ARCHITECTURE FOR PEOPLE:

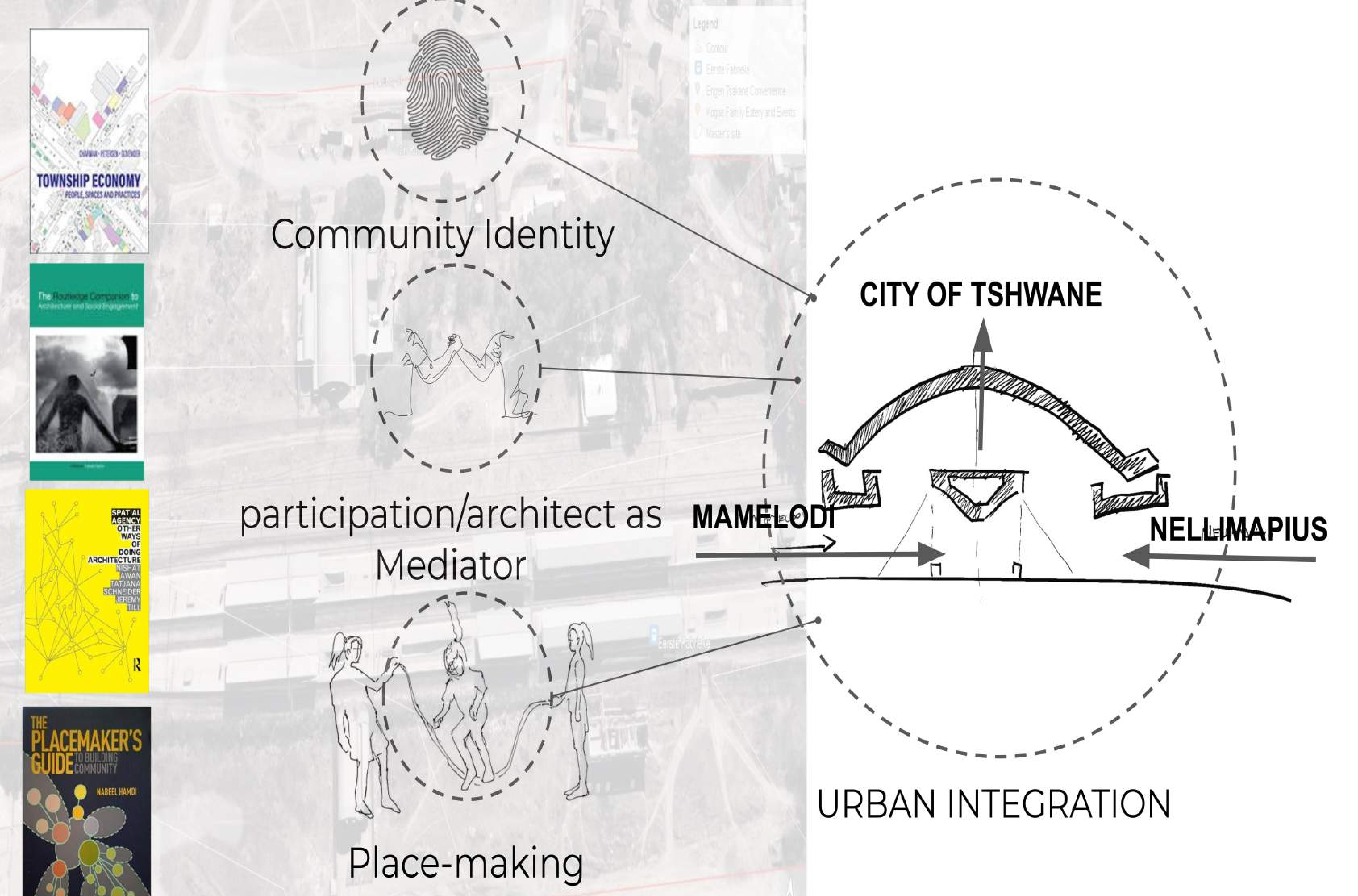
COMMUNITY RAILWAY STATION

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Complex Urban integration of informal settlements

How can a architectural intervention within the context of rail infrastructure be strategically designed to facilitate the complex urban integration of informal settlements, while concurrently supporting and enhancing the livelihoods of local traders?

Problem Statement

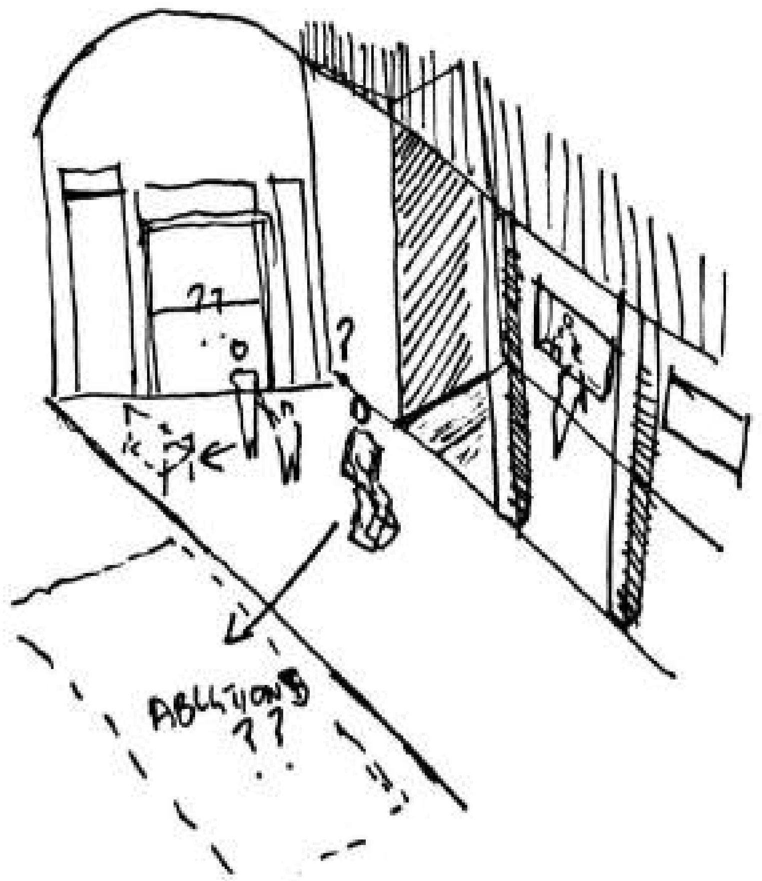


Conceptual Framework

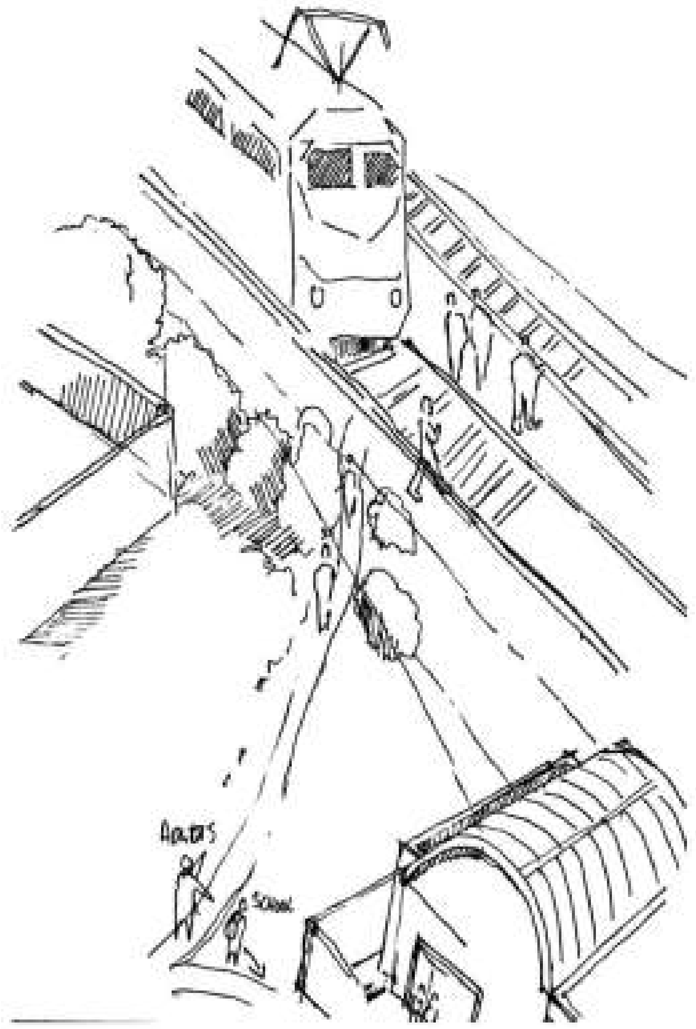
PRASA

PASSENGER RAIL AGENCY OF SOUTH AFRICA

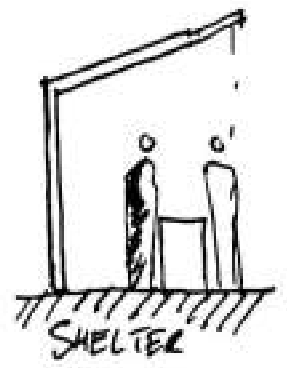
PRASA

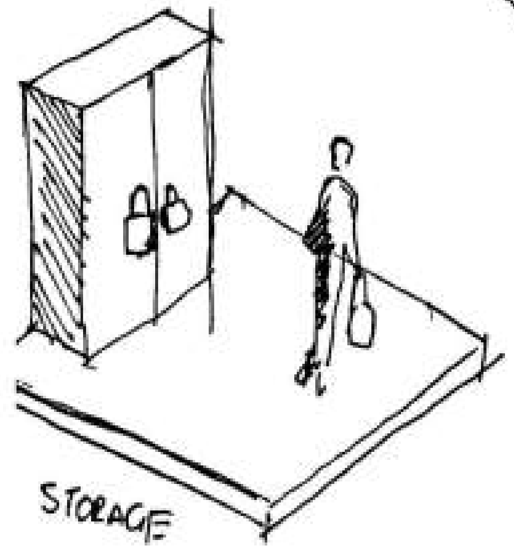


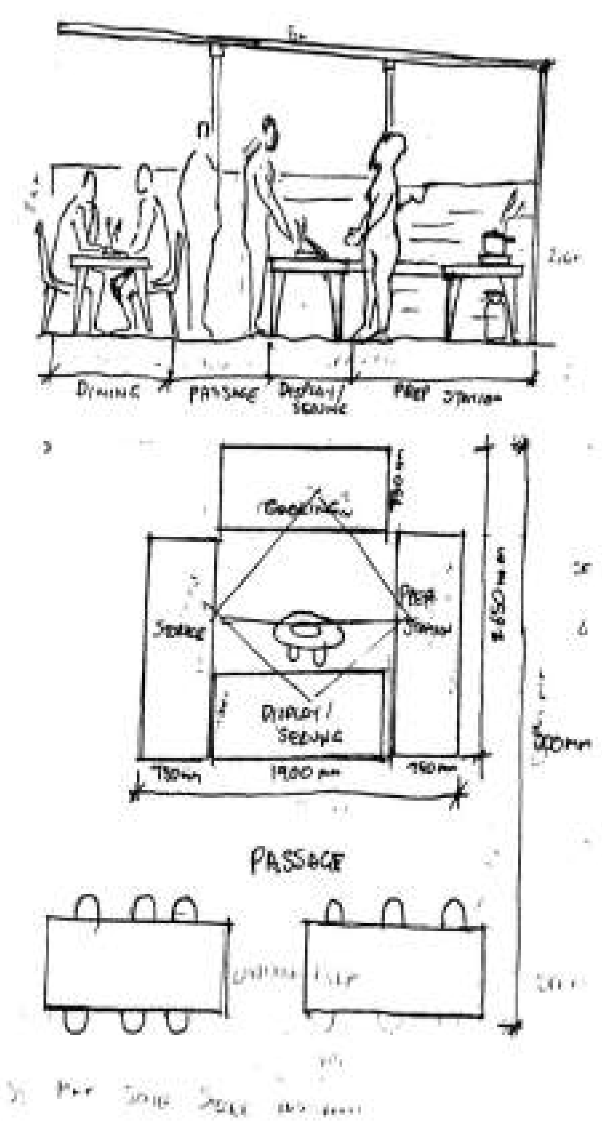
Everyday Traveller



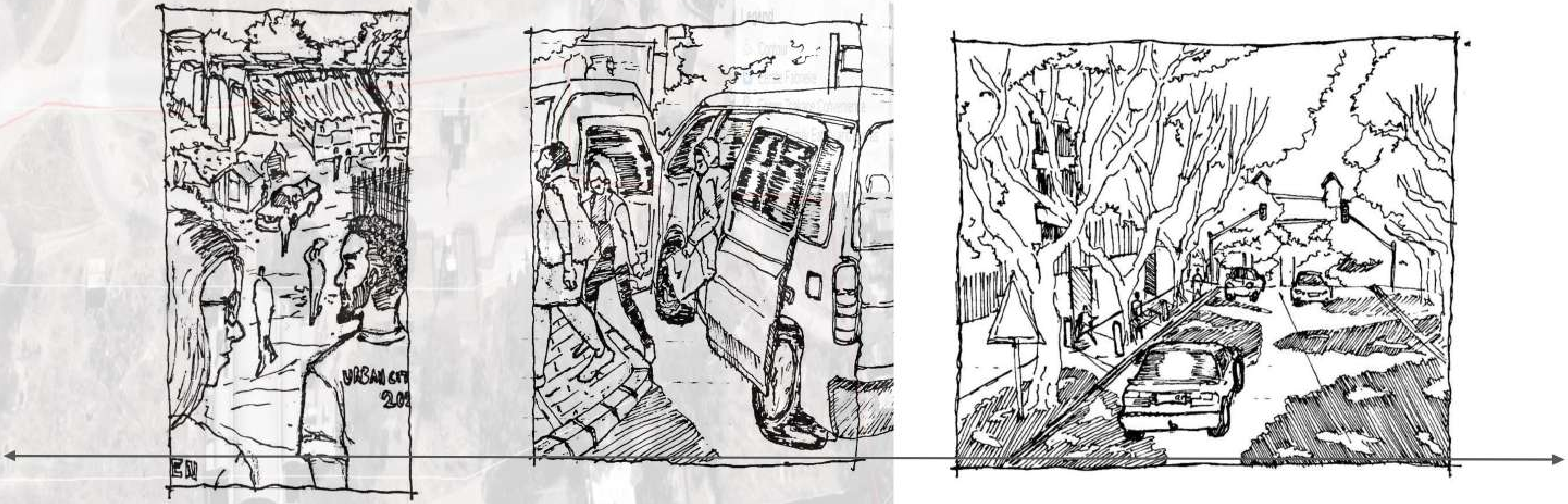
Local Street Vendor







SITE USERS



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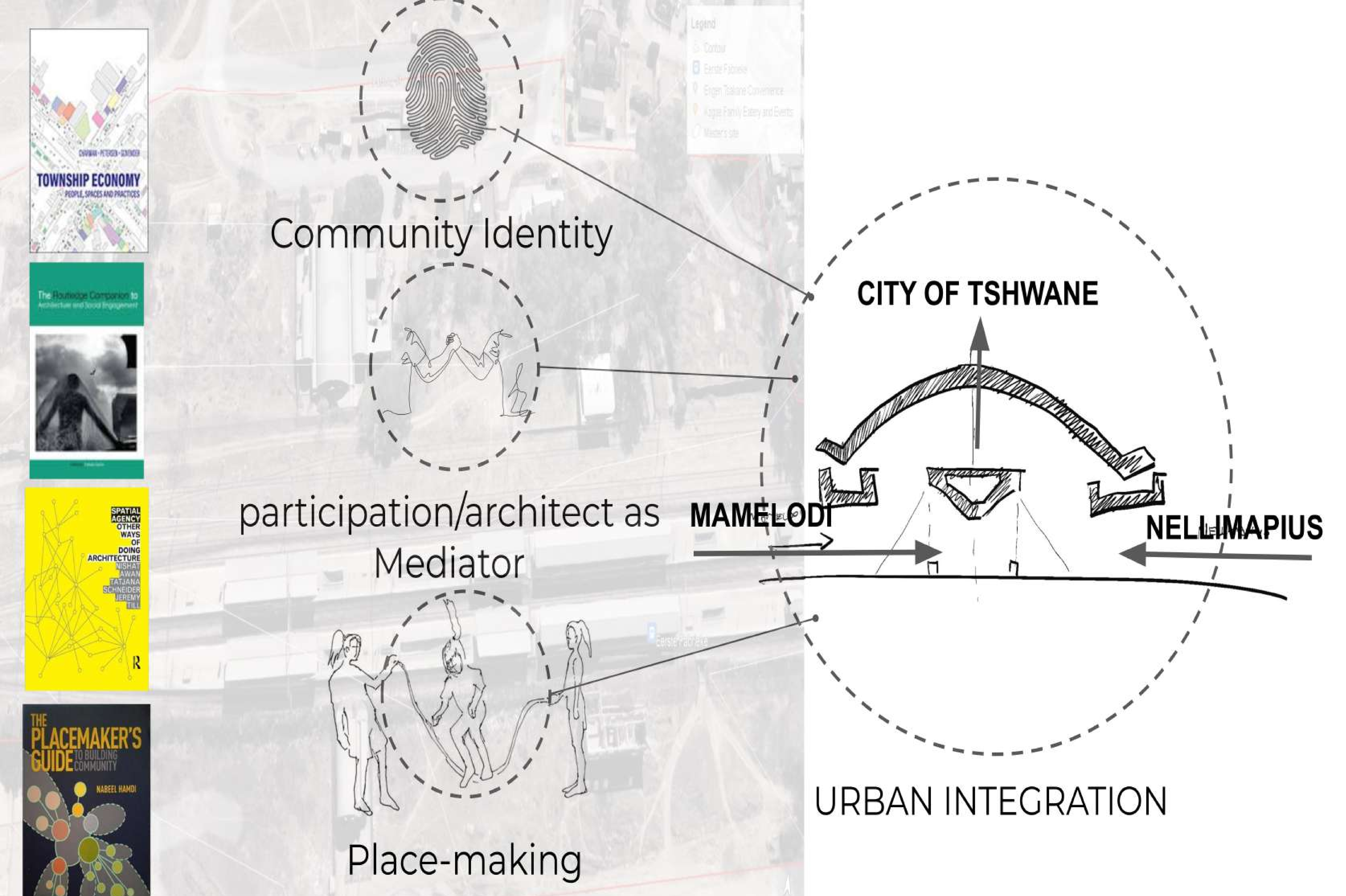
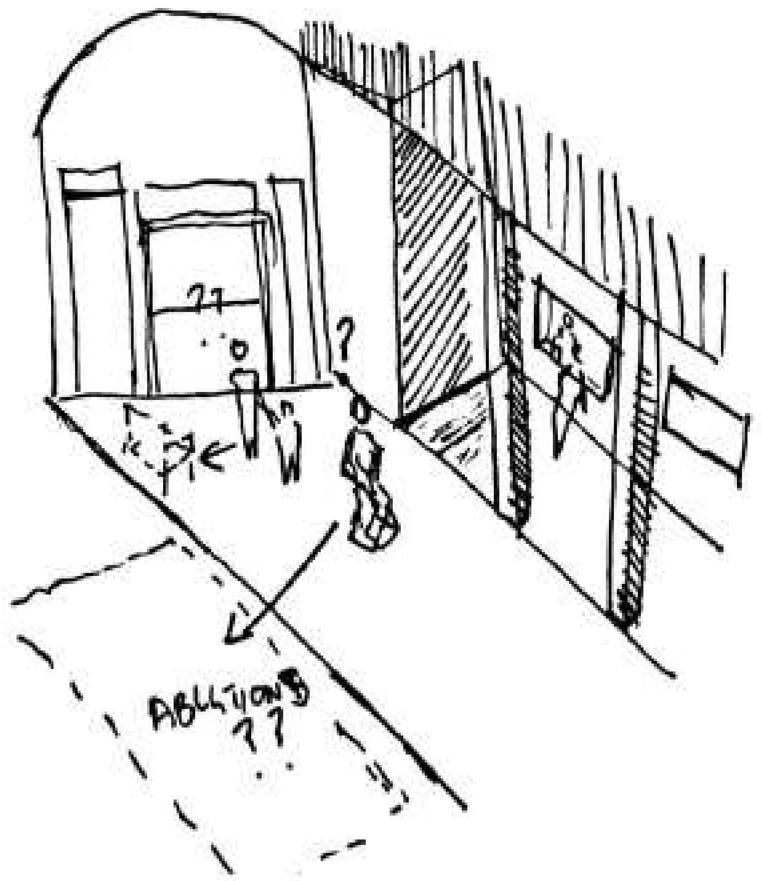


Conceptual Framework

PASSENGER RAIL AGENCY
OF SOUTH AFRICA

PRASA



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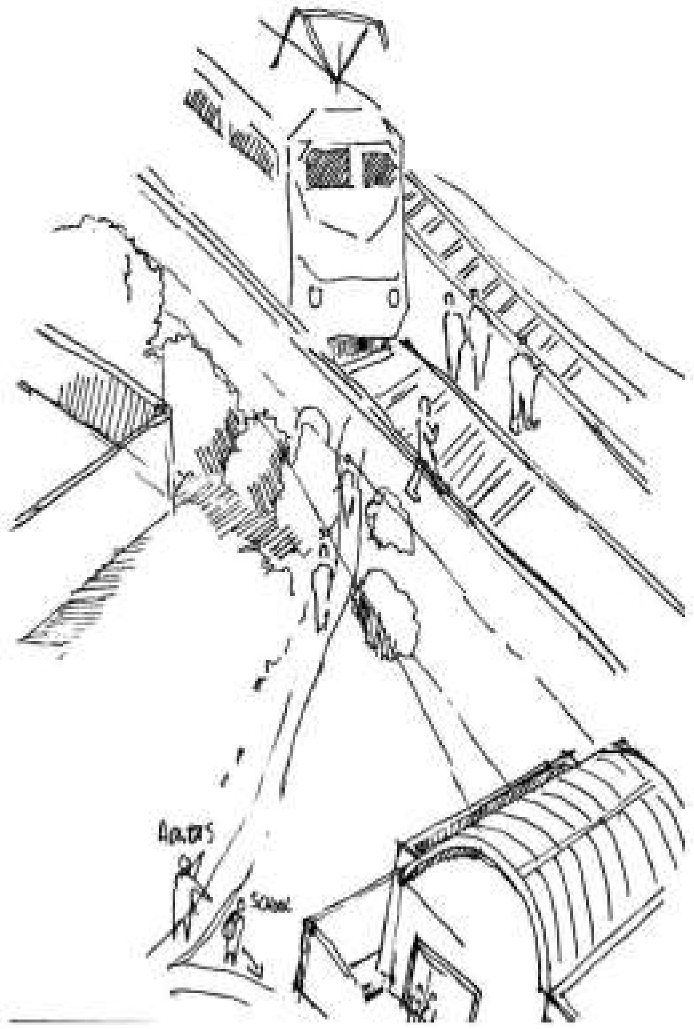

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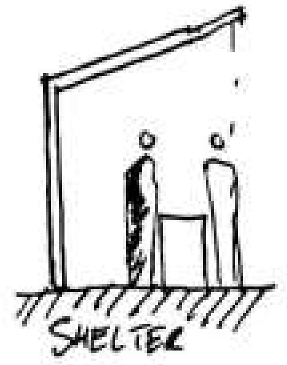

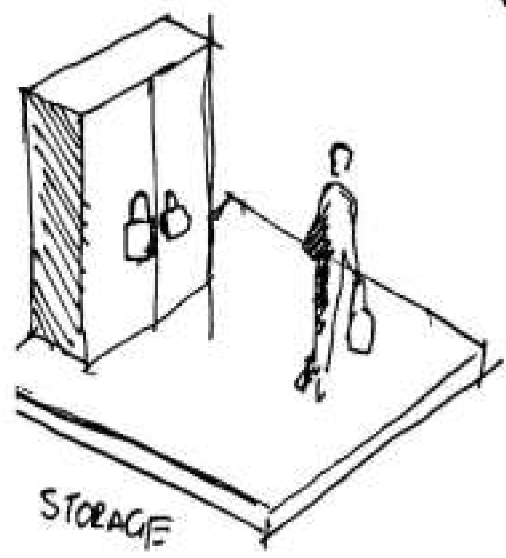

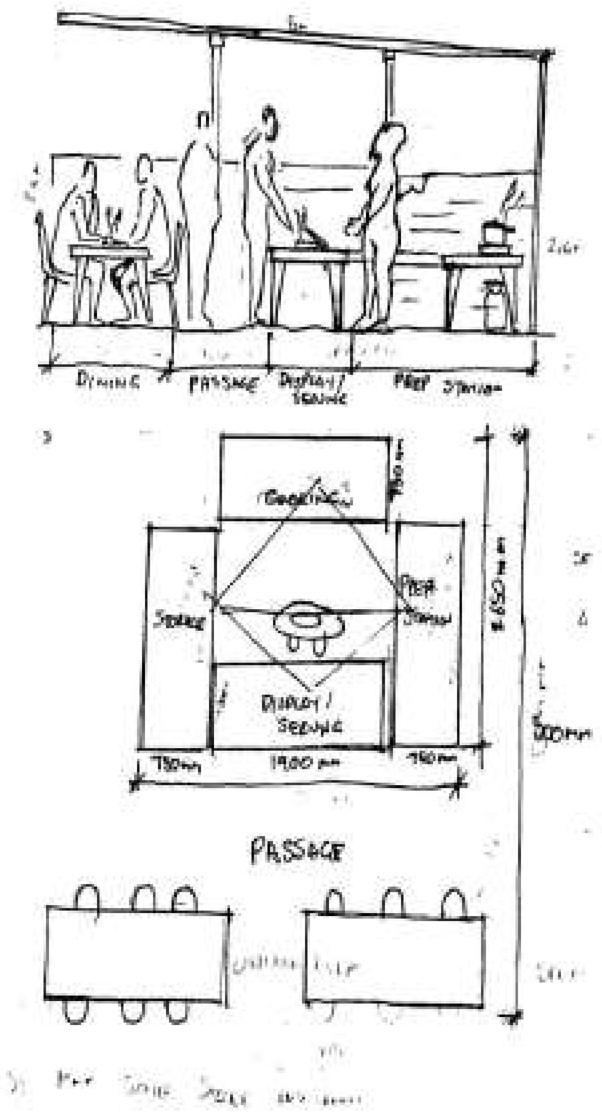

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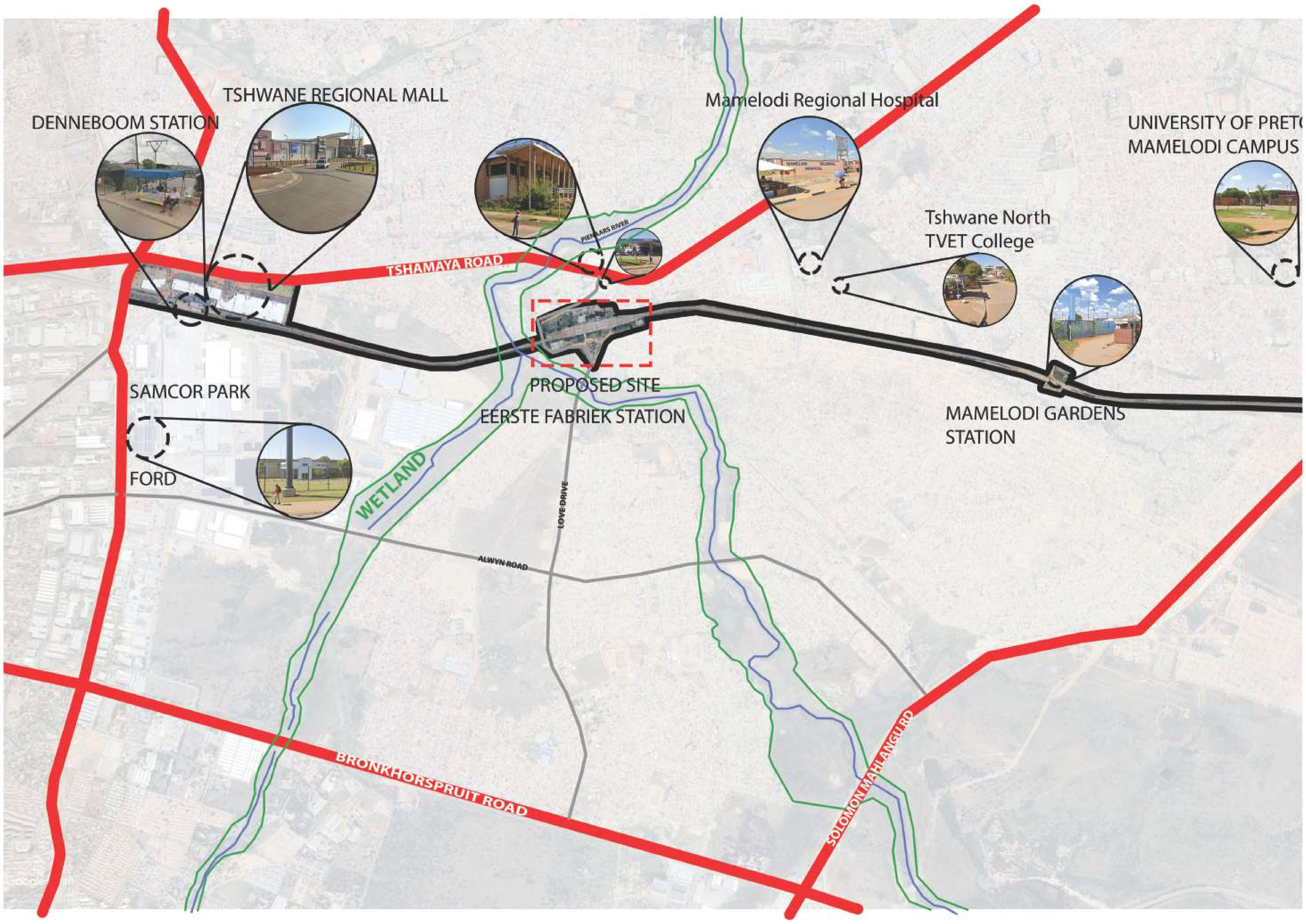
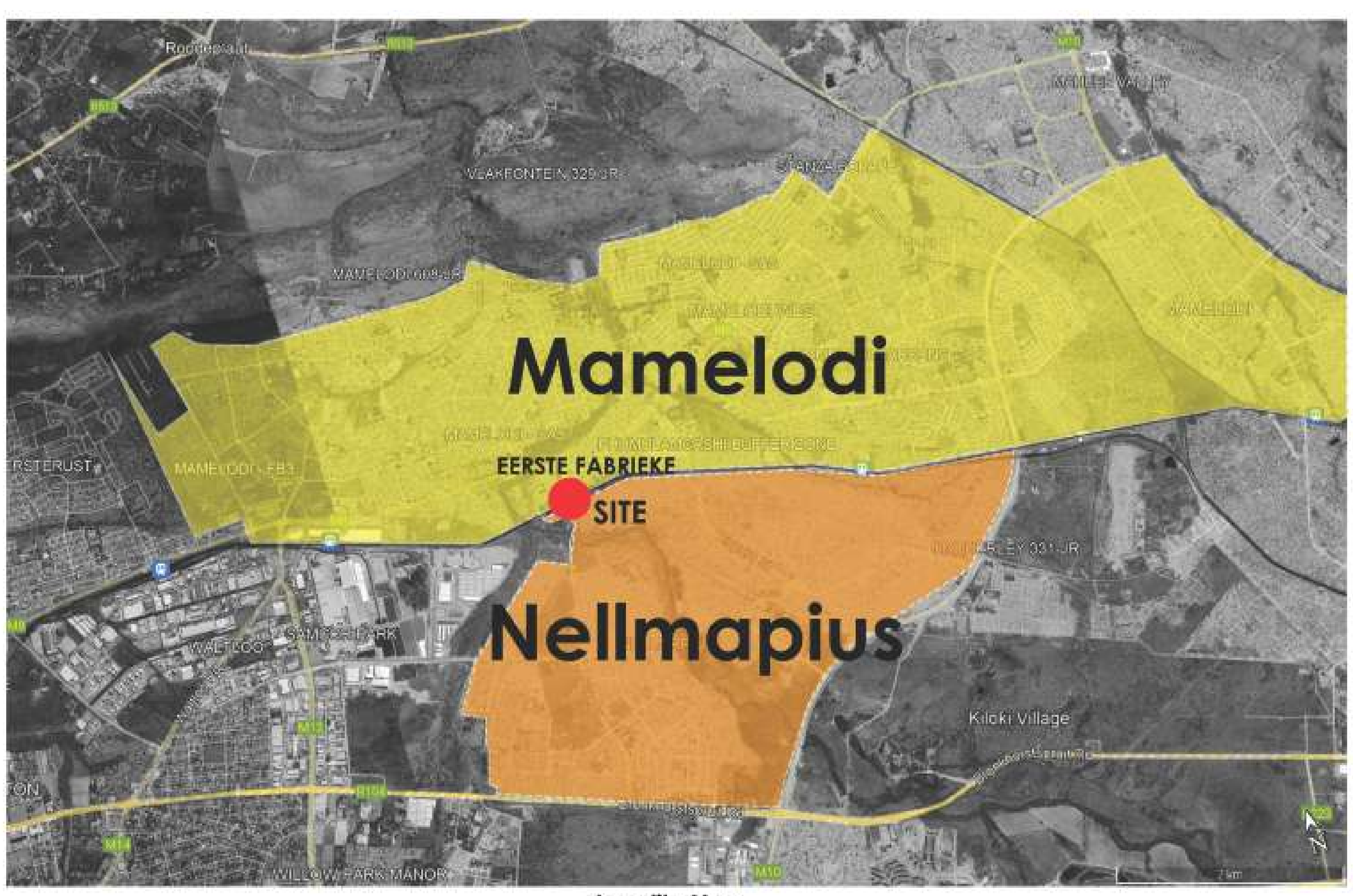
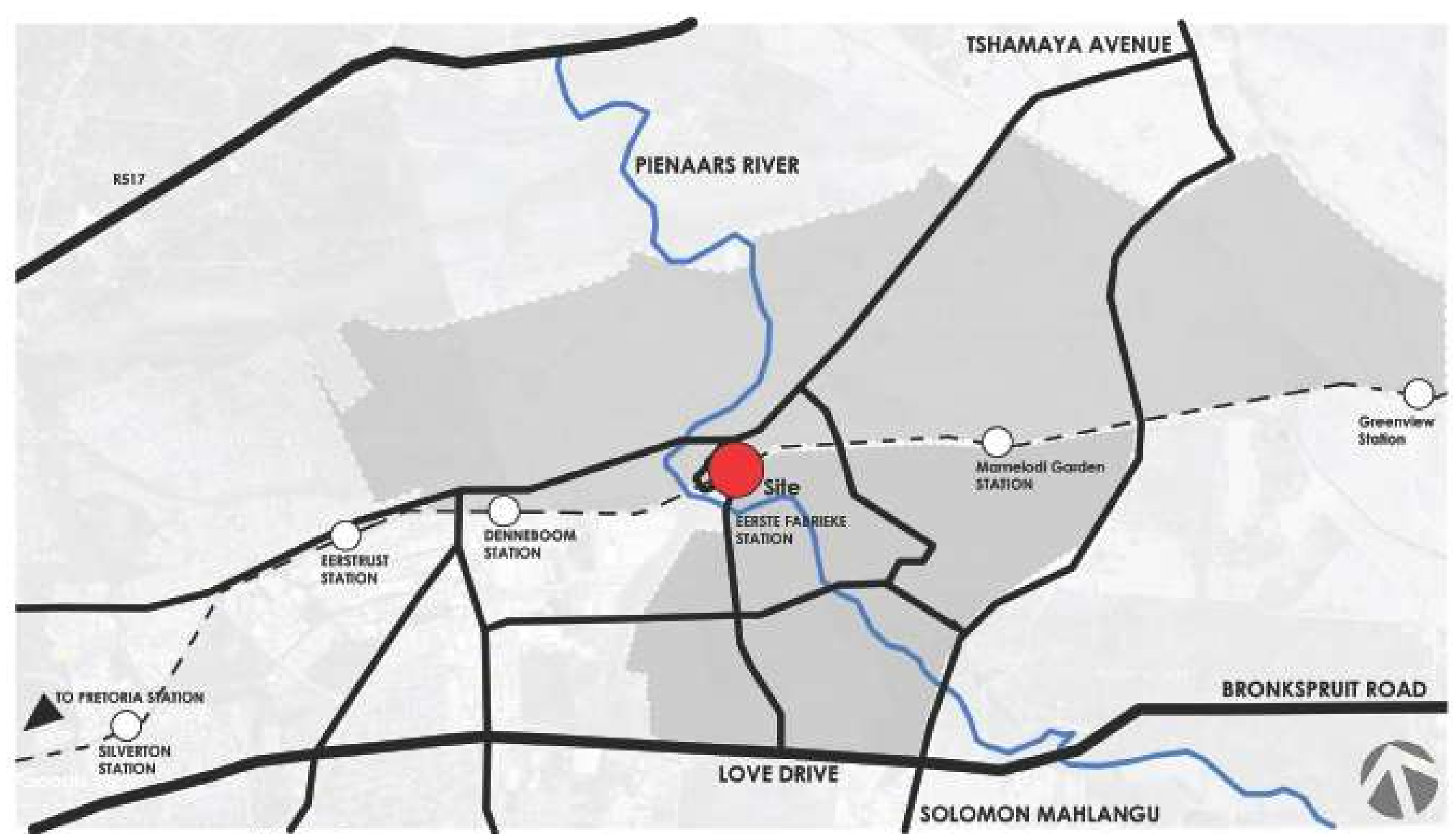


LANDMARKS

The Proposed site is located at the eerste fabriek station, Located at the east mamelodi , Pretoria along the Tshamaya Road . the train station borders Mamelodi in the Tskane region and Nellmapius . the station seperates the two region . The site is also located near the pienaars river which has a major impact on the surround informal settlment found near the site. Some important landmark around our site are the Denneboom station which now also houses the Tshwane regional mall, which was original meant to be built at the Eerste Fabriek Station . Samcor Park and the Ford Manufacturing plant, which is large scale industrial zone , which creates job opportunities for the people of Mamelodi and Nellmapius. The abandoned Tskane Magriastrate Court, which was hijacked by the construction Mafia and left to decoy since 2014. Mamelodi Regional Hospital locate 1km away from the proposed site which services people of Mamelodi. There are two Large Education faculities in close promixity to the proposed Site , which is Tshwane North TVET College and University of Pretoria Mamelodi Campus

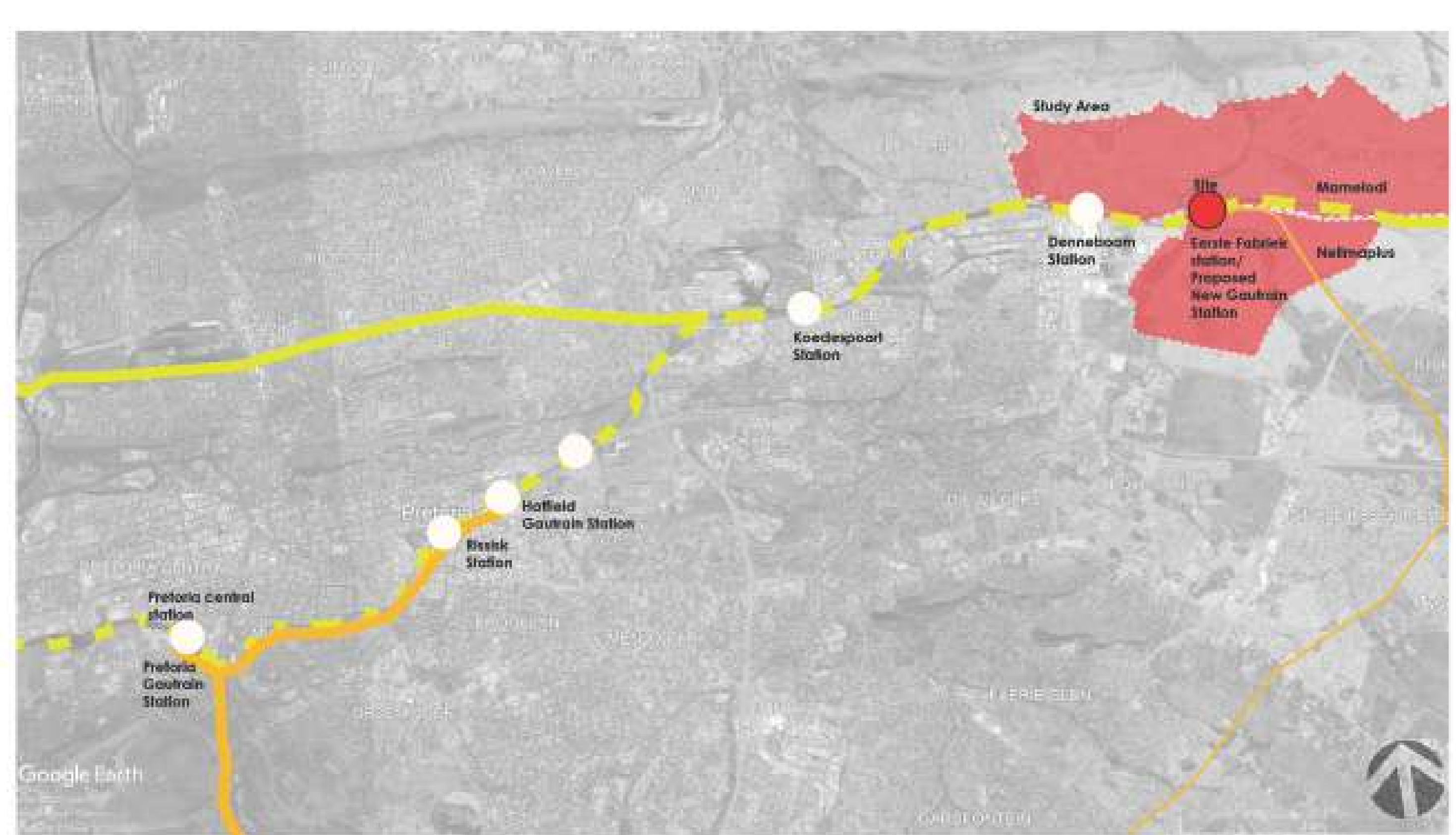


Locality Map



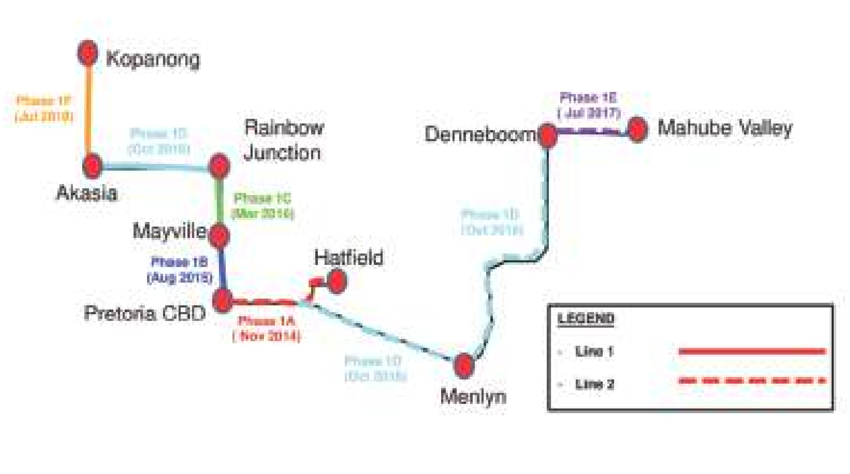
ROADS

The are few key routes thath the proposed Site located near , which the Larger Provincial Roads being, to the south Bronkspruit road, to the south east Solomon Mahlangu and R517 to the North . Main Roads being Love drive that leads directionly to the site and Tshamaya Road which is the main road of mamelodi.



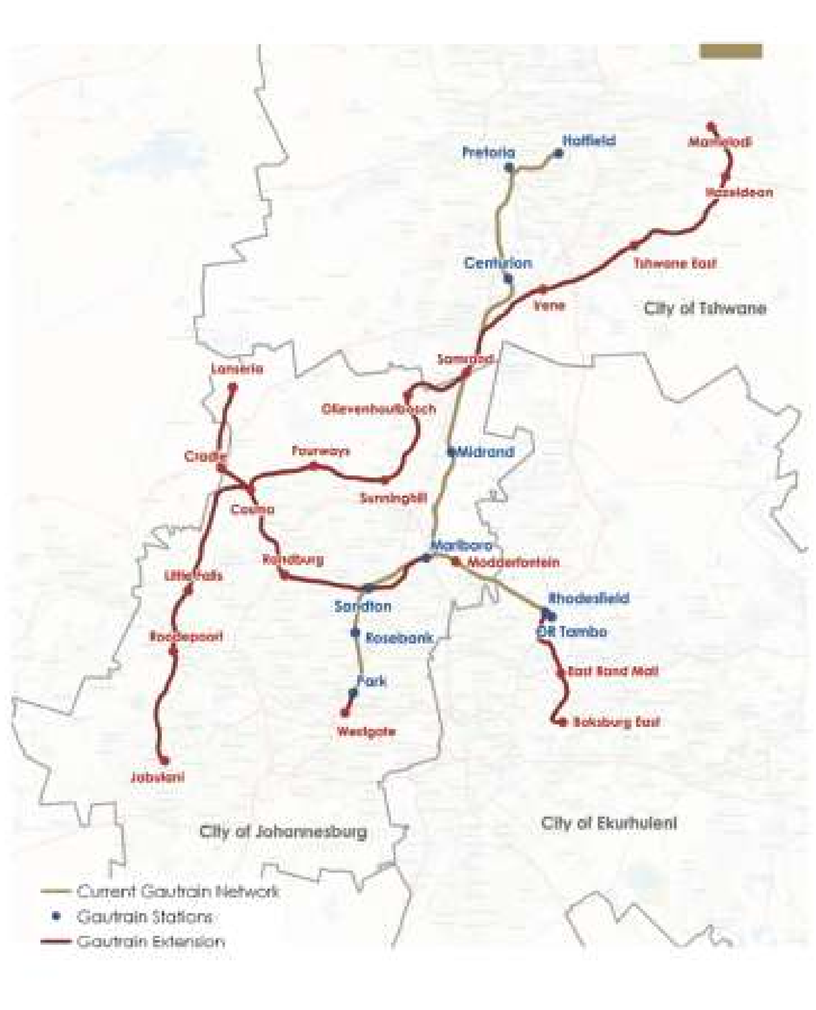
MASS TRANSPORTATION

Rail is the largest mass Transportation Model in this country, carrying over million people daily. Proposed Site falls under PRASA and is this Rail route highlighted in Yellow shows the route connecting mamelodi to the rest of the city , leading to Pretoria Central station or travelling to the North of Pretoria through Gezina. Gautrain on the other hand is rapid rail interchange which aims to connect the whole of Gauteng and provided quick and reliable transportion, with only two stations in Pretoria Central and Hatfiled , The Gautrain Management Agency iin 2010 made a statement that there plan to extend to the Gautrain line to Mamelodi with mission to connect the townships and provide reliable transportions, but the people of Mamelodi question its feasibilty as it know to be more expensive and people are already struggling to the R6 prasa Ticket.



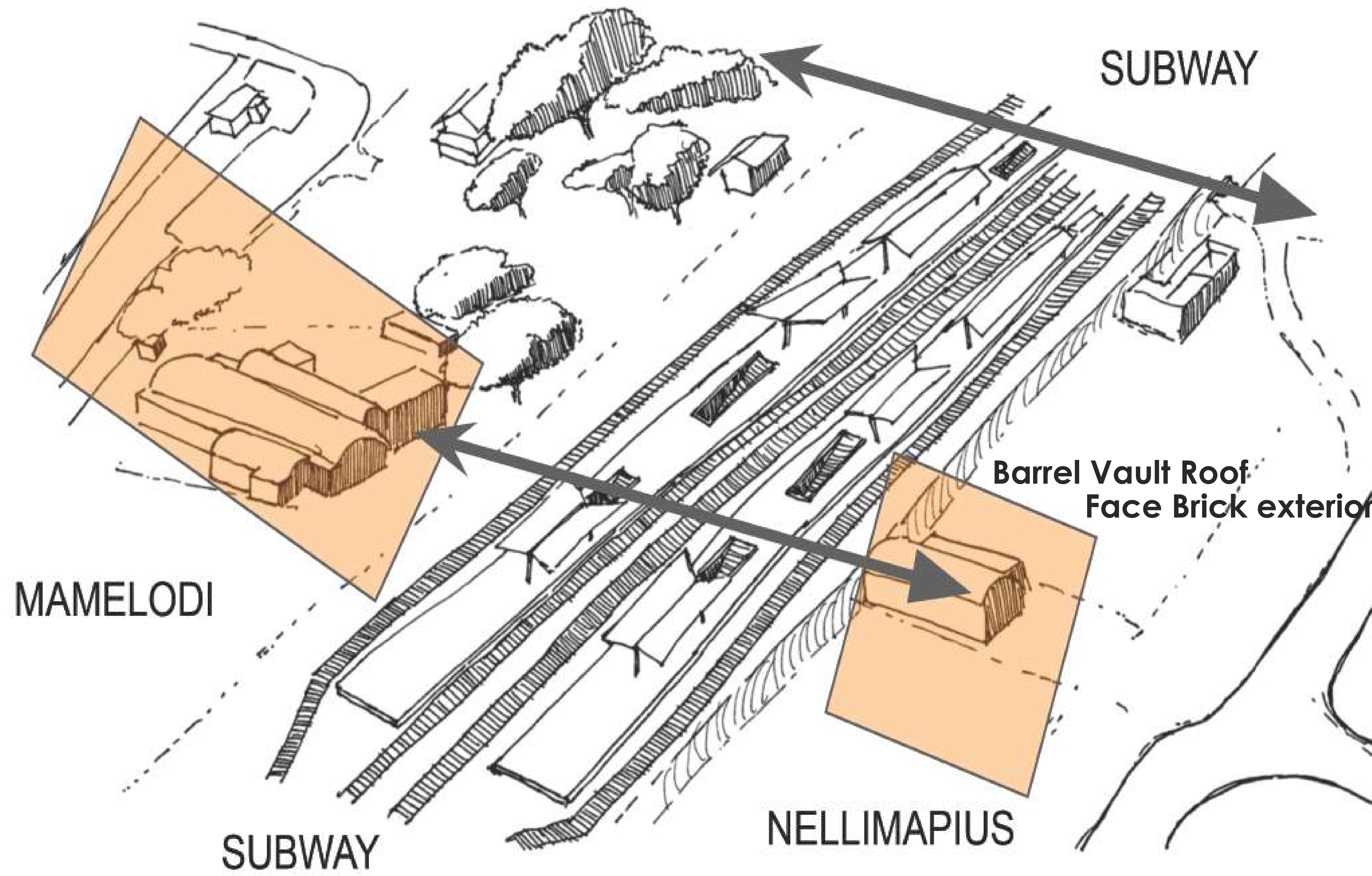
Proposed Projects

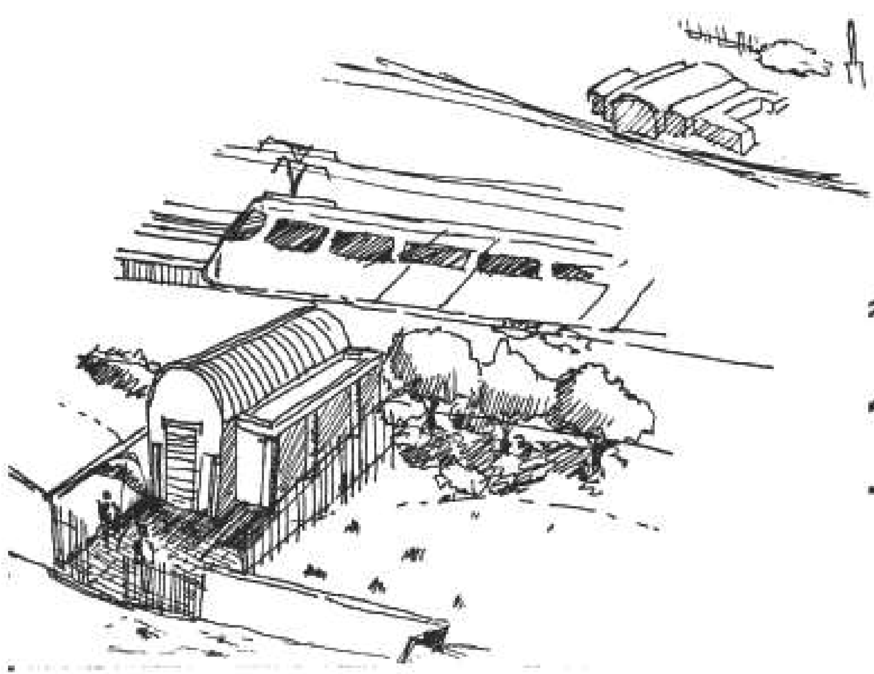
Over the years few projects aimed to connect mamelodi/ Nellmapius to the City have been proposed Like Gautrain Station at Eerste Fabriek Station, Which the Gautrain Management Agency aimed to connect more townships on their lines as means to provide more reliable transport to the townships. The BRT is a major project in Pretoria which in 2017 there where plans to Extend the line in Pretoria East and Proposed a Route from the Denneboom Station to Mahube Valley which to the Far East of Mamelodi using the Tshamaya Road to host the service and they would be stop at key points like the eerste fabriek station also making it intermodal node .

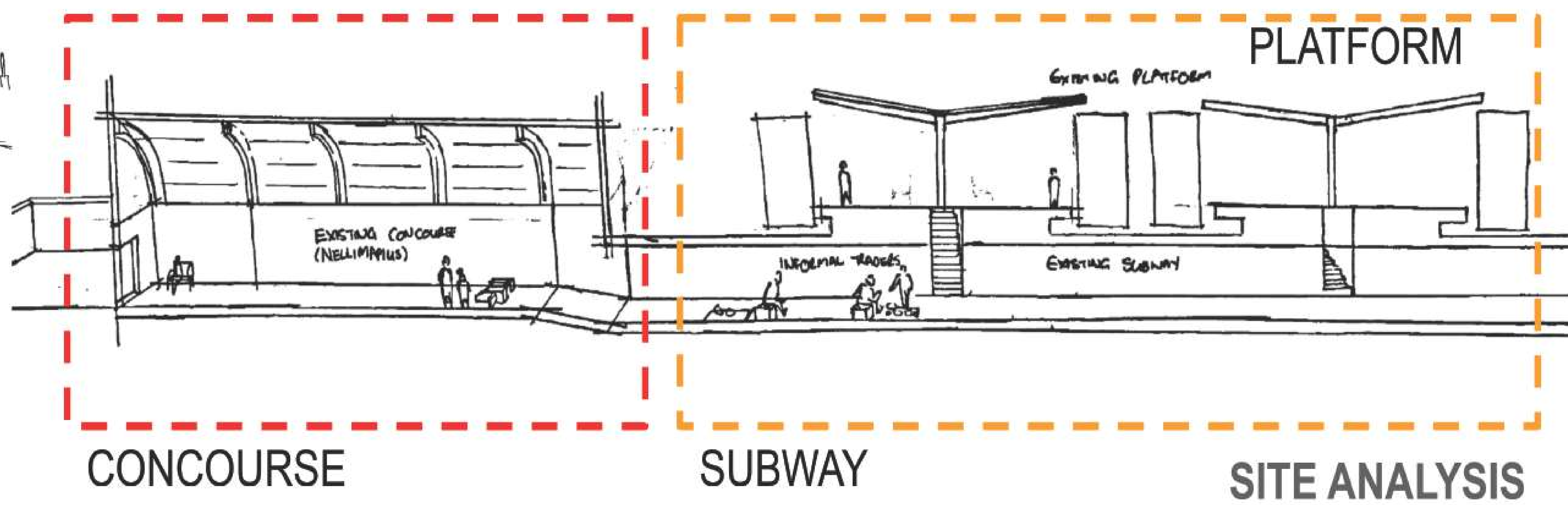


MACRO
Contextual Analysis

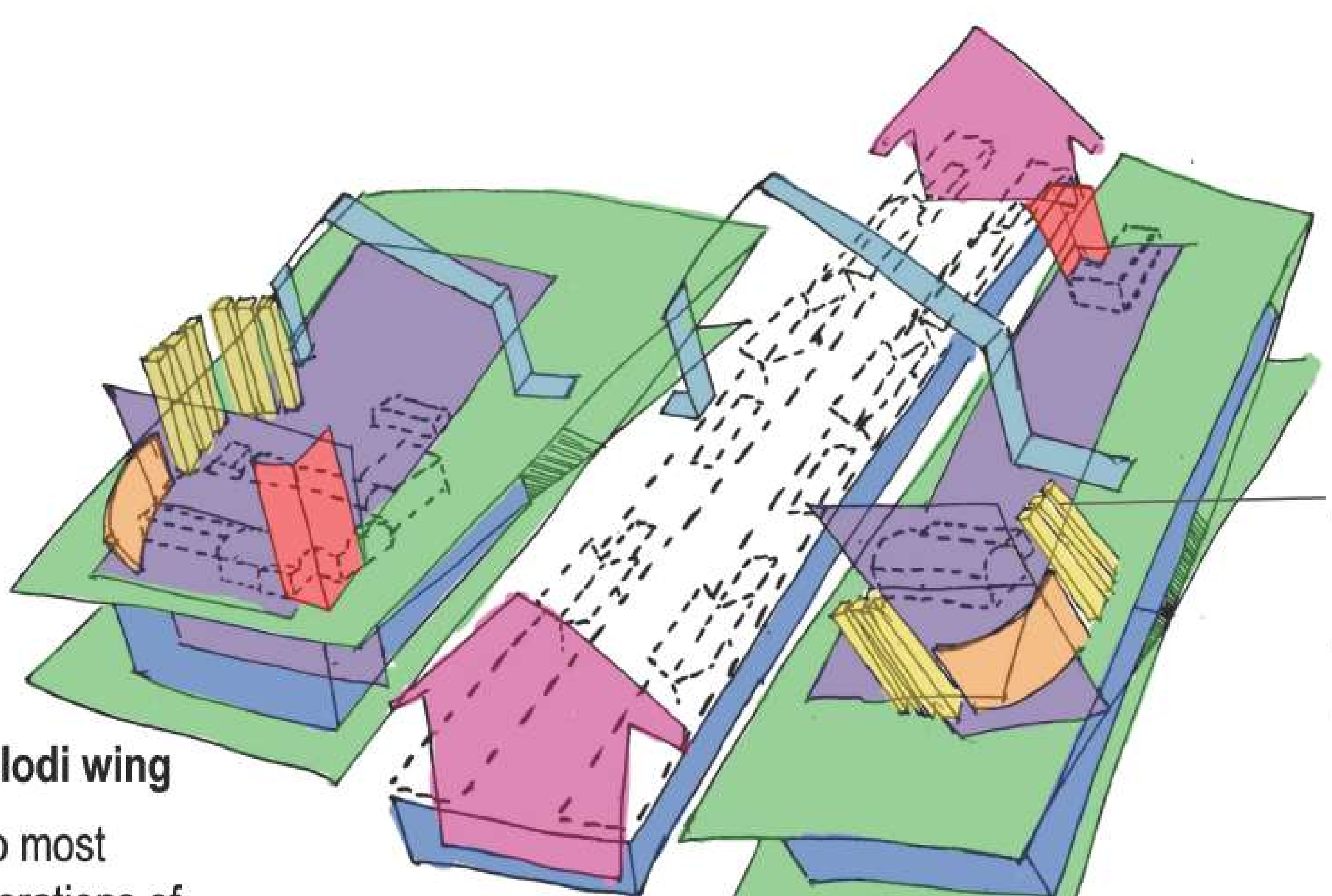
Existing Building







SITE ANALYSIS

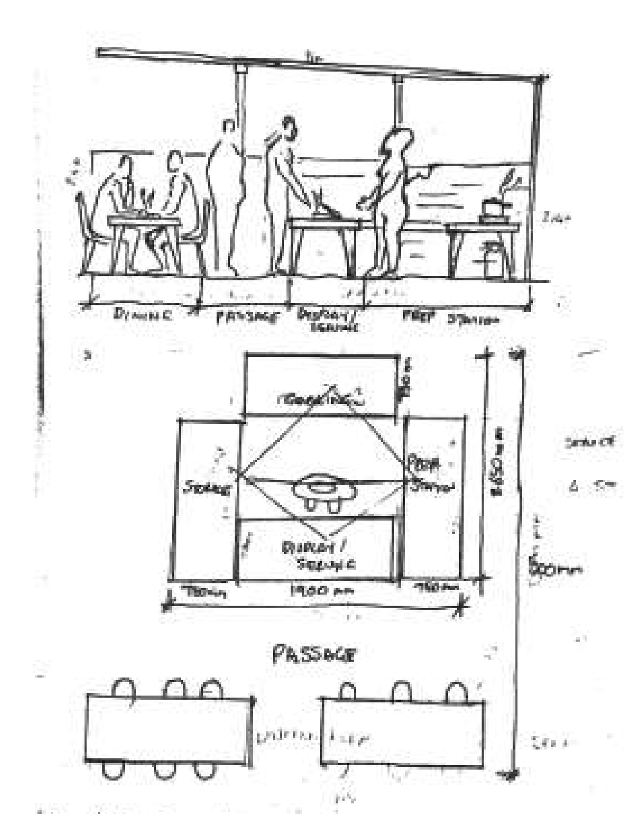


Interior road
That is open to public connecting the two informal settlements

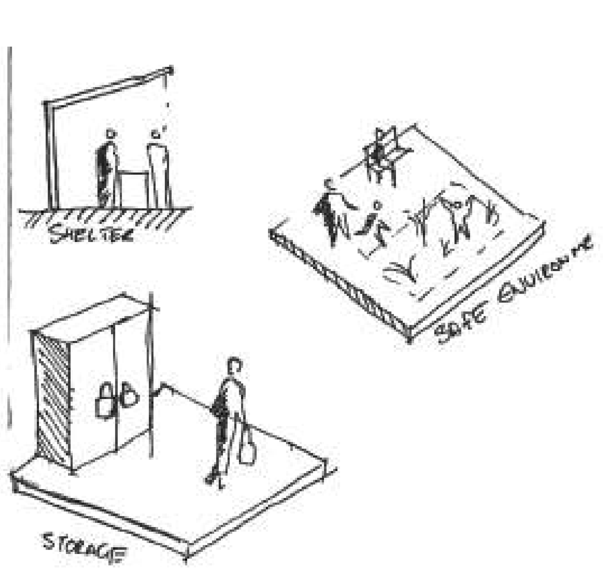
Mamelodi wing
WIDER to most Of the operations of the station and to house other essential services

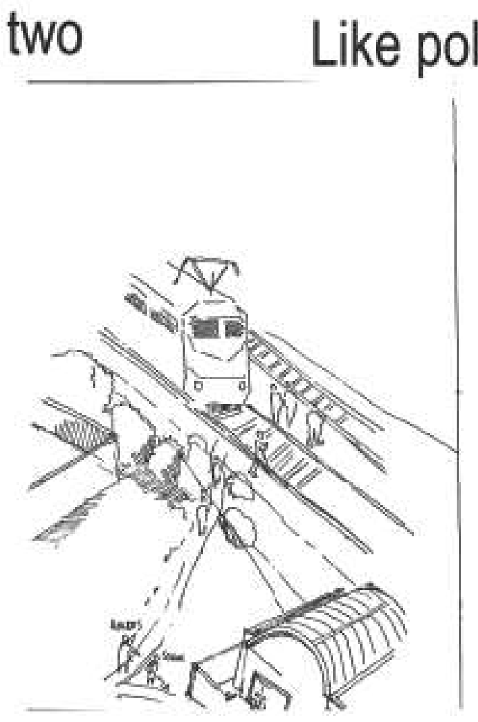
Platform
Renovate platform and Anchor stores on top as bridge to connect the two

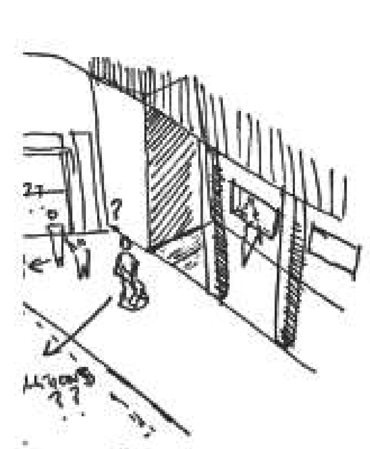
Nellmapius wing
Long and Narrower
To house most the retail services
And some of the essential services
Like police station and ECD Center



DESIGN INTENTION







Design Concept

Design Informants

Neighbourhood Impression


barbershop


Salon


Fill station


SPAZA shop


Public Ablution


scrap yard

The Neighbourhood has a very unique Identity, populated with majority single level buildings, painted brick and mural as signage for their shopfronts.

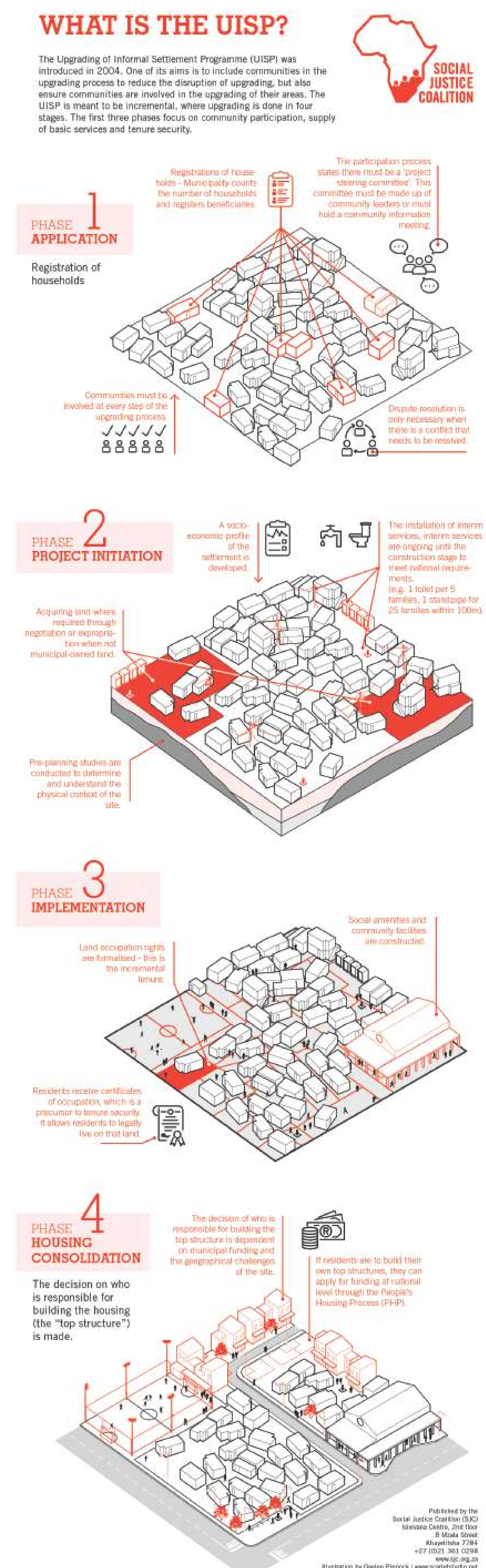
Characteristic of the hand painted is an important character identified within this context and should be adopted in the train station design.

Open green space in front of public buildings like the train station and the filling station


Informal Settlement

URBAN BLOCK VISON

UISP



Site Analysis

Surveillance + Visibility
a. Physical
1. Are all public spaces overlooked from surrounding buildings, so as to offer surveillance opportunities along routes and open spaces (VPUU, 2016)?
2. Are the entrances to buildings easily visible and recognizable?
    a. Are there controlled entrance opportunities located every 7-9m (Al-Saaidy, 2022, 1275)?
3. Does the development ensure that there are no 'inactive frontages' such as blank walls, hidden corners or dense vegetation? (VPUU, 2016) (Al-Saaidy, 2022: 1265) Is the transitional edge (between public and private) a soft edge (active, permeable, social) not a hard edge (blank, impermeable, inactive) (Gehl 1987, Gehl & Gemzoe 1996)? /accommodate social activities?
    a. Is the facade transparency around 63% (Al-Saaidy, 2022, 1275)?
4. does lighting meet minimum standards to contribute to the legibility of routes at night (VPUU, 2016)? SABS 098 Part 1&2 SANS 10114, SANS 10400 Part O.
5. Is the building below 5 storeys (ideal being max 3 storeys) to allow for street visibility and social interaction, whilst still containing elements that are visible from a distance (12m is visible from 24 km away) (Remali, 2014:344) (Al-Saaidy, 2022)?
6. Have you implemented a smallness or neighbourhood scale to your project? (smallness brings about a sense of identity, ownership, user interaction and area of surveillance and proprietorship and therefore safety). (Newman, 1996: 44)

b. Intention (Perceived Safety)
1. Is there good passive surveillance opportunities along building edges and pedestrian movement routes?
2. Have activity nodes, that attract user activity throughout the entire day, been incorporated into the public space with sufficient means of passive surveillance or observation (e.g. play areas for kids with benches for adults to supervise)? (Newman, 1996: 71)
3. Are the proposed circulation routes in line with current pedestrian desire lines, while also providing sufficient opportunities for rest, accessible to all users? (Newman, 1996: 68).

Owned Spaces (territory)
Physical
1. Has the development created a clear hierarchy of spaces into public, semi-public and private spaces, so as to clearly define the differences thereof to the user (VPUU, 2016)?
2. Do buildings have 'owned spaces' to mark the transition between public and private spaces such as porches, verandas, changes in levels, street furniture (VPUU, 2016)?
3. Are public, semi-public, and private spaces designed in such a way to allow the user to exercise some measure of ownership/control over it, as to create a sense of defensible space and encourage community building (Newman, 1996: 75)?
4. Does the intervention have a public sidewalk adjacent to the street, acting as a transitional threshold into the site (Al-Saaidy, 2022: 1265)?

Intention (Perceived Safety)
1. Are there mechanisms in place that provide surveilled thresholds into the site, so as to make the user aware.
2. Is the intervention designed in such a way so as to not exasperate possible power imbalances that might exist in the physical implementation of the desired programmes?
3. Have you implemented a smallness or neighborhood scale to your project? (smallness brings about a sense of identity, ownership, user interaction and area of surveillance and proprietorship and therefore safety).

Defined access and safe movement
Physical
1. Is the access to and through public space signposted? For example, security measures and signage information, and emergency services (VPUU, 2016).
2. Are pedestrian routes well lit (VPUU, 2016)?
3. Are the pedestrian movement routes integrated within the existing wider network of moving and gathering spaces (VPUU, 2016)?
4. Are the number of circulation routes optimized so as to not provide redundant routes, thus diluting pedestrian activity, whilst still providing alternatives for escape (Newman, 1996: 68) ?
5. Are circulation routes unobstructed designed so as to include demarcated lanes reserved for specific types of circulation/activities? eg. Waiting/walking/running/biking
6. Have you made provision for emergency vehicle access? (This includes entry portals made available from arterial roads - these roads must be located on the border to ensure outsider wayfinding into the project area) (Newman, 1996: 44)?

Intention (Perceived Safety)
1. No visual connections to neglected/unprogrammed/unkempt spaces to exist along movement routes (Vacant sites add to the perceived lack of safety) (GEHL, 2010).

Image and Aesthetics
Physical
1. Does the development use consistent (non-identical) design language with regards to the choice of street furniture, signage, lighting, materials, and building forms; this will help the user orientate themselves within the development (VPUU, 2016)?
2. Is there provision made for protected areas from harsh climatic events?

Intention (Perceived Safety)
1. Has public art been incorporated into the design, creating a sense of community ownership and pride?
2. Are visual connections to surrounding buildings and lots mitigated successfully as to minimize visual exposure to damaged and vandalized buildings and lots?
3. Is the building reflecting a certain culture of inclusion through materials and design? e.g.. different demographics/cultures

Maintenance and Management
Physical
1. Do the materials used allow for minimal maintenance requirements, decreasing the chance of a building becoming unkempt and derelict?
2. Are the materials used easily sourced and locally available, allowing for an easy maintenance process?
3. Does the intervention comply with SANS fire regulations and requirement, Part T?

Physical Barriers
Physical
1. Has target hardening strategies been implemented successfully so as to not alienate the public from what's happening inside? For example, are the fences surrounding buildings or public open spaces such that one can see through them?
2. Have you got few entrances to deter illicit activities (this limits escape opportunities). (Newman, 1996: 41)

Intention (Perceived Safety)
1. Are these physical barriers designed in such a way so as to not echo the segregation and exclusionary practices of the Apartheid regime?

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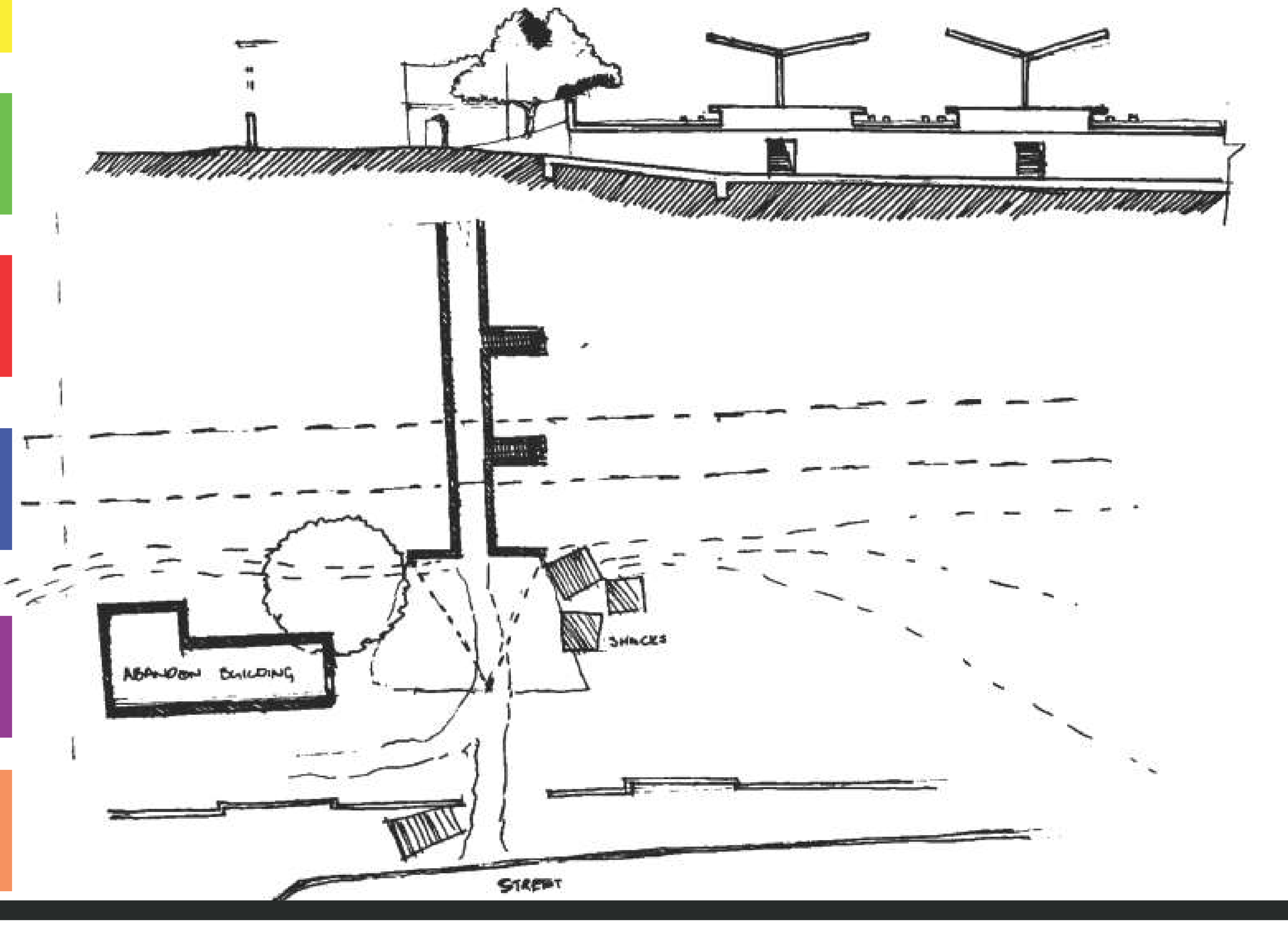
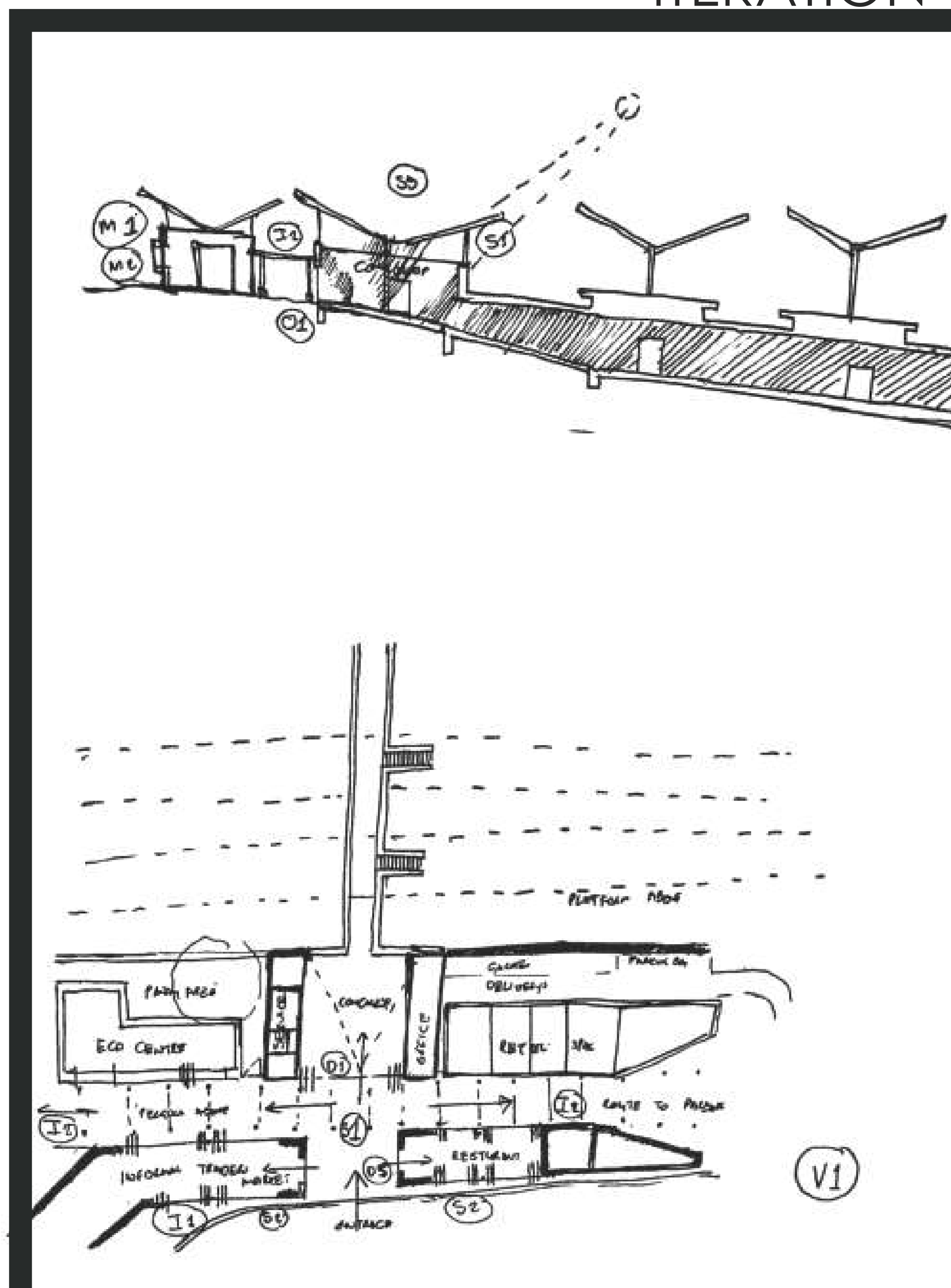


Base Case

ITERATION 1



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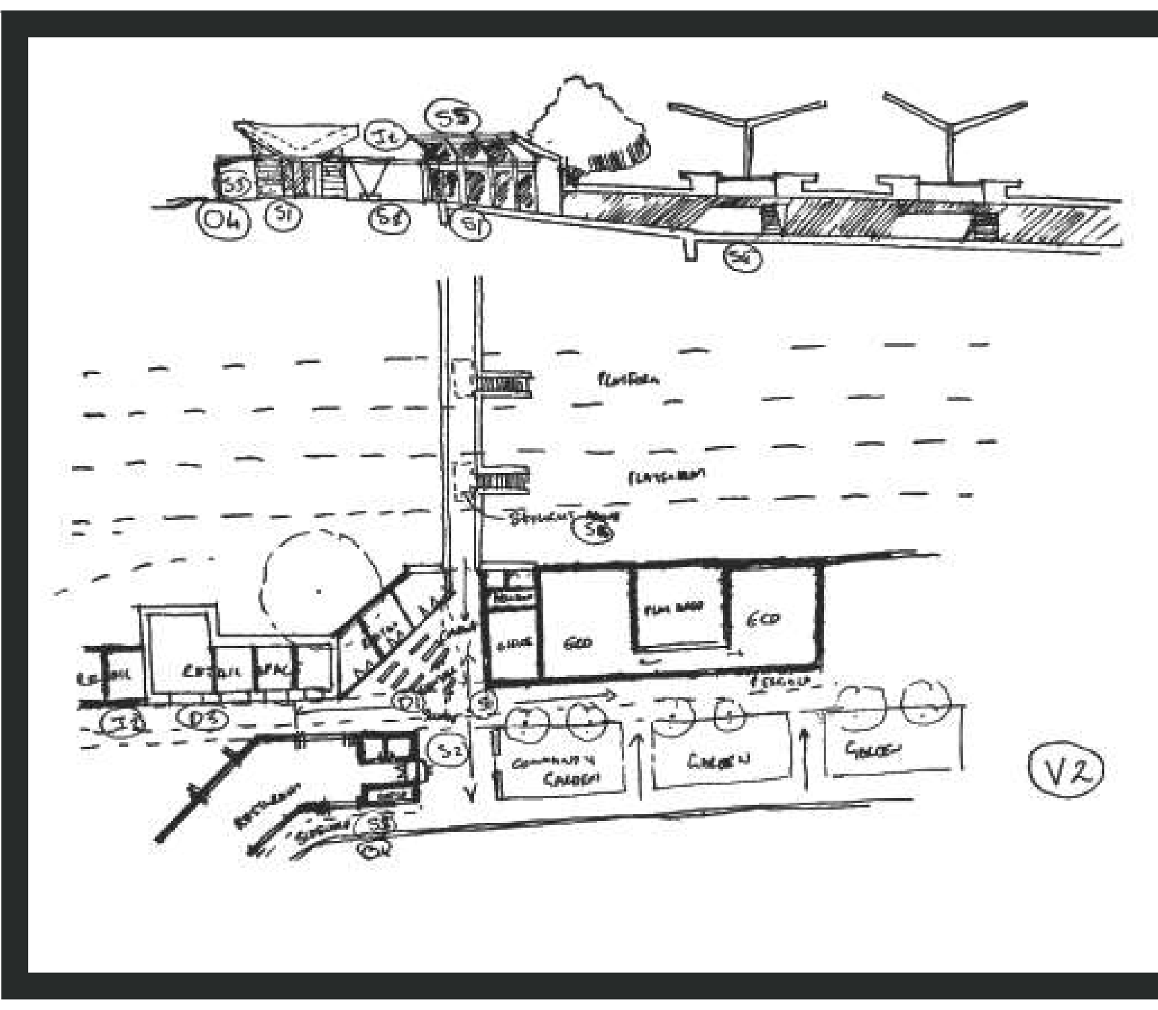
ITERATION 2



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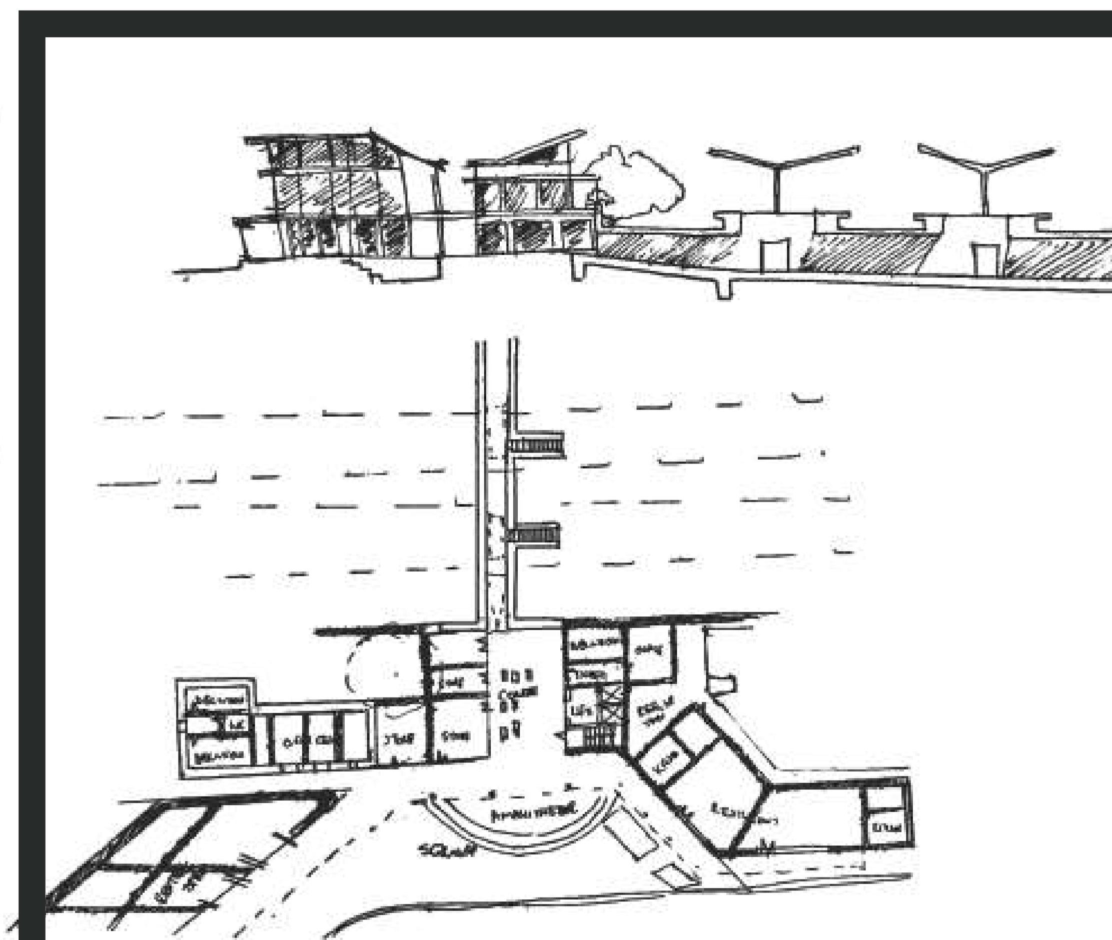
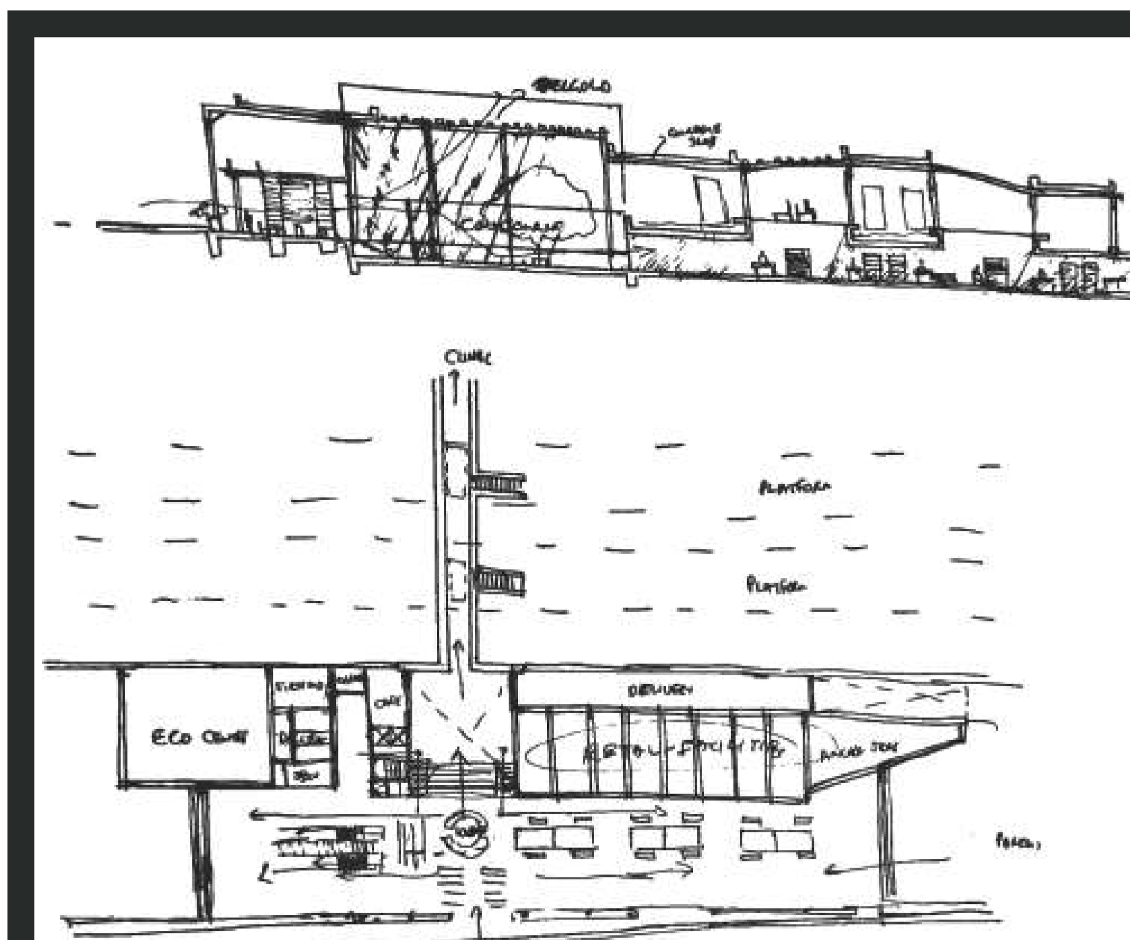




ITERATION 3

4/6 2/4 4/6 1/2 3/3 2/3

ITERATION 4

5/6 3/4 4/6 2/2 3/3 2/2

SAFETY
DESIGN PERFOMANCE

Architecture for People: Design for Social Inclusion the Eerste Fabriek

Criteria

Surveillance + Visibility	
a. Physical 1. Are all public spaces overlooked from surrounding buildings, so as to offer surveillance opportunities along routes and open spaces (VPUU, 2016)? 2. Are the entrances to buildings easily visible and recognizable? a. Are there controlled entrance opportunities located every 7-9m (Al-Saaidy, 2022, 1275)? 3. Does the development ensure that there are no 'inactive frontages' such as blank walls, hidden corners or dense vegetation? (VPUU, 2016) (Al-Saaidy, 2022: 1265) Is the transitional edge (between public and private) a soft edge (active, permeable, social) not a hard edge (blank, impermeable, inactive) (Gehl 1987, Gehl & Gemzoe 1996)? /accommodate social activities? a. Is the facade transparency around 63% (Al-Saaidy, 2022, 1275)? 4. does lighting meet minimum standards to contribute to the legibility of routes at night (VPUU, 2016)? SABS 098 Part 1&2 SANS 10114, SANS 10400 Part O 5. Is the building below 5 storeys (ideal being max 3 storeys) to allow for street visibility and social interaction, whilst still containing elements that are visible from a distance (12m is visible from 24 km away) (Remali, 2014:344) (Al-Saaidy, 2022)? 6. Have you implemented a smallness or neighbourhood scale to your project? (smallness brings about a sense of identity, ownership, user interaction and area of surveillance and proprietorship and therefore safety). (Newman, 1996: 44)	**YES ALL IS ACHIEVED**
b. Intention (Perceived Safety) 1. Is there good passive surveillance opportunities along building edges and pedestrian movement routes? 2. Have activity nodes, that attract user activity throughout the entire day, been incorporated into the public space with sufficient means of passive surveillance or observation (e.g. play areas for kids with benches for adults to supervise)? (Newman, 1996: 71) 3. Are the proposed circulation routes in line with current pedestrian desire lines, while also providing sufficient opportunities for rest, accessible to all users? (Newman, 1996: 68).	**6/6**

Owned Spaces (territory)	
Physical 1. Has the development created a clear hierarchy of spaces into public, semi-public and private spaces, so as to clearly define the differences thereof to the user (VPUU, 2016)? 2. Do buildings have 'owned spaces' to mark the transition between public and private spaces such as porches, verandas, changes in levels, street furniture (VPUU, 2016)? 3. Are public, semi-public, and private spaces designed in such a way to allow the user to exercise some measure of ownership/control over it, as to create a sense of defensible space and encourage community building (Newman, 1996: 75)? 4. Does the intervention have a public sidewalk adjacent to the street, acting as a transitional threshold into the site (Al-Saaidy, 2022: 1265)?	**YES ALL IS ACHIEVED**
Intention (Perceived Safety) 1. Are there mechanisms in place that provide surveilled thresholds into the site, so as to make the user aware. 2. Is the intervention designed in such a way so as to not exasperate possible power imbalances that might exist in the physical implementation of the desired programmes? 3. Have you implemented a smallness or neighborhood scale to your project? (smallness brings about a sense of identity, ownership, user interaction and area of surveillance and proprietorship and therefore safety).	**4/4**

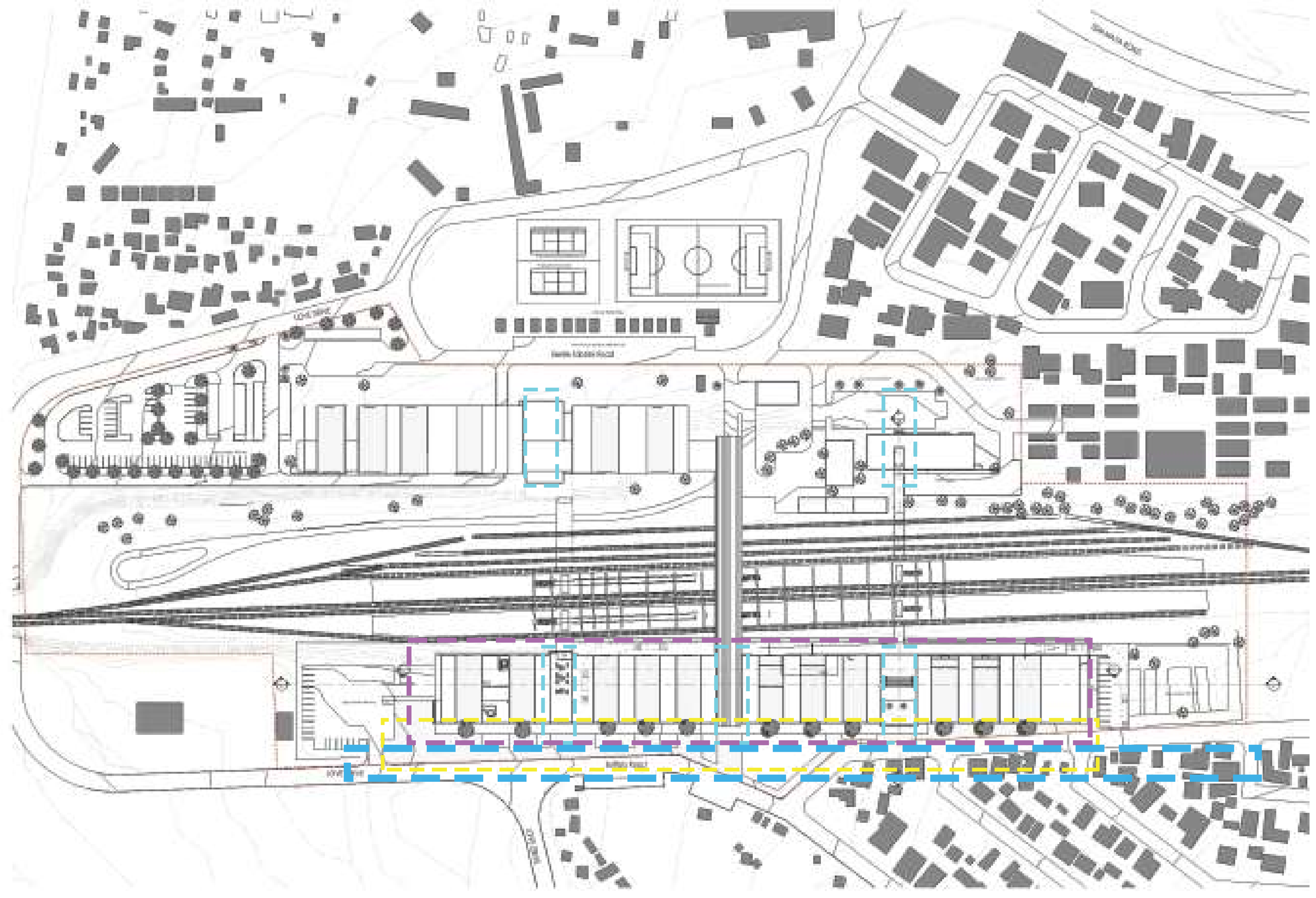
Defined access and safe movement	
Physical	
1. Is the access to and through public space signposted? For example, security measures and signage information, and emergency services (VPUU, 2016).	**NO**
2. Are pedestrian routes well lit (VPUU, 2016)? 3. Are the pedestrian movement routes integrated within the existing wider network of moving and gathering spaces (VPUU, 2016)?	**YES**
4. Are the number of circulation routes optimized so as to not provide redundant routes, thus diluting pedestrian activity, whilst still providing alternatives for escape (Newman, 1996: 68) ?	**YES**
5. Are circulation routes unobstructed designed so as to include demarcated lanes reserved for specific types of circulation/activities? eg. Waiting/walking/running/biking	**NO**
6. Have you made provision for emergency vehicle access? (This includes entry portals made available from arterial roads - these roads must be located on the border to ensure outsider wayfinding into the project area) (Newman, 1996: 44)?	
Intention (Perceived Safety) 1. No visual connections to neglected/unprogrammed/unkempt spaces to exist along movement routes (Vacant sites add to the perceived lack of safety) (GEHL, 2010).	**4/6**

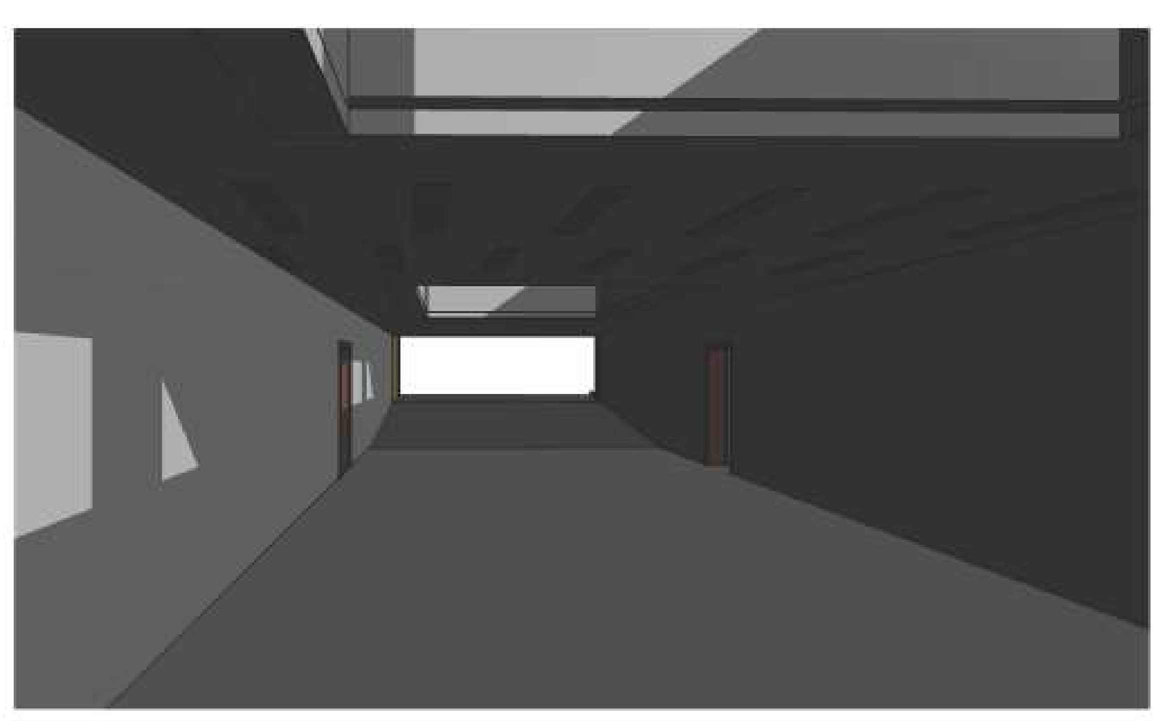
Image and Aesthetics	
Physical	
1. Does the development use consistent (non-identical) design language with regards to the choice of street furniture, signage, lighting, materials, and building forms; this will help the user orientate themselves within the development (VPUU, 2016)?	**Yes**
2. Is there provision made for protected areas from harsh climatic events?	**Yes**
Intention (Perceived Safety) 1. Has public art been incorporated into the design, creating a sense of community ownership and pride? 2. Are visual connections to surrounding buildings and lots mitigated successfully as to minimize visual exposure to damaged and vandalized buildings and lots? 3. Is the building reflecting a certain culture of inclusion through materials and design? e.g.. different demographics/cultures	**2/2**

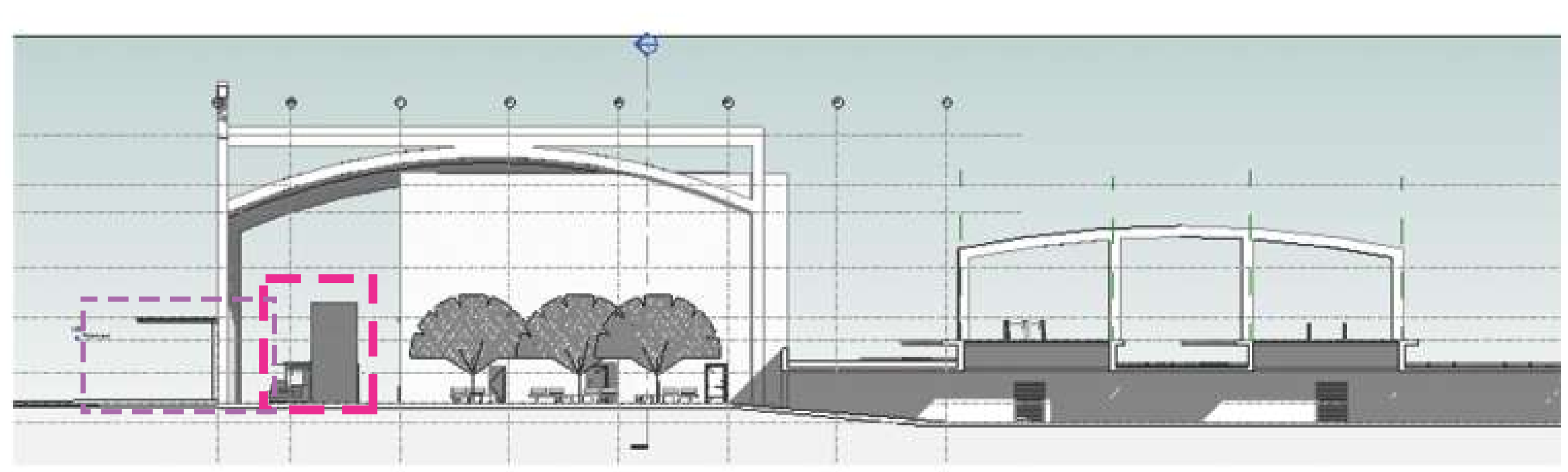
Maintenance and Management	
Physical 1. Do the materials used allow for minimal maintenance requirements, decreasing the chance of a building becoming unkempt and derelict? 2. Are the materials used easily sourced and locally available, allowing for an easy maintenance process? 3. Does the intervention comply with SANS fire regulations and requirement, Part T?	**2/3**

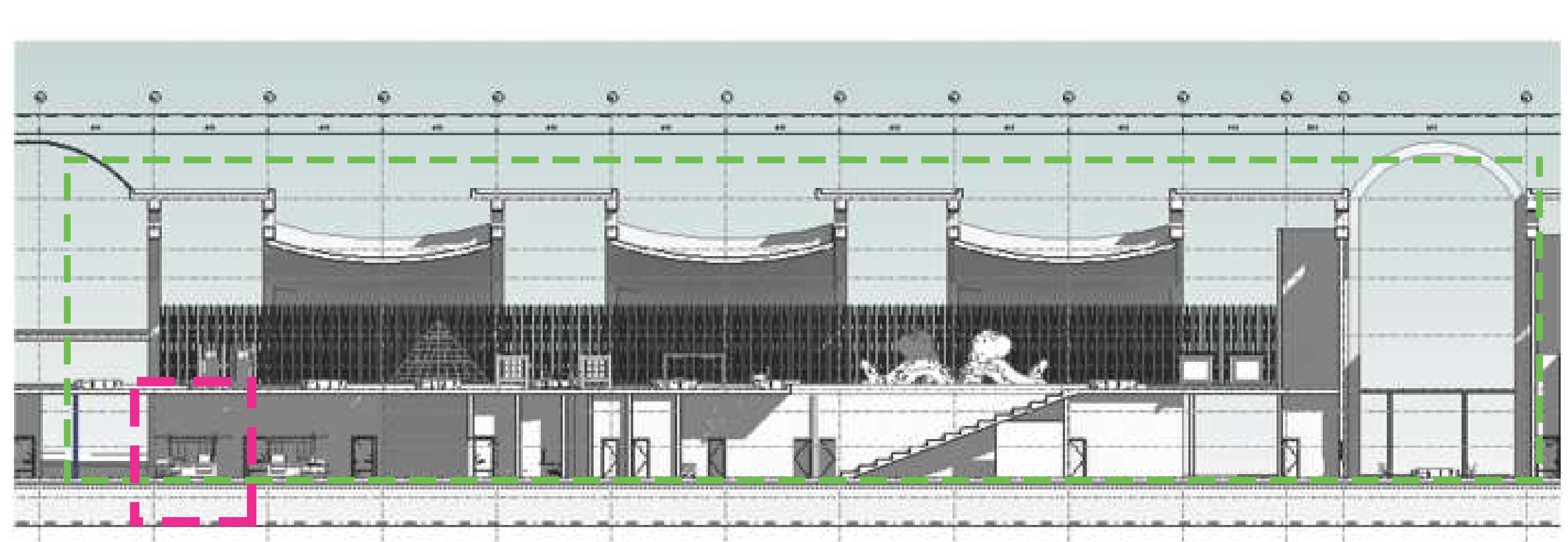
Physical Barriers	
Physical	
1. Has target hardening strategies been implemented successfully so as to not alienate the public from what's happening inside? For example, are the fences surrounding buildings or public open spaces such that one can see through them?	**YES**
2. Have you got few entrances to deter illicit activities (this limits escape opportunities). (Newman, 1996: 41)	**NO**
Intention (Perceived Safety) 1. Are these physical barriers designed in such a way so as to not echo the segregation and exclusionary practices of the Apartheid regime?	**1/2**

Design









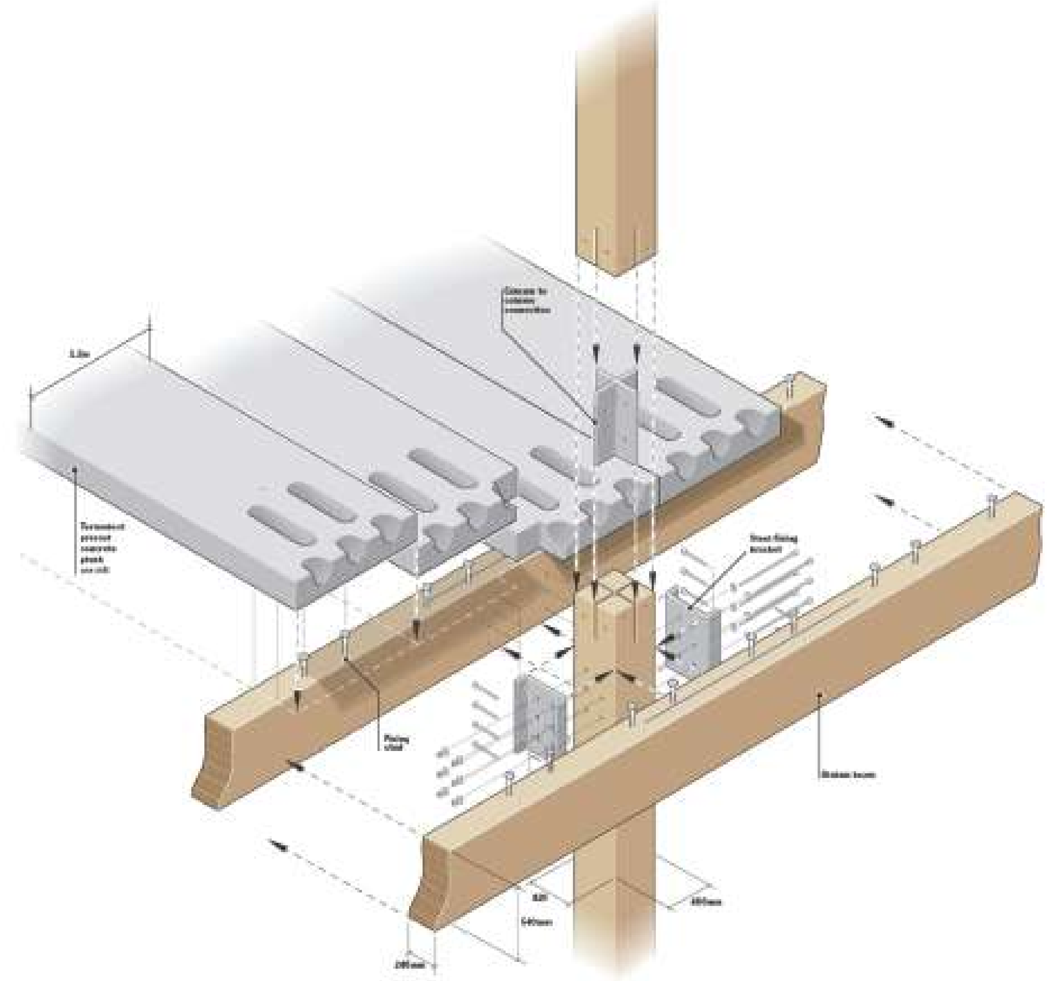
Strategy

1. Open entrances facing the street
2. Barrel Vault Roof Skylight
3. Public spaces with direct access to the street
4. Trader stalls allow space for display and storage and the rooms, givibg them a better connection with the public
5. Passive survelliance by placing trader near the circulation routes .
6.Material choice, FACE BRICK AND STEEL AND TIMBER
7.Paint mural as signage to embrace local indentity
8.Open un obstructed floor plan, so that public has access to almost all features by site
9. Rised Ceiling to allow light to enter the place
10. Cut out skylight on subway ceiling to allow light to enter the space adding to the artifical lighting in the space
11. hierarchy Low space more public, high the level more private
12. Back route for delivery and emergency vechicles, also to create a barrier between front building and platform
13. Building is 3 levels and maxium height of 13m

SAFETY

DESIGN PERFOMANCE

GLULAM TIMBER



DISADVANTAGES

Glulam has lower moisture resistance than steel and concrete, thus it is designed with larger dimension components to reduce the moisture impact. Using larger dimension products adds more cost and material. Another limitation is the difficulty of repairing if required.

it will lose its structural integrity if improperly protected. Making sure that glulam is treated with the correct finishes (varnish/stain, etc.) is crucial.

It is important to consider each repair objectively, the repair strategy will be determined by structural requirements, ease of access, proximity of connectors and fixings, and aesthetic considerations.

There are numerous methods to repair significantly decayed sections of timber including, steel reinforcement, timber-resin splices and other composite repairs.

We have found that glulam (and regular sawn timber) structures suffer more when in close proximity to trees, therefore we recommend the annual cleaning of structures in these environments.

Periodic cleaning will help remove algae and bacteria, which are the precursor to more significant fungal decay.

Rot in beams
Typically, rot attacks the ends of beams and causes localised decay around connections and fixings.The decay is usually the result of limitations associated with the design, specification or maintenance issues.

Conclusion

Timber around connections and fixings is often the first area to begin to decay, especially if not robustly maintained.
Glulam beams manufactured from durable timber species will consistently outperform glulam components reliant of preservative treatment and coatings.
Structures shaded by trees and vegetation often suffer premature decay.
Maintenance is essential – many structures are not maintenance-friendly.

ADVANTAGES

There are examples of ‘glulam’ structural components in buildings and semi-protected external structures that have survived well over 100 years. Its durability is largely dependent on the same things that determine the service life of regular sawn timber, namely the level of natural durability the specified species of timber will provide, the robustness of design detailing (especially fixings), preservative/protective coatings, maintenance and ultimately, its exposure.

Used internally, glulam should be very durable, in fact the only issues we see are caused by water ingress via the external envelope, or those caused by challenging environments such as swimming pools where issues can develop if humidity levels are not adequately managed. Problems can occur where cold bridging has facilitated condensation around the fixings between the roof structure and glulam, and where a glulam ring beam or other component is directly exposed to the external elements.

Glued Laminated Timber, commonly referred to as glulam, is an engineered timber product manufactured by gluing together short pieces of strength graded timber. These laminates, typically 45mm thick, are finger-jointed to make continuous lengths with layers of laminations then bonded to create both straight and curved beams.

Beams can be manufactured to truly impressive proportions: we have assessed the conditions of individual beams that were over 30 metres in length, 400mm wide and 1600mm deep, producing clear spans well in excess of 60M (we had to invest in another microdrill to assess these massive beams – this super long, 600mm non-destructive assessment tool now helps us to assess the biggest beams).

As a result, glulam is generally sturdier and more homogenous than large, solid softwood lumber. Moreover, since the slats are dried individually at the plant before being glued together, glulam is also more dimensionally stable than solid lumber

The first and most obvious benefit of glulam is that its main component, timber, grows out of the ground and does not need to be mined and subjected to the high energy demand manufacturing processes that steel and cement require

Glulam is often chosen over steel or concrete for its appearance, and is often credited with creating a warm and comfortable feel to a building. There are many different timber species and treatments available all with their own character that can be tailored to suit your requirements.

Large section timber elements actually perform very well in fires. This is due to the way in which timber chars at a known rate and does not deform like steel. Fire performance of glulam has been the subject of extensive research and structural glulam members can be designed to last a certain period of time in a fire based on the rate at which it chars. Additional fire protective finishes can be used to further increase the fire performance.

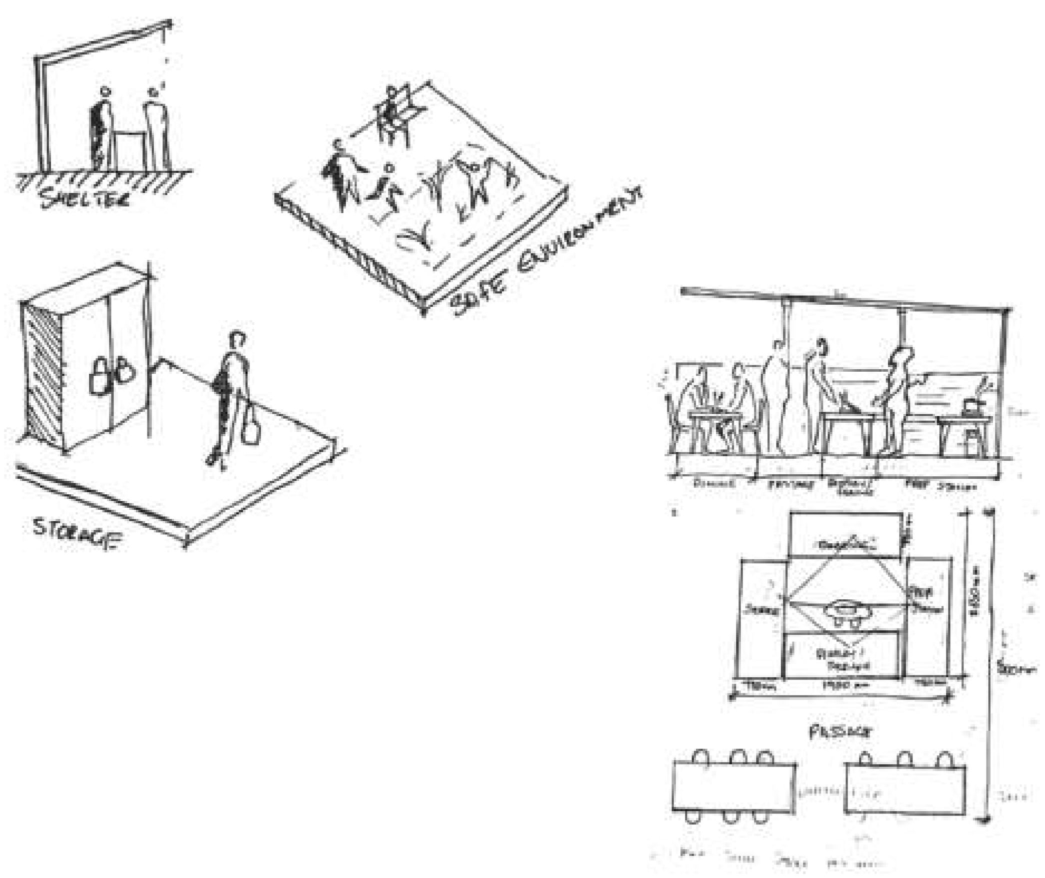
Glulam beams are very efficient to produce. The energy required to produce a glue-laminated beam from the log is only a fraction of the energy required to produce steel or concrete. Glulam has superior earthquake resilience and greater resistance to fire than any other structural construction material.

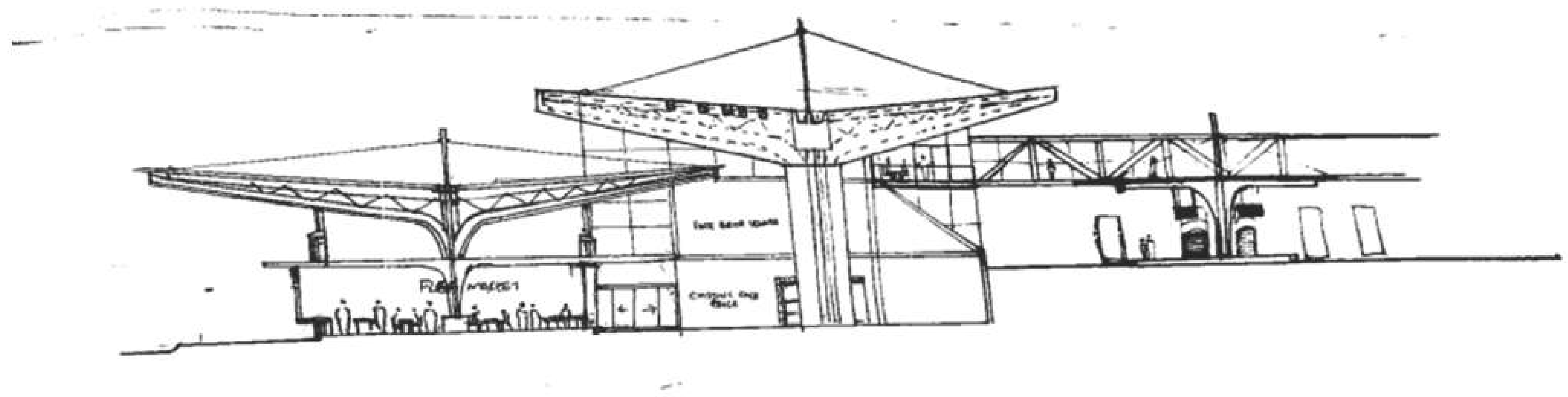
BRICK (Timbrel Vault)

The Timbrel Vault with bricks create the opportunity to break away from the traditonal ways of using brick. Its Flexible and economical as its save material and ecological as it also can use material readliy available on site or even the waste material fromexcavation.
thois techinical has the ablity to uplift the community and echanching their brick making and brick lating skills

The people of Nellmapius making their own adobe bricks for construction using the skillset from the community

Material Found on site





Steel Barrel Vault As over head structure

RECLAIMED BRICKS FROM DEMOLITION

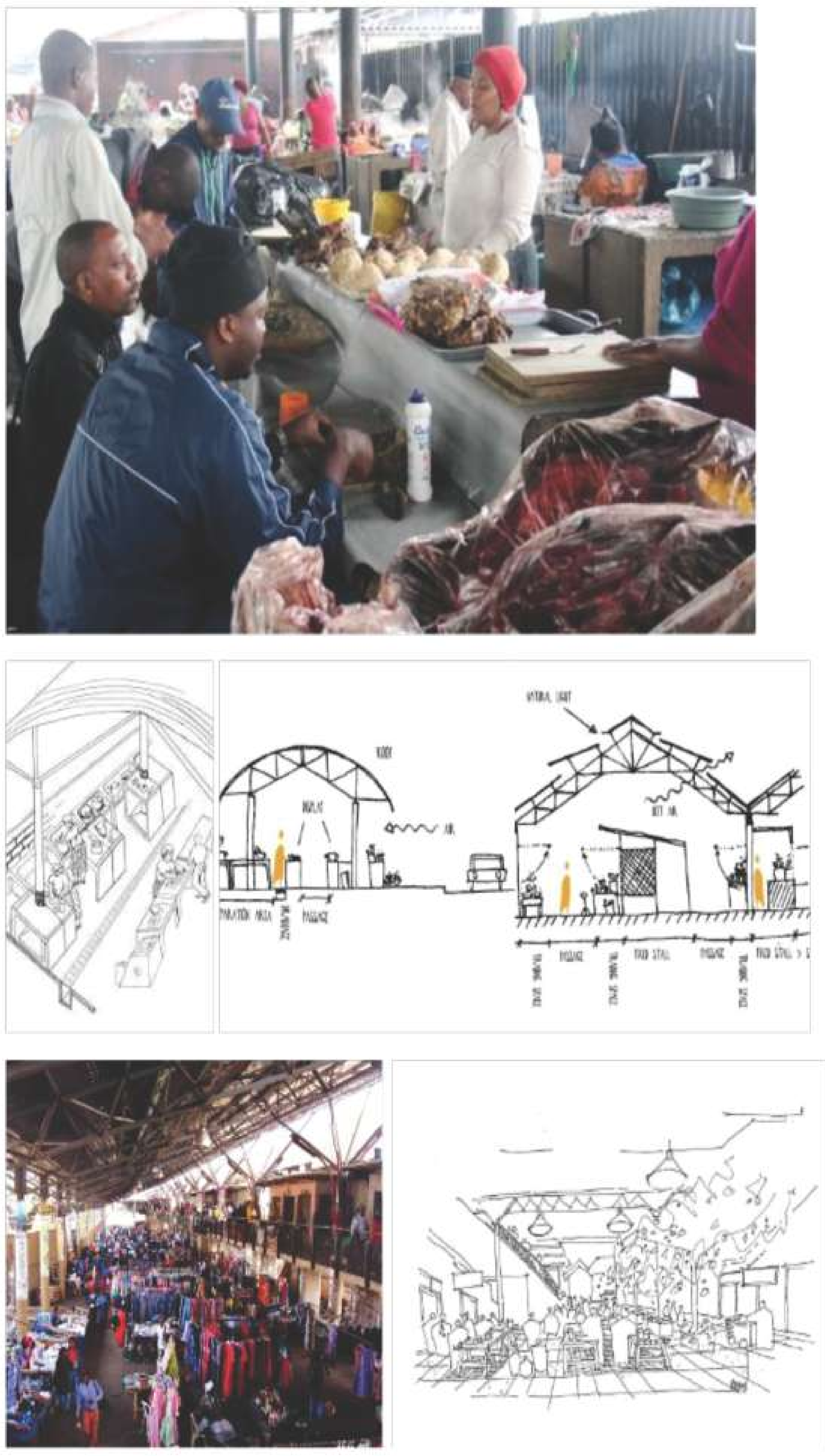
Green Concrete using Construction Rubble near site

ADOBE BRICKS MADE LOCALS

Timber Construction
Simple Local construction

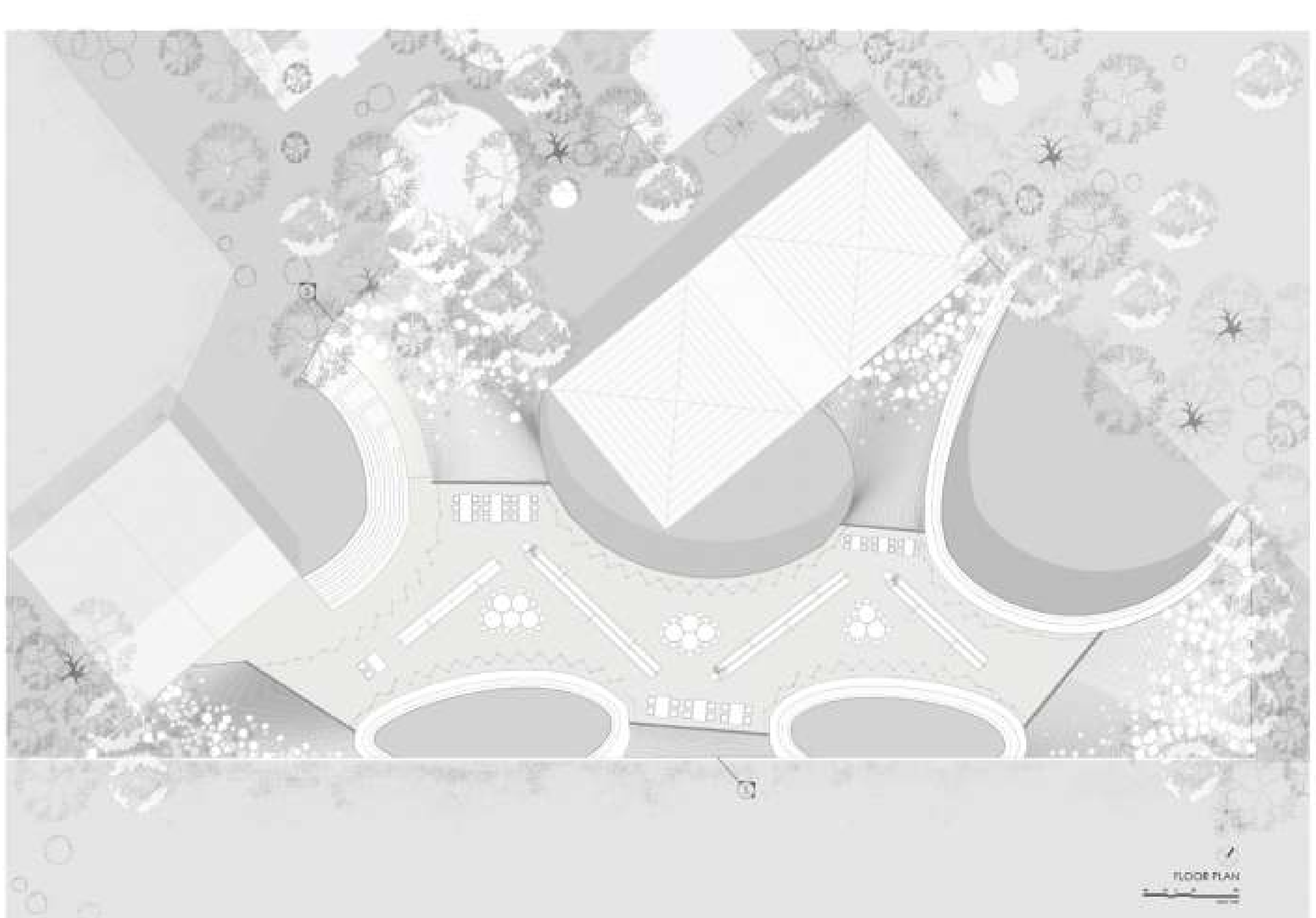
Material and Construction

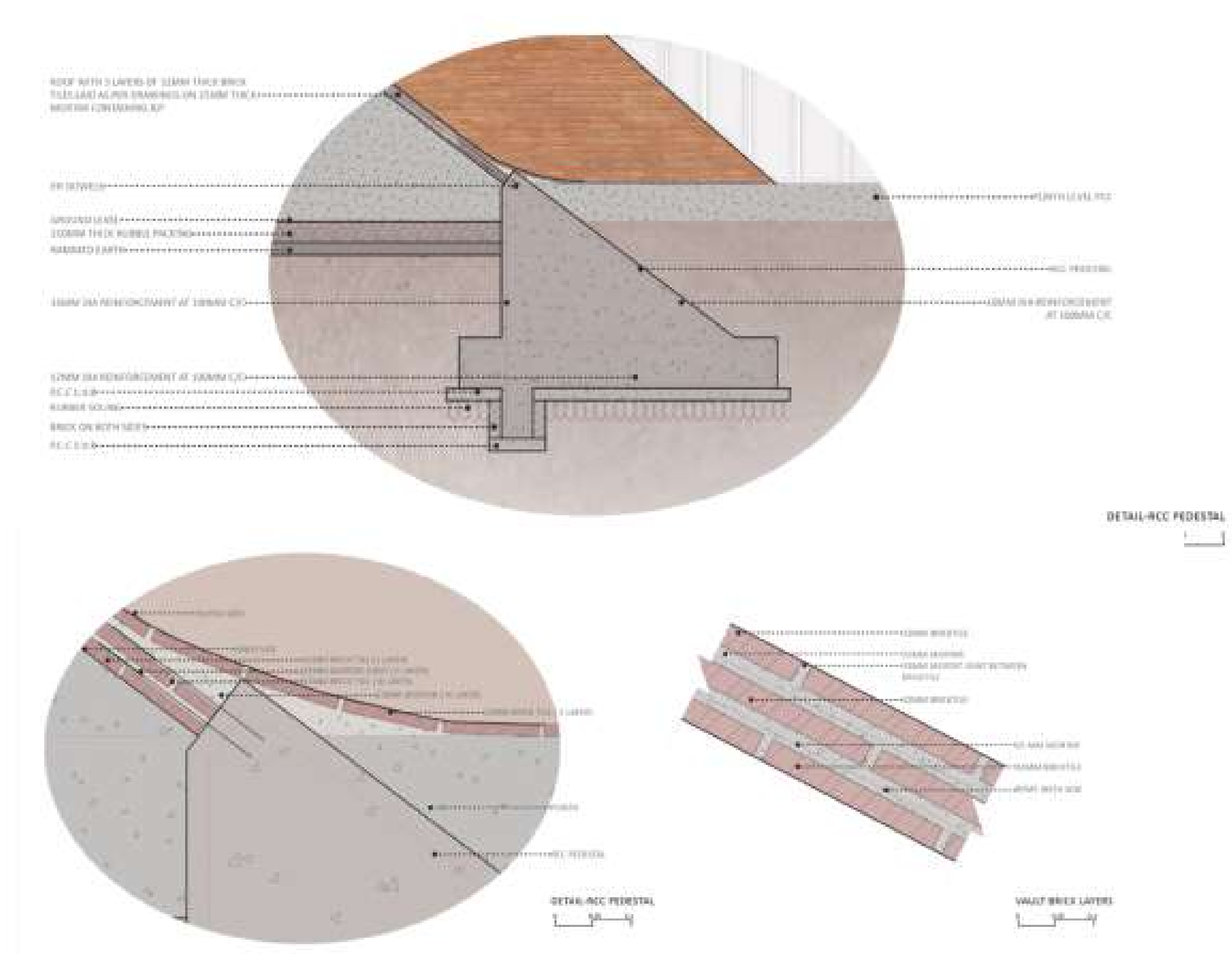
WARICK JUNCTION - RICHARD DOBSON, DURBAN SOUTH AFRICA



FUTURE AFRICA CAMPUS- EARTHWORLD ARCHITECTS, PRETORIA

GAUTRAIN MIDRAND STATION- BENTAL ASSOCIATES, MIDRAND





Techical

sP+a constructs brick vaulted library for a school in india

Precedent Studies

MASTER PLAN
1:500

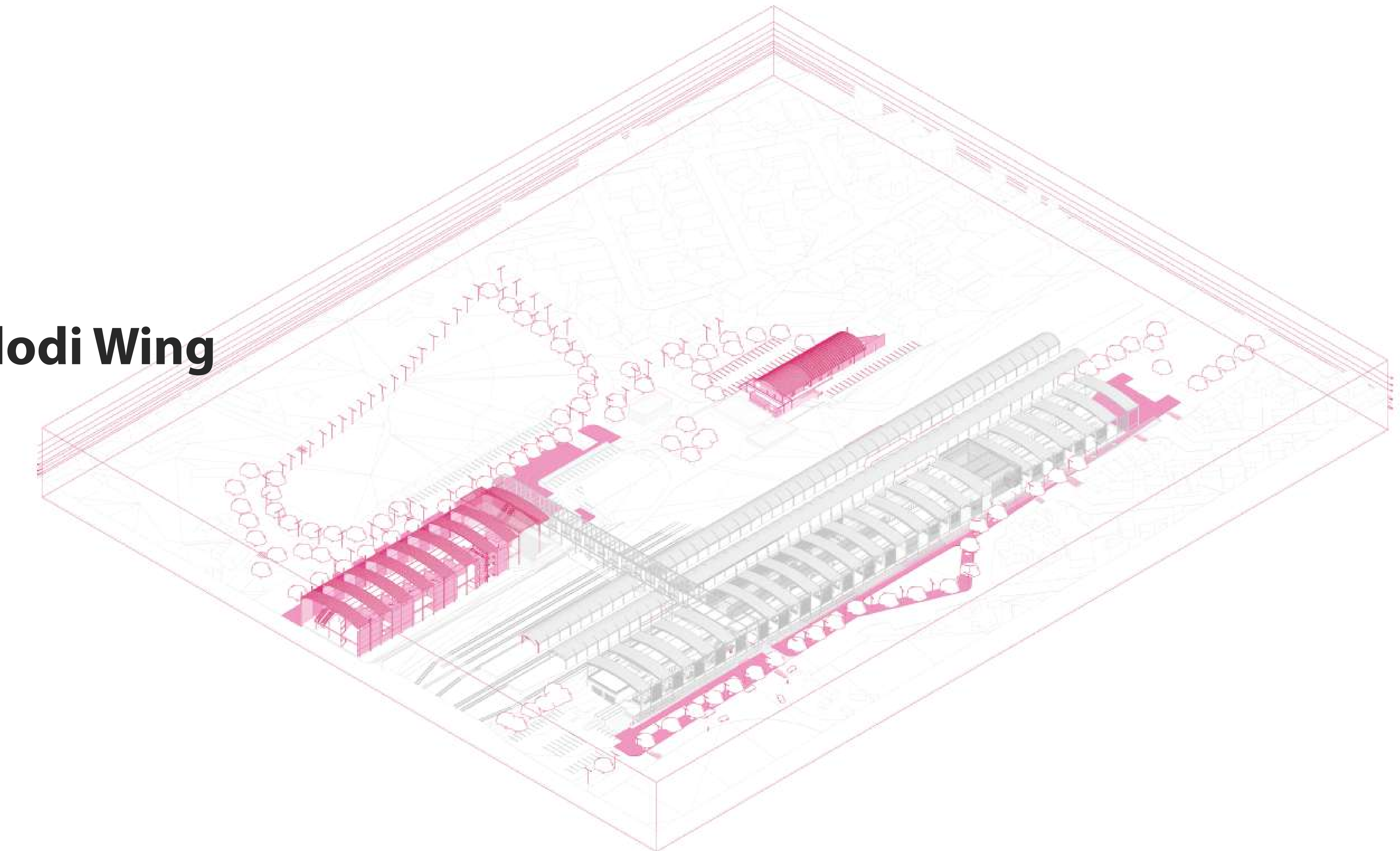
SITE PLAN
1:500

Second Floor Plan

1 : 100

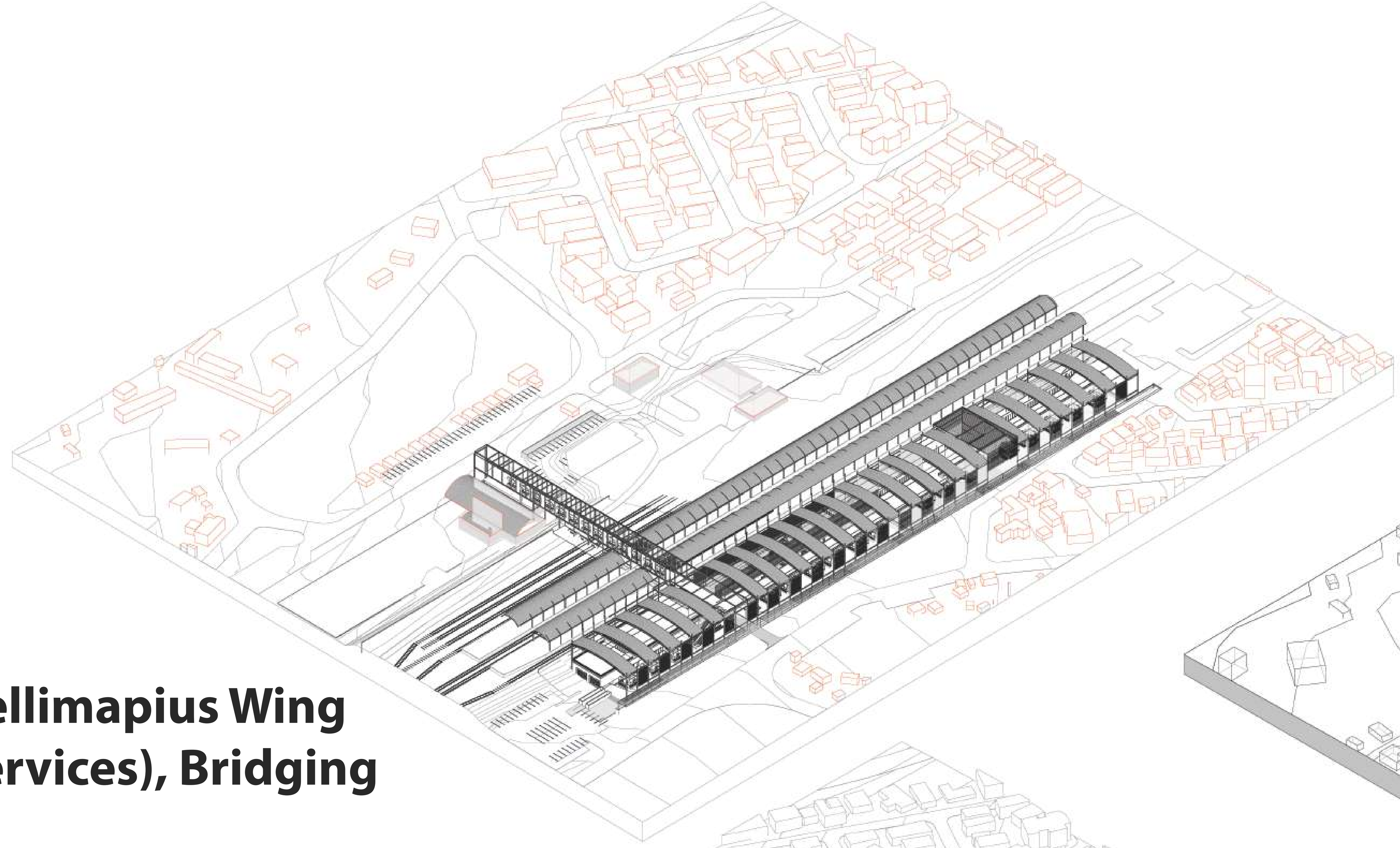
3

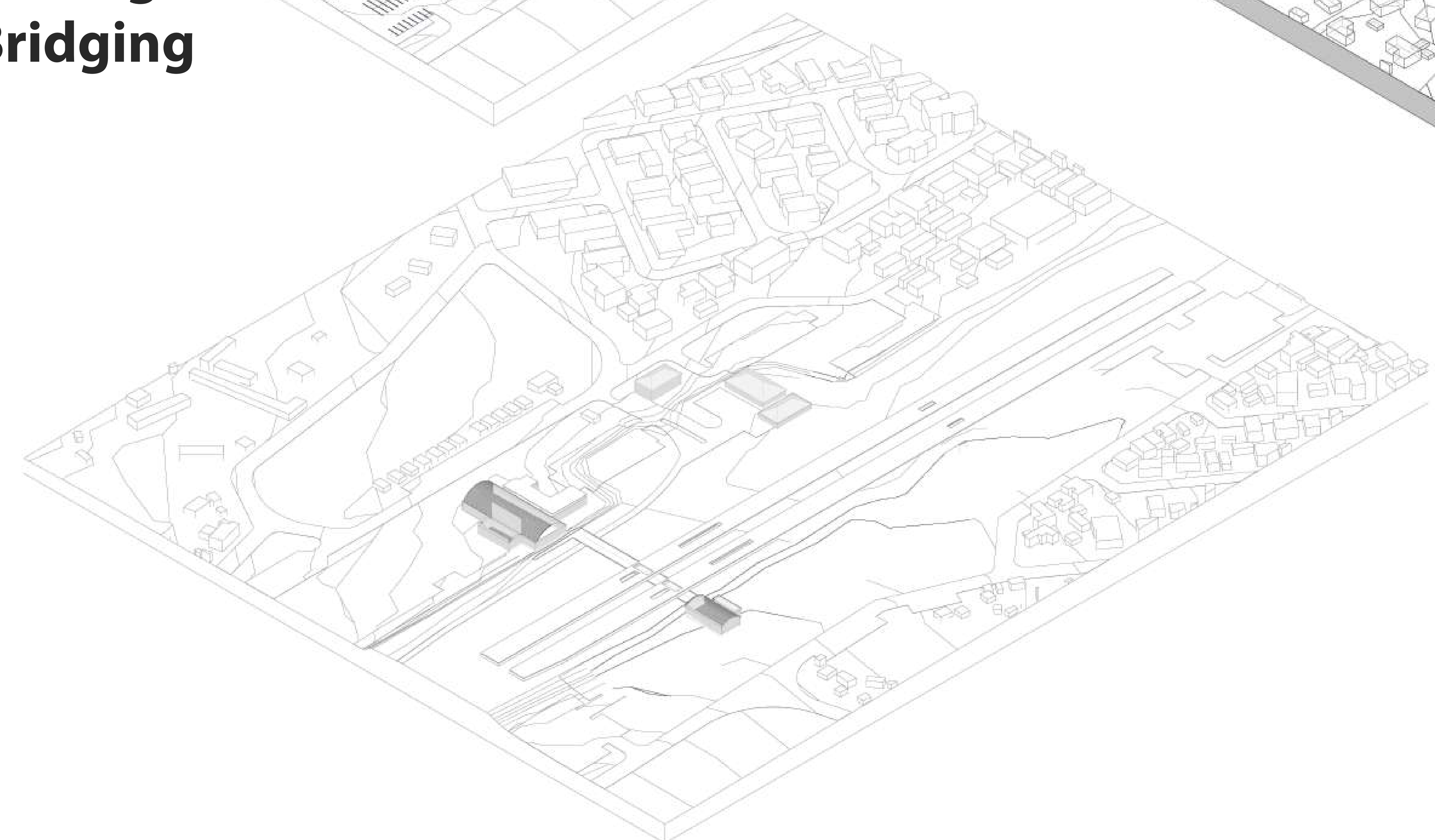
Construction of Mamelodi Wing and Clinic



2

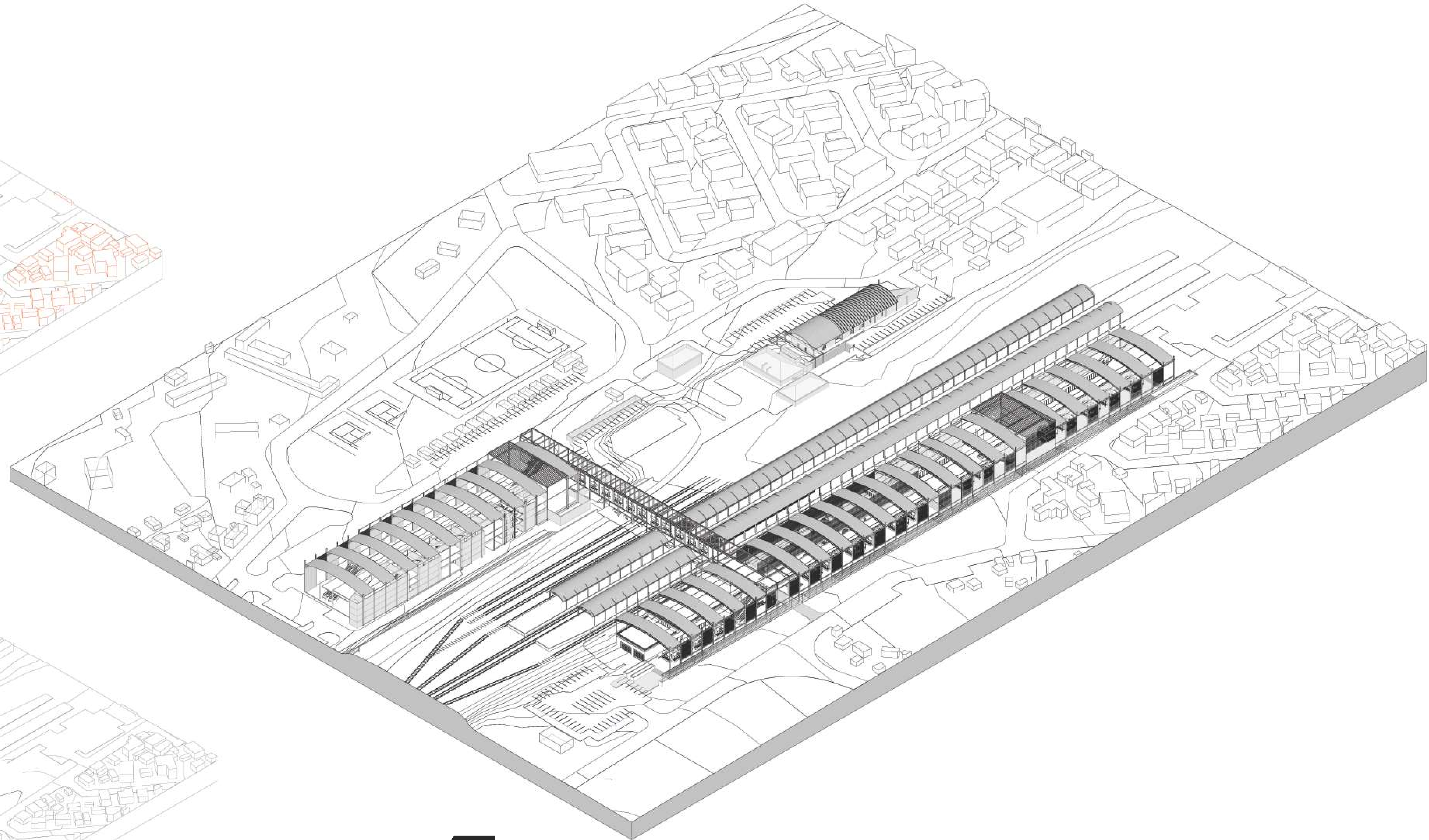
Construction of Nellimapius Wing (House essential services), Bridging to Mamelodi





1

EXISTING CONDITION

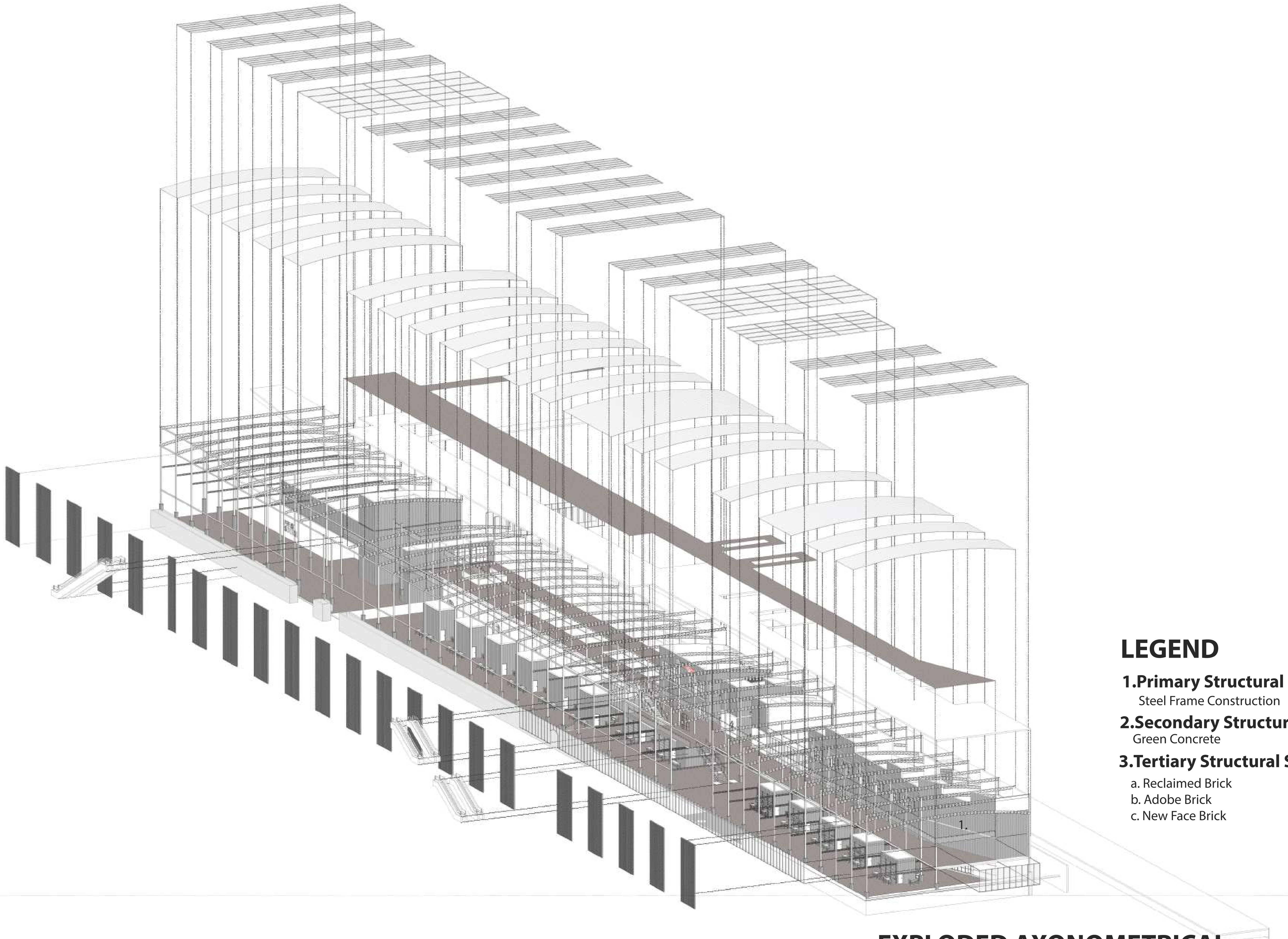


4

Addition of Public Spaces

Ground Floor Plan
SCALE 1:200

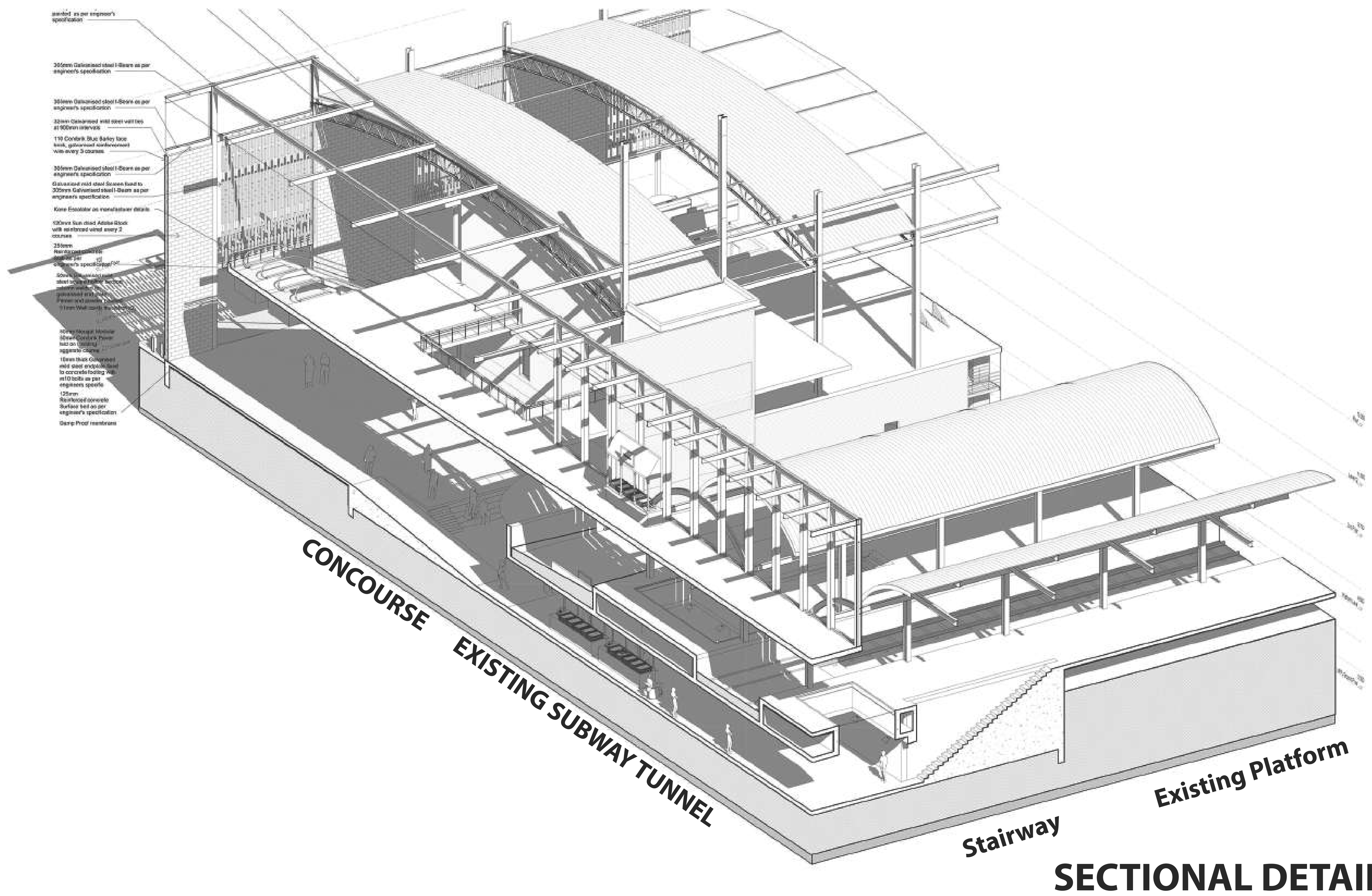
SECTION C-C
1:100



EXPLODED AXONOMETRICAL

LEGEND

1. **Primary Structural System**
   Steel Frame Construction
2. **Secondary Structural System**
   Green Concrete
3. **Tertiary Structural System**
   a. Reclaimed Brick
   b. Adobe Brick
   c. New Face Brick



SECTIONAL DETAIL

SECTION B-B
1:100

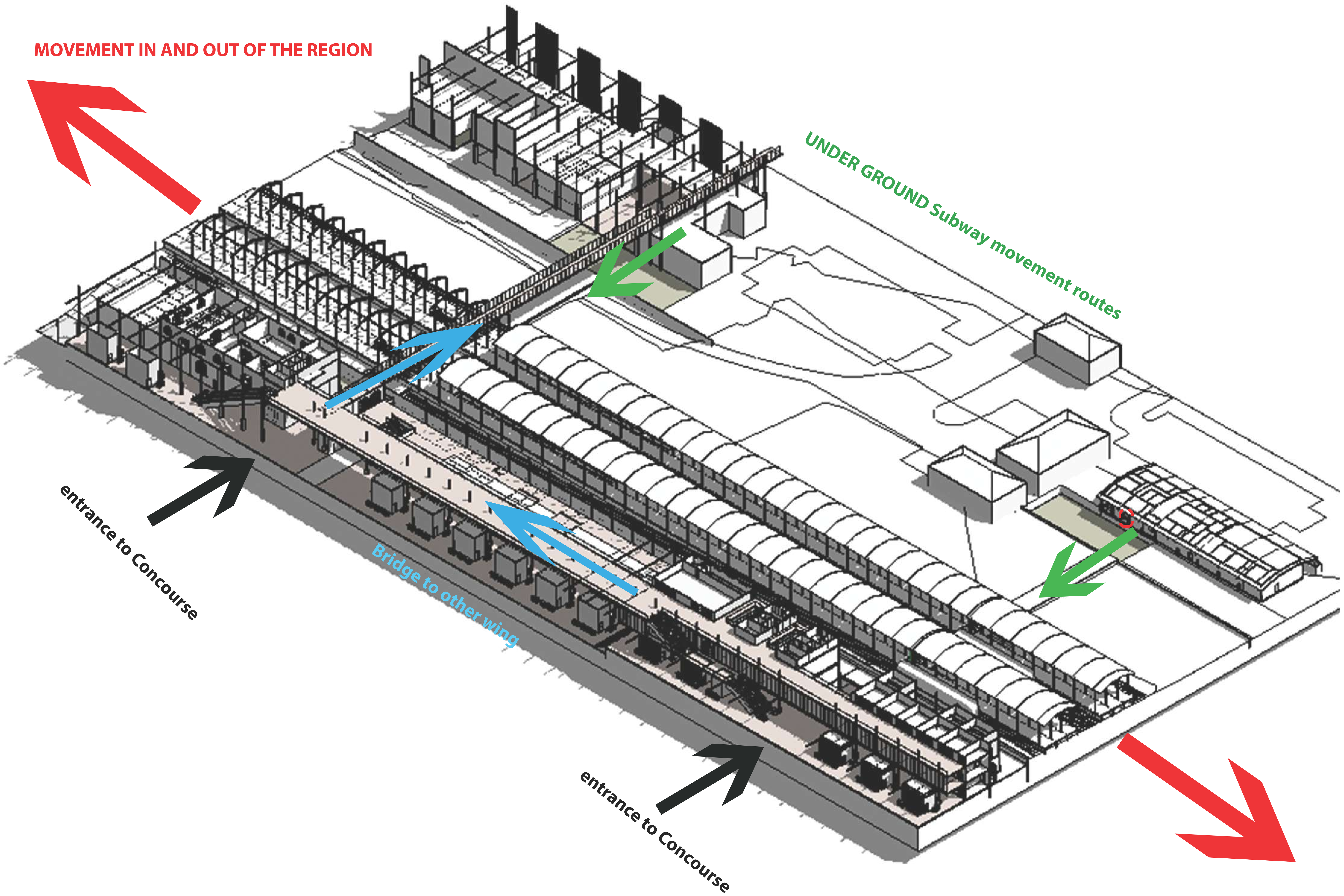

Edgars
lumion

First Floor Plan
1 : 100

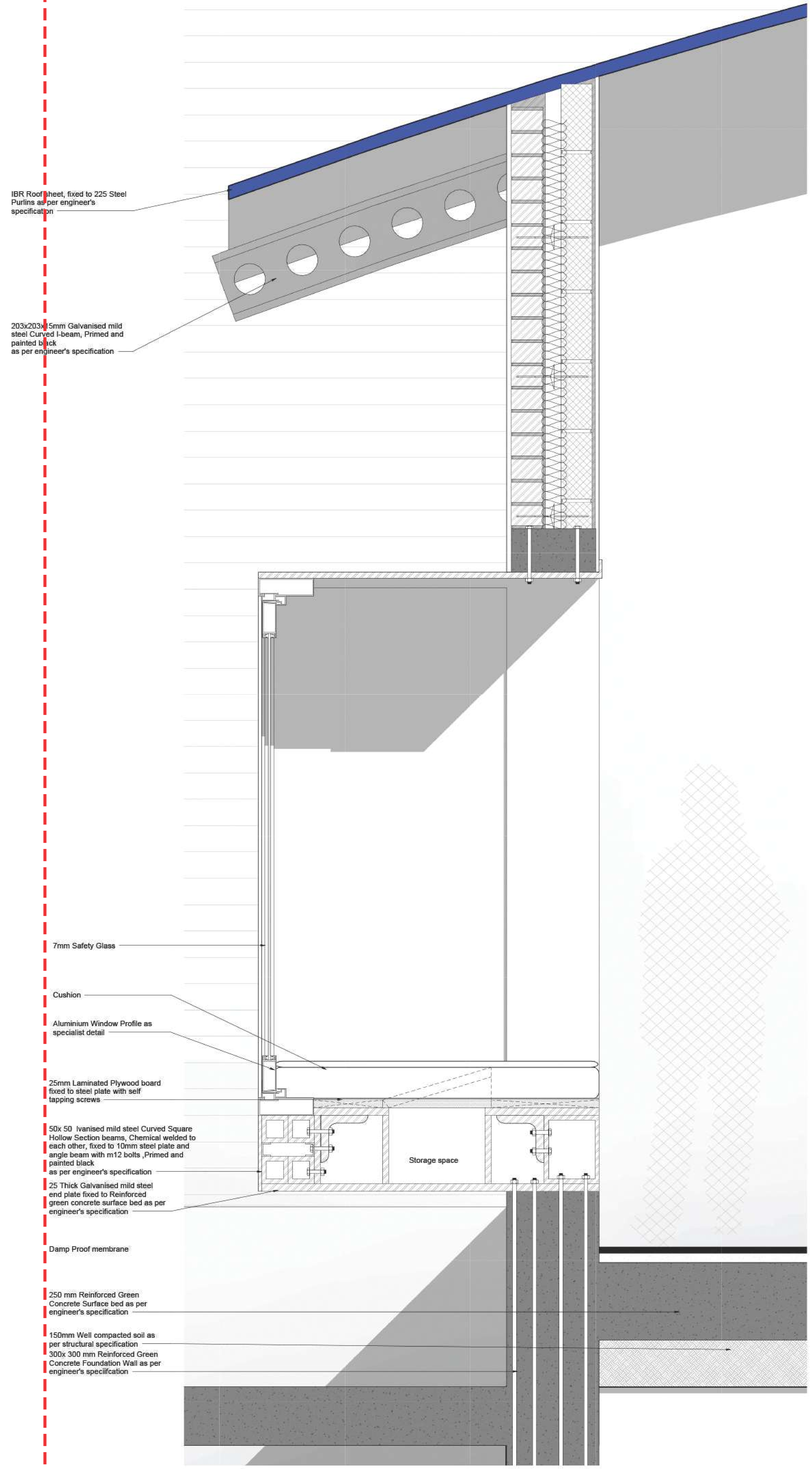
Ground Floor Plan

SCALE 1:200

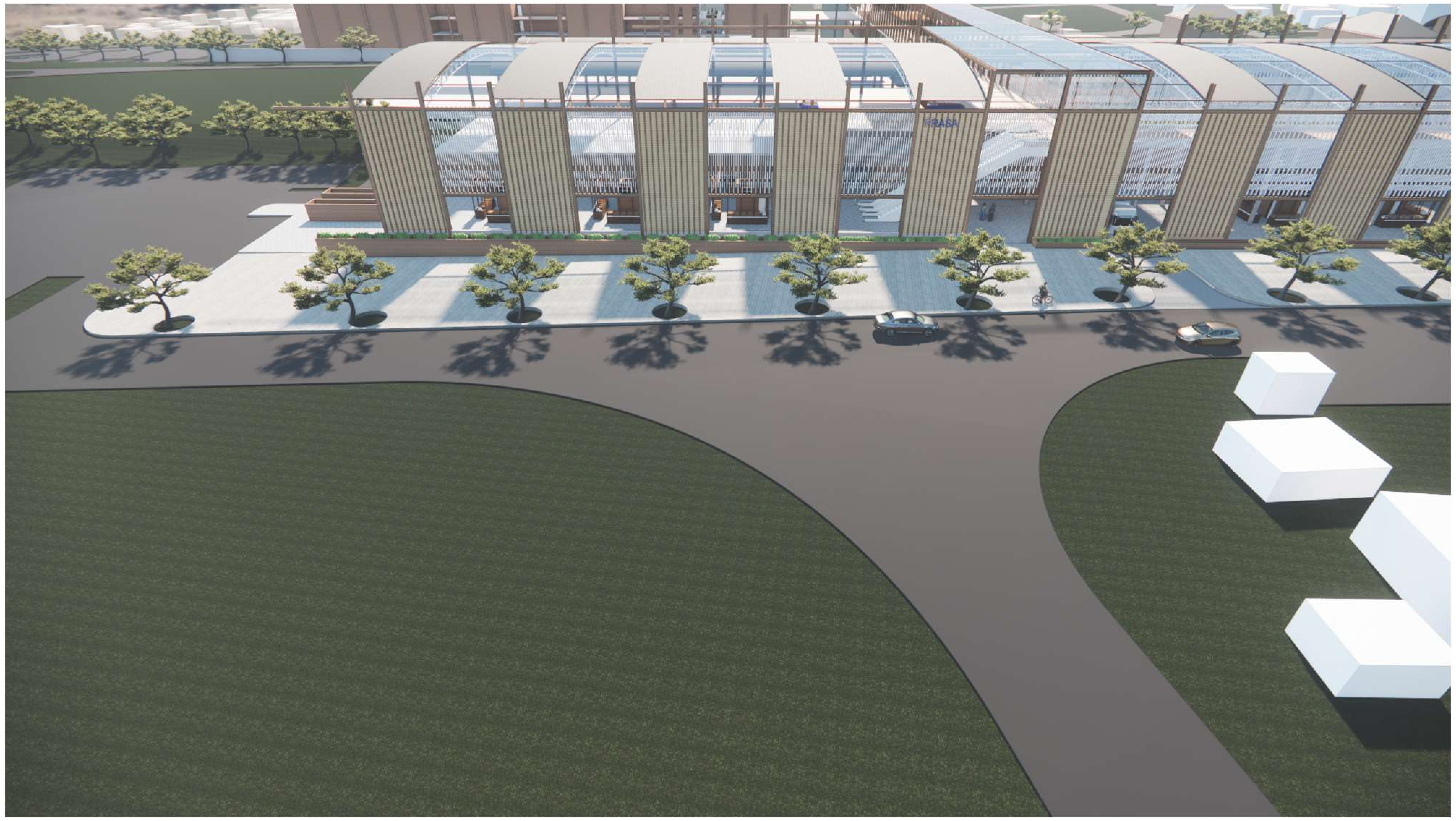
UP
UP
UP
DN
DN
SLAB LINE ABOVE
SLAB LINE ABOVE
11
10
9
8
7
6
5
4
3
2
1
16
15
14
13
12

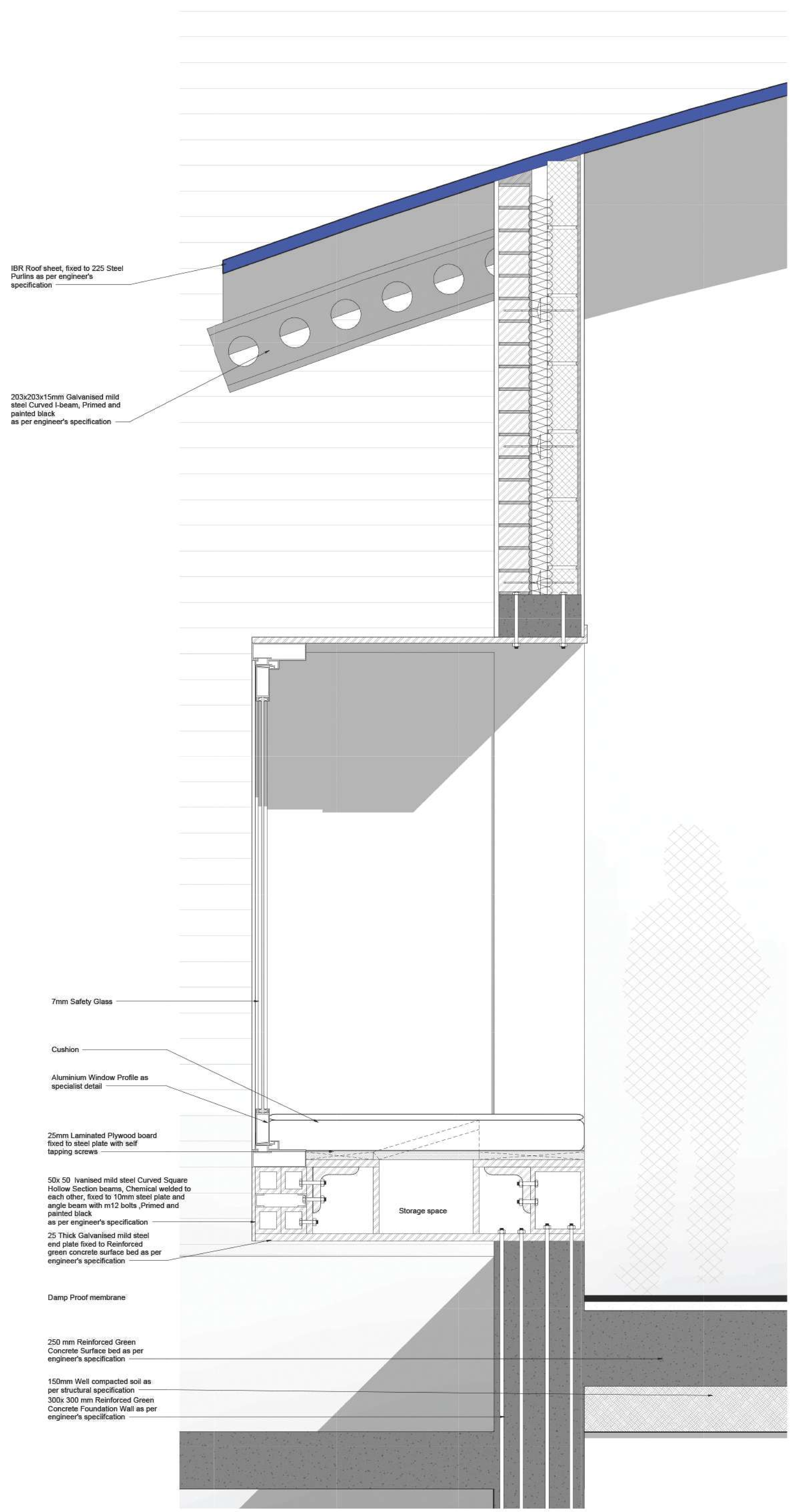


MOVEMENT ROUTES



BAYWINDOW DETAIL
Scale 1:5





BAYWINDOW DETAIL
Scale 1:5


VEGETABLES

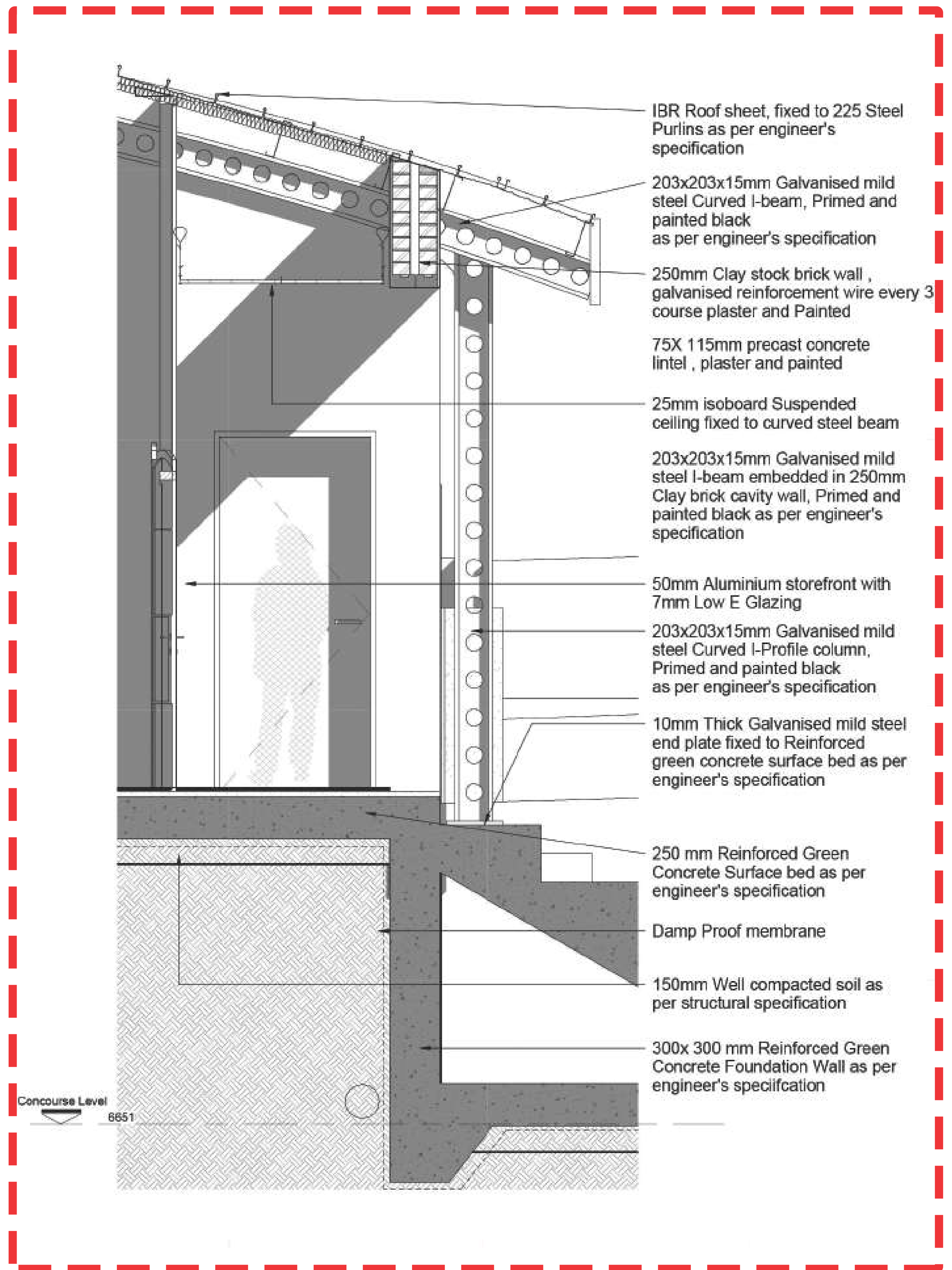

LEGIT


WHOA


LOVE

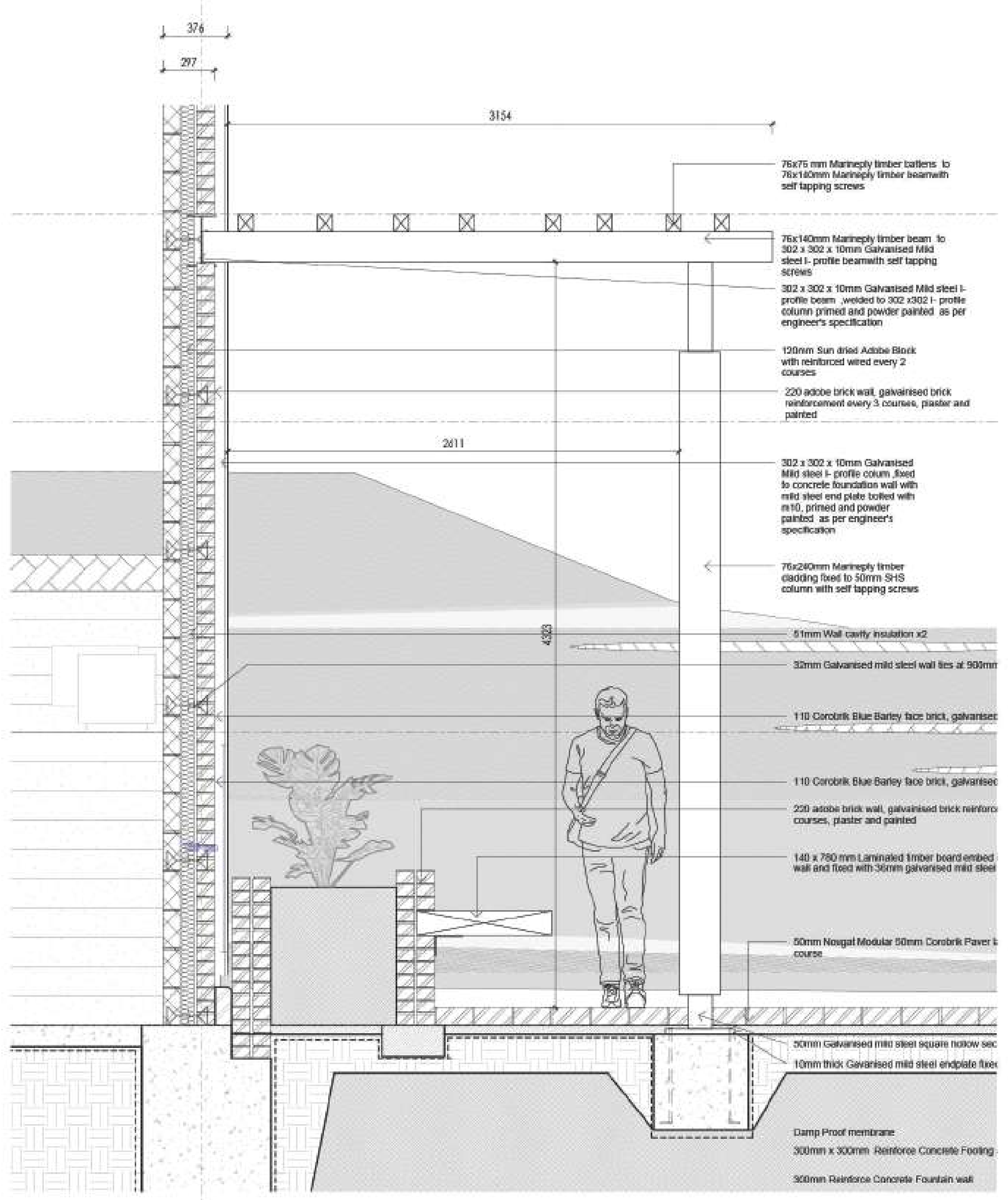

KFC
Edgars

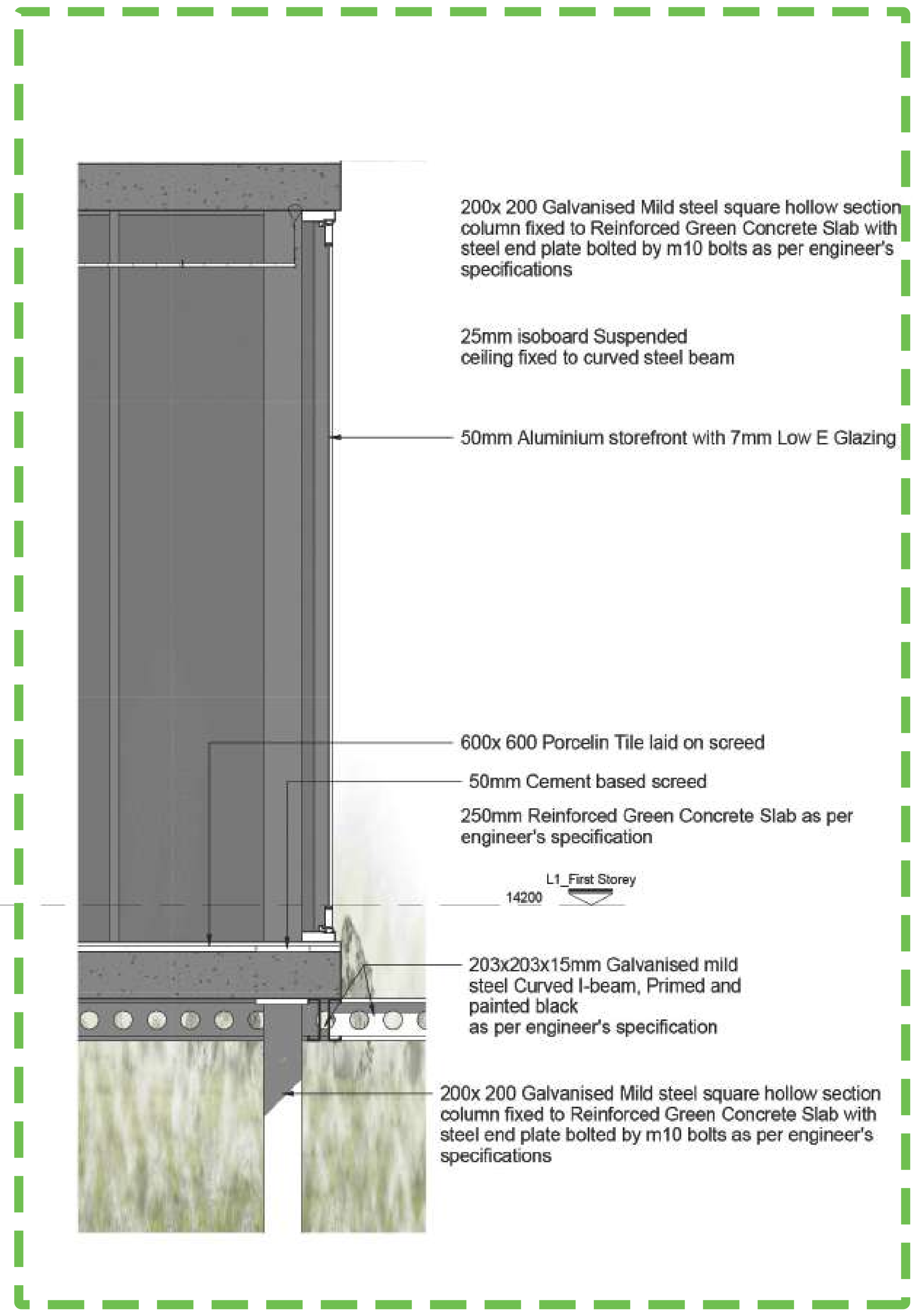
FRONT ELE VATION

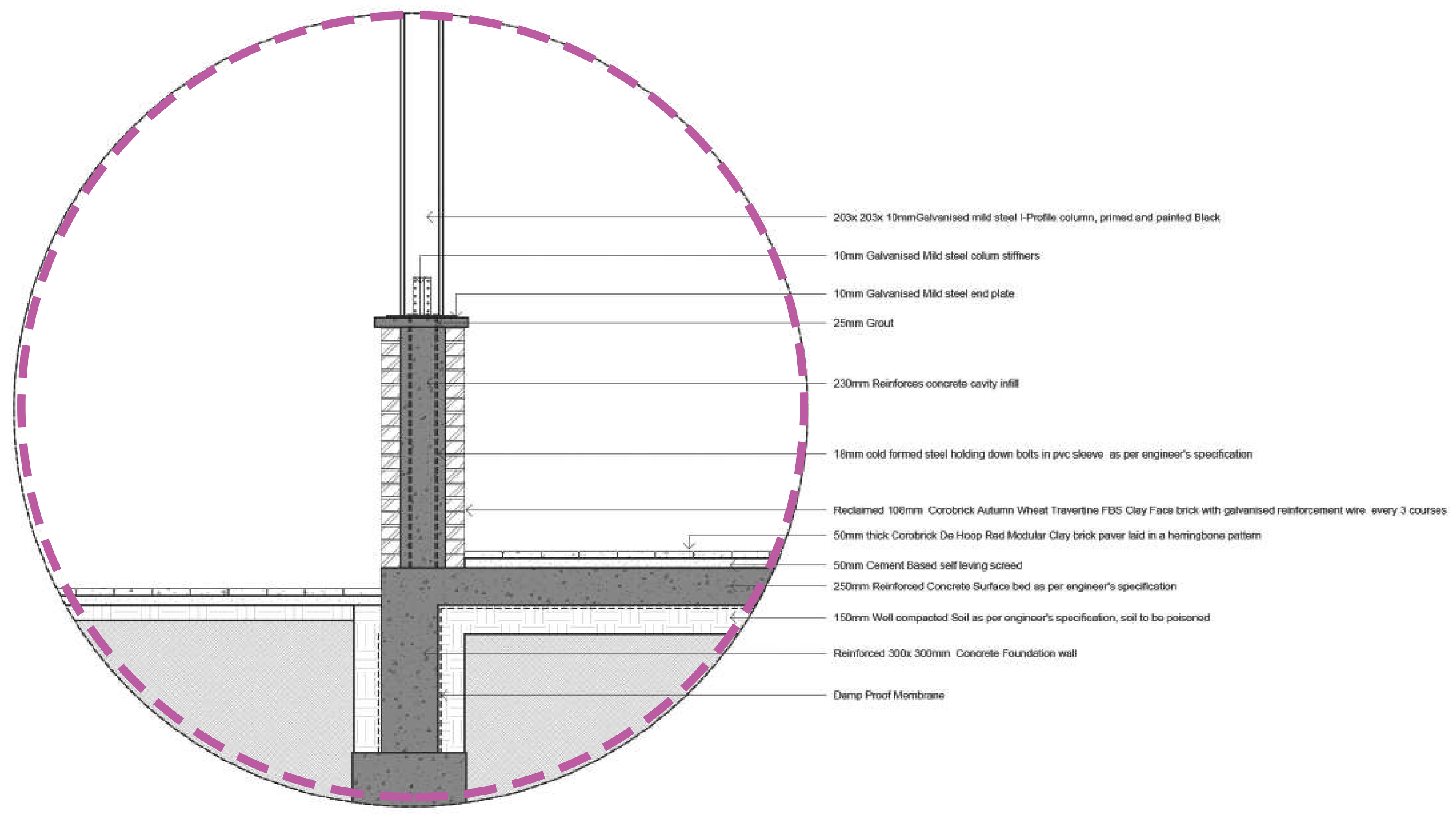


CLINIC EDGE DETAIL

1:20







Column base detail
1:20

SECTION A-A
1:50

ARCHITECTURE FOR PEOPLE