

D I G I T A L B O U N D A R I E S

A study into how mobile devices and Information + Communication Technologies can influence the social programming, spatial conditions and construction of public architecture.

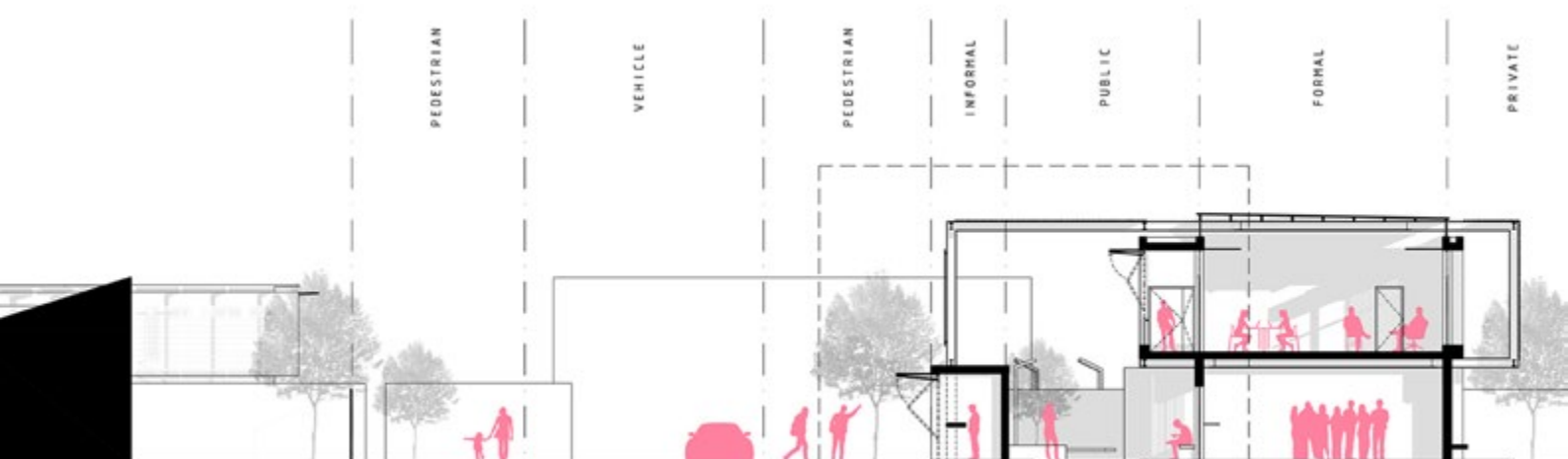
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Design Dissertation report presented as part fulfilment of the degree of Master of Architecture (Professional) in the School of Architecture Planning and Geomatics, University of Cape Town.

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"Architecture is a form of communication... of knowledge. Architecture is a way of to understand our world, and also possibly to have some effect on it. It doesn't have to be through buildings - it has to do with ideas that involve our immediate environment, our physical space. Any way to use that physical environment, that architectural context, as a means to discuss issues I think is very appropriate."

- Bernard Tschumi

"One's 'first place' is the home and those that one lives with. The 'second place' is the workplace -- where people may actually spend most of their time. Third places, then, are 'anchors' of community life and facilitate and foster broader, more creative interaction."

- Ray Oldenburg, 1989

0.1. A B S T R A C T

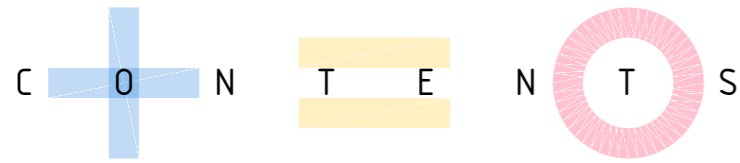
D I G I T A L B O U N D A R I E S explores the notion of how ICTs and mobile devices can influence the social programming, spatial conditions and construction of public architecture. This topic is derived from the study of Urban Informatics which looks at three key actors: people, place and technology. This can be seen in South Africa where many young individuals inhabit public buildings in the urban environment purely to be connected to wireless internet through their mobile devices. This is done so that they are able to do research for studies, look for job opportunities or socialise. This digital infrastructure then becomes an important aspect of the public realm, not only for personal benefit and need, but for attracting people to place. Situated in the Nyanga Junction precinct south of Gugulethu, the architectural proposition looks at adding digital infrastructure to this complex precinct in the informal area of Cape Town through three scales of architecture; small, medium and large. The small scale is that of Wi-Fi hotspots at street level embedded within the informal market at ten strategically located sites. The medium scale interventions are upgrades to four existing trade posts elevated above at first floor level. Lastly the large scale which is of catalytic and institutional architecture at two proposed sites, of which one is the main architectural focus of the design dissertation and explored further. The architectural programme provides spaces for: IT learning and skills development to help individuals seek employment, collaborative hubs for those developing new entrepreneurial ideas, and youth hubs for students to study and socialise. These three scales and their locality have been informed by social thresholds developed through the theory and technology studies that have been influential in the urban strategy of the design dissertation. It has created a framework for digital infrastructure to be implemented that will help enhance the public realm for a safer and more conducive urban environment.

0.2. ACKNOWLEDGEMENTS

First and foremost I would like to thank my supervisor Francis Carter, of UCT, who has guided me through my two years attending UCT as well as the rest of the teaching and administrative staff at the university. Creating a great learning environment that has set up the foundations for me to pursue my career in architecture. Secondly my co-supervisor Tessa Brunette, and the rest of the ARUP Cape Town team who have helped throughout my studies to develop a better understanding of both technical resolution and design that has enhanced my appreciation for architecture.

A special thank you goes to all my class mates particularly those of the Fields of Play Studio, who have offered constructive criticism as well valued company that I will always appreciate. Recognition also needs to go to Violence Prevention through Urban Upgrading (VPUU), a group of individuals who have been influential in understanding the context of informal settlements and how architecture can be catalytic. Furthermore, thank you to all those who have helped with and participated in the fieldwork for the design dissertation research.

Lastly, I would like to send my greatest appreciation to my family and friends who have been nothing but supportive throughout all my years of studies and encouraging me to follow my passion in architecture.



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INTRODUCE

CONCLUDE

PART 1 INTRODUCTION

1.1. INTRODUCTION

The following report is the Design Dissertation (APG5079W) titled 'Digital Boundaries' for the Masters in Architecture (Professional) degree at the University of Cape Town, UCT. The dissertation is a study into the influence of Information + Communication Technologies (ICTs) and mobile devices on the social programming, spatial conditions and construction of public architecture. The report follows from and is supported by the Theory + Technology Studies (APG5088Z) titled 'Where Buildings Meet the Street'. The Theory Study paper focusses on urban upgrading through the global ideas of Jan Gehl on human scale in the urban environment, and second local implementation Violence Prevention through Urban Upgrading (VPUU) of catalytic architecture. The Technology Study Paper explores the idea of digital infrastructure and how it can influence the built fabric of architecture as well enhance the public realm.

The Design Dissertation report has been split into eight parts, each exploring the ideas expressed and in support of the argument and architectural proposition. Part 1 is the introduction to the issues, topic, design research questions and the research methodology used in the design dissertation. Part 2 reflects on the urban context of the study area, and the urban strategy that sets up the foundation for the design proposition. Part 3 deals with the actual architectural proposition of the programme, design principles derived from the Theory + Technology Studies and design development of all three scales of architecture proposed. Part 4 explores the technical resolution of the architectural proposition, its sustainability + environmental response, building performance, materiality and structure through detailing. Part 5 then summarises the architectural synthesis that ties together the urban design, architectural proposition and technical resolution. Part 6 is the concluding part that expresses the findings of the study and possible ways forward.

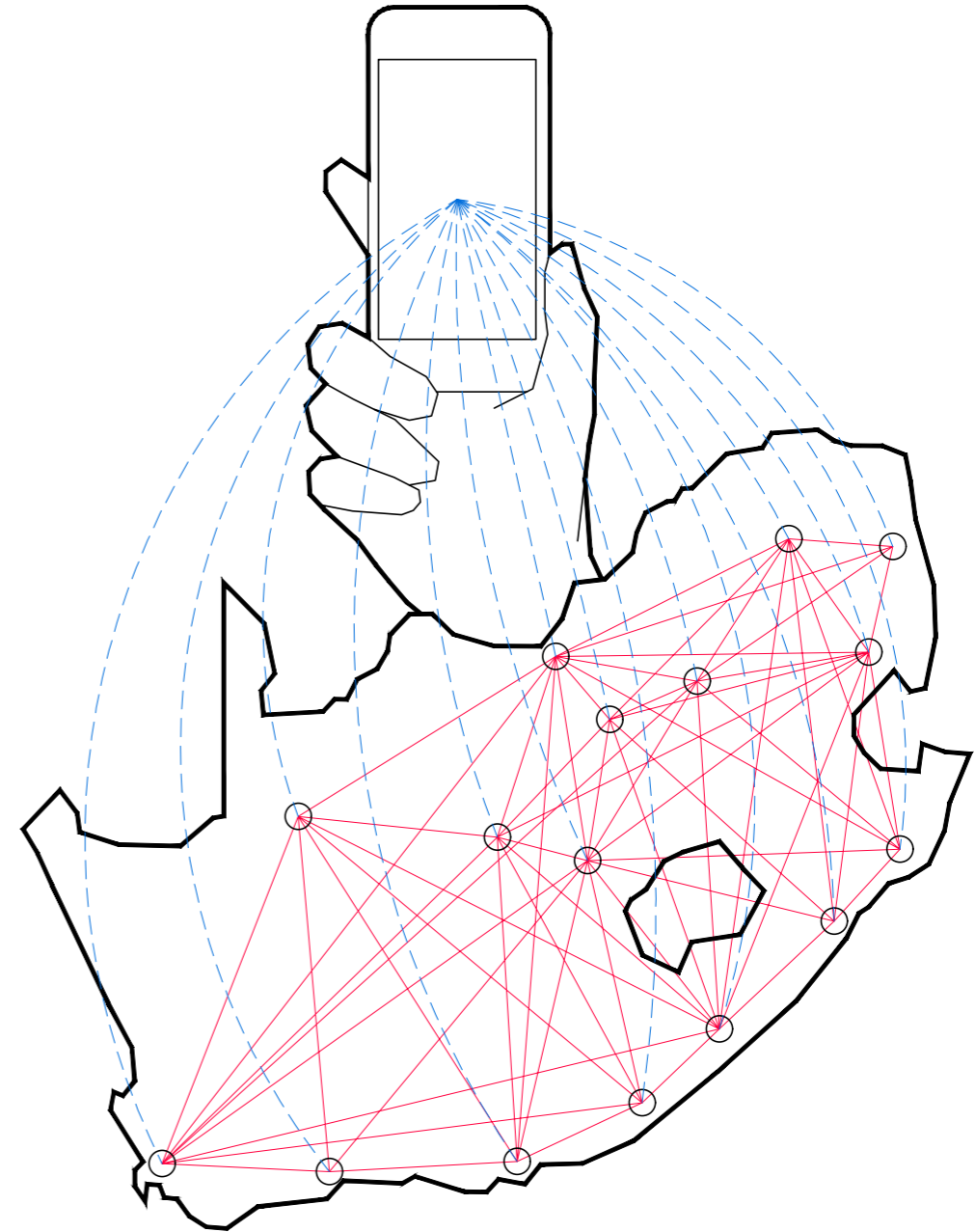


FIGURE 01: SOUTH AFRICA CONNECTED

1.2. TOPIC + BACKGROUND

The topic and narrative of the design dissertation is derived from the study of Urban Informatics, which looks at the socio-technical relationship of three key actors in the urban environment: People, Place and Technology (Devisch, 2012). In South Africa, where fees for mobile data fees are so high, one starts to see a trend where individuals inhabit spaces that offer free internet accessibility through Wi-Fi, in order to be connected to the Internet. In my Technology Study paper, focused around digital infrastructure and its ability to impact public space, I noted that many young individuals inhabit public places such as MyCiti bus stops with the sole intention to be connected spending up to three hours at these spaces (Makghato & Gaanakgomo, 2017). Urban Informatics thus comes into play through the notion that these individuals (people) inhabit urban spaces and public buildings (place) solely for the intention to be connected to the internet through their mobiles phones and devices (technology). They do this in order to do research for study assignments and/or to socialize. Furthermore, this now informs how something non-spatial such as mobile devices become immensely spatial, attracting people to place. Without their device, individuals might not inhabit these spaces, as they cannot connect to the virtual 'place' - mobile devices becoming an ordering-device of place making.

The locality chosen to explore these theories and ideas is the Nyanga Junction precinct, a busy train station, taxi rank and market in Gugulethu situated just 15 kilometres from the Cape Town city centre. In Gugulethu, approximately 42.7% of the population have access to internet. Furthermore, just under half, 48% to be exact, of these individuals predominantly access the internet through mobile phones and devices. Other means are 'elsewhere' (32%), work (10%), home (9%) and unspecified (1%) (Statistics South Africa, 2012)

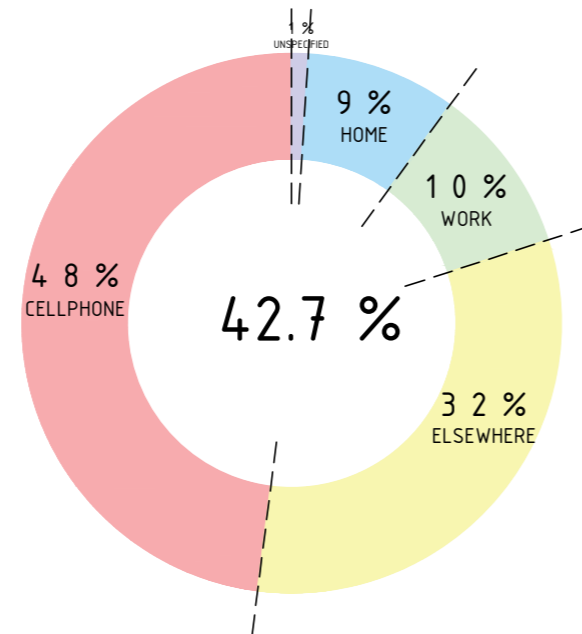


FIGURE 02: INTERNET ACCESSIBILITY IN GUGULETHU

Through the fieldwork done for the design dissertation, it is very evident in the informal areas of Cape Town that many individuals are constantly seeking new forms of employment or a means to generate income to support themselves and their families. Often these individuals lack the skills to apply for jobs and are in dire need of training that may make them employable. IT and computer literacy is important to this but is compromised by the lack of access to computers, IT facilities and internet accessibility.

Here lies the opportunity to provide many in informal areas with public architecture that offers internet connectivity and places for learning, working, socializing and studying.

The architectural proposition follows on from Ray Oldenburg's notion of the 'third place' where he states 'third place' is one that is neither home nor the workplace, but rather where individuals can collect, interact, collaborate over new entrepreneurial ideas or socialize (Oldenburg, 1989). It looks at providing skills development and training facilities centre or hub, across three scales of architecture throughout the busy and vibrant precinct of Nyanga Junction that offers access to amenities that individuals might not have access to do so at home or work, particularly digital infrastructure and internet accessibility. This will be supported by public space that is conducive to the human at the human scale through the ideas expressed by Jan Gehl and design principles developed by VPUU.

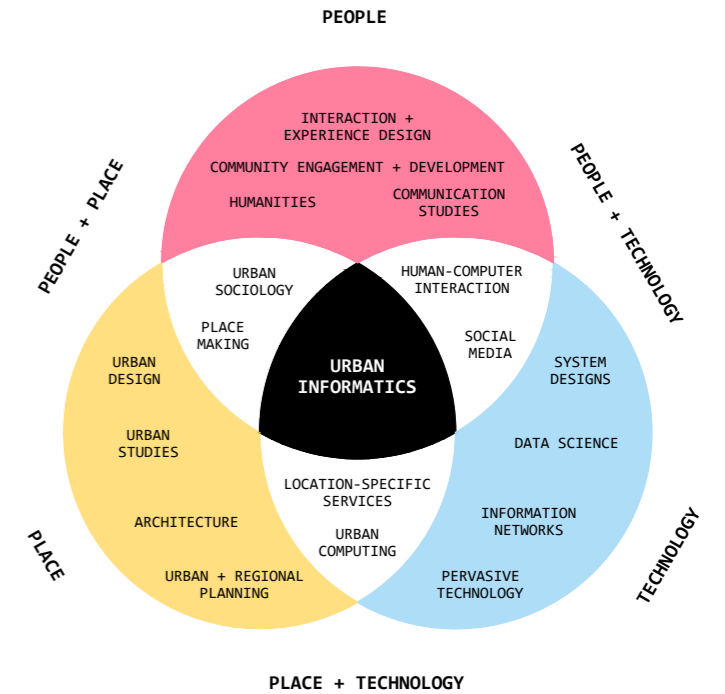


FIGURE 04: URBAN INFORMATICS VENN DIAGRAM

FIGURE 03: PEOPLE, PLACE + TECHNOLOGY
Young individual connected to a MyCiti bustation Wi-Fi through a mobile device in order to do research and homework for studies.



1.3. DESIGN RESEARCH QUESTIONS

The primary Design Research Question that derives from these theories is:

How can virtual technologies such as ICT systems, mobile devices and wireless Internet connectivity influence the social programming, spatial conditions and construction of public architecture in the physical realm?

Sub Questions:

How can this notion of internet connectivity help enhance the public realm as a device of place making?

How can this proposition be linked to social programmes for training centres and skills development?

How can the addition of digital infrastructure support the existing conditions of public space?

1.4. APPROACH TO STUDY + METHODOLOGY

The methodology used for the design research has been both qualitative and quantitative and two main methods have been executed through the design dissertation, firstly literature review done through the Theory and Technology Studies and secondly fieldwork.

In support of the design dissertation topic, data was collected to establish where there are public facilities that offer internet accessibility across the full extent of Cape Town. This was done with public data provided by both the City of Cape Town and the Western Cape Government. As the area of interest for the design dissertation is in Gugulethu and its surroundings, a careful selection of these identified internet hotpots or facilities was made according to programme and site locality, to get a full understanding of how each facility is used by the public and the ease or difficulty of accessibility.

The selected sites for fieldwork are as follows:

1. Religious - JL Zwane Church Centre, Gugulethu;
2. Education - Silulo Ulutho Technologies, Philippi;
3. Business - Harare Square Live/Work Units, Khayelitsha;
4. Sport - Amandla Edufootball and Oliver Kahn Safehub, Gugulethu.

Originally, the intent was to interview individuals who use the facilities as well those who are part of management but it proved difficult to interview those using the facilities as many of the users were paying for the time they had at the facility and did not want to waste it on an interview. Therefore, only those working at the facilities were interviewed.

All human subjects interviewed have been over the age of 18 years and done so with their informed consent. Secondly, while the questions are not personally intrusive, subjects were likely to be poor or unemployed residents of under-resourced neighbourhoods and care was taken to not raise expectations and awareness that the study will benefit parties involved in any way, and is for educational purposes. Data has been documented for the fieldwork through site observations by photographing site + public conditions, interview recordings and on site drawings and sketches. Data collected has been limited to the availability of the parties involved as well the accessibility of the facilities.

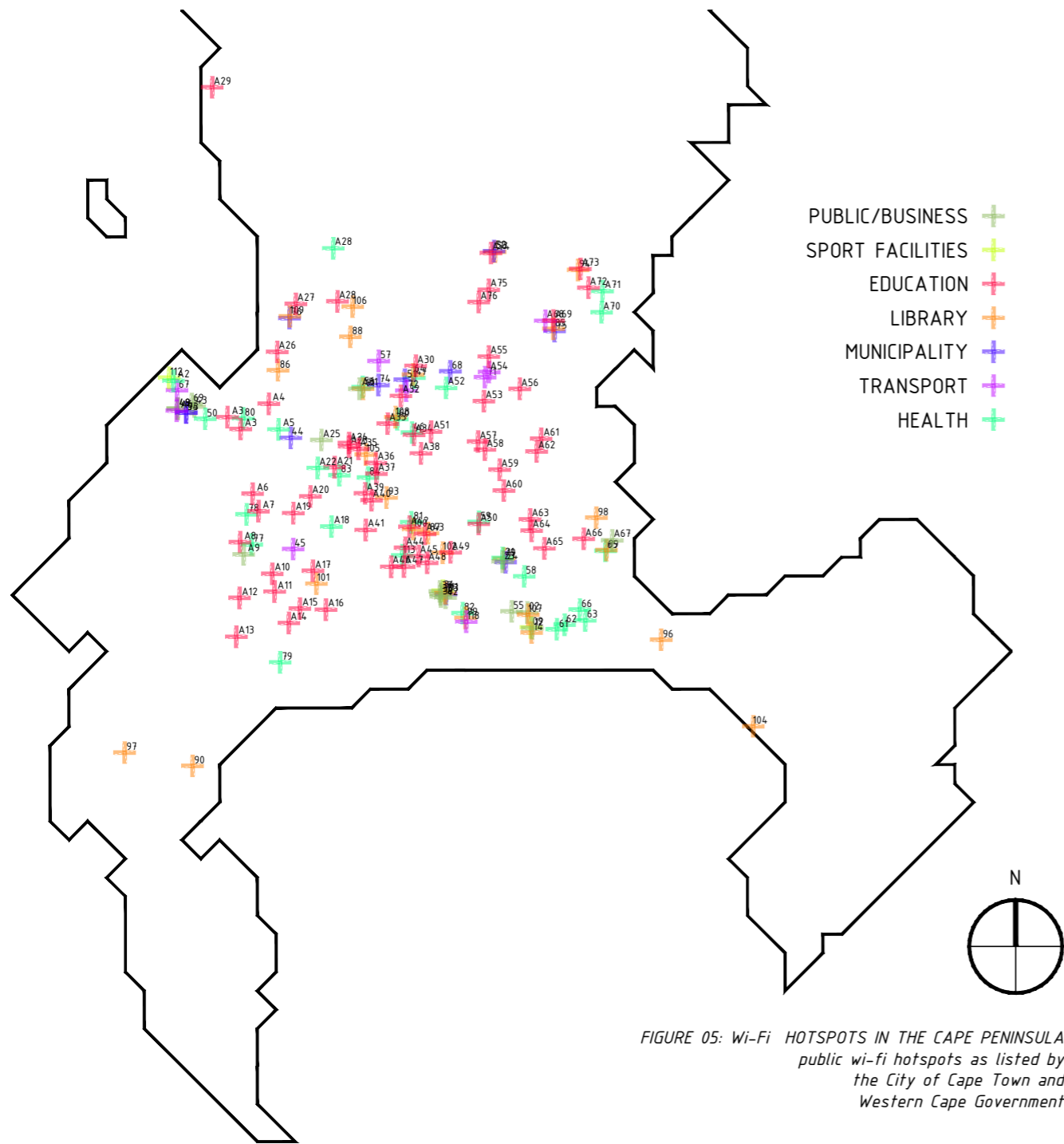


FIGURE 05: Wi-Fi HOTSPOTS IN THE CAPE PENINSULA
public wi-fi hotspots as listed by
the City of Cape Town and
Western Cape Government

When interviewing the managing staff of the internet café located at Harare Park in one of the Live/Work units, they claimed to have anything between 600–700 people using the internet facilities every day. This is interesting as the internet café itself is approximately 25 m². Furthermore, many of these individuals using the facilities are visiting the café more than once a day to regularly check their emails. Often these emails sent out, with the help of the administrative staff, are emails to possible job opportunities. Furthermore, many of the

people of the area are not accustomed to IT and computer literacy and think that one needs to travel in person to apply for a job, not realizing the ease of internet accessibility and its benefit in reducing the cost and time needed for travel. The internet cafe offers such services as helping with CV documentation and sending out job applications, thus becoming an important place of 'hope' for the people of the area, especially those seeking job opportunities.

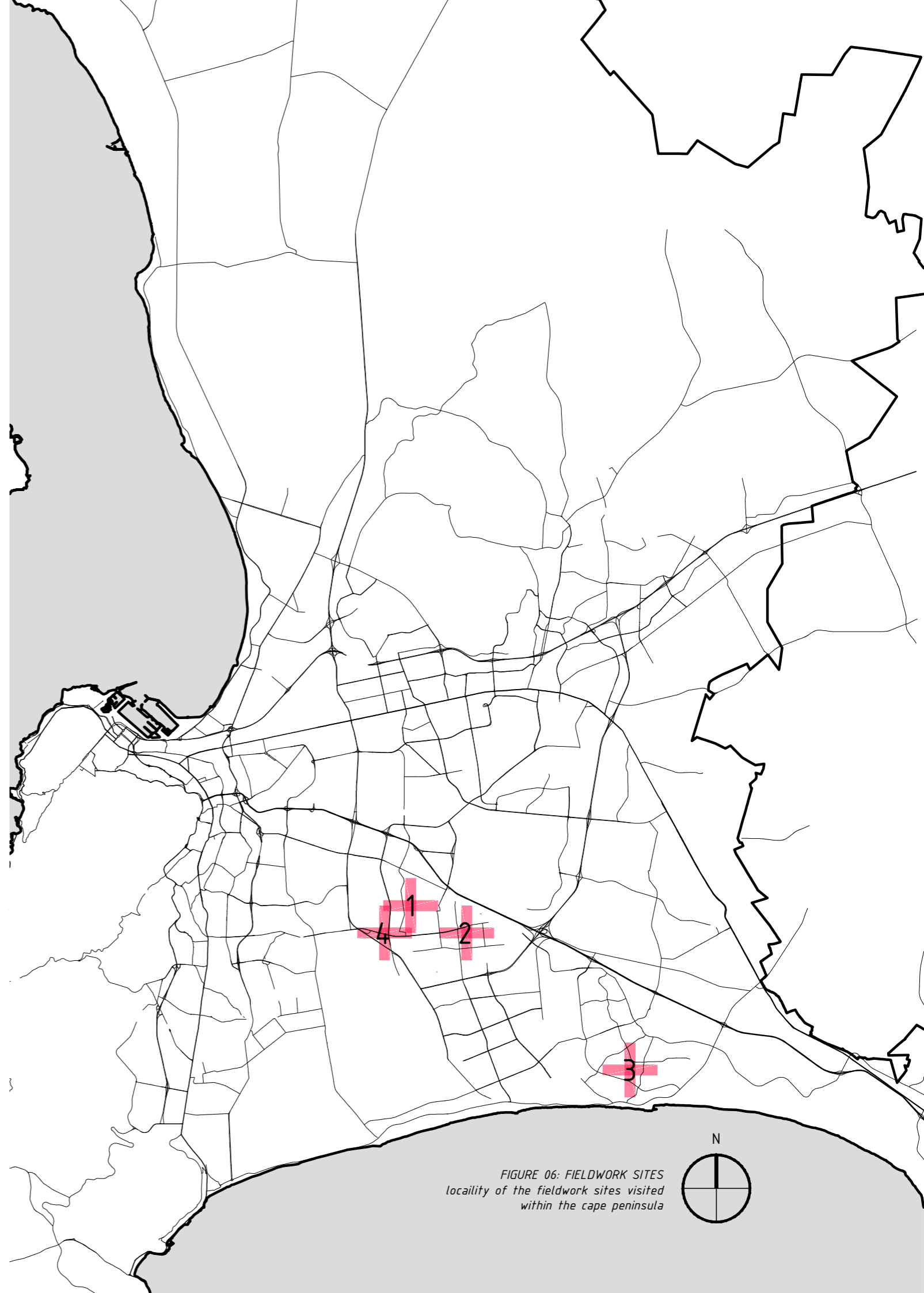
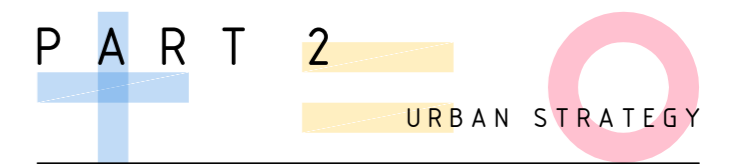


FIGURE 06: FIELDWORK SITES
locality of the fieldwork sites visited
within the cape peninsula

PART 2

URBAN STRATEGY



2.1. LOCALITY + URBAN CONTEXT

Gugulethu plays host to many individuals that have suffered from segregation and is overpopulated, which has resulted in many creating informal dwellings in the form of 'shacks', either attached to existing, formal dwellings or occupying vacant land in informal settlements. Three major informal settlements situated in the vicinity of Gugulethu are Barcelona and Kanana in the North and Lotus Park in the South. A railway flanks Gugulethu on the west, which is the bordering element between the adjacent areas of Manenberg and Heideveld. Furthermore, the national highway, N2, borders Gugulethu on the North and is the dominate link into the CBD of Cape Town. On the East, Gugulethu has a strong connection with the neighbouring areas and feeds into Nyanga, Crossroads and Philippi. It is important to note that the main connection between the surroundings is Steve Biko Road, previously NY1, which cuts through the full extent of Gugulethu from North to South, and Klipfontein Road, which runs from West to East.

The design dissertation is not focussed on Gugulethu in its entirety but rather a vital precinct within this complex area of Cape Town. This precinct is Nyanga Junction located in the South West and accommodates many commuters every day, as it is the main transport hub in the area not only serving Gugulethu residents but also all those from the surrounding areas such as Manenberg, Nyanga and Crossroads. Nyanga Junction is a very vibrant and busy precinct that has much merit with

vast activity created by the movement of pedestrians commuting to and from the station along NY3 linking to Steve Biko Road. One of the contributing aspects is the informal trade, along with the more formal retail within the station itself that happens in the forecourt of the station and extends along NY3, which also feeds into the informal settlement Lotus Park. This informal market plays host to many forms of trade ranging from food, beauty, clothing, hardware and spaza shops.

Just across from the station is Intshukumo Secondary School and the recently completed Amandla Edufootball and Oliver Kahn Safehub, a sports development centre. North of this precinct is a residential area and south is the Informal Settlement Lotus Park. Connecting Lotus Park to Nyanga Junction is the Lotus Park Neighbourhood Centre, implemented by VPUU, which serves as a place for safety for many in the immediate context.

Thus, three buildings, the Lotus Park Neighbourhood Centre, Amandla Edufootball and Nyanga Junction Station have become vitally catalytic to the area offering much potential and set a precedent for new and exciting projects to develop.

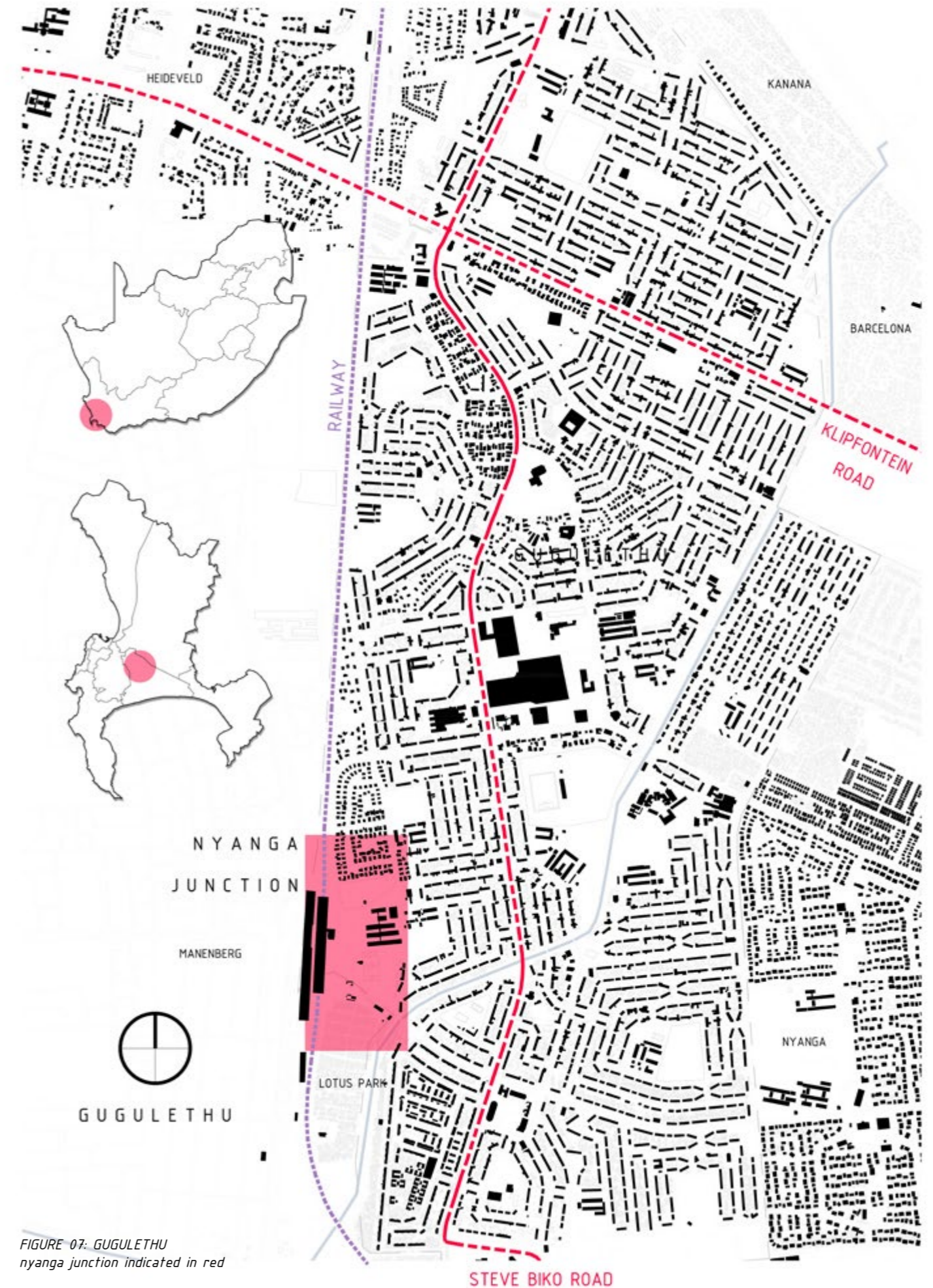
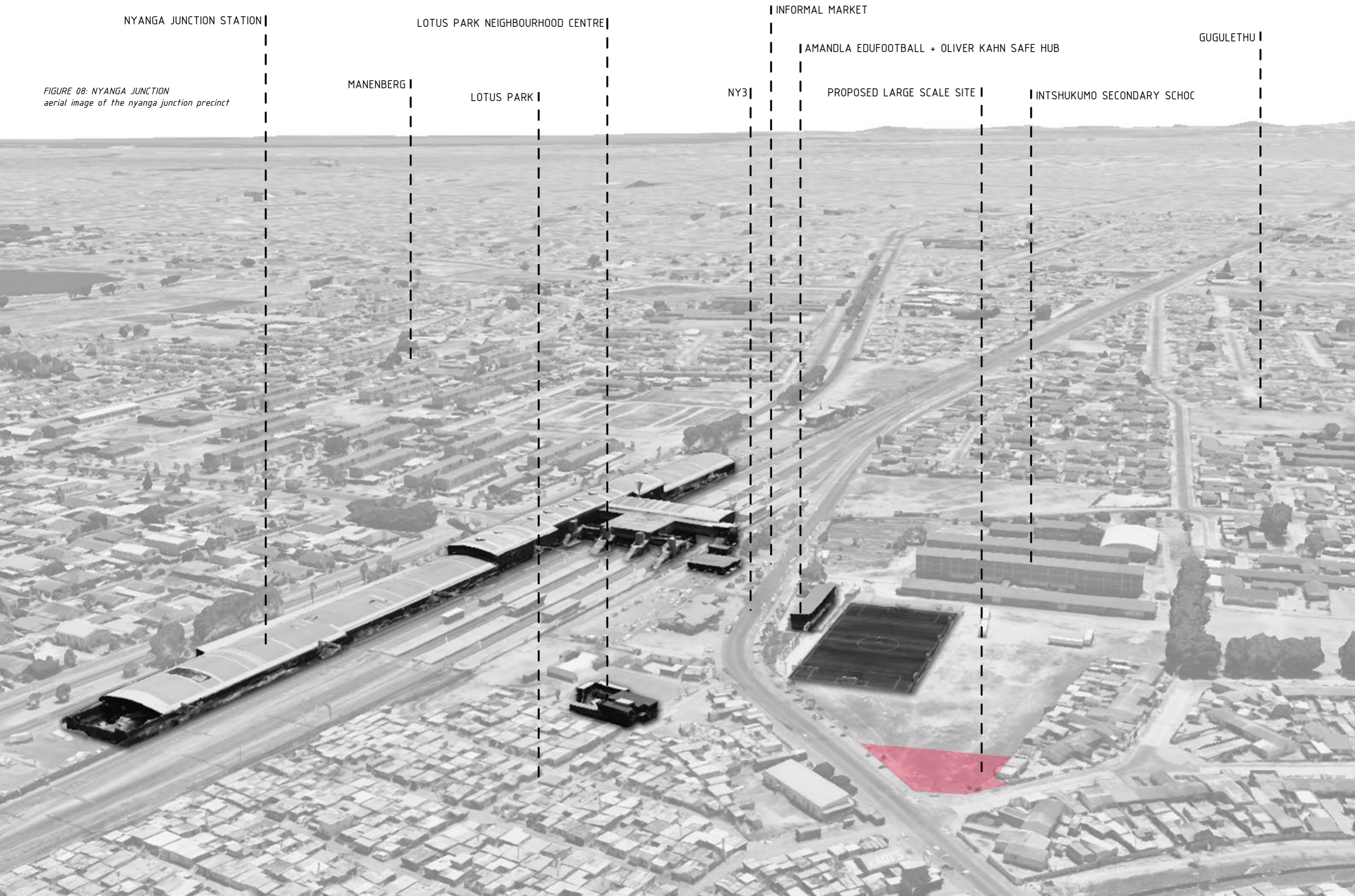


FIGURE 07: GUGULETHU
nyanga junction indicated in red

FIGURE 08: NYANGA JUNCTION
aerial image of the nyanga junction precinct



NYANGA JUNCTION STATION

LOTUS PARK NEIGHBOURHOOD CENTRE

INFORMAL MARKET

GUGULETHU

MANENBERG

LOTUS PARK

NY3

AMANDLA EDUFOOTBALL + OLIVER KAHN SAFE HUB

PROPOSED LARGE SCALE SITE

INTSHUKUMO SECONDARY SCHOC



2.2. URBAN STRATEGY

Through the studies of both human scale and digital infrastructure, it is determined that there are many important social thresholds in play when it comes to urban environments and the public realm. These social thresholds range from human sense of both distance (sight, hearing and smell) and proximity (touch and taste) (Hall, 1966). For instance, sight becomes our most important sense in public space. It is this sense that allows us as individuals to first register everything around us through surveillance. Two vital thresholds are then social recognition of 100 metres, when we are able to recognize others through body language, and emotional recognition at 25 metres, where we are able to recognize facial expressions (Gehl, 2010, p35). Another important social threshold is aural where individuals can hear clear conversation from 7 metres and muffled speech up to 35 metres (Suchocka, et al., 2016, p160). Territoriality is a vital aspect to many informal settlements and two such social thresholds are 'Close Range Surveillance' of 50 metres, which is the range where individuals are most likely to help if a problem occurs. The second being 'Maximum Recognition Distance' of 135 metre radii in which individuals may help out or report an incident that has happened (Krause, 2015, p39).

Thus if one takes these social thresholds into account and overlays them on the precinct and the three catalytic buildings mentioned instantly relationships can be seen of how the urban framework works to connect spaces for potential development. It is evident to see that the Nyanga Junction Station, Amandla Edufootball and the Lotus Park Neighbourhood centre are all located approximately 100 metres apart along the perimetres of the informal market. This 100 metre distance coincides with the 100 metre social threshold of sight and body language recognition. Furthermore, two sites are instantly identified at both ends of the informal market which themselves are approximately a 100 metres away from closest catalytic architecture. Between the intersection of smaller social thresholds of 25, 35 and 50 metres suggest 'pockets' for potential development at smaller scales.

This had led to the concept of implementing an architectural proposition with urban design across three notable scales of architecture:

-  - *Large scale: Catalytic architecture done at the two bookend sites identified, approximately 100m from existing community centres.*
-  - *Medium scale: Trade Upgrade propositions implemented to existing trade posts, approximately 50m between large scale interventions.*
-  - *Small scale: Wi-Fi hotspots within the precinct that offer places for public to use as they wish, approximately 25-35m between large and medium scales interventions.*

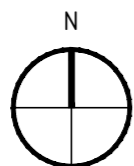
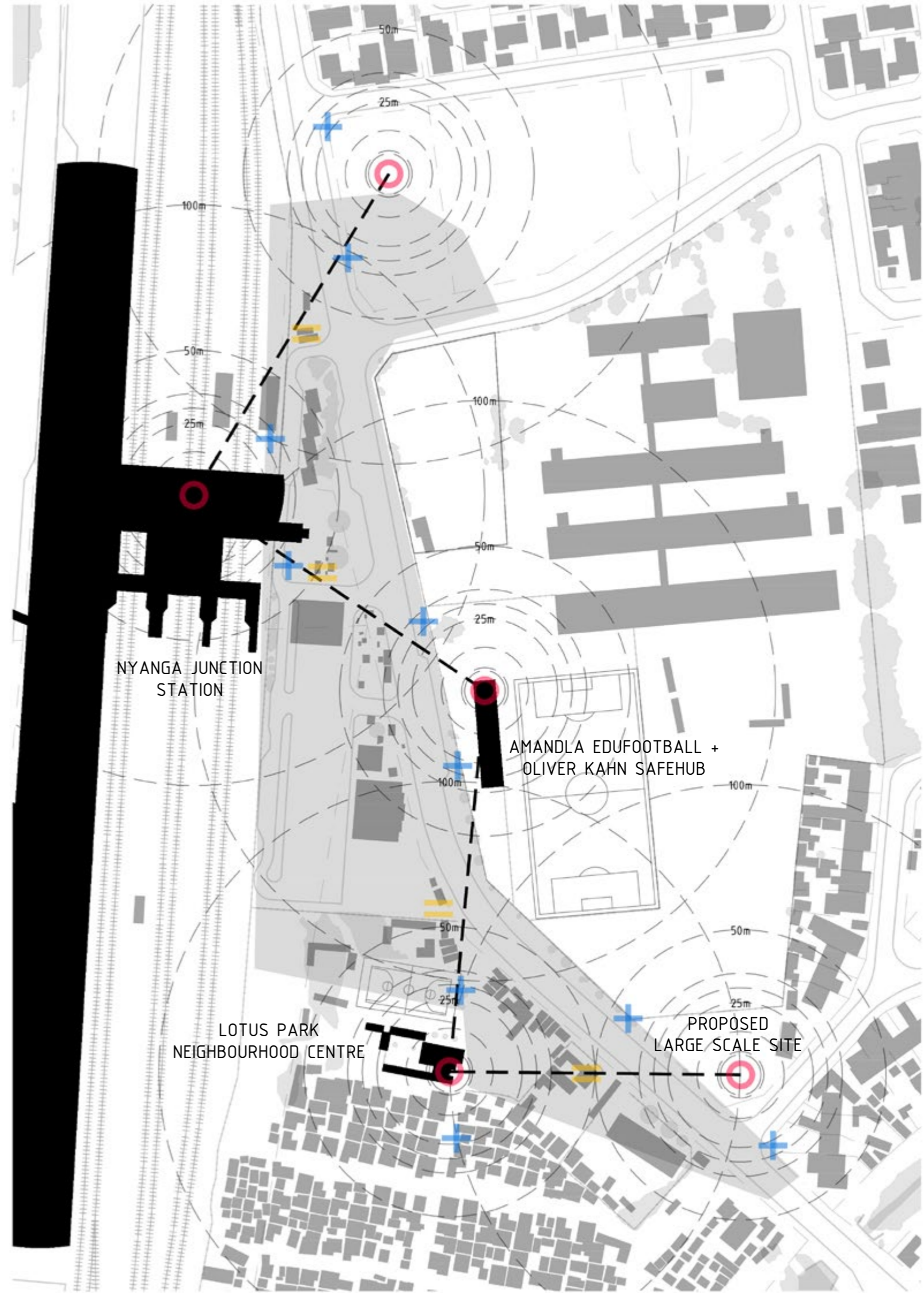


FIGURE 08: URBAN STRATEGY PLAN precinct plan of nyangas junction precinct with social thresholds indicated and proposed site for all three scales of architecture



2.3. THREE SCALES OF ARCHITECTURE

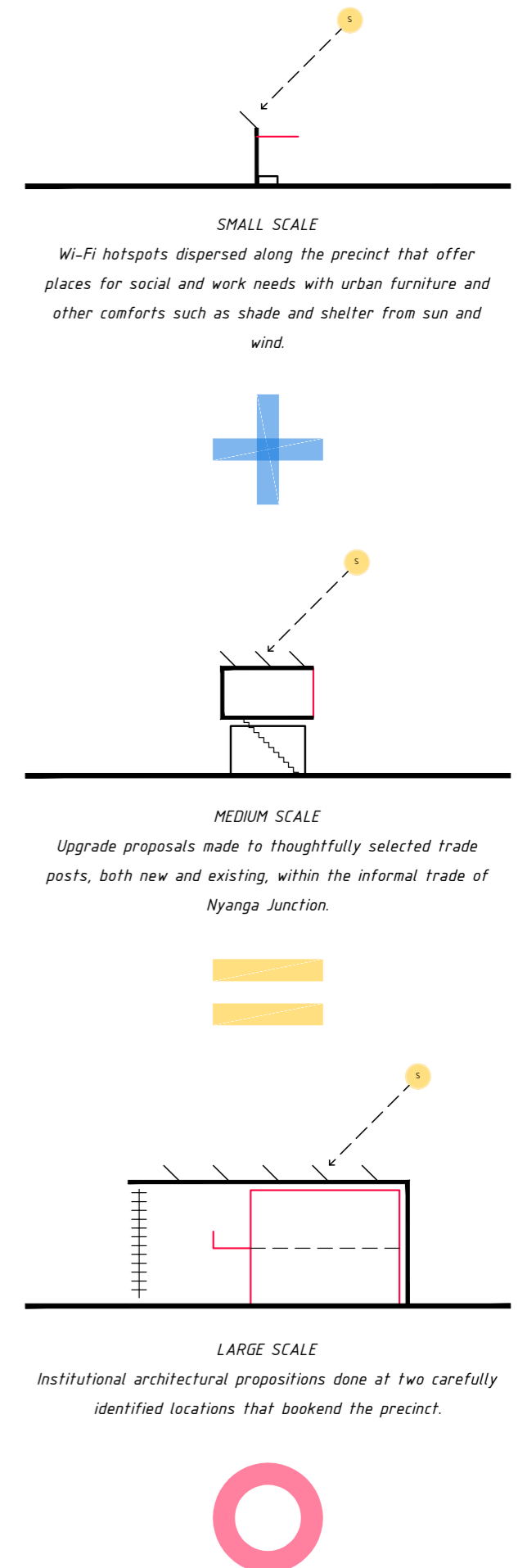
These three scales of architecture then make up the basis of the architectural proposition, adding a new layer of digital infrastructure to the complex precinct of Nyanga Junction.

Identifiable by their blue crosshair icons, the small scale consists of decentralized Wi-Fi hotspots situated within the full extent of the informal trade network of the Nyanga Junction and along the street edges. These hotspots can potentially spill out or rather extend to the rest of Gugulethu along main movement routes and always be in sight of one another. There are 10 proposed locations within the precinct at ground level that allows for good surveillance for 'eyes in the street' (Krause, 2015, p38). These locations are in support of the large scale sites, where each catalytic architectural institution will have two hotspots at approximately 30–35 metres within its vicinity. Thus also ensuring there is always two hotspots between each large scale with clear surveillance and easily heard in the case of an incident. These small scale interventions will be made up of minimum structure needed while still able to facilitate flexible movement of the public and provide the necessary comforts and protection from climatic conditions. Potentially these hotspot structures can be adjusted over time to adapt to programme change ultimately becoming a place of trade. Thus, remain viable social infrastructure as IT systems evolve.

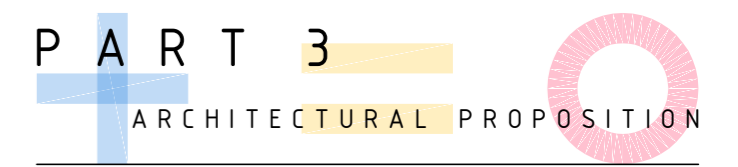
The yellow line icons are used to represent the medium scale and is an addition to existing trade posts. These medium scale proposals are implemented at first floor level above the market in order to not disrupt or compete with existing trade. They are designed for semi-private use and programme. Furthermore, it allows for great opportunities of 'eyes on the street' from a vantage point and easily identifiable from a distance (Krause, 2015, p38). There are four proposed sites within the precinct which are located approximately 50 metres between each large scale intervention. These spaces can also adapt over time to become a place for living modelled on the VPUU live/work units, where individuals who have retail at ground level can have living services above (Cooke, et al., 2015, p25).

The large scale, recognizable by the red circle icons, is of catalytic and institutional architecture that is designed for specific sites. As previously stated, three interventions are already existing, the Nyanga Junction Station, Amandla Edufootball and the Lotus Park Neighbourhood Centre. Proposed are two sites that bookend the precinct and are situated approximately 100 metres from other existing large scale architecture. One site has been chosen for the purpose of the design dissertation to develop the architectural proposition, located at the south end of the precinct. This proposal works hand in hand with the two smaller scales which inform the design and programme of the proposal. The ground floor and street interface is influenced by the small scale of architecture in that it is open to public and allows for flexible event to occur while the first level is for more private use and programme to happen similar to that of the medium scale. The large scale is modelled on VPUU's active box concept as a place for safety and easily identifiable from afar (Cooke, et al., 2015, p24). This architectural proposition is an institution of learning and assembly for collaboration, IT training and youth development.

FIGURES 09–11: THREE SCALES OF ARCHITECTURE



PART 3
ARCHITECTURAL PROPOSITION



3.1. PROGRAMME

The intervention looks at predominately three primary programmes supported by an array of secondary programmes in order to help the facility run. These three primary programmes being;

1. Collaboration Hive - a space for individuals to develop entrepreneurial ideas with facilities they might not have access to elsewhere.
2. Skills Training - a space for IT learning and development to provide individuals with computer literacy in order to help them become employable.
3. Youth Hub - a space for young individuals to learn with homework and study facilities.

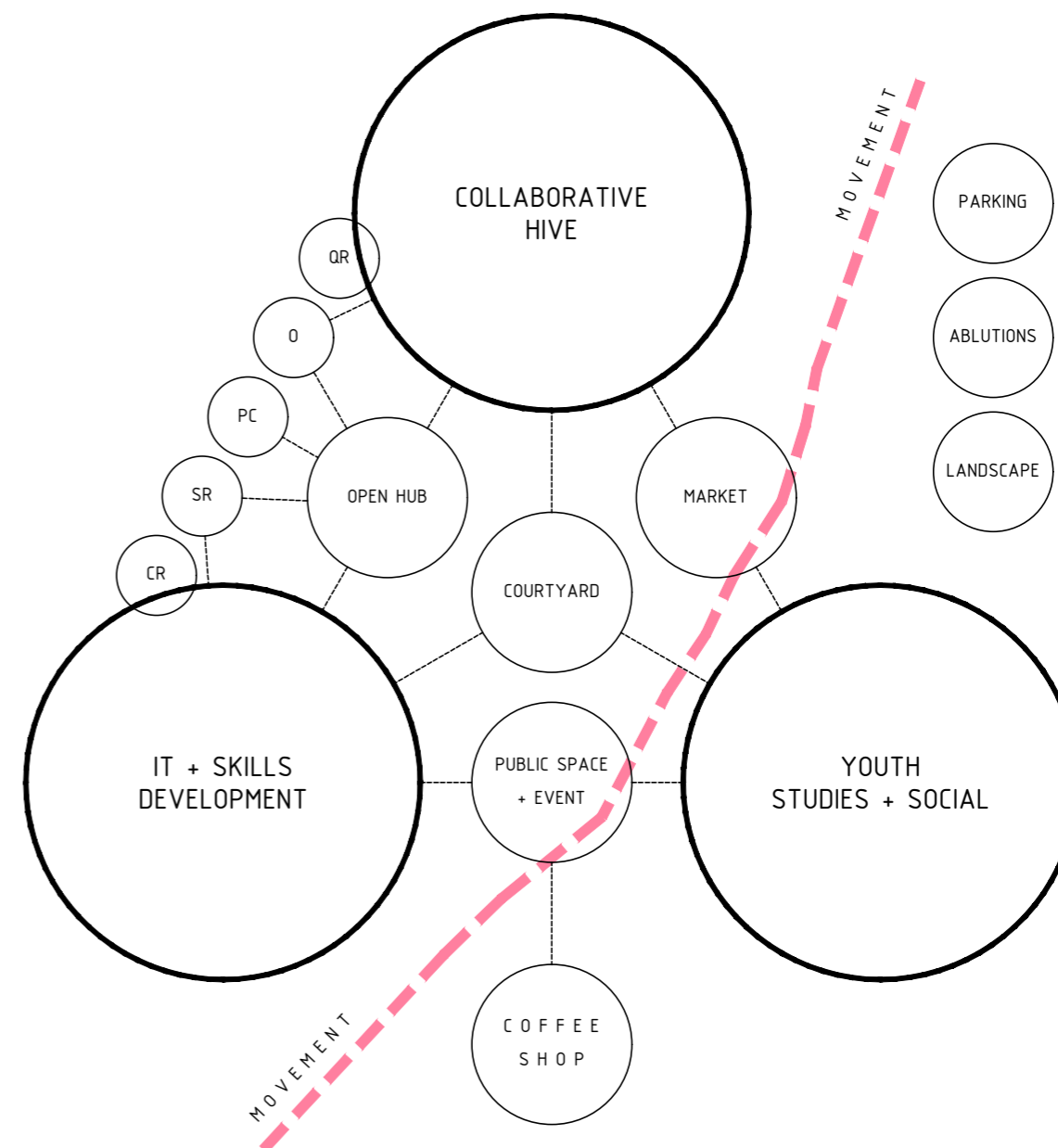
These three programmes make up the large scale of the proposition. The two smaller scales of medium and small will play host to a combination of the above mention programmes whether it is a combination of all three with more attention made at one or two of the programmes or solely directed at just one of the programmes ultimately creating places for youth, students or individuals working.

The secondary programmes implemented to support these primary programmes of a collaboration hive, IT + skills development and youth hub are spaces such as;

- Open meeting space - for individuals to meet and work together and develop concepts for new entrepreneurial ideas with the help of mentorship provided by the institution.
- PC Classroom (formal) - controlled space to be used as a place for learning in IT and computer skills.
- PC lab (informal) - a less formal space for individuals to use laptop 'hotdesks' and printing facilities to support the work they are doing at the institution.
- Quiet room - smaller work spaces for concentrative work.
- Offices and staffroom - private spaces for the administrative and management staff of the institution to use and work from.
- Reception + Security - to allow for controlled access of the institution.
- Coffee shop - space for eating and socialising that is open to all using the facility as well the public.
- Ablutions - both public and private toilets are provided.

Furthermore, at the larger scale of architecture, spaces for trade will be provided where individuals using the facilities for training and developing concepts can 'showcase' their ideas. These spaces will add to the extent of the existing informal market along Nyanga Junction reinforcing the architectural proposition as stated above.

FIGURE 12: PROGRAMME
bubble diagram showing the three main programmes
and the secondary programmes
that supports the architectural propositions



3.2. DESIGN PRINCIPLES

Before approaching each design of the different scales of architecture, it was important to develop design principles that were established through the Theory + Technology Studies. These range from ideas of ordering devices in place-making, to built-form and finishes.

To create a place of attraction in the public realm, one should always work the flow of people and design along the desire lines of pedestrian movement in order to pull people in and enact the architecture (Gehl, 2010, p239). It then becomes important to understand the different thresholds from public to private both through vertical and horizontal planes of public architecture as to where one arranges the specific programmes suited to public and private use. These thresholds should always be of some permeability in order for one to view their surroundings and feel at ease. Furthermore, how these thresholds work with the movement of people at the street interface and how the building meets the street that draws people in (Krause, 2015, p40).

Working with the ideas of VPUU, any institutional architectural proposition done in this context should be one that is an active box usually a mixed-used building of 2-3 levels open to the public. It is seen as a place of safety in the case of any incident or sign of danger nearby and is ideally in sight of another active box in close proximity. In this case, the Lotus Park Neighbourhood Centre (Cooke, et al., 2015, p24).

For architecture that is open to public, often noise becomes an issue. One can treat this by elevating more private use and concentrative work up from the ground level in order to create noise isolation. This can be

seen at the Amandla Edufootball where the ground floor is used to accommodate the busy activities of all those using the facility and the first floor becomes an isolated space for learning and working thus able to accommodate both set of programmes at the same time.

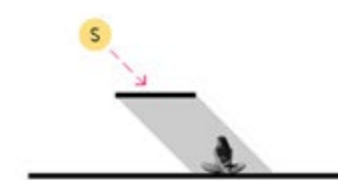
One can use Wi-Fi signal as an ordering device for programme, as stated in the Technology Studies, more concentrative and learning work can happen with weaker signal as not much media (uploading and downloading) takes place; however, social programmes such as gaming and social media should take place where signal is strongest. Thus, one should place programmes accordingly as to where they want stronger signal (Suchocka, et al., 2016, p158).

When designing spaces in the public realm, it is always important to consider the quality of life and comfort of the space in order to attract people. Design principles to consider are shading for sun, wind and rain as well robust and semi-permanent urban furniture for individuals to use as they wish but not break or steal. This urban furniture should always face towards public activity with ones back against a hard surface. Vegetation and landscaping becomes important in public spaces as it not only softens the built fabric and makes the space more inviting but can serve as a wind break as well regulate Wi-Fi signal, as explained in the Technology studies (Suchocka, et al., 2016, p158). One of VPUU's main design approaches is surveillance and visibility, and this is done by providing high levels of lighting especially for users and commuters at night (Krause, 2015, p38).

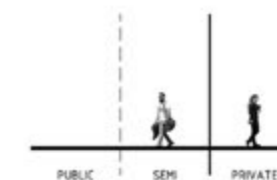
One should always consider the finishes and final aesthetic of any architectural project. As stated by VPUU, this can help in creating a sense of pride and ownership within the immediate community, feeling proud of 'their' building and take care of it (Krause, 2015, p39). Two principles developed are ideas of concealed detailing to not only create flush finishes but to prevent the theft of materials that are exposed to the public and secondly muted colours in order to not detract from the immediate context and create a conducive work environment (Suchocka, et al., 2016, p156).



ACTIVE BOX



SHADING



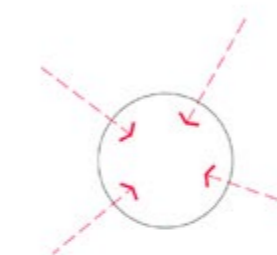
THRESHOLDS



PEDESTRIAN MOVEMENT



SIGNAL STRENGTH



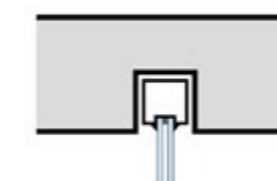
PLACE OF ATTRACTION



URBAN FURNITURE



VEGETATION



CONCEALED DETAILS



NOISE ISOLATION



MUTED COLOURS



LIGHTING

FIGURES 13-24: DESIGN PRINCIPLES
a set of design principles derived from
the theory + technology studies as well fieldwork

3.3. SMALL SCALE WIFI HOTSPOTS

Located at ten strategically located sites, the small scale proposal of Wi-Fi hotspots are situated in close proximity of both the large and medium scale proposals as to always be in sight. These small interventions are implemented at ground level along NY 3 within the informal market and are permanently open to the public for free Wi-Fi connectivity.

As many would occupy these hotspots, charging of devices needs to be provided. This is supported by regenerative power in the form of photovoltaic solar panels. These panels are also use shade to create a comfortable and protective layer from climatic conditions. The Cape Flats suffers tremendously from strong winds, especially from the south east thus wind breaks are introduced through vegetation and screening. Lighting is used to create a safer environment for both those using the space and those commuting past at night. A further sense of security is added by creating a hard surface for users to sit against, which ultimately becomes the surface and structural core for the small scale intervention. This hard surface becomes the edge of the hotspot and faces out towards all public activity on the street to limit foot traffic from behind. Three robust materials that are not easily damaged or stolen are used; steel, brick and concrete. Lastly a small advertisement space is provided to help generate income for the institution.

d i g i t a l b o u n d a r i e s



These small-scale interventions are similar in size to that of a bus-stop of 6-8 m² and are designed to be modular in that they are able to adapt over time and increase or decrease in size to accommodate the amount of users and patterns of flexible event that happens at each specific location.

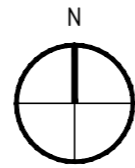


FIGURE 25: SMALL SCALE LOCALITY
proposed sites for each of the small scale interventions

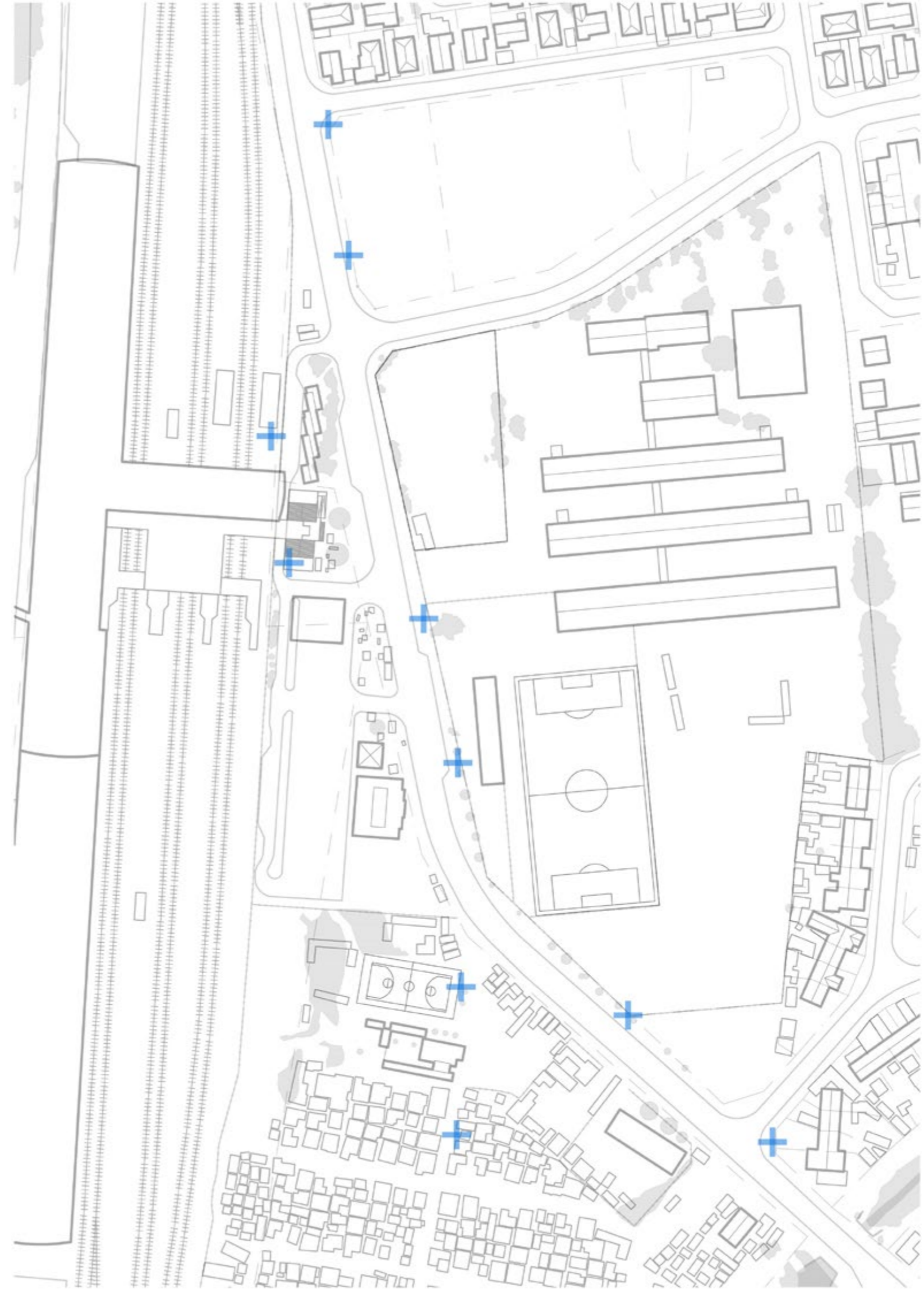
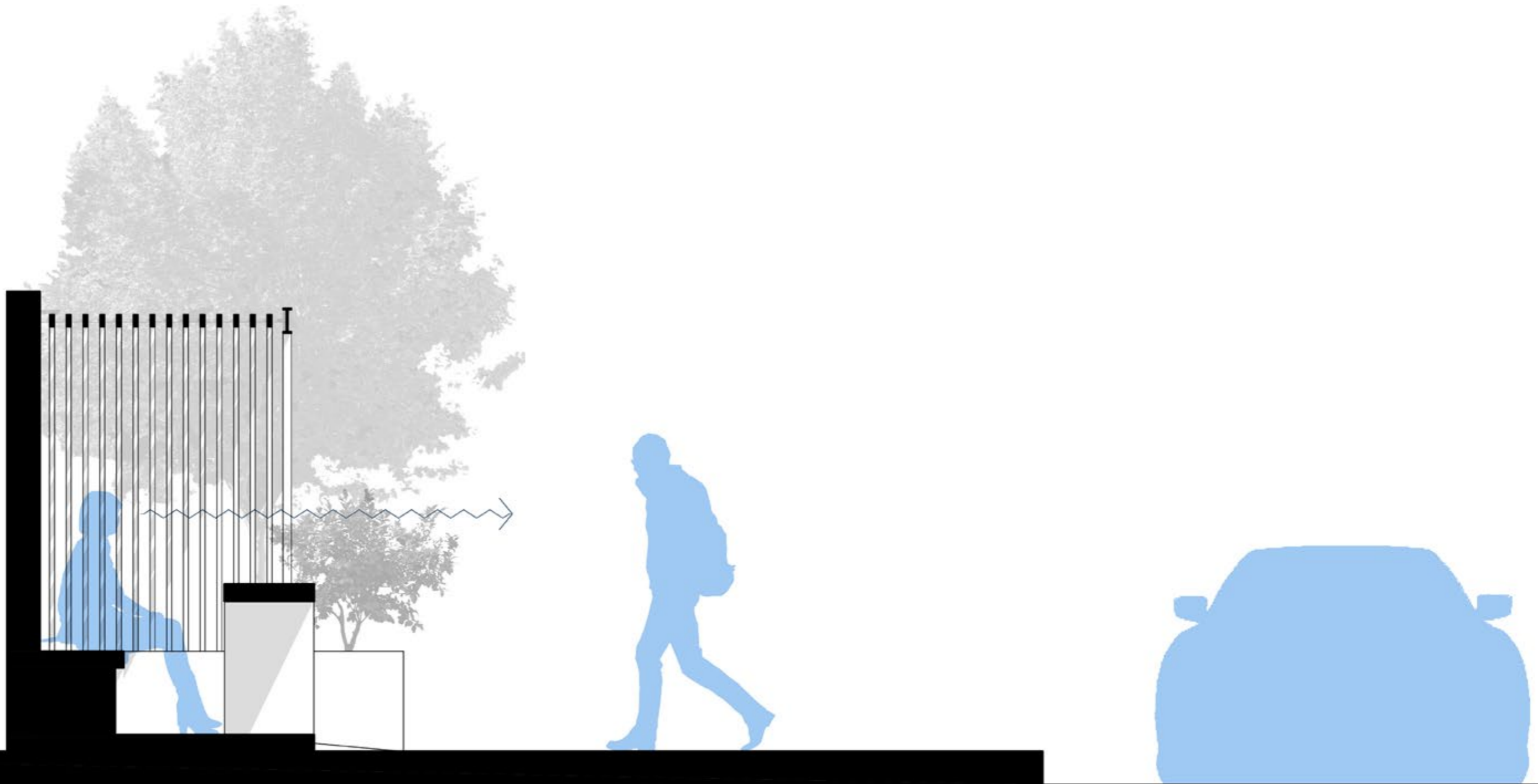


FIGURE 26: SMALL SCALE SECTION
scale 1:25



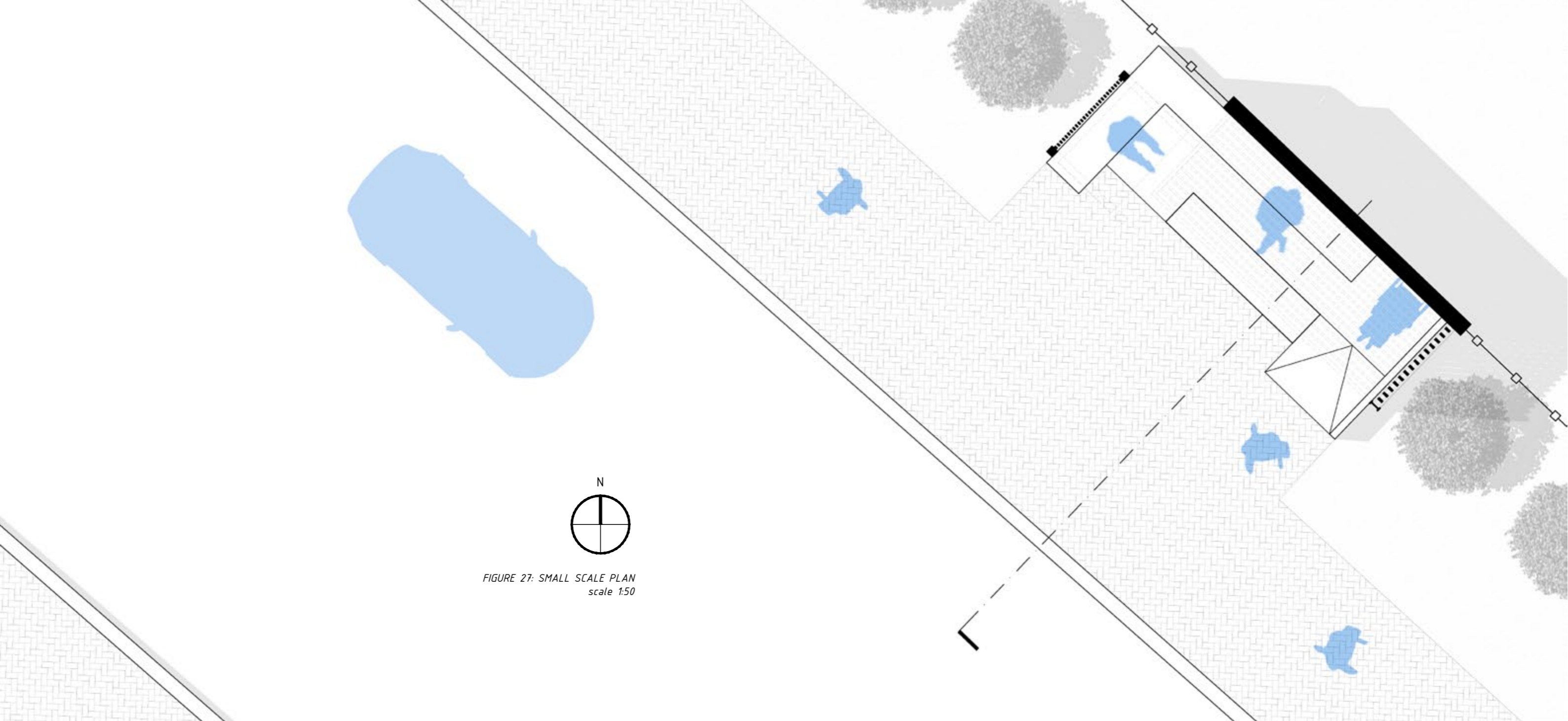


FIGURE 27: SMALL SCALE PLAN
scale 1:50

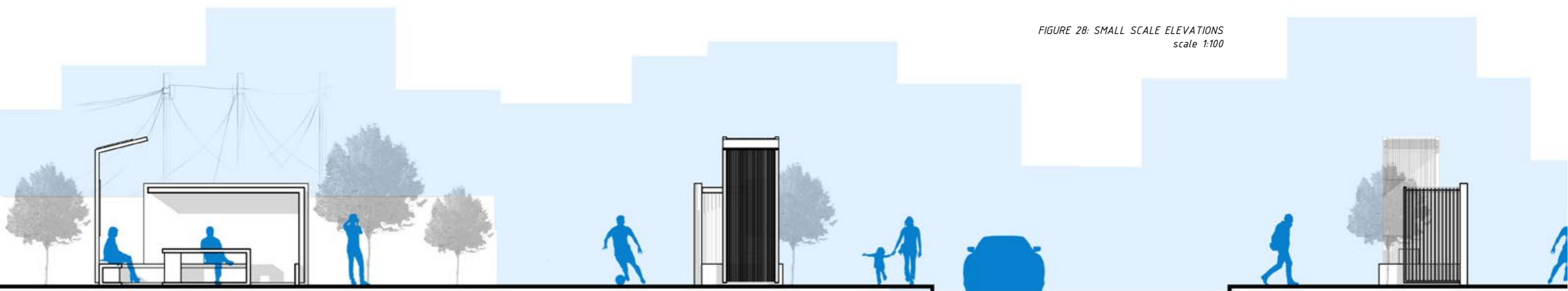


FIGURE 28: SMALL SCALE ELEVATIONS
scale 1:100

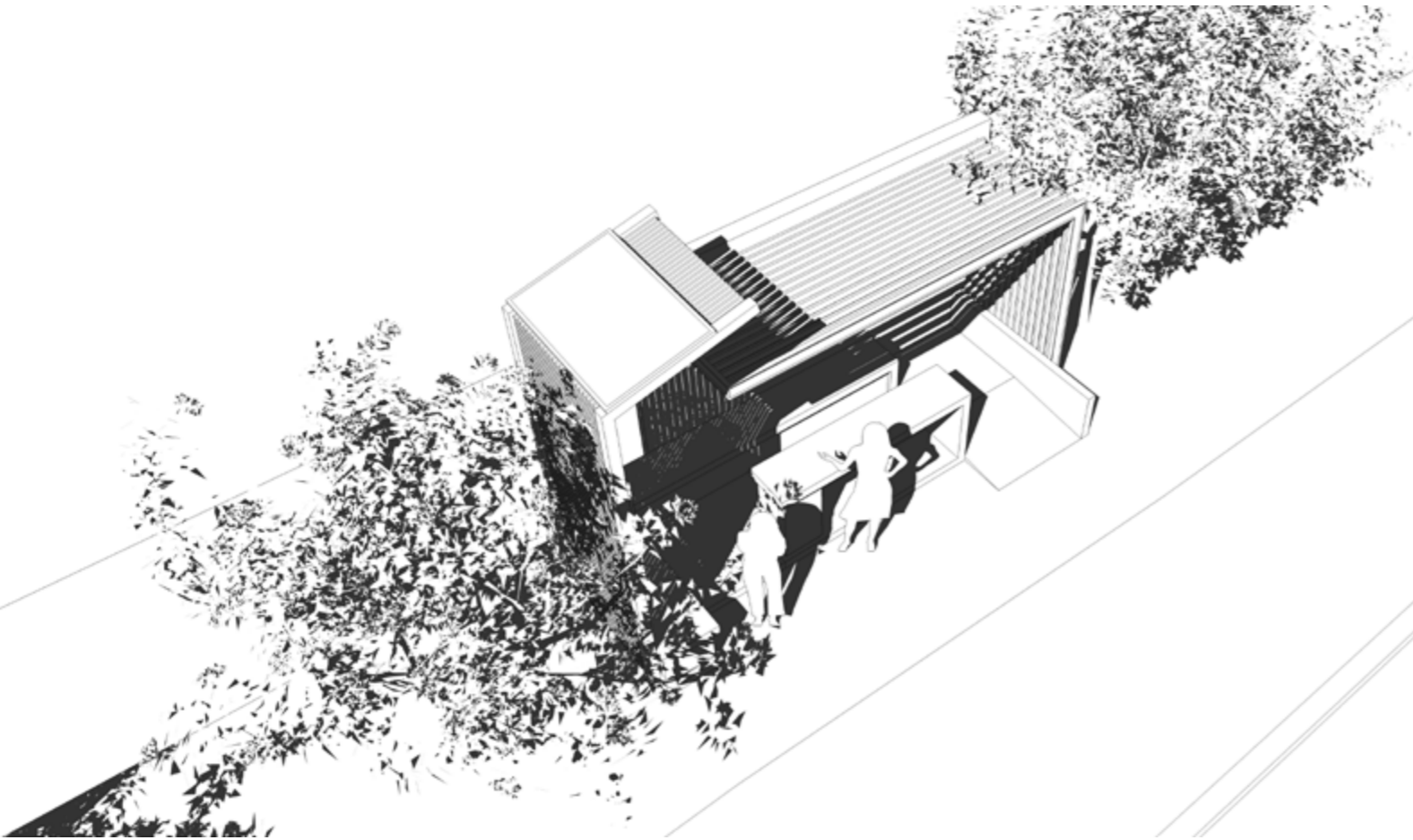


FIGURE 29: SMALL SCALE AERIAL

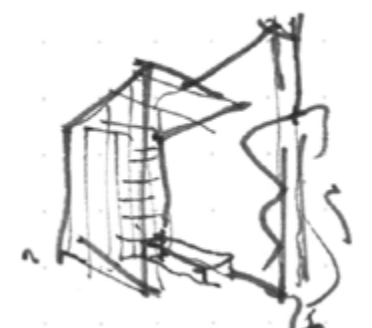
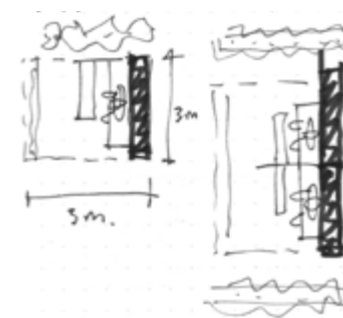
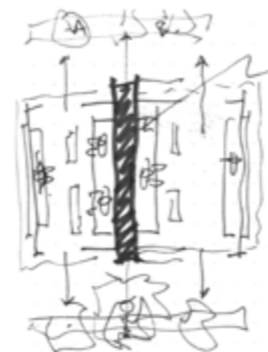
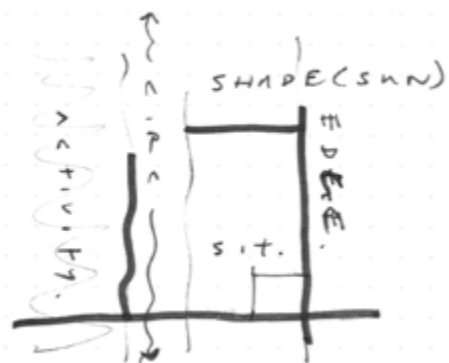
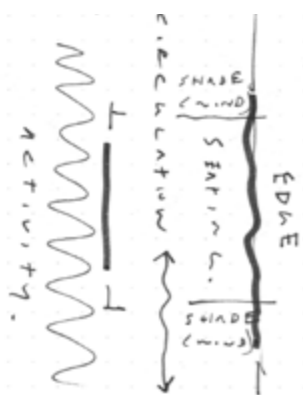


FIGURE 30: SMALL SCALE STREET VIEW



FIGURE 31: SMALL SCALE STREET VIEW

FIGURES 32-37: DESIGN DEVELOPMENT SKETCHES



3.4. MEDIUM SCALE TRADE UPGRADE

The medium scale of trade upgrade proposals are made at four strategically placed locations of existing trade along the informal trade network. Each one appears between two large scale interventions and approximately 50 metres from the closest. As previously noted, these medium scale proposals are implemented at one level above the ground floor on the street edge and face towards the street activity. They are placed directly above the trade itself as to not disrupt street trade and activity. This allows for both controlled access to the facility, as well a vantage point to look from and can be seen from a distance. Thus, these spaces are places for separate and semi-private programmes to occur with free access to Wi-Fi such as homework rooms for students on their way to or from other educational facilities, as well internet cafés for work purposes and small classrooms for IT training.

Unlike the smaller scale of open hotspots, these elevated spaces are secure and enclosed to provide protection from all climatic conditions including sun, rain and wind. Workspaces and hot desks are provided with diffuse lighting, seating and work surfaces. Each medium scale structure will have printing facilities and one permanent management staff present. Thus the more private use allocated at the back and the public work spaces for users at the front facing towards the street.

The size and structure of the medium scale is based on the most common type of trade structure, the container.

Many containers are used along the street edge for the informal trade of Nyanga Junction often sitting adjacent and connected to one another. Using the structural integrity of the container, the medium scale sits on two containers which give the proposal its key dimension and size. This being approximately 5 x 6 metres and roughly between 30-35 m², depending on the location of said proposal. A steel structure designed on these dimensions, is connected at the four structural points of the container. Furthermore, this medium scale facility does not only occur on containers but could be placed above other trade types of kiosks or stalls. In this scenario, the steel structure used is bought to the ground and supported by columns where flexible event can occur below while still keeping its elevated presence. Gaining the same aesthetic as the small scale hotspots, the medium scale facilities are made up of predominantly three robust materials: steel, brick and concrete. Circulation is provided by installing stairs adjacent and within the steel structure. A screening element is provided that allows for great advertisement space for generating income similar to that of the smaller scale.

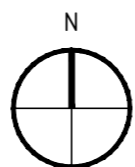


FIGURE 38: MEDIUM SCALE LOCALITY
proposed sites for each of the medium scale interventions

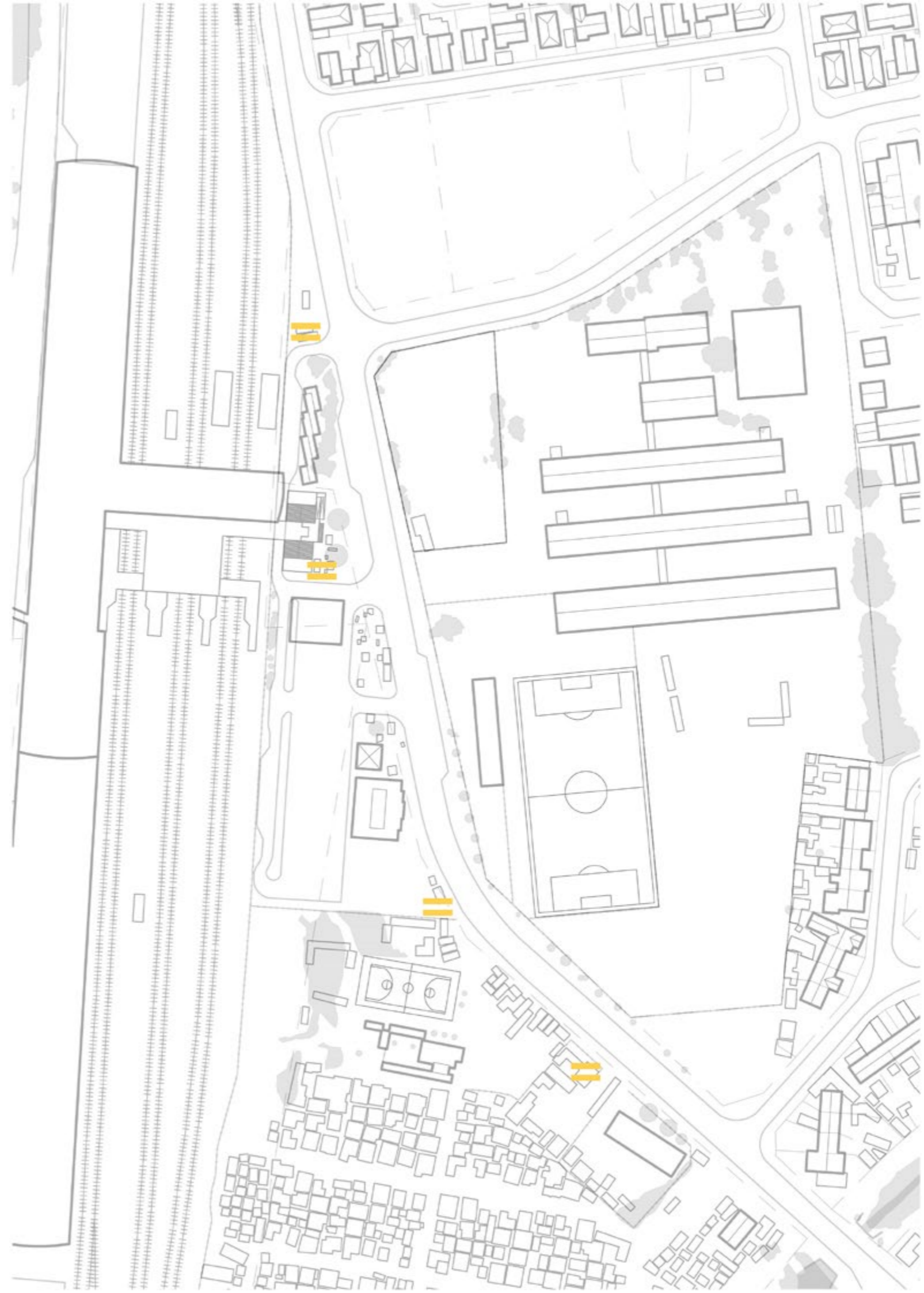


FIGURE 39: MEDIUM SCALE SECTION
scale 1:50



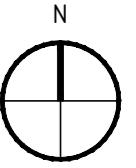
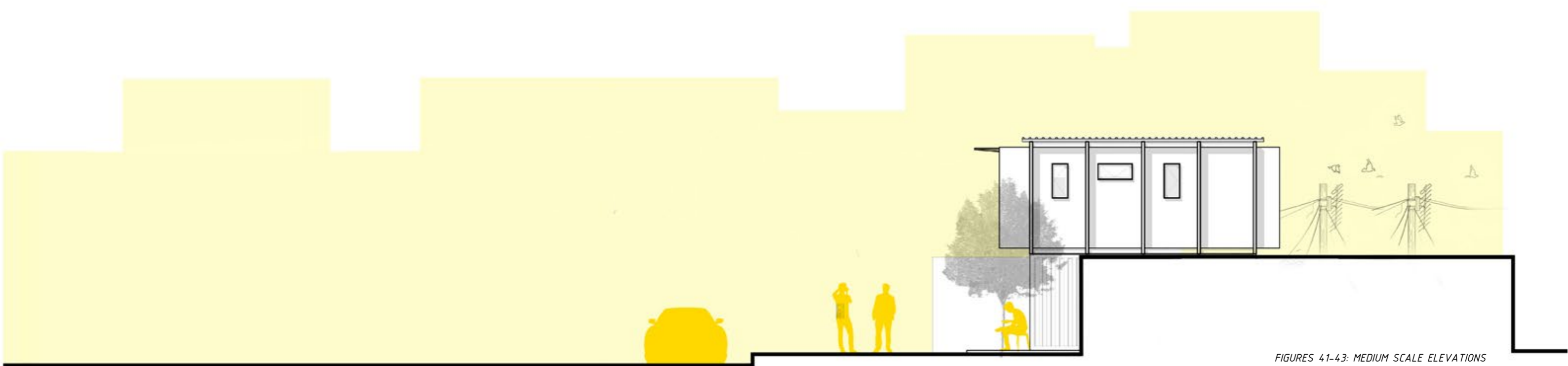
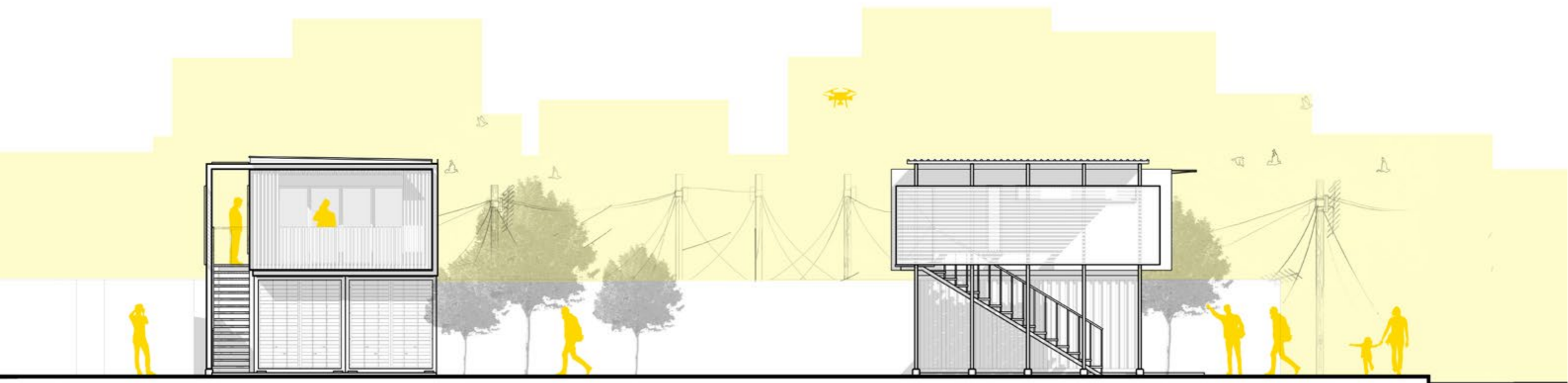


FIGURE 40: MEDIUM SCALE PLAN
scale 1:50





FIGURES 41-43: MEDIUM SCALE ELEVATIONS
scale 1:100



FIGURE 44: MEDIUM SCALE AERIAL

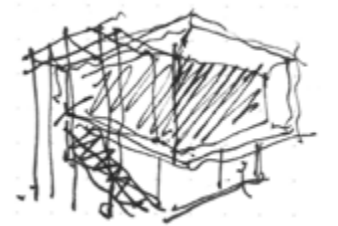
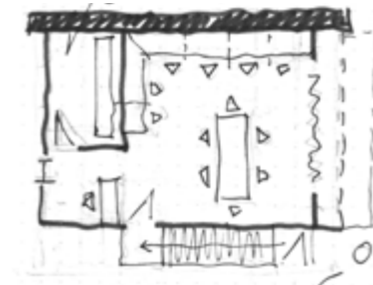
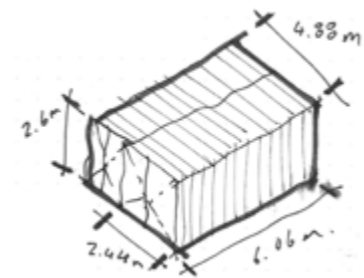
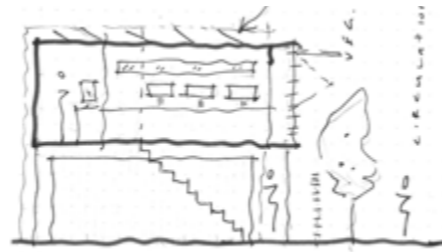
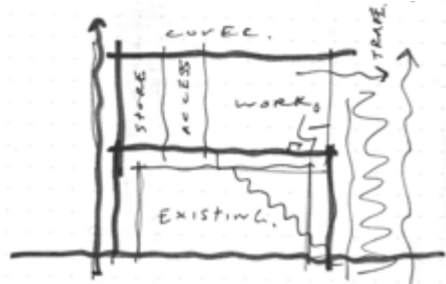
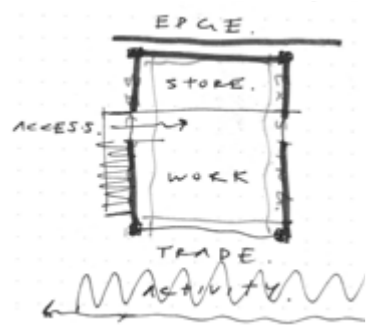


FIGURE 45: MEDIUM SCALE STREET VIEW



FIGURE 46: MEDIUM SCALE STREET VIEW

FIGURES 47-52: DESIGN DEVELOPMENT SKETCHES



3.5. LARGE SCALE ARCHITECTURE

The large scale proposal is of significant presence and institutional architecture that is the main architectural project of the design dissertation. This is supported by the small and medium scale proposals. Using the notion of VPUU's active box, the building is both easily identifiable from afar and is in sight of the nearest active box, the Lotus Park Neighbourhood Centre approximately 100 metres away. It serves as a place of presence and refuge as well surveillance for 'eyes in and on the street' as suggested by the ideas expressed by VPUU (Krause, 2015, p38).

There are two proposed sites that bookend the informal trade of Nyanga Junction and the chosen site is located on the south end of the precinct. The second vacant site north of the precinct is for future development of another large-scale intervention. The site selected is that of the Intshukumo Secondary School on ERF 6824. This large and vast site plays host to an array of different buildings and programmes from the vegetable garden and school north of site to the Amanda Edufootball situated on the middle of the site leaving the south vacant for new development and a potentially strong link between new and existing uses on site. The proposed part of the site for the large scale is on the corner of the main movement route, NY3 leading to and from Nyanga Junction and NY21, which had a direct link to the Lotus Park informal settlement.



As previously stated the large scale will host all three of the primary programmes as well the supporting secondary programmes. Like the small scale, the ground floor is open to pedestrian movement and accessible to the public using the facility where as the first floor emulates that of the medium scale, elevating more private use above. The ground floor street interface works with the desire lines of pedestrian movement along NY3 in order to draw public into the architecture. The small and medium scales have influenced the design in determining key dimensions. The direct street edge is modelled on a band similar to the small-scale width and openness with a public walkway adjacent that then runs along the buildings edge leading into more private spaces for the proposed programmes that are similar in size and layout to that of the medium scale. This is done to emphasize the notion expressed in the technology study paper of the interior expanding to the exterior of the public realm (Devisch, 2012). These spaces then lead to more private use and access of an internal courtyard for quieter use to IT classrooms and administrative offices at the back of site. The internal walkway and public space can be locked up for controlled access at night while still allowing for public to populate the small scale pods at the street interface. A separate and main entrance is then introduced with a circulation and ablutions core that leads to the first floor with controlled access to the open plan collaboration hive. A circulation passage runs along the public edge to keep a direct link to public event.

The making, materiality and structure of the architecture is of robust materials similar to that of the small and medium scales. These materials predominantly being steel, concrete and brick. Vegetation and landscaping that is of low maintenance and implemented to contrast these robust materials for aesthetics as well to provide shading from wind and sun along the street edge of the public space. At the corner edge of NY3 and NY21, space is provided for the informal trade to extend along site with the minimum built form.

FIGURE 53: LARGE SCALE STREET VIEW



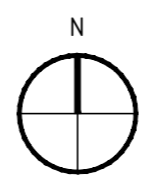
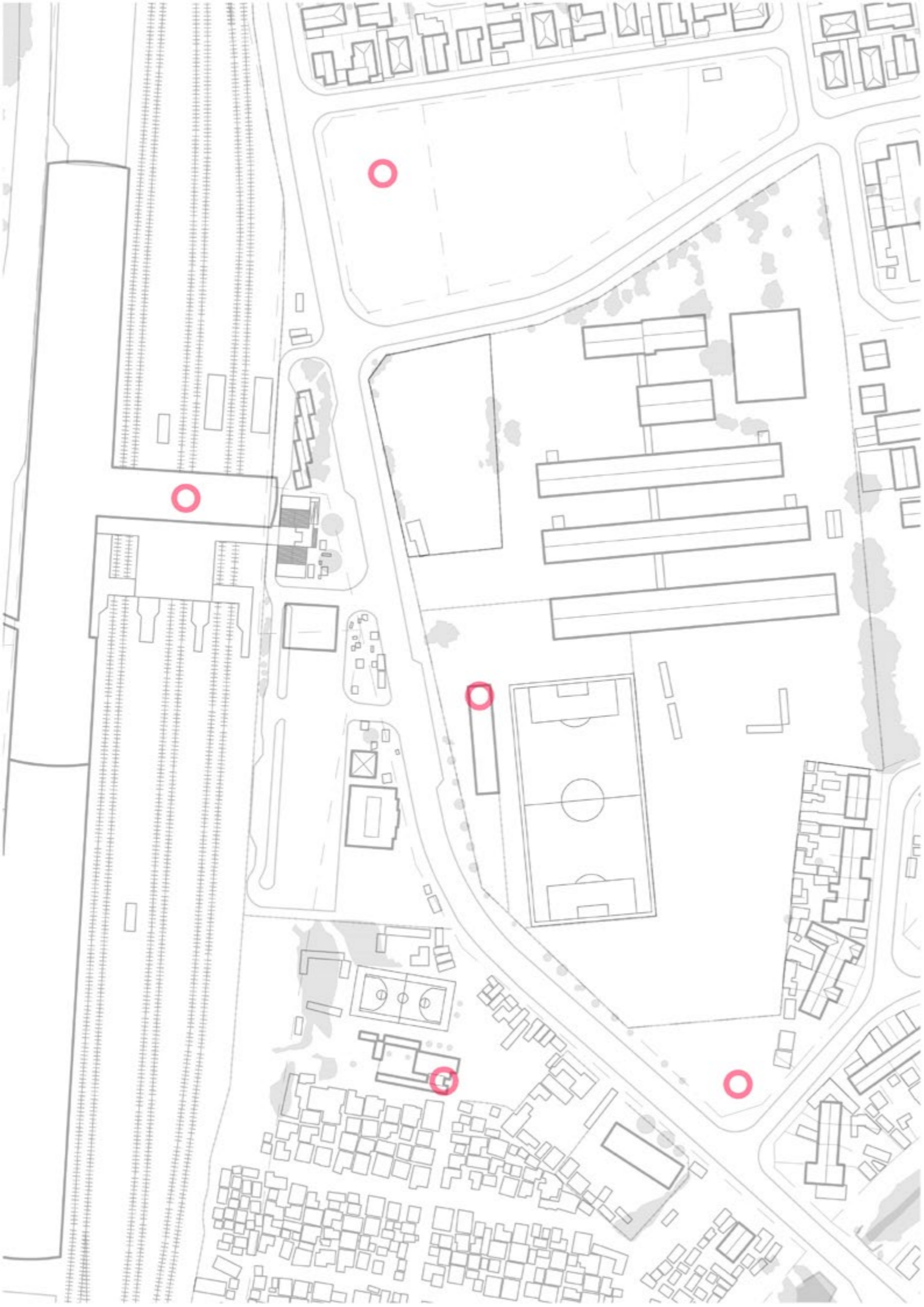


FIGURE 54: LARGE SCALE LOCALITY proposed and existing sites for each of the large scale interventions

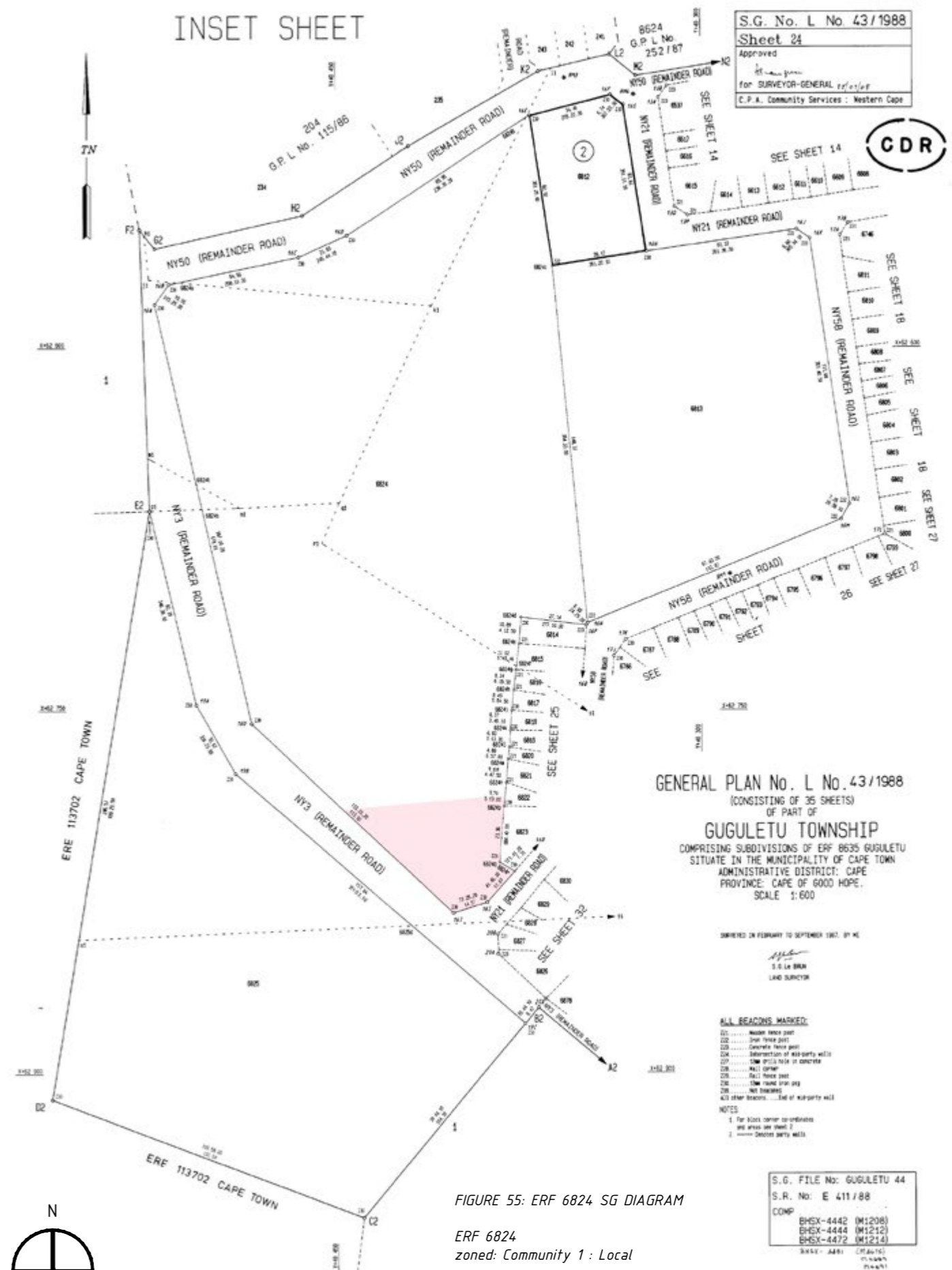


FIGURE 55: ERF 6824 SG DIAGRAM

ERF 6824
zoned: Community 1 : Local

small part of site to be allocated for the large scale intervention, adding another community institution of learning

S.G. No. L No 43/1988
Sheet 24
Approved
for SURVEYOR-GENERAL
C.P.A. Community Services : Western Cape



GENERAL PLAN No. L No.43/1988
(CONSISTING OF 35 SHEETS)
OF PART OF
GUGULETU TOWNSHIP
COMPRISING SUBDIVISIONS OF ERF 8635 GUGULETU
SITUATE IN THE MUNICIPALITY OF CAPE TOWN
ADMINISTRATIVE DISTRICT: CAPE
PROVINCE: CAPE OF GOOD HOPE.
SCALE 1:600

DRAWN IN FEBRUARY TO SEPTEMBER 1987. BY ME
S.G. L. B. B. B.
LAND SURVEYOR

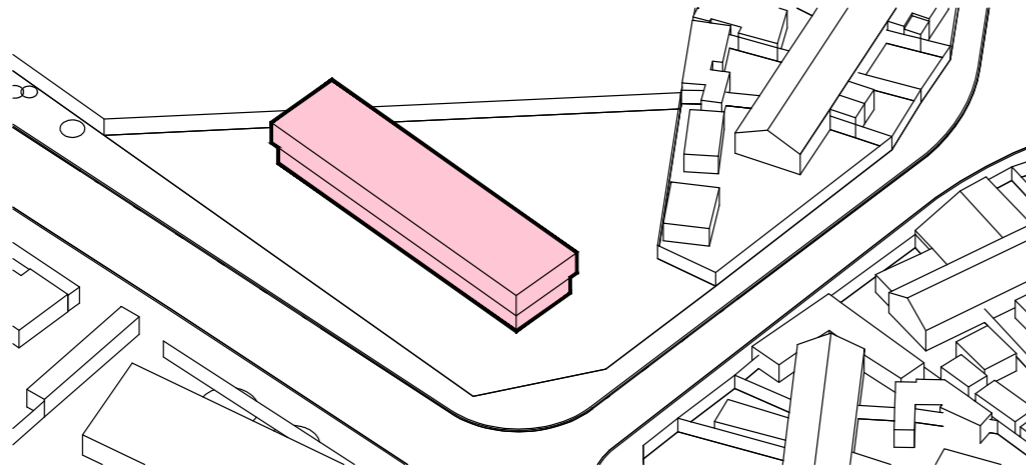
- ALL BEACONS MARKED:
- 201 Wooden fence post
 - 202 Iron fence post
 - 203 Concrete fence post
 - 204 Intersection of all-party wall
 - 205 100mm Ø pipe hole in concrete
 - 206 Nail corner
 - 207 Nail fence post
 - 208 New road strip peg
 - 209 Nail stake
 - 410 other beacons End of all-party wall

NOTES
1. For block corner co-ordinates see annex sheet 2
2. --- Shaded party walls

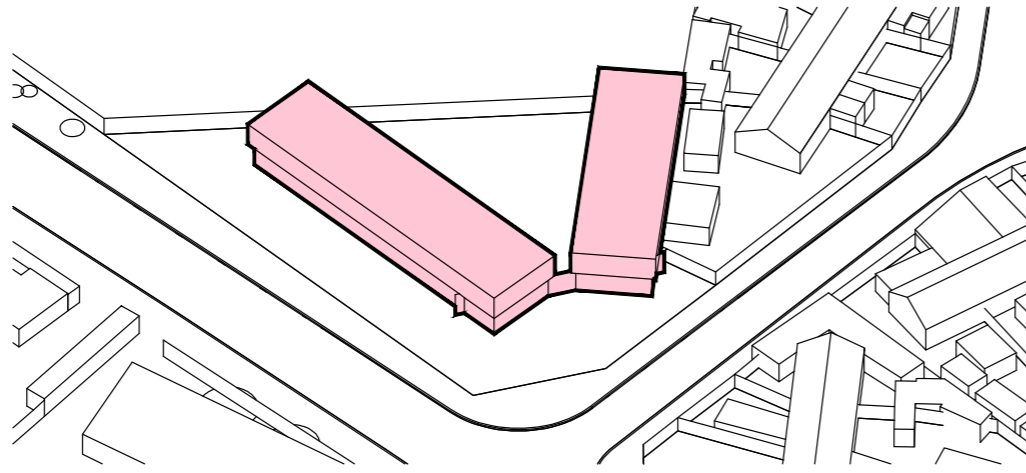
S.G. FILE No: GUGULETU 44
S.R. No: E 411/88
COMP
BHSX-4442 (M1208)
BHSX-4444 (M1212)
BHSX-4472 (M1214)
SHEET: 4441 (of 4476)
DATE: 1987

FIGURES 56-59: DESIGN DEVELOPMENT

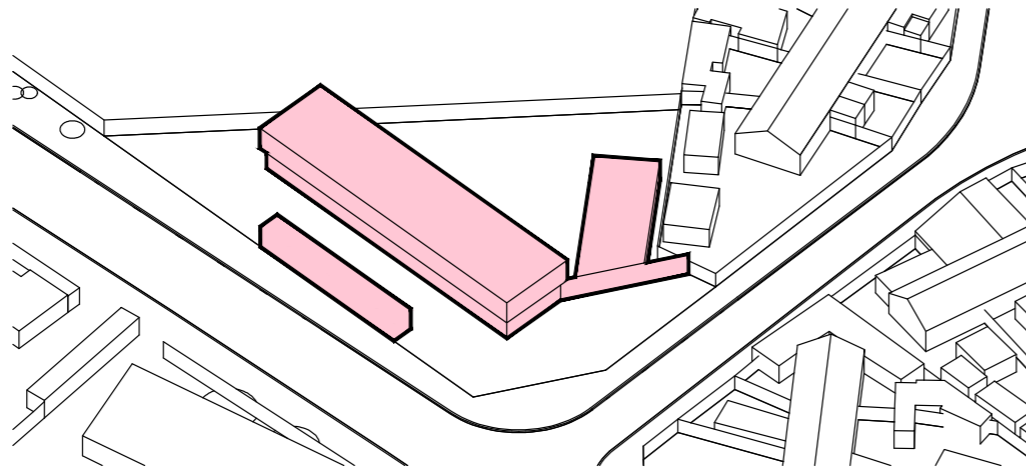
implement building edge along street edge to work with pedestrian movement



additional private wing added to back of site to prevent intruders from gathering



height reduced at back of site programmes moved to street edge and public walkway



private courtyard introduced that serves as link to the rest of the site

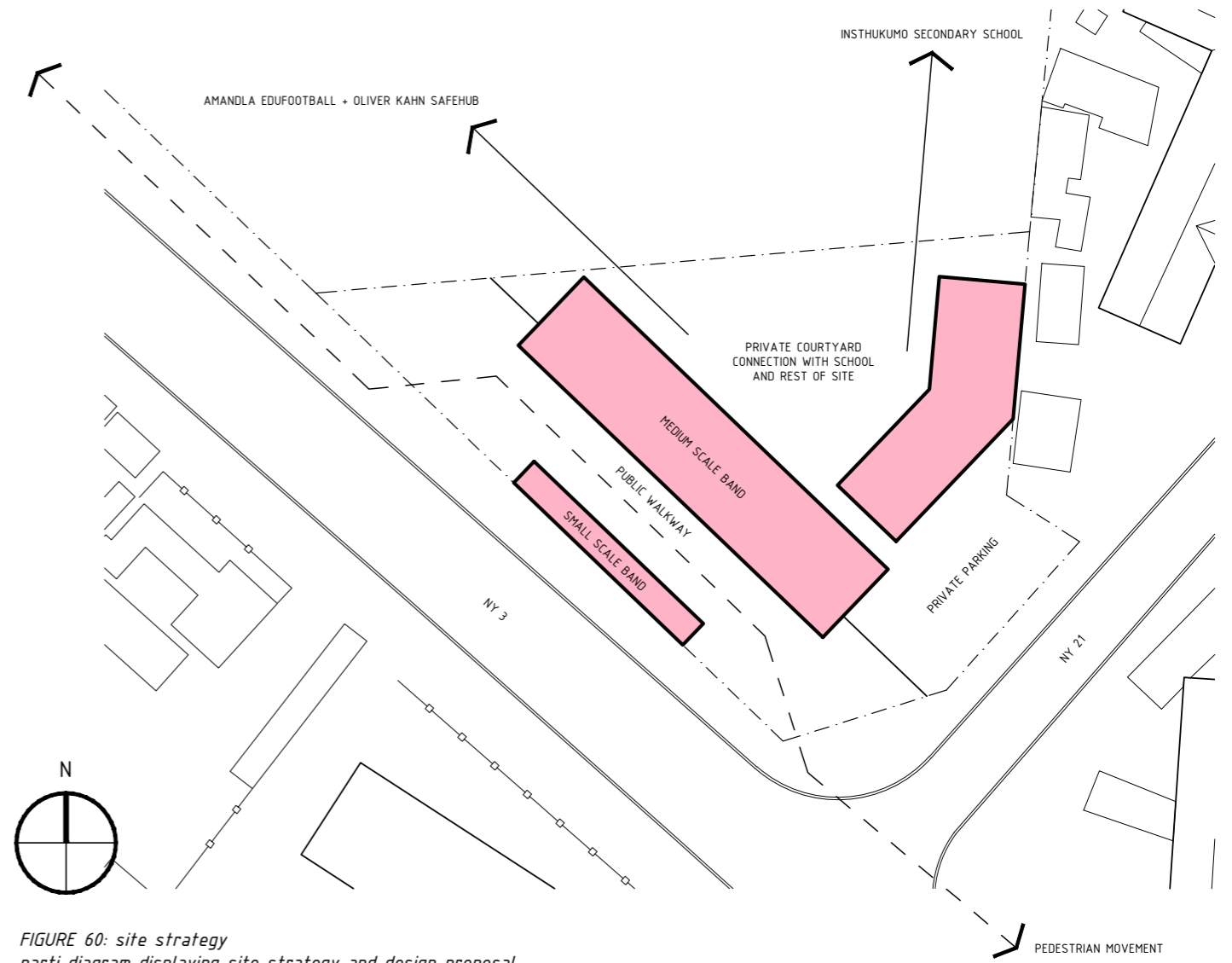
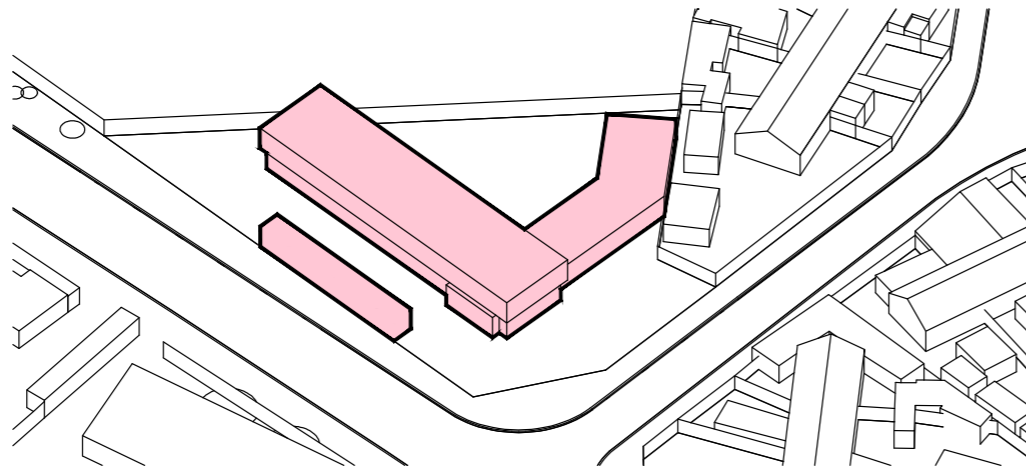
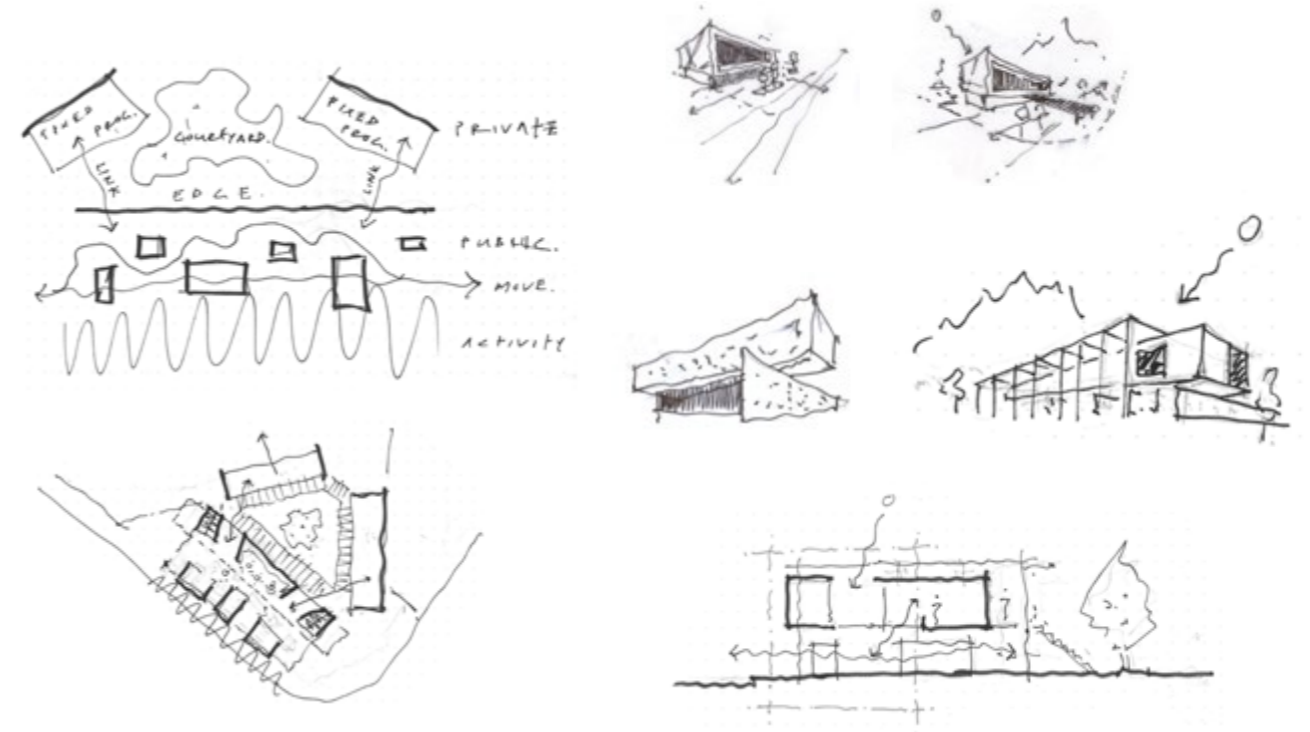
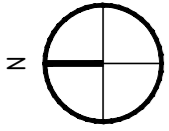


FIGURE 60: site strategy parti diagram displaying site strategy and design proposal

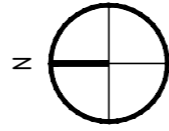
FIGURES 61-67: DESIGN DEVELOPMENT SKETCHES





- 1 ENTRANCE LOBBY - 2 SECURITY - 3 ABLUTIONS - 4 COLLABORATION - 5 TRAINING
- 6 YOUTH - 7 COFFEE SHOP - 8 COVERED WALKWAY - 9 TRADE POSTS - 10 PUBLIC SPACE
- 11 APPROACH - 12 PARKING - 13 OFFICE - 14 ADMIN - 15 SERVER ROOM
- 16 IT CLASSTOOM - 17 PRIVATE COURTYARD - 18 AC PLANT

FIGURE 68: GROUND FLOOR PLAN
not to scale



- 19 RECEPTION - 20 LOBBY - 21 ABLUTIONS - 22 KITCHENETTE - 23 OPEN WORK HUB
- 24 QUIET ROOM - 25 OPEN PASSAGE - 26 SUN ROOM - 27 FIRE STAIR

FIGURE 69: FIRST FLOOR PLAN
not to scale



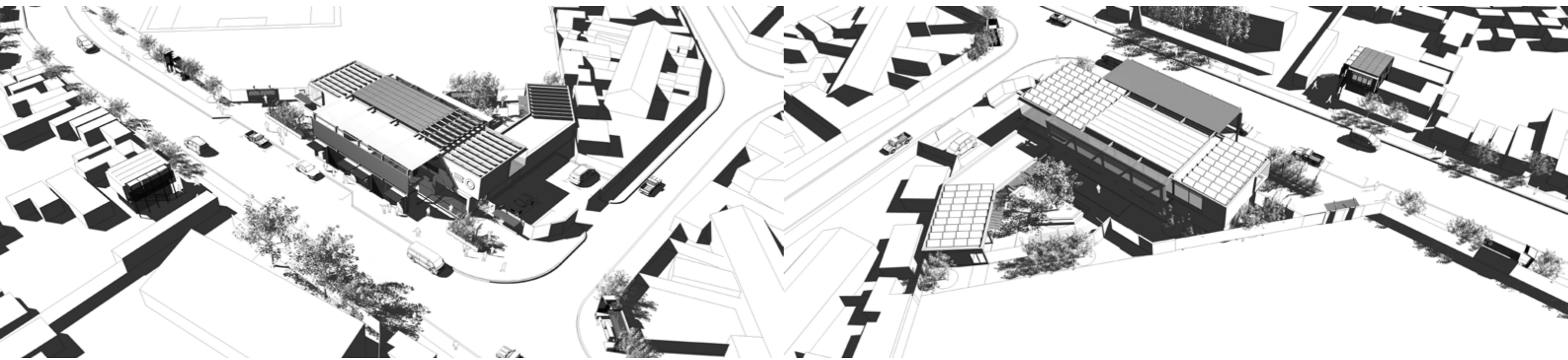


FIGURE 70: AERIAL FRONT OF SITE

FIGURE 71: AERIAL BACK OF SITE

FIGURE 72 CROSS SECTION
not to scale

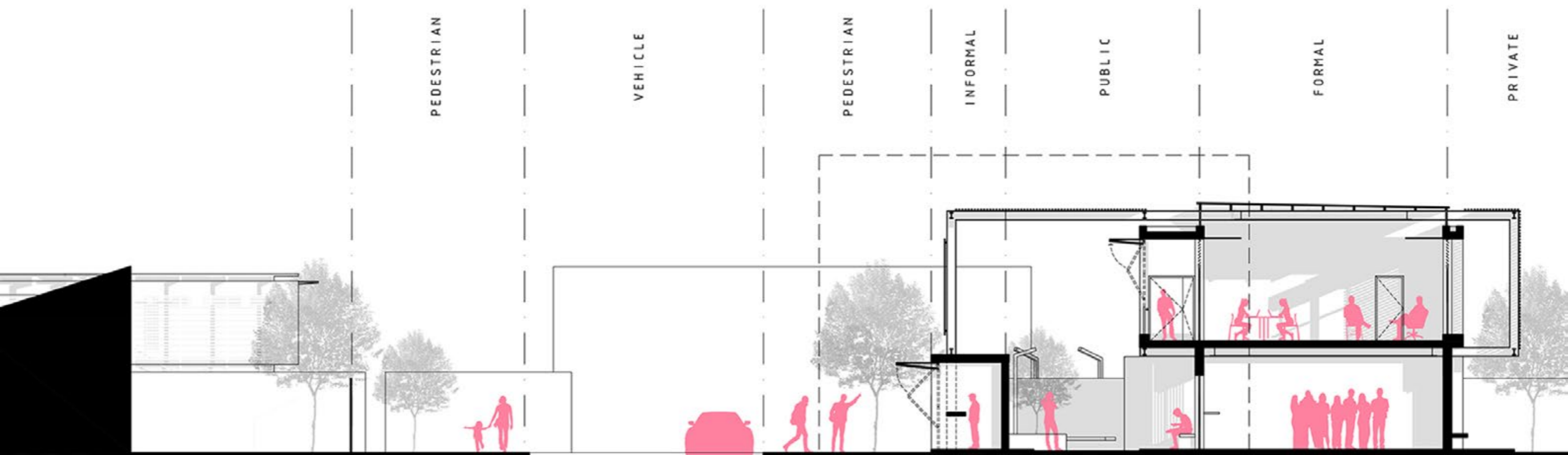




FIGURE 73: LARGE SCALE STREET VIEW

FIGURE 74: LARGE SCALE SECTION SECTION
scale 1:100

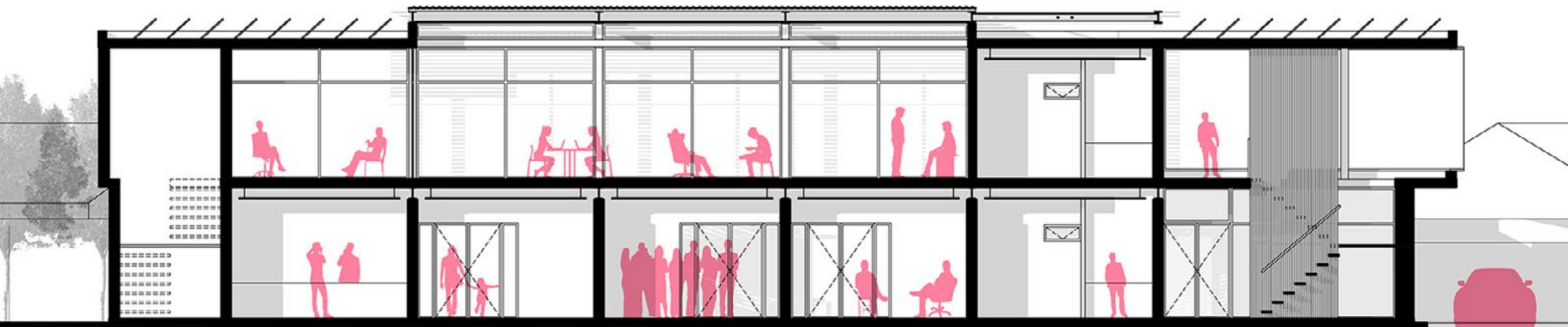




FIGURE 75: SOUTH WEST ELEVATION (INTERNAL OF WALKWAY)
scale 1:100

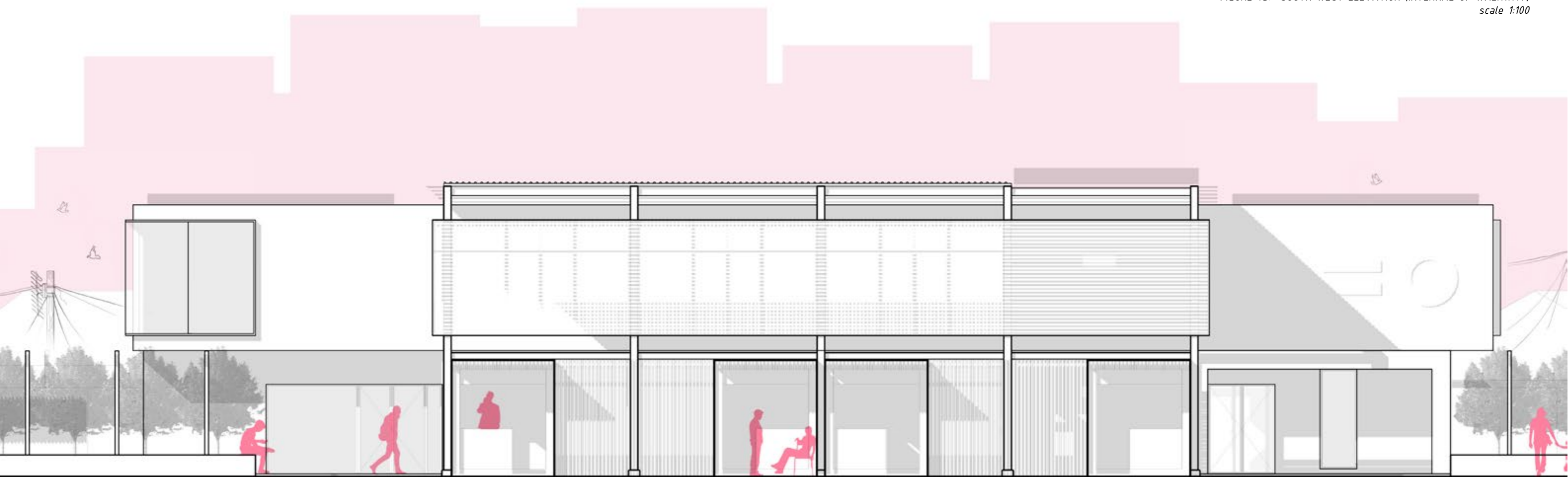


FIGURE 76: SOUTH WEST ELEVATION (EXTERNAL OF WALKWAY)
scale 1:100



FIGURE 77: NORTH EAST ELEVATION (CUT THROUGH COURTYARD)
scale 1:100

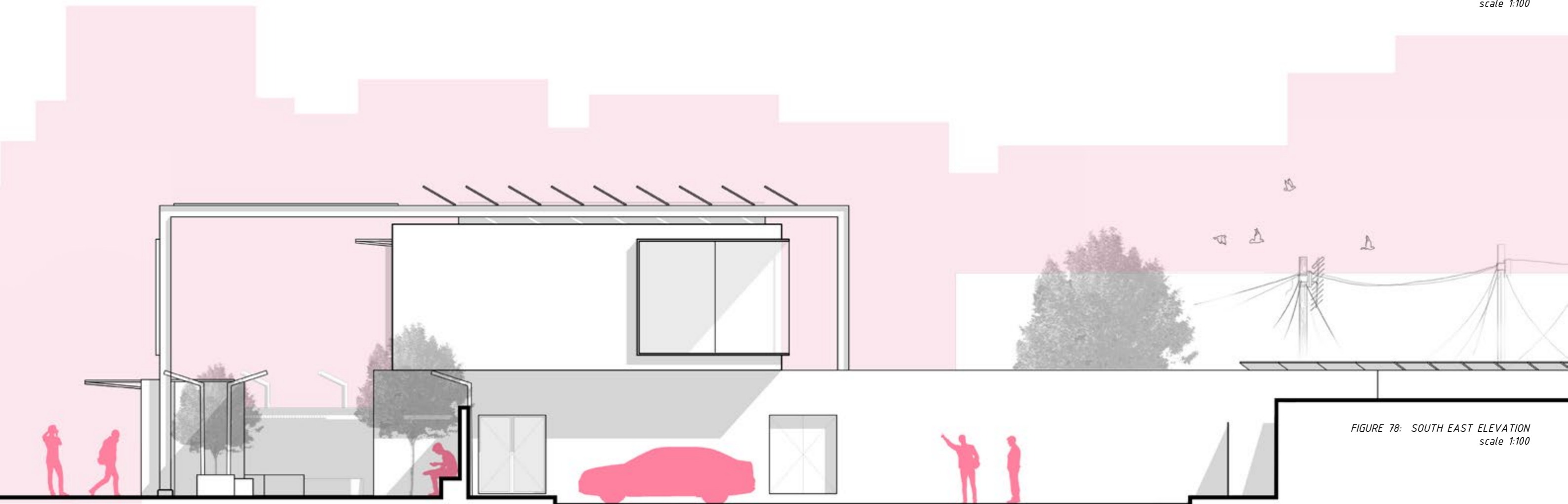


FIGURE 78: SOUTH EAST ELEVATION
scale 1:100

FIGURE 79: DESIGN MODEL

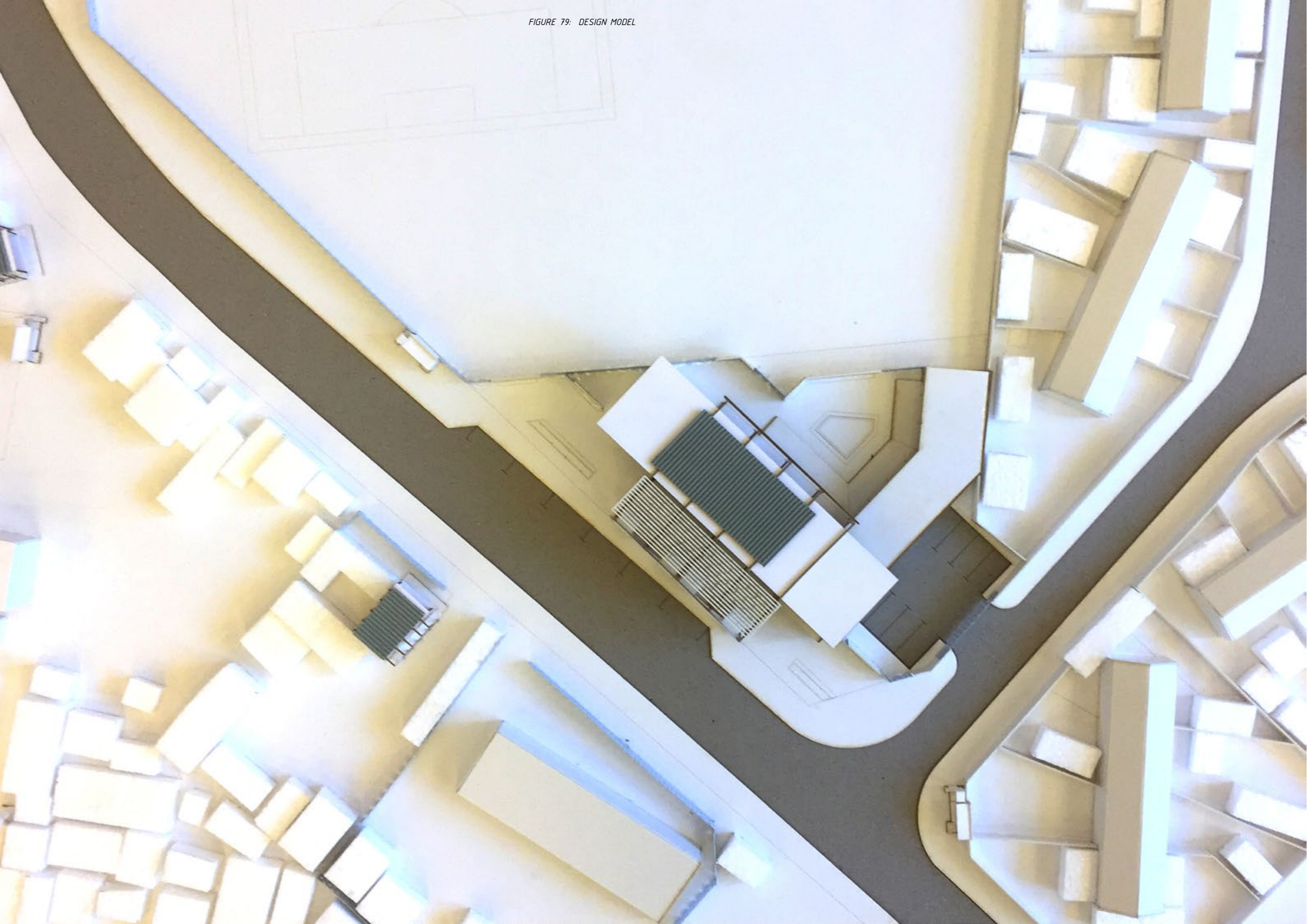


FIGURE 80: DESIGN MODEL



PART 4
TECHNICAL RESPONSE

4.1. T R I P L E B O T T O M L I N E

When one takes a sustainability approach to any architectural proposition, one should always consider how the intervention would fit into the urban framework to potentially support the immediate context. Thus, the 'Triple Bottom Line' approach is adopted and implemented at an urban scale before developing the sustainability strategy directed to the architecture itself.

Developed by John Elkington in 1994, TBL refers to three key bottom lines in the urban environment, these being profit (economic), people (social) and planet (environmental) (The Economist, 2009).

With the concept of implementing digital infrastructure across the complex precinct and informal trade network of Nyanga Junction through three different scales of architecture, one can instantly suggest ways of using the TBL approach to benefit the immediate context through the three P's of profit, people and planet. Profit and economic benefit can be generated to those of the informal trade by allowing the said individuals to connect to wireless internet that shall be readily available and give a new 'reach' of contact to both clients and suppliers of their product. Furthermore, by installing solar photovoltaic panels to all three scales of architecture, the interventions feed energy back into the grid to supply the immediate context of the informal market to cut down costs of running their stalls. This then has a people and social benefit as it is a proposal directed to the people of the area to enhance public

space and provide digital infrastructure and amenities to those who did not have access to it previously. The narrative of the Technology studies suggests the notion of how people spend most of their time indoors and not enough outdoors (Shepard, 2011). By spending more time outdoors, one can instantly propose healthy living and improve well-being. These three scale interventions look at providing spaces for individuals, who wish to do research for studies, reach out to others socially in another place or city and provide mentorship for young entrepreneurs to develop new ideas. Lastly as suggested previously, the three scales of architecture will have renewable energy generated through solar PV panels to limit the amount used from local resources that shall help with environmental issues.

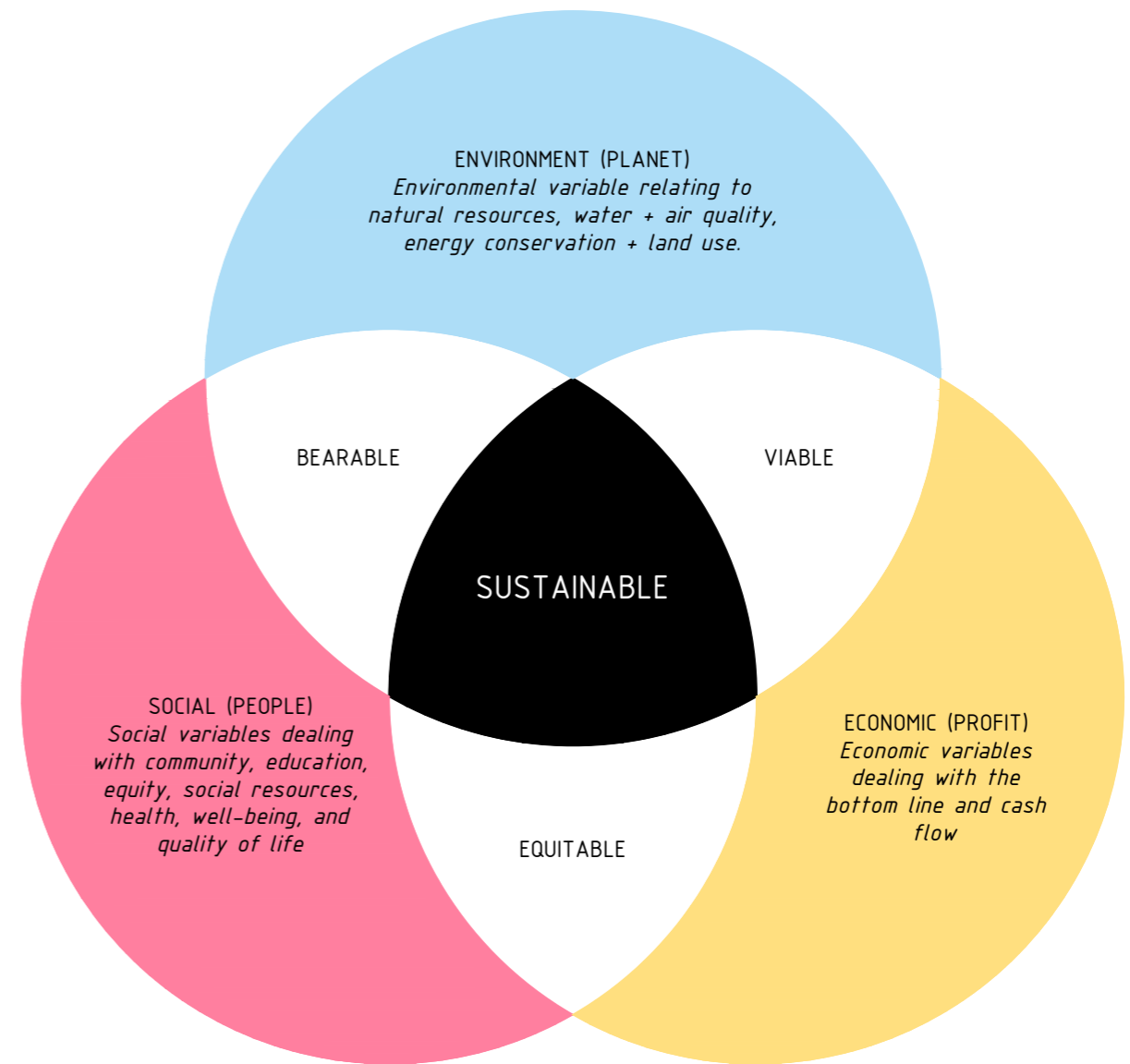


FIGURE 81: TRIPLE BOTTOM LINE VENN DIAGRAM

4.2. BUILDING PERFORMANCE

The main sustainability strategy implemented at the scales of architecture is that of minimizing energy use in order to provide a sufficient building performance. This has been done by:

- Generating renewable energy
- Limited AC units where needed
- Passive cooling with cross ventilation
- Passive heating in the colder months
- Light shelves for indirect lighting
- Acoustic ceilings
- Screening and shading devices

Firstly, photovoltaic solar panels are installed throughout each scale of the design dissertation. These panels, that convert solar energy into electricity, are able to fully support each scale and provide back into the grid of the immediate context. They are installed as rooftop systems facing north where they are able to receive as much uninterrupted sun radiation as possible as well safer from damage and theft. The panels are relatively light and have very little effect on structure and waterproofing. For the small scale, a single PV panel is installed above the street lighting that will help with producing electricity for night lighting and feedback to charging outlets for mobile devices.

PV panels at the medium scale are installed above the stair approach, this does not only generate the electricity required for running the medium intervention but has a dual function of providing shading for the users arriving and leaving the unit. PV panels are installed at both levels of the large scale roofs. The lower roof plane that covers the administration and IT classroom wing is used to provide the said part of the building while the bulk of the panels sit on the main roof and apex of the building.

Desktops, and the people using them, generate a vast amount of heat that is needed to be cooled in order to provide a healthy and comfortable work environment, thus the only desktop PCs used are in the IT Classroom at the back of site while the other programmes will use a 'hot desk' system of laptops. AC is only then used for the classroom to limit the use of energy, while the remainder of the building uses passive cooling and heating systems. Passive cooling is introduced with cross ventilation, by installing high-rise louvre windows that allows hot and stale air to escape and cooler fresh air to lead in at lower levels. Passive heating is introduced for the cooler months of the year with a well-insulated 'sun' room on the north corner of the building that is able to store hot air and distribute it accordingly.

Ideally, one needs indirect sun and diffused lighting for workspaces; this notion has been practiced by implementing light shelves that reflect sunlight indirectly into the interior of the building. These light shelves sit at the same level as the underside of the roof slab with a lightweight roof that 'pops' up with high-rise windows the extent of the main programme at first floor. The light then reflects off the light shelves to the underside of the ceiling board and distributed into the workspace below. These ceilings have a dual function and serve as an acoustic layer to the interior of the rooms that are able to absorb sound generated in the spaces that may otherwise reflect throughout the room. This is done largely to prevent noise travelling from the public programmes at ground floor to the more private programmes at first floor. Additional direct sunlight is deflected by adding screening devices that provide another layer of shading and protection from the north as well early and late sun.

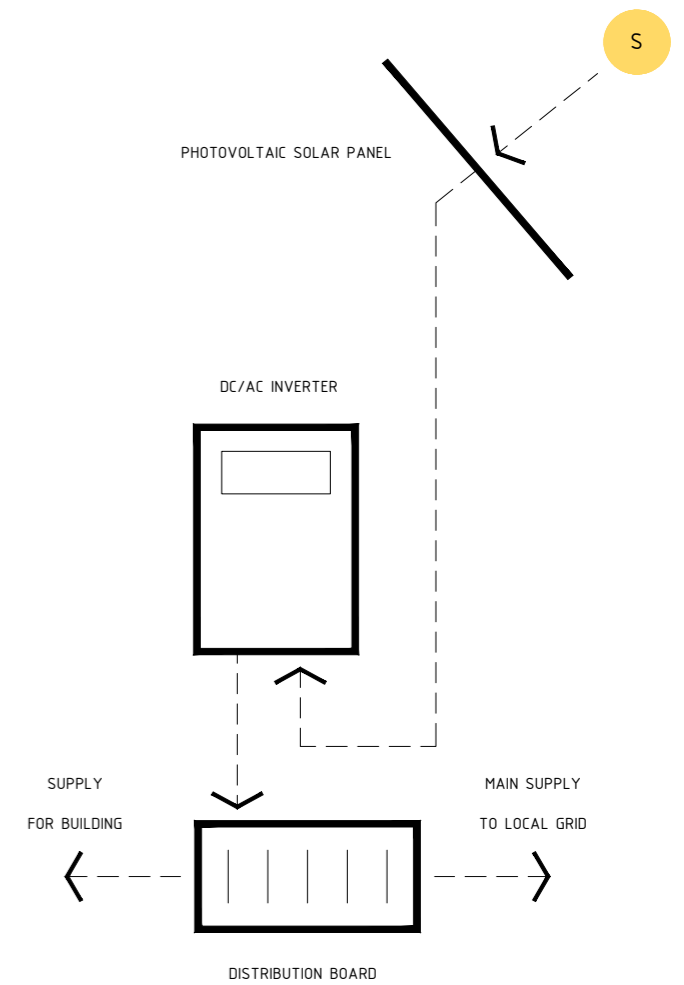
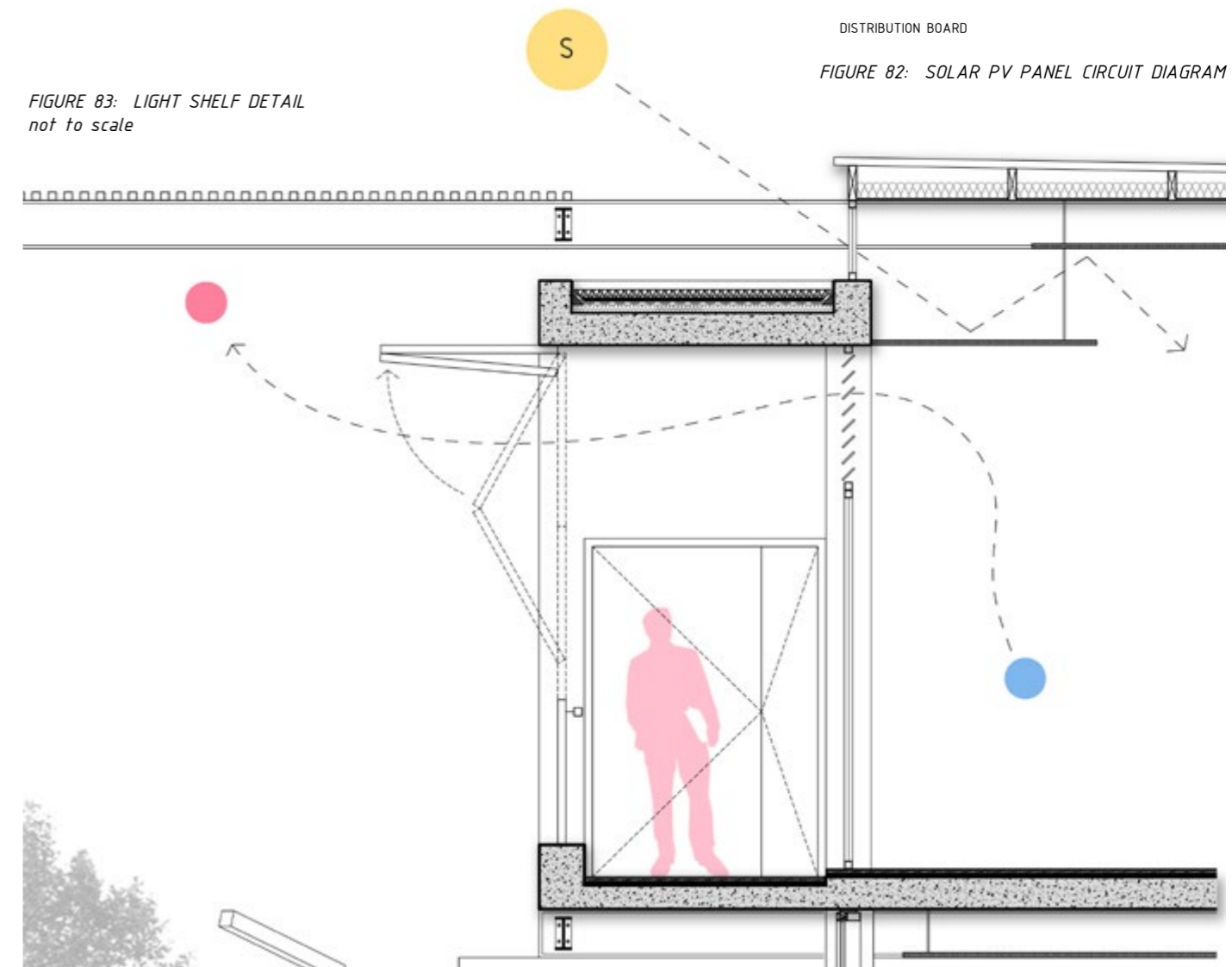


FIGURE 82: SOLAR PV PANEL CIRCUIT DIAGRAM

FIGURE 83: LIGHT SHELF DETAIL
not to scale



4.3. MATERIALITY

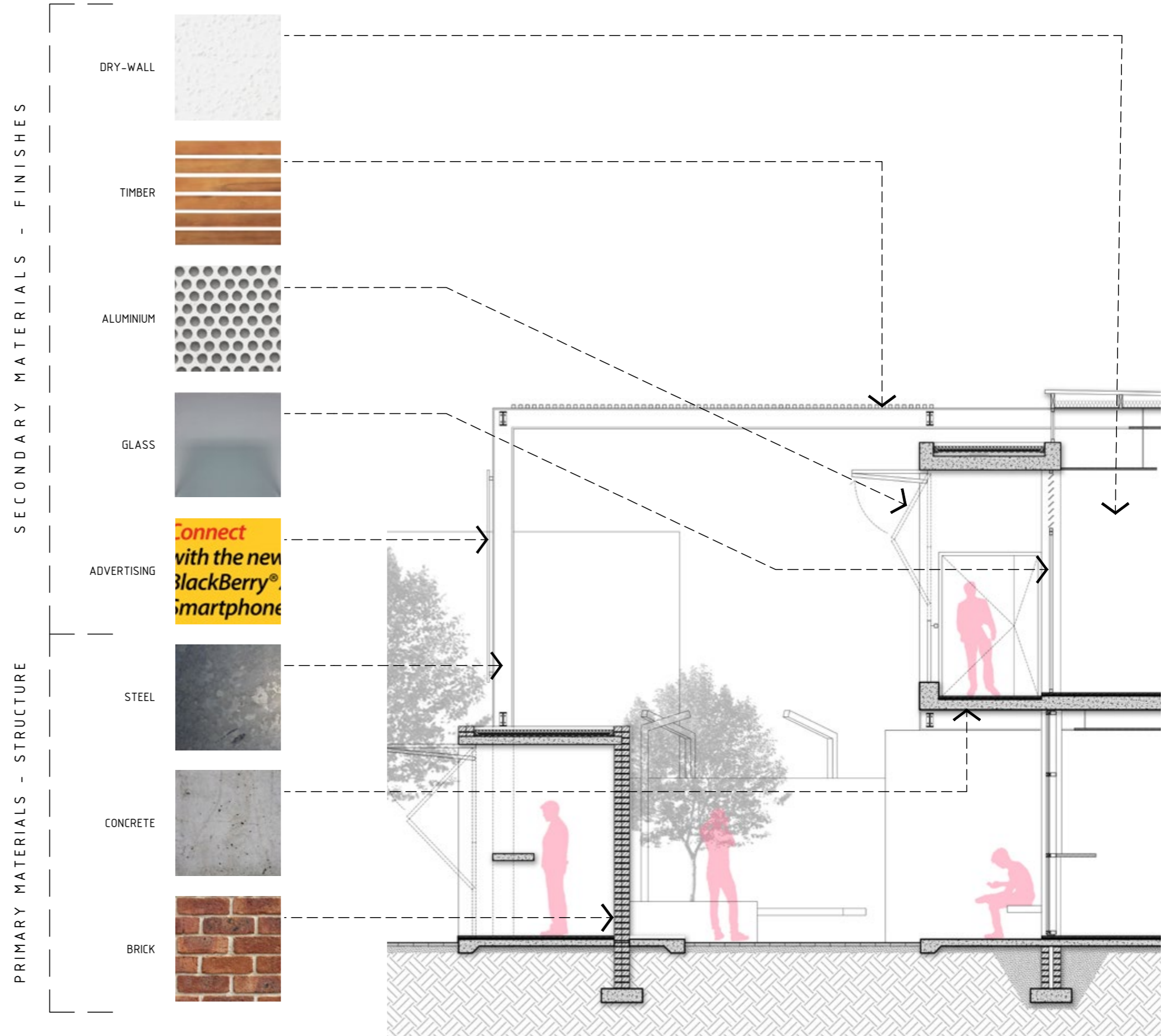
Three main materials are used in the making of the projects; steel, concrete, brick.

These three conventional materials give all three scales a certain robustness that is suited for the context on the area, while still able to keep a coherent aesthetic across each architectural intervention and similar to other existing architecture within the area and precinct. Steel serves as the main structural element while the floor slabs and beds are made up of concrete with brick infill of 280mm external walls.

It is then these three robust materials, which make up the permanent and built foundation of the architecture across all three scales. Secondary materials are used for internal partitions, cladding and screening such as; dry-walling, aluminium mesh, timber screens, glass, vegetation, 'advertising'

These materials offer permeability that helps in supporting the programme of flexible event within fixed spaces. Furthermore, materials of high density can cause a disturbance of Wi-Fi signal thus these more permeable materials can help in distribution signal regulation throughout the different scales of architecture and the precinct as a whole (Suchocka, et al., 2016, p158). A 'material' that can help in supporting this notion is vegetation, which is able to counteract radio waves and direct them. Lastly, advertising space is provided on the exterior of the different scales of architecture. This serves as a screening device while also generating an income for the institution.

FIGURE 84: STRIP SECTION
not to scale



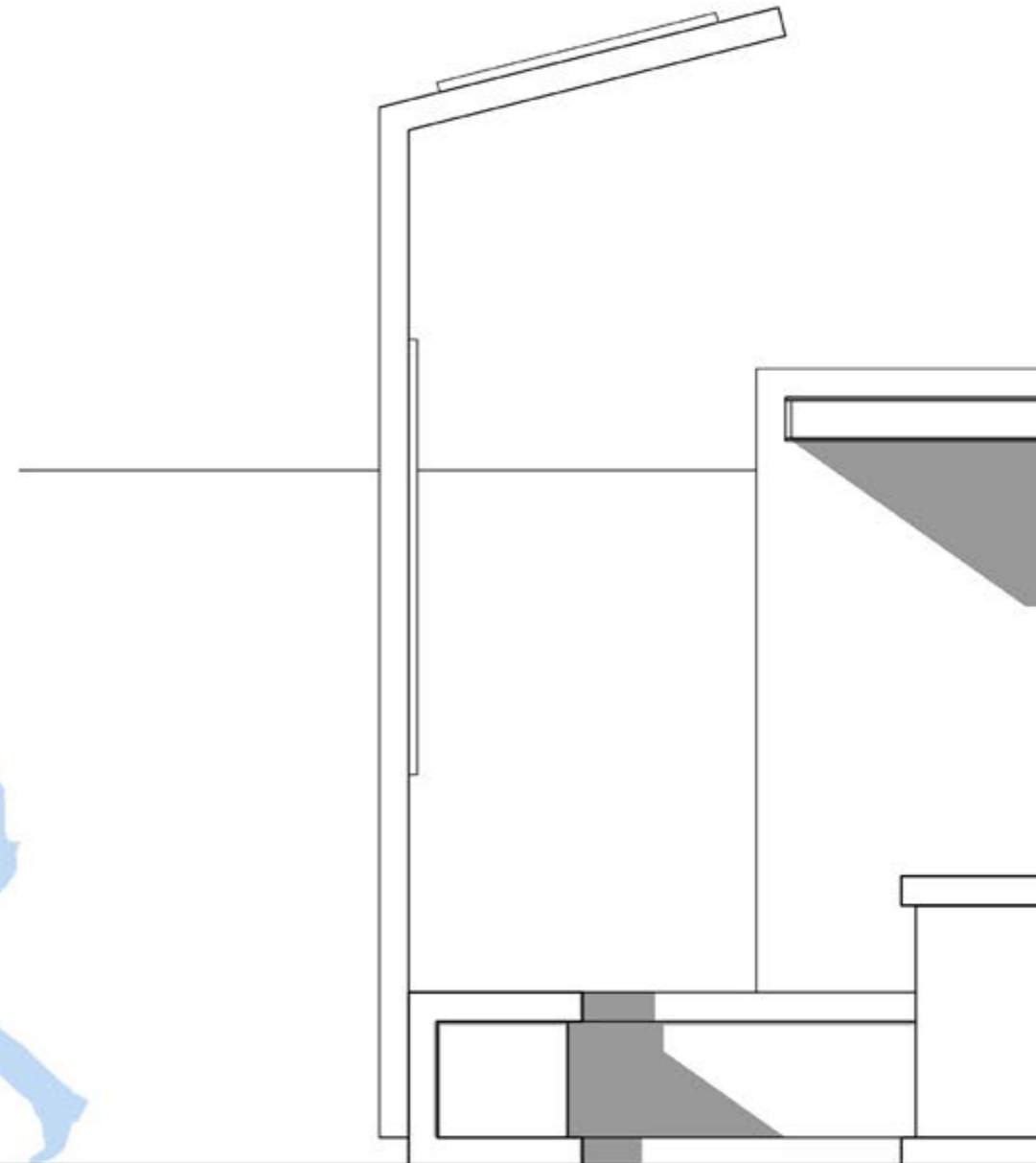
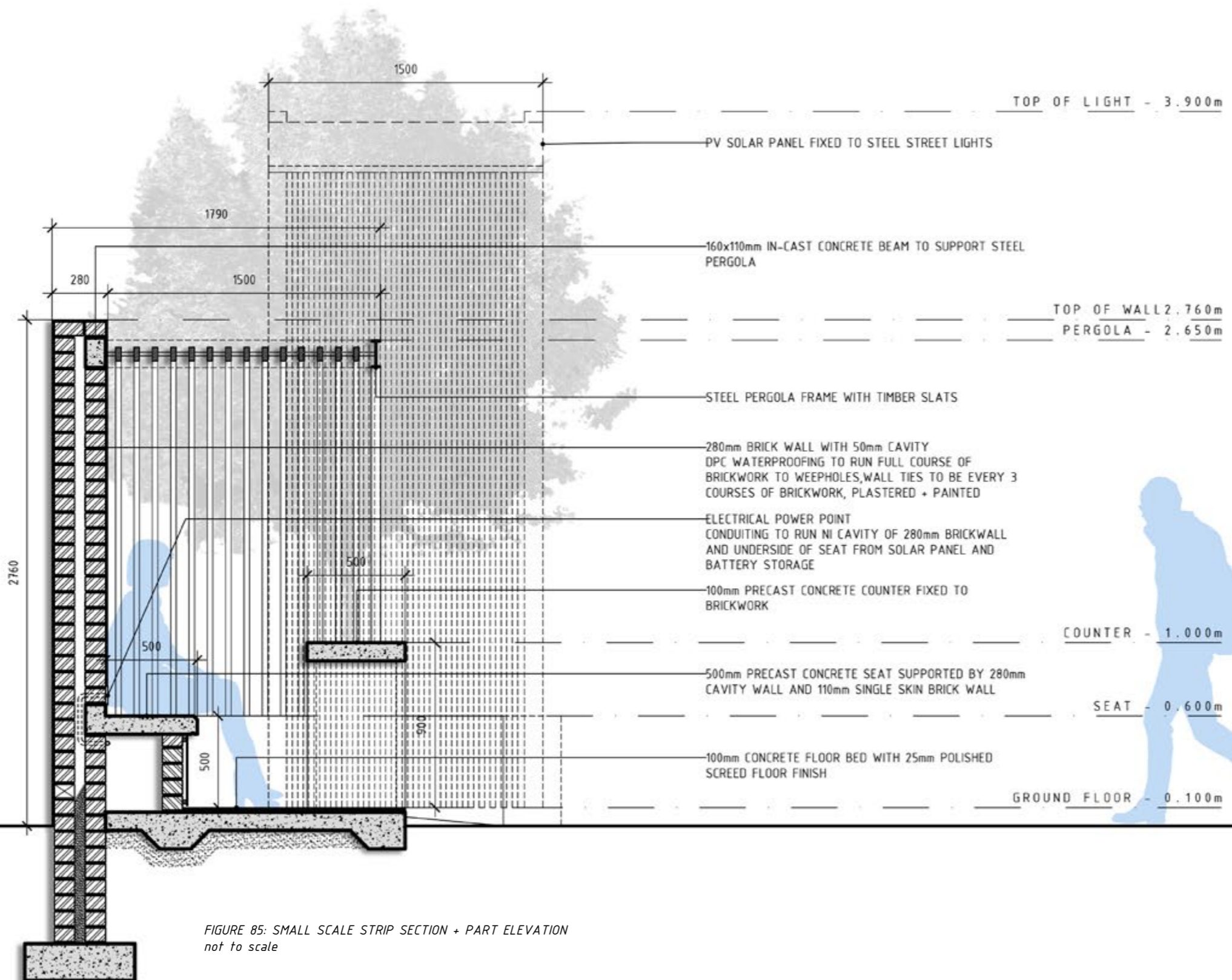


FIGURE 85: SMALL SCALE STRIP SECTION + PART ELEVATION
not to scale

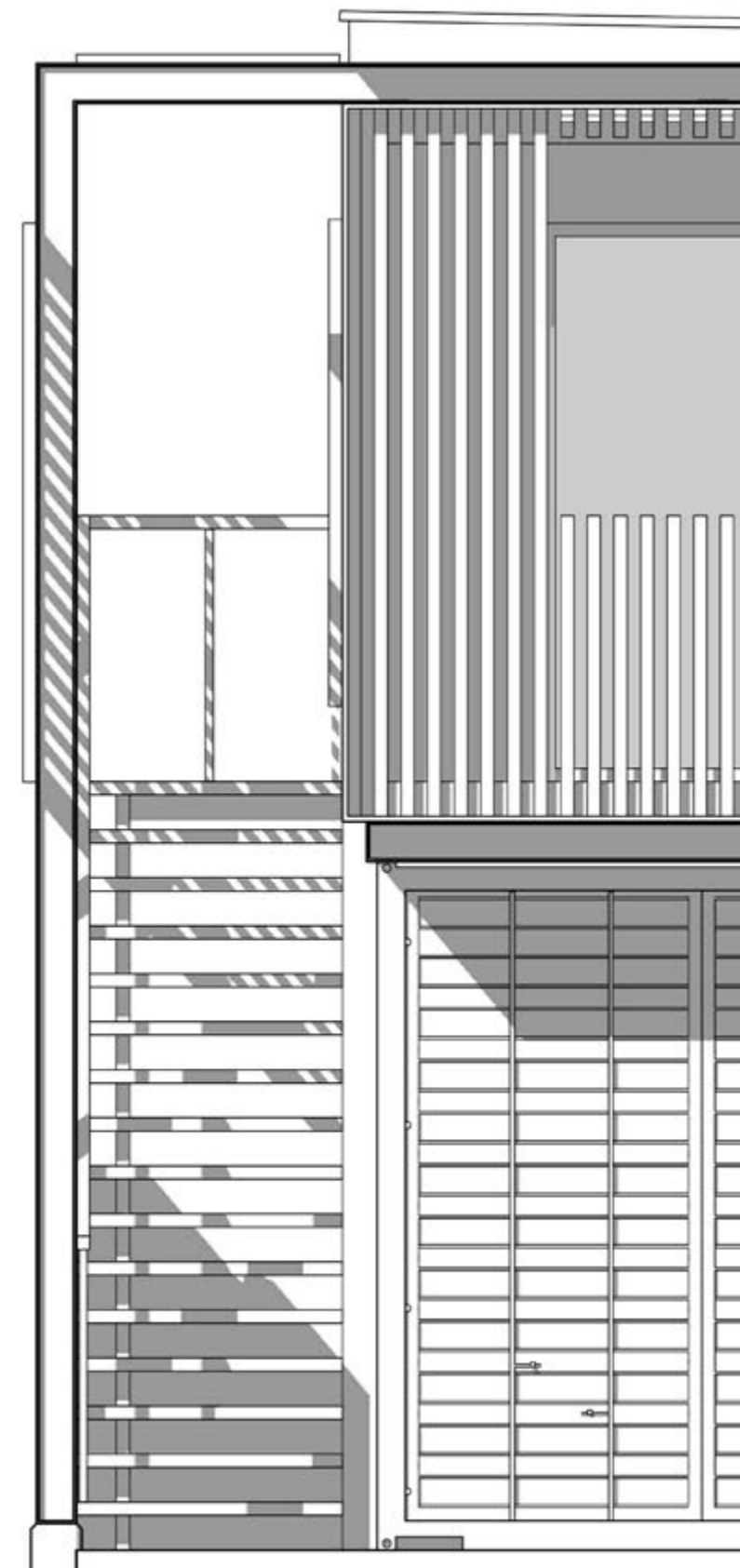
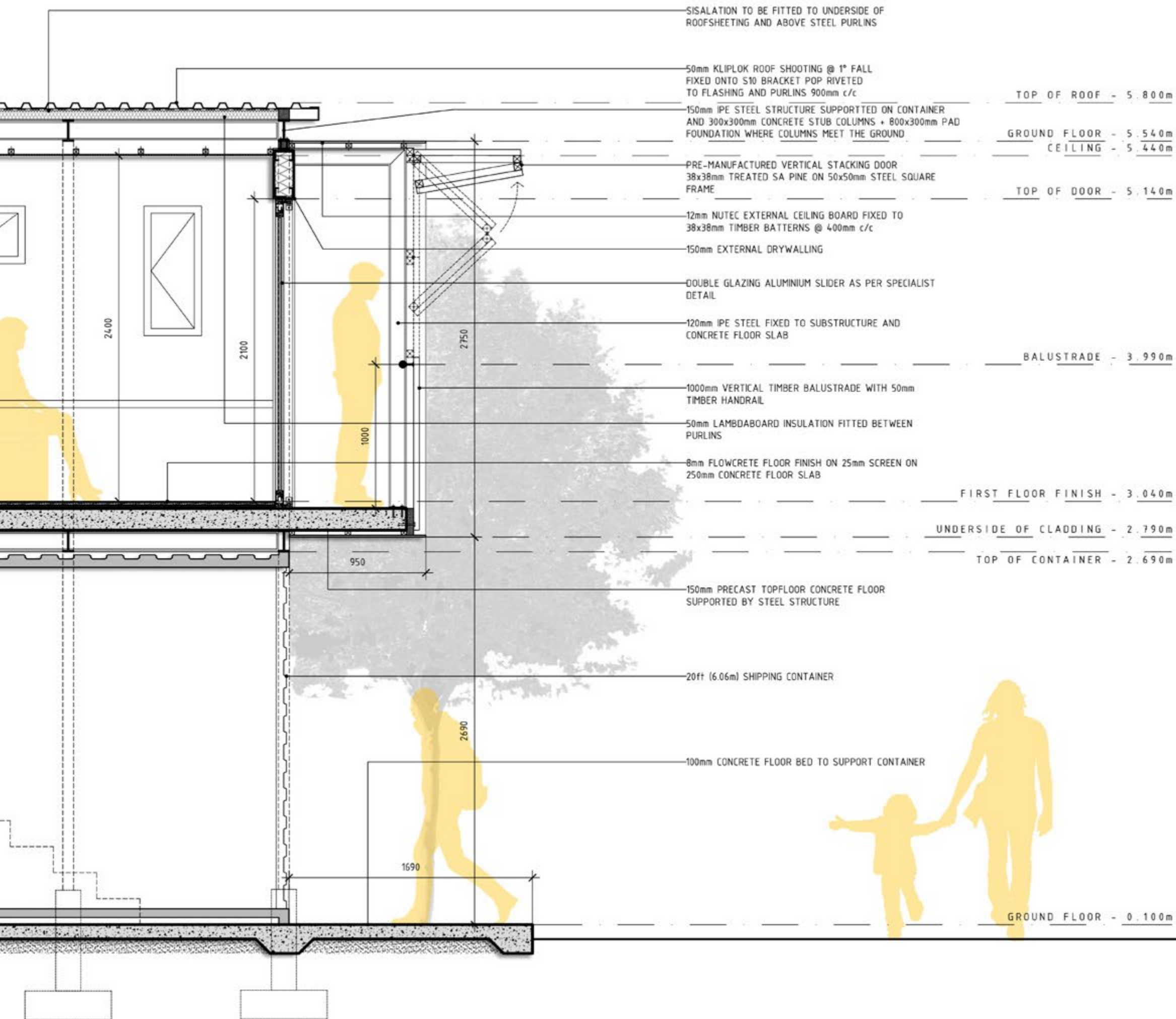


FIGURE 86: MEDIUM SCALE STRIP SECTION + PART ELEVATION
not to scale

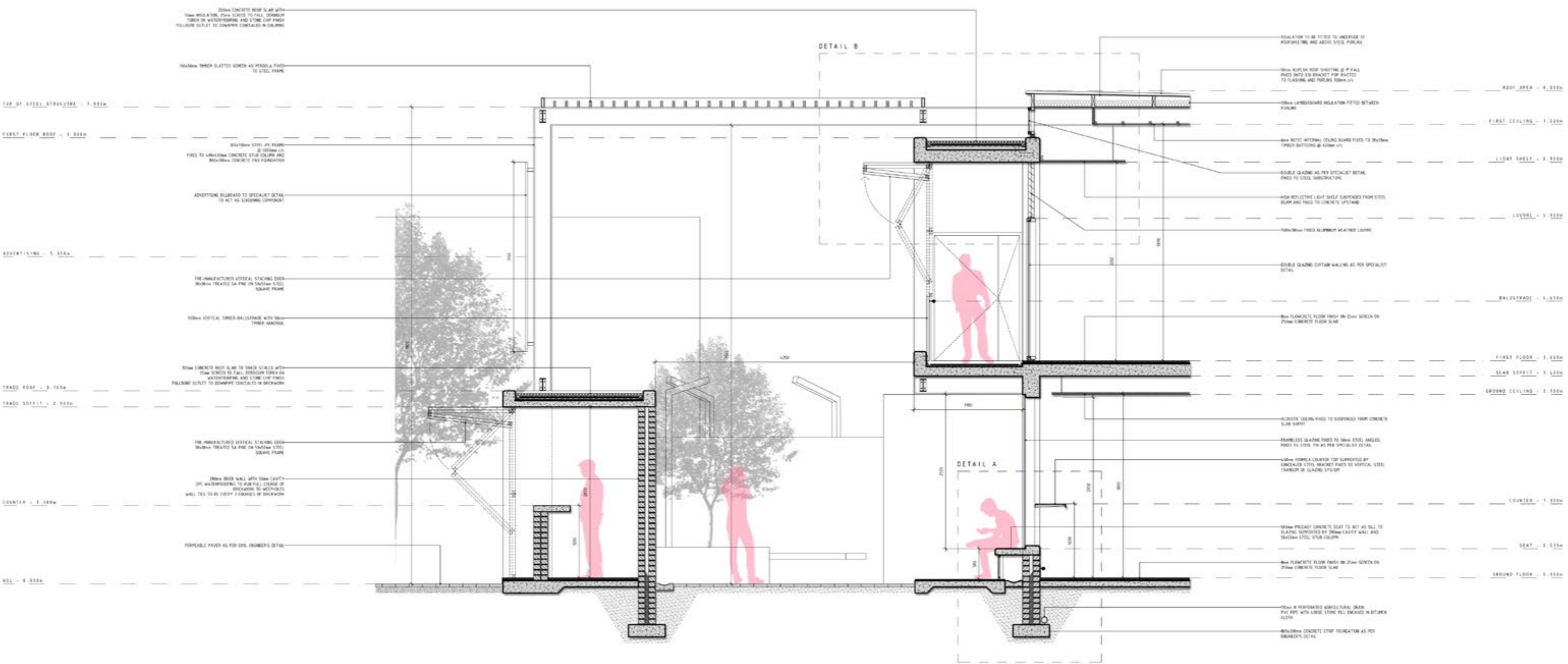
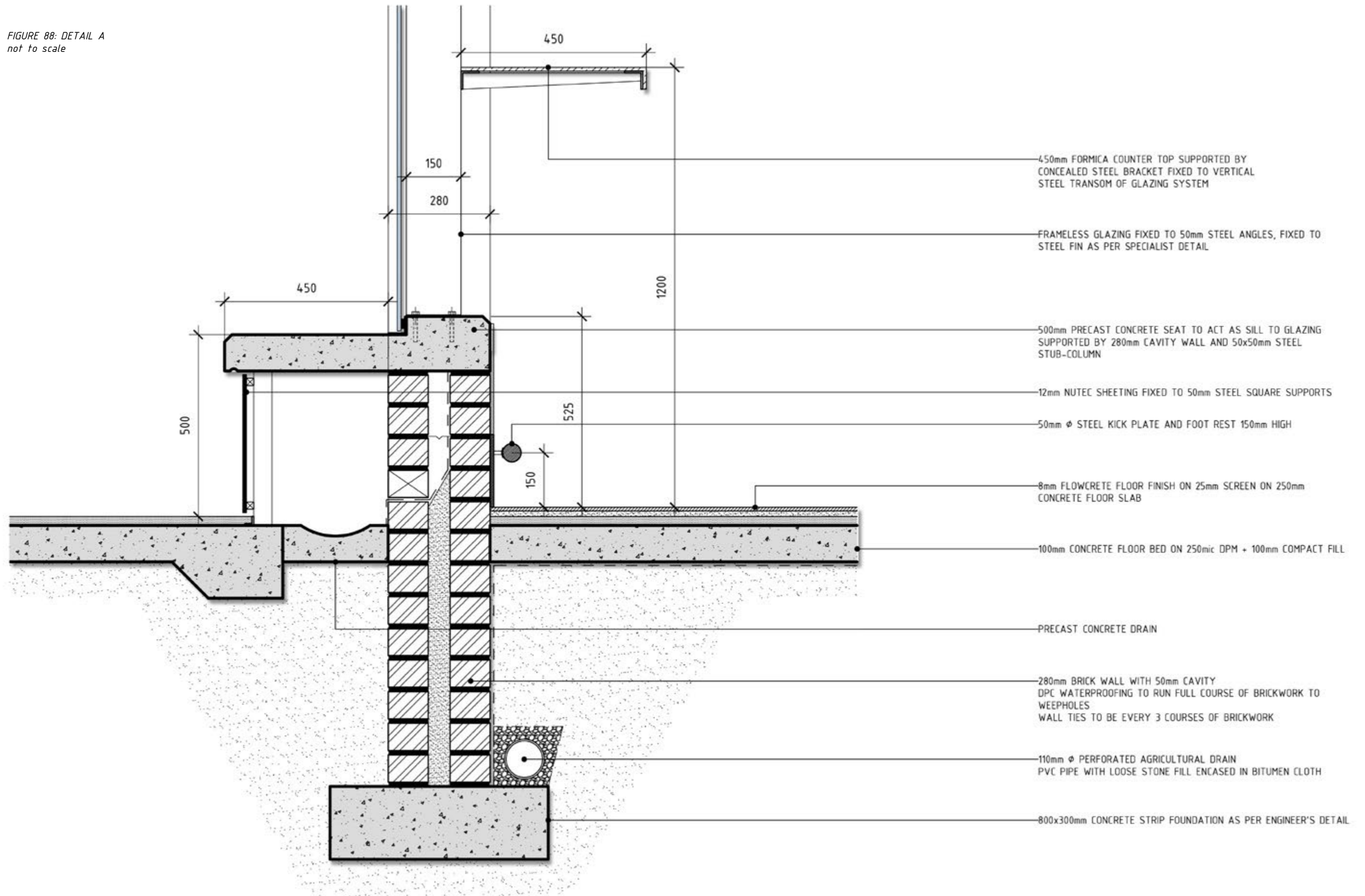


FIGURE 87: LARGE SCALE STRIP SECTION
not to scale

FIGURE 88: DETAIL A
not to scale



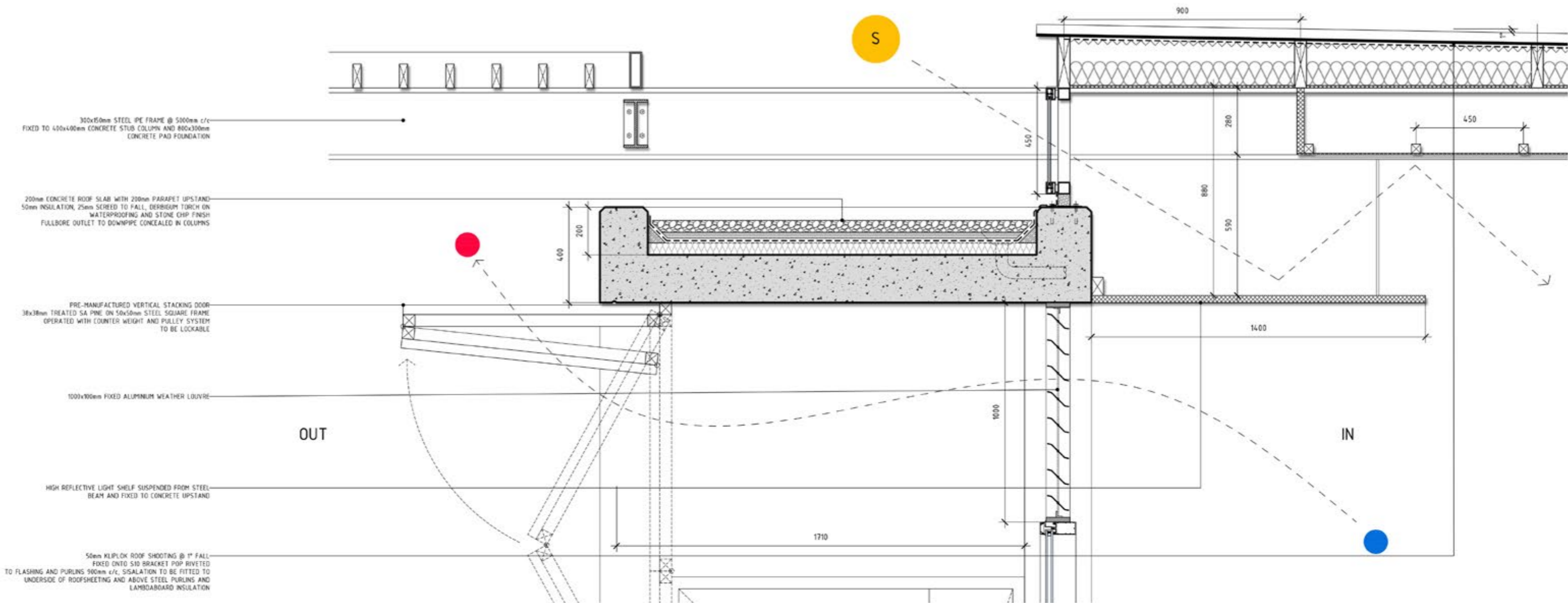
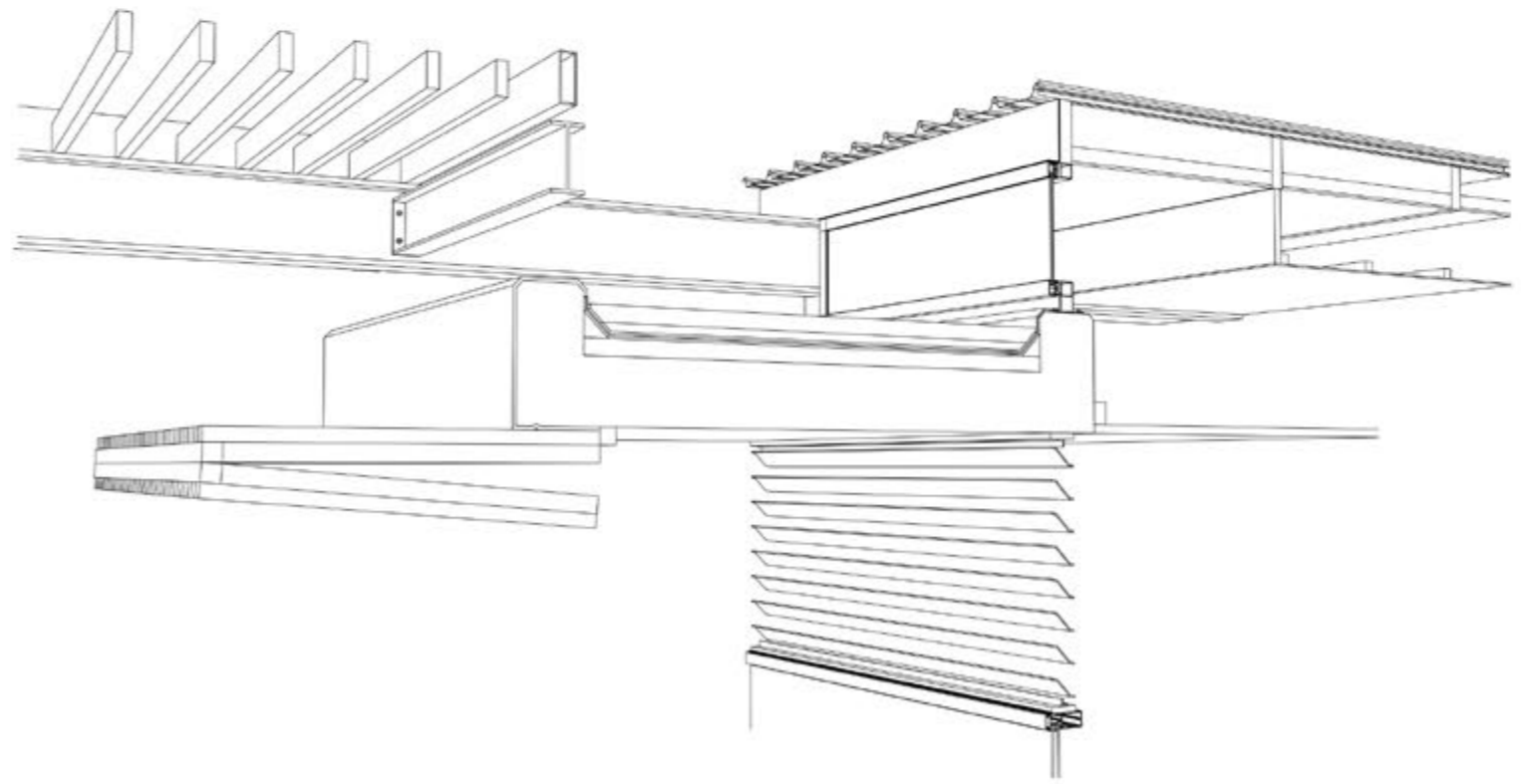


FIGURE 89: DETAIL B
not to scale



4.4. STRUCTURE

The three robust materials of steel, concrete and brick make up the structure of the three different scales of architecture and gives each their structural integrity. Each are made up of similar structural systems but the systems have been adapted according to the size and locality of the different interventions.

The small scale works at ground and street level thus not needing to be elevated or have an overcomplicated structural system. The main structural component is that of a brick wall that serves as the hard surface for individuals to rest against. Furthermore, it acts as a core to the intervention where services such as battery storage from the PV solar panels is kept and electrical distribution for the charging outlets. The shading device of a steel pergola is then fixed and anchored to the core. Lastly, a concrete floor bed is laid down as the surface with concrete seating and planters.

The medium scale proposition is implemented at first floor level above the street and is based on the size of two containers. The two containers essentially give the medium scale its key dimension of approximately 5x6 metres. The architecture rests above the containers with a steel structure of 150mm beams fixed to the four structural points of the containers. Furthermore, this steel structure then wraps around the programme 'box' of concrete slabs and brick walls, surpassing it to allow a structure for the approach stairs. The steel frame follows down to the ground and each column comes to rest on a 200x200mm concrete stub column and 800x800x200mm pad foundation. The steel beams running above serve as the rafters for the roof. The concrete slab is laid over and supported on the lower steel beams on which the exterior brick walls and internal partitions are fixed. Lastly, although the medium scale is designed to the dimension of two containers it does not necessarily have to be supported on them as it can have columns run down to the ground in place of the containers that allows for other flexible trade structures to be erected underneath.

The large-scale architecture is based on a similar system as that of the medium scale. In this case, containers are omitted and rather concrete sheer walls act as the structural system that props up the steel frame of 300mm beams and columns. The steel columns come to the ground and are fixed to 300x300mm concrete stub columns and 1000x1000x300mm pad foundations. This steel frame is at a 5000mm c/c grid spacing with cross bracing both horizontally and vertically at one of the bays. Furthermore, where the concrete roof is penetrated, to create a larger volume for the first floor, the steel frame like that of the medium scale works as rafters for the lightweight roof.

All flat roofs and slabs used are 200mm deep concrete except for floor beds which are 100mm. 800mm strip foundations have been used for all scales of architecture where walls meet the ground.

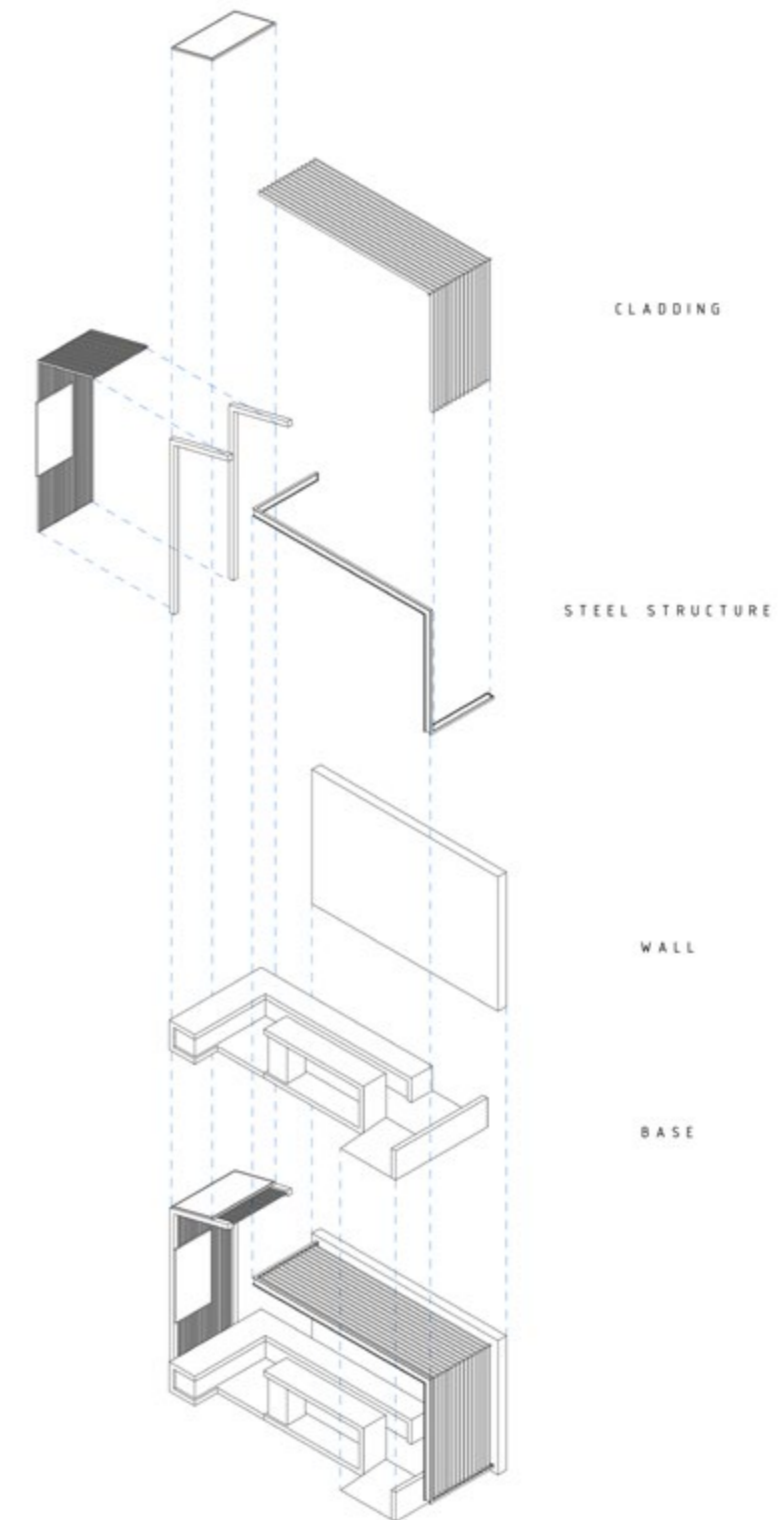
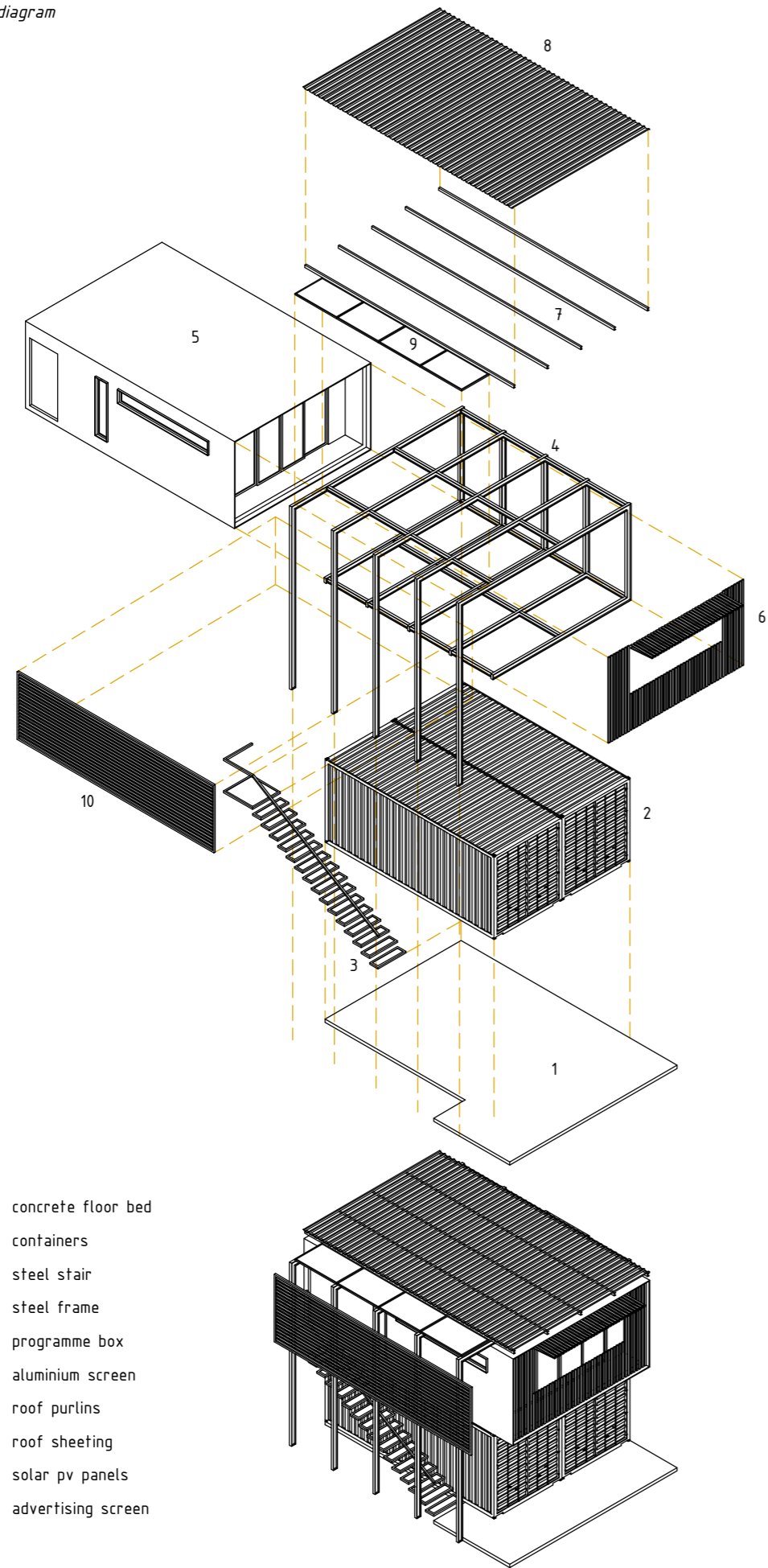
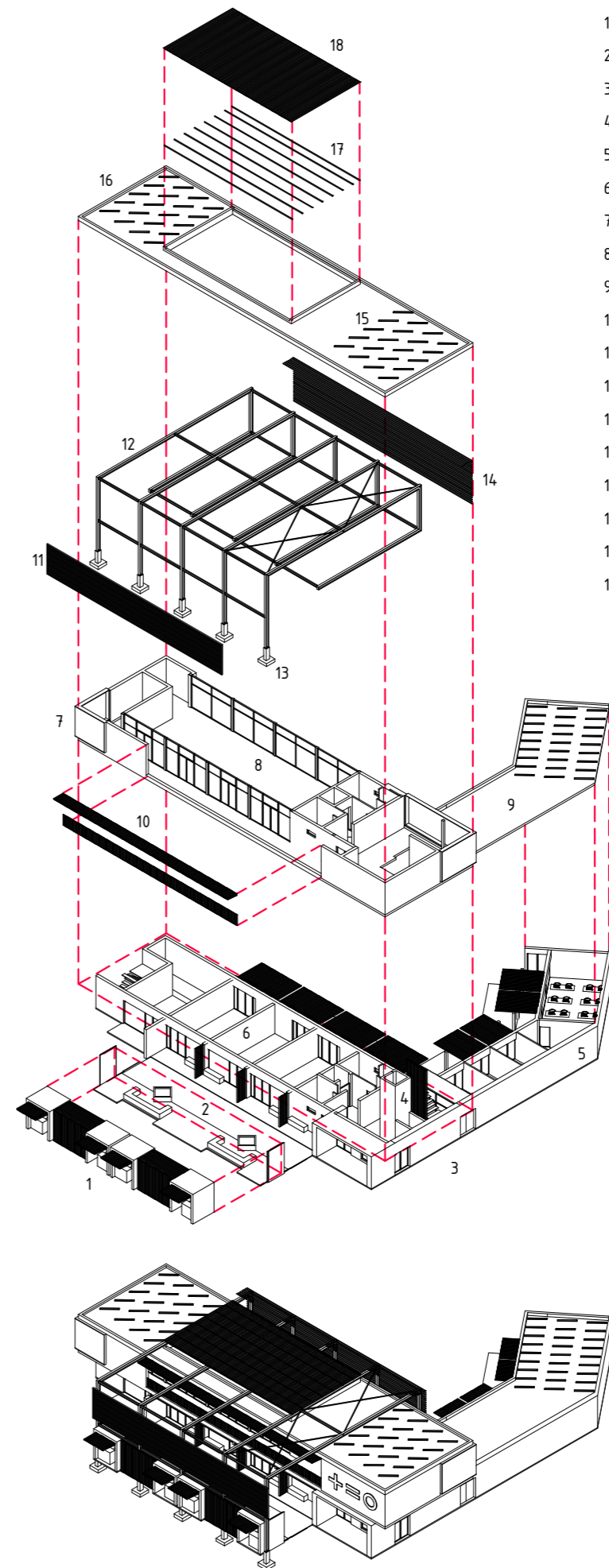


FIGURE 90: SMALL SCALE
exploded axonometric diagram

FIGURE 91: MEDIUM SCALE
exploded axonometric diagram



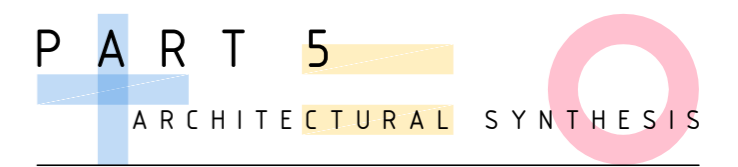
1. concrete floor bed
2. containers
3. steel stair
4. steel frame
5. programme box
6. aluminium screen
7. roof purlins
8. roof sheeting
9. solar pv panels
10. advertising screen



1. trade stalls
2. public walkway
3. ground floor
4. lift core
5. concrete wall
6. concrete sheer wall
7. first floor
8. open hub
9. ground floor concrete roof
10. aluminium screen
11. advertising screen
12. steel frame
13. pad foundations
14. timber screen
15. solar pv panels
16. first floor concrete roof
17. roof purlins
18. roof sheeting

FIGURE 92: LARGE SCALE
exploded axonometric diagram

PART 5
ARCHITECTURAL SYNTHESIS



5.1. ARCHITECTURAL SYNTHESIS

When one reflects back on the main design research question of understanding the influence ICTs and mobile devices have on the social programming, spatial conditions and construction of public architecture, it becomes quite evident that part 2 (urban strategy), part 3 (architectural proposition) and part 4 (technical response) support this notion throughout.

Socially, one can instantly see, through the topic and argument, that there is a dire need for digital infrastructure within these informal areas of Cape Town and the greater extent of South Africa. It becomes a device of place making that attracts people to spaces within the public realm. Thus, the quality of life in this public realm becomes important in order to make it conducive to the human. These individuals will ultimately use the space or architecture as they wish, thus making the actual programme varied among the users ranging from studies and work to socialising and play.

Spatial conditions have resulted in an urban strategy and concept that supports the idea of digital infrastructure within the public realm across three scales of architecture. Each of these scales located at specific sites that support each other in a complex and busy precinct informed by ideas of social thresholds developed through the theory and technology studies. These ideas

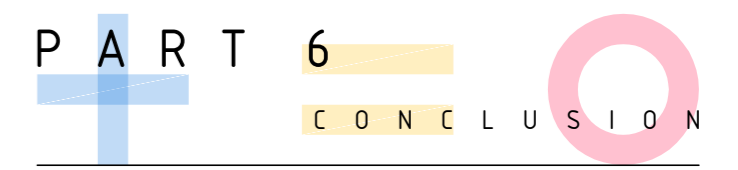
then have informed ways of implementing design principles at an architecture scale whether it is programmes at ground floor that are more open for flexible event to occur or more private programme elevated above the busy activity below. Furthermore, how existing conditions and programme have informed the key dimensions of the each scale, especially the medium scale and the containers.

The construction of the three scales has been influenced largely by the social programming and spatial conditions by using robust materials that are fixed and structurally support the architecture as a built form within the urban context and more notably the idea of light permeable materials that can adapt to the array and flexibility of programmes that may occur within the different spaces. Furthermore, how these permeable materials are designed to suit the transmitting properties of digital infrastructure through space. The programme has influenced the construction and detailing of the different scales of architecture in order to improve the building performance with ideas of shading, diffused light and renewable energy.



FIGURE 93: FINAL DESIGN VISUAL

PART 6
CONCLUSION



6.1.

C O N C L U S I O N

Digital Boundaries explores the designing and implementation of public architecture at an urban scale to better the quality of life within the public realm that can be beneficial socially, economically and environmentally. All infrastructure is important in the urban context for cities to run well such as water, transport and electricity; digital infrastructure is no different and people become heavily reliant on it. Although a non-spatial entity, it becomes significantly spatial in use, attracting people to urban space, especially informal areas as it is a vital place where people commute, trade and socialize.

Each part of the report explores these ideas across different scales of architecture and design. Part 1 understanding the social issues and needs for such an intervention at the scale of the human. Part 2 developing spatial concepts at an urban scale that has led to the notion of designing across the urban environment through three scales of architecture. This concept has helped with a bottom up approach, working with the existing infrastructure, conditions and most importantly the people of the area concerned to better enhance said public space. After developing the concept of three scales of architecture, Part 3 explores the need of IT facilities and programme at the scale of architecture. Furthermore, how this architecture of the large, medium and small interventions interacts with the public realm

and how the buildings meet the street. Especially the concept of the interior expanding to the exterior as developed in the technical studies and how this space should be designed to be safe and conducive to the human scale as informed by the theory paper. Leading on from the three scales of architecture comes the consideration of making and understanding the building through detailing and performance as discussed in part 4.

FIN



PART 7
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7.2. LIST OF IMAGES

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| fig 03 – English, 2017 – further developed by Author, 2017 – Free Wi-Fi has young SA seeking out hotspots, Sunday Independent | fig 72 – author, 2017 |
| fig 04 – Foth, 2013 – further developed by Author, 2017 – source: http://www.urbaninformatics.net/ | fig 73 – author, 2017 |
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PART 8 
SUPPORTING DOCUMENTATION 

8.1. DECLARATION OF P L A G I A R I S M

D I G I T A L B O U N D A R I E S

A study into how mobile devices and Information + Communication Technologies can influence the social programming, spatial conditions and construction of public architecture.

BY

Marcus Daniel van't Hof -VTHMAR002

SUPERVISOR: Francis Carter, for UCT

CO-SUPERVISOR: Tessa Brunette, for ARUP Cape Town

Design Dissertation report presented as part fulfilment of the degree of Master of Architecture (Professional) in the School of Architecture Planning and Geomatics, University of Cape Town.

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- Except as stated below, neither the substance or any part of the design dissertation has been submitted for a degree in this university or any other university: N/A
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Date: 06 - 11 - 2017

8.2. E T H I C S A P P R O V A L

APPLICATION FORM

Please Note:

Any person planning to undertake research in the Faculty of Engineering and the Built Environment (EBE) at the University of Cape Town is required to complete this form **before** collecting or analysing data. The objective of submitting this application *prior* to embarking on research is to ensure that the highest ethical standards in research, conducted under the auspices of the EBE Faculty, are met. Please ensure that you have read, and understood the **EBE Ethics in Research Handbook** (available from the UCT EBE, Research Ethics website) prior to completing this application form: <http://www.ebe.uct.ac.za/usr/ebe/research/ethics.pdf>

APPLICANT'S DETAILS		
Name of principal researcher, student or external applicant	Marcus Daniel van't Hof	
Department	Architecture, Planning + Geomatics	
Preferred email address of applicant:	vthmar002@myuct.ac.za	
If a Student	Your Degree: e.g., MSc, PhD, etc.,	MArch (Prof)
	Name of Supervisor (if supervised):	Supervisor: Francis Carter (UCT) Co-supervisor: Tessa Brunette (ARUP Cape Town)
If this is a research contract, indicate the source of funding/sponsorship		Click here to enter text.
Project Title		Digital Boundaries

I hereby undertake to carry out my research in such a way that:

- there is no apparent legal objection to the nature or the method of research; and
- the research will not compromise staff or students or the other responsibilities of the University;
- the stated objective will be achieved, and the findings will have a high degree of validity;
- limitations and alternative interpretations will be considered;
- the findings could be subject to peer review and publicly available; and
- I will comply with the conventions of copyright and avoid any practice that would constitute plagiarism.

SIGNED BY	Full name	Signature	Date
Principal Researcher/ Student/External applicant	Marcus Daniel van't Hof	signature removed	10 Apr 2017

APPLICATION APPROVED BY	Full name	Signature	Date
Supervisor (where applicable)	F. Carter	signature removed	Click here to enter a date. 2017
HOD (or delegated nominee) Final authority for all applicants who have answered NO to all questions in Section 1; and for all Undergraduate research (Including Honours).	Prof. T. Berlanda	signature removed	Click here to enter a date.
Chair : Faculty EIR Committee For applicants other than undergraduate students who have answered YES to any of the above questions.	Click here to enter text.		Click here to enter a date.

