GRANT BICKNELL [2014] _ UNIVERSITY OF THE FREE STATE

TRANSPORT [BRT] INTERCHANGE _ BLOEMFONTEIN

URBAN ACUPUNCTURE EXPLORATION

ACKNOWLEDGEMENTS

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- Fellow mates from my cubicle for making it a fun and productive year.
- My parents for their constant support and interest

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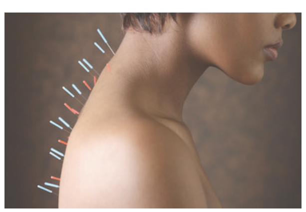
Starting point >> >



Experience the acupuncture

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ABSTRACT

The objective of this thesis is to produce a transport interchange as an urban intervention connecting different modes of transport consisting of a BRT station, the BRT control Centre, market spaces, a public square and kitchenettes. The transport interchange will regenerate the infrastructure and CBD area in terms of a more sustainable, efficient and accessible public transport system as well as conceptually investigating urban relieve within Bloemfontein. This reactivation will look at the integration of the acupunctural space with the urban fabric as one of the catalyst methods to reactivate the city organism.

Architecture should help grasp our connection with reality; it must reveal to one what the eye doesn't perceive or understand.

[fig 1.2] Acupuncture (Kyle, 2012: online).
[fig 1.3] eye as the visual sense. (Jordan, 2012: online).

TRANSPORT [BRT] INTERCHANGE _ Urban Acupuncture exploration

GRANT EDWARD BICKNELL

Date of submission: 30 September 2014

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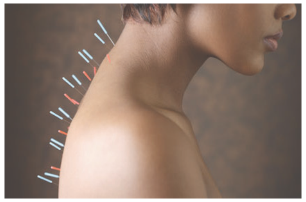

The thesis is submitted in partial fulfilment of the requirements for the degree Master in Architecture (Professional). Department of Architecture, Faculty of Natural and Agricultural Sciences, University of the Free State. The work contained in this thesis has not been previously submitted to meet requirements for an award at this or any other higher education institution. To the best of my knowledge and belief, the thesis contains no material previously published or written by another person except where due reference is made.

Urban Acupuncture >> >

Perception of space through movement

Acupuncture >> >

Perception of space through movement

[fig 1.4 - 1.7] experience space through movement (Stanley, 2010: online).

Signature: ______________________________

30 September 2014

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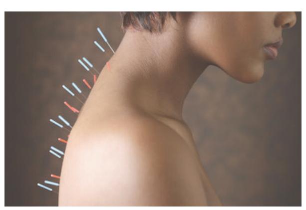

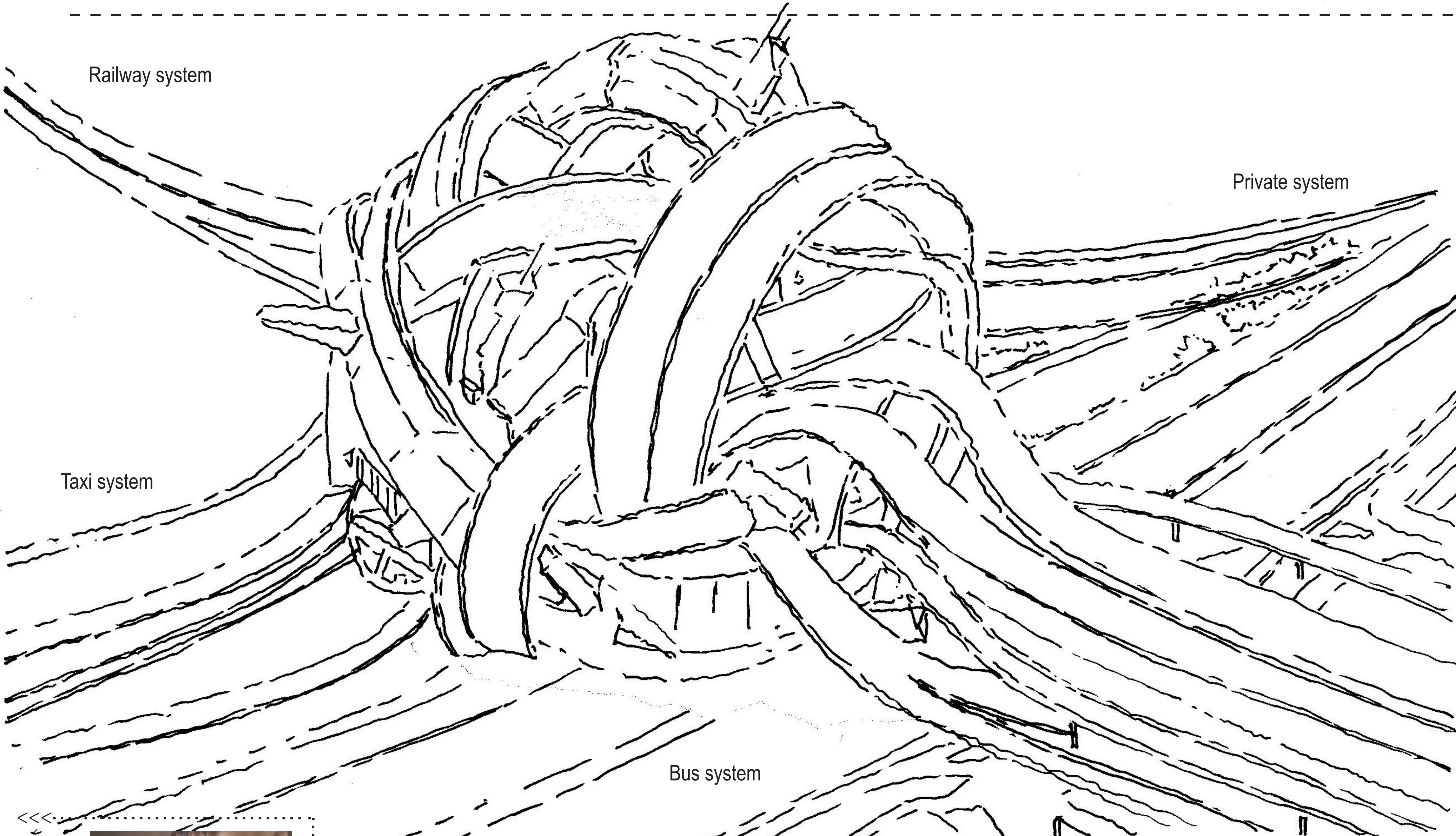

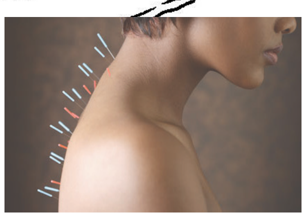

Disconnected transport infrastructure

Author's experience of current transport infrastructure. Sketch, 2014.

[fig 1.8] Man in motion (Tann, 2013: online).

001 _ Introduction

Design proposition

Background

Transit Orientated Development

Bus Rapid Transit [BRT]

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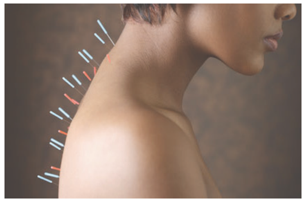

DESIGN PROPOSITION


[fig] Perspective from station building entrance towards Charlotte Maxeke street.

PROBLEM STATEMENT

Despite constant urban development and interventions since 1994, many South African city layouts continue within the Apartheid urban scheme. The railway line that was built in 1890 formed a boundary effectively segregated the rural areas from Bloemfontein CBD. This created displaced regions where the predominantly lower income groups tended to live the furthest away from the city (Schoeman, 1980: 58). This phenomenon of infrastructural development has led to subsidized public transport systems such as bus and railway systems. These economically-driven infrastructure developments have tended to inhibit the nature of the urban fabric with disregard to the consequences. This created dilapidated and vacant spaces throughout the city which are in dire need of regeneration and re-integration into the living urban fabric.

HYPOTHESIS

Acupuncture is a process whereby pressure points are distressed by impressing needles in the infected points and thereby initiating a healing process. This process is represented in the stressed urban infrastructure of Bloemfontein, through implementing needles (the BRT system) to regenerate the dilapidated urban organism. To achieve this urban reactivation, the implementation of the Urban Acupuncture theory and principles will be used in the form of New Urbanism. These depleted spaces (pocket urban spaces) throughout the city need to be integrated with the urban fabric so that the city organism can function to its full potential.

[fig 1.9] Bloemfontein skyline (Travel Guide, 2011: online).

[fig 1.10] Bloemfontein city roses (Media, 2014: online).

BACKGROUND

Situated in the heart of South Africa, Bloemfontein was originally known as Bloem Fontein that was, owned by Johan Nicolaas Brits. Brits settled on his farm in 1821. In 1909 the town received municipal statues, after which Henry Douglas Warden changed the name to Bloemfontein (Schoeman, 1980: 1).

After the 1950 boom in the stock exchange, the city experienced large economic growth due to the Free State goldfields situated 150km from the city. This former agricultural village quickly developed and grew into the thriving family and retirement town as it is today. Bloemfontein managed to maintain its vast natural skyline beauty and small agricultural community charm.

Bloemfontein is surrounded by vast open natural landscapes and small mountains such as Navil Hill. Bloemfontein is also known as “the city of roses”, due to the abundance of these flowers and annual flower festivals. Tourists from all around South Africa visit Bloemfontein during spring and summer time. During the rose festivals, a week in October each year, the focus is placed on the huge variety of roses visiting these grounds and on the local artists.

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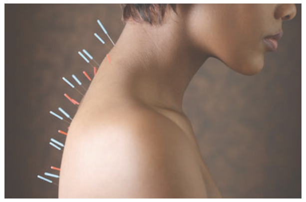

Many of these artists make use of the inefficient local railway or taxi system which tends to place a lot of stress on the current transport infrastructure of the city.

The railway station is categorized as historical monument, and more could be learned of its history when visiting the National Museum. The museum is situated on Aliwal Street, merging with the integral node of Bloemfontein CBD.

The city is punctuated with rich historic public squares which are packed with arts and crafts trader's from which to savour the surrounding urban atmosphere of the city of roses. The current polemics with these sites is there is a lost of organized public transport. With the proposed BRT system it will focus on connecting not just the suburbs with the city centre, but also connecting these historic squares with the city, and its community.

The city has rich historic public squares that are packed with arts and crafts traders. The current polemics with these sites are that there is a complete lack of organized modes of public transport. With the proposed BRT system it will focus on connecting not just the suburbs with the heart of the city, but also integrating these historical squares in the city fabric and its community. (Schoeman, 1980: 1-3)

[fig] Historic Railway Station.

[fig] Intermodal Transport Interchange.

[fig] Hertzog Sqaure.

THE CITY OF ROSES

Late at night
hearts pounding
heads in the stars
Three young men
head over to the local diner
Their bodies are in one place
but their souls are somewhere else
The cloak of night surrounds them
As they journey to their destination
Laughing out loud
They light up the darkness
In this Unreal City
the taste of unreality
may be just what is needed
Auto lights are reflected
on the asphalt
The asphalt homeland
where these youths
are living out their fantasies
and enjoying laughter
The laughter of youth

AUTHOR_ INTERPRETATION OF SITE
17 February 2014

GENIUS LOCI >> AXIS >> DATUM >> EXPERIENCE >> >

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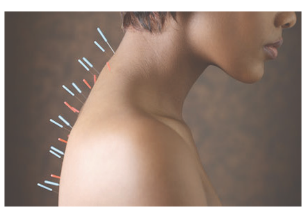
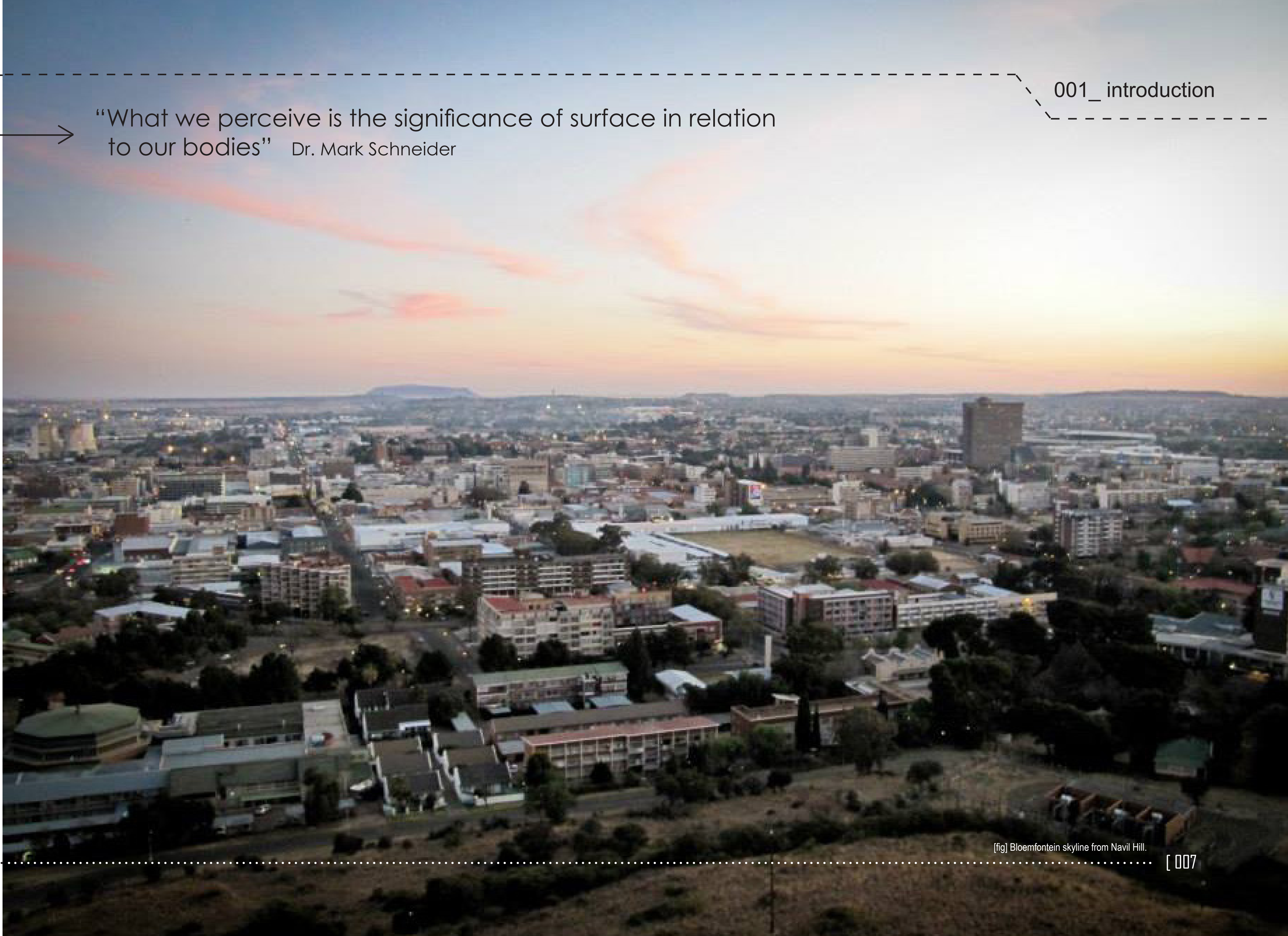


Man in motion. Sketch, 2014.

"What we perceive is the significance of surface in relation to our bodies" Dr. Mark Schneider



[fig] Bloemfontein skyline from Navil Hill.

BRT

Transit Orientated Development

CONNECT

WALK

- Walkable environment
- Pedestrian path priority
- Shorten street crossing
- Minimized crossing distance

CYCLE

- Door to door travel
- Safety and convenience
- Separated from motorized traffic

TRANSIT

- Support high quality transit
- Ensure frequent, fast, direct transit service
- High capacity, high speed transit corridor
- Walking station

SYNTHESIS

- Integrating residential, retail an entertainment activities
- Overlapping activity
- Combined activity
- Combined with dynamic public space and plaza of the Railway Station

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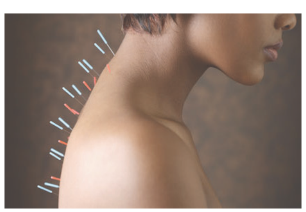
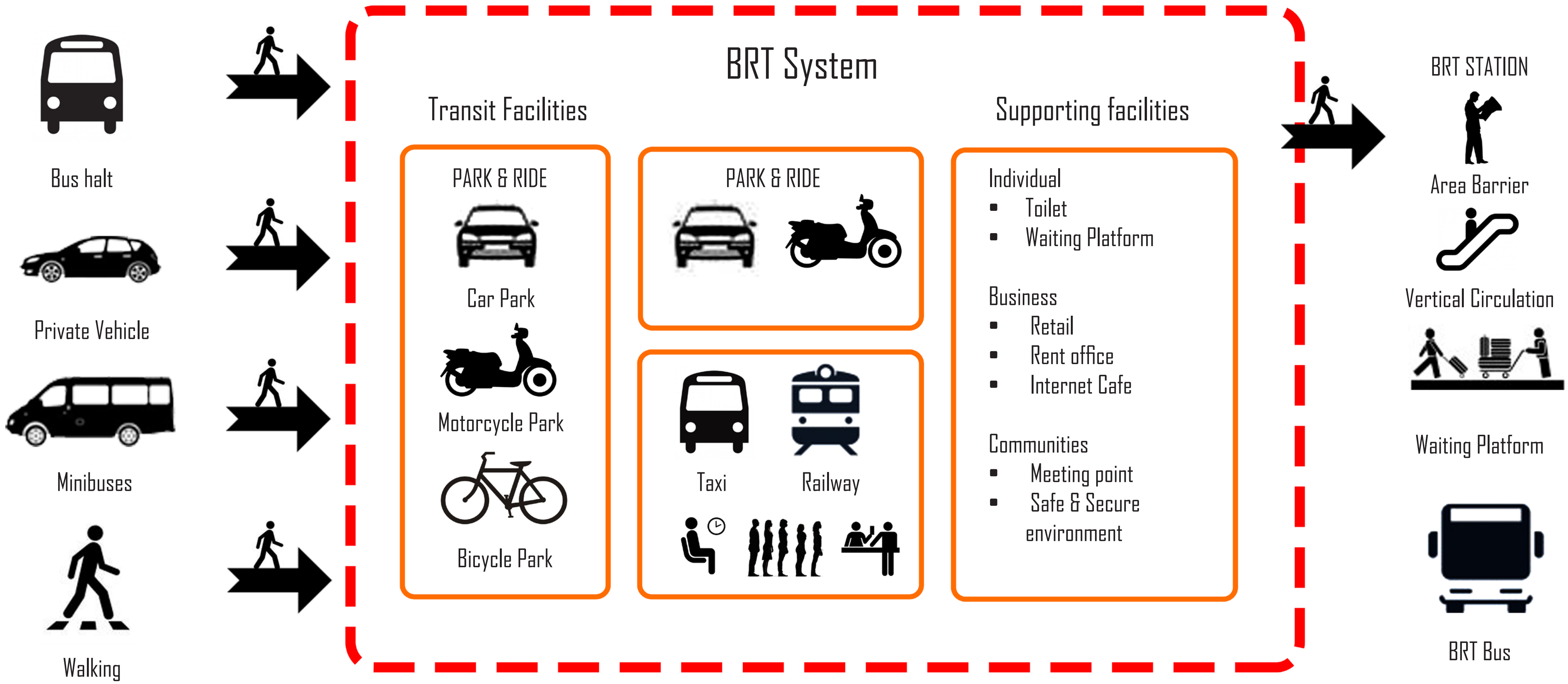


[fig] BRT Orientate development conceptual diagram. Sketch, 2014.



BRT system diagram. Sketch, 2014.

Transport BRT system in Bloemfontein

The current trend of modern cities is to create a better sustainable city (3rd Generation city); a city which will be able to adapt and transform its public transport systems. A sustainable public transport system can cause a positive ripple effect on the urban environment by minimizing single occupant vehicles. Research indicates that 1% reduction in single occupant vehicle usage to a public transport creates a remarkable reduction of 50 000 tons of CO_2 within one calendar year (Wright & Fulton, 2005: 710).

Lerner states for a city to act as solution for climate change it needs to focus on all of the sustainable methods and materials. We need to realize that 75% of car emissions are related to the city, and for the city to function more effectively we need to work with the city as a concept.

To support the vision of a sustainable and integrated city, there is need for a high capacity transport systems such as the BRT system, which will be a better sustainable, efficient, and accessible transport system. By achieving the above, it would contribute to the decrease in energy usage & climate change and increase the living standards of the inhabitants of the city, since 15% of all energy usage in South Africa mainly spend on our current transport industry (Wright & Hook, 2005: 712).

The BRT is a flexible and integrated road based transportation system that can adapt to the future urban sprawl without compromising the current urban spatial framework of the municipality. The system ensures a better passenger experience which is safer, more affordable and has a positive environmental and social impact on the city.

[1%]

reduction

sustainable future =

<<<

[fig 1.10] Intermodal Transport Interchange (Air, 2014: online).

During the 1970s, urbanization was increasing at rapid pace in Brazil, which created a polemic for their existing public transport system. The question was asked, how does one address the social and economic aspects without changing the whole urban layout? This polemic gave way to the development and implementation of the BRT system.

The proposed thesis framework aims to integrate the heart of city with the surrounding suburbs of Bloemfontein, while simultaneously aiming to increase the circulation on the east-west axis. The proposed BRT routes will be placed on the main circulation routes of Bloemfontein such as Zastron Street (N8) and the Bloemfontein railway station.

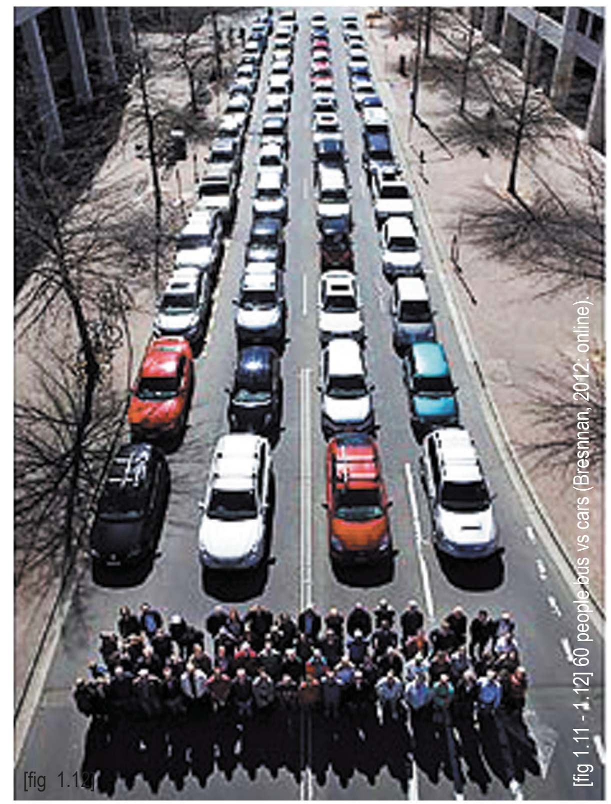
Dresman states (Personal communication, February 2014) that the implementation of the system will be seen as a one of the spatial development elements within Bloemfontein. Currently our surface transportation is the future of transportation in the Mangaung district, essentially the BRT implementation needs to be integrated with the urban landscape and growth of the city. This transportation axis creates a spine of diverse opportunities for the local inhabitants. The architect and urban planner, Jaime Lerner, who experimented with these portable streets, define implemented this method in Curitiba, Brazil. These portal streets gave vendors the opportunity to enable their setup in this space, creating an instantly informal and spontaneous market space. In essence, the corridor surface starts to become more than just a vehicle circulation axis, but also activates the space for pedestrian circulation and usage.

The entire BRT system

The thesis theoretically identifies different potential BRT and bus routes within the Mangaung district, which will conceptually enhance the local infrastructure. These routes will work together with the feeder zones to provide much needed coverage and promote a better integrated public transport system.

The system will construct out of 5 phases, but the thesis will mainly focus on phase 1. Phase 1 will consist of two trunk routes and two enhanced bus routes. The initial aim is to integrate the southern suburbs' movement and east-west axis circulation through the city and connect at the Bloemfontein railway station.

[fig 1.11]



[fig 1.12]

[fig 1.11 - 1.12] 60 people bus vs cars (Bresnnan, 2012: online).

1x BRT Bus VS 60 x Vehicles

Routes and BRT in Bloemfontein [phase 1]

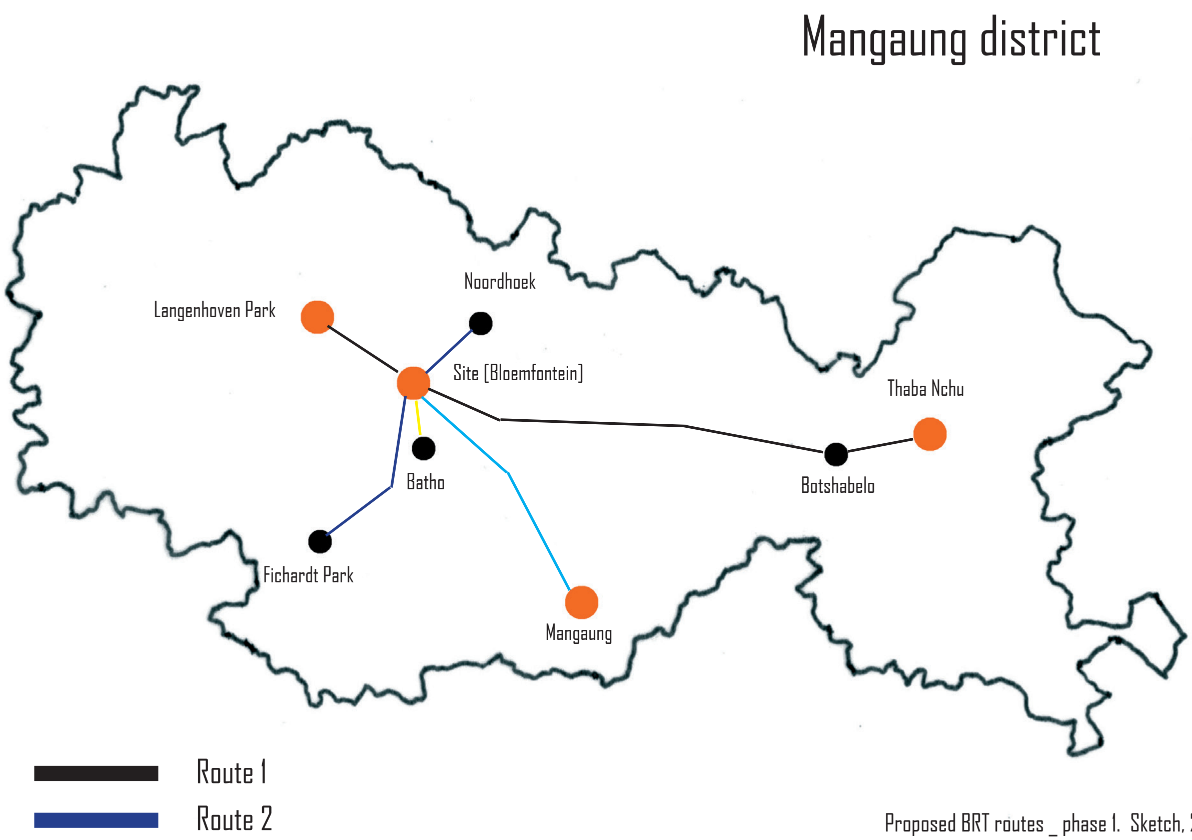
Two BRT routes are proposed for phase 1 of the BRT development, as indicated on the right:

Route 1 _ From Langenhoven Park to ThabaNchu
Route 2 _ Batho to Noordhoek

The aim of these two trunk routes is primarily to improve the integration between the northern and south-eastern suburbs with the heart of the city. In both of these routes a dedicated bus lane will be incorporated to improve its efficiency. The following proposed stations will have two services namely an express and normal route stopping:

1. the proposed thesis site (Next to Bloemfontein railway station);
2. Batho Station;
3. ThabaNchu Station; and
4. Langenhoven Park

Route 1 is seen as the main transportation axis which will provide the most coverage since it runs through Zastron Street; the main east-west axis. Conceptually this will lead to an increased frequency of transport throughout this corridor, therefore reducing the use of private vehicles. The implementation of this proposal will create a more prominent pedestrian route as well as the decreasing the widths of the lane for private vehicles.



Proposed BRT routes _ phase 1. Sketch, 2014.

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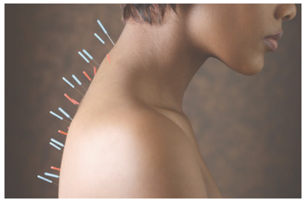


Below is a projected number of users who will make use of the BRT service during the peak hours (5am till 8am).

4 800 users per hour (Route 1 ThabaNchu)
3 100 users per hour (Route 2 Batho)

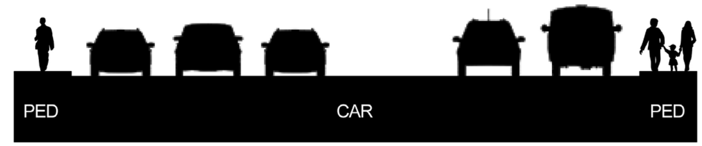
The enhanced bus routes will travel in the common traffic routes with normal curb stations and will consist of low floor buses. The buses will be running on an express route, which will freely transport people between the allocated stations, but still follow a strict timetable.

The existing feeder zones (existing taxi and railway infrastructure) will act a feeder system that will be integrated with the proposed BRT routes to ensure easy accessibility to the facility. By utilizing the existing feeder zones extra trunk routes need to be constructed. The thesis will conceptually propose a partnership among the taxi association and BRT to buy in with the BRT system, in which the system allows the taxi's to utilize the routes as well – as in the case of the Cape Town BRT system.

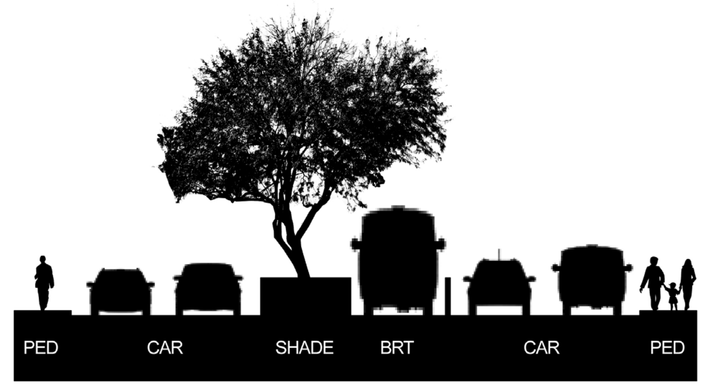
BRT Terminal layout at Bloemfontein railway station

The site for the transport interchange building is on the northern adjacent of the Bloemfontein railway station – currently a vacant parking area. The station building was constructed in 1910 and is one of the first public buildings designed by Sir Herbert Baker (Lindeque, 2001: 4). The building itself has historic architectural value, while the Station Square was constructed between 1912-25, has experienced many changes throughout its history. The World War 1 and World War 2 memorial and original walls on the square are still intact.

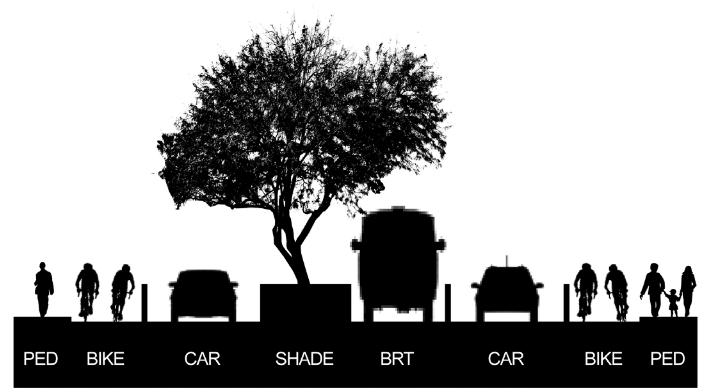
This is cultural and historically a very sensitive site. Unfortunately development on this site has been uncoordinated and has led to an illegible and fragmented site (Seabrook, 2009: 38).



EXISTING TYPICAL STREET CONDITION [fig 1.13]



PROPOSED BRT STREET CONDITION [fig 1.14]



PROPOSED BRT STREET CONDITION WITH BIKE ROUTE OPTION [fig 1.15]

[fig 1.13 - 1.15] Diagram of the BRT street system (Costello, 2011: online).

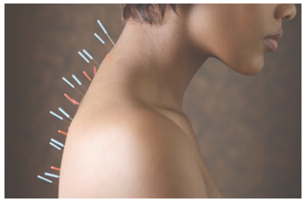
Station buildings

The proposed stations will be located at the end of each route. To ensure efficiency of the stations, the bus depots need to be located as close as possible to the stations. The proposed depots stations will be allocated in Thaba Nchu and Batho areas.

The following facilities will be incorporated with these stations:

1. surveillance room;
2. information kiosk;
3. rest rooms; and
4. commercial facilities.

These stations will act as acupuncture (nodal) points within the context, which release energy in a ripple effect around it. These stations will provide diverse services and facilities such as educational and health care facilities that will uplift the surrounding environment.. The integration of the formal and informal traders at the terminal building will create passive surveillance and will create an integrated system where different income groups can come together.



Accommodating the informal traders at the terminal needs to be handled in terms of ease of movement and keeping people at a safe distance from the bus runways. There also has to be sufficient recreational and waiting areas at the stations for commuters and traders.

The intermediate staging area for the bus drivers will be the parking garage on the corner of Charles Street and Hanger Street. Utilizing this proposed site will prevent any buses to turn up late and not be on schedule. In terms of the monitoring and surveillance of the BRT buses, all of the buses are going to be equipped with a GPS systems which will be monitored from the BRT Administrative building.

[fig 1.16] Masivo Integrado de Occidente BRT Station in Colombia (Elpias, 2009: online).

[fig 1.17] Brazil's Transparency Portal BRT station (Broadus, 2009: online).

[fig 1.18] Chinese BRT system (Kassab, 2010: online).

Regulations & restrictions

The proposed BRT station will be placed in the middle of a boulevard, thus minimizing the potential for conflict between the BRT and turning traffic.

Wright and Hook state that the transition from the station to the other transport modes needs to happen without any problems for the user. The user firstly must not walk very far to the station and the rest of the facilities, with that the user needs to be protected from any man-made or natural elements (Wright & Hook, 2007: 232).

The platform parameters as articulated by the Tshwane Bus Rapid Transit Operational Plan (Advanced Logistics Group, 2008: 78) suggest the following:

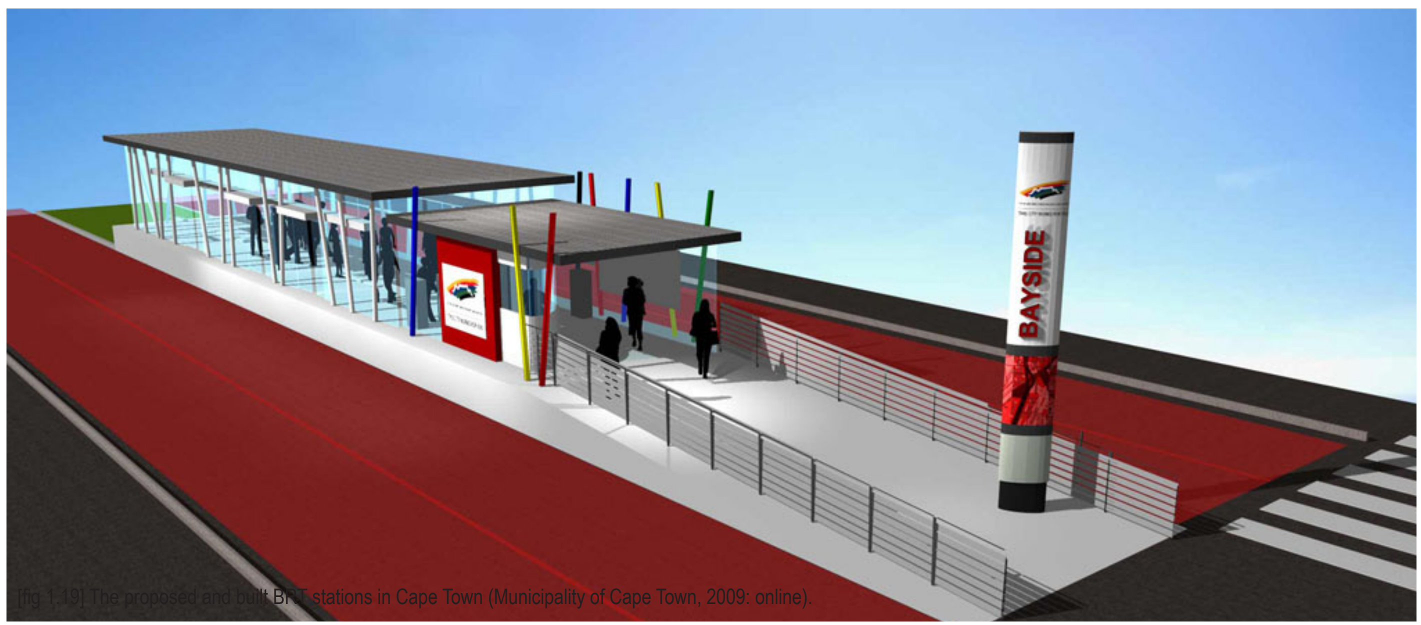
1. the station must be located in the middle of the transportation corridor;
2. the platform height needs to be 940mm above finished ground level;
3. the platform should be 1.7 times the length of the bus;
4. There must be entrances on both sides of the station;
5. doors should be 1100mm wide; and
6. the platform needs to be 3 – 4 meters wide.

On route1 the proposed station will require 2 bays while route 2 only requires a single bay per station.

The platform size depends on the number of users of the BRT system during peak hours (5am – 8am). The regulations states, for a 1m wide corridor to apply to the BRT regulations it needs 1m2 for every three users, which implies that a 1m corridor can accommodate up 2000 users per hour (Advanced Logistics Group, 2008: 78)

In terms of the security: there needs to be a security system on site to ensure a closed and secure station. This will provide a better surveillance system that ensures a safer off-board payment system which is integrated with the system where the user pays for zone to zone traveling. The proposed stations will have an off-board payment system, which will help with the safety and security of the user.

Provision needs to be made for the high influx of passenger flow for future usage, which needs to circulate as efficiently as the current trend of passengers. Therefore the proposed stations must have minimum of two doors to receive arriving passengers, while the bus must have three doors. All of this is implemented to ensure a quick and efficient transfer of the passengers. The minimum door width regarding the BRT bus regulations is 1,1m and it has to be mechanically operable to ensure the safety of the passengers as well as prohibiting any chance of escaping. Our local example of such is door system is seen in the Johannesburg BRT bus, where the doors are operable with the control by the bus driver.



[fig 1.19] The proposed and built BRT stations in Cape Town (Municipality of Cape Town, 2009: online).

Future sustainable methods such as pedestrian and bicycles also need to be accommodated within the spatial development of the station, to help ensure an effortlessly transfer between the different travel modes. These parameters for the station will promote a safer environment for the user and ticket control.

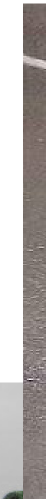
Classification of Bus component

The proposed BRT bus type will be same bus used as in Johannesburg BRT. The bus is 18,5m long, is articulated 930mm above ground level and makes use of a central axle system. They use of a Euro III engines that use cleaner diesel for fuel which creates a lower-carbon footprint.

In South Africa, our main source of generating energy is through coal power plants which make up to 95% of all of our generated energy. Therefore a more sustainable and cleaner fuel has been developed specifically for the BRT buses. These fuels consist of low sulphur diesel which generate the lowest greenhouse gas currently available in South Africa (Sasol: online).

The passenger loading number for these busses is 130 passengers and a bus has three 1, 1m wide sliding doors (Advanced Logistics Group, 2008: 81). Studies have shown that a three-door bus functions more efficiently than one or two doors.

These busses are larger, heavier and have a bigger turning radius than a normal bus. A new sustainable surface material has been develop and implemented as a prototype in North Idaho, United States. The material is solar road panels. The sustainability aspect will be elaborated in the sustainability chapter.



[fig 1.20] Rea Vaya BRT service bus (Coggin, 2009: online).

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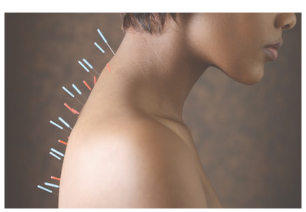
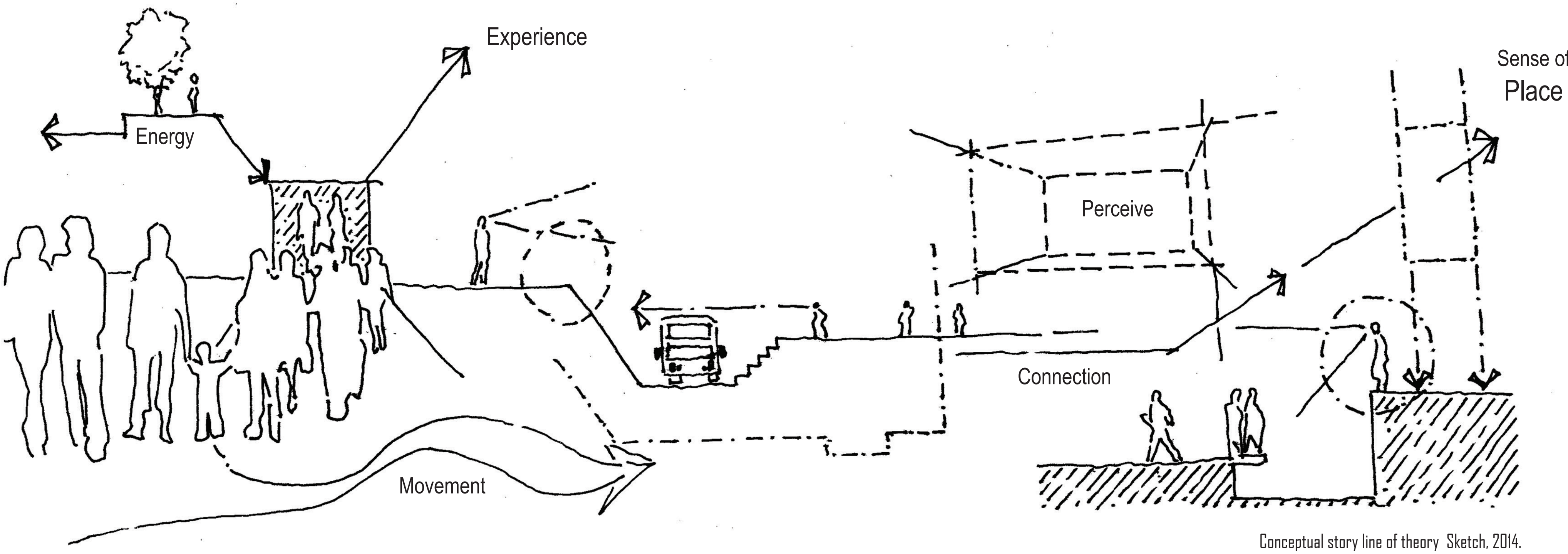


002 _ theoretical framework

STORY LINE

URBAN ACUPUNCTURE _ means the exploration of place through movement and social interaction, which can be achieved through physical or visual movement



Conceptual story line of theory Sketch, 2014.

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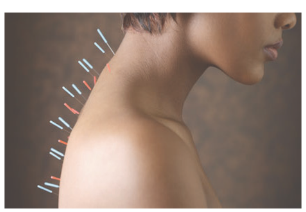


The concept Urbanism, living organism and urban acupuncture each explain a certain part of perceiving, experience and concepts how human perception is created. Composing these theories it initiates a better foundation of social interaction and a better understanding of the sense of place. While urban acupuncture focuses on the movement and experience of the individual to enhance his/hers sense of place.

Acupuncture the infrastructure urbanism

The Bloemfontein railway station site is situated in the heart of the central business district (CBD) of Bloemfontein. The railway line stands on the edge of the CBD, between the historic city center and the industrial & rural area(s). The railway line has long been a prized possession of the Bloemfontein community. Several layers of boundaries, mostly created by infrastructure, such as the railway tracks and factories, segregated the city from the rural communities during the apartheid era. This thesis deals with realizing and integrating the infrastructure into the existing urban fabric and its communities, effectively creating a fusion between elements of new- and Post-urbanism through material use and visual perception to enhance the human sensorial experiences. Rather than to compete with the historical railway station the proposed design will use the station as the main feeder source of providing commuters. In other words, instead of isolating the boundary between the two sites, the thesis aims to remove the boundary and create one continuous active public space. This tends to integration, rather than the removal of the existing railway infrastructure. Urban acupuncture will tell us how this action can be achieved, while the new- and Post-urbanism will explain what action is required to achieve the goal of this thesis.

New urbanism tends to be idealistic and pragmatic while Post-urbanism tends to be more provocative and sensational (Haas, 2008: 9). The crux will be to find the right combination between the two elements.

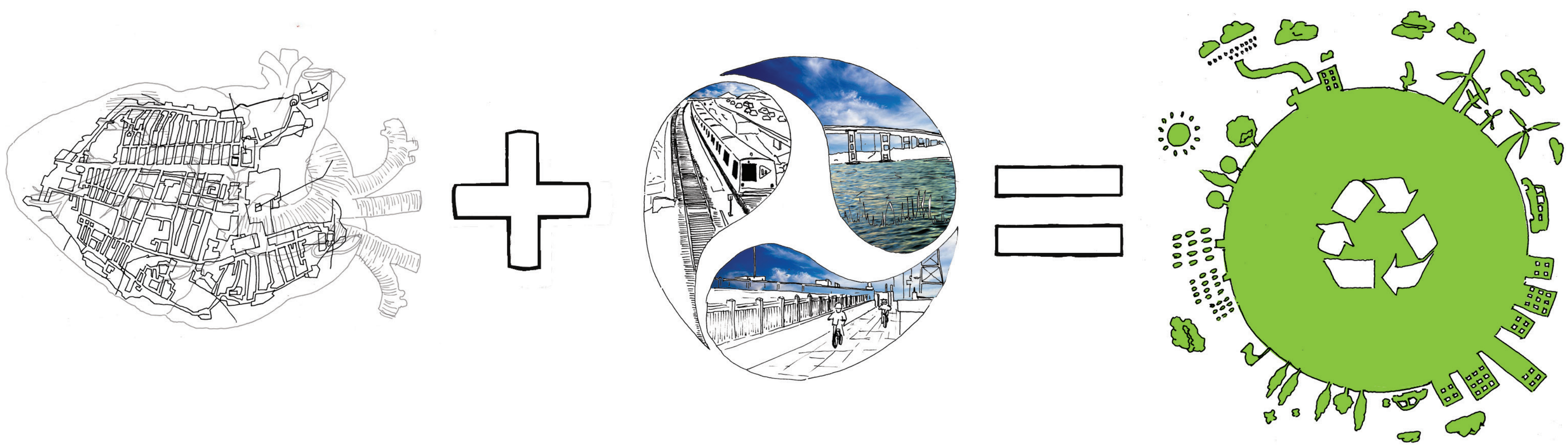
Landscape Urbanism arose in the mid 1990's, and has gradually become a common element used in dense urban fabrics and neighborhoods to add new energy to the fragmented context. The concept indicates the liminal zone (Kelbaugh, 2008: 43) That is vacant or forgotten (commonly found in South Africa with its dysfunctional public squares); a hybrid of possibilities waiting to be re-developed. These depleted spaces have potential but it is mainly obscured by intransient risk and exposures. These spaces need to be incorporated once again in the market trends of our society, because they offer new opportunities to the way in which we construct a better sustainable and interactive city. These Post-structuralist spaces tend to be more dynamic structures in terms of form and movement, all of which influence the fragmented urban spaces.

New Urbanism strives to establish a sense of community and promote organized movement by addressing the pocket spaces. The pocket space is used as an urban element that complements the regionalist architecture in the urban landscape. The main purpose of New urbanism is to create an integrated system of green (pocket spaces) and street spaces that are cohesive to create a more functional infrastructure. The local infrastructure provides a supporting framework for the operational needs of our society and enterprises, while the aim of New urbanism is the study of these pocket spaces. These pocket spaces tends to connect with the other developmental elements of the urban sprawl by utilizing regional public transit to help create a better functioning city organism. This tends to create integration spaces with the other urban living spaces by articulating the rapidity of motion and ease of access. In this thesis, new- and post-urbanism and urban acupuncture theory will be used as an investigation guideline to investigate spatial qualities and the structures, and then exploring it to its utmost potential.

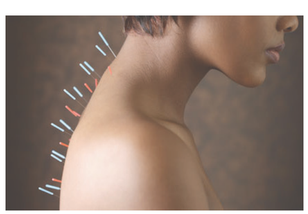
[fig 2.1] Urban acupuncture concept in a urban context (Oya, 2013: online).

[Urban Acupuncture]

City organism + existing infrastructure structure = 3rd Generation city



Summary of proposed design + theory = 3rd Generation sustainable city. Sketch, 2014.



Urban Acupuncture

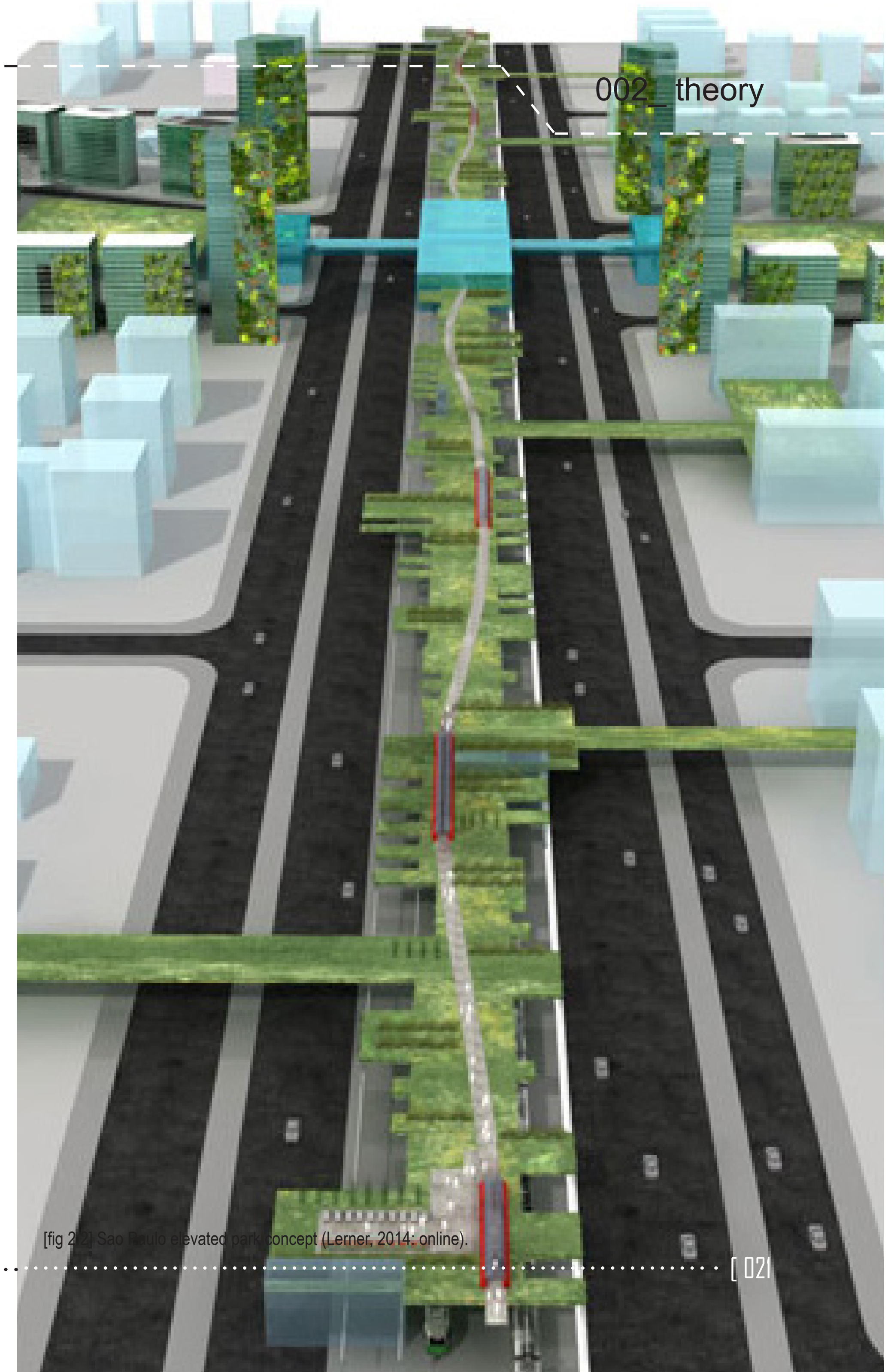
Transformation of urban space = urban acupuncture

Urban acupuncture as an architectural concept that emerged in the 1980's. This movement sought to create and harmonise the relationship between the city organism and nature. The theoretical discourse focuses only on the acupuncture principles derived from Marco Casagrande. The urban acupuncture movement is a theoretical concept which is an extension of the traditional Chinese acupuncture in terms of small-scale interventions (such as the BRT proposal) to transform it into a larger active urban context. Casagrande talks about the city as a complex living organism which consists of pinpoint (vacant and under-utilized) areas in desperate need of repair (Casagrande, online: 2013).

Casagrande's theory regarding urban acupuncture is that it is solely a complex energy organism in which different overlapping layers of energy flows are determining the actions of the citizens as well as the future developments of the city. By applying the theory, it helps to clearly distinguish between architectural and urban space, which enables each citizen to utilize the urban space as his/her own. This encourages each citizen to express his or her own individuality within the existing social order. The BRT buses and taxis can be interpreted as being part of the structure, in a sense, a piece which can be manipulated and adopted to the desired functions of the of the user(s). Therefore, this part of the structure helps to manipulate the urban energy flow in order to create a sustainable third Generation City (Post-industrial city) (Casagrande, online: 2013). Holmes states that essence to creating a new functional city is the relationship between the city organism and its transportation infrastructure and the "link of the city to its own history and cultural heritage" (Holmes, 2008: 63); to acknowledge the social culture with the pocket public spaces of the city.

The thesis will investigate the four key principles of urban acupuncture by Casagrande within the framework of New- and Post-Urbanism; they consist of the following:

- disconnected forms and spaces;
- time;
- mobility; and
- provocative architectural construction methods



[fig 2.2] Sao Paulo elevated park concept (Lerner, 2014: online).

Essence of time in Urban Acupuncture

Transformation of time = Past, present & future

Acupuncture seeks to reactivate the past, present and looking ahead towards the future in terms of expressing revitalization and sustainable architecture to the urban spaces, and the functions, which currently exists. The perspective of time can be seen as a complex & constant element that allows the idea of the past and future to create an interwoven element, which is introduced within current contemporary architecture.

Architectural work is in a constant state of growing and adaptation. All that it needs is the acupuncture element of the individual to revitalize or sustain the function of the pure original idea of what the architect intended. Hence, the concepts should not merely focus to accommodate the current situation and polemics, based on the history of the space, but rather contribute for better possibilities in the future. With the implementation of this concept in terms of architecture, one needs to ask oneself, how can the acupuncture space be transformed to help cater for the future social needs in the community of Bloemfontein? The proposed design is therefore seen as the

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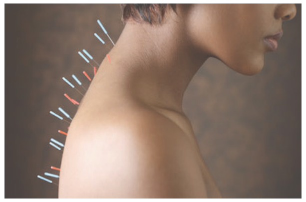

[fig 12.3] Time Warped _ Many ways how man experience time (Ashbrook, 2014: online).

initial acupuncture needle that can regenerate one of the pinpoints in the city organism. The proposed design addresses the future developments in the area such as the new train system, Hoffman Square and the already built Intermodal Transport Interchange, which was complete in 2012.

The proposed design also acknowledges the rich architectural history of the surrounding area and the significant placement of the railway station and the railway lines. Throughout the design the architectural materials used is chosen for the sole purpose to be robust to withstand any damages from users and nature. Secondly, the material is chosen to indicate time and its passing by how the material character and abilities transform over time. Emphasis is placed on the choice of materials to communicate the necessary message, the following materials were used namely corten steel and galvanised mild steel.

[fig 2.4] Brick (Socttile, 2011: online).

[fig 2.5] Galvanized steel (Robertson, 2013: online).

[fig 2.6] Corten steel (Burgen, 2012: online).

[fig 2.7] Timber (Uknata, 2009: online).

[fig 2.8] Taipei Organic Acupuncture (Casagrande, 2011: online).

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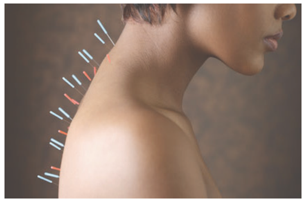


Pressure point space

Looking from the architectural perspective, New- and Post-urbanism is attempting to merge the urban mixed-use space and infrastructure into one harmonious urban space.

Jill Grant states (2008: 117) that these mergers are roughly created by 10 ideas. The thesis will only look at four key principles, all of which forms the outline of New- and Post-urbanism. This will be applied through the principles of urban acupuncture namely, architectural construction methods, through symbiosis, smarter and more effective public mobility, connectivity and sustainability through time.

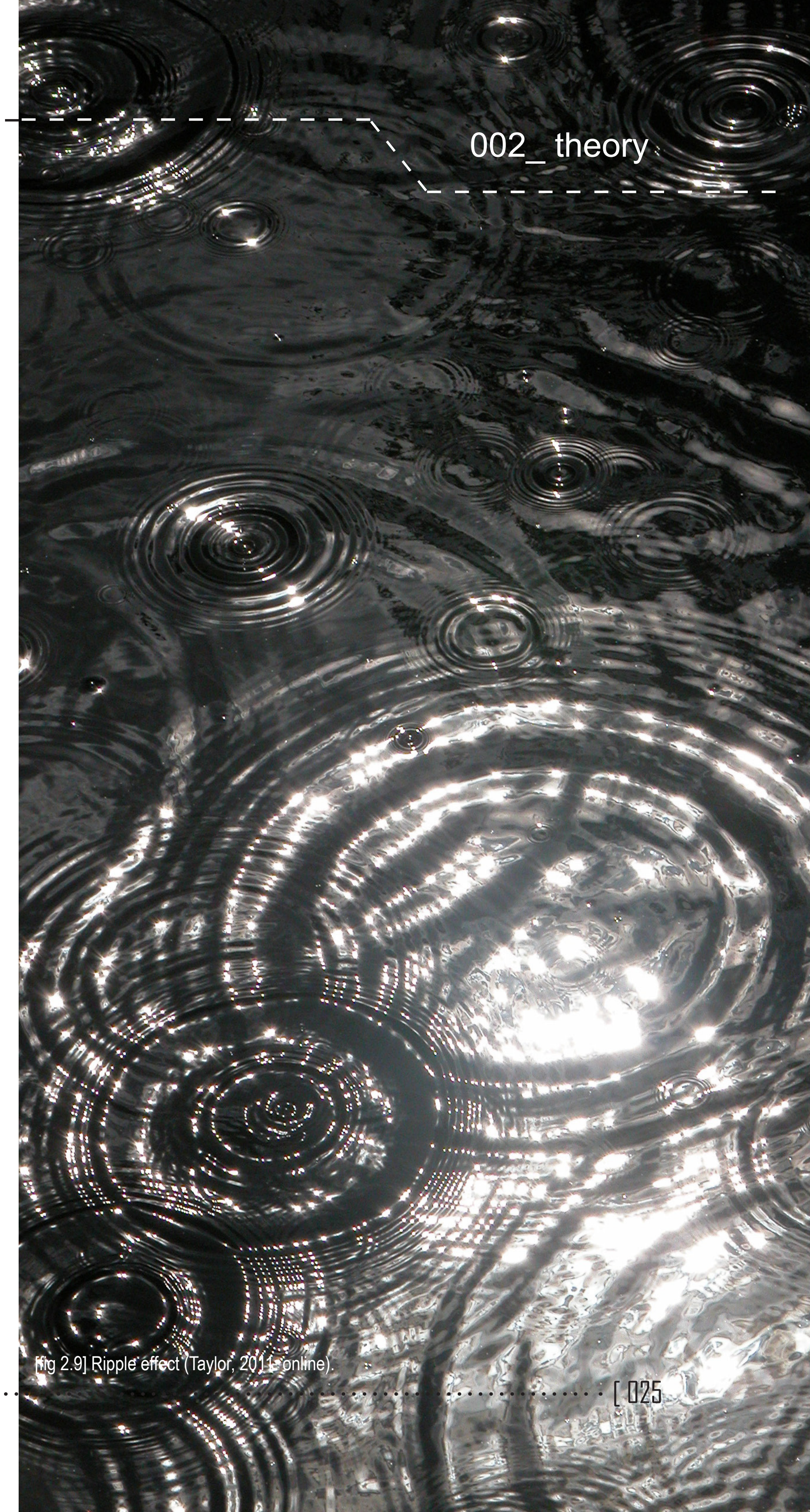
Reactivation of the pinpoint areas

Throughout the urban and infrastructure environment, there will always be urban conflicts.

Casagrande states that once an urban space is in conflict it will relieve stress and release new positive energy in the surrounding context. These mixtures arose from the constant conflict between the different public infrastructures competing against one another (road and railway systems) which tend to be impossible to separate otherwise the region's infrastructure cannot function to its full potential. This conflict of infrastructure spaces is merely a combination of the dynamic infrastructure with the static pedestrian systems; this is seen as Everyday Urbanism (1998: 52).

Chris Leinberger states that Everyday Urbanism tends to function as low as the financial system would allow it, to give power back to disadvantage communities by working in the in-between spaces of infrastructure networks (Kelbaugh, 2008: 42).

> "...the public sphere is a collection of material and institutional common spaces, in which the members of society meet to share experience...and create meaning..."
>
> (Madanipour: 2008: 117)



[fig 2.9] Ripple effect (Taylor, 2011: online).

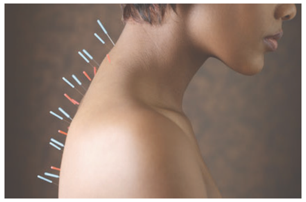
Generating acupunctural architctural exploration through Mobility

Fusion of movement and energy creates pressure point spaces, dynamic movement integrated into underutilized spaces = revitalize.

The urban world of the 21st century is expanding and transforming at a fast speed. The 21st century cities comprise of numerous nodes, webs and links which create a new urban landscape of globalization and impose a different logic of space and time perception in our society. The need of mobility of the individual and information is constantly increasing in demand, and endangering our traditional closed living structures (Kurokawa, 1977: 43). The Development Acupuncture in Brazil has been characterized by the accommodation of movement, and reclaimed the ownership of land to the public and emphasized the importance of community development through stations in the design of cities; accommodating the slow pace of traders to the fast pace of public vehicles.

The 21st century cities are clearly divided into three kinds of spaces namely, social, function and recreational spaces. All of these spaces are connected by some form of formal or informal infrastructure transport facility. Taiwanese architect and academic Ti-Nan Chi believes that for transportation and the transition spaces to fit into our current urban spaces in which we find ourselves, we need to rethink it carefully by coming up with a more sustainable way of transport (Casagrande: 2013).

[fig 2.10] World wide connection (Hegman, 2013: online).



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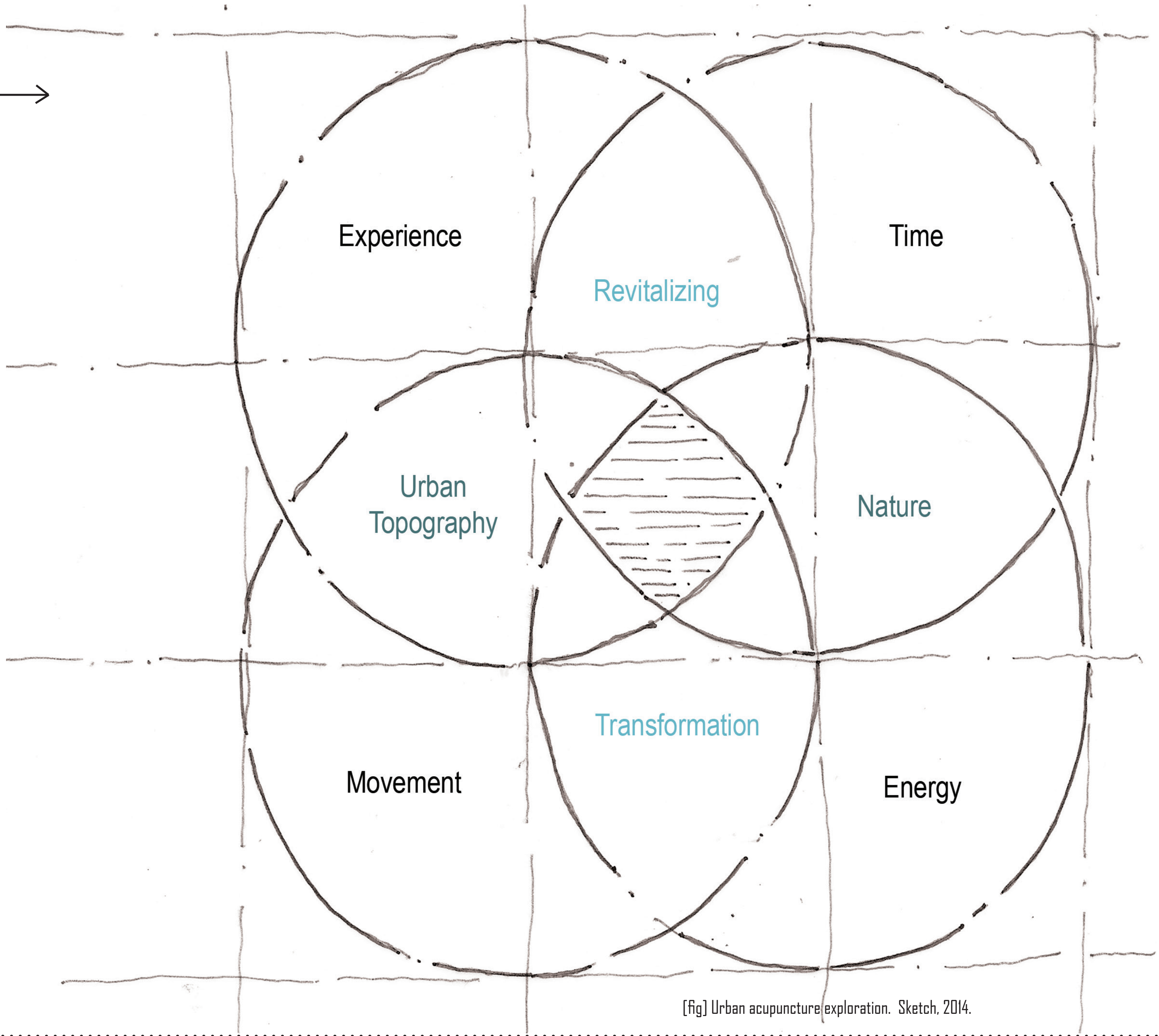
[fig 2.11] Connection methods (Hegman, 2013: online).

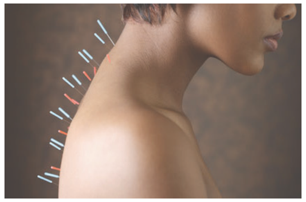
[fig 2.12] Connection methods (Snyder, 2010: online).

[fig 2.13] Man running on the beach (Bassanese, 2011: online).

Urban Acupuncture



[fig] Urban acupuncture exploration. Sketch, 2014.



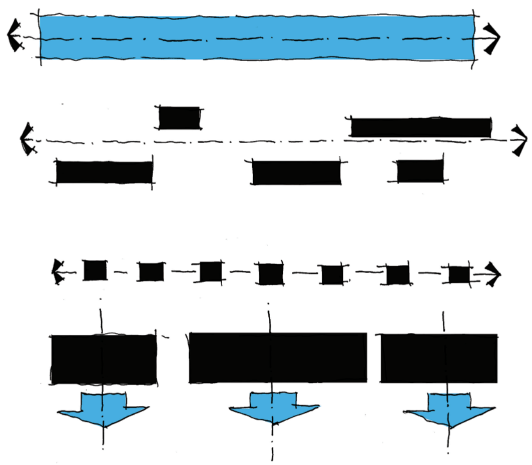
[fig 2.14] Transport in motion (Maher, 2012: online).

Spatial organization methodology of circulation

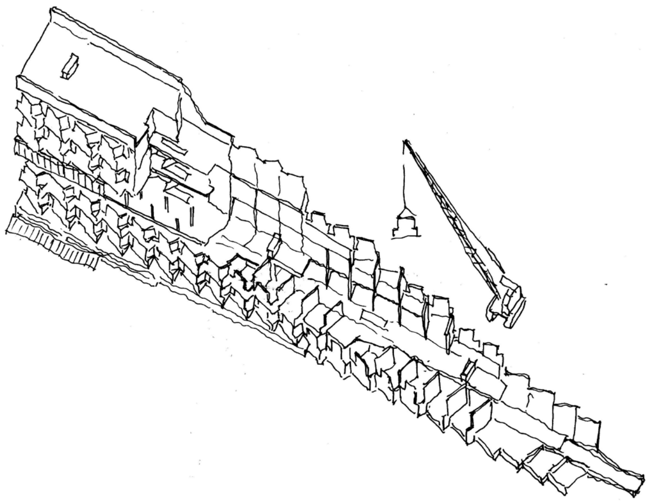
Series of organized spaces = movement = experience

Ching states for a linear space to be organized it needs to consist of a series of spaces. This can be achieved by being directly connected with one another or by visual connections. To prevent that the linear sequence of space start to become too long, one can incorporate different functions along this route. One can achieve this by articulating the sequencial sizes or form. Since the characteristic of a linear organization is experienced as a journey from one space to another, it tends to express direction, movement, growth and future extensions (Ching, 1996: 206). From theory to practical example, James Stirling used this method to demonstrate linear growth, making use of repetitive formwork in his Runcorn New Town Housing proposal.

The proposed Interchange takes on a combination of a linear and organic typology, emphasizing the concept of future expansion (that is, it transforms to the social needs of the time) and linear circulation (pedestrians or vehicles). The Interchange is conceptually split into two by the security lookout tower (axis-mundi), acting as a transition space (gateway) from the historic station plaza to the new developed interchange space.



[fig] Functions articulates the fragmented linear spaces. Sketch, 2014.



[fig] Contiuous sequence of spaces - Runcorn New Town Housing. Sketch, 2014.

[fig 2.15] Southgate Estate in 1989 (Pearman, 2010: online).

[fig 2.16] Southgate Estate in 1989 (Pearman, 2010: online).

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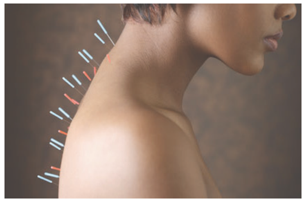


Transport Hub Centres

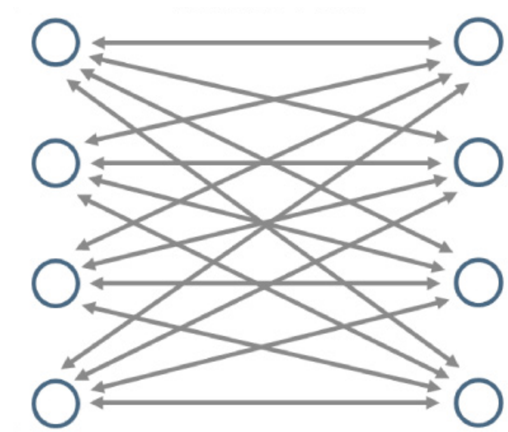
Hubs = urban facilitators = Interchange = movement

Transport hubs have become very clear key elements within the 21st Century city. These transport hub centres can be seen as gateways which connect different layers and boundaries with one another by making use of the different interchange systems. In many cases, these interchanges of movement have developed into a system, which consists of more than just mobility, but with a variety of formal and informal functions. These pinpoints (transport hubs) act as facilitators within the city, since it tends to control the public infrastructure layout; in other words, how it connects the entire public infrastructure at a single point (Newman, 2008: 187).

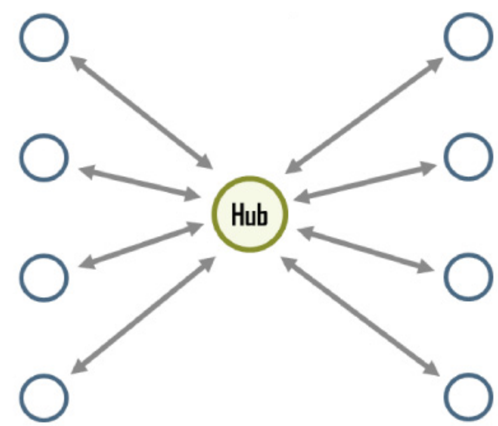
These infrastructural hubs of the 21st century consist of two very important elements which have been present for many years namely, the traditional railway system and contemporary airport system. Without these two hubs the infrastructure of the city would have surely collapsed. Mokena Makeka, a renowned South African architect, states: “We have inherited infrastructure that is problematic and it is close to impossible to entirely change our cities.” (Makeka: 2013). However, he also states in the same sentence that the power of the community is such that it can create new opportunities in these spaces. These two prominent infrastructures have created universal opportunity since it can connect communities and information to the outskirts of the city centre. The current situation is that these systems are totally detached from our daily urbanity. Zuger states that these knots have transformed from a detached urban systems into a new infrastructural force (Zuger, 2011: 202).

The erection of the Bloemfontein railway led to a new infrastructure which helps sustain the infrastructure. This took place in 1890, connecting Bloemfontein to Cape Town; this resulting in a central location within the city and the nation. During this era the railway infrastructure was acting on its own, connecting to the historic city layout on the British axis (East-West). The expansion of the informal public transport system and security issues on the railway routes, led to the decay in the railway infrastructure. This caused the railway infrastructure to adopt and start becoming an independent network. By doing so, it resulted in the railway infrastructure immediately segregating itself from the rest of the city by putting up a fence in front of the station plaza, creating boundaries to the streetscape and its users. The interchange typology is a relatively new typology in South Africa, but as the railway station bridges over the railway line, in a similar fashion will the proposed thesis bridge over the two sites to create a linear active continuous space.

Abstract diagram of current transport system



Abstract diagram of transport hub system



[fig] Diagram indicating functionality of a transport hub. Sketch, 2014.

Interchange archetype typology

Interchange = typology

Transport buildings have been identified as the gateways in and from the city since the early inception of their services and placement. Transport Interchange buildings have become new benchmarks of social and economic progress in our country. For example, the new infrastructure transport era of our time will provide the conceptual motivation for the future of mass transport strategies and designs. Steel and cast-in-place technology is the stepping stone for our sustainable contemporary construction era as well as the combination with critical regionalism methods, these techniques conceived the interchange shed typology. The concrete, steel and brick interchange shed has become an enduring socially recognized archetype in South African transport infrastructure.

The brutality and robust architecture in South African traders markets have become vibrant spaces created by muscular rhythm of repeated concrete and brick structures and light. Local examples of such interchanges and traders markets include Baragwanath Public transport Interchange and Traders Market, Metro Mall transport facilities and traders market, Kuyasa Transport Interchange.

As public transport enters a new era of sustainable, more efficient networks, it needs to celebrate the origin of the archetype but then again create a more sustainable and region response.

BRT systems around the world, especially in the South American countries are implemented to create a balance between overcrowded populations per square metre within a small confined space with the efficiency of the transport infrastructure. Therefore, the BRT system needs to be promoted and implemented as a quicker, affordable and sustainable alternative to any other road transport system currently utilized in South Africa. This is all based on the grounds of economic and conservation decisions for the sustainable future (Lerner, 2014).

[fig 2.17] Internal arcade space (Flickr, 2007: online).

[fig 2.18] Street edge (Flickr, 2008: online).

[fig 2.19] Informal traders area (Flickr, 2008: online).

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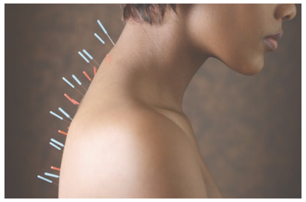


Integration of trader systems

Vacant space = public spaces = trader systems = social interaction

The dynamic high tempo infrastructure system tends to create a sterile space around it; it is for that specific reason that trader systems need to be erected to add additional functionality to the space. This needs to happen firstly, since it creates a balance between the two systems; Secondly, the systems are dependent on each other to function as one harmonized system. This method is implemented to revitalize the surrounding context. The static acupuncture system is produced on a small-scale, but promotes a ripple effect as a socially catalytic intervention into the urban fabric (Lerner, 2014). In conclusion, the combination of the dynamic and trader infrastructure systems will act as the catalyst for the pinpoint spaces.

New urbanism tend optimally utilise every piece of space within the urban context. Jill Grant (2008: 120) states that no matter the circumstance of the space, it contains a certain social and spatial vastness. Once the space has been abandon and stands vacant, the development of the space tends to be challenged in terms of infrastructure what to do with the space. It is the community responsibility to identify the underutilized space and take ownership of it by modifying it to their specific need, revitalizing the site integrity and function. The proposed design must offer certain activities for the local community who will identify the project and which will fulfil their daily needs in these spaces.

Urban acupuncture makes use of punctual manipulation such as lightweight structures and in replaceable parts which then can be reused for different functions in the design. The persistence of the punctual manipulation series is that if material continues to break or underperform the material can be replaced without damaging the whole structure or system. Lerner states one should strive that each material used in the structure strives to be interchangeable; this contributes to the conceptual idea of urban acupuncture to sustainable structures, resources and their lifespan (Lerner, 2014). The proposed design will make use of the railway line as the dominant transportation service to deliver the pre-assembled modular structures which are then assembled and cast into place. The proposed design is perceived as public investment for the future. The structural modules have been designed to accommodate future growth of housing / retail usages on top of the formal shops and these parts can easily be replaced in the future. These housing units will overlook the public plaza space and will be accessible from the back of the shops.

According to Lerner, throughout the city many structures and spaces tend to become ineffective due to social changes. He is proposes that, adapting to these situations, one needs to design assemble kits and parts so that any part of the structure can be manipulated to accommodate the necessity of the social desires of the time (Lerner, 2014). In conclusion, urban acupuncture allows for renovation and interventions of the city's social space and needs. The level to which the space can adapt to the current social and urban needs determines its distinction as a punctual space.

[fig 2.20] Flower street market (Lacome, 2014: online).

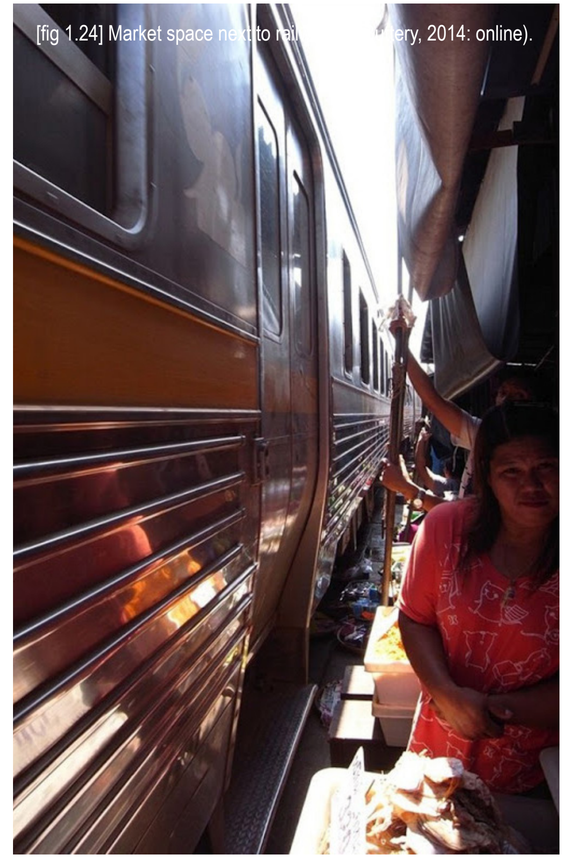
[fig 2.21] Mae Klong railway market (Hartung, 209: online).

[fig 2.22] Italy street markets (Donatella, 2011: online).

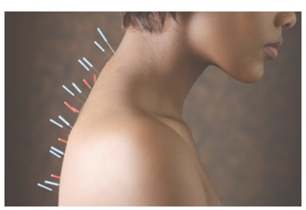
Casagrande states that the urban acupuncture concept is a design tool where ‘punctual manipulations’ contribute to the creation of a sustainable urban sprawl. This concept allows the structure to adopt and transform to the extent it is satisfactory for the local community. He combines urban design with the traditional Chinese medical theory of acupuncture in order to understand the city (Rasmussen, 2012 87). “…[I]f an element is unhealthy or unbalanced then the effects are visible in the urban fabric. Each element is of equal importance and the balance of all is fundamental to a sustainable environment.” (Frank, 2011: 17). In terms of the architecture, it tends to acknowledge the transformation of social, spatial and durability structures, for that reason, punctual manipulations becomes a key architectural tool.

The role of urban acupuncture has altered since the beginning; the role of a designer (architect, urban planner or developer) nowadays is to present not just a current solution for the problem but also a future development framework as well. The thesis proposal will show that the traders’ facilities structure would be developed in the future as small housing / retail units. The structure has been designed to accommodate different functional types on top of the structure, whether it is housing units, offices, medical suites or a satellite police station.


[fig 1.23] Market space next to railway line (Buttery, 2014: online).


[fig 1.24] Market space next to rail[illegible]ttery, 2014: online).

All of this offers different functions towards the interchange, primarily modifying use of the space. In principle the space can transform into many diverse types of dwellings, which aids the community to implement their system within this infrastructure.



“Beauty lies in the eye of the beholder – reality is what one perceives it to be” _ unknown

New sustainable Post-urbanism (Landscape Urbanism or Infrastructure Urbanism)

Casagrande states that urban landscaping acts as an urban therapy to solve the sickness of our 21st century cities (Casagrande, 2013). He sees the treatment as ‘bio urban acupuncture’, which is a revitalizing Chinese remedy practice on an urban scale, in order to activate the healing processes in city organism. These puncture landscaping of greenery can be seen in the renowned Brazilian architect and urban planners work, Jaime Lerner’s, whose urban idea of sustainability was implemented in Curitiba, which consist of an integrated land use and introducing the first BRT to the world (Hidalgo, 2014). Lerner’s idea was specifically focused on the ecology and natural sustainability of the city while working in a poor community, which can sustain itself through simple solutions.

Symbiosis of acupunctural boundaries

Urban landscaping = relationship = architecture + society

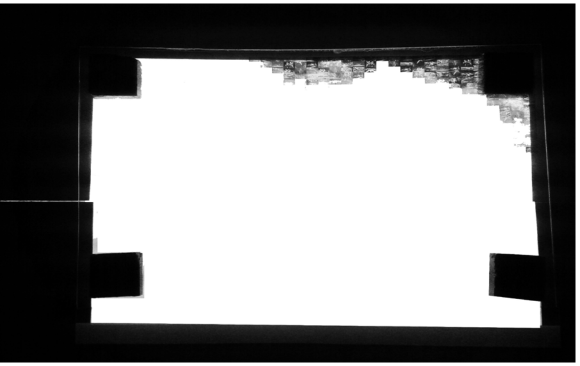
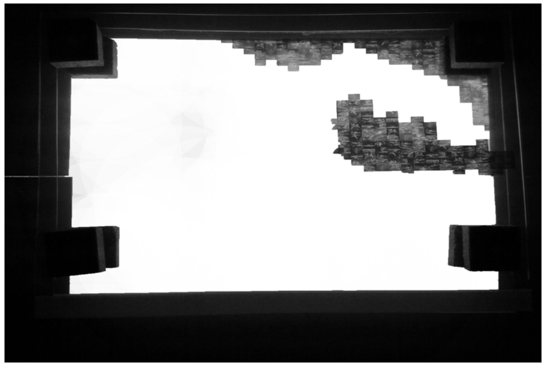
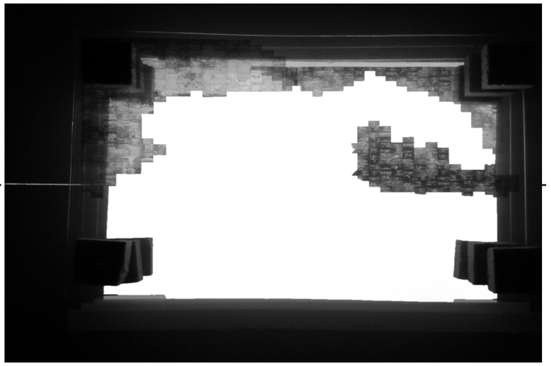
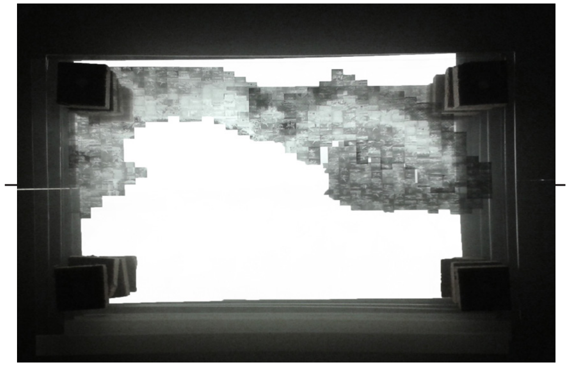
Cities throughout time have always played a fundamental role in the way communities integrated with the surrounding context. In a utopian domain, cities would have been constructed in such a way that could have allowed for the perfect symbiosis connection among the community and the context.

These connections are articulated and acknowledged through the ‘crack’ space. In architectural terms, these spaces are that which articulates the different boundaries from street edge with public square, man-made with nature. Casagrande states that in Taipei the weed grows from the cracked concrete and asphalt, showing the continuous connection between the man-made structure and nature (Casagrande, 2013). Between these two spaces exists a liminal space. The intermediate space has developed as an important architectural element to help contemporary architecture not to be experienced as alienated structures in a rich historical architectural context.

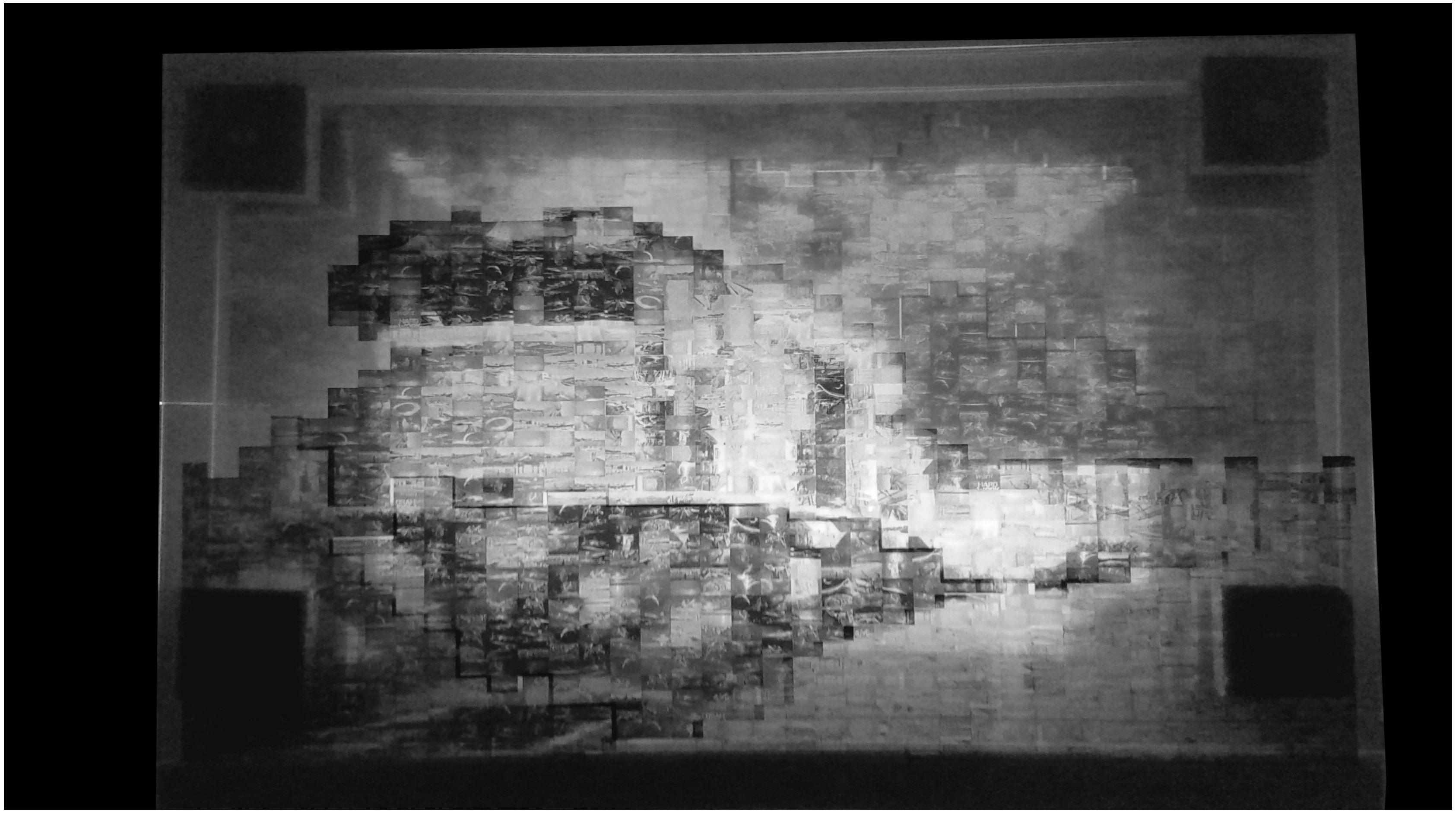
In the design, there is symbiotic relationship between the street edge and public square spaces, all of which flow into one another and continue through the existing urban fabric (Casagrande, 2013). To achieve this, one need to bluer the street edge boundary as being part of the public square space and vice versa.

Conclusion

The fundamental theory of acupunctural boundaries is that one needs to identify the significance of the relationship among urbanity, our current society needs and architecture of our time, all of it in a continuous transforming state throughout time.

Touchstone _ The creating of an abstract art work which guides the design process by exploring the conceptual and theoretical approach regarding the thesis.



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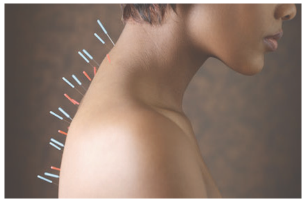
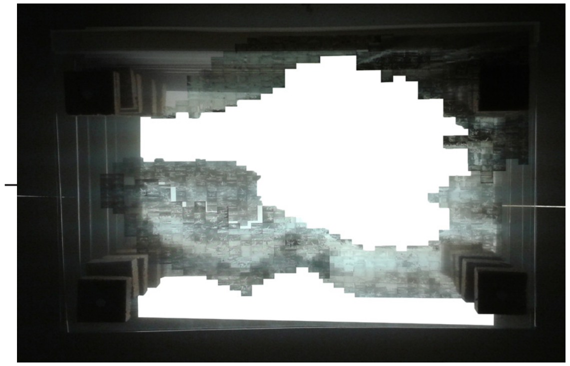




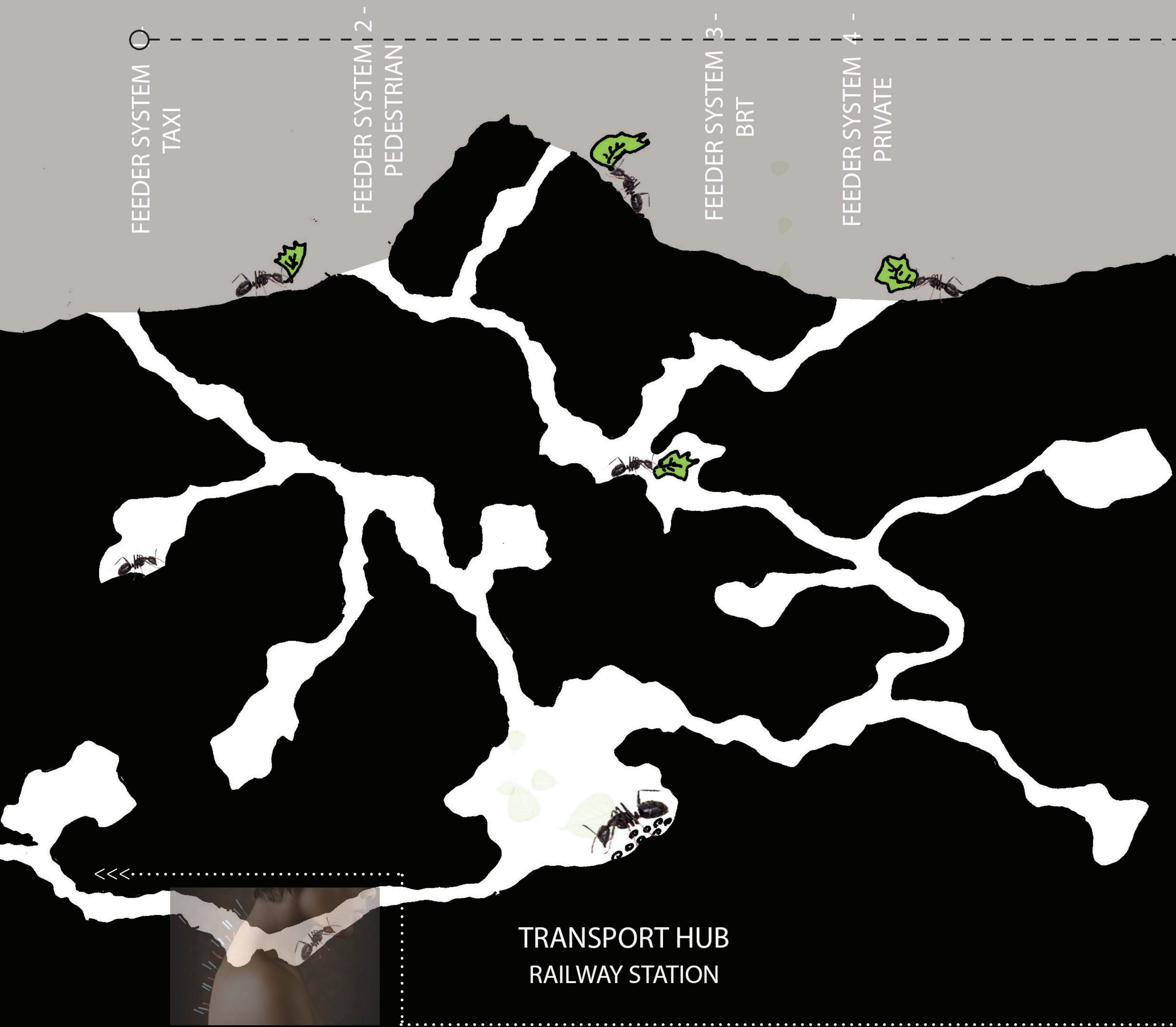
T o u c h s t o n e >> >

I made a collage of layered of images on a single huge image to form a mosaic, to illustrate the transformation that an object undergoes when one starts to compile different networks on top of one another, creating a new network of meaning and memory.

This process demonstrates the idea of Juhani Pallasmaa: that we as architects do not invent anything, we merely transform reality, using the natural potential of the situation to reveal what exists (Pallasmaa, 2009: 16).

In order to represent the site as a pressure point within a complex city network, a touchstone was created. A touchstone was made by taking perspex (plastic) and placing various small images together to create a single image with a specific memory and meaning.

The plastic was connected with timber by punching nails through the plastic into the timber as anchor [acupuncture] points between the decay and vibrant areas in Bloemfontein. Following this, a small copper pipe was glued, to the timber to articulate the joint. The process was repeated 10 times in order to achieve the final product – a single image. The timber and copper pipe runs through every layer to illustrate a common thread that binds history with the future of public transport.



CONCEPT

The concept on how the transport interchange (BRT) will become a catalyst and facilitator for place making is derived from how ant tunnels act as catchment to then distribute the food to the queen's nest (railway station).

The transport will therefore act as a transport hub that will distribute to different parts of the city centre and suburbs, while also acting as a feeder system for the railway industry.

The concept is also enhanced by the idea of how the station plaza [currently experienced as a non-place] is transformed into a sense of place and meaning for the everyday user.

003 _ Contextual investigation

Regional analysis [macro]
- History
- Development growth
- Environmental study

Site analysis [micro]

South Africa cosmology

South Africa has produced numerous segregate and isolated cities under the Apartheid government, which isolated the city centres from the suburbs. From a racial perspective the areas was deliberately segregated from one another to articulate the diverse South African population according to their race (Du Plessis, 2003: 246).

This development has led to a fragmented and unsustainable city organism with isolated suburbs. This gave rose to a dispirited need of developing a sustainable, affordable and efficient transport system, which connects these fragmental spaces generated throughout the Apartheid period. The BRT systems will conceptual help reconnecting these displaced societies in Bloemfontein as well as on bigger national scale as South Africa.

Three big provenances namely Cape Town, Pretoria and Johannesburg has already implemented the BRT system with great success since 2010. Throughout the thesis, it will become evidentially how important this transport system is for the rejuvenation of the lost urban connections.

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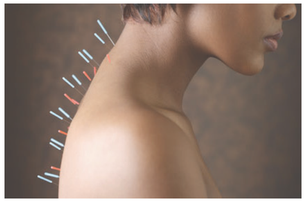
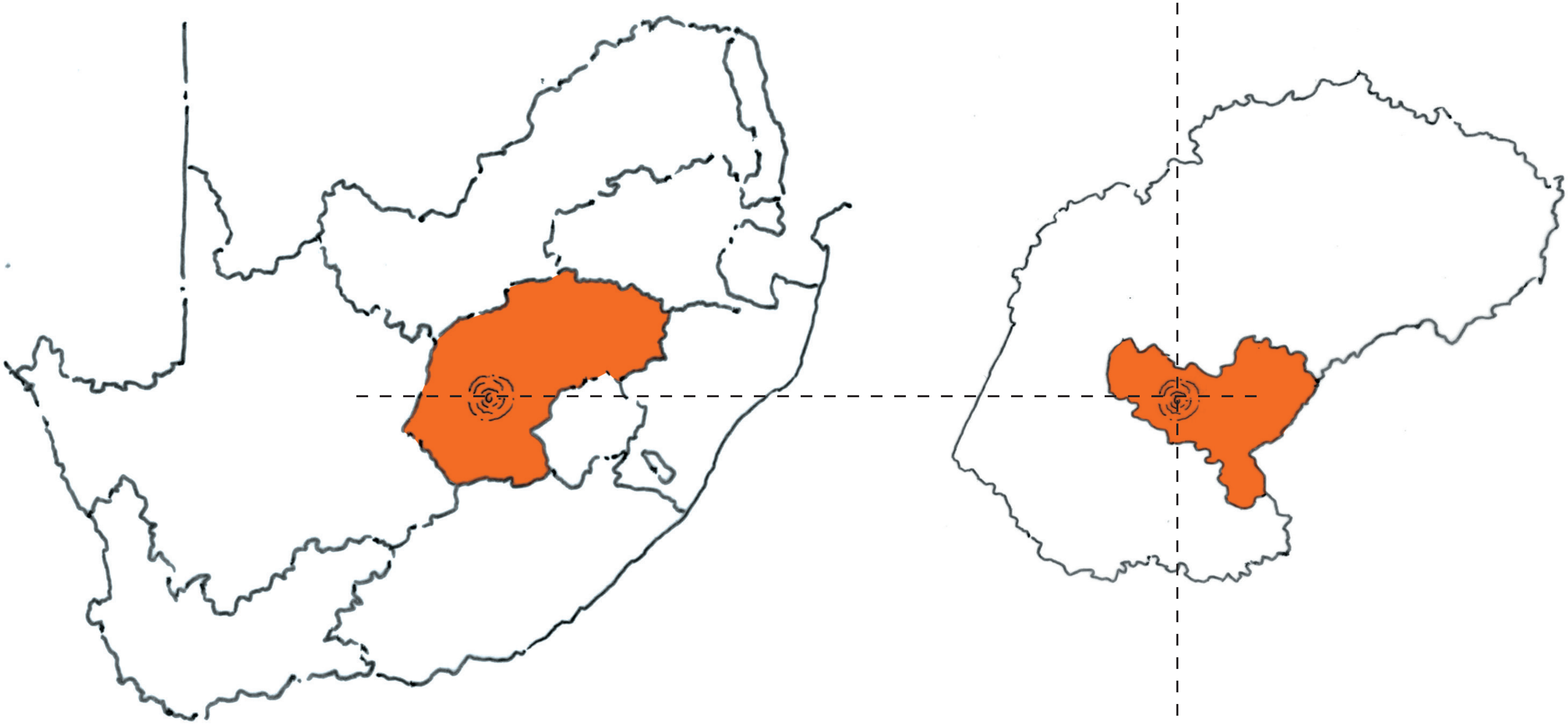
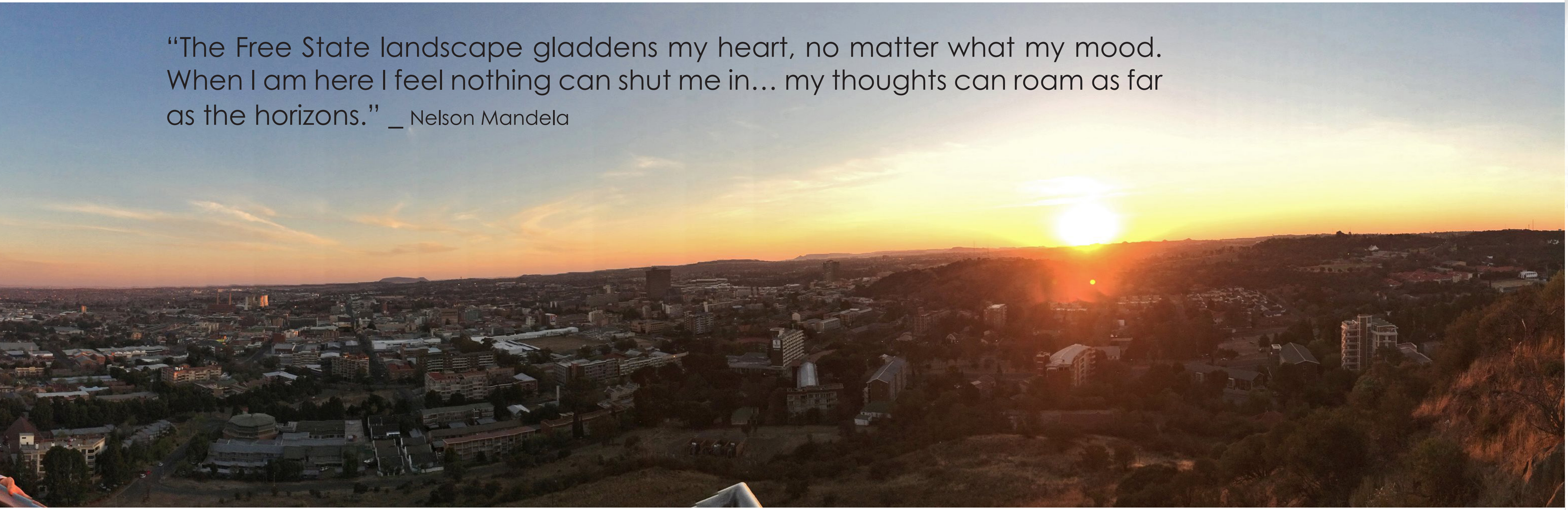


Regional analysis [macro]



Bloemfontein

29°07'S26°13E 290117°S26.217°E



[fig] Bloemfontein sunset .

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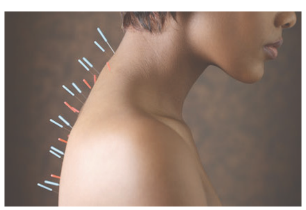

[Fig 3.2] Context plan. Sketch. 2014.

Overview of Bloemfontein [macro context]

[fig 3.1] Twin Spire Church (Le Roux, 2010: online).

DUTCH REFORMED CHURCH of Bloemfontein was established on 13 November 1848 and completed on 29 May 1852. By 1862, the church grown too small for Bloemfontein's needs and was designed by AW Wocker in 1874. The old building was demolished and in 1880 the new building was constructed. The structure was notable for its twin spires, and is commonly known amongst citizens of Bloemfontein as the Tweetoring Kerk (Schoeman, 1980: 30).

THE OLD MARKET BUILDING was erected due to the positive growth and use of the Hoffman Square. The building functioned as public building which served as city- and meeting hall, a room reading room and library functions. Since then Bloemfontein has noticeably developed in terms of its market squares and functions (Schoeman, 1980: 34-35).

FLOREAT AVENUE was erected as a vibrant street market which was utilized on a daily basis. It is situated on a strong pedestrian axis which connects the historic Twin Tower Church and Hoffman Square. It is a hive of local art and musicians.

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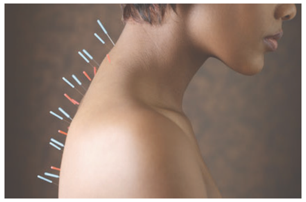


[fig 3.2] Hoffman Square (Kozak, 2010: online).


[fig 3.3] Bloem Spruit origin (Reichardt, 2012: online).

The historic HOFFMAN SQUARE was laid out in 1853 and is currently under construction to make Mangaung's streets and open areas, green and pedestrian friendly. In the middle of the square stands a huge monument which was erected to commemorate soldiers from Bloemfontein who were killed during the WWI and WWII. The monument is the only feature remaining of the old square after the area was changed in the 1970s (National Museum, online).

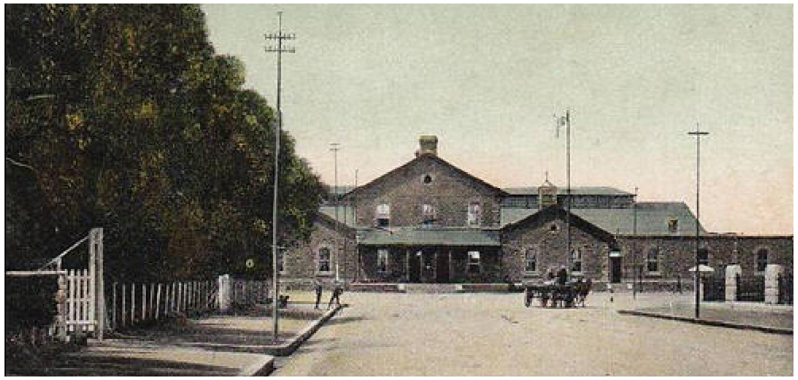
THE RAILWAY STATION of Bloemfontein is situated on the far east of the CBD edge in a large double story heritage building. The station accommodates an office, retail and vacant office spaces.

Seeing that the Railway Station is housed within a heritage building, expansion is not possible, although it is most certainly needed of renovation due to the lack of maintenance and vandalism.

THE BLOEM SPRUIT is situated in the heart of the city. With the development of Bloemfontein, the biggest concern was the shortage in a growing community. The British created a water channel, consisting out of clay and rock, which run eastwards to into a small dam, called Major Warden's dam to provide sufficient water to the Major Warden and his family at the time.

Later the Spruit served as a water source for the whole community of Bloemfontein, with this the settlement sprawl of Bloemfontein came to an end. (Schoeman, 1980: 4)

History



[fig 3.6] The railway station (Frescura: online).

[fig 3.7] Express train leaving Bloemfontein in 1928 (Allen, 2010: online).

Bloemfontein is situated approximately in the heart of South Africa, and was founded by Major Henry Douglas Warden in 1846. Soldiers and farmers were attracted to this land due to vast open country space and the absence of the horse sickness which occured over most of the Free State region at the time. All of them joined Major Warden at the natural spring where he settled.

D.E. Wentink designed and built the double-storey railway station in 1898, provisionally at the time the railway lines ran from the Cape to the Transvaal. The cornerstone was laid on the site by President Steyn in June 1898. Since 1895 people were drawn to Bloemfontein by the large quantity and variety of agricultural harvest opportunity from the region. The railway station provided a safe area to launch picnics and outings. The station was known as Railway Complex, which brought enthusiastic tourists and visitors to the Free State.

Additional construction work took place on the adjacent railway station to expand the functions, now the station building was bigger and more convenient. The construction of the station had a great effect in the in terms of crime, tramps and the selling of illegal liquor on the streets. Within three months of opening the railway, crime rates rocketed from 1528 in 1890 to 2316 in 1891. This gave way for the construction of the old Town Prison in St George Street in 1892 (Schoeman, K. 1980: 113).

The erection of the railway lines gave way for establishment of new stores and branches in Bloemfontein such Cleghorn & Harris, Hepworth and Chudleigh Brothers, all of them having a big impact on the local economic life of Bloemfontein. In 1970 the railway station was declared as a national monument (Schoeman, K. 1980: 115).

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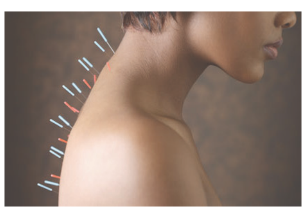

Development | growth

Bloemfontein has developed tremendously over the past 50 years into a strong agricultural city as it is commonly known. It has also increased in student and retired inhabitants with the development of new shopping, academic, and sports centers.

Unlike many other cities in South Africa Bloemfontein is not as limited in terms of expansion possibilities since it is only surrounded by rural communities and vast open landscapes. Real estate development is in an active state to the North and West of Bloemfontein where the N1 separates it from Universitas, and new development has stretched along the edge of Nelson Mandela Street. The industrial area to the East has also grown immensely during the past few years in terms of the urban sprawl.

People open shops and businesses in the CBD area of Bloemfontein to accommodate the influx of tourists during the festivals and events throughout the year. Many of these business owners would live in the smaller neighbouring suburbs like Noordstad, Langenhoven Park, Thaba Nchu, which all form part of the Mangaung municipality.

The public transport infrastructure and agricultural contribution form the cornerstone of the town's economy growth. The easternmost part of Bloemfontein, at the foot of the CBD edge, is Buitesig. This is the area where most of the lower-income inhabitants tend to stay, close to the railway line and industrial area. This residential neighbourhood consist mainly of the old railway houses of Spoornet.

Bloemfontein is also very fortunate to have a deep water reservoir and a protected nature reserve in the hill above the residential area of Noordstad, supplying the residents with it needed fresh water. Noordstad and the CBD areas have developed along Naval Hill forming a grid of roads, with Nelson Mandela Road running straight through it, splitting it up in two sections.

The Railway station and the annual rose festival at Loch Logan Waterfront, forms the central social hub of Bloemfontein, around which the commercial and older residential neighborhood have developed.

The society has redeveloped and promoted this idyllic backdrop of an Agricultural Village, using the cheetah as an icon and causing the CBD to lose its pure essence.

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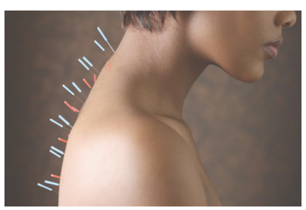
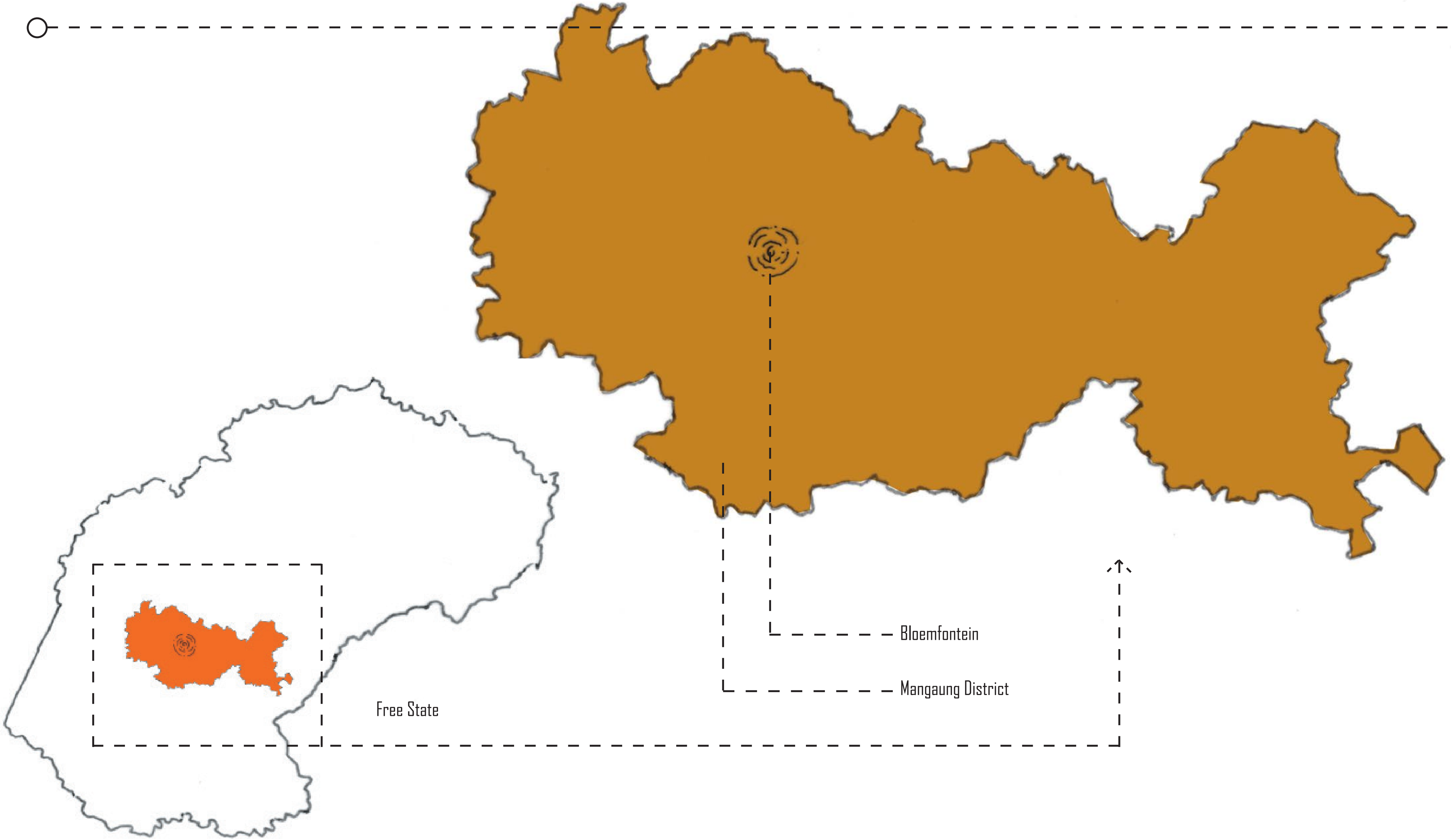
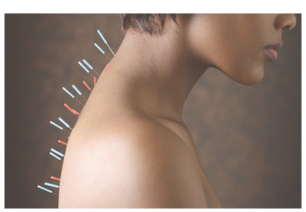




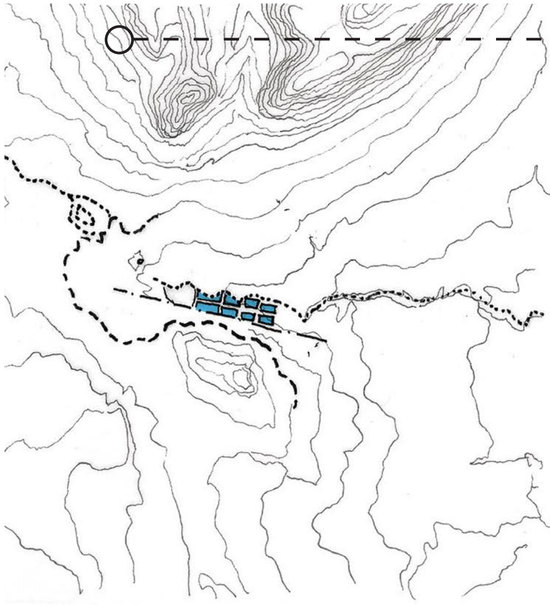


Bloemfontein location in Mangaung. Sketch, 2014.

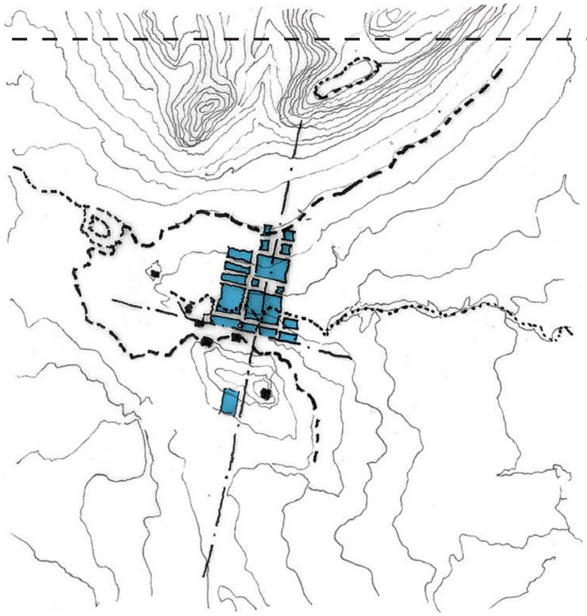
3D View of the CBD

Bloemfontein _ development of the past 150 years

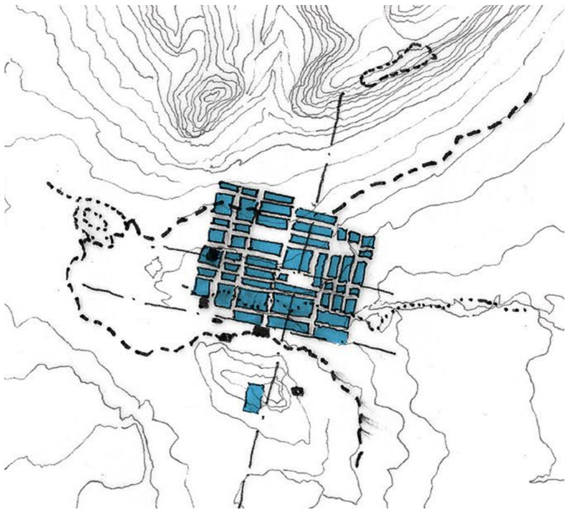
D e v e l o p m e n t | G r o w t h



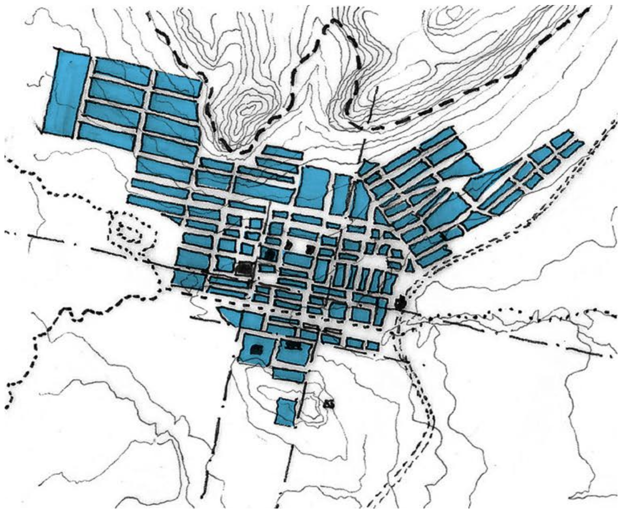
< 1854



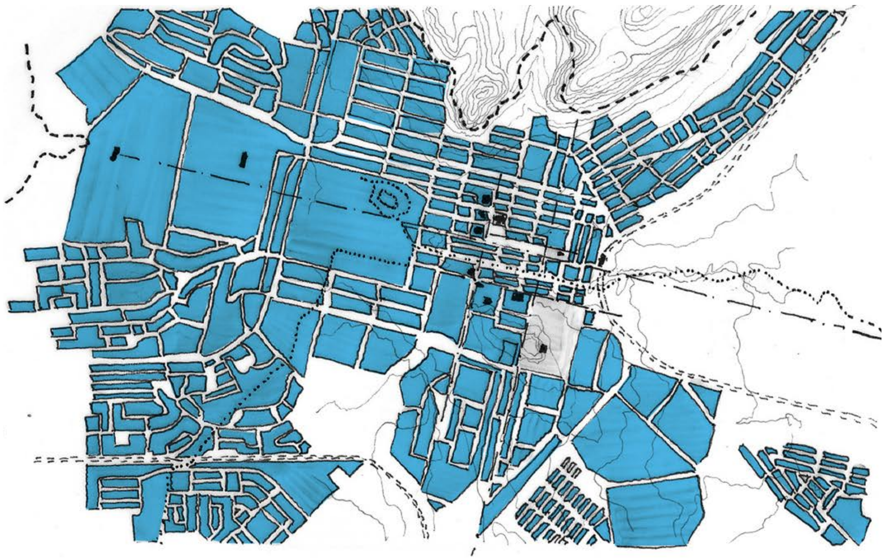
1854 > 1900



1900 > 1930



1930 > 1994



1994 > 2014

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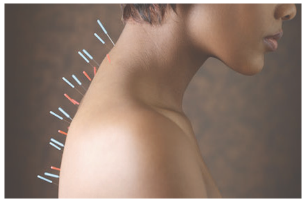
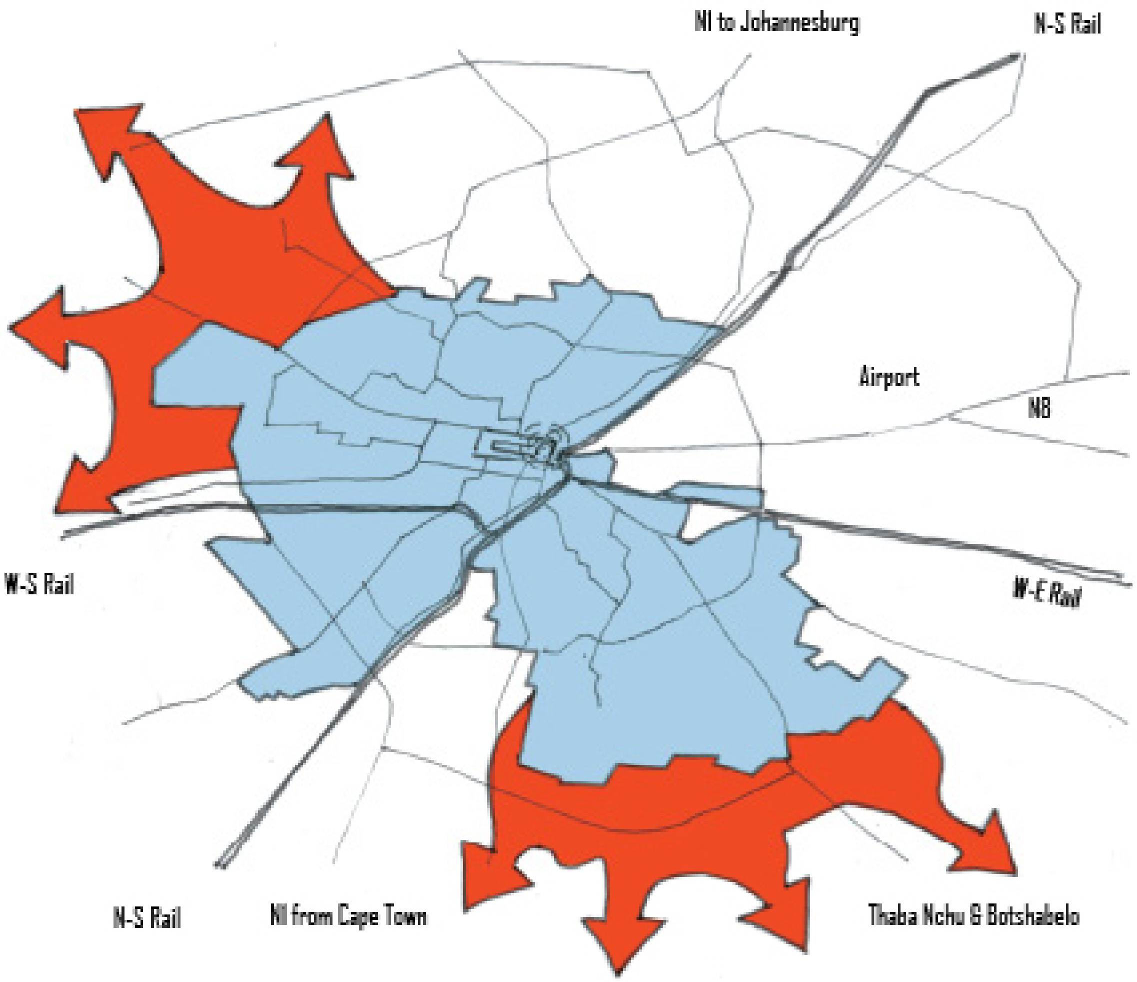


[Fig 3.21] Bloemfontein development over the past 150 years - Sketch. (Mangaung Municpality spatial development framework, 2014).

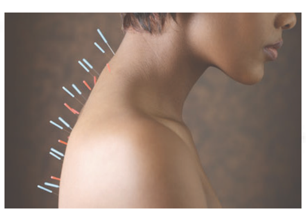
Urban | Developing areas



Bloemfontein's current development patterns

Strategic location of economic growth

[Influence of BRT development]



[Fig 3.61] Influence of BRT ysystem. (Mangaung Spatial Framework, 2013).

Bloemfontein demographic layout - Sketch. (Mangaung Municpality spatial development framework, 2014).

Demographic

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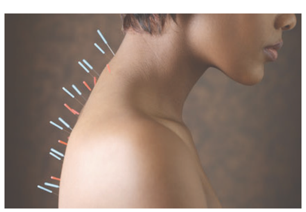
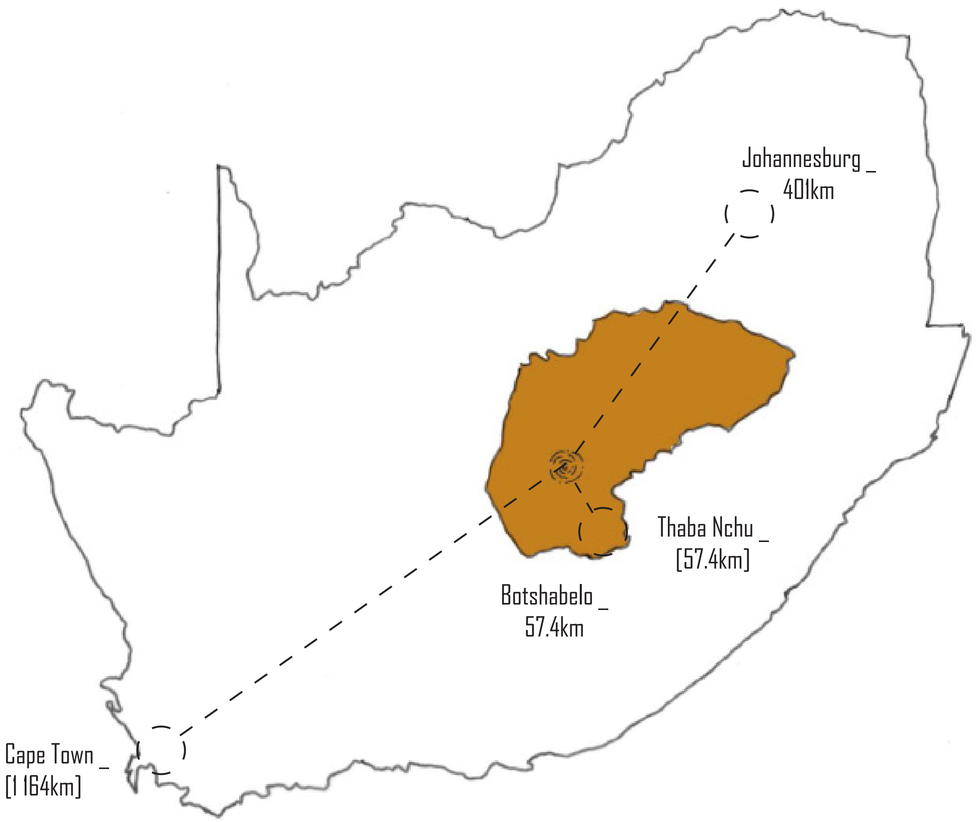


Traffic _ Congested areas

Site proximity



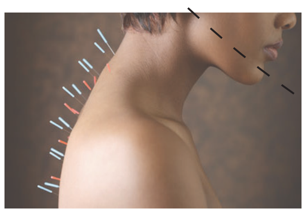
Distance from Bloemfontein. Sketch, 2014.

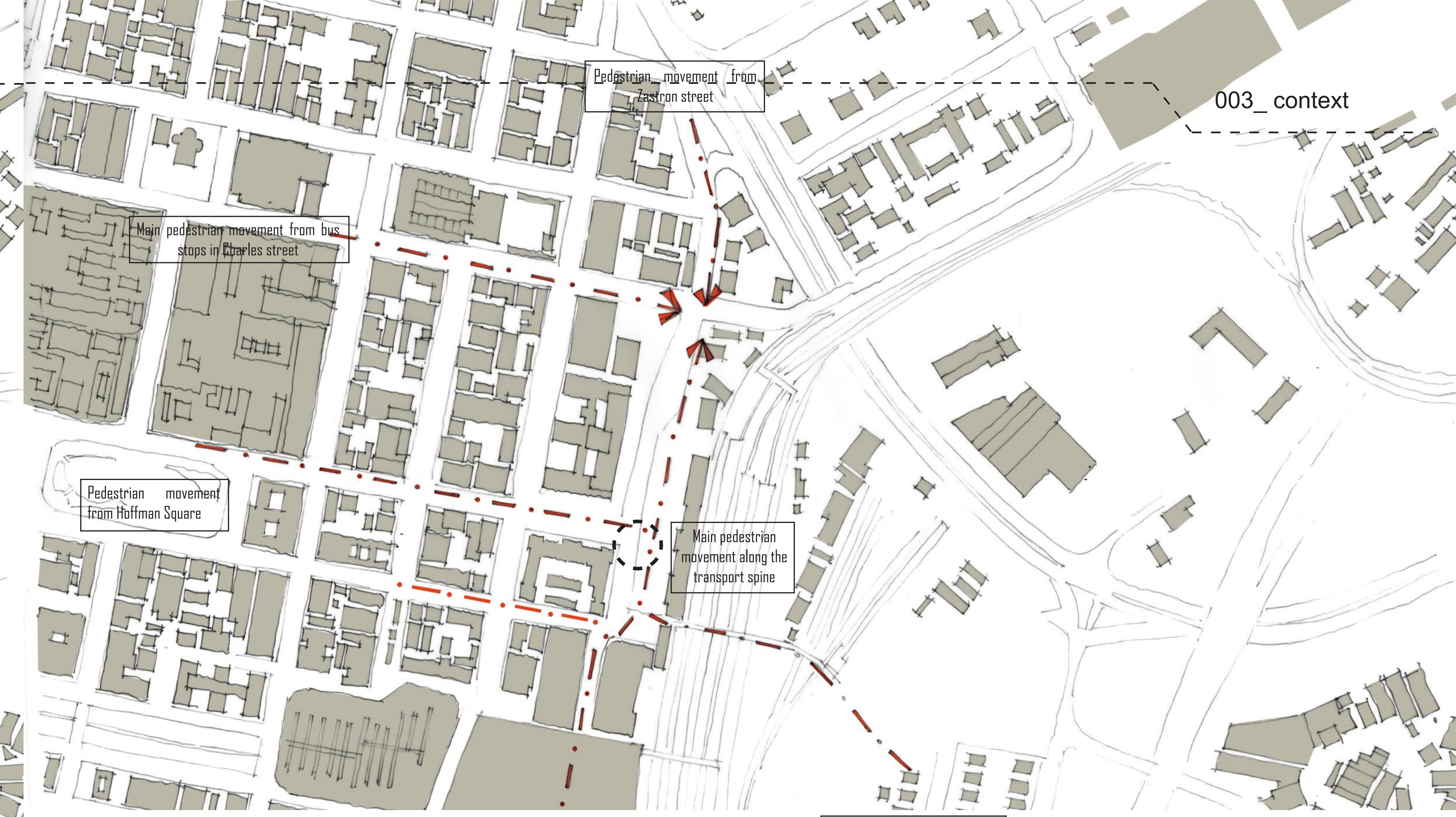
Contextual investigation & layers. Sketch, 2014

Distance from site >> >

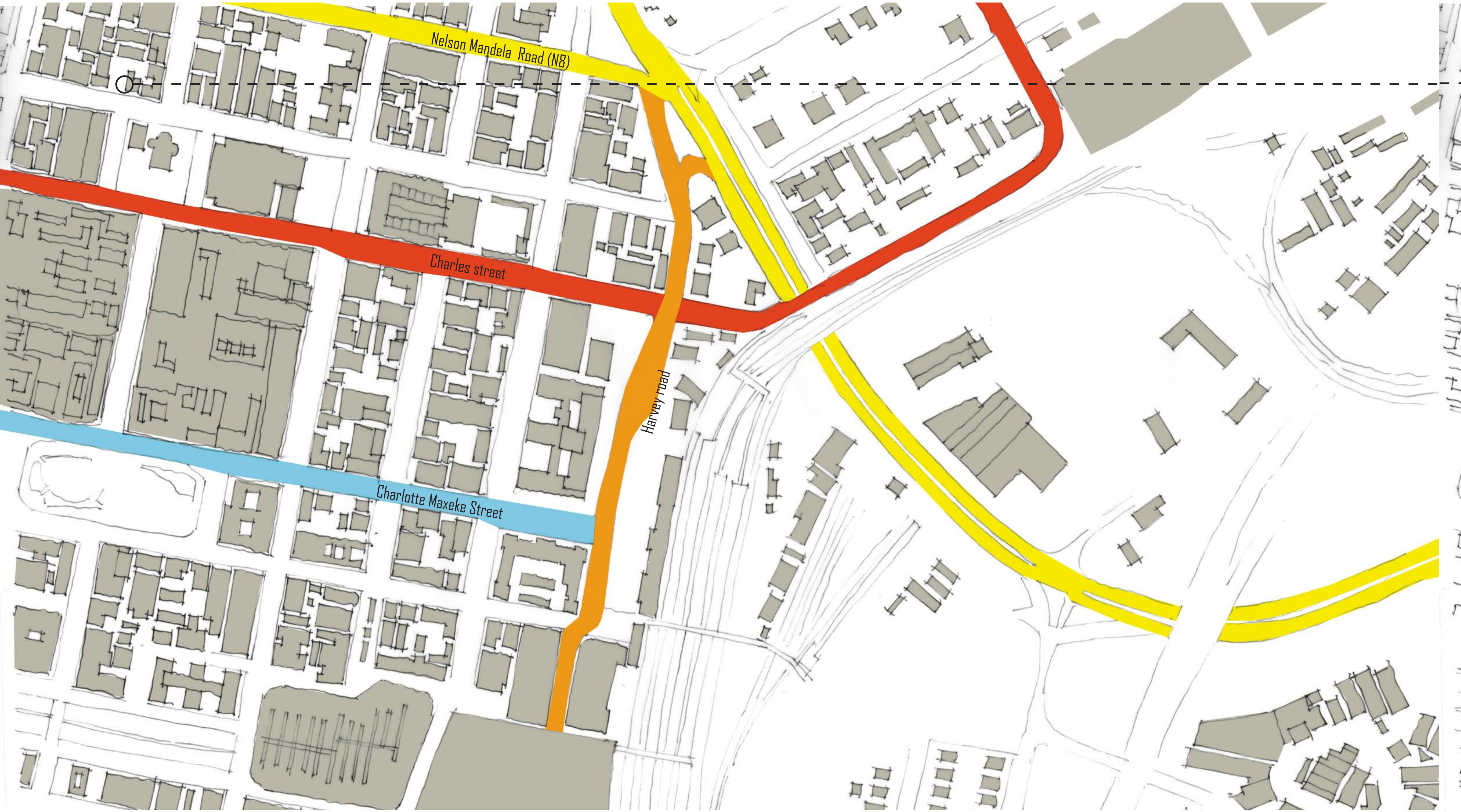
1 _ 320m to Mark Square
2 _ 300m to the Railway Station
3 _ 900m to Hoffman Square
4 _ 950m to the Intermodal Transport Intercahnge
5 _ 11 300m to the Airport

Radial distance from site. Sketch, 2014





M o v e m e n t _
Pedestrian networks



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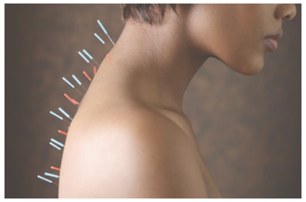
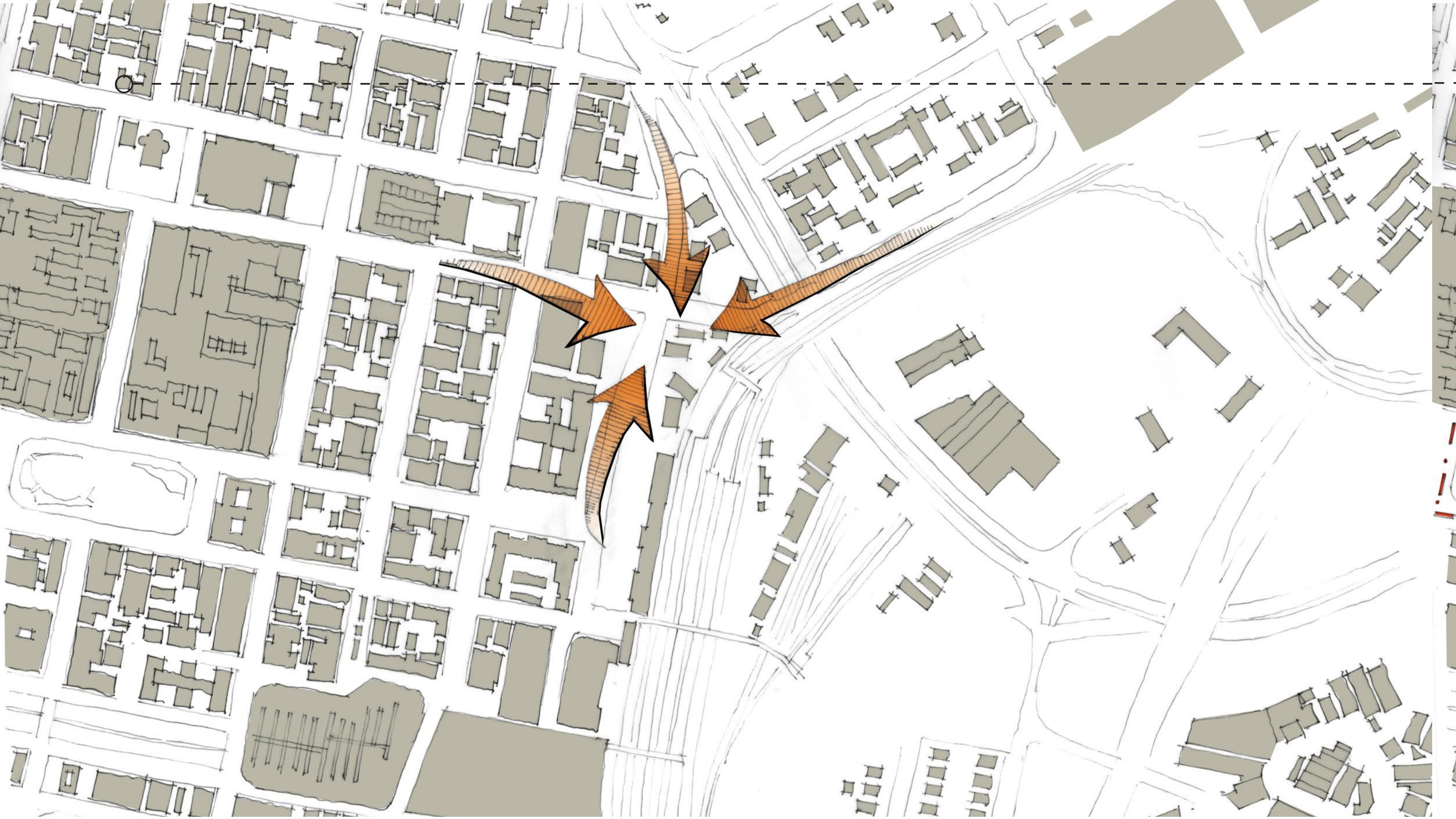


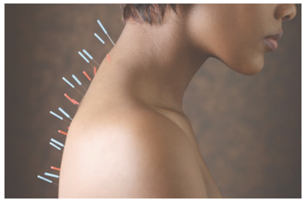
Main roads to Site

1 _ Visual connection to Intermodal Transport Facility

2 _ Visual connection to Loch Logan Waterfront

V i s u a l   c o n n e c t i o n
from site



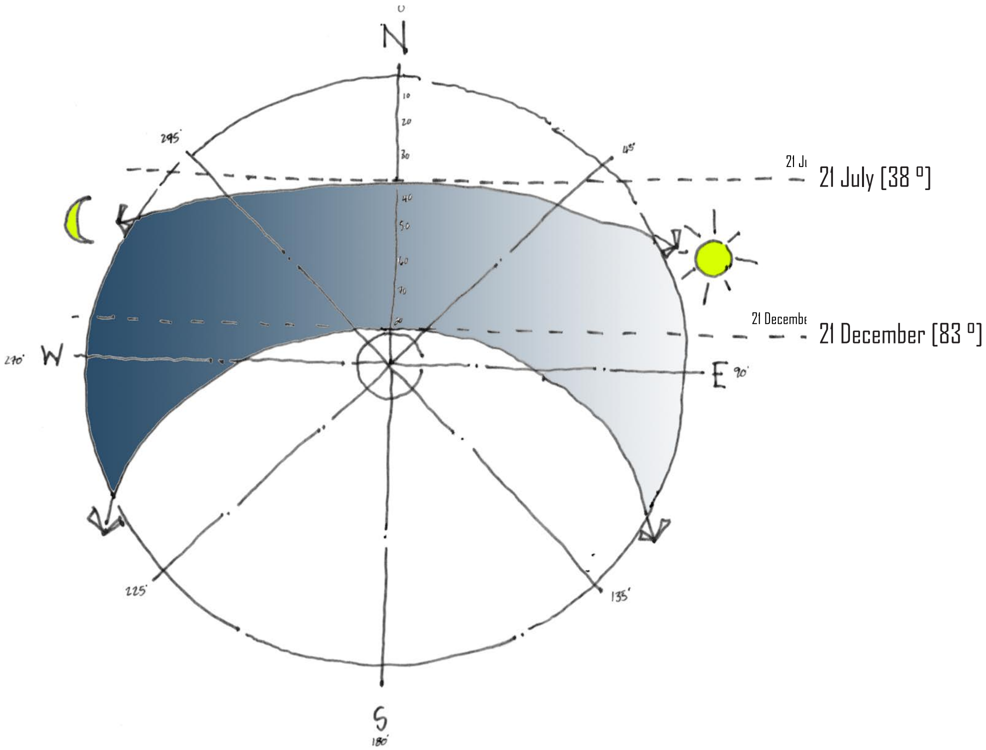


V i s u a l   c o n n e c t i o n

to site

Current Bus Routes

Bloemfontein sun patterns



[fig] Sun pattern. Sketch, 2014.

	Jan	Feb	Mrt	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Temperature °C	31	29	27	23	20	17	17	20	24	26	28	30
Wind speed, m/s	4.28	4.43	4.14	3.98	5.2	5.69	5.69	5.69	5.36	5.68	5.32	5.42
Precipitation, mm	32	30	43	82	5.69	160	158	162	78	61	40	36
Wet days, d	3.8	3.4	4.1	7.1	160	12.3	12.0	12.7	10.1	7.8	4.6	4.2

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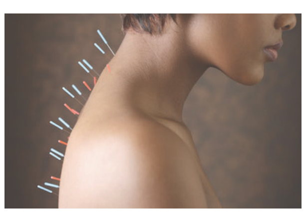


BRT Vision

South Africa infrastructure is currently spending more than 25% of all its energy in this transport industry.

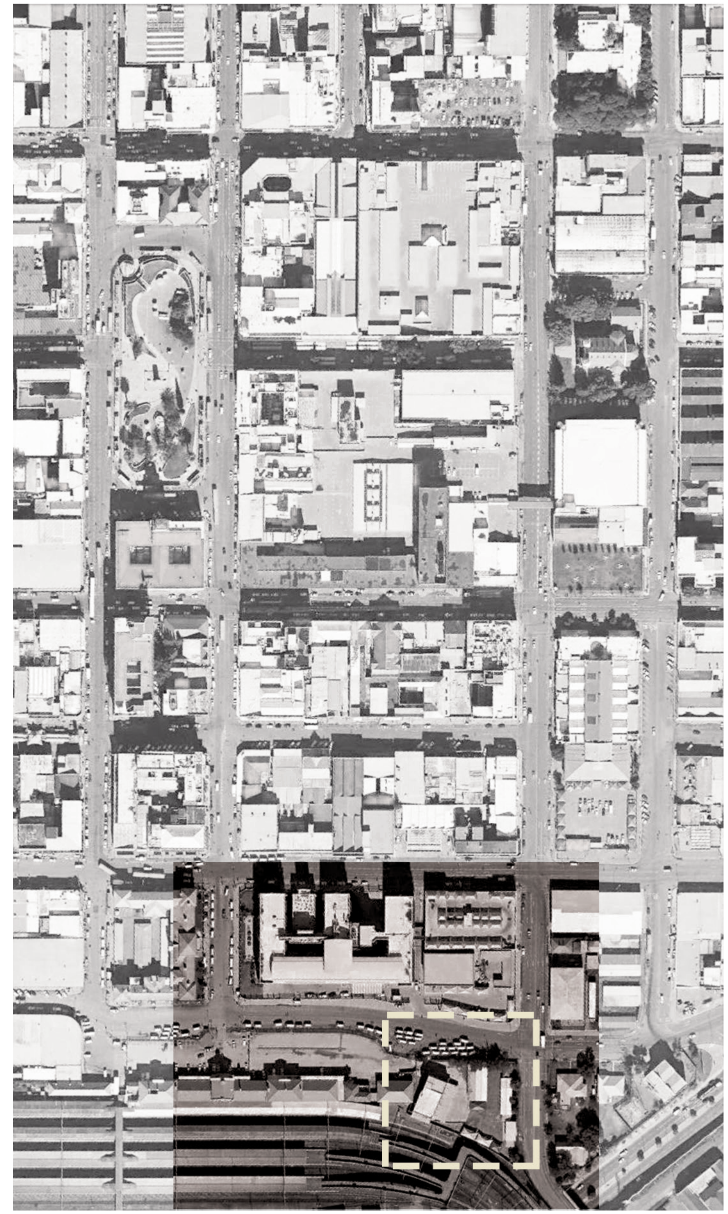
From out a sustainable city (3rd Generation city) we need to address the problem by implementing a more efficient transport system, which lowers infrastructure costs and energy consumption. One of these methods of addressing this method is by in visioning the use of a Rapid Bus Transit (BRT) system in Bloemfontein to develop a more sustainable, efficient and accessible public transport system. These busses use cleaner fuels, function within an independent road system and transport higher number of commuters than the conventional bus and taxi systems (Wright & Hook, 2007: 703). This will contribute to a better-integrated &efficient transport industry in Bloemfontein.

The BRT system is propose to be a new transport archetype and will conceptually be constructed throughout the Mangaung district of the Free State. Throughout the implementation of the BRT system, the system is trying to achieve a low-carbon and energy efficient footprint, which has a smaller environmental impact on our current transport systems.

The proposed site for the thesis is located next to Bloemfontein Railway Station. The station is an active modal of transport, which has rich historical, and architecture value to Bloemfontein. The station lays on a historic cardo decumanus axis (which runs through to the University of the Free State Main building), which links the station with the historic heart of Bloemfontein. We currently find ourselves in an era that transport systems is significantly is increasingat high rate, which will create a system that will influence our rationality of city's economic and social functionality.

Aims & Objectives

- The aim of the thesis is to propose interchange with a integrated BRT system of which the interchange should respond to the historical context while adapting to the social needs of the community
- A new archetype of a BRT stations can be developed from the thesis to assists in the future sustainable infrastructural development of the Mangaung public transport systems.
- The proposed interchange will contribute to the existing historical order by adding additional facilities and functions to ensure the adaptability and sustainability of the historic railway station.
- In the thesis, the material performance and sustainability aspects will be investigated, to help enlighten the optimal decision of usages of materials and structure.



[fig 1.24] Locality Plan (Google Images, 2013: online).

Site analysis [micro]

SITE OVERVIEW

The historical landmarks, the railway station and memorial statue, on the platform of the station building, all of these rich historical elements on site are not emphasised or given any form of acknowledgement. The northern part of the site is currently vacant administrative buildings for Transnet, while southern part of the site (in front of the railway station) is currently open for vehicle access and is used as informal parking.

The site is very neglected because of safety concerns and vagrancy, stretching from the most northern point to the most southern foot of the site, up to where the pedestrian path continuous to the Intermodal Transport Interchange in Harvey Street.

Meagre trader's space are allocated to the local vendors alongside the public street edge of Harvey Street.

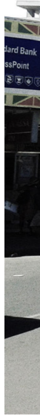
This site is wedged in between the edge of the CBD area and nature, leaving a limited corridor for future development and the extension of the scenic public plaza in front of the railway station.

FUTURE AIMS

Redesigning the public plaza in front of the railway station, creating a sense of place, by making use of the space as a place of social interaction and gathering.

Promoting and integrating social facilities on site with new urban landscaping, to make the railway station the social precinct of the CBD area again. Doing so, it will tend to promote diversity and convenience for the local community.

Overview of site [micro context] >> >



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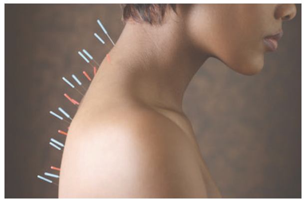


STAR

[fig] Historic Railway Station current state.

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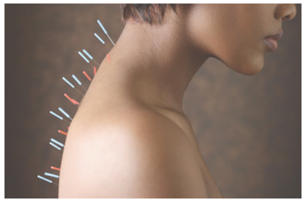

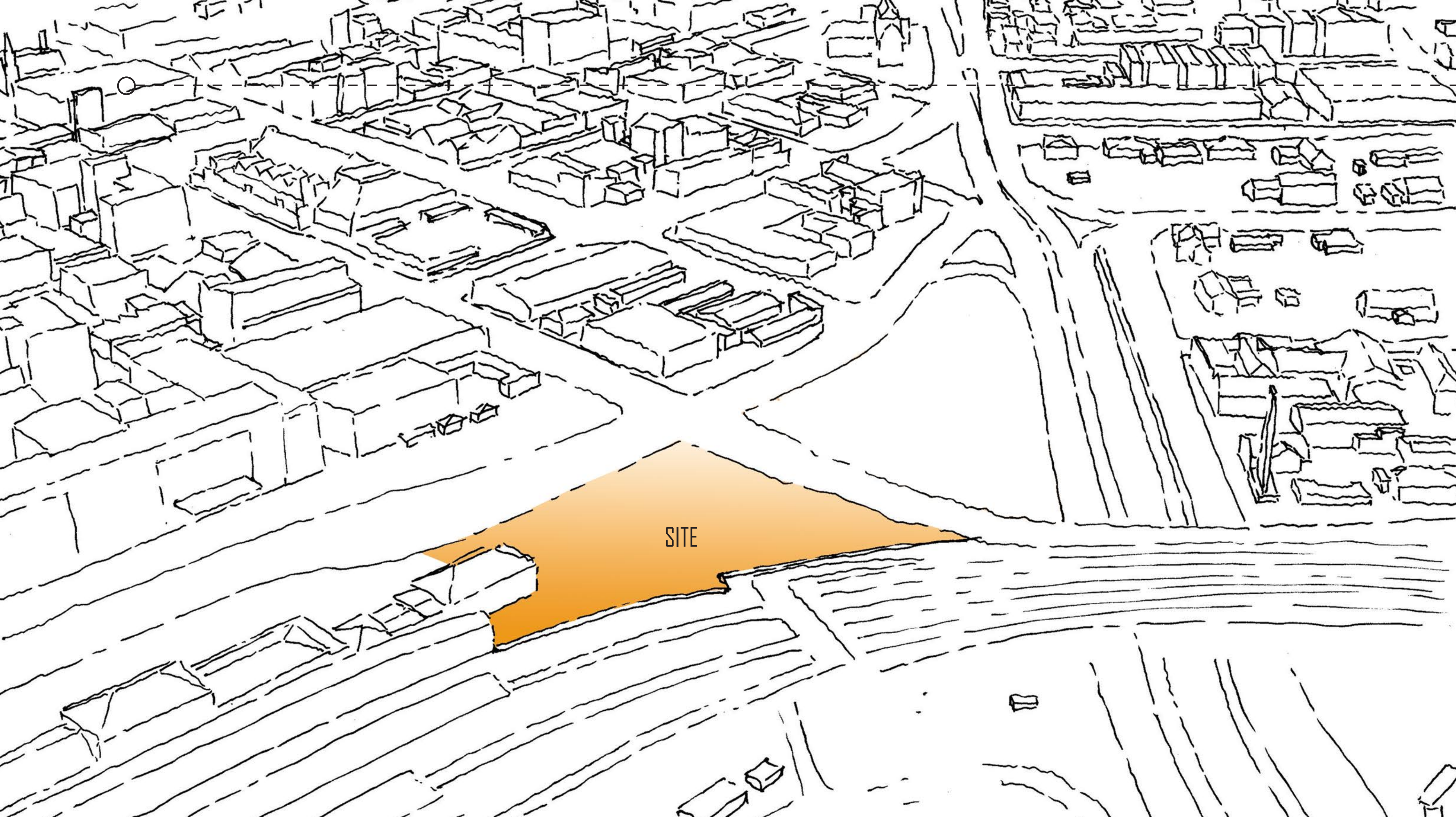

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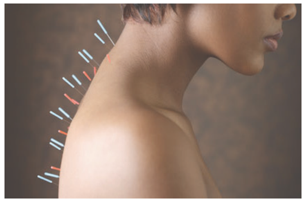

3D Site in context

Surrounding buildings

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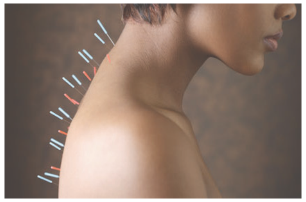
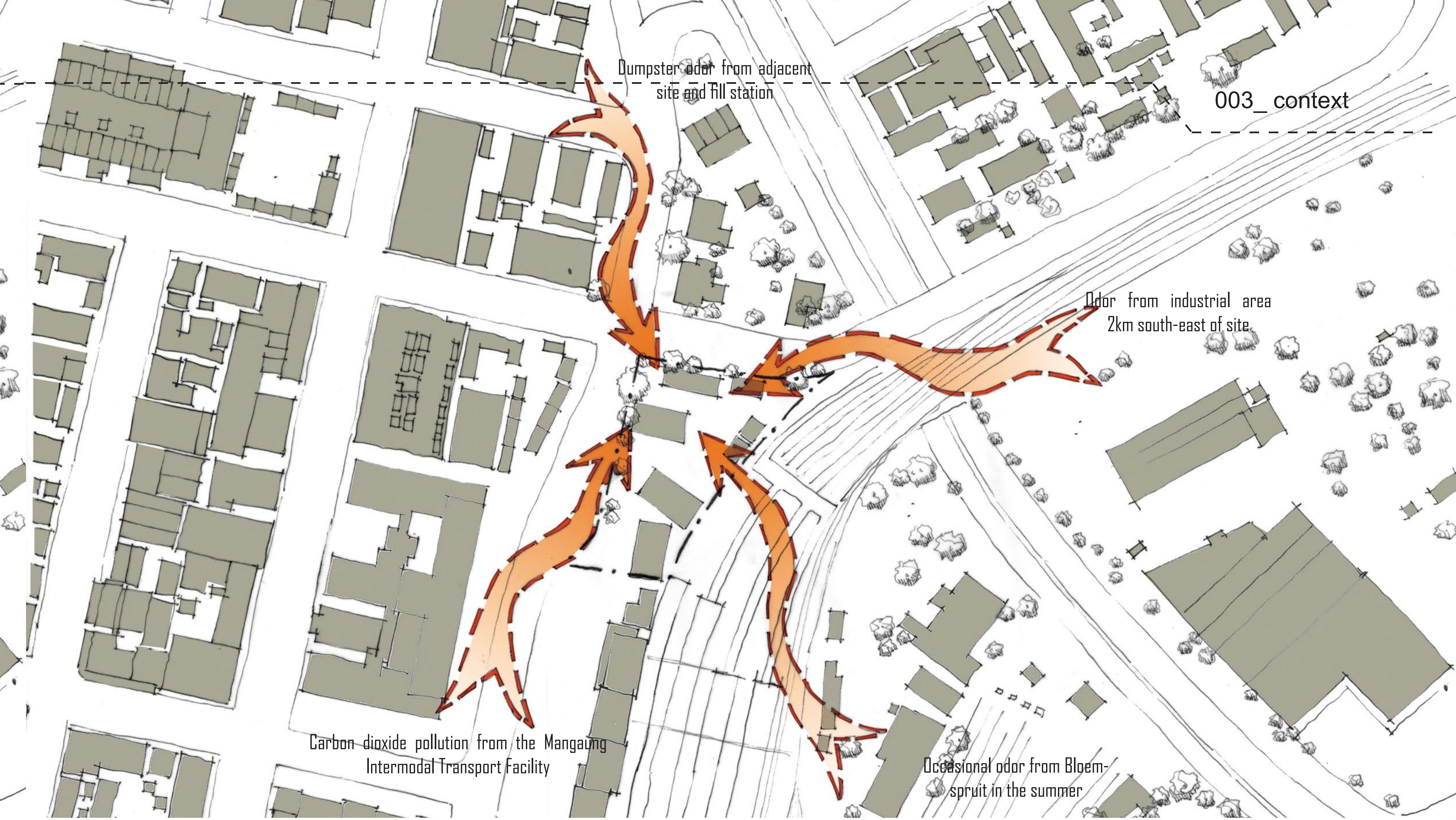


Circulation around site



Sensorial aroma experiences

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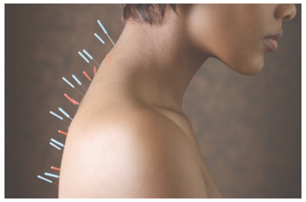
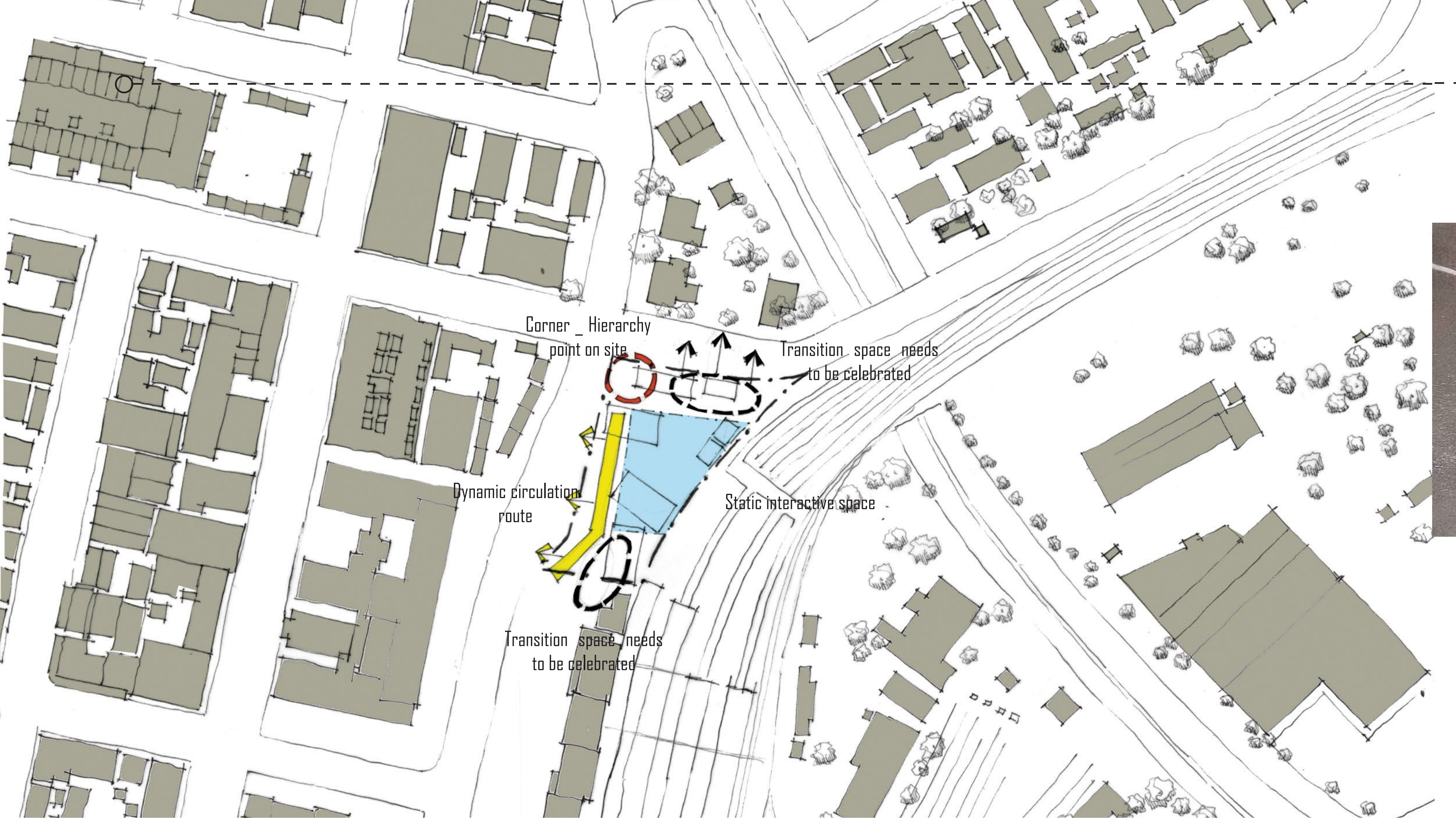


Natural features


003_ context
[68db] _ Cars accelerating & stop at traffic lights
[60db] _ Dumpster pickups at adjacent building: Tuesday morning
[72db] _ Car retail and parking garage
[60db] _ Cars travelling on Nelson Mandela Road (N8)
[72db] _ Cars starting in adjacent parking lot M-F primarily, at noon and 17:00pm duration: 15min
[98db] _ Running trains: 5 times a day. Duration: All weekends.

Noise level



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Visual connection from opposing site corners

Site Observations

0 0 4 _ P r e c e d e n t S t u d i e s

Metro Mall transport facilities + traders market _ Johannesburg, Gauteng

Kuyasa Transport Interchange _ Khayelitsha, Cape Town

Baragwanath Public Transport Interchange + Traders Market _ Johannesburg, Gauteng

Case study_ Pretoria Main Station _ Tshwane, Pretoria precinct - sector

[fig 4.1] Metro Mall (Wessels, 2012: online).

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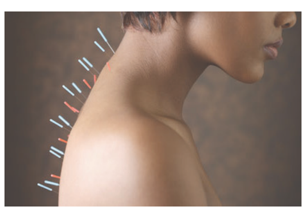


[fig 4.2] Metro Mall (Wessels, 2012: online).

The Metro Mall is situated in North West corner of Johannesburg's CBD area. The building was designed by Urban Solutions Architects + Urban Designs, and completed in 2009. The Metro Mall was designed to act as a catalyst in the region, connecting the local urban environment and vibrant culture through architectural form and materiality, renew their interrelationship.

The success of the Metro Mall lies in the interface with the enclosing street and its utilization of the high flow of pedestrian movement. Trading spaces is predominantly placed next to Bree Street, reacting to the existing retail spaces on the opposite side of the street. Simmonds Street also provides a larger number of by passing pedestrians, they address the polemic by providing street facing vending spaces for local vendors.

The entire project is situated over two city blocks, the project still reads as a cohesive structure, especially from a pedestrian experience and views. The enormous building scale is brought down to a human scale at the traders areas, as too at the taxi rank.

Merge with the surrounding urban planning, the Metro Mall start to act as a catalyst (regenerate) in the urban contexts. This is achieved by creating and enhancing the connections with the existing city fabric. In essence the project succeeded in transforming the boundary (stress point) space into a new active nodal. This released new energy to relieve stressed in surrounding urban fabric.

METRO MALL TRANSPORT FACILITIES + TRADERS MARKET _ Johannesburg, South Africa
_ Urban solutions Architects + Urban Designs

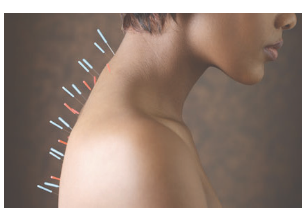
[fig 4.3] Metro Mall street edge (Wessels, 2012: online).

[fig 4.4] Double volume central space (Wessels, 2012: online).

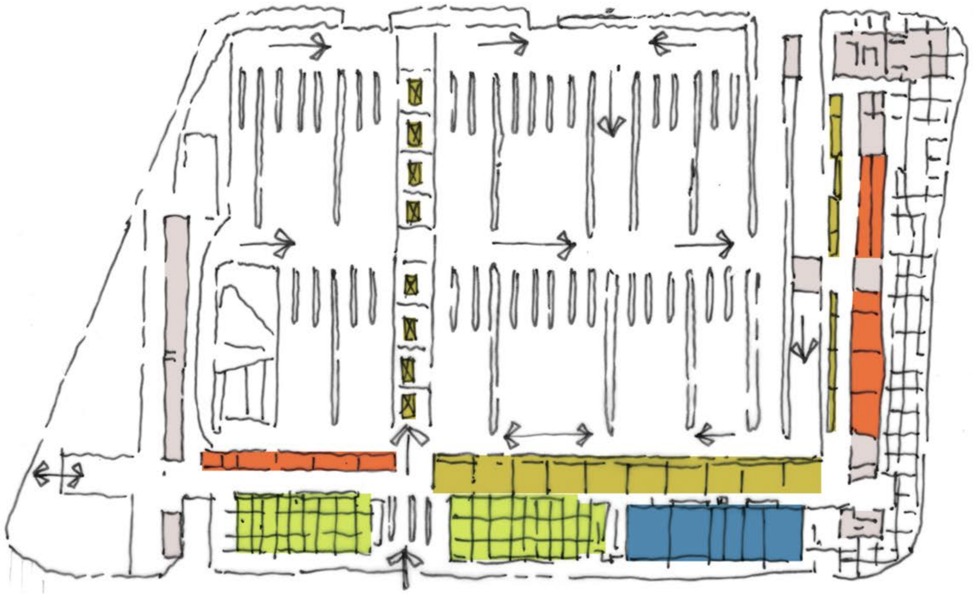
[fig 4.5] Metro Mall (Wessels, 2012: online).

Considerations:

- The buildings bring together the local urban environment and vibrant culture, and the urban environment through architectural form and materiality.
- The street edge is integrated to form part of the design.
- How the project inter-link the two separate sites as one cohesion space.
- Traffic investigation.



[fig] Longitudinal street elevation. Sketch, 2014.



[fig] Circulation routes on plan. Sketch, 2014.

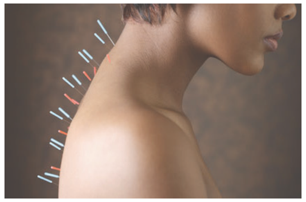
[fig] Interior interactive arcade. Sketch, 2014.

[fig] Entrance acting as beacon point. Sketch, 2014.

Circulation:

The figure to the bottom clearly indicates how the pedestrian routes and urban design framework work in cohesion with one another so that there can be a clear continuation movement throughout the vicinity without any conflict between the vehicles and pedestrians. They achieved this by making the commuters cut across these stacking areas to arrive at their destinations. Pedestrian movement also utilized the pavement that is lined with informal commuters and stalls to create an interactive street edge with the site.

[fig 4.6] Central Square (Meyer & Vorster, 2012: online).



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[fig 4.7] Connection between square and traders arcade (Meyer & Voster, 2012: online).

The Kuyasa Transport Interchange was designed by Meyer and Voster Architects, and completed in 2010. Situated on both sides of Kuyasa Station, separated by the railway line, the building harmonises well with Cape Flats landscape.

The Kuyasa Transport Interchange is a project that resulted from a larger urban design study of Khayelitsha that identifies the surrounding area as a new urban node. Due to the identification of this area as an important node, the project sought to address more than mere transportation needs, but rather as public investment in the community.

The geometrical complex floor plan combined with uniform sections generates interesting threshold spaces within this interchange. Unique details and textures are designed to emphasise local identities.

The building leads from the arcade space to the street edge at the start of the one wing, branching out onto the various public squares and seating areas. The transition from informality (public square) to formality (permanent trading space) is resolved not only on plan, but also on section, as illustrated. Meyer and Voster resolve the duality of providing a barrier between the building and the busy road, and providing a public space that is not void of users.

KUYASA TRANSPORT INTERCHANGE _ Khayelitsha, Cape Town
_ Meyer and Vorster architects

[fig 4.8] Locality Plan (Meyer & Voster, 2012: online).

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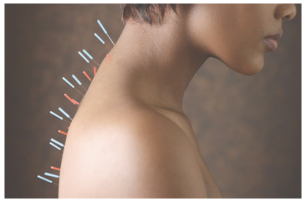
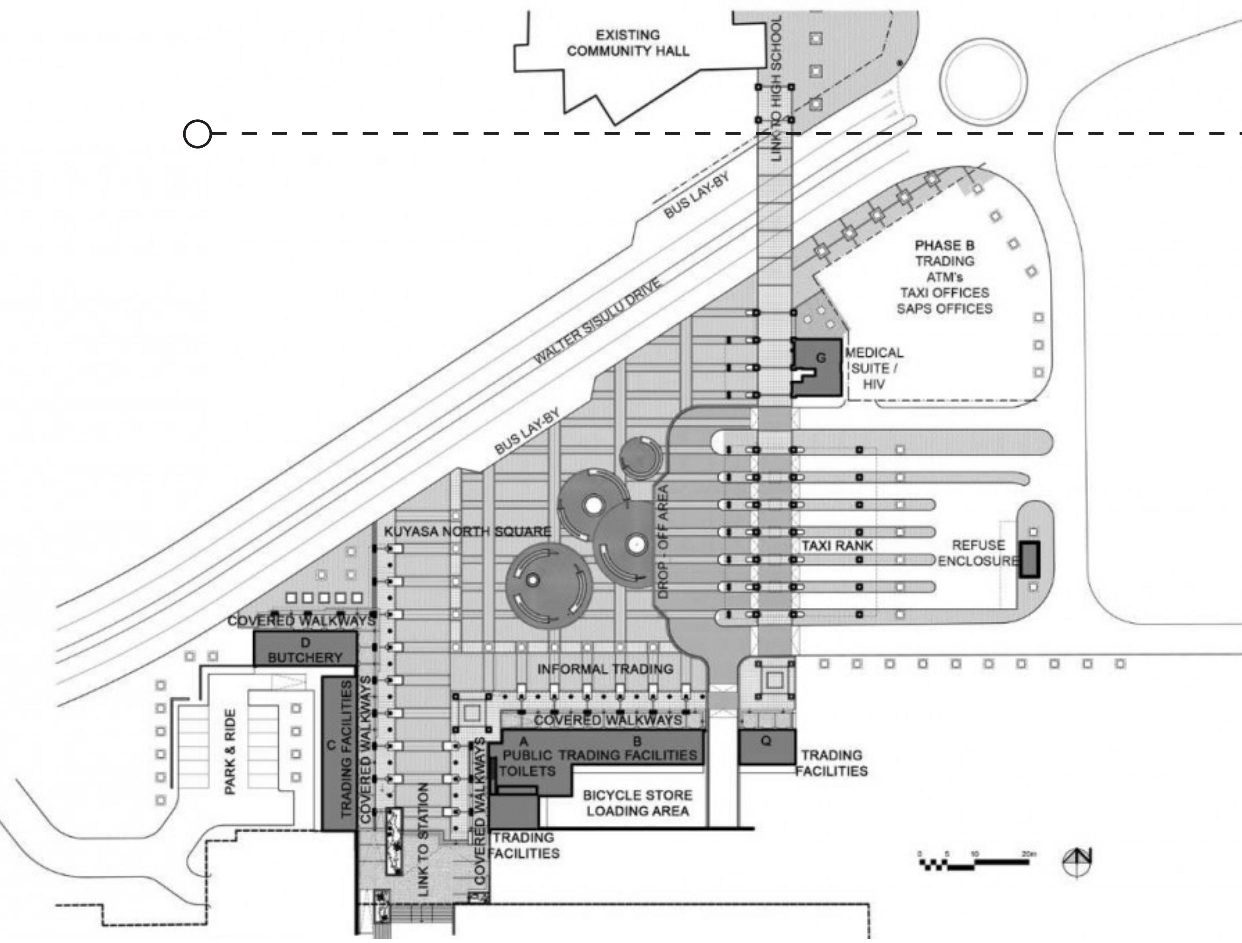


[fig 4.9] Traders stall, at night (Meyer & Voster, 2012: online).

Within this square semi-circular seating is provided (Samuel, 2011: 7), thereby breaking down the ambiguity associated with large open spaces. The building form creates view corridors from the surrounding context, and creates a strong visual connection between the inside, threshold and outside.

The central square (pressure point space) is brought together by the diverse spaces covered by the various gradients of the sloping roof, resembling the surround Cape Flats landscape, forming the external volume.

The interchange places the focus on change, and how a building can be designed in such a way that future development is possible and even stimulated. Structure is overcompensated in terms of load-bearing capability to allow vertical expansion. Thus, boundaries normally imposed on vertical expansion of a project are overcome by a thorough understanding of the predicted future context. They made use of a color coding system to create a project, which is site specific in terms of materials and the local community identity. The use of mosaic work on the columns and pedestrian seating created a sense of playfulness and humane quality to the formality of the central public square. The space is then also articulated by the use of the local red face brick around the perimeter of the square (Architecture South Africa, Samuel (6) 2008: 7-9).



[fig 4.10] Site plan (Meyer & Voster, 2012: online).

Concept:

The Kuyasa Transport Interchange is a project that resulted from a larger urban design study of Khayelitsha that identifies the surrounding area as a new urban node. Due to the identification of this area as an important node, the project sought to address more than mere transportation needs, but rather as public investment in the community.

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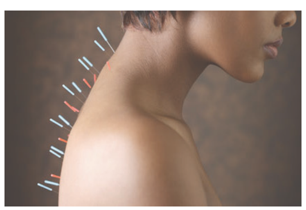
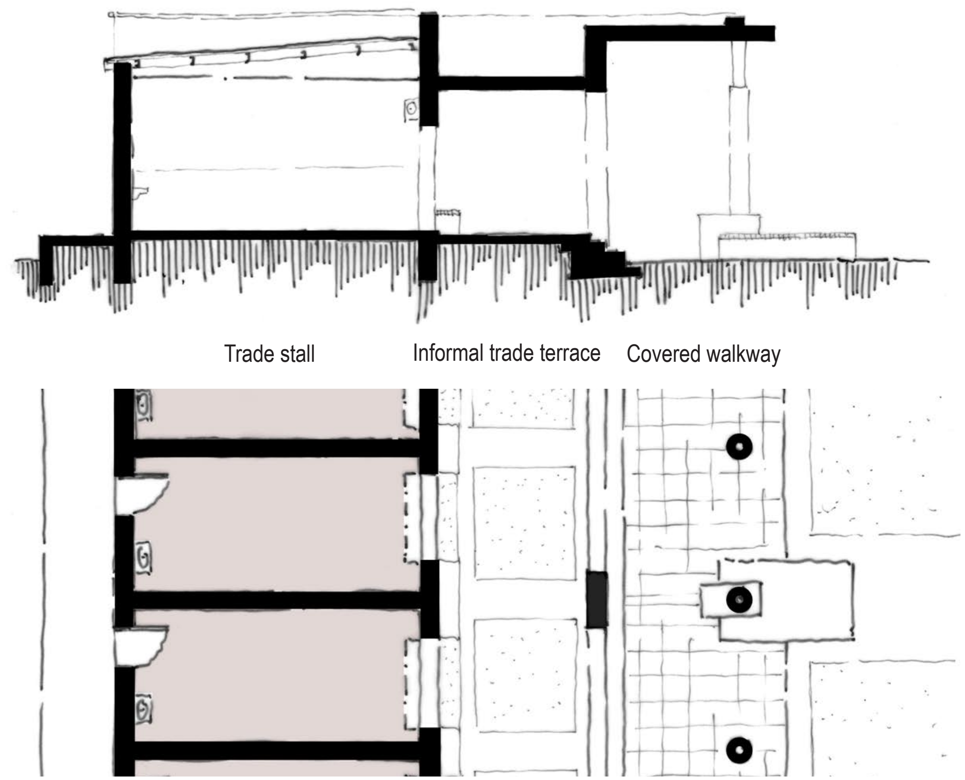


[fig 4.11] Birds eye view of site (Meyer & Voster, 2012: online).

[fig 4.12] Security Tower _ beacon on site (Meyer & Voster, 2012: online).

Considerations:

- The building harmonises well into the landscape, mimicking the flat skyline.
- The use of local textures, design details and natural light to emphasis the spatial experience. The use of open structures and high windows to reflect natural light into the building and articulate the walkways.
- Future expansion on structure to accommodate the different social needs of the time.
- The building becomes a social and interactive journey, using elevated and lowered walkways, changing visual connections, combined with interactive (pressure point) spaces to form a whole experience as one moves through it.



[fig] Threshold transitions. Sketch, 2014.

[fig 4.13] Locality Plan (Goofgle images, 2011: online)

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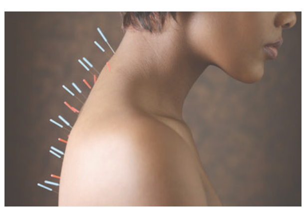
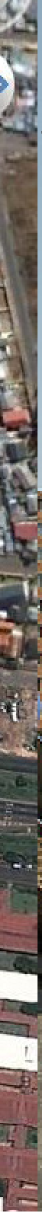




[fig 1.24] Beacon (Hansen, 2011: online).

The project forms part of the1997 Baralink Development Framework of Johannesburg. The initial idea was to integrate and uplift this important gateway into Soweto. Lately council trend has shifted to the broader concerns of integrating the greater part of Soweto with Johannesburg.

Baragwanath mall is situated in Soweto, and shares a hierarchy nodal point with the Chris-Hani Baragwanathhospital which is opposite to it. It was designed by Urban Solutions Architects and Urban Designs and was completed in 2008.

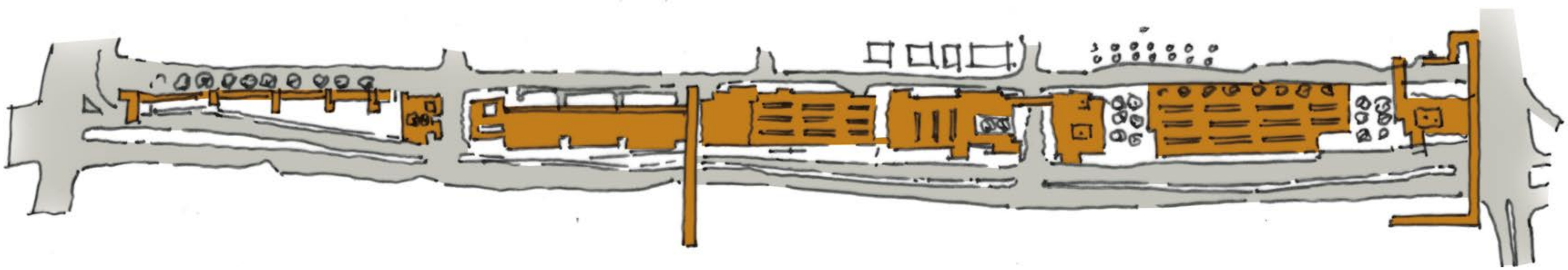
The main structure is a spine like concept which directly responds to the passing of Old Potchefstrrom Road. This double volume arcade structure stretches 1300m between the busy Chris Hani Road (Old Potch Road) and residential area, barely visible from above with it slick and elegant spine form. This Interchange provides flexible arcade spaces that include great number of traders and public amenities, transport stations and public display areas.

BARAGWANATH TRANSPORT INTERCHANGE AND TRADERS MARKET _ Soweto, South Africa
_ Urban Solutions Architects + Urban Designs

[fig 4.15] Structure becomes the functional space (Hansen, 2011: online).

Considerations:

- The arcade acts as structural spine that runs through the whole length of the site.
- The structural spine blends into and forms part of the urban landscape
- The Transport Interchange + Traders market's footprint follows the natural contours of the site between the existing busy Harvey Street and the CBD edge, functioning as the mediator.
- The materials were aesthetically applied to prevent a monotonous experience, given the long spine footprint of the building.
- The arcade (acupuncture) spaces become the stitching element for which various functional developments are attached.
- Tower elements have been used to orientate the user and emphasis entry points.



[fig] Building mass in surrounding context. Sketch, 2014.

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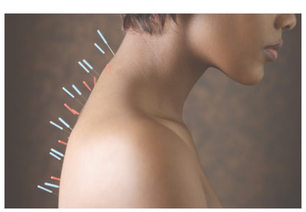
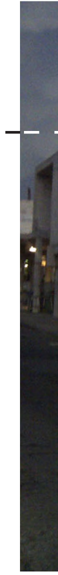
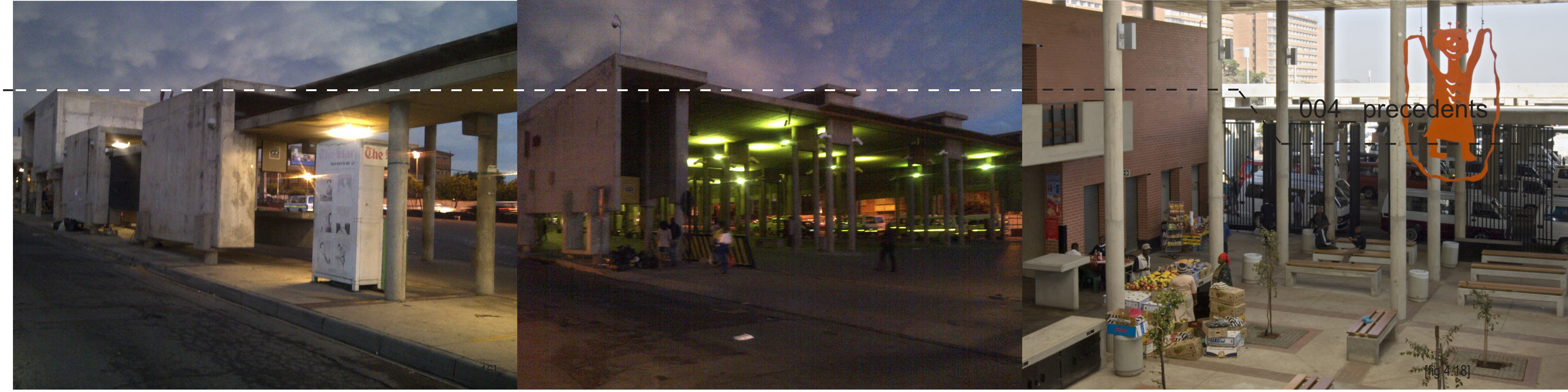






[fig 4.16 - 4.18] Baragwanath (Mokholo, 2012: online).

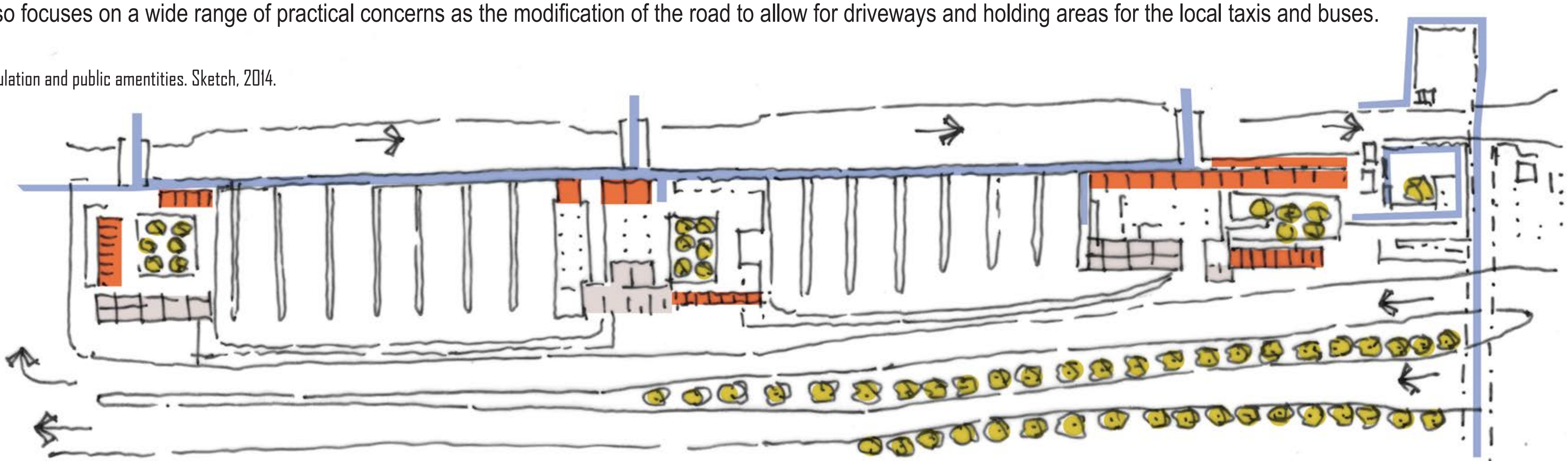
Circulation:

The building is a simple spine like concept with an arcade running the full length of the northern side of the building, which varies in height. This creating a circulation spine, which defines the entries and clusters of the market accommodations. This double volume arcade links the different terminals with pause spaces in between. These pause space is utilized as market squares which tend to create a recreational and inviting space for the commuters. The focal towers (as indicated below) are at the entrances to help orientate and identify the commuters to where they are going (Digest of South African Architecture 2006/2007 (11): 44-47).

Concept:

The concept of the Baragwanath Mall arose from the Bara design framework (Joubert, 2009: 145); the objective was to connect it with the busiest transportation nodes in Johannesburg.The project also focuses on a wide range of practical concerns as the modification of the road to allow for driveways and holding areas for the local taxis and buses.

[fig] Site circulation and public amentities. Sketch, 2014.



[fig 4.19] Perspective of the main entrance to the railway station (Prinsloo, 2014: online)

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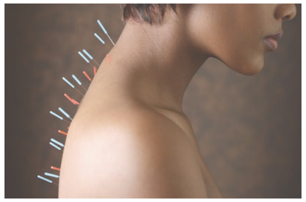



[Fig 4.20] Perspective towards the Bus station (Prinsloo, 2014: online)

OVER VIEW

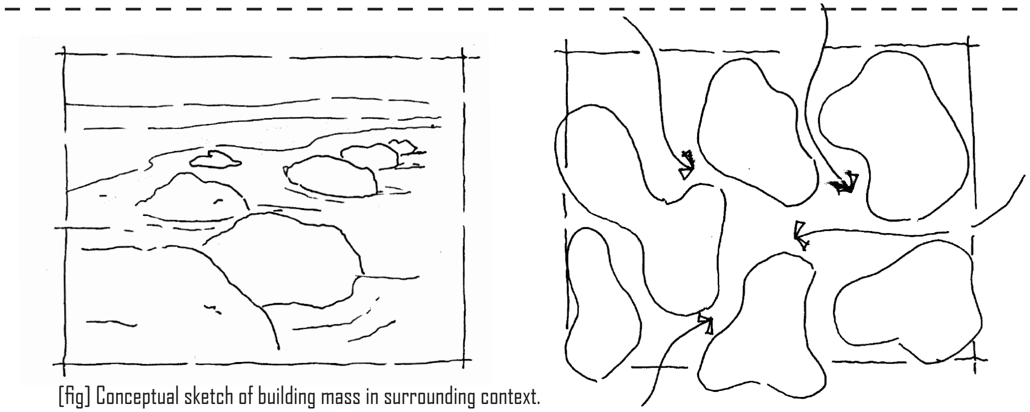
The Pretoria main station is situated in Tshwane, and was completed in 1912. The current state of the site is a very busy modal interchange, which consists of different modes of transport such as the Gautrain, long distance busses, taxis, Metro Rail and BRT systems.

The site is on a prominent location and is the termination point of the cardusmaximus that links the site with heart of the city (Holm, 1998: 61). The site and station has a rich historical and architectural value, which adds on to the heritage of the city of Tshwane.

Numerous of pedestrians utilise and move through the site on a daily basis, but the station square does not accommodate the pedestrians and mostly act as boundary to which one need to cross. In terms of the landscaping, it is not functional as it was during the erection of the square with a classical layout. These days the landscaping tends to be unsafe and not pedestrian / user friendly. The landscaping predominantly consists of hard and dark surfaces that

PRETORIA MAIN STATION SQUARE _ Tshwane, Pretoria, South Africa _ Sir Herbert Baker

[fig 4.21] Locality Plan (Google Images, 2013: online).



[fig] Conceptual sketch of building mass in surrounding context.

generates plenty of heat and very few integrated green landscaping that will help activated the square again. New transport systems such as the Gautrain, Gautrain feeder system and BRT have been implemented which served additional users per hour to the site. In terms of the BRT system, it acts as additional feeder system for the Gautrain, which led to a better integrated and efficient transport system.

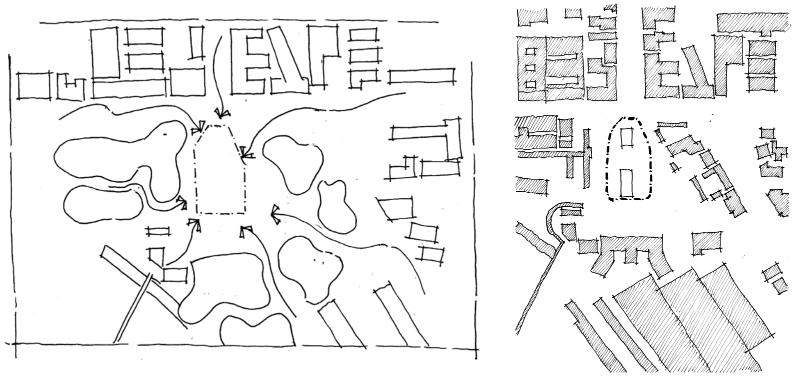
Currently in South African railway system, the railway system is commonly used by low-income commutes. This tends to create a wide diversity of small commercial and informal enterprises on and around the site. Future developments need to evaluate the unique identity of these enterprises so that this unique identity does not disappear over time.

ANALYSIS OF CASE STUDY

The Pretoria square is a classical public space, literally flooded from all sides by people and light, similar to the way that that stones are found in a river, occasionally surrounded by huge flood of racing water.

Each approach creates a unique visual and interactive relationship between the surrounding buildings (stones) and the urban square, this gives the urban square an distinctive identity.

The layout of the buildings around the square allows the users to be part of a journey and to experience the public square from any side they approach it. Moving through and between these buildings (stones), each of these building elements forms and articulates the specific threshold spaces that one experience.

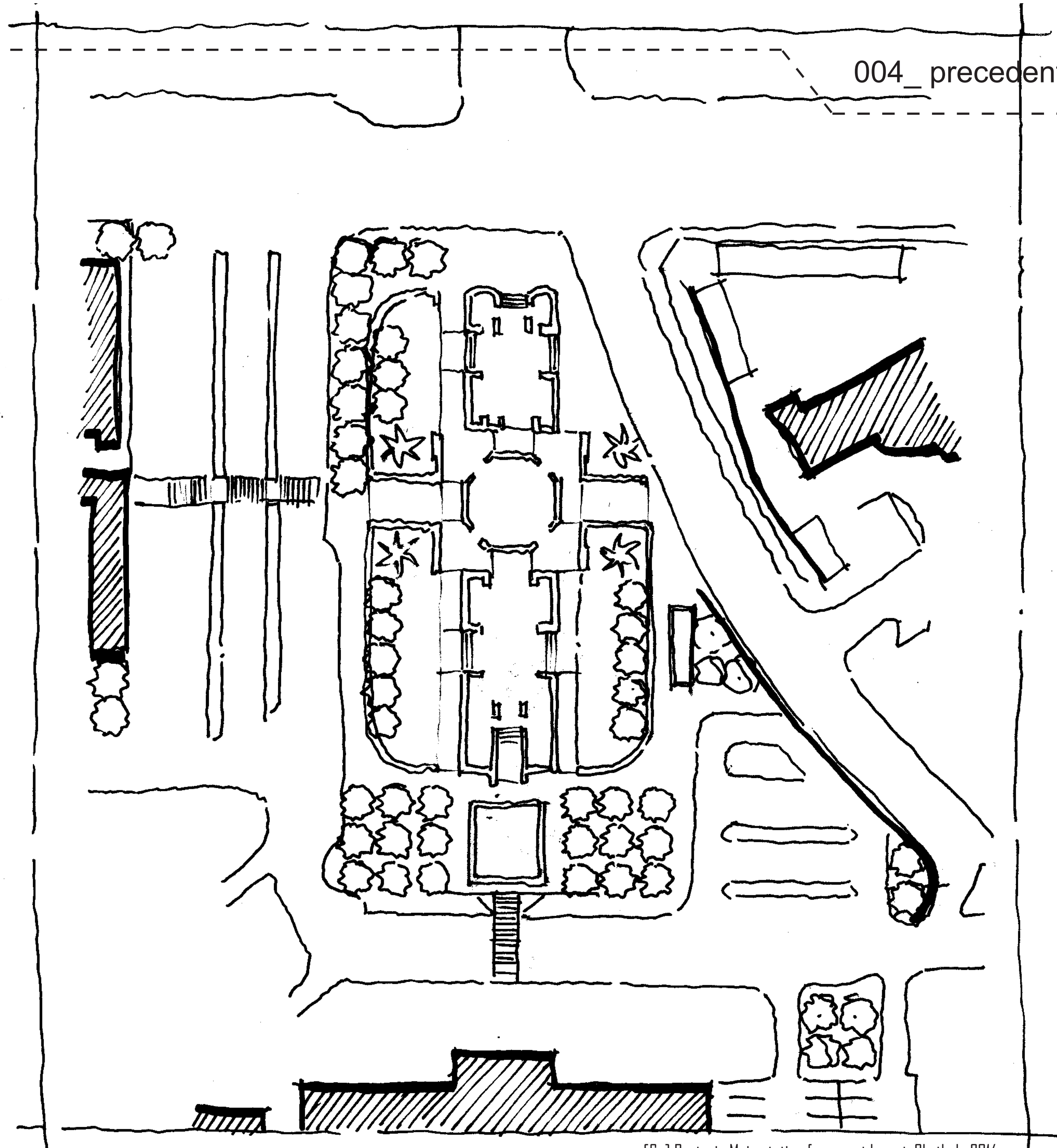


[fig] Movement diagram. Sketch, 2014.

Considerations:

- The square allows the users and visitors to access the station building and public square from any side inviting them to be part of a journey through the public square and building. Using urban landscaping, light steel structures, natural light and functional layout of buildings around the square to place focus on the public square (acupunctural space).

- The Station is compiled of a central public square with three main building elements (stones – Railway Station building, BRT Station and Police station) housing different public amities and facilities, each with its diverse functions.

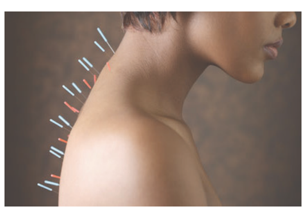


[fig] Pretoria Main station forecourt layout. Skethch, 2014.

[fig 4.22] Gautrain to Sandton Express Rail service (Gautrain rail, 2013: online).

[fig 4.23] Taxi congestion in urban environment of Soweto (Bronwyn, 2012: online).

[fig 4.24] Rea Vaya BRT service bus (Coggin, 2009: online).



005 _ Brief & Accommodation

Brief

Accommodation list

Client & Usrers

BRIEF

The brief requires a centrally located transport facility, linking the existing railway system and making it easily accessible for the public. This interchange should become a node in Bloemfontein, emphasizing the historical backdrop of this former agricultural village. The understanding of space should be facilitated through experience, using the acupunctural space and our senses as a guide. The interchange should become a mediator between man and architecture; an instigator for community interaction.

This structure must emphasize the view and nature of the station square rather than to obstruct it, therefore it should adapt to the shape of the site and create a contemporary structure, which can adapt to the social changes. The facility needs to be organized rationality and should be understandable for the commuter, although focus still has to be placed on the infrastructure as well as provoking and stimulating of interaction through the acupunctural spaces. The building must echo the context and form a vibrant public hub within this linear transport path of the city.

The building and structure on the edge of the street should be durable and needs to be protected from natural and manufactured elements. The commuters should also experience a sense of protection from these elements within the urban landscape.

This public interchange is situated next to one of the significant nodal points within Bloemfontein namely, Bloemfontein Railway Station and next to that the new Intermodal Interchange. They are interpreted as the history of Bloemfontein and around it the developing transport future.

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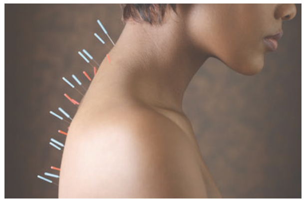

ACCOMMODATION LIST

BRT Administrative building _ 308m²

Reception desk _ 16m²
Foyer / Waiting area _ 18m²
Kitchen _ 11m²
Server room _ 11m²
Monitor & Surveillance area _ 36m²
Print & Copy area _ 17m²
Boardroom _ 35m²
Outer deck _ 42m²
Foyer ablution _ 15m²
Manager office _ 13m²
Fire escape _ 8m²
Stairs – 9m²

Internet café _ 280m²

Computer area _ 130m²
Café _ 115m²
Reception desk _17m²
Staff ablution _ 7m²
Staff kitchen _ 11m²

Public Ablution _ 78m²

2x Female _ 18m² [3x WC, 3x basin]
2x Male _ 15m² [1x WC, 2x urinals, 2x basin]
2x Disabled _ 6m²

BRT Station _ 448m²

Ticket / Kiosk _ 18m²
Security booth _ 12m²
Transport waiting area _ 370m²
- Inside waiting area _ 285m²
- Outdoor waiting platform _ 85m²

Waiting deck & Lift _ 28m²
Emergency exit platform_ 20m²

Formal shop _ 488m²

4x Large shop _ 55m²
3x Small shop _ 20m²
10x Rental kitchens _ 165m²
Disposal area _ 34m²
Water tank area _ 9m²

Station Security _ 190m²

Foyer / Reception _ 44m²
Ablution _ 10m²
Storage _ 4m
Kitchen _ 8m²
Lift & Staircase _ 11m²
Monitor room _ 85m²
Print & Copy area _ 10m²
Outer deck area _ 12m²
Stair _ 6m²

Informal trader's area _ 250m²

Parking _ 516m²

Staff & Delivery parking _ 301m² [14 parking's]
Public parking with circulation _ 215m² [10 parking's]

CLIENT & USERS

The proposed client for the project is the Mangaung Municipality, Department of Transport, Public works and infrastructure. The Municipality and Prasa (Passenger Rail Agency of South Africa) will participate as client in this proposed project, seeing that they have been doing planning and analysis of this site and station square for future development and upgrading.

The city users wish to avoid the CBD's road traffic congestion. The most common used mode of transport is the taxi, which comprise 30% of public transport. The commuter population usage: 18% use the railway, 20% use buses and private transportation 32%. In essence, these statistics clearly indicate that the 68% of daily commuters use of public transport. Currently the commuters make use of the inefficient taxi system (Department of Transport, 2014: online).

The commuters who wish to use the BRT can enjoy the leisure facilities of the Interchange by the local commuters. The building becomes a regenerate recreational node with urban leisure, which acts as pinpoint in the urban fabric: a place where commuters can host events, dine and visit the historical railway station.

[fig 5.1] (Chong, 2013: online).

[fig 5.2] (Department of Transport, 2012: online).

[fig 5.3] (PRASA, 2012: online).

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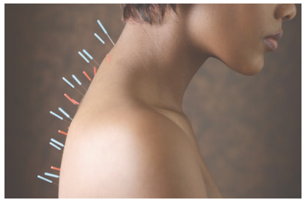


006 _ Design synthesis

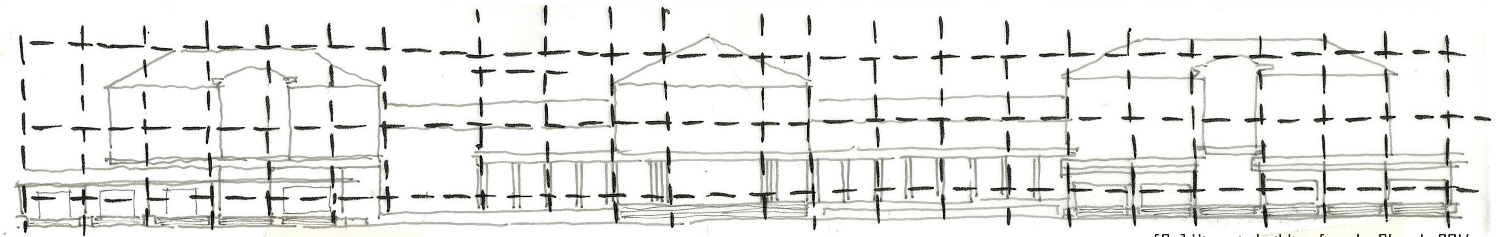
Theoretical Application

Conceptual development

Design components

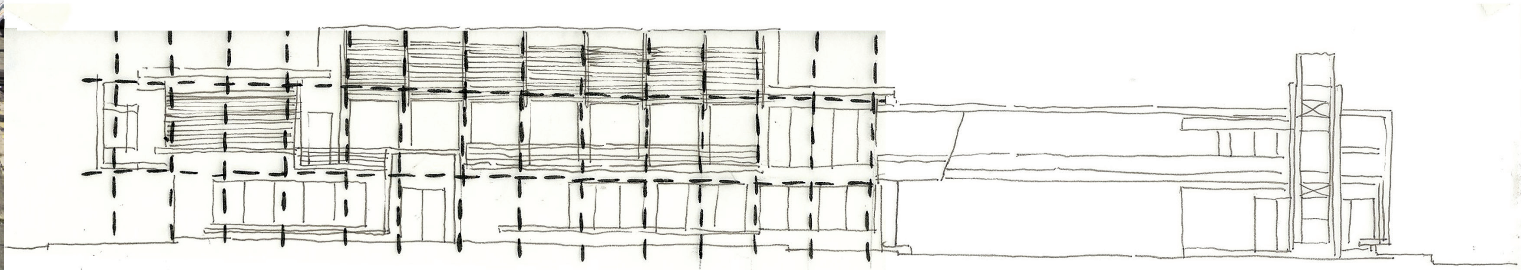
Instigating urban acupuncture _ theoretical application

Urban Acupuncture Time Spatial organization Trader system >> > movement



[fig] Historic building facade. Sketch, 2014.

The modular grid derives from the analytical study of the historic building in terms of the heights, rhythms and geometries. A strong 5m grid is introduced to allow for modular inter-changeability accessibility. The size of the modular grid has been derived from the historical colonnade with columns with a spacing of 2.5 meters.



[fig] Grid in propose structure. Sketch, 2014.

The strong modular repetition language is clearly present in the station building in the form of containers freights, bus axle-tree and column repetition all echoe the theoretical concept.

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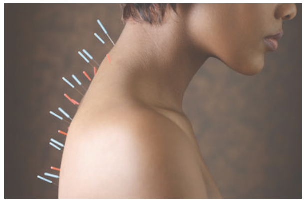
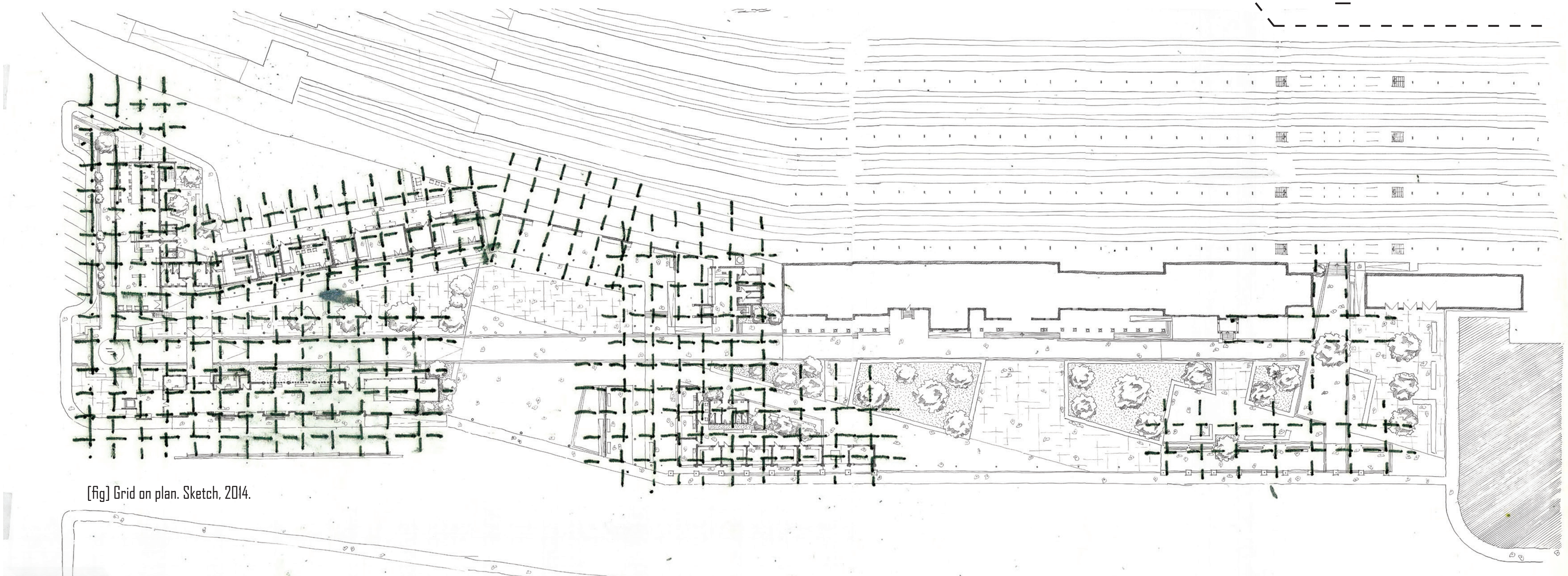


The railway lines,trains and classical column echo the modularity



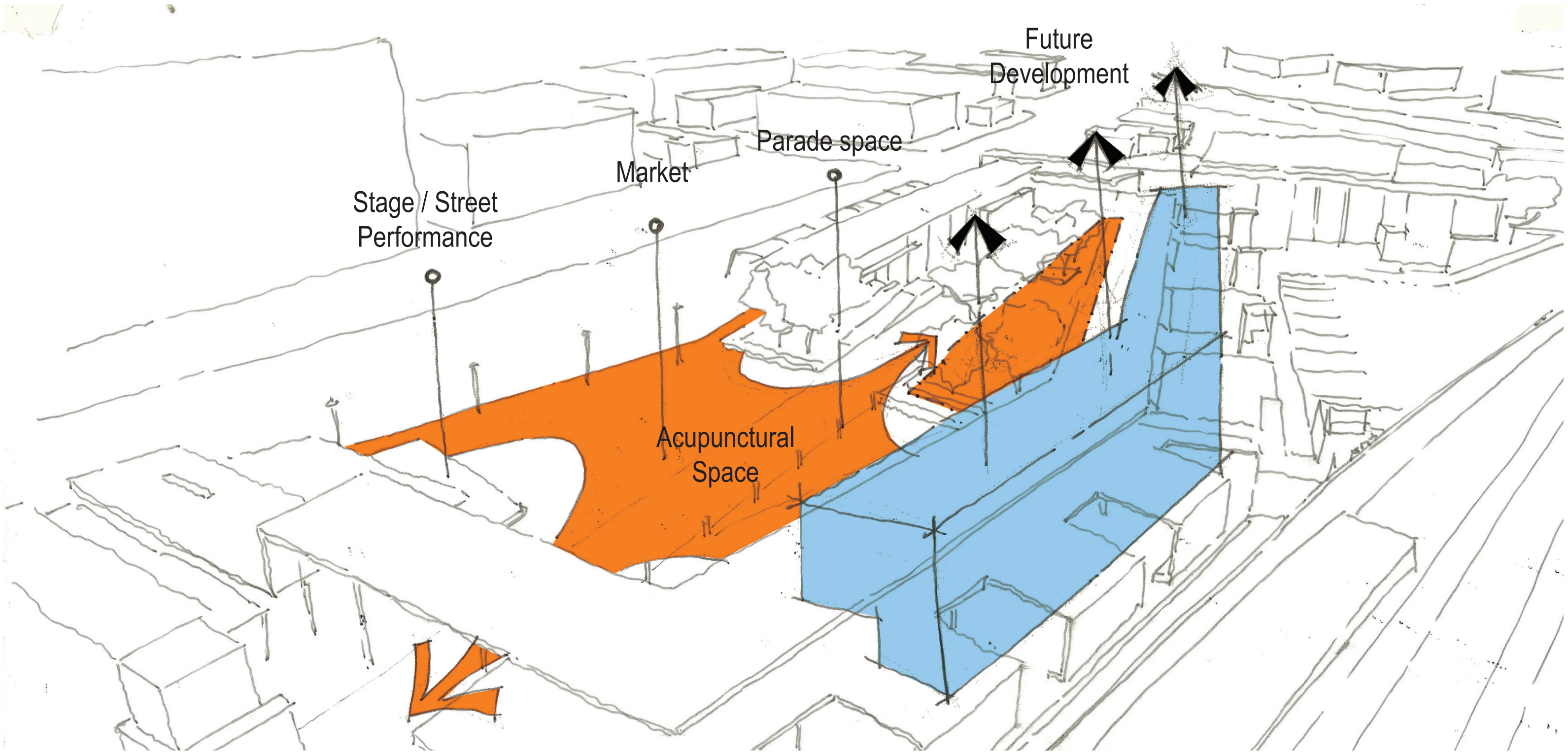
[fig] Grid on plan. Sketch, 2014.

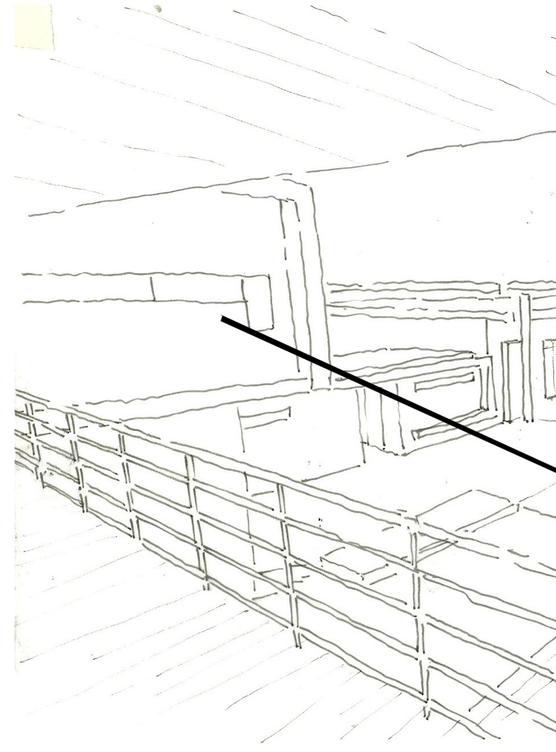
[fig] Train in motion from Railway Station platform.

[fig] Current state of station square.

[fig] Railway tracks next to site.

Instigating urban acupuncture _ theoretical application





[fig] Acupunctural space. Sketch, 2014.

Reactivating the past is incorporated from the modular systems, using the systems references to the past made and the past is reactivated.

The organic building typology and rigid modular grid allow the structure to expand and transform through time. The hybrid (linear & organic) typology is not terminated at the southern end of the site, but rather left as incomplete suggesting that in future it can be expanded to conform to the social needs of the community.

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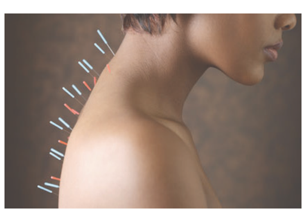
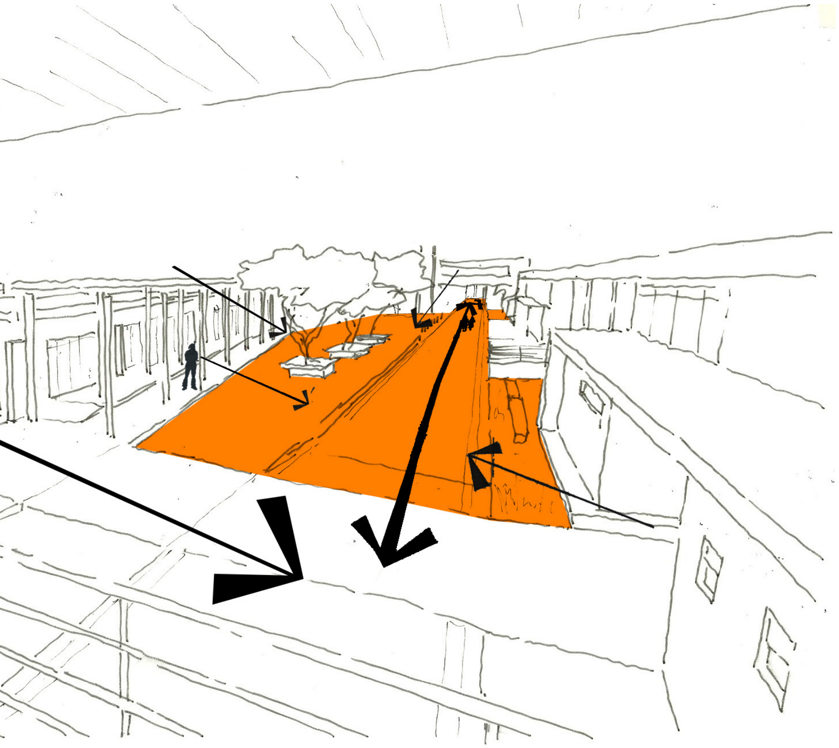
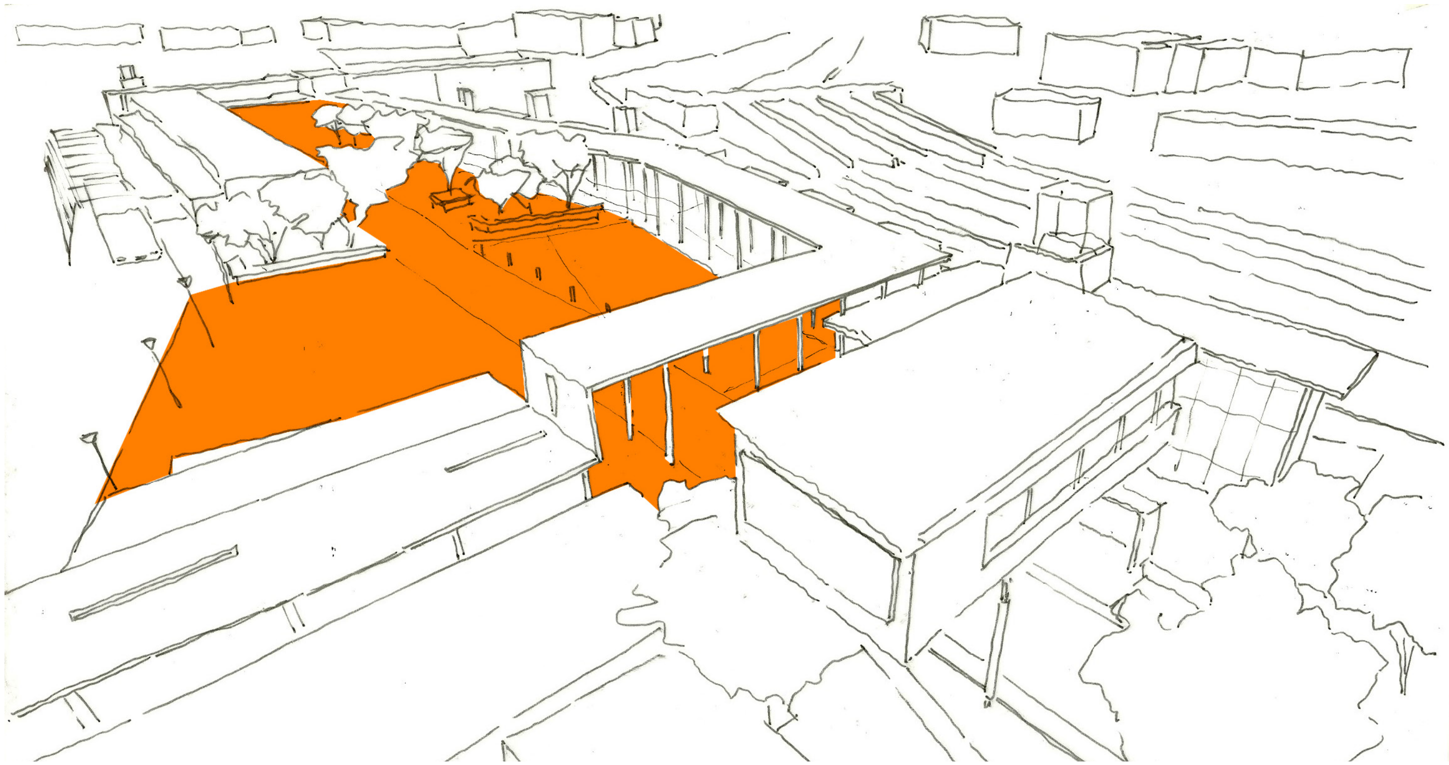




[fig] View from circulation bridge to Administrative building. Sketch, 2014.



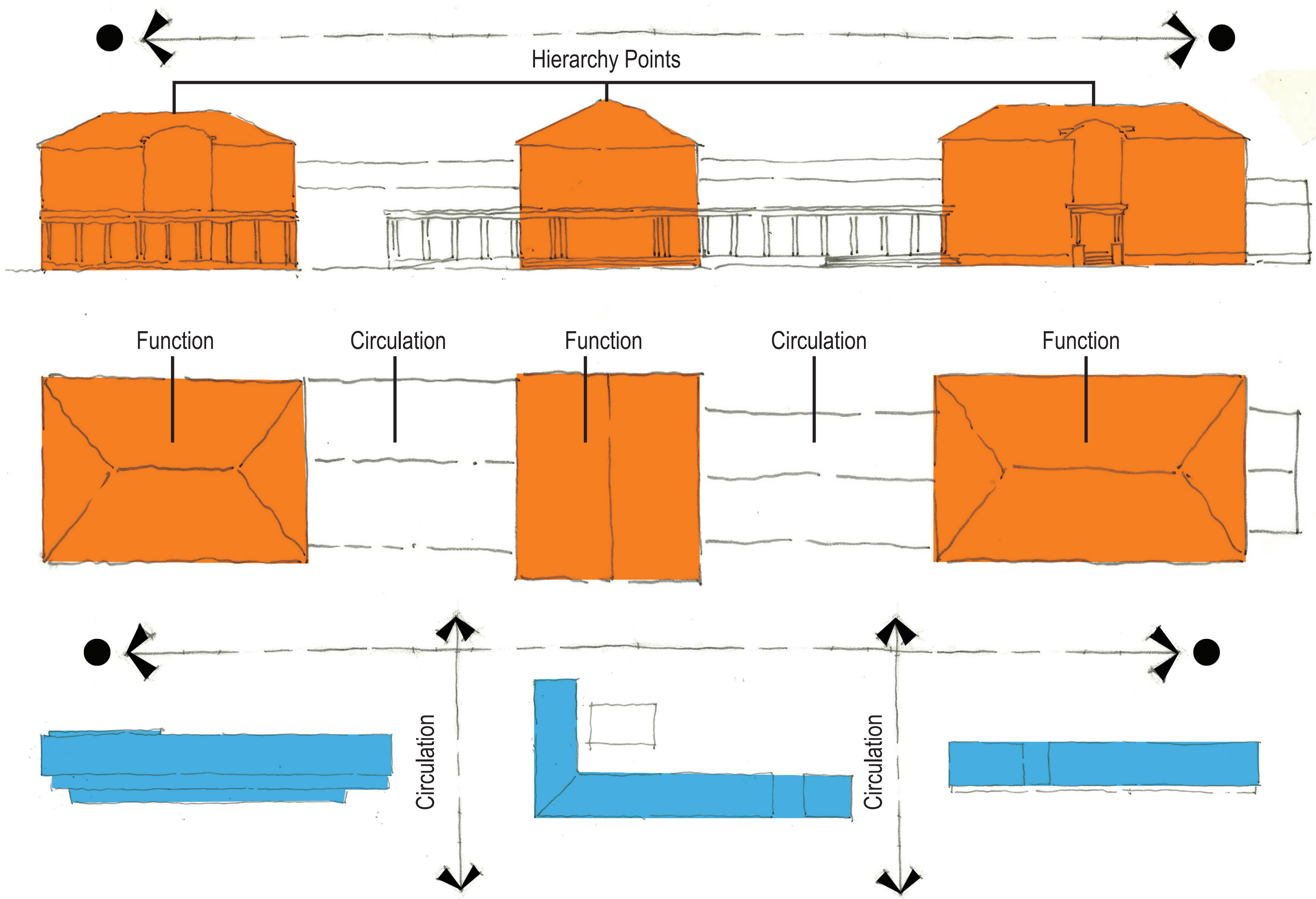
[fig] Birds eye view of Acupunctural space. Sketch, 2014.

The central plaza becomes an acupuncture space which can transform and adapt to accommodate present social needs. This can be achieved by becoming a diverse platform for market, performance, outdoor event spaces and so forth.

Instigating urban acupuncture _ theoretical application

Urban Acupuncture Time Spatial organization Trader system >> > movement

The proposed Interchange has developed into an organic formation with linear linked spaces. The hybrid (organic & linear) typology is also motivated by the strong linearity of the existing railway lines and Harvey Street next to the site.



[fig] Analyses of historic building mass and interpreted into propose design. Sketch, 2014.

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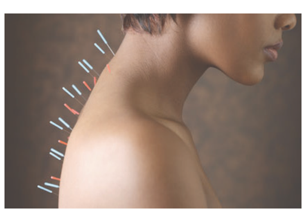
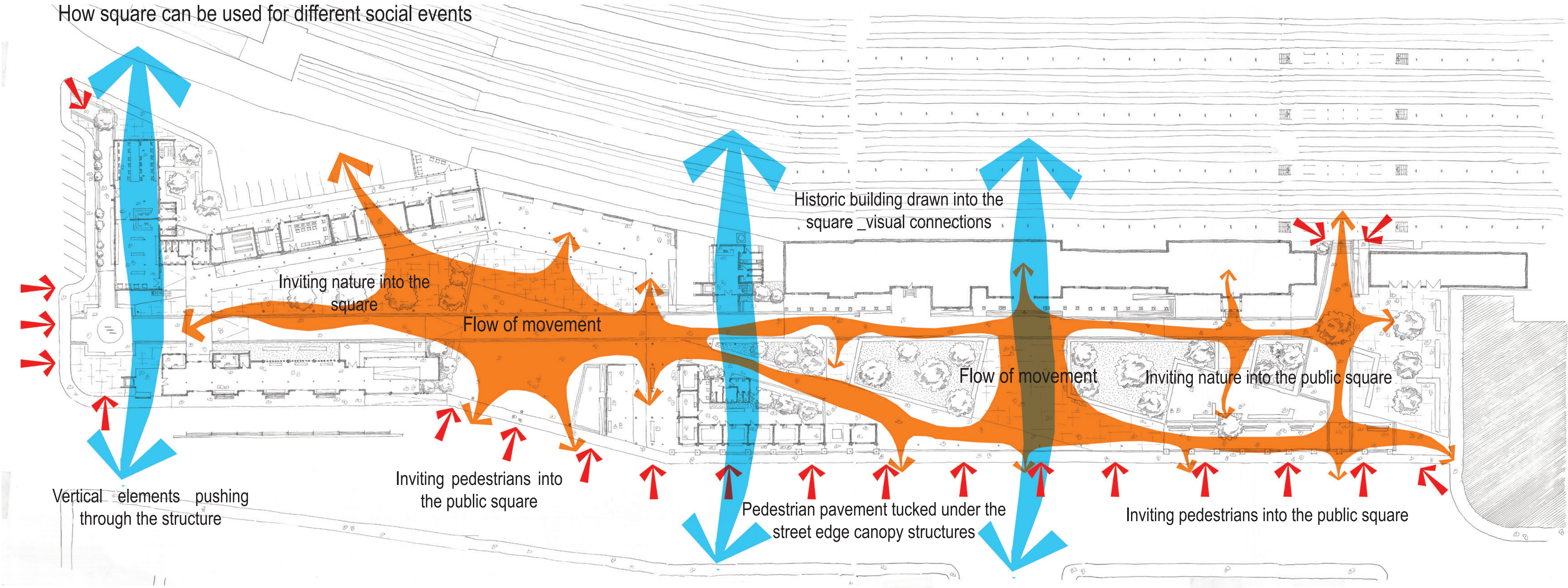


Instigating urban acupuncture _ theoretical application

Urban Acupuncture Time Spatial organization Trader system >> > movement

How square can be used for different social events



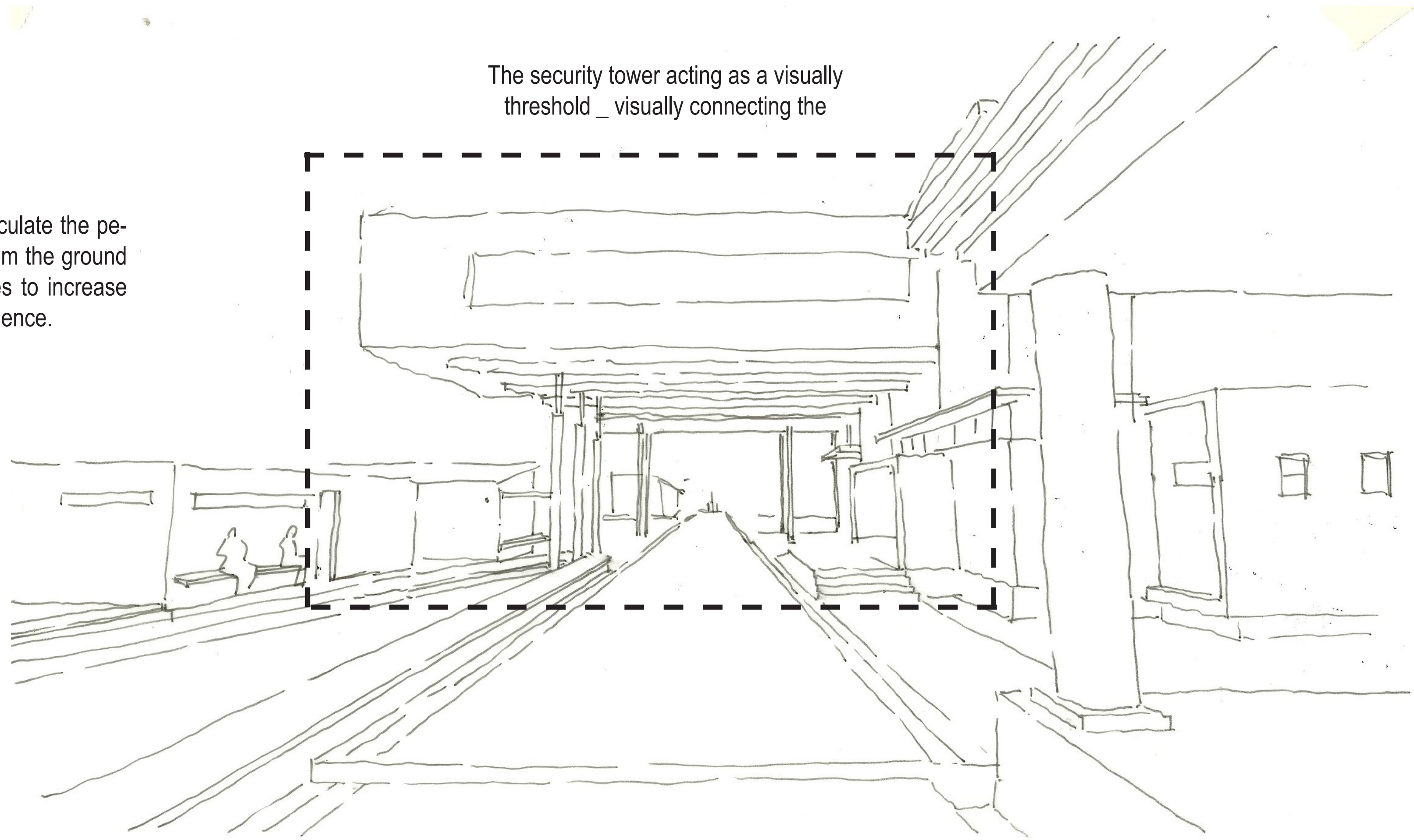
Pedestrians are invited into the building, blurring the threshold between street edge and urban square. The majority of the structures becomes an interactive social space between the boundaries. There is a continuous flow of movement through the site. The urban landscaping has become a design tool which helped dissolve the harsh mechanical nature of the urbanism landscape. The implementation of the traders network allows for the constant filtration of pedestrian movement and is a catalyst for the urban spaces. In conclusion, architecture becomes the tool that stitches the society with the urban landscape.

[fig] How public square can be used for different social events. Sketch, 2014.

Instigating urban acupuncture _ theoretical application

Urban Acupuncture Time Spatial organization Trader system >> > movement

Using the architecture to frame and articulate the pedestrians view _ lifting the structures from the ground and making use of perforated structures to increase the visual connection and journey experience.



[fig] Visual connection on circulation route, framing the threshold space and beacon ponts. Sketch, 2014.

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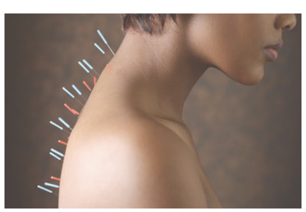
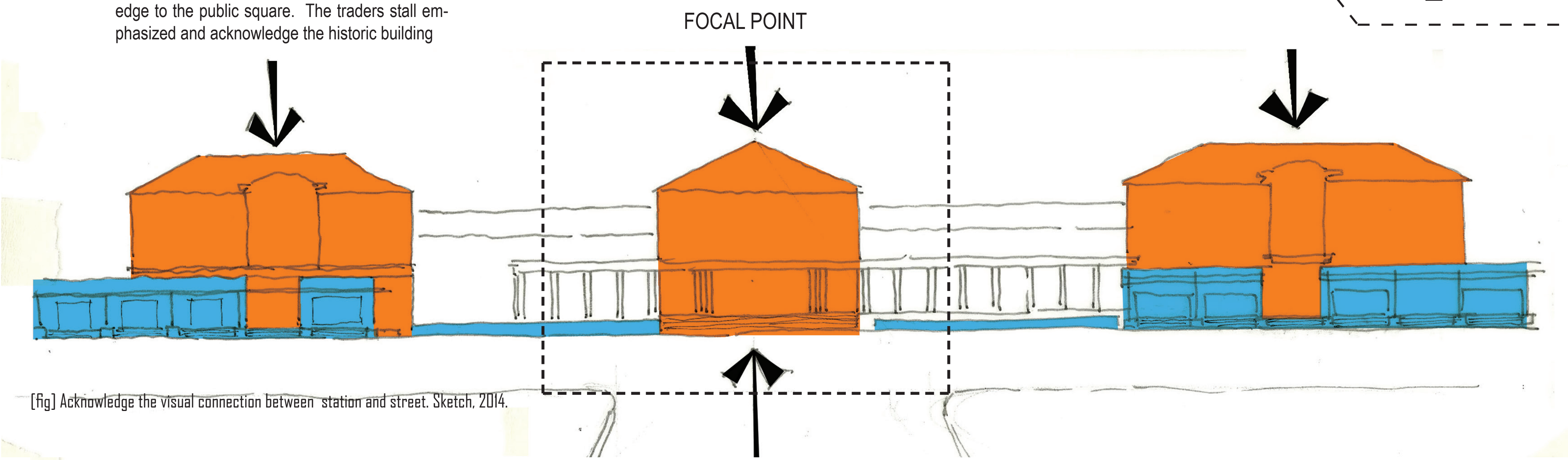
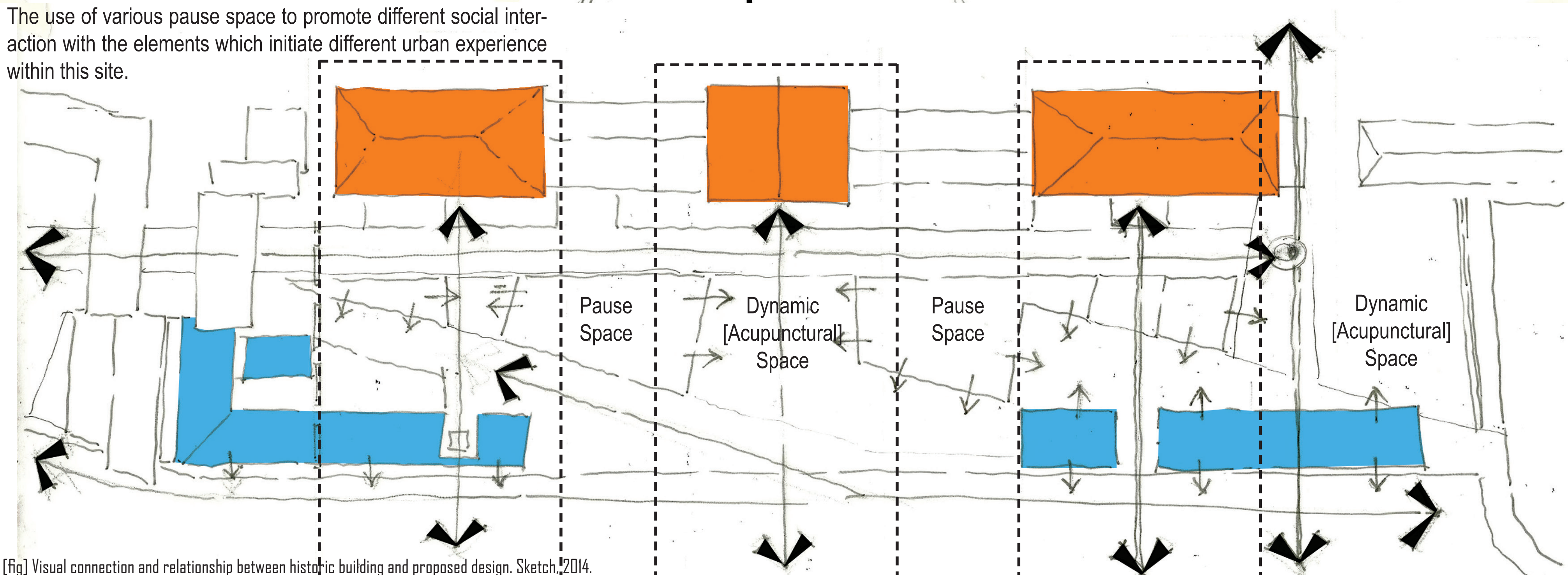


Traders stall acting as the filter from the street edge to the public square. The traders stall emphasized and acknowledge the historic building



[fig] Acknowledge the visual connection between station and street. Sketch, 2014.

The use of various pause space to promote different social interaction with the elements which initiate different urban experience within this site.



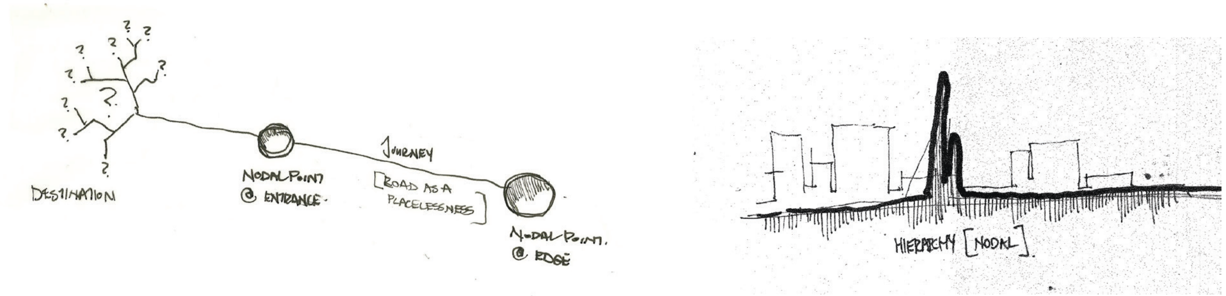
[fig] Visual connection and relationship between historic building and proposed design. Sketch, 2014.

Design process

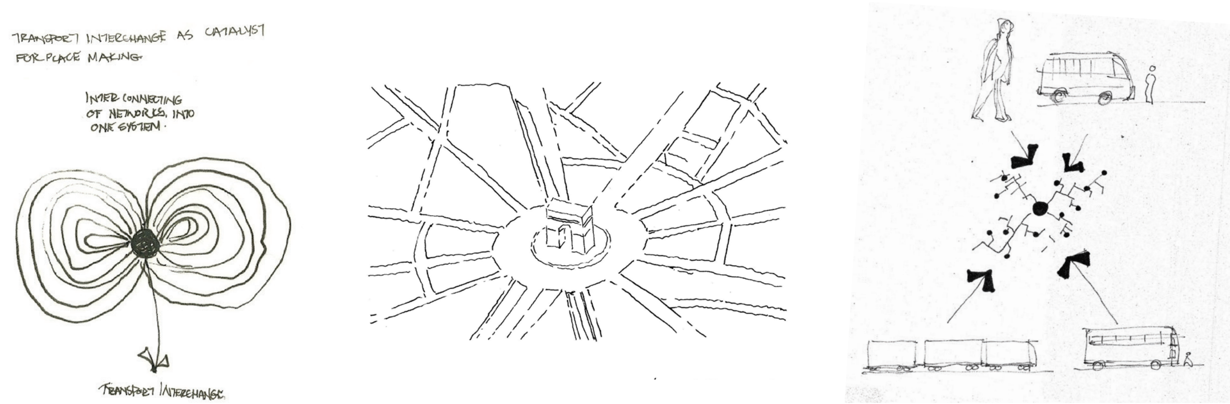
Stage 1 _ Nodal point

Design development: This early conceptual sketches was a manifestation of what intuitively and inherently may belong to the site. The initial reaction to the site polemics was to acknowledge the corner, street edge and erection of a beacon acting as a nodal point on site.

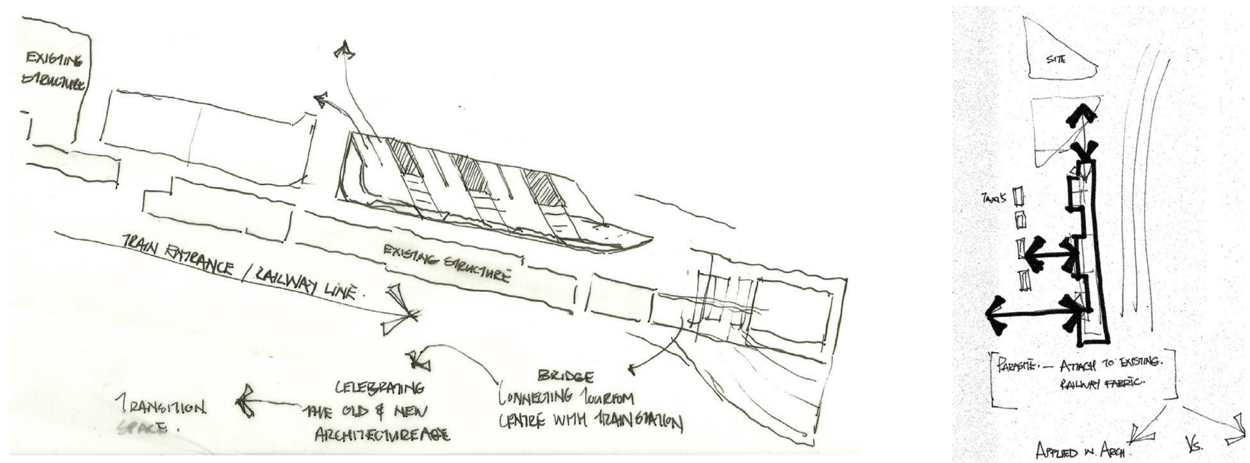
A linear typology was realized as a comment on the strong railway line and Harvey Road next to the site. The structure consists of a articulated tectonic structure which echoes the temporarily of pedestrian in a continuous state of motion. The public amenities has a solid ridge base, acting as a mediator between



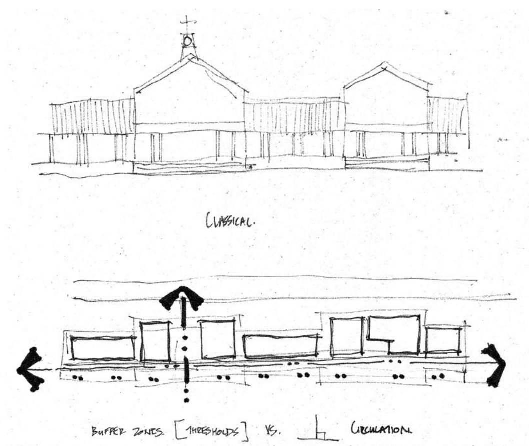
Beacon point for users on and around site.



The interchange as a catalyst for place making and connection of different infrastructure systems.



Linear typology identify due to long and elegant footprint of the site.



Acknowledge the historic western façade of the Railway Station – visual connections with street.

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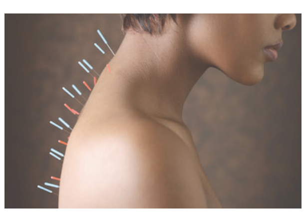
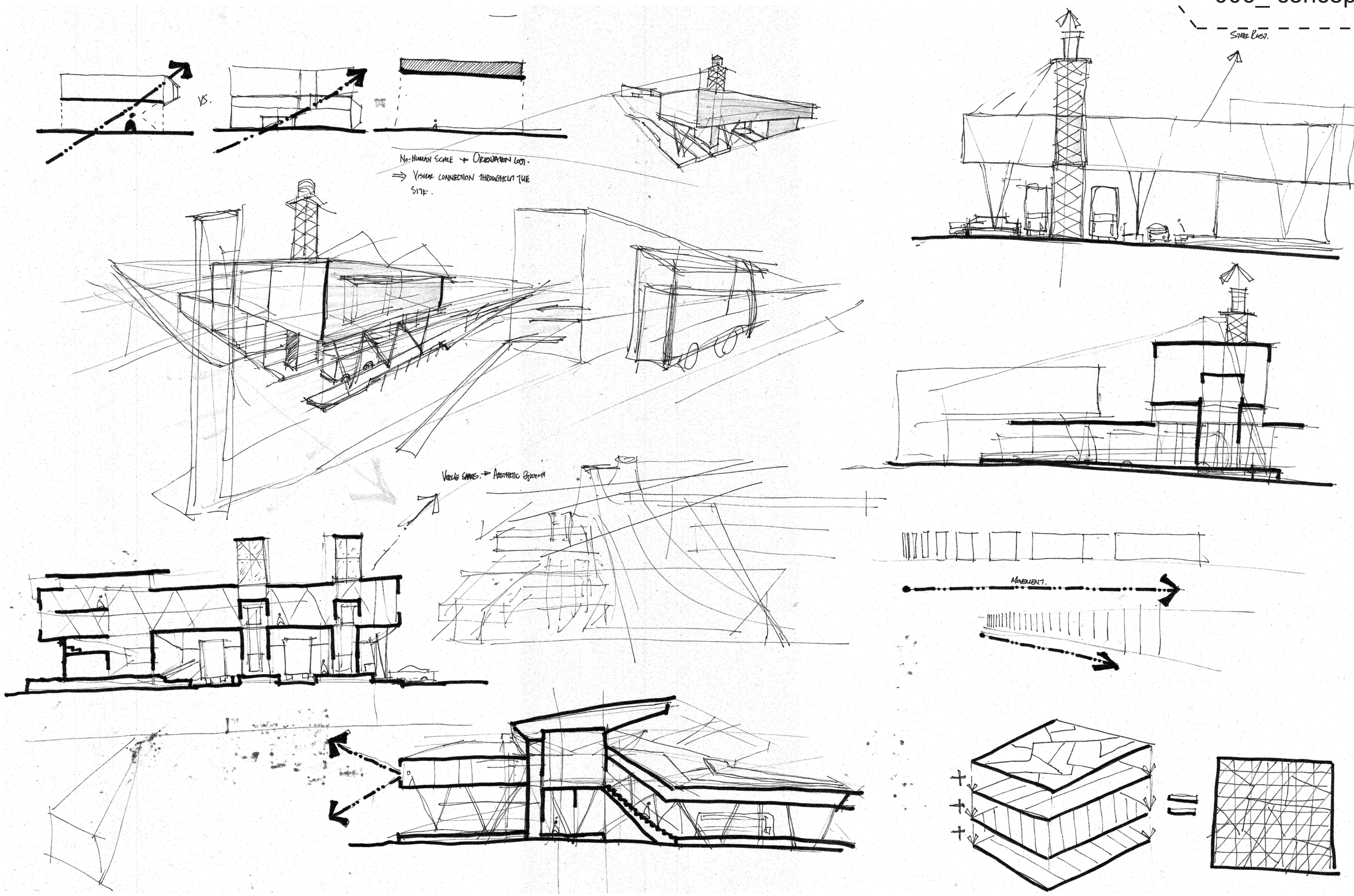
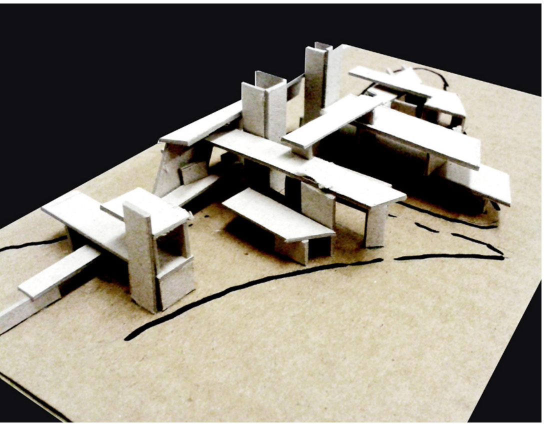
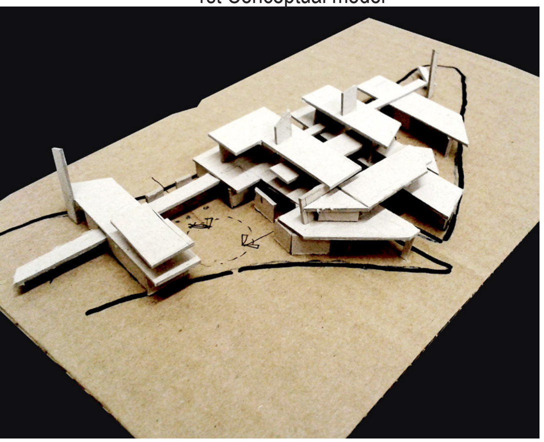



VS.
NO-HUMAN SCALE + ORIENTATION LOST.
⇒ VISUAL CONNECTION THROUGHOUT THE SITE.
MOVEMENT.

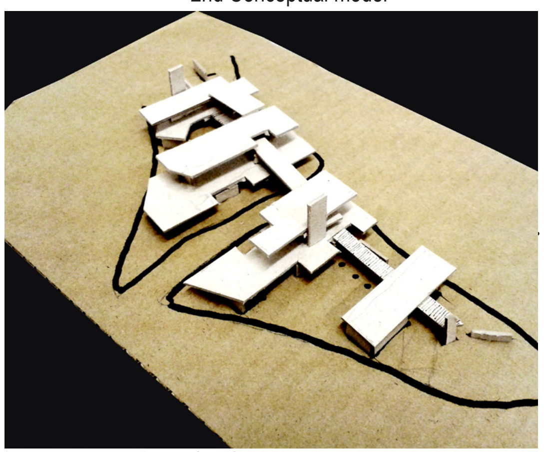
Conceptual approach



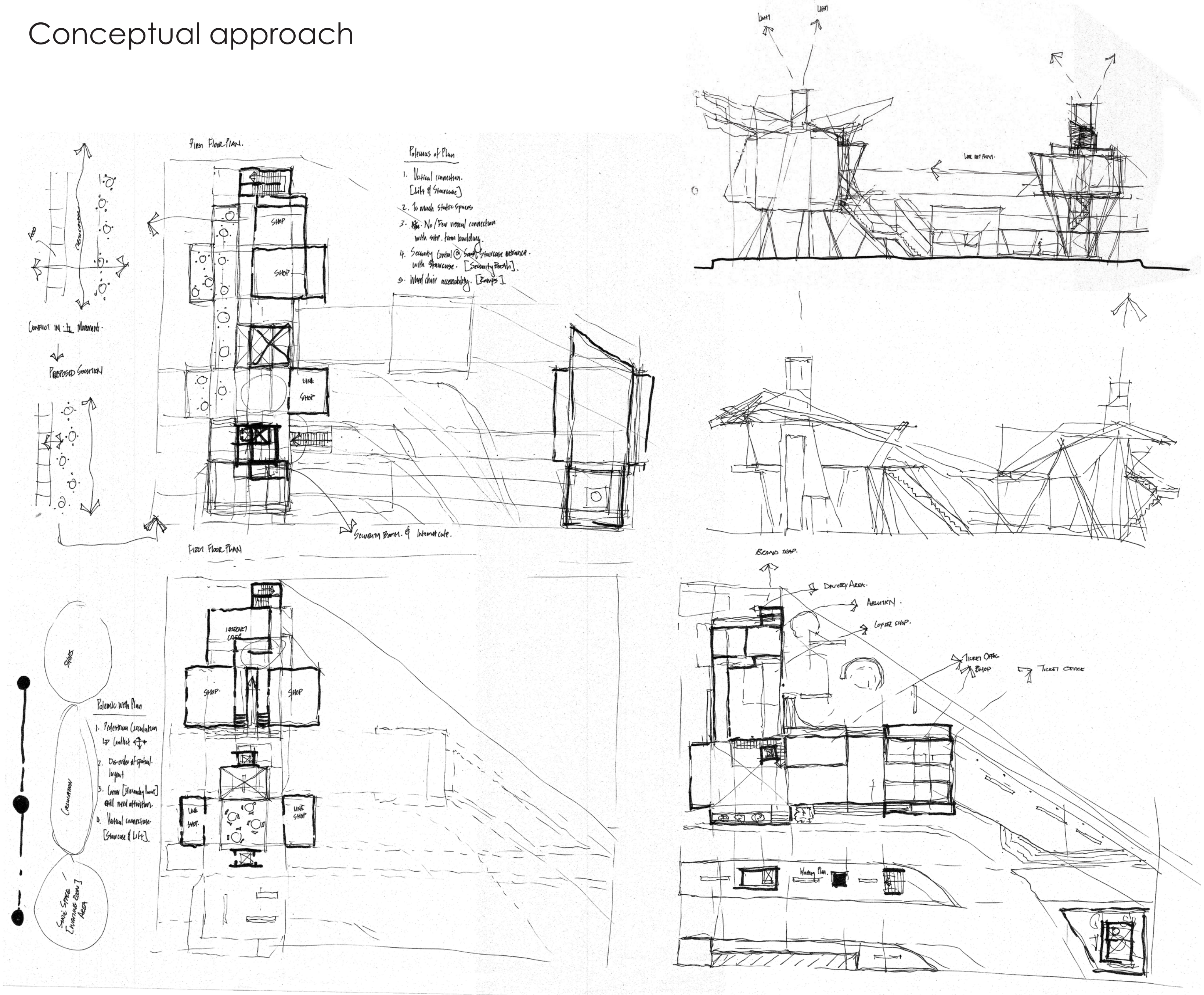
1st Conceptual model

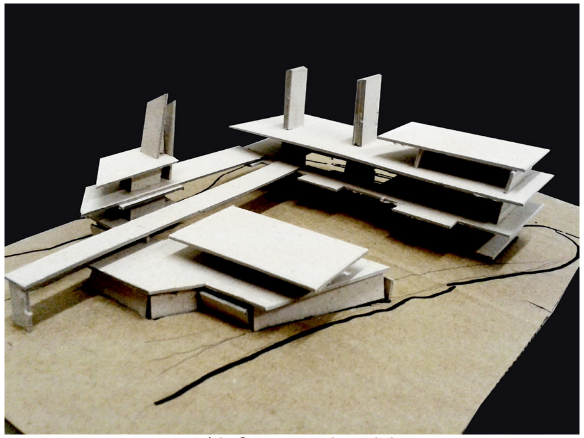


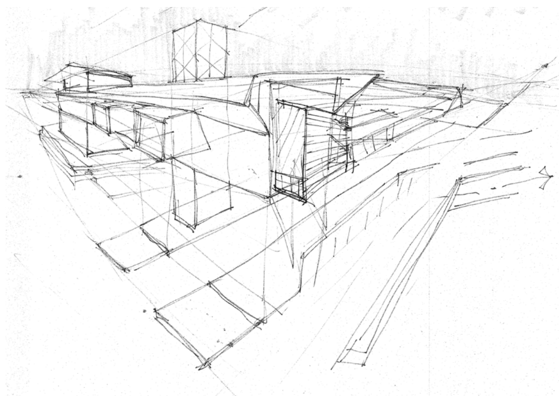
2nd Conceptual model

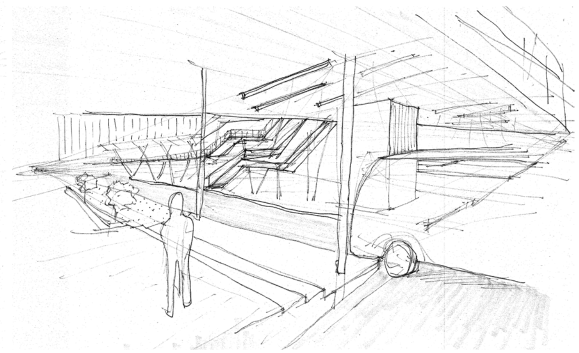


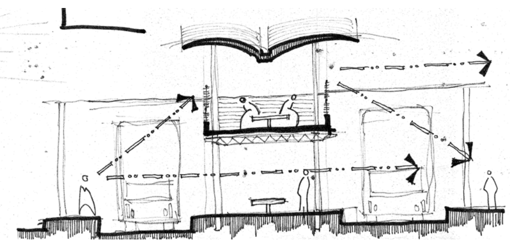
3rd Conceptual model

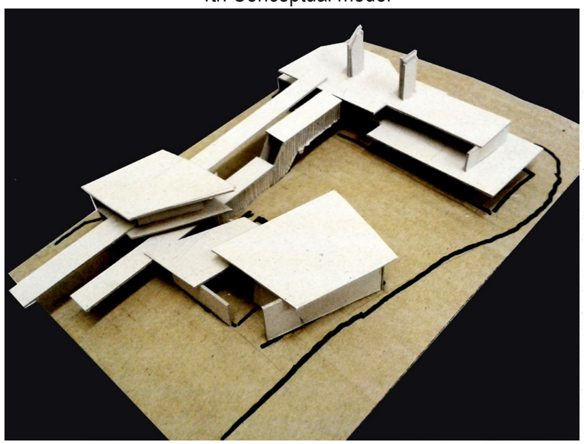


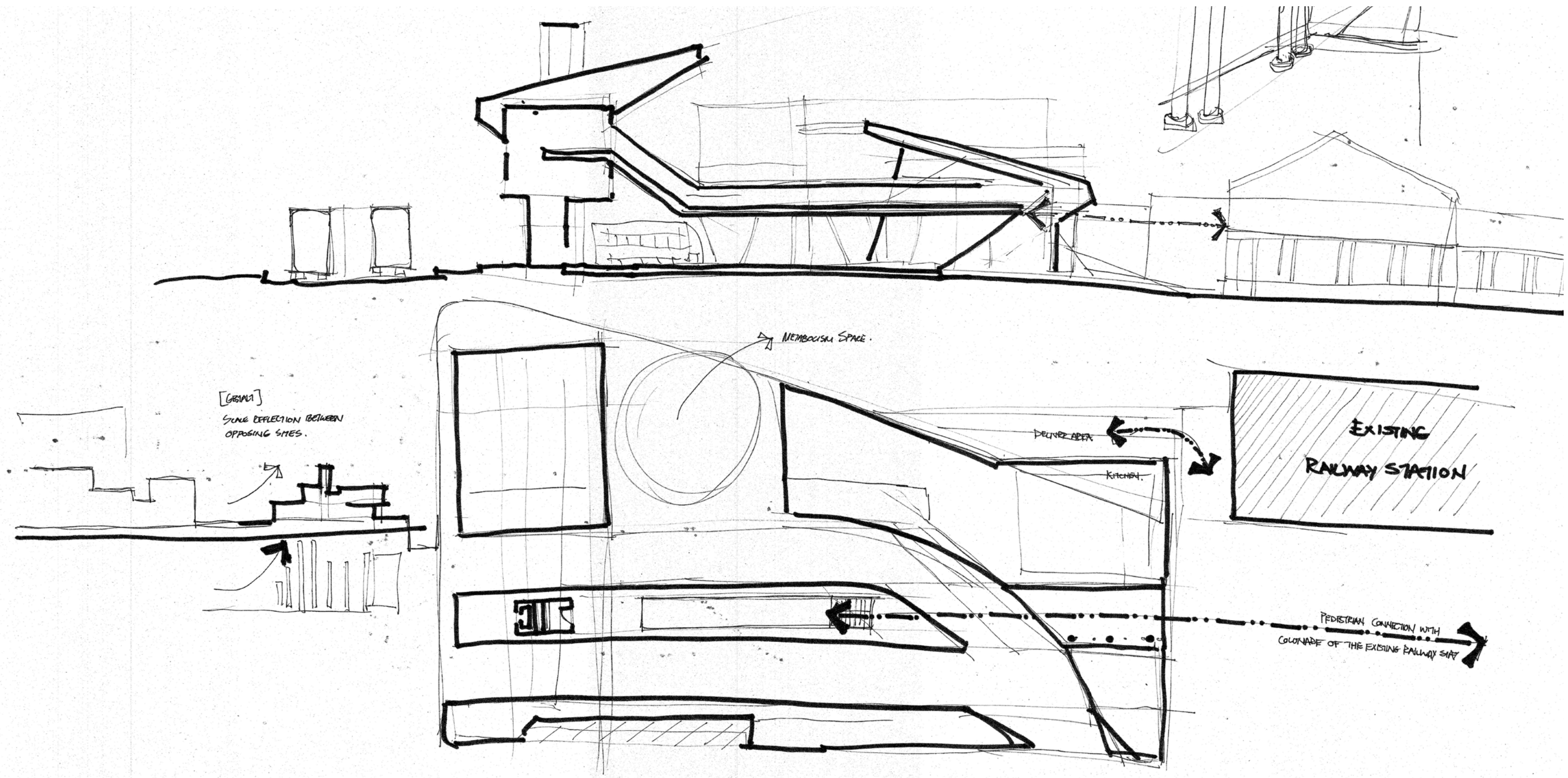

4th Conceptual model

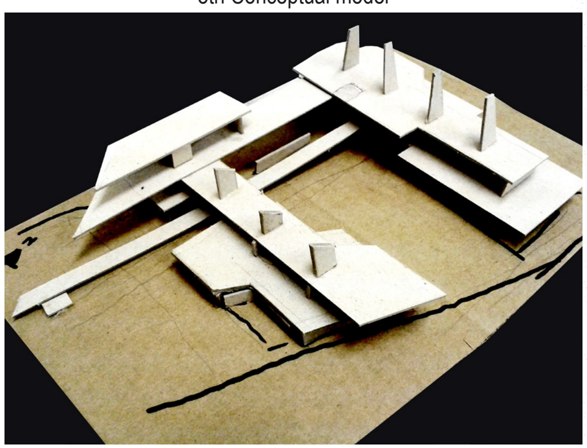


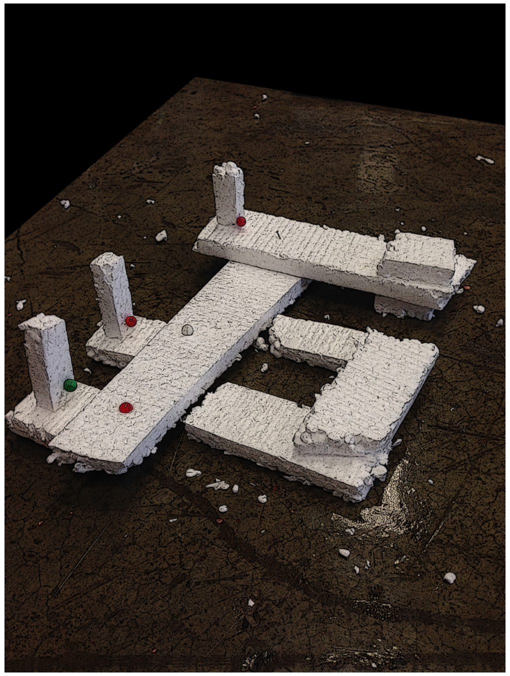




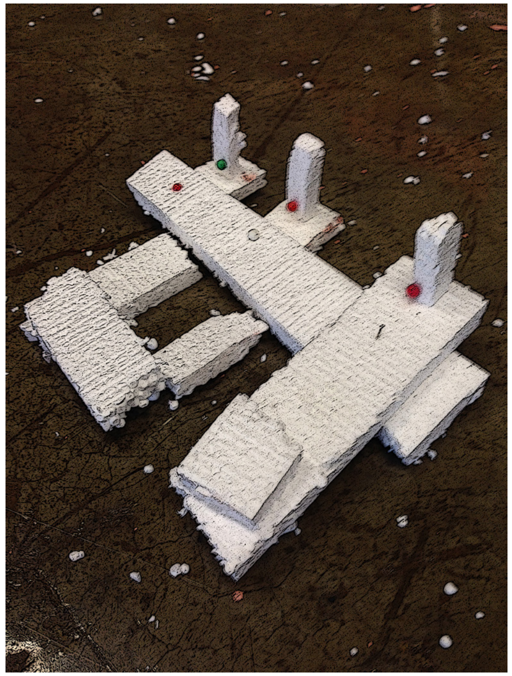

5th Conceptual model



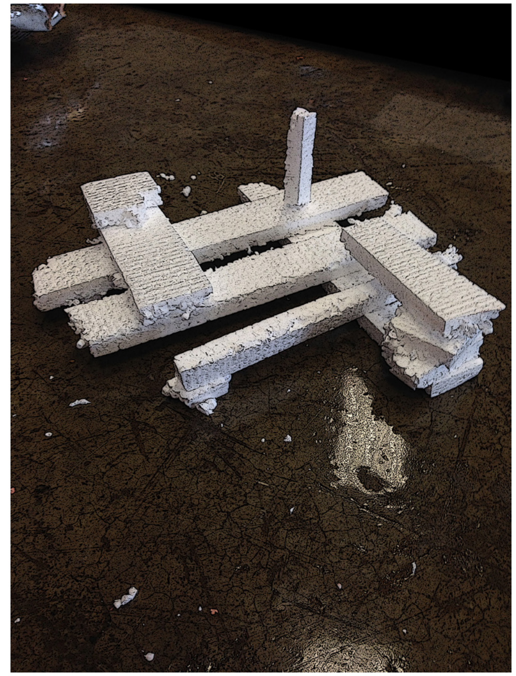

6th Conceptual model



7th Conceptual model

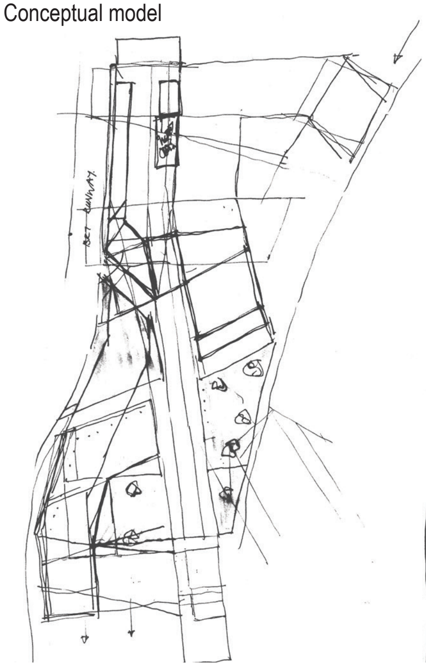


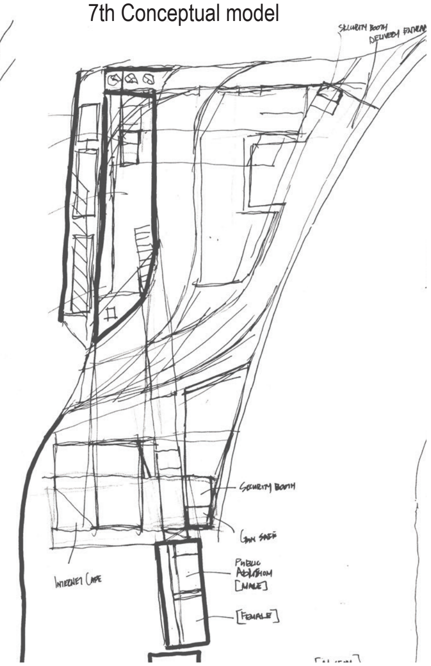
7th Conceptual model



8th Conceptual model

7th Conceptual model





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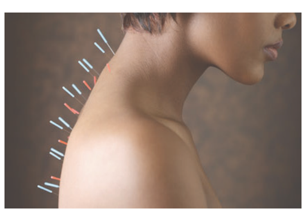

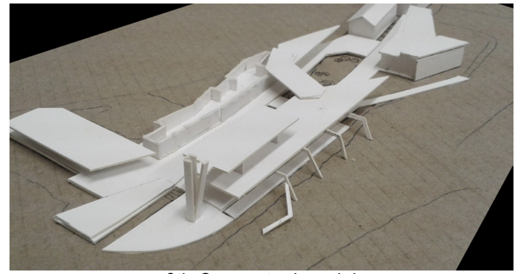

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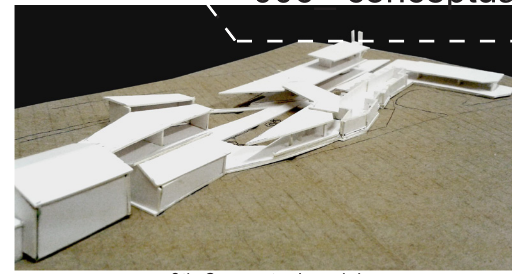

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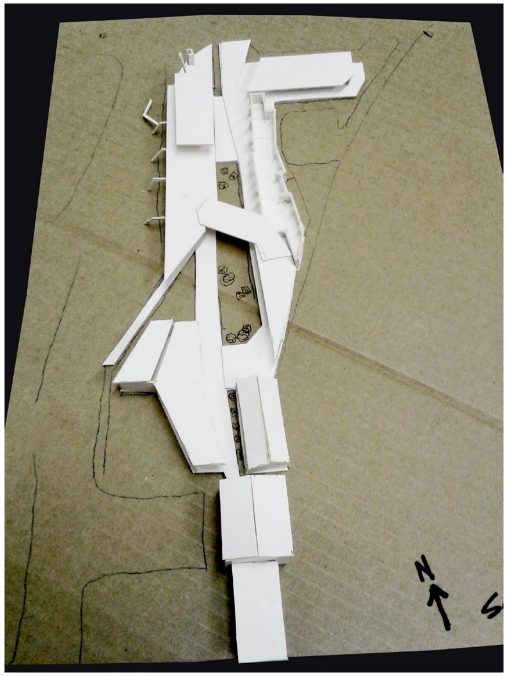

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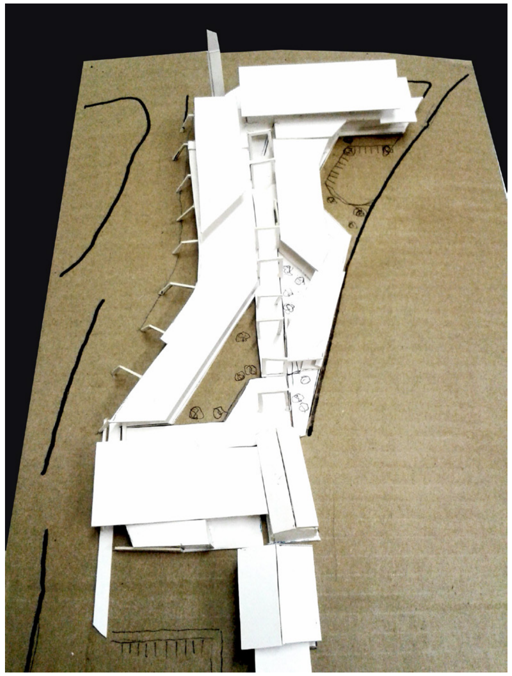
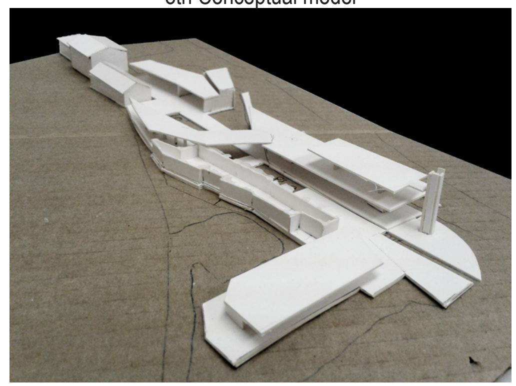


9th Conceptual model



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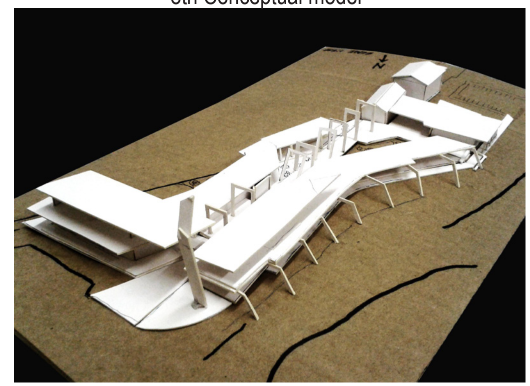
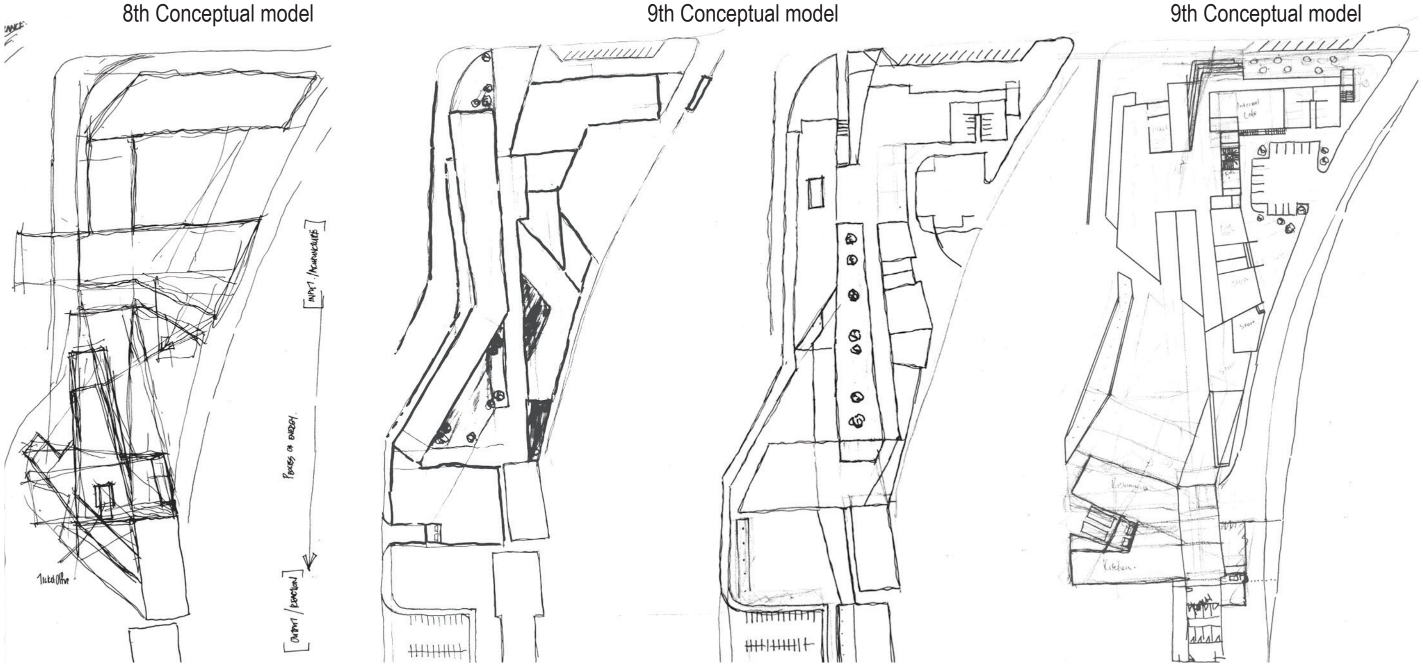


9th Conceptual model

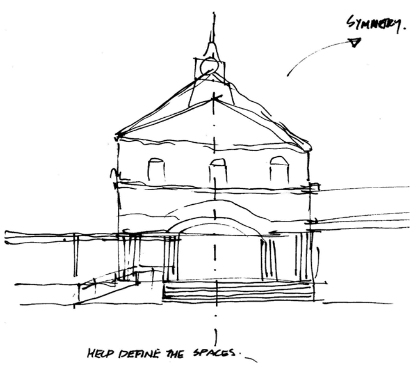


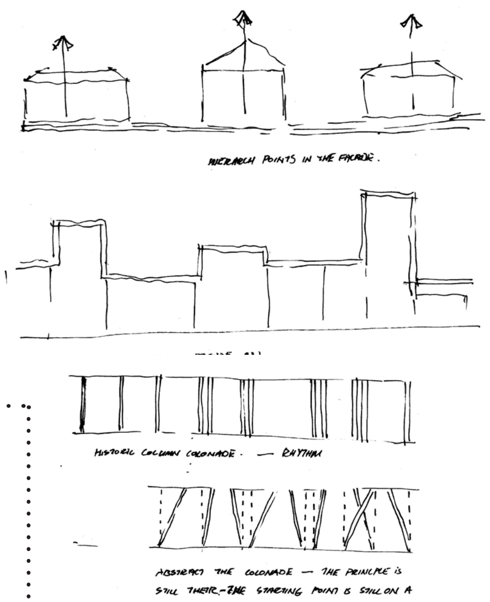
Stage 2 _ Typology investigation

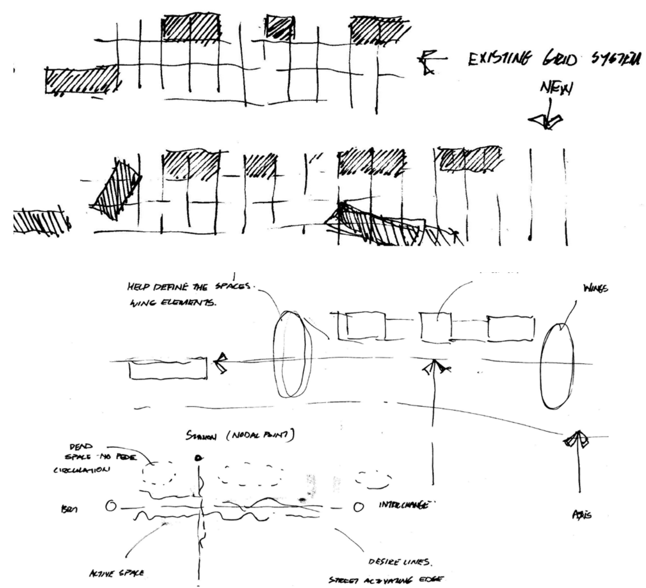
Design development: This early model explores and emphasized the strange site typography, while introducing a strong circulation route. The implementation of the BRT station is placed for its functionality and particularity in terms of minimizing disturbance of the existing traffic flow and linking with existing bus route. The linear typology is manifested from realizing the railway line adjacent to the site. Acupunctural modulation of spaces is explored.

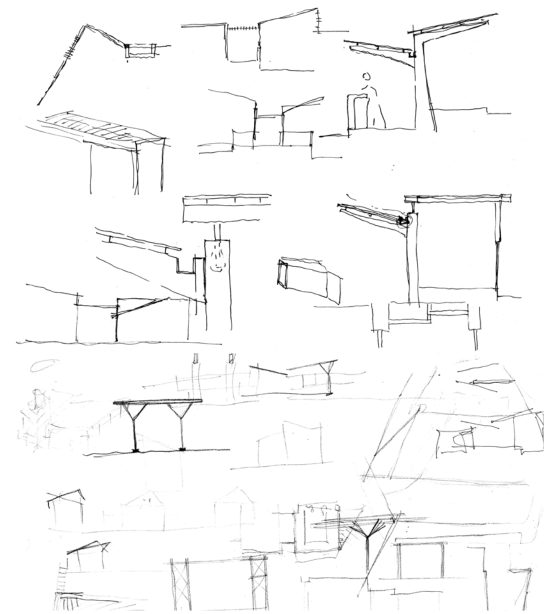
Design development

9th Conceptual plan. Sketch,2014.









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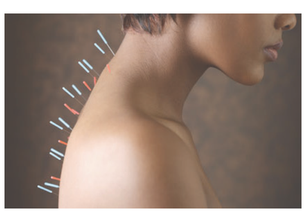
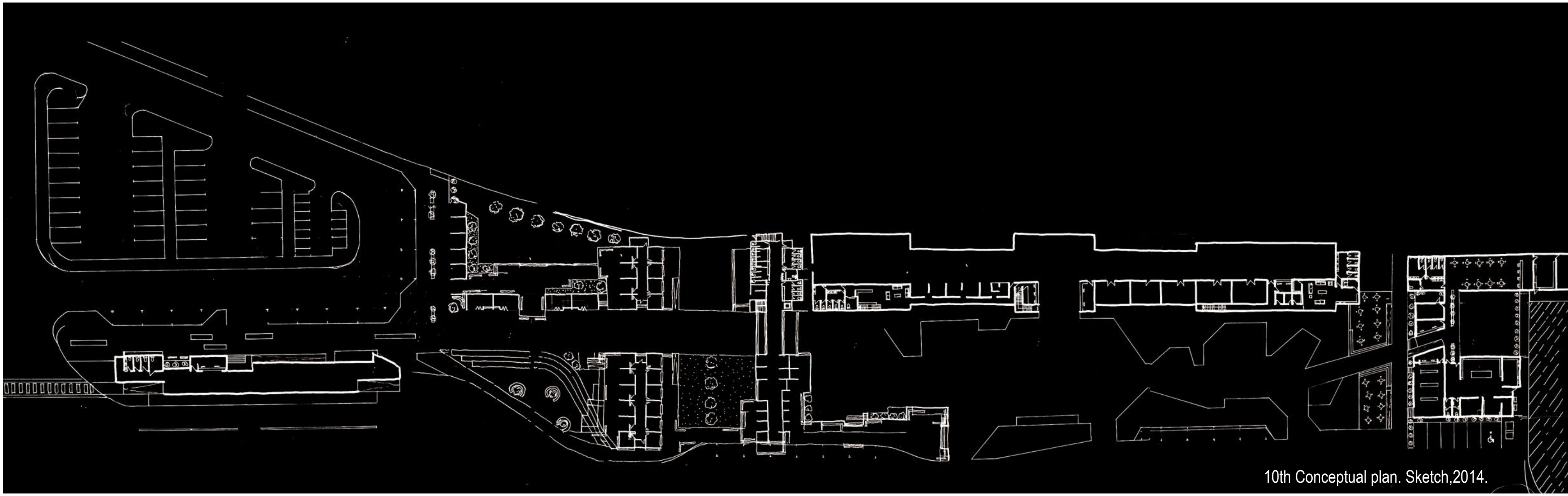
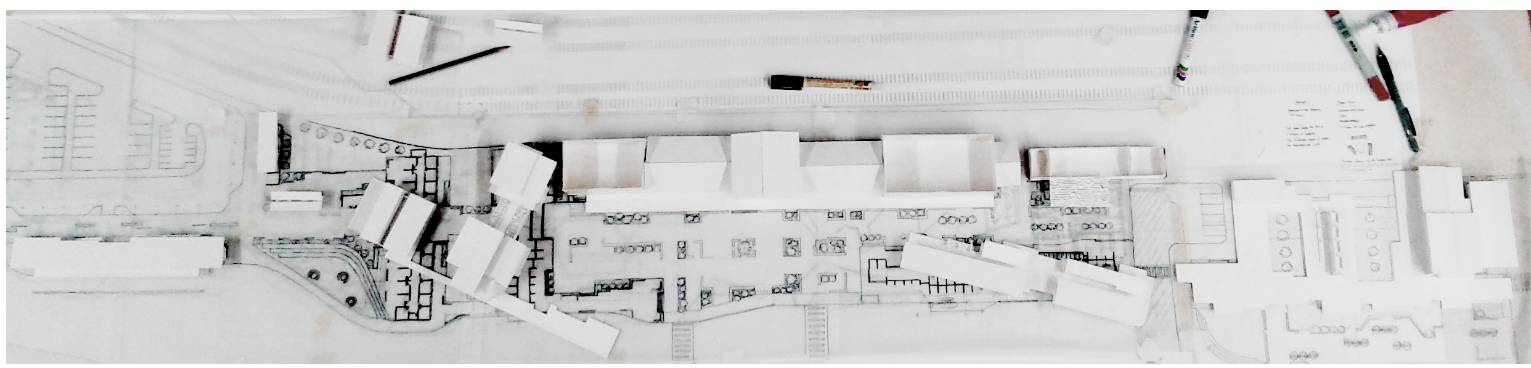




10th Conceptual plan. Sketch,2014.

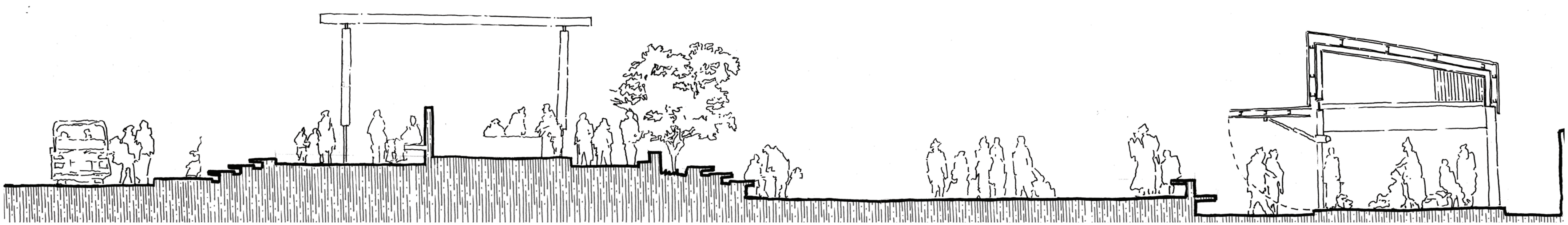
Stage 3 _ Urban landscaping

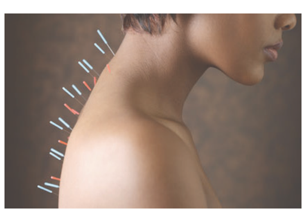
Design development: This design stage attempted to create urban landscaping where diverse social and interactive activities can take place. This led to that the building needs to be integrated with the urban fabric by reflecting a strong grid within it. A focal point emerges at the end of the longitudinal site, which gave way for the placing of the BRT station. This is justified as a nodal point on the site, ending the experience between the BRT station and Intermodal Transport Interchange. Vertical elements were introduced as urban beacons, and would later develop into the final design lift tower elements.

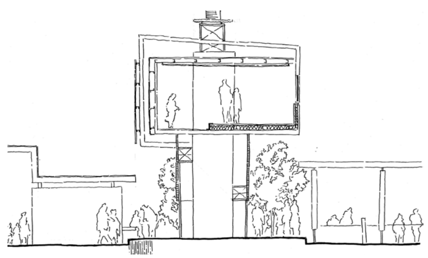


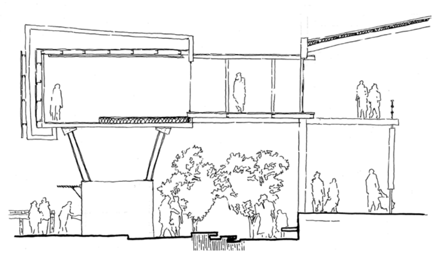
10th Conceptual model

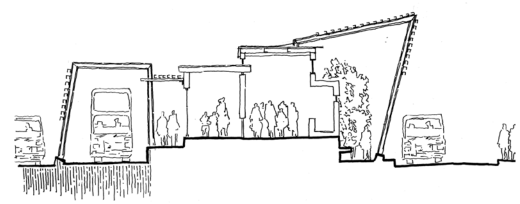
11th Conceptual plan. Sketch,2014.

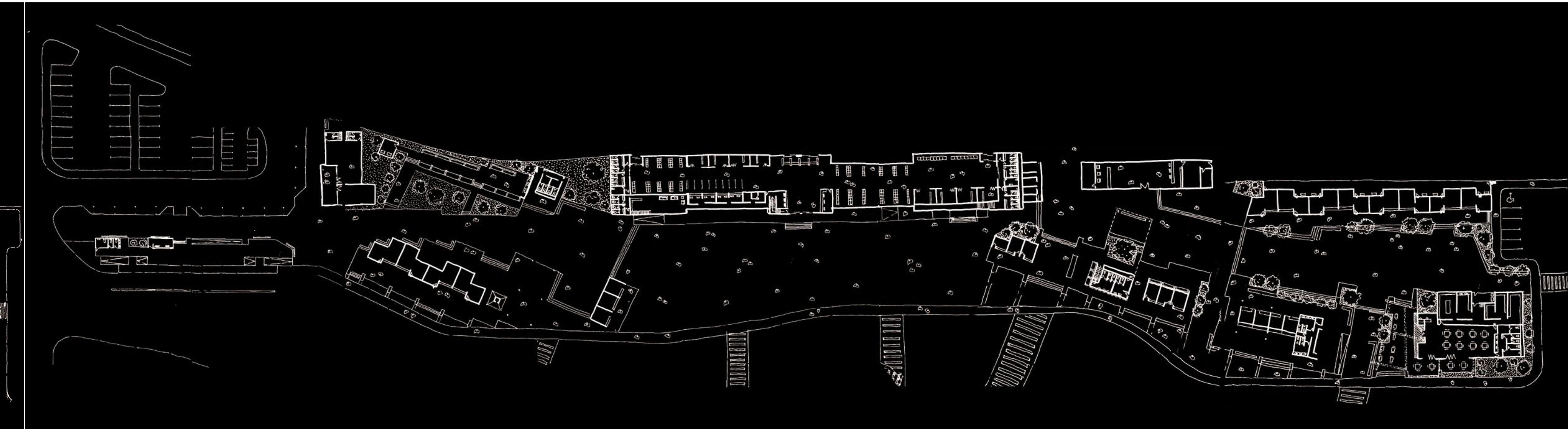










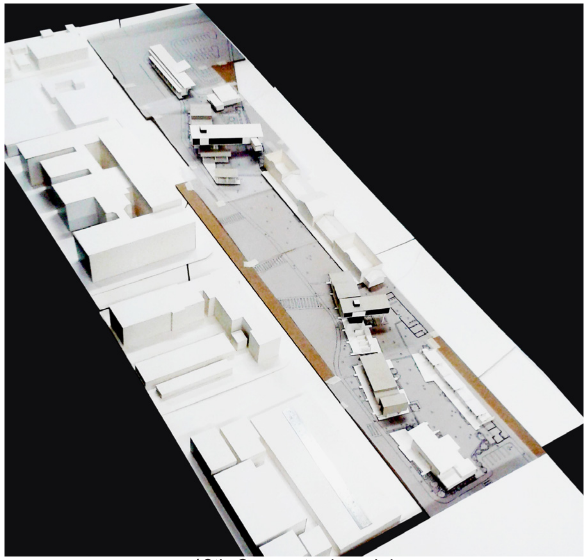


12th Conceptual plan. Sketch,2014.

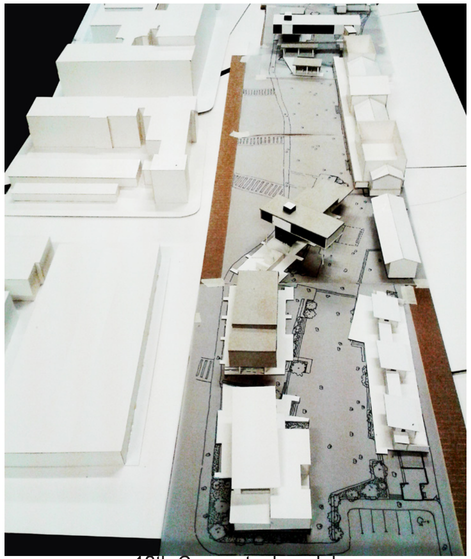
Stage 4 _ Urban connection investigation

Design development: The 4th design stage dealt with the extension of the proposed site, linking the Railway Station and Intermodal Transport Interchange in a continuous space. This was suggested to promote ease of access and physical connection between the sites. The problem with this solution was that, while spatially it connected the Railway Station square with the Interchange, visually it disconnected the two.

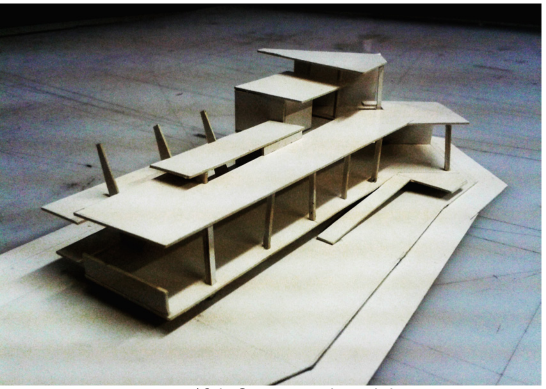
The design stage also focus on opening up the public space in front of the main building and pushing the functions to the side. The idea of a strong pedestrian route pushing through the site is present in the final design, and acting as a conceptual spine that links the two sites. During this stage the building footprint lost its formal and rigid geometric nature which was reintroduced at a later stage in a structured dynamic grid.



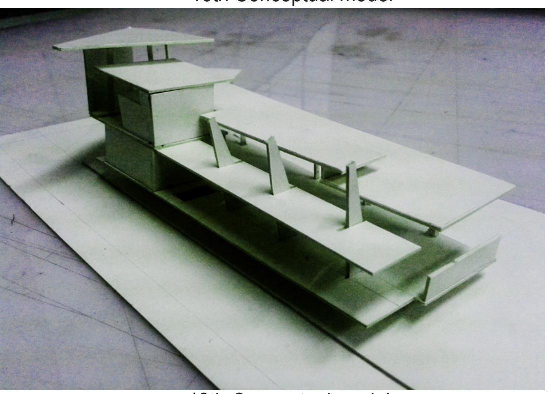
12th Conceptual model



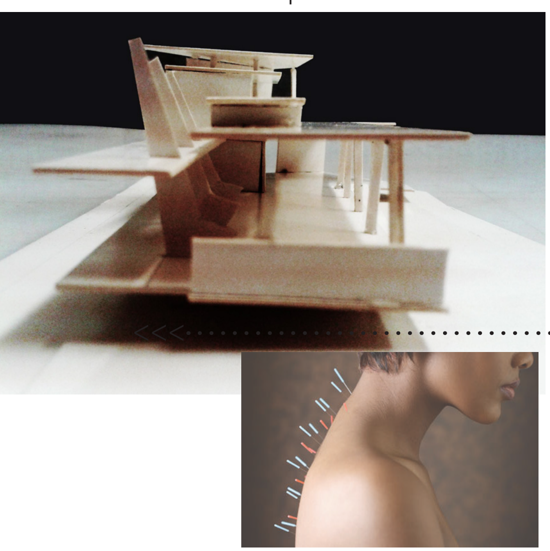
12th Conceptual model

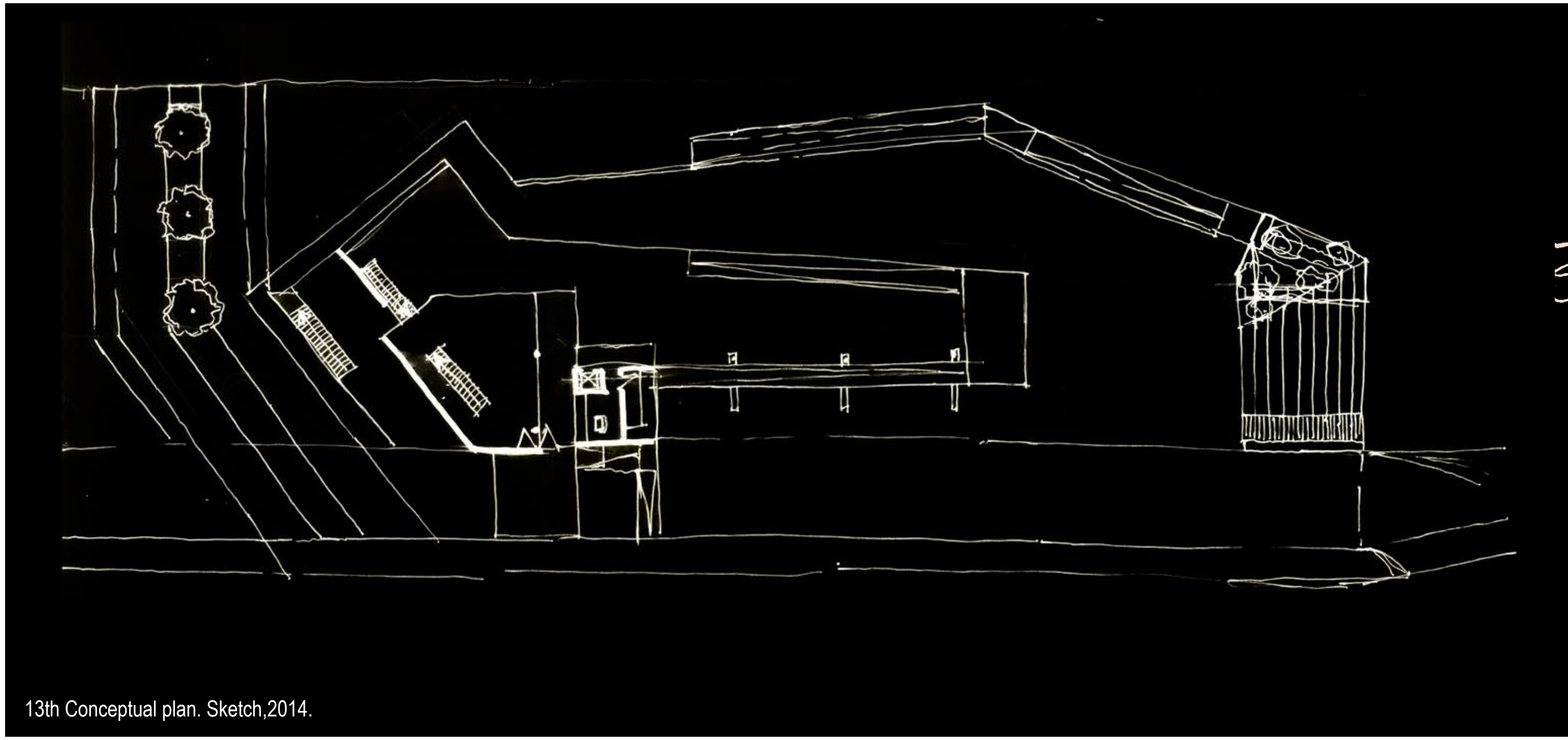


13th Conceptual model

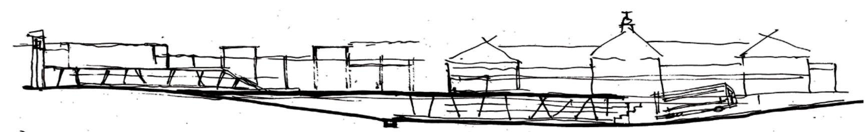


13th Conceptual model

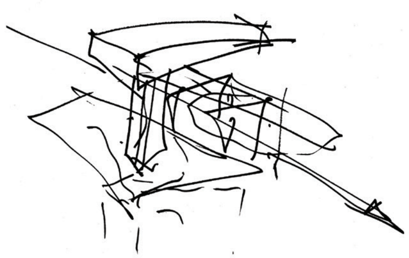


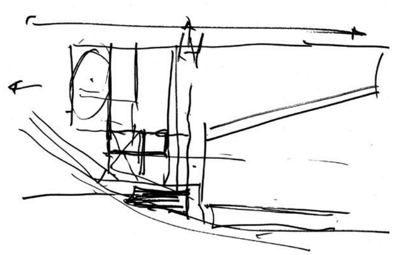


13th Conceptual plan. Sketch,2014.

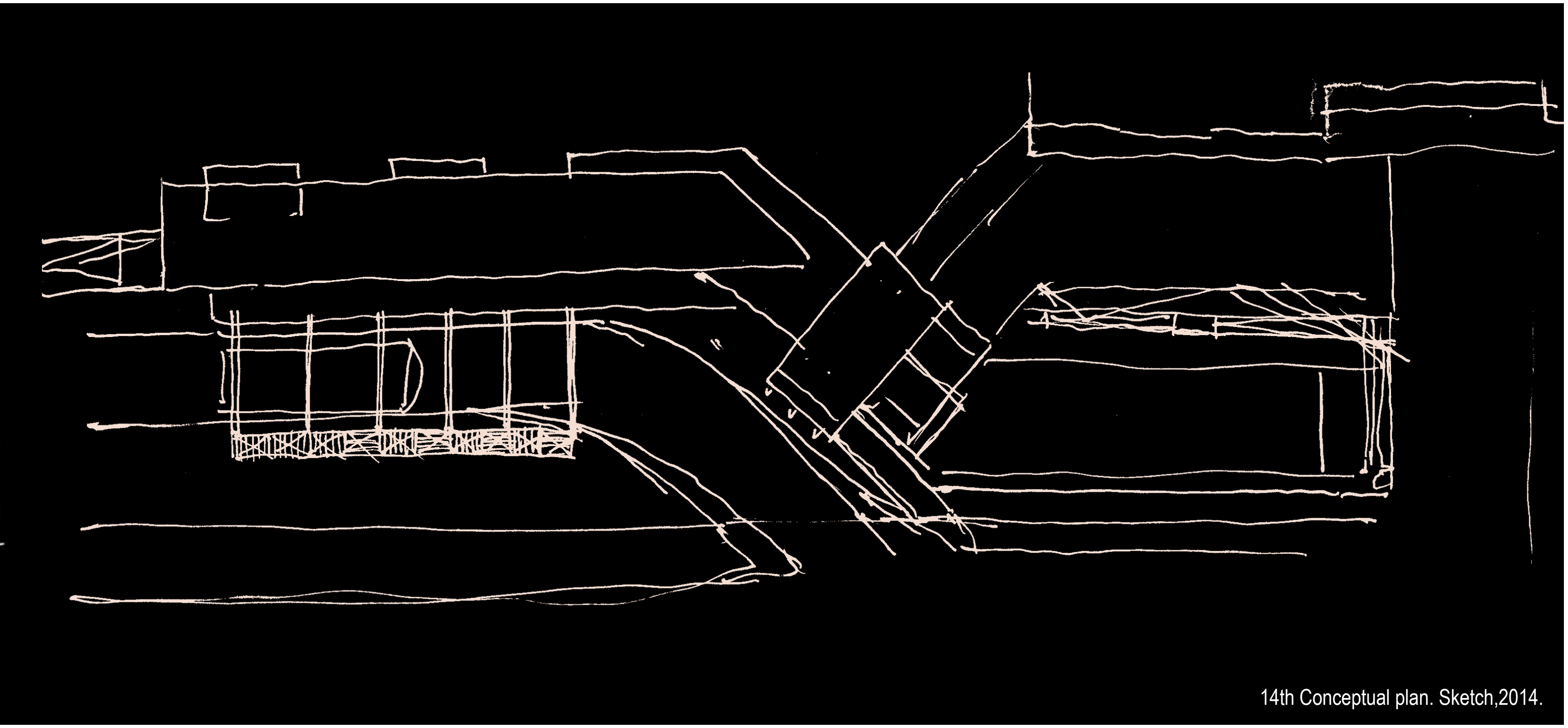


Stage 5 _ BRT Station





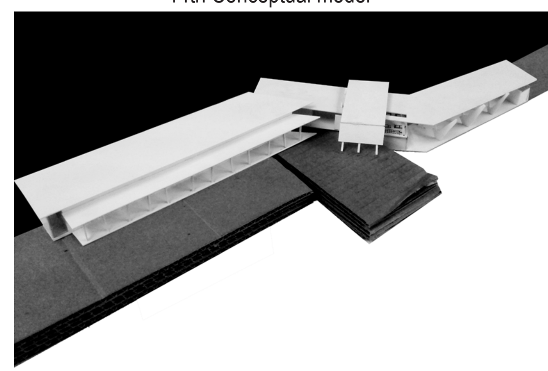
During this stage the focus was placed on how the BRT Station reflects the historic building, but in a contemporary way, this was achieved by partly submerging the BRT Station in front of the historic building. The developed gave way for analyzing and understanding of the classical elements of the historic building and implemented into the Interchange structure. This solution created unnecessarily excavation and pedestrian safety issues.



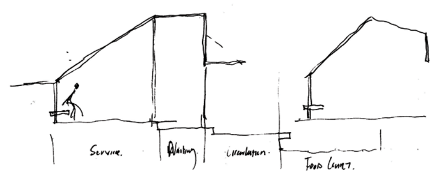
14th Conceptual plan. Sketch,2014.

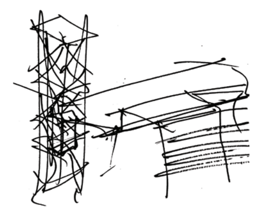
14th Conceptual model

14th Conceptual model



14th Conceptual model





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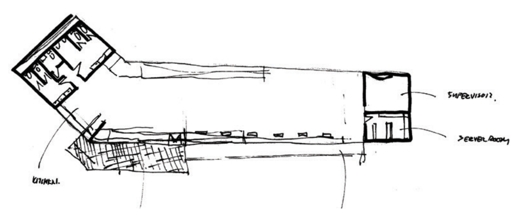
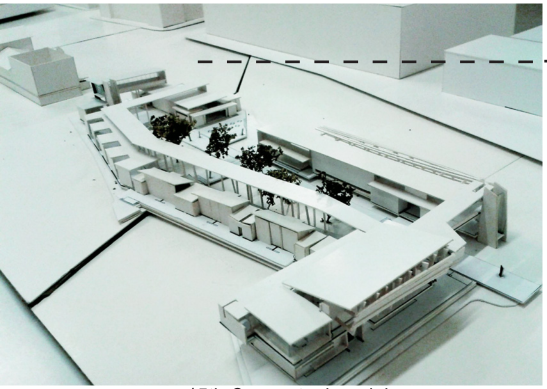
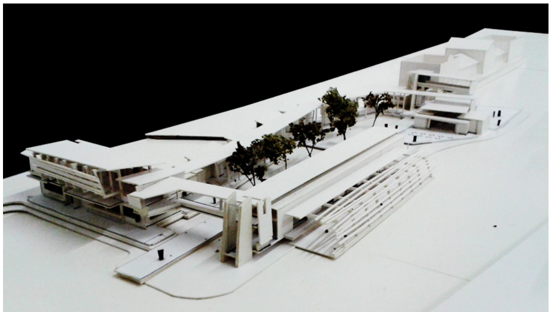
This process underlined two main elements that influence the future designs:

- separation of BRT public and private facilities, and
- the abstract implementation of the classical elements (rhythm, order and hierarchy) in the proposed design.



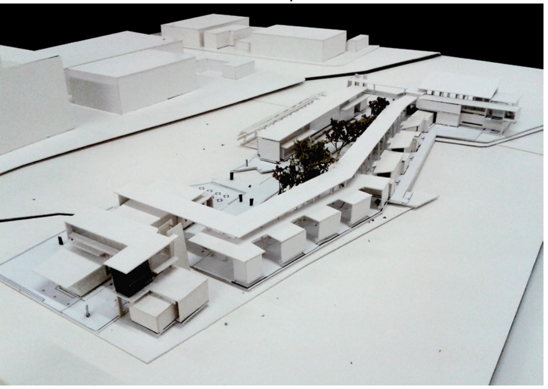


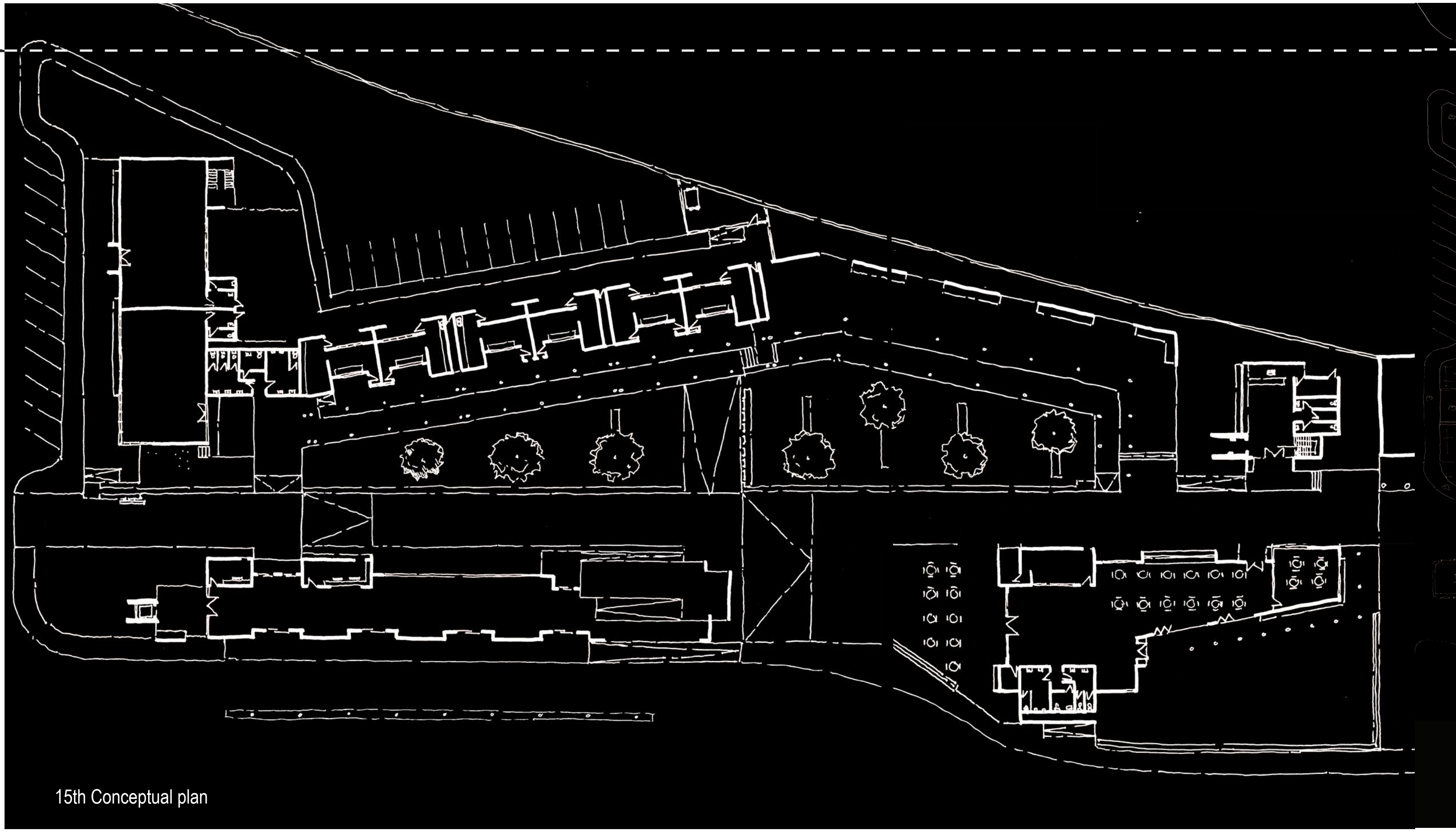
15th Conceptual model



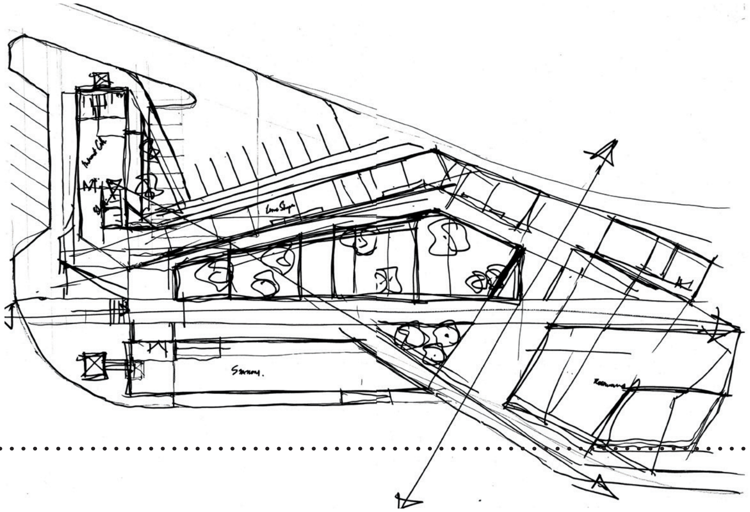
15th Conceptual model

15th Conceptual model





15th Conceptual plan



Stage 6 _ Termination point

Design development: The 6th design stage is of the most important-dealing with how to cross the street edge boundary and introducing a circulation arcade. This arcade wraps around and emphasizes the square (acupunctural) space, acting as a spine connecting and organizing the linear pedestrian circulation. Concerns with this stage were the placement of irrelative functions and the termination of the circulation route.

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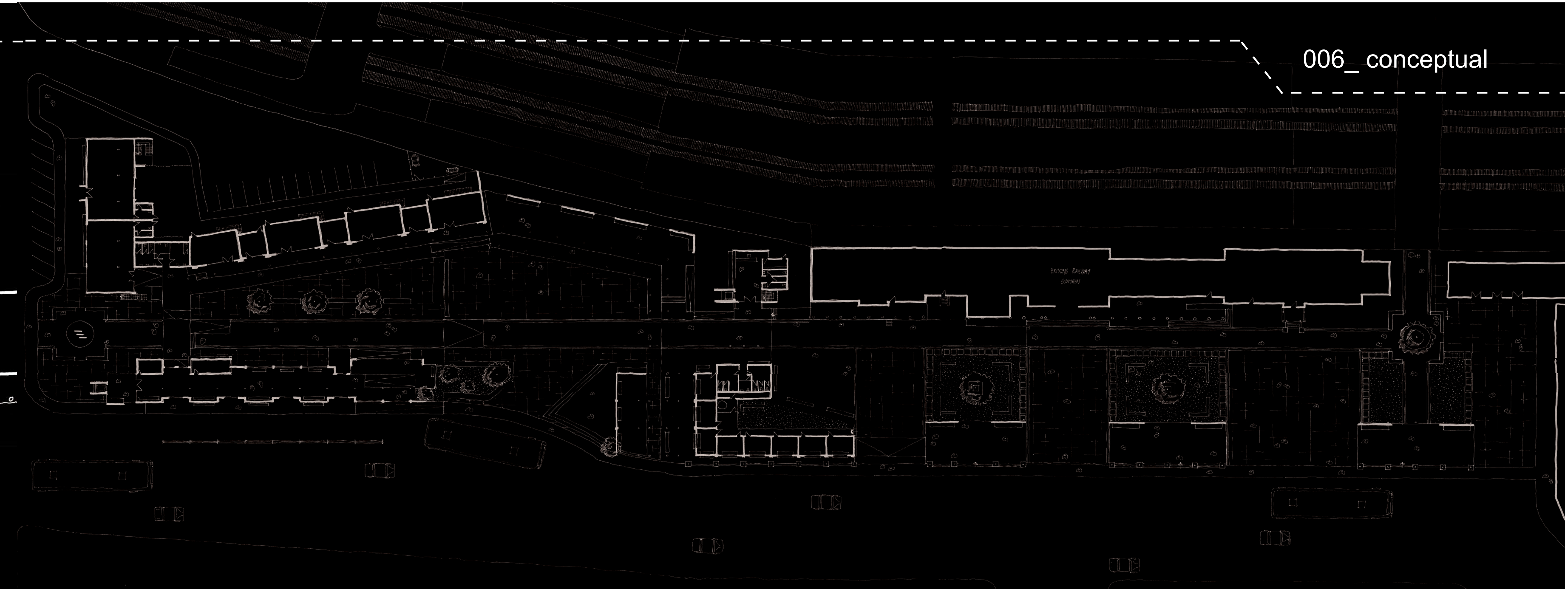
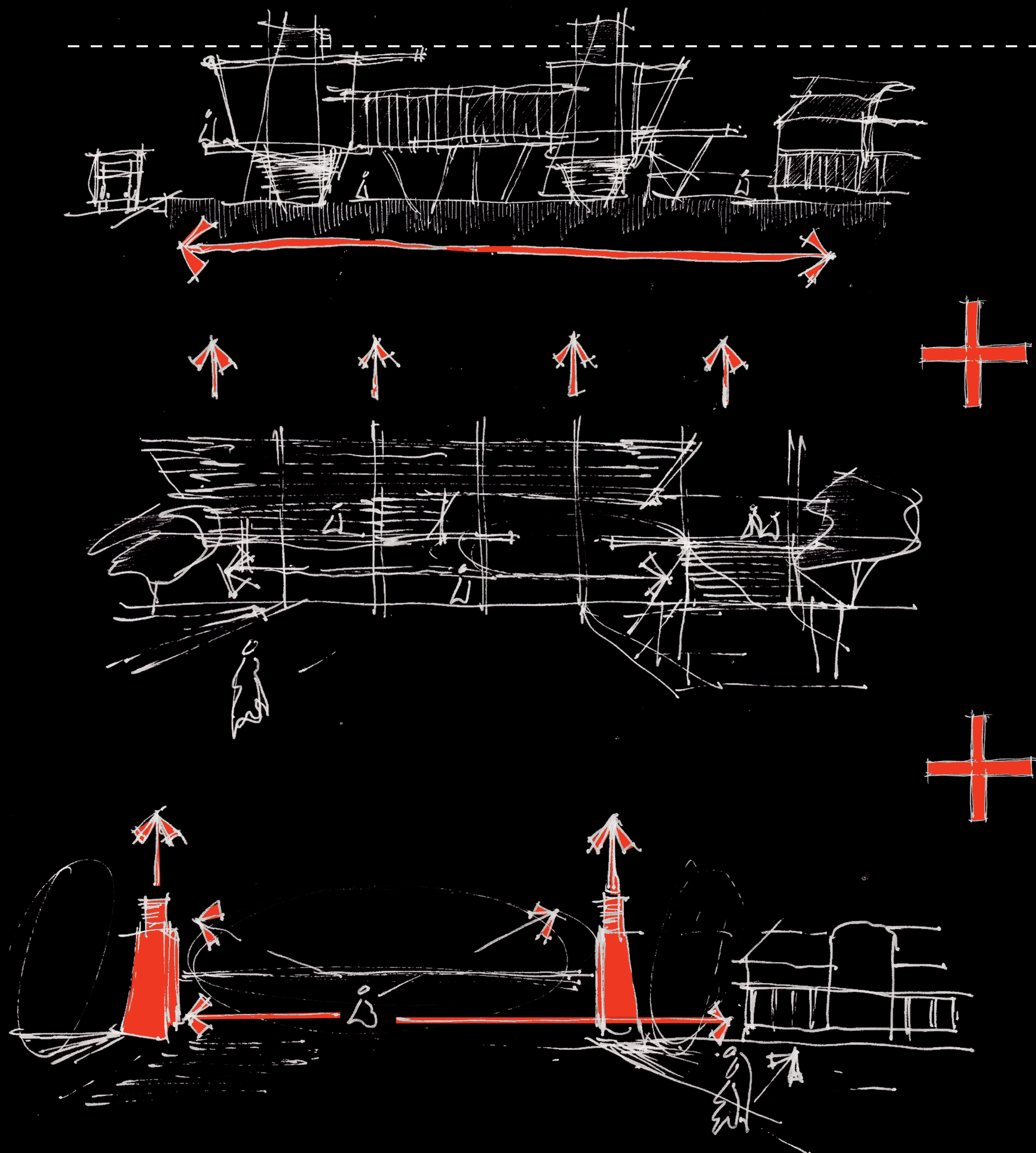


16th Conceptual plan. Sketch,2014.

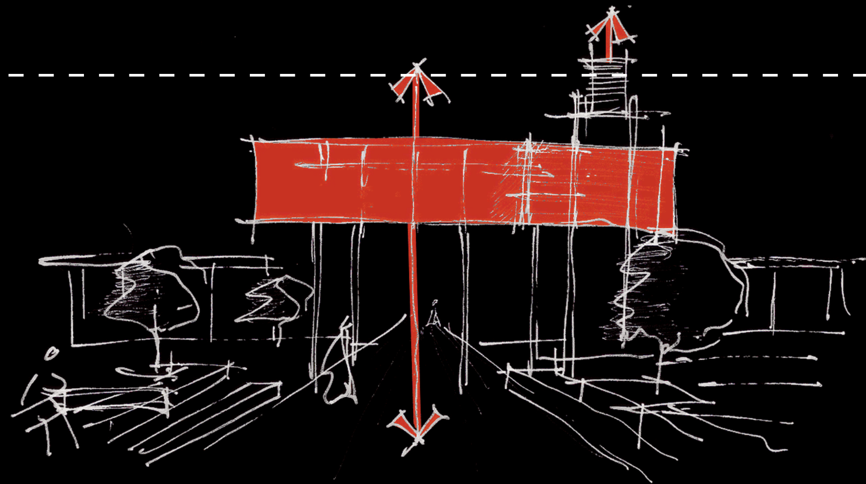
Design development



Stage 1:
The influence of the linear plan was kept throughout the design development.

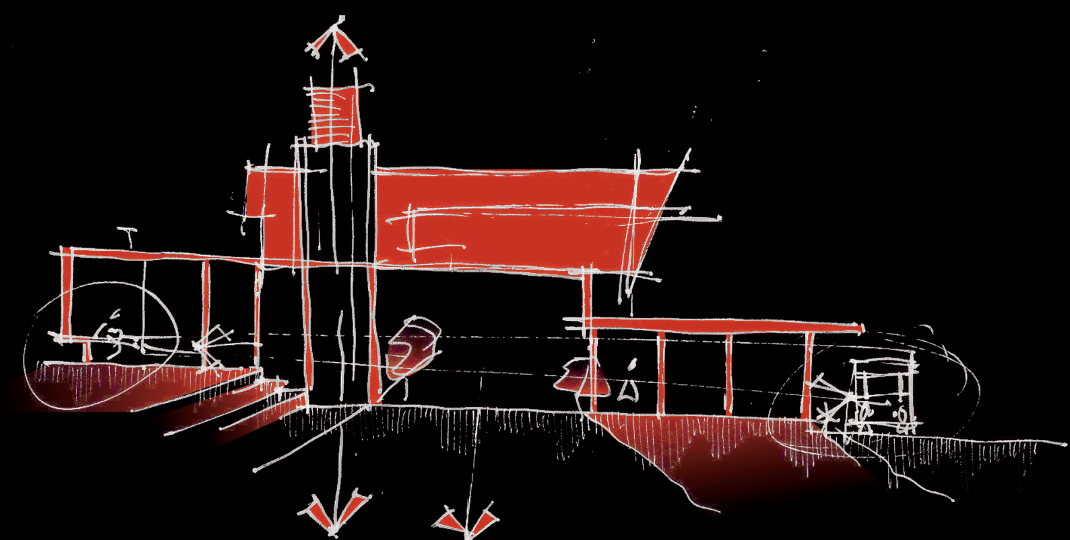
Stage 2:
Rational design methodology, public amenities on ground level and administrative functions raised, and building takes on a spine structure for visual experience and journey. Strong rhythm and pressure point spaces introduced.

Stage 3:
Vertical element introduced, as an urban beacon. Movement of the active rail line and vehicles emphasized with horizontal lines.



Stage 4:
Urban landscaping is introduced as a design tool to define the public square. Development of the security lookout tower, for orientation. The security lookout tower element is change but is manifested in the final design.

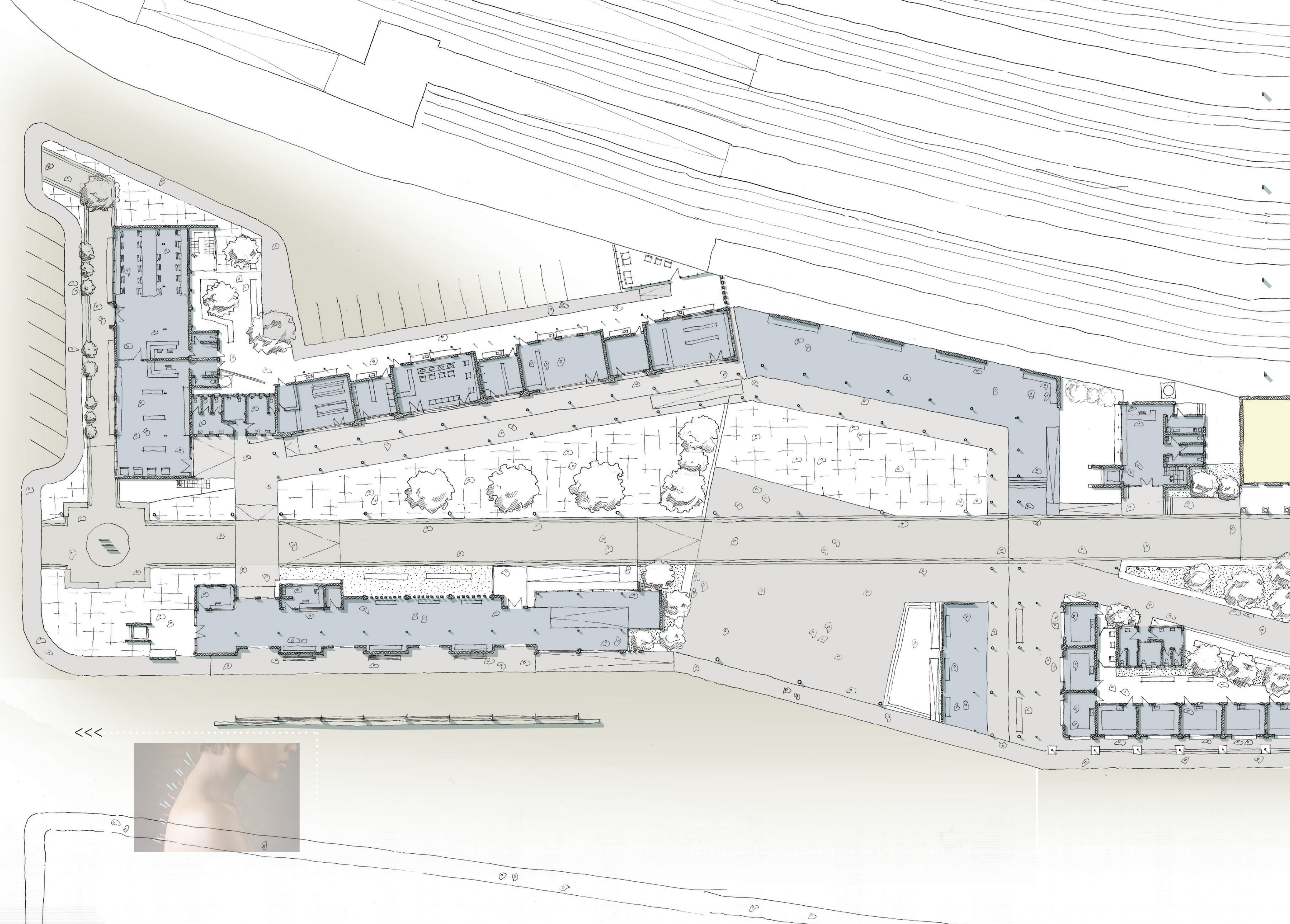
Stage 6:
The arcade is explored as a roof element and circulation spine. The arcade becomes a canopy, drawing its inspiration from Free State 'stoep' canopy typology.

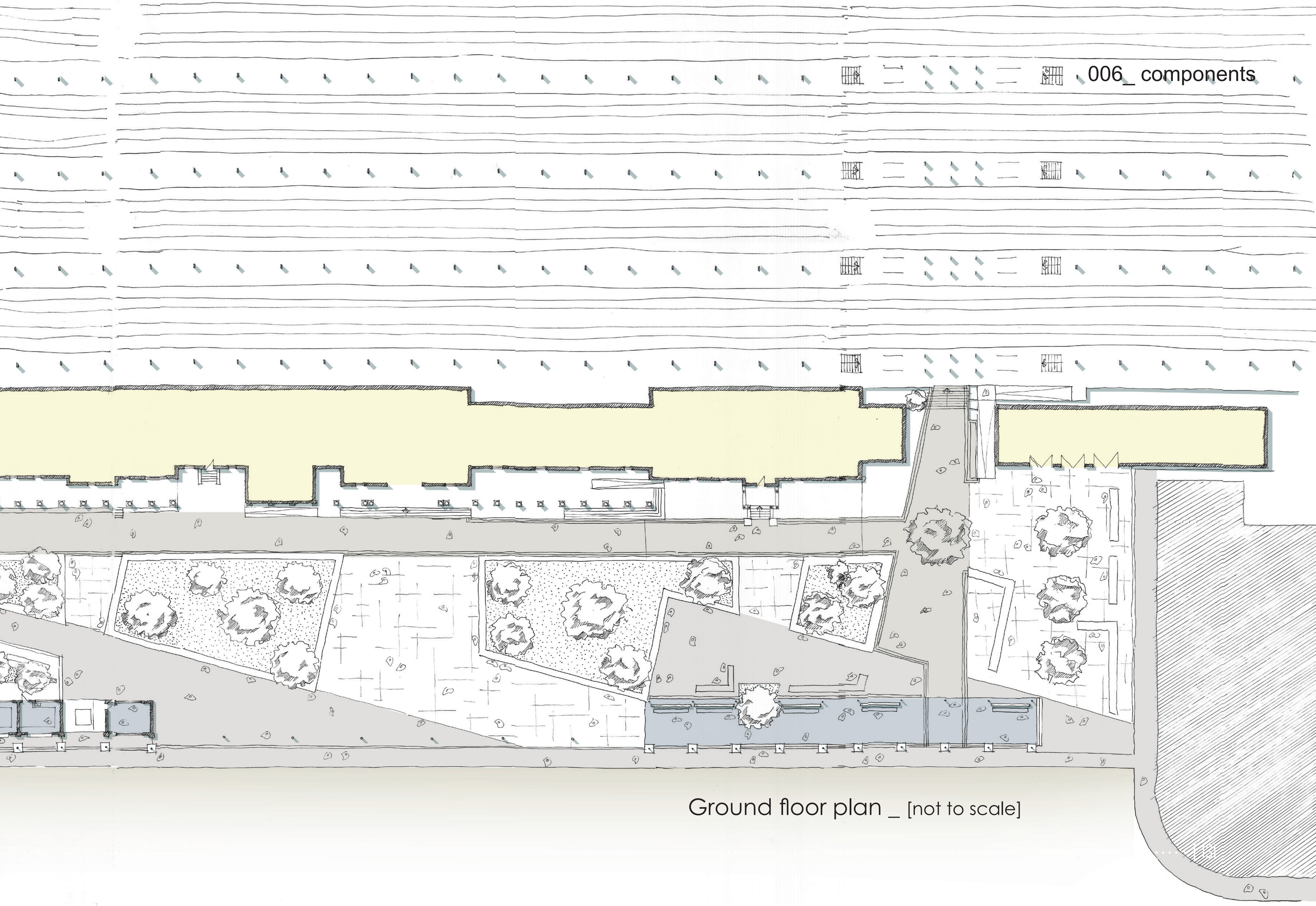


Stage 7:
The final design incorporates all of the above elements. The fundamental change from stage 5 to stage 6 was the expansion of the trader's amenities to allow people to experience the diverse social and interactive public spaces on the historic square.

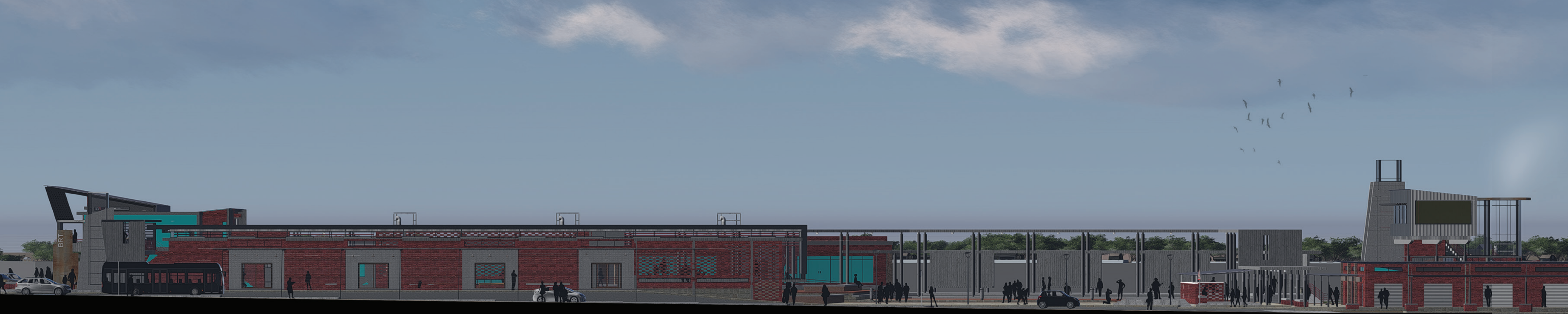

Design components_
Context plan _ not to scale


STOP
STOP
STOP



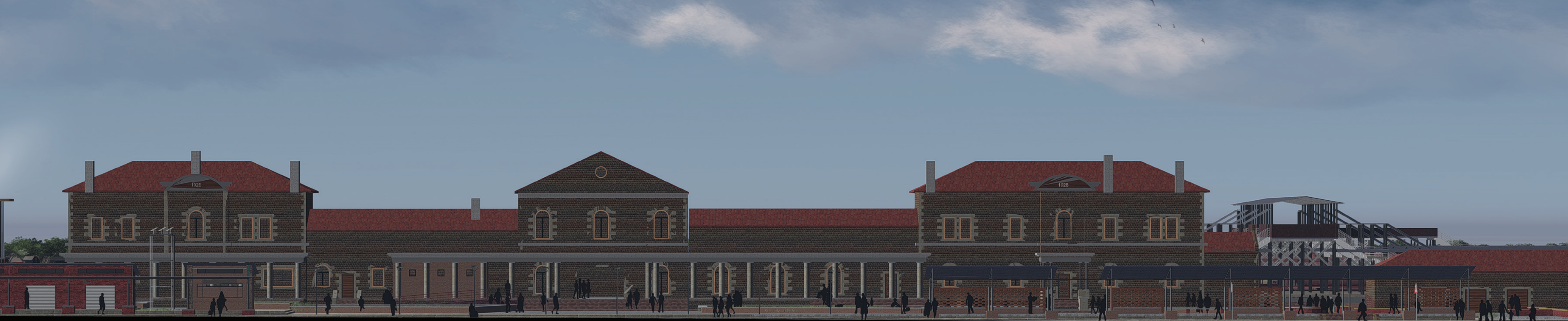


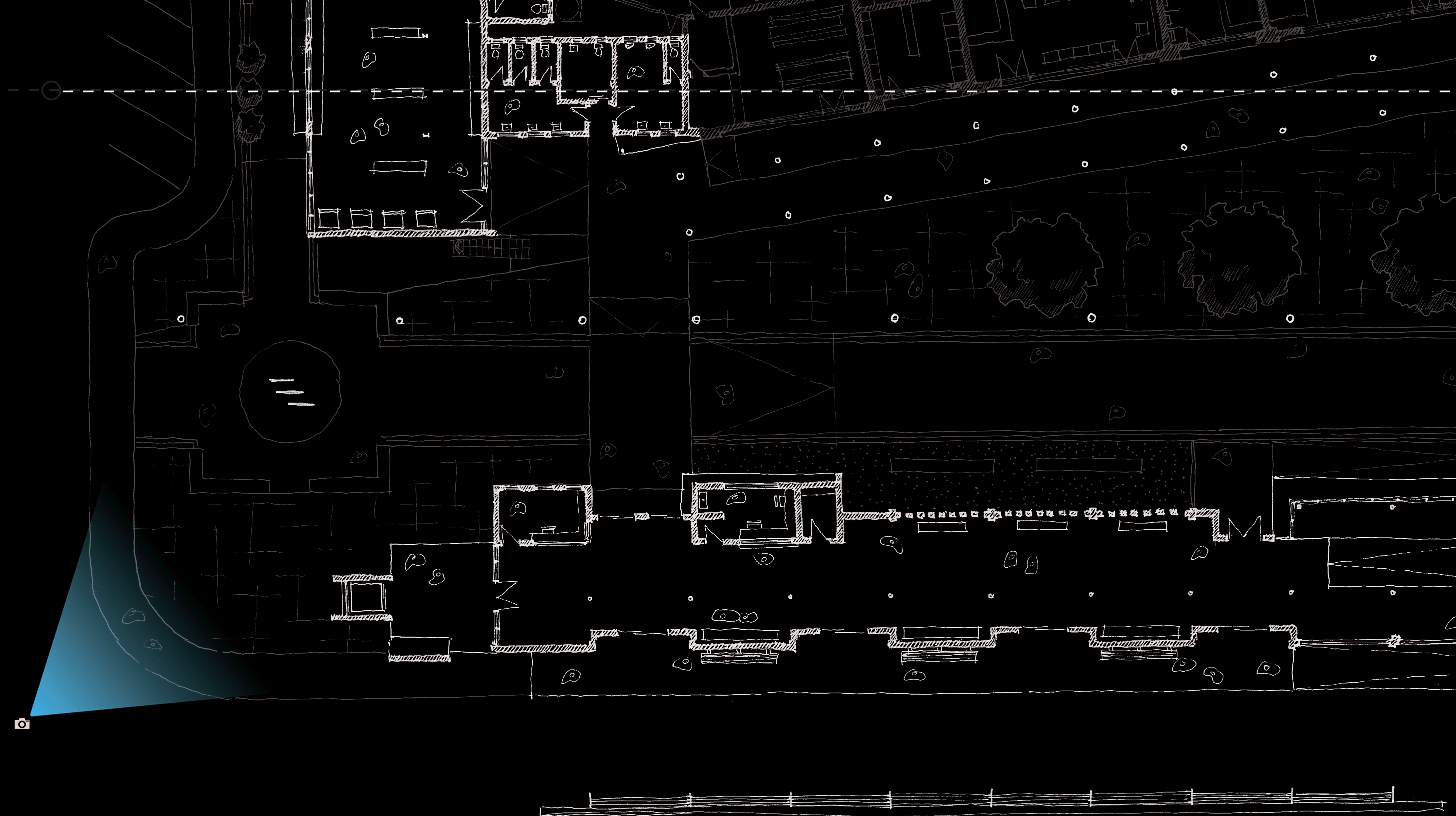
Ground floor plan _ [not to scale]



West Elevation

North Elevation





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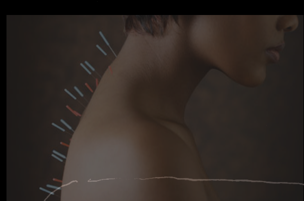
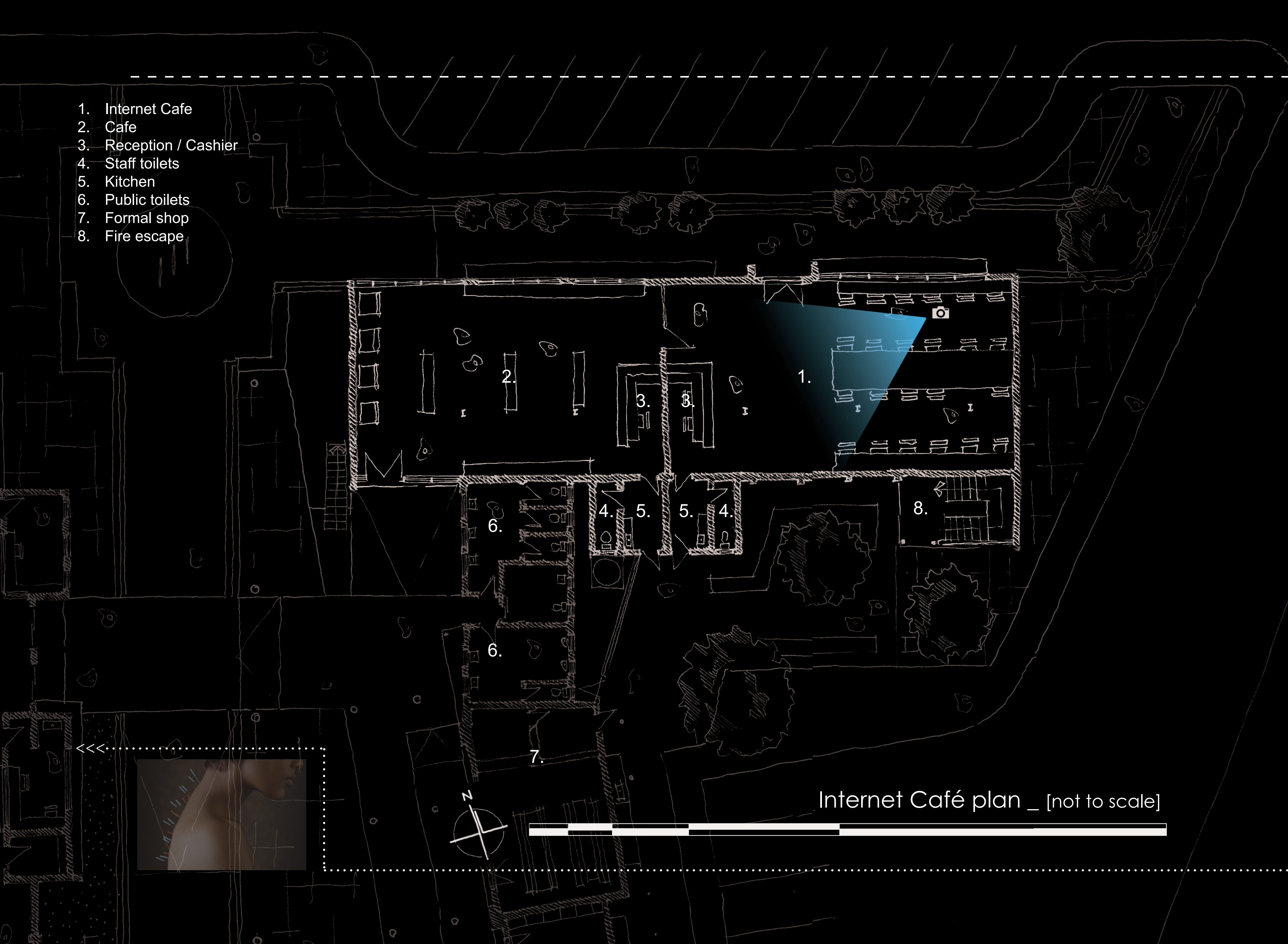


Street approach_ [not to scale]


BRT

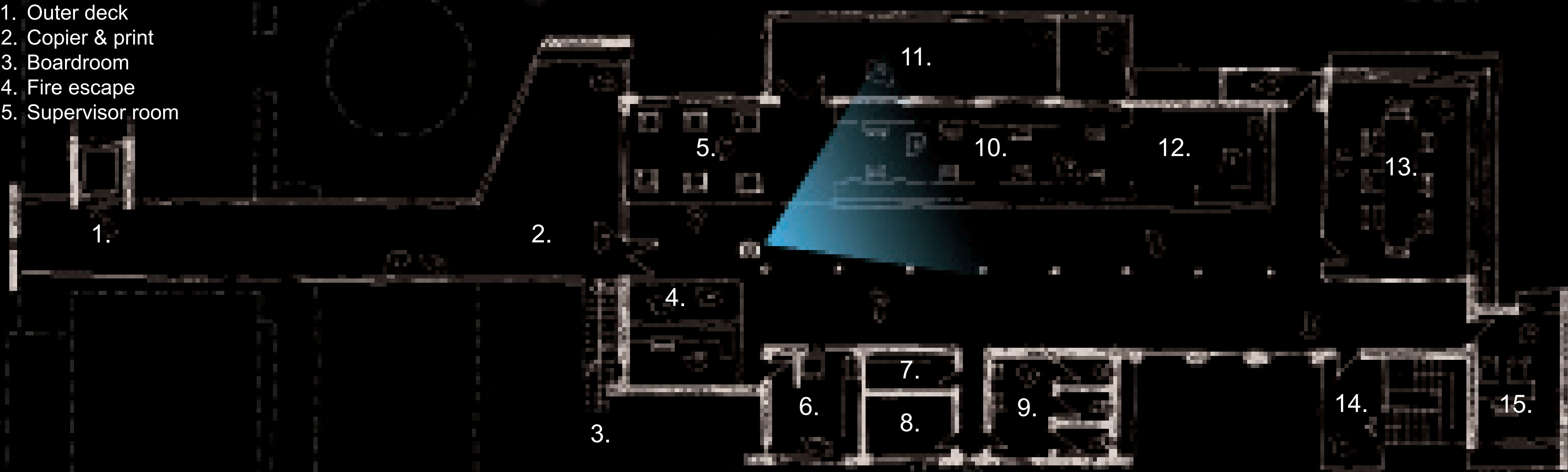
1. Internet Cafe
2. Cafe
3. Reception / Cashier
4. Staff toilets
5. Kitchen
6. Public toilets
7. Formal shop
8. Fire escape



Internet Café plan _ [not to scale]


CASHIER

1. Lift shaft
2. Circulation brdige
3. Staircase
4. Reception
5. Waiting area
6. Kitchen
7. Storage
8. Server room
9. Staff toilets
10. Monitor room
11. Outer deck
12. Copier & print
13. Boardroom
14. Fire escape
15. Supervisor room



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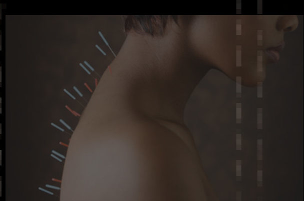
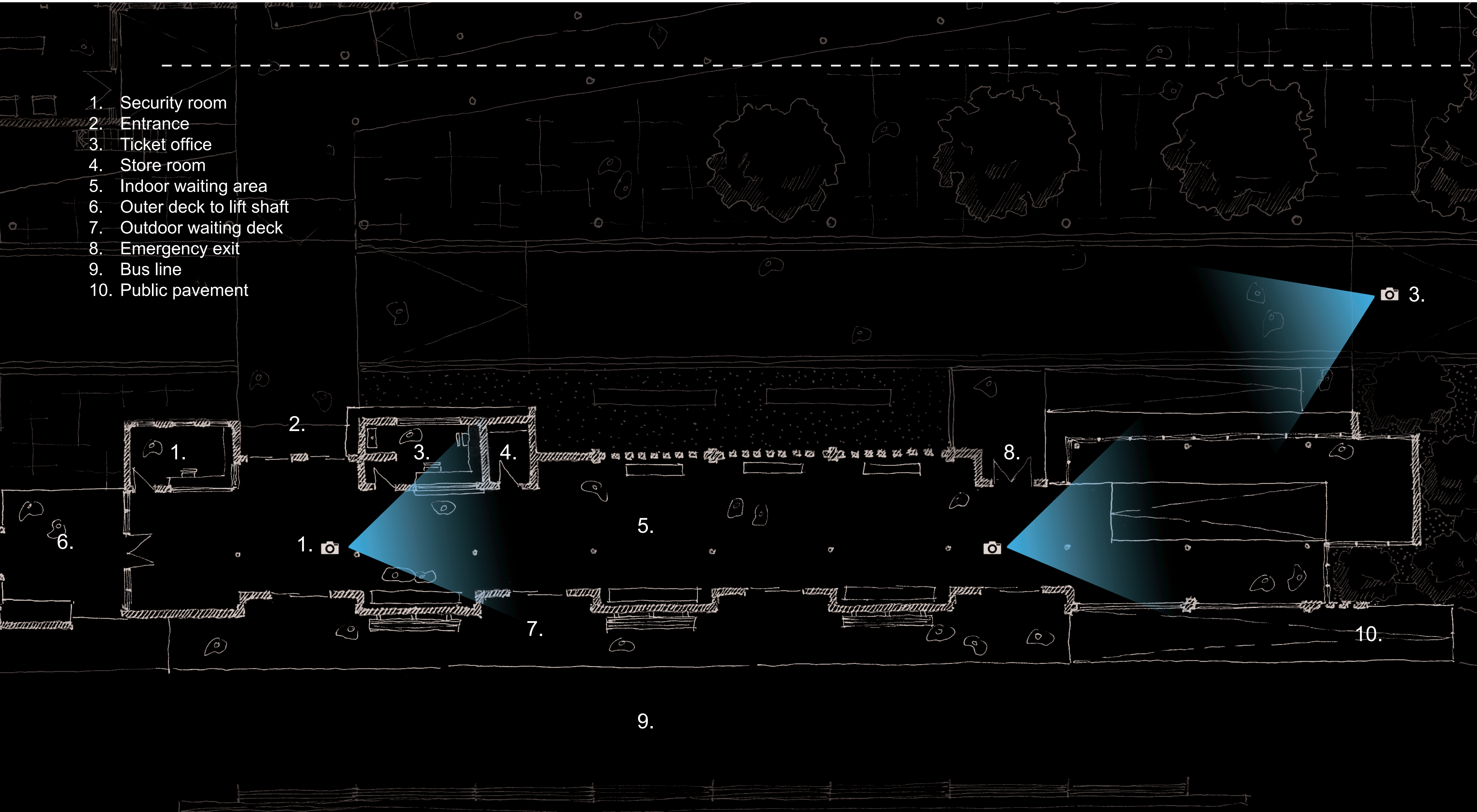


Administrative building _ First floor plan



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BRT Station _ Ground floor plan _ [not to scale]


Ticket Office
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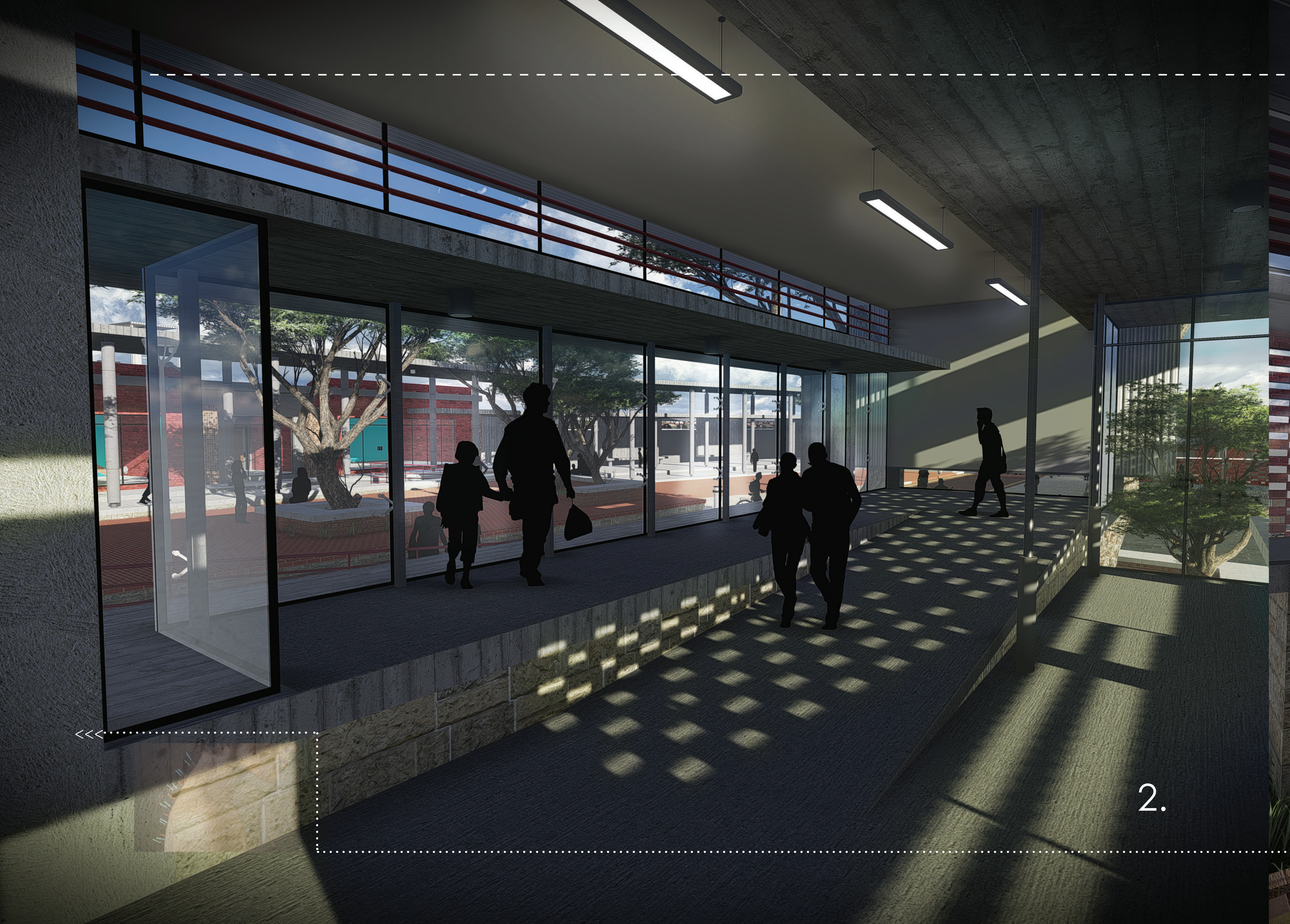
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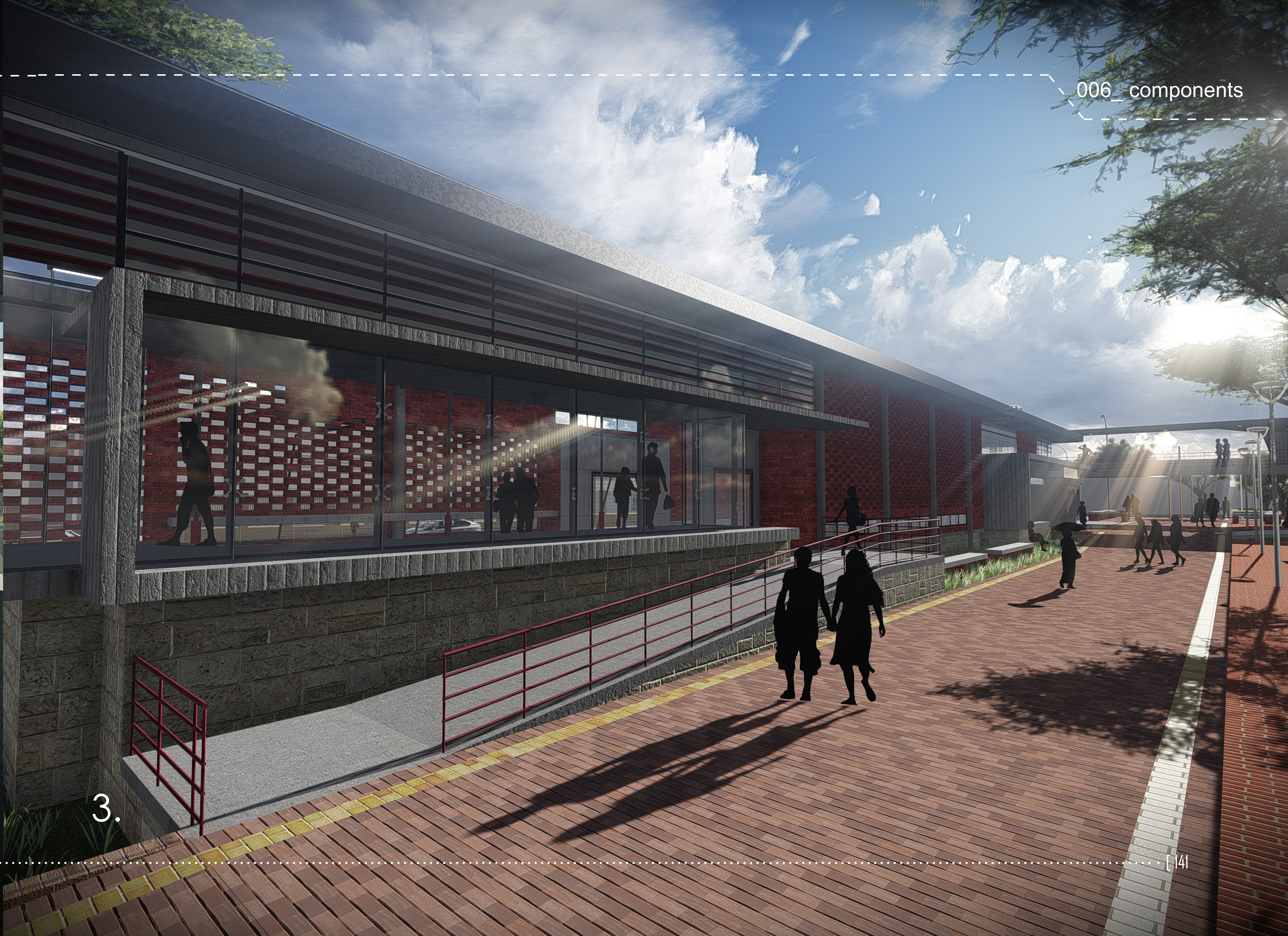

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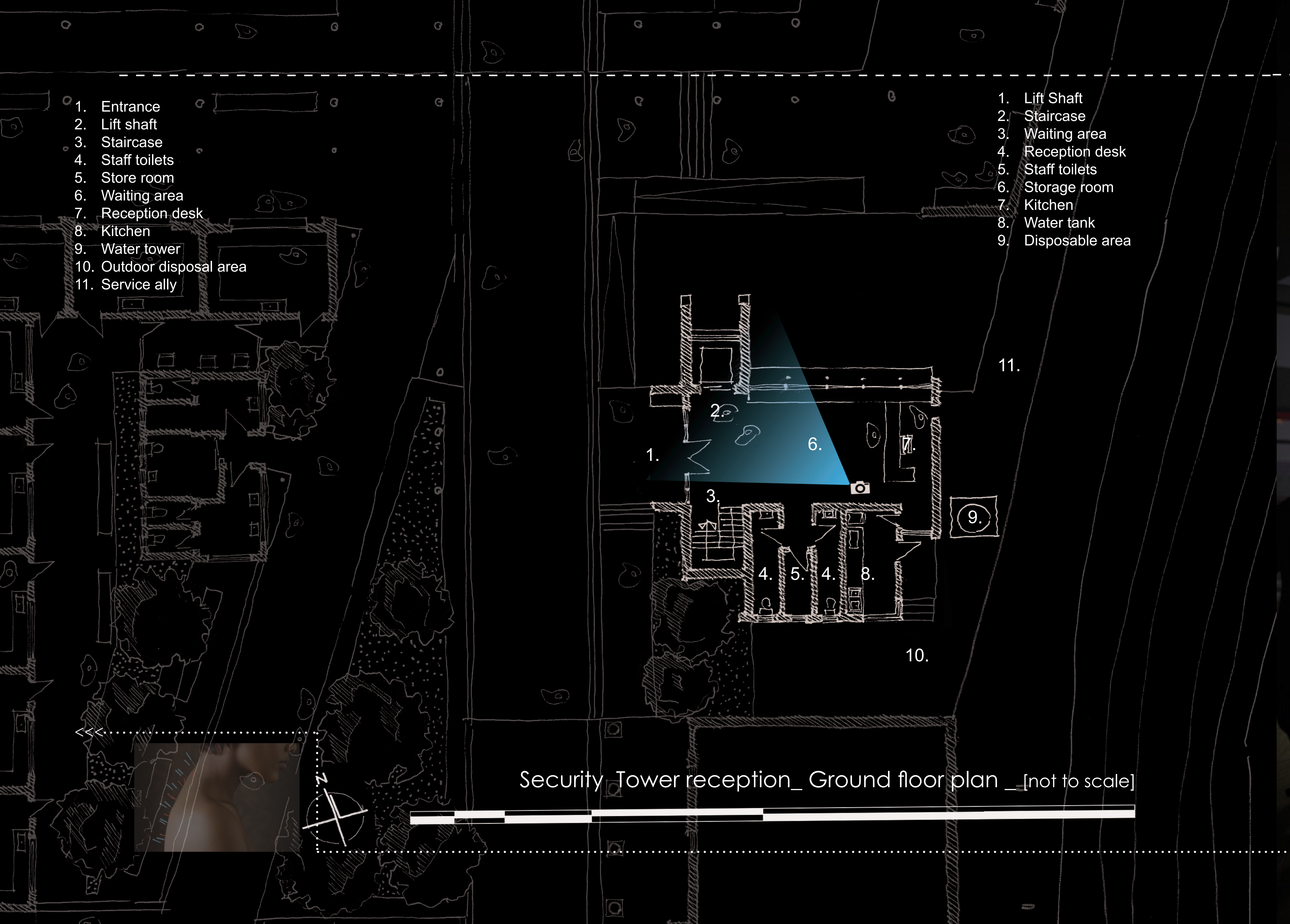
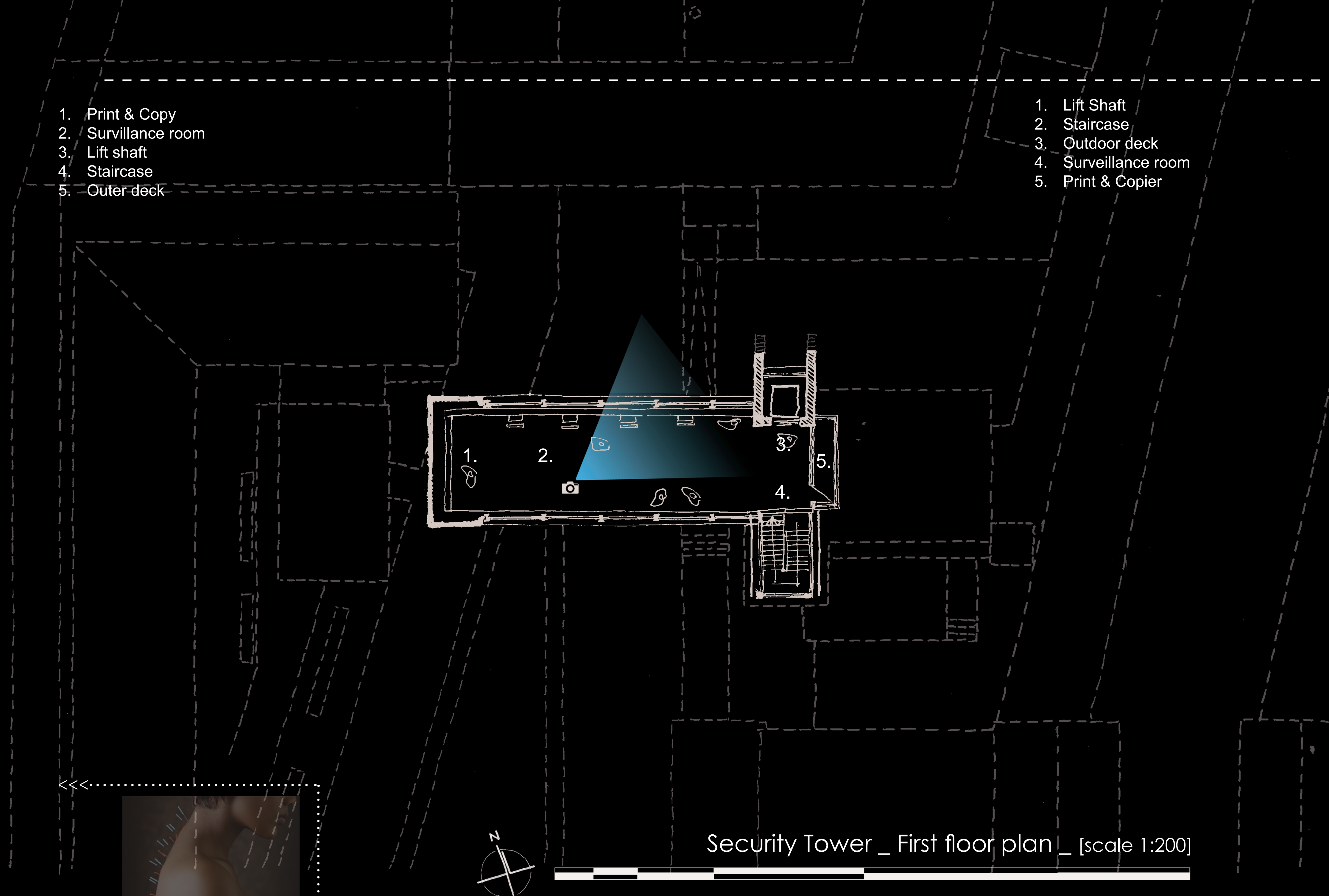
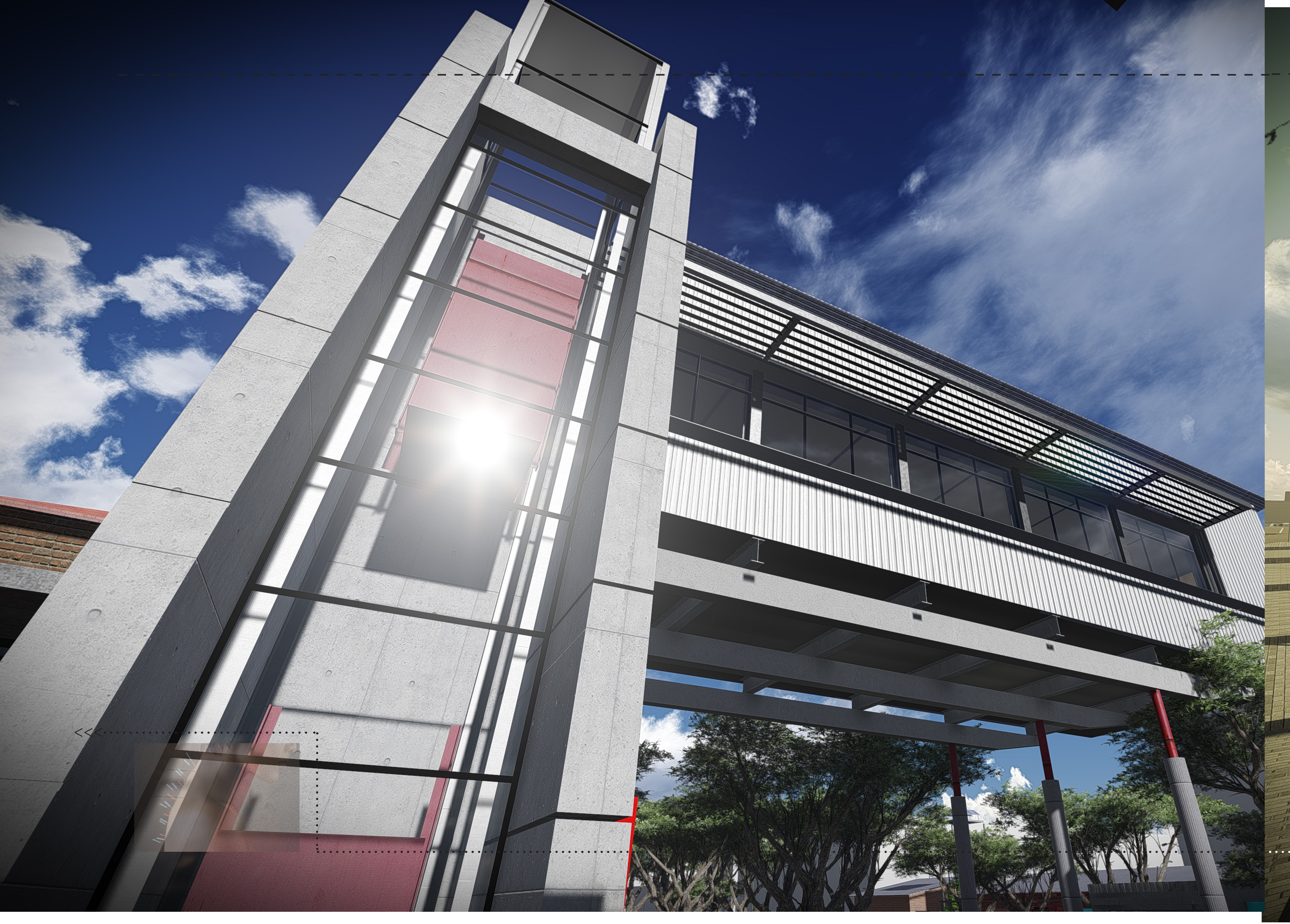
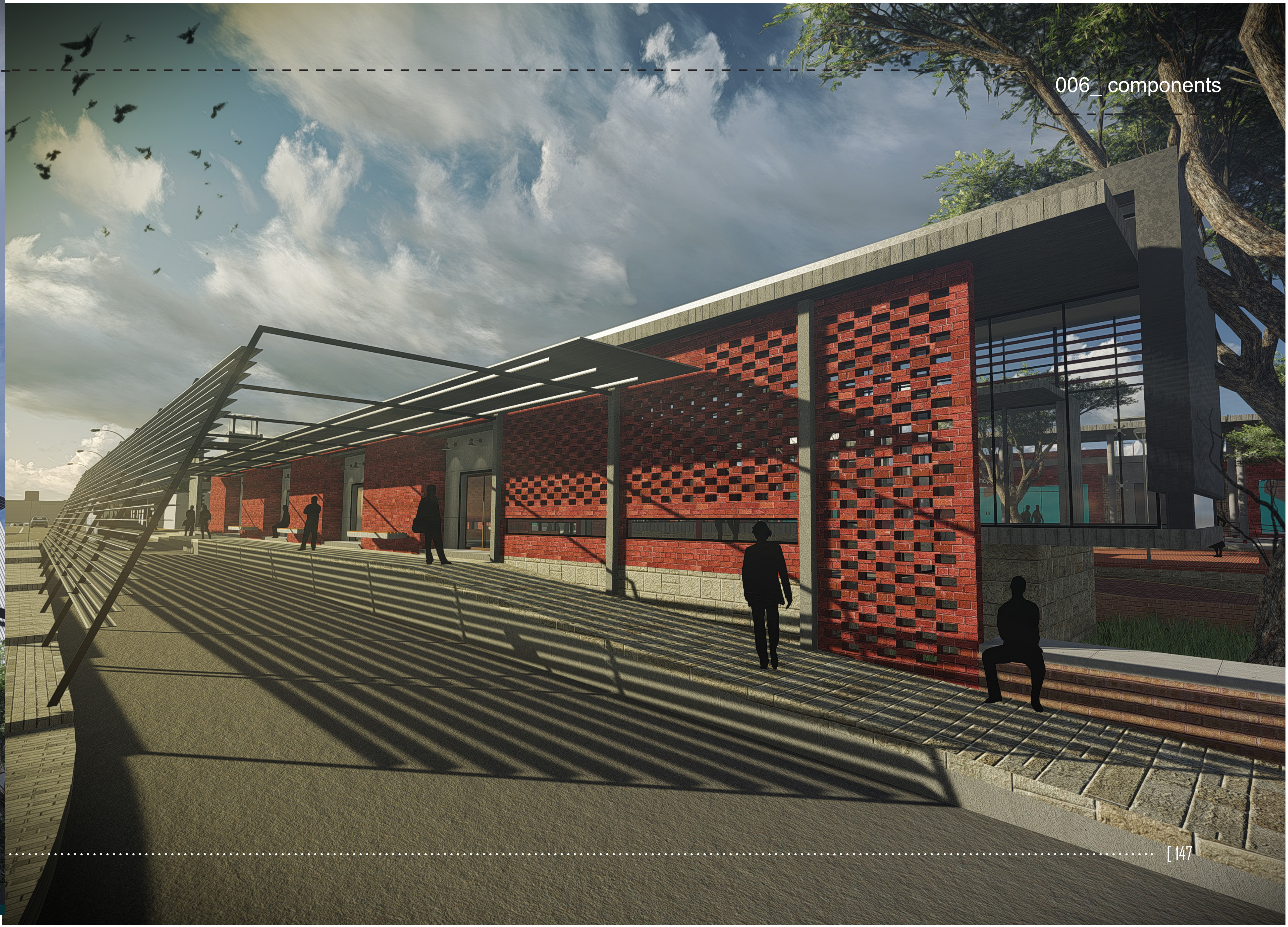


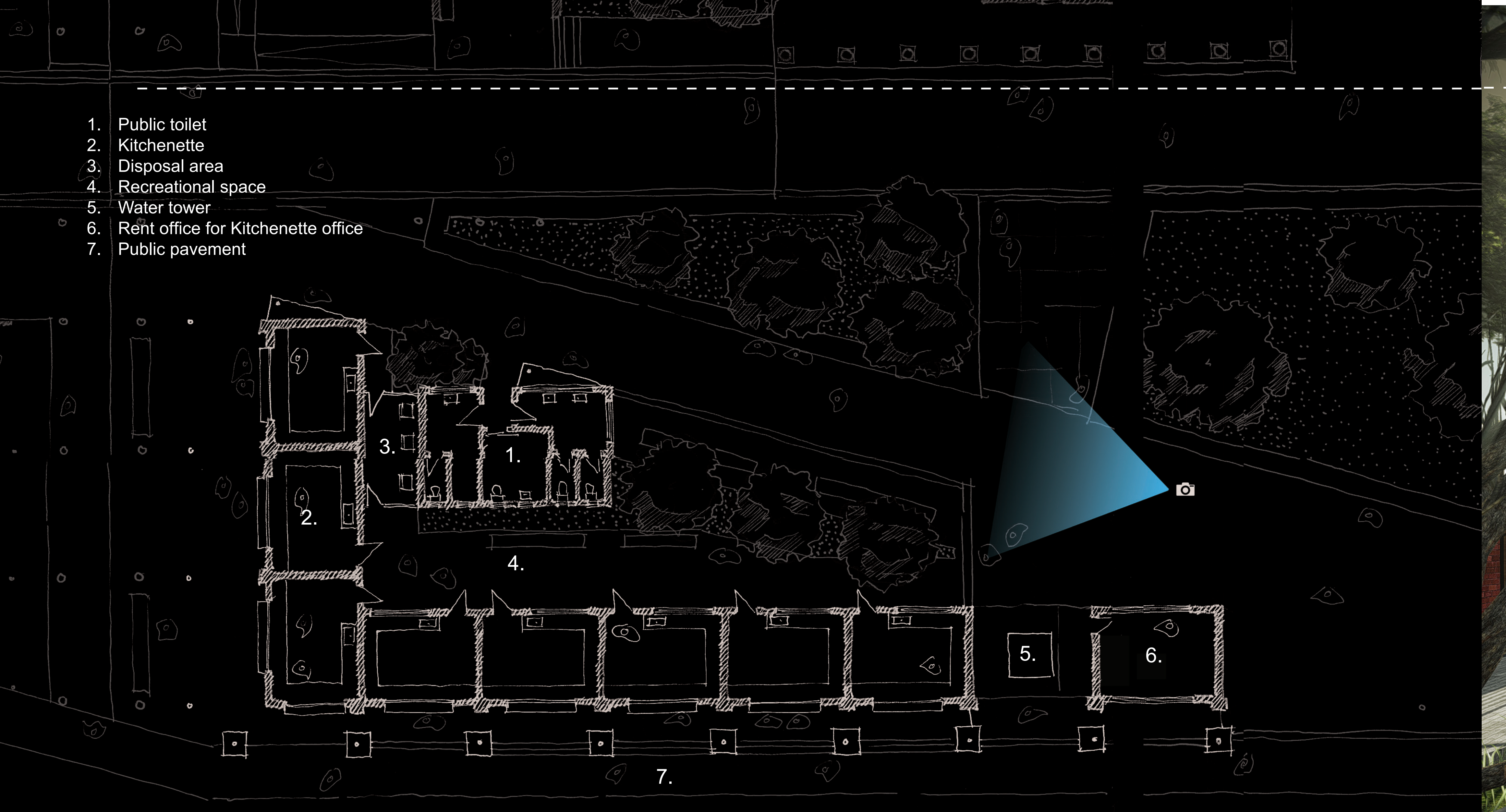
Security_Tower reception_ Ground floor plan _[not to scale]



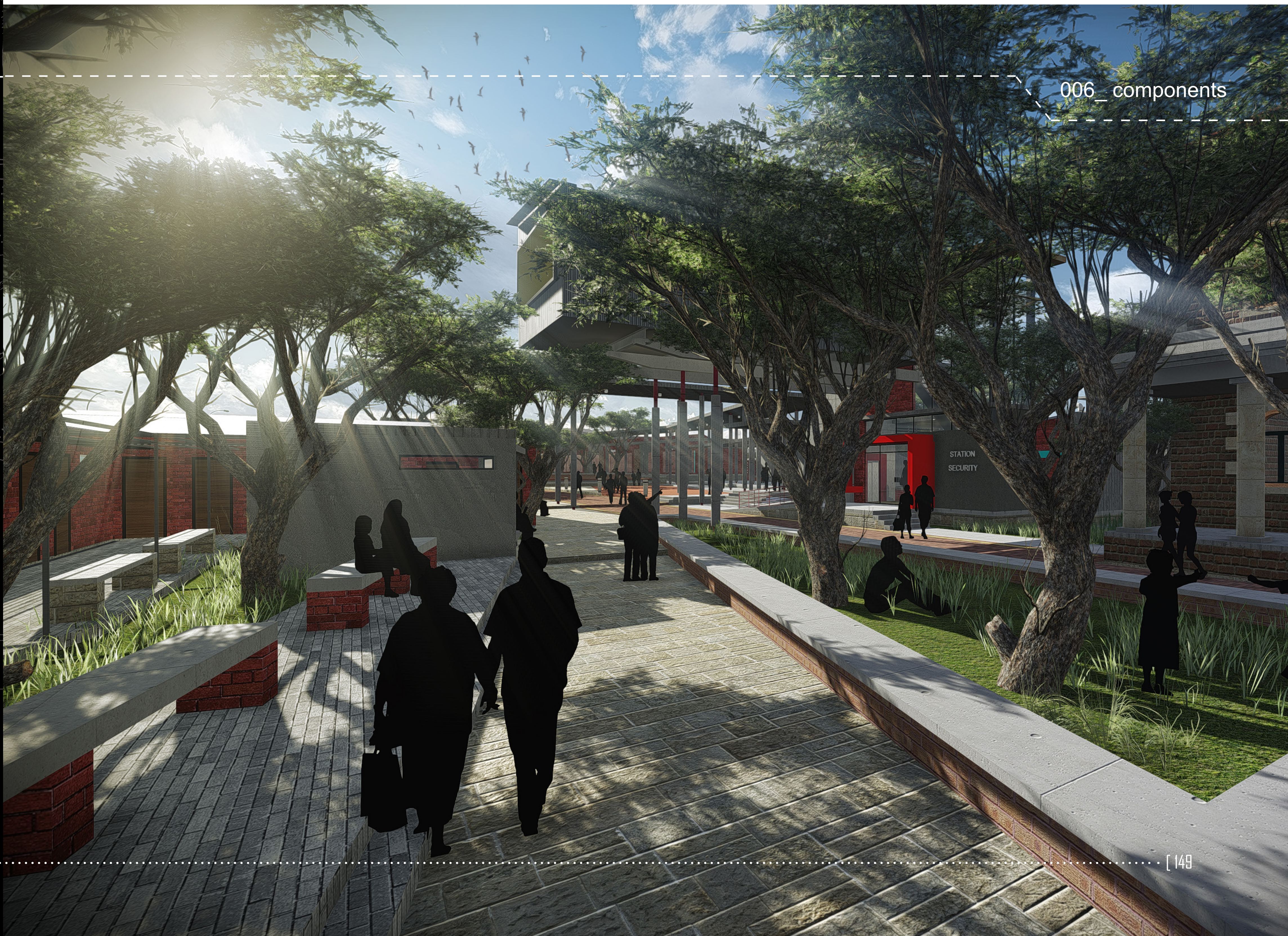
Security Tower _ First floor plan _ [scale 1:200]

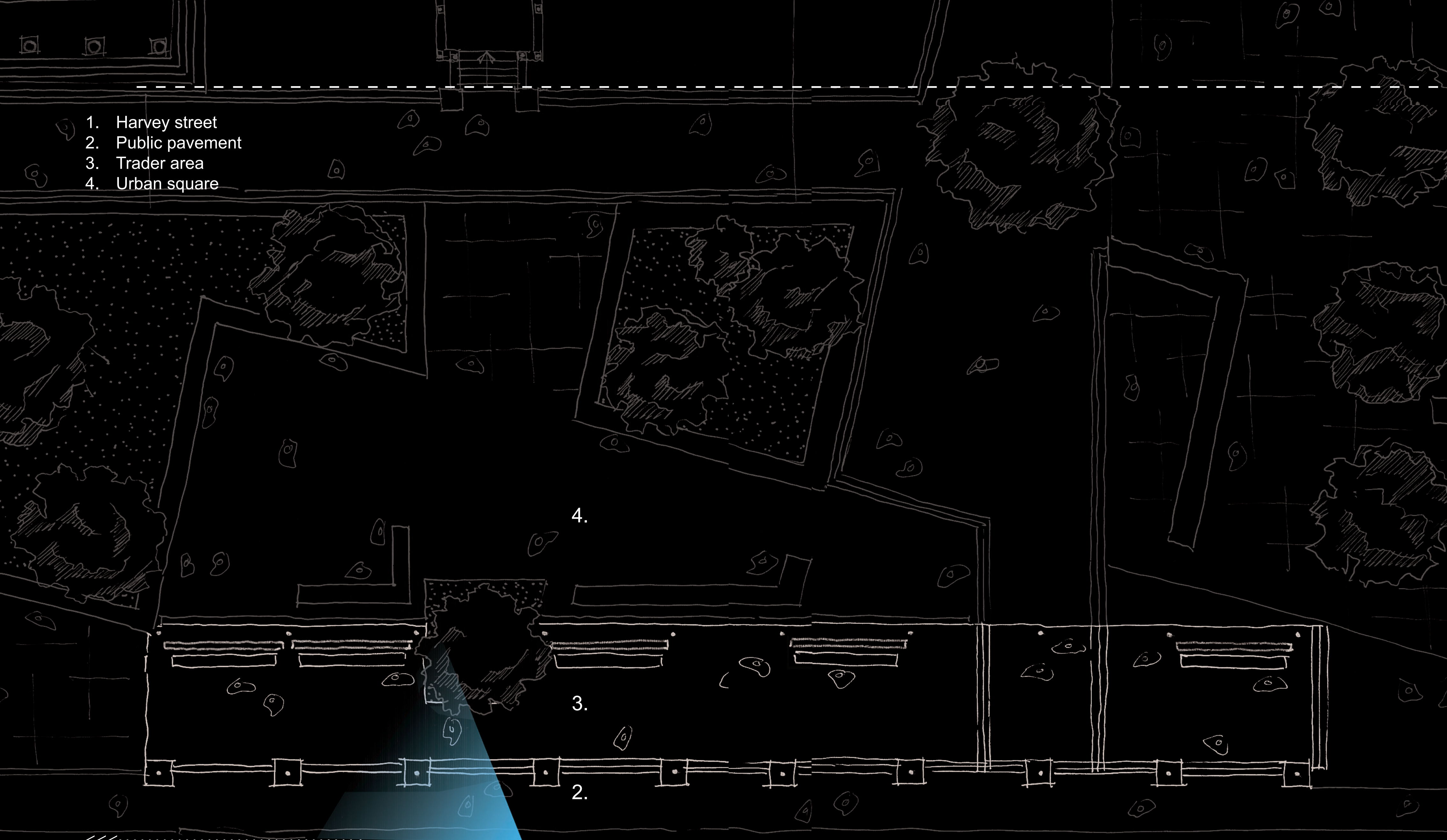






Kitchenette _ Ground floor plan _ [not to scale]


STATION
SECURITY



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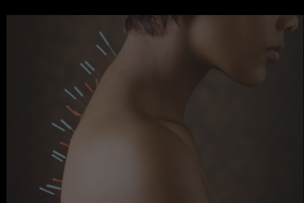


Traders area _ Ground floor plan _ [not to scale]


BRT
STOP

007 _ Technical report

Passive climate control

Structural study _ design application

Sustainability

Materials

Construction stages

Passive climate_ Design principles

Bloemfontein is situated within a mixture of a semi-arid Karoo and Highveld climatically zone. Bloemfontein tends to have very high temperatures during the summers times and the north-easterly winds ensures a fine constant weather during the day. The City of Roses tends to be dry and dusty during the winter months, since most rainfall commonly take places during the summer months, in the form of short-lived thunderstorms. Snow during the winter months is rare, but frost is very common in the early morning hours (World Weather: online).

Winter months one experienced low pressure that dominates the interior spaces, this creates long periods of bad and cold weather. North-westerly winds will triumph in the early morning hours while the North-easterly in the late afternoons. Cold fronts are common, due to freezing temperatures on the Lesotho Mountains on the eastern border of the Free State region. This cold front is driven by the south-eastern winds over the cold mountains, onto the flat Highveld landscape of Bloemfontein. The urbanized (CBD) area, experience higher temperature due to the glass and brick high-rise buildings, which acts as a hotbox. The suburbs areas tends to have significant reduce of heat gain, due to the exchange of vast open landscape and less buildings (less heat gain materials).

Solar panel resources is utilized a 3d angle, and needs to be adjusted from season to season to function sufficiently. In Bloemfontein, sun panels needs to be set up with an angle of 35 degrees to maximize the solar resource.

Principles_

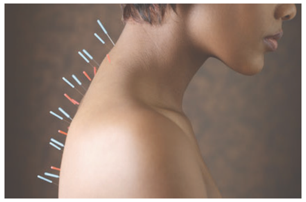
- Orientation
- Rainfall
- Wind

Orientation_

Bloemfontein is situated in the southern hemisphere, and the rule of thumb for an energy efficient building is design and orientate the structure on an east-west axis. To maximize the natural light in the building one need to orientate the main facade of the structure to open up to the northern sun light. The building footprint plays a huge role in the relationship to natural airflow and solar access. For semi-arid climate, insulation and natural light is of utmost important, and an open floor plan with a canopy is ideal. Minimize the Eastern and Western facades to prevent additional heat gain in the early mornings and later afternoons.

The building skin is main element that has the biggest influence on the surrounding context. Contemporary buildings make use of intelligent skins system, which adapts to the climate and comfort level needs of the users inside of the building. The skin should consist of many different functions for example: glazing protection, insulation, natural ventilation, shading reduction and thermal mass.

The structure should be designed to minimized mechanical ventilation and more emphasis



Openings in the structure needs to place to optimize air flow through a space, therefore not all of the openings can be the same size and heights. Glazing should be utilized to maximized natural light without the additional heat gain, to compensate for heat gain in a space with huge windows, the implementation of operability windows are vital to help ventilate a space. The use of roof ventilators adds additional support to help ventilate the hot captured air to escape and create a natural air flow.

Rainfall _

Bloemfontein tends to experience the most rainfall during the summer months with frequent thunderstorms that are rather refreshing during the hot days. The annual rainfall consists of an average of 65% between December and February (World Weather: online).

Wind_

The North-eastern wind is characterized as favorable winds while the south-western wind as unfavorable due to rainfall. The highest wind speeds appear during the early summer months of October up and till to January and the lowest wind speed during April to June (Windfinder: online).

NORTH MELBOURNE RAILWAY STATION_ Melbourne, Australia_
Cox Architects + Planners & Ove Arup + Partners

[fig 7.1] The new station entrance and station building from the forecourt on top of the embankment (Zimmer, 2010: online).

OVER VIEW

The North Melbourne railway station is situated on the northern edge of the CBD of Melbourne, Australia. The redevelopment of the station is seen as a key interchange which provides upgraded access to public transport services and reconnects the station to the greater North Melbourne (Correnza, Culhane, Ristig & Stanley, 2010: 16).

The new station lays on a strong axis that provides a direct and visual connection with the heart of the city. The project is seen as a catalyst for both upgrading the transport industry and rejuvenation of the surrounding context. It creates an active and visual connection between the street edge and the station concourse.

Arup had multiple construction challenges which they needed to address within a live-rail environment; they devised a unique solution that has been used as bench mark for current projects in Melbourne (Correnza *et al.*, 2010: 23). These design developed solutions include the prefabrication of materials, modular design and the method of construction.

In many project, transport, fabrication and ease of construction are the major contributors to increase cost of the project. Arup identified two main polemics of an active rail station, interruptions and shutdowns are equally as high as the polemics state earlier. They derived a strategic plan which allowed platforms to remain active over live rail lines, with the result that disruption to users was drastically minimized while construction could continue with-

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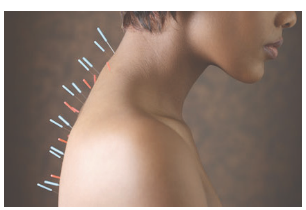
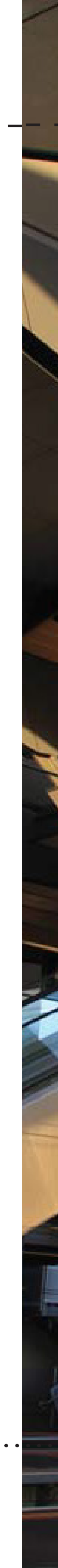
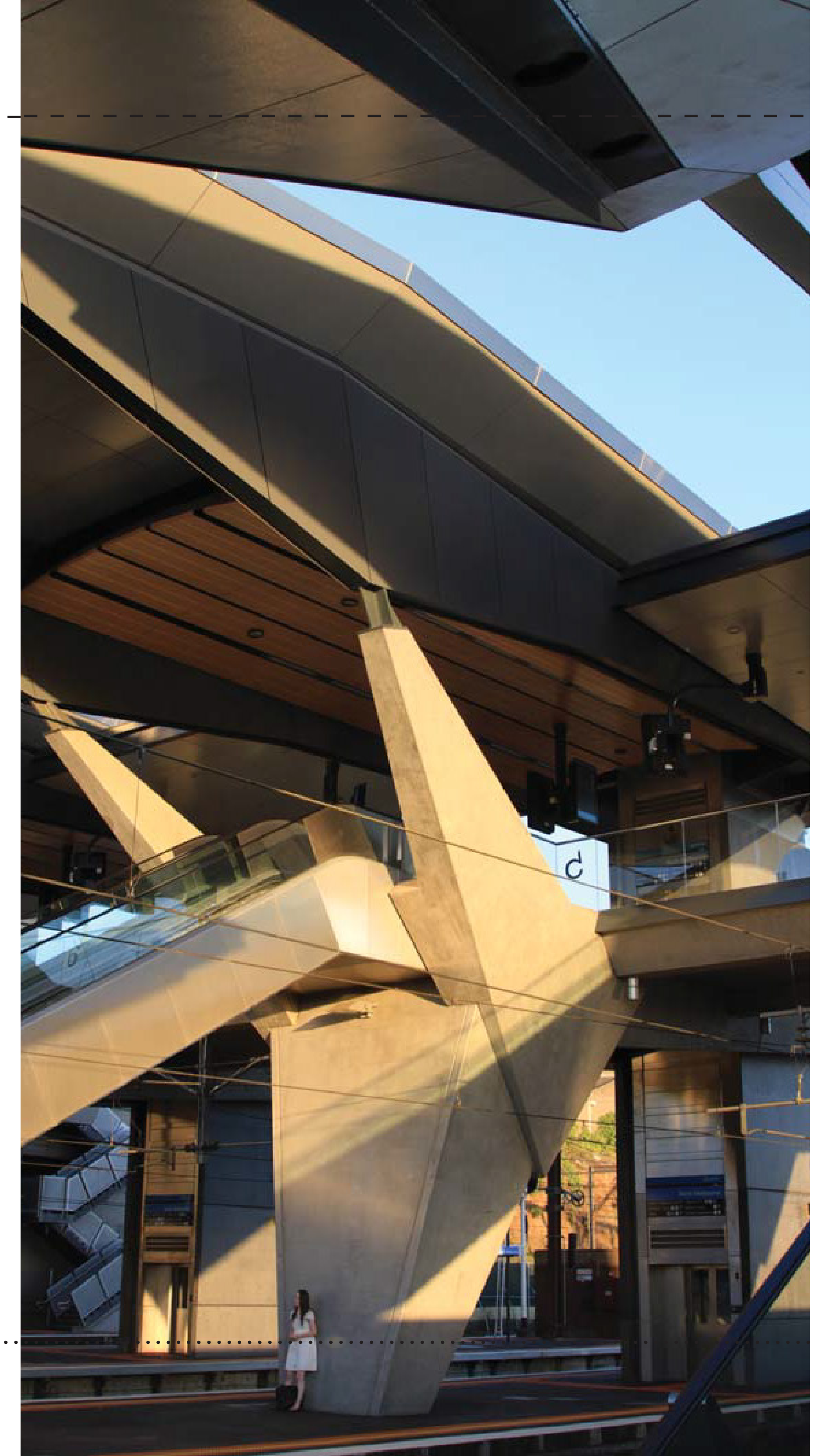






STRATEGIES

- Elemental-modular design
- Separation of construction activities from train operation

CONSTRUCTIBILITY

First they need to break the structure into elements with a maximum weight. This ensured that the crane capacity on top of the embankment was adequate and minimized the time an element had to be on the crane hook. Secondly, other elements were designed to act in composite (precast plus in situ) due to space constraints (Correnza *et al*., 2010: 23).

SUSTAINABILITY

Sustainable measures incorporated natural ventilation, maximum use of light and sustainable strategies for heating and cooling. The choice of material were carefully selected to minimize unused quantities of materials, reduce resources during shutdown, and select components and materials based on durability and long term maintainability.

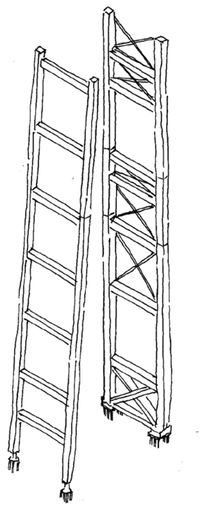
DESIGN APPLICATION

- The choice of prefabrication materials.
- The use of interchangeable modular design methods and structures.
- More sustainable construction methods.
- Material choice in terms of durability and maintainability.

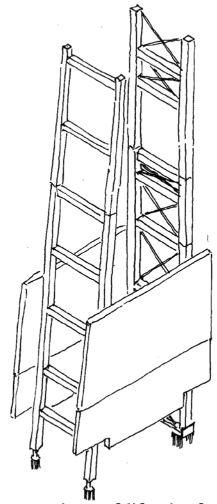
[fig 7.2] The main impact- resistance support pier from platform level (Zimmer, 2010: online).

Instigating urban acupuncture _ design application

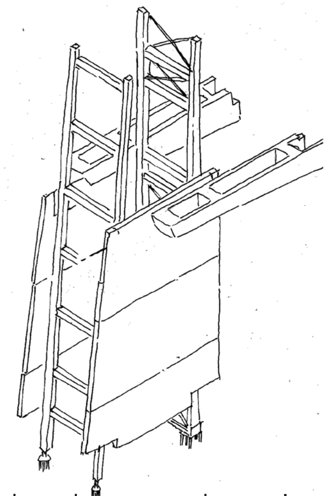
Prefabrication Interchangeable modular design Sustainable construction method Material choice >> >



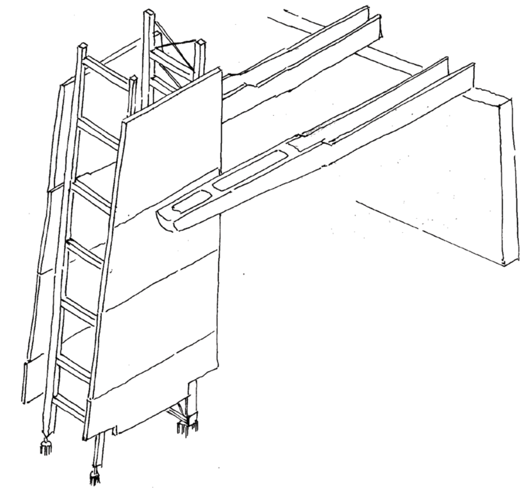
Construction of lift shaft steel ladder frames.



Construction of lift shaft precast panels.

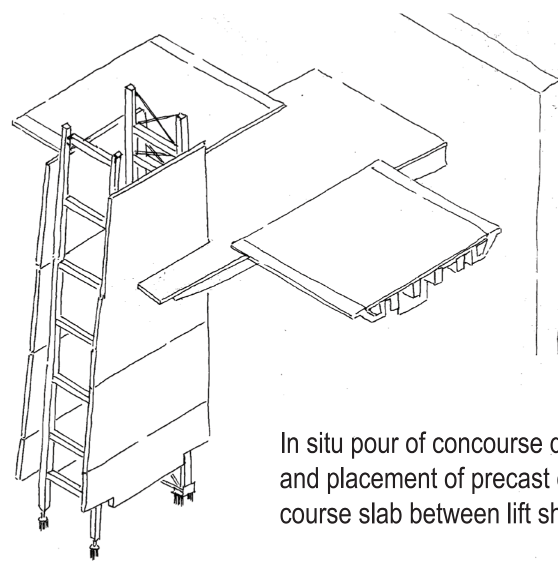


U-shaped concourse beam element connected to lift shaft.

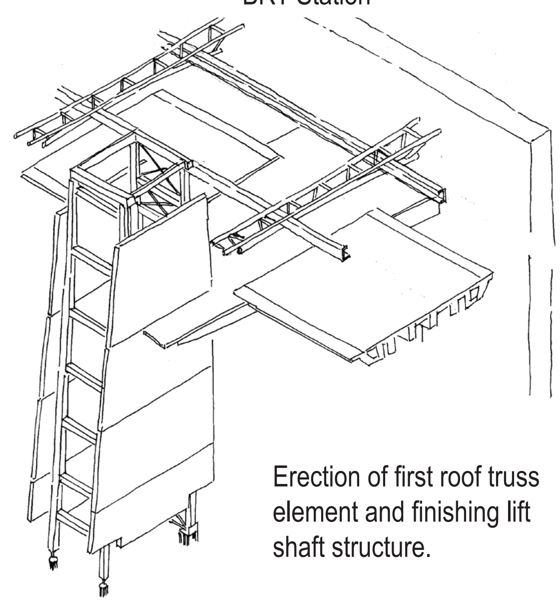


Construction of U-shaped concourse beams connecting to lift shaft with main load bearing wall of the BRT Station

Constructability_
Lift shaft structure



In situ pour of concourse deck and placement of precast concourse slab between lift shaft



Erection of first roof truss element and finishing lift shaft structure.

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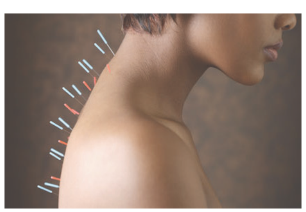
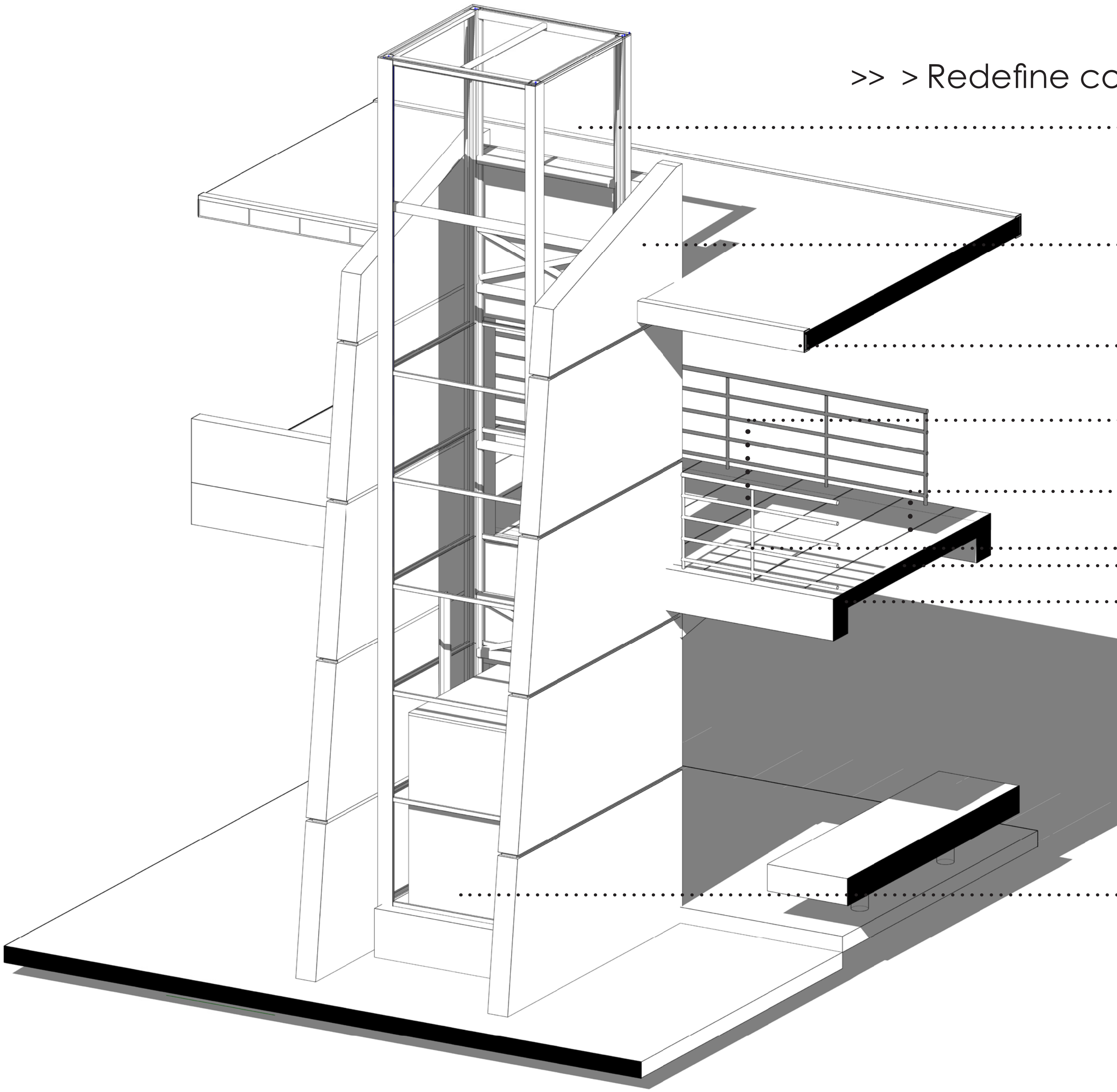


>> > Redefine construction



3D of Lift shaft

The proposed design consists out of the following 2 structural methods namely: Portal frame & Braced frames.

Throughout the thesis the structural system was constantly questioned to apply the best suitable and sustainable structure for the function of the space and structure. The investigation includes the advantages and disadvantages of these two structural methods.

Portal Frames

Advantages:

- Can span great distances without support, creating large unobstructed floor and circulation spaces.
- Easy and quickly to erected the structure.
- The framework is prefabricated, which makes the construction period more economic and easier to manage on site.
- More cost effective method since less portal frame is utilized than a truss frame.
- A better economical option since the universal beam is used to construct the frames.

Disadvantages:

- Labour cost increase, skilled and competent labours are needed in this field of steel construction methods.
- Mainly used in single storey construction projects.

Braced frames

Advantages:

- The local labours are familiar with this type of structural system.
- Steel framed structures tend to be erected quicker than the concrete frame structures.
- It gives opportunity for combination of mixed use structural systems such as steel and concrete.
- Many of the walls act as infill panel structure rather than load bearing structure, which makes the wall structure more elegant and thinner.

Disadvantages:

- The structural system does not give the vast open floor area as the portal frame system, since it is dependent on columns for support.
- Large open space = Deep beams which is more expansive.

[fig 7.3] Portal frame structure (Eagle-structural: online).

[fig 7.4] Brace frame structure (Gartner: online).

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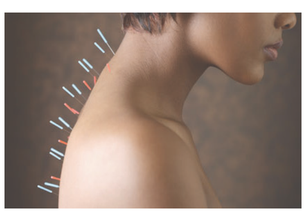

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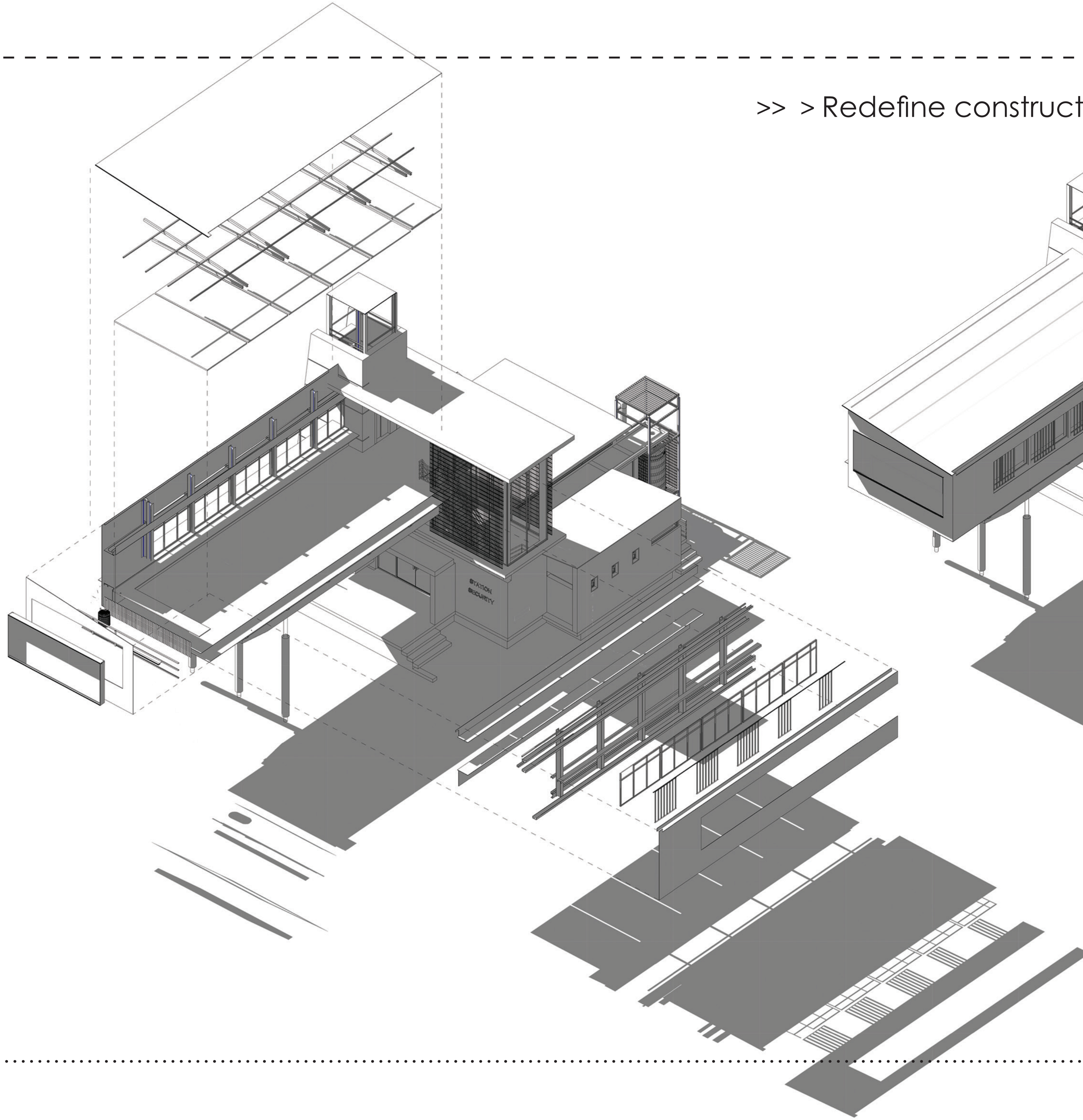
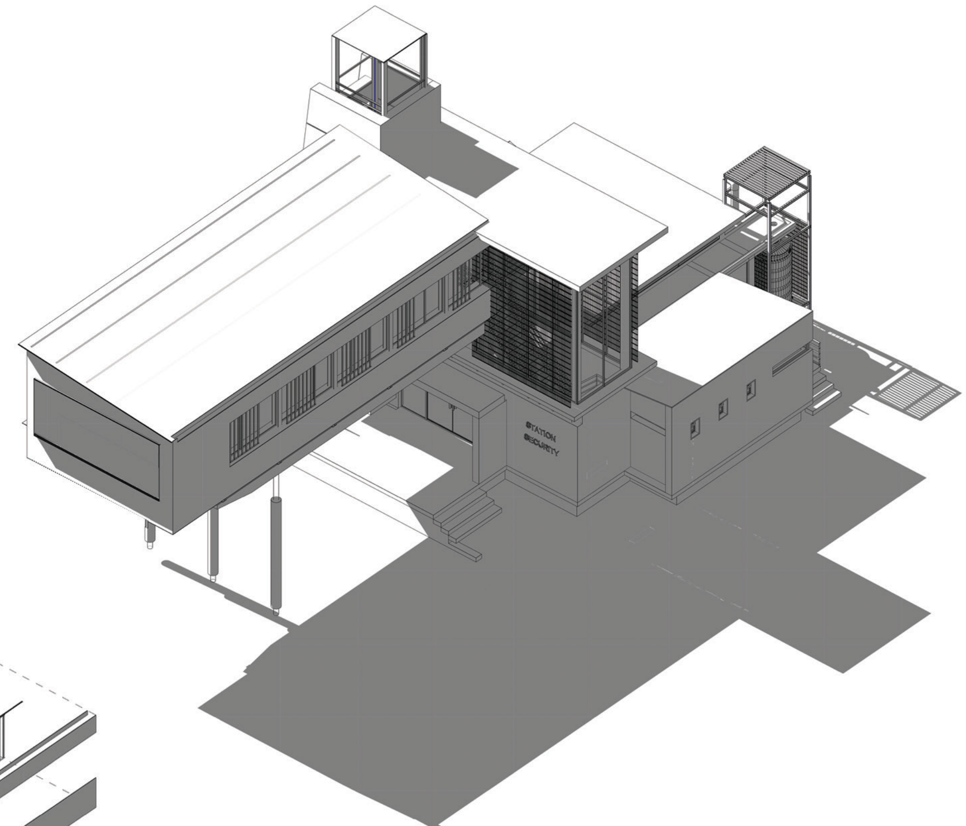
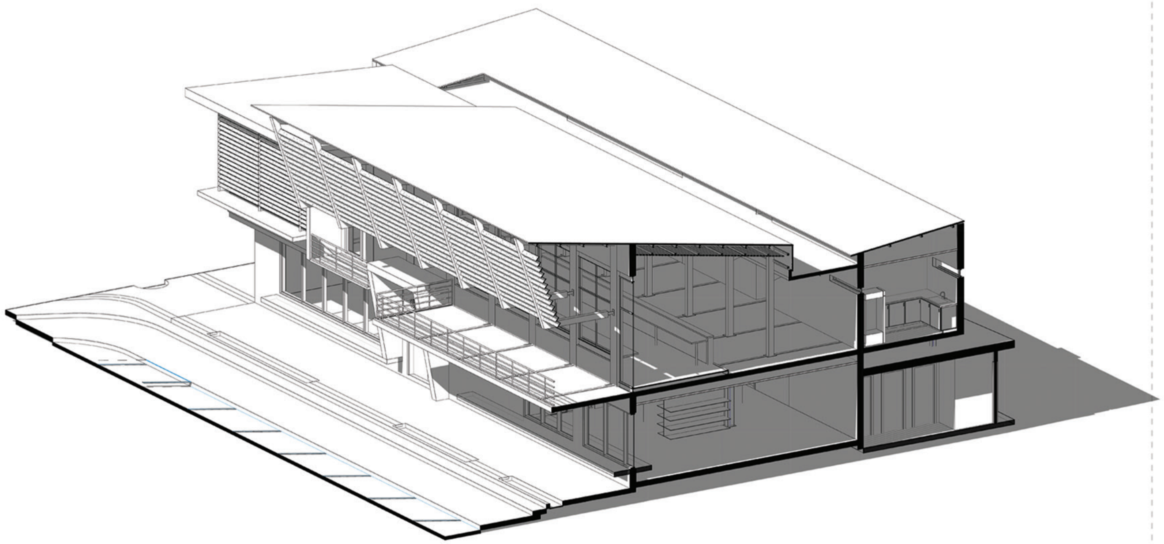


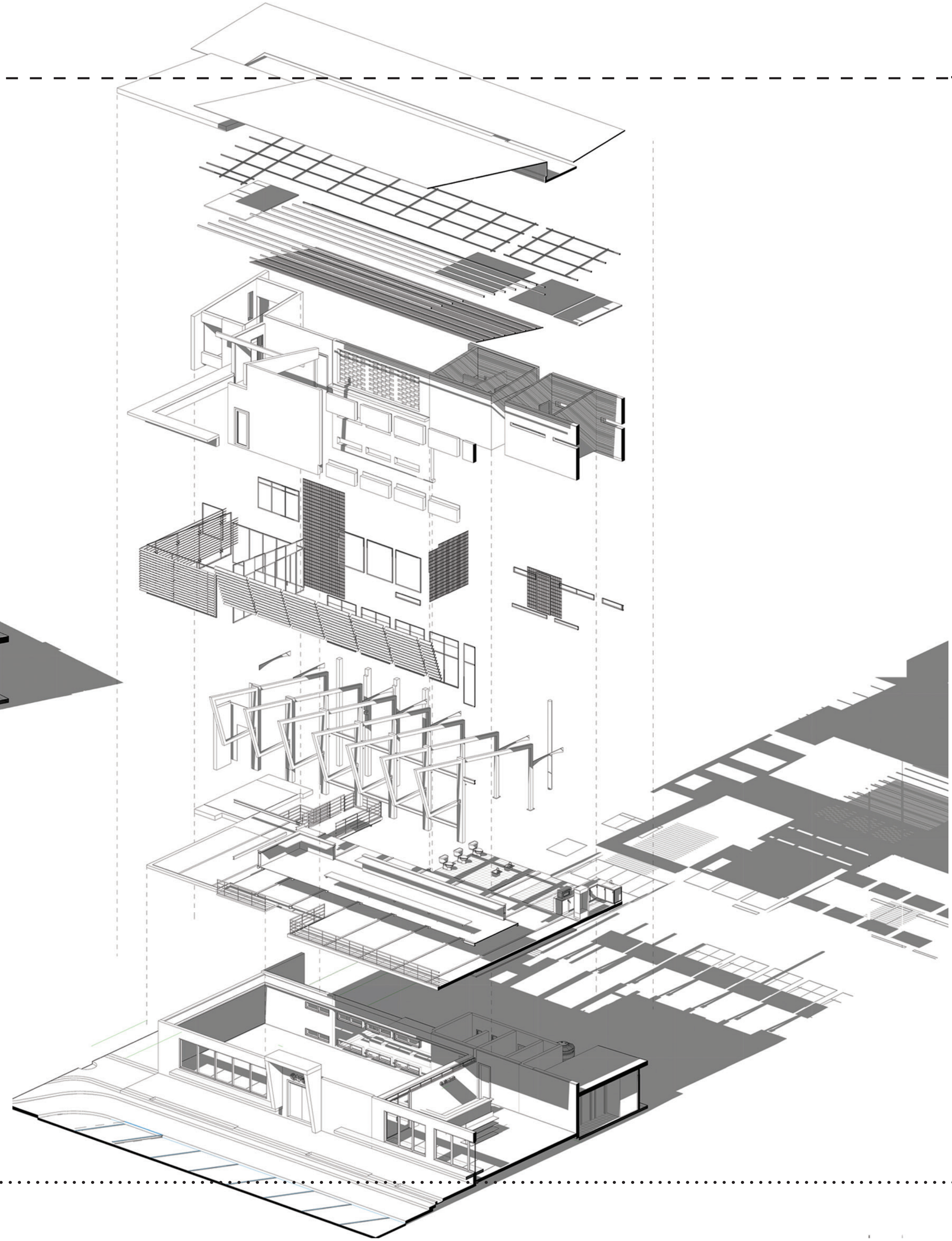


3D Perspective

Explode-Axonometric_
Station Security Tower



3D Perspective



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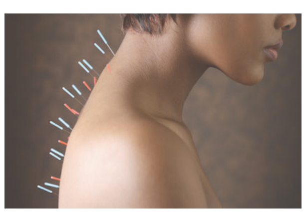
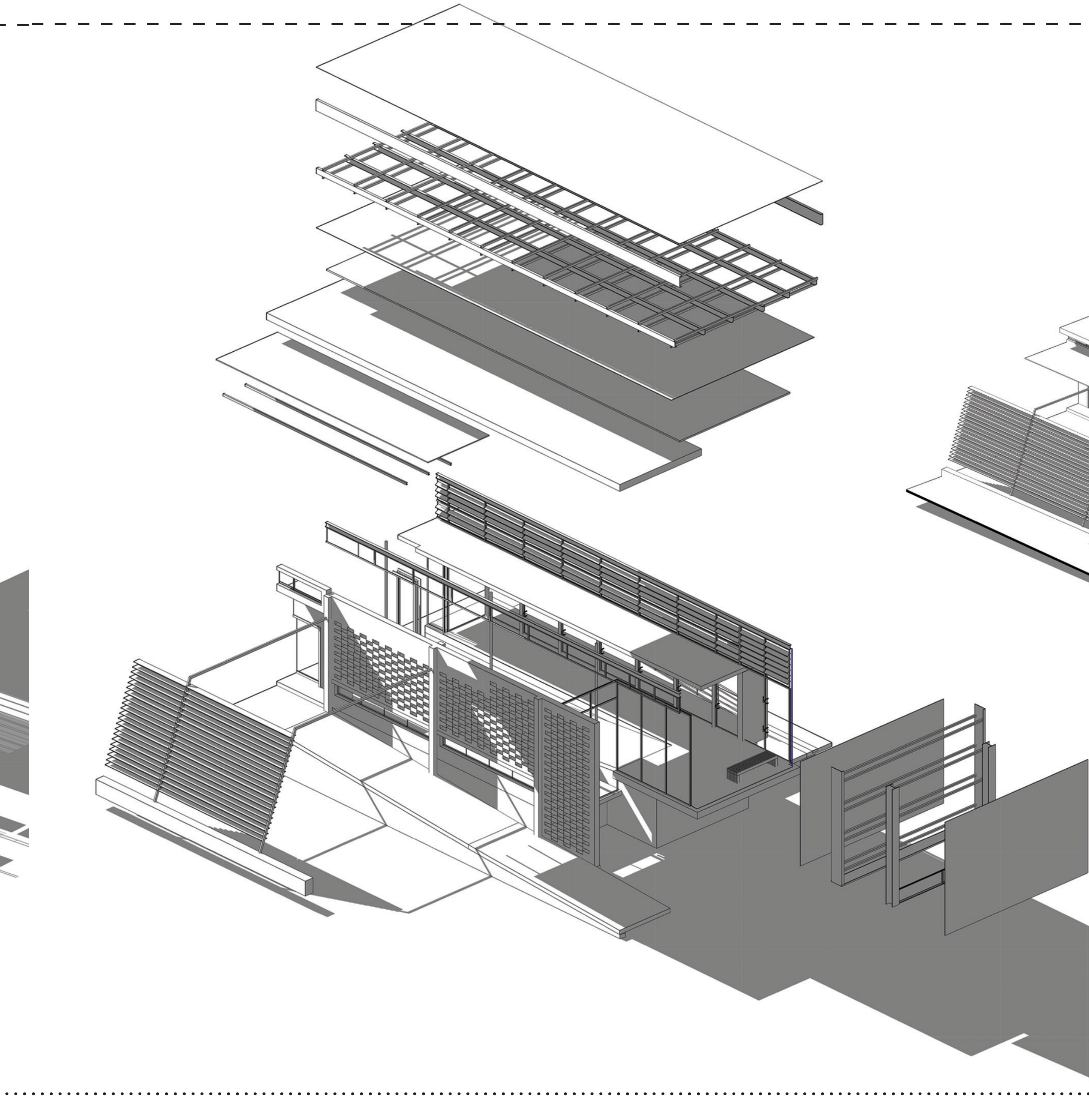
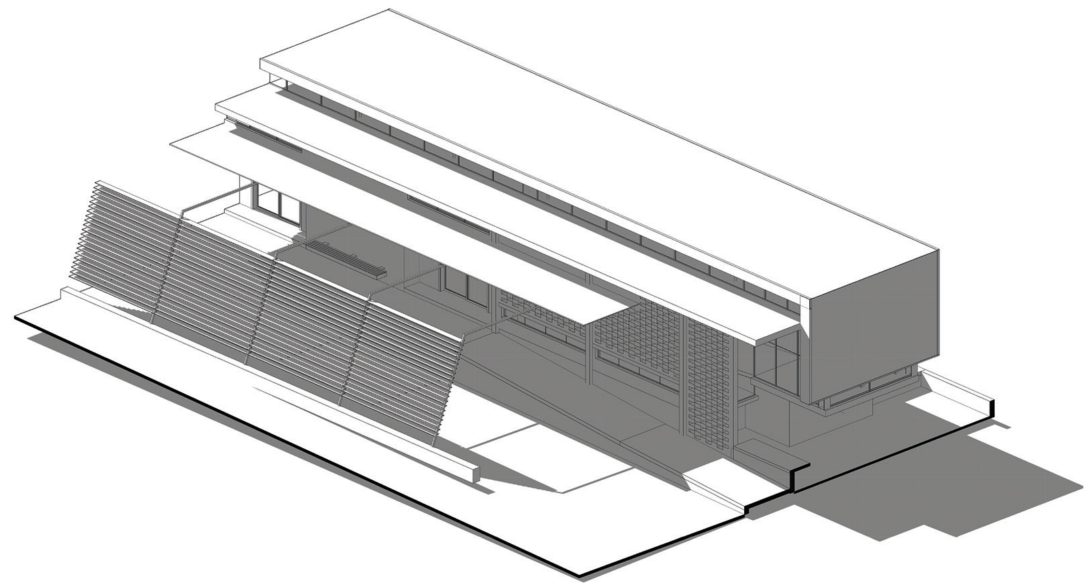


Explode-Axonometric_
Administrative Building





3D Perspective

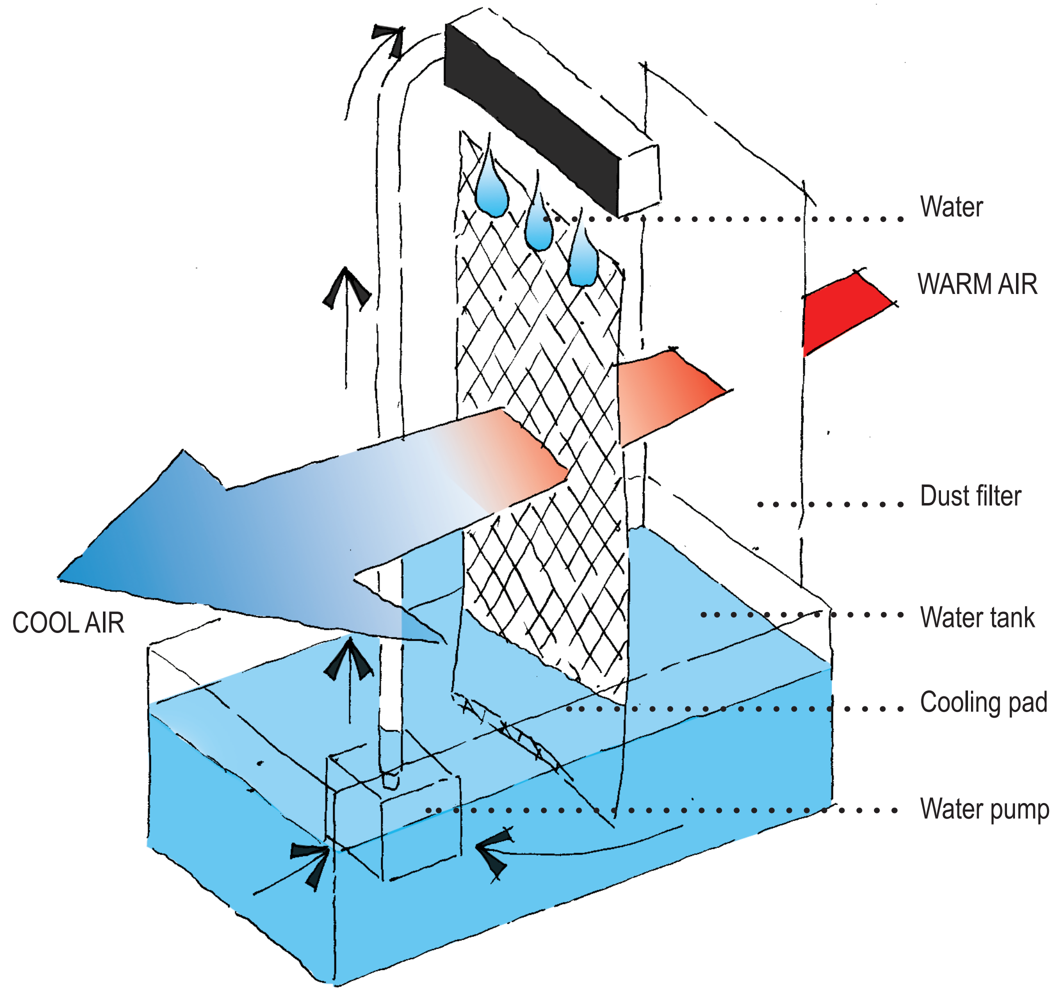
Explode-Axonometric_
BRT Station

SUSTAINABILITY

The two sustainability approaches being addressed in the thesis is that of a sustainable transport infrastructure and social aspects. The focus of implementing a more integrated and efficient transport system which will lower infrastructure costs and energy consumptions, while bringing the community together were social sustainable interaction can take place. The typology aim is to contribute to the existing historical order and society.

Structures will make provision of passive climate principles for optimum natural ventilation and light, translucent materials are used to maximize light inlet, but reduced heat gained throughout the process. All of the materials has been choosed and applied in a sustainable approach. The common structures are that it consists of an open structures and high windows to reflect natural light into the building and space. Trading space roofs to be sheet metal and pitched for optimum water harvesting, while flat arcade roofs slabs are adequate with down pipes which guides the water to a vertical 4000 liter water storage tank.

The design introduce an passive cooling system which ensure cool ventilating air at a low energy cost versus a high cooling output, which makes it a suitable design element in a semi-arid Karoo region. The cooling system will also make use of the rain water harvested to function to its maximum potential.



Evaporative cooler. Sketch,2014.

Working of Evaporative cooler system

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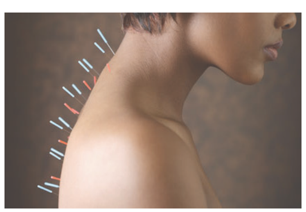
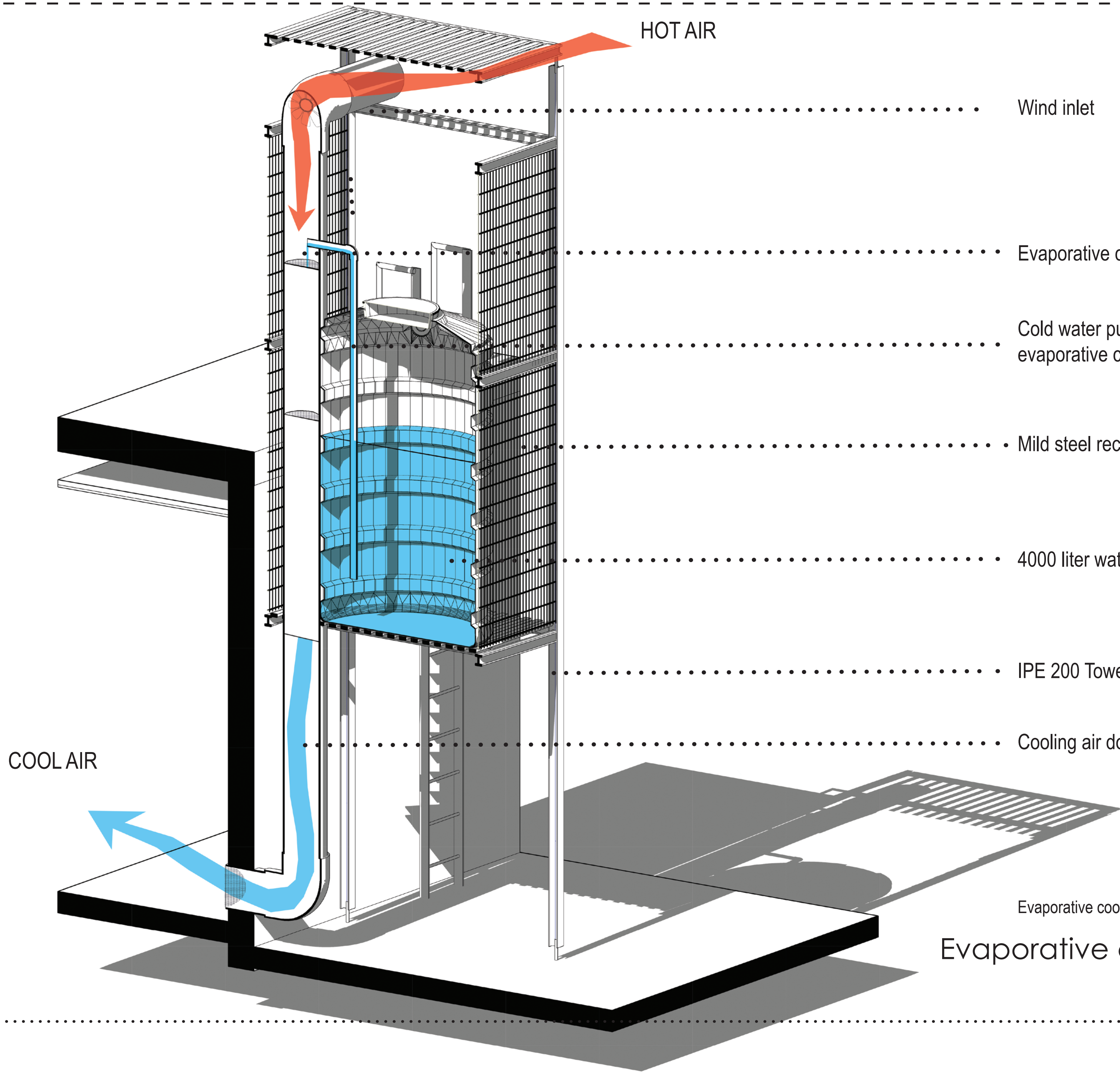
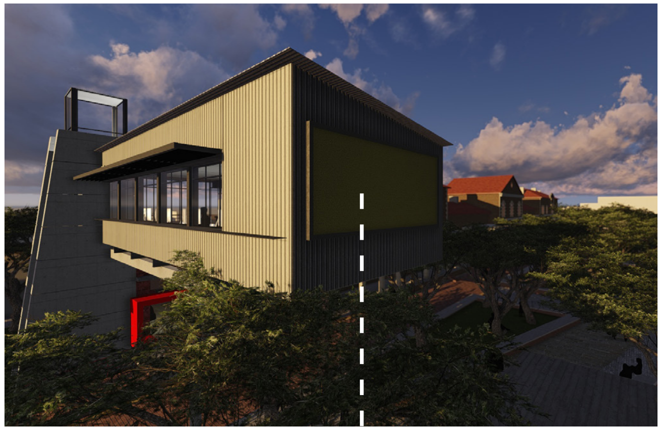




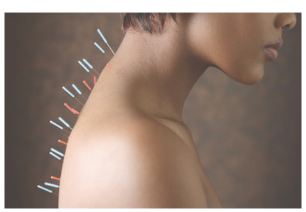
Evaporative cooling tower. Sketch,2014.

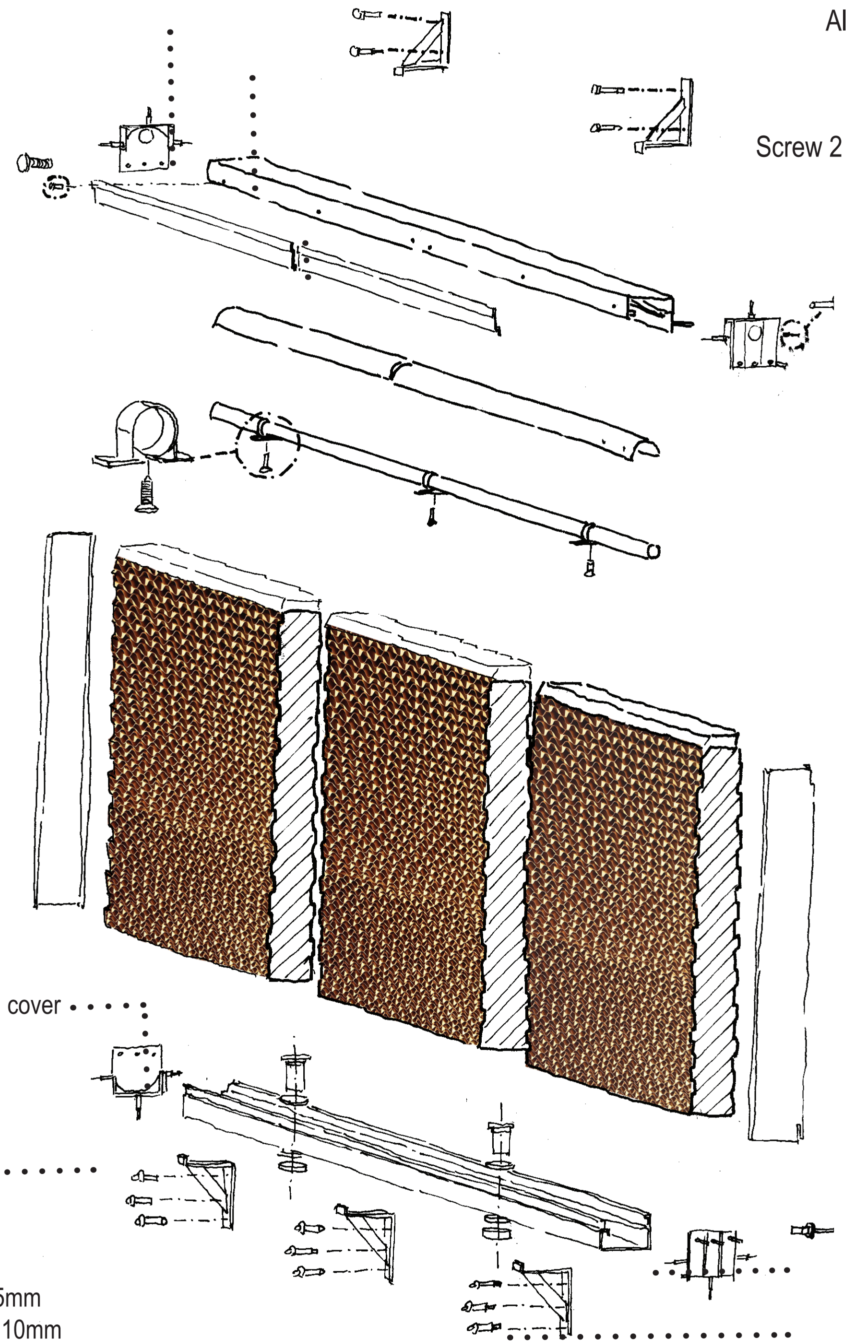
Evaporative cooling tower

Explode view_
Evaporative cooler system



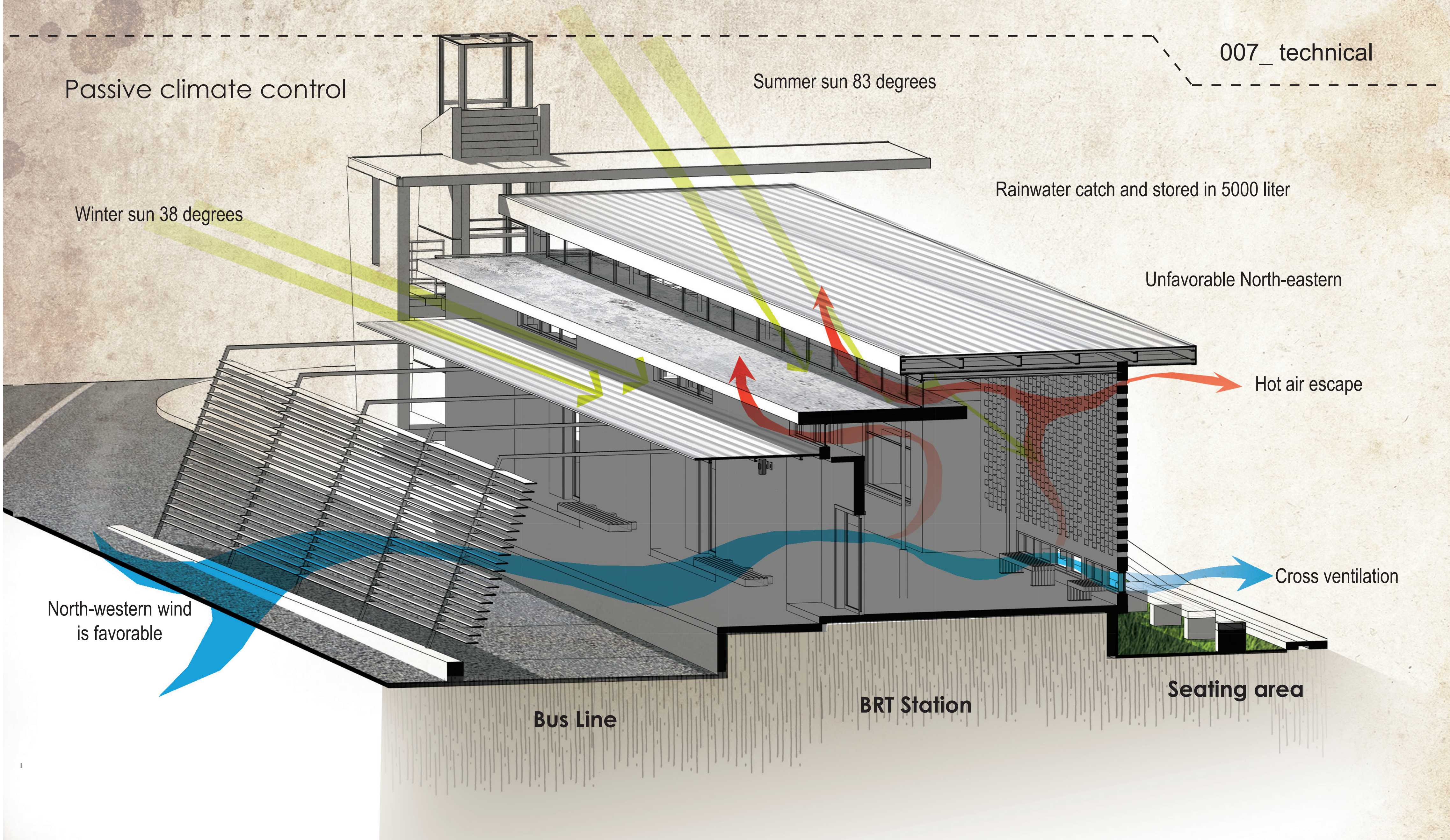
[fig 7.5] Evaporative cooler (Gartner: online).





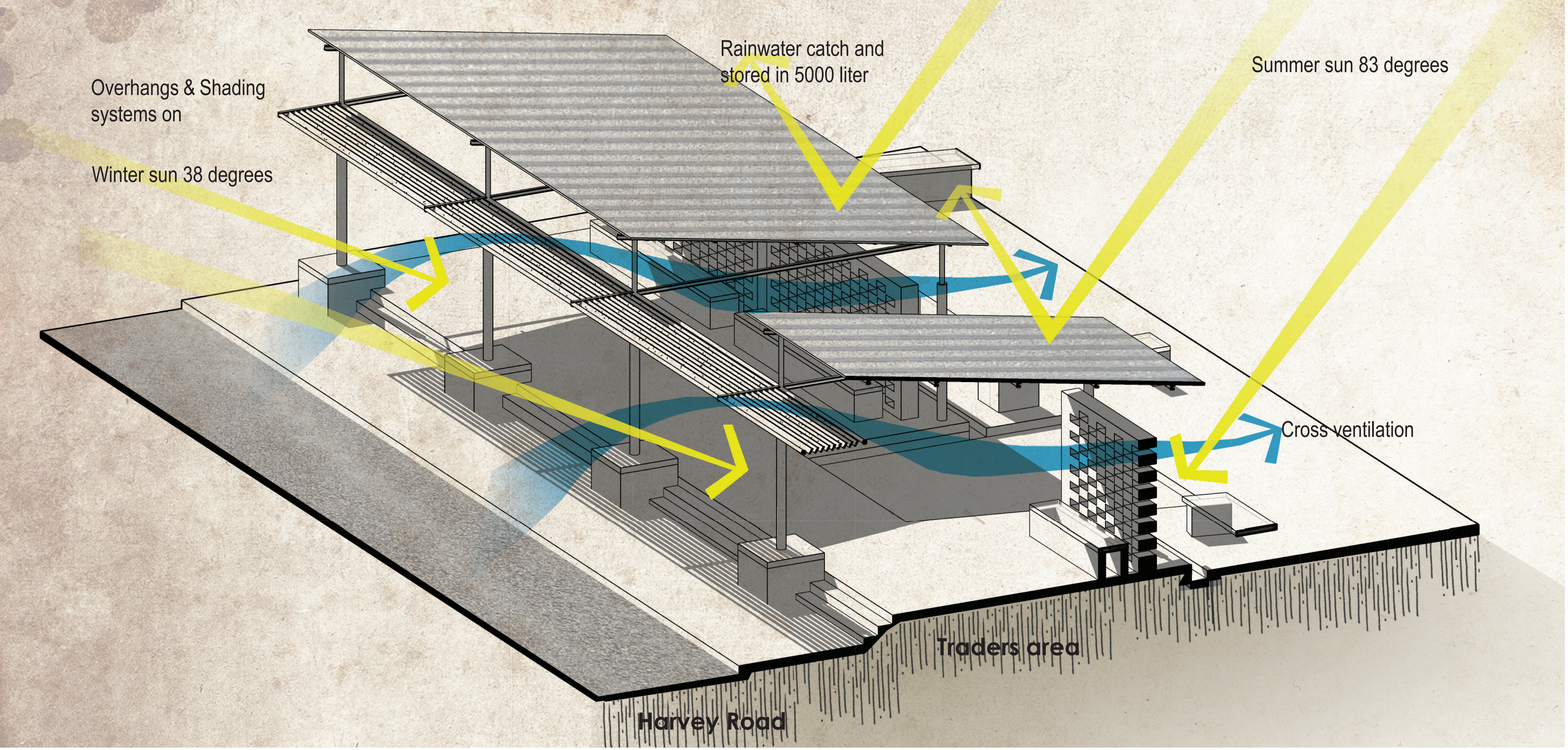
Evaporative cooler. Sketch,2014.

Passive climate control



3D Section_ BRT Station

Prefabrication Interchangeable modular design Sustainable construction method Material choice >> >



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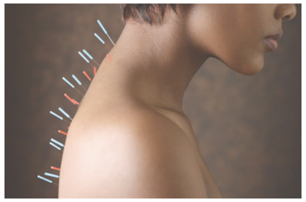
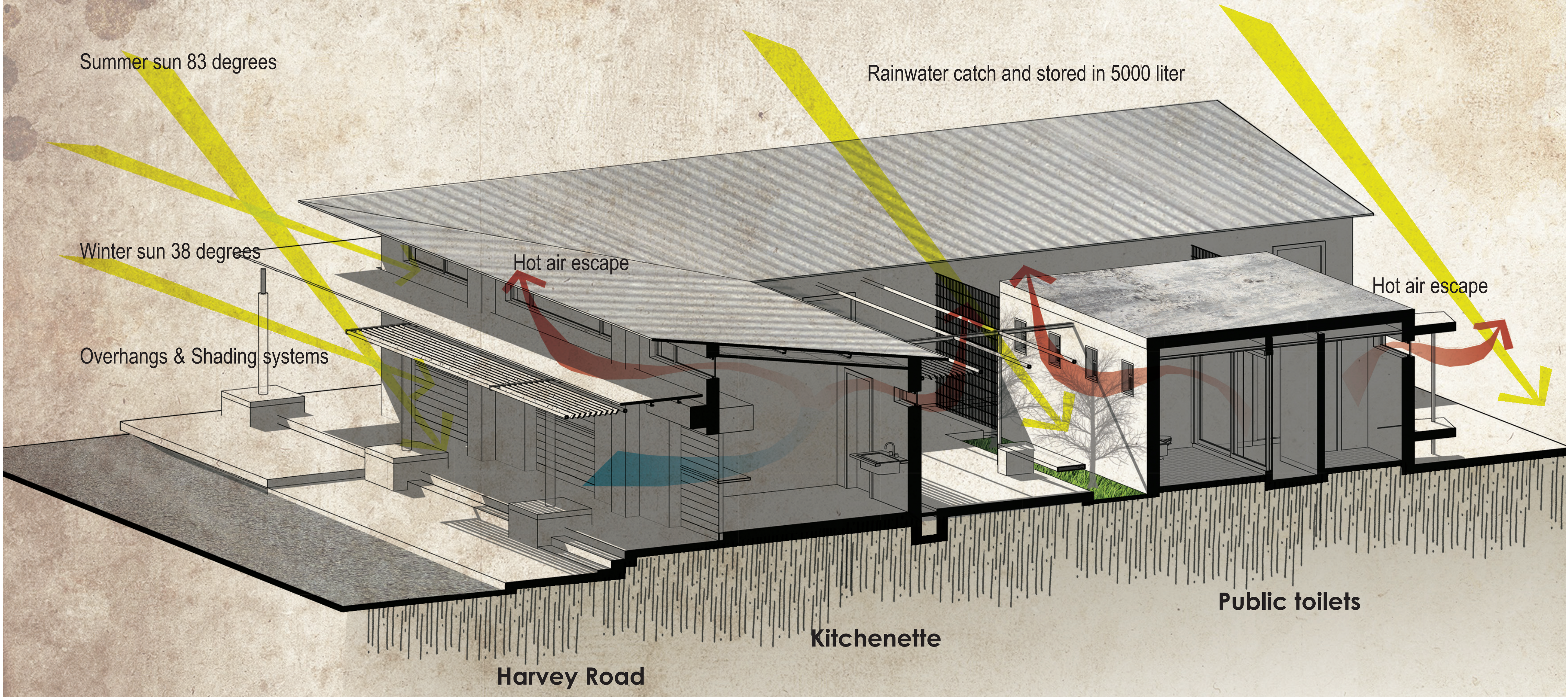


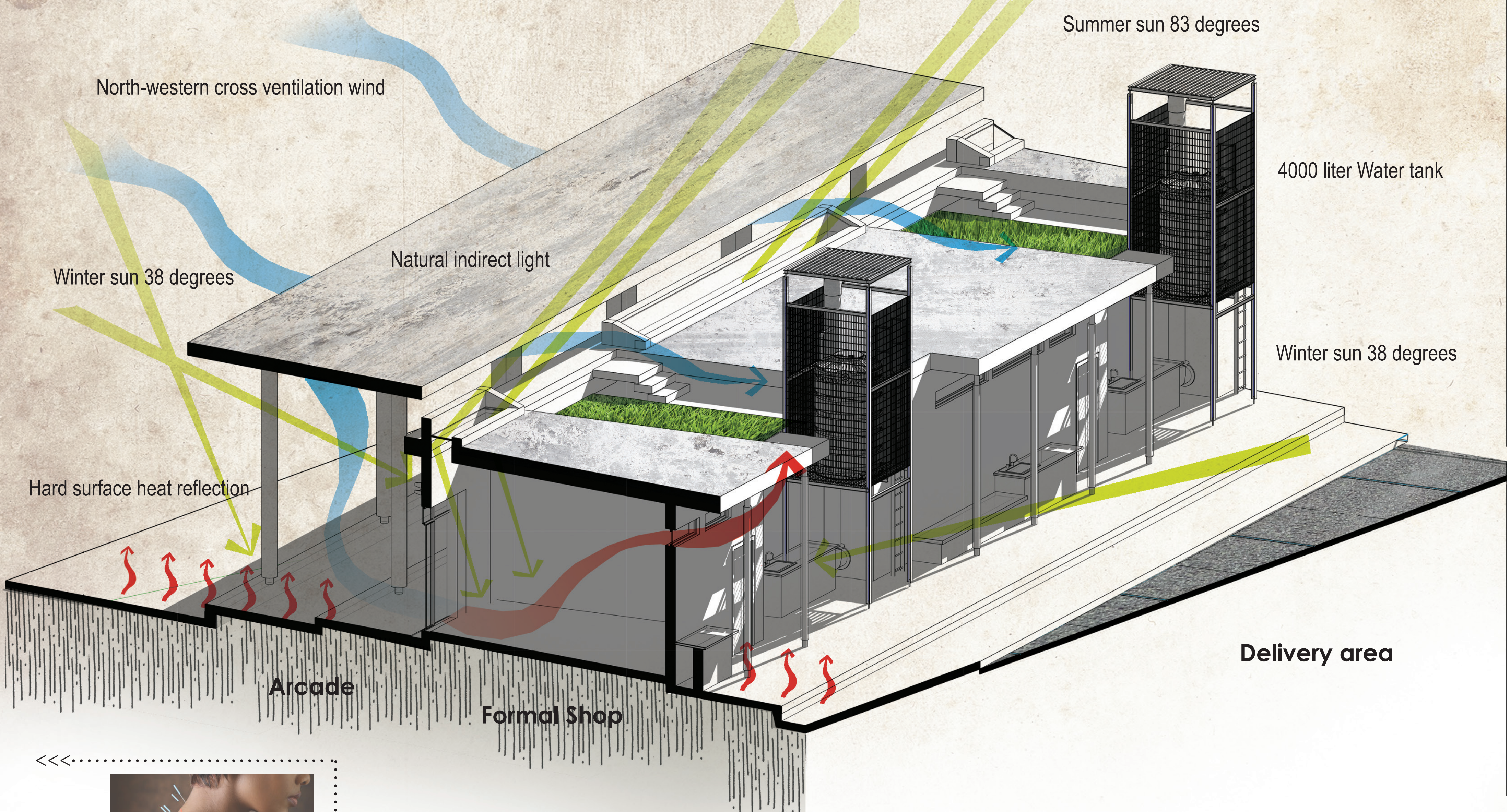
3D Section_ Street Traders

>> Redefine construction



3D Section_ Kitchenette

Prefabrication Interchangeable modular design Sustainable construction method Material choice >> >



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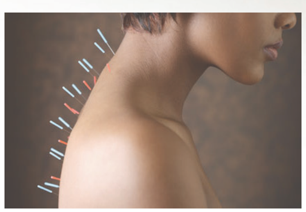
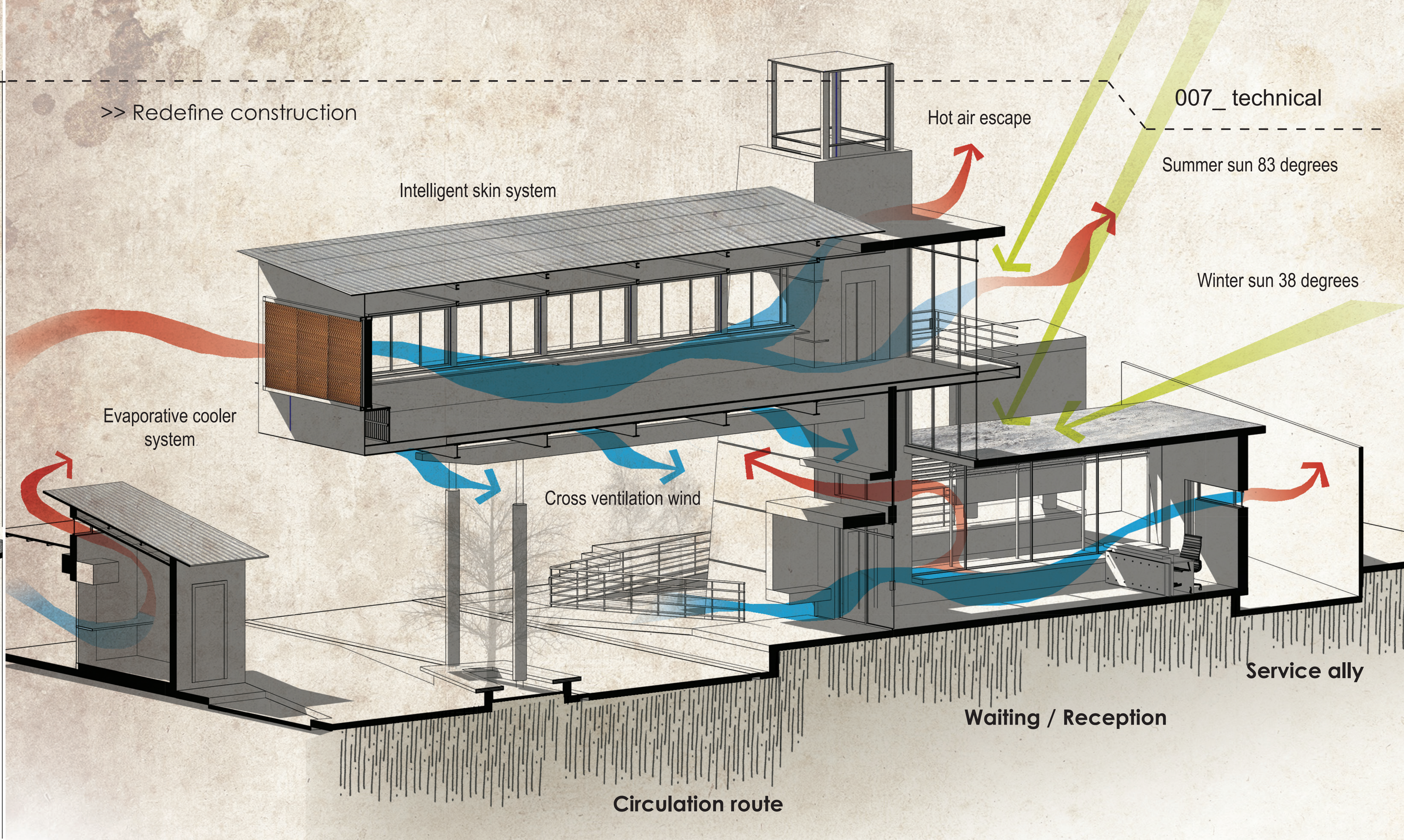


3D Section_ Formal Shop



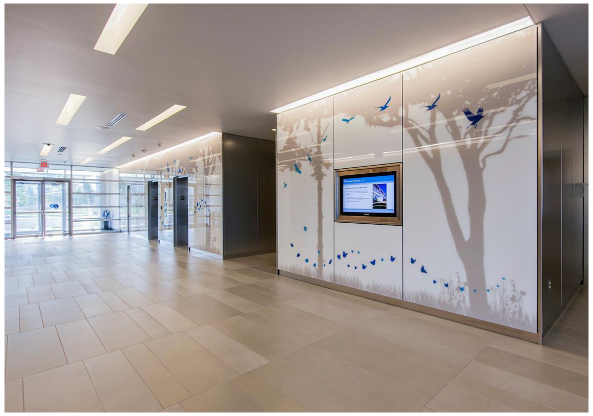
3D Section_ Station Security Tower

[fig 1.2] Recycled bricks (Greenne, 2012: online).

RECYCLED BRICKS & STONES

Building materials such as concrete slabs and bricks will be cleaned re-used from the demolished structure and incorporated into the proposed design. The use of recycled building materials will reduce the material cost of the project and creates work opportunity for the local community. Recycled materials will need to be cleaned and check before usages. Ballast stone from the local railway tracks will also be gathered and placed in a steel mesh structure which will add to the aesthetically characteristics of the local architecture.

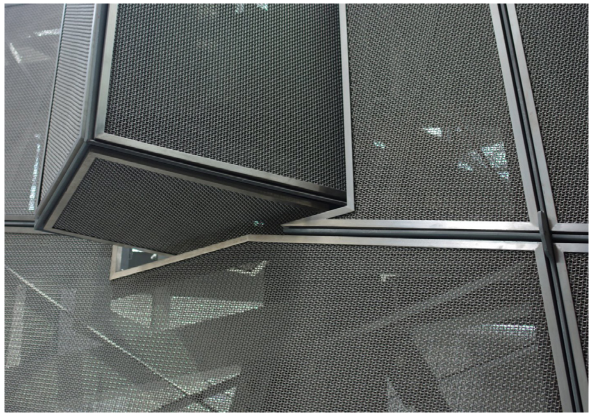
[fig 1.2] Glass panels (Aarkay: online).



GRAPHIXART FROM PG GLASS

The product is mainly use in the design as marketing tool which is printed on glass panels to promote the BRT system. The dimensions for the maximum printing area are 2 400 x 3 660mm and the minimum is 300 x 300mm. The thickness of the printing glass varies from 5mm to 18mm, depending on the client's needs in terms of marketing and budget.

[fig 1.2] Stainless steel mesh (GKD: online).



GKD STAINLESS STEEL MESH

Reason for utilizing GKD mesh is because it has a high fire resistance, low maintenance and is corrosion resistance. The mesh is utilized in different aspects of the design weather it is for partition walls, shading, balustrades or facade cladding. The mesh chosen for the design is Capella 71, it has an 41% diffusion of light. These mesh panels is available in a standard modular size, 2 x 3m, but other specifications and dimensions is also available on request.

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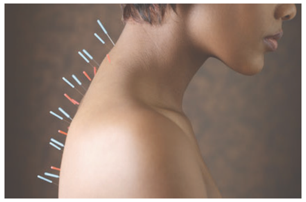


[fig 1.2] Insulation boards (Insulpro: online).

INSULPRO FACTORYLITE

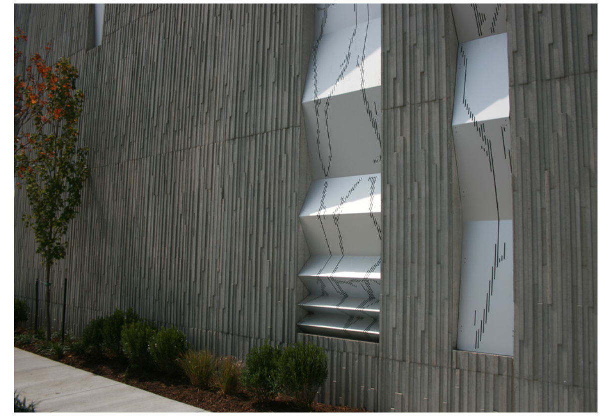
This fiberglass insulation material with reinforced foil on the one side is available in roles of 1200mm wide and up to a length of 25m with a thickness of 100mm. Factorylite reduces the heat loss percentage in a room and is non-combustible.

[fig 1.2] Polycarbonate panels (Archiproducts: online).

POLYCARBONATE: ARCOPLUS626

ArcoPlus626 consist of a six wall polycarbonate panels which is laid into a modular system with a combined thickness of 20mm. The use of a 600mm module is utilized when there is no hight restriction for the transport system. In this case, the main transport is the railway since it runs next to the proposed site. The wall panels are assembled onto a steel profile which will make use of a klip-lock system. These panels can be used for roof covering or acting as a wall panel. This material has many architectural and construction advantages namely: heat insulation, good resistance to UV rays, easy to install and good light diffusion. ArcoPlus can be arrange in many different colors and heights to create a unique experience within a specific space.

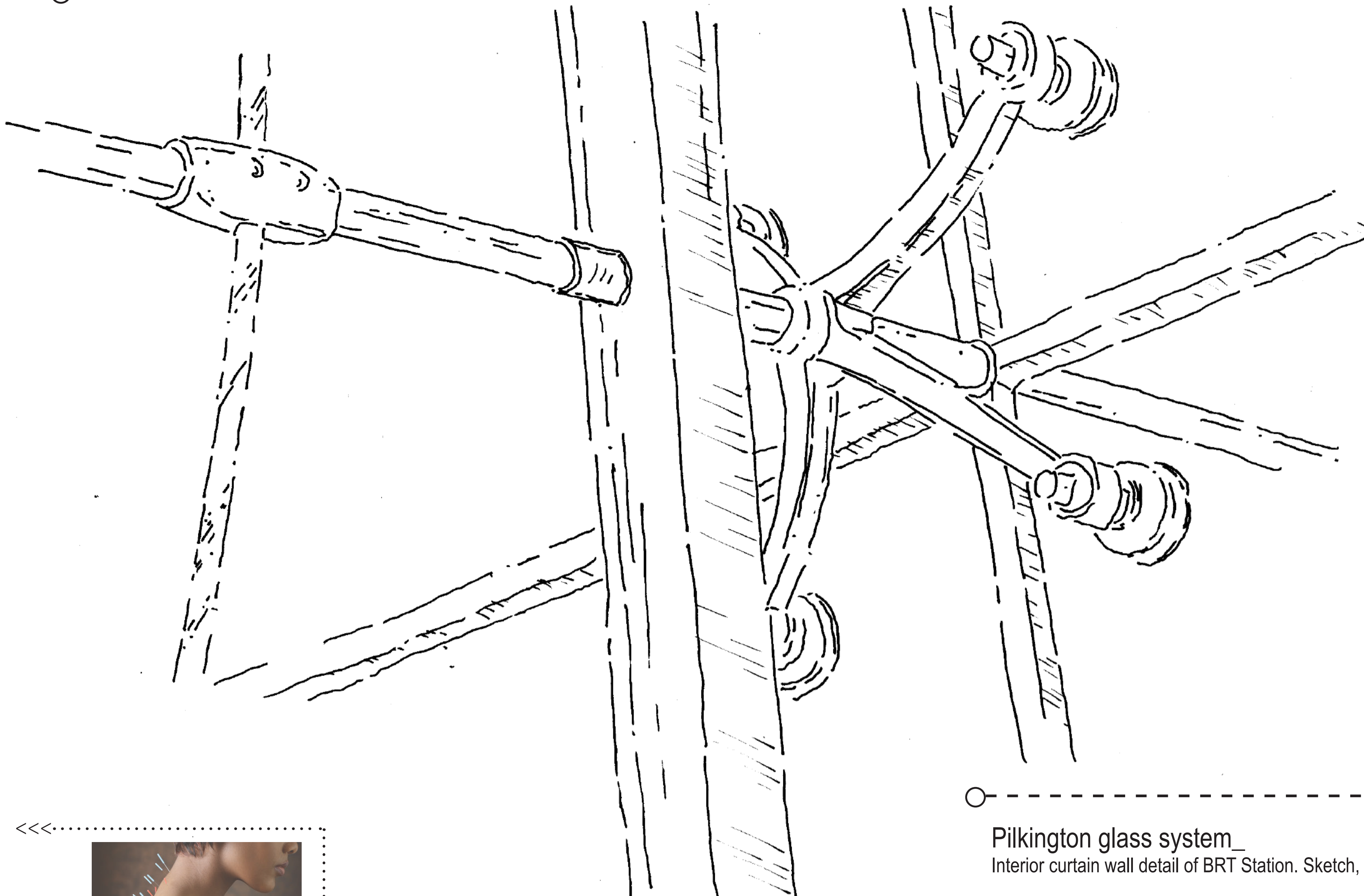
[fig 1.2] Precast concrete panels (Reid: online).



PRECAST CONCRETE PANELS

Three types of precast concrete panels are in design: cladding, load-bearing wall units, and shear walls.

Precast cladding is the most commonly used component through the design. This panel does not transfer vertical loads but simply encloses the space. Used as wall panels and wall units. Load-bearing wall units resists and transfer load from other elements and cannot be removed without effecting the strength or stability of the structure. Precast concrete shear wall panels are used to provide lateral load-resistance and the effectiveness of the shear wall depends largely on the panel-to-panel connections.



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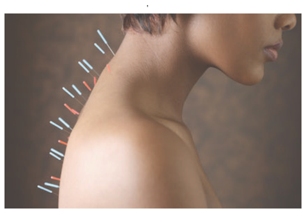
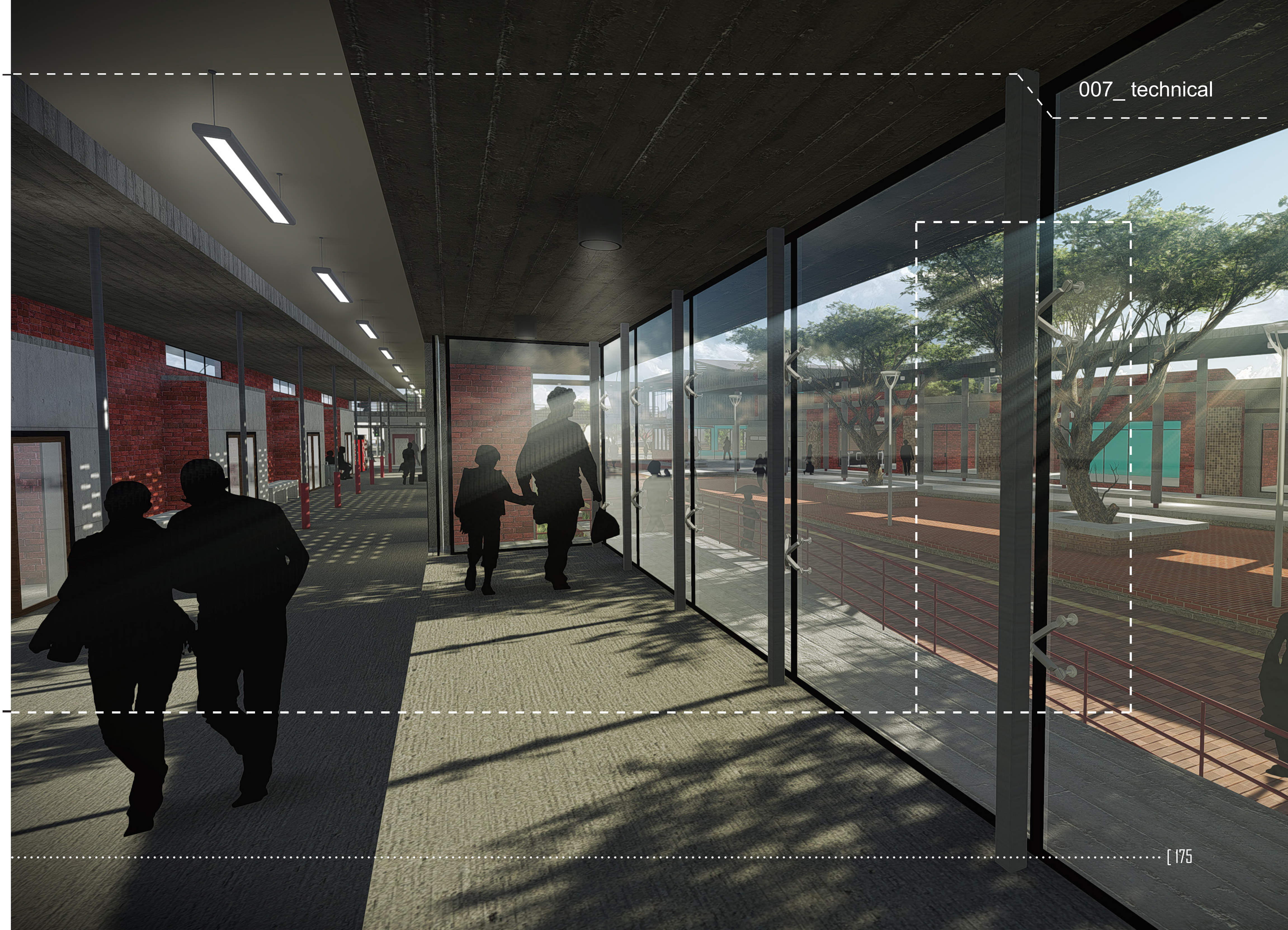
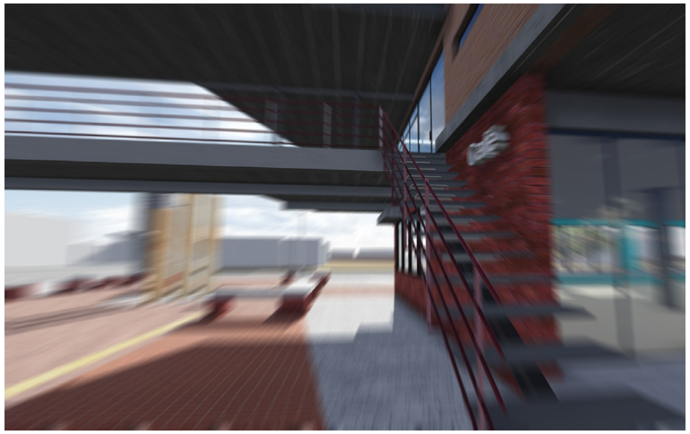


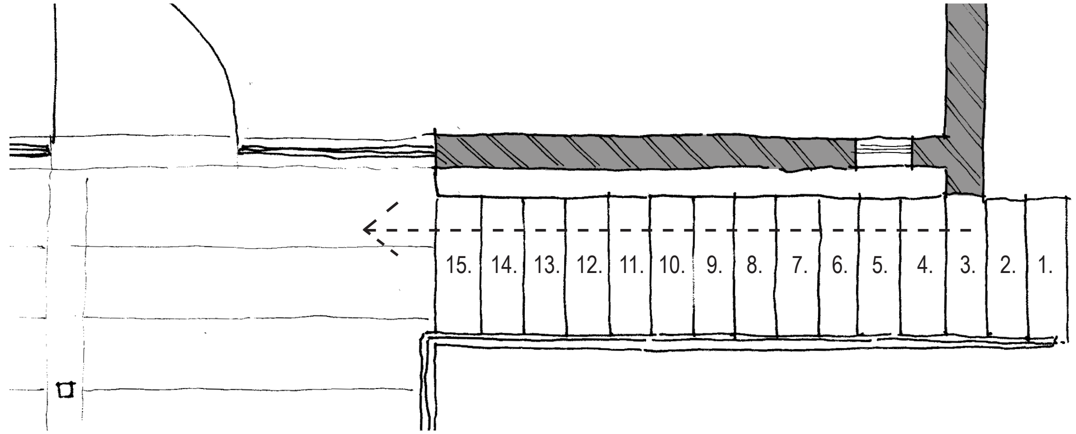
Pilkington glass system_

Interior curtain wall detail of BRT Station. Sketch, 2014.

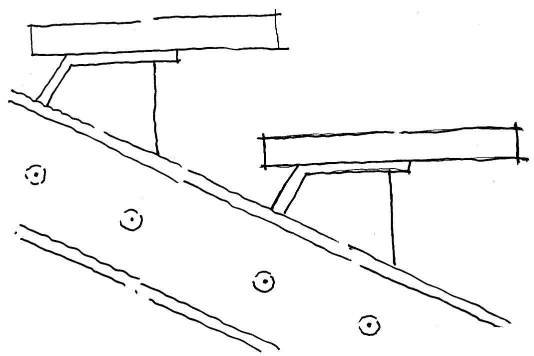




Perspective



Staircase Plan. Sketch,2014.



Staircase detail

30mm steel grid with a 50mm Mild steel angle plate frame on 10mm galvanized steel profile, fixed between two hot rolled c–channel profiles, 178 x 76 x 10mm.

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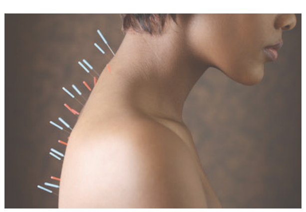
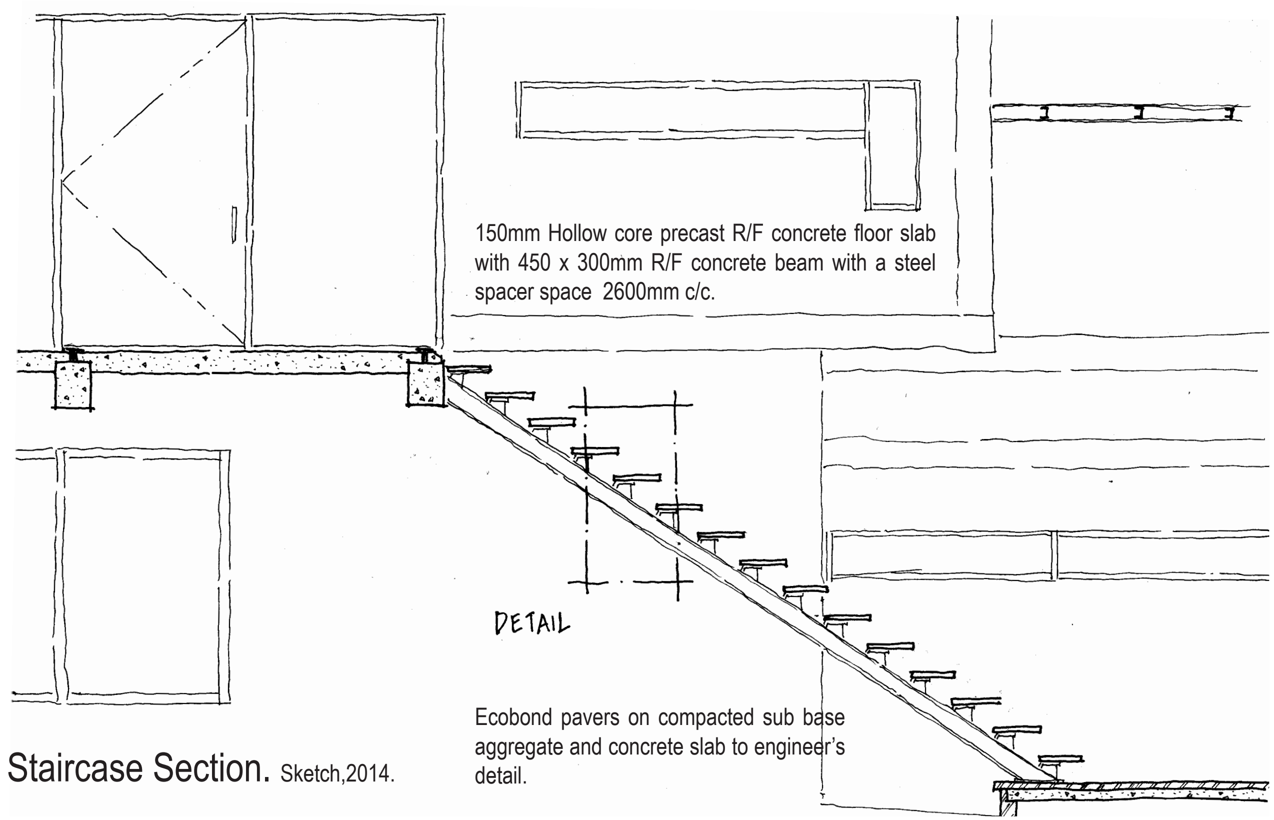


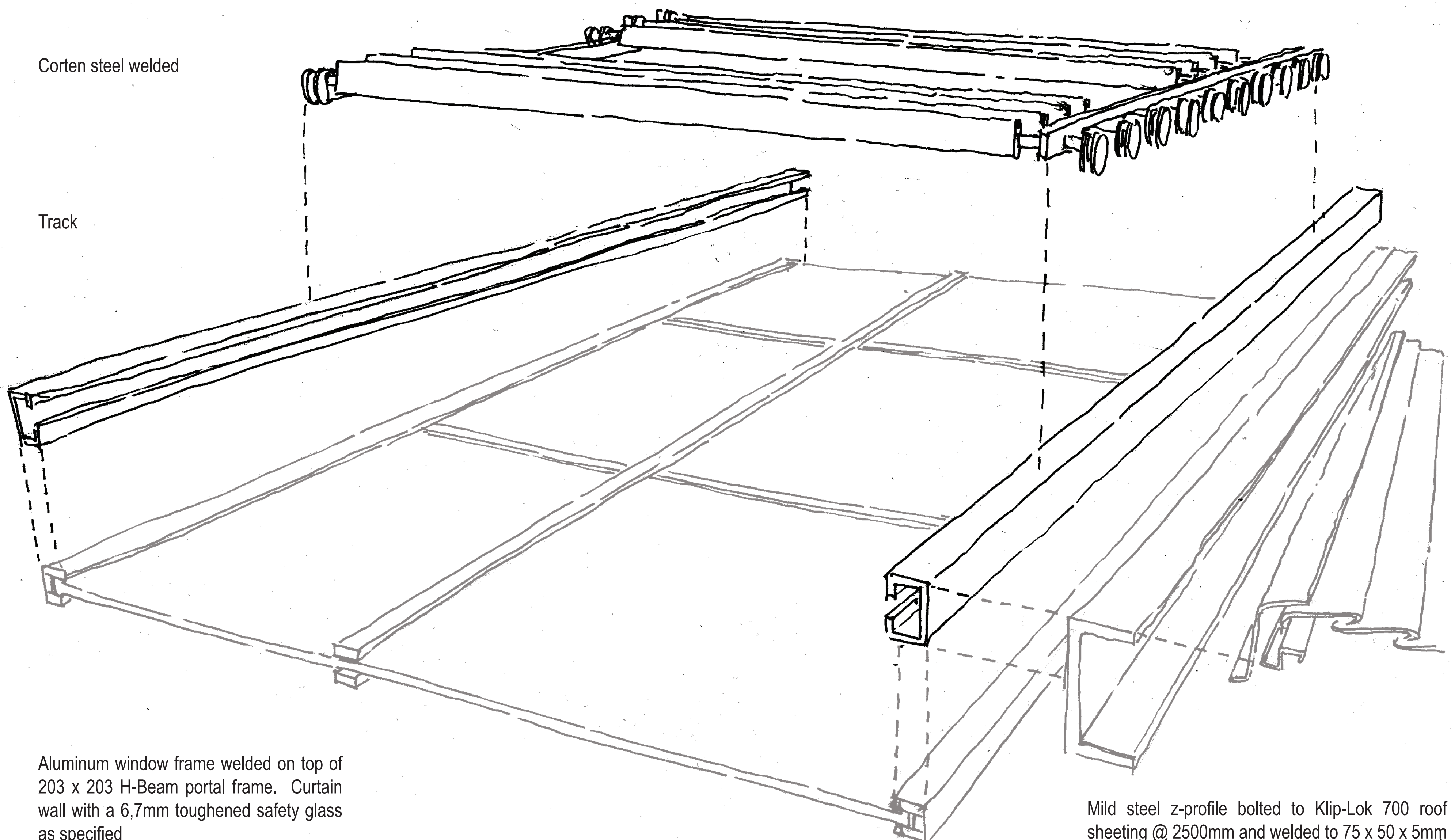


Staircase Section. Sketch,2014.

Skin structure. Sketch,2014.

Corten steel welded

Track



Aluminum window frame welded on top of 203 x 203 H-Beam portal frame. Curtain wall with a 6,7mm toughened safety glass as specified

Mild steel z-profile bolted to Klip-Lok 700 roof sheeting @ 2500mm and welded to 75 x 50 x 5mm mild steel purlin with RSA welded to face.

Construction stages

1.

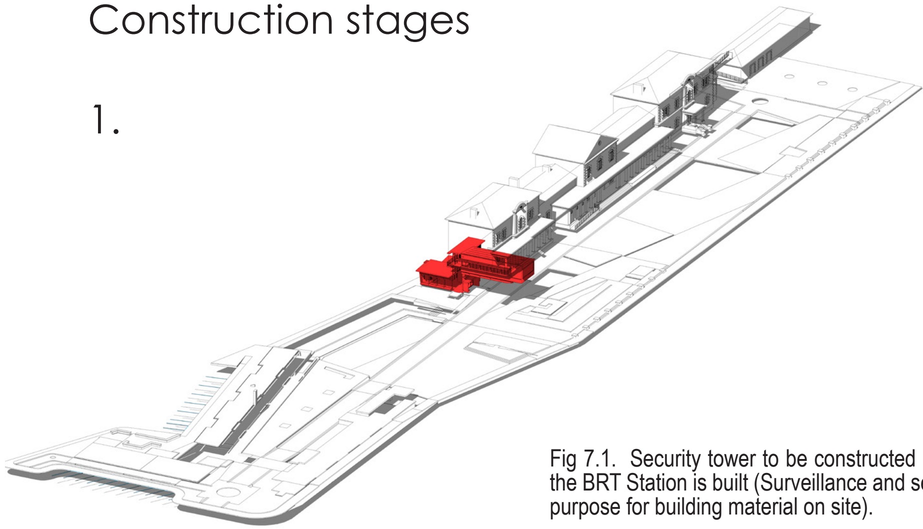
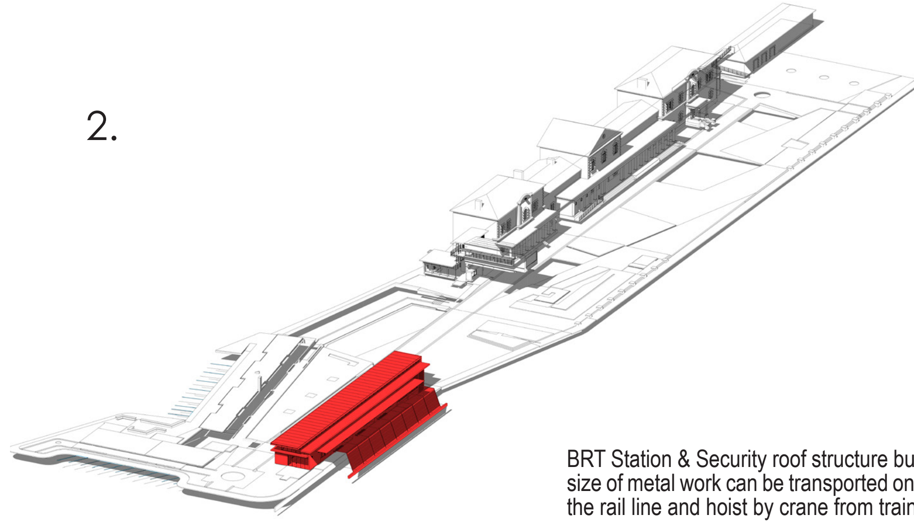


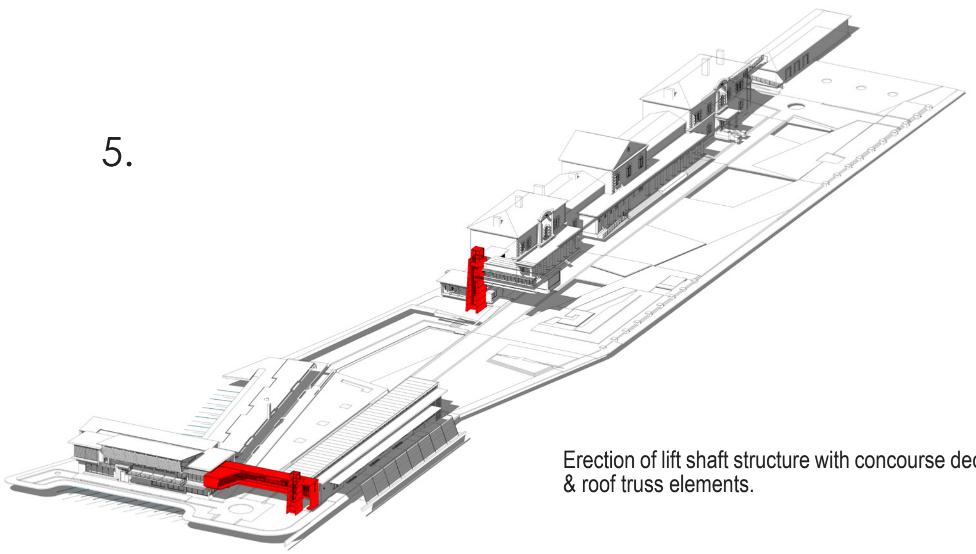
Fig 7.1. Security tower to be constructed before the BRT Station is built (Surveillance and security purpose for building material on site).

2.



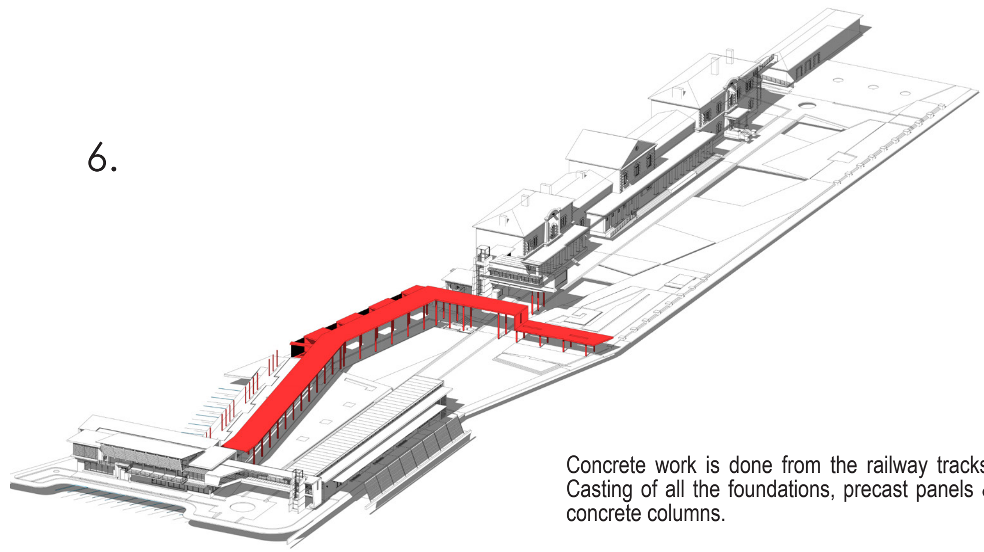
BRT Station & Security roof structure built. Large size of metal work can be transported onto site via the rail line and hoist by crane from train chassis.

5.



Erection of lift shaft structure with concourse deck & roof truss elements.

6.



Concrete work is done from the railway tracks. Casting of all the foundations, precast panels & concrete columns.

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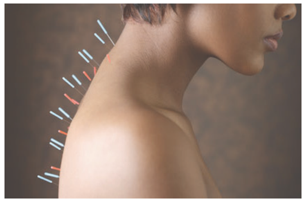
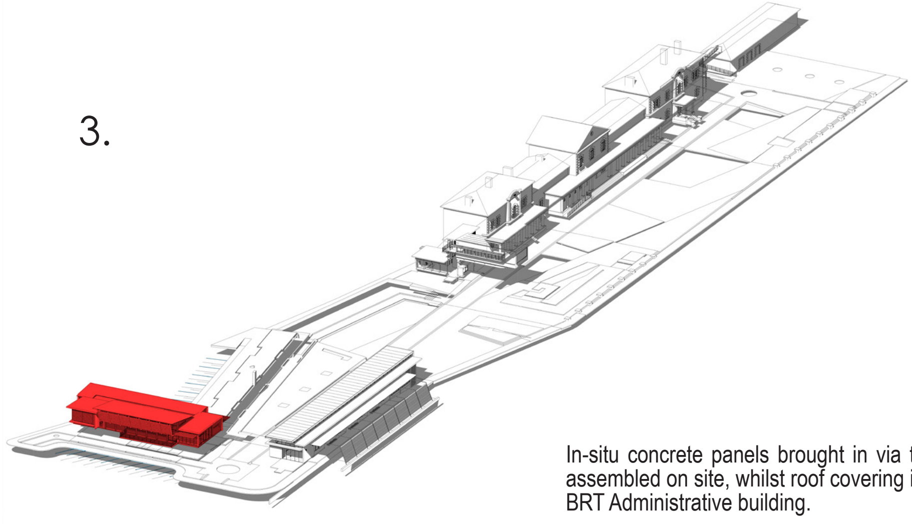


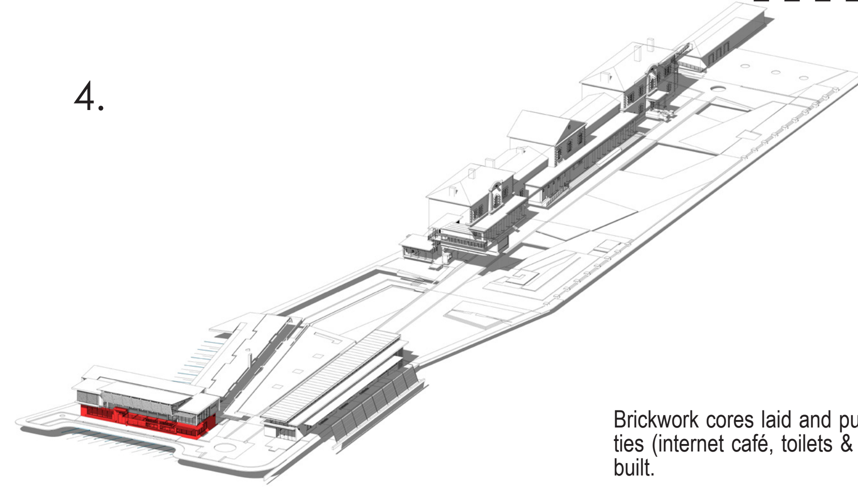
New railway tracks are added and a platform 7 & 8 are built additionally as future railway development indicates (PRASA railway proposal to accommodate next generation trains). This allows trains to move materials to and from the site without disturbing the active rail line.

3.



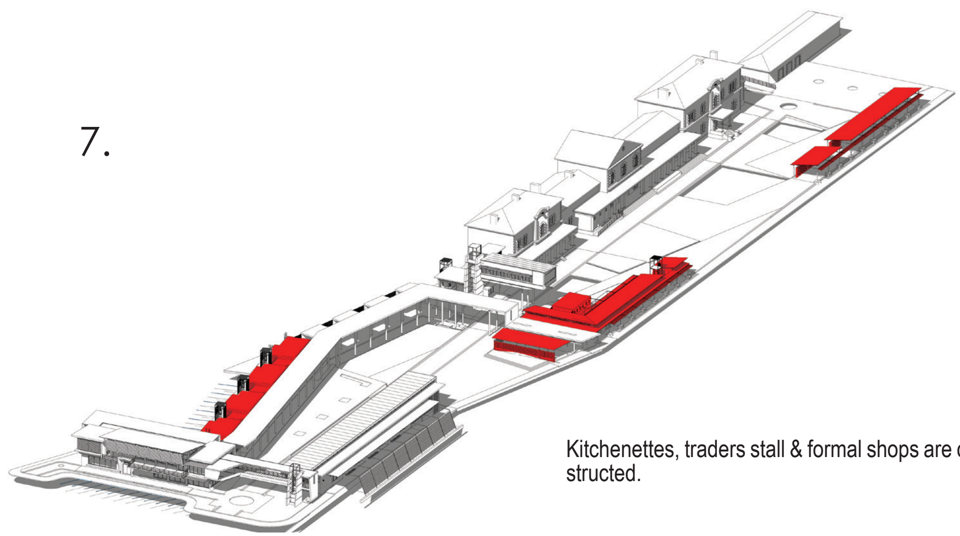
In-situ concrete panels brought in via train, and assembled on site, whilst roof covering is built for BRT Administrative building.

4.



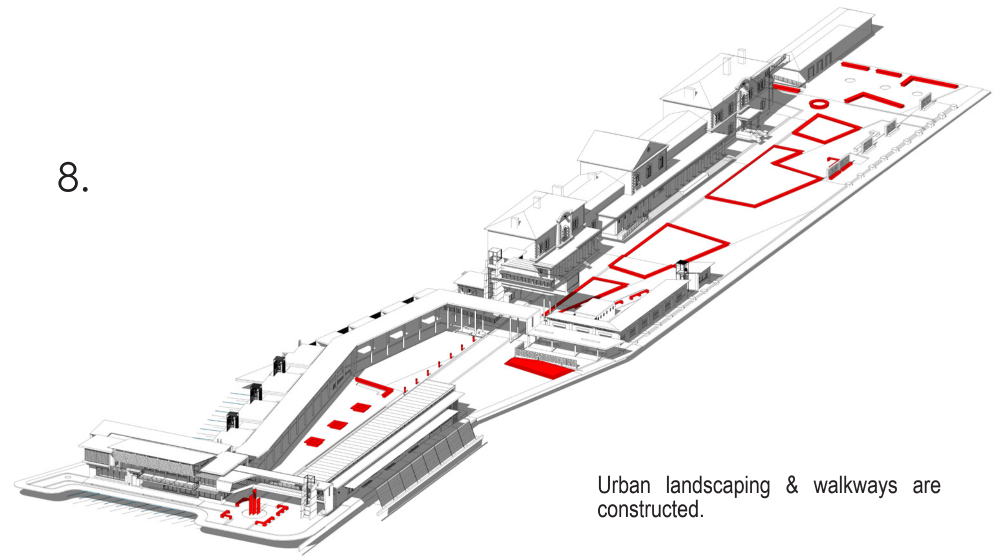
Brickwork cores laid and public amenities (internet café, toilets & café) to be built.

7.



Kitchenettes, traders stall & formal shops are constructed.

8.



Urban landscaping & walkways are constructed.

TRANSPORT METHOD_

The method will act as being part of the construction process, transporting materials with ease to and from site. From a conceptually perspective the means of transport routes would be perceived as being part of the interchangeable structure (acupunctural method), and therefore experience as the first stage of the construction and design development. The transport advantages of utilizing the variety of transport routes and the allocation of the site makes the project more suitable and possible to deal with large prefabrication materials and interchangeable modular structures. This tends to accelerate the construction period, since the structures can be easily assembled and constructed before construction commenced.

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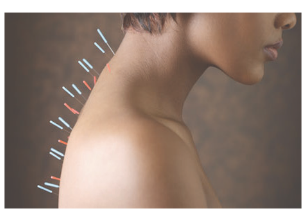

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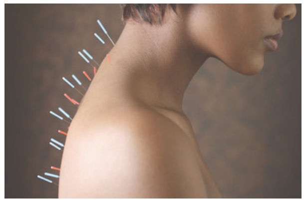

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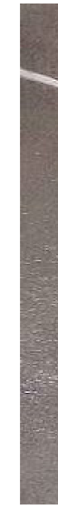
Conclusion

Bloemfontein's urban fabric has been affected by disconnected transport infrastructure, causing segregating communities and transport systems. The development of the Apartheid urban scheme of Bloemfontein, needs to be addressed. The objective of this thesis was acknowledge the historic railway station, public square and the railway infrastructure, which has been integrated into the existing city organism, rather than to reject and remove the historical layer. The new infrastructure system needs to be integrated sensitively and meaningfully into the dilapidated urban spaces of Bloemfontein.

This was achieved through the underpinning of acupunctural space which can respond to the different social needs of the time. The new bus rapid transit (BRT) system deals with the users experience and movement to allow the space to become an acupunctural space. Implementing urbanism on a human scale into the built space, essentially creating Post urbanism, the integration of architecture, urbanism and society.

The revival and reactivation of the CBD is achieved by integrating the main polemics of the current transport infrastructure, rather than to remove it. Post urbanism and urban acupuncture, allows the transport infrastructure to be implemented into the existing city organism and fabric.



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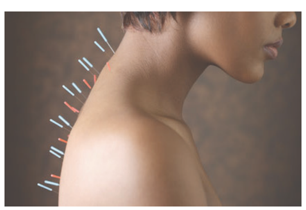
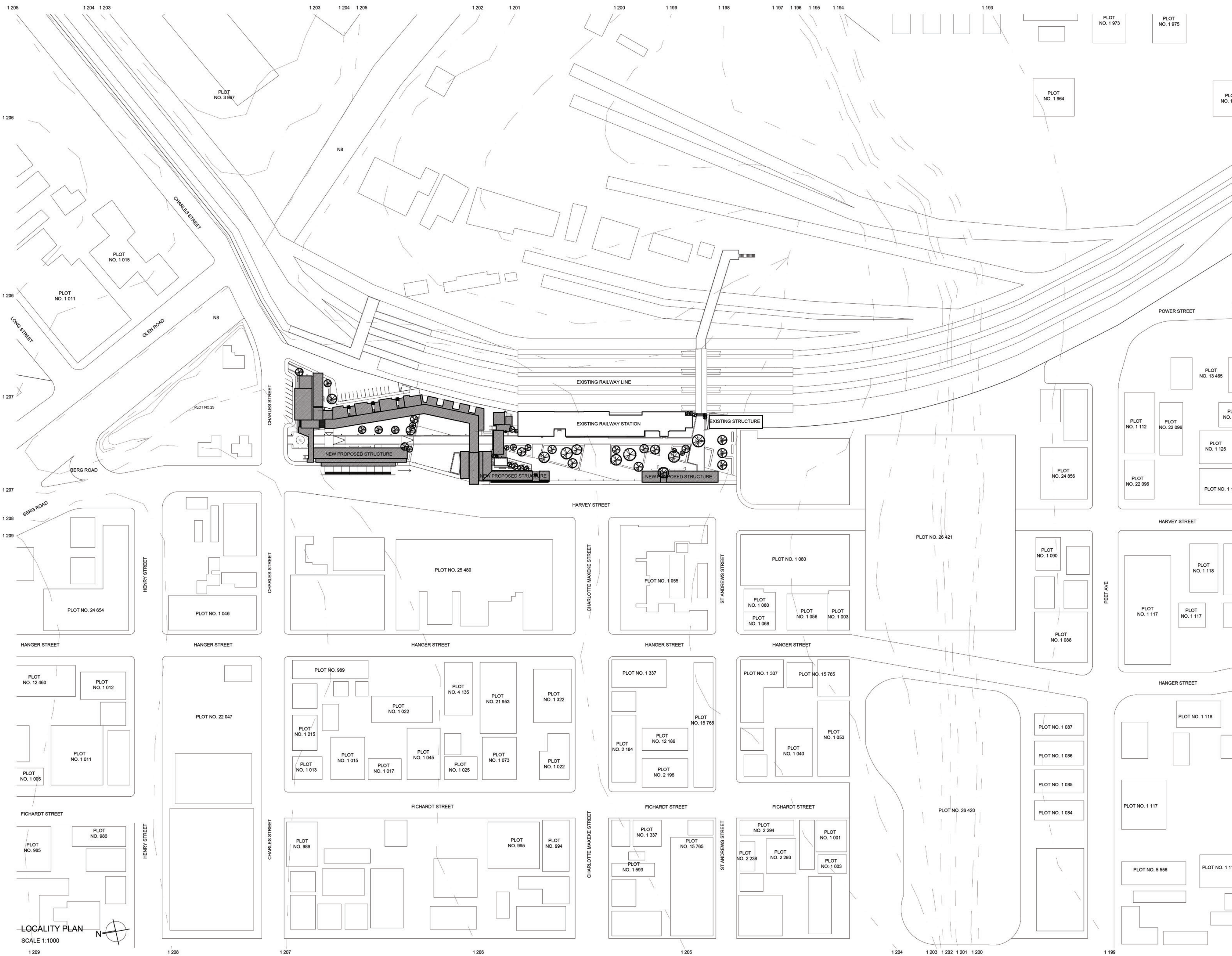


009 _ Design documentation

Appendix



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GRANT BICKNELL
ARCHITECTS

SACAP Reg. Professional Architect #7571

PROJECT:
PROPOSED TRANSPORT INTERCHANGE

ITEMS:
LOCALITY PLAN
scale 1:1000

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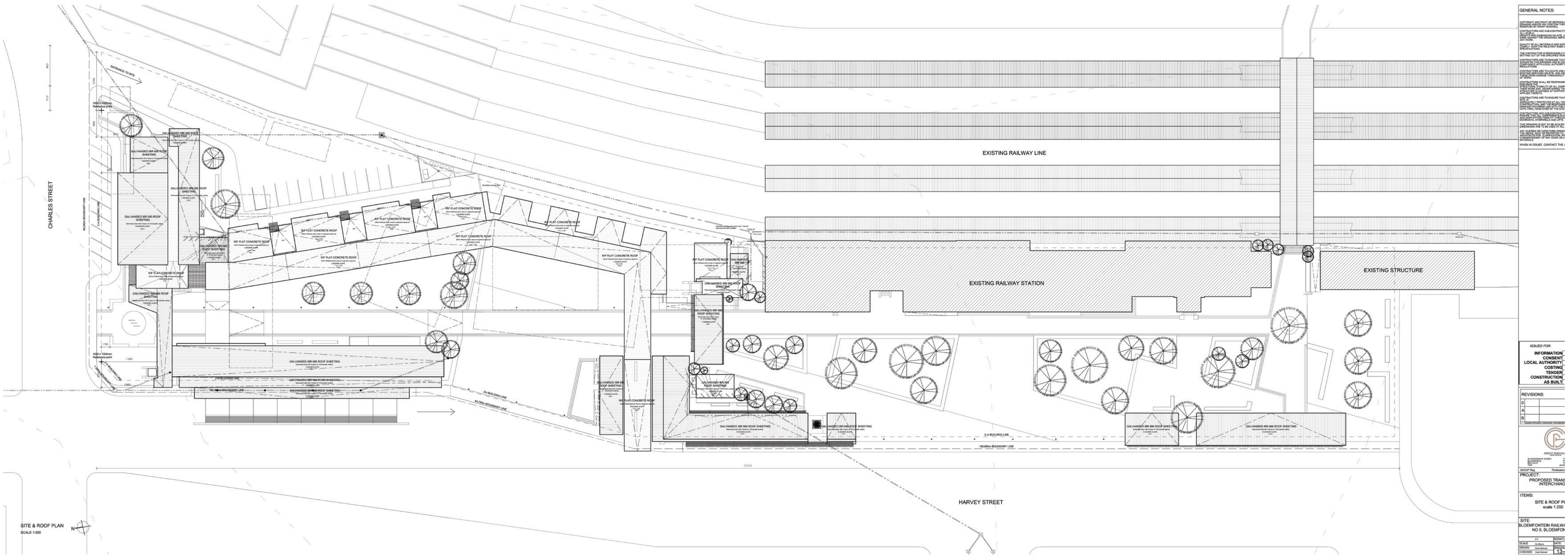
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EXISTING STRUCTURE
CHARLES STREET
HARVEY STREET
SITE & ROOF PLAN
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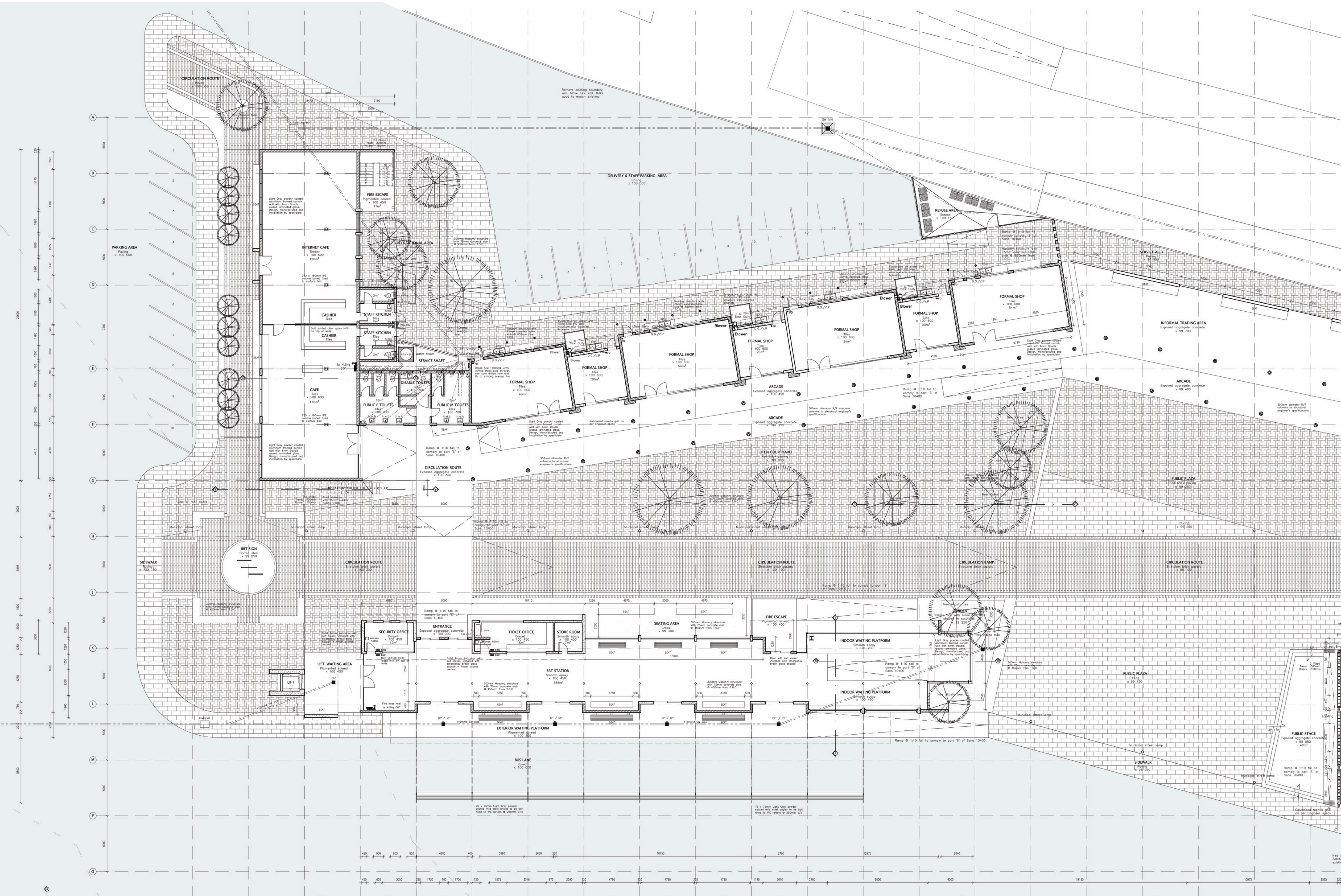

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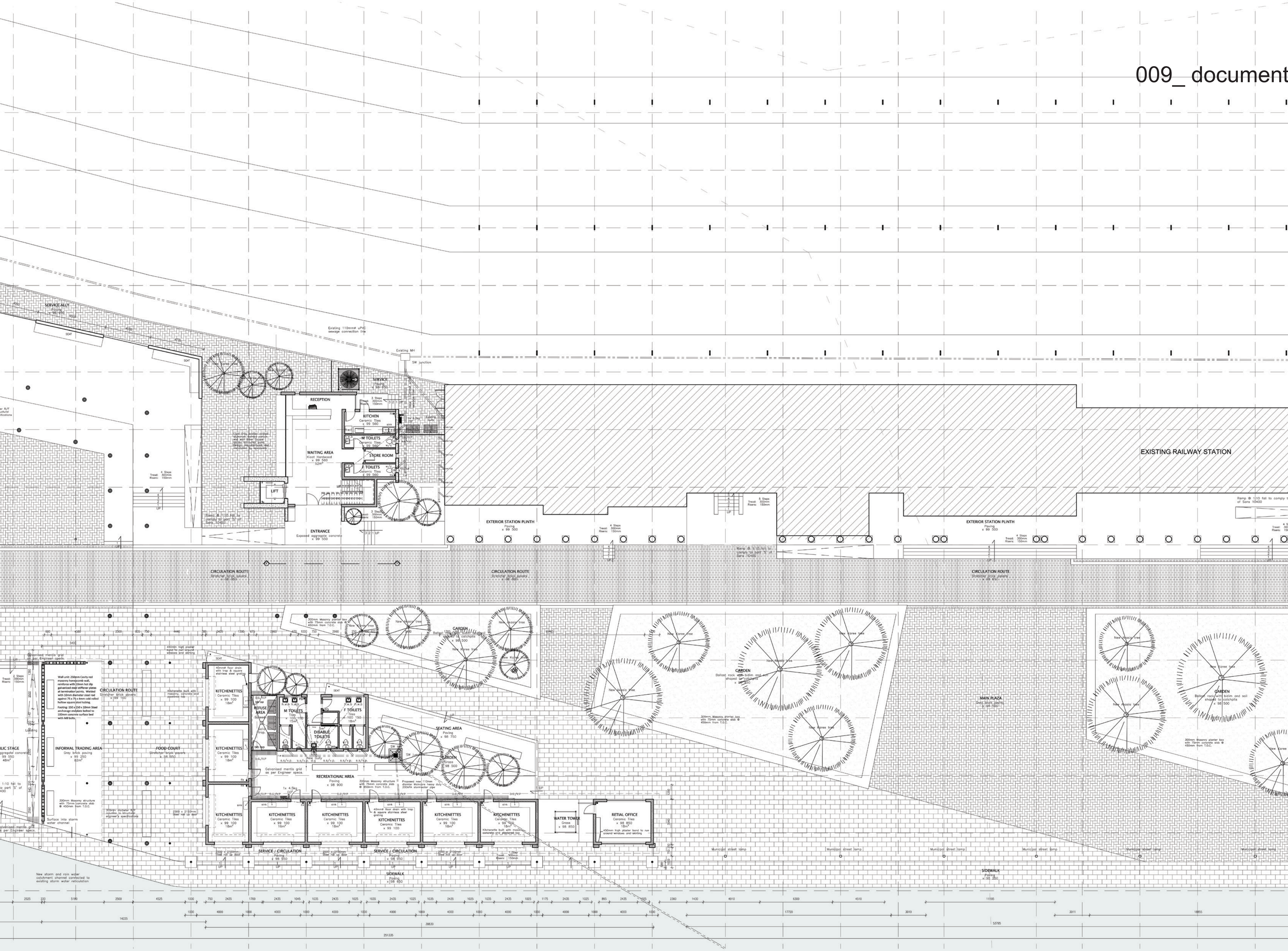

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PROJECT:
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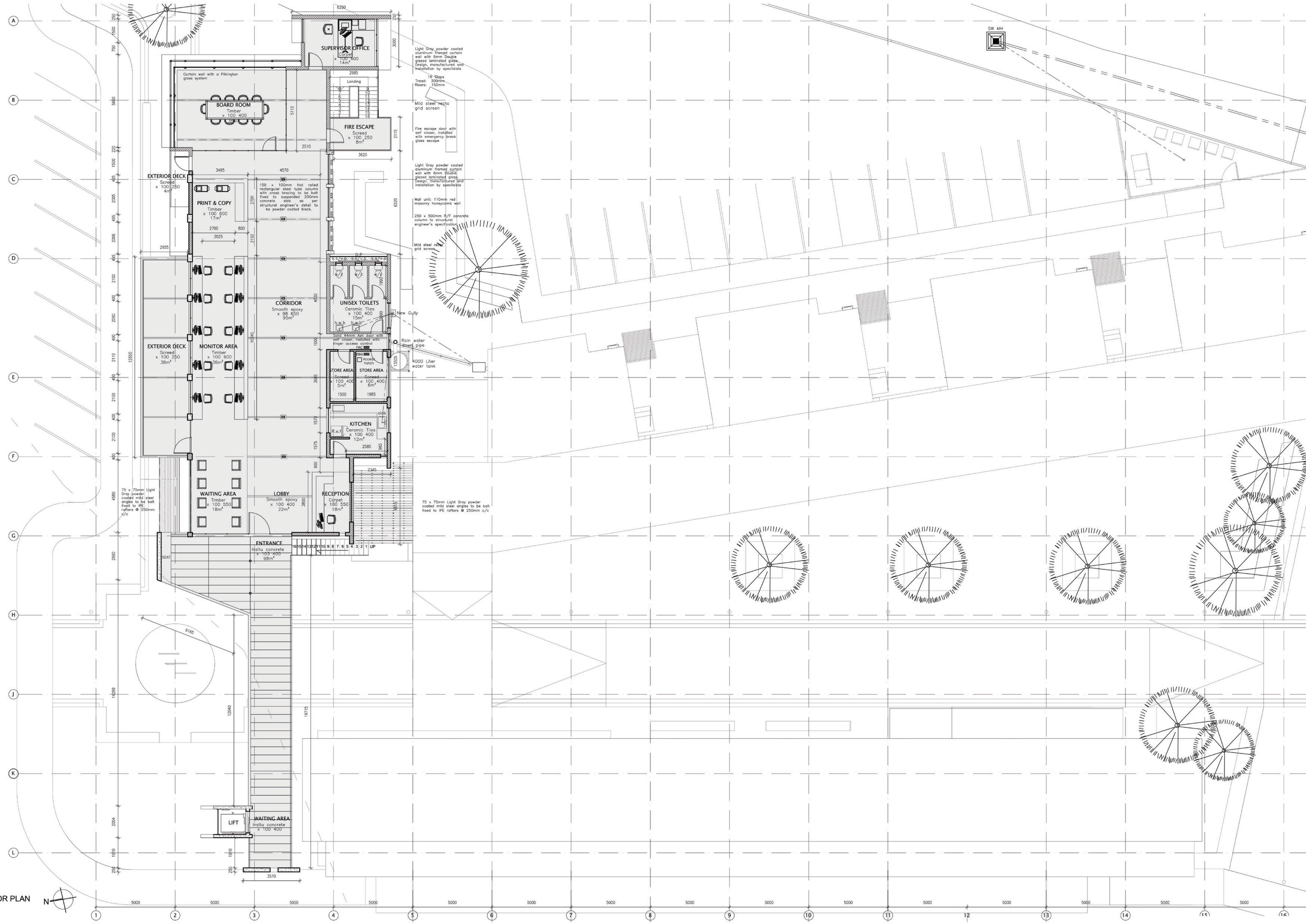

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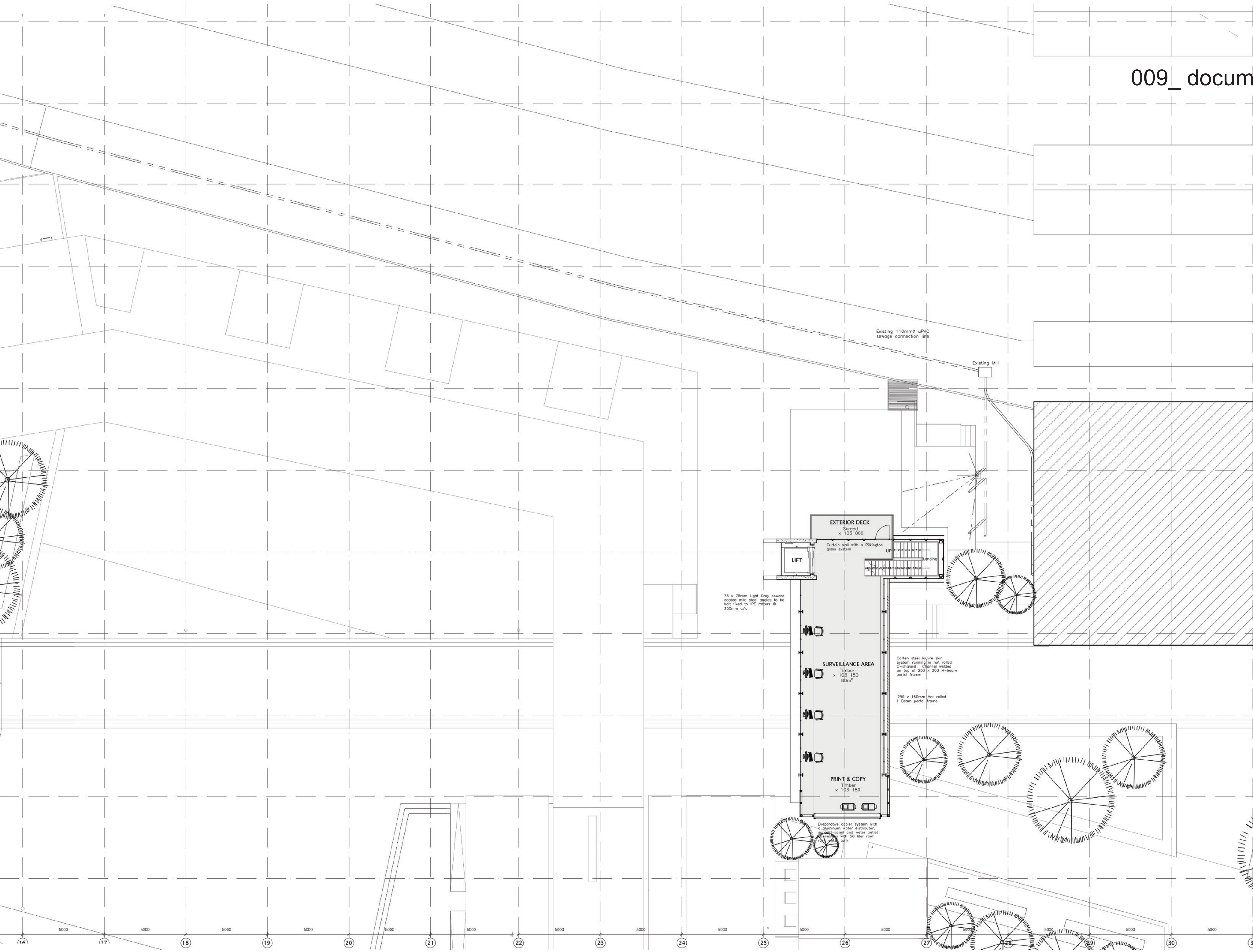

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PROJECT:
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ITEMS:
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scale 1:100

SITE:
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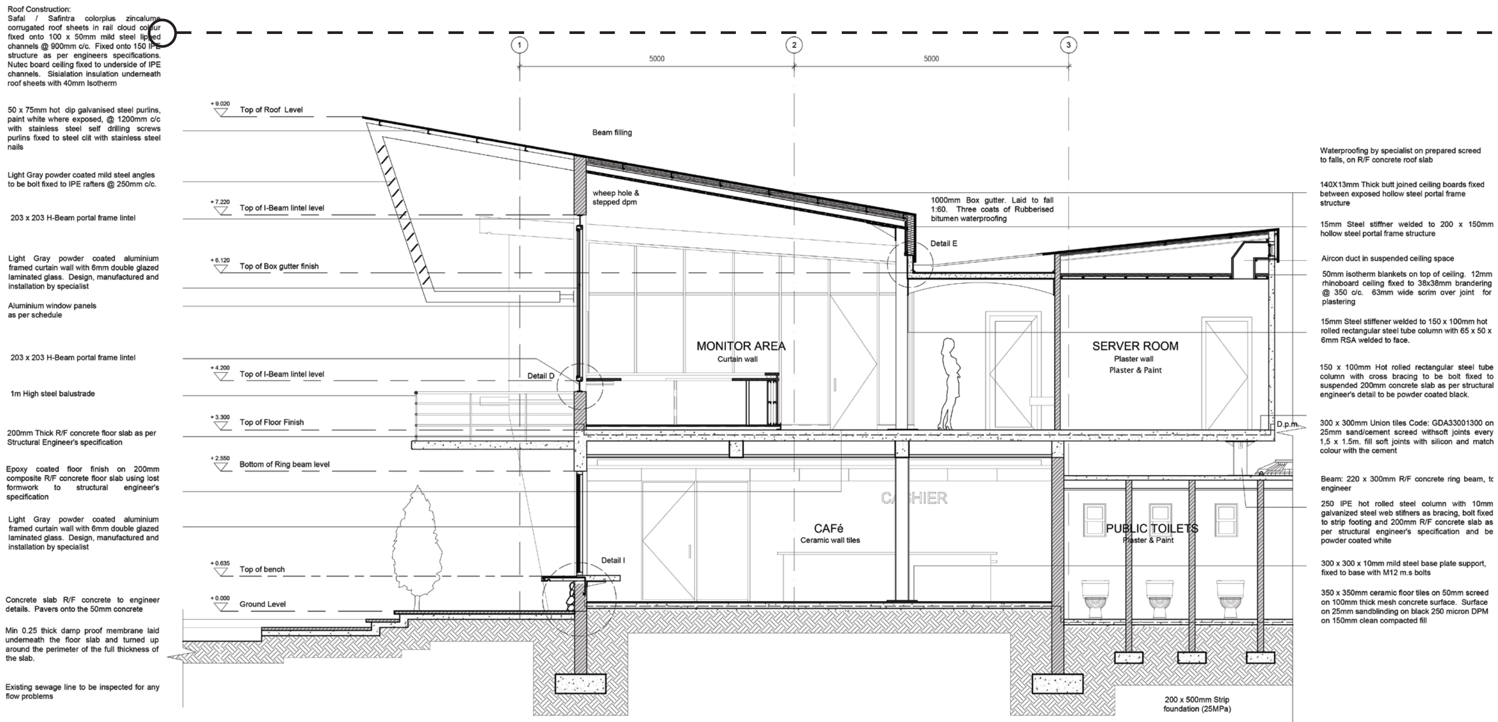

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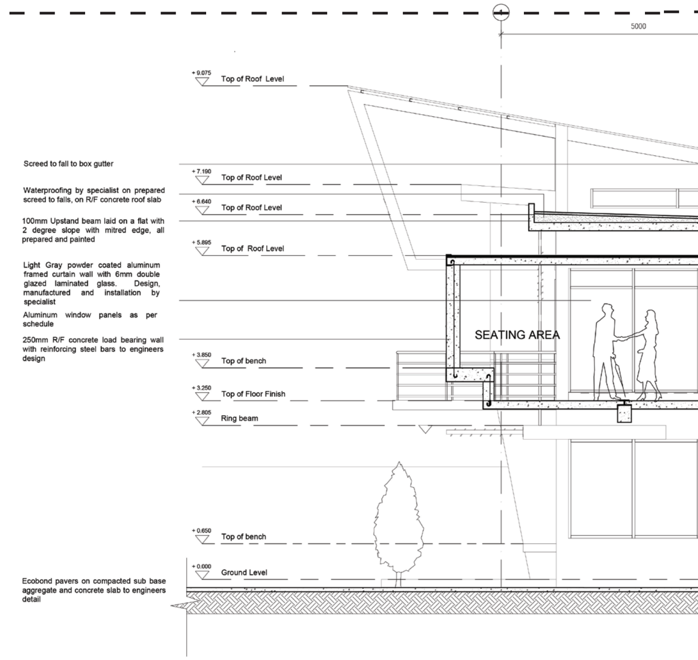

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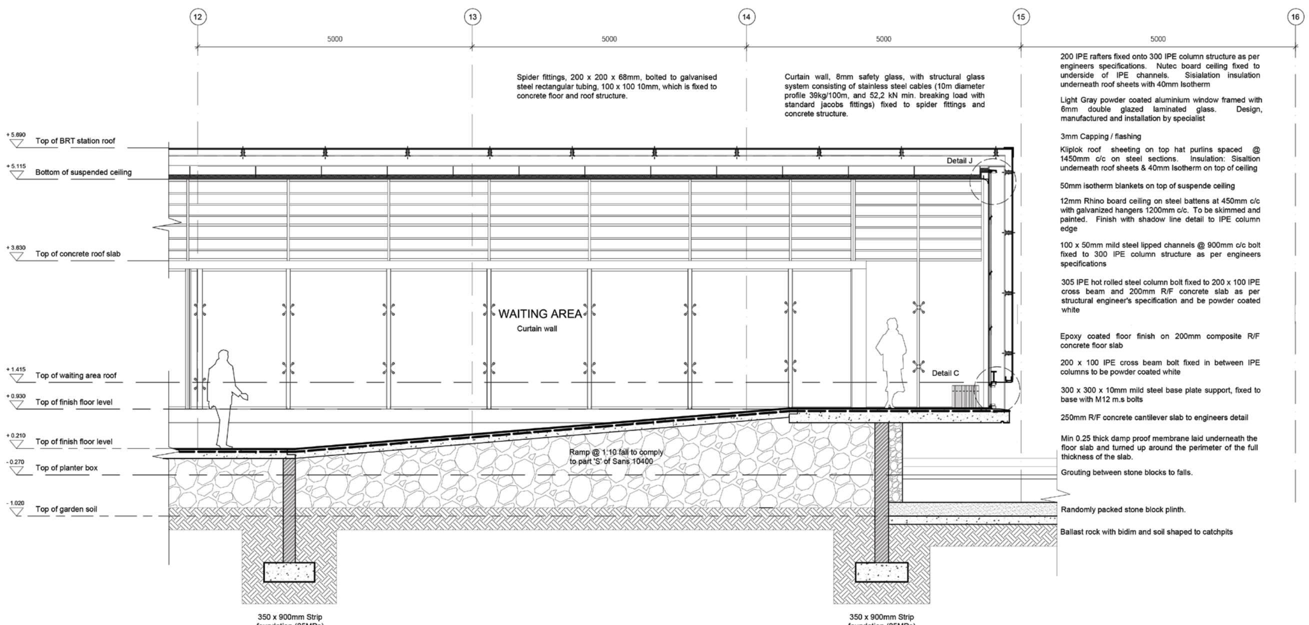

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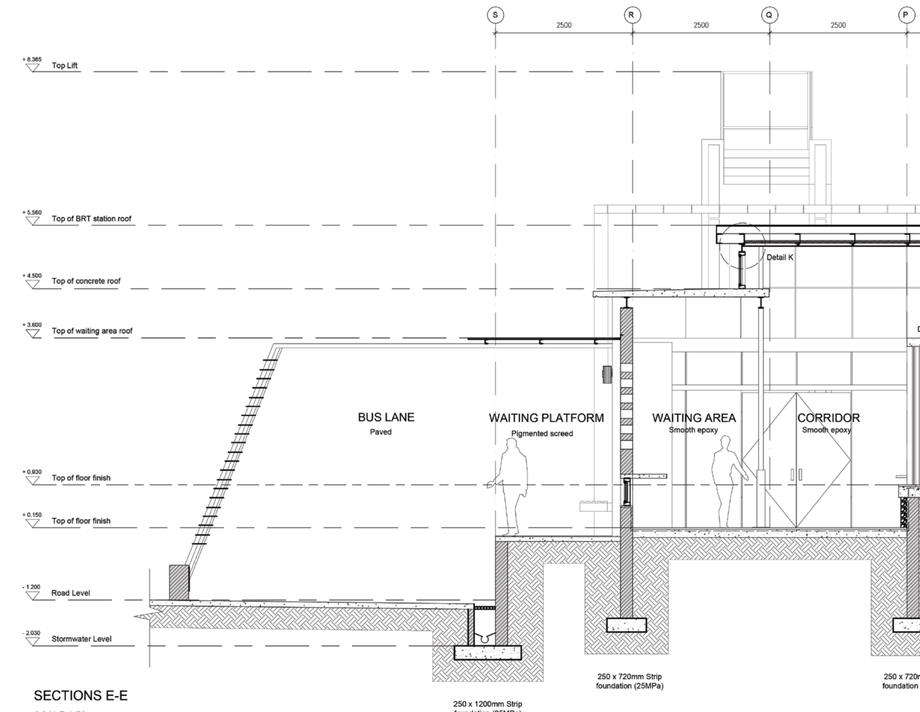

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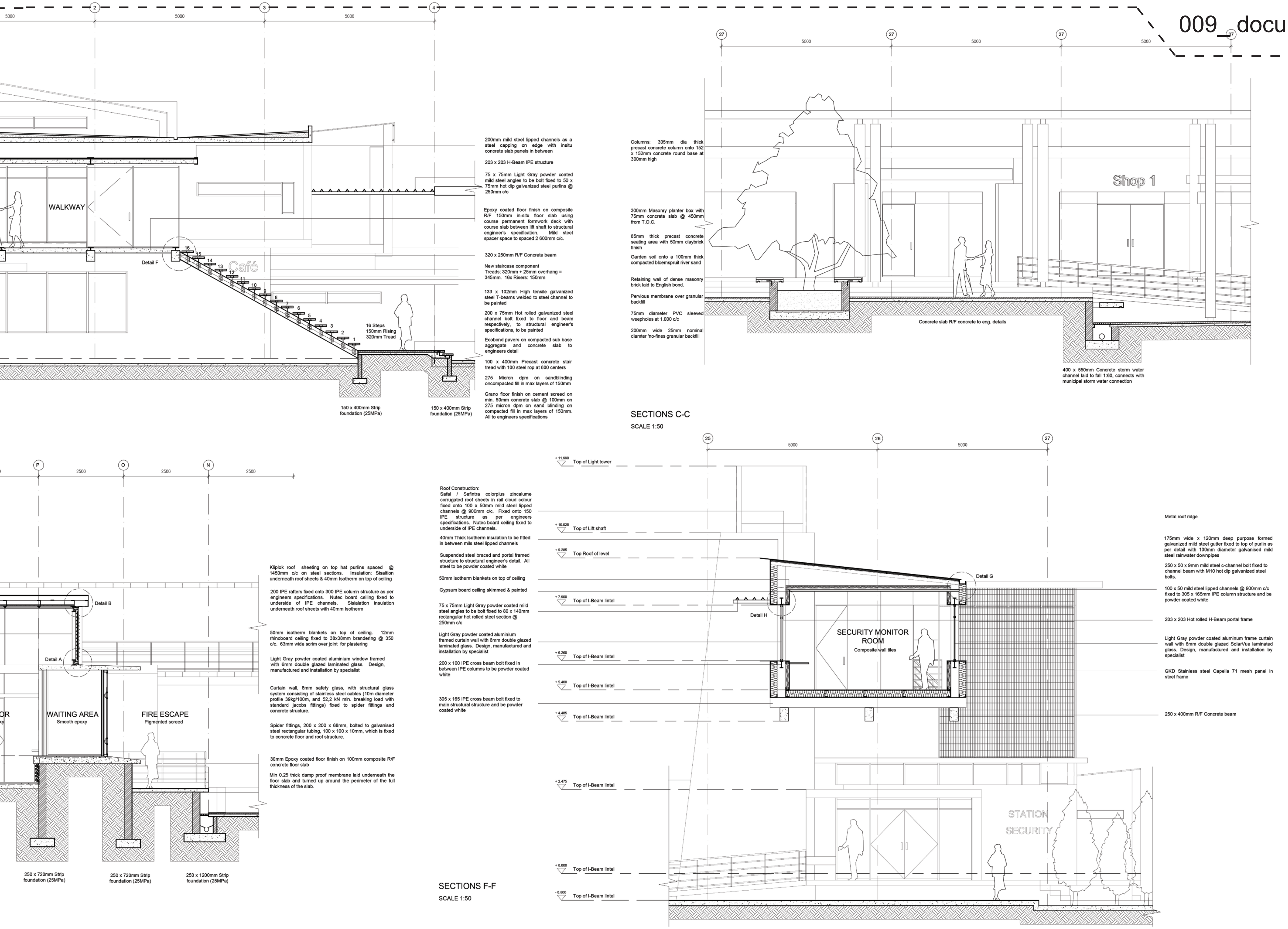

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SACAP Reg. Professional Architect #7571

PROJECT:
PROPOSED TRANSPORT INTERCHANGE

ITEMS:
SECTIONS
scale 1:50

SITE:
BLOEMFONTEIN RAILWAY STATION, NO 8, BLOEMFONTEIN

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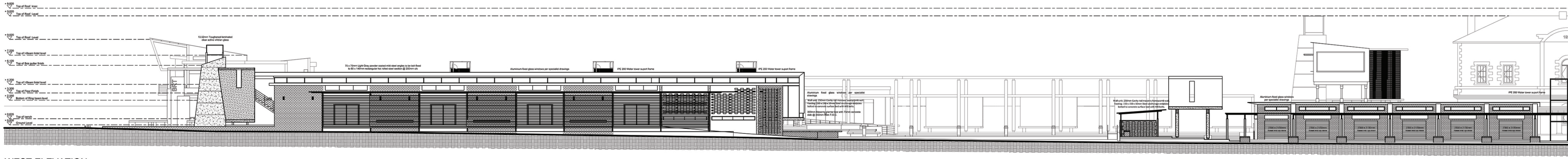

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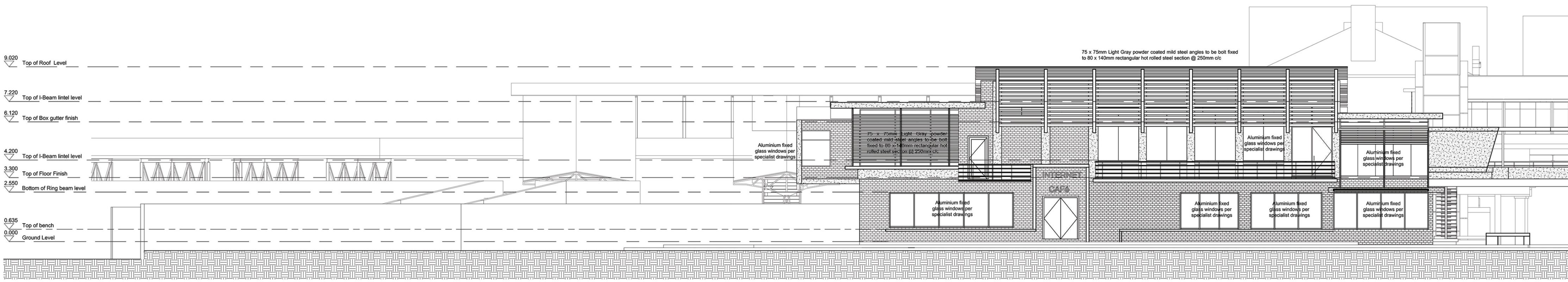

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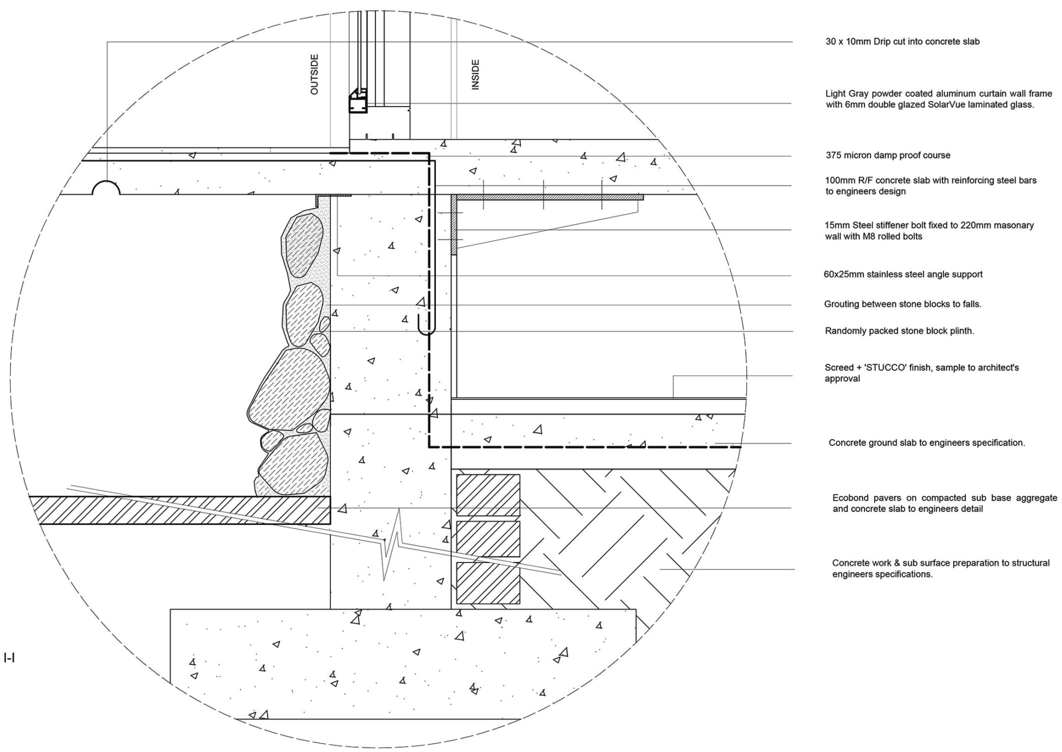

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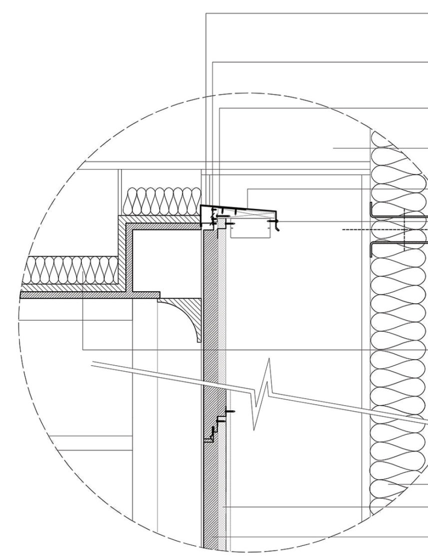

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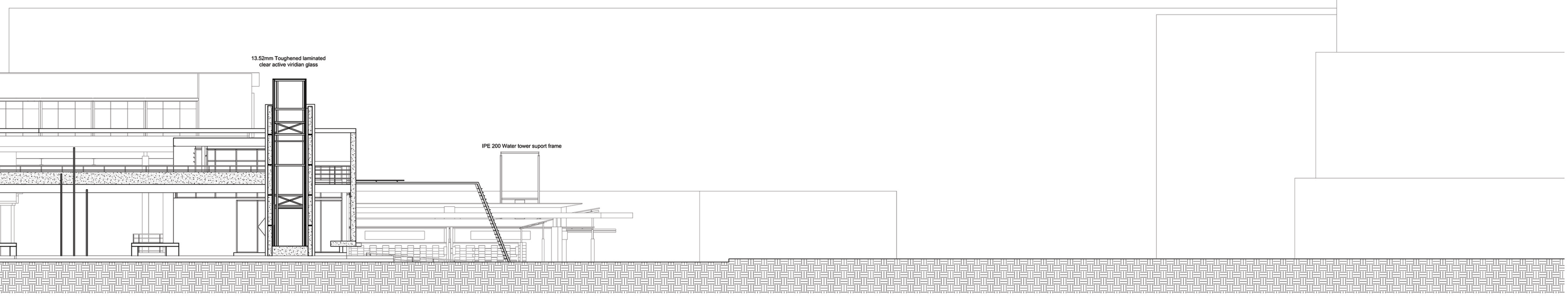

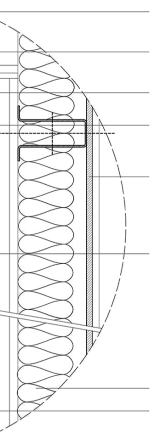

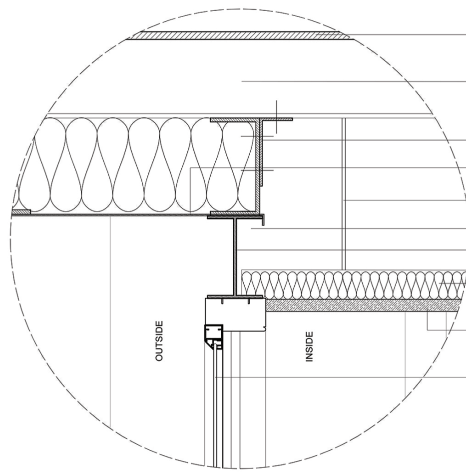

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SCALE 1:5

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PROJECT:
PROPOSED TRANSPORT INTERCHANGE

ITEMS:
ELEVATION
&
DETAILS

SITE:
BLOEMFONTEIN RAILWAY STATION, NO 8, BLOEMFONTEIN

[19]

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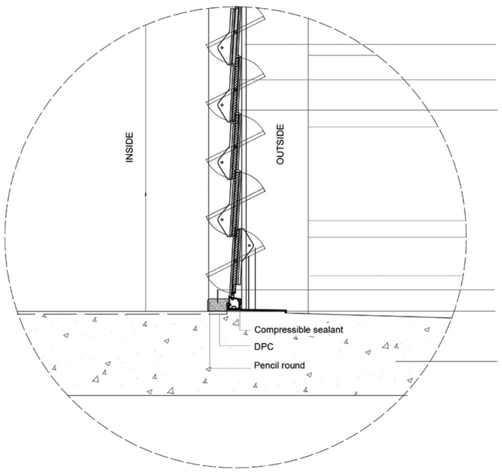

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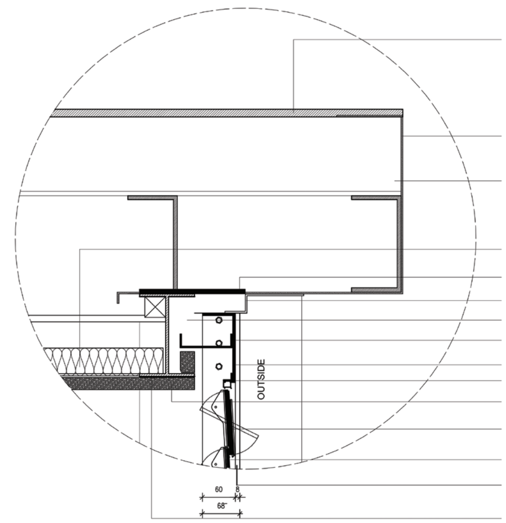

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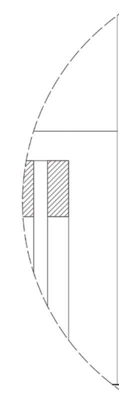

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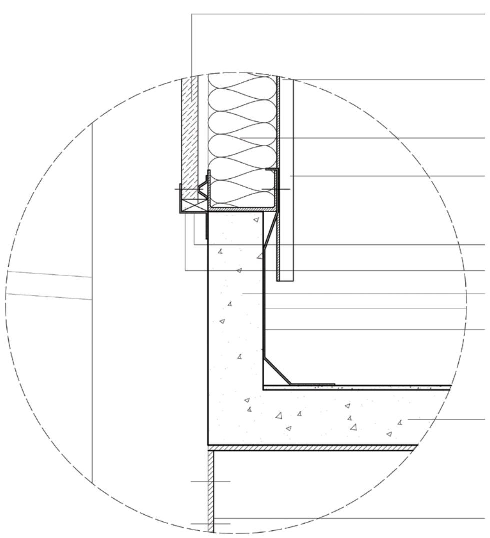

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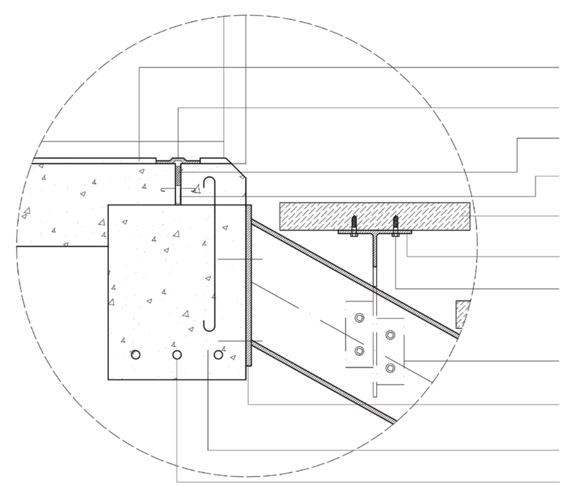

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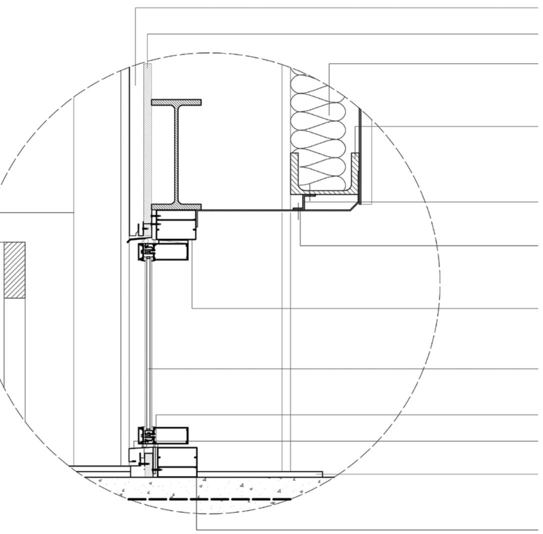
DETAIL G-
Scale 1:5

009_ documentation



Northclad aluminum panel

Insulation and WRB

Insulpro Factorylite 100mm Insulation

50 x 75mm hot dip galvanised steel purlins & 200 x 75mm C-channel, paint white where exposed, @ 2500mm c/c with welded to 300 IPE column structure as per engineers specifications with a RSA welded to face

Mild steel z-porfile bolted to Safal / Safintra colorplus zincalume corrugated roof sheets in rail cloud colour @ 2500mm and bolt fixed to 75 x 50 x 8mm mild steel purlin with RSA welded to face

2mm Flashing fixed to mild steel z-profile with metal drive pins at 450mm c/c

Aluminum window frame welded under 200 x 100 IPE cross beam bolt fixed in between IPE columns to be powder coated white. Curtain wall with a 6,7mm toughened safety glass as specified

Aluminum window system and sealant

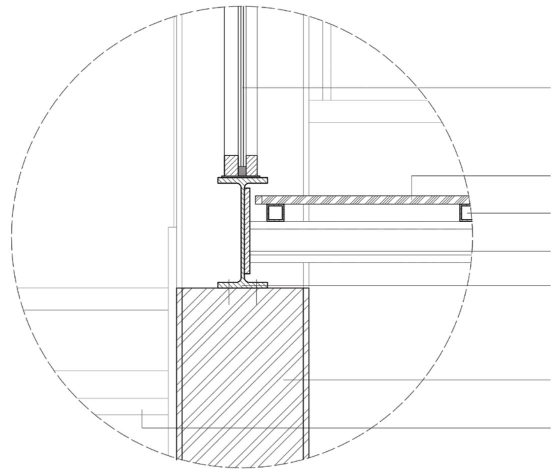
Primary & secondary seal

2mm Pre-finished aluminum flashing

300 IPE column structure fixed to 300 x 300 x 10mm mild steel base plate support, fixed to R/F 200mm floor slab with M12 m.s bolts

Light Gray powder coated aluminum frame with 6mm double glazed SolarVue laminated glass. Foil faced WRB around aluminum framed opening.

DETAIL C-C
SCALE 1:5



Aluminum window frame welded on top of 203 x 203 H-Beam portal frame. Curtain wall with a 6,7mm toughened safety glass as specified

30mm thick laminated teak hardwood table slab 800mm from finish floor level. Table depth 500mm

30 x 30 x 3mm hollow steel tubing welded to purlin, 500mm c/c

75 x 50 x 10mm hot rolled purlins welded to 10mm Galvanised steel end plate

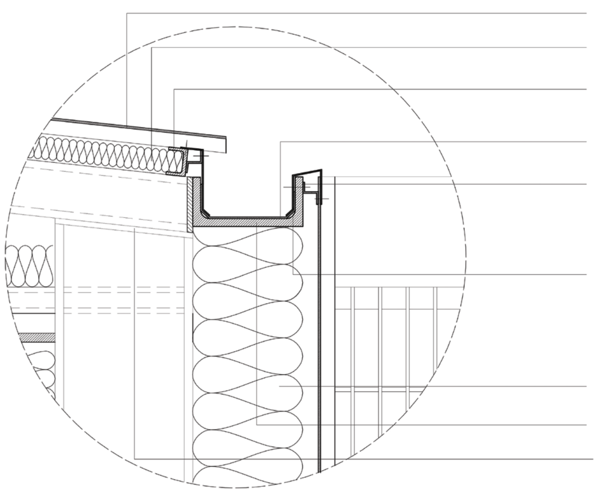
200 IPE beam filling with M10 bolts on top of 220mm masonry wall

Waterproofing

220mm Masonry wall with 10mm interior & exterior plaster finish

900mm high cicular handrail welded to 180 x 90 x 10mm parallel flange channel with a 200 x 200 x 10mm galvanised end plate

DETAIL D-D
SCALE 1:5



Klip-Lok 700 Roof sheeting fixed to 50 x 75mm purlins @ 1500mm. Purlins bolted onto a clit with M8 hot dip galvanized bolt.

Insulpro Factorylite 100mm Insulation

50 x 75mm hot dip galvanised steel purlins, paint white where exposed, @ 1200mm c/c with stainless steel self drilling screws purlins fixed to steel clit with stainless steel nails @ raised middle sections.

150 x 40 x 2,5mm galvanised mild steel gutter, on 120 dia c/c fixed onto 200mm hot rolled I-Section

Mild steel z-porfile bolted to klip-lok roof sheeting and welded to C-channel with RSA welded to face

Wrap flashing down into gutter. Removable sheet metal counter flashing

Membrane base flashing

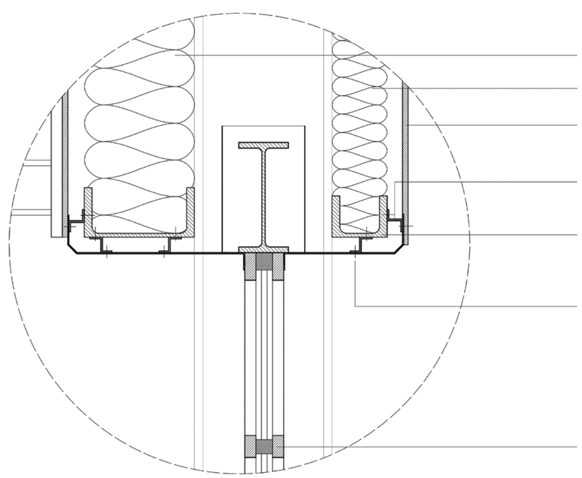
Metal drive pins at 450mm c/c

Insulpro Factorylite 150mm Insulation

50 x 75 Purlins welded onto 200 x 250 x 8mm steel hollow section portal frame with 65 x 50 x 6mm RSA welded to face

10mm endplate welded to top of IPE structure

DETAIL G-G
Scale 1:5



Insulpro Factorylite 150mm Insulation

Insulpro Factorylite 100mm Insulation

Klip-Lok 700 Roof sheeting fixed to 50 x 75mm purlins @ 1500mm. Purlins bolted onto a clit with M8 hot dip galvanized bolt.

Mild steel z-porfile bolted to klip-lok roof sheeting @ 2500mm and welded to 75 x 50 x 8mm mild steel purlin with RSA welded to face

50 x 75mm hot dip galvanised steel purlins & 200 x 75mm C-channel, paint white where exposed, @ 2500mm c/c with welded to IPE structure with a RSA welded to face

Metal drive pins at 450mm c/c

Aluminum window frame welded on top of 203 x 203mm H-Beam portal frame. Curtain wall with a 6,7mm toughened safety glass as specified

DETAIL H-H
Scale 1:5

GENERAL NOTES:

CONTRACTORS AND SUB-CONTRACTORS TO VERIFY ALL LEVELS,
HEIGHTS AND DIMENSIONS ON SITE, AND TO CHECK SAME AGAINST THE DRAWINGS, BEFORE COMMENCING ANY WORK.

QUALITY OF ALL MATERIALS AND WORKMANSHIP TO COMPLY WITH THE RELEVANT SABS AND NBR SPECIFICATIONS.

THE CONTRACTOR IS RESPONSIBLE FOR CORRECT SETTING OUT OF THE SPECIFIED WORKS.

CONTRACTORS ARE TO ENSURE THAT ALL DETAILS SHOWN ON THIS DRAWING ARE IN COMPLETE COMPLIANCE WITH LOCAL AUTHORITY BY-LAWS AND REGULATIONS.

CONTRACTORS ARE TO LOCATE AND IDENTIFY EXISTING SERVICES ON SITE, AND ARE TO PROTECT THESE FROM DAMAGE THROUGHOUT THE DURATION OF WORK.

CONTRACTORS SHALL BE RESPONSIBLE FOR ENSURING THE
STRUCTURAL STABILITY OF ALL COMPONENTS OF THEIR WORK AND ASCERTAINING THAT THE MAIN STRUCTURE IS CAPABLE OF SUPPORTING ALL LOADS APPLIED THERETO.

CONTRACTORS ARE TO ENSURE THAT THEIR WORK, ON SITE, IS
ADEQUATELY PROTECTED AT ALL TIMES, DURING CONSTRUCTION, AND THE RESPONSIBILITY FOR ANY DAMAGES INCURRED LIES WITH THE CONTRACTOR UNTIL FINAL HAND-OVER OF THE SITE.

CONTRACTORS AND SUB-CONTRACTORS ARE TO ENSURE THAT ALL COMPONENTS,GLAZING PANELS AND SHOP-FITTED ITEMS FIT THROUGH ALL DOORWAYS, STAIRWELLS AND LIFTS.

THIS DRAWING IS NOT TO BE SCALED. FIGURED DIMENSIONS ARE TO BE USED AT ALL TIMES.

ANY QUERIES OR VARIATIONS ARISING FROM ANY OF THE ABOVE, MUST BE REPORTED TO DEREK KOCK ARCHITECTS FOR CLARIFICATION, PRIOR TO THE COMMENCEMENT OF ANY WORK OR ORDERING OF MATERIALS.

WHEN IN DOUBT, CONTACT THE ARCHITECT!

ISSUED FOR:		ISSUE DATE:
INFORMATION		12 - 10 - 2014
CONSENT		
LOCAL AUTHORITY		
COSTING		
TENDER		
CONSTRUCTION		
AS BUILT		

REVISIONS:

0		
A		
B		

UNLESS OFFICIALLY VALIDATED, THIS DRAWING SHOULD NOT BE USED

GRANT BICKNELL
ARCHITECTS

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SACAP Reg. Professional Architect #7571

PROJECT:
PROPOSED TRANSPORT INTERCHANGE

ITEMS:
DETAILS
scale 1:5

SITE:
BLOEMFONTEIN RAILWAY STATION, NO 8, BLOEMFONTEIN

	411	SIGNATURE	
SCALE	As Shown	DATE:	12 - 10 - 2014
DRAWN	Grant Bicknell	DRAWING	13-418-1301
CHECKED	Grant Bicknell		