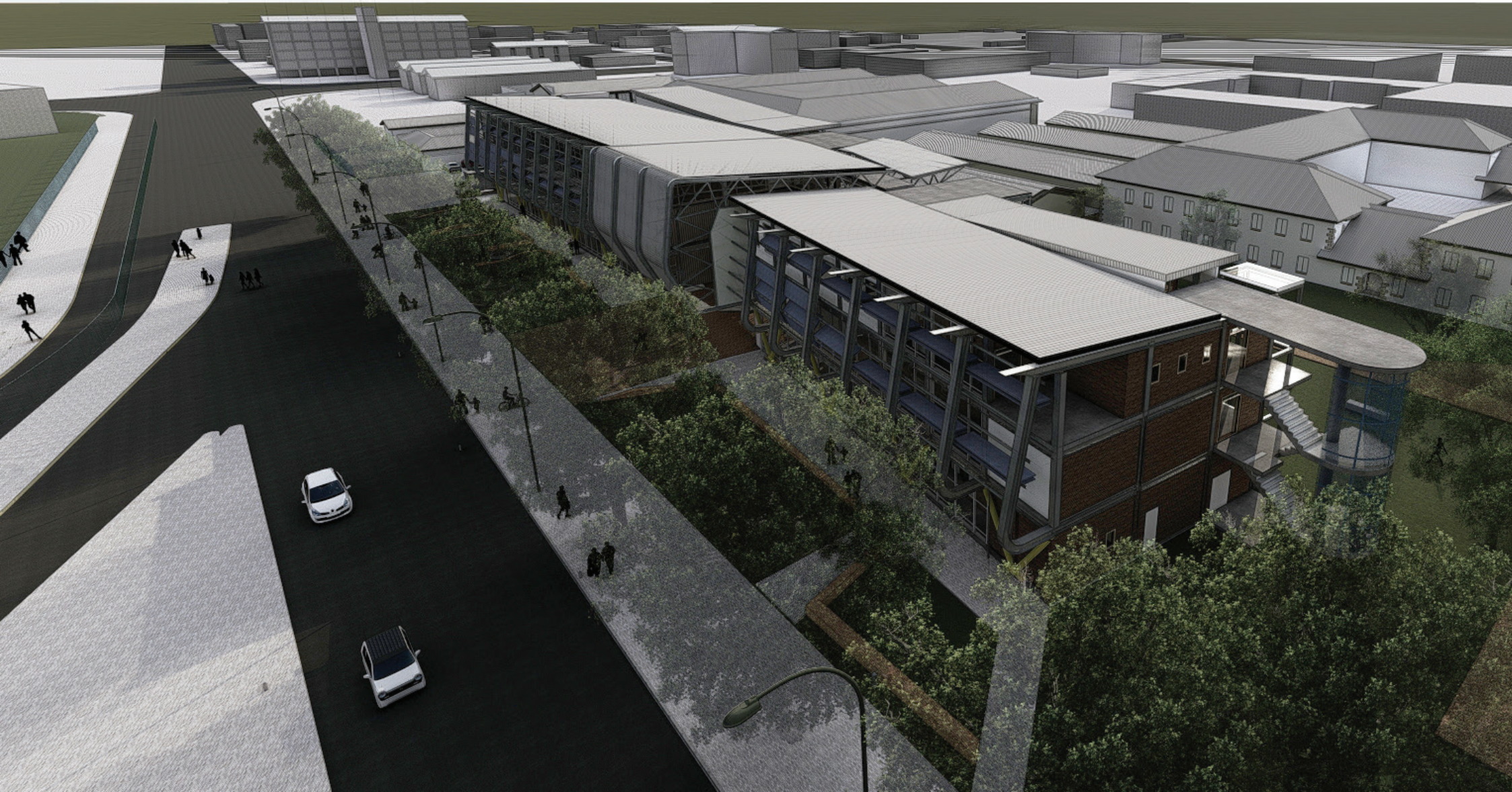
Speaking to the City Beyond Thresholds

An Industrial Design Department that Dematerializes the Institutional Boundaries in Bloemfontein



Acknowledgements

Aiden Topkin | 2014040576 | aidentopkin@gmail.com | 060 528 5112
Department of Architecture, Faculty of Natural and Agricultural Sciences University of the Free State.

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This dissertation is submitted in partial fulfilment of the requirements for the degree M. Arch. (Prof).

Declaration of original authorship:

The work contained in this dissertation has not been previously submitted to meet the requirements for a qualification at this or any other institution of higher education. To the best of my knowledge, this dissertation contains no material previously published or written by any other person except where due reference is made.

Acknowledgments:

All the members in my cubicle.
My parents for their sacrifices and continuous support.
My girlfriend, for all her love, support and encouragement.
My friends for always believing in me.
My lecturers and supervisor for their input throughout the year,
Supervisor:
Prof. Dr Gerhard Bosman
Lecturers: Prof JD. Smit, P. Smit,
A. Wagener and J.W. Ras.

Preamble

This dissertation looks at the existing educational methods in South Africa's tertiary education system.

This dissertation focuses on the exploration of breaking boundaries between tertiary institutions and its cities to enable the two entities to constantly exchange information between each other. It looks at the existing educational spaces within these institutions and how they can be dematerialized to create better places of learning. It proposes an industrial design school on the Central University of Technology in Bloemfontein. The aim is to design a connected space between the city and university where knowledge is exchanged.

The clients for the proposal are the Central University of Technology (CUT).

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INTRODUCTION AND ORIENTATION

The Central University of Technology (CUT) is an innovative institution that aims to be a centre of knowledge that will produce an excellent group of innovators who WILL contribute directly to society as well as the 4th Industrial Revolution society (CUT, 2019: online). It is an important institution that focuses on technological fields of studies including engineering, information systems and, health and environmental studies, etc. CUT also has various research units which include a CRPM (Centre for Rapid Prototyping and Manufacturing), PDTS (Product Development Technology Station), FabLab, etc (CUT. 2019.online). These units are equipped with advanced machinery that makes it possible for the development of new products and technologies. So far, these units are mainly used by lecturers and researchers and not by students or the public. Industrial design is an ideal course that will allow students to make use of these machines and equipment. This will give CUT the opportunity to expand its course selections and allows students to participate in a course that offers the opportunity to be part of cutting-edge designs and inventions.

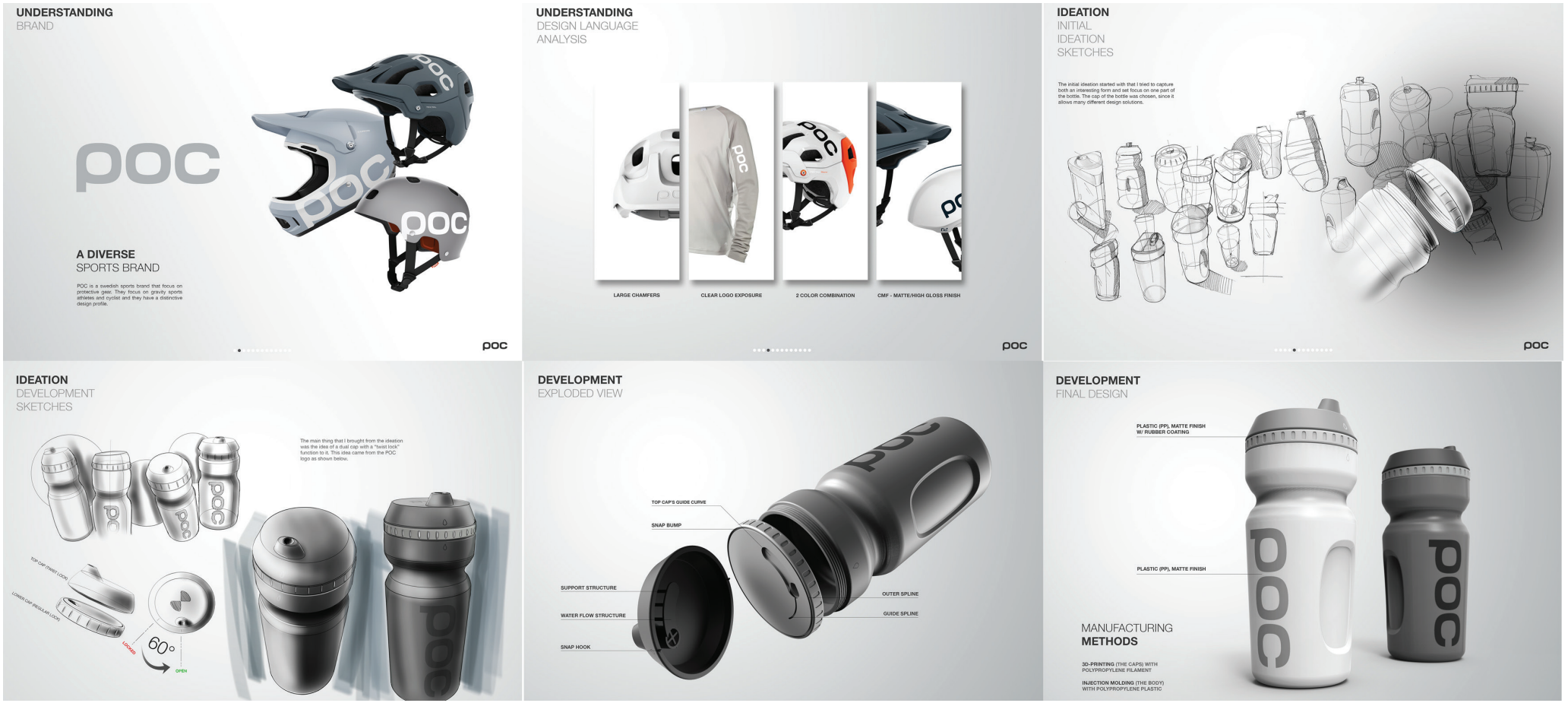
An industrial design department on the campus of CUT is proposed which will contain all the equipment and expertise from CUT's research units that students can learn from. This new department will be situated on the edge of the campus along President Avenue which is close to the FabLab and CRPM units. The proximity to the public street will give students and the public to interact and share (exchange) knowledge. The focal point of the building should be that the department is structured in such way that the public can enter parts of the building and learn about industrial design. The public should be allowed to test the student's designs and give feedback on how it can be improved or even re-designed. There should be constant exchange and collaboration between the public and the students. This will encourage critical thinking and foster life – long learning which are all competencies needed in the 4th Industrial Revolution.

The aim is to explore boundaries on the CUT campus and dematerialize them without removing them. It is important for the interested persons from the public to learn from CUT without being enrolled at the institution. The department should be planned in such way that the public is always cognisant of what is happening inside.
The main question asked during this investigation is: Can an industrial design department architecturally break the institutional tertiary boundaries on a South African campus?

The dissertation is structured into four parts. The first part looks at the problems and aims identified through topology, typology, morphology and tectonics. The second part explores the conceptual frame and theoretical underpinnings of the dissertation. Part three explores the design process and its technical resolutions. A reflection of this dissertation concludes the fourth part.

Industrial design is the application of both art and science to improve the usability, appearance and ergonomics of an object or product (Fig.01). Industrial design aims to innovate the future. It is a field which requires one to analysis current trends and technologies to improve. Industrial design looks at: feasibility and manufacturing, human centred design, sustainable design, economics of the design, methodology research, and lastly future research. Industrial design aims to improve the lives of society while also focusing on aesthetics.

Figure **01**
Illustration on the stages of industrial design (Sneijder 2017:online).



INDUSTRIAL REVOLUTION

FIRST

MECHANICAL PRODUCTION

Between the late 1700's and 1800's, the invention of the power loom created mechanical production which relied on a central source of production where the scale of pro-ductionwas increased while keeping economics relatively low. Although it was the first mechanical production, it only supported local communities. It was only until the steam engine was invented and built which provided a faster form of transportation over long distances, where the invention of the telegraph assisted in telecommunica-tions between such areas (Ncsl.org, 2019: online).

SECOND

MASS PRODUCTION

Similar trends of inventing started after the development of the telephone, where the introduction of the lightbulb and electric motor introduced the ability to use electricity as a source of energy. This led to the first assembly line in 1913 in which Henry Ford implemented the concept of mass production which reduced the time to build the Ford Model T by 70%. The introduction of mass production and advances on technology brought in influx of people into cities where they could access mass manufacturing servicesand goods (Ncsl.org, 2019: online).

THIRD

AUTOMATED PRODUCTION

During the 1960's, the rise of electronic systems occurred in which the integrated circuit was developed which allowed creating miniaturized materials that opened doors to space exploration and biotechnology. The invention of
the personal computer made access to information commonplace. The manufacturing industry became an automated process, which used computer systems and robotic to automate the production process (Ncsl.org, 2019:online).

FOURTH

MECHANICAL PRODUCTION

The advancement of technologies such as artificial intelligence, augmented reality, advanced robotics, smart devices,
and 3D printing are shifting towards digitalization, where the power is being democratized to the individual creators and consumers. Augmented reality and wearables allow real time information to be accessed. The advances of 3D technology and artificial intelligence (AI) are transforming traditional product manufacturing in design, prototyping, production, distribution, etc (Ncsl.org, 2019:
online).

DOCUMENT FRAMEWORK

what?
The proposed design is an industrial design departmnet. Buildings of similar nature will be analysed.

where?
The site is on the Central University of Technology Main Campus, Bloemfontein. The tennis courts on site are to be removed for a more appropriate intention that suits the character of the campus.

how?
The form develops through a series of theoretical underpinning generated from the typology and topology.

how?
The buildings construction aims to keep the aesthetic of an industrial building while dematerializing the boundaries of campus.

PART 01

PROJECT AIMS AND CHALLENGES

1.1 Typology
- Client and Users
- Challenges and Aims

1.2 Topology
- Challenges and Aims

1.3 Morphology
- Challenges and Aims

Tectonics
- Challenges and Aims

PART 02

EXPLORATION AND GROUNDING

Touchstone

Conceptual Framework

Typology
-Precedent and case studies
-Investigation of Clients and Users
-Accommodation List

Topology
-Macro Analysis
-Meso Analysis
-Micro Analysis

Morphology
-Theoretical Grounding

Tectonics

PART 03

DESIGN AND TECHNICAL SYNTHESIS

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-Development Stage 1
-Development Stage 2
-Development Stage 3
-Development Stage 4

Final Design

Technical Resolution

- Technical Report

PART 04

EXPLORATION AND GROUNDING

Reflection

Reflecting on the success and progress of the years work

RESEARCH METHODOLOGY

PART 01

The research methods develop around the fundamental aspects of architecture: the who, the what, the where and the how? These questions are structured in the following way: typology aims to investigate the client, program and type of building. Topology gathers qualitative and quantities data from the surrounding context and site, which hints what the site character and issues. Morphology and tectonics further apply data in theoretical investigations on how to approach the building.

The following are explorative methods employed throughout the design process:

Touchstone forms part of the initial design idea and is constructured in an abstracted manner. The touchstone represents how this design is in a constant tension with the past and present. It relates to how industrial design constantly creates for the future whilst in the present.

The concept is the core of the design which the user always falls back on. The concept explores how thresholds within boundaries can activate non-places.

The conceptual framework develops from the exploration of ideas taken from the concepts and touchstone with applicable precedents.

Site investigation relies on quantitative and cognitive analysis were completed which provides a clearer understanding of the site.

The Literature Review investigates conceptual approaches through theoretical writings of the following theories:

Social Drama
Edges and boundaries
Thresholds
Non- place and in-between space
Liminality
Rhizome

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01

PROJECT CHALLENGES AND AIMS

Figure **02**
View of the proposed site

Figure **03**
Bethuel Setai Library, CUT.

PART 1 HIGHLIGHTS THE MAIN CONSIDERATIONS WHICH HAVE BEEN IDENTIFIED IN EACH OF THE FOUR CATERGORIES OF RESEARCH:

- TYPOLOGY
- TOPOLOGY
- MORPHOLOGY
- TECHTONICS

THESE CONSIDERATIONS WERE FURTHER INVESTIGATED IN PART 2 WHERE RESEARCH WAS CONDUCTED IN ORDER TO ESTABLISH DESIGN TOOLS WHICH WRE USED DURING THE DESIGN PROCESS

TYPOLOGY

CLIENT

The Central University of Technology(CUT) is responsible for the admission, management and day to day running of the industrial design department.

USER

Students enrolled in the industrial design course can use the facility and all its functions throughout the day and night. Although the public can make use of the facility during the day, certain spaces will remain closed off for only the students of CUT (Fig. 4+6).
The aim is to encourage collaboration between students and the public as the public will be free to test the students' work and provide their input on the students' designs and usability.

TOWARDS A PROBLEM STATEMENT

The proposed design department is an Industrial Design Department which provides workshops for students and available to the public to hire. The types of spaces within this IDD will vary from big open spaces for workshops and studios to smaller practical spaces for offices and administration facilities.

An IDD requires open spaces to allow for workshop and studio space. The typology is different to that of an education or law faculty which requires smaller classes and lecture spaces.

The aim is to break the boundary between institutional, public and industrial into one component which can create places of dialogue on a site that previously housed tennis courts.

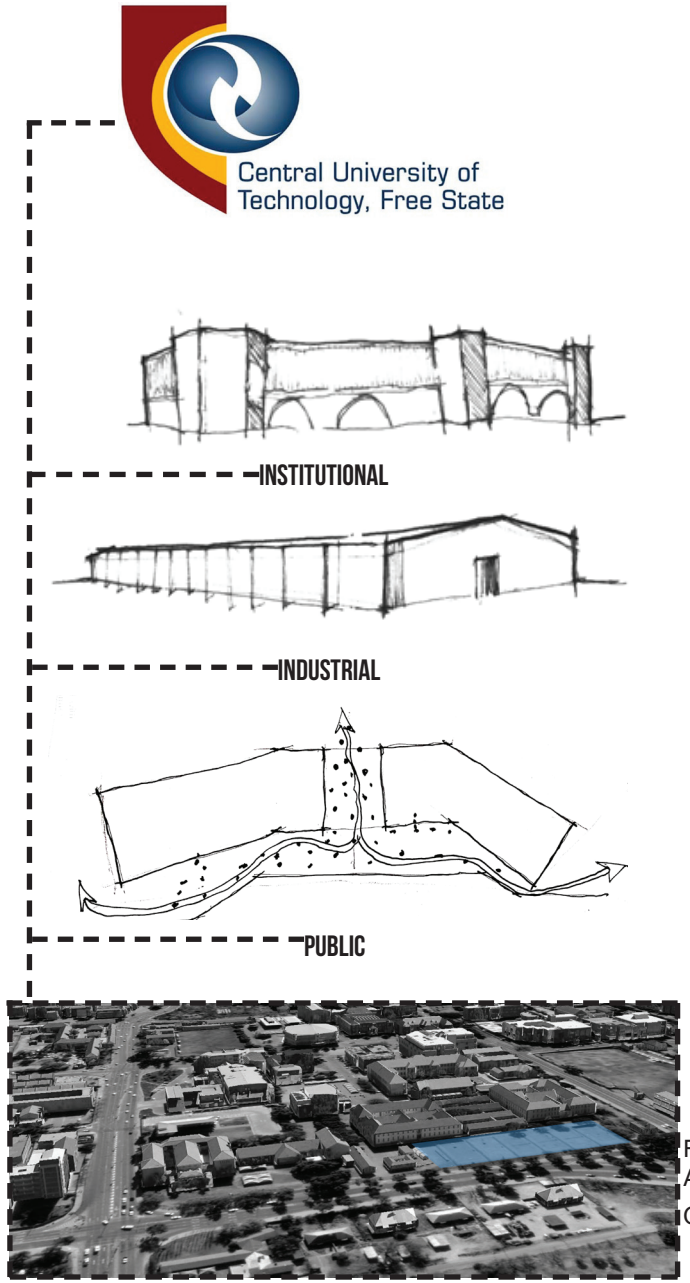


Figure **05**
Aerial View of Site taken from Google Earth,2019.

TOPOLOGY

The proposed site is located along the street of President Avenue in Willows, Bloemfontein. It is currently used as tennis courts for the campus and sits behind two residences and the education facility of CUT. The southern part of the site is fenced off from the public where a long stretch of pavement is located.

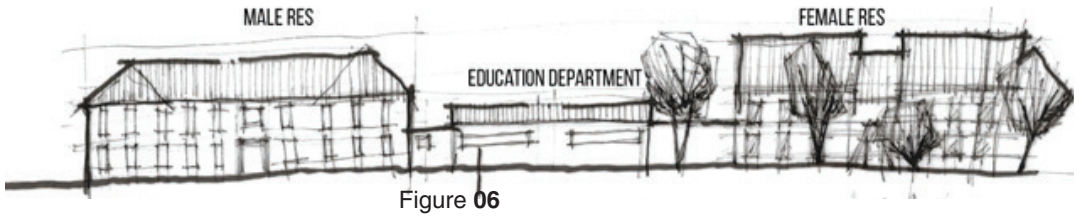


Figure **06**
Neighbouring buildings on campus.

CHALLENGES

The six tennis courts take almost all the sites space and is hardly used for most of the day, creating dead spaces throughout the day. It sits long a prominent and busy sidewalk which gives pedestrians monotonous views. The education building is located between two residence.

AIMS

The design will create a public space for the public to engage with.

Figure **07**
View of site

MORPHOLOGY

It is important for the design to break the institutional architecture that exists today amongst CUT and other campuses. It is a design philosophy that does not consider the outside and contains strong and solid facades that make its presence uninviting for visitors.
It is important to create a meaningful place from an in-between space which connect the public and students. The open spaces of IDD will show a break in the solid façades which is indicative of the traditional buildings of tertiary institutions.

CHALLENGES

Workshops are normally big open spaces with solid exteriors. It is important to allow the public access to these workshops to foster a greater understanding of how products are manufactured. Safety will always be a priority in the workshop area although the space is perceived to be open and accessible.

The other challenge is that although the IDD is an institutional building, there needs to be a balance between institutional, industrial and urban architecture.

AIMS

The aim is to create an IDD which breaks the institutional tertiary boundary of campus that provides various thresholds into public, semi-public and semi-private. These different architype levels need to be addressed in such a way that they provide spaces that embodies the “gestalt” of the site and function.

TECHTONICS

The structural system is relatively simple where the orientation and positioning of the building allow for a north-south linear grid for the structure with an east-west orientation in the short direction

CHALLENGES

The building needs to be serviced well as it needs to provide proper ventilation. Fumigation needs to be done regularly. Noise may become problematic as there may be large open spaces in the building.

AIMS

To provide state of the art facilities that go into an industrial design building.
To provide a porous structure which most spaces give the perception of openness.
To dematerialize the facades of the building which celebrates the structure of the building and services.

02

EXPLORATION AND GROUNDING

Figure **08**
Bridge situated on third level of Engineering Department, CUT.

PART HIGHLIGHTS THE MAIN PROBLEMS WHICH HAVE BEEN IDENTIFIED IN EACH OF THE FOUR CATERGORIES OF RESEARCH:

TYPOLOGY
TOPOLOGY
MORPHOLOGY
TECHTONICS

THESE PROBLEMS WERE FURTHER INVESTIGATED IN PART 2 WHERE RESEARCH WAS CONDUCTED IN ORDER TO ESTABLISH DESIGN TOOLS WHICH WRE USED DURING THE DESIGN PROCESS

Figure 09
Bethuel Sitai Library, CUT

TOUCHSTONE

Figure **10**
Exploded View of touchstone

The touchstone consists of a (Fig.10-15) timber box frame which contains mechanical gears on the side that control the gears on the inside. A white piece of fabric rests on top of the frame.
The exposed frame of the box is the only element that is needed for a frame to stand. It represents how industrial designers only use the necessary elements to create new products. It's the idea of minimalism where only what is needed is used to create a piece of art.

Figure 11 indicates the fabric which covers the moving gears is the constant adaption of how industrial products are created. The fabric moves as the gears are moved by the operator which creates nodes that are in constant tension with one another. As the gears move, the nodes move along to create newer nodes which generate and release tension every time the gears move.

Figure **11**
Touchstone with covered layer of fabric

This relates to how the industrial industry comes in and causes tension with the new and the old technological advances. These diagrams indicate how the gears pull the fabric and cause tension within the threads.

This disruption that occurs within the fabric and gears then rotate and come back into equilibrium. It relates to how industrial design disrupts current situations when releasing new enhancements or ranges of products which take out the outdated technology and replaces it with new enhanced technology

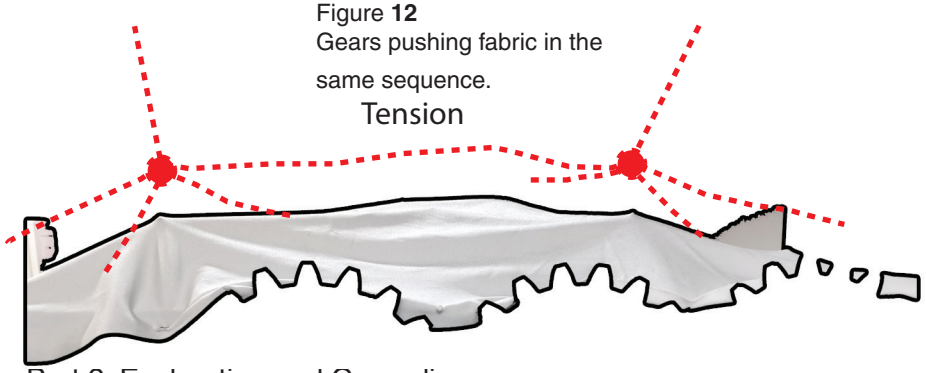


Figure **12**
Gears pushing fabric in the same sequence.

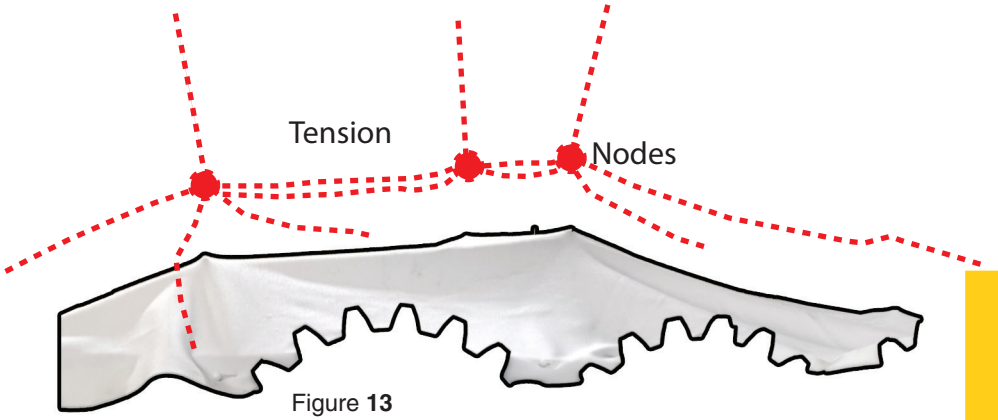


Figure **13**
Fabric in tension.

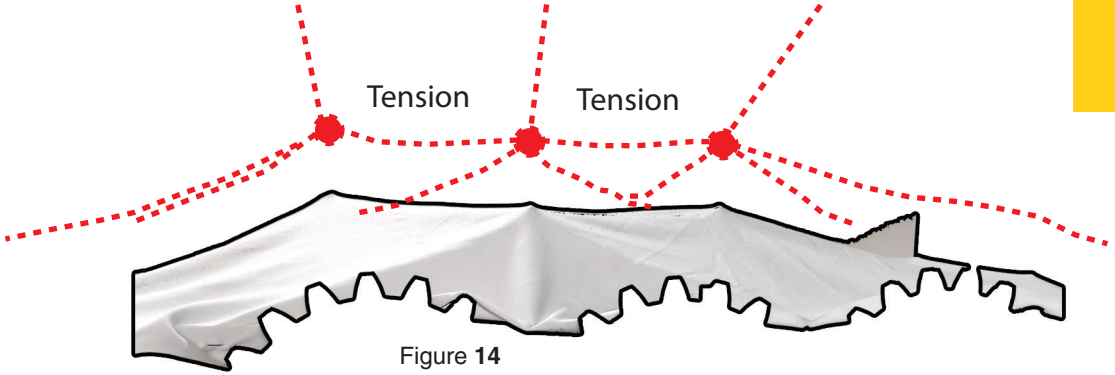


Figure **14**
Fabric in the same sequence.

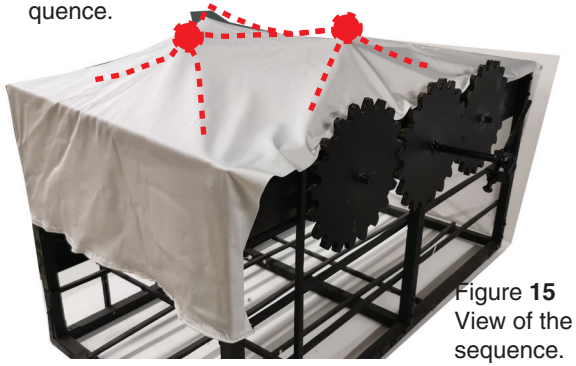


Figure **15**
View of the touchstone in sequence.

CONCEPT 01

TRANSPARENCY

The concept revolves around dematerializing the facades of the IDD which create a sense of transparency

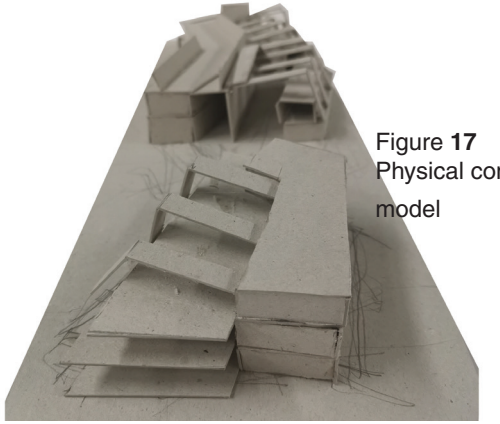


Figure **17**
Physical conceptual model

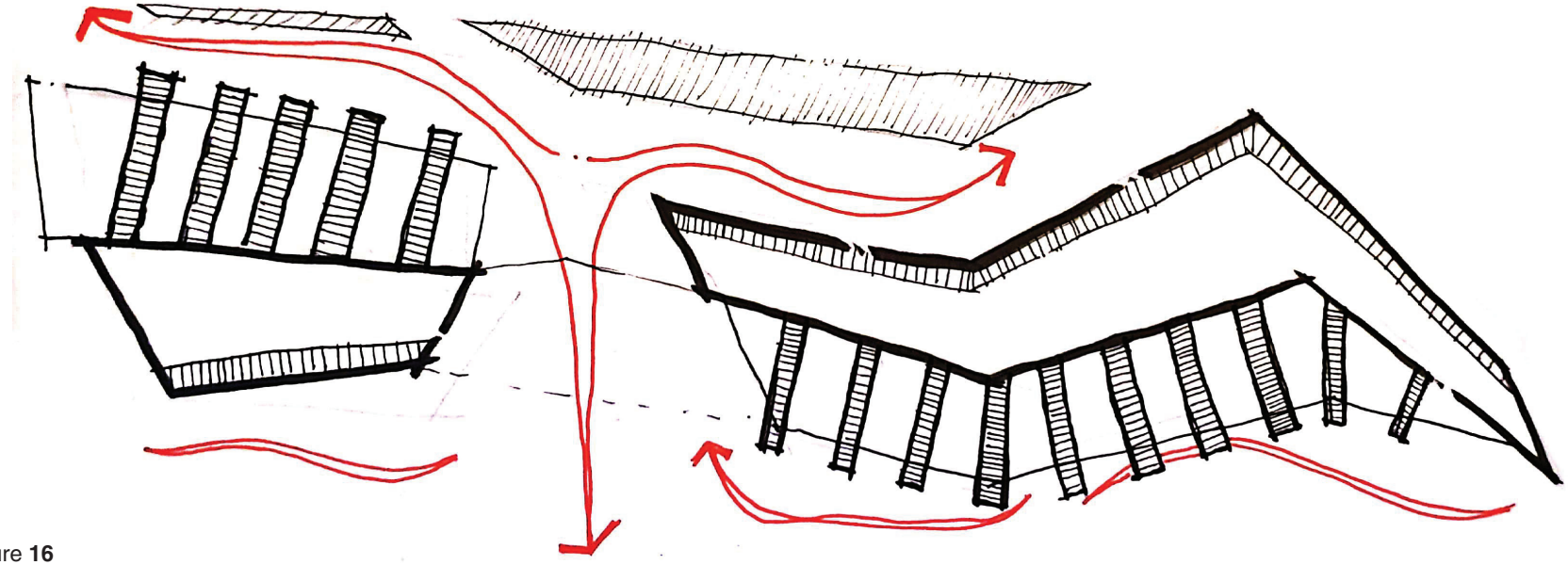
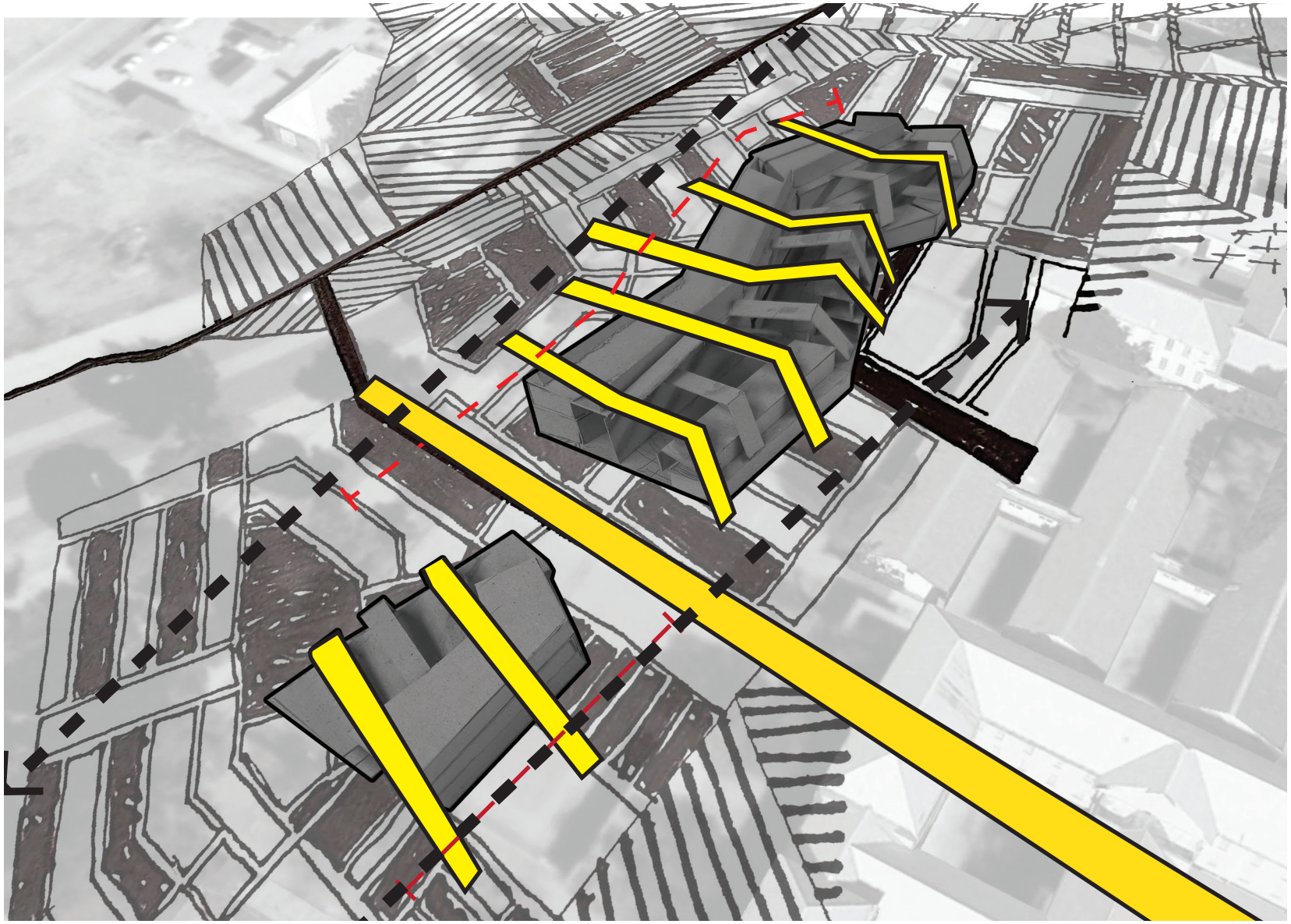


Figure **16**

Figure **18**
Conceptual Illustration



SOFTENING THE EDGE

The idea of softening the edge looks at how stereotomic and harsh institutional buildings are built. The linear grid lines of Bloemfontein juxtaposed with softer more organic lines.

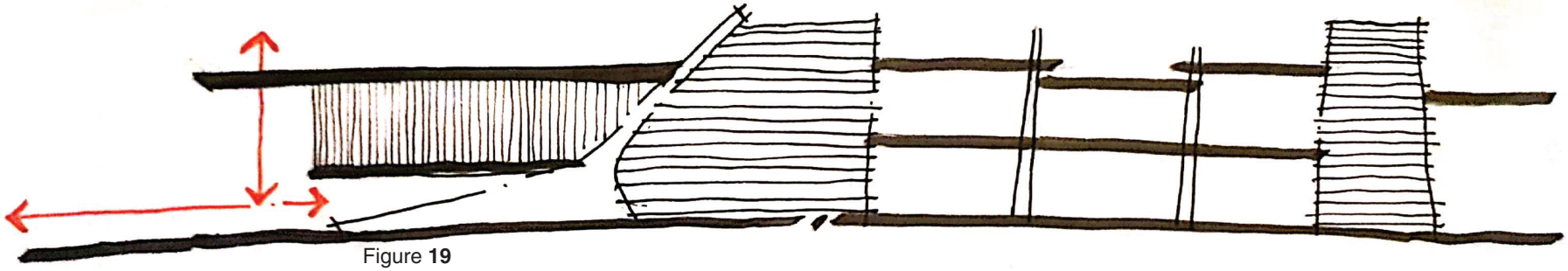


Figure **19**
lifted spaces to allow for movement

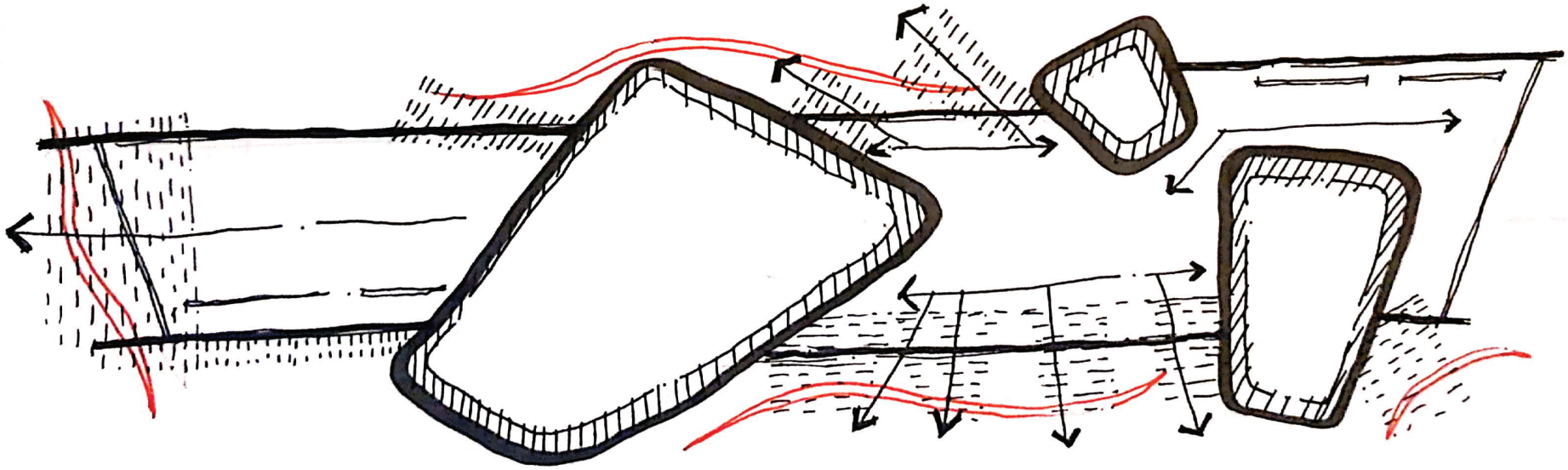
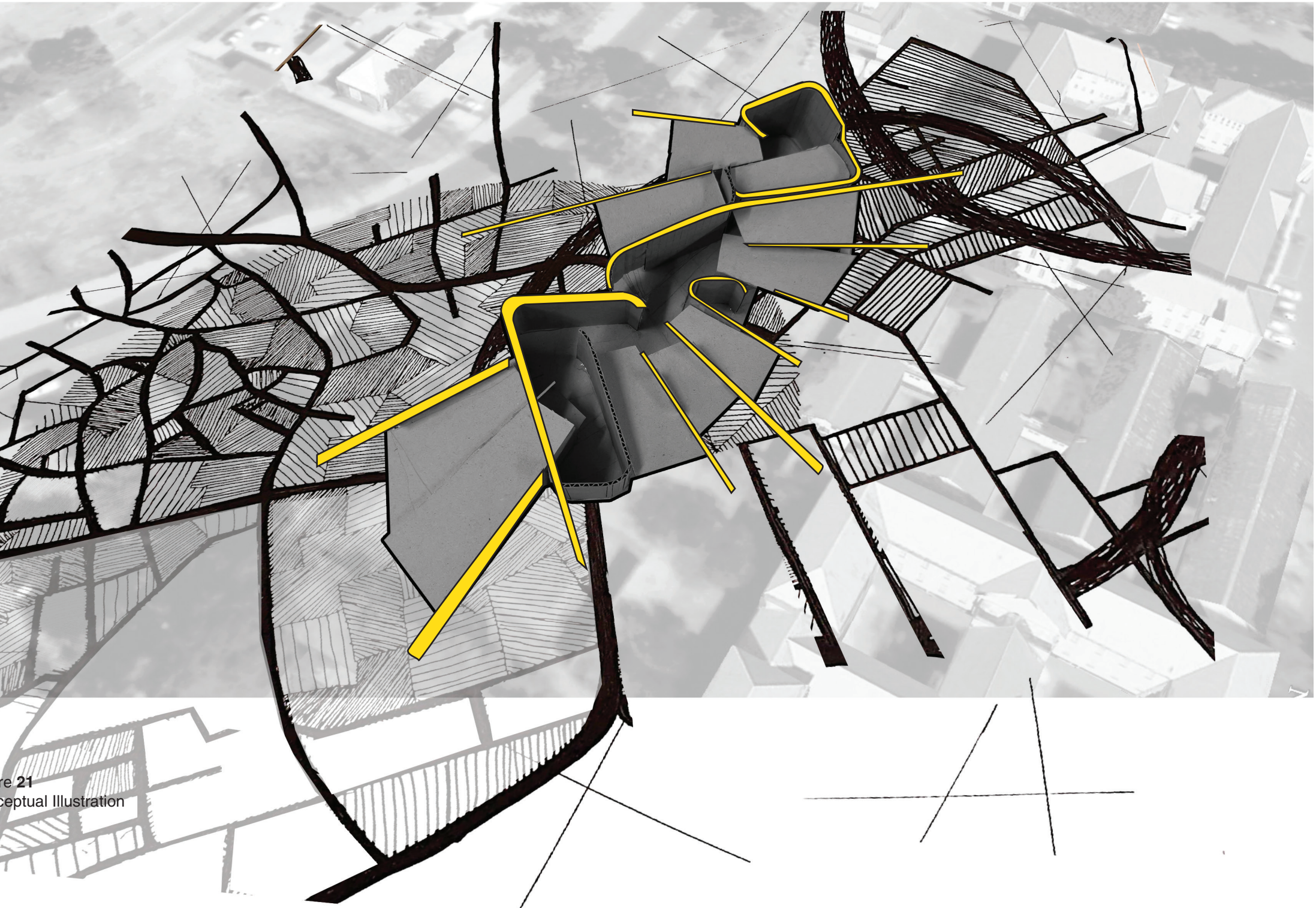


Figure **20**



re **21**
ceptual Illustration

LIMINALITY

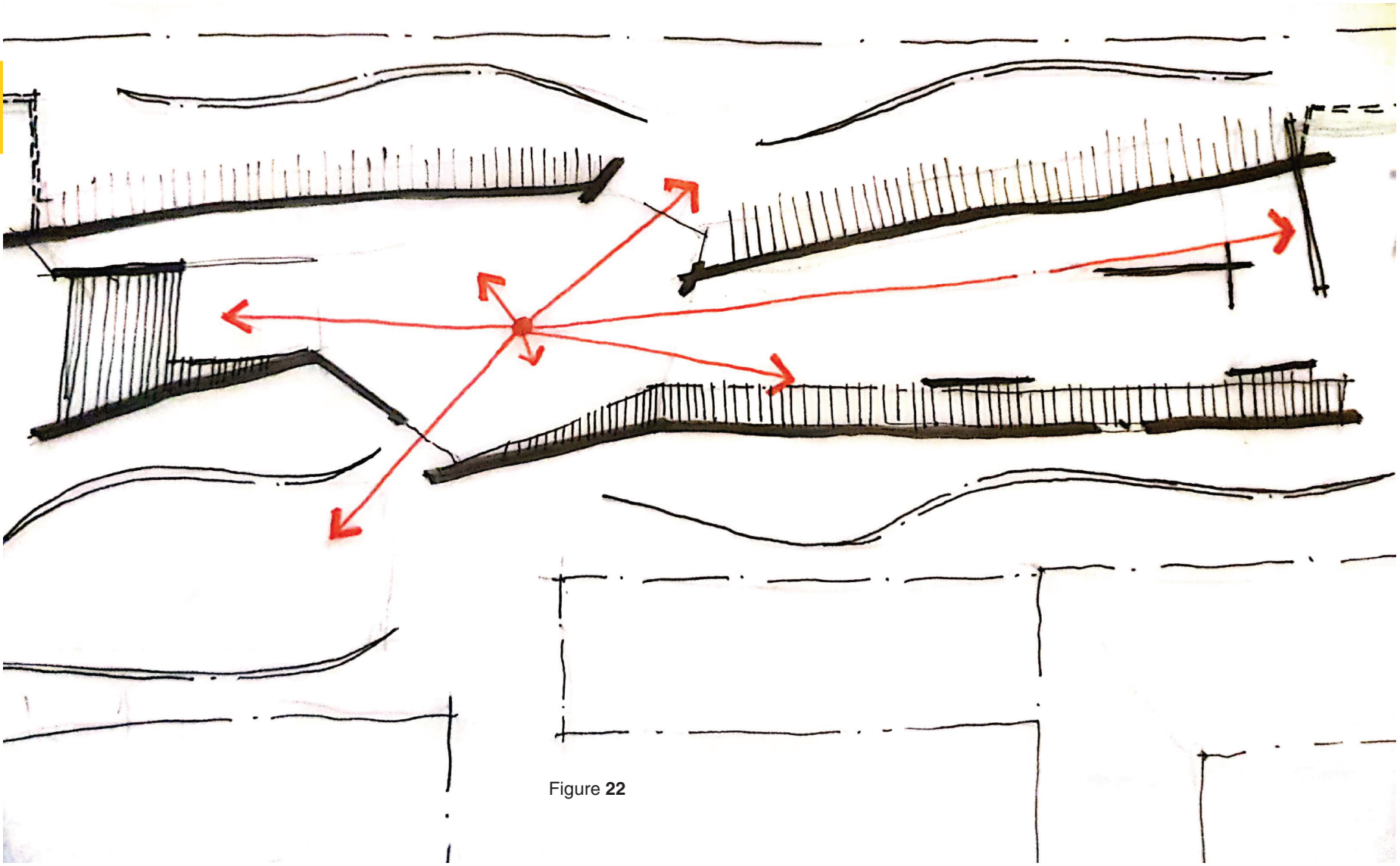


Figure **22**

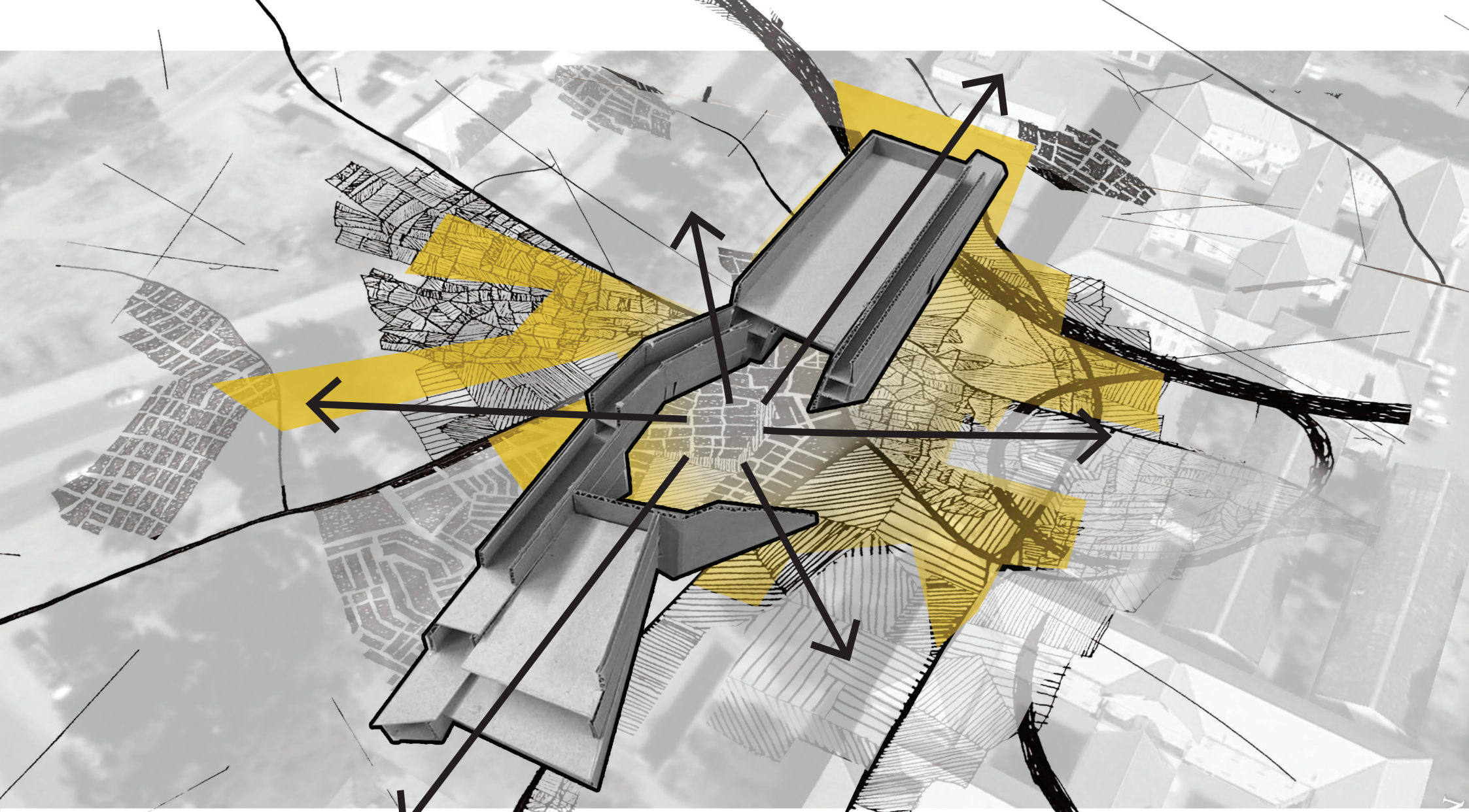


Figure 23
Conceptual illustration

PRECEDENT STUDY

THE UNIVERSITY OF MASSACHUSETTS DESIGN BUILDING- LEERS WEINZAPFEL ASSOCIATES

The University of Massachusetts Design Building by Leers Weinzapfel Associates comprises of the Architecture, Landscape Architecture and Regional Planning, and the Building Construction Program. It is designed around a central space which also opens onto the street for design exhibitions(Fig.25). It uses a green roof system which consists of outdoor learning experimental spaces (archdaily.. 2017:online).

The double volume exhibition space levels allows for viewing crits and presentations at different environmental levels. In Fig.26, a section of the building shows the different thresholds within this buildin: public, semi-public and semi-private.

Figure **25**
Public entrance of the Design Building emphasized with red lines. Image reworked from published photos (Vecerka 2017: online).

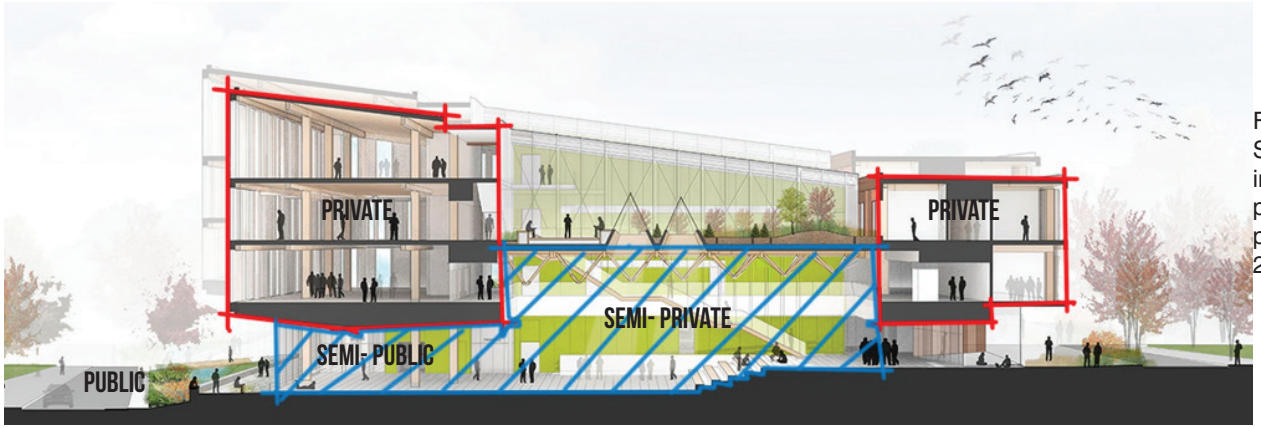


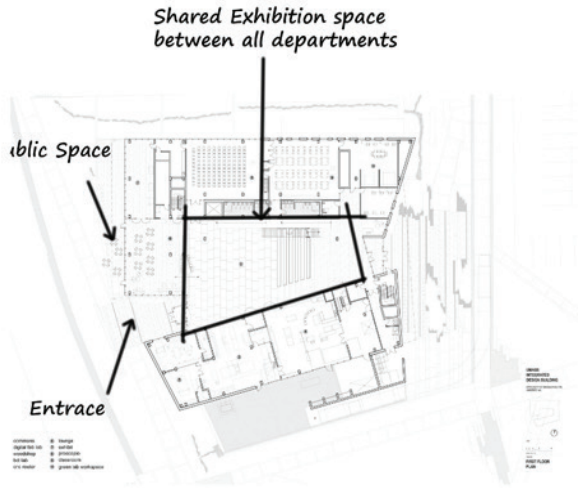
Figure **26**
Section of the Design Building illustrating the levels of privacy. Image reworked from published sections (archdaily. 2017: online).

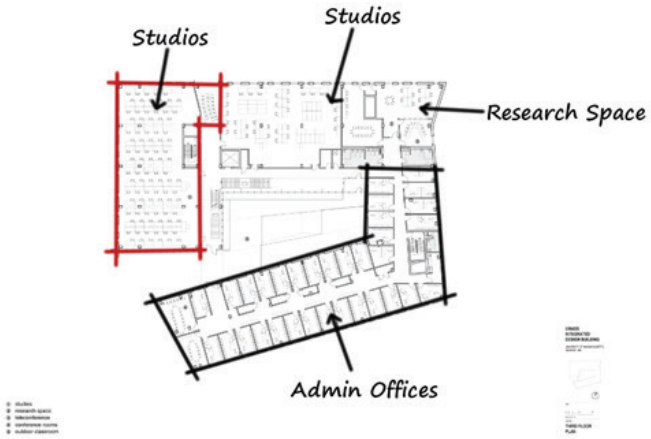
The central exhibition space in Fig.29 allows for students of other disciplines to view students work. This can be beneficial when students collaborate and shares knowledge from each other. The workshop and noisier spaces are all placed on ground level(Fig.27) to isolate the noise on one level. The workshops being placed on ground floor also allow for better transportation: materials which leave the delivery trucks and into the workshops, and when students move their projects into the exhibitions space. Having the workshops give the public an insight on what students make and how they make it.

The studio spaces are also mixed(Fig. 27-29) within the department. All the administration occurs on the second floor which gives the staff complete privacy from the public.

The exhibition space in Fig.29 creates a seamless space which caters for the entire building. Roof trusses support an outside garden space on the second level and also brings natural light into the space.

Figure **29**
Photgraph of exhibition space(archdaily. 2017:online).



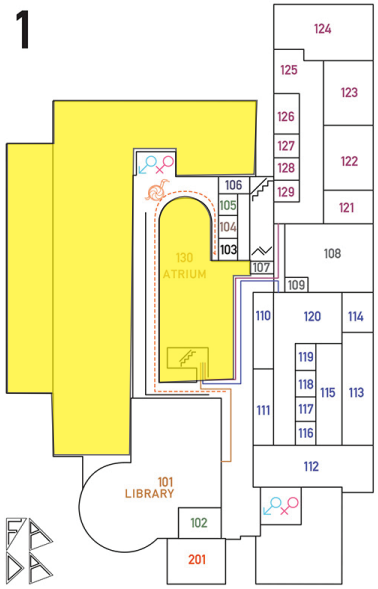


PRECEDENT STUDY

THE FACULTY OF ARTS, DESIGN AND ARCHITECTURE (FADA), UJ, JOHANNESBURG

The FADA building houses all the creative disciplines under one roof that focus on sustainability and relevance, dynamism and active engagement.With the eight creative disciplines at FADA, Architecture, Interior Design, Industrial Design, Multimedia Design, Fashion Design, Graphic Design, Visual Art and Jewellery Design, the boundaries within the facility are blurred with its internal and externals collaborations (FADA. 2019: online).

1



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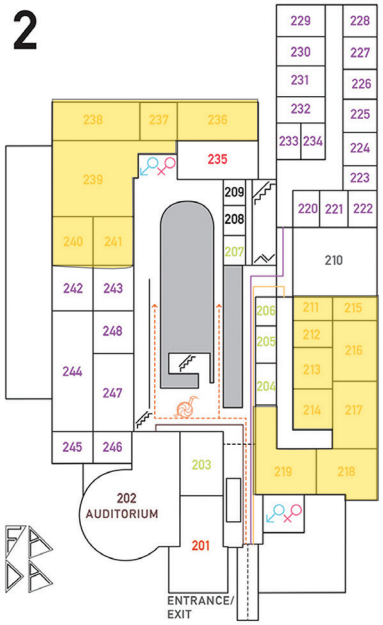
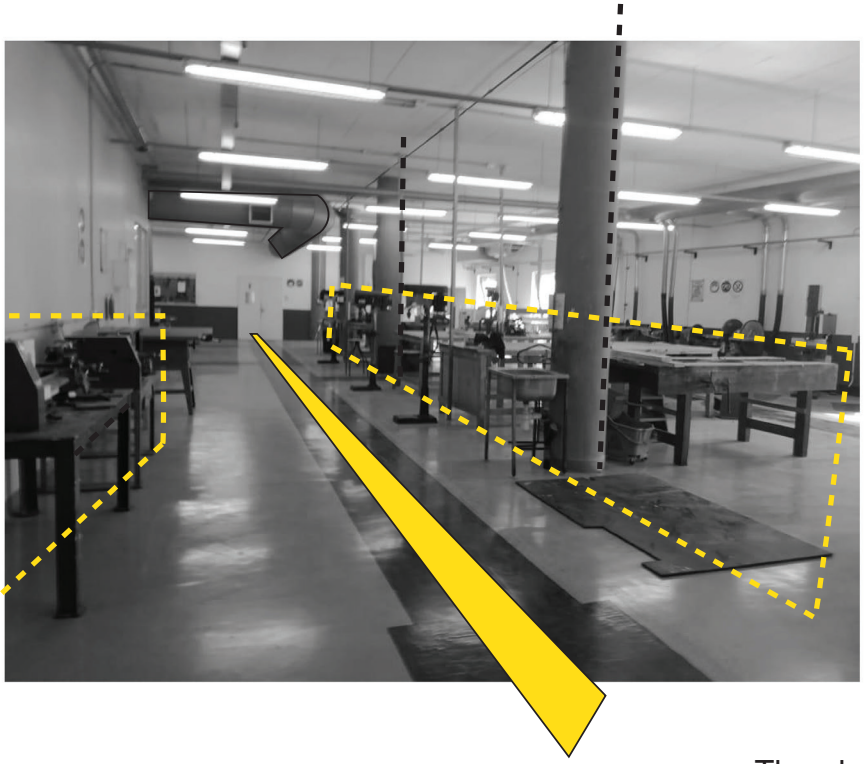


The First floor of the building in figure houses caters for the larger spaces of the building, with the workshops, central exhibition space and library all on one level.

Par



The workshop area size is enough to accommodate all of its machinery used. Figure indicates the wasted space in the workshop and very little design seemed to go into the layout of the equipment itself. The floors above are supported by the buildings concrete framed structure.

Figure **33**
Workshop ventilation system(Saunders. 2019).

The class room and studio space in figure indicates the convential classroom.

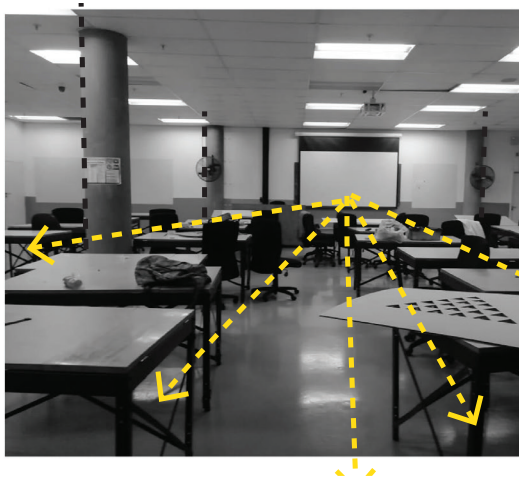


Figure **34**
Classroom (Saunders. 2019).

PRECEDENT STUDY

ROYAL COLLEGE OF ART, DYSON AND WOO BUILDING, LONDON
HAWORTH TOMPKINS

The Dyson and Woo Buildings by Haworth Tompkins house the Ceramics and Glass and Jewellery and Metal Department in the Woo Building. The Dyson buildings houses the print making and photography department. The factory-like building also contains an innovation wing where start-ups can use rentable space from the building and use its facilities (Frearson, 2012: online).

The ground floor indicated on Fig.36 of the building contains a factory production room which is filled with large printing machines and layout spaces. Triple-height spaces in the building contain studios surrounded by glass walls which allow students to look what other students are doing throughout the building (Frearson, 2012:online). This gives the opportunity for total transparency and collaborations between the different departments.

Figure **35** Public view of Dyson Building (Tomkins. 2015:online).

Figure **36** Double volume space of Dyson workshop (Tomkins. 2015:online).

The reason for the open plan of the building is to create the idea of visible art production where everything can be seen; from the creative design stages, to having the product being made and finally the final version of the products being produced.
Raw concrete walls and surfaces are used throughout the building. The architect hopes that one day, these walls could be filled with traces of glue, paint and other materials that students use when producing their work (Frearson, 2012: online). It emphasises this idea of the building being a place of constant and visible art production.

The workshops on ground level are open spaces in a double volume space, where these workshops require specialized ventilation and air extraction equipment. All of this is placed in an open space where the extraction systems are visible. This reiterates the idea of the building dis- playing visible art production as even how the extractors and HVAC systems operate should be illustrations of art production in the space.

The idea of an open working space becomes an appropriate space for the proposed industrial design department where the process of creating projects are emphasised. This intervention provides a shared experience within the space which helps with the distribution of knowledge when creating complex objects.

Figure **37**
Circulation of space of Dyson workshop
(Tomkins. 2015:online).

CASE STUDY

THE DEPARTMENT OF ARCHITECTURE, UFS, BLOEMFONTEIN
TOPOLOGY ARCHITECTS

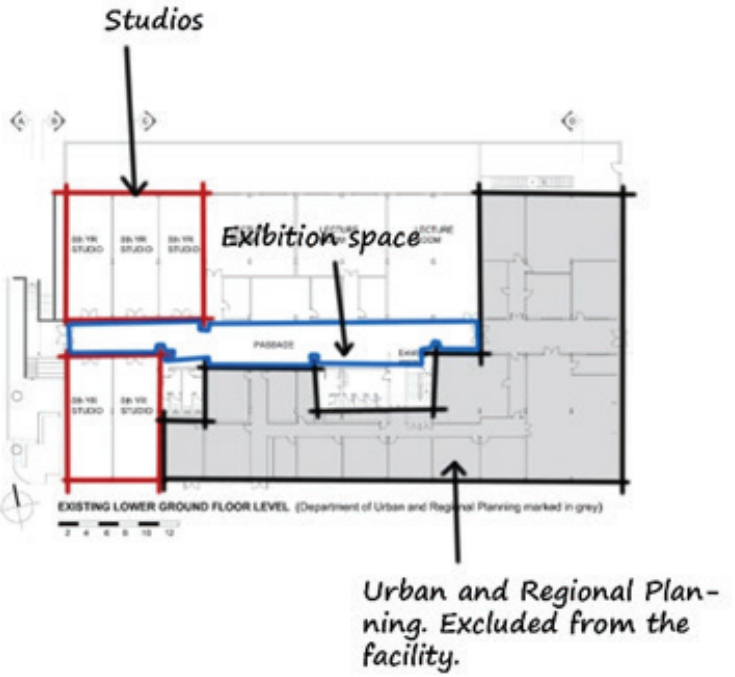
The Department OF Architecture (figure) is a renovation of an old shed-like urban and regional planning building. It embodies a large roof that folds onto the western façade which unifies the entire building while also shading the spaces from the harsh western light.

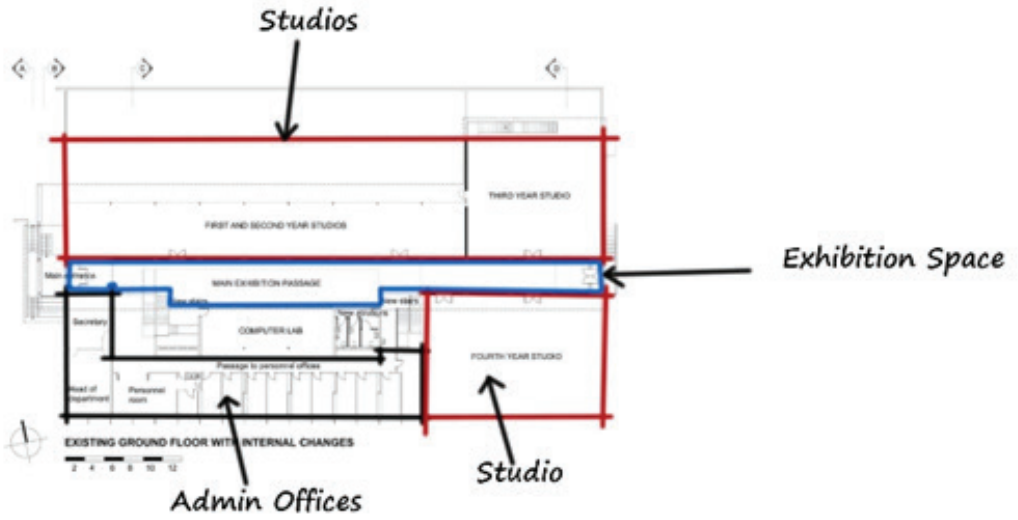
The alterations makes use of a steel construction where the unified folding roof element is cladded with corrogated sheeting which contains the old typology of the shed-like structure. The extended height of the building added a mezzazine level which allows for moreteaching functions to occur above. Natural light enters the main exhibition passage which reduces the need for artificial light during the day. The open spaces in the department provide a factory like experience where all production is made under one roof.

The new materials and structure are articulated in such a way which leaves most of it exposed, celebrating the new and the old.

Figure **38**
Main Entrance of the Dept of Architecture.

It includes first year students up to master's students in the building with each year given a studio space. The exhibition spaces sit between the studios and lecture halls(fig.39).This gives student from each year to view what other years are doing which shared knowledge is gained in the process. The studios get smaller as the years advance as postgraduate students require less guidance.





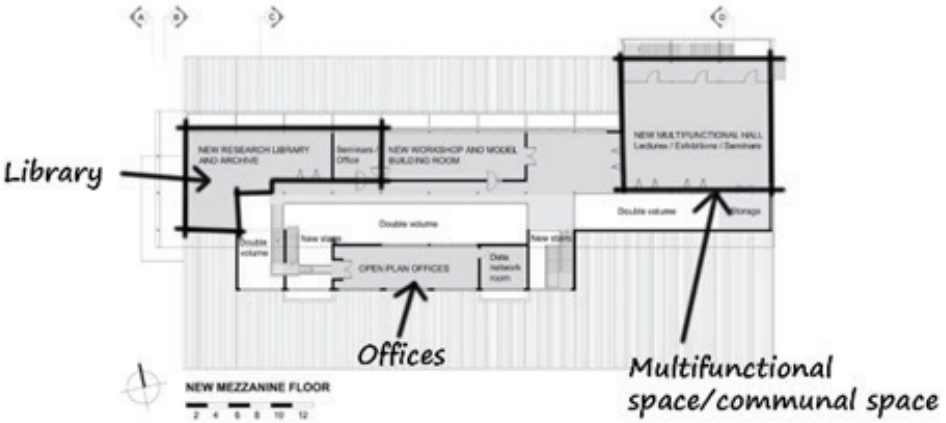


Figure **39**
Ground floor, first floor and second floor indicating spaces. Image redrawn from published plans (Pretorius, 2012: 57).

PRECEDENT STUDY

JOHN J. BOWEN CENTER FOR SCIENCE AND INNOVATION AT JOHNSON & WALES UNIVERSITY / ARCHITECTURAL RESOURCES CAMBRIDGE

Figure **40**
Public Facade of Building (archdaily.com 2016: online).

Figure **41**
Large window opening showcasing workshops (archdaily.com 2016: online).

The Centre for Science and Innovation at Johnson and Wales University sits on the edge of its campus which aims to support the urban urban street grid with a cafe, outdoor courtyard, lobby event space and learning spaces which are visible from the street (archdaily.2016:online).

The facade of the building on ground floor is exposed brickwork which appropriates itself into the existing framework. Pedestrians can openly move through the site which provides a pathway which also leads into the building.

Noisy spaces are located (Fig.43) on the ground floor with the cafeteria in a double volume space which leads to an outisde courtyard. The courtyard is set back and provides a more intimate space away from the sidewalks and road.

The exhibition space for the projects (Fig.42) sits on the edge of the building which pedestrians can view from outside. The space sits flush with the outside ground level to emphasise the students work.

Figure **42**
Exbition space and circulation (archdaily.2016: online).

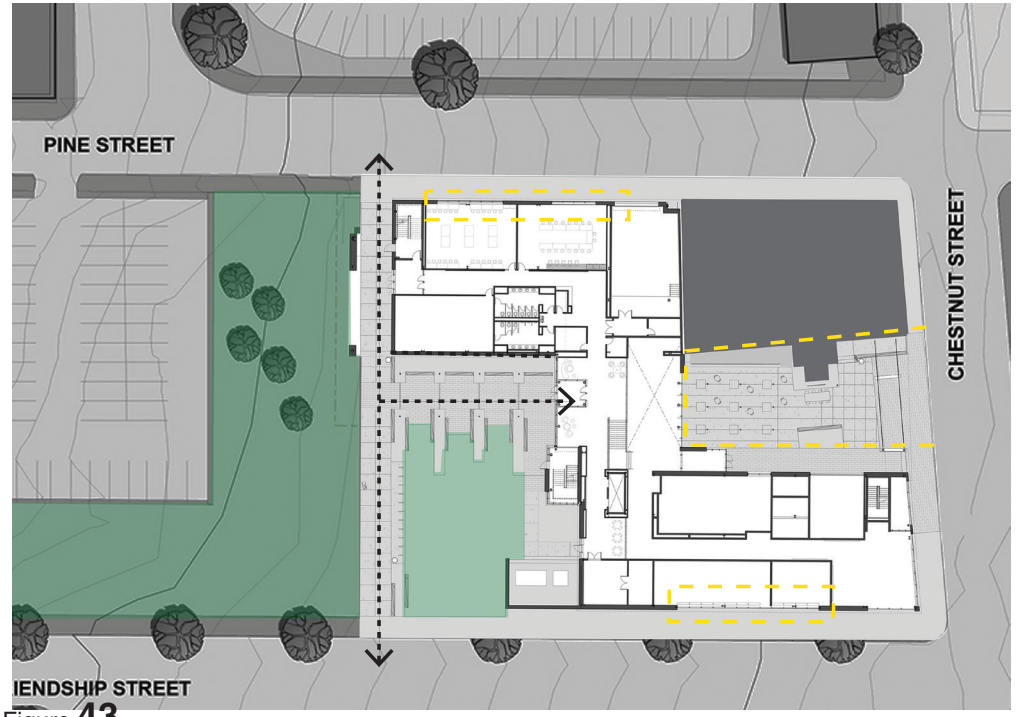
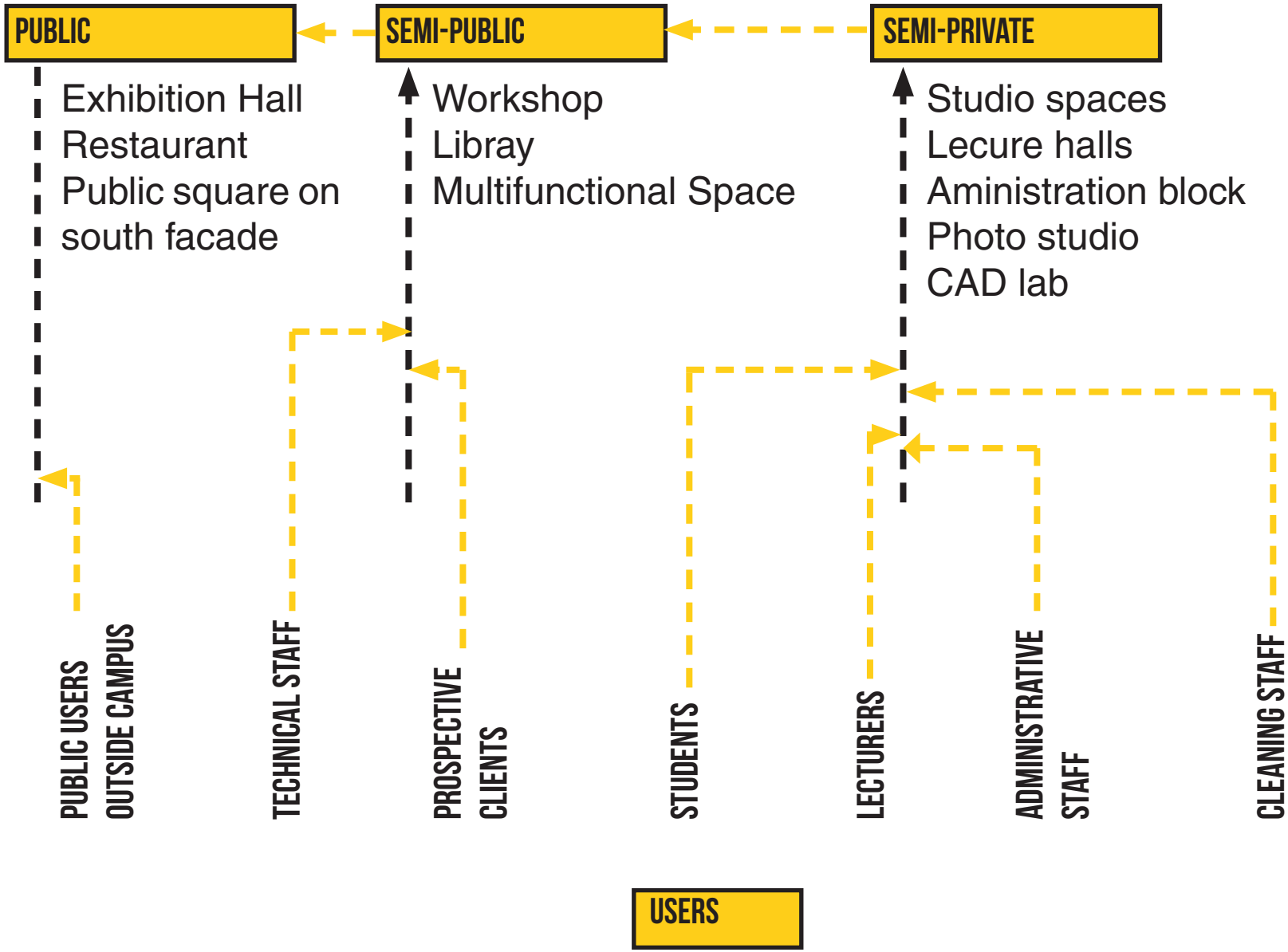


Figure **43**
Ground floor indicating green spaces and courtyards(archdaily.2016: online).

The circulation passages in Fig.44 throughout the building provide seating spaces on the corners for intervals. The walls have giant boards which students can use to share information and ideas while breaking. The services are left exposed in the passage.

Figure **44**
Circulation with seating spaces and drawing board (archdaily.2016: online).

OVERVIEW OF ACCOMMODATION LIST



ACCOMMODATION LIST

GROUND FLOOR

Public gallerry,foyer and reception area

Workshops

Rapid Prototyping
- Storage

Metal Workshop
- Office
- Storage

Clay Workshop
- Office
- Storage

Wood Workshop
- Office
- Storage

Toilets

Cafe

Kitchen
Dining area
Cold Storage
Dry Storage
Refuse Yard
Office
Toilets
CAD Lab
Research office space
Printing Room
Cleaning Staff Facilities
- Staff Room
- Management office
- Cleaning facilities

FIRST FLOOR

First Year Studio
- Storage

Second Year Studio
- Storage

Active Learning Class-room
Classroom
Toilets
Library
Mulitfunctional Space
Storage
Photo Studio

SECOND FLOOR

Third Year Studio
- Storage

Honours Year Studio
- Storage

Masters Year Studio
- Storage

Toilets
Storage

Adminstration Block
- Waiting area
- Reception
- Offices
- Staff Room
- HOD Office
- Boardroom
- Toilets

TOPOLOGY

WHERE?

The proposed sites are situated in the city of Bloemfontein, Free State which was specially chosen to broaden the course curriculums of tertiary institutions in Bloemfontein.
The proposed IDD is ideal for institutional campuses such as the University of the Free State or Central University of Technology.
A macro, meso and micro analysis is done in this chapter to underline the quantitative and cognitive information about the site and its context

Figure **45**
Google Earth image of Manguang district(Earth.2019:online).

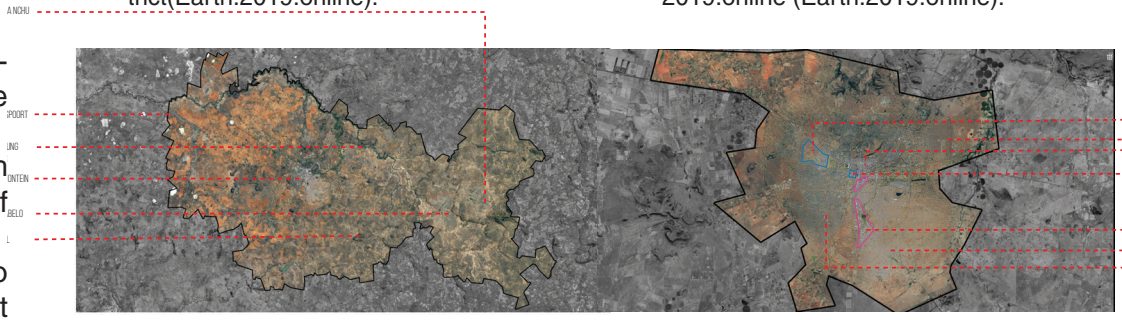


Figure **46**
Google Earth image of Bloemfontein city. 2019:online (Earth.2019:online).

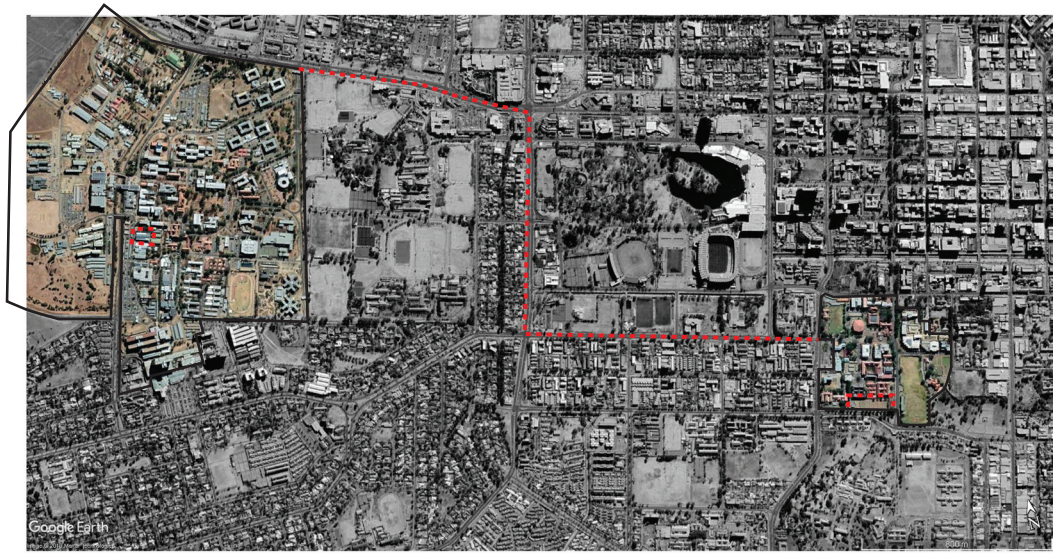
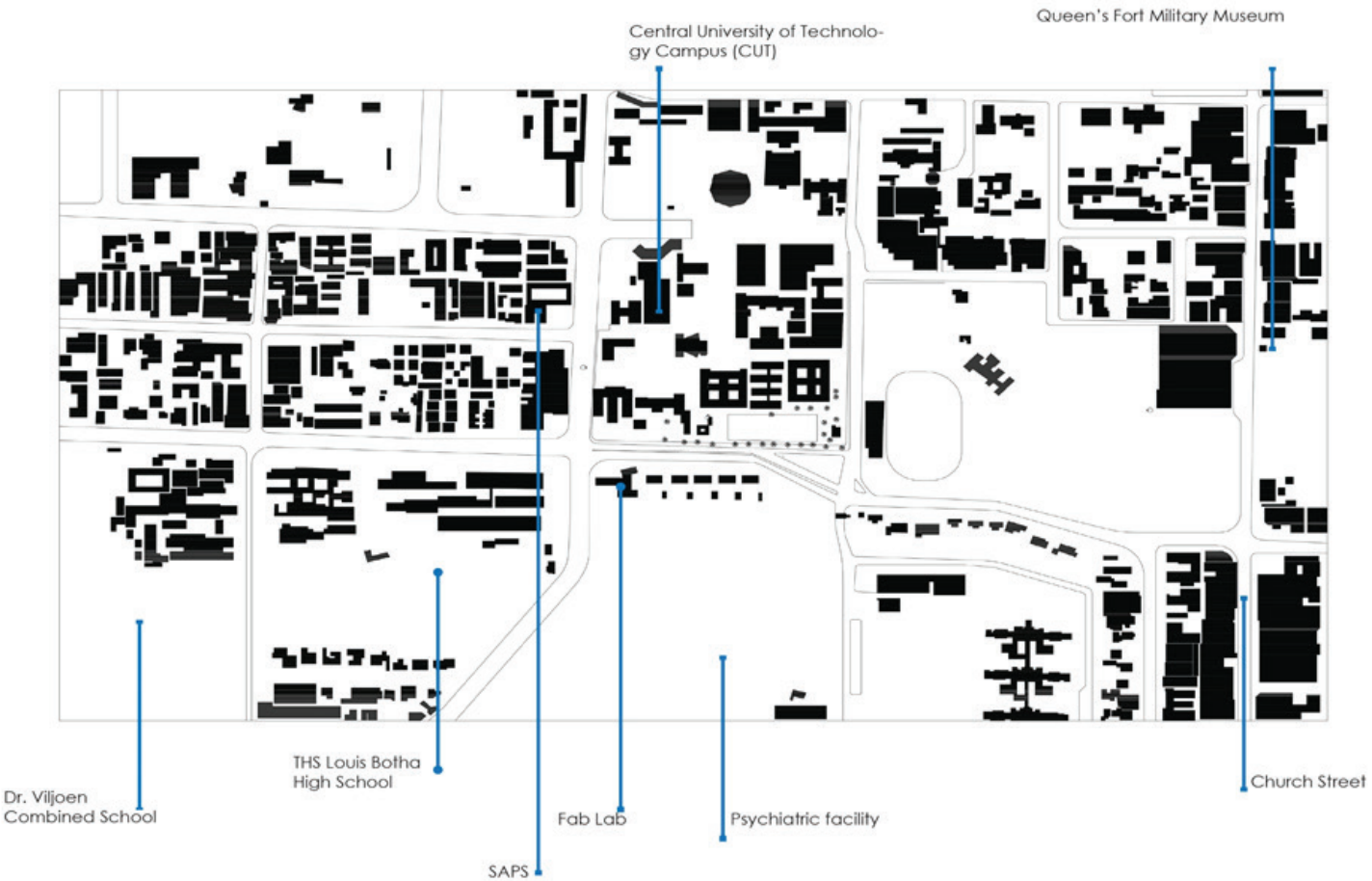


Figure **47**
Edited Google Earth image of Bloemfontein's two main campuses.(Earth.2019:online).

IMPORTANT NODES IN WILLOWS AREA



Noli diagram indicating all the important nodes in Willows area.

CUT MAIN CAMPUS

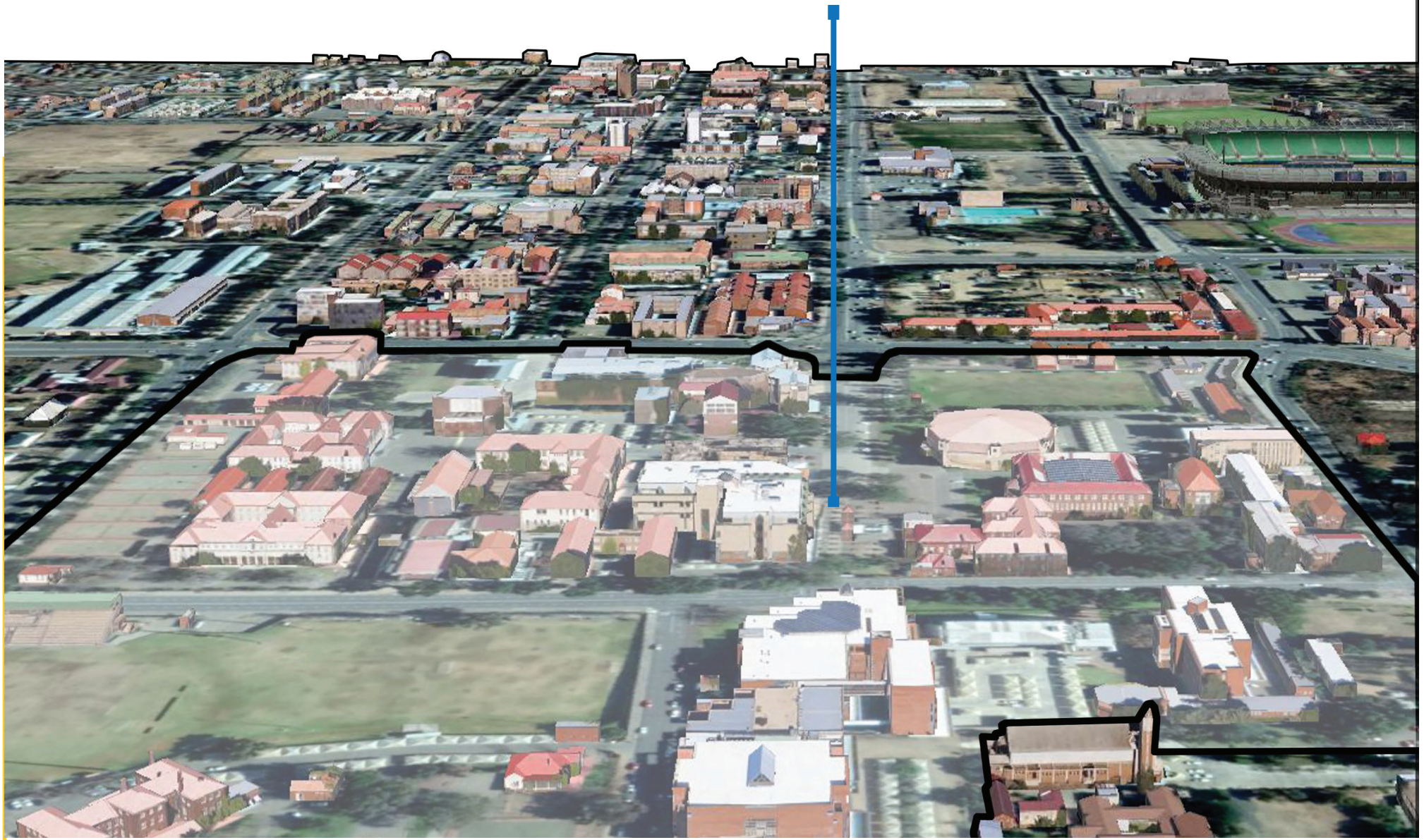


Figure **49**
Map indicating the location of CUT

MACRO SITE ANALYSIS

The site is located on the corner of President Brandt Street and President Avenue. A fence seperates the CUT Campus and the public. The demarcated site itself contains five poorly maintained tennis courts. It runs parallel to a main street which is highly congested during the day due to it also running across the pyschiatric facility.

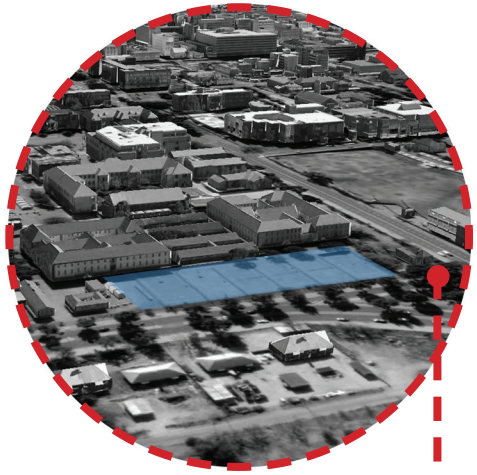


Figure **50**
Google Earth image of site. 2019:online.

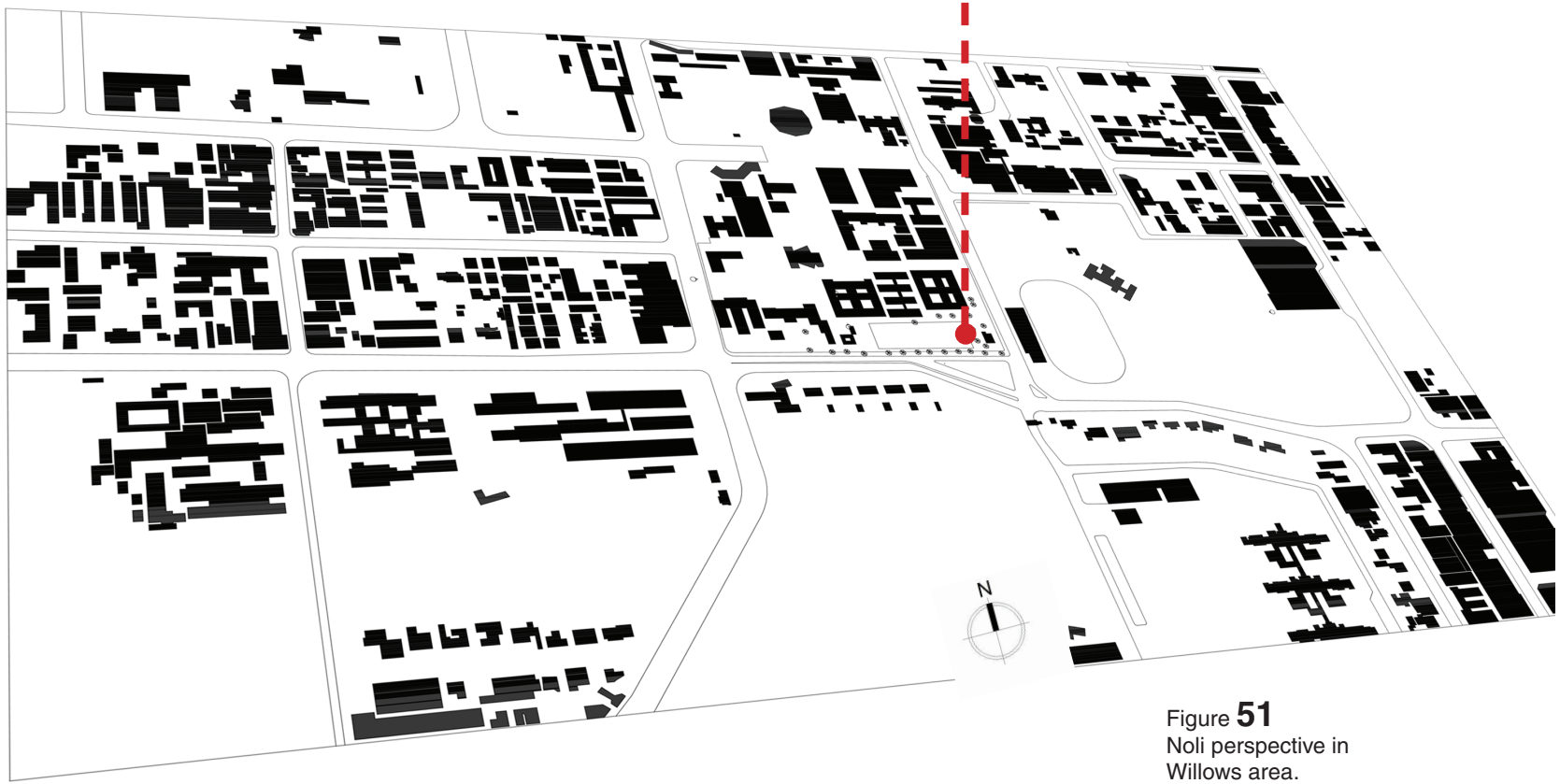


Figure **51**
Noli perspective in Willows area.

TOPOLOGY

ARTERIAL ROADS

The site sits between main roads that lead to the industrial area of Bloemfontein and Institutional area where the Magistrates Court and High court is situated. It is important to place vehicular access to the side that will not affect the traffic flow.

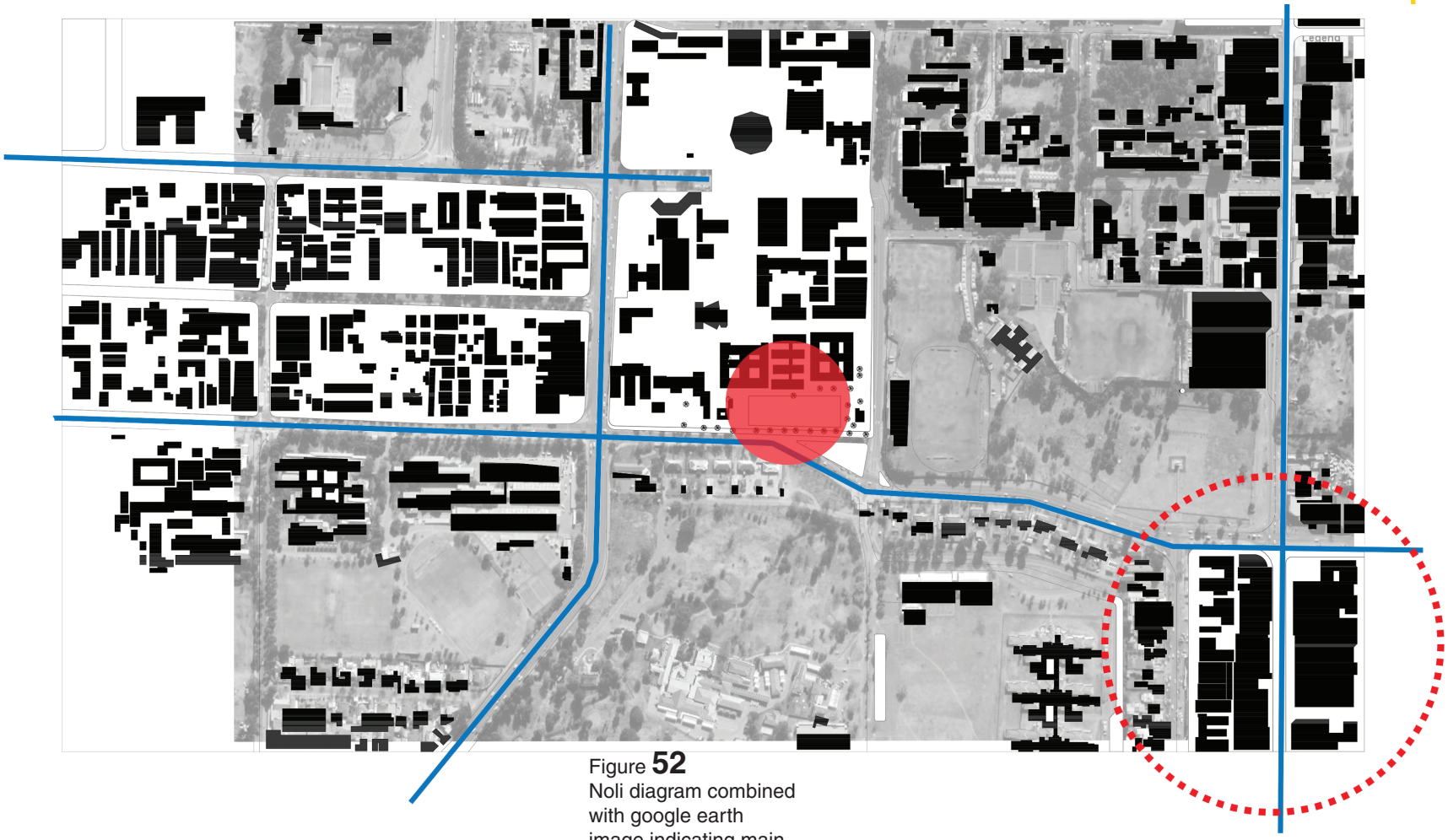


Figure **52**
Noli diagram combined with google earth image indicating main roads

Figure **54**
Vehicular Traffic

Figure **55**
Pedestrian Traffic

Vehicular Traffic

Most of the vehicular traffic occurs in across the site in President Avenue as this road leads to the industrial area of Bloemfontein. In Fig 54 vehicular travel occurs in simple grid patterns with no complex one-ways. Park Road gets congesting during the early mornings and late afternoons as vehicles travel to CUT.

Pedestrian Traffic

Pedestrian traffic (Fig. 55) occurs in a grid like pattern outside of the CUT campus and moving into it, while inside of CUT it becomes more informal as students and staff move to the projected lectures. Students from the flats opposite the main entrance cause most of the vehicular traffic coming into CUT.

TOPOLOGY-MESO

SITE ANALYSIS

Figure **56**
Site access.

Figure **57**
Site boundaries.

Site access

The main site access occurs at the main gate on the west where alternative access for students only sits on the east side of CUT. Alternative vehicular access for staff only is located on the south next to the proposed site. Smaller access points are located on the far east of campus for the engineering faculty. Access to the sport field is situated on the south east side. These access points are the only points of entry into the CUT campus which indicates the disconnect between CUT and the city.

Site boundaries

The CUT main campus is separated between 3 erfs which are completely fenced off from the public. This makes it almost impossible for the campus and city to interact, unless you are a student or prospective student.

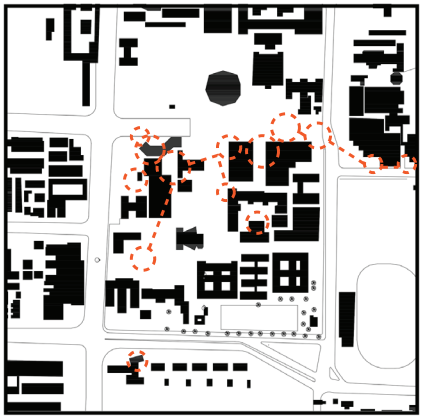


Figure **58**
Activity hubs

Figure **59**
Population density

Activity hubs

The active spaces on Fig.58 indicated where students regularly situated themselves in. These spaces include: the main entrance gates, the food court, library and spaces where human comfort is ideal such as the greenery and seating spaces. The entire south of CUT campus contains no seating spaces or comfort zones. This is also evident on the southern border of the campus parallel to the site which contains a long stretch of pavement but no comfort spaces.

Population density

Fig. 59 indicated the current density and activity on and around CUT. The densest areas are the main access gates and food court. The southern boundary of CUT campus contains a lot of activity where school learners and commuters pass by.

TOPOLOGY-HISTORY

HOW HISTORY SHAPED THE PRESENT

Figure 60 shows an aerial map from 1937 of what stood before CUT was established in 1981.

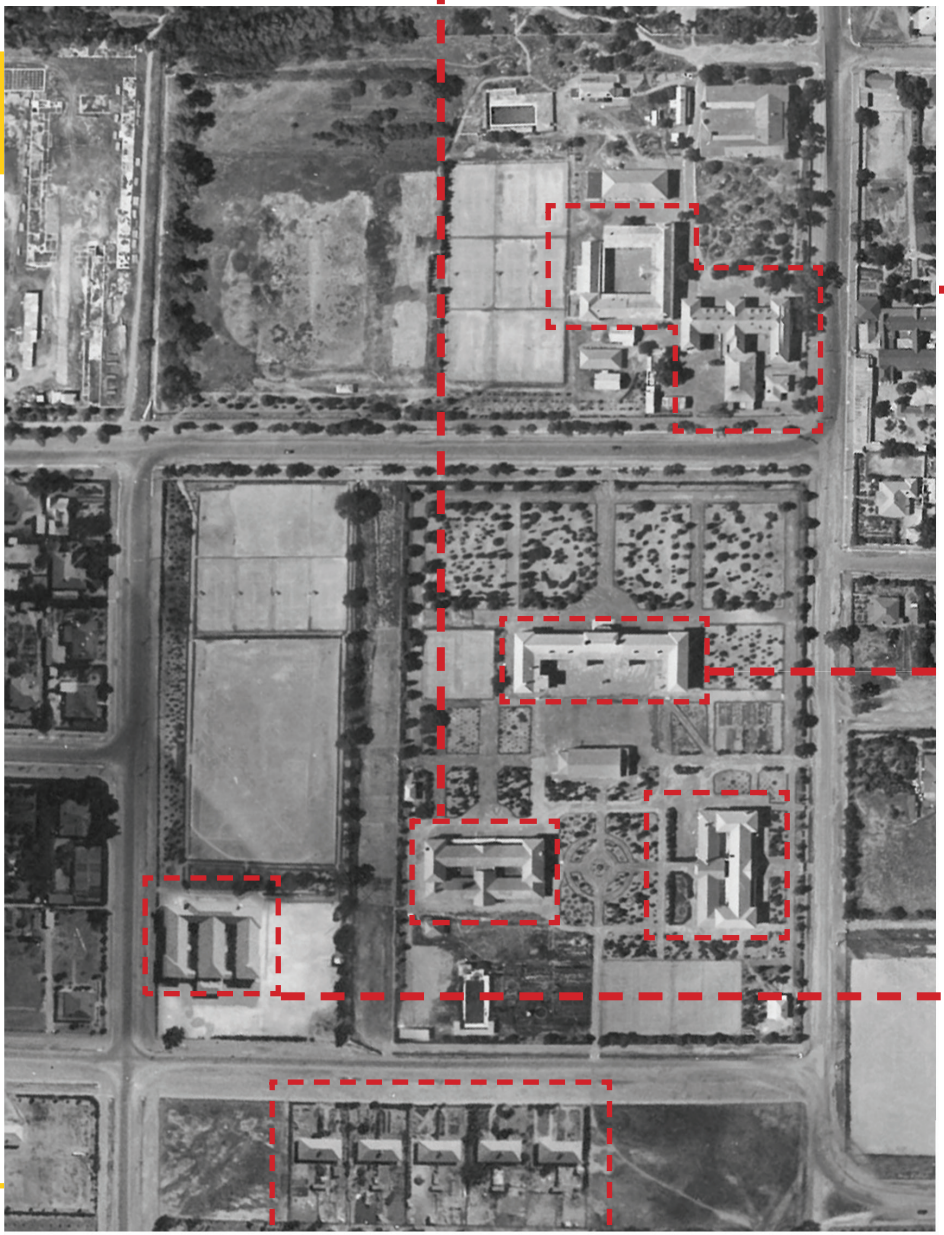


Figure **61**

Figure **62**

Figure **63**

Figure **64**

Figure **65**

Figure **66**

TOPOLOGY-HISTORY

WHAT EXISTS TODAY

The active spaces on (fig.67) indicated where students regularly situated themselves in. These spaces include: the main entrance gates, the food court, library and spaces where human comfort is ideal such as the greenery and seating spaces. The entire south of CUT campus contains no seating spaces or comfort zones. This is also evident on the southern border of the campus parallel to the site which contains a long stretch of pavement but no comfort spaces.

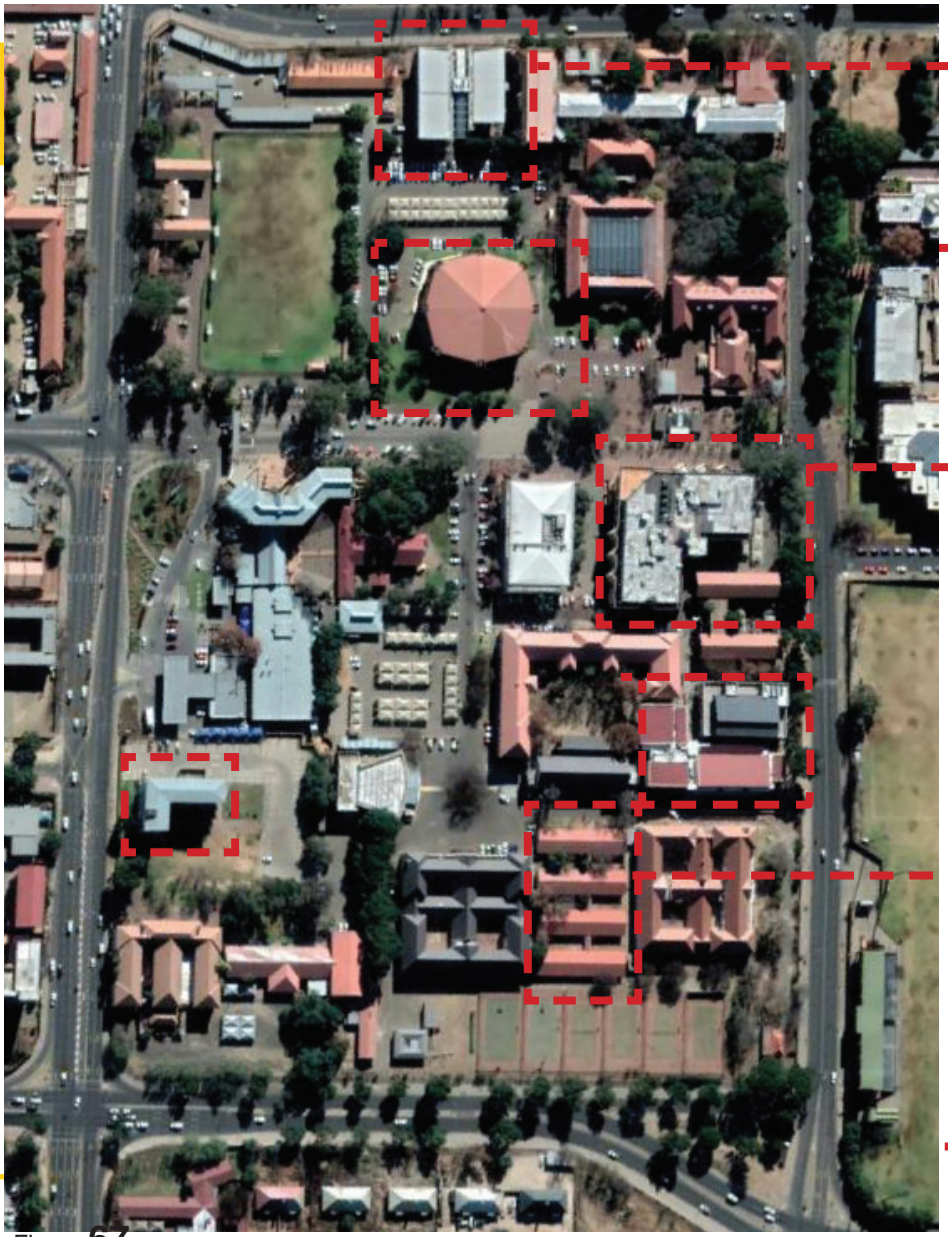


Figure 67

GoogleEarth Aerial view of Cut

Figure 68

The Dirk Coetzee West Block Building's façade appropriates itself with the existing framework. It caters for the outside and inside where a courtyard sits in front of the entrance with seating space and vegetation.

Figure 69

The Bethuel Setai Library in figure's entire façade of the building is brickwork which is reminiscent of the historical buildings on campus and industrial aspect of CUT. The large mass is lifted with reinforced concrete columns that lightens the mass and emphasises the entrance which makes the façade more appealing and inviting.

Figure 70

The Jewellery department sits between the two residences which requires a significant amount of maintenance. The building has no identity that can be associated with jewellery making. It sits between two historical buildings and contains very dull and closed off facades which create no interaction between the outside.

Figure 71

The Boet Troskie Hall houses all graduation ceremonies for students and large scale lectures. Its façade is solid where little emphasis is put on interaction with outside spaces.

Figure 72

The Teachers Training Building designed by Roodt Architects pays reference to the old and existing framework on the CUT campus. It uses the colonnade to dematerialize the façade and lighten the mass.

Figure 73

The new residence on the campus contains 5 levels which students occupy. The building is plastered which appropriates itself with the existing residences. It has green space in the front of the building with exercise machines that draws students to the space.

TOPOLOGY-MESO

HOW THE CONTEXT INFLUENCES THE TOPLOGY OF THE PROPOSED SITE

The library and CUT Support Centre of the right of figure 74 are separated by a walk-way which frames the gable of the historic Management Building in the south. Both building facades are emphasised by con-temporary stoa with columns that reach up to the three levels. Between these buildings, seating space along the library is created via the steps and across is curved seating space which contrasts the sharp geometry of the library.

Figure **74**

Gathering space infront of library

HOW THE CONTEXT INFLUENCES THE TOPLOGY OF THE PROPOSED SITE

The café sits between the two main access gates. It is less formal than the food court near the main gate. This provides students with food and drinks while being on a main access route which is convenient for both the student and café. A large square surround the café with informal seating spaces with vegetation.

Figure **75**
Main Circulation on campus with Cafe

TOPOLOGY-MESO

HOW THE CONTEXT INFLUENCES THE TOPLOGY OF THE PROPOSED SITE

The Technikon Female Residence sits behind the proposed site along the boundary of campus. The original block of the historic building is still seen but further additions have been made to accommodate the buildings typology. The fence along the res spans the entire street with no seating or comfort spaces such as shading. This street is merely for pedestrians to pass by to their destinations with no interaction between the campus and city.

Figure **76**
Technikon Residence

HOW THE CONTEXT INFLUENCES THE TOPLOGY OF THE PROPOSED SITE

The site sits along a wide sidewalk that spans the entire street. School leaners as in figure (fig.78) use the sidewalk every day when going to school and leaving from school. This sideway caters for many pedestrians of the city as it leads to many institutions and the industrial part of Bloemfontein. A green space separates President Brand Street: the secondary road leads to CUT and president avenue while the main road of President Brand Street takes vehicles to church street.

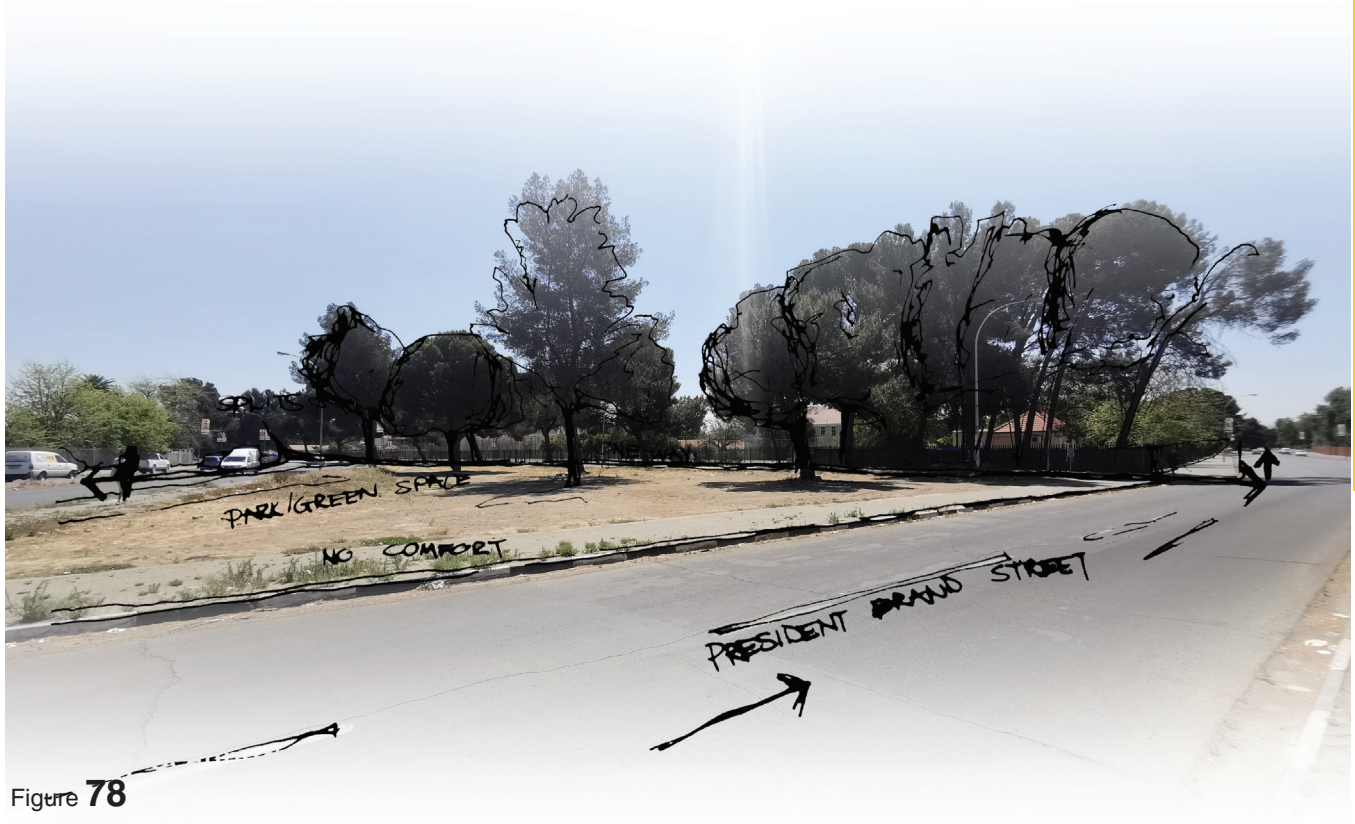


Figure **78**

Green Space opposite site

MICRO SITE ANALYSIS

SITE VIEWS AND ISSUES

The site is situated on the edge of campus between residential buildings and the jewellery department. The existing status of the site houses five tennis courts that are seldomly used. The courts have therefore been moved to accommodate the industrial design department. Two house-head residential houses sit by each of the sits short ends where a fence is placed on the south.

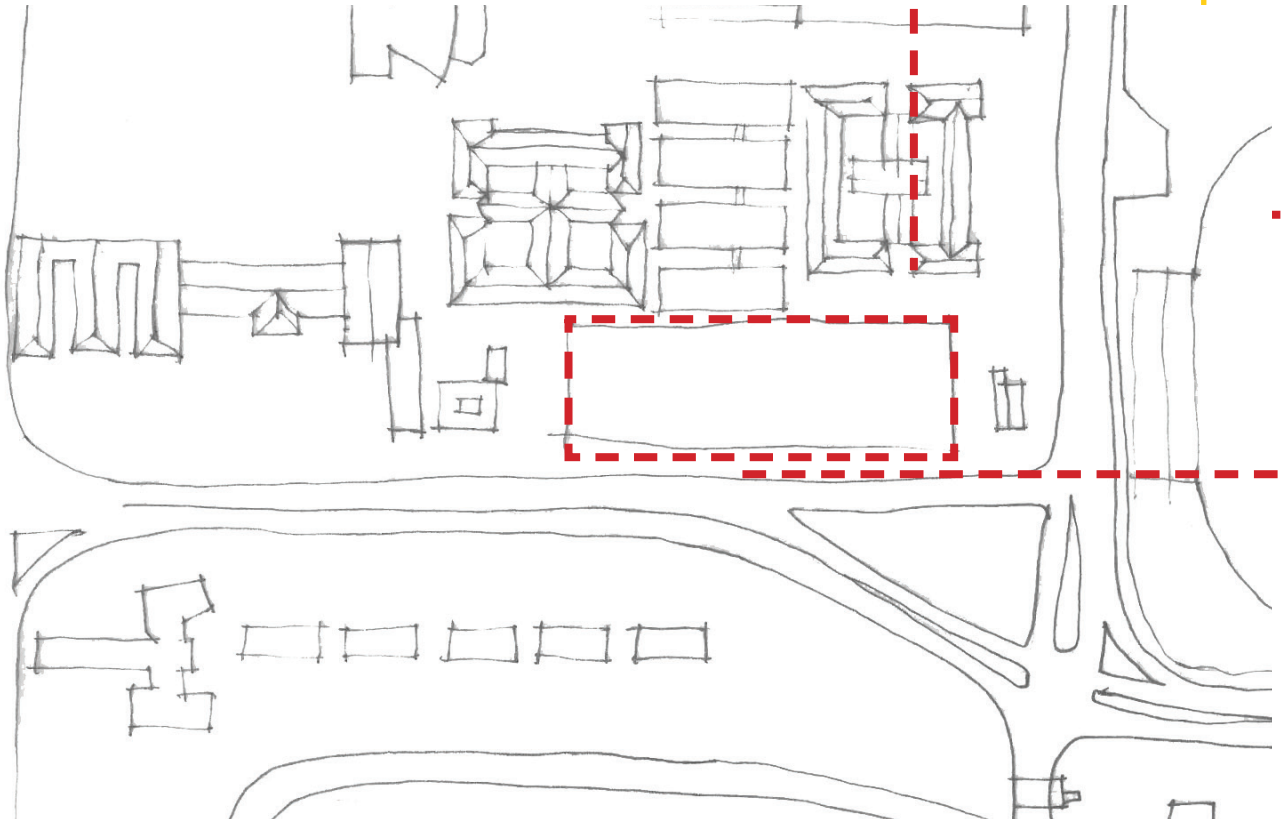


Figure **80**
Views from the tennis court

A long pathway separates the tennis courts from the residence buildings along with a small courtyard between the courts and Technikon res. The residence is undergoing maintenance repairs as the plaster on the facades are cracking.

Figure **81**
Sidewalk along site

Many learners move through this sidewalk every day. The only comfort levels indicated on the sidewalk are the trees for some shading. The views when walking by are dull as most of the context around is poorly maintained.

Figure **82**
Tennis courts

The jewellery department on the right is poorly maintained does not interaction with any of its context. No signage or design indicates that it is the jewellery department. The building needs a complete overhaul.

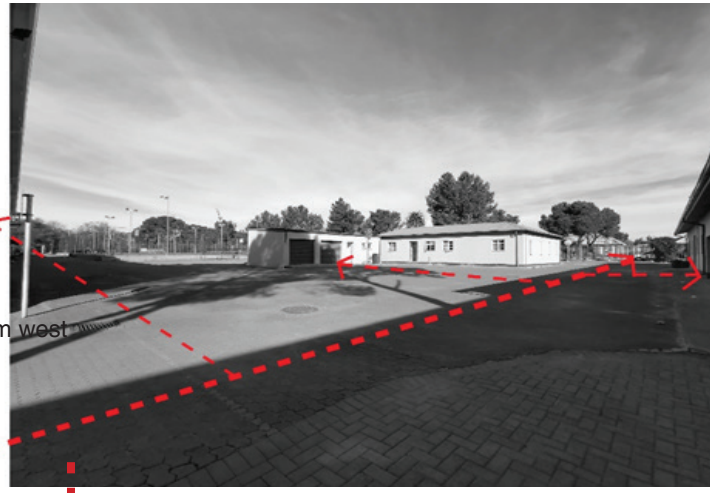


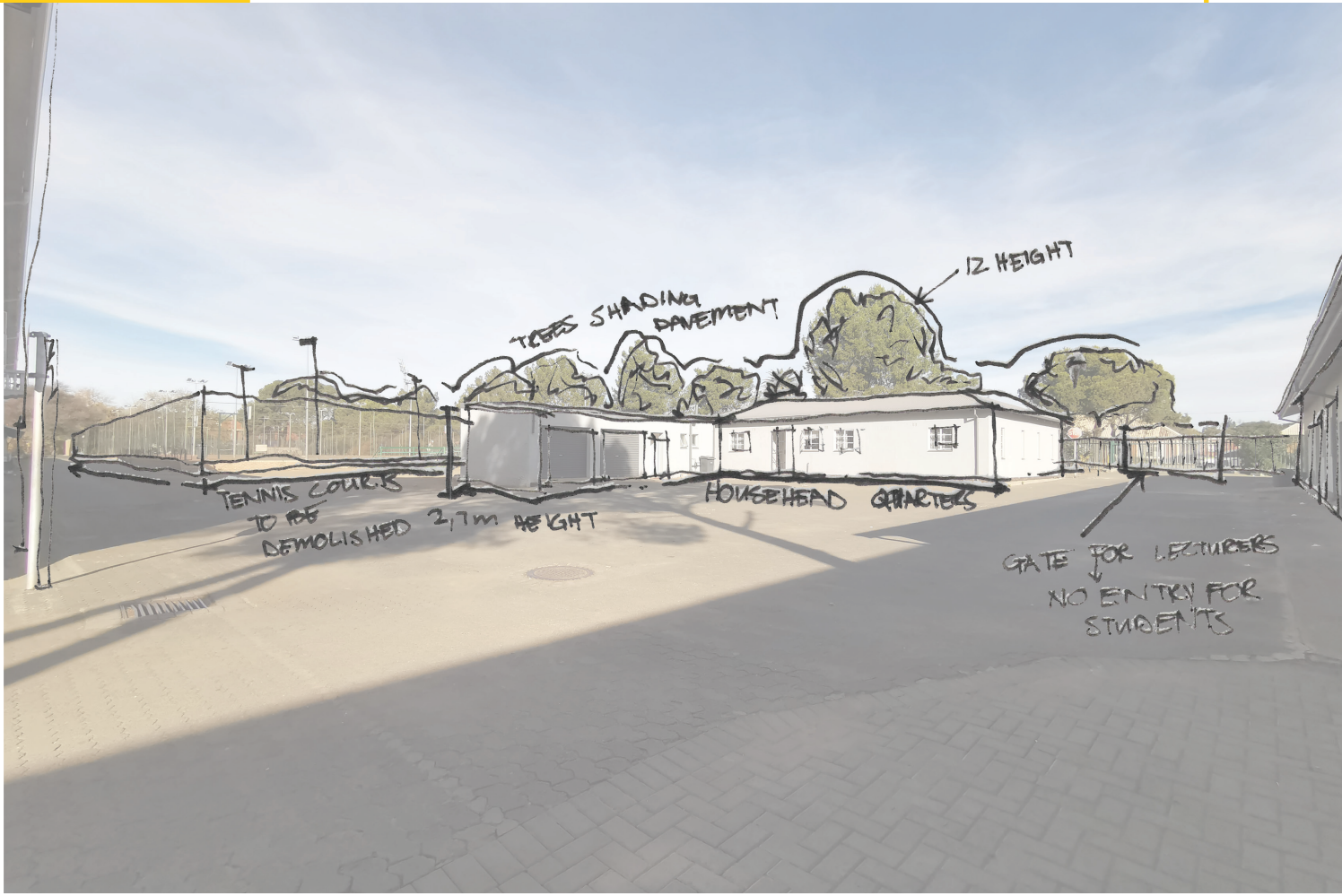
Figure **83**
Views of site from west

The Eendrag Residence Head house sits on the west of the site with a gate accessible for lecturers on the south. The site itself carries no protection from the north and western sunlight during the day which makes it very uncomfortable to be at for most parts of the day.

MICRO SITE ANALYSIS

SITE VIEWS AND ISSUES

The intention is to demolish the tennis courts and move them to another site to accommodate the industrial design department. This gives an opportunity for the workshop and parking to be on the west of the site where rubble stands now. The existing gate allows for delivery trucks to enter and drop off material and machines needed.



SITE VIEWS AND ISSUES

Figure **85**
Views of site from the court-yard

MICRO SITE ANALYSIS

SITE ISSUES AND APPLICATION

Breaking down the courts and creating an outside space for both the industrial design department and residence would be more appropriate as it allows for break spaces and more comfortable spaces than the current court which is always exposed to direct sunlight. The brickwork from the wall indicated on the left will also be reused for the infill of the building.

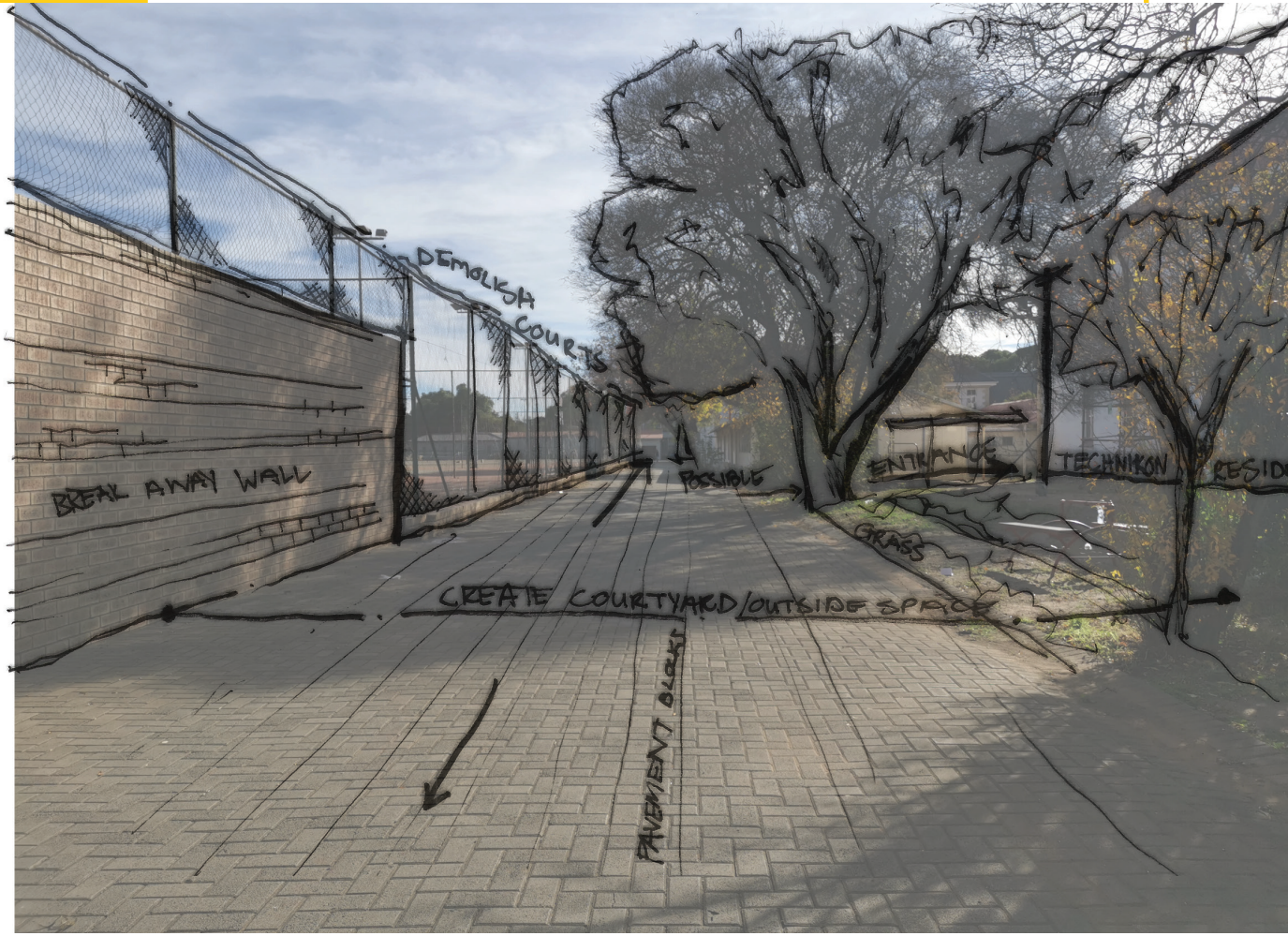


Figure **87**

Views of boundary of site

The fence in figure xxxxx should be demolished to allow for the building to sit back and create a public space which can interact with the rest of the city and also accommodate pedestrians for a short time while walking. The seven-metre pathway can accommodate many pedestrians that walk past while providing seating.

MORPHOLOGY

THEORETICAL GROUNDING

In this chapter, explorations regarding breaking boundaries and thresholds will be explored within a non-place to enable transformation on the CUT campus. These theories are found in Casey's Idea of thresholds and Victor Turner's notion of social drama.

MORPHOLOGY

INTRODUCTION

History sees a city, as the of maximum concentration for the power and culture of the community (Mumford,1970: 03). Mumford states that a city is a form and symbol of an integrated social relationship: “it is the seat of the temple, the market, the hall of justice, the academy of learning. Here in the city the goods of civilization are multiplied and manifolded; here is where human experience is transformed into viable signs, symbols, patterns of conduct, systems of order. Here is where the issues of civilization are focused: here, too, ritual passes on occasion into the active drama of a fully differentiated and self-conscious society” (Mumford,1970: 03). Mumford describes a city as a series of networks that constantly link with one another. It is a place where power, economics, knowledge and community act as an interdepend organism. Within this organism, constant exchange occurs between these networks. These exchanges exist when a business exchanges good with another entity or community. During conversations there is an exchange of knowledge between the persons.

This chapter focuses on knowledge and its impact within in the education sector, city sector and how these two sectors can learn between one another. Looking at how the industrial revolution influenced how cities developed plays an important role in this investigation where the world is currently going through the fourth industrial revolution. Education and the transfer of knowledge within these institutions are vital as many institutions still use 13th century learning mechanisms within this technologically advanced society. Using these prehistoric learning mechanisms can still benefit society by dematerializing them using fourth industrial techniques.

The theoretical framework of this dissertation is framed under the work of Victor Turner and his passage of ritual and social drama. The other objective is to focus on how thresholds not only act as liminal spaces but also boarders that restrict passage. Edward Casey’s theory on edges focus on how mental edges limit transformation and integration within the city.

MORPHOLOGY

SOCIAL DRAMA

The first concept that Victor Turner discusses is the concept of breach where a calm/balanced situation often breaks equilibrium. This can be when certain rules are broken deliberately and turns chaotic which is called crisis. This is when the break in balance has shifted and creates conflict within sections and factions which then reveals hidden interests between characters which result in clashes between the two. Redressive actions then need to be taken into action to restore this balance. These can be done by means of law or religion where the judicial processes use reason and evidence to solve this shifting of balance. Religious processes rather emphasise ethical problems and hidden malice operations. The fourth concept of social drama is called reintegration where things either reintegrate into society of split from society in form of a schism. This is where there is a restoration of peace and balance amongst the participants but schism on the other hand is when the balance can never be restored amongst the participants where an irreversible breach of schism occurs, and these two entities break away (Turner, 1990, pg 9).

In the movie Shutter Island. U.S marshal Teddy Daniel along with his partner travel to Shutter Island, an island for the criminally insane, to investigate a missing persons case. Upon further investigations, he then proceeds to enter a lighthouse to confront the doctor, Dr.Crawley allegedly doing brain tests on patients. The doctor along with the warden tell Daniel's that he in fact is a patient
He then finds Dr. Cawley, who tells Teddy that he is in fact Andrew Laeddis, a patient on the island and that he has killed his wife, Dolores Chanal (an anagram of Rachel Solando , the missing person), after she killed their children. Daniel's partner Chuck arrives, and it is shown that Chuck is actually Dr. Sheehan, his psychiatrist. Sheehan claims that he and Dr. Cawley have given Andrew/Teddy the drugs to help him live his fantasy out in his mind and ultimately confront the truth about how he killed his wife. If he doesn't accept the truth, the doctors will force him to undergo a radical lobotomy (Gradesaver.com, 2019).

This social drama that occurs during the film is as follows:

Andrew Laeddis(Teddy) comes home and notices his wife without the children. Through asking her where they were, he then realizes that she has drowned them in the pool. This is the first stage of social drama; breach. This is when Andrews wife murders their children which leaves him conflicted. Turner describes a person or subgroup which breaks a rule deliberately or by an inward compulsion which normally is in a public setting (Turner, 1990:8).

Figure **89**

Scene where Andrew discovers his wife without the children

The crisis occurs when he sees no other choice but to shoot his wife as she was clearly dilutional. The murder of his children by his own wife led to him killing her. The conflict between the two occurs when he confronts her, and their interested and morals clash: she sees no wrongdoing which he then realizes that she is dilutional and the only way forward is to shoot her.

Figure **90**

Scene where Andrew shoots his wife

The redressive process occurs when Andrew is sentenced to a psychiatric island for criminals as he cannot come to terms with what has he has done and lost. The facility tries to rehabilitate him in hope that he's sanity is restored. Through this phase, rituals are created to help with his rehabilitation. They play out a two-year program and drugs to allow Andrew to live his fantasy in hope of curing him.

Figure **91**
Scene where Andrew realizes his a patient

The last phase, reintegration, the restoration of peace, or social recognition of irremediable or irreversible breach of schism (Turner, 1990:9) occurs when Andrew partially comes to terms with reality of what he has done. This temporarily restores his sanity and peace but later, Andrew falls back into his fantasy where an irreversible breach of schism occurs. The doctors realize that the only force of action is to lobotomize him as he can no longer be reintegrated back into society.

Figure **92**
Andrew accepting his labotomy therapy

MORPHOLOGY

SOCIAL DRAMA ON CUT CAMPUS

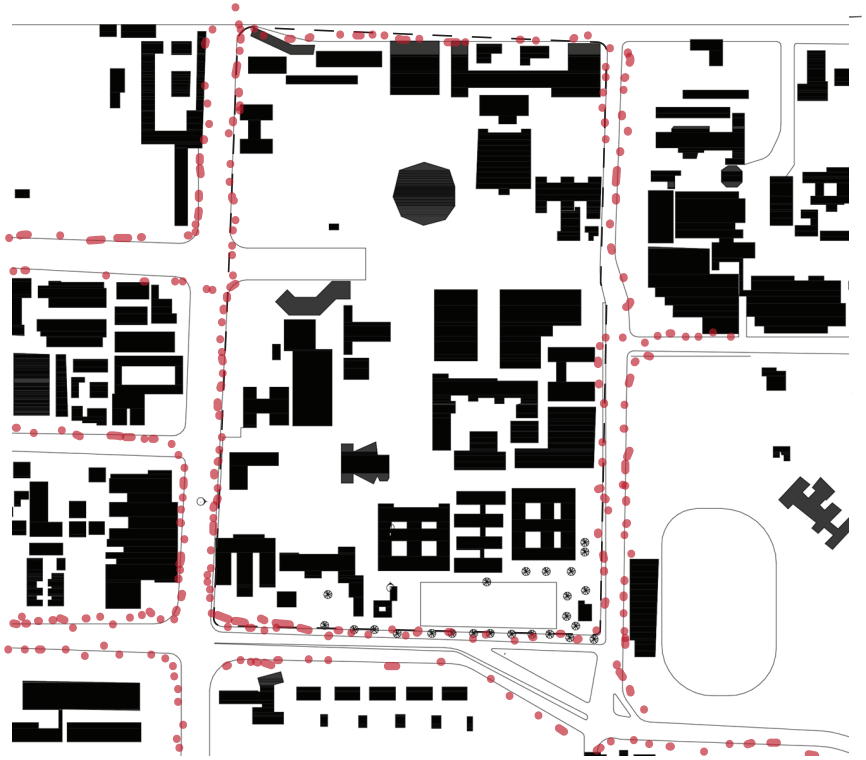
Breach

1981, CUT, opened its doors to 285 students and when the unoccupied buildings of the Commercial High School which housed the students became too small. This led the University to purchase the former premises of Eunice Primary School and the campus of the Bloemfontein College of Education (Cut.ac.za, 2019). Breach occurred when the fence around CUT was built to create a 'utopia' for its students. A separation between the campus and the city was imposed. The fence around CUT keeps the students inside safer but it also separates the campus from the city. In Fig the fence around campus illustrates the movement around campus. Pedestrians who do not study at CUT make use of the sidewalks of the perimeter and cannot move through campus. Placing the fence creates physical boundaries between CUT and the city where no form of interaction occurs. The breach occurs when these physical perimeter around CUT create spaces where no interaction takes place, ultimately providing non-places around the campus itself where the sidewalks simply act as mediators for pedestrians. .

CRISIS

According to Augé's hypothesis, super modernity creates non-places, spaces that are not themselves anthropological places, where society remain anonymous holding no such significance to be regarded as a place (Augé, 1995:78). Augé compares a place to having identity and historical reference whereas a non-place lacks the two. These spaces are the sidewalks which pedestrians use daily where buildings and places are fenced off which break down any interaction. Where security and stability in place exists, openness, freedom and threat of space allows for non-spaces to occur. de Certeau argues that space is place, and place is space. Auge mentions that space for de Certeau is seen as a frequented place where an intersection of moving bodies exists. It is the pedestrians who transform an empty street into a lively street.

The fence which separates CUT and the city force pedestrians to make use of the sidewalk along the perimeter. It provides the street with a vast amount of congestion which de Certeau notion of place would refer such a street as a space of place. Although the street is busy during most parts of the day, the fence and lack of reference creates vast amounts of dead space where pedestrians cannot identify themselves in, which supports Auge's theory of non-place.



REDRESSIVE

The exploration of boundaries and edges of Casey provides the sidewalk on President Brand Street, the opportunity to develop from a non-place, into a place. Casey becomes aware of such edges while painting.“I am aware that I am working within the edges of the painting. I am navigating between them. What does this mean? What does it mean to be between edges – more to the point, to be in between them? (Casey, 2008: 1).”

Casey(2008:1) implies ,when looking at the painting, one must always respect the edges of the painting. This implies that the artist should also keep the edges of the work in mind which involves two kinds of edge: Edges of mental space where the edge between the physical is not distinct (Casey, 2008: 1). This implies that the body and the mind is not distinct and therefore not a physical edge but rather a mental edge. Edges of the canvas or paper imply that there is a complete juxtaposition from mental edge where spatial edges are considered infinite places for creation. These edges are where spaces can be created where shared experience is prioritized over singular experiences (Casey, 2008: 2).

Through edges in spaces, the in-between coexists where these two entities are interdependent on each other. The in-between exists within these edges which gives it identities and structure. When an edge does not exist, an in-between space can no longer exist as there is no edge to differentiate between two components. Without edges there can be no in-between and without in-between there can be no edges (Casey, 2008: 6). Edges supply bounds that are porous which take in as well as give out. This is in contrast with borders that only allow for a linear representation and do not allow for other thought processes to enter. The in-between offers a matrix for edges where these edges are located (Casey, 2008: 6).

THRESHOLDS

The in-between of campus and the sidewalk allows for various thresholds to be placed on the edge of campus which. Benjamin's definition of theory states: "The threshold must be carefully distinguished from the boundary. A Schwelle "threshold" is a zone. Transformation, passage, wave action are in the word Schwellen swell, and etymology ought not to overlook these senses. On the other hand, it is necessary to keep in mind the immediate tectonic and ceremonial context which has brought the word to its current meaning (Benjamin &Tiedemann. 1999:494)".

Till Boettger describes thresholds as spatial conditions which allow for openings in boundaries for movement and transition in space (Boetgger, 1999:15). Steven's identifies a threshold as an opening between inside and outside of a boundary which opens possibilities and social encounters It gives spaces the opportunity to interact with the outside and inside world. It creates an element that make the place come alive (Schulz, 1971:25). It creates various levels of privacy; public, semi-public, semi-private, private. Opening a space allows for interchange and mediation between two different spatial conditions that are separated by an impermeable boundary.
Fig illustrates how thresholds which can be made within the fence of CUT allows the city and campus to integrate into one homogenous space where the flow of movement is not constrained and opens possibilities for social encounters between the two. This possibility enables various spaces of engagement to exist within the campus.
Although in an ideal world, the possibility of having an open campus in Bloemfontein would exist, safety concerns play a major role in keeping the fence around the campus. Further analysis of President Brand Street indicates how the fence of the edge of campus can merge these two singularities into multiplicities. The idea of creating a singular threshold through the boundary on the south of campus has the potential to create a liminal space for both students and pedestrians.

Figure **94**
Pedestrian movement through campus

The pedestrians which use this sidewalk bear in mind the destination to which they are heading to. This ritual process is seen as way to comprehend itself and evaluate its significance inside society (Turner. 1990:80). The possibility of campus and the space on the sidewalk interacting creates a place that allows the production of architectural and urban space to celebrate the rituals of the everyday between the two.

Liminal space

Liminal derives from the Latin word for threshold, where it occurs as an intermediate state or condition. It has characteristics of an in-between but also separate and distinct from such space. It is the realm of conscious and unconscious speculation and questioning. It is the zone where ideas are intermingled, taken apart and resembled, where memory, values, and intentions collide (Koetter. 1980:69).

The proposed industrial design department provides the tools for such a liminal space to exist on the edge of campus. The functioning capabilities of the IDD carries the capacity for such a space to create a place which pedestrians and students can share and fundamentally, engage within this liminal space. The space creates a platform of experience, where the social environment which the students and pedestrians live, is separated where various platforms of ideas that have various possibilities are created.

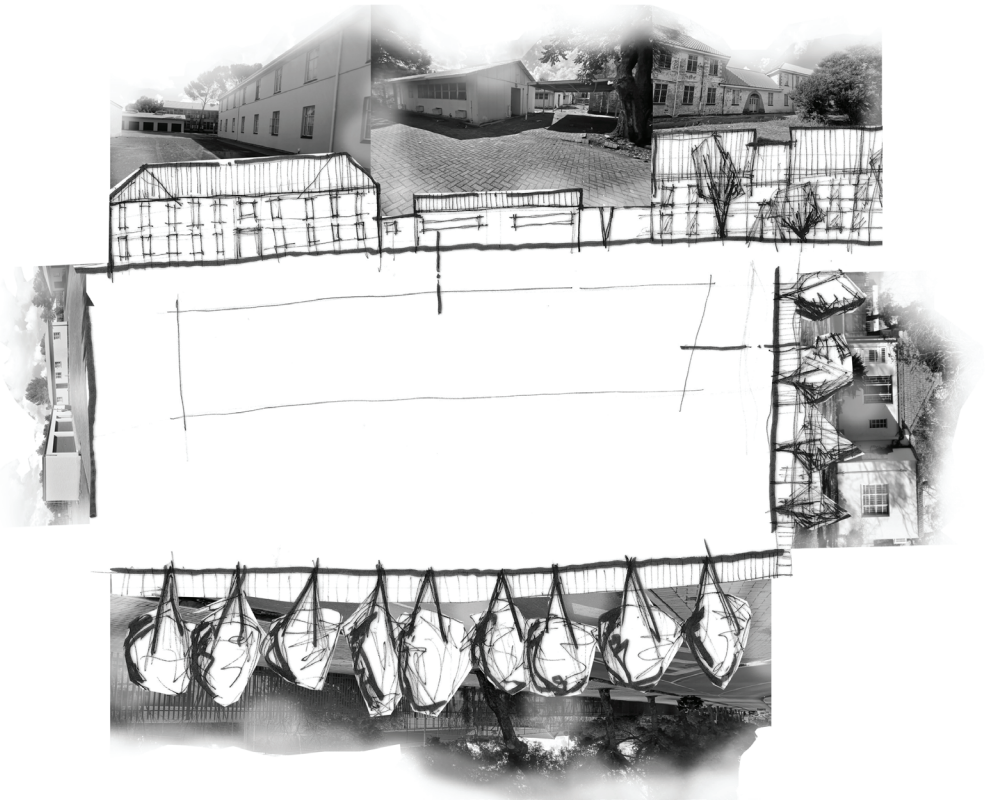
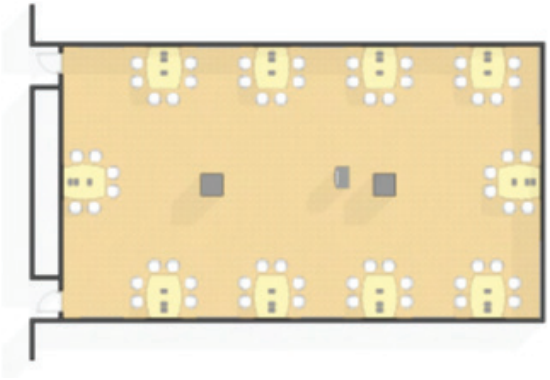


Figure **95**
Illustration of site and its context

The IDD therefore, cannot be a singularity, but instead a multiplicity where various exchanges occur within this building. Deleuze and Guattari's notion of rhizome takes place where multiple interchanges and possibilities occur.
A rhizome can connect to anything at any point other than itself and must do so. It is multitude of connections between organizations of power, semiotic chains and events which are relative to sciences, arts and social struggles (Deleuze, Guattari, 1987: 7). It is seen as a multiplicity where there no interdependence occurs. If one root or connection within the rhizome is removed, it still functions independently and creates more connections and multiplicities.
The IDD acts a rhizome on the edge of campus where various experiences occur. The building operates as a workshop for research and innovation various technologies are brought it. The IDD opens its doors for the public where certain spaces will be accessible, and a shared experience occur between the students and public. The public can test the students work to provide feedback for improvements. This creates a space where multiple experiences and interactions take place and continuously change and evolve. The building itself is a multiplicity where if the public are taken out of the building, it still actions as an industrial design department. When students leave during the recess period, it carries on being a public building where the workshops cater for the public.
The IDD aesthetics and functions are dematerialszied to create such a shared place. Where teriary buildings are closed off to the public with its strong geometry and heavy mass, the IDD breaks these facades into various layers which reveal its functionality and spaces.

The sense of seamless continuity occurs by opening the building to allow pedestrians to enter. Although, they will not be able to enter campus through the IDD, most of its spaces will be transparent that celebrates the aesthetics and functions of the building.
Collaborative learning happens throughout the building with new learning spaces integrated into the building, such as ALC. Active learning classrooms (ALCs) are designed around student collaboration and active engagement learning. ALCs use round tables where small groups of students can sit together, that allows them to participate in group discussions. The layout is designed in such a manner that minimalizes the hierarchical status of the lecturer and students and allows for better facilitation in class (Chiu,2016:52). These classrooms include flexible furniture, technology support for digital information sharing (blackboard), collaborative areas, low and high technology learning schools, and network connectivity (Lee, 2014: 59).



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2. 3D Interior of ALC, Lee.2014:60.
The furniture (see Figure 1) is laid out in such a way that it promotes collaborative learning. The group tables are on the parameters of the class, making the lecturer promote teaching that has less of a hierarchical status and more collaborative. Large TV screens (see figure 2) are placed on either side of the classrooms where students can either see from every side of the side what they are being taught and can also connect their PC's to them when discussing group activities.

Opening the boundary on the edge of campus and allowing the public to experience and learn from such an intervention can be the start of breaking the fence around campus where the city and campus could be integrated within one another.

03

DESIGN SYNTHESIS

DESIGN SYNTHESIS

CONCEPTUAL APPROACHES

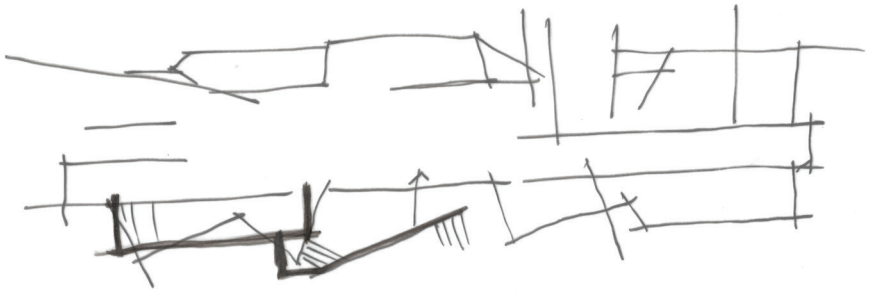
DEVELOPMENT 01

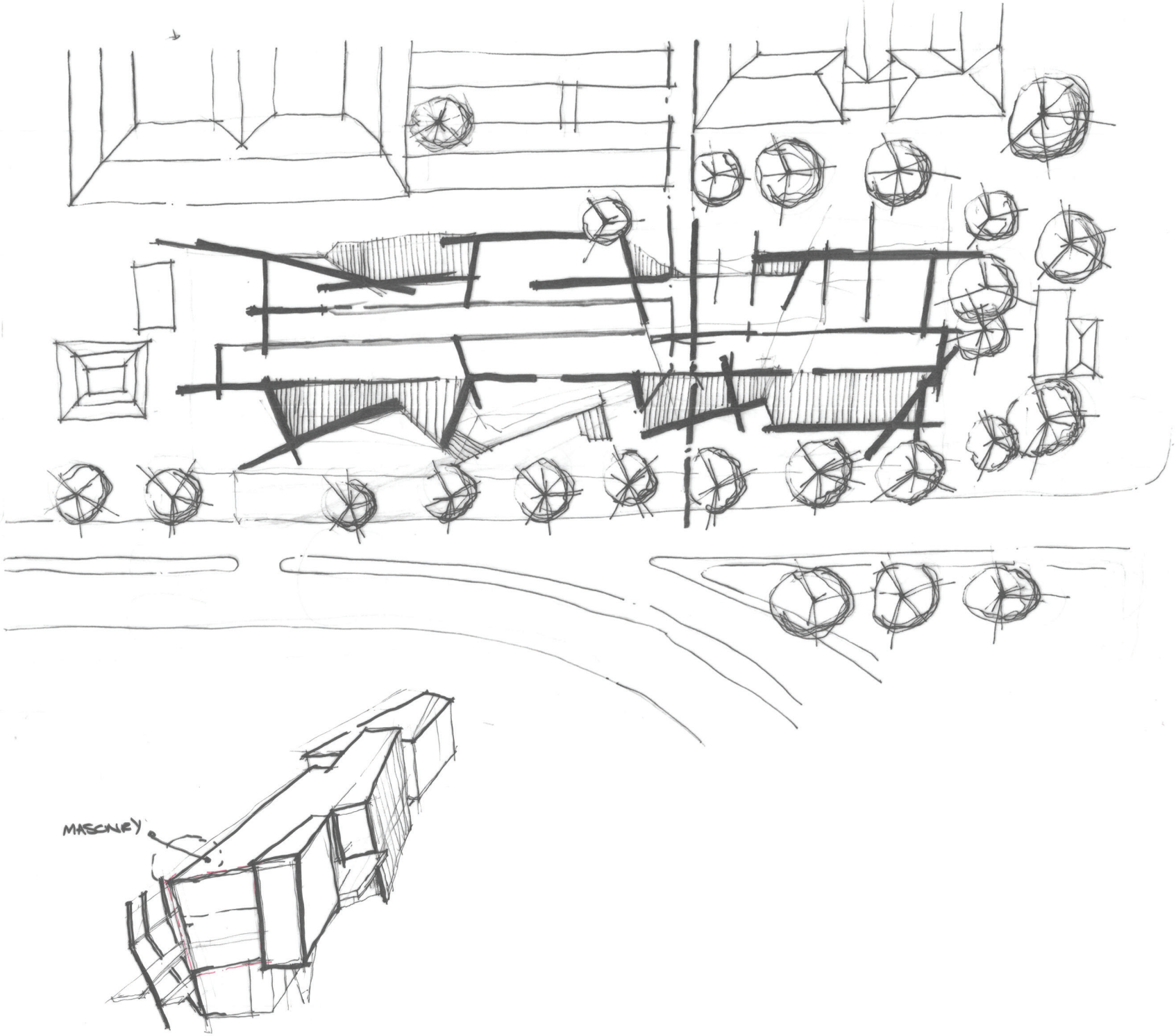
DEVELOPMENT 02

DEVELOPMENT 03

DEVELOPMENT 04

CONCEPTUAL APPROACHES

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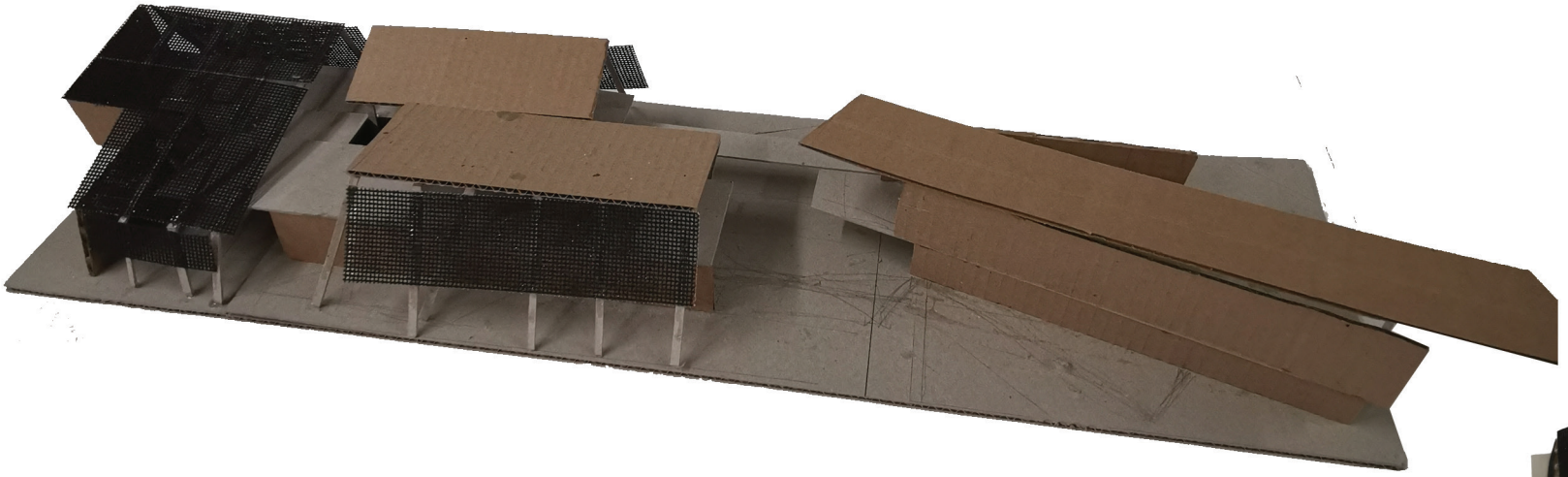
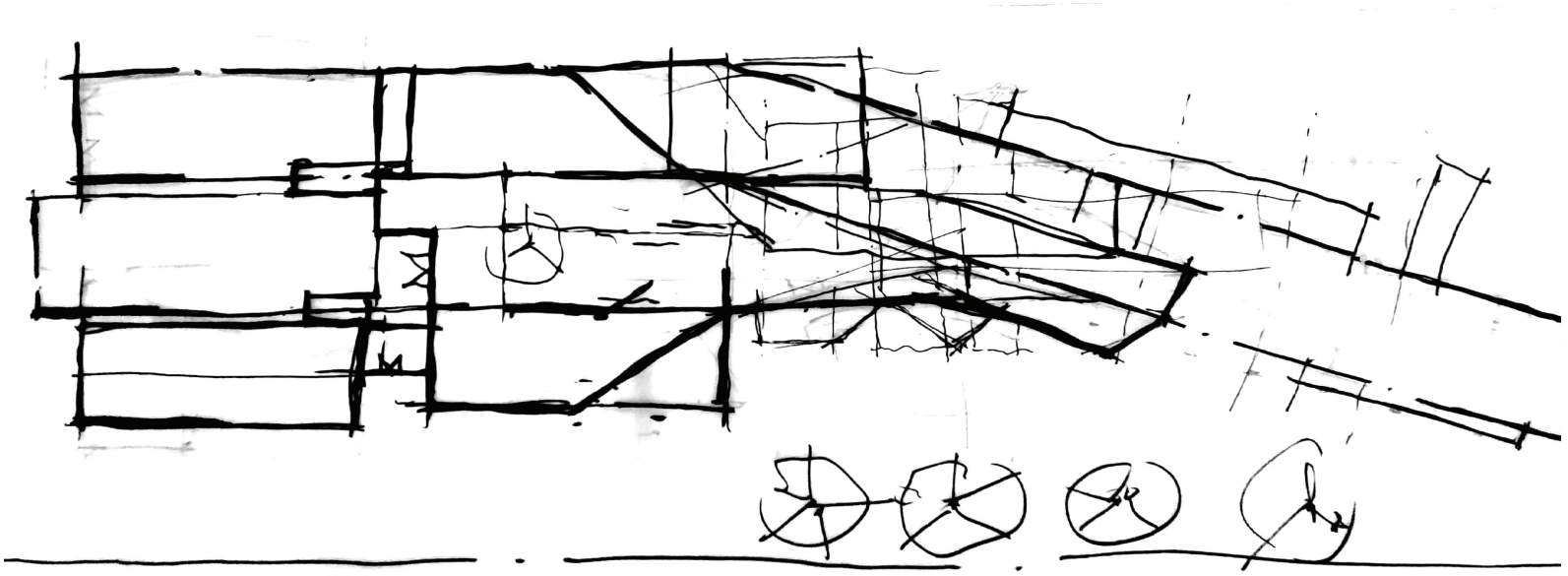
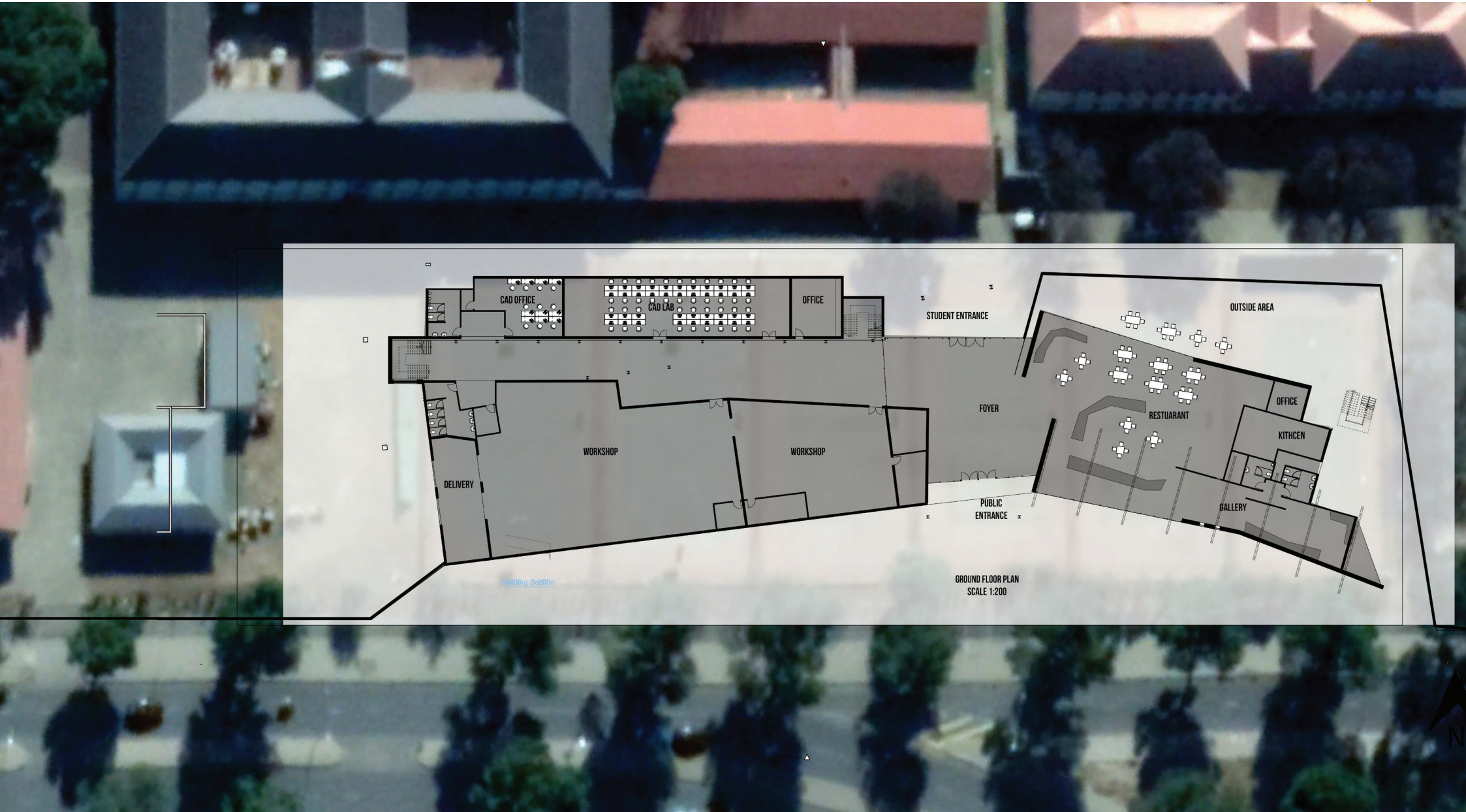
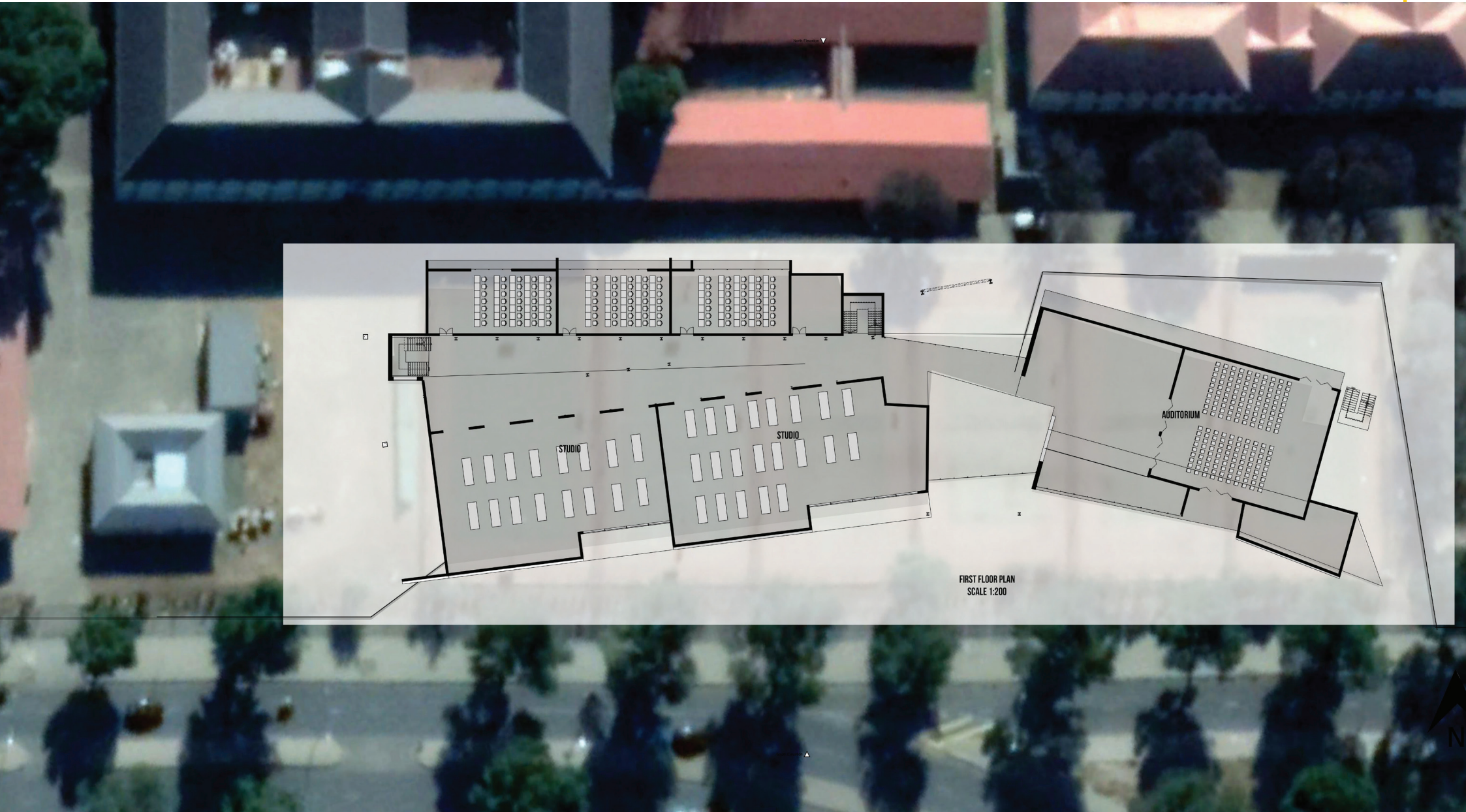




DEVELOPMENT STAGE 01

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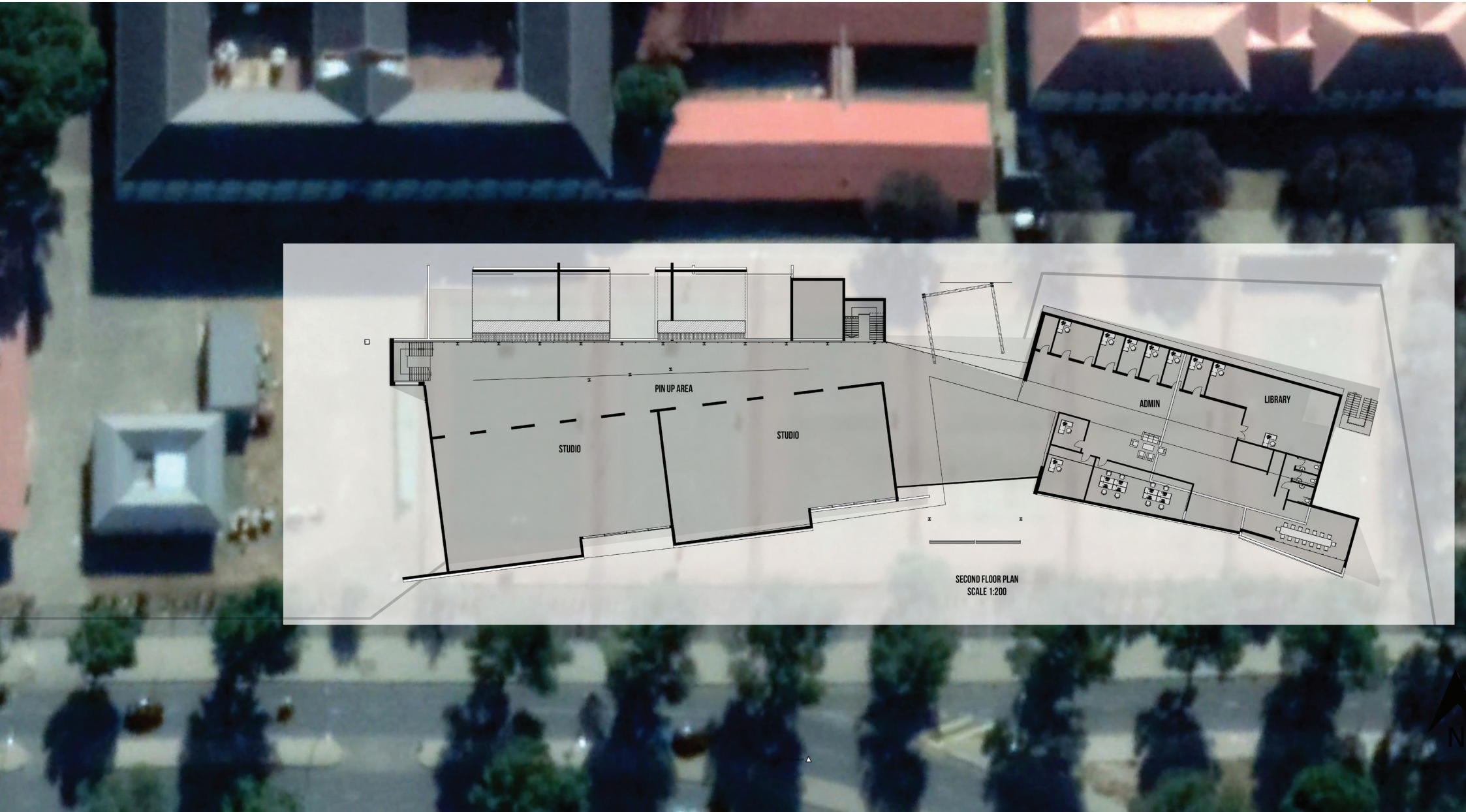
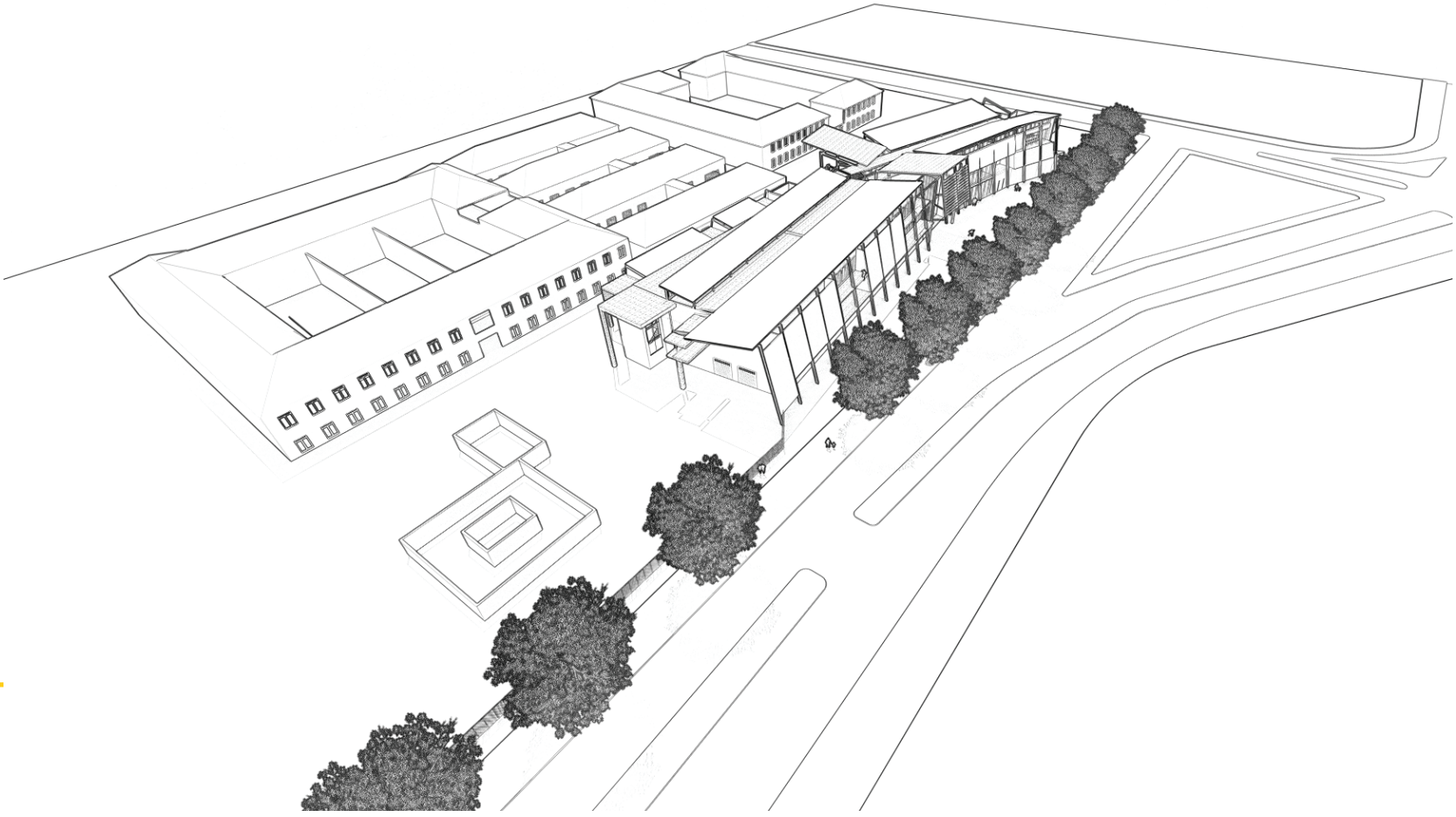
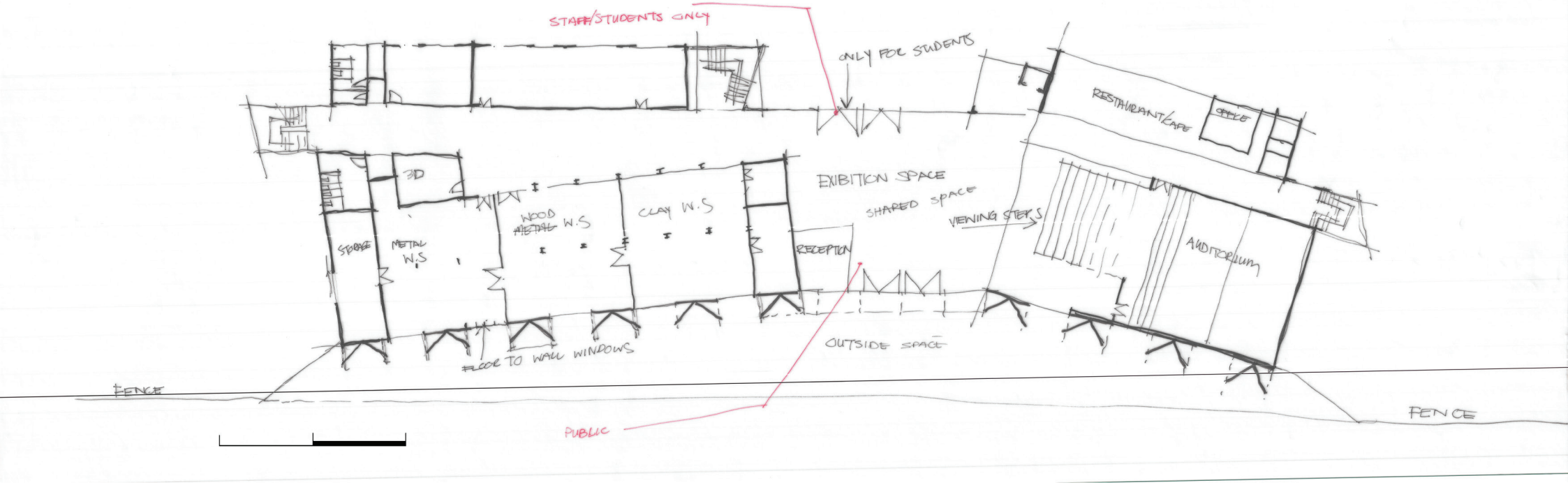
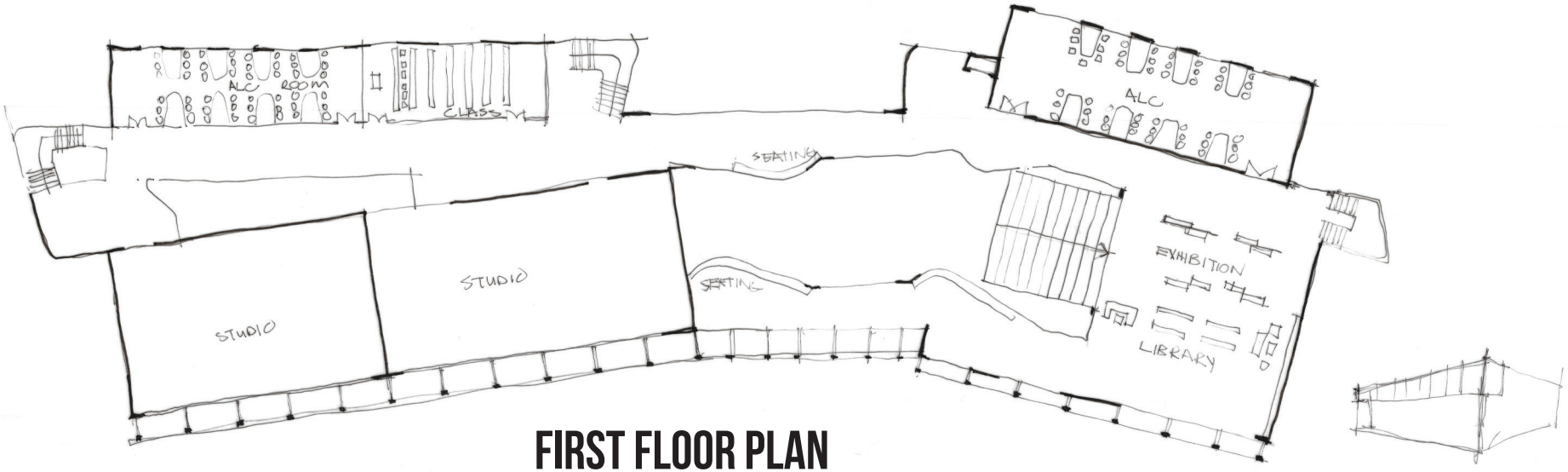
STUDIO
AUDITORIUM
FIRST FLOOR PLAN
SCALE 1:200


PIN UP AREA
STUDIO
STUDIO
ADMIN
LIBRARY
SECOND FLOOR PLAN
SCALE 1:200
N




STAFF/STUDENTS ONLY
ONLY FOR STUDENTS
RESTAURANT/CAFE
OFFICE
3D
WOOD W.S
CLAY W.S
EXIBITION SPACE
SHARED SPACE
VIEWING STEPS
STORAGE
METAL W.S
RECEPTION
AUDITORIUM
FLOOR TO WALL WINDOWS
OUTSIDE SPACE
FENCE
PUBLIC
FENCE



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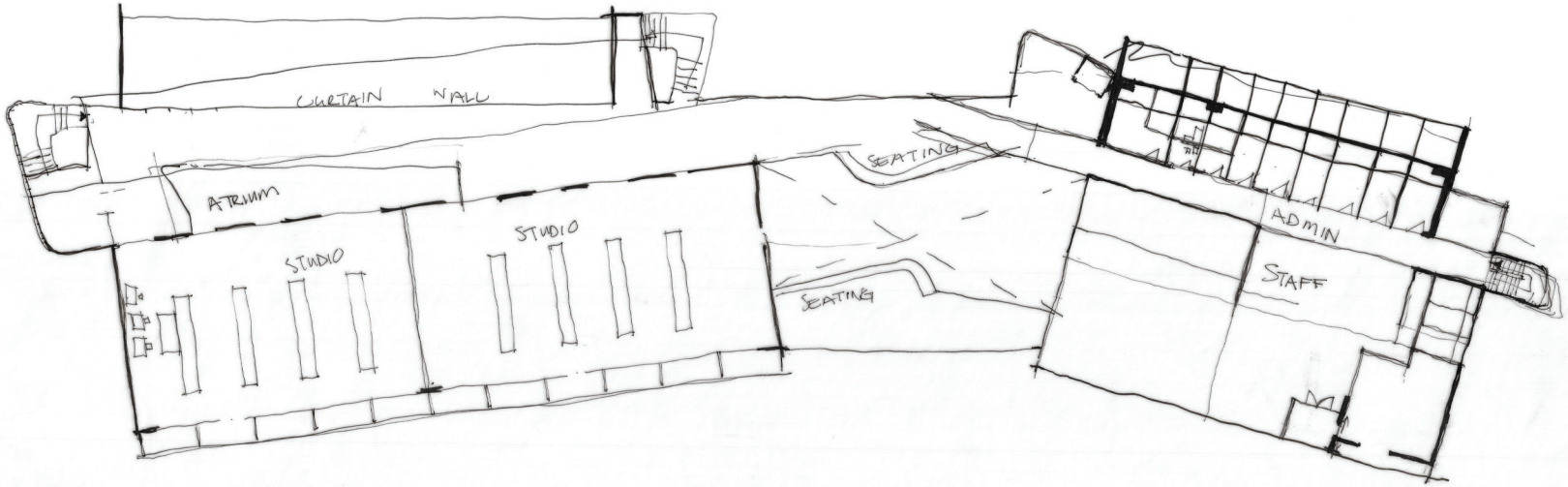

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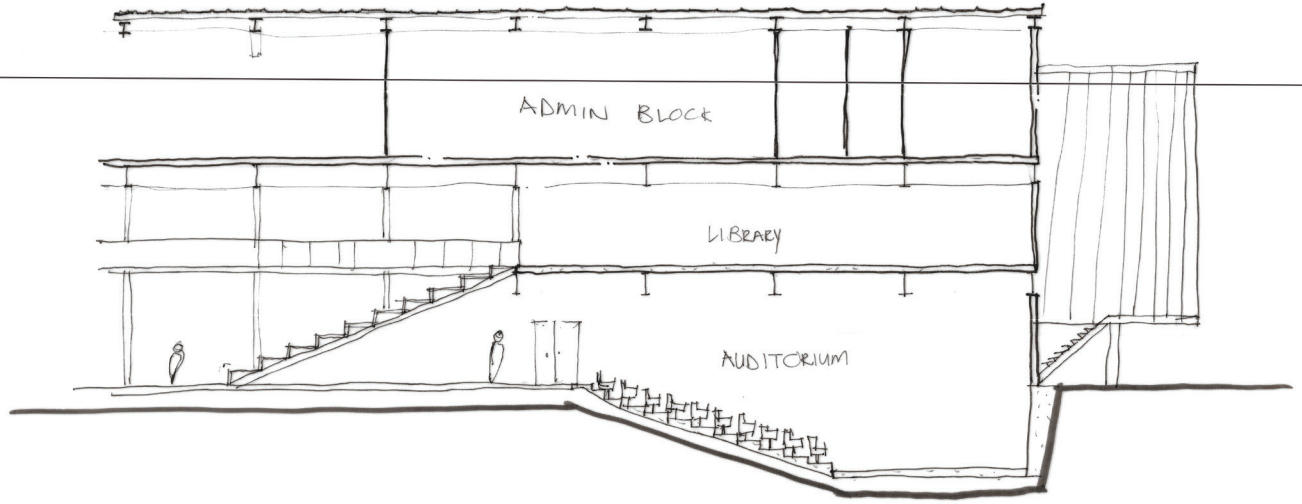
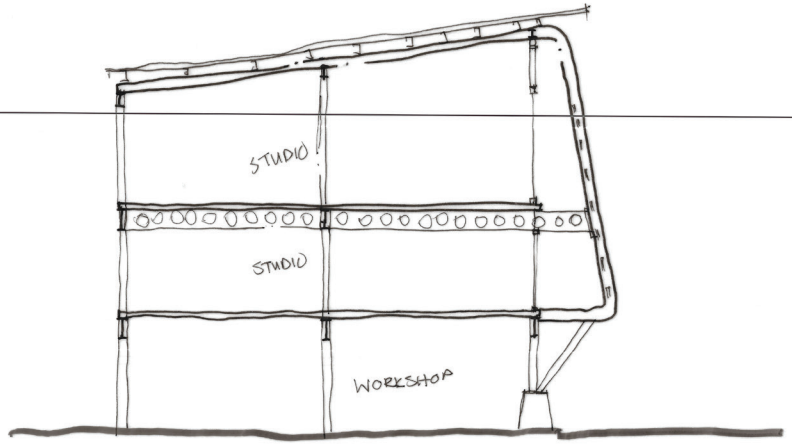
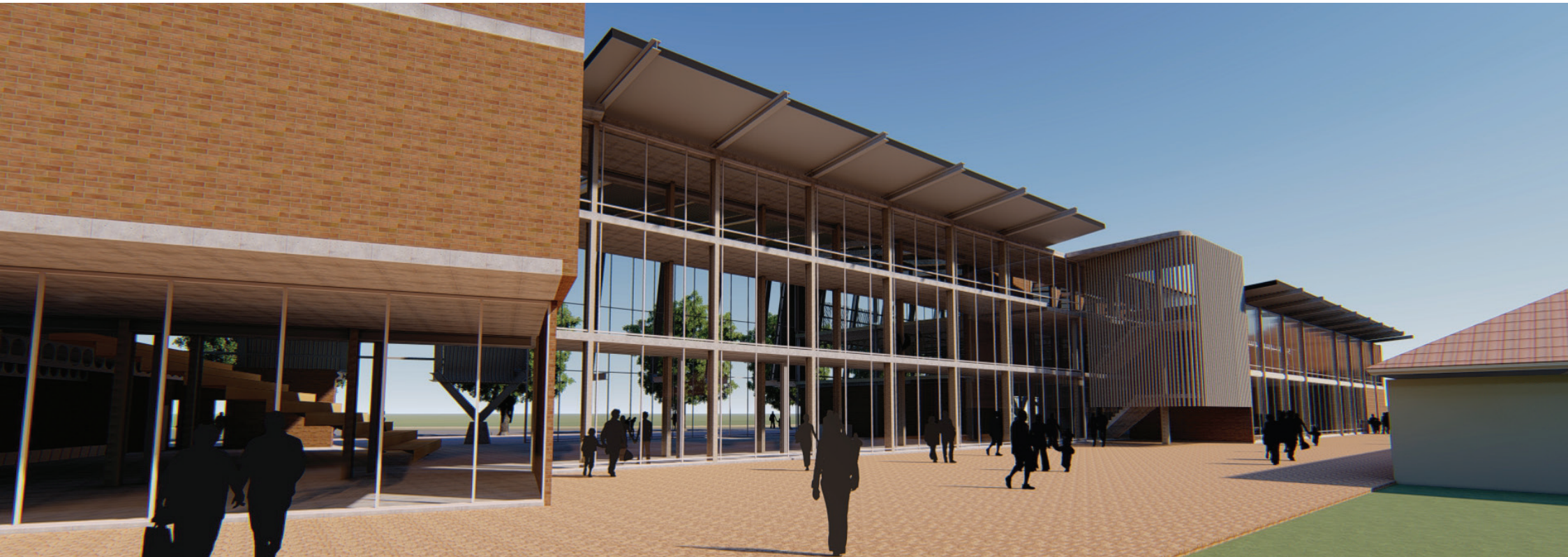
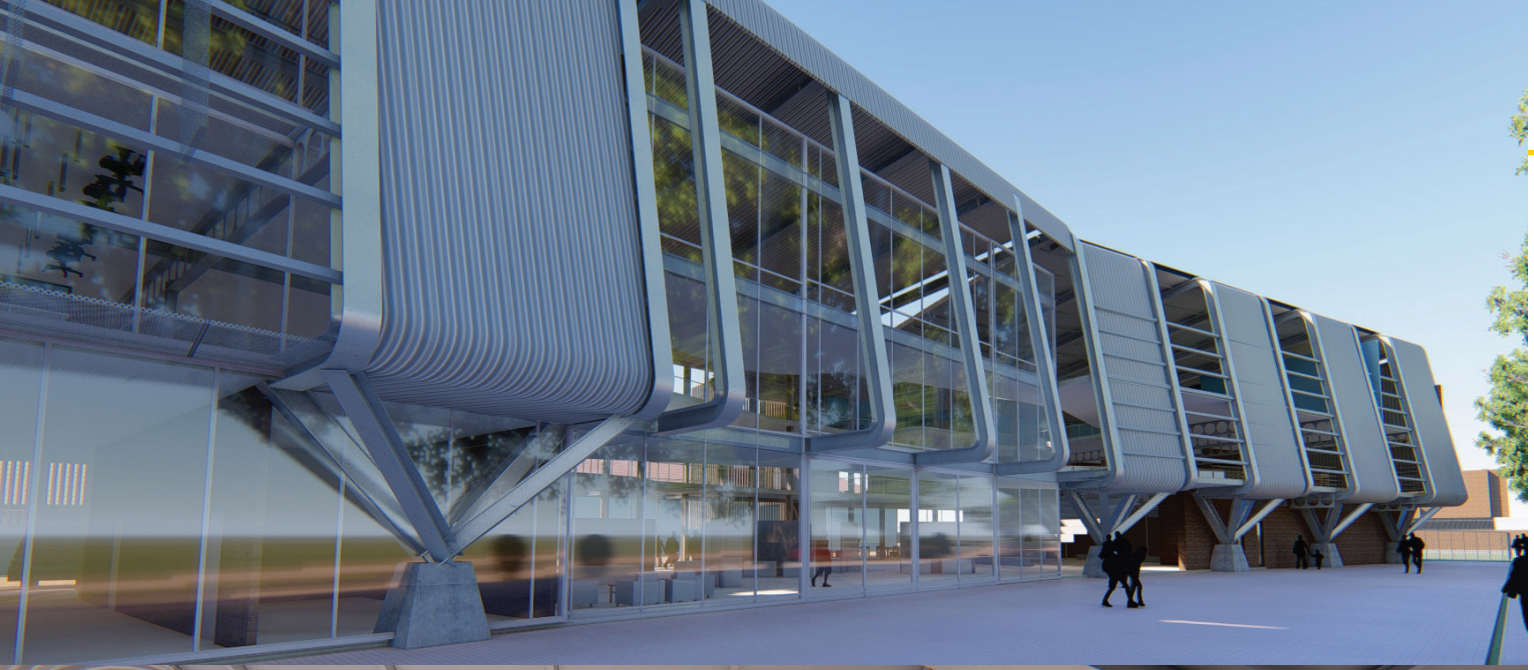
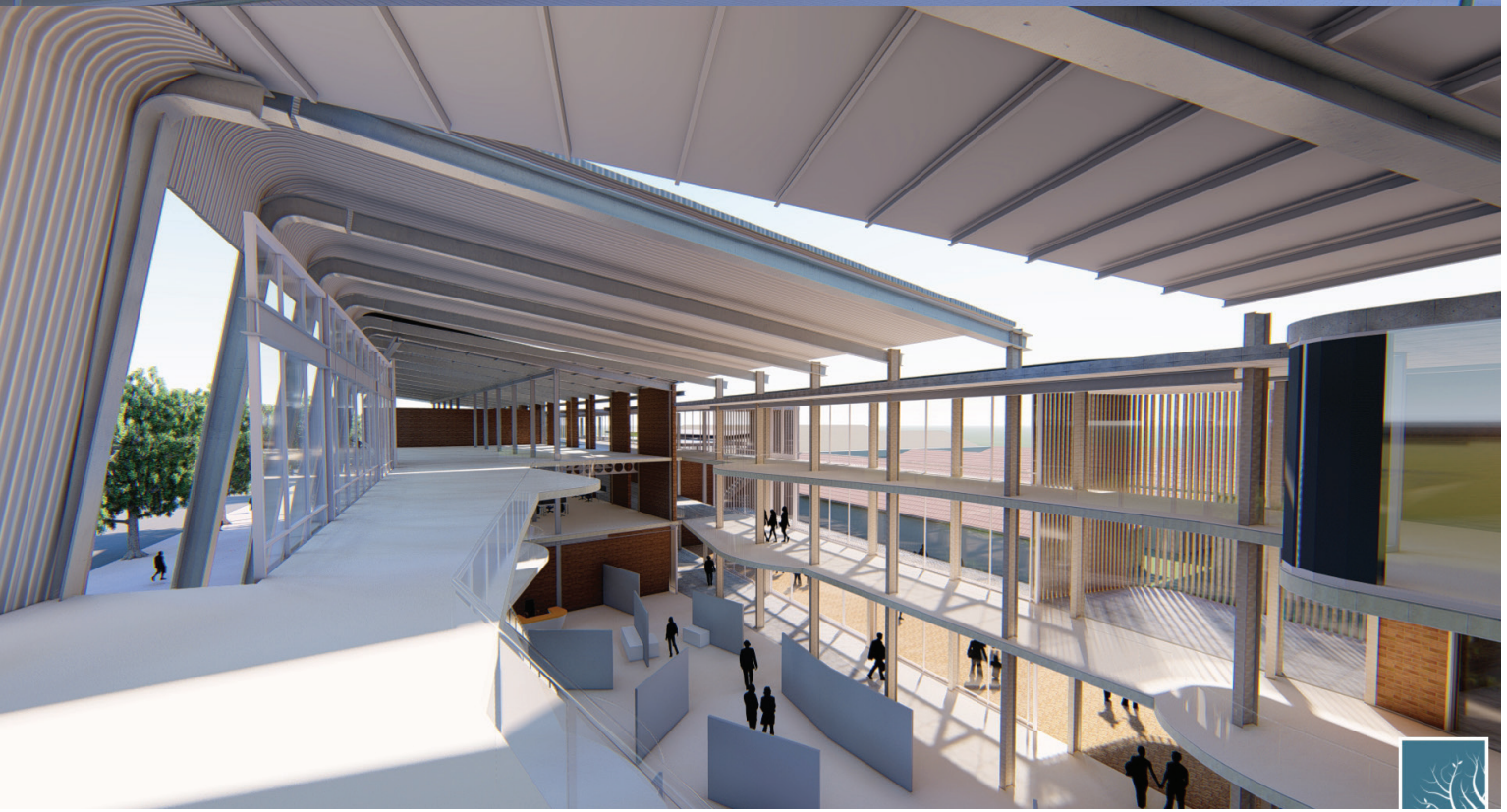

ADMIN BLOCK
LIBRARY
AUDITORIUM

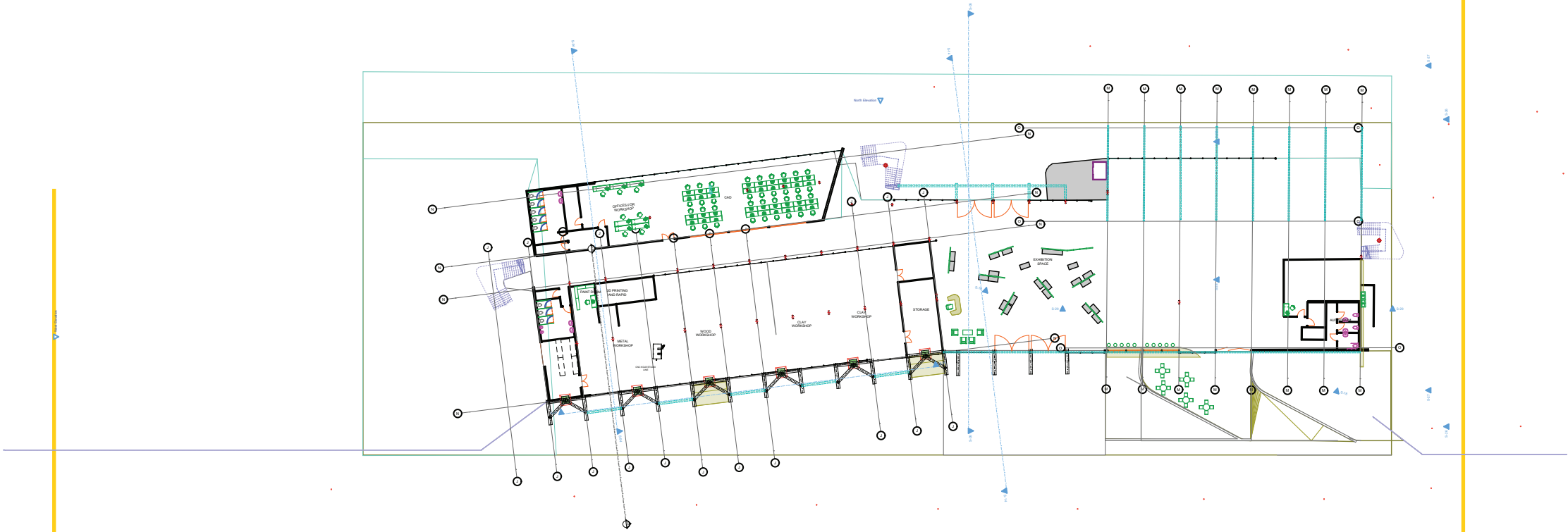

STUDIO
STUDIO
WORKSHOP







DEVELOPMENT STAGE 03



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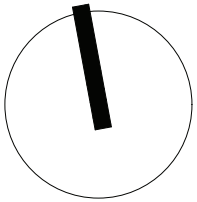
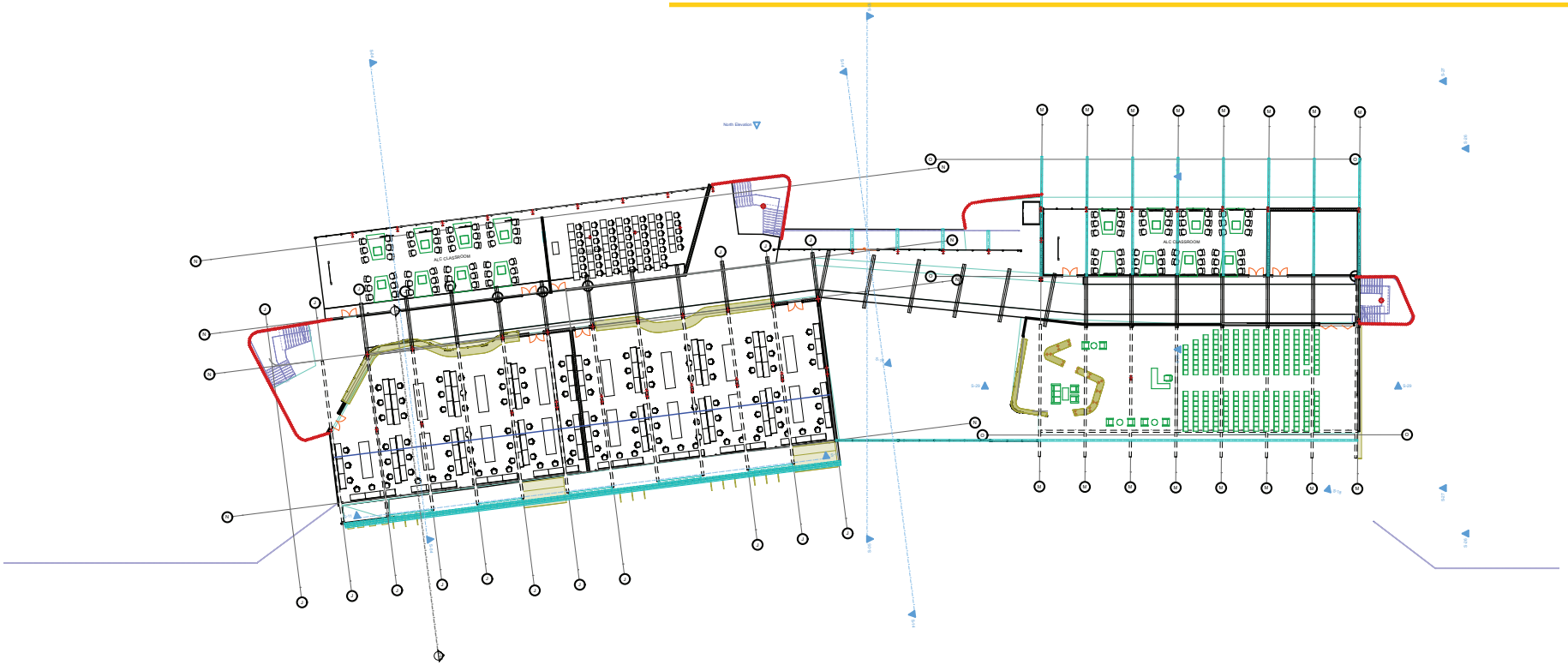
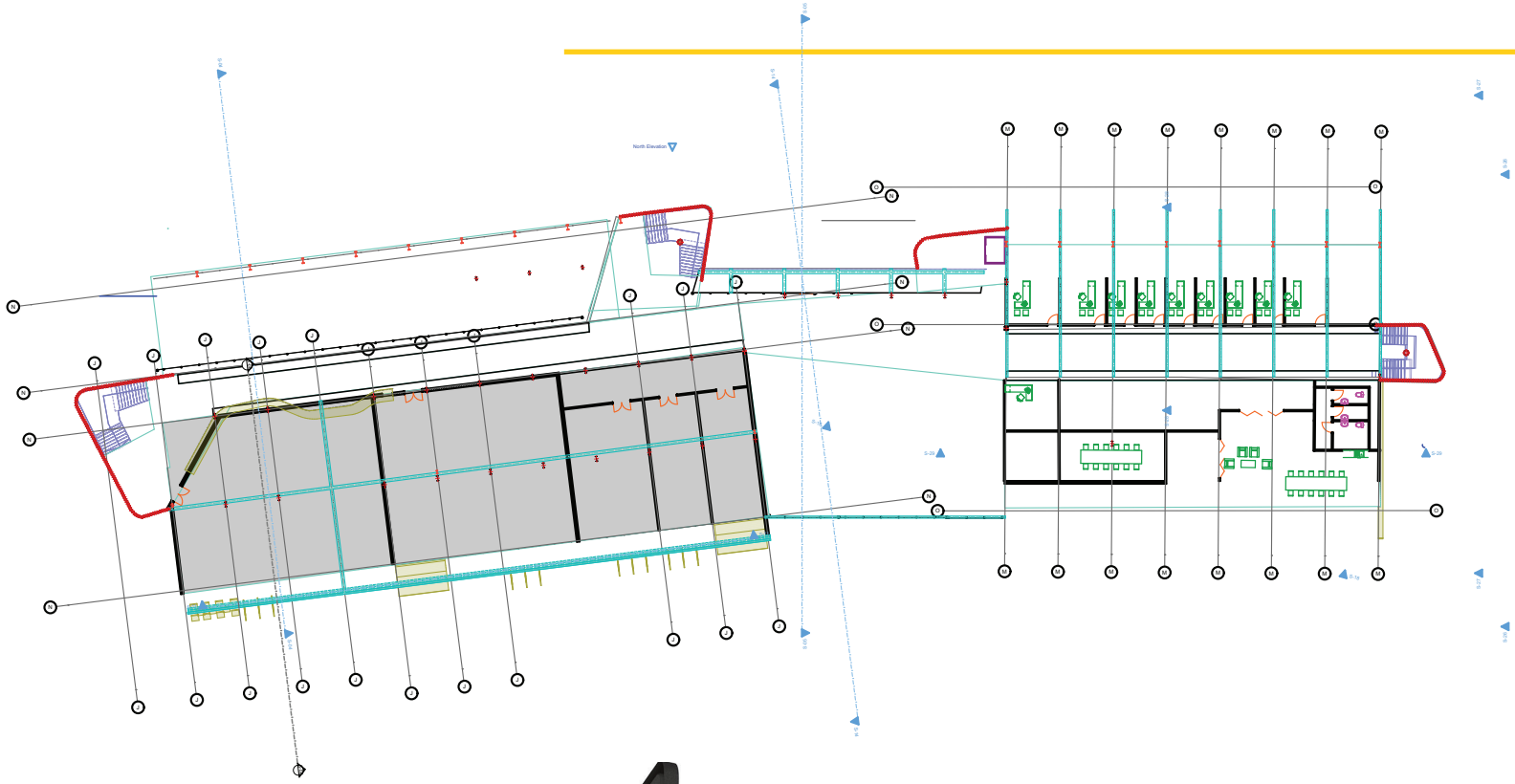
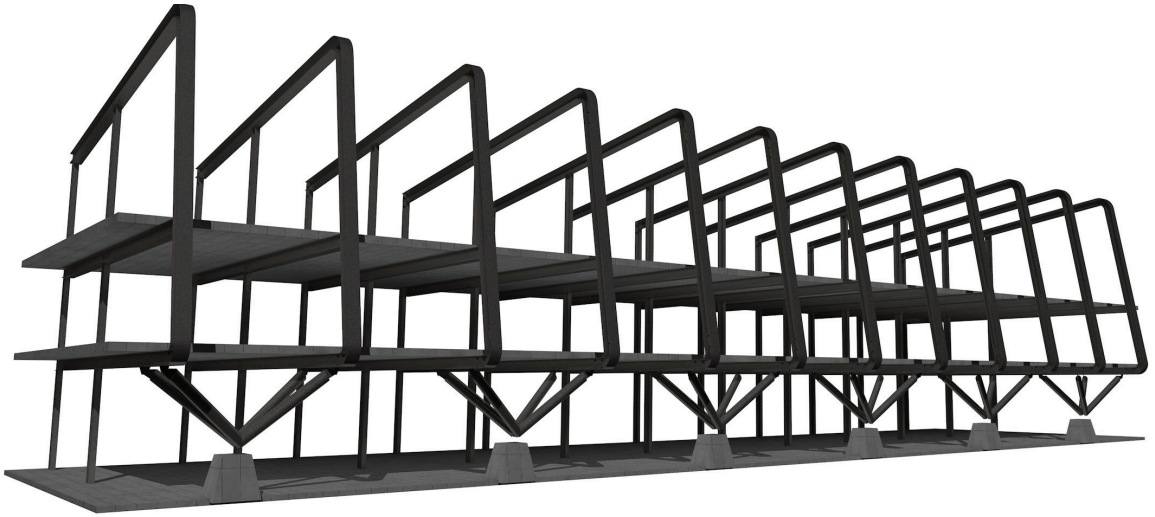




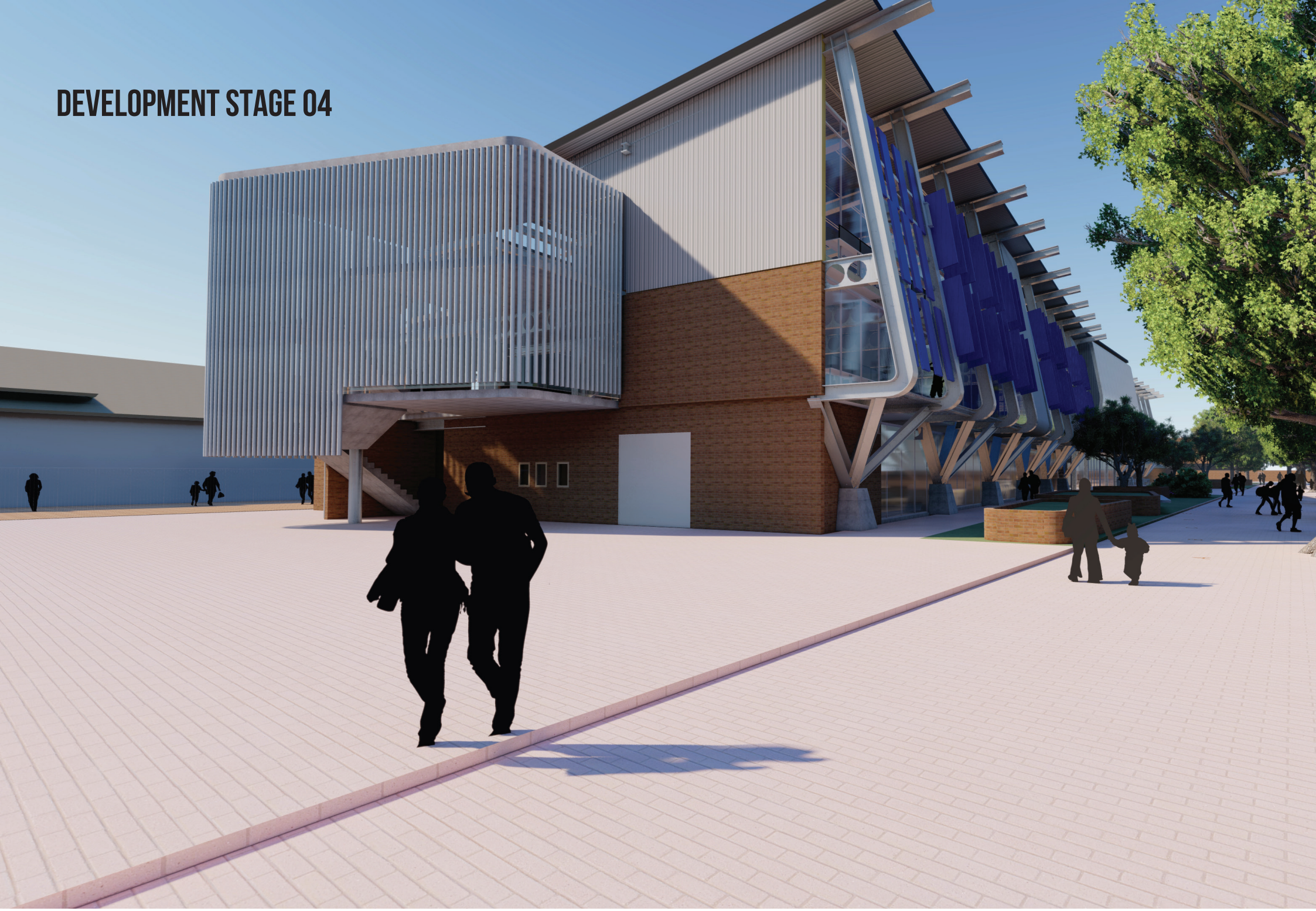
FIRST FLOOR
SCALE 1:500

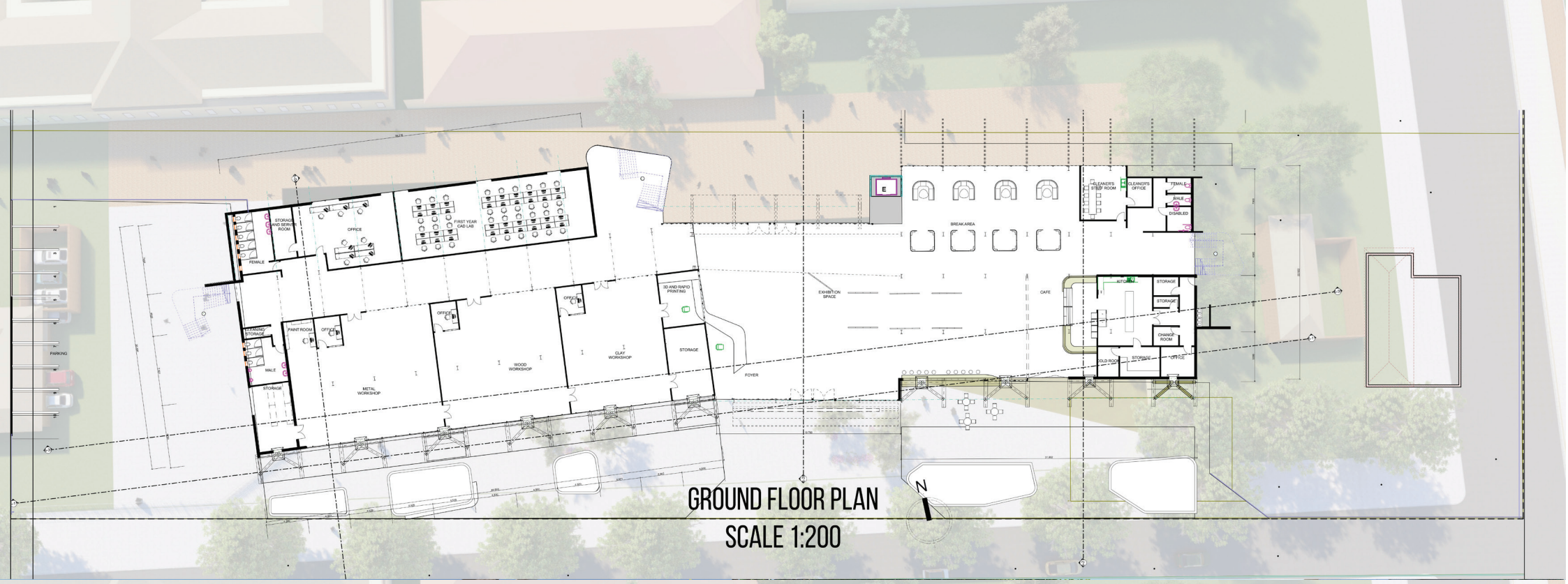




SECOND FLOOR
SCALE 1:500

DEVELOPMENT STAGE 04





GROUND FLOOR PLAN
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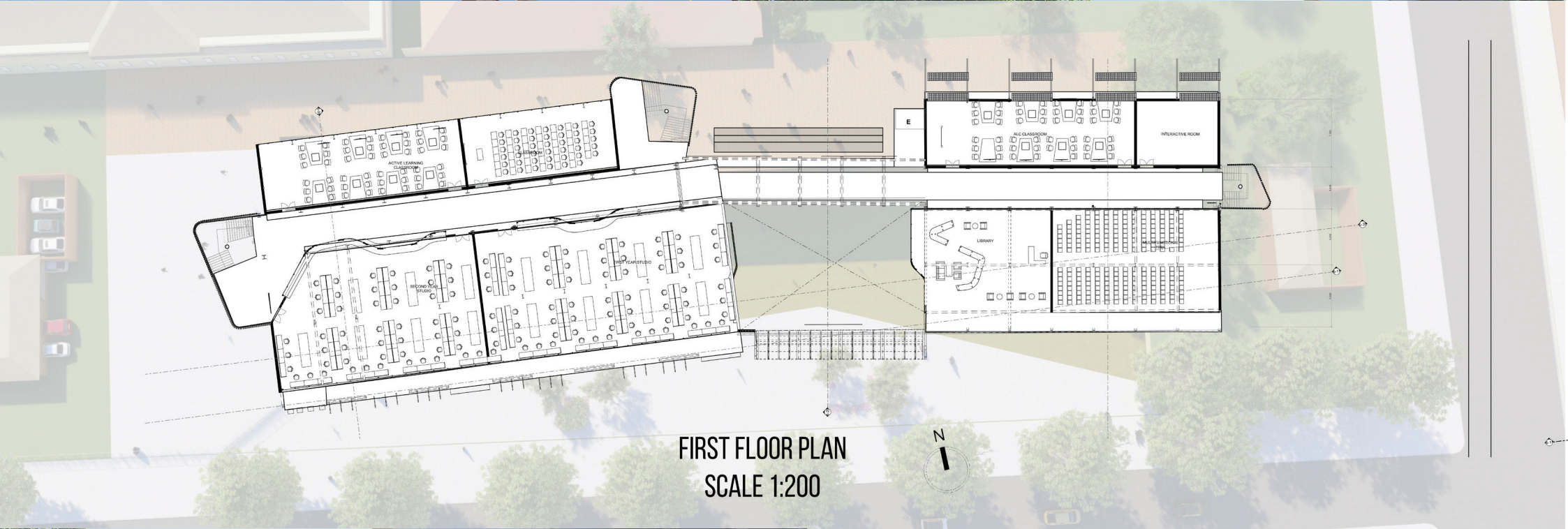

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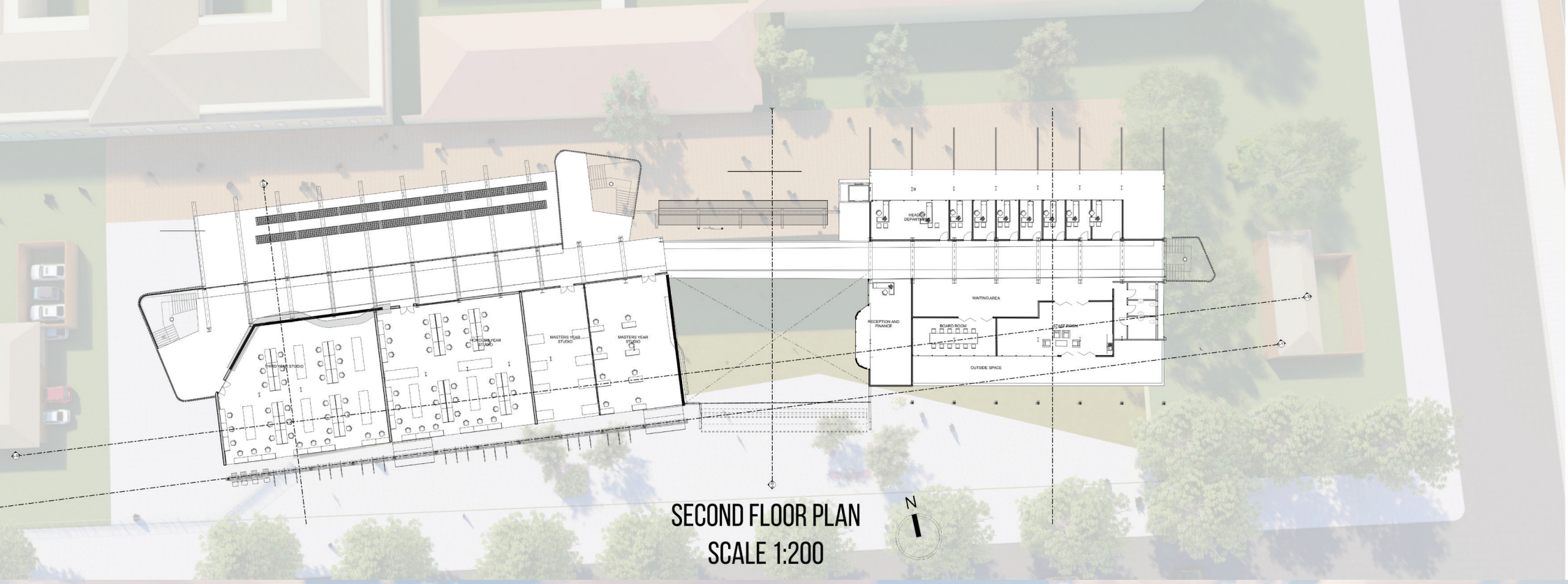

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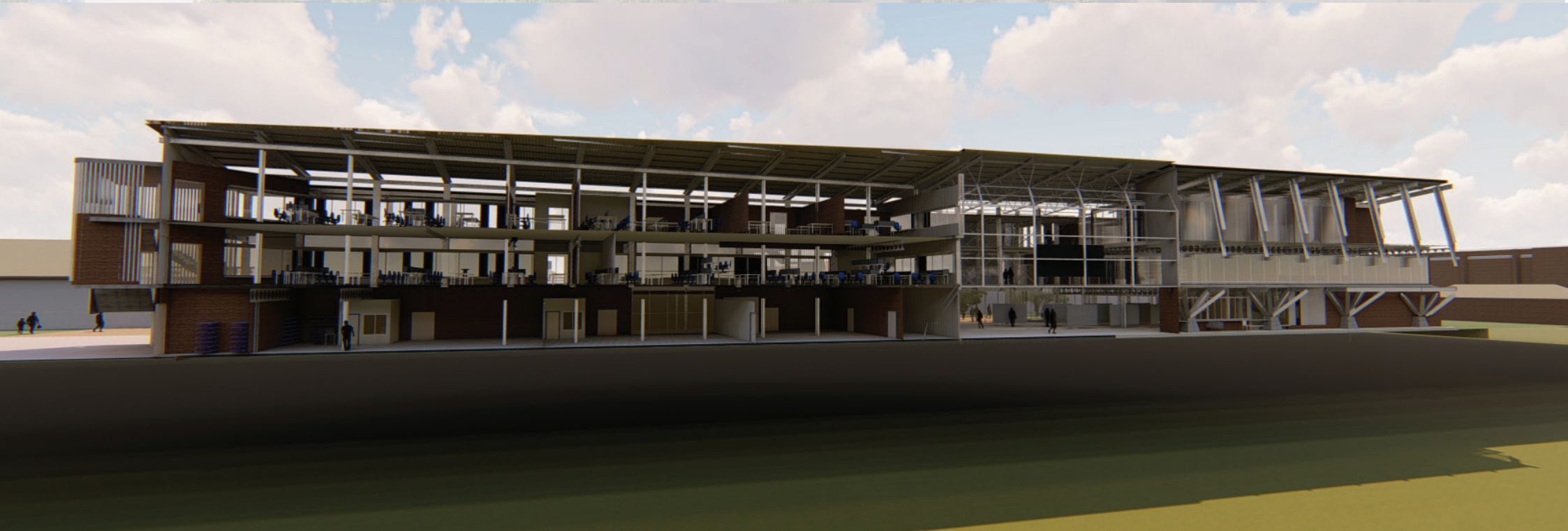
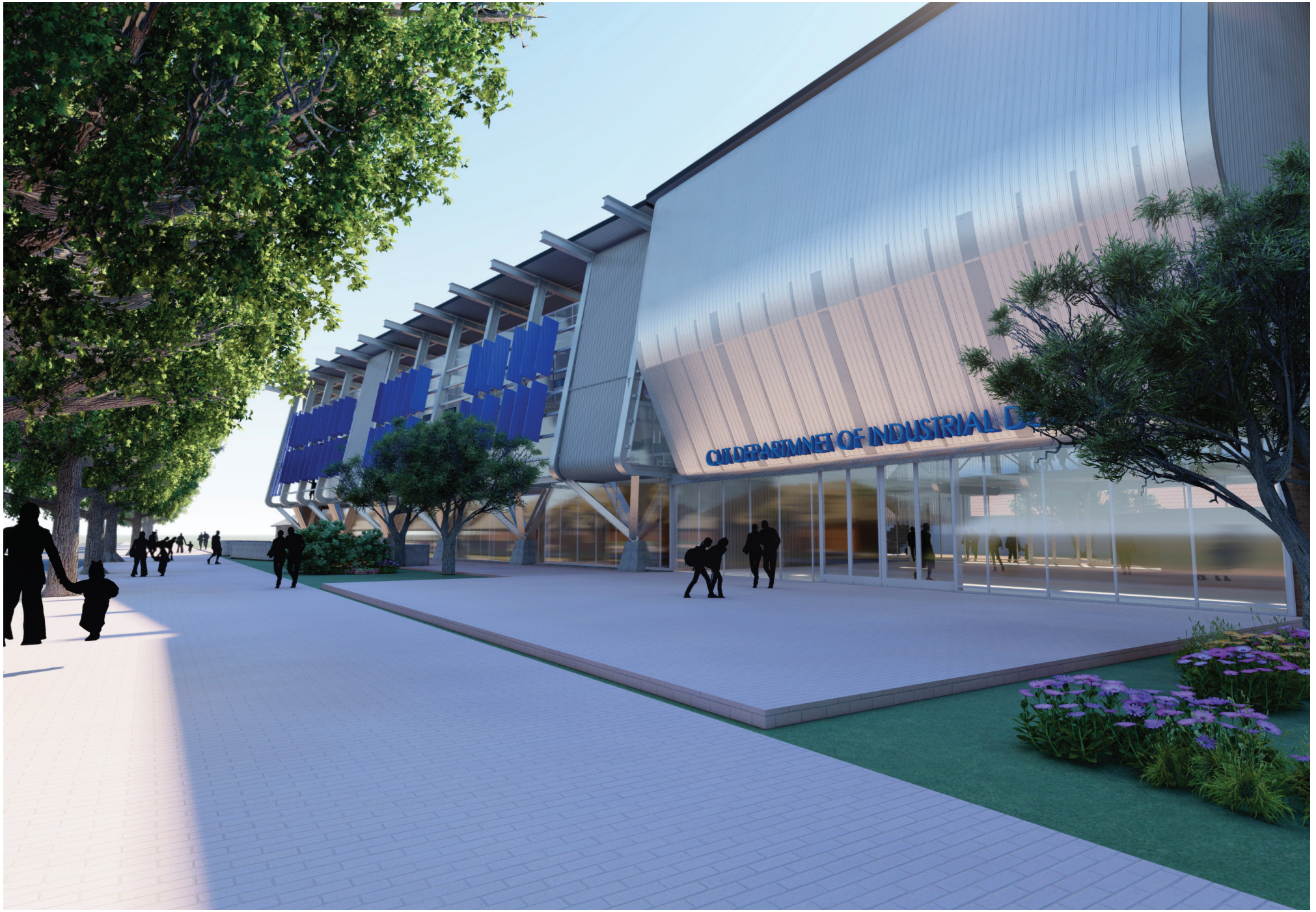
SCALE 1:200

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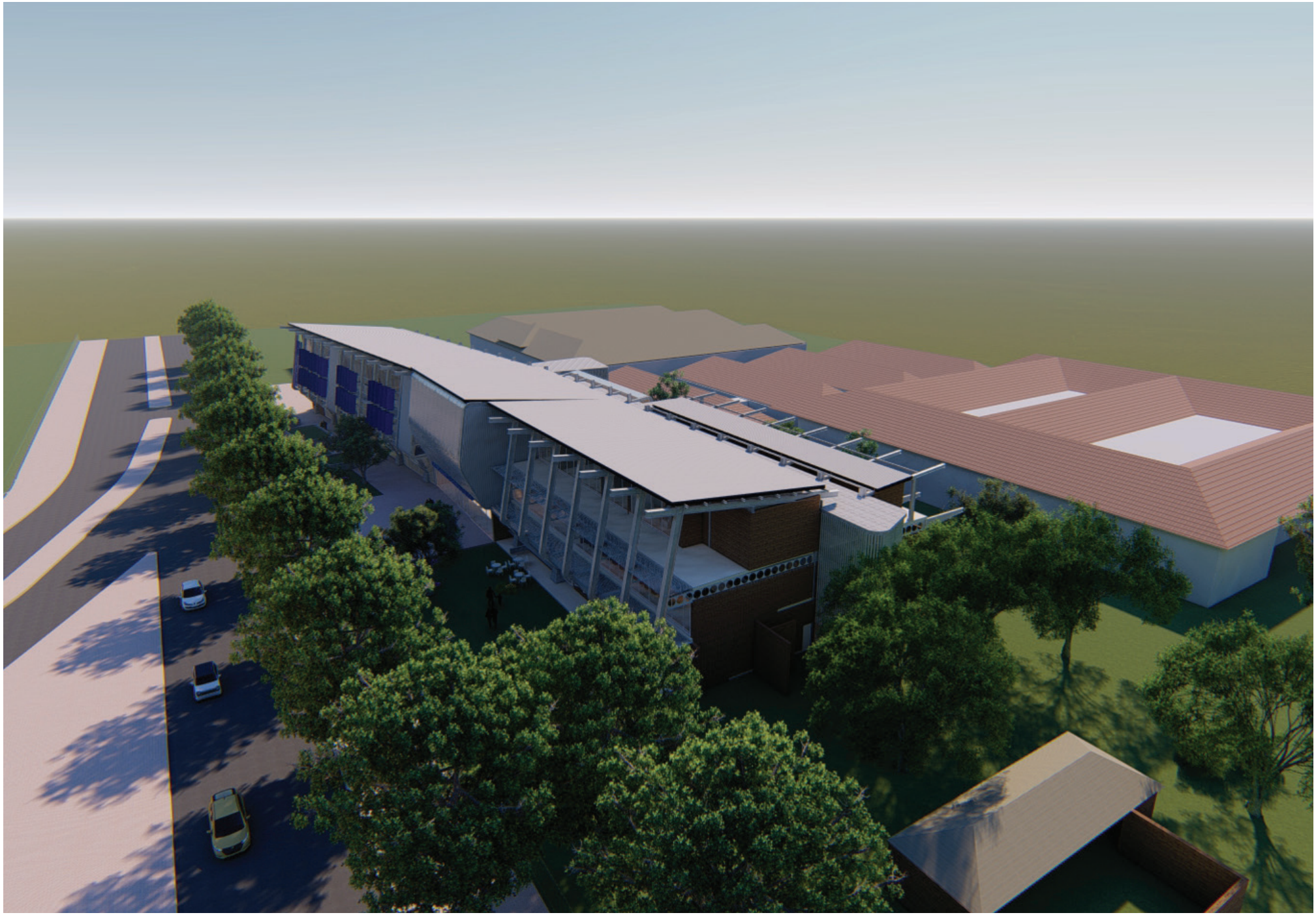


LUMION
PRO STUDENT


LUMION
PRO STUDENT


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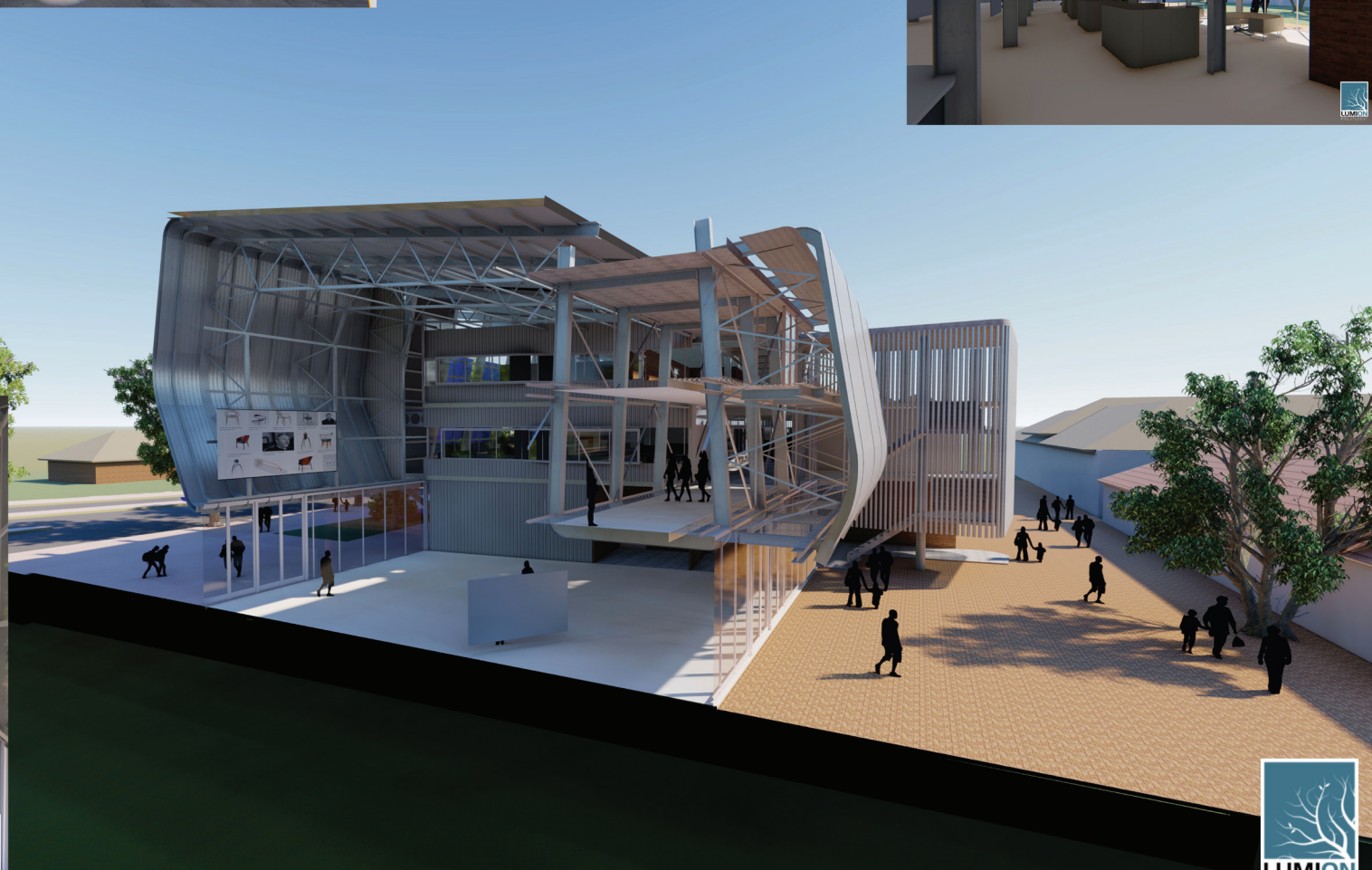
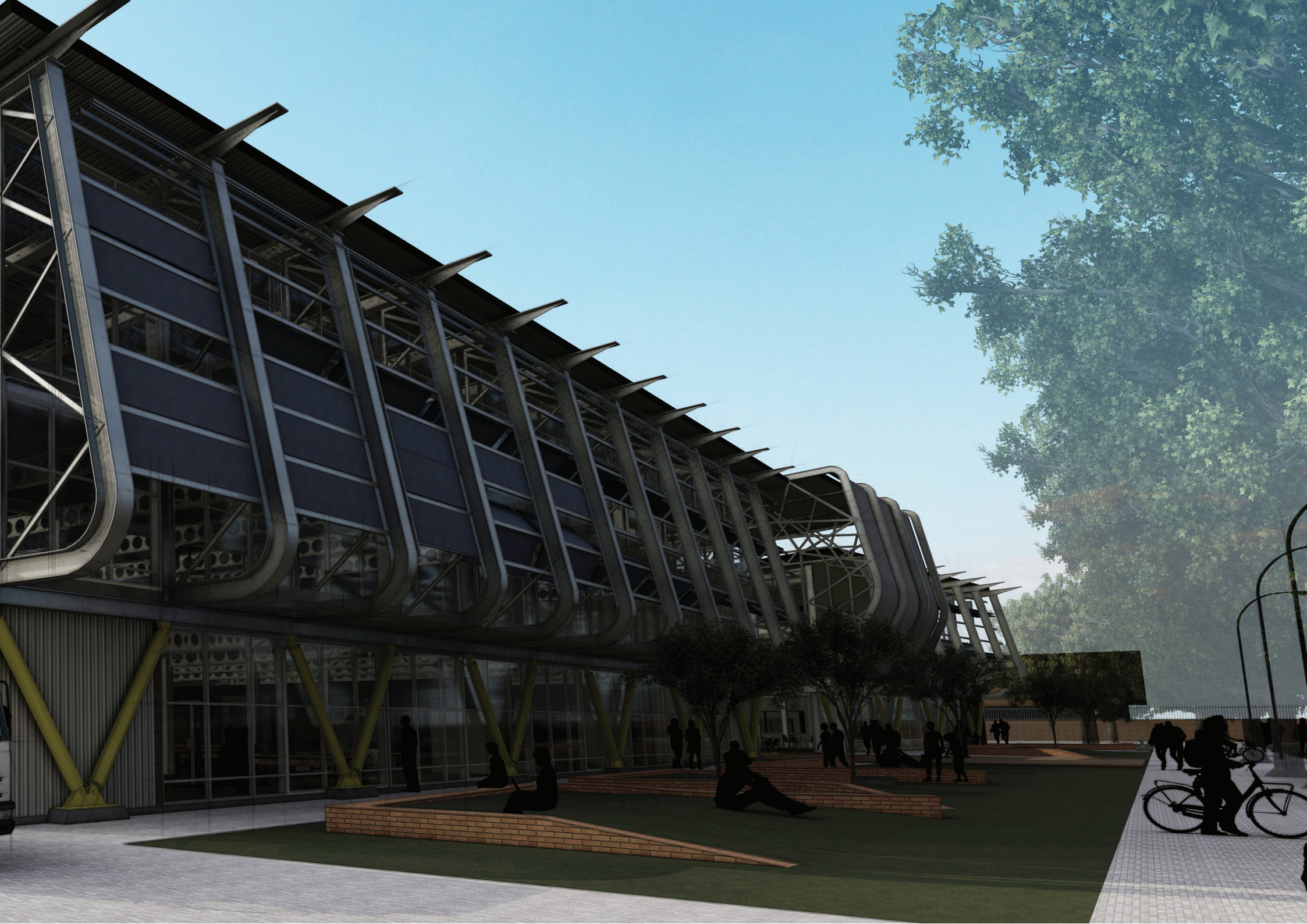
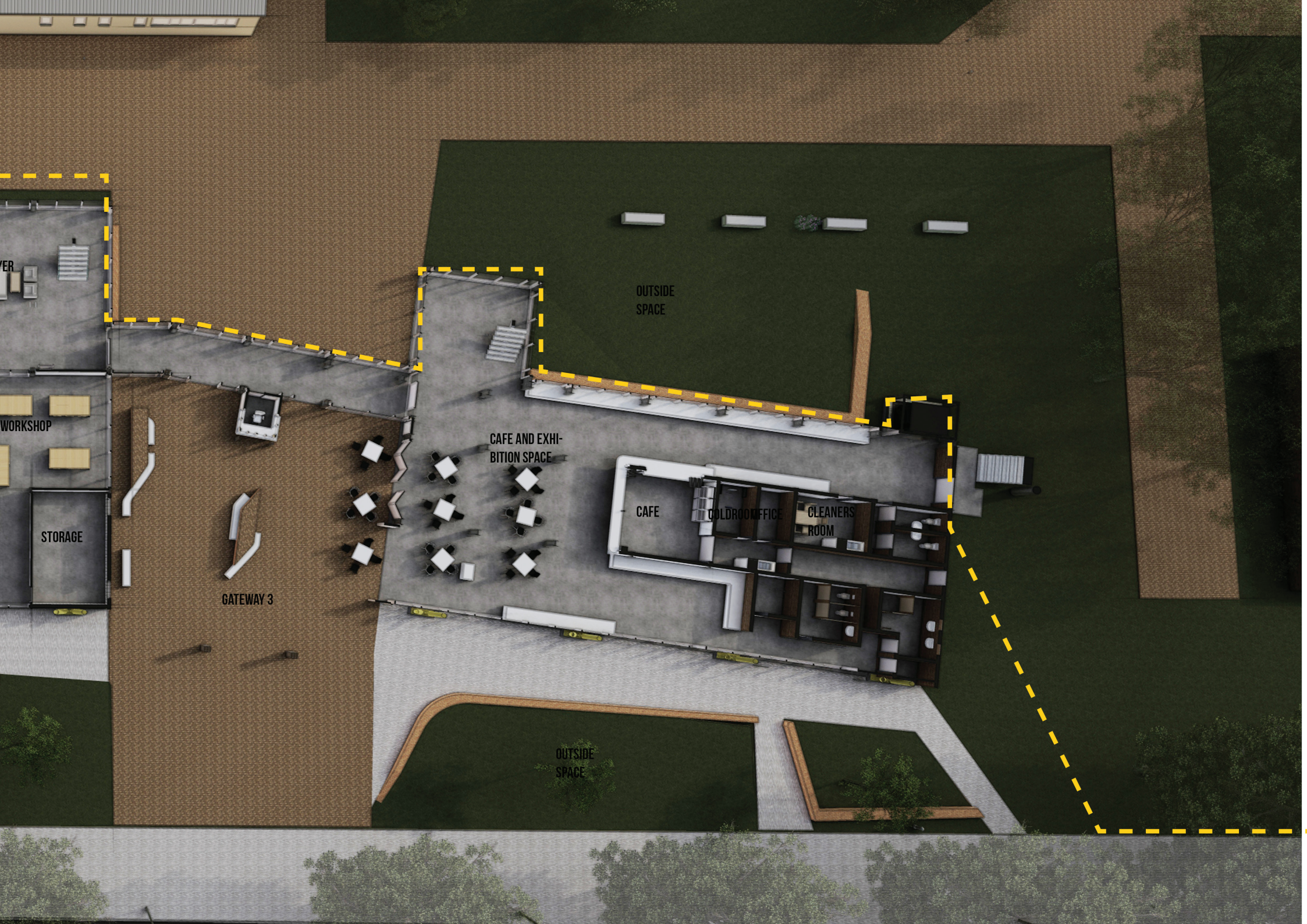
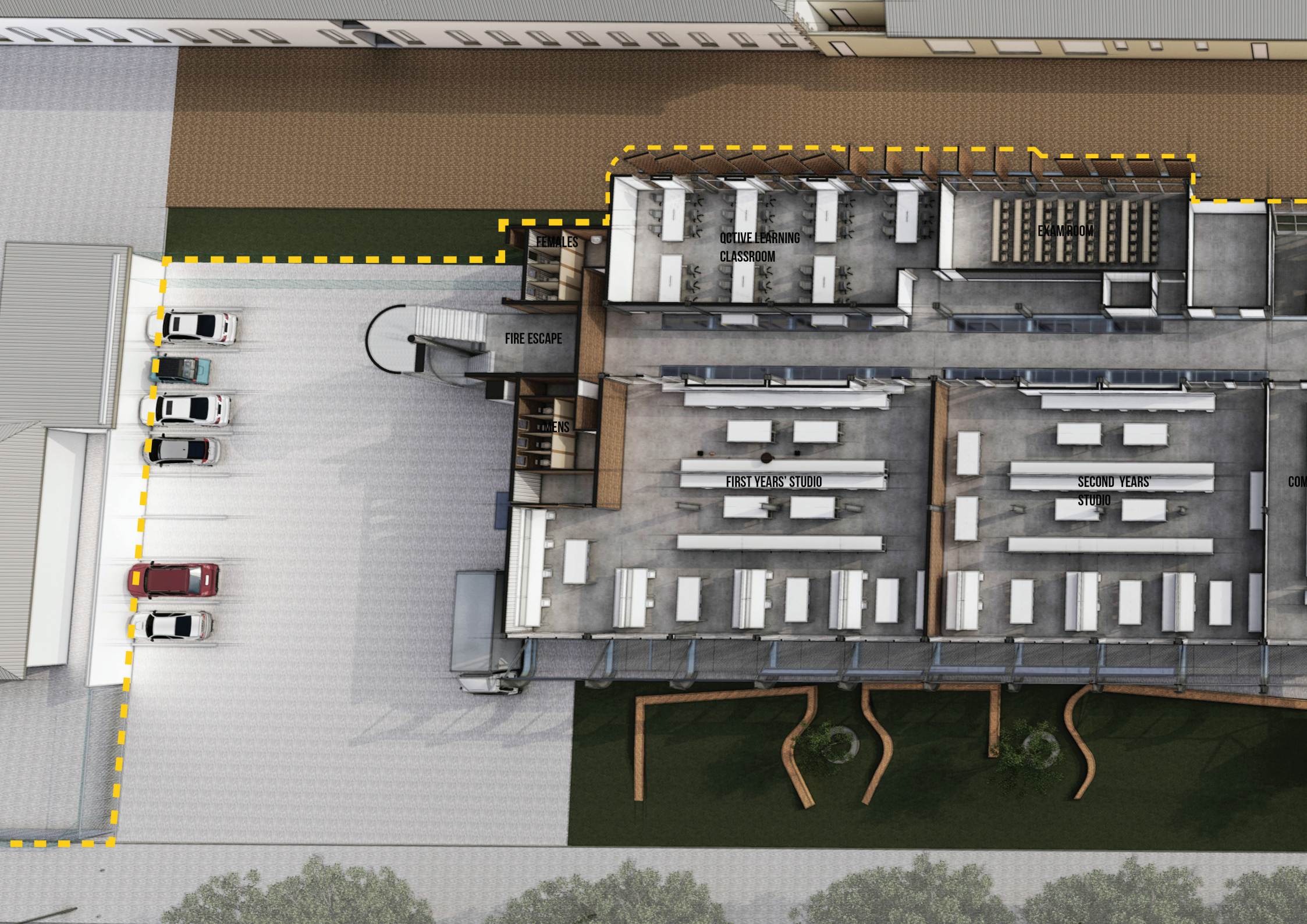

LUMION

FINAL SYNTHESIS




STAFF ROOM
RESEARCHERS OFFICE
BOARD ROOM
ASSEMBLY ROOM
RAPID PRINTING ROOM
RECEPTION
FEMALE
CIRCULATION
STORAGE
OFFICE
OFFICE
MENS
METAL WORKSHOP
WOOD WORKSHOP
CLAY
PAINT
STORAGE
OUTSIDE SPACE


VER
WORKSHOP
STORAGE
GATEWAY 3
CAFE AND EXHI-
BITION SPACE
OUTSIDE
SPACE
CAFE
COLDROOM
OFFICE
CLEANERS
ROOM
OUTSIDE
SPACE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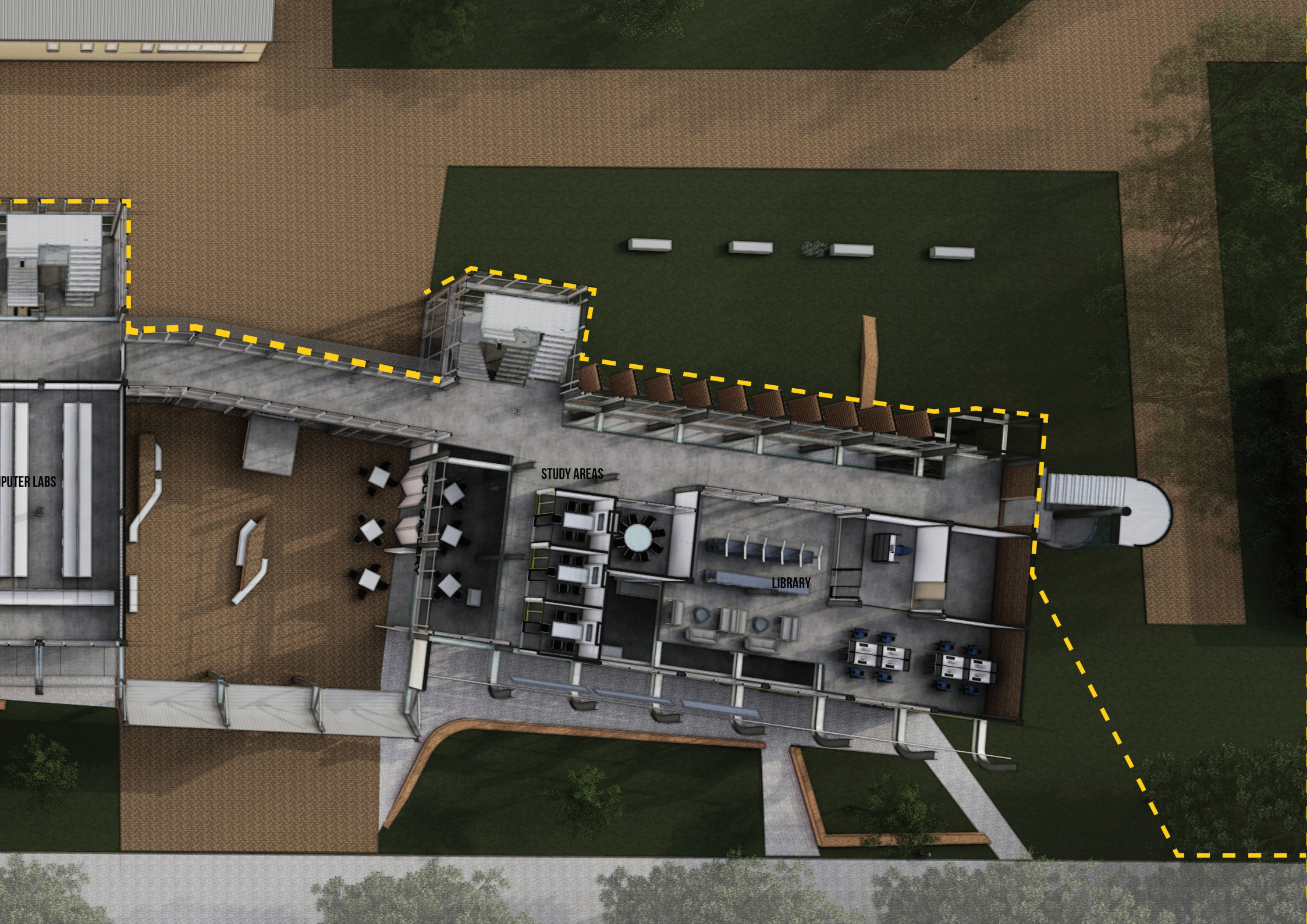
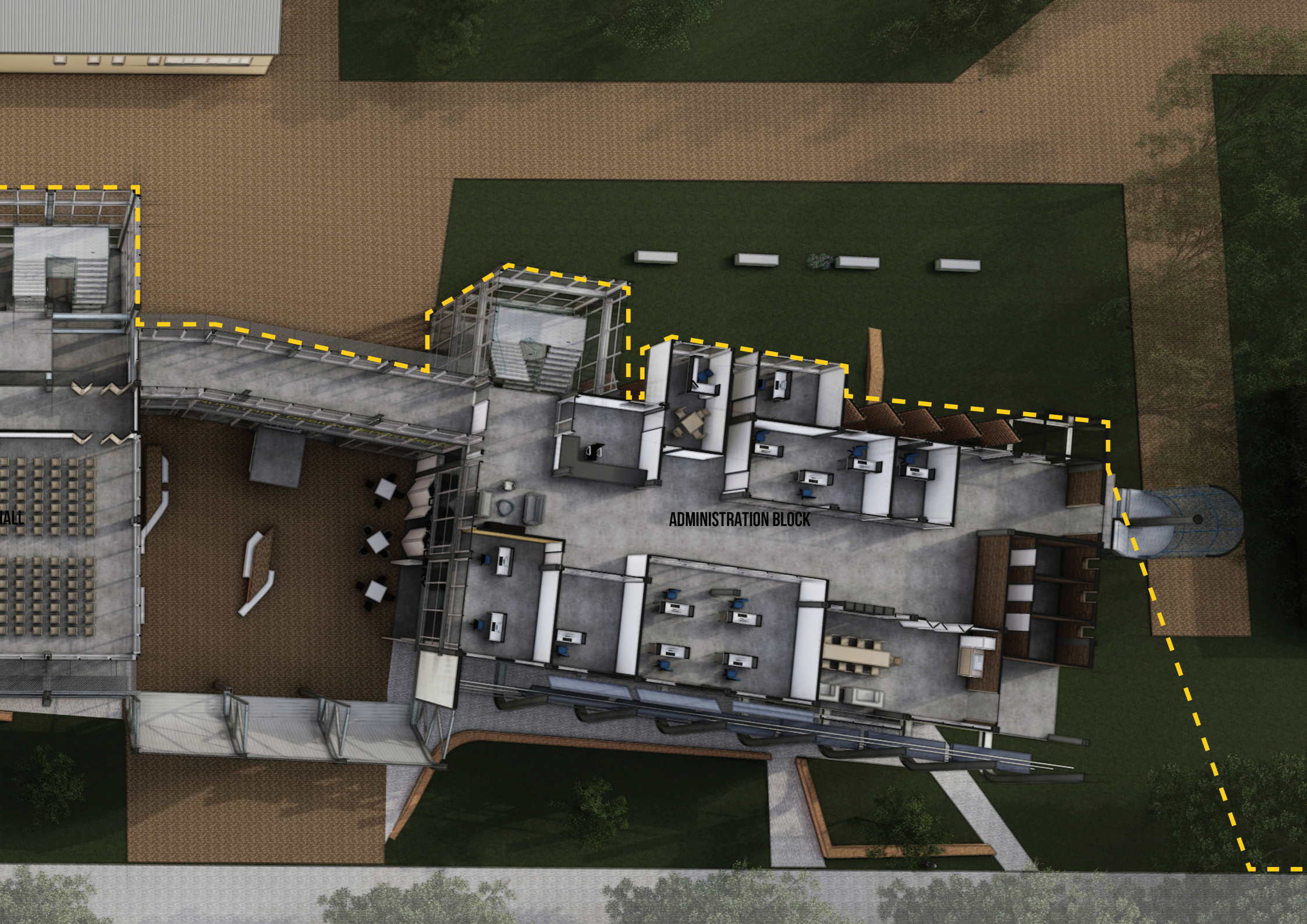
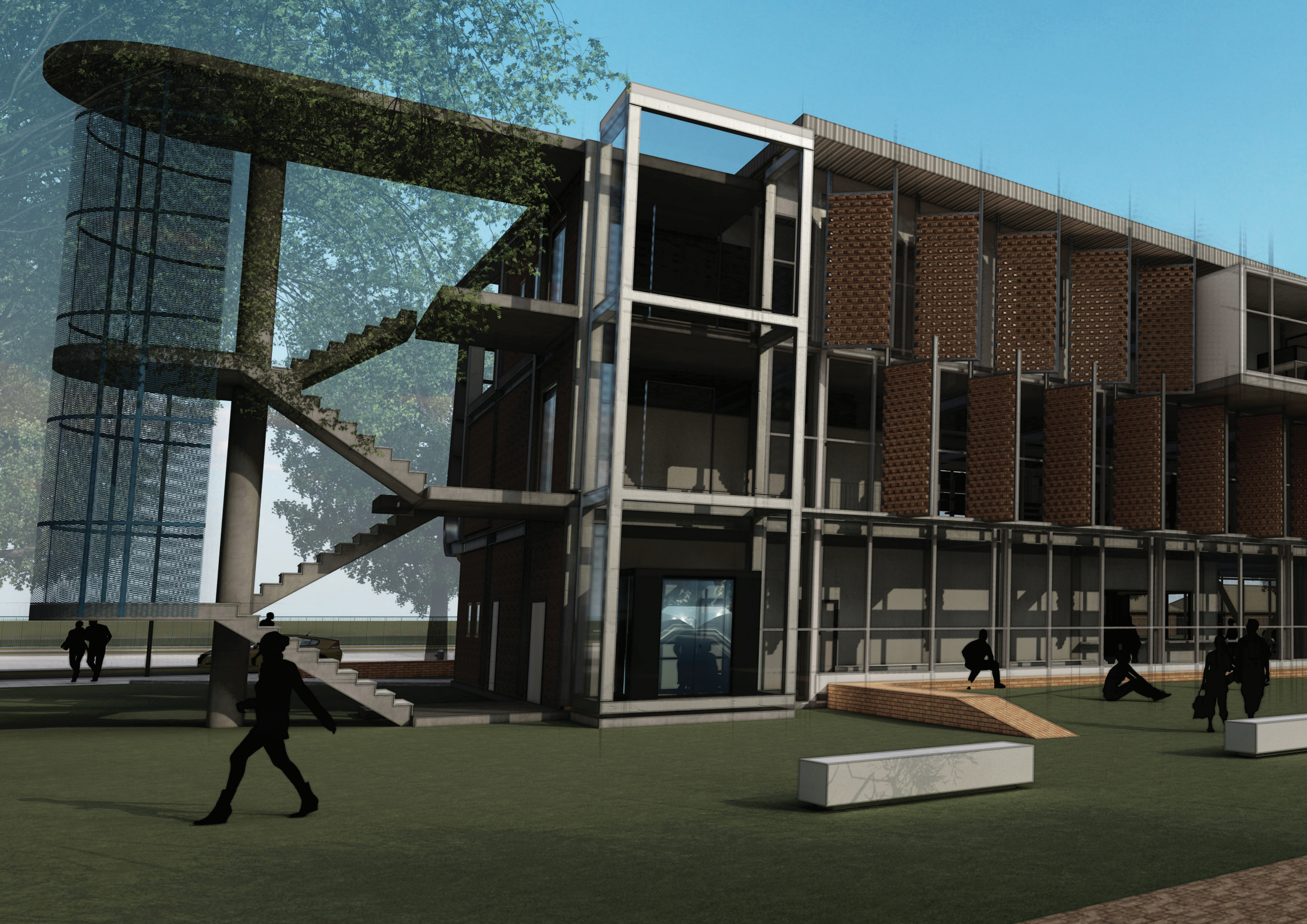
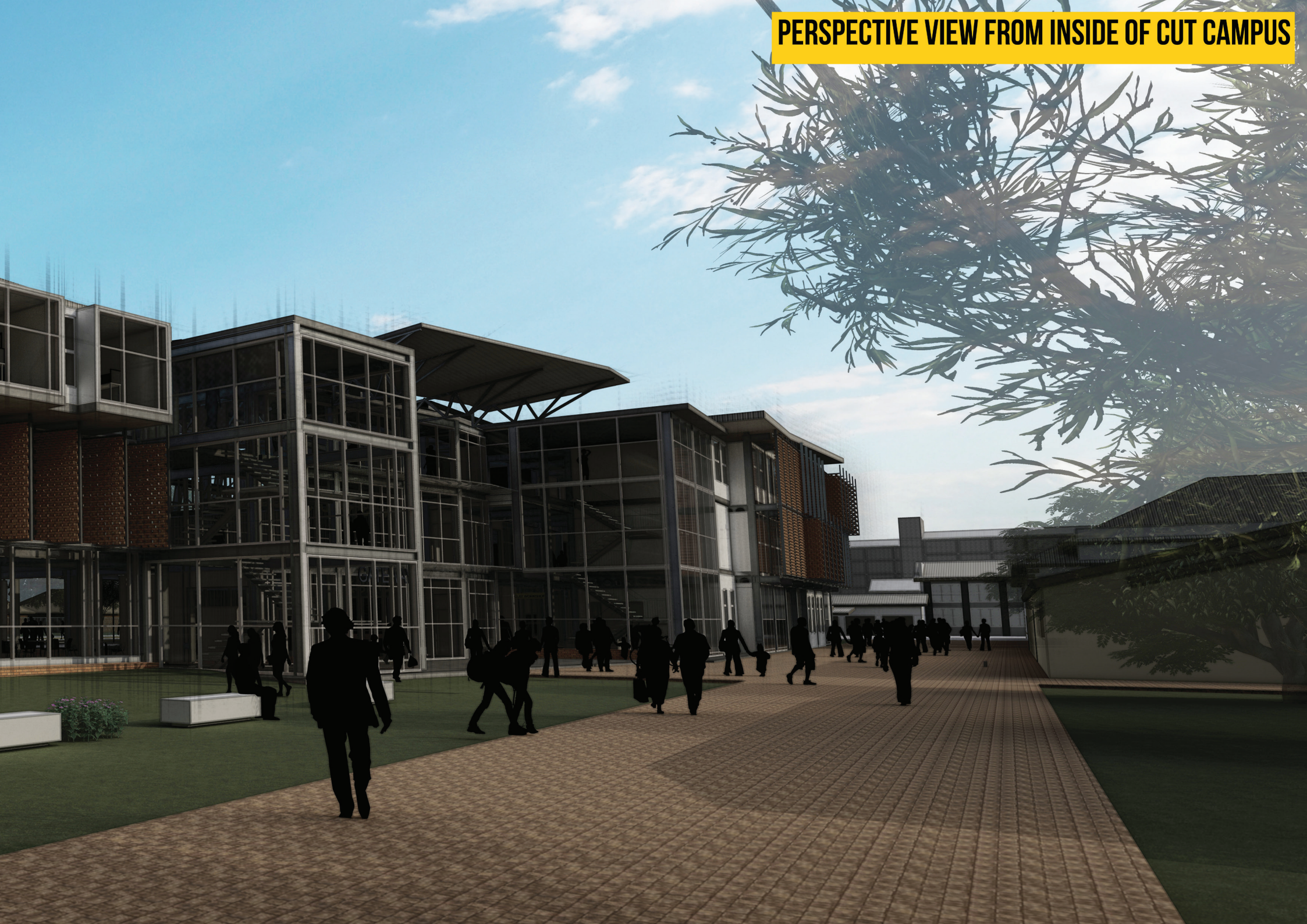
QCTIVE LEARNING
CLASSROOM
EXAM ROOM
FIRE ESCAPE
MENS
FIRST YEARS' STUDIO
SECOND YEARS'
STUDIO

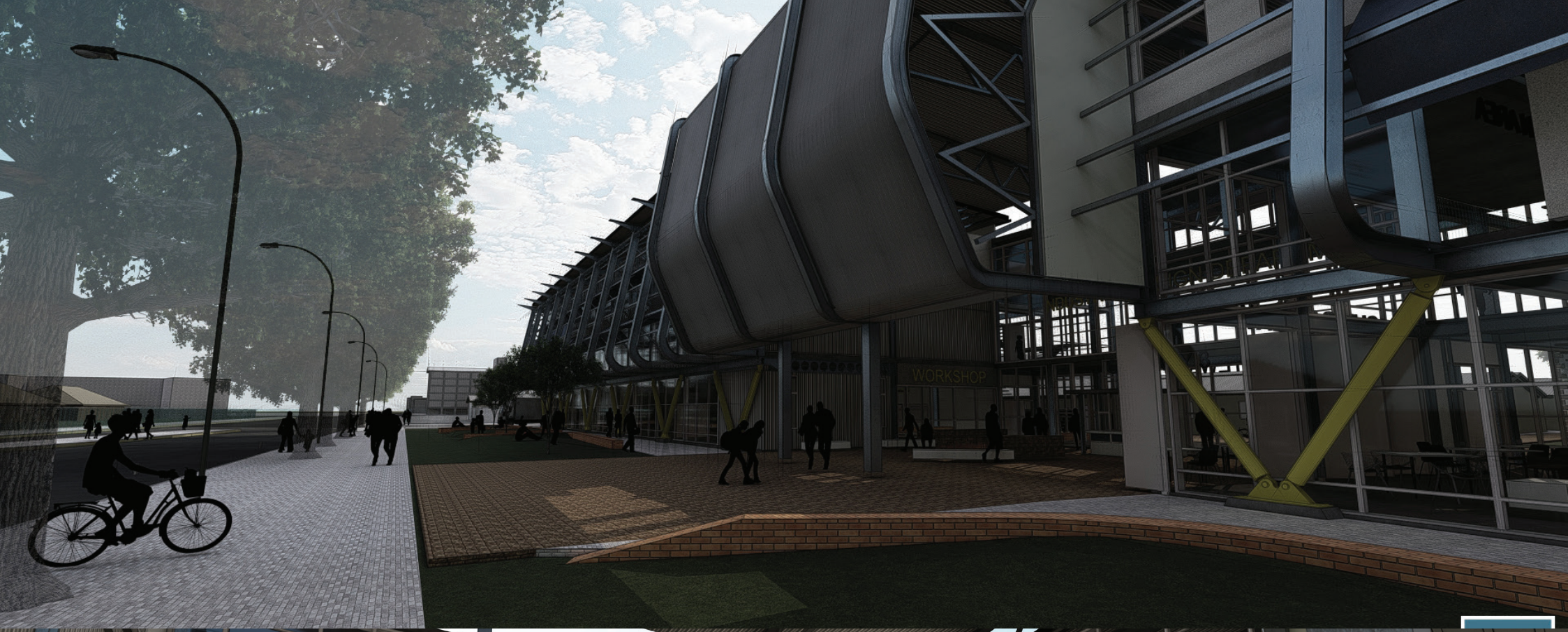

PUTER LABS
STUDY AREAS
LIBRARY

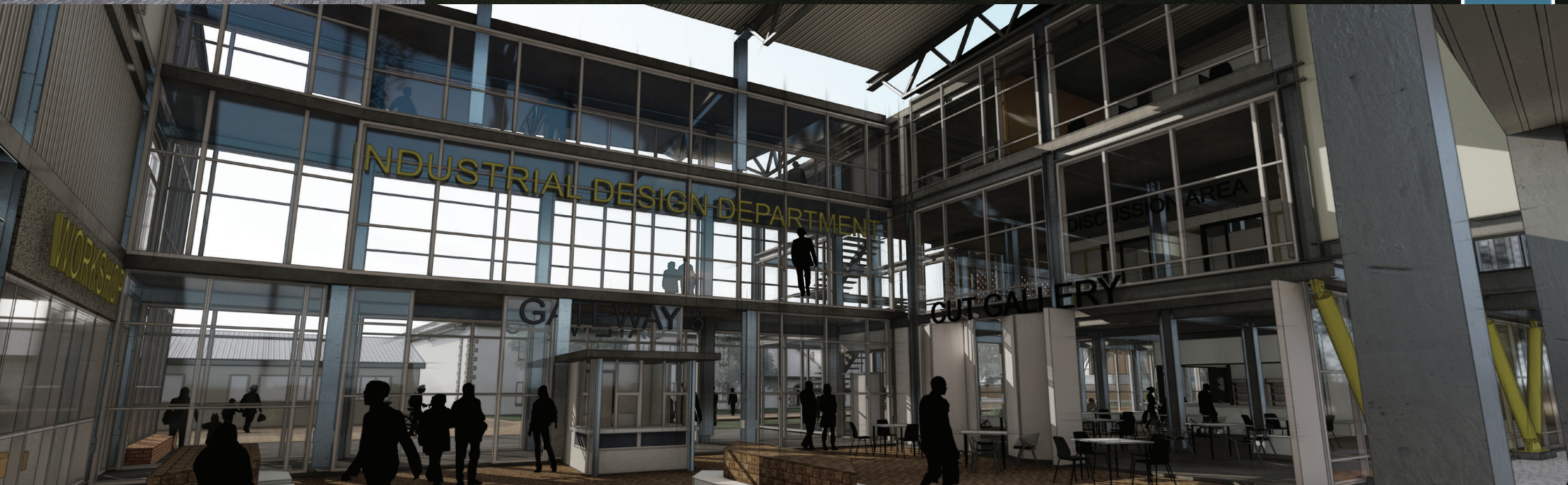
MASTERS' STUDIO
THIRD YEARS' STUDIO
HONOURS' STUDIO

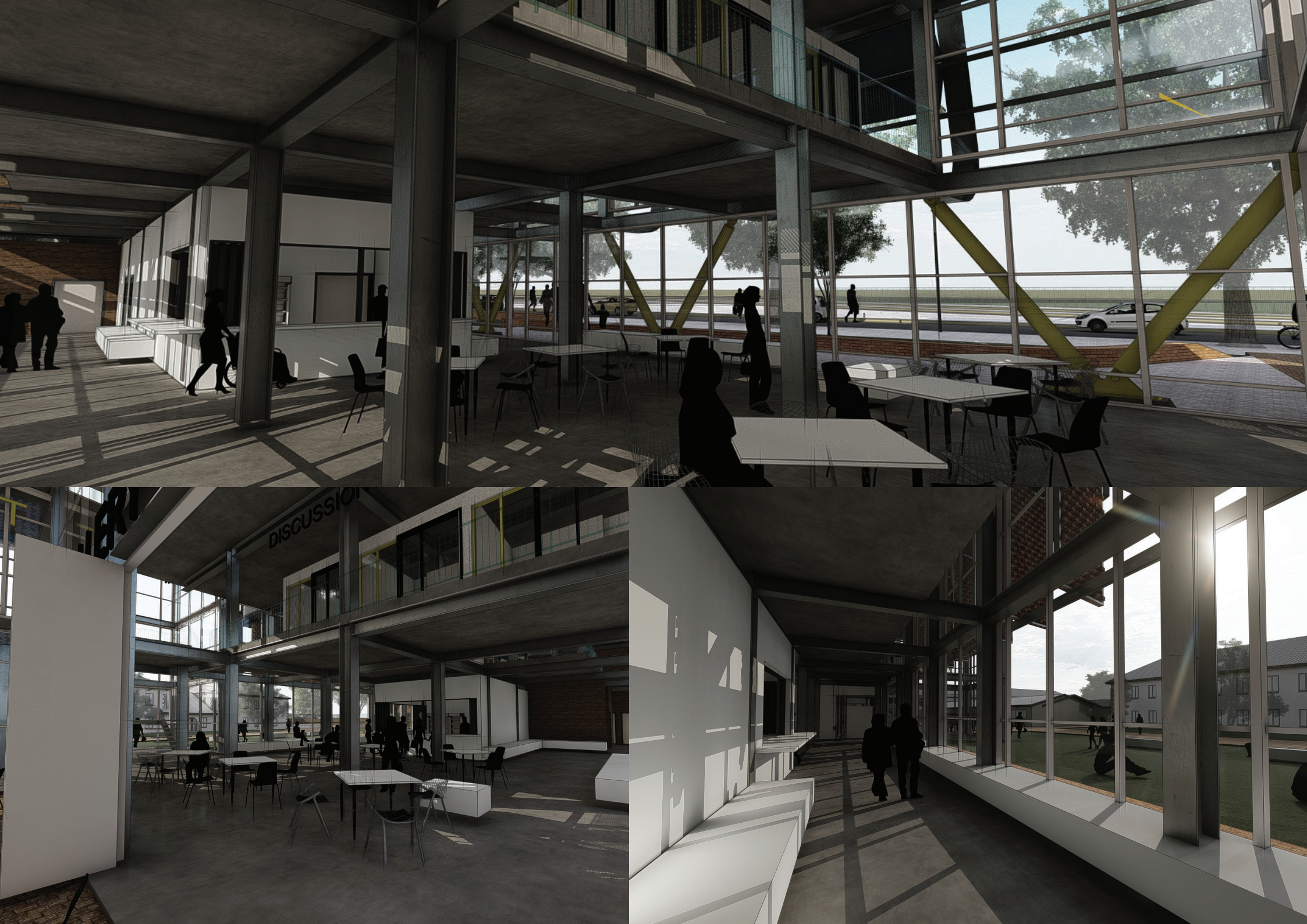

ADMINISTRATION BLOCK

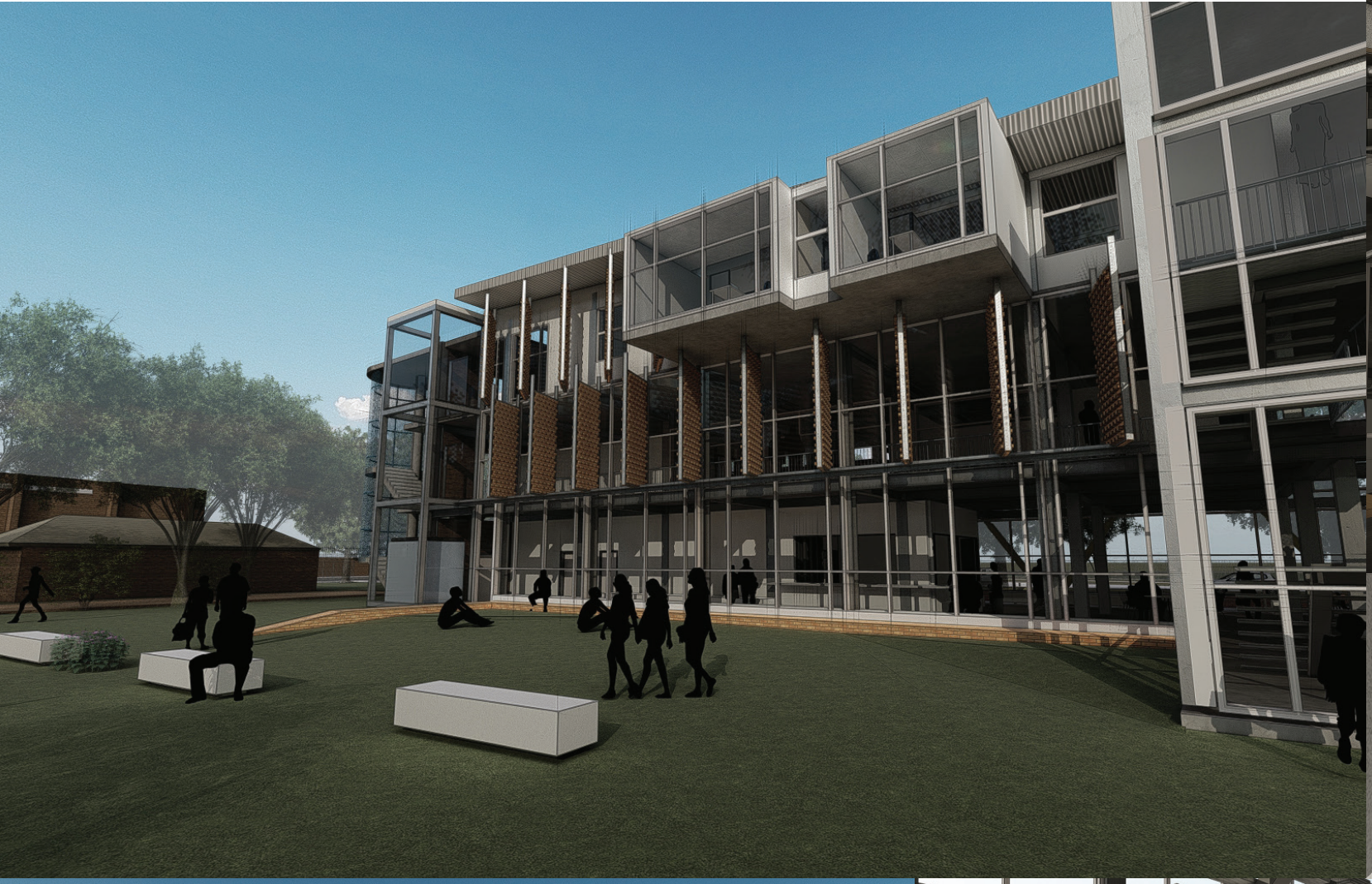


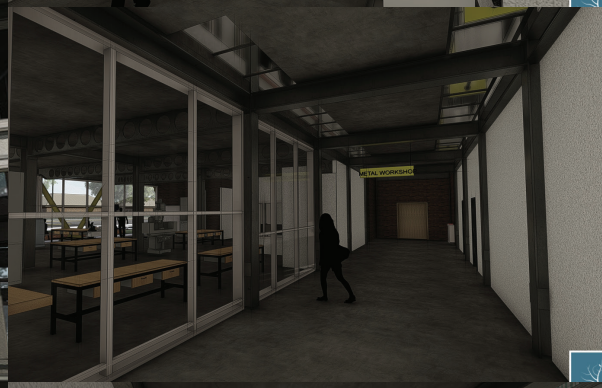

PERSPECTIVE VIEW FROM INSIDE OF CUT CAMPUS

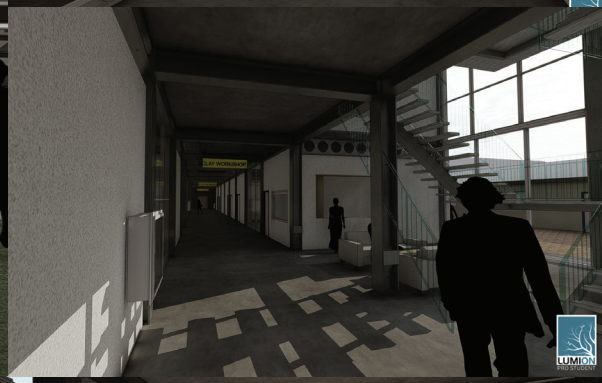

WORKSHOP

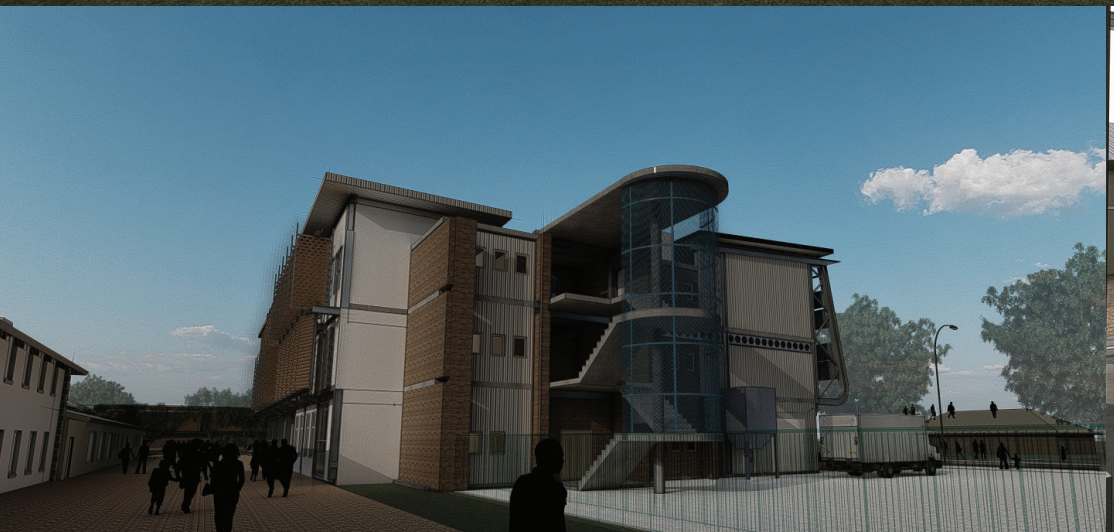

INDUSTRIAL DESIGN DEPARTMENT
GALLERY
WORKSHOP

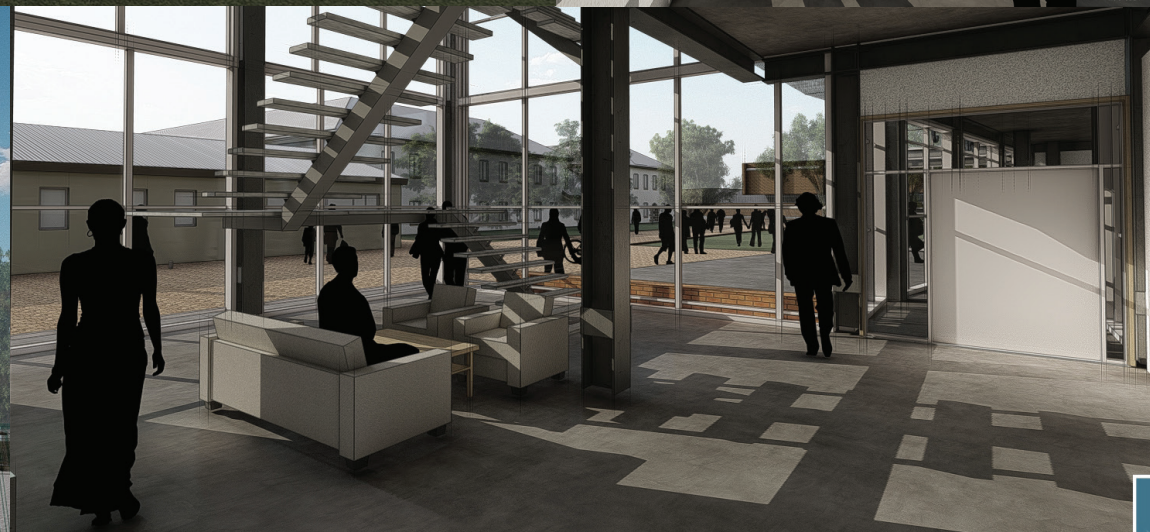


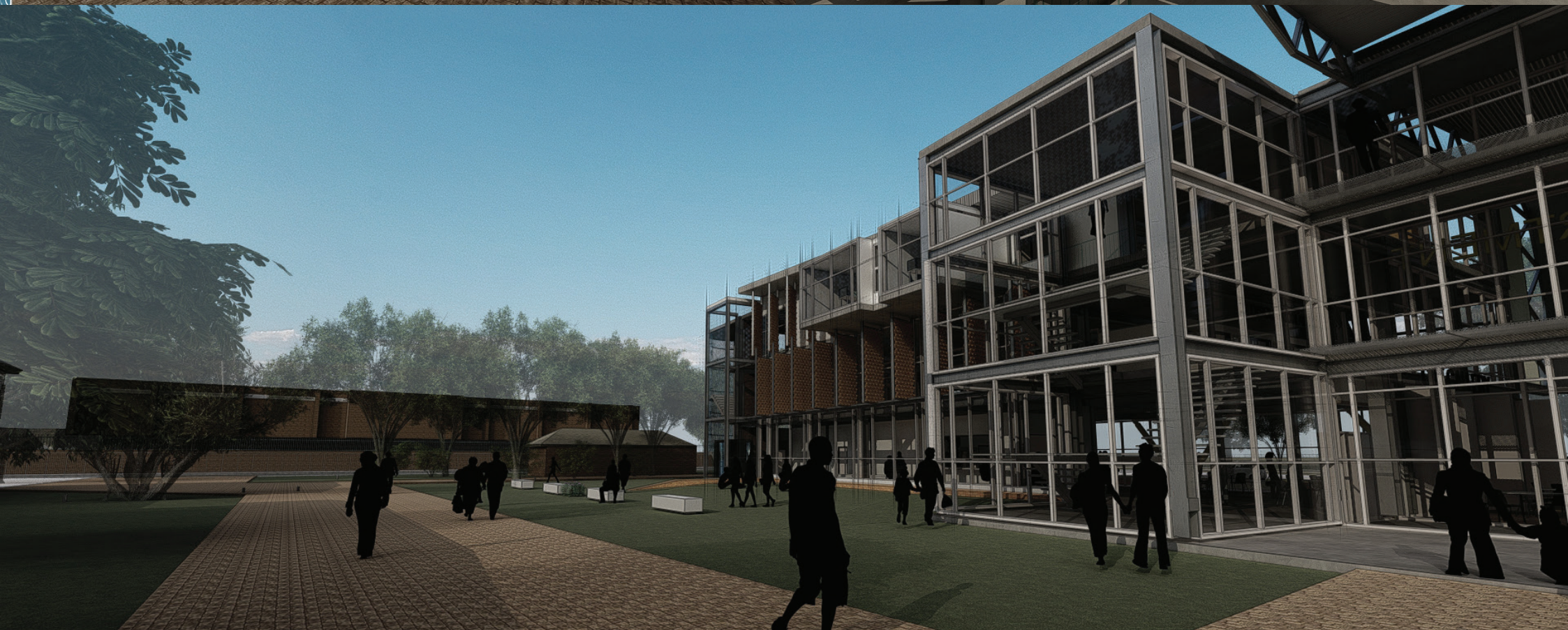



METAL WORKSHOP

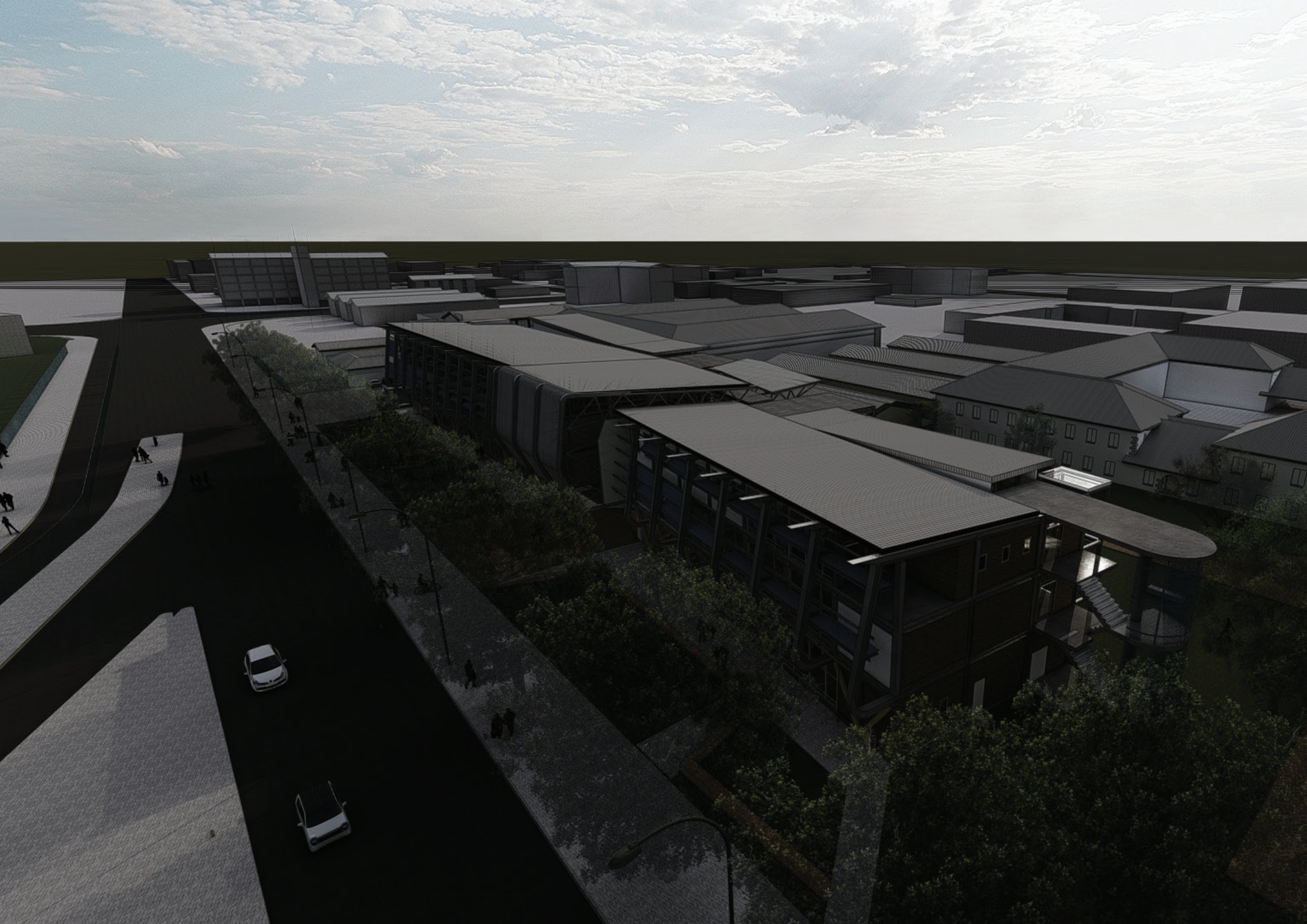

CLAY WORKSHOP








LUMION



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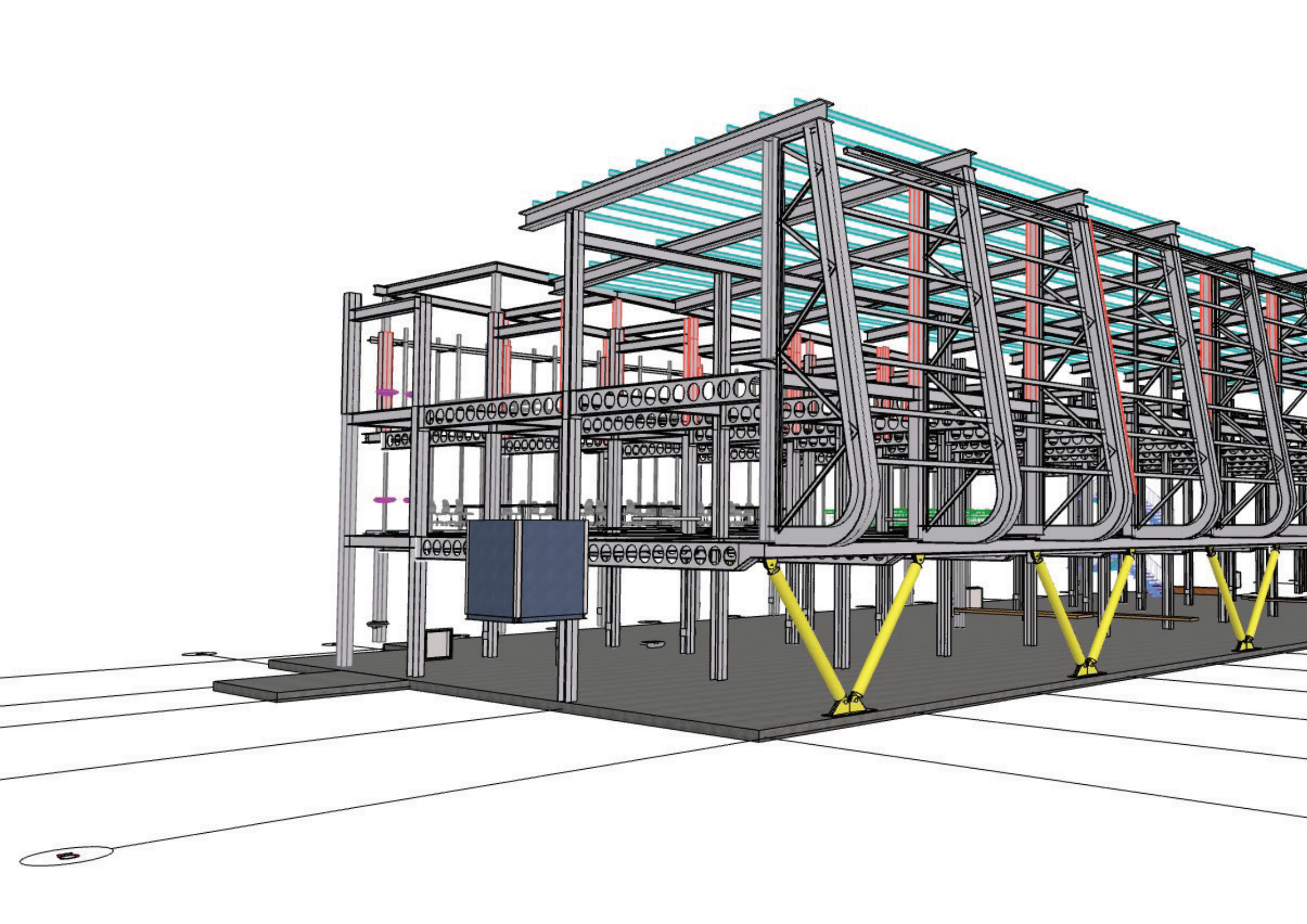


TECHNICAL REPORT

INDUSTRIAL DESIGN DEPARTMNET, CUT CAMPUS
WILLOWS, BLOEMFONTEIN, SOUTH AFRICA

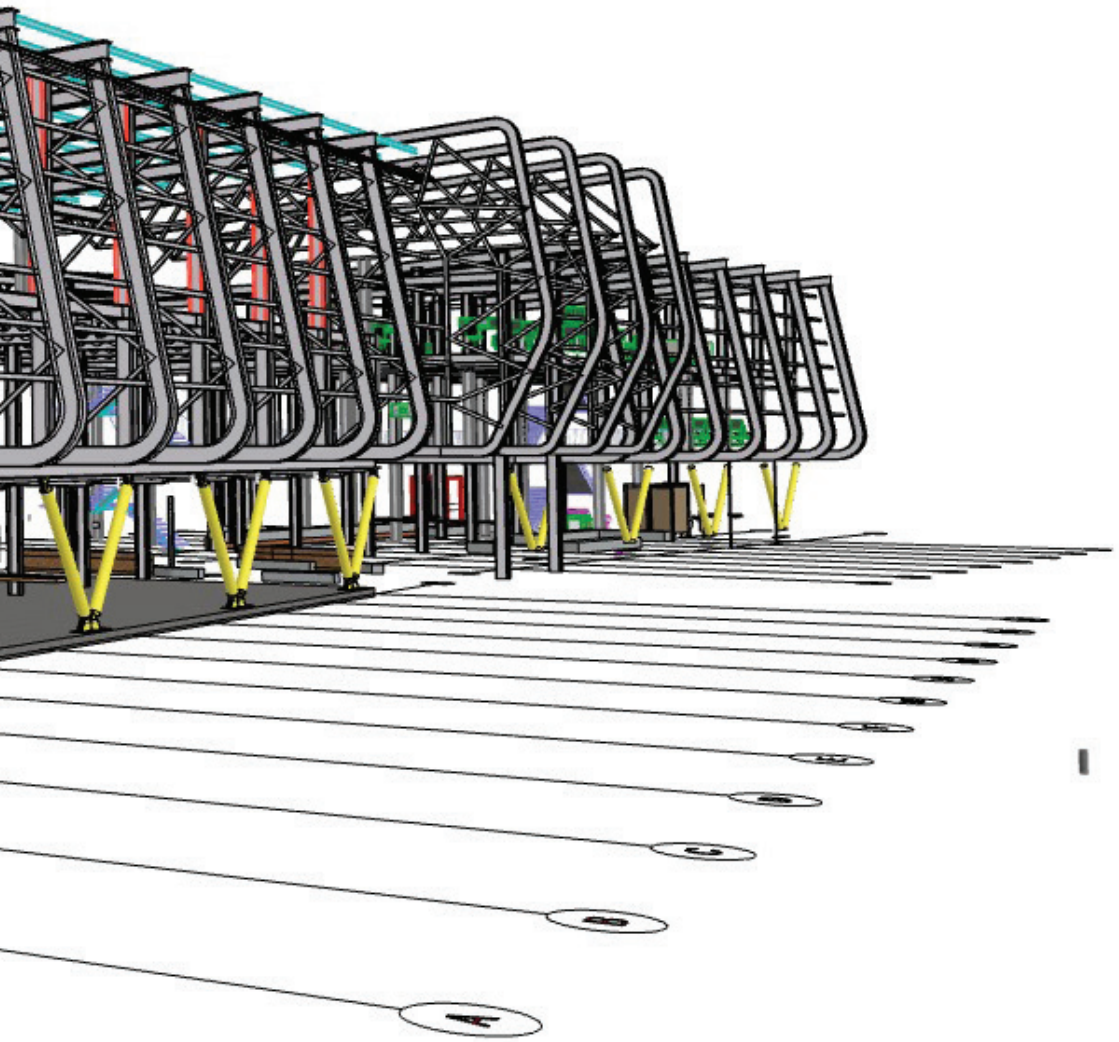
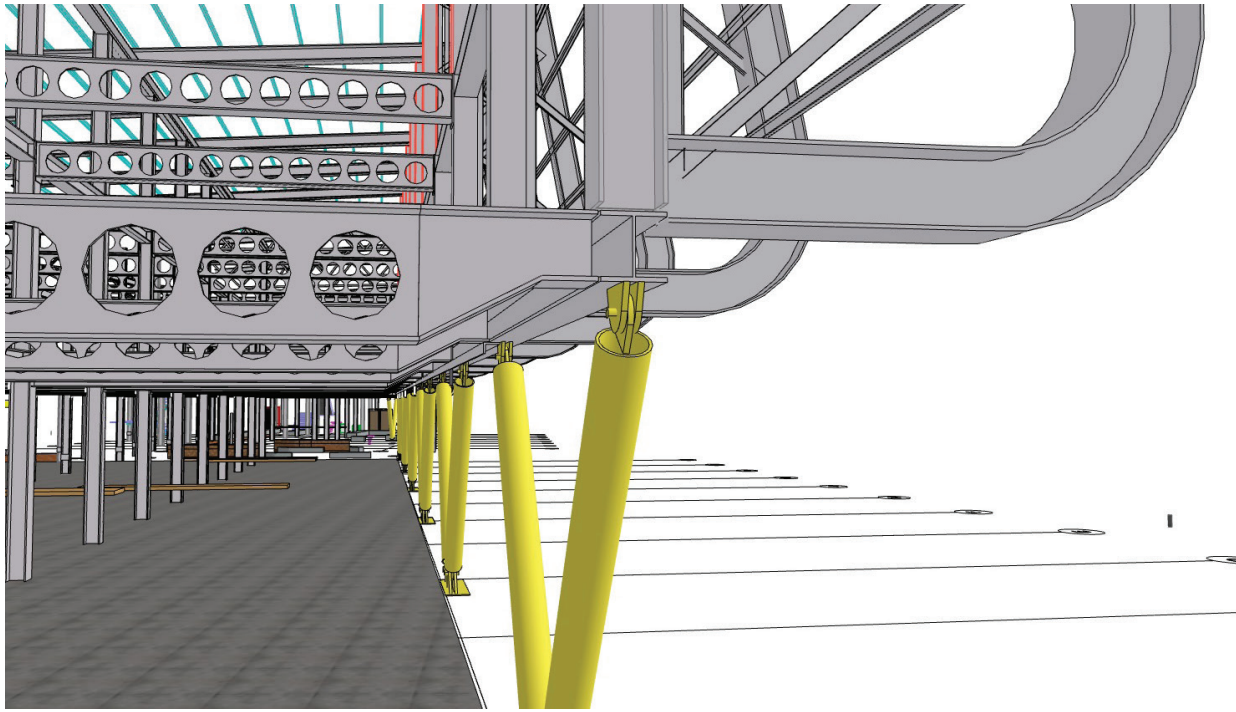


TABLE OF CONTENTS



INTRODUCTION

The proposed Industrial Design Department on the Central Univerty of Technology Main Campus will be analyzed according to design, program and function. Through this research, technical solutions have been made.

The project aims to connect the public will the university as there is a physical boundary between the two. Through this, it will allow for the building to showcase what industrial design is about and also how products are designed and manufactured into prototypes. The building contains workshop spaces which is important to note that every safety measure for such spaces should be considered. The materials and structure play an important role as the design department combines industrial, institutional and public architecture into one building. Specific ventilation and cooling systems need to be considered as well as sound insulation materials to combat the large spaces that the industrial design department needs.

Figure 1, photograph of proposed site,2019

Figure 2, photograph of proposed site, from the East, 2019

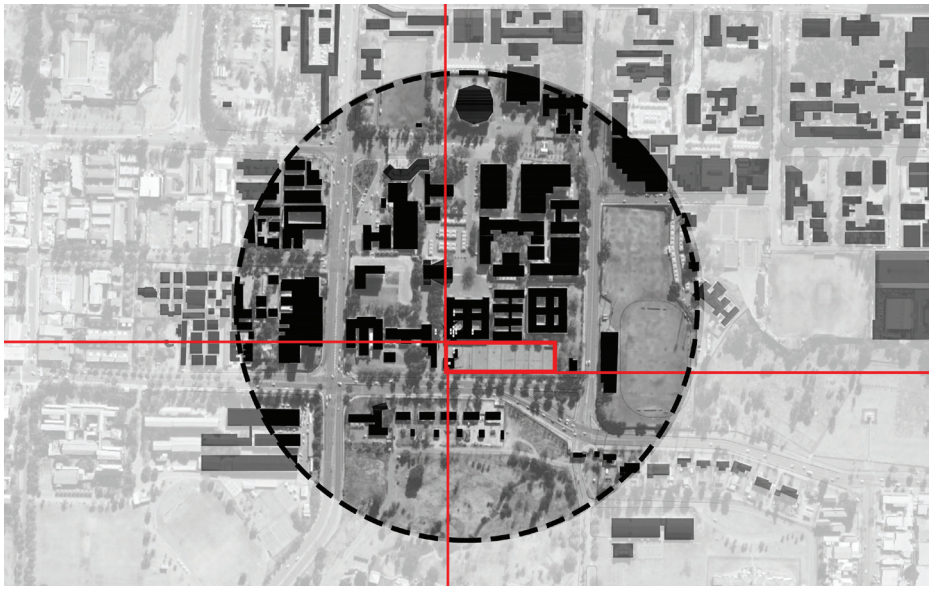


Figure 3,Google earth view of the proposed site. 2019. Edited by Author

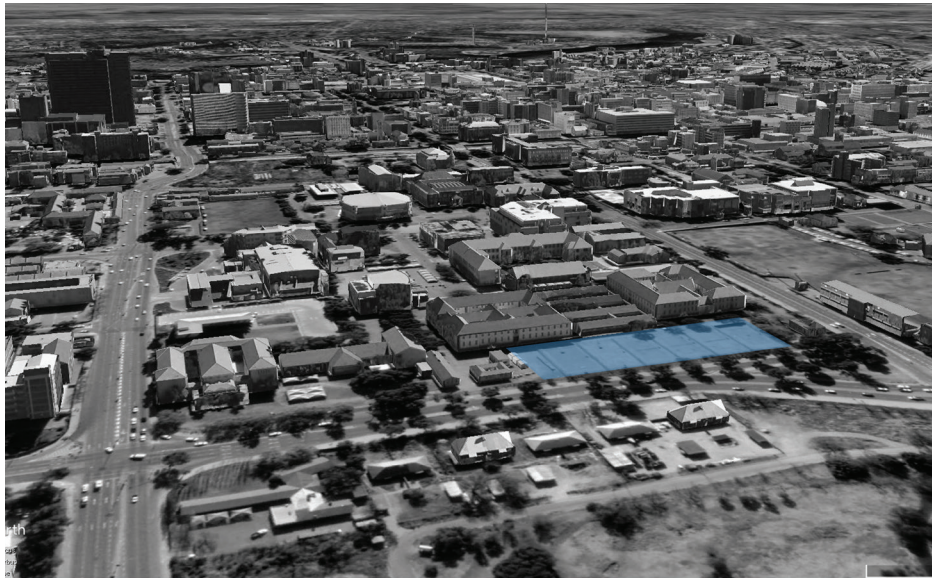


Figure 3, Google Earth aerial view of the proposed site, 2019

ENVIRONMENT AND MICRO-CLIMATE

MICRO-CLIMATE

Bloemfontein's climate is categorized as cold interior where the main climate characteristics for Bloemfontein are:

- Cold winters with uncomfortable human conditions
- Hot summers that exceed human winters
- Low humidity
- Rainfall during summers
- Appropriate design methods should carefully be considered, if ignored, the costs of heating and cooling would increase drastically.

ORIENTATION

Bloemfontein and the rest of South Africa recieves sunlight where north-south orientation for most buildings is ideal.

Rainfall rarely occurs during winter,whereas in summer heavy and unpridictable rainfall occurs. Pitched roofs are essential in keeping water out of buildings. Heavy rainfalls often lead to occassional flooding in Bloemfontein which is why it is essential to have adequate draining on site. The city's unpredictable temperatures means that passive design principles should be implemented.

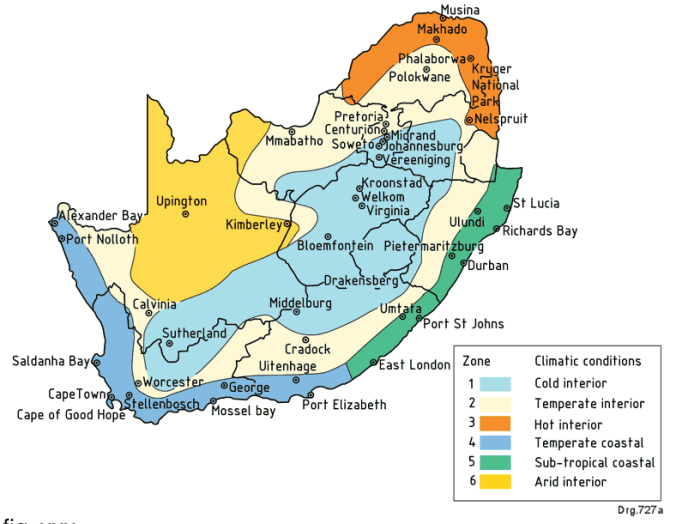


fig. xxx
Climate zone map. (Schmidt, 2014:104).

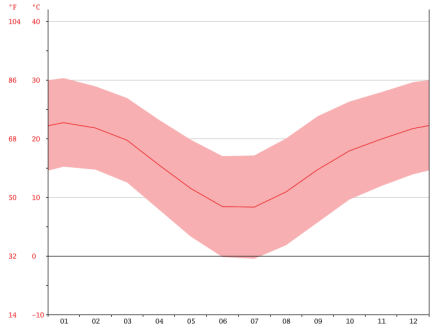


fig. xxx
Average temperature graph . (2019:online)

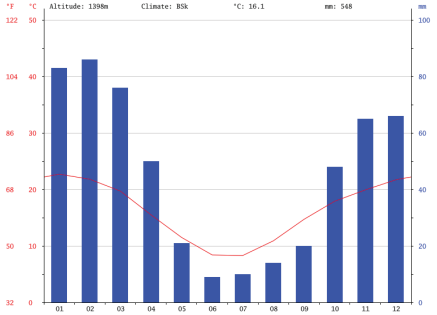


fig. xxx
Average climate graph . (2019:online)

CADASTRAL INFORMATION

ERF 26642

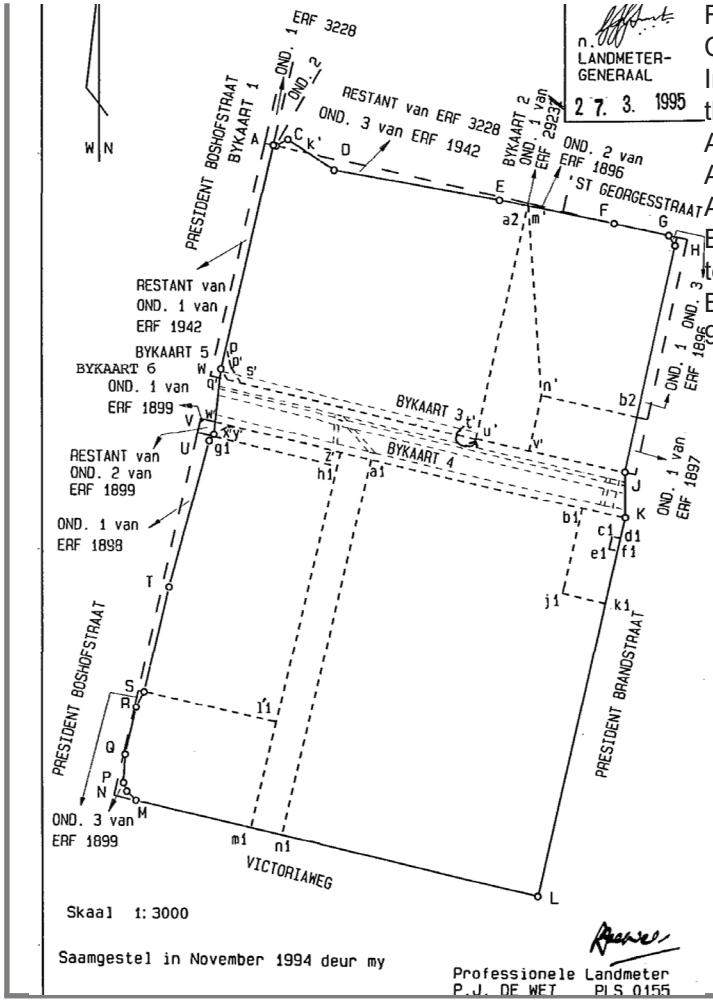


Figure 4, Cadastral Information of the site, 2019. Available at Address: 73 Aliwal St, Bloemfontein Central, Bloemfontein, 9301; Hours:

BOUNDARIES

VEL 1 van 5 velle

SYE Meter		HOEKE		KOÖRDINATE Y Stelsel: Lo. 27° X		L.G. No. 1620/1994
		Konstante:		± 0,00	+3200000,00	Goedgekeur
AB	2,06	A	90 37 10	A	+ 76 577,78	+ 22 490,40
BC	9,68	B	220 39 10	B	+ 76 575,83	+ 22 490,84
CD	40,23	C	118 35 10	C	+ 76 567,29	+ 22 486,29
DE	121,61	D	203 21 50	D	+ 76 533,68	+ 22 508,40
EF	83,53	E	179 04 10	E	+ 76 413,91	+ 22 529,49
FG	40,04	F	178 19 40	F	+ 76 331,90	+ 22 545,31
GH	8,51	G	134 27 30	G	+ 76 292,86	+ 22 554,03
HJ	166,44	H	135 32 30	H	+ 76 288,36	+ 22 561,25
JK	33,30	J	192 56 20	J	+ 76 324,64	+ 22 723,69
KL	277,07	K	166 35 20	K	+ 76 324,43	+ 22 756,99
LM	297,71	L	90 00 00	L		
MN	9,10	M	147 54 00	M	+ 76 677,08	+ 22 959,46
NP	6,50	N	157 47 00	N	+ 76 683,50	+ 22 953,00
PQ	20,50	P	153 54 10	P	+ 76 686,00	+ 22 947,00
QR	35,07	Q	170 21 10	Q	+ 76 684,76	+ 22 926,54
RS	12,76	R	165 51 30	R	+ 76 676,79	+ 22 892,39
ST	76,20	S	193 39 00	S	+ 76 670,95	+ 22 881,05
TU	109,05	T	178 13 00	T	+ 76 653,01	+ 22 806,99
UV	6,02	U	159 14 20	U	+ 76 624,05	+ 22 701,86
VW	46,38	V	209 54 40	V	+ 76 620,50	+ 22 697,00
WA	164,85	W	173 02 30	W	+ 76 615,45	+ 22 650,89
	TANK		(49)	▲	+ 75 352,02	+ 21 015,15
	C.R. SWART		(357)	▲	+ 76 525,10	+ 22 053,64

Beskrywing van bakens

A : 12 x 450mm Ysterpen
B, C, D : 16mm Ysterpen
E : Hoek van muur
F, G, H : 12mm Gat in plaveisel
M, P, Q, R, S, N,
T, U, V : 12mm Ysterpen
J, K, W : 12mm Ysterpen in plaveisel

Die figuur A B C D E F G H J K L M N P Q R S T U V W

stel voor 14,5611 hektaar grond, synde

ERF 26642 BLOEMFONTEIN

en bestaan uit komponente 1. tot 14. soos aangetoon op Vel 2

Administratiewe Distrik : Bloemfontein

Provinsie : Oranje-Vrystaat

Saamgestel in November 1994 deur my

Professionele Landmeter
P.J. DE WET PLS 0155

Hierdie kaart is geheg aan No. met Reg. nommer ged. t.g.v. Registrateur van Aktes	Die oorspronklike kaarte is soos aangetoon op Vel 2	Lêer 1901-2000 Bloemfontein M.S. Komp. FP-1A-25/C A12/1/8/1/2/13 dd. 1994-03-30

SERVITUDES

Figure 6

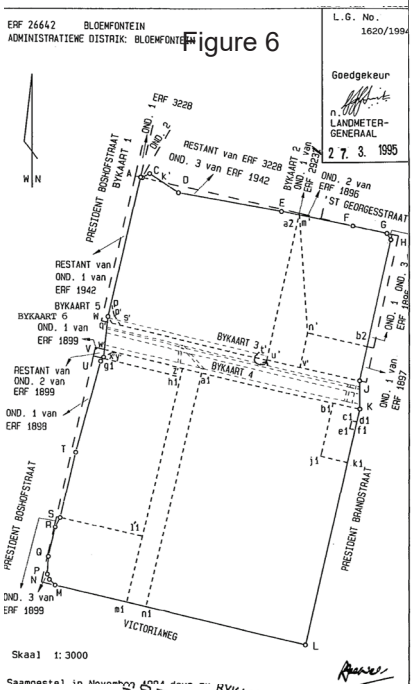
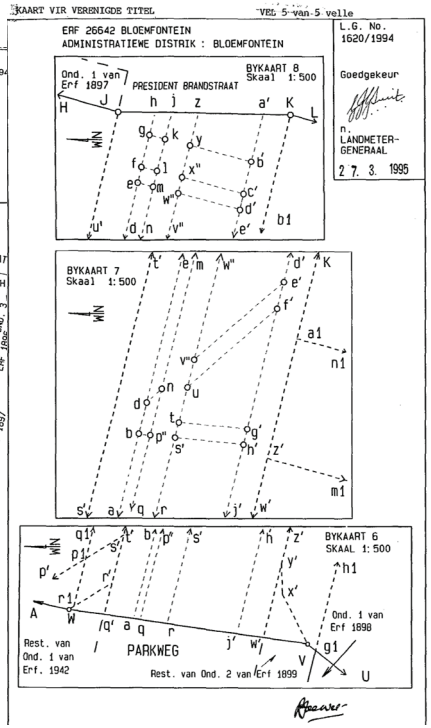


Figure 7



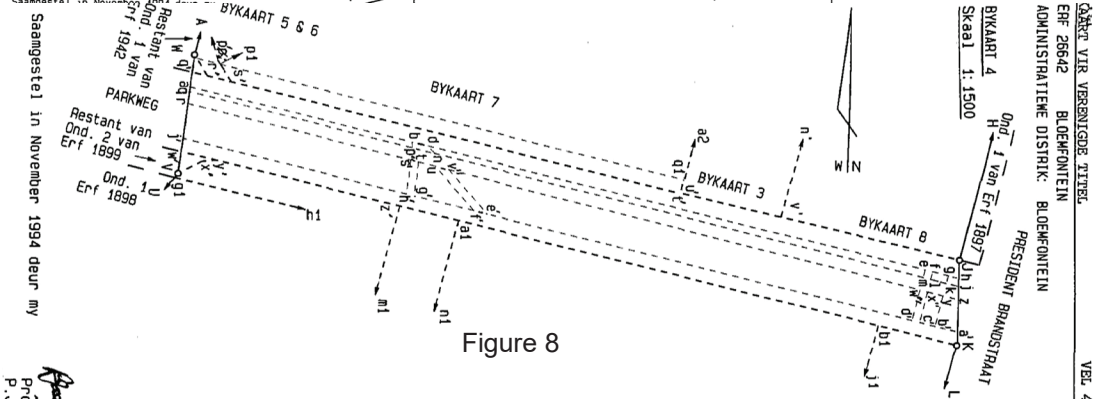


Figure 8

KAART VIR VERENIGDE TITEL VEL 3 van 5 velle

ERF 26642 BLOEMFONTEIN
ADMINISTRATIEWE DISTRIK : BLOEMFONTEIN

L.G. No. 1620/1994
Goedgekeur
n. LANDMETER-GENERAAL
27. 3. 1995

Komponente:

No. Figuur	Beskrywing	Kaart	Transportakte No.
1. ABCDE a2 t' s' p' p	Erf 26454	L.G. No. 828/1992	T1811/1994
2. a2 m' n' v' u'	Restant Erf 2923	L.G. No. 757/1930	1872/1931
3. m' F G H b2 n'	Restant Erf 1896	L.G. No. 59/1936	25101/1881
4. n' b2 J v'	Restant Erf 1897	L.G No.2183/1892	41274/1892
5. p pp's' r' W	Onderverdeling. 2 Erf 1942	L.G. No. 548/1988	T14161/1991
6. W r' q'	Onderverdeling. 4 (van 1) Erf 1942	L.G. No. 1617/1994	
7. q' t' u' J K w'	Erf 26445	L.G. No. 1618/1994	
8. w' y' x' V	Onderverdeling. 4 (van 2) Erf 1899	L.G. No. 1619/1994	T14161/1991
9. y' z' h1 g1 V x' en S I1 m1 M N P Q R	Restant Erf 1899	L.G. No. 410/B/1904	11736/1905
10. z' a1 n1 m1	Erf 3179	L.G. No. 573/1935	2841/1935
11. a1 b1 j1 k1 L n1	Erf 1945	No. 362/I/1913	T2666/1913
12. b1 K d1 c1 e1 f1 k1 j1	Restant Erf 1259	No. 118/D	T21038/1907
13. c1 d1 f1 e1 y1	Onderverdeling. 1 Erf 1259	L.G. No. 337/1938	46/1944
14. g1 h1 a2 S X T U	Restant Erf 1898	L.G.No. 2023/1901	69/1901

Serwituutnotas:

1) Die figuur q' t' u' J h a stel voor 'n Serwituutgebied.
2) Die figuur b d n p'' stel voor 'n Serwituutgebied.
3) Die figuur e f l m stel voor 'n Serwituutgebied.
4) Die figuur g h j k stel voor 'n Serwituutgebied.
5) Die figuur q j z r stel voor 'n Serwituutgebied.
6) Die figuur s' t g' h' stel voor 'n Serwituutgebied.
7) Die figuur w' x'' c' d' stel voor 'n Serwituutgebied.
8) Die figuur y z a' b' stel voor 'n Serwituutgebied.
9) Die figuur u v'' e' f' stel voor 'n Serwituutgebied.
10) Die figuur j' a' K w' stel voor 'n Serwituutgebied.
11) Die figuur r1 q1 t' r' stel voor 'n serwituutgebied; Kaart L.G. No. 970/1987; Serwituutakte No. K300/1988.

Sien Kaart L.G. No. 1618/1994

Transportakte No.

Saamgestel in November 1994 deur my

Professionele Landmeter
P.J. DE WET PLS 0155

Figure 6-9, Cadastral Information for servitues of the site, 2019. Available at Address: 73 Aliwal St, Bloemfontein Central, Bloemfontein, 9301; Hours: 8 AM □ 4PM; Phone: 051 448

ZONING INFORMATION

The development restrictions for "Public Building" are as follows:

COVERAGE:	(a) Places of Instruction:	50%
	(b) Places of Adult Instruction:	75%
	(c) Public Building:	50%
BULK:	1	
HEIGHT:	No restriction	
SPACES ABOUT MAIN BUILDING:	A minimum of 3,0m from front and rear boundaries in the case of Places of A Instruction, except where the building line requires otherwise. In the case of P Buildings, 3,0m from every boundary, unless the building line requires more an portion of the building to be nearer any boundary of the erf than ½ the height o portion above the level of the ground or 4,5m whichever is the greater.	
OUTBUILDINGS:	See Section 17 of Bloemfontein Town Planning Scheme.	
STREET BUILDING LINE:	7m	

2.3 TOPOGRPAHY

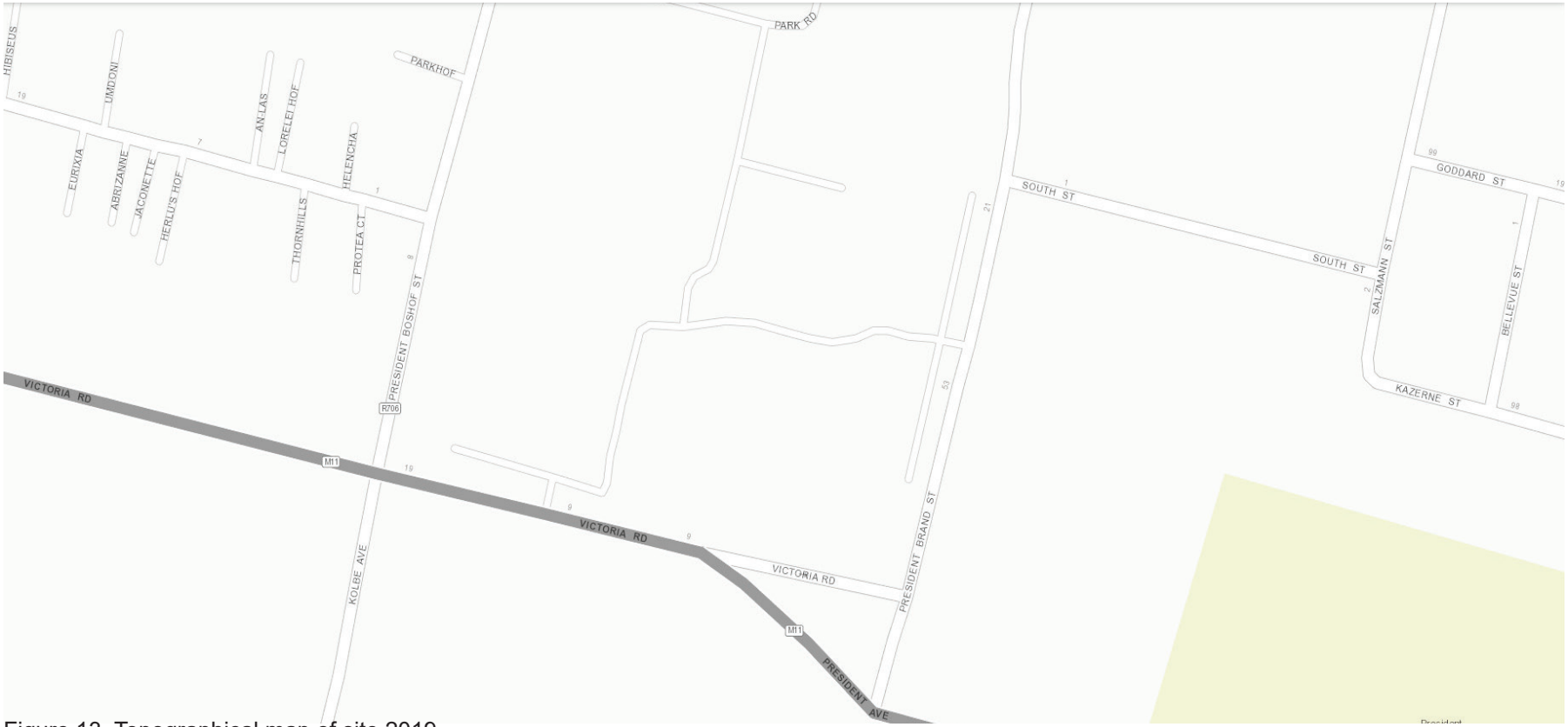


Figure 13, Topographical map of site,2019.

2.3 TOPOGRPAHY

SITE PLAN

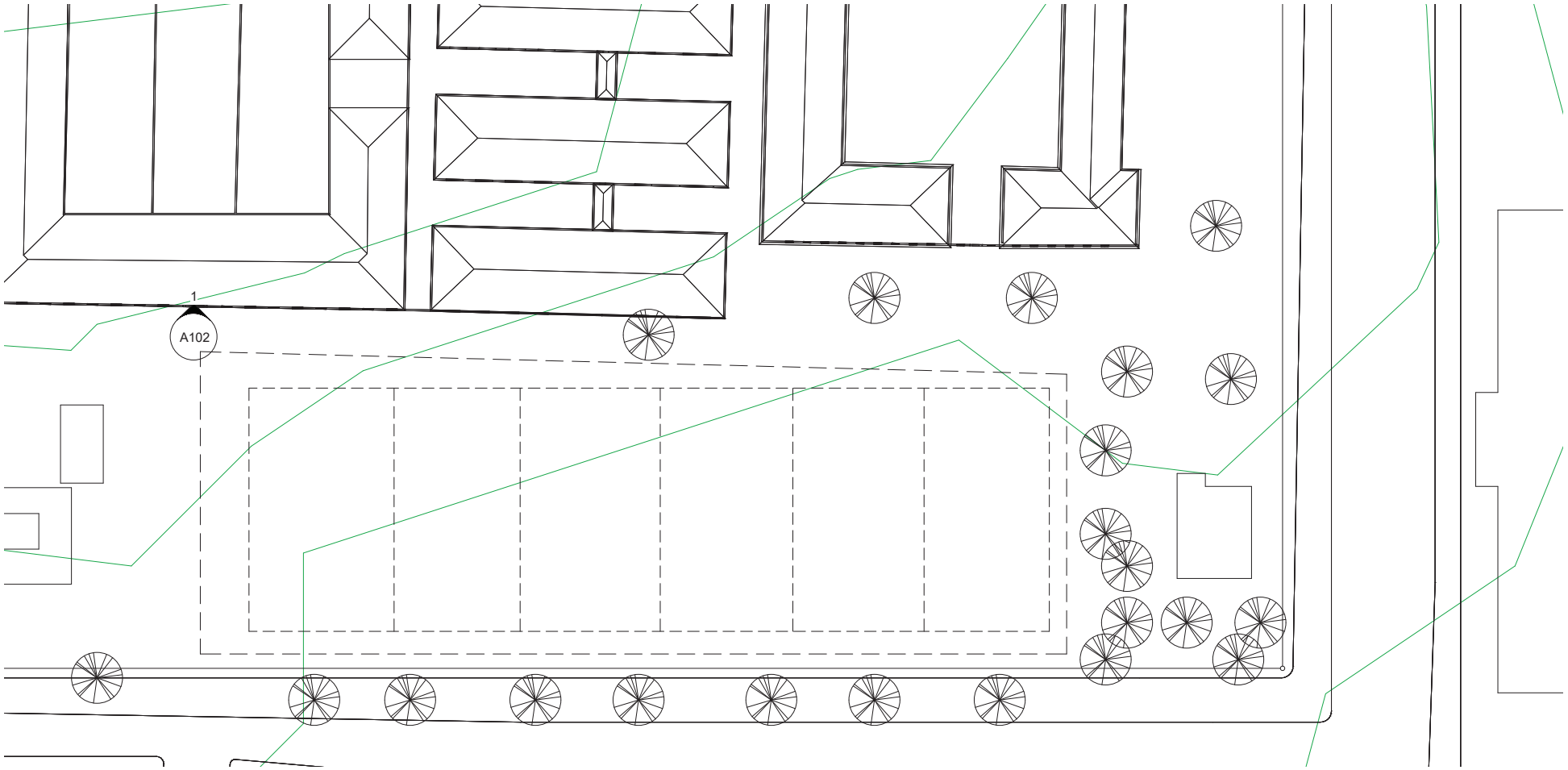


Figure 14
Author, Site Plan,2019.

03 ENVIRONMENT AND TECHNICAL STRATEGY

SITE VIEWS

Figure 19, Analysis of pathway between site and Eendrag Res.,2019.

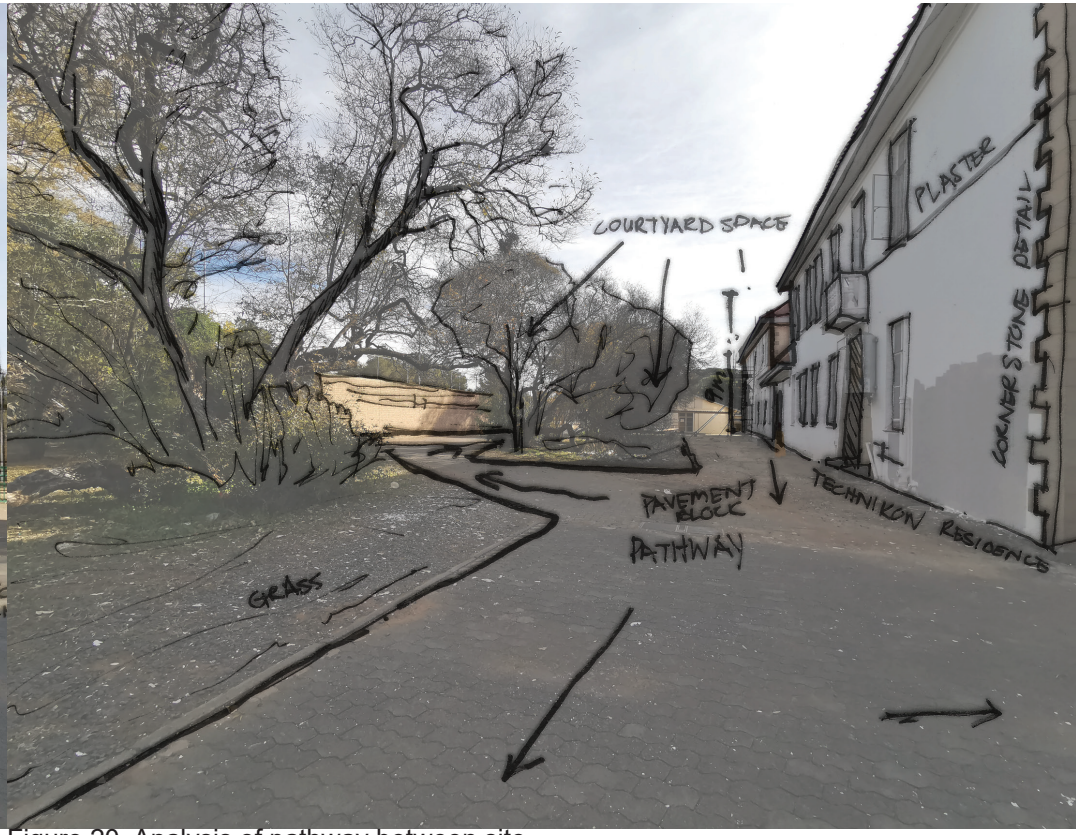


Figure 20, Analysis of pathway between site and Technikon Res.,2019.

03 ENVIRONMENT AND TECHNICAL STRATEGY

SITE VIEWS

Figure 21, Analysis of pathway between site and Main Road.,2019.

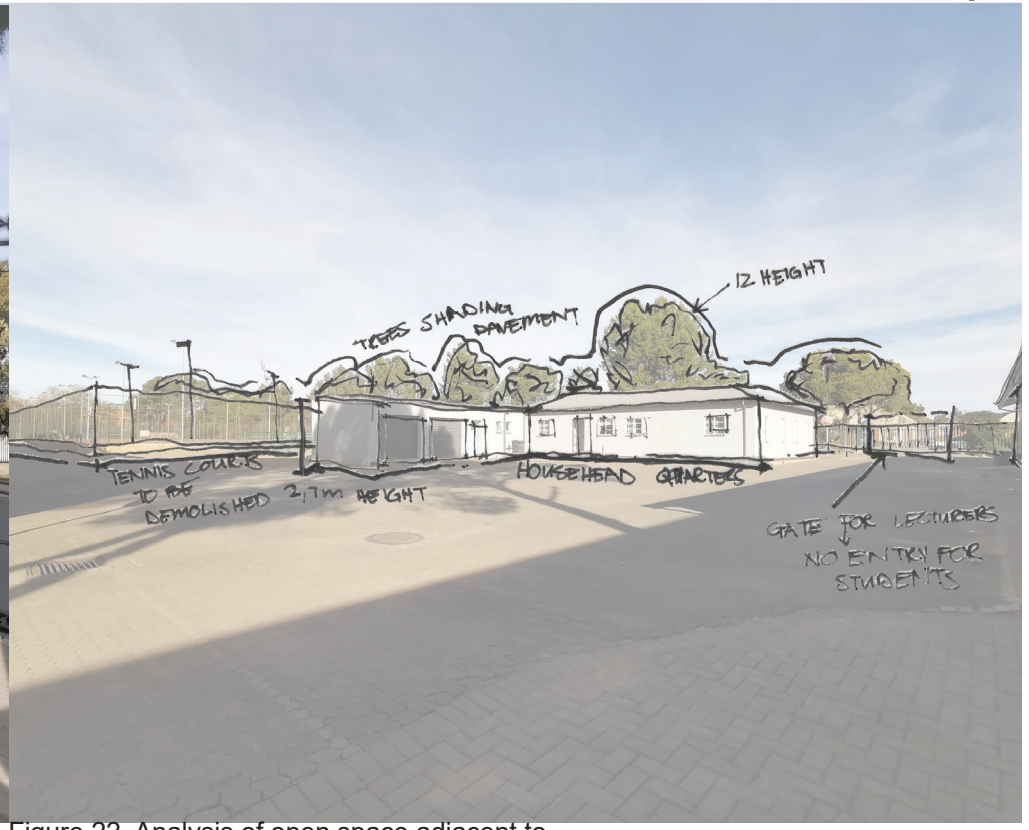


Figure 22, Analysis of open space adjacent to site,2019.

03 ENVIRONMENT AND TECHNICAL STRATEGY

SITE RESPONSES

Stacked ventilation occurs when warm air inside a building rises due to thermal buoyancy, through lower openings in the building and will continue if the air entering the building is continuously heated by either, casual or solar gains (online,2019).

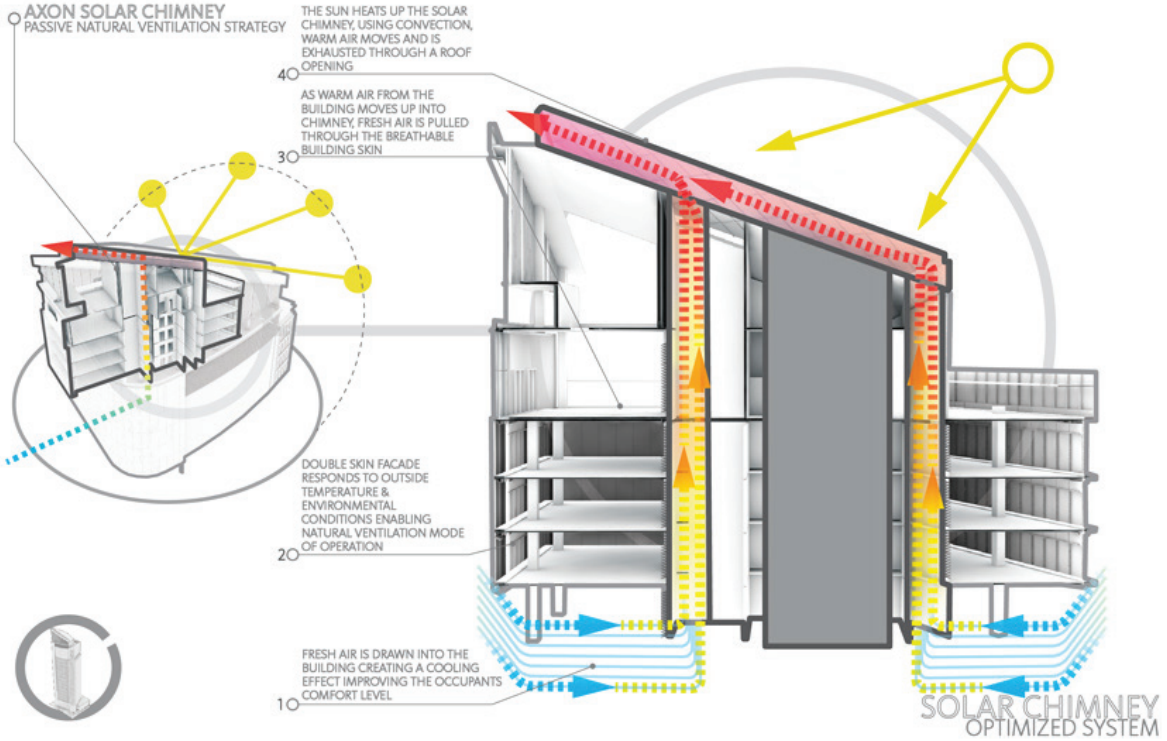


Figure 24, Diagram of a stacked Ventilation system,online, 2019.

04 DESIGN INTENTION

Clay Workshop 200m2
Metal Workshop 240m2
Wood Workshop 180m2
Rapid Prototyping 40 m2

Student Studios
- 1ST and 2nd year 500m2
- 3rd year 180m2
- 4th year 250m2
- 5th year 270m2

Photo Studio 70m2
Library 90m2

Lecture halls
- Room 1 70m2
- Room 2 70m2
- Room 3 70m2

Restaurant 300m2
exhibition spaces 400m2

Computer Labs
- CAD Lab 1 70m2

Administration and Staff
Lecturers' offices
- Offices 15 x 10m2 150m2

Admin Offices
- ADH 30m2
- Secretary 24m2
- Departmental assistant 10m2
- General 10m2

Other
- Staff Room and Kitchenette 50m2
- Seminar Room 30m2
- Storage 50m2
- Toilet Facilities --------

STRUCTURE

CIRCULATION

Horizontal Circulation
There are no level differences between different thresholds to accommodate for disabled access. The main entrances of the building have gradual sloping outside spaces which help with stormwater runoffs. All floors will have a continuous thin strip of contrasting flooring for visually impaired people to follow to the different spaces.
Vertical circulation
Stairs and elevators are used for vertical circulation. There will be four staircases in the building: two being enclosed while the other two are designed according to fire escape standards. The elevator will be accessible from all floors of the building for disabled access.

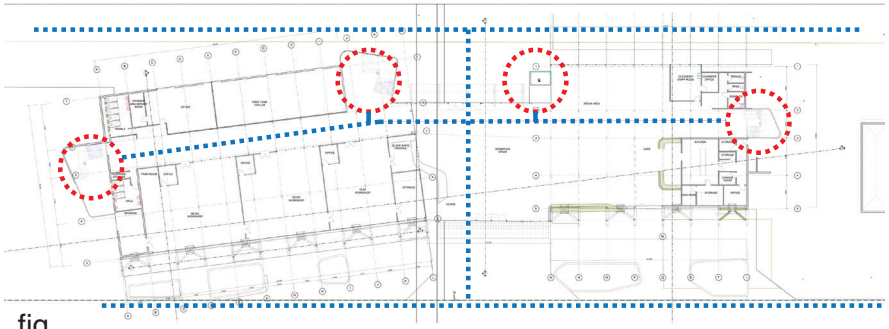


fig
Diagram of vertical and horizontal circulation,
Author. 2019

FORM AND FUNCTION

Form and function
Ground floor is open for public use-

- workshops are accessible via request
- The foyer, exhibition space and discussion areas are open until 16:00 every day on weekdays
- The café is open for the public until 16:00 everyday on weekdays

The first floor is studios for the students and ALC classrooms. These are only accessible for students, but the library and multifunctional hall space is open for public use.
The second floor contains two more studio spaces with the administration block on the east side of the building.
The form of the building is bound together by curved steel columns that help give its industrial like identity.

MORPHOLOGY

The building essentially contains three identities, institutional, industrial and public. The industrial identity is essential within the department which is emphasised with exposed industrial materials. The structure and materials should be celebrated as works of art, rather than being concealed with unnecessary materials. This also emphasises the rational thinking of industrial design, that only the essential materials should be used and celebrated. The curved steel structures are lifted off the ground and repeated throughout the southern façade, which hints at the building also being public.

STRUCTURE

STRUCTURAL SYSTEM

The system of a building is the most important factor to consider when constructing a building. It is important that the structure fits in with the context as material is locally sourced. The structure of a building should be practical and typologically appropriate. When designing for an industrial design department, the aesthetics of the structure should always be considered and left as is to celebrate its identity.

The arrangement of the whole building is steel framed construction with pre-cast concrete floor slabs and rooftops. It speeds up the building phases as everything is fabricated and done in factory. The construction phases become part of the design process as industrial design always emphasises prefabrication. The specification and detailing of these systems, will fall under the technical application (drawings).

DEMOLITION OF EXISTING STRUCTURE

Demolition of existing structure
The existing tennis and basketball courts on site are rarely used and aren't well maintained. It is more appropriate to have another department there and move the tennis courts to the sports block of CUT where there already are tennis courts available. This provides an opportunity to use the site and create a meaningful place of instruction that the public could also make use of.
It is important to demolish these courts with caution as such bricks can be reused in parts of the building. The entire site which the courts are situated on has already been compacted and flattened which makes the demolishing of it easier as no other structures or natural vegetation will be damaged.

STRUCTURE

MAIN STRUCTURE

The steel columns used for the main structure are 254x254mm H-profile columns which will be connected and welded to castellated I-section beam of a depth of 605mm. The castellated beams will help carry the loads above over a longer span. This is held together by a specific grid system which will be further shown in the technical application.
The structure used for the exhibition and foyer space in the centre of the building consists of a streel framed truss system which spans 20m over 12m.

FOUNDATIONS

The industrial design department's entire main structure consists of steel which is why a high stub column pad foundation is used. The columns and lift shaft pit require excavations, which correspond with SANS 10400 Part G (SANS10400,2010).

FLOORS

The proposed floor system uses a hollowcore flooring system which consist of precast slabs supported from the structural frame system. This system creates larger clear spans, typically up to 12 metres (Watts, 2016:328).

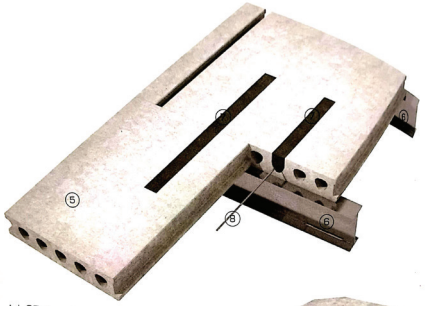


fig
Diagram Floor system, Watts,2016

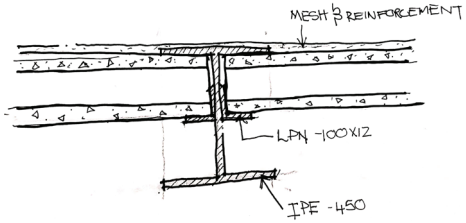


fig
Diagram of floor system,Author. 2019

Steel mesh floor systems is also introduced in the building to allow for more natural light in the corridors. This also provides a lightweight, economic deck for outside spaces which allows rainwater and air to pass through immediately. The span between the two supports are up to 2 metres (Watts, 2016:330).

fig
Ilustration of mesh floor system, Watts. 2016

STRUCTURE

WALLS

Walls
Parts of the external façade of the building consists of 230mm brick wall infills. The brick infill walls provide an aesthetic that fit in with the institutional context of CUT. Large parts of the building consist of double-glazed facades to help with heat gain and loss. The interior walls used are composite panels which provide high thermal comfort in a thin panel.
This system provides a wall assembly in a single panel form in which windows and doors interlock with these panels. It consists of an inner core of rigid thermal insulation onto which a thin metal sheet is bonded to each side (Watts, 2016:94). These panels provide a smooth surface finish which eliminates the need for another coating or finish. It provides weathertight connections between the panels.

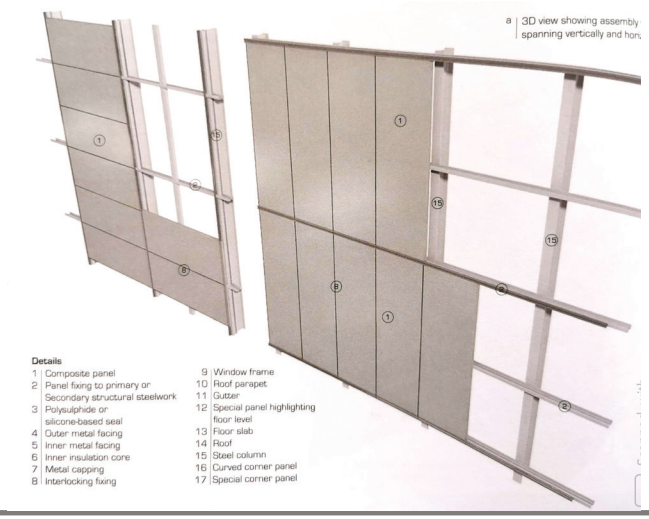
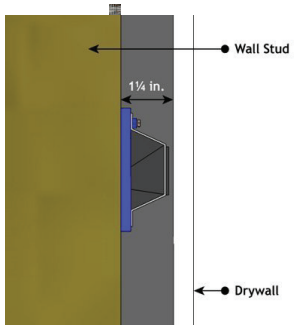


fig
Diagram of Composite panel, Author. 2019

ACCOUSTICS

The buildings contains a lot of machinery which gets really noisy. This combined with the studios and triple volume foyer space contributes to the noise levels of the panels. Various acoustic panels will be inserted throughout the building between different areas. However, most of the ceiling space is exposed which make the space difficult to treat. A combination of acoustic panels and IsoTrax Sound Isolation Systems will be connected to the secondary structure of the ceilings to combat noise.
The IsoTrax systems are spacers that offset the wall panels from wall studs or ceiling joists. This traps vibration and noise into such spacers which are made from medium density thermoplastic (soundproofcow.com.2019). This system also runs on the exposed ceiling via joists that have been treated acoustically to trap the vibrations and dampen them.



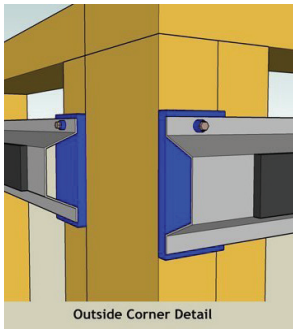


fig
Diagram of IsoTrax Systems being used, Author. 2019

STRUCTURE

ROOFING SYSTEM

The materials used for the roofing of most of the building is profiled metal sheeting. It is also practical because of its ability to curve in one direction where the structural support beneath requires only a few structural members to be curved. This also provides a continuous weatherproof skin (Watts, 2016:204).
The roofing system used in the exhibition space contains curved roof sheeting whereas the rest of the building only straight sheeting.

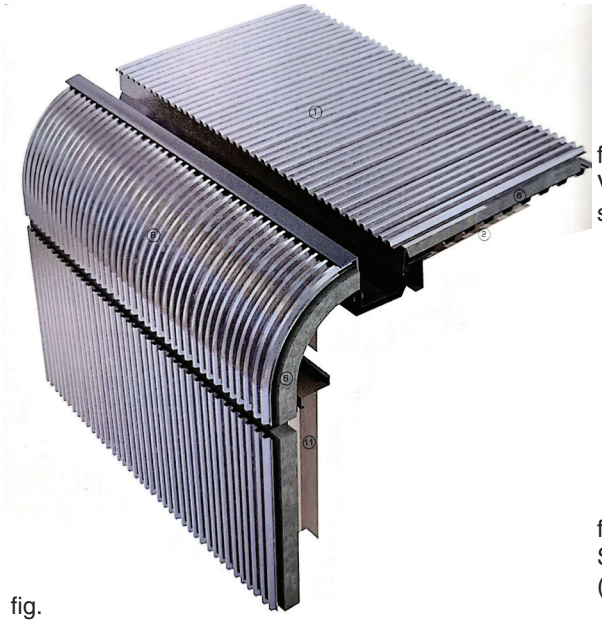


fig.
3D view showing profile metal construction
(Watts, 2016:205).

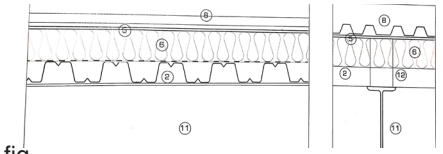


fig.
Vertical section of typical profiled metal sheet (Watts, 2016:205).

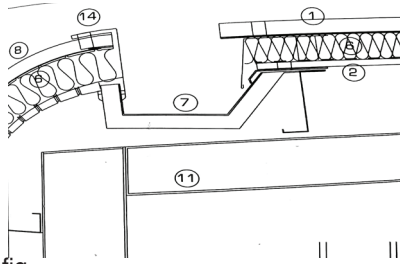


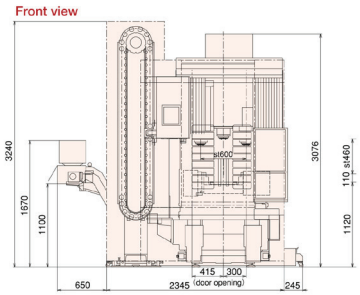
fig.
Section of concealed gutter
(Watts, 2016:205).

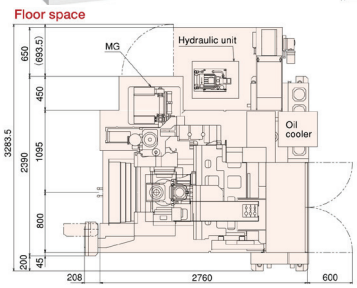
SERVICES

METAL WORKSHOP

It is necessary to look at the workshops separately as they need different ventilation and extraction services. The metal workshop houses equipment such as:

OKK VC-X350 5 Axis CNC Milling Machine





ig. xxx
Plans of the OKK Milling Machine
aken from published plans (Yua-
sa-intl.com, 2019).

Flatbed Fiber Laser Cutting Machine OR-F

Model OR-F 3015
Working Area 3000*1500mm
Laser Power
1000w/1500w/2000w/3000w/4000w
Max Speed 140m/min

fig. xxx
Photo of Flatbed laser cutter (Oreelaser.com, 2019).

Metal Chop Saw

fig. xxx
Photo of Metal Chop Saw used in workshop (Baileigh.com, 2019).

SERVICES

METAL WORKSHOP

Welding booth

Illustration of welding booth (Avanienvironmental.com, 2019)

Sheet Bending Machine

Photo of sheet bending machine(Adendorff Machinery Mart, 2019)

1320 mm x 1 mm, 1016 mm x 1 mm, 1320 mm x 1.5 mm

Laithe Machine

Photo of Lathe Machine(Adendorff Machinery Mart, 2019)

SERVICES

METAL WORKSHOP

With the metal workshop equipment, specialized fume extractors are needed to extract the fumes from the welding machines and any piece of machinery that emits fumes. The KemJet General Ventilation System is used in the metal workshop to extract all the fumes from the machines (kemper.eu, 2019).
It is a central ventilation system that protects the users from fine dust and fumes. The fumes emitted travel up into the system where it will go through a purifaction system and let out purified air back into the workshop. The heated air helps to keep the workshops warm during winter which can save costs on HVAC systems (kemper.eu, 2019).

fig.
Photo of the KemJet General Ventilation (Baileigh.com, 2019).

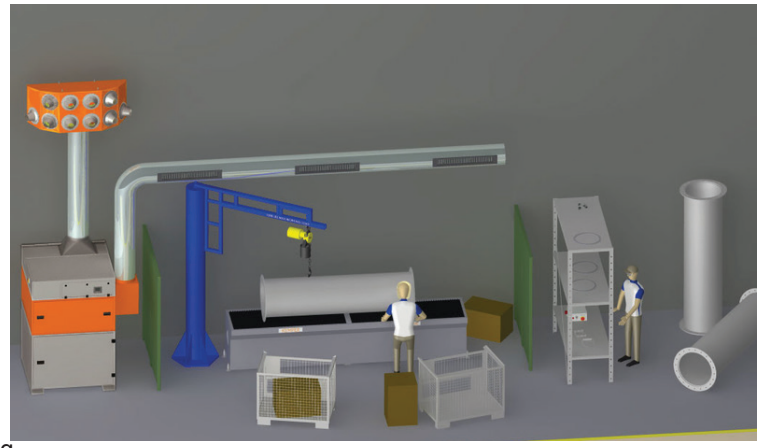


fig.
Illustration of how the KemJet General Ventilation system works(Baileigh.com, 2019).

SERVICES

WOOD WORKSHOP

The woodwork workshop houses equipment completely different to the metal workshop. All of the machines used to cut and refine the timber pieces transfer dust into the workshop. Dust extractors are necessary to filter the dust out and into the dust collectors.

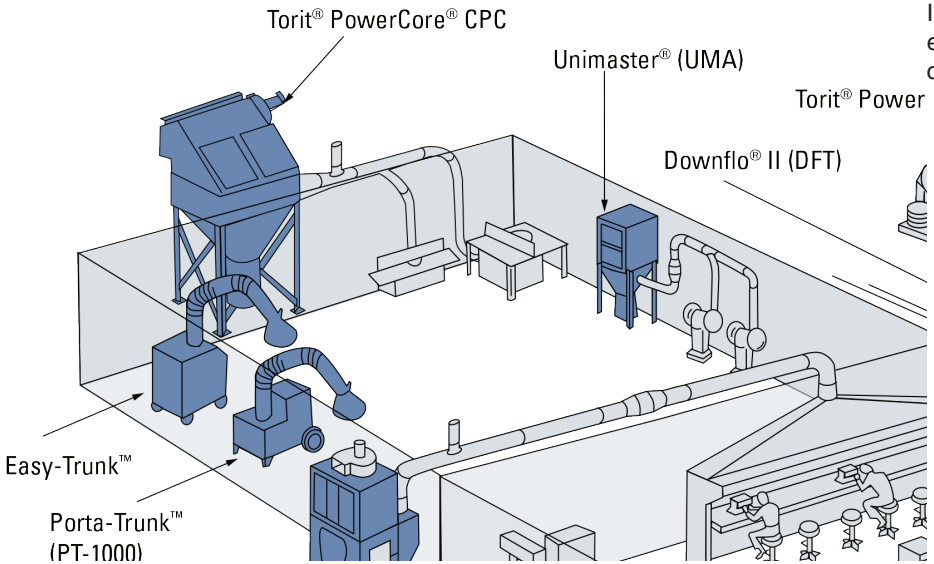


fig.
Illustration of the different kinds of dust extractors used in the workshop(Baileigh.com, 2019).

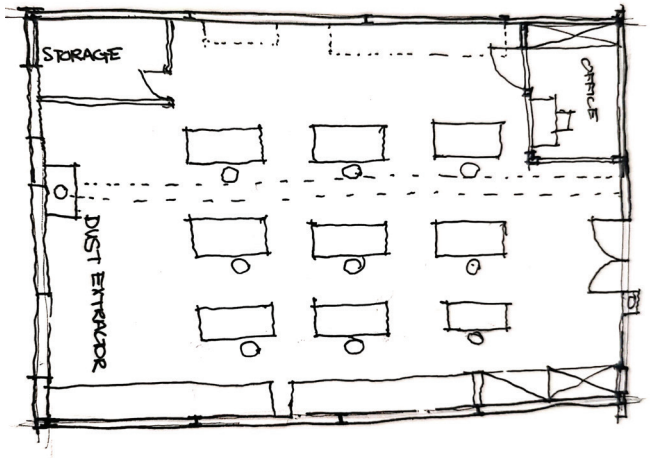


fig.
Plan of a typical woodworking workshop (Author, 2019).

CLAY WORKSHOP

The clay workshop uses a similar plan to that of the wood-working workshop. The clay projects either go into a kiln or are dried outside in the sun.

SERVICES

HVAC

Due to the building's workshops and electronic equipment, it is neccessary to install HVAC equipment to keep the building cool during summers. A variable air volume (VAV) system is integrated into the building.

It is used when the heating and cooling requiremrents differ within the same building. This system consists of a single supply duct which distributes air at a constant temperature. When an area requires more cooling, it alters the volume of air supplied without affecting the other spaces within the building. This VAV system also eliminates the need for separate aircon units. The heating of spaces can be provided for by a liquid perimeter system (Watts, 2016:392).

This type of system is beneficial for an industrial design department. The different types of spaces such as the workshops and cad labs require more cooling than the offices and studios because of the amount of heat the machines emit.

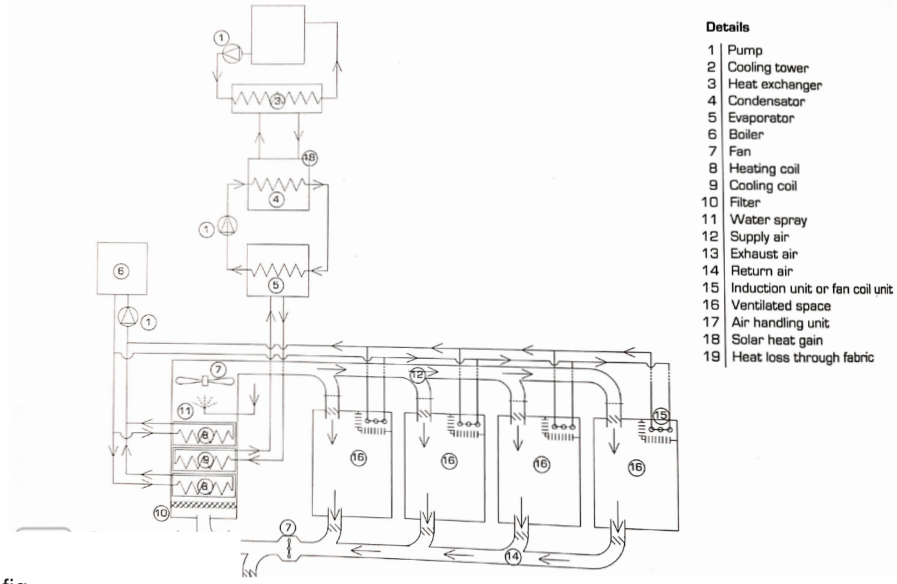


fig.
Diagram of VAV System (Watts, 2016:392).

The alternative to the VAV system is the mechanical ventilation system which consists of an air handling plant with a network of supply and extract duct. The air is blown through the supply ducts to a series of supply grills and then returned via the extract grills or ceiling voids (Watts, 2016:392).

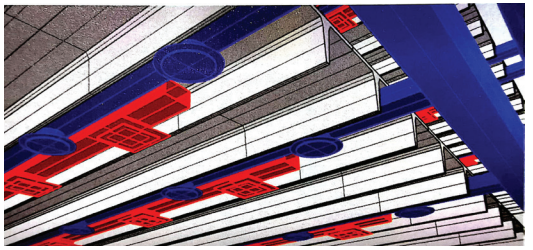


fig.
3D view of mechanical ventilation system in exposed ceiling (Watts, 2016:392).

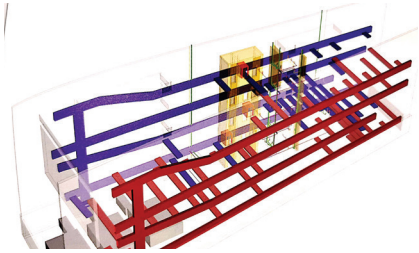


fig.
3D model of mechanical ventilation system (Watts, 2016:392).

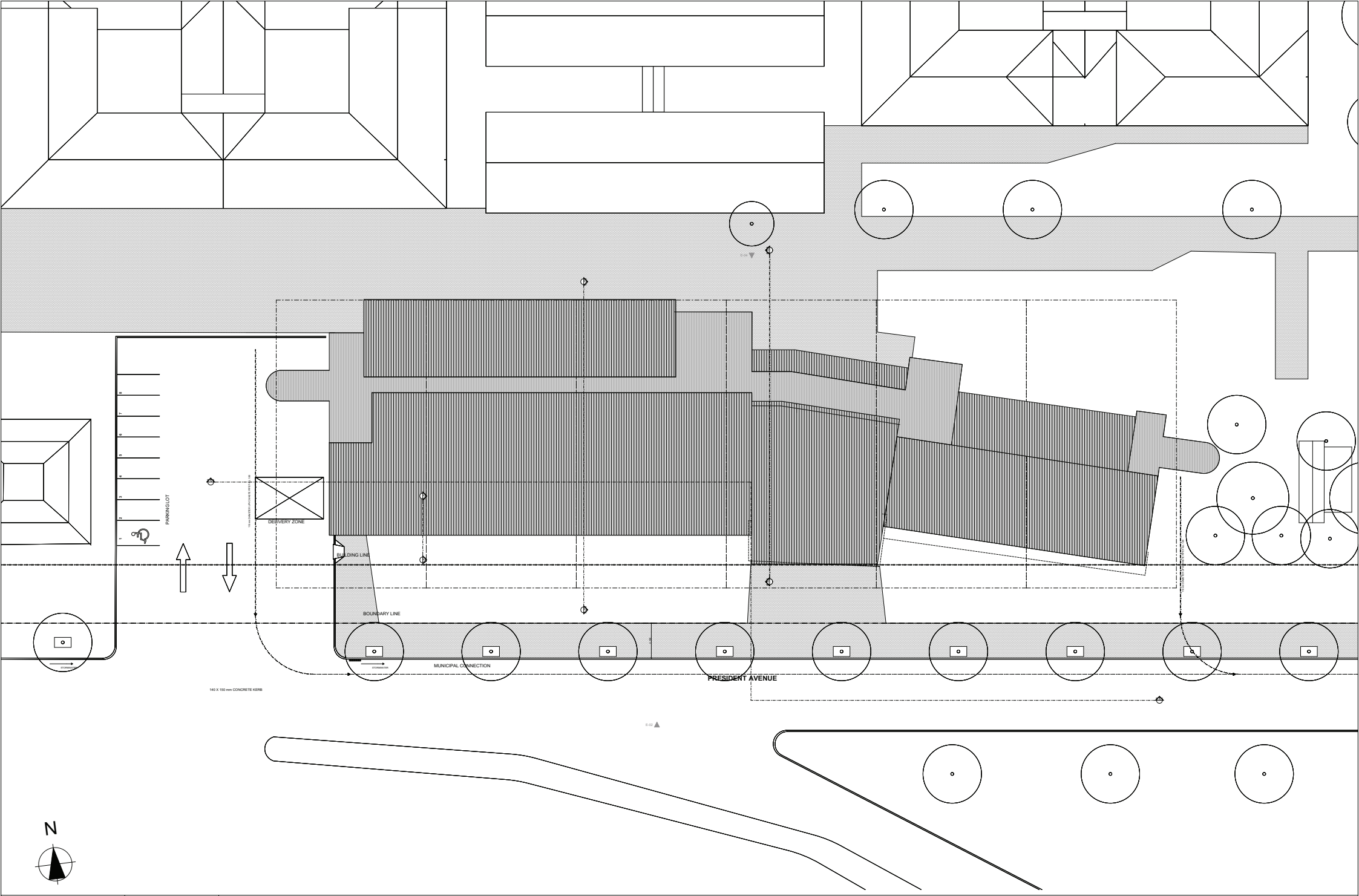
SERVICES

FIRE ALARM SYSTEM

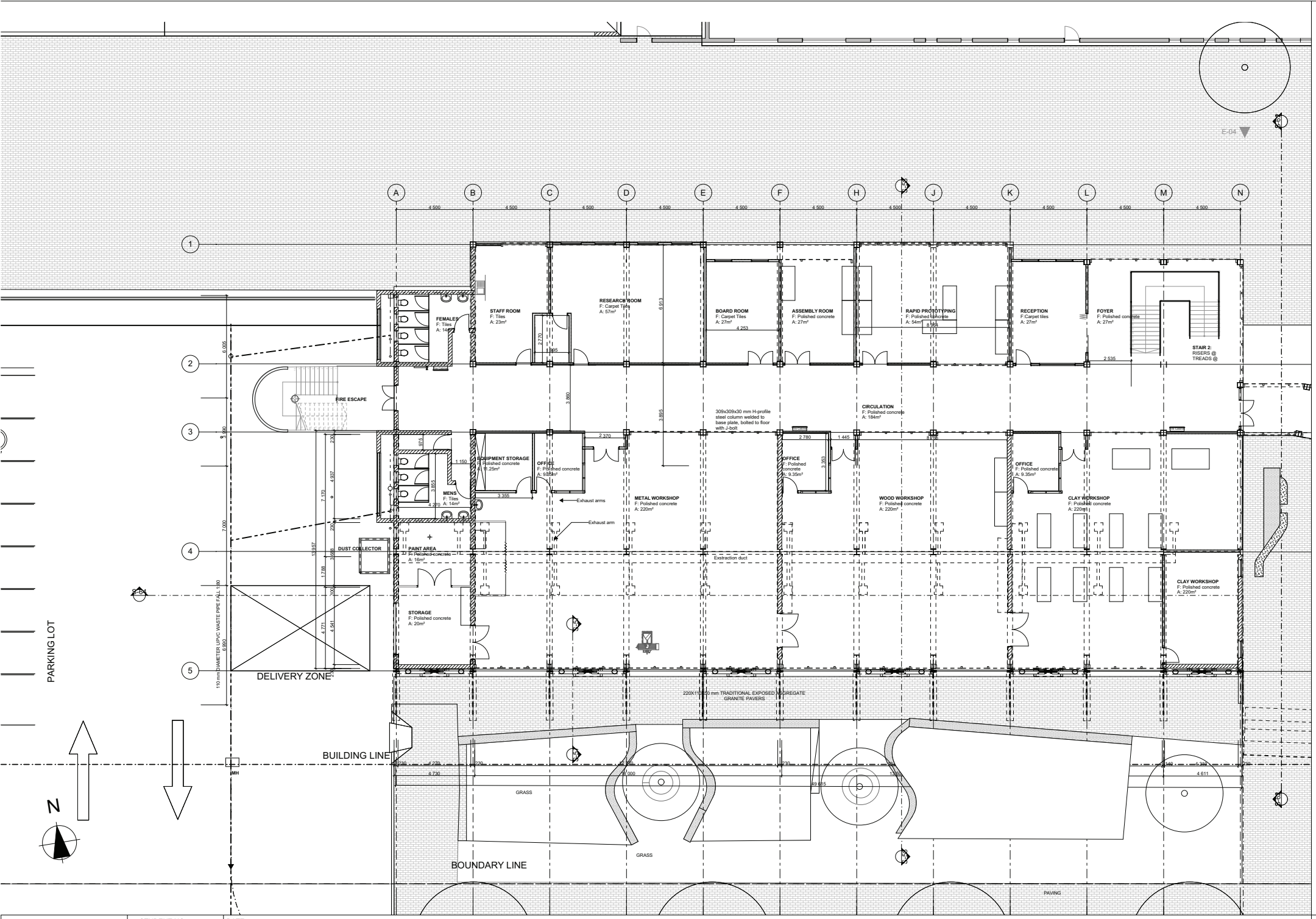
SANS 10400-T:2011, requires that category 1 building bigger than single stories require rational designs for automatic sprinkler systems, fixed fire fighting systems, emergency routes, mechanical smoke or heat control systems with fire detection and alarm system. This includes smoke detectors, thermal detectors, flame detectors and fire-gas detectors. Such building also requires two escape routes.
15m shall be the maximum total travel distance from any point in a room to such exit door. Where the total travel distance from any point to the exit door, a maximum of 45m is permitted. Hose reels must be installed in every floor and every 50m2 (SANS 10400-T:2011: [Part T, Fire Protection).

WATER SUPPLY

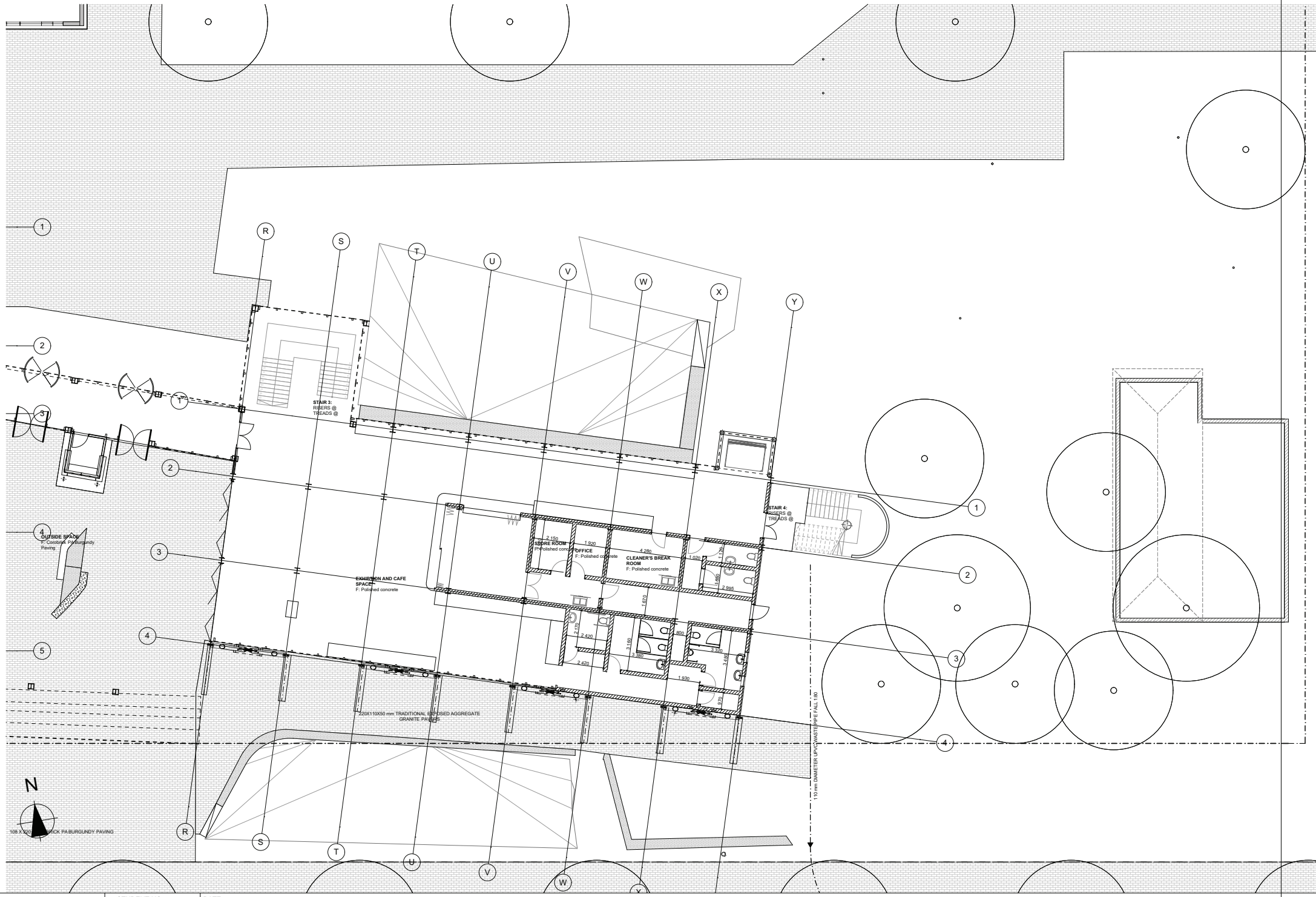
The water and sewage supply services consist of two main service cores. One of each side of the building where the water supply and sewage system have seperate lines, therfore resulting in uncomplicated supply solutions. These supply lines run right above each on the each floor which a service duct enclosing each. The sewage pipes will then join the municple line at the nearest manhole.



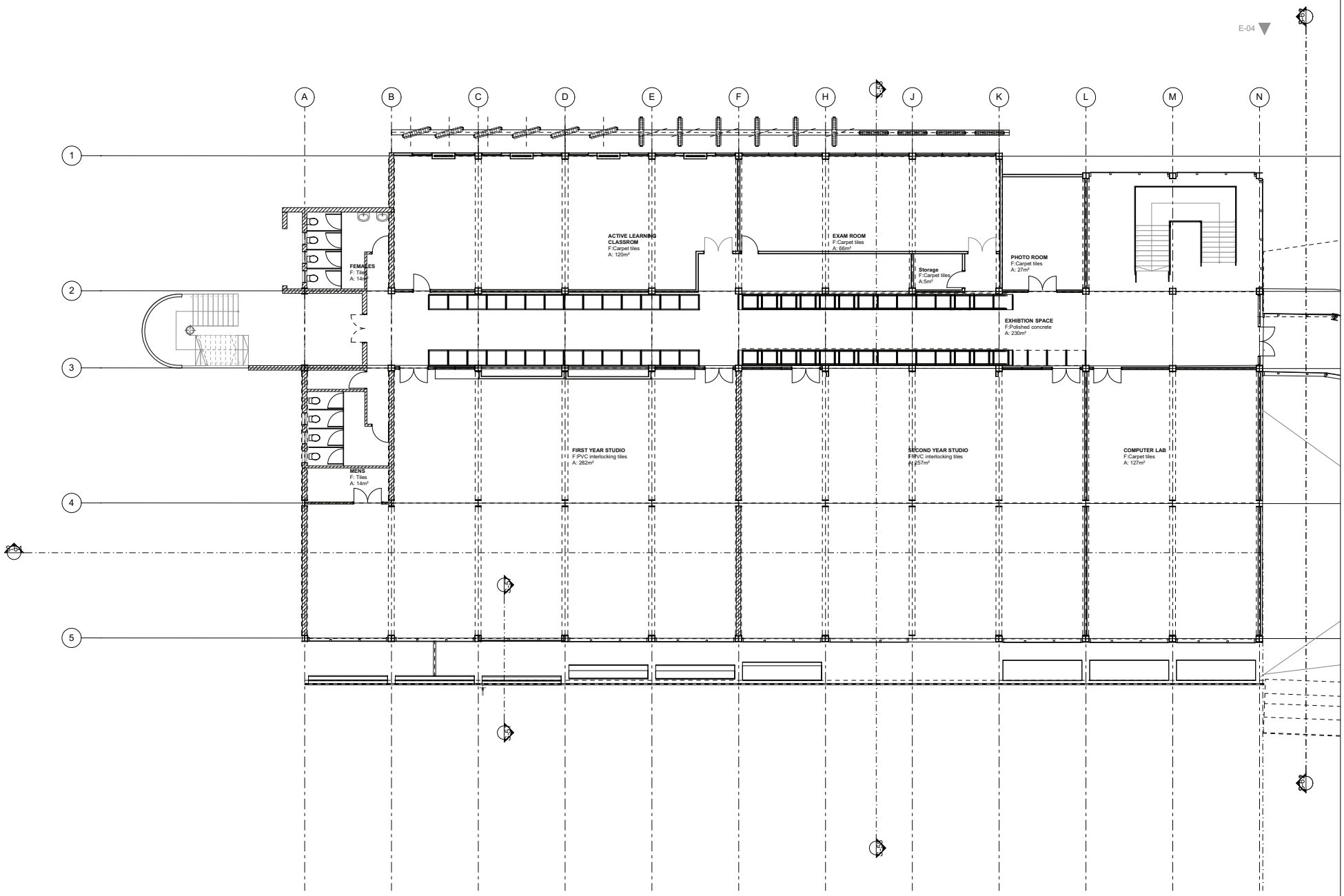
SURNAME AND NAME **TOPKIN AIDEN**	STUDENT NO: **2014040576**	DATE **19 NOVEMBER 2019**
DRAWING DESCRIPTION **SITE PLAN**		SCALE **1:200**



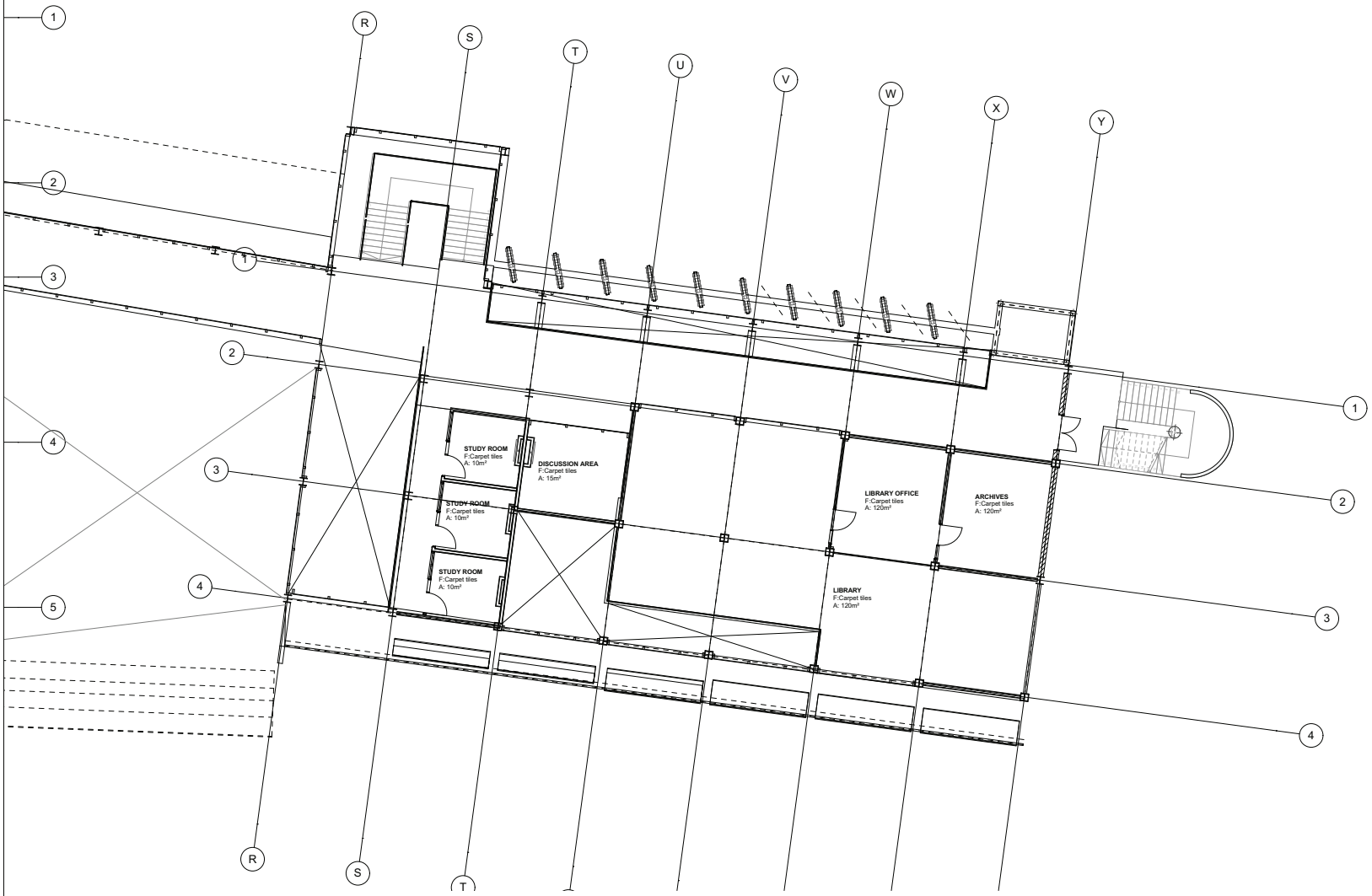
SURNAME AND NAME **TOPKIN AIDEN**	STUDENT NO: **2014040576**	DATE **19 NOVEMBER 2019**
DRAWING DESCRIPTION **GROUND FLOOR PLAN 01**		SCALE **1:100**



SURNAME AND NAME **TOPKIN AIDEN**	STUDENT NO: **2014040576**	DATE **19 NOVEMBER 2019**
DRAWING DESCRIPTION **GROUND FLOOR PLAN 01**		SCALE **1:100**

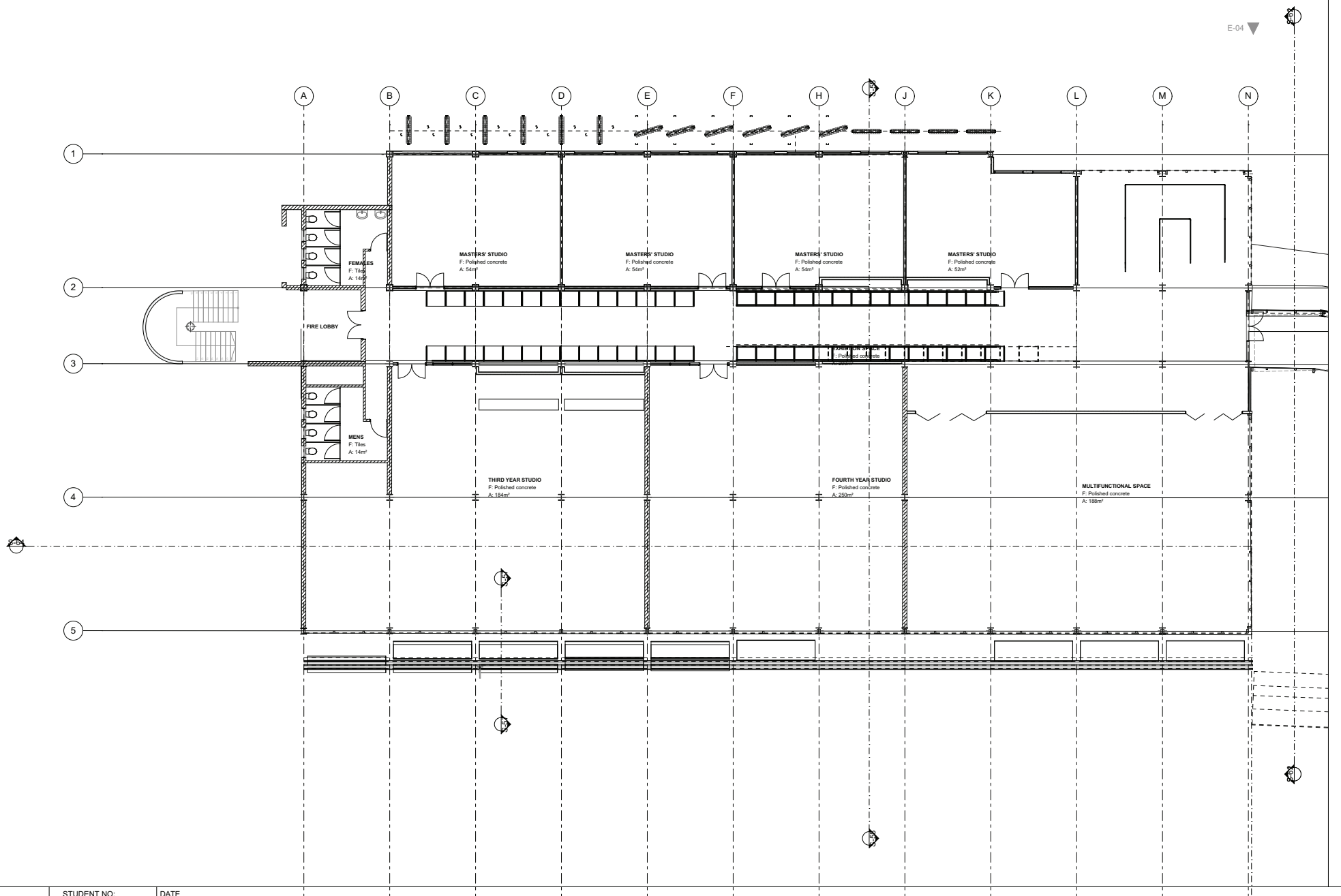


SURNAME AND NAME **TOPKIN AIDEN**	STUDENT NO: **2014040576**	DATE **19 NOVEMBER 2019**
DRAWING DESCRIPTION **FIRST FLOOR PLAN 01**		SCALE **1:100**

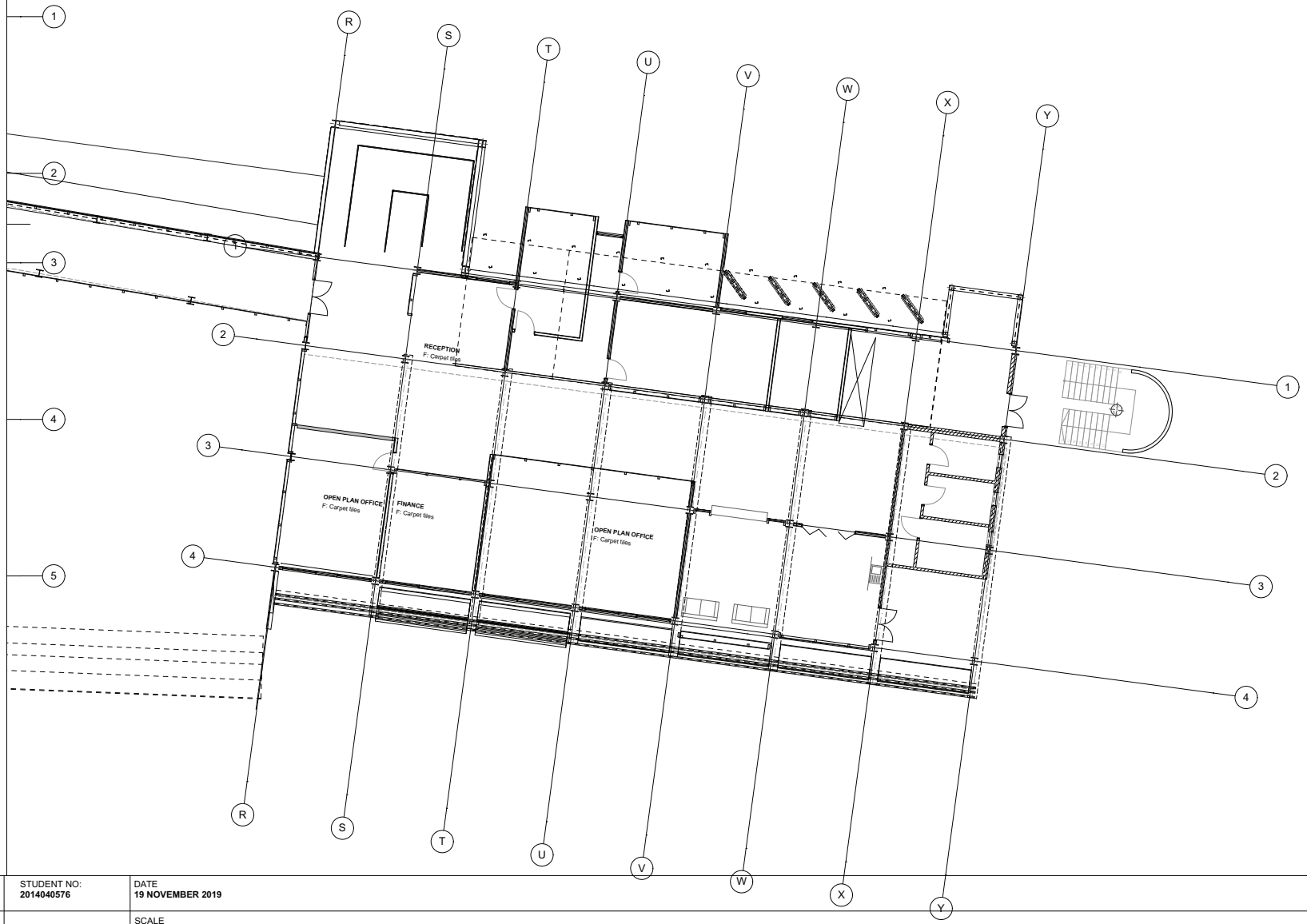


N

SURNAME AND NAME **TOPKIN AIDEN**	STUDENT NO: **2014040576**	DATE **19 NOVEMBER 2019**
DRAWING DESCRIPTION **FIRST FLOOR PLAN 02**		SCALE **1:100**

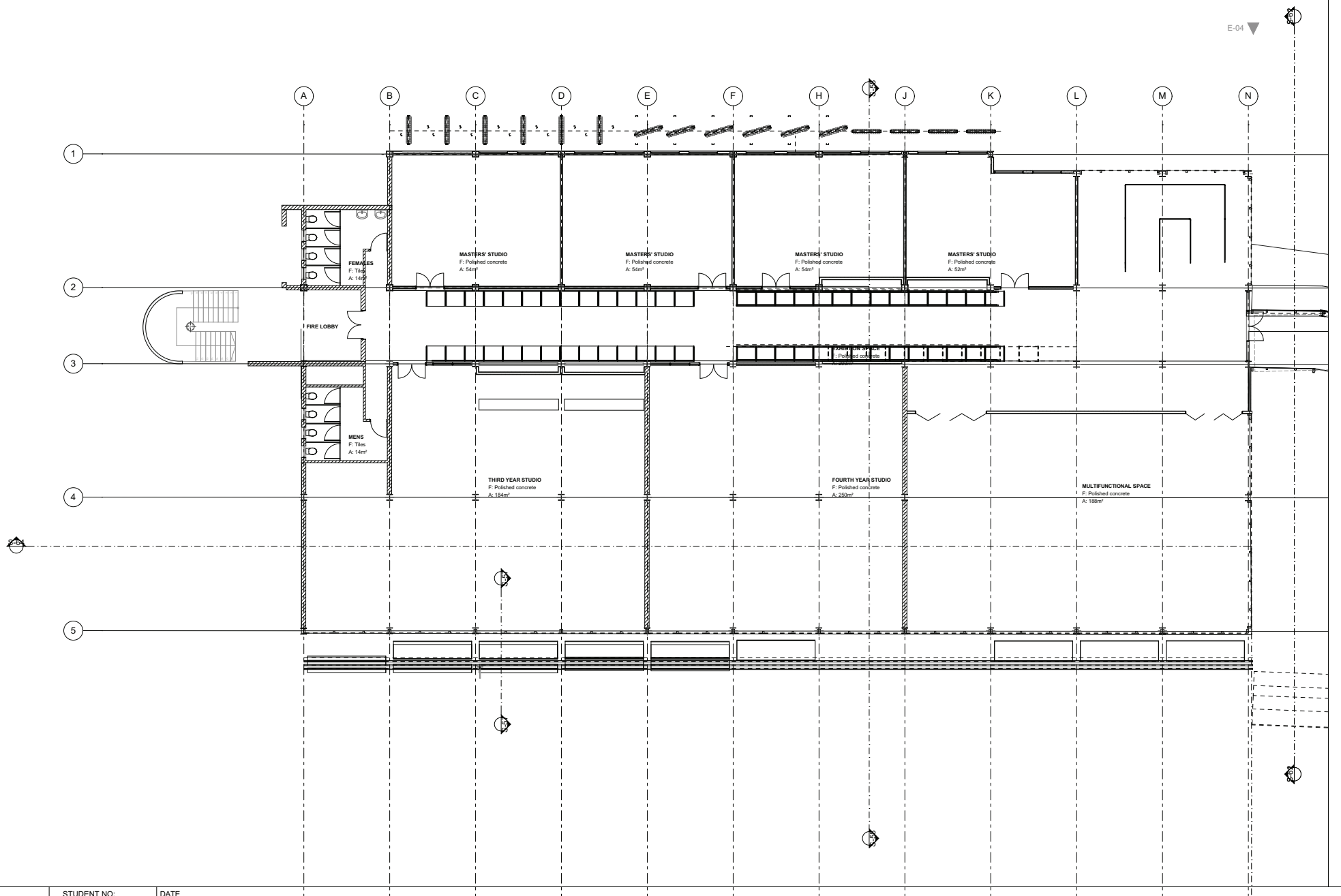


SURNAME AND NAME **TOPKIN AIDEN**	STUDENT NO: **2014040576**	DATE **19 NOVEMBER 2019**
DRAWING DESCRIPTION **SECOND FLOOR PLAN 02**		SCALE **1:100**



N

SURNAME AND NAME **TOPKIN AIDEN**	STUDENT NO: **2014040576**	DATE **19 NOVEMBER 2019**
DRAWING DESCRIPTION **SECOND FLOOR PLAN 02**		SCALE **1:100**



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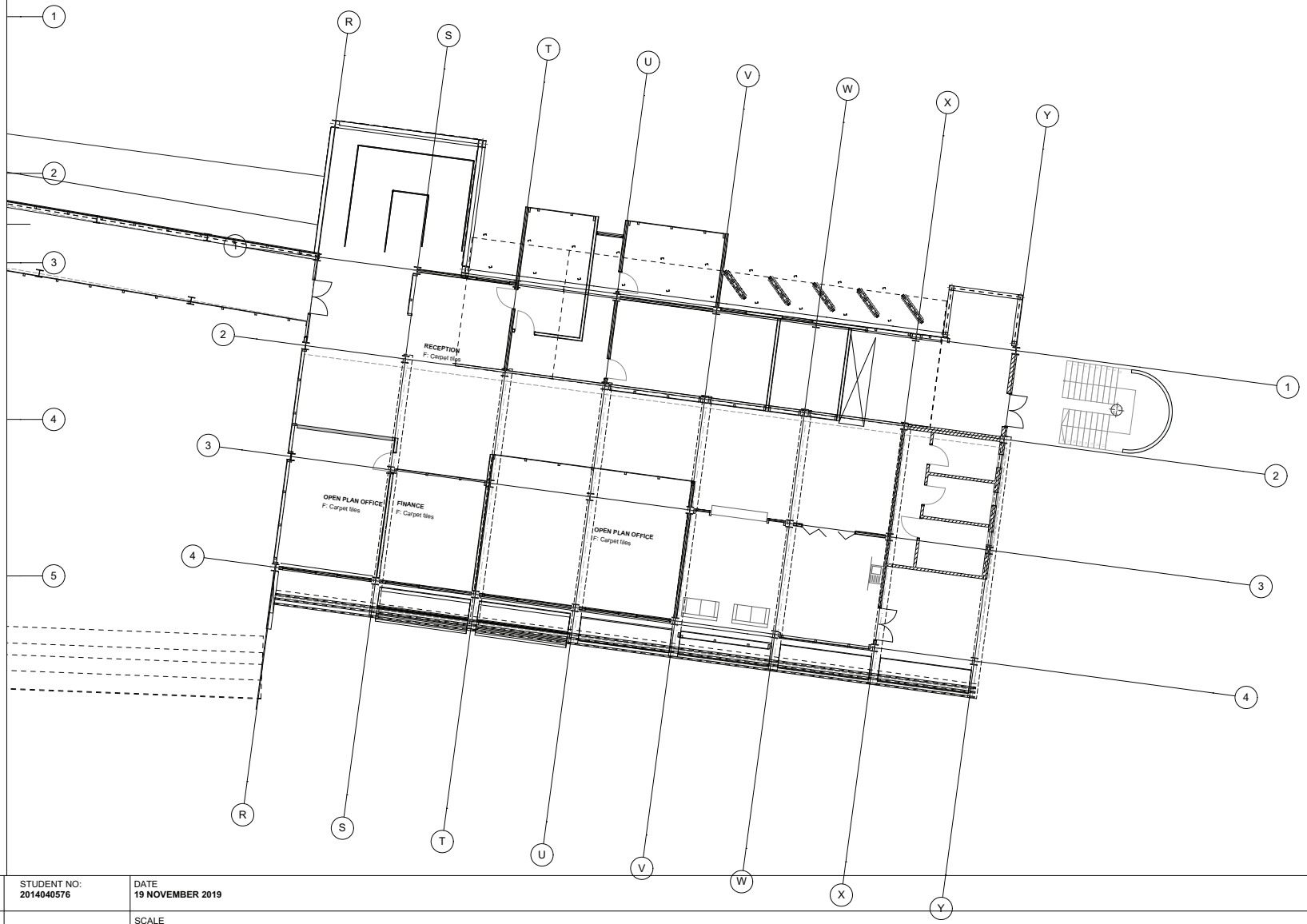
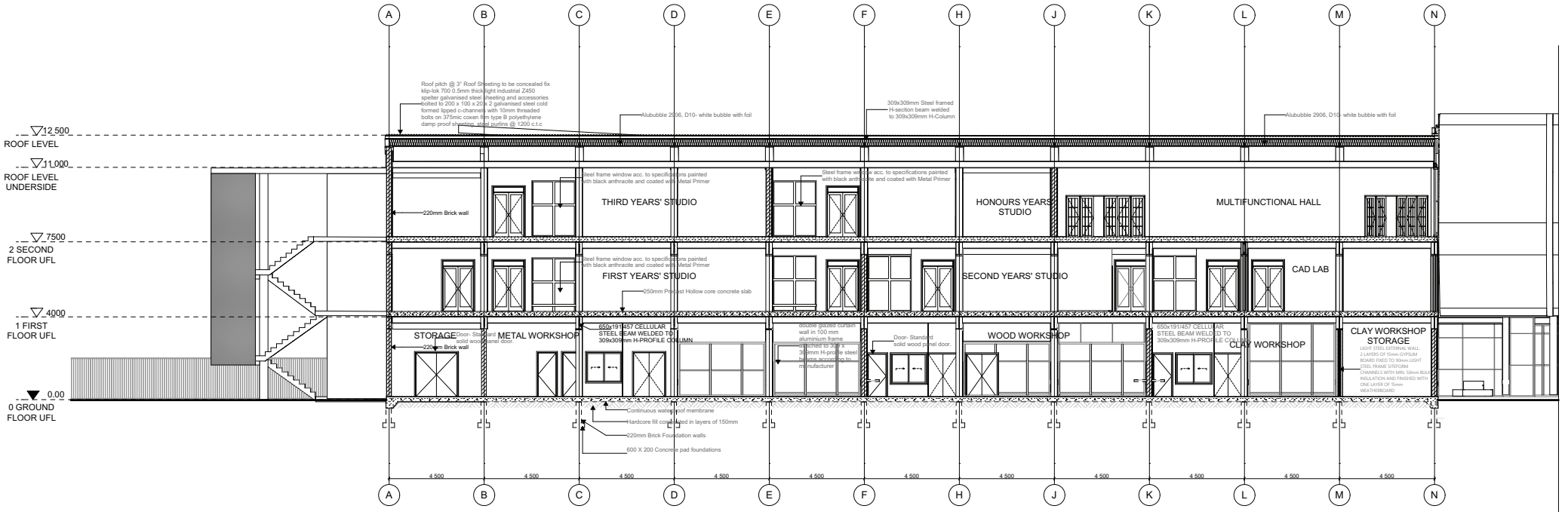
DRAWING DESCRIPTION **SECOND FLOOR PLAN 02**		SCALE **1:100**

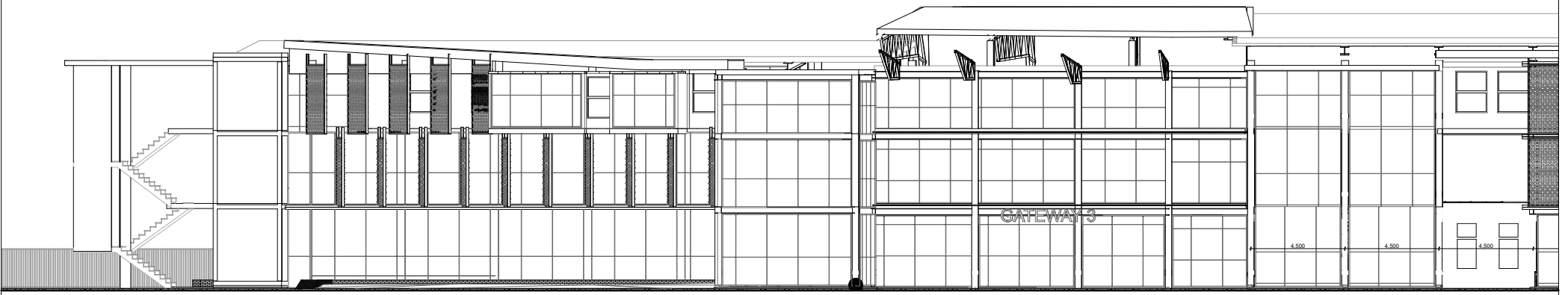


N

SURNAME AND NAME **TOPKIN AIDEN**	STUDENT NO: **2014040576**	DATE **19 NOVEMBER 2019**
DRAWING DESCRIPTION **SECOND FLOOR PLAN 02**		SCALE **1:100**

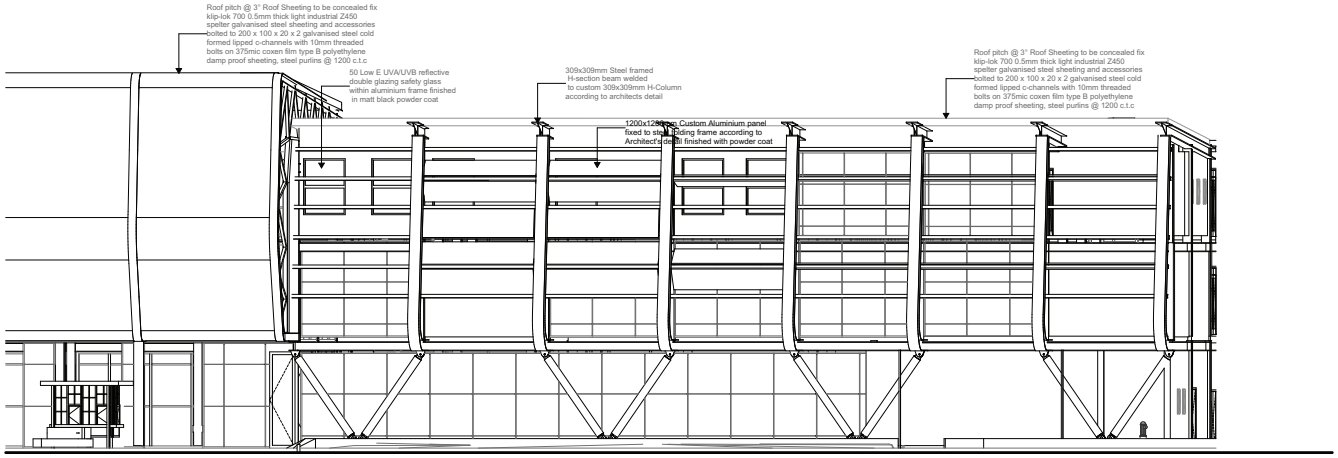


SECTIONAL ELEVATION
SCALE 1:100



NORTH ELEVATION
SCALE 1:100

SURNAME AND NAME **TOPKIN AIDEN**	STUDENT NO: **2014040576**	DATE **19 NOVEMBER 2019**
DRAWING DESCRIPTION **SECTIONAL ELEVATION**	DRAWING DESCRIPTION **NORTH ELEVATION**	SCALE **1:100**



SECTIONAL ELEVATION
SCALE 1:100

NORTH ELEVATION
SCALE 1:100

SURNAME AND NAME **TOPKIN AIDEN**	STUDENT NO: **2014040576**	DATE **19 NOVEMBER 2019**
DRAWING DESCRIPTION **SECTIONAL ELEVATION**	DRAWING DESCRIPTION **NORTH ELEVATION**	SCALE **1:100**

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