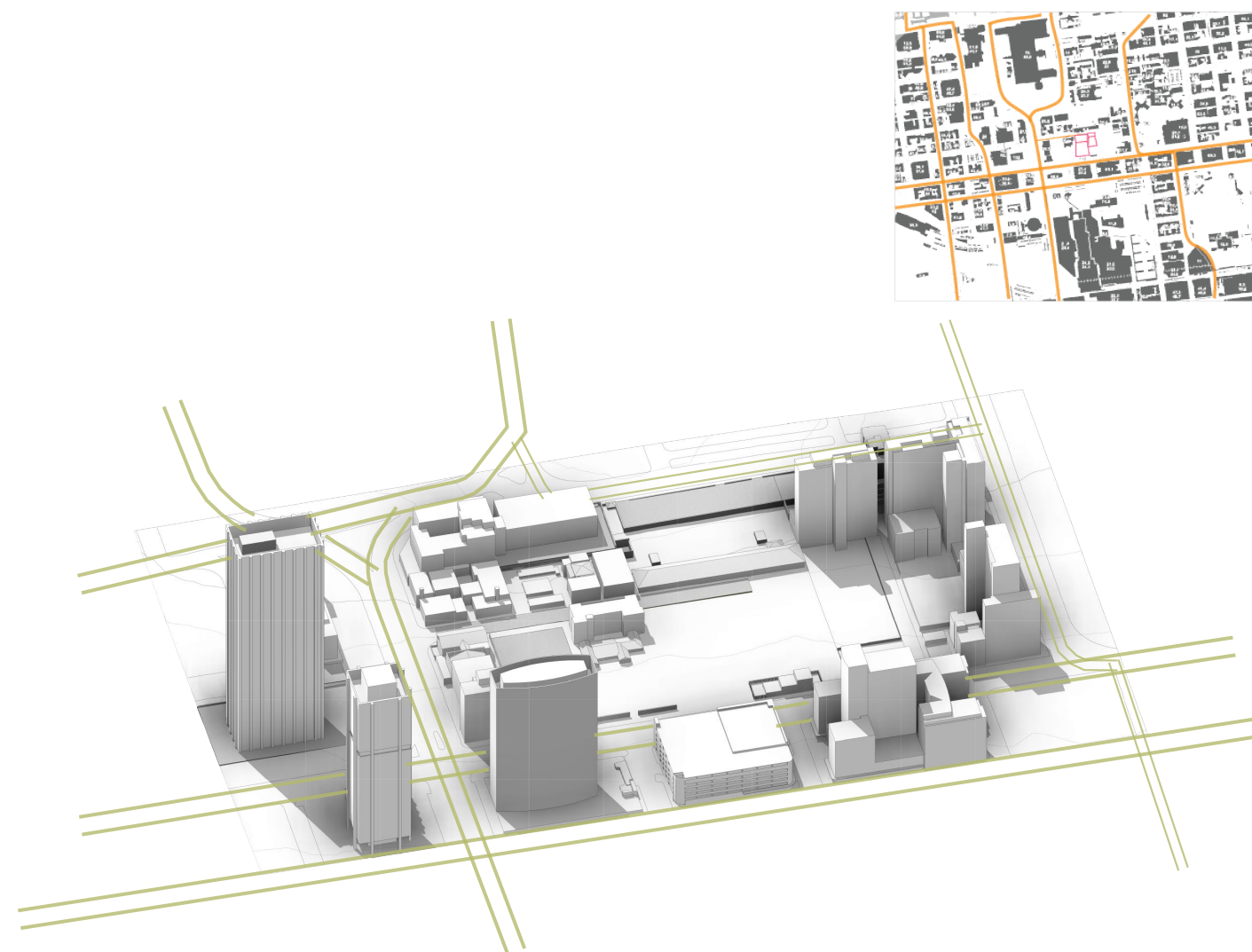




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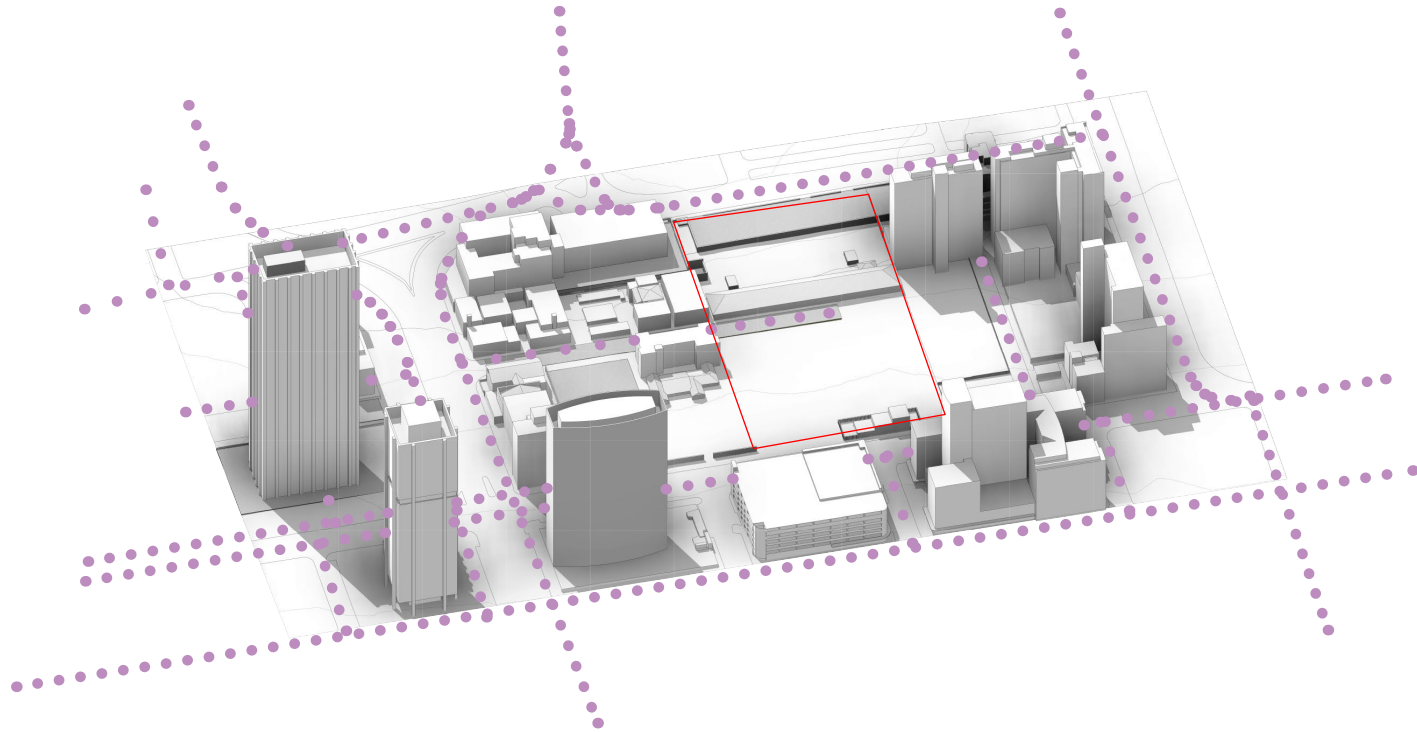
vehicular **MOVEMENT**



legend



public transport **MOVEMENT**

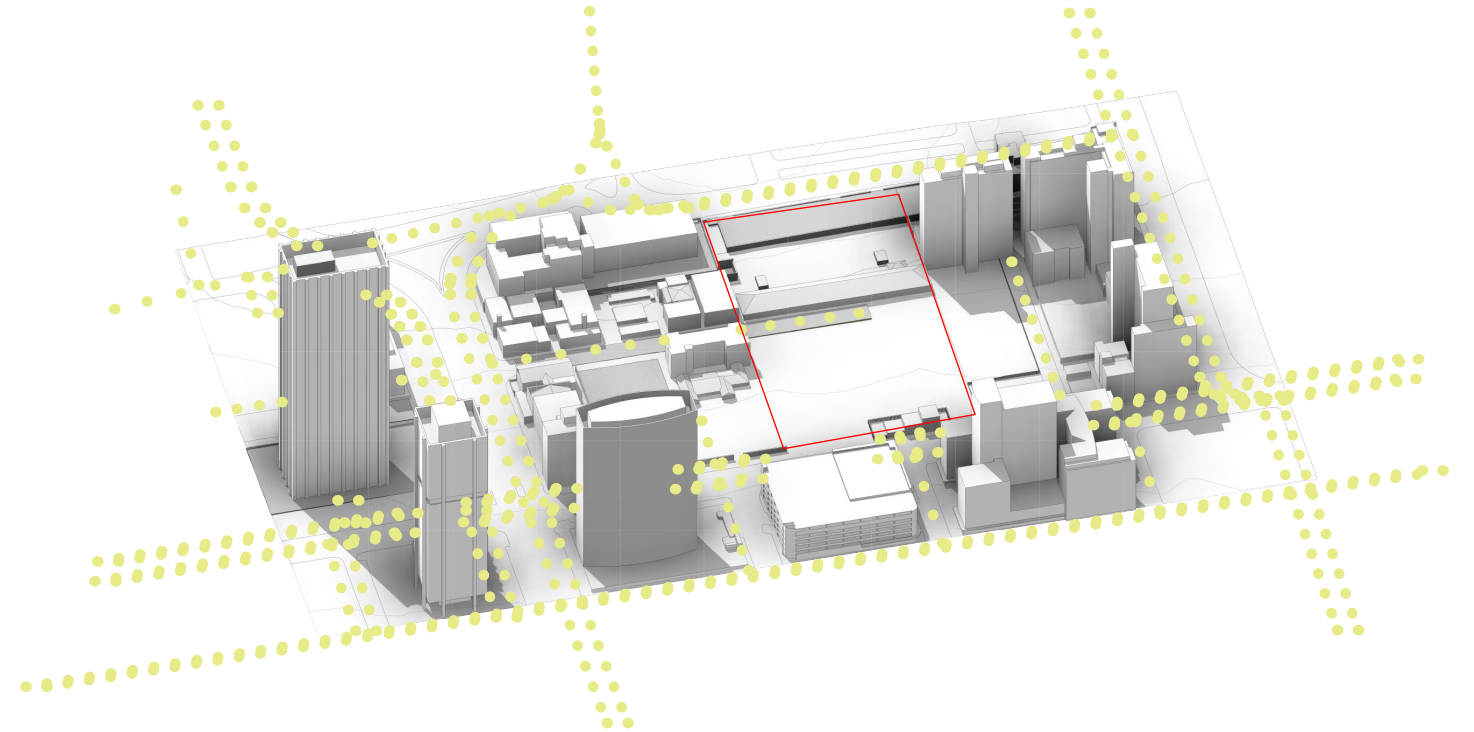


legend

Monday - Friday
09h00 - 15h00



pedestrian**MOVEMENT**

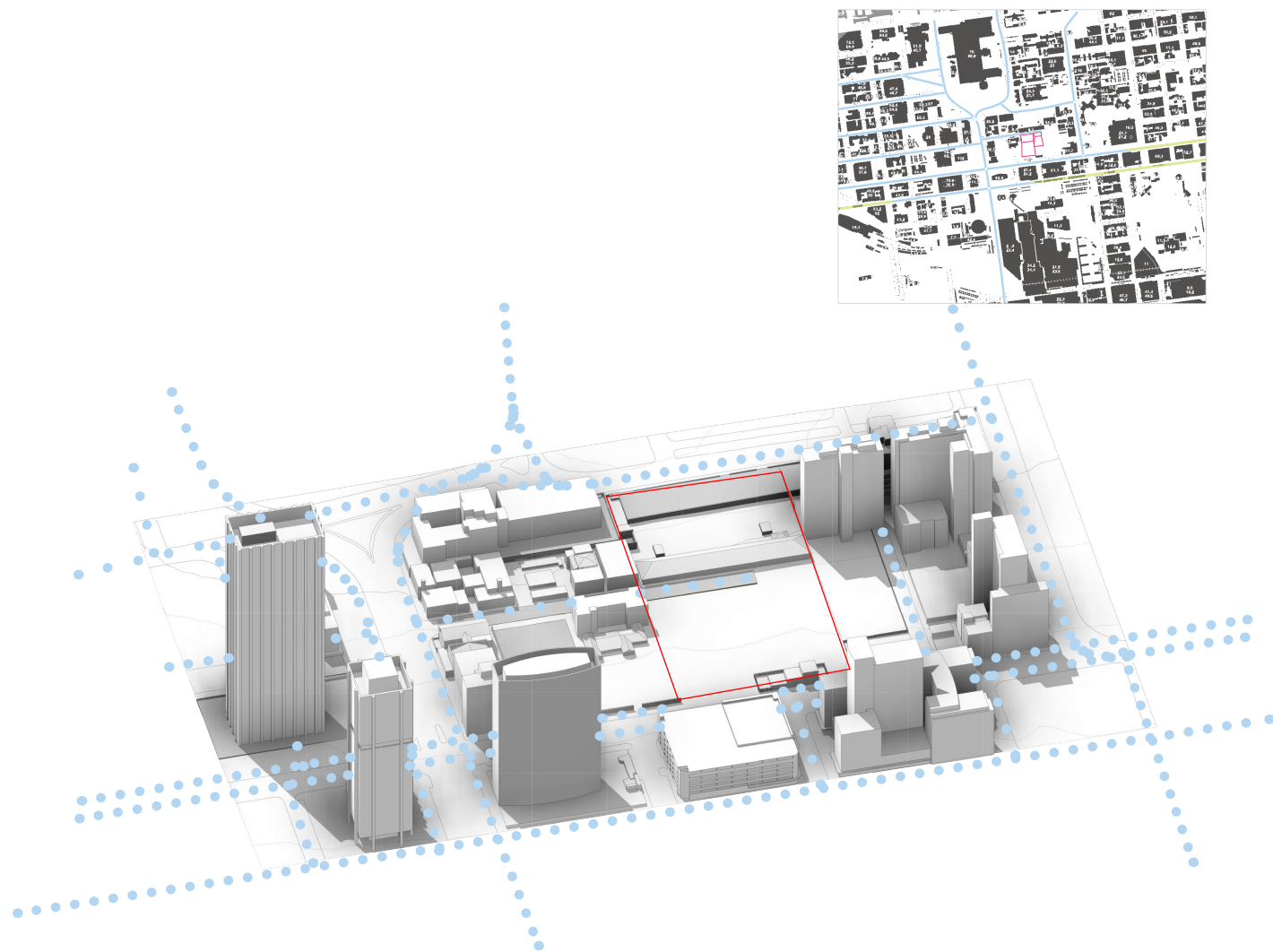


legend

Monday - Friday
06:00 - 09h00, 15h00 - 18h00



pedestrian**MOVEMENT**

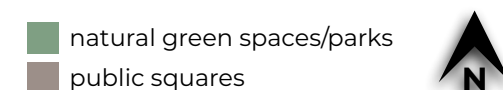


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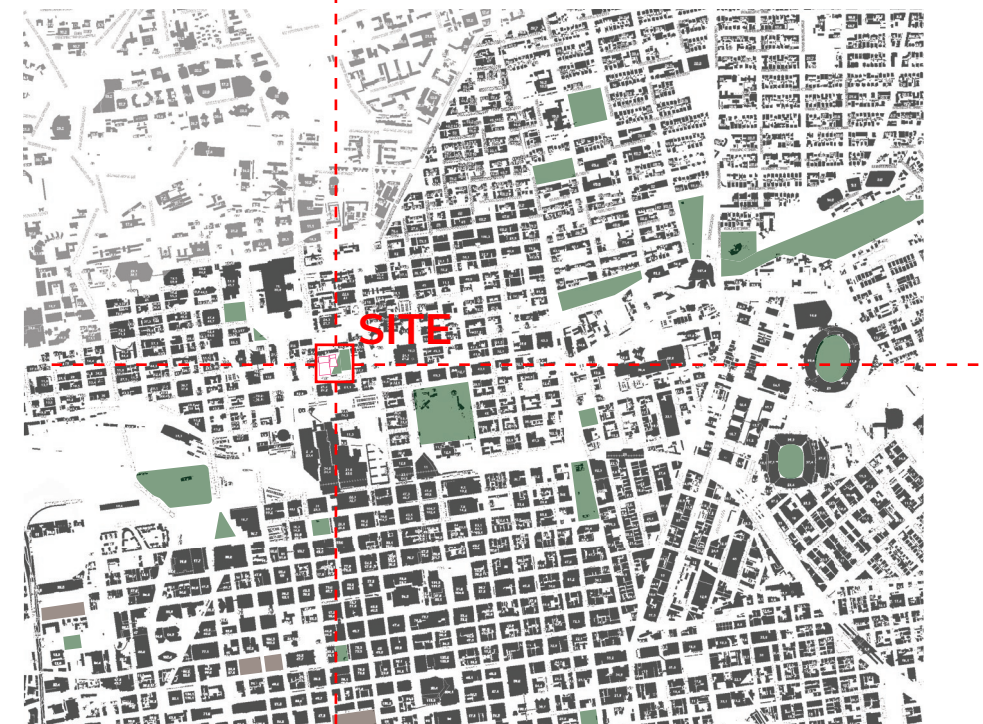


pedestrian**MOVEMENT**

legend



inner city**GREEN ZONES**





inner city**LANDMARKS**



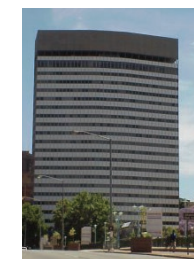
1. Hillbrow Tower



2. Ponte City Apartments



3. Jo'burg Theatre



4. Schlesinger Building



5. Mandela Bridge



6. Johannesburg Art Gallery



7. Ellis Park



8. Marbel Towers



9. KwaDukuza Egoli Hotel



10. Jo'burg High Court



11. Ansteys Building



12. Museum Africa



13. Jo'burg City Hall



14. Old Post Office



15. Standard Bank



16. Carlton Centre

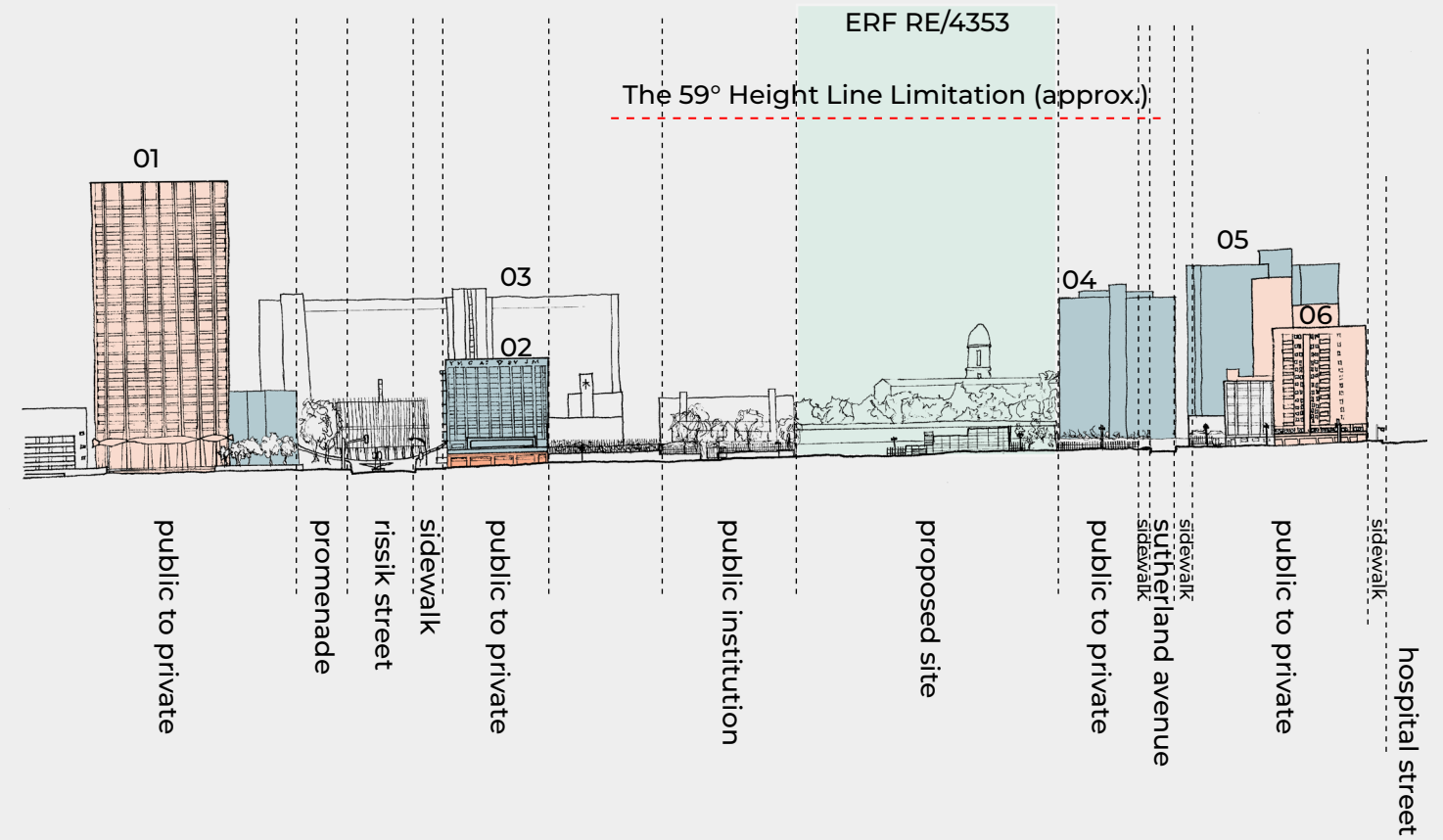
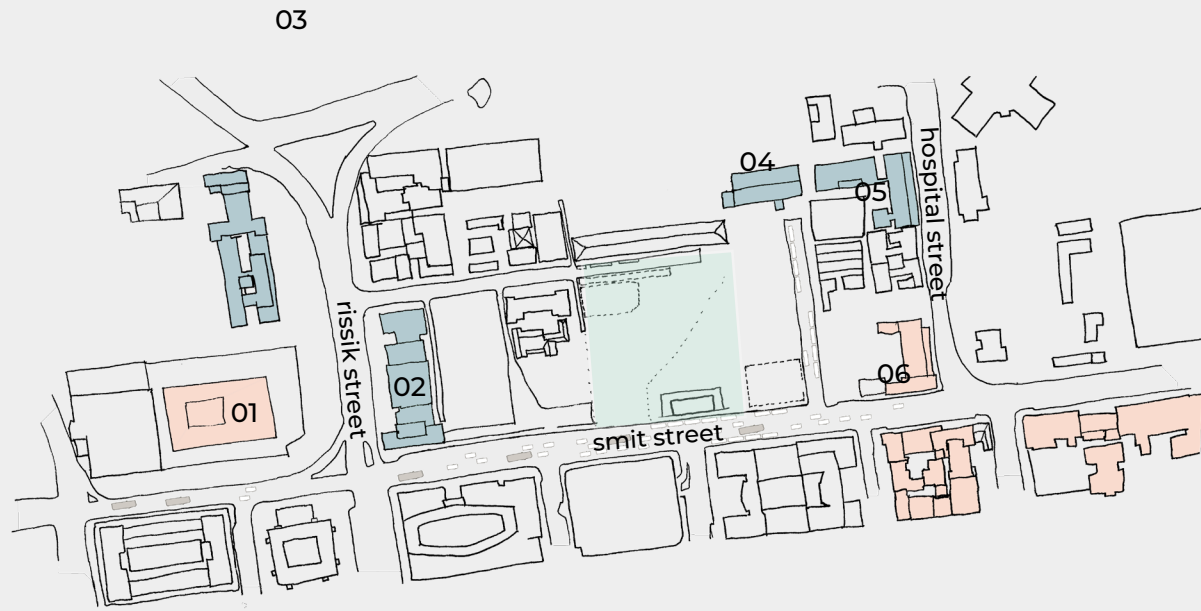


17. Carlton Hotel

Figure 3.18: Inner city Johannesburg landmarks (see list of figures)

inner city**LANDMARKS**

student housing
 general
 proposed site
 residential



- | | |
|---|--|
| 1. Braamfontein Gate
30 floors
128m | 4. Skyways
15 floors
54.4m |
| 2. YMCA
11 floors
36.5m | 5. Dudley Heights (Student Digz)
18 floors
63.5m |
| 3. City of Johannesburg Council Offices
19 floors
80.9m | 6. Smitshop Mansions
17 floors
57.7m |



erfRE/4353

With a combination of hard surface textures and soft grassy surface textures - together with half of the site being unsafe to build on - an opportunity to construct a building on

one half of the site and create a park on the other is realised. No tall buildings immediately surround the actual site which means the potential park will have some sun

coverage as far as the design of the proposed building will allow. The limited amount of available space influences a vertical architectural response to the issue.



city**Varsity**

The facade of this building comprises of large reflective windows within a concrete frame grid with large suspended concrete panels set forward creating the impression of balconies on each level. This adds a bit of character to the facade.



BOSTONcity campus & business college

This building’s facade is a regular brick structure with windows set into the brickwork in a grid form. Nothing about the facade is interesting as it looks like any other building in and around the inner city, especially Hilbrow.



RICHFIELDgraduate institute of technologh

This building has a heavy concrete facade which is set forward in front of the actual structure. The glazing sits back behind these concrete forms. These concrete forms could also be crucial for controlling the amount of daylight that penetrates into the building.



ROSEBANKcollege

The facades on this building are interesting as more interesting materials have been used. Cladding panels are used and glazing is used where it is needed. On other facades, balconies have been created, setting the interior spaces back where more glazing is used to maximise on daylight.



DAMELIN

This building has brickwork facades with a few windows in specific locations. This building is not exciting from the outside as it appears to be an ordinary face-brick office building with average size windows.



theSOFT

The site consists of a collection of soft textures such as grass, trees and shrubs. These textures enforce the idea of creating a green space within the development that will add to the limited existence of green spaces within the inner city as seen on the inner city green zones mapping. These textures represent the delicate occupants of the proposed building who have to be nurtured and protected from this concrete jungle and the investigator has

decided that the vegetation already on site should be preserved and nurtured in order to give birth to a green park where the students can enjoy the outdoors without being on the dangerous streets of the inner city during school hours.



theHARD

The site is also made up of hard surfaces such as concrete and stone - from the ground to the fences and surrounding structures. These textures represent the strength of the ground on which the proposed building will stand and the strength of the structure that is required for this building. The aim is to use concrete for the structure simply because it is a material already present on site. The concrete is on the half of the site that the building will stand on

as this is the side of the site which was never excavated for the tunneling of the Gautrain. The hardness of this half of the site and surrounding structures has inspired a lightweight skin to the building to create a contrast.

chapter four
viability



the **PROJECT**

This development introduces a new typology required to deal with rising numbers of students due to rising numbers of young families moving into the inner city, and as a response to inadequate schools with no adequate facilities required to provide quality education. The aim of this new learning community development will be to create spaces within the dense setting of Johannesburg where methods of creating adequate academic and recreational spaces within a vertical typology are explored in order to create a model for the future of educational spaces within a dense urban setting.

project **INITIATION**

The project is to be initiated as an effort by the Gauteng Department of Education through the Sci-Bono Discovery Centre in partnership with many of the already existing Sci-Bono corporate and industry partners and those within inner city Johannesburg. The City of Johannesburg Municipality will also be involved as this project will become yet another project within the inner city that will help realise the city's rejuvenation efforts of the greater Johannesburg inner city.

the **CLIENT**

Sci-Bono Discovery Centre is a non-profit company started as a partnership of the Gauteng Department of Education with various private sector partners in 2004 "to help build South Africa's science, engineering and technology capacity. It is the largest science centre in South Africa. The company is supported by various scientific and engineering bodies in the industry as well as the diplomatic community in South Africa. Its core responsibility is to implement the Gauteng maths, science and technology education strategy." (WHO WE ARE, no date). The Sci-Bono Discovery Centre is based within the inner city of Johannesburg, in the Newtown Precinct.

This development will be an opportunity for the client to incorporate and test its experience and various programmes inside a school environment. They usually work with school groups

that visit the centre as a learning opportunity for the students, allowing them the opportunity to access science laboratories and numerous programmes aimed at improving their academic performance. They support students from disadvantaged areas, mainly within the inner city, but other students do travel in from townships around Johannesburg.

The programmes include but aren't limited to:

- Teacher Support
- ICT Training and Development
- Secondary School Improvement Programme (SSIP)
- Blended Learning Programme

Sci-Bono is:

- a non-profit organisation (NPO Reg: 056-334-NPO)

- a not-for-profit company (Companies Act 71 of 2008 Reg: 2004/010183/08)
 - a public benefit organisation (Section 30 of Income Tax Act 58 of 1962)
 - Profit to be reinvested and used for the purpose of attaining the main good. Not for profit of members but benefit of the public.
 - a company where donations are approved as Tax deductible (Section 18A of the Act. PBO Reg: 930014449)
- This client has been chosen because they are based within the inner city community and they already work within the education sphere which means they will be coming into the development with the experience and expertise required for working with children and academic subjects such as mathematics and science. This is also a non-profit company which is the perfect type of company to run a school as it depends on both government subsidies and private sector donations.

managementSTRUCTURE

As most schools in the country operate, this development will be governed by a School Governing Body (SGB) which will consist of nominated parents of students who attend the schools, the head prefects, the two headmasters and representatives of the donors. The Three2Six Project will also be represented as the facility will become a new host school for the project in addition to the existing schools. This body will meet on a monthly basis and will make the decisions based on the visions, structure and policies concerning the facility. During the initial months of the facility, these meetings will likely have to be more frequent.

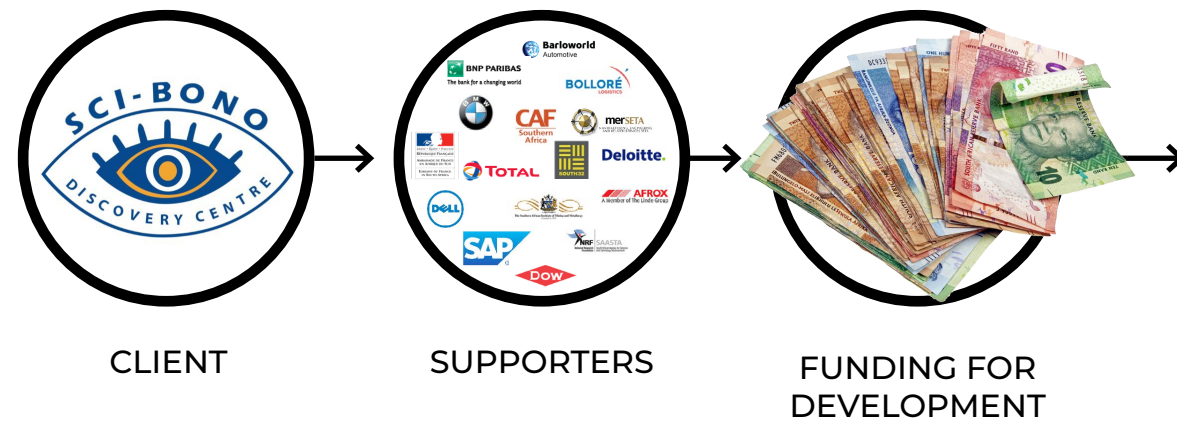
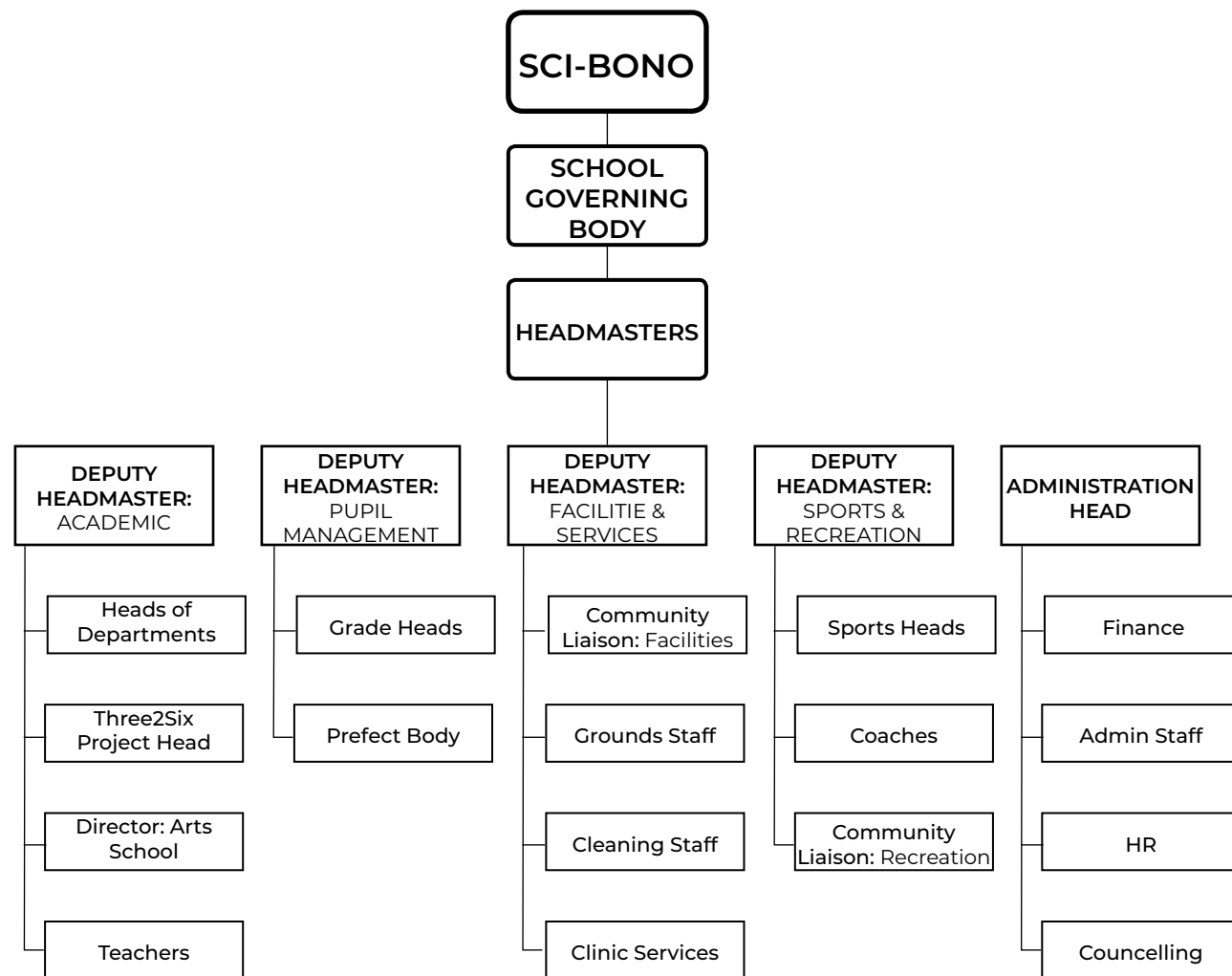


Figure 4.1: SciBono Logo
(Sci-bono, 2018)

Figure 4.2: SciBono Supporters
(Sci-bono, 2018)

Figure 4.3: South African bank
notes(JakarandaFM, 2018)



ECONOMIC implication & sustainability

The development brings with it a positive economic potential for the inner city. Not only will it improve the quality of education of those living within this community, which on its own has a great long-term impact on the economy, but it will also create jobs for many people living in the community. Experienced construction workers will be targeted through public announcements within the community and will undergo training before entering the site as the labour force for the development along others from other parts of the city. Other community workers will be recruited as educators (those who are qualified) and will be trained by the client's Teacher Support Programme before entering the completed project as the official educators. More community members will be recruited as grounds staff and cleaning staff, preferably through respective companies operating within the inner

city and will be trained before being allocated to the development as their base workplace. The recruitment of cleaning staff can start when the construction is close to completion and the building is being prepared for a handover.

Buildings being built in the 21st-century should always aim to be sustainable and as a result, sustainability experts, technical advisors and engineers will be appointed at the planning stage of the development to work together with the design team to come up with sustainable solutions for the development.

Sustainable architecture principles will have a large influence on the green/sustainability rating of the design and will lead to more comfortable spaces for the occupants. The materials and the building systems being used will be determined by their sustainability requirements of the development as per the experts and the design team's

specifications and will have several cost implications to be considered and planned well ahead of time for. The topic of sustainability results in economic implications that have to be in mind during the design process. Building systems and sustainable materials and technology will most probably be more costly than the conventional alternatives resulting in higher costs. These could be more difficult or even impossible to source locally and time and transportation along with additional expenses will threaten the progression of the project. These are extremely important to plan well ahead of time for to prevent delays.

FINANCIAL modelling

Funding & Financial Viability:

The client will be able to obtain financing through donations made by its donors and the potential partners identified within the inner city. These donors are financial institutions, science and

technology industry and mining private donors as well as members of the diplomatic community within South Africa. To ensure ongoing design and site operations without any delays as a result of financing shortages, the client will approach a financial institution for a development finance which will also provide a guarantee of payment for the contractor. The donor money will then be used by the client to pay the interest and repayment for the said loan at the relevant time.

As this is an educational development, no financial return is to be expected by the donors as they are donating funds for the institution and not making a financial investment. However; in the long-term, this is a good social and economic investment that the donors are making as the institution will aim to produce future mathematicians, scientists and engineers who will contribute to the economy and perhaps some of the students may eventually be recruited by some of these companies upon qualifying from tertiary institutions.

Construction & Development Costs:

Using per m² Approximate Inclusive Building Cost Rates from the AECOM Africa Property & Construction Cost Guide document, the following construction and development costs approximations apply:

Construction Costs = R110 035 050.00

Professional Fees = R9 766 985.17 Architect: Stages 1-6 Project-Based

Development Costs = R119 802 035.17 with Architect's Professional Fees (Stages 1-6)

Total Income = R484 500.00 from leas-able spaces

chapter five
program

pro



Figure 5.1: Aerial image of school (ArchDaily, 2016)

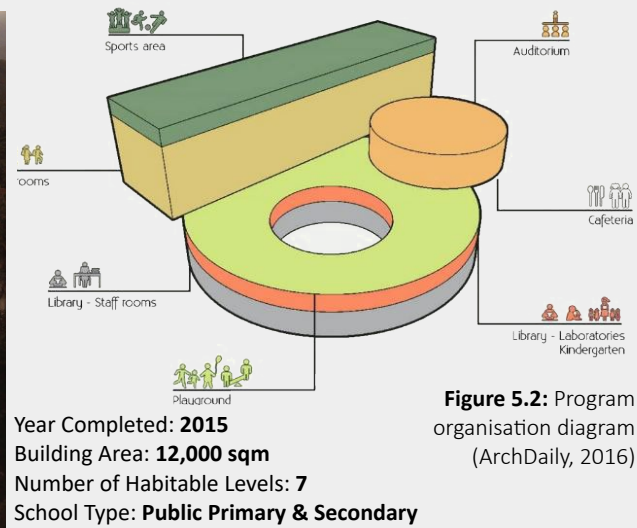
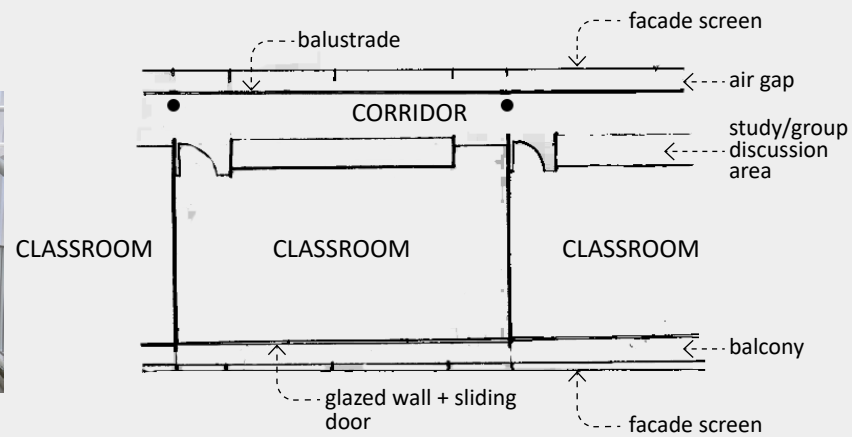


Figure 5.3: School corridor (ArchDaily, 2016)



learningspaces

The classrooms are provided with adequate space and daylight by means of full glazed walls to the south and partial glazing to the north. Daylight is controlled by the facade screen which has been designed in such a manner that it allows direct light through in certain areas and

diffused light through in others. The gap between the building and facade ensure natural ventilation. Outside each classroom, a recessed space is provided for use by students for peer learning or exhibitions.

structure&material

Lightweight material and building systems have been used which provide a light and airy atmosphere for a building which has a heavy concrete structure. The use of glass walls internally also emphasizes this airy nature which accommodates natural light controlled by the specifically designed screen facade. The gap between the structure and building allows natural ventilation.



Figure 5.4: Cladding system (ArchDaily, 2016)

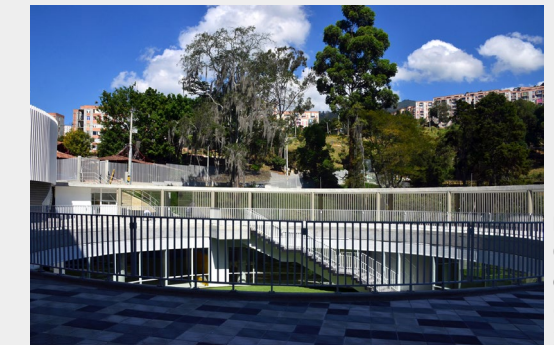
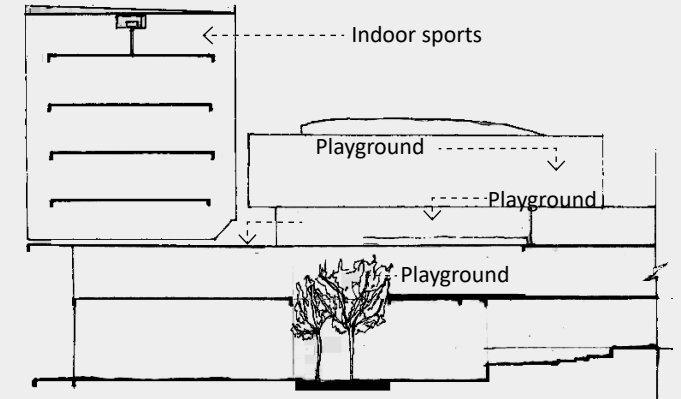
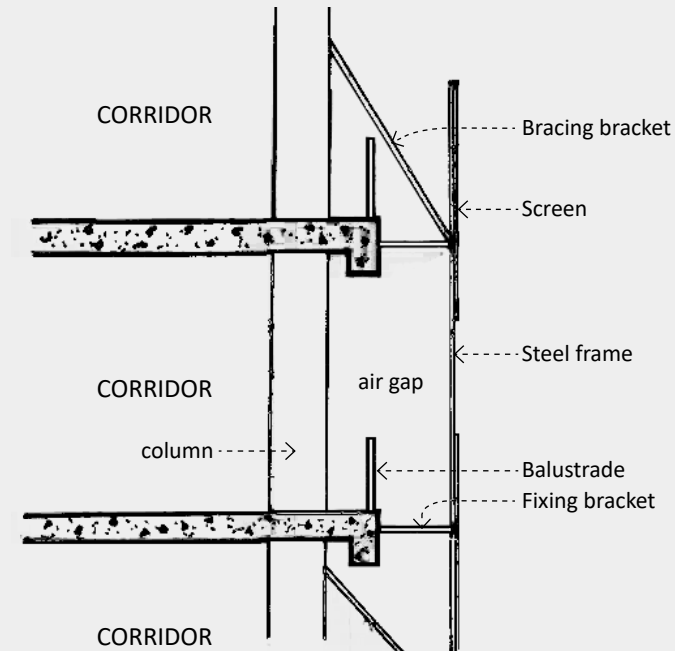


Figure 5.5 Overlooking courtyard (ArchDaily, 2016)

recreationspaces

A lower courtyard has been created in the centre of the terrace which drops down to ground level and provides an external natural space for recreation purposes with internal recreation spaces adjacent and strategically placed on other levels. The top level of the box is also a recreational space and houses an internal hall. This position is good as the columns supporting the hall do not penetrate through the hall as it is the highest floor that's being supported.



Figure 5.6: Exterior image of school building (Swinburn and Hadley, 2017)

Year Completed: **2011**
 Site Area: **4,500 sqm** | Building Area: **23,000 sqm (Secondary)**
 Number of Habitable Levels: **14**
 School Type: **Private Secondary (Primary School ajoined)**
 Student Population: **800 (Secondary)**

Figure 5.8: Circulation (Assoc. for Learning Environments Australasia, 2013)

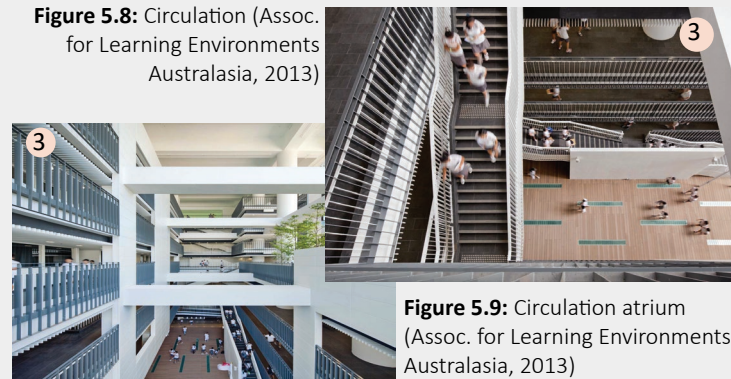


Figure 5.9: Circulation atrium (Assoc. for Learning Environments Australasia, 2013)

circulationspaces

This school has large movement spaces which incorporate vertical circulation within them as well. Double or triple volumes make these spaces feel large and natural lighting penetrates through to the ground floor and to other levels through these spaces. White paint on the walls reflects more light throughout the space.

Figure 5.10: Sports hall (Swinburn and Hadley, 2017)



recreationspaces

An indoor gymnasium (multipurpose hall) is introduced at the top most level of the school to provide an indoor space for sporting activities to occur without hindrance from columns. These spaces have higher ceilings than most of the school spaces.

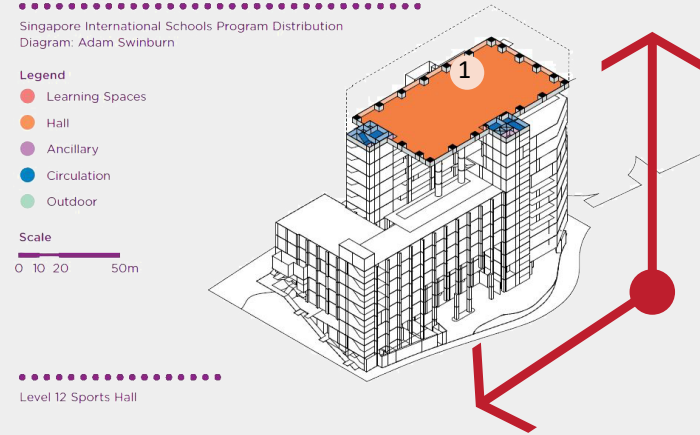
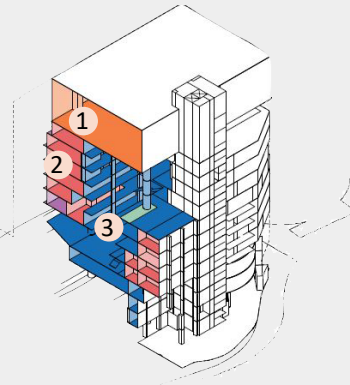


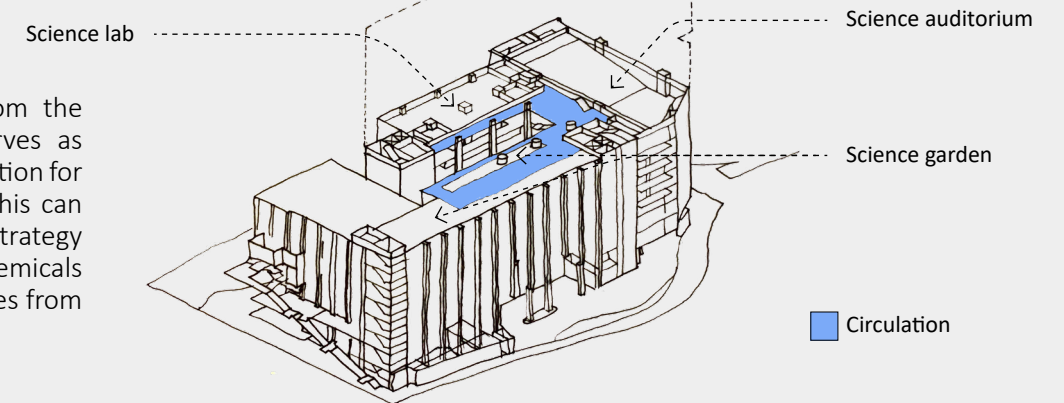
Figure 5.7: Level 12 Sports Hall (Swinburn and Hadley, 2017)

Figure 5.11: Section 1 (Swinburn and Hadley, 2017)



Science lab

The air coming from the science garden serves as fresh natural ventilation for the science floor. This can be seen as a good strategy to filter out the chemicals and other substances from the science lab.



Science auditorium

Science garden

Circulation

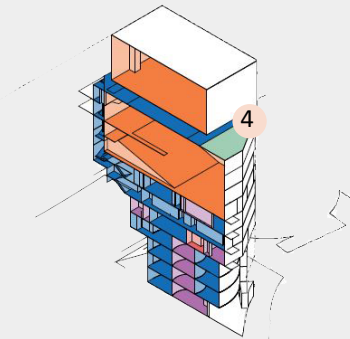
roof gardenspaces

Roof garden spaces can be used by students as spaces to relax and refresh their minds as they're open-air. The vegetation is also good for their mental state and helps relax them. These spaces are a substitute for the usual outdoor spaces such as courtyards/quads in normal horizontal schools.



Figure 5.14: Roof garden (Swinburn and Hadley, 2017)

Figure 5.13: Section 2 (Swinburn and Hadley, 2017)



group learningspaces

These are spaces which are placed immediately outside the classroom spaces where students can close themselves off to study one-on-one or in groups with their peers. These are particularly better spaces for students who cannot study well within large classroom environments.

Figure 5.12: Group study area (MKPL Architects, 2011)





Figure 5.15: Street view (Avenues New York, 2015)

Year Completed: **2011**

Site Area: **2,000 sqm** | Building Area: **20,000 sqm**

Number of Habitable Levels: **10** | School Type: **Private K-12**

Student Population: **1,500**

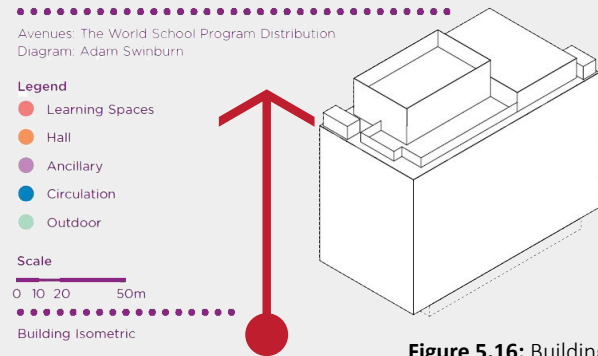


Figure 5.16: Building isometric (Swinburn and Hadley, 2017)

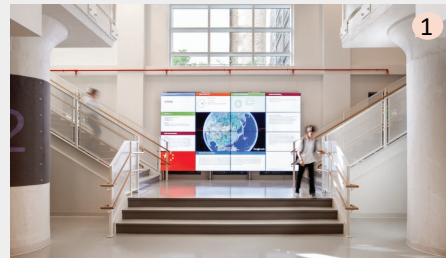


Figure 5.17: Digital display at staircase landing (Avenues New York, 2015)

1 circulationspaces

Movement spaces can also be used as exhibition or notice display areas since the traffic of the building passes through these spaces. Creative methods of display such as the digital wall as the one above are employed to me effective use of otherwise dead spaces.

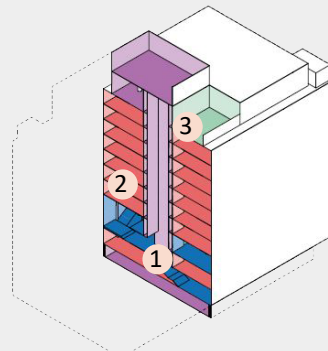


Figure 5.18: Section 1 (Avenues New York, 2015)



Figure 5.19: Canteen (Avenues New York, 2015)

canteenspace

Large spaces on upper level of the building where the students can be noisy as they socialise and eat their lunch during breaks. Students can sit down in a space with maximum levels of natural light and views which helps them relax their brains before going back to class.

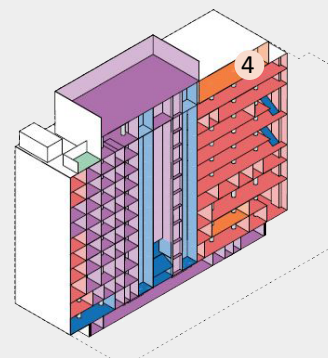


Figure 5.20: Section 2 (Avenues New York, 2015)

recreationspaces

Several recreational spaces are added to this school at different levels to create different physical activity nodes throughout the building which are essential for any school. Multipurpose hall, dance studio and gym as well as an external early development playground.

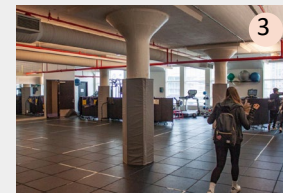


Figure 5.21: Gym (Avenues New York, 2015)



Figure 5.22: Sports hall (Avenues New York, 2015)

learningspaces

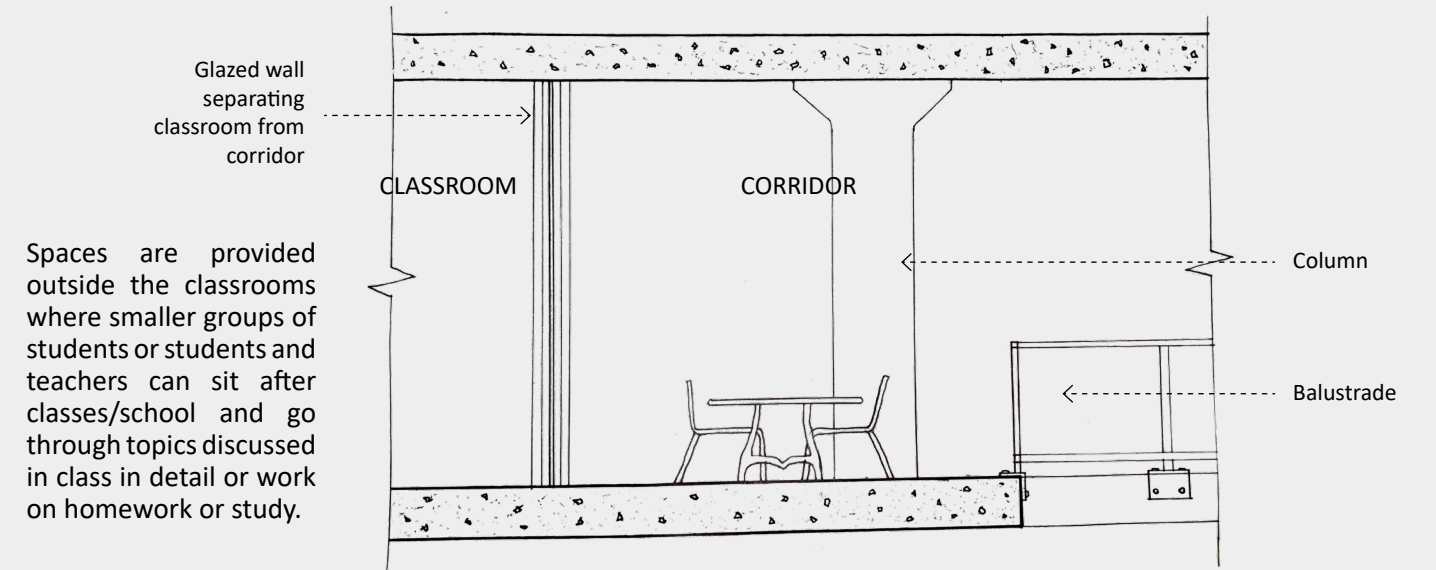
The learning spaces are positioned in the center floors of the building between the major recreational, lobby and administration spaces. These spaces are different in character according to the student age groups who are going to be using them and the purpose of their use. Several seating arrangements are experimented with for effective learning and discussion/study spaces are created outside classrooms. The learning spaces allow for flexibility.



Figure 5.23: Digital display at staircase landing (Avenues New York, 2015)



Figure 5.24: Kindergarten classroom (Avenues New York, 2015)



Spaces are provided outside the classrooms where smaller groups of students or students and teachers can sit after classes/school and go through topics discussed in class in detail or work on homework or study.



Figure 5.25: Aerial view of the centre (Ta.r.i Architects, 2018)



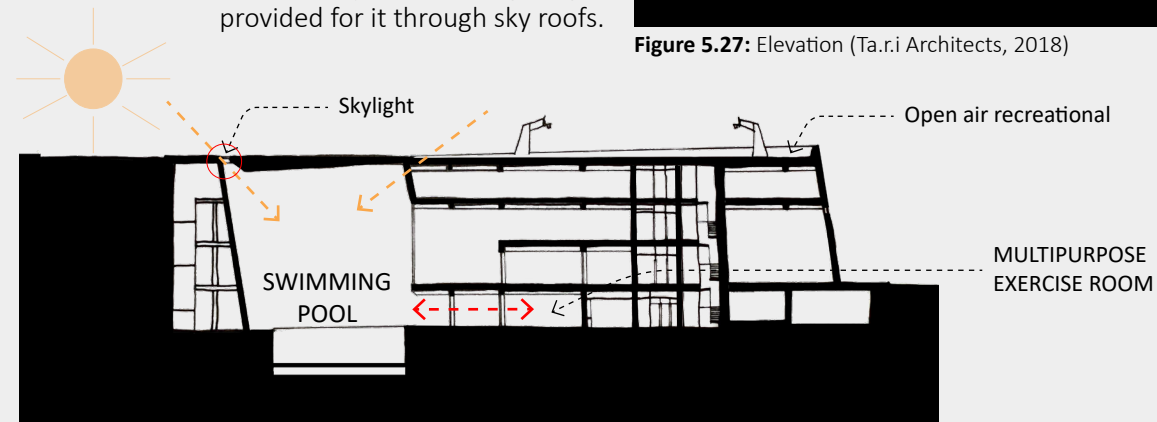
Figure 5.26: View of public square (Ta.r.i Architects, 2018)

publicspaces

Due to a lack of adequate space on the ground level, two other roofs of the centre accommodate a park and another accommodates a public open-air theatre. A series of ramps are used to access these rooftop spaces directly from the ground floor without having to enter the buildings first. This creates a connection between the ground public spaces and rooftop spaces.



Figure 5.27: Elevation (Ta.r.i Architects, 2018)



recreationalspaces

A combination of internal and external recreational spaces have been used in this building providing a combination of different experiences for the occupants/users. An open air roof spaces are used for sports activities such as basketball. A pool and exercise room are provided internally on the lower level where it is more private and lighting is provided for it through sky roofs.



Figure 5.28: Employees picking flowers from the facade garden (Carlos Chen, 2013)

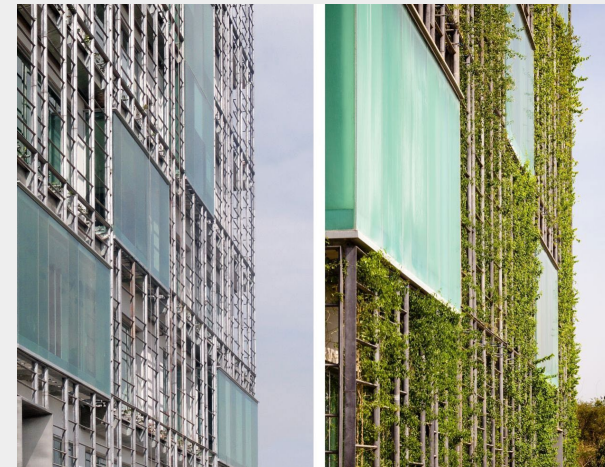
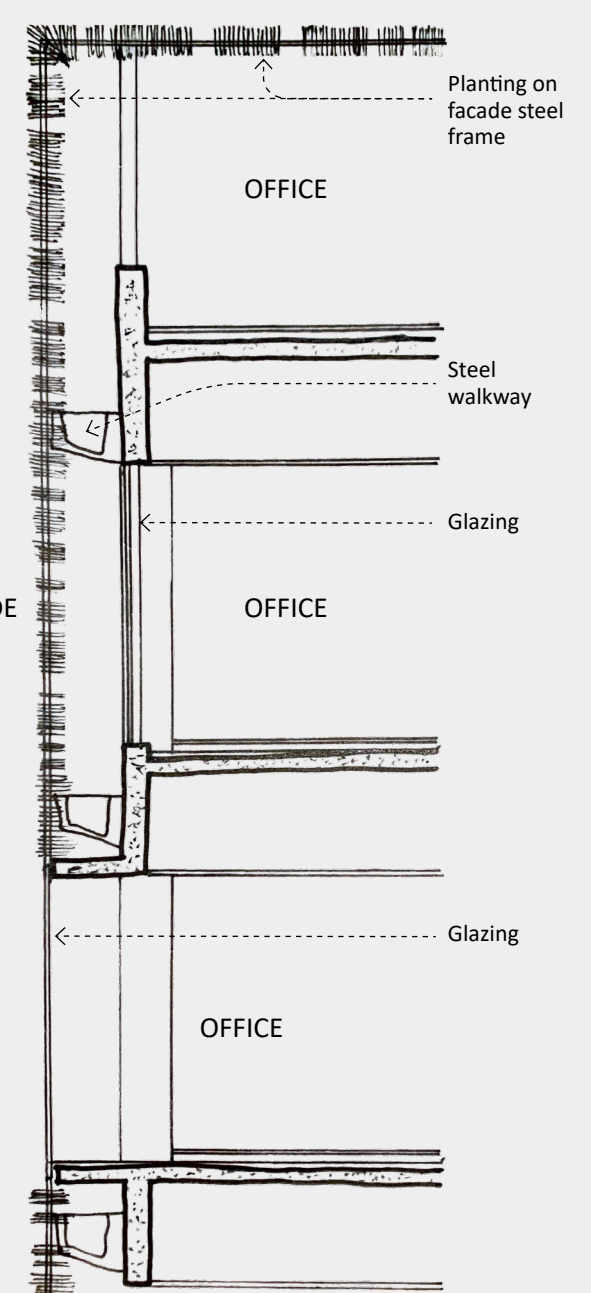


Figure 5.29: Steel work and glazing of facade where the plants are then planted (Carlos Chen, 2013)

facadetreatment

In order to deal with the heat in India, the architect decided to use plants on the facades of the building to cool down the building by acting as a barrier between the heat and the internal spaces. Walkways between the building and the steel frame are created to allow access to the vertical garden which employees are permitted to pick from.

OUTSIDE



lobby

- 1. Lobby
- 2. Security desk
- 3. Reading/Studying/Exhibitions/Recreation

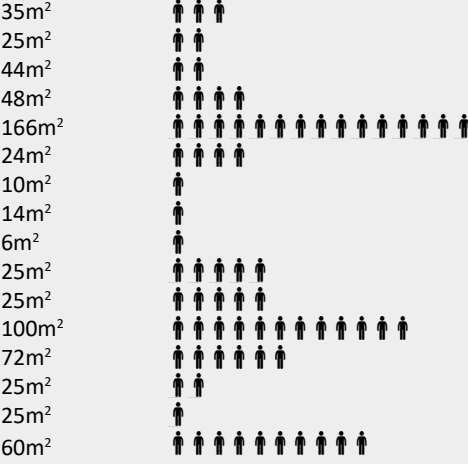
1890m²



administration

- 1. Reception & Admin Staff x1
- 2. Fees Office x1
- 3. Headmaster’s Office x2
- 4. Deputy Headmaster Offices x4
- 5. Staff Room with Kitchen x2
- 6. Sickbay x4
- 7. Strong Room x1
- 8. Storeroom/Stationery x1
- 9. Printing Room x1
- 10. Ablutions (Female) x2
- 11. Ablutions (Male) x2
- 12. Deans of Departments/Teacher Workspaces x4
- 13. Grade Heads x6
- 14. Large Storeroom x1
- 15. Garden Storeroom x1
- 16. Admin Staff (Sports Coaches,Aids, etc) x10

879m²



learning spaces: primary school

- 1. Standard Classrooms x28
- 2. Multipurpose / Specialist / VR Studio x1
- 3. Computer Room + Storage x1
- 4. Grade R Classroom x2
- 5. Team Teaching / Group / Peer Learning (dividable) x1

890m²



sanitation: primary school

- 1. Ablutions: Girls x2
- 2. Ablutions: Boys x2
- 3. Ablutions: Teachers x2
- 4. Ablutions: Disabled Persons x1

110m²



library

625m²



school hall

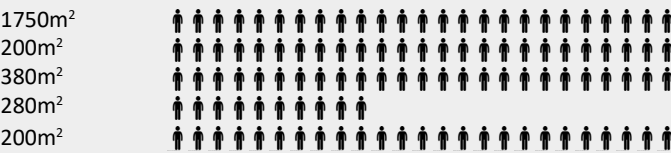
500m²



learning spaces: high school

- 1. Standard Classrooms x35
- 2. Multipurpose / Specialist / VR Studio x2
- 3. Technical Workshops / Consumers Kitchen / Science Labs x4
- 4. Team Teaching / Group / Peer Learning (dividable) x2
- 5. Computer Room + Storage x2

2810m²



sanitation: high school

- 1. Ablutions: Girls x2
- 2. Ablutions: Boys x2
- 3. Ablutions: Teachers x2
- 4. Ablutions: Disabled Persons x1

110m²



recreational

- 1. Courtyard / Garden Roofs / Balconies
- 2. Recreation: Courts, Multipurpose Hall, Gym, etc

3700m²



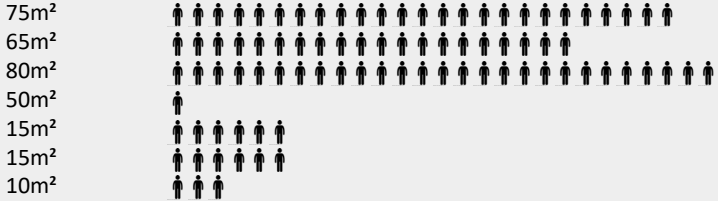
canteen

250m²

art school

- 1. Dance Studio
- 2. Music Room
- 3. Art Studio
- 4. Storage Room
- 5. Ablutions: Female
- 6. Ablutions: Male
- 7. Ablutions: Staff

310m²



public & gymnasium

- 1. Clinic x1
- 2. Ablutions: Male + Female (Clinic)
- 3. Ablutions: Gym & Pool x2
- 4. Swimming Pool and Gymnasium

1810m²



PART C

ARCHITECTURE

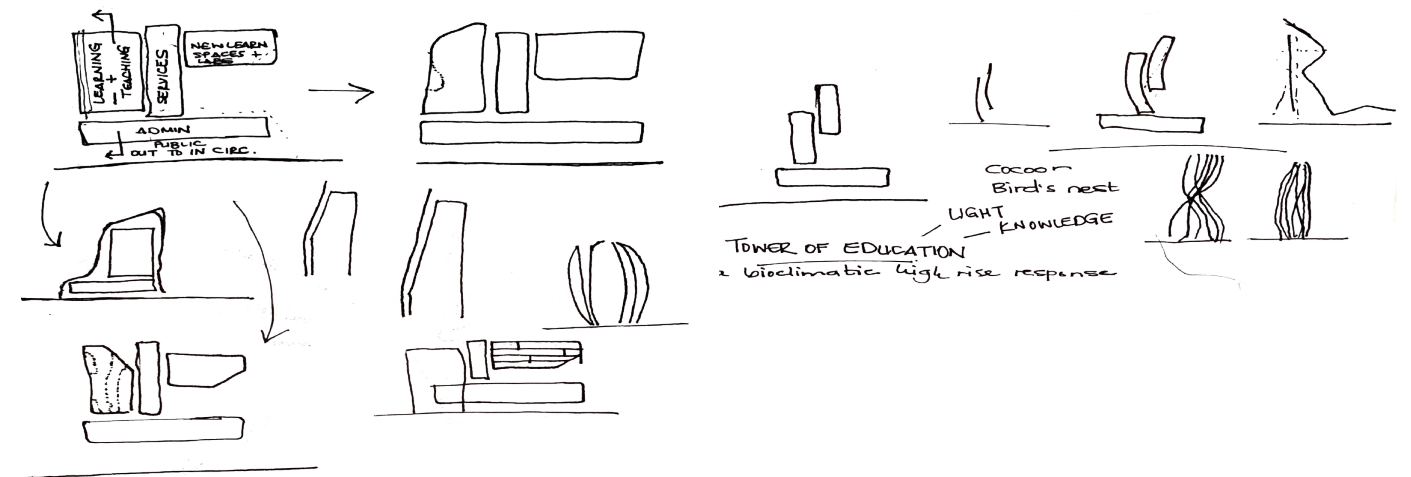
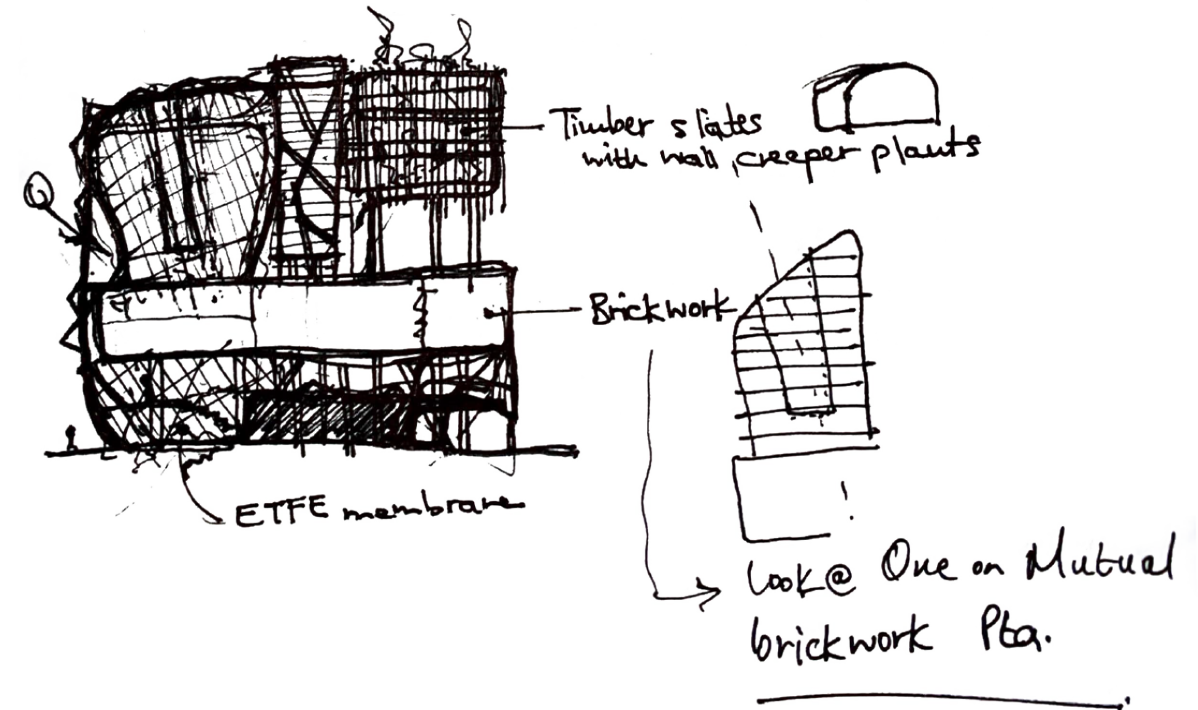
chapter six
the concept
design process

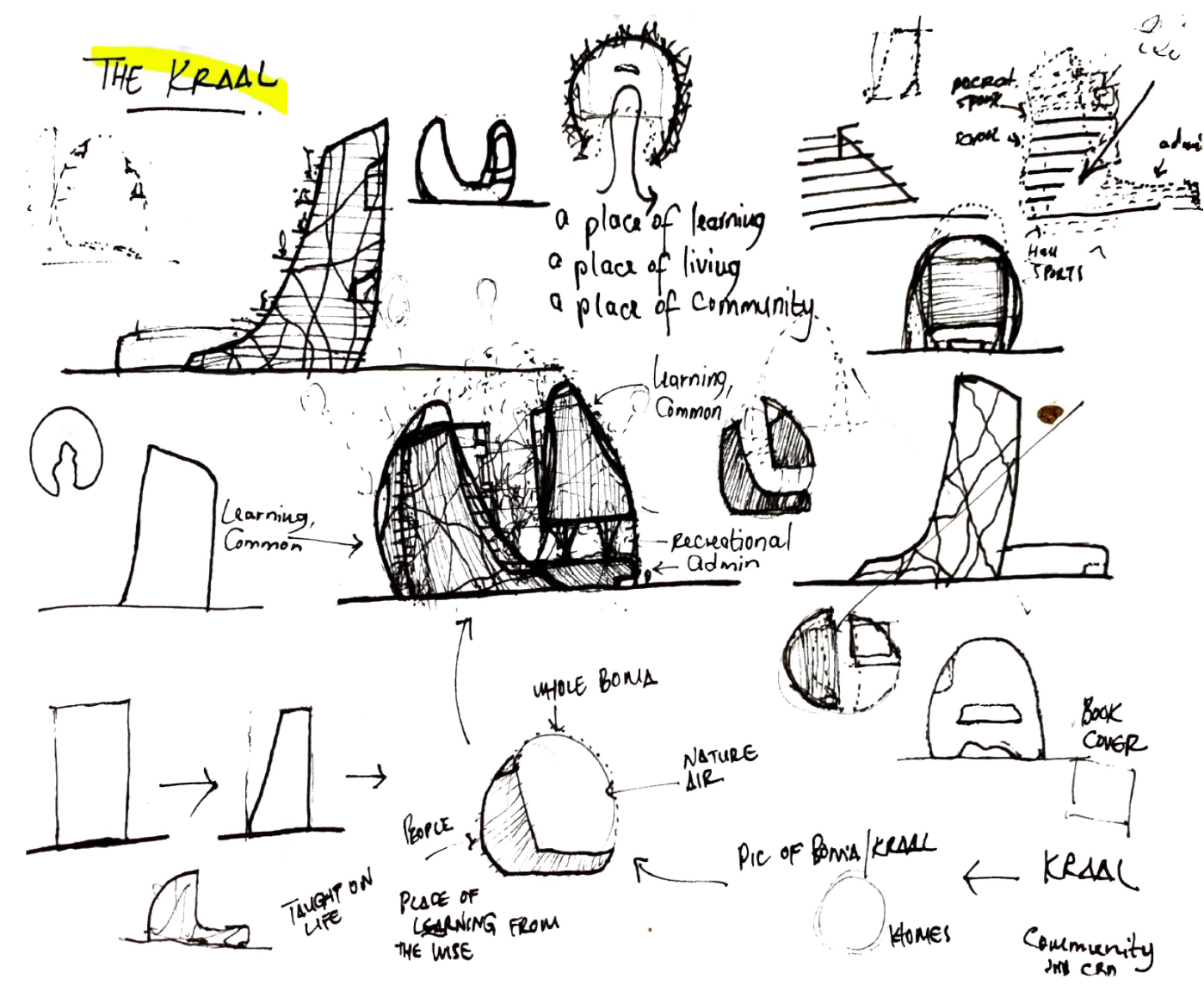
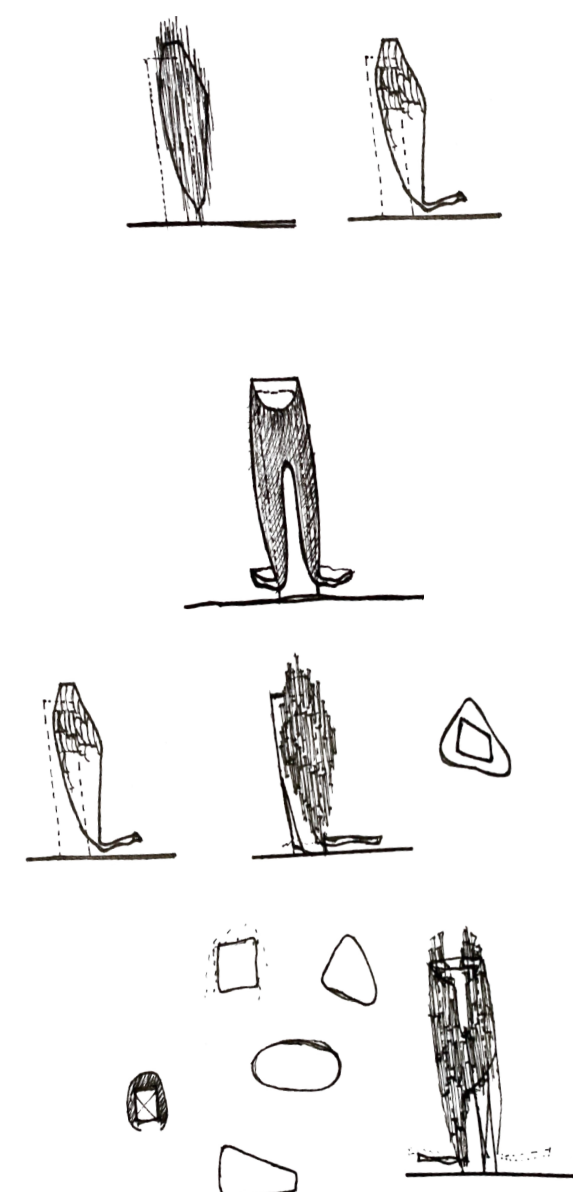
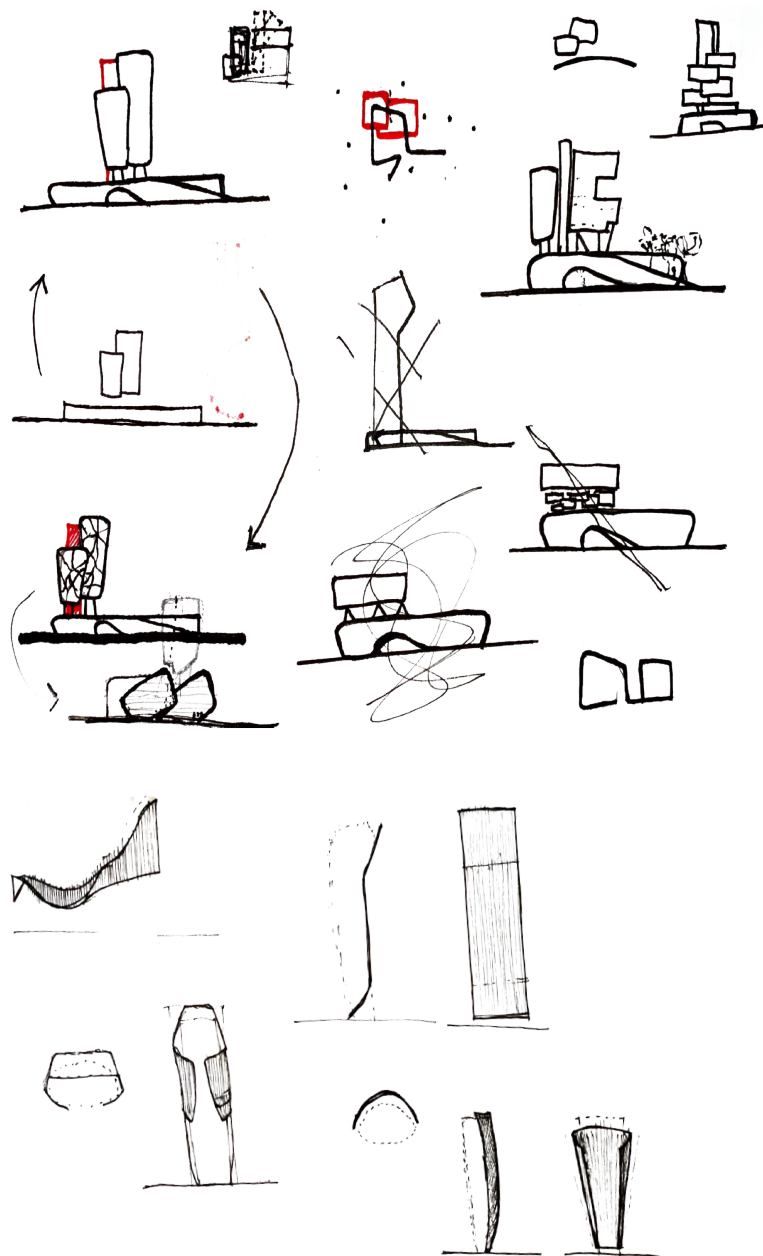


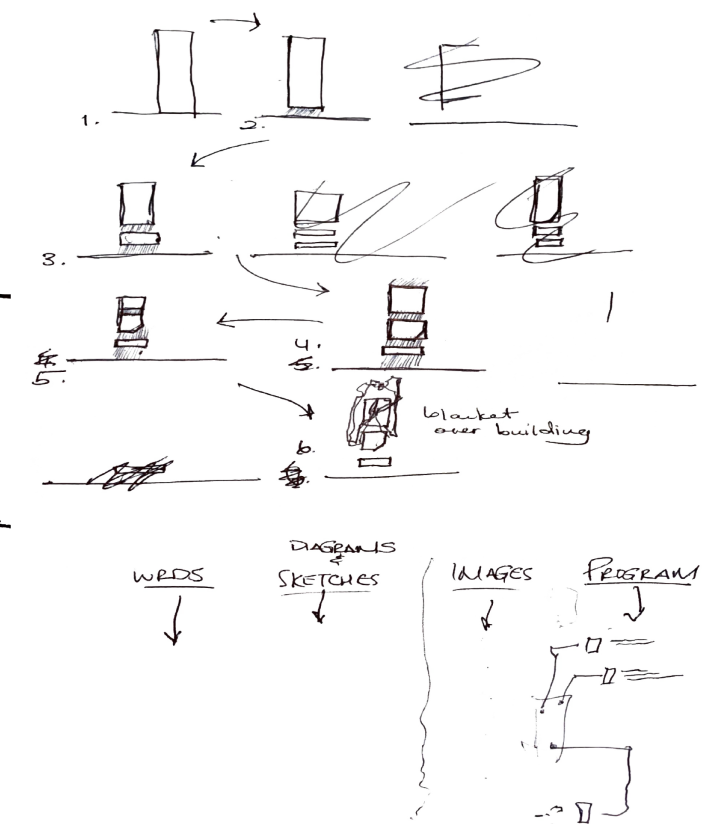
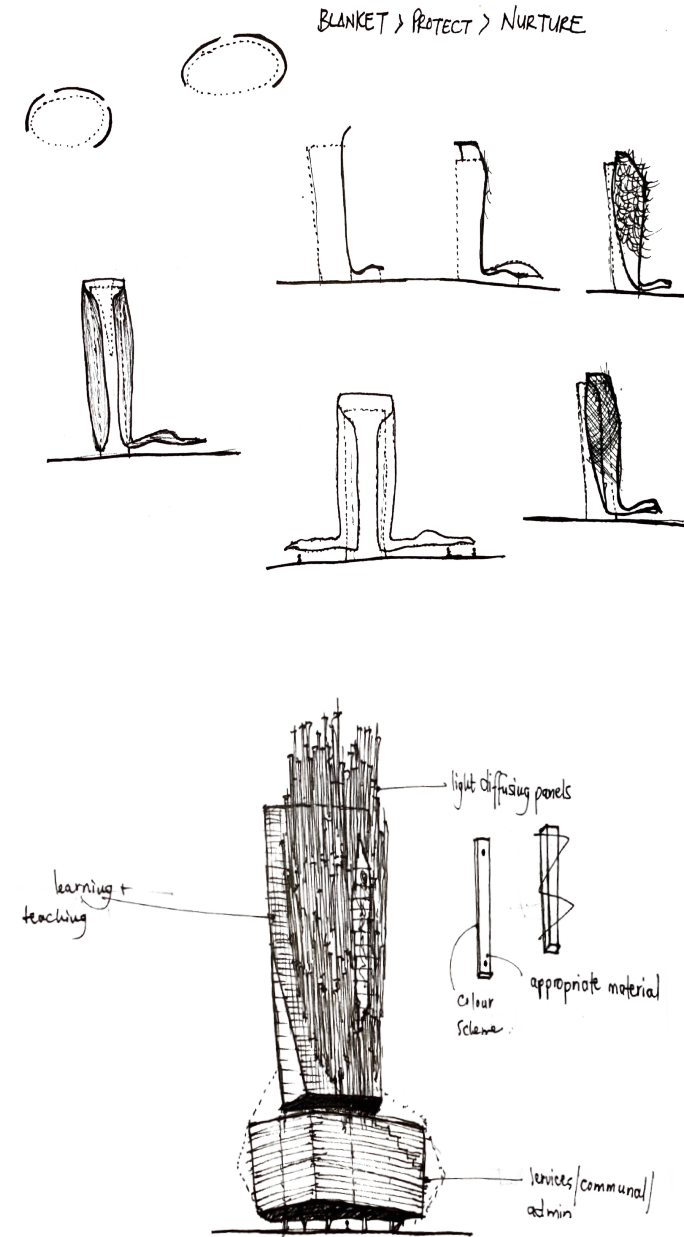
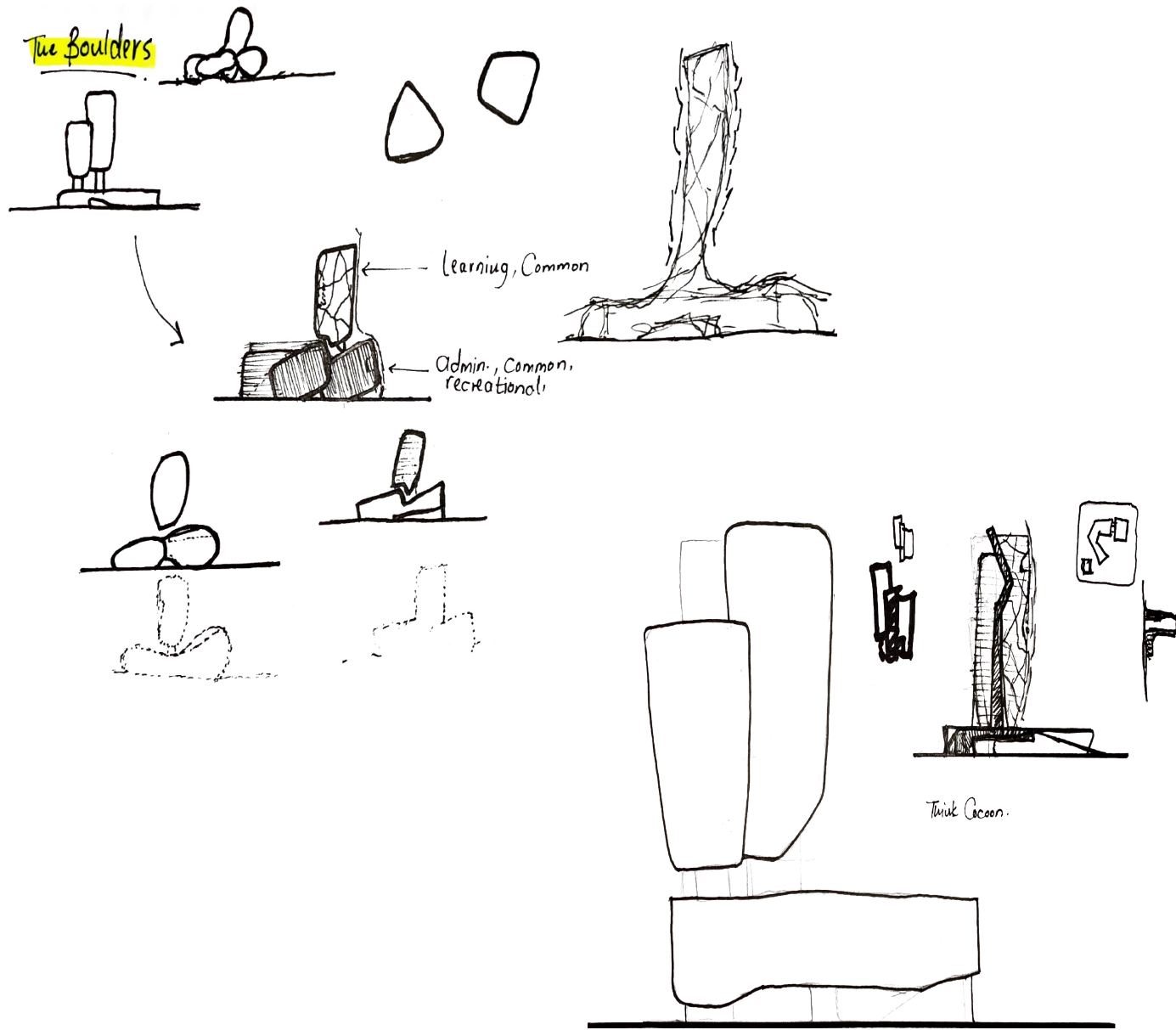
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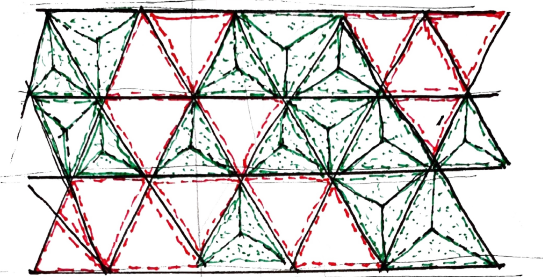
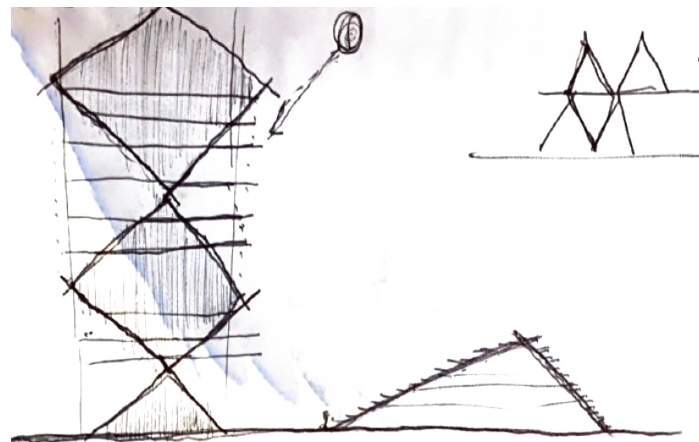
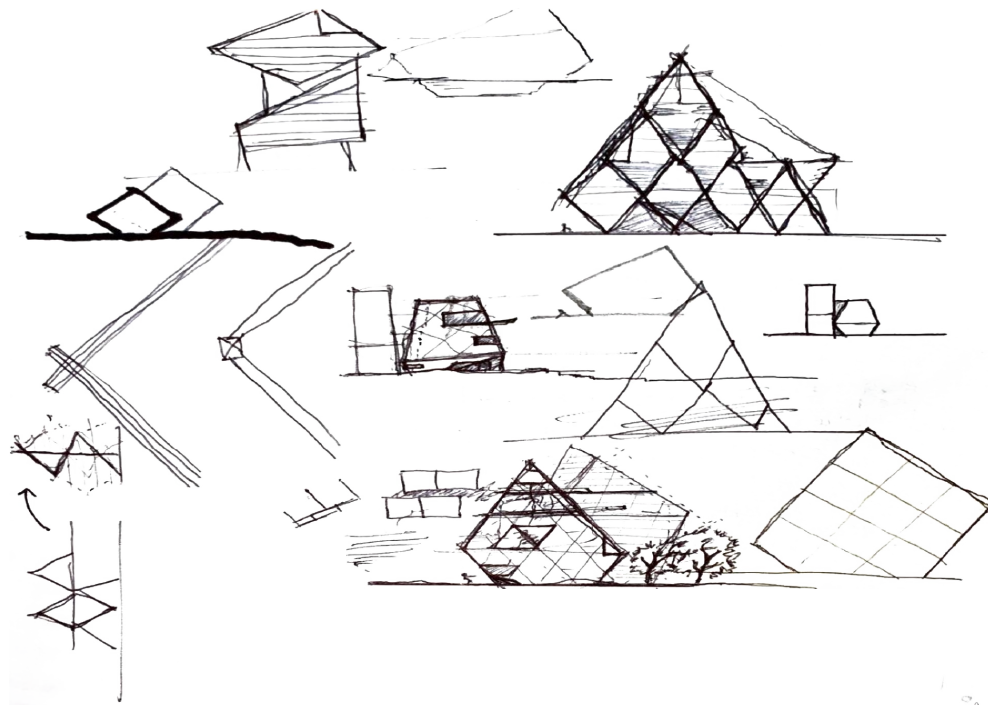


conceptual **SKETCHES**

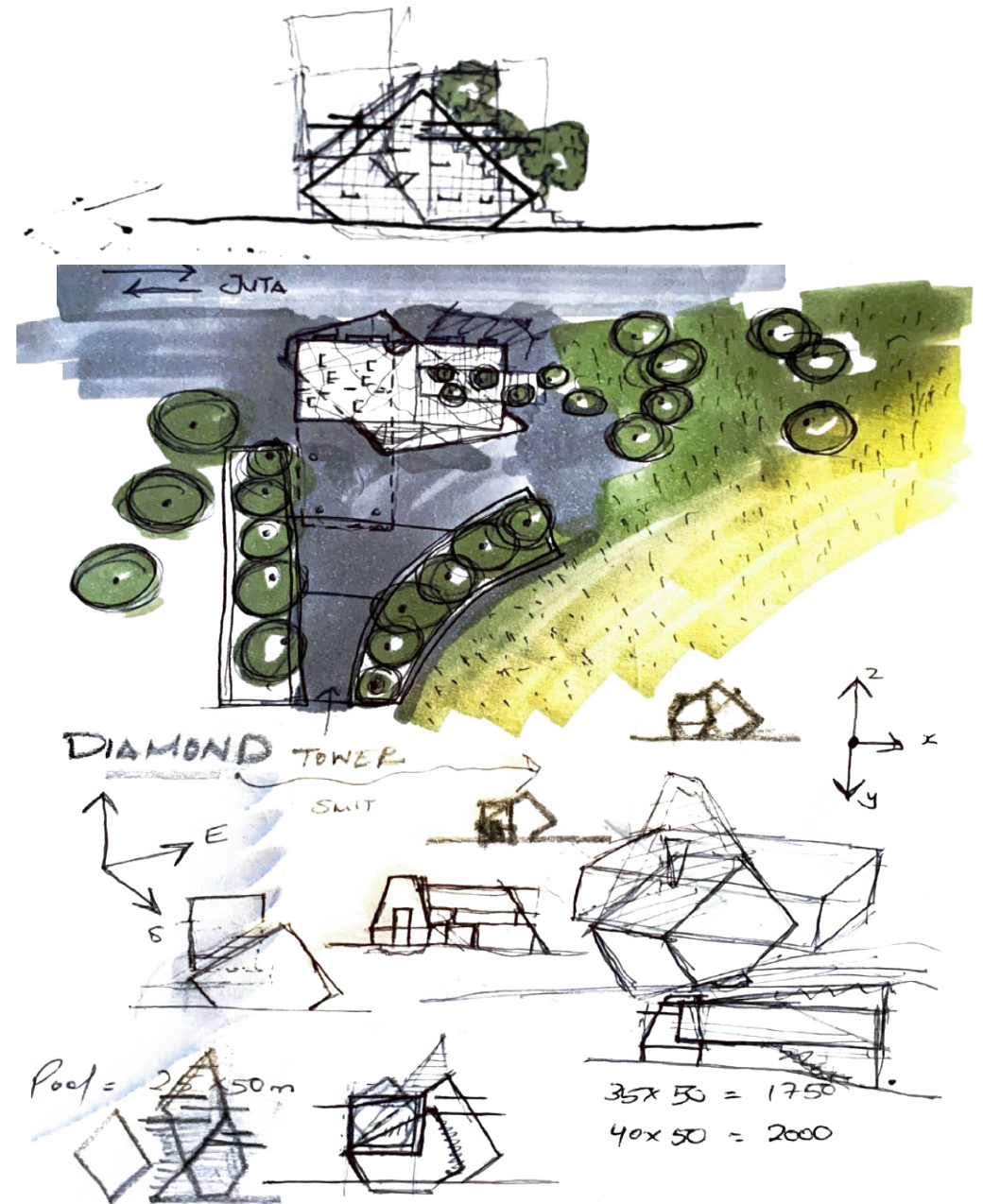




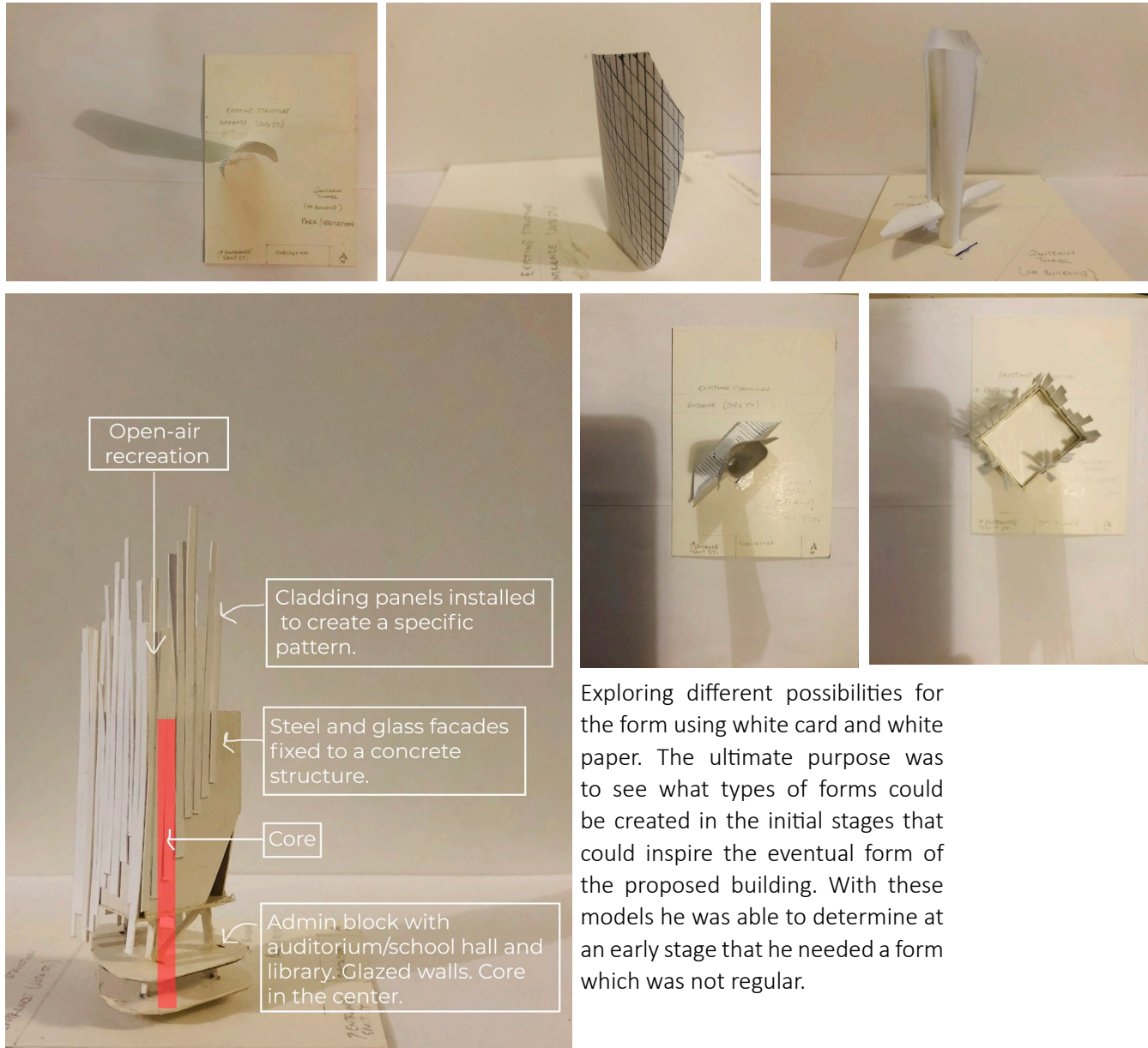




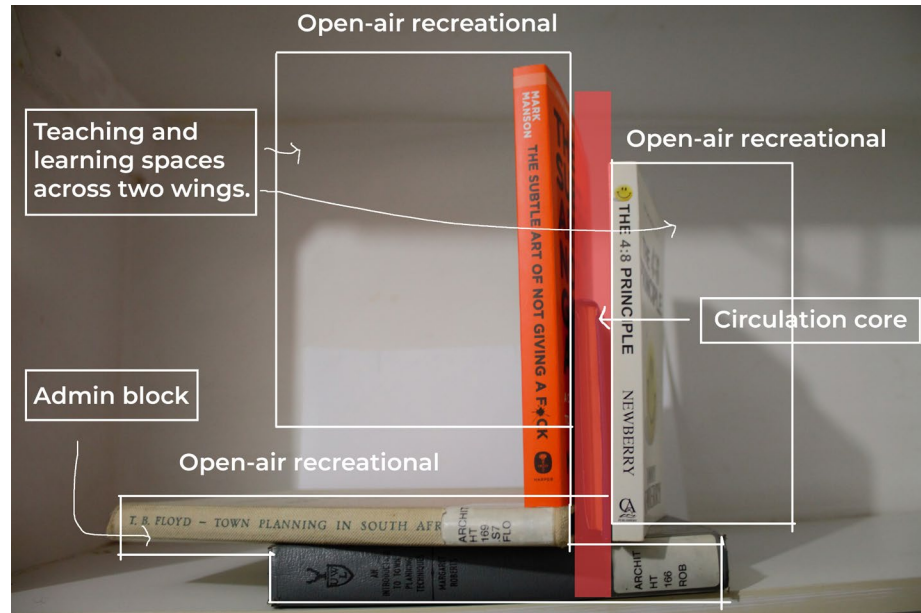
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 = PTFE Type 2A Ventilated PTFE Coated Fibreglass Membrane / Waterproof Laminated 'PTFE' Coated Membrane Fibreglass Mesh Type 2C
 (3D)



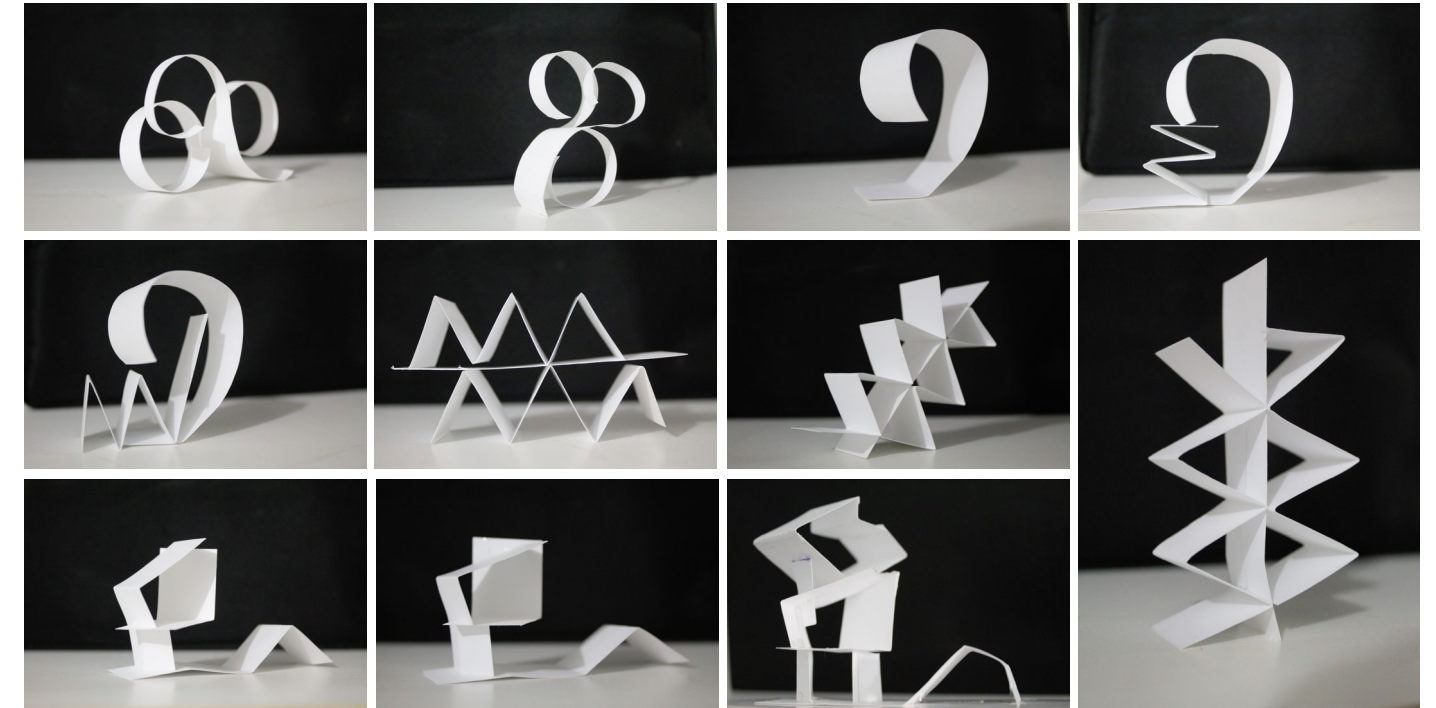
conceptual**MODELS**



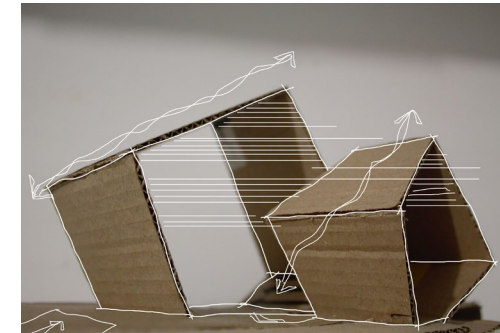
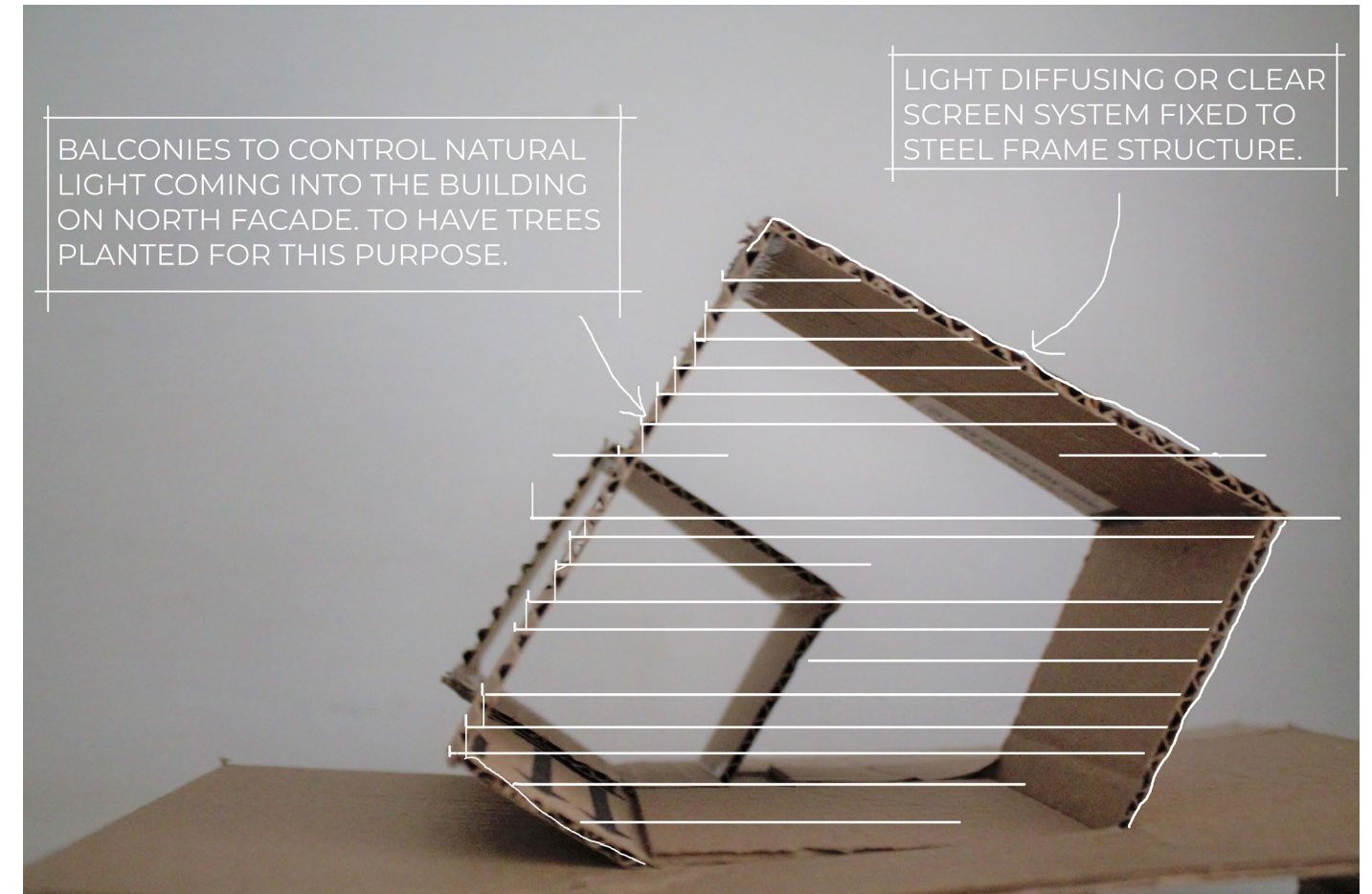
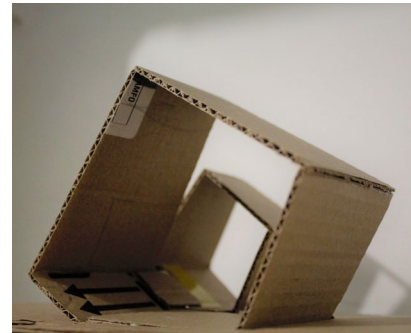
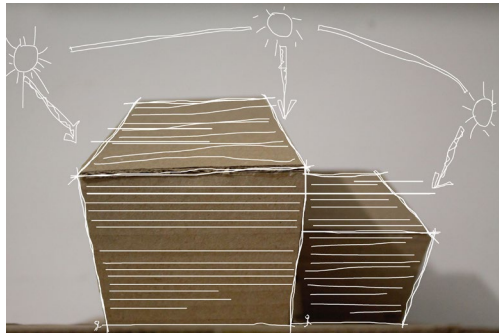
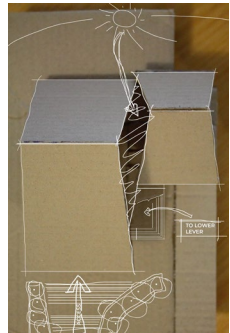
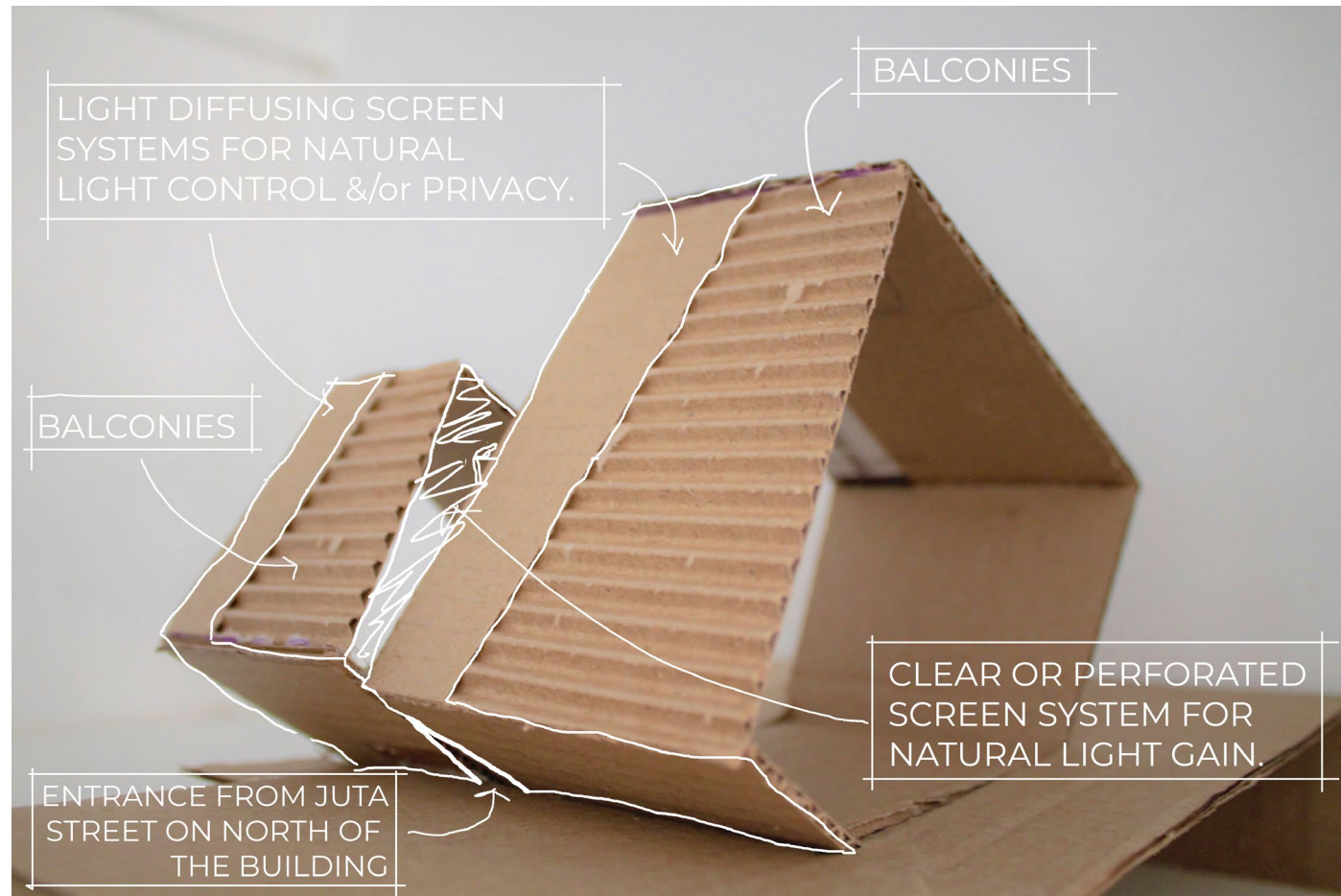
Exploring different possibilities for the form using white card and white paper. The ultimate purpose was to see what types of forms could be created in the initial stages that could inspire the eventual form of the proposed building. With these models he was able to determine at an early stage that he needed a form which was not regular.



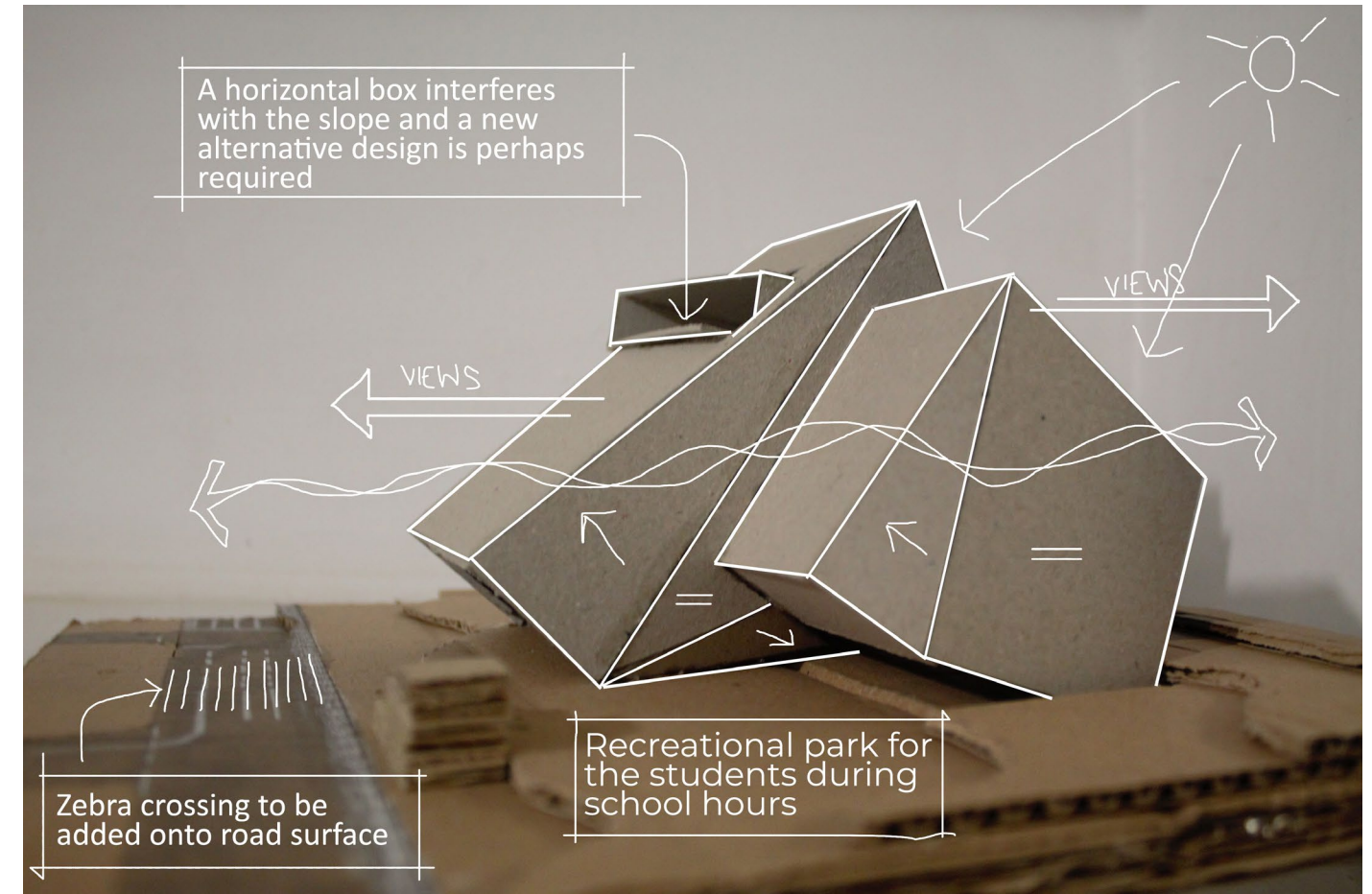
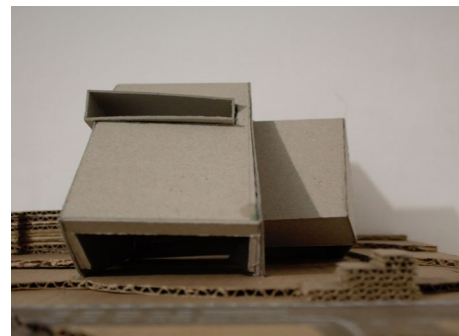
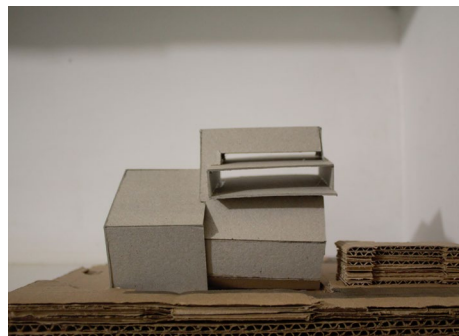
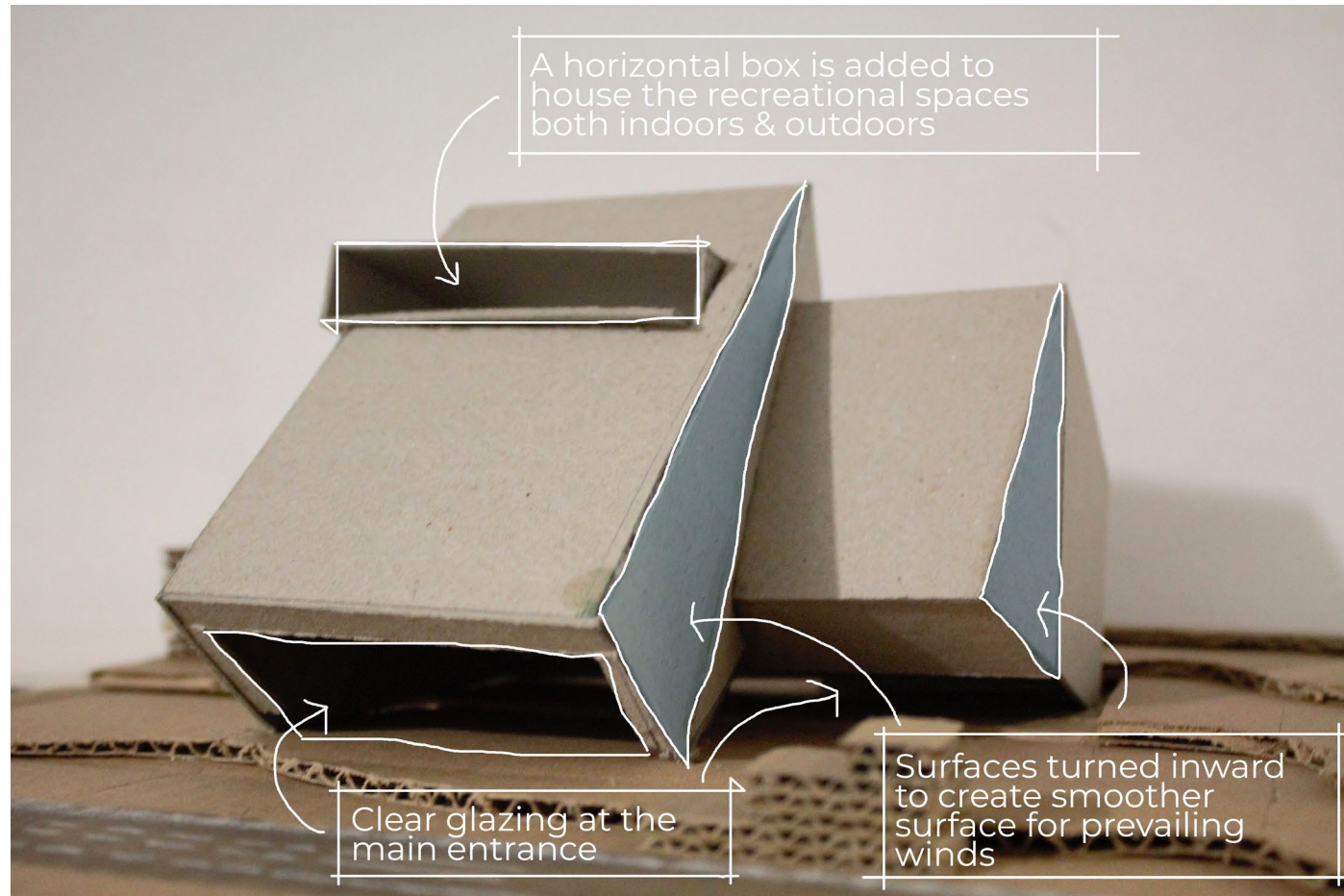
During this exercise, books were used in order to achieve the same goal as in the previous exercise. Positioning the books in different (and some what random) arrangements could lead to a possible geometry/form that would influence the eventual form of the project. The exercise got me thinking out of the box, but was not successful in creating a final form.



The third exercise in the form finding process saw the use of white paper and thin card, again, to find some interesting forms. The difference this time is that different random forms were being created instead of being too precise or specific about the shape being created. Two or more forms were also combined to see what form they collectively created.



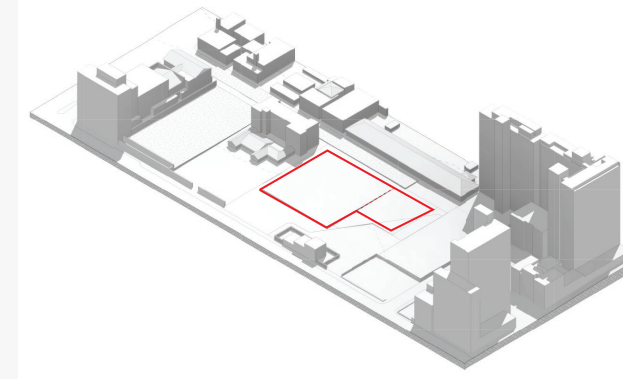
Inspired by the triangular forms created in the previous exercise, the investigator started using brown card to explore this triangular/diamond form in-depth. He visualised it as a box that has been turned onto one of its edges for various strategic reasons. The corrugation also allowed me to visualize balcony vs. cladding possibilities with the corrugation acting as the balconies.



At this point the aim was trying to visualise what the complete enclosed form would look like. This allowed the investigator to play around with the deformation of certain surfaces in order to achieve surfaces where prevailing winds can blow without exerting too much force on the lightweight facade. This also adds a bit of character to the form and prevents it

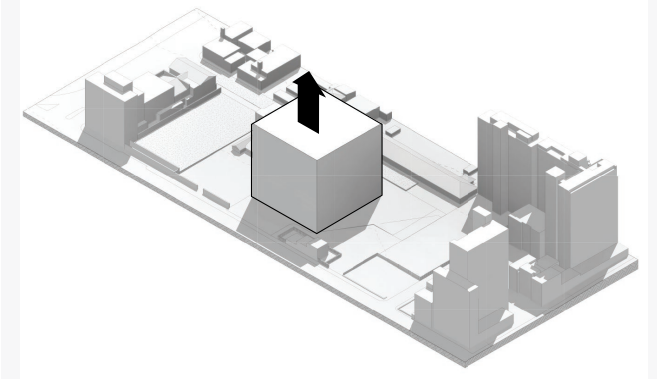
from being too rigid. This form allows the investigator to avoid deep floor spaces as this would be an issue he would be dealing with had he not twisted the box. The sloping character of the form provides opportunities for every level to receive daylight deep within the floor areas.

conceptual **DIAGRAMS**



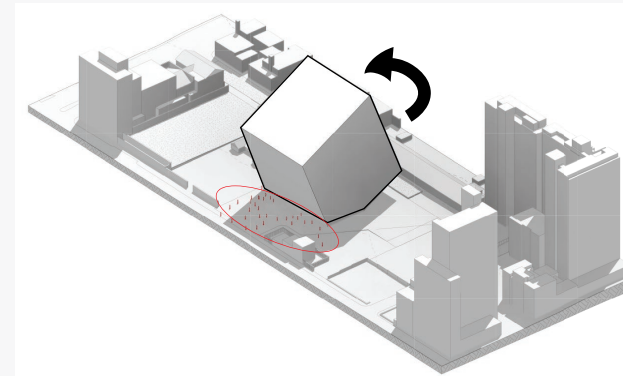
Site

The site is part of a larger erven which sits within the dense inner-city of Johannesburg context. Surrounding the site are student accommodation facilities and residential blocks with the Johannesburg Park Station and Gautrain Station to the south of the site.



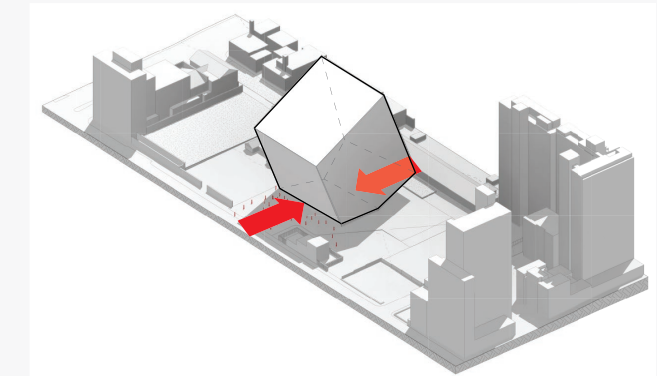
Extrusion

This action gives you a maximum building volume with deep floor plans. This presents certain issues such as lack of sufficient sunlight in deeper spaces.



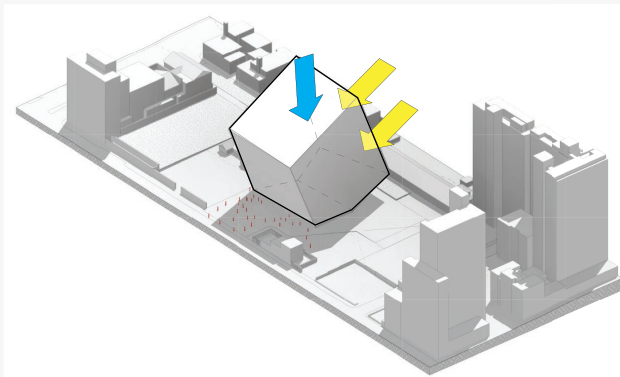
Rotation

Opportunities for more external ground floor space for gathering before entering the building and the building also provides cover. A more interesting building profile is introduced.



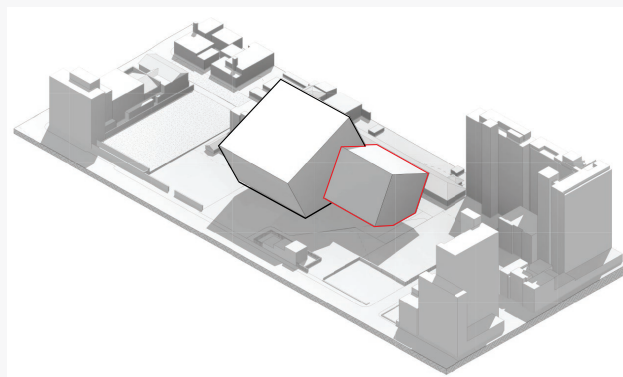
Central entrance lobby

The rotation creates a slightly smaller building footprint and this shortens the distance from points of entry to the vertical circulation.



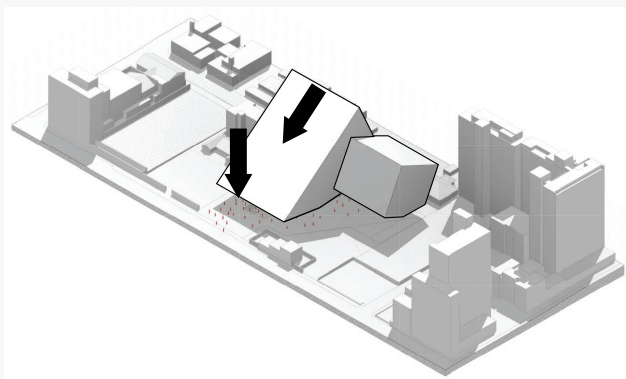
Climate

As floor plans are now terraced, the rotated form makes daylight gain on all the floors possible from along the solar path along the north façade. This form also allows rain to run off the building easily as it now has sloped surfaces.



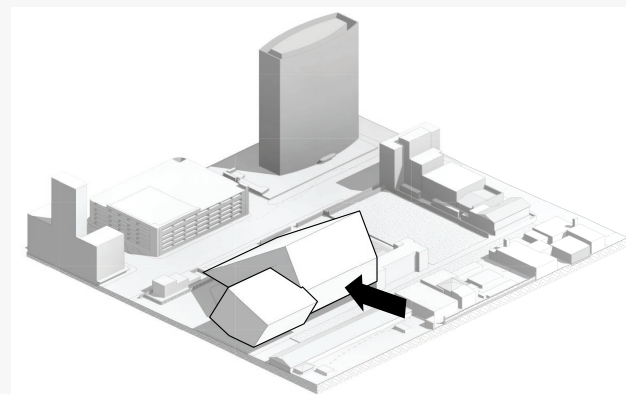
Add more space

An additional cube increases the spatial capacity of the facility. The additional shape is smaller as a portion of the site in front of it is reserved for a proposed park which is part of the intervention on the site.



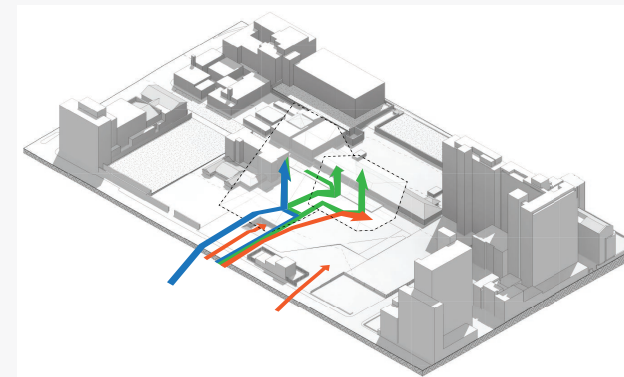
Deformation towards Smit St.

Lower level extents are increased and the entrance to the building becomes a narrow slit which is meant to be an interesting experience between the external and internal spaces.



Deformation from Juta St.

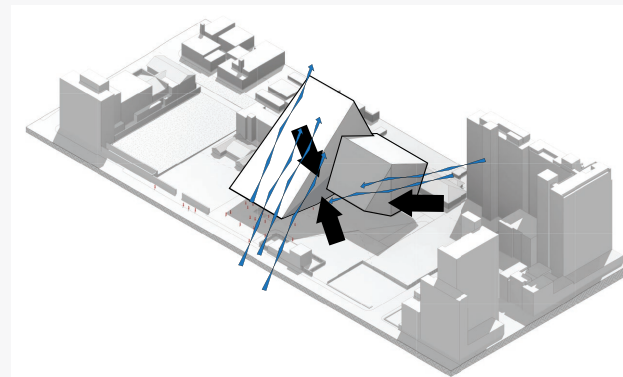
This shortens the floor extents at this section of the building meaning that the number of columns extending outwards is minimal/non-existing.



Circulation

There are various pedestrian entry routes onto the site and into the building for various users.

- Students
- Staff
- Community



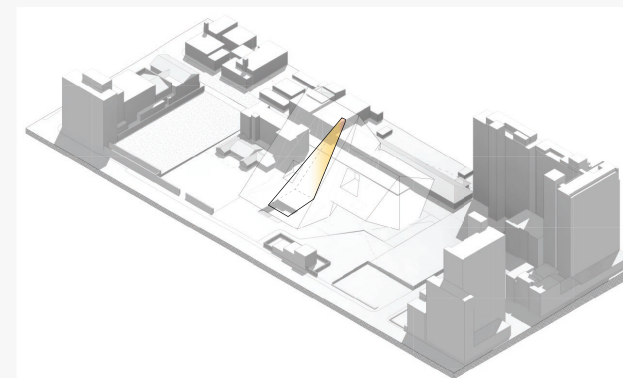
Deformation for wind

Several faces of the building's surfaces are deformed in order to allow free flow of south westerly and north westerly prevailing winds.



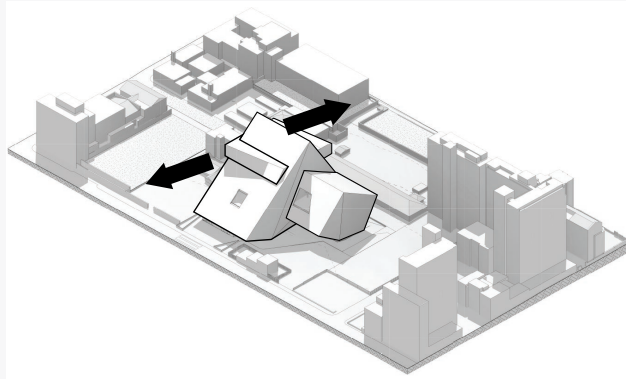
Green zones

The intention is to introduce more green spaces that contribute towards the city's green footprint. External voids are added where "roof gardens" are to go and a portion of the site where no building being erected is turned into a public park.



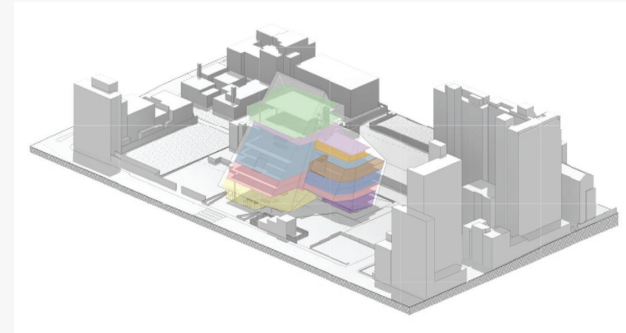
Sunlight

A opening is made on the north façade of the building and filters into the central circulation space, through voids down to the lower level for maximum daylight gain.



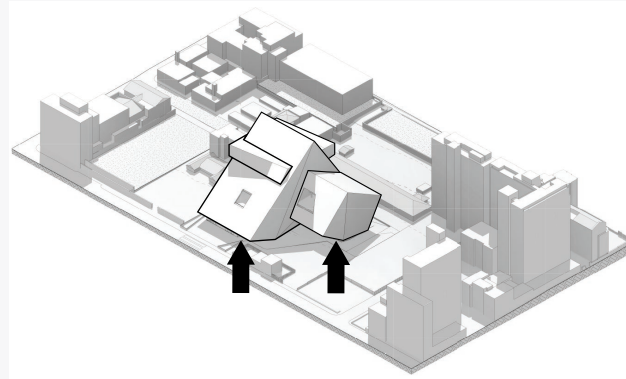
Recreation box

A box is added and intersects with the main building on the tenth level to increase the extent of the floor area where sporting activities are to take place.



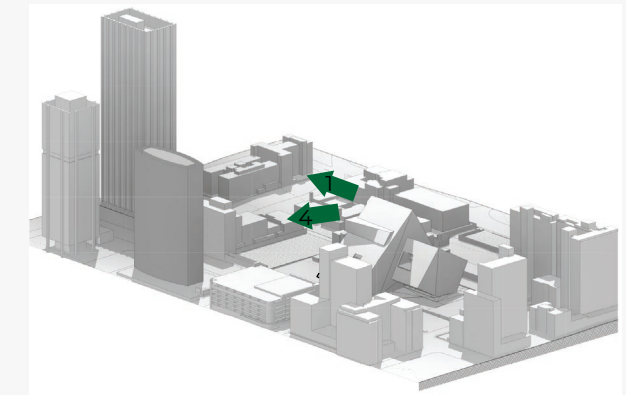
Function

The different spaces of the school are strategically positioned throughout the building around the circulation nodes.



Ground floor deformation

Portions of the cladding on the ground floor are lifted from the ground and replaced with glazing to allow maximum daylight into the ground floor spaces.



Views

From several floors throughout the building, views towards 1. Braamfontein, 2. Constitution Hill, 3. Hilbrow and 4. the CBD will be experienced. The building will also be visible from most of these locations.



8 a.m.



9 a.m.



10 a.m.



11 a.m.

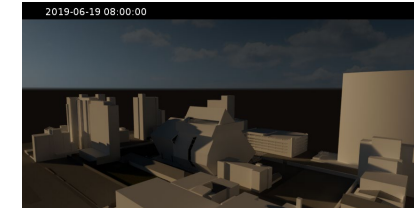


12 p.m.



1 p.m.

south east



8 a.m.



9 a.m.



10 a.m.



12 p.m.



2 p.m.

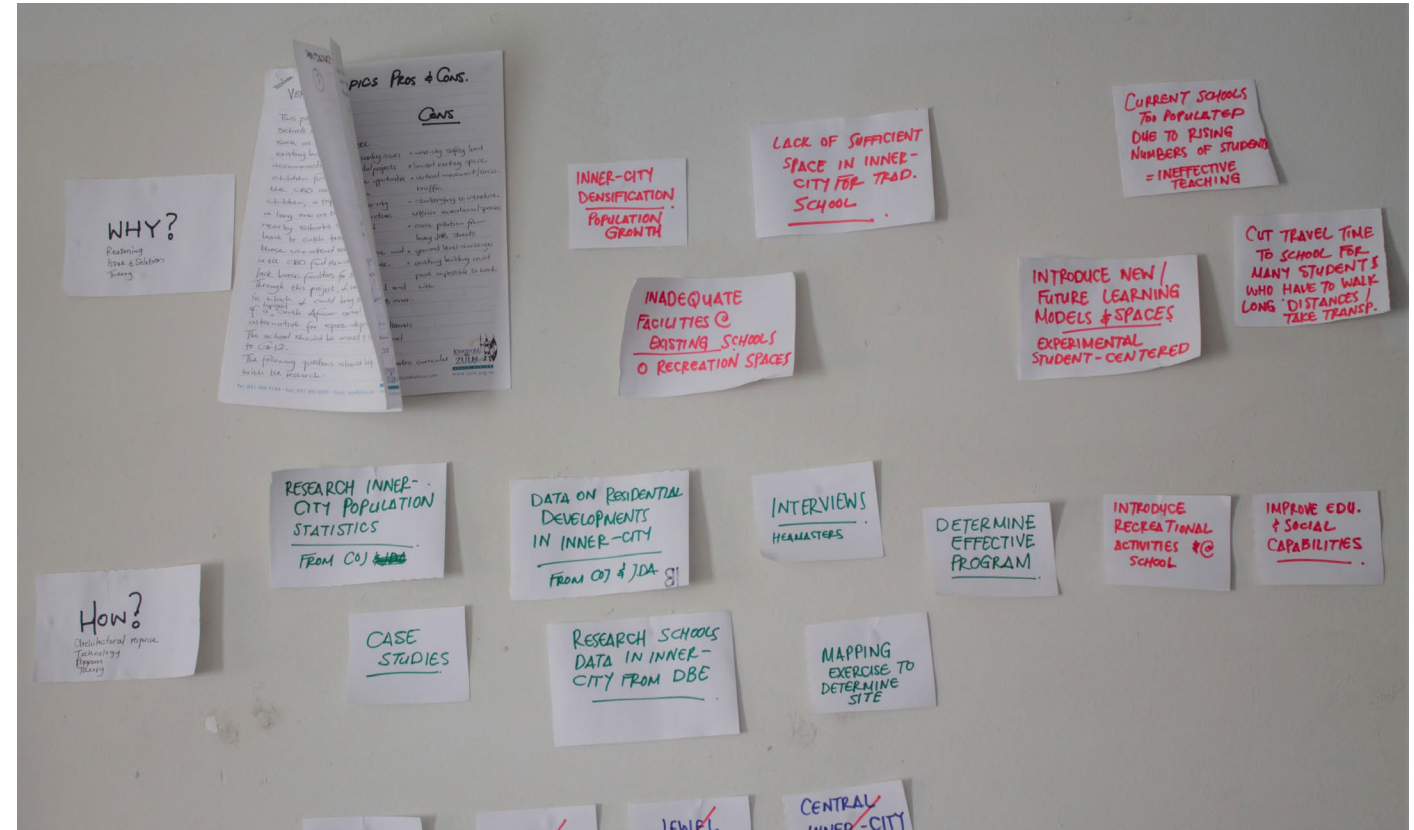


3 p.m.

north west

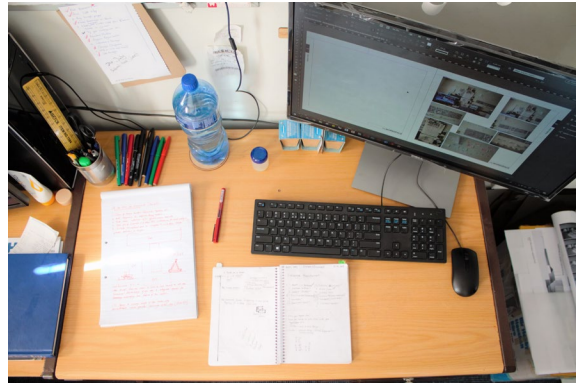
SOLARstudy

theWORKSPACE

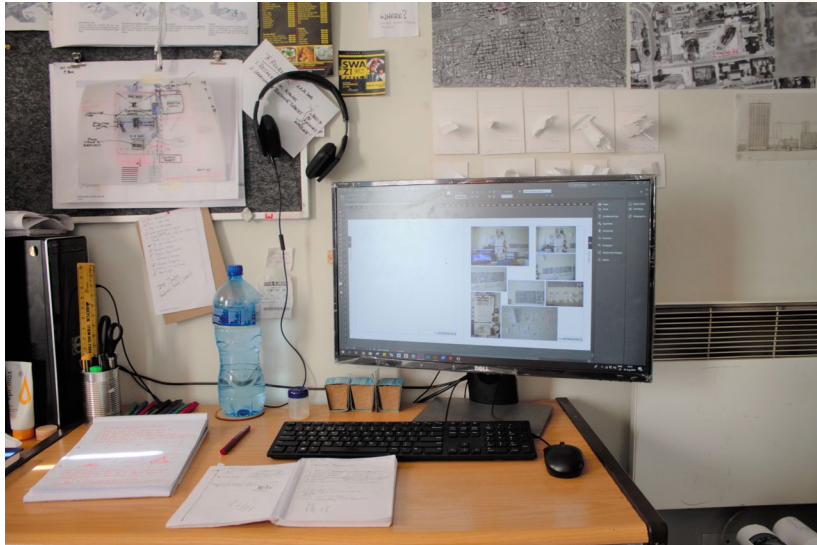


The initial step of the entire research and design process was centered around figuring out some topics that were to be explored which would be part of the research report and would inevitably inform the design of this project. These were written down on pieces of paper and grouped according to **WHY**

the investigator thought the inner city schools are inadequate and **HOW** he was planning on resolving the issue of inadequate inner city schools through research and design. The wall started getting more populated as time went by and as the investigator moved on to the next stages of the process. He



started deciding on where to locate the development and this involved looking at the map of the inner city to identify certain possible sites which he then shortlisted until he was left with one favourable choice. After this step, the wall started welcoming some miniature scale models which were the initial stage of the form finding process - trying to figure out what this building would look like.



chapter seven
the response

res



THE IDEA: doing things differently

As a result of the research conducted in chapter two, it is apparent that more must be done in the inner city to improve the quality of education through the implementation of certain architectural interventions and the formation of specific relationships. As discussed, there are several factors which render existing schools being able to offer quality education through adequate spaces and facilities. The lack in these spaces and facilities limit the effectiveness of the education throughout and this does raise some important questions.

Evidently the current methods of creating school environments are no longer effective or are just simply outdated, especially within communities such as the inner city. There is a need to start looking into alternative methods and innovations to create spaces which are relevant to the students of today and tomorrow and how they process information and obtain knowledge. This, of course, is a process that involves technological advancements as these spaces and

facilities can be used effectively if they are used with new technologies that make the teaching and learning processes more effective.

Government and educators also have to be open to the process of doing things differently. There is usually a yearning for the normal and old way of doing things, especially amongst older people. Unless we are able to convince the older leaders, who populate the South African Government at present, it will be some time before we are able to introduce new alternatives to learning environments without facing obstacles from concerned officials.

A veteran South African teacher, William Smith, alluded to the notion of doing things differently recently when he appeared on eNCA questioning the effectiveness of the current syllabus on preparing students for the real world - especially at the high school level. He also added "...we teach subjects for the sake of the subject rather for the sake of the pupil". It has to start being about the students and what is best and most affective for them, not the usual "we also did this when we were at school - it works". Times have changed and are

changing and this needs to be reflected in learning environments as well.

In addition, the owners of the inner city properties have a responsibility of uplifting the face of the inner city. Currently, the state of the inner city is in disrepair and this has an effect on preventing any real developmental work from occurring in the inner city as a result. Many of the properties have been neglected to the point where immigrants and the homeless accommodate themselves inside these properties and this has proven to have quite dangerous consequences.

The owners - most of whom are white and are honestly detached from this community - as well as the city and province - who also own a lot of the properties - have to take responsibility and work side-by-side towards reshaping the image of the inner city. Strides have been made towards plans by the city for more developmental projects to occur, but this also needs a hand from the private sector.

This is no community that children should be growing up in and attending school at, but circumstances have made that their reality, therefore; the owners have to make a change that will allow this community to be a lively, healthy, wealthy and safe community for all who live in it.

This intended proposal is also meant to serve as a catalyst for this very purpose. It must not be just any usual building that goes up in the inner city. It must become a building that helps give the inner city a new image. A new architectural language that speaks to the future. It must inspire the community and offer many opportunities to everyone who calls it home.

creating **EFFECTIVE SPACES** to enhance learning

The idea is to introduce new types of spaces or to enhance the existing ones such that they create an environment that is conducive for many teaching and learning preferences. They are to be born from the existing spaces within schools but should be developed further to be more relevant to current and effective teaching and learning methods. The ideal alternatives are as follows:

classrooms

- interactive – flexible seating arrangements/classroom designs
- spacious and flexible
- large windows for natural light
- sufficient natural air-conditioning

alternative spaces for teaching

- interactive computer laboratories
- interactive and high-tech (incl. VR) science and biology laboratories
- hologram rooms for enhanced learning experiences
- one-on-one/small group teaching spaces for teachers and students

- exhibition spaces

peer-learning and self-learning nodes

- informal spaces along corridors
- study and work studios
- group discussion rooms/spaces
- garden/courtyard spaces

interactive library

- audio visual zones
- self-study/reading zones
- noise rooms for discussions – project rooms

The aim is for these ambitious spaces to be user-friendly. We know that different students prefer learning in different ways and certain educators also prefer teaching in different ways and therefore the designs should provide for these preferences.

combining **VARIOUS PROGRAMS** in one building

The intention is for this learning environment to present different learning experiences for the school community by combining several different programs in order to create an ideal environment.

The challenge may present itself during the actual design of the building and arrangement of these programs in a logical manner throughout the structure. This needs to be done strategically with considerations of movement and circulation, noise pollution, natural daylight maximisation, private and public spaces articulation and general safety and security.

The programs to be introduced are:

administrative

- Administration block for the facility
- Day care centre
- Clinic

academic

- Primary school

- High school
- Bridging school for immigrant children – Three2Six Project (Children’s Refugee Education Project)

The project was established 11 years ago and caters to refugee and asylum seeker children. It is currently hosted by three schools within Johannesburg and has about 300 students that it caters for, having served about 2396 children (as of 2018). Its purpose is to provide “necessary training, knowledge development and preparation to enter regular school”. The centre can become a fourth host of the project and will prepare the children to enter either the primary school or high school at the centre.

- Shared learning spaces-between all the schools
- Auditorium/school hall

recreation

- Sports facilities
- Green spaces

arts

- Art, Music and Dance school

RECREATIONAL SPACES

and how they are incorporated into a single vertical structure

As stated in chapter two, the existence of recreational spaces at a school is important and brings with it several benefits. The challenge in this specific project will be finding ways of incorporating spaces which are usually placed on vast amounts of land within a building footprint, meaning that currently there will be several limitations and restrictions. There is an opportunity to use these spaces as mechanisms to break the building up into its different sections which could be done quite creatively and effectively.

The recreational spaces need to be a combination of internal and external spaces. These are the spaces where physical education classes and physical sports activities will occur and there needs to be a provision for both internal and external conditions for these activities. Opportunities that will arise from having these spaces will also include the possibility of providing access to the community

to use the spaces while other schools could also have the opportunity of making use of these spaces if they do not have the facilities.

This outside usage of the facilities will have to be strategically managed with scheduling and rules and guidelines in order to ensure that there is control and order exercised when these spaces are being hired out without interference with teaching and learning.

These recreational spaces will include:

internal

- Indoor multi-purpose sports hall
- Squash courts
- Fitness gym with aerobic studio
- Swimming pool arena

external

- Basketball/Netball/Futsal/Tennis courts (combi courts)
- Astro turf (hockey and soccer)
- Park

additional CONSIDERATIONS

safety and security

The premises will be guarded and protected by a couple of security personnel who will be strategically located around the site as well as CCTV surveillance. Members of the public who enter the premises will be required to sign in and sign out at the security checkpoint.

The way the school is designed will ensure the safety of the students: The younger students will be separated from the older students as they will be placed on different levels and will barely cross paths during a normal school day. There will only be two entrances to the building itself and this will limit the possibility of someone getting in and out of the building undetected.

This will also ensure that the students enter and exit through a collective space – the lobby – where a close eye can be placed on students who may think about escaping from school during the day.

transportation

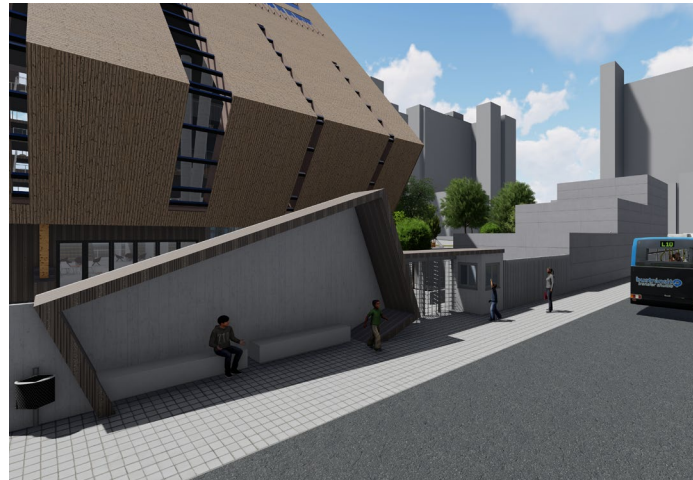
Transportation in the form of a couple of minibuses will be available for students who live within the inner city. This will be for pre-school to intermediate phase students who cannot be picked up from school because perhaps they live with elderly guardians and cannot travel home on their own. Transportation will also be available for field trip to certain educational/edutainment facilities within the city such as the SciBono Discovery Centre.

chapter eight
the architecture

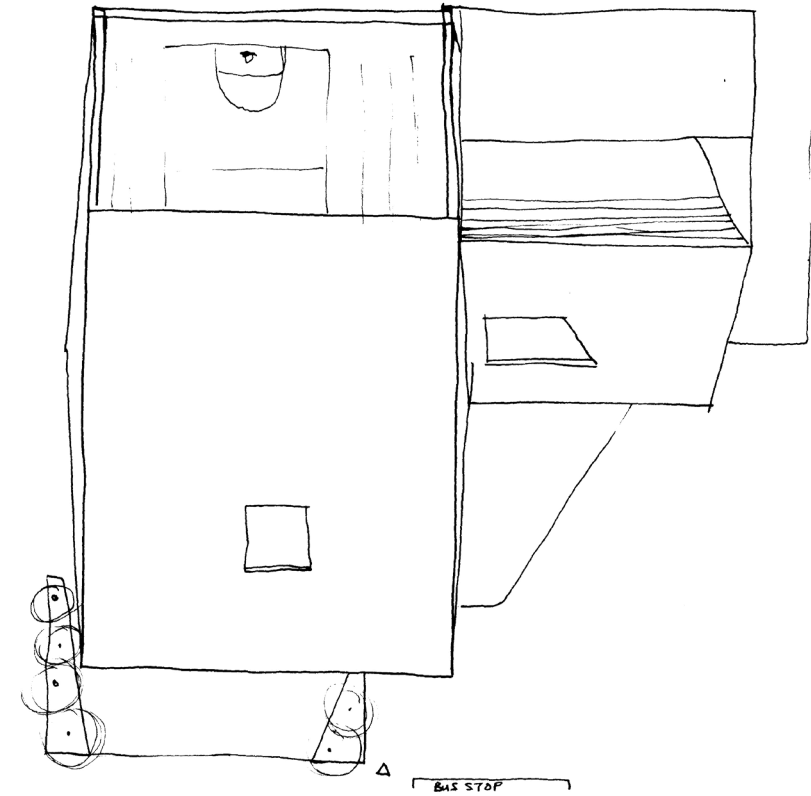
arc

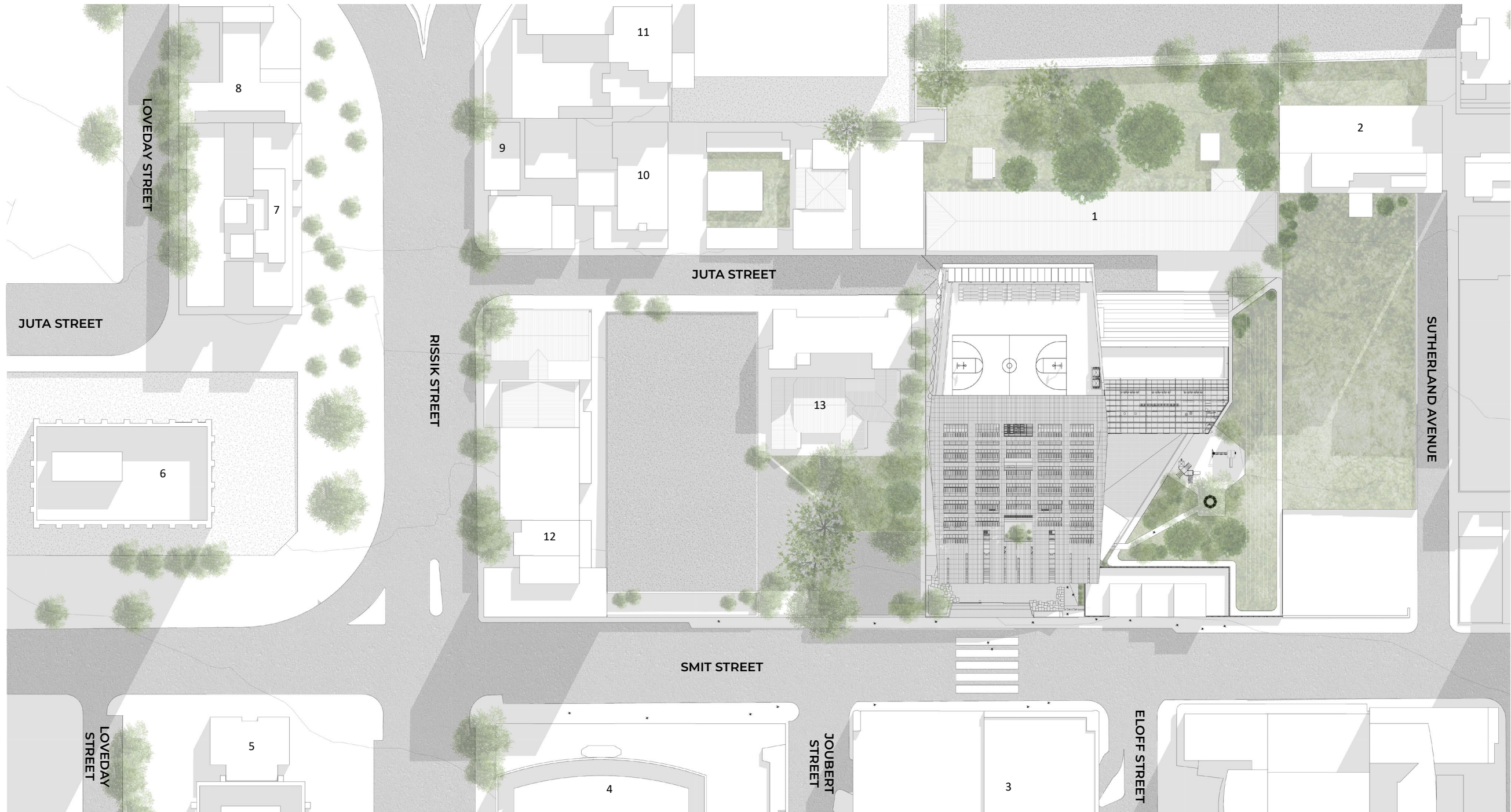
RENDERS





floor**PLANS**



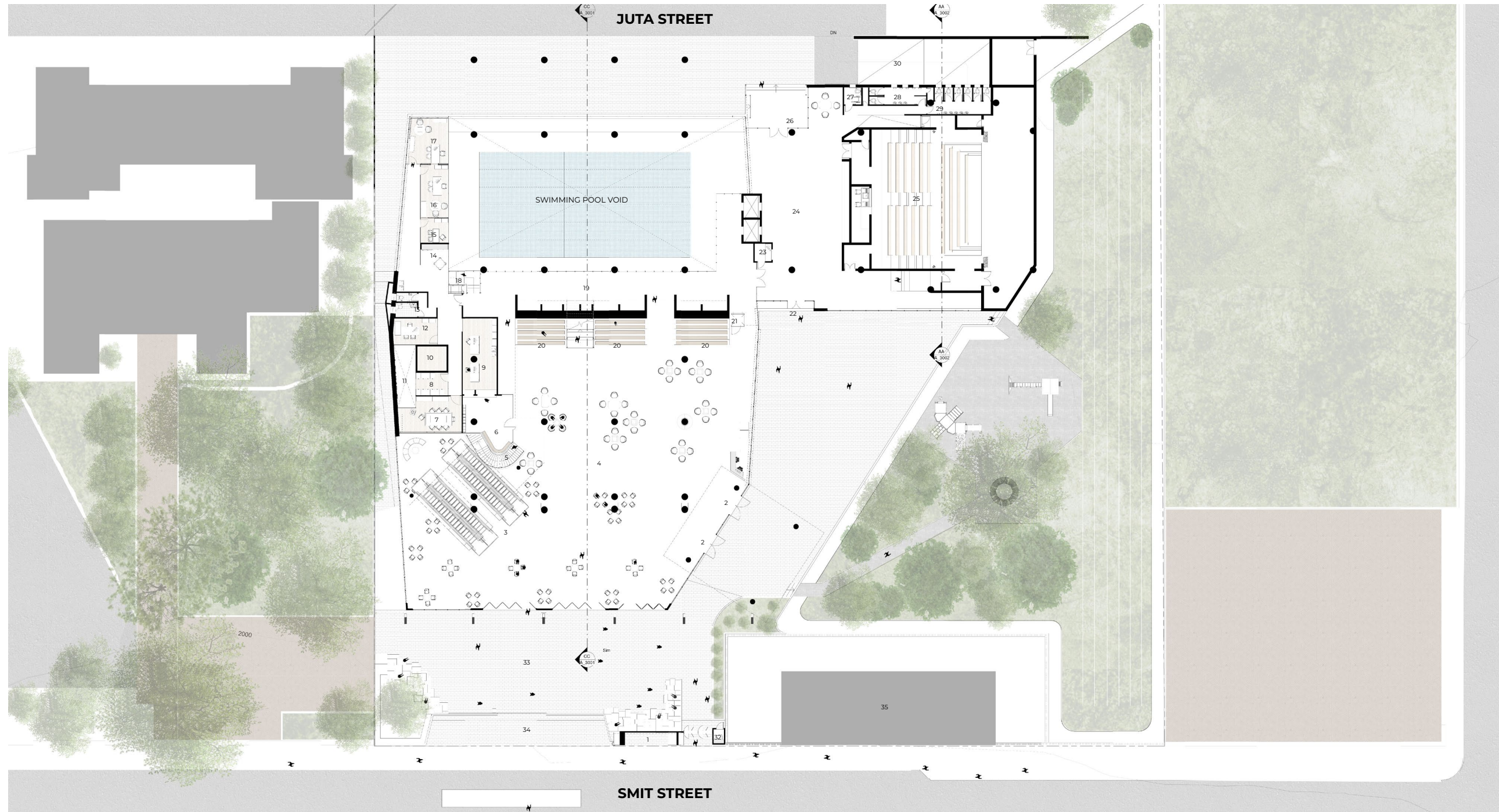


LEGEND

1. Old Witwatersrand Trades School
2. Skyways Student Accommodation
3. Park Station gautrain Parkade
4. Schlesinger Building- Lesotho Consulate General
5. Transet
6. Braamfontein Gate
7. Salvation Army National Head Office
8. YW Junction Student Accommodation
9. Methodist House
10. Good News Community Church/ Mukhanyo Theology College
11. Dept. of Health Bureau for Occupational Diseases
12. YMCA Student Accommodation
13. Central Johannesburg College School of Hospitality Services



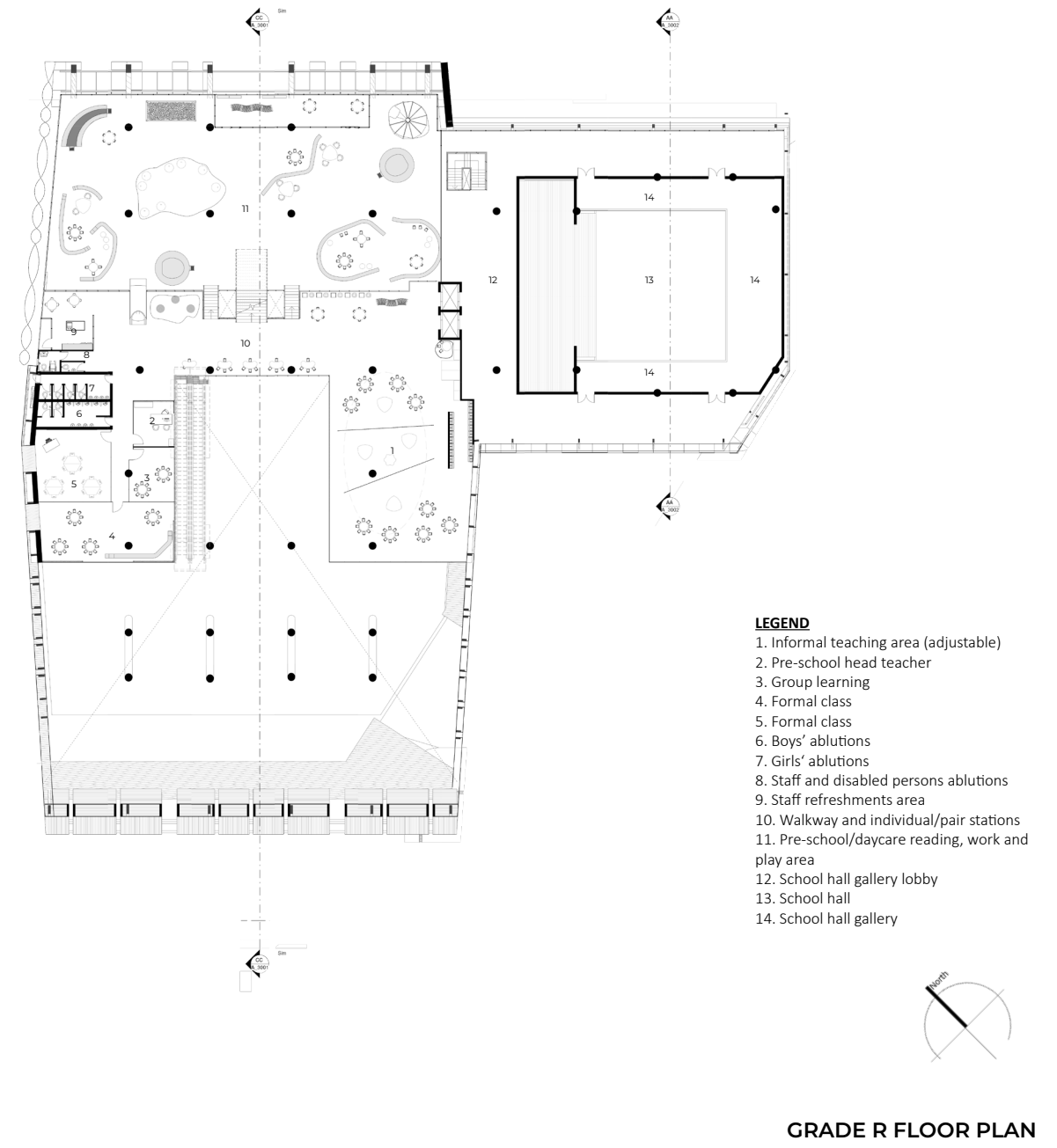
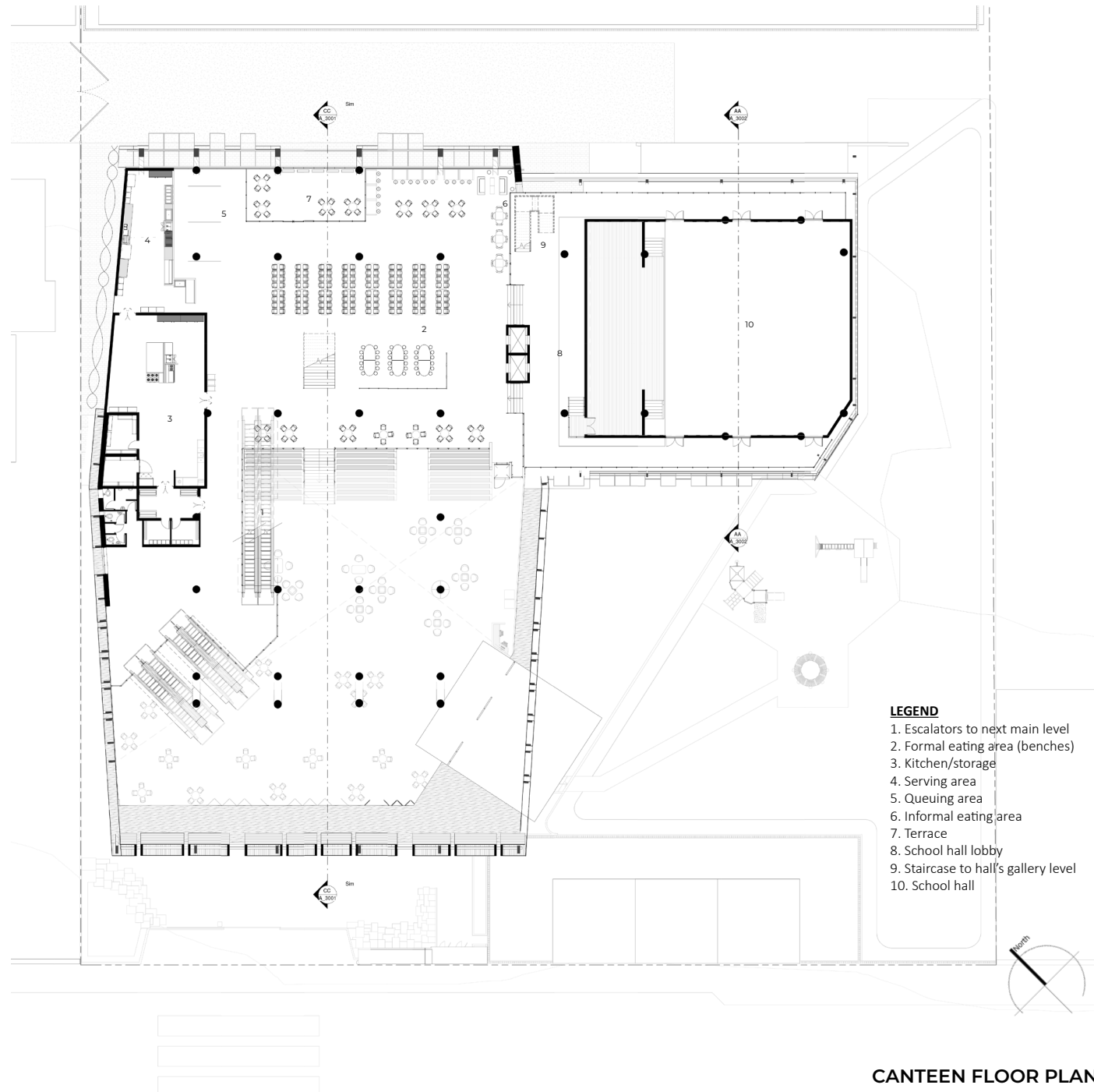
SITE PLAN

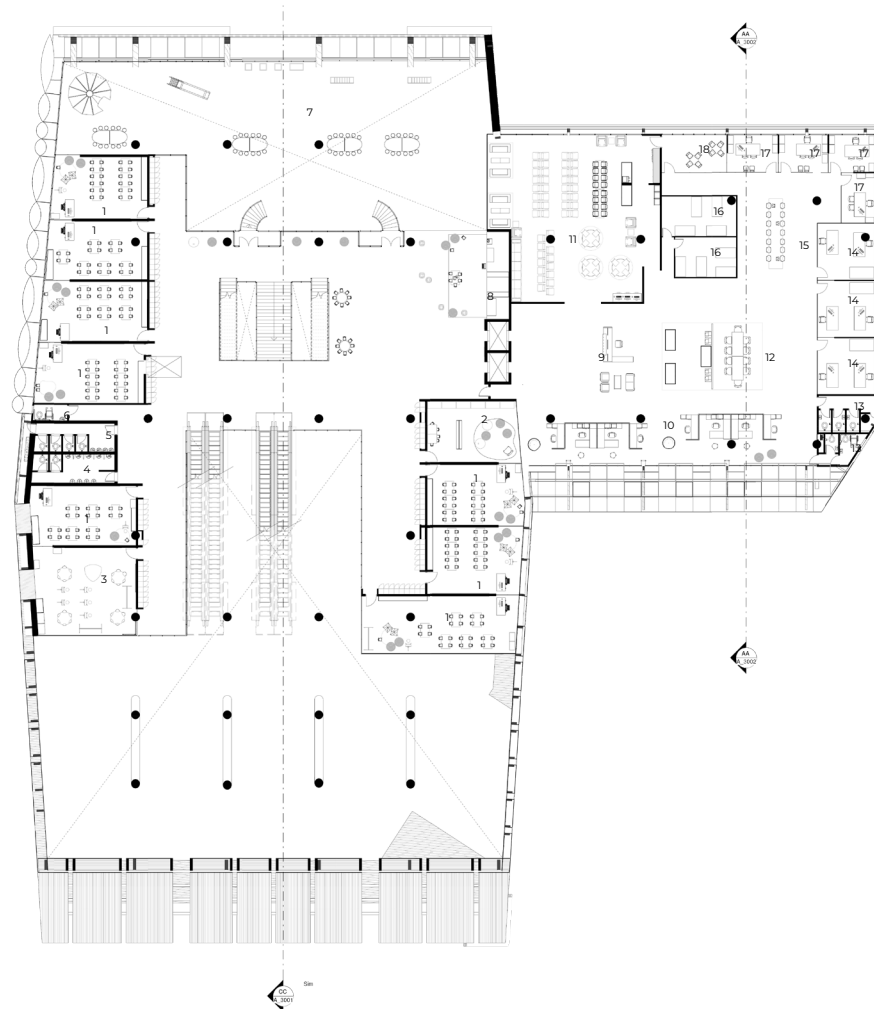


LEGEND

1. Bus stop
2. Main entrance to school
3. Escalators to upper level
4. Lobby (Exhibitions, after school studying, etc)
5. Staircase to clinic
6. Waiting area
7. Meeting room
8. Filing room
9. Reception
10. Bookkeeper
11. Wall climbing void
12. Admin assistant
13. Ablutions
14. Kitchenette
15. Principals' assistant
16. Principal Primary school
17. Principal: High school
18. Staircase to gym and swimming pool
19. Viewing deck
20. "Chill steps"
21. Wheelchair lift to canteen level
22. Entrance to auditorium and lifts
23. Ticket/info office
24. Auditorium lobby
25. Auditorium
26. Entrance from back of the site
27. Disabled persons ablutions
28. Men's ablutions
29. Female's ablutions
30. Ramp to parking
31. Park
32. Security booth
33. Outside social space (overflow)
34. Public space (street market. etc)
35. Gautrain property

GROUND FLOOR PLAN

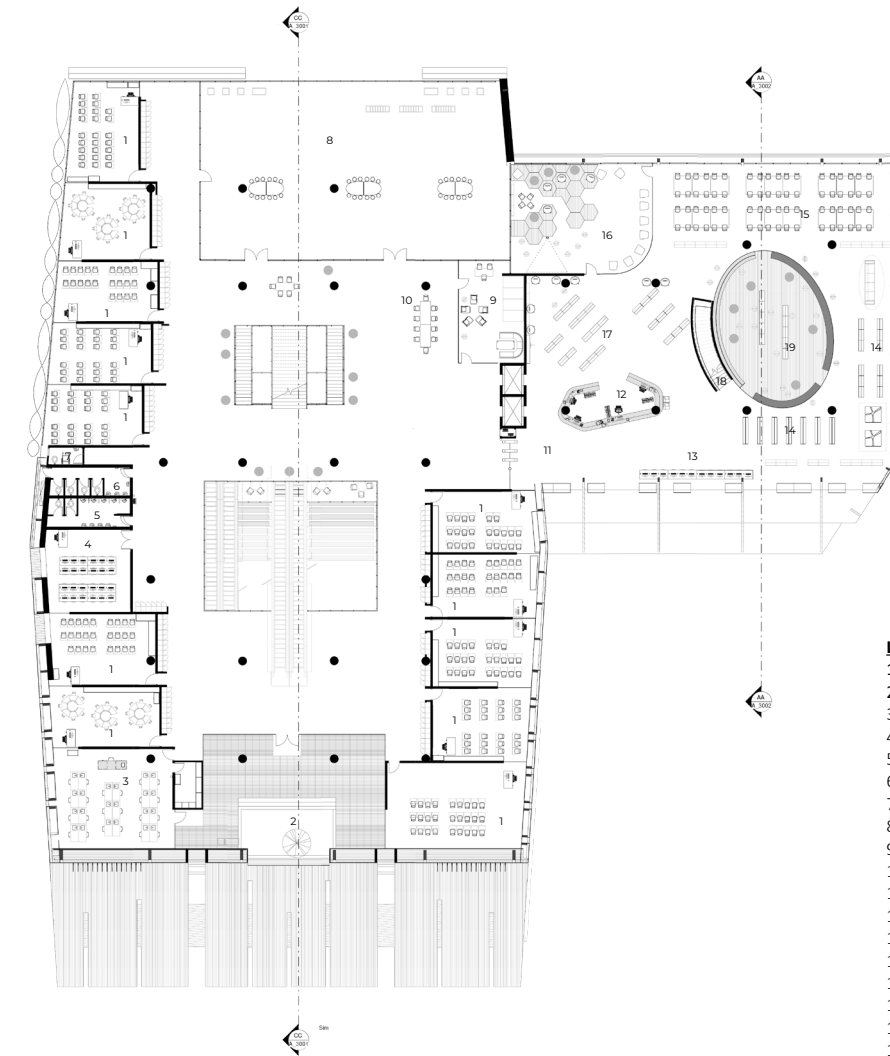




- LEGEND**
- 1. Formal classrooms
 - 2. Grade 1&2 book room
 - 3. Multipurpose room
 - 4. Boys' ablutions
 - 5. Girls' ablutions
 - 6. Staff and disabled persons ablution
 - 7. Lower level break area (Grades 1&2)
 - 8. Informal reading area
 - 9. Reception
 - 10. Admin workspaces
 - 11. Staff room
 - 12. Meeting area
 - 13. Unisex ablutions
 - 14. Grade/Department Heads
 - 15. Informal meeting/work space
 - 16. Sickbays
 - 17. Deputy Heads
 - 18. Balcony



GRADE 1-2 & ADMIN FLOOR PLAN

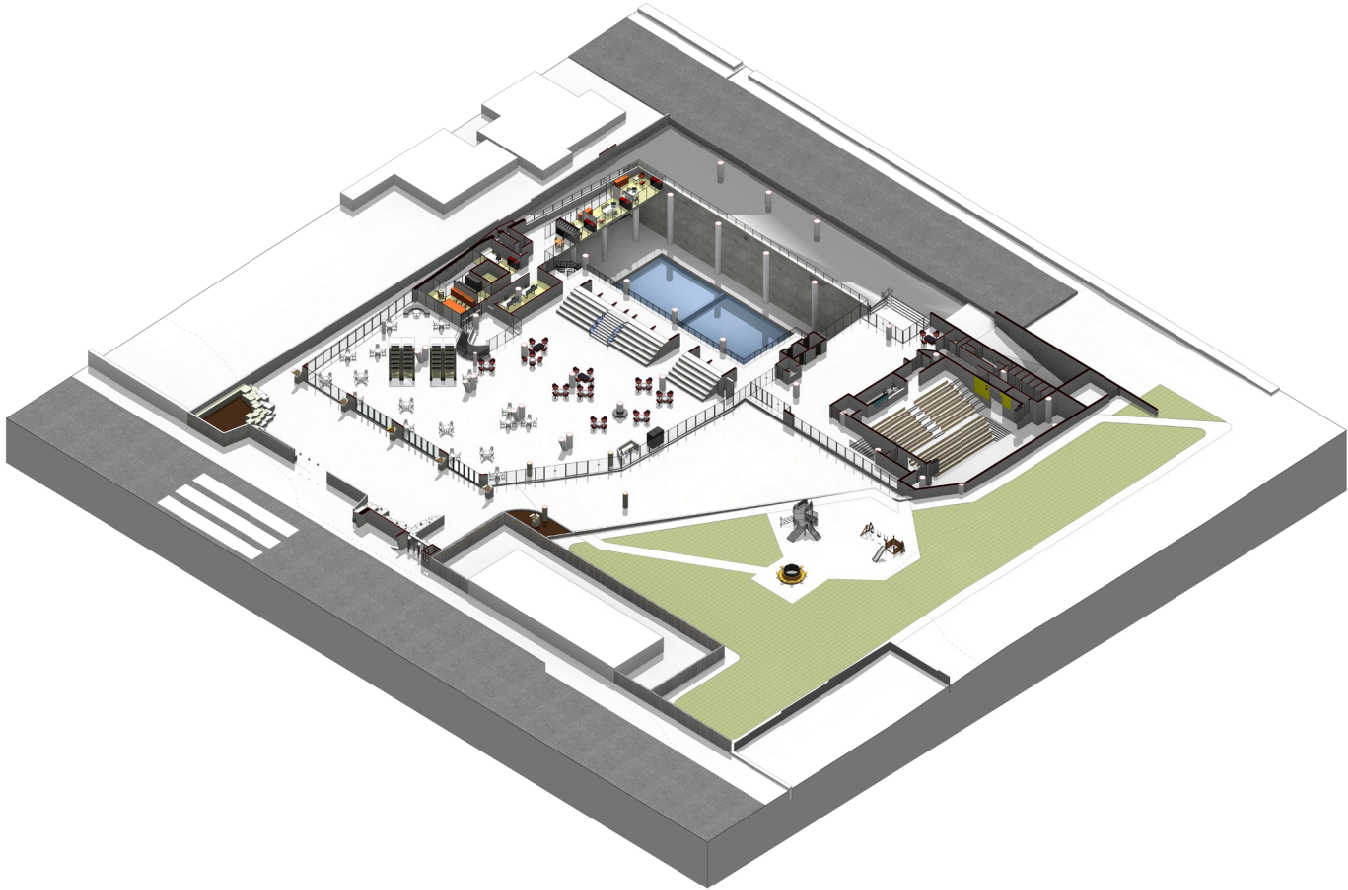


- LEGEND**
- 1. Formal classrooms
 - 2. Science/"roof" garden
 - 3. Science lab
 - 4. Computer lab
 - 5. Boys' ablutions
 - 6. Girls' ablutions
 - 7. Handicapped persons/staff ablutions
 - 8. Break area
 - 9. Quiet group learning/discussion space
 - 10. Project table
 - 11. e-Reading
 - 12. Circulation desk
 - 13. Internet area
 - 14. Open access
 - 15. Study/reading area
 - 16. Audio/visual area
 - 17. Open access
 - 18. Staircase to upper library floor
 - 19. Reading area

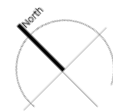
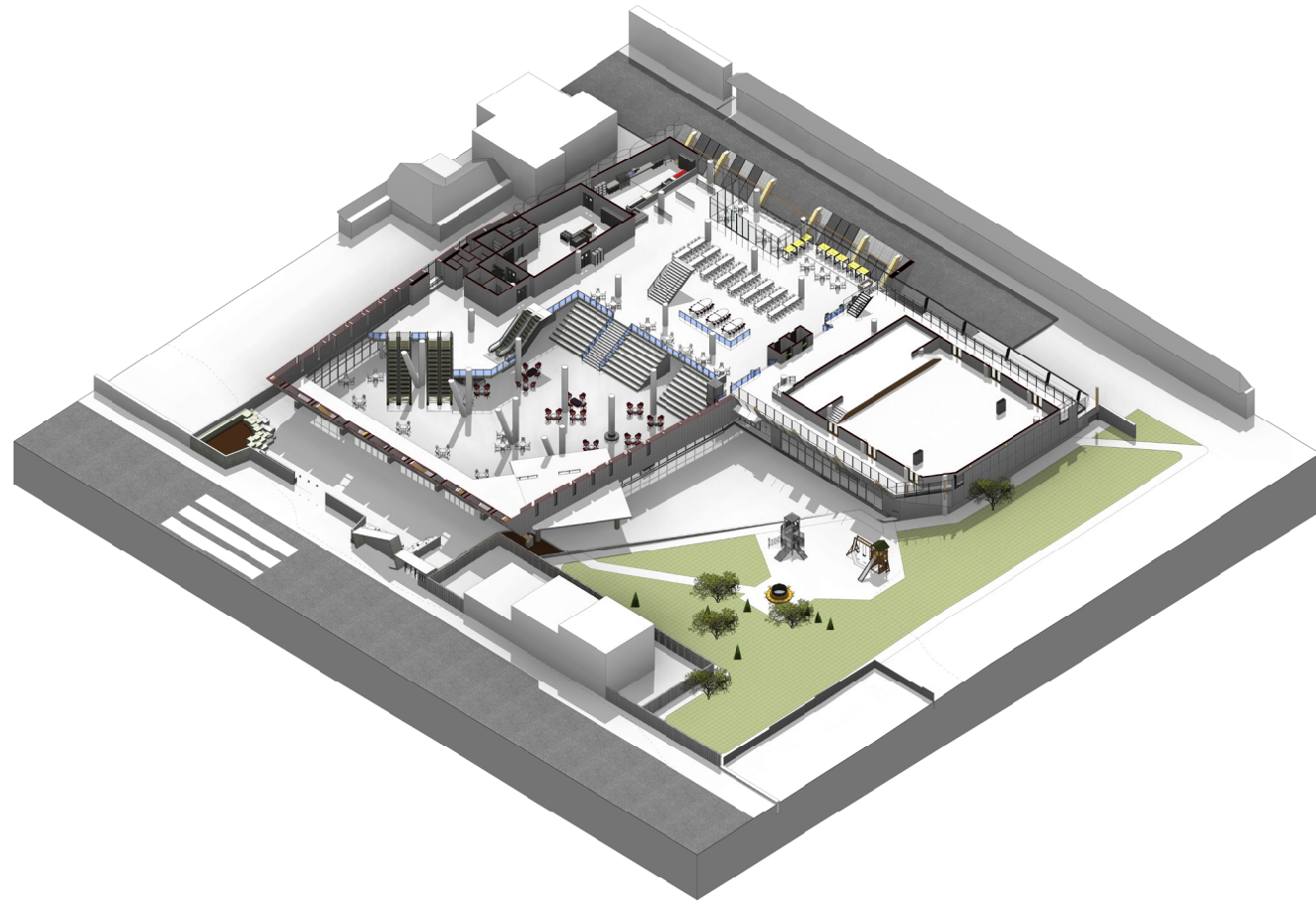


GR 3-5 & LIBRARY FLOOR PLAN

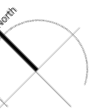
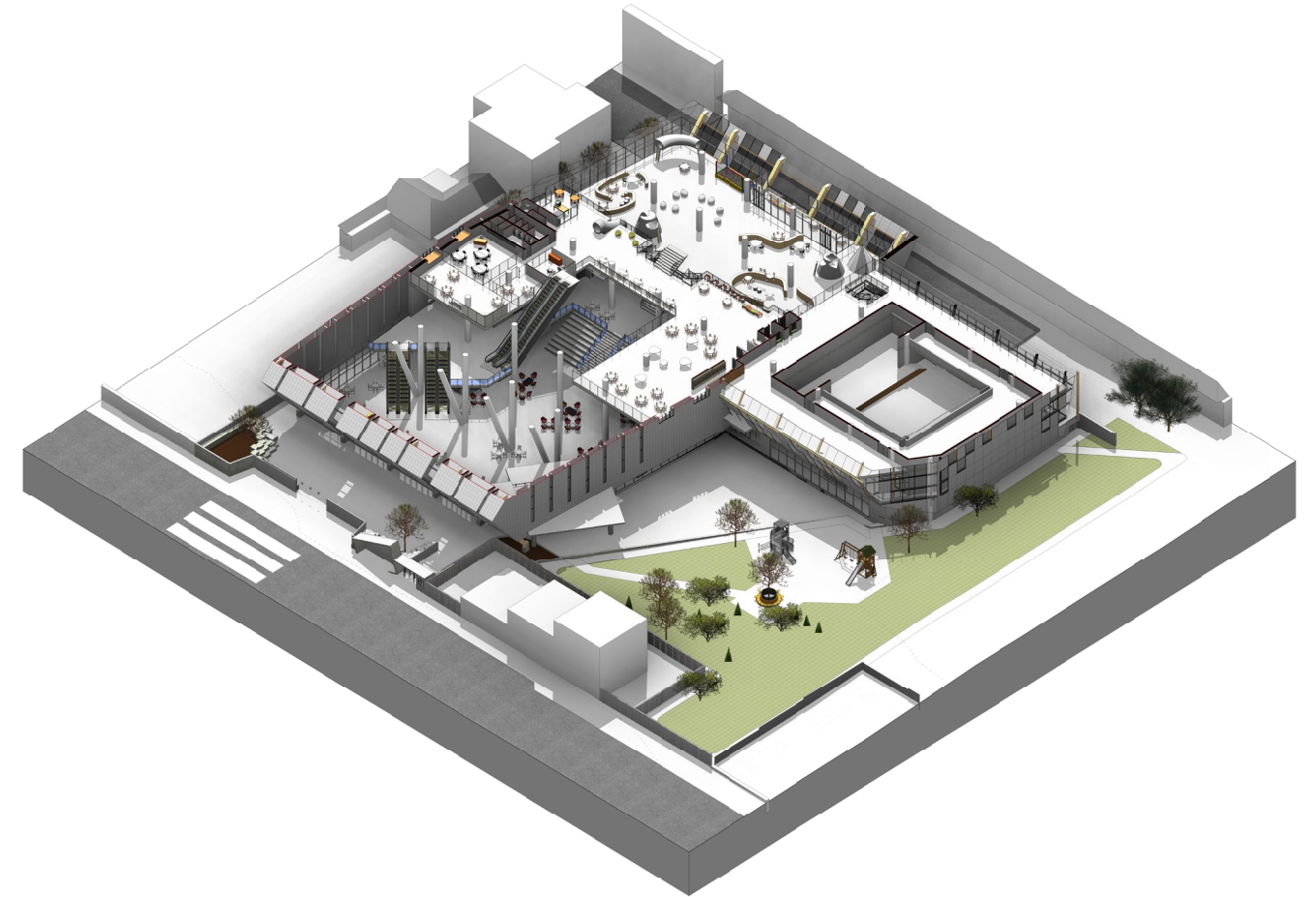
AXONOMETRIC PLANS



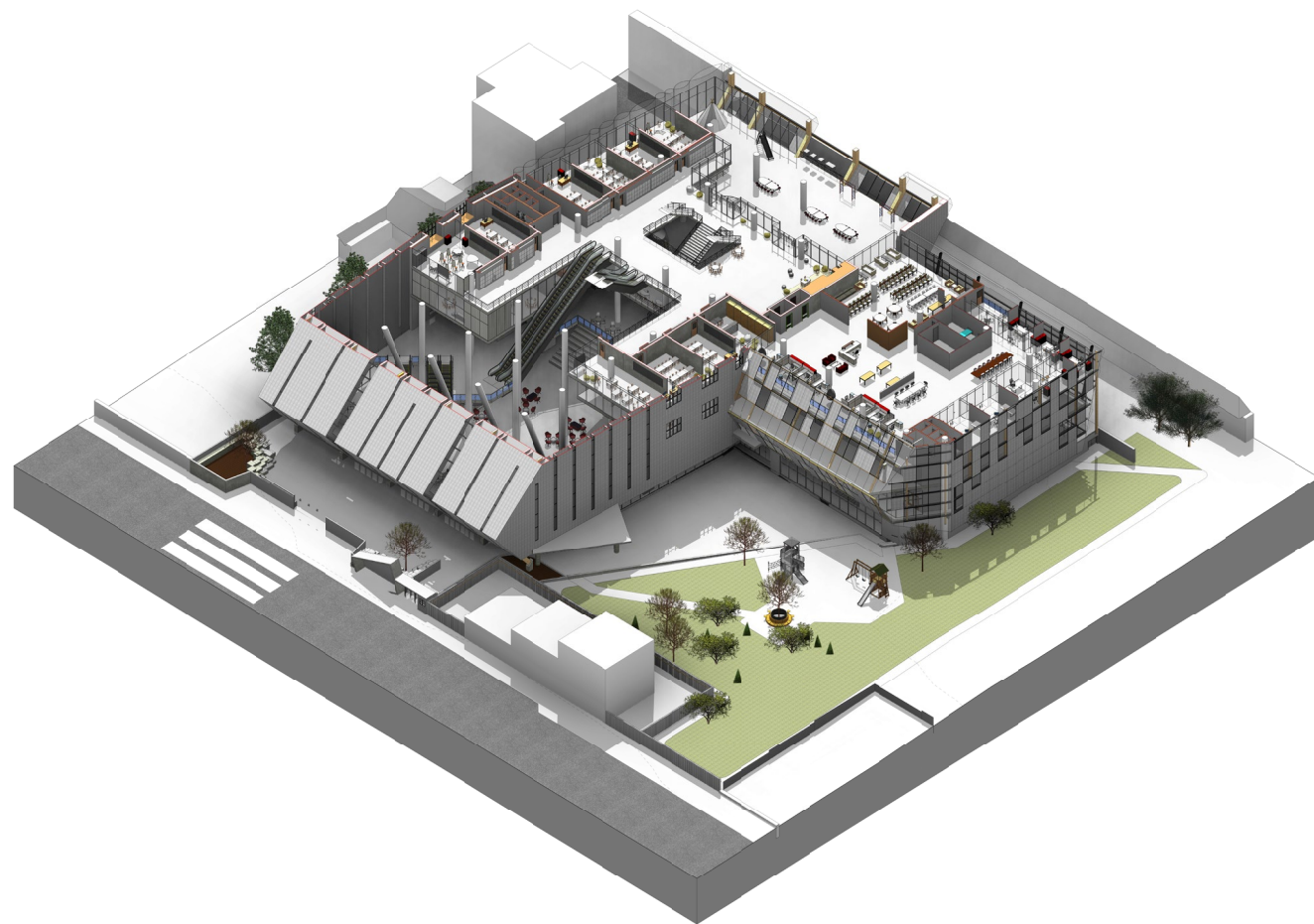
GROUND FLOOR AXO PLAN



CANTEEN FLOOR AXO PLAN



GRADE R FLOOR AXO PLAN

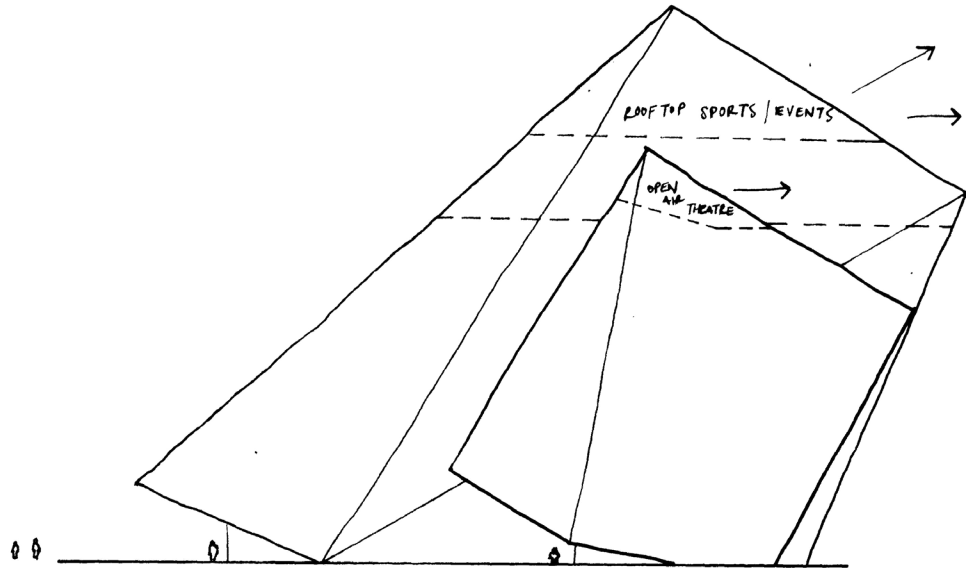


GRADE 1-2 & ADMIN FLOOR AXO PLAN



GR 3-5 & LIBRARY FLOOR AXO PLAN

ELEVATIONS





SOUTH ELEVATION

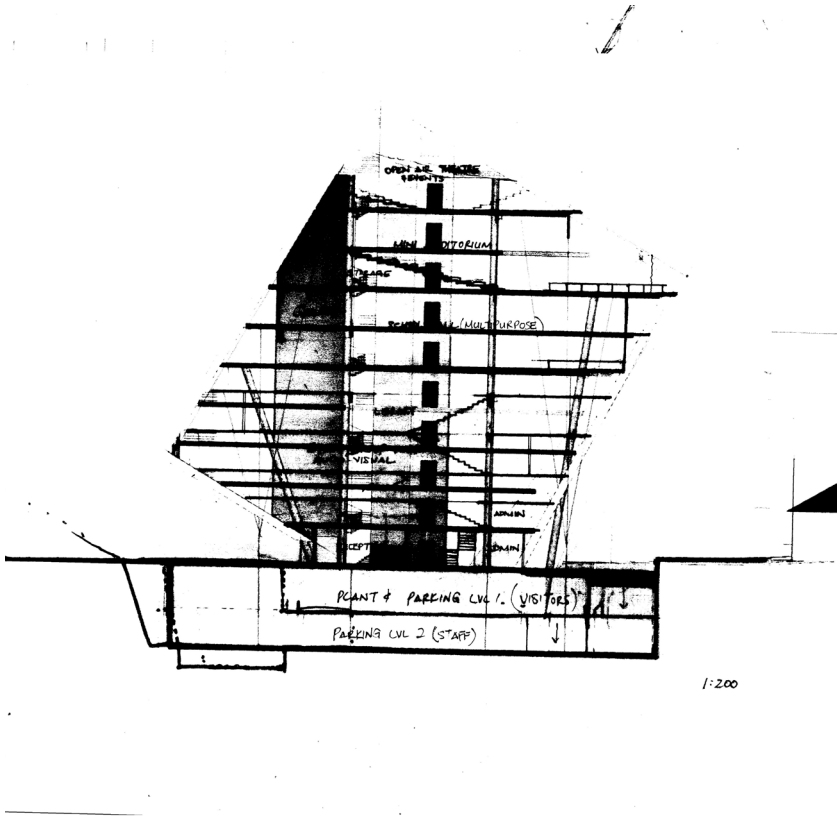


WEST ELEVATION



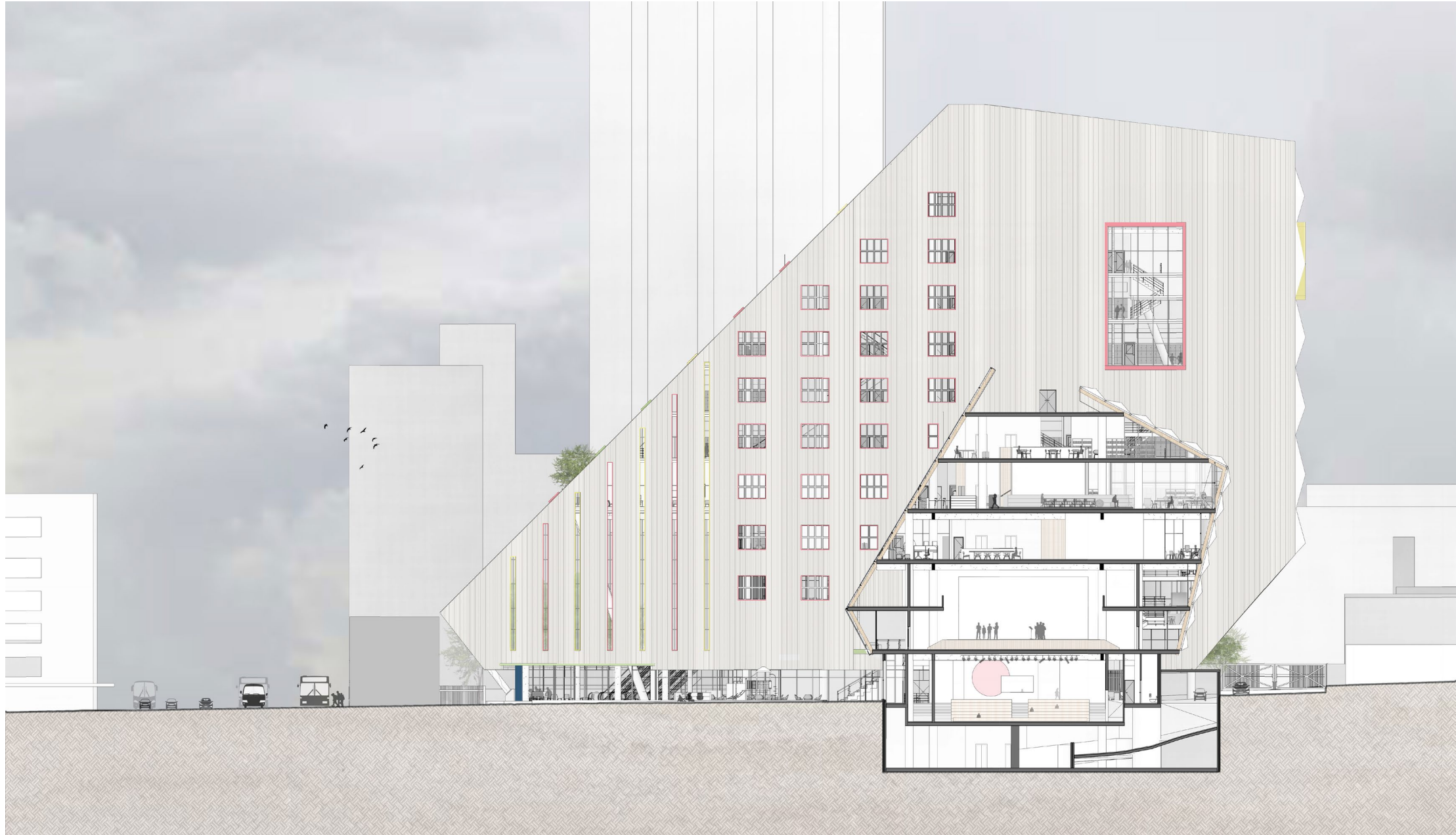
EAST ELEVATION

SECTIONS





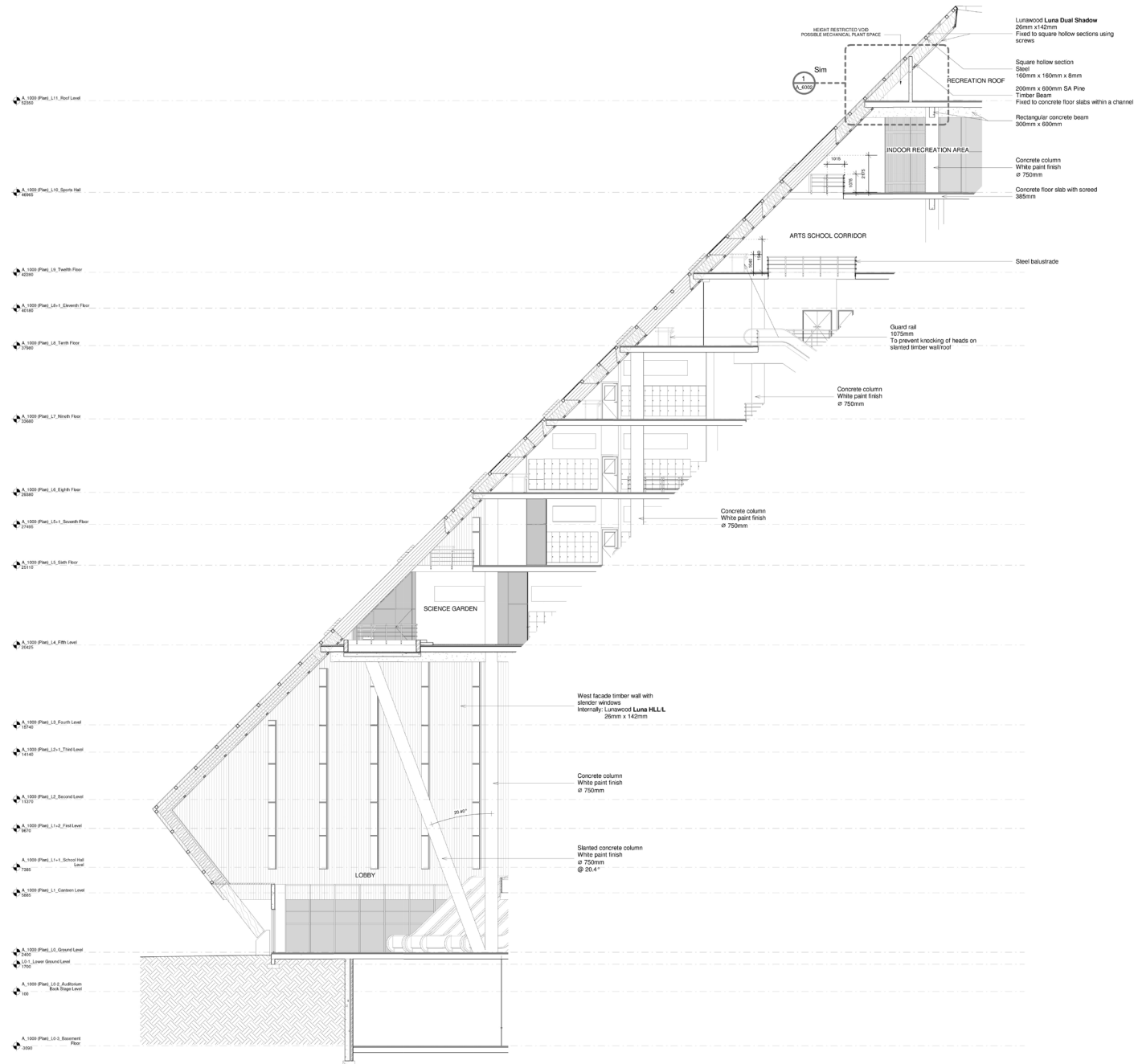
SECTION CC



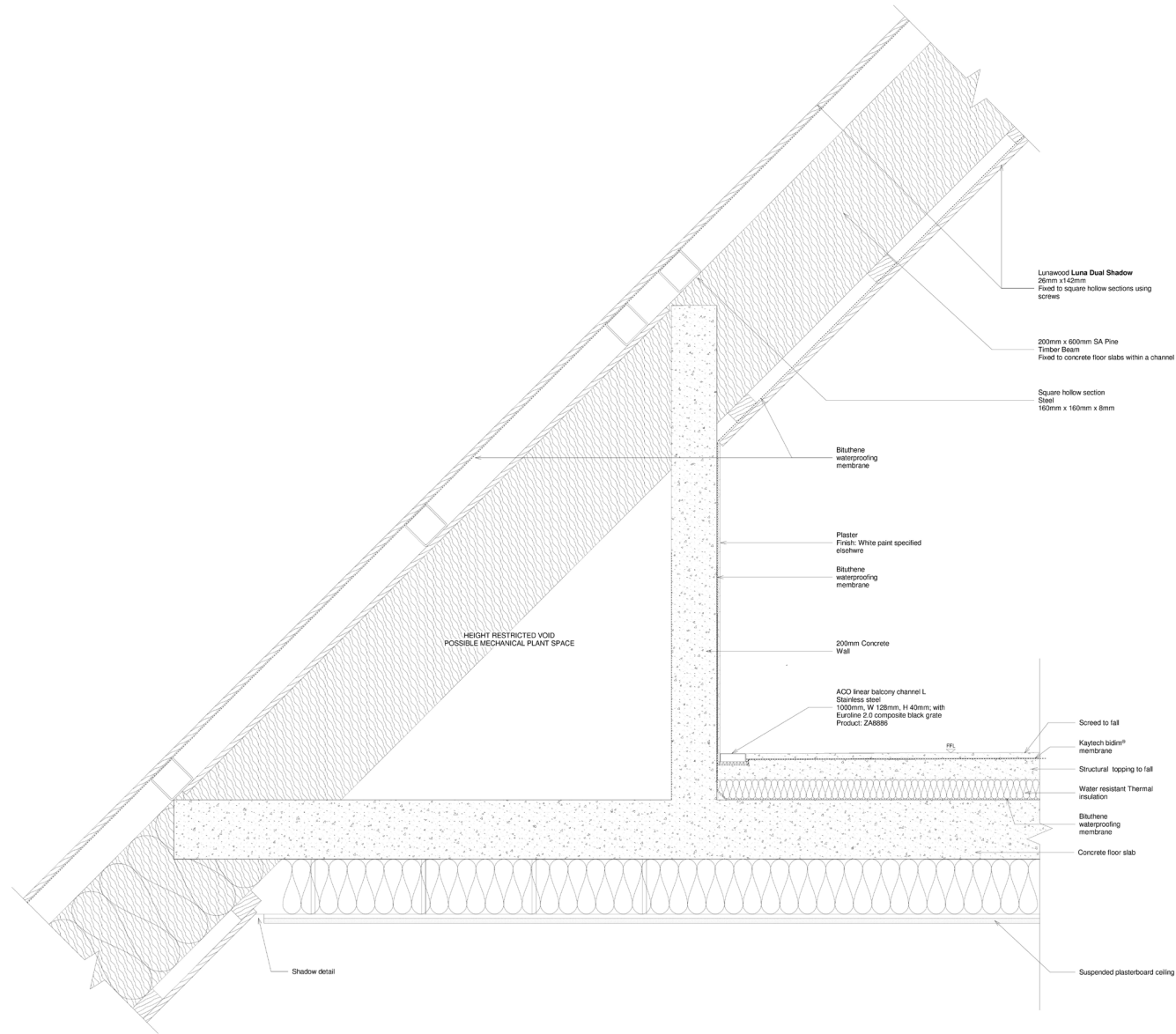
SECTION AA

chapter nine
technology & material

te



PARTIAL TECHNICAL SECTION



DETAIL 01 - ROOF & CLADDING

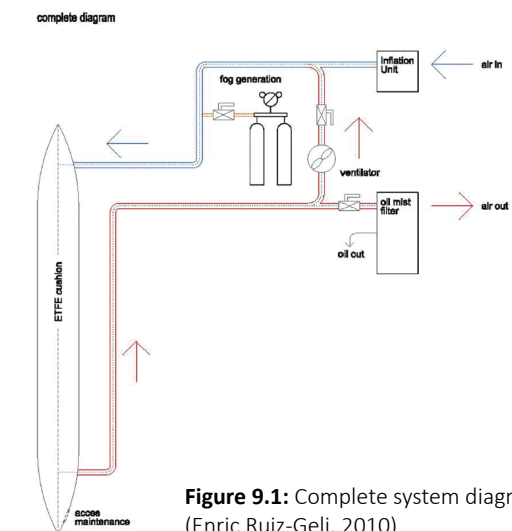
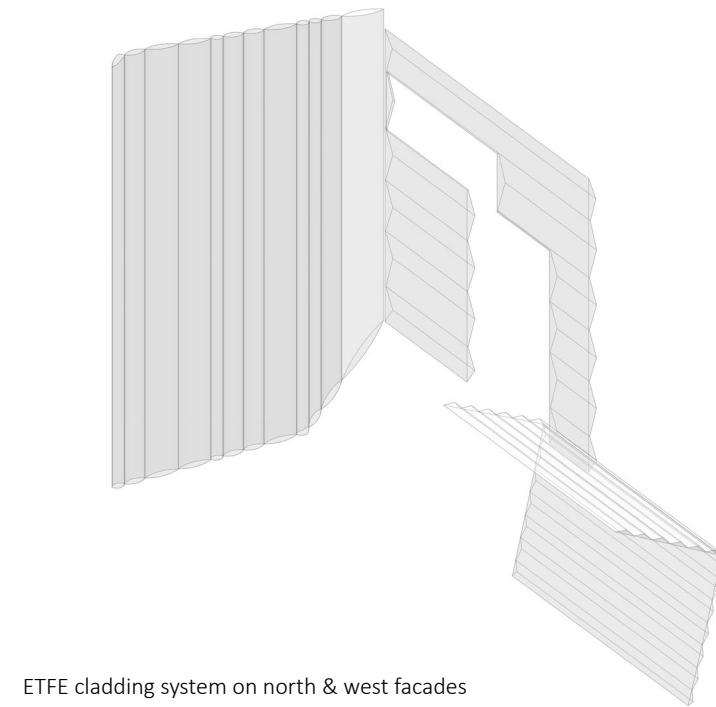
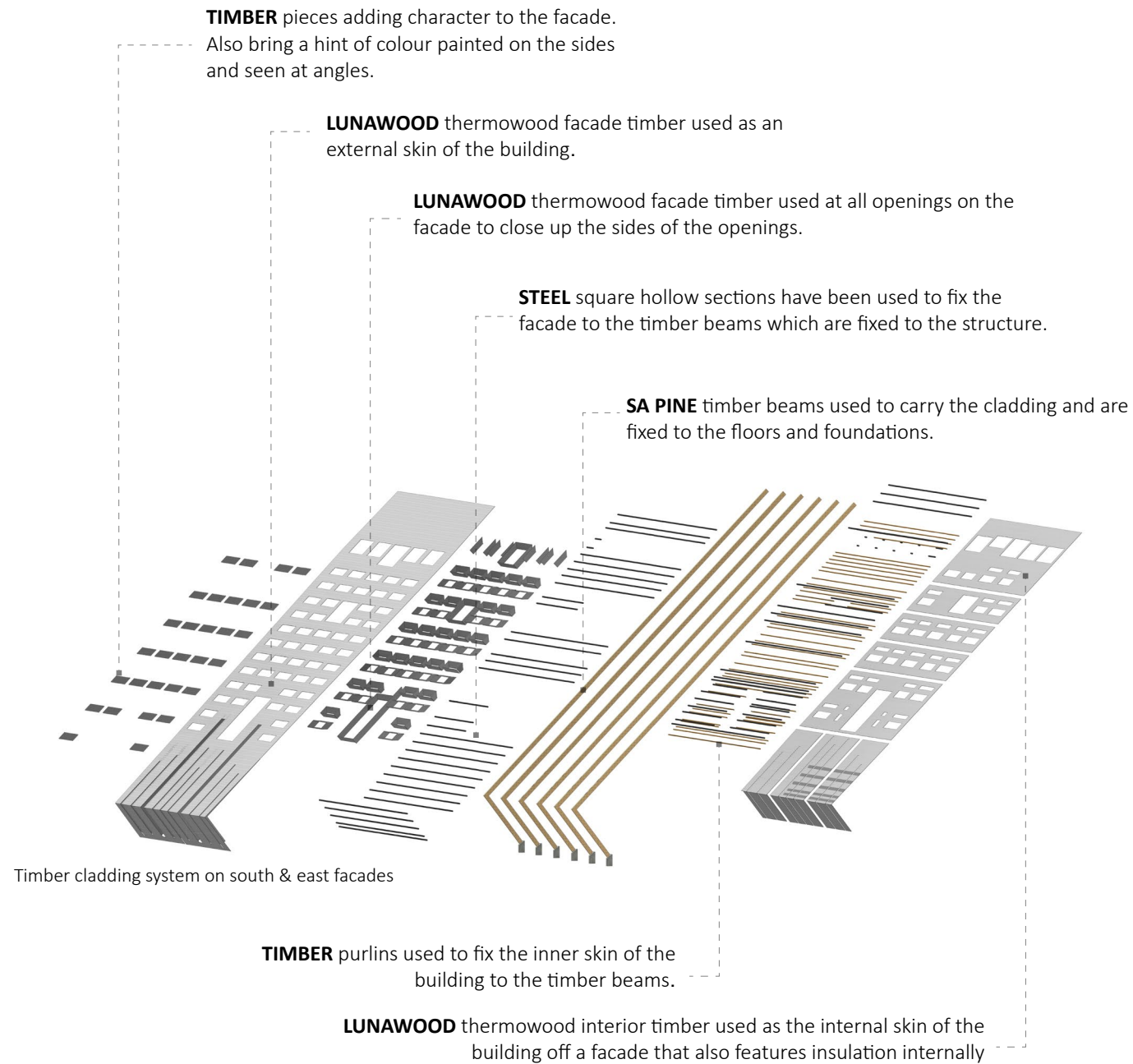


Figure 9.1: Complete system diagram of fog generation system (Enric Ruiz-Geli, 2010)

A **FOG INJECTING SYSTEM (into ETFE cushions)** has been chosen for the north and west facades in order to take full advantage of the sunlight when there is a need to do so, but still be able to control the direct sunlight coming into the building from these facades. Fog is injected into the cushions using a fog machine mounted on the roof. The fog creates a variable shading which reduces solar heat gain; making it less harsh for the occupants of the spaces immediately behind the glazing.

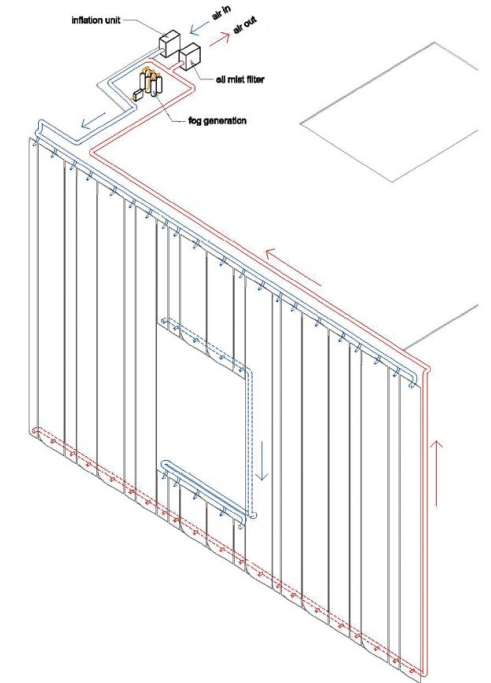
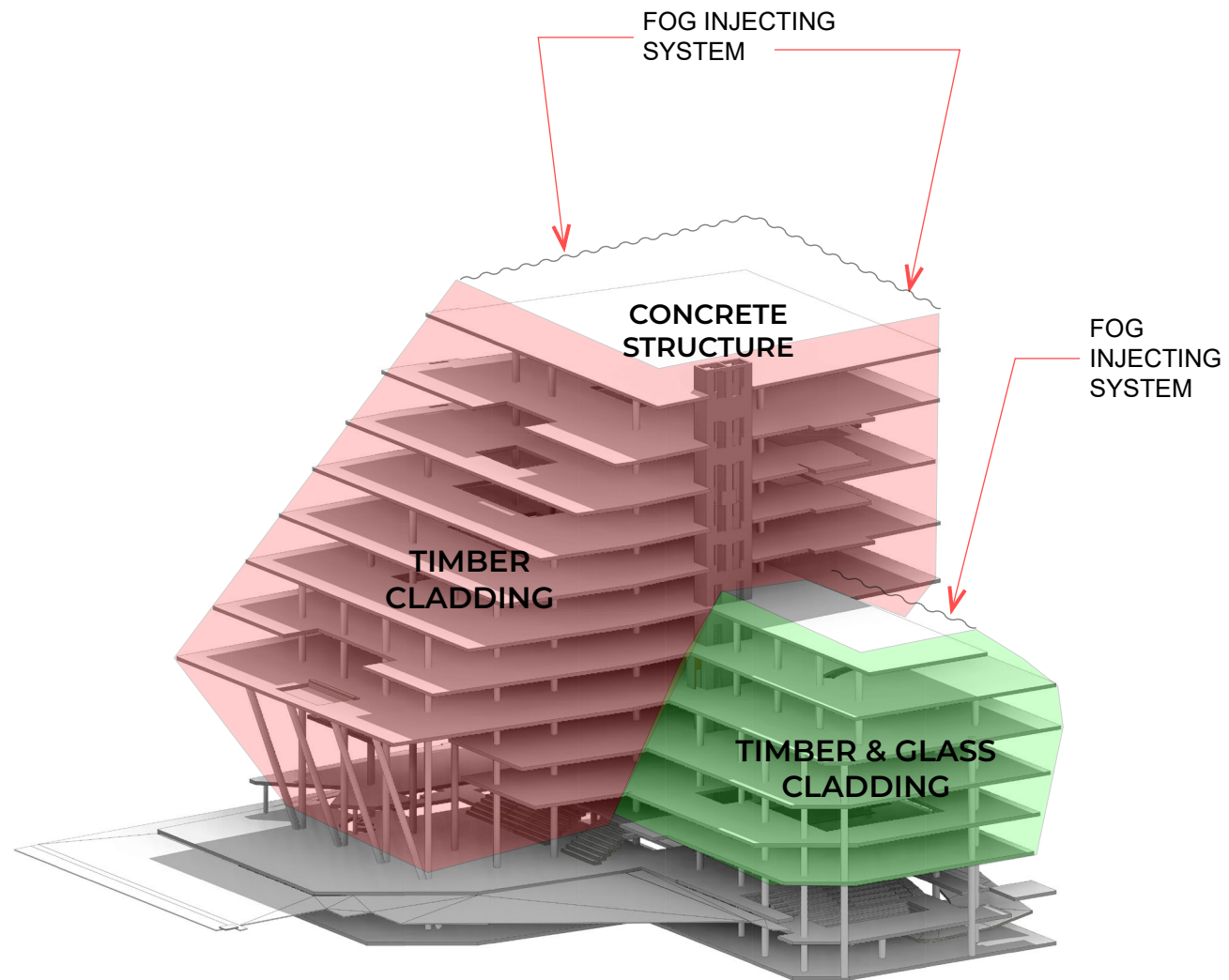
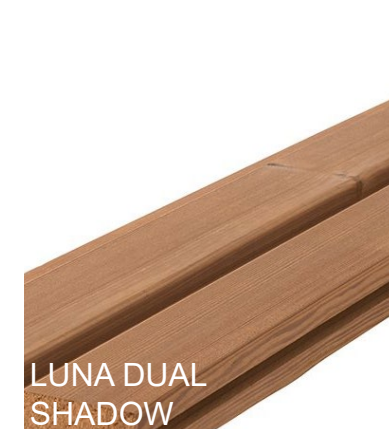


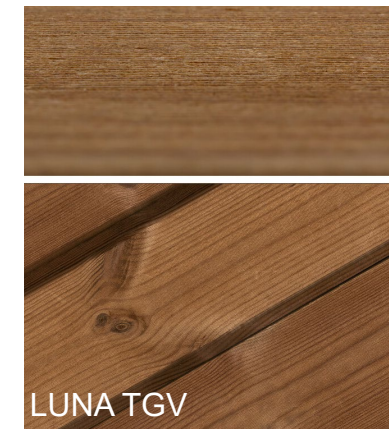
Figure 9.2: Esquematic isometric diagram of fog generation system (Enric Ruiz-Geli, 2010)



MATERIALS



EXTERNAL CLADDING



INTERNAL PANELING



Product images and installation photographs sourced from lunawood.com

MATERIALS

conclusion

“... perhaps our idea of what a school is or should be will change and might be the answer to an already suffering education system.”

- (Investigator, 2019)

This research report has only just scraped the top of the surface regarding the level of investigation that is needed to discuss what is a very important topic. This is a topic that needs a deep level of assistance in order to improve the quality of education that is being delivered to students.

All schools have to be able to provide the same level of education and should be able to offer the same facilities in which this education is delivered, regardless of the socio-economic status of the communities they inhabit.

Architecture is the beginning step at achieving this. Architects have the ideas and abilities to design educational spaces located within dense inner city settings that can still work as normal schools and provide all the necessary facilities and opportunities that they are required to offer.

This need to create such spaces within these types of settings also presents many opportunities. New typologies such as the one proposed in this research report are the future. Times have changed since the current school configuration/system was established and architecturally designed

spaces should now be expected to reflect and accommodate these changes and future possibilities as well. The way teaching and learning happens has evolved and will continue to evolve as technology develops.

The proposed typology of this vertical learning centre within the inner city can be taken a step or more further and become more than just a vertical school which provides all necessary facilities to students within a vertical setup. Other ideas could start involving the communities more and become learning hubs for various members of communities.

Further explorations should start looking at 24 hour learning/information centers where teaching and learning happens at flexible times in a day; where “students” can go in at any time of the day and obtain knowledge through various forms of teaching and learning (peer, self, teacher-based, technology-based, etc).

Lastly, the current typology of a school and its effectiveness should be investigated and perhaps our idea of what a school is or should be will change and might be the answer to an already suffering education system.

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