

**Design research report APG 5058S**

**Submitted in partial fulfillment of the requirements for the  
degree Master of Architecture (Professional), University  
of Cape Town**

**by Jason Stephen Venter VNTJAS001**

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**Salt River Multi Modal Transport Interchange**

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## Introduction

South African cities have unique spatial design challenges which can be attributed to our historical and politically charged urban planning practices. Our cities are characterised by modernist town planning principles which have fragmented communities through spatial barriers such as highways, train lines and fences while current development perpetuates urban sprawl. Due to these circumstances many contemporary urban design policies promote densification strategies through transit orientated approaches.

In my thesis project, I propose to redesign Salt River Train Station into a multi modal transport interchange. I argue that this multimodal interchange can have an urban developmental and regenerative effect that can address some of the challenges faced in our urban landscape. This design report will attempt to document the processes and explorative methods that I have incorporated during this design process.

In section A, I will give an overview of the issues regarding transportation and land-use in South Africa - and Cape Town in particular- and summarize theories that attempt to address these issues. In addition, I will also give an overview of key areas of research that were relevant and informative to the project. I will then briefly discuss theories that have guided me during the design process. The focus falls particularly on Heidegger and his theories of dwelling - which I believe is fundamental to the architectural project - followed by the mapping theories of James Corner as a design tool. The document will also summarize the technical studies that acted as a precedent for the making process and materiality.

In section B I will focus on the exploration of design ideas. Here I will document the processes and methods that were used to design the overall project. I will attempt to show how I have used and merged the theories and information researched to manifest in the building concept. The main focus of this part of the document will be the visual and descriptive documentation of the conceptual development and exploration of the project through mapping, drawing, model building and 3D computer processes. Plans and sections will show a more detailed representation of the building design process but should not be seen as conclusive drawings. This will be included in the Appendices at the end of the document.

## Section A

### The current transportation debate in South African Cities

Urban sprawl has become a major spatial development characteristic of South African cities. The effects of poorly integrated transport and land use planning are highly evident in the low population densities that are common in our cities, and the long distances that people are often forced to travel as a result. This situation is socially, environmentally and economically unsustainable. The majority of the population is forced to live in segregated, isolated and hostile townships, separated from each other by freeways and buffer zones. This has created a vastly inequitable and inefficient city in which the poor are marginalized from urban opportunities (Pistorious, 2002). According to Beukes and Vanderschuren (2009), the problems are further compounded by historically poor investment in public transport infrastructure, especially in poor neighbourhoods. The net result is that it is often the poorest people in urban centres who spend the largest percentage of their disposable incomes on transport costs.

#### How can some of these spatial issues be addressed? Laying down the principles

Efforts are increasingly being made to enhance the role of transport in order to improve the social and economic conditions of South Africa. This is evident in the preparation of documents such as the Integrated Transport Plans and Spatial Development Frameworks which are intended to encourage the transformation process. Williams (2009) explains that "South Africa's changing context is driven mainly by political imperatives for transforming the built environment to improve social equity and economic inclusion, overcoming the separation of home and work with more effective transportation, reducing transport costs for users while improving financial viability of public transport services."

Williams (2009) argues that a few key responses and principles are needed to implement changes, in particular: The treatment of transport nodes, or interchange hubs and their surrounding precincts, which is critical to the success of the system as a whole. Safe, convenient access to the transport system depends on good urban design, and a more considered approach will serve multiple policy sectors, such as health, education and labour. A key challenge is defining project briefs that are broad enough to allow for effective interventions.

Beukes and Vanderschuren (2009) also argue that the guiding literature for transportation planning in South Africa emphasizes the importance of encouraging a multimodal transportation environment that addresses the economic inequities in our towns and cities, that protects the environment from the effects of transportation, and that stimulates the development of a healthy social realm. In addition, the inseparable relationship between transportation and land use is emphasized and planners are encouraged to view land use and transportation as being almost two sides of the same coin. Land use and transportation are therefore intrinsically linked, as changes in land use often initiate changes in trip making patterns, and vice versa. Many factors contribute to economic and social progress, but multi-modal mobility is especially important because the ingredients of satisfactory life, from food and health to education and employment, are generally available only if there is adequate means of moving people, goods and ideas. (Owen, 1987) Dewar and Uytendogaardt, (1991) argue in favour of the creation of a compact, intensive and convenient city which operates as an integrated system, which works well at the level of the lowest common denominator (people on

foot), which makes maximum use of limited resources and which is respectful of its beautiful natural setting.

### **Cape Town Transport system characteristics**

According to the Integrated Transport Plan (ITP 2006) Cape Town has a relatively extensive but poorly integrated public transport system, the backbone of which is its rail system, which is depicted in image 1. Providing transport across the greater part of the metropolitan area is the bus service operated by Golden Arrow Bus Services under contract to the Provincial Government of the Western Cape. Service frequencies are very low on many routes and night services are extremely limited. Both rail and bus services are subsidised. Unsubsidised services are provided by minibus taxis, which operate over most of the metropolitan area, providing greater penetration than other modes, especially in low income, high-density residential areas. The City also has an active metered taxi component, one that has recently seen some growth in demand through the introduction of shared metered taxi services. Finally, these services are backed up by more tourist oriented bus services, such as the City Hopper, which operates on key scenic routes around the City. In support of tourist activities, additional train services are operated during holiday service that caters for registered special needs users.

The Cape Town Spatial Development framework (SDF) sets out the following objectives in order to promote a more sustainable Cape Town with an effective urban form and urban and regional planning for the city:

- Promote integration between areas to improve access, and increase the economic potential of marginalised areas.
- Improve the accessibility and efficiency of the city's resources and opportunities for all communities through appropriate investment in transport infrastructure
- Protect, manage and enhance valuable natural resources
- Focus on improving the quality of the public environment in degraded areas
- Promote all new settlement areas as mixed-use, mixed-income, sustainable developments supported by public transport.

In addition, the City of Cape Town Integrated Transport Plan sets out the following objectives:

- A more compact city in which land use and transport effectively supports sustainability. Priority is given to supporting infill rather than dispersed developments and densification is encouraged where population thresholds are required along public transport priority corridors.
- A good quality transport system that provides for basic mobility for the economically disadvantaged but also provides a competitive alternative to the private vehicle with reference to convenience, comfort, network coverage and accessibility.
- A well functioning integrated transport system that supports a growing economy. This system must ensure coordination across the various modes to maximize service coverage and promote comfortable transfers between them. This may be conceptualised as a "complete" transport system.
- A transport system that reflects environmental sensitivities and is sustainable for future generations whilst incorporating applicable technologies and innovations to achieve its goals
- A transport system that discourages unsustainable transport modes such as the single occupancy vehicle and prioritises public transport and non-motorised transport.



Image 1: Cape Town rail network. (<http://www.capemetrorail.co.za/>)

## Design intention

My intention for this project is to design a multi modal transport interchange in Cape Town that can fully address the issues of transportation and land use as discussed above. The emphasis is to design a transportation hub that becomes a main destination and a landmark in the city. The project will be in line with the principles laid out by the MSDF and ITF to encourage residential areas closer to work opportunities, mixed use development, more efficient and cheaper transportation that is better integrated, and the utilisation of existing resources and infrastructure. The interchange will promote vibrancy, is easily accessible and will be safe to use. On its turn, this multi modal interchange can lead to the development of adjacent land in a manner that promotes the maximum and efficient use of the public facility while contributing to much needed urban regeneration.

The intermodal concept defines the transportation facility of the 21st century. The idea can be described in several ways. It could refer to the interaction between people, services, and different modes of transportation. It is also clearly described by Muller (1999) as "the concept of transporting passengers and freight on two or more different modes in such a way that all parts of the transportation process, including the exchange of information, are efficiently connected and coordinated." The mix of transportation facilities can thus meet the diverse needs of a community or population. As a consequence, they will form an integral part of the urban setting.

Hopkinson and Parkinson (1995) defined the intermodal transportation centre as a structure combining various technologies of transportation such as regional trains, light rails, bus lines etc. Moreover many transit planners believe that such centres serve more than just transportation. They include well-designed buildings providing various kinds of integrated services, such as restaurants, newsstands, small shops, and travel information systems. In parallel, the development of the intermodal concept typically pays much attention to utilizing existing infrastructures, for instance, old railway stations or bus terminals which are normally located in central cities. Thus the use of a centrally located station or terminal supports the view that an intermodal transportation centre not only forms an integral part of the urban scene, but has the potential to become a major destination in the city.

## Site establishment and research

From the outset, Salt River train station captured my attention. The station is closely located to Cape Town CBD. When viewed from an aerial perspective, it is apparent that the station forms an important strategic junction within the city. It is located at the point where transportation modes (including car and rail) from the outer city in all directions come together and flow into the CBD and vice versa. Historically, it was also the point where Voortrekker road – one of the first economic arterials and the first road leading towards the Northern suburbs - entered the city. The station forms part of Salt River residential area towards the south, joins with the Culembourg industrial zone towards the harbour to the North and links with more industrial zones towards the east off Voortrekker road.



Image 2: Map indicating Salt River Station Location within larger Cape Town area

It also came under my attention that the station was located adjacent to a large rolling stock yard that took up a large amount of valuable land closely located to the CBD. The site is primarily used as a rolling stock maintenance and repairs facility.



Image 3: Map indicating Salt River Station Location and adjacent Rolling Stock yard

Viewed from a closer perspective, the station almost appears 'hidden' behind a cross-over vehicular bridge that marks the beginning of Voortrekker road where it eventually meets with Salt River circle. London Road and Foundry road currently gives access to the station off Albert Road. On the opposite end the station is further locked in and 'hidden' behind a combination of abandoned retail premises, vacant land – or 'dead spaces' - and dilapidated Victorian row housing complexes off London Road. Industrial buildings surround the larger area towards Voortrekker road and in the direction of Mowbray.



Image 4: Map indicating Salt River Station Location and immediate context

Minibus taxi services currently drop off and collect passengers in front of the station entrance while passengers have to walk approximately 300 meters towards Albert Road in order to connect with Golden Arrow bus services. A bus drop off and collect station does currently exist on the Voortrekker bridge on the opposite end. No clear pedestrian friendly walkways or demarcated areas currently exist, with the result that pedestrians walk along motorways toward their destinations. Due to the dilapidated and unfriendly pedestrian nature of the areas

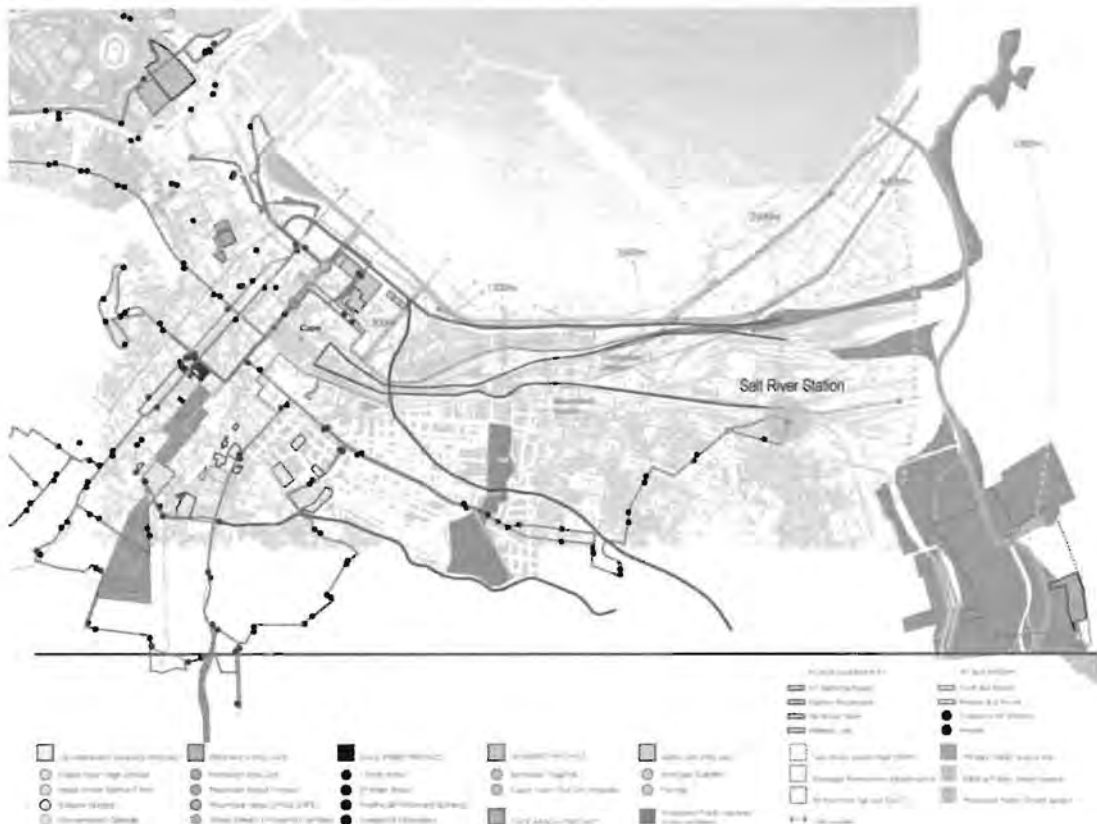
surrounding the station, regular muggings currently occur, rendering the area unsafe and unpleasant as a destination.

The adjacent rolling stock yard towards the east sits locked between the Northern/Monte vista line and the Voortrekker industrial area to the north, Salt River Industrial area to the South and the Black River greenery towards the south east and east. The site has large amounts of under utilized and vacant land that offers the potential for a high to medium density development. The periphery of the site including the river currently remains un-maintained. In addition, the green open land around the river towards Mowbray offers great recreational opportunities for park land that could potentially create a green belt and river promenade next to the Black River that could join with the Two Oceans Park in Mowbray/Observatory.

### **General Research**

The rail network of the City of Cape Town is shown in *Image 1* which also shows the commuter stations. All the commuter lines are electrified with an overhead catenary system (3KV DC Power). The track infrastructure of the Cape metropolitan railway system comprises 581km of Cape Gauge track (1 065mm) with 631 line turnouts, 521 yard turnouts and 121 yard track-kms. Most of the main line network is equipped with concrete sleepers. Most of the network is double-tracked (up and down lines) but single track sections extend from Fish Hoek to Simon's Town, from Eersterivier to Strand and Muldersvlei via Stellenbosch, and on the Atlantis line from Chempet Station. The railway signal system comprises of 1 473 signals with a mix of technologies in place. Approximately 80% of the network is equipped with centralised traffic control (CTC), featuring automatic train routing, bi-directional signalling and electronic train registering. There are a total of 42 signal interlockings, including several junctions where branch lines merge. Signal blocks are approximately 1km in length, permitting a nominal headway of three minutes on most of the mainline tracks close to Cape Town.(reference)

Upon further investigation it came to light that Salt River station is earmarked in future to be integrated into the feeder bus services connecting it to the city bowl. The area around the station also forms part of the N1 corridor that has been recommended for future high density development and that will consequently form part, support and make the City of Cape Town's integrated transportation plan more viable. (Cape Town Spatial Development Plan). According to the City of Cape Town Integrated Transport Plan, approximately 58 000 passengers currently use the station's facilities - including line cross-over - while approximately 23 000 passengers board at the station on a daily basis. This makes it one of the busiest and strategically important located stations on the metro line.



PROVINCIAL PROPERTY HOLDINGS Draft document for consultation purposes only prepared May 2010 | 10  
**Image 5: Map indicating City of Cape Town future integrated transport plan ([www.capetown.gov.za](http://www.capetown.gov.za))**



**Image 6: Map indicating peak hour passenger usage (includes bus and feeder taxis passengers) (ITP). From this map it is evident to notice the strategic importance of Salt River Station especially as a junction within the Cape Town Metro pole.**

## **Summary: Proposal and motivation for architectural intervention**

Salt River train station is one of the busiest and oldest train stations on the Cape Town Metro line. Approximately 58000 commuters currently pass through the station and use its facilities on a daily basis. It is one of the main cross-over stations which allow passengers to switch between the different lines en-route to their destinations. The station is also centrally located and it is where the different metro lines split towards the Northern and Southern suburbs of Cape Town. It therefore also acts as the junction or 'pivot point' in the city where these different lines meet en-route towards the Cape Town CBD. The station is earmarked to connect with city feeder buses in the near future while some of the vacant land surrounding the station has been identified for density development.

The area surrounding Salt River train station including Salt River and the industrial area on Voortrekker road is currently in a state of urban decay. The station is in need of infrastructural upgrading as no money has been spent for upgrading purposes - including the surrounding urban area - for many years.

As Bierman (2009) argue, land use and transportation are intrinsically linked. For the purposes of this project, I would therefore like to propose to redesign Salt River train station into a multi-modal transportation interchange. The station has the potential to be turned into a major 'destination' and transport interchange where passengers board and pass through to cross from one transport mode to another en-route to their destinations within the Cape Town metro-pole.

I argue that this multimodal interchange can have an urban developmental and regenerative effect on its surrounding areas. Good architectural and urban design can lead to much needed regeneration occurring within the immediate Salt River area. I would also like to argue that with effective spatial planning and application of good, integrated urban principles, infrastructural and urban links can be formed with the site (the rolling stock yard) that can have great potential for further urban development purposes. The rolling stock site offers great opportunities for potential mixed used and densification developments including office, retail, recreational, housing and other facilities. Due to its central nature and close proximity to the Cape Town CBD, the scheme intends to address some of the spatial challenges faced by the Cape Town urban landscape such as densification, sustainability and social integration. The redesign of Salt River Station therefore represents a unique opportunity for building communities through transportation while reinforcing and creating public spaces and corridors for development.

## Programme

- **Train station** - A major junction in the city between all existing lines including northern suburbs, southern suburbs and cape flats lines.
- **Tram station** - (mono rail) as part of train station extension. It will act as a major link between the new urban density development and Salt River station to enable easy access to the CBD. This will be a free subsidised service that promotes the use of public transport while connecting with bicycle and foot networks.
- **Bus interchange** - A major connection point where city bus services link with rail network. Bus services will include Golden Arrow, as well as newly introduced 'feeder' bus services. It will also act as a station for private long hall bus services for example Grey-Hound etc.
- **Taxi rank** - The taxi rank links up efficiently with all other modes of transport.
- **Mixed use development** - The station development will include the relocation of metro rail administration office facilities from its location at the rolling stock yard to the new premise at the station. There will also be retail facilities. Recreational facilities will include retail facilities and a public park to fulfil the needs of commuters and local residents alike.
- **Bicycle port and car park-and ride** facilities.
- **Urban public space** or 'square' to form part of overall scheme that is pedestrian friendly and that connect to other pedestrian and bicycle walkways.
- **Medium density apartment** accommodation as part of the station development scheme. This will enable residents to live near a prominent transport interchange close to the CBD. (This will form part of phase 2 of the overall scheme)

Henceforth, 'the site' will refer to the grey demarcated area in *Image 7* which is the portion of land where the train station is located and where the actual architectural intervention will take place.

The 'rolling stock site' will refer to the larger site demarcated in yellow in *Image 7* which can be used for future mixed use development as a result of the architectural intervention.

The 'overall site' will refer to both as a whole.

PROPOSED SITE MAP : SCALE : NTS

N



Image 7: Maps indicating site locations and proposals

## Architectural theory, site making and design approaches

In the following section I will summarize key architectural theories and design approaches that influenced and guided my thinking during the overall design process.

### Design theories: Dwelling as described by Heidegger

I attempted to use the theories on dwelling as explained by Heidegger as a theoretical guideline during the site exploration and early design process. This was undertaken in an effort to grapple with the social complexities that accompany the design of contemporary urban space. Heidegger (1971) argues that "the real plight of dwelling lies in this; that mortals ever search anew for the essence of dwelling, that they *"must ever learn to dwell"*. He explains that the sense of the unfamiliar, of homelessness and uprootedness, that pervades modern man is due precisely to the fact that man no longer dwells in the full sense of the word. The problem with dwelling in the aftermath of modernism therefore lies in the fact that it is currently experienced and perceived as "an activity that man performs alongside many other activities," rather than a fundamental trait of human existence. Heidegger argues that man dwells in 'places', not in abstract 'space'. He also suggested that dwelling is connected with every act of construction, every act of building. He thus placed dwelling at the heart of the debate on the built environment. Dwelling is "The gathering of the fourfold – earth, sky, mortals and divinities which form the world of human beings" (Heidegger, 1971) Heidegger approaches the making of things, especially the erection of buildings, from two standpoints: that of art and that of dwelling. Whereas dwelling is associated with gathering the fourfold, art is all about drawing things out of the 'state of concealment' and at the same time sheltering them; it is about letting each thing "stand in the light of its being"

These two parameters of human existence, dwelling and "the setting itself to work of the truth of beings" are mutually complementary. By dwelling and making art, the world of man comes into existence and human beings are substantiated as human beings. One can interpret Heidegger's argument in architectural terms as saying that the 'act of building' – as an act of making (art) -must be approached in such a manner as to make dwelling possible.



Image 8: Claude Monet, *Bridge over a pool of waterlilies*, 1899. Oil on Canvas.  
The bridge gathers the Fourfold .A 'place' comes into existence only because of the bridge and allows a site for the fourfold.

## Mapping as tool to unfold the 'intangible' landscape through emotive processes

"Mapping is a fantastic cultural project, creating and building the world as much as measuring and describing it" (Corner, 1999). I propose that creative mapping techniques and collage processes can be used as a tool in order to explore and unfold the various layers of meaning as well as to create and explore new possible meanings in our urban landscape.

In his article 'The agency of mapping: Speculation, Critique and Invention' James corner (1999) argues that current techniques have neglected to embrace the contingency, improvisation, inaccuracies and the uncertainty that inevitably circulate in the urban condition. He argues that from a general standpoint, mapping is a cultural activity that reunites important aspects of perception and cognition.

It thus functions as an instrument for the visualization of different needs, for the understanding of spatial phenomena, for the storage of information, as a research tool by which we can comprehend relationships and distribution patterns, and so forth. Furthermore, he describes mapping as a collective enabling enterprise, a project that both reveals and realizes hidden potential. However, one of the problems that Corner identifies in his article is related precisely to the fact that we view maps more in terms of what they represent, and less in what they do; his critique is that maps are regarded as mere 'mirrors of reality' or depictions, as instruments of measurement and empirical description.

"Space is subjectively constituted, which makes the map more of a project than of an empirical description". (Corner, 1999) In Corner's sense, maps therefore have very little to do with representation as depiction. More specifically, Corner refers to the activity of mapping – mapping in its active sense –, as 'creative practice' and as 'a collective enabling project' with productive, liberating capacities. In this understanding, maps are thus "not retrospective or representational tools exclusively; their power lies in their capacity of simultaneously concealing and revealing potential, allowing us to discern what *is* from what is not, and to envision what is not *yet* and which to my mind can directly be associated with Heidegger's approach of "the making of things as a process of drawing out of a state of concealment and also hiding it".

"As a creative practice, mapping precipitates its most productive effects through a finding that is also a founding; its agency lies in neither reproduction nor imposition but rather in uncovering realities previously unseen or unimagined, even across seemingly exhausted grounds. Thus, mapping unfolds potential; it remakes territory over and over again, each time with new and diverse consequences". (Corner, 1999) In other words, one of the most important characteristics of this 'reformulation' is that it includes conceptual issues, setting the factors from which eidetic and physical worlds may emerge. Landscape or space is not something given or external to our apprehension; it is constituted or formed through our participation with things, material objects, images, values, cultural cods, cognition and events which enforces a sense of dwelling.

Hence, in describing the 'agency' of mapping, I work from the standpoint that mappings can allow spatial designers to discover a sensibility and (cultural) dynamic from a place that allows it to have meaning and that can make it form part of a greater system of (cultural) meaning. Every site has a potential. Its meaning/significance can either be enhanced or broken down through a layering and or elimination process, through transposition and dissection in order to discover its other potentials. Therefore, the layering and collage process of breaking down, juxtaposing and reinventing allows for new potential meanings or 'loci' to exist that can be related to our sense of dwelling. This 'cultural act' can ultimately form part of our potentially

new spatial imagination and also form part of our existing socio-cultural landscape that can not be determined or be undertaken by empirical research observations. (This is often depicted in 'traditional' mapping techniques)

Siegfried Giedion (1941 ) also emphasizes the point in his commentary that there is a clear indication that architecture may well have to merge with social realities and complexities and accept juxtaposition and montage as design principles which allow for this merging.



Image 9: James Corner, *Rail networks 2*: 1996  
(Trajectories of rail infrastructure)

## Technical studies

The intention of the technical studies were to investigate the materiality and appropriate 'making' process that will be required in order to successfully redesign Salt River Station into a multimodal/ integrated transportation node. I analysed and compared 3 case studies namely Waterloo Station, East Croydon Station and Newport Train Station. These projects are relevant to my thesis project as they were all old train stations that had to be redesigned to meet contemporary transportation needs as they formed part of larger urban regeneration schemes. The projects also give a multi faceted view for my design proposal as they vary in scale and construction methodology. I made an attempt to analyse and understand the relations between the structural systems of each project that were required in order to achieve their planning, programming and organisational requirements and in order to form a link between design and structural response. The research thus focused on the exploration and understanding of an order/hierarchy of construction and materiality – the 'constellation' of parts and building systems as part of the overall design approach and philosophy of the projects in order to understand a variety of construction approaches that could inform my construction and materiality approach.



Image 10, 11 and 12. illustrating Waterloo, Croydon and Newport Stations.

Waterloo international terminal is the biggest station of all the case studies and has the largest requirements in terms of accommodating passengers, different modes of transport, services and programmatic demands. A large triangular and bow shaped truss is therefore used that consists of a three-pin steel arched roof which employs 36 trusses and which makes spans of up to 48.5 m possible. The primary structural principle of the roof is thus an arch made of two trusses, a major and minor one, pinned together at the top.

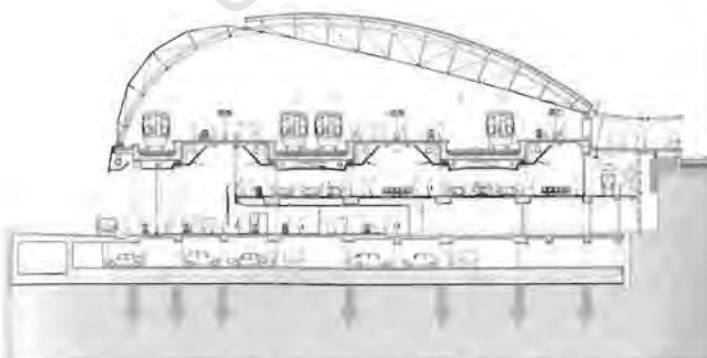


Image 13: Section through Waterloo Station indicating structural principles

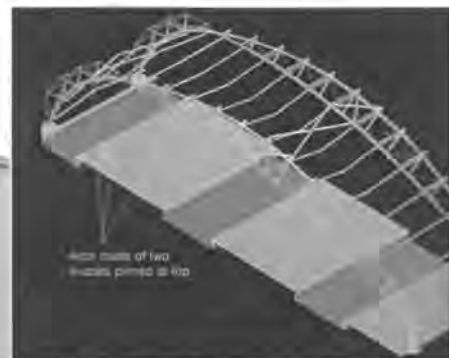


Image 14: Illustration of truss system

On the other hand Croydon station implements the use of a lattice girder structure that is supported and tied to four masts with tensile steel rods. This makes a clear span of 55 meters

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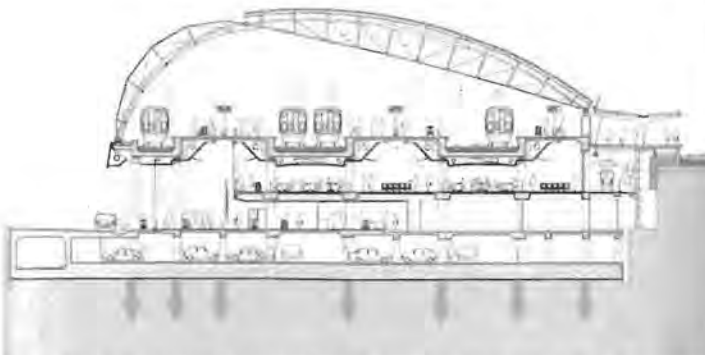


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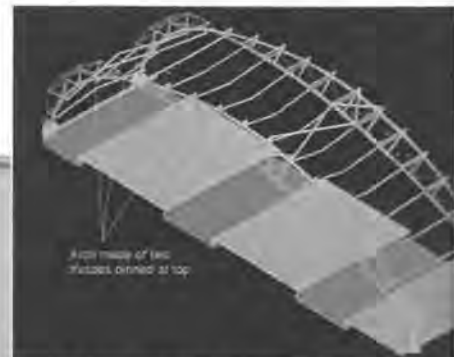


Image14: Illustration of truss system

possible without the use of any columns so that passengers can find their way through the station without distraction.

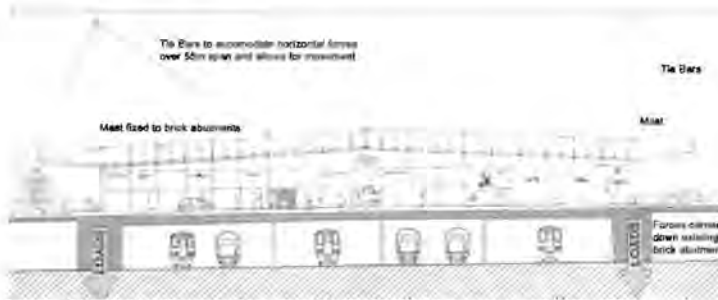


Image 15: Section through Croydon Station indicating structural principles system



Image 16: Illustration of truss and girder

Newport station is substantially smaller in scale than both Waterloo and Croydon station. Here a radial steel portal frame structure is used for the dome structures that are fixed at the top to a high level compression ring functioning as the primary structure. A lattice girder structure is implemented for the bridge that is laterally supported by the concrete lift core.

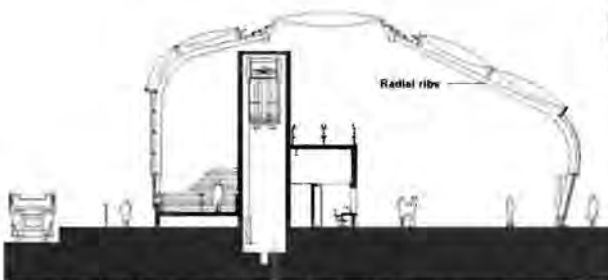


Image 17: Section through Newport Station indicating structural principles

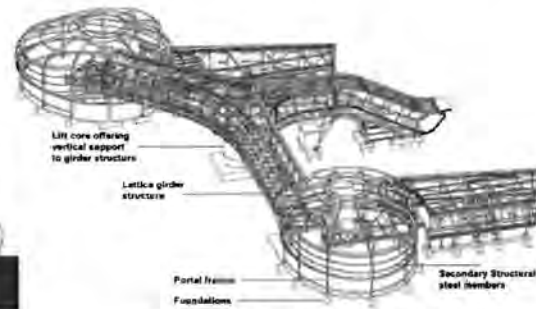


Image 18: Illustration of lattice girder system

In all three projects tubular steel sections are used as secondary bracing support which also allows for the tertiary cladding to be fixed. Waterloo station implements a combination of glass and sheet metal cladding which allows for views and protection from the elements where necessary. The glazing overlaps to allow for extreme vertical and horizontal movement. On the other hand, a planar glazing system supported by an extruded aluminium structure is used for the roof structure as well as the façade for Croydon station to allow maximum visibility and light. Overall, the amounts of standardization of tertiary components are maximized for both Waterloo and Croydon stations. Newport station implements a combination of sheet metal and glass panels as tertiary cladding that allows for views and light to penetrate, but also protects the building against vandalism. Both Waterloo and Croydon stations carry their structural weight into existing abutments and foundations.

It is clear that the projects discussed in the case studies are different in their construction and design approaches. Each project has a site specific response and therefore has a unique structural response to accommodate for their specific architectural needs, both utilitarian and conceptual. A variety of materials and building methodologies with a clear hierarchy and structural logic is also evident in all the projects and is very well executed and articulated. In all the cases the structural articulation forms an integral part of the architectural aesthetic expression, but also serves functional purposes to bring in light, give volume to the spaces and to enable a clear relationship between the different programmatic spaces. In all these projects, the construction detailing are expressed in such a way to ultimately make the overall

On the other hand Croydon station implements the use of a lattice girder structure that is supported and tied to four masts with tensile steel rods. This makes a clear span of 55 meters possible without the use of any columns so that passengers can find their way through the station without distraction.



Image 15: Section through Croydon Station indicating structural principles system



Image16: Illustration of truss and girder system

Newport station is substantially smaller in scale than both Waterloo and Croydon station. Here a radial steel portal frame structure is used for the dome structures that are fixed at the top to a high level compression ring functioning as the primary structure. A lattice girder structure is implemented for the bridge that is laterally supported by the concrete lift core.

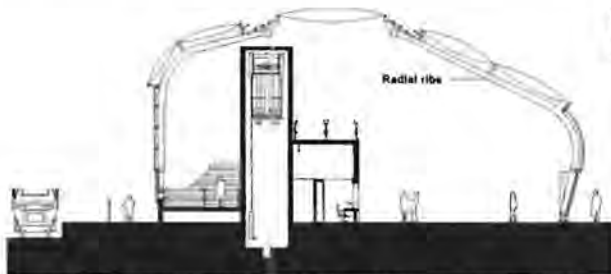


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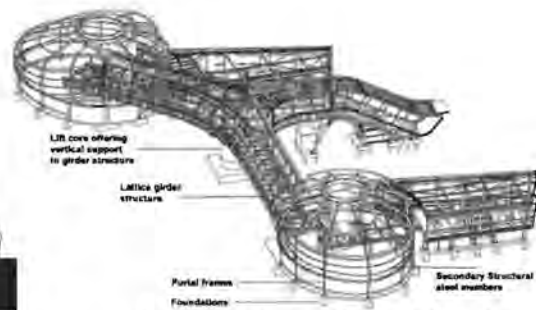


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conceptual and functional design solutions possible. Although all the projects differ in execution and form, from superstructure to medium sized portal frames, they all achieve a structural simplicity and hierarchy made largely from standardized components which is logic and clear to understand.

## **Section B**

### **Site analyses**

I aimed to use a combination of collage and mapping techniques during my initial site analyses. These processes were undertaken largely from a phenomenological perspective and served as an emotive process. I thus tried to unearth unique characteristics of the overall site both physical and experiential in order to establish a sense or 'spirit' of the place. I also tried to find or rediscover existing (hidden or abandoned) dwelling places that could be 're-enforced' and 'drawn out of the state of concealment' as Heidegger puts it, in order to act as a connecting or starting point during the design process.

My first design approach was undertaken largely from an urban analyses perspective. The intention was to investigate the development possibilities that the (assumed) completed station could have on the adjacent rolling stock site, as well as on the existing immediate surrounding urban landscape in Salt River. It was important to understand what role this major interchange will have as a destination in the city assuming that all the transportation modes have been fully implemented and working at full capacity. I also explored various inherent potentials and relationships embedded within the overall site, as well as the surrounding areas that could inform and guide my design decisions and could possibly act as a source of inspiration and conception for the overall project. In particular, I explored and attempted to unearth infrastructural and natural urban systems in an effort to locate the architectural design within the larger and more holistic urban system. I wanted to unearth potential links between the overall site and the station. It could form part and 'blend in' - to become a node within a larger constellation of nodes and systems within the immediate environment but also in the larger city environment.

### **Emotive mapping process**

In *Map A* and *B*, I investigated the physical attributes of the site. I intentionally highlighted particular elements in isolation from the larger urban surroundings. On the overall site itself I "eliminated" all existing buildings, instead, only leaving graphic traces of buildings and of movement and connecting arterial flows. (Illustrated in white).

In *Map A*, my intention was to highlight and investigate the characteristics of the surrounding urban fabric. I strived to identify urban 'sub areas' that I thought could be relevant to impact on the overall site. Accordingly, I created a node that described its particular intrinsic characteristics of each 'sub area' - whether it is social, cultural, economic, functional or descriptive elements etc. - as well as future potentials possibly having an impact and contribution to the site development.

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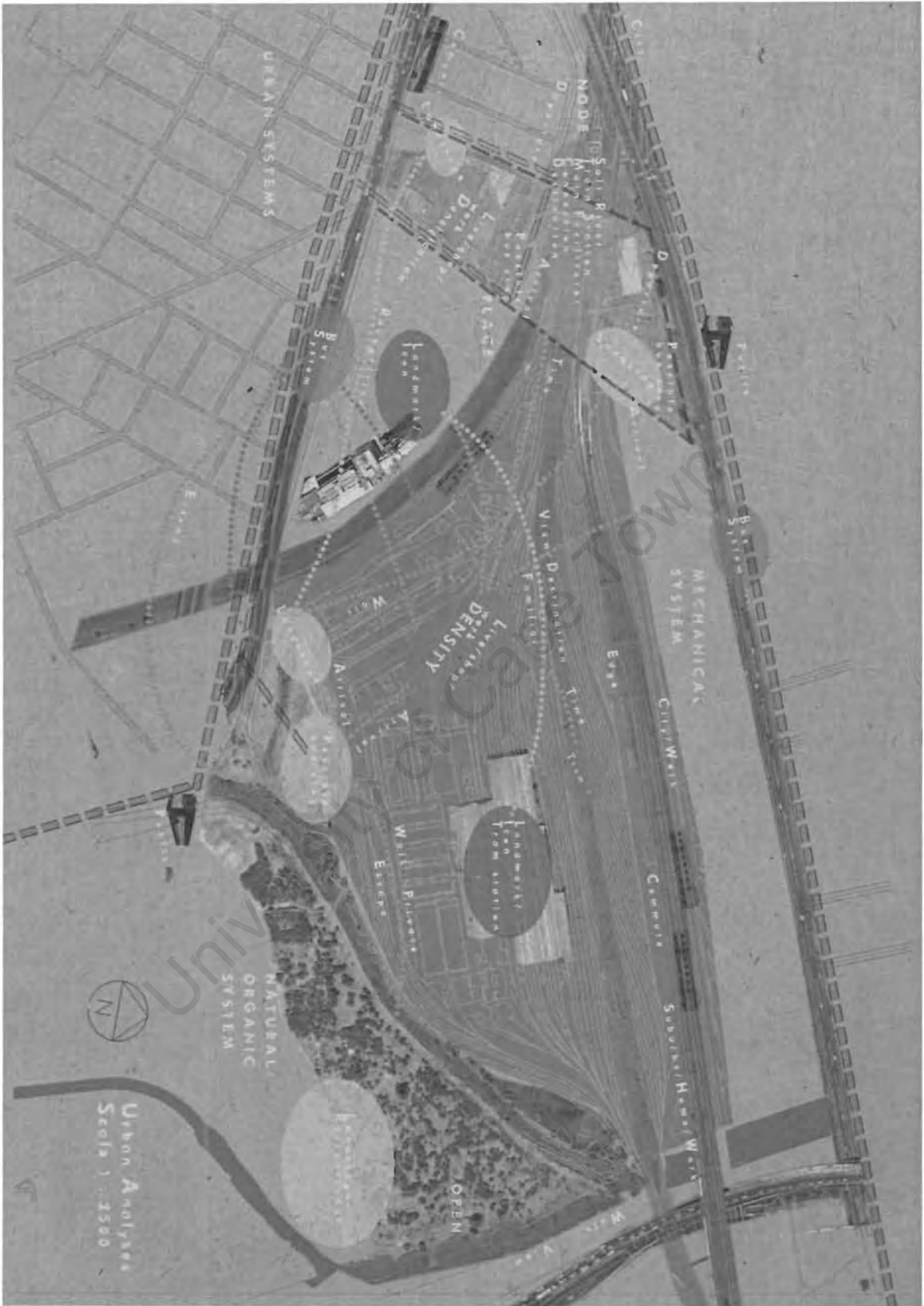


Image20: Map B: Infrastructure and urbane systems

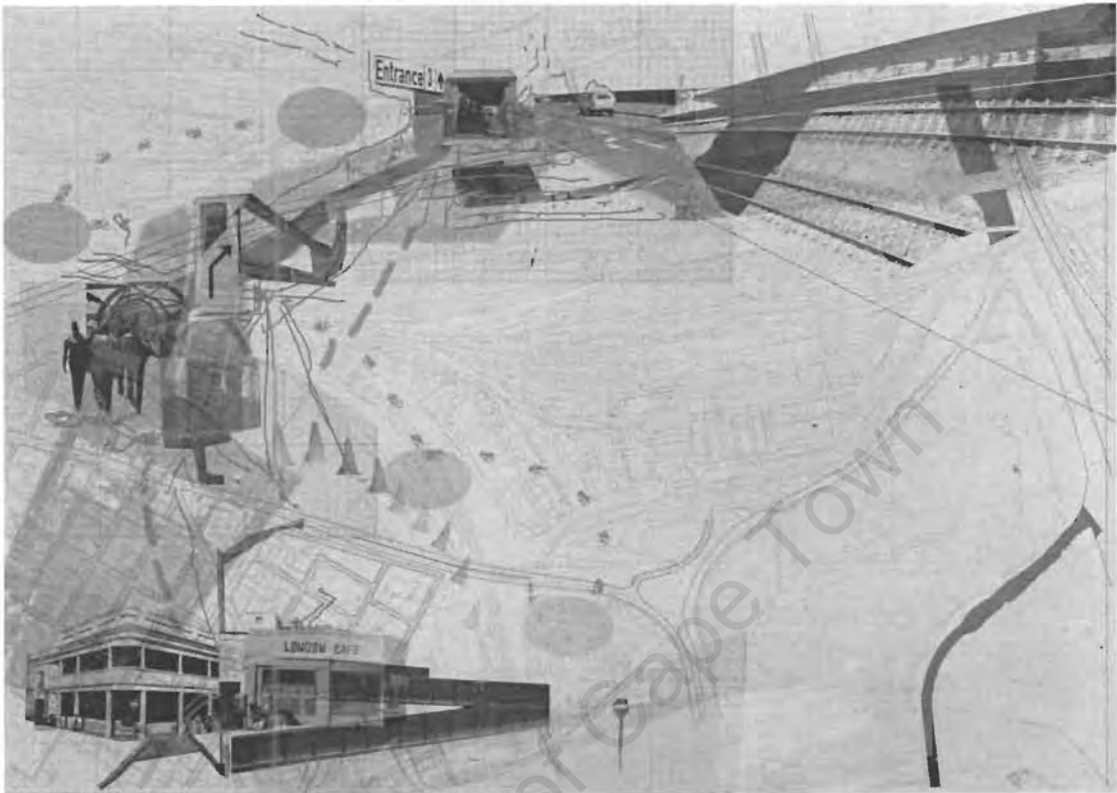


Image21: Map C: Emotive journey through Salt River Train Station



Image22: Map D: Infrastructure at Salt River Train Station



Image23: Map E: 'Natural' systems. An Emotive journey near the black river

All nodes that were identified with having similar characteristics were colour coded the same. I then attempted to connect these different descriptive nodes in order to investigate and establish new possible relationships and connections. New ideas and associations were written on the links that connected the nodes thus forming a new constellation of possible relations and ideas resulting from the overall site and its immediate surroundings that could create new urban and architectural possibilities.

In map B, my intention was to highlight and investigate the characteristic urbane systems – both natural and infrastructural - that I identified as having a possible design impact on the overall site. I attempted to investigate natural and infrastructural systems as potential barriers, but also as potential opportunities of access and integration. As with *Map A*, I identified similar systems and 'districts' with similar characteristics - for instance 'greenery' - as nodes and colour coded them the same. I also wrote the 'district's' particular characteristics and potentials in the nodes and attempted to form connections between the different nodes. New ideas and associations between the nodes were also written on the connections thus forming a constellation of possibilities, of new possible relations and ideas resulting from the existing urbane systems that could have a potential design impact for the project.

Map C is an emotive 'place map' that was inspired by the 'derive' of the 1960's Situationist International. This map documents my journey or stroll from Voortrekker Road, past the bus stop, across the existing railway concourse, through the railway exit and moving towards Albert Road. The 'place map' acts as a gestural representation that are built up through layers of juxtaposed photographic images overlaid with emotive drawings and markings each undertaken at particular stops indicated by the red nodes. Different existing architectural features from the site such as facades and columns are combined with different geographical schema including the site map with the train lines, urban settlement and river and road systems seen from different perspectives, scales and views. The map attempts to capture the spirit and flow of the place conveyed through a collage that represents a layering and compression of time, place and space.

*Map D* and *E* were created during and after a visit to the overall site. The maps represent a cacophony of overlaid images and marks. It creates pictures of an imagined rather than actual reality, attempting to create a new narrative through abstracted images of architectural and infrastructural materials, markings and imagery found at the site. The 'place maps' intend to represent and unravel the speed, atmosphere and 'loci' as experienced at the site, also depicted by a visual flattening and compression of time, space and place.

*Map C* and *D* and *E* can thus be described as part of a mental mapping process and is a graphic depiction of my experiences at the site. I therefore felt that the process of 'mapping' the areas on the site - through a process of collage techniques - were more important than the end result as a represented image of the place. The maps therefore serve as depictions rather than representations in an attempt to unfold potentials and unseen realities that can serve as a conceptual guidance for the project. They function as an instrument for the visualization and understanding of the spatial phenomena of the place as well as for the storage of information and as a research tool.

The site is pre-occupied with the movement of people and transportation vehicles and machinery. Groups of people constantly move from one end of the site towards the other via the existing pedestrian overpass bridge while droves of people chaotically pass over the pedestrian concourse from one platform to another to catch their trains. Trains stop and pass through the station en-route to their destinations on a frequent basis. However, the site is harsh and bears the scars of heavy industry and engineering. Accordingly, it has been shaped and moulded to accommodate the particular patterns of movement. At the same time the site has a large scale to it much of which is left barren and un-built, while other areas consist of abandoned buildings and platforms from a bygone era left over to nature to take its course. As thousands of people pass through the site on a daily basis, the current station facilities and surrounding buildings feel wholeheartedly utilitarian and is civil, hard wearing and functional in nature. Although there is a sense of structure and purpose to the events occurring on the site and to the existing buildings, one is however left with an overall feeling of a kind of isolated emptiness and 'hidden sense of place' as well as a sense of degradation when moving and experiencing the place. It is as if all actions have been handed over to a kind of lifeless functionalism.

Also refer to Appendix 1 for more conventional figure ground mapping and site sections.

## **Design process**

Although the final intent is for the architectural design to be located on the site, it was important initially to design in tandem from a macro/urban scale (focussing on the rolling stock site) as well as on a more micro scale (the station location itself)

From my first explorations, it was important to establish links between the station and the adjacent rolling stock site. I approached the overall site design based on an infrastructure developed around sustainable transportation principles as discussed in section A above. I felt that the large rolling stock shed could be retained as it had immense potential to be renovated into a mixed use commercial space. This would form the 'heart' or nucleus' of a 'sustainable transport village' to be developed on the rolling stock site. Major links can then be formed with it from the multi-modal transport station in order to set up an overall infrastructural framework.

Firstly, I wanted to create an 'infrastructural' link between the station and the rolling stock site that could potentially set up commercial and other developments along side it. This could act as one of the main 'arteries' linking Woodstock with this site. I wanted to maintain one of the strong rail links already present between the existing train station and the rolling stock shed. I thus propose that in future this line - which is currently used to transport the rolling stock - can be redeveloped into an electric tram system that could easily and cheaply transport passengers to and from the station to the future residential and commercial premises. (Illustrated in red in *Image 23*) Other infrastructural elements include drop off/entrance nodes identified around the site, (Illustrated in yellow in *Image 23*) which act as entrance and exit points to the overall urban development possibly for bus and taxi services. This will eventually join with other transport modes and link into the overall development.

Secondly, I wanted to fuse all the natural and infrastructural elements that were present at the overall site to inform and eventually be articulated in the station building design. These refer to elements identified in the emotive mapping processes. In particular, I wanted to create a main link between the existing green area adjacent to the station and Albert Road and a potential riverfront park or promenade that could be developed next to the black river.

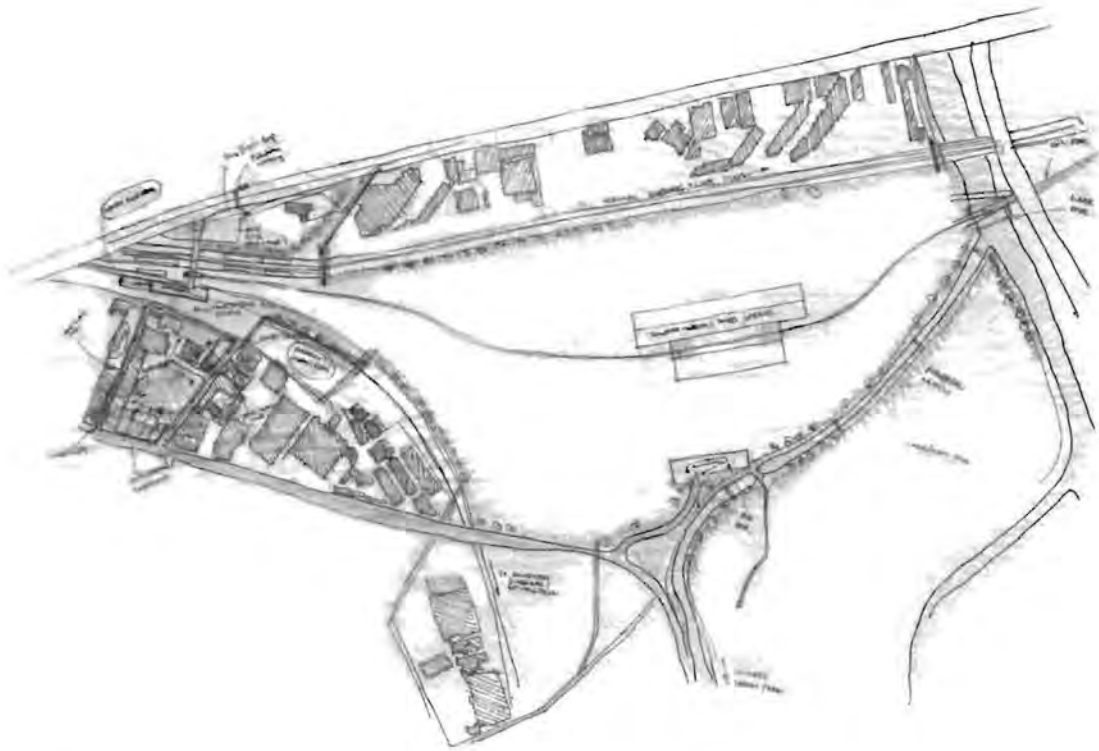


Image24: Site exploration. Forming potential links. The red line suggests a possible tram link that could be created across the site to initiate an infrastructure from the station.

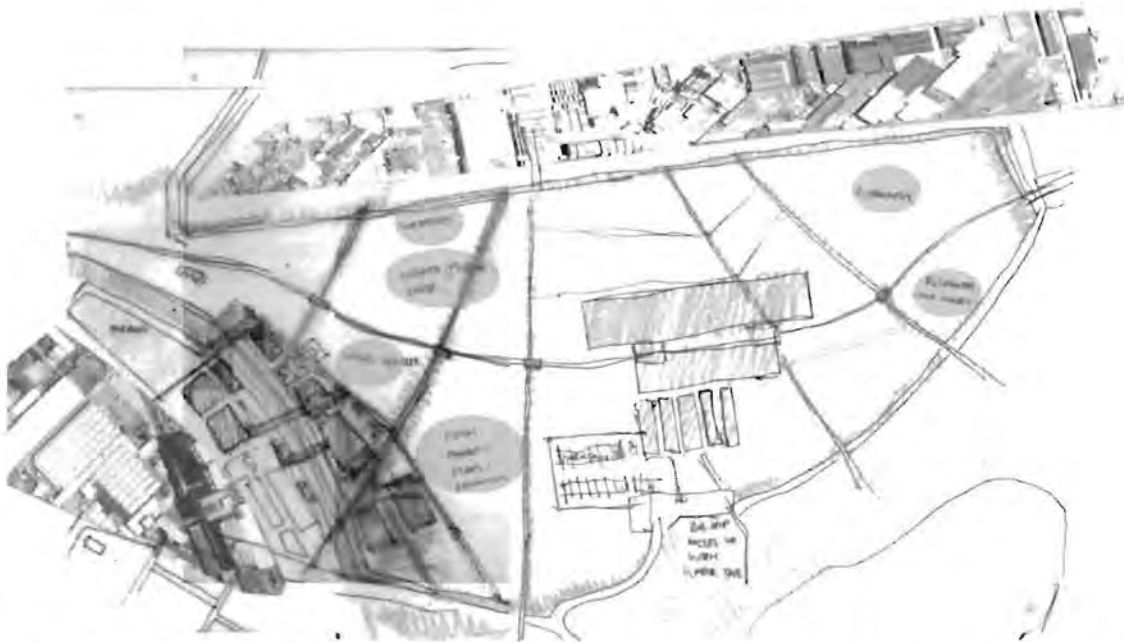
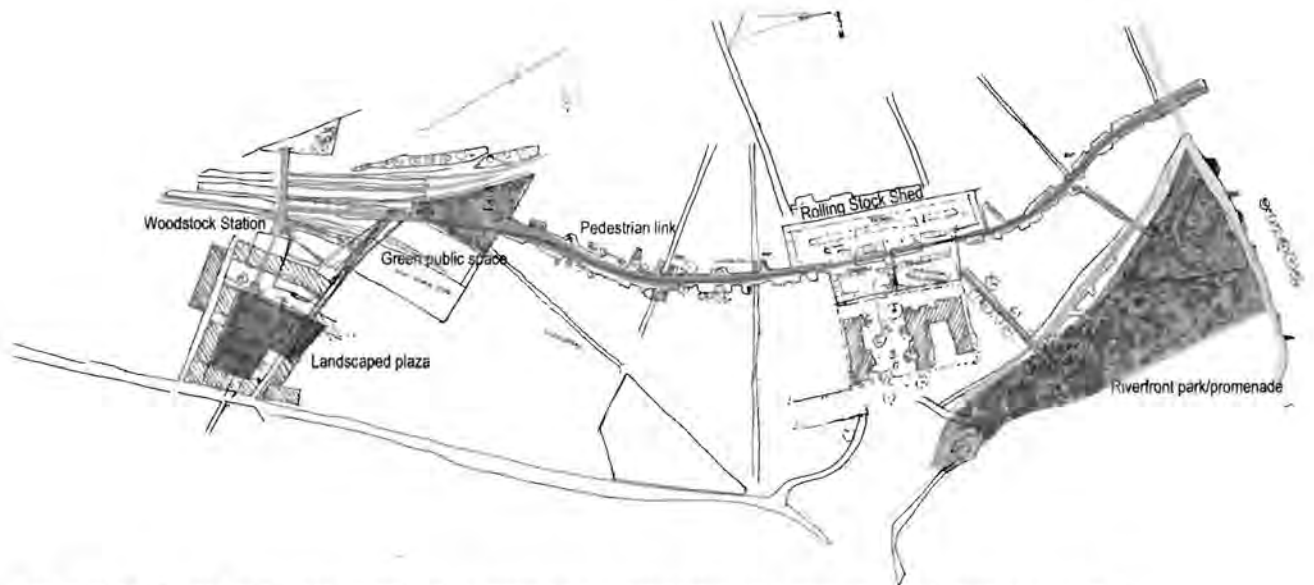
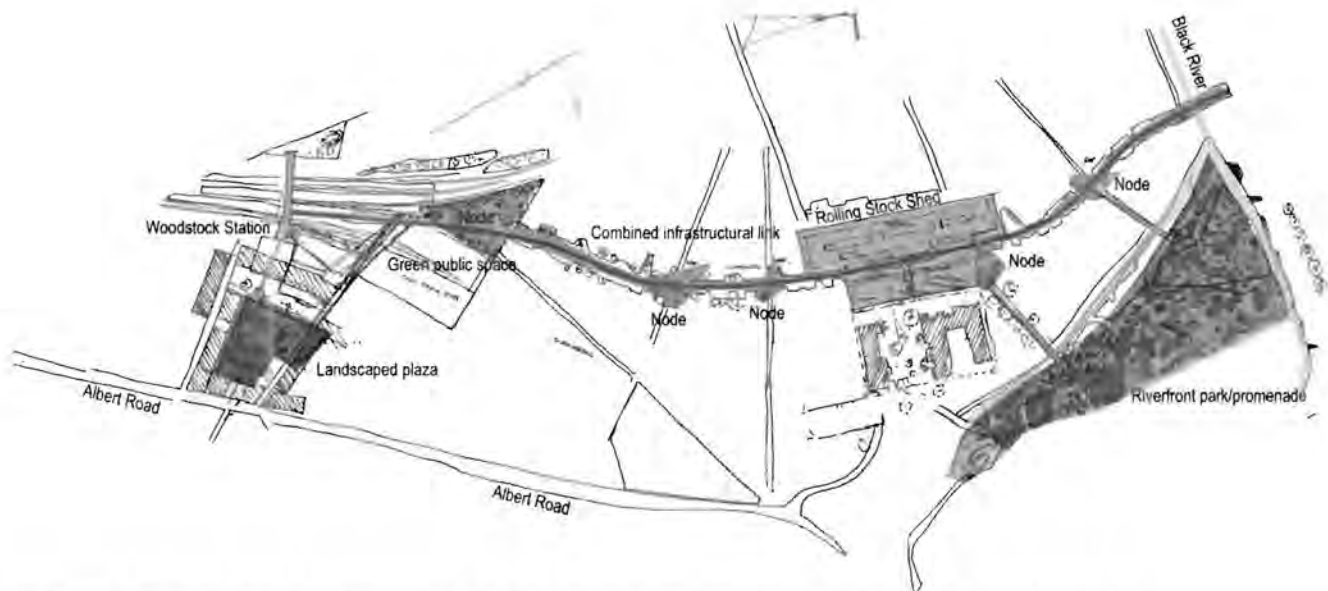


Image25: Site exploration. Forming potential links that set up an eventual hierarchical infrastructure. Substations are created on the main link from where secondary green pathways evolve that eventually merge with Salt River.

I propose that the existing park be opened up to Albert road which can act as a pedestrian friendly and landscaped plaza from which the station building would emerge. From here a 'green belt' - which is pedestrian and cycle friendly- would eventually meet up with the river front. This could then set up the main pedestrian and 'green' natural infrastructure as one of the main linking and informative architectural elements for the project. (Illustrated in green) In addition, these green links or pathways could also set up edges and softer boundaries around the site to mediate between the existing harsh industrial buildings and the new mixed use developments. (Also refer to *Image 234* and *245* as well as *Appendix 2*)



**Image26:** Map indicating a potential pedestrian friendly green link to be created between the green area (plaza) adjacent to the station and the greenery at the riverside, setting up the urban and station building design platform.



**Image27:** Map indicating fusion of pedestrian (green) and tram (red) infrastructural network with a sequence of public spaces or nodes from which secondary routes emerge, setting up the overall urban and station building design platform.

The main focus is to set up a permanent infrastructure around which the zoning and building developments can discretionally take place. Bearing this in mind, Appendix B shows an example of how the overall site can potentially be designed into a medium to high density mixed use development to address transport and land use issues of Cape Town.

Once the Urban and infrastructural principles were established, I focussed on the actual building site for the architectural design analyses. As mentioned before, Salt River station forms a pivotal point within the city. Directional movement intersect each other through the site. All of the train and vehicular movement happen across the site in a west and easterly (horizontally) direction while most pedestrian movement intersect this in a north-south (lateral) direction. The point of intersection is where the most frantic activity takes place and will be the key area of the design.

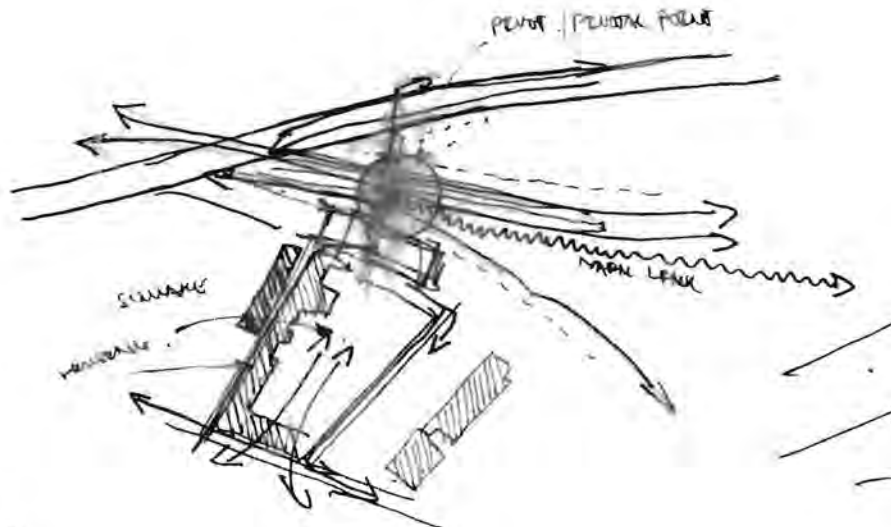


Image28: Site analyses

Approximately 23000 passengers board at the station while about 28000 passengers cross over from one line to the other at the station on a daily basis. The station currently sits hidden away and locked between Voortrekker Road bridge to the north and other adjacent buildings to the south. Due to this fact, I propose to visually open up the station to Albert road by demolishing the old disused buildings and turning the existing 'park' which currently also sits hidden behind the old buildings into a landscaped urban plaza or square. I also propose that busses approach the station off Albert Road via London Road, which, subsequently can be turned into a one way street. Busses and vehicles can then circle the plaza and exit the station on the opposite end after drop off to again join with Albert Road. Pedestrians and vehicle movement will subsequently be separated as pedestrians will then be able to access the station by foot from Albert Road via the public square. A new pedestrian link will also be formed with the rolling stock site via the new station concourse.



## Conceptual explorations

The following drawings and models illustrate early conceptual explorations for the transport building. My idea was that the building should be manifested from a reading from the site and its particular topographical and other industrial characteristics, instead of it being conceived of as an idealised object placed or forced onto the site. The building had to capture and accentuate existing characteristics or 'forces' and flows of movement already prevalent on the site. I explored the idea of the building existing as a series of elongated or tubular spaces that intersect, juxtapose and off set each other. Accordingly these spaces can act as a movement generator within its particular pivotal setting in the City. It is the point where opposite forces of movement come together, and split off again in different modes of transport and to different destinations and directions. These opposite modes of movement and elongated spaces are held together by one main elaborated space that intersects over the length of the site that can eventually become the concourse of the train station. It acts as the mediator of the different directional movements.

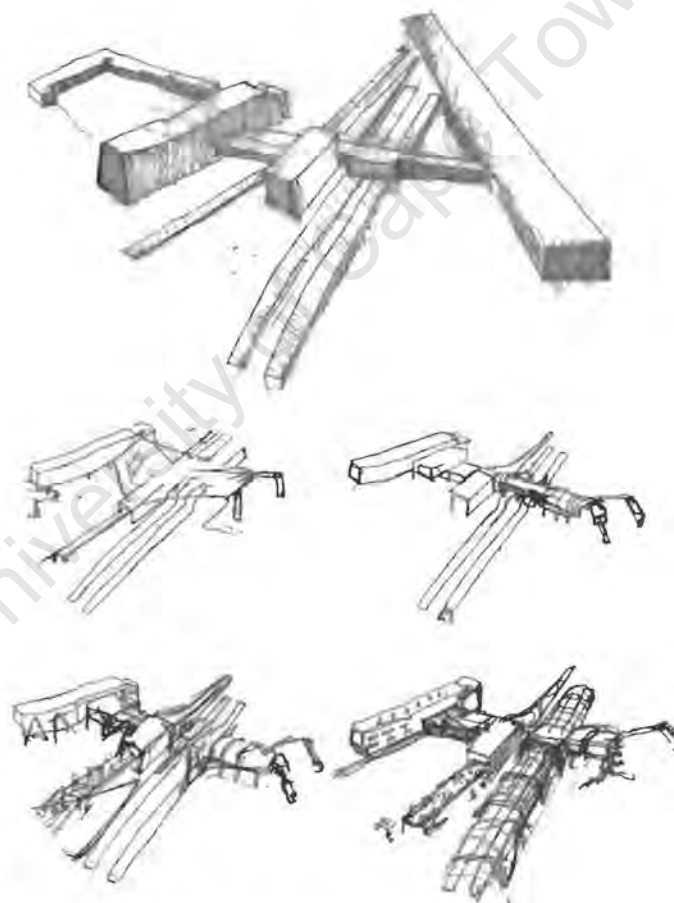


Image31: Early conceptual drawings exploring the elongated character of the building imitating the site characteristics and conditions



Image32: Early conceptual drawings exploring the character of the building and different compositions.

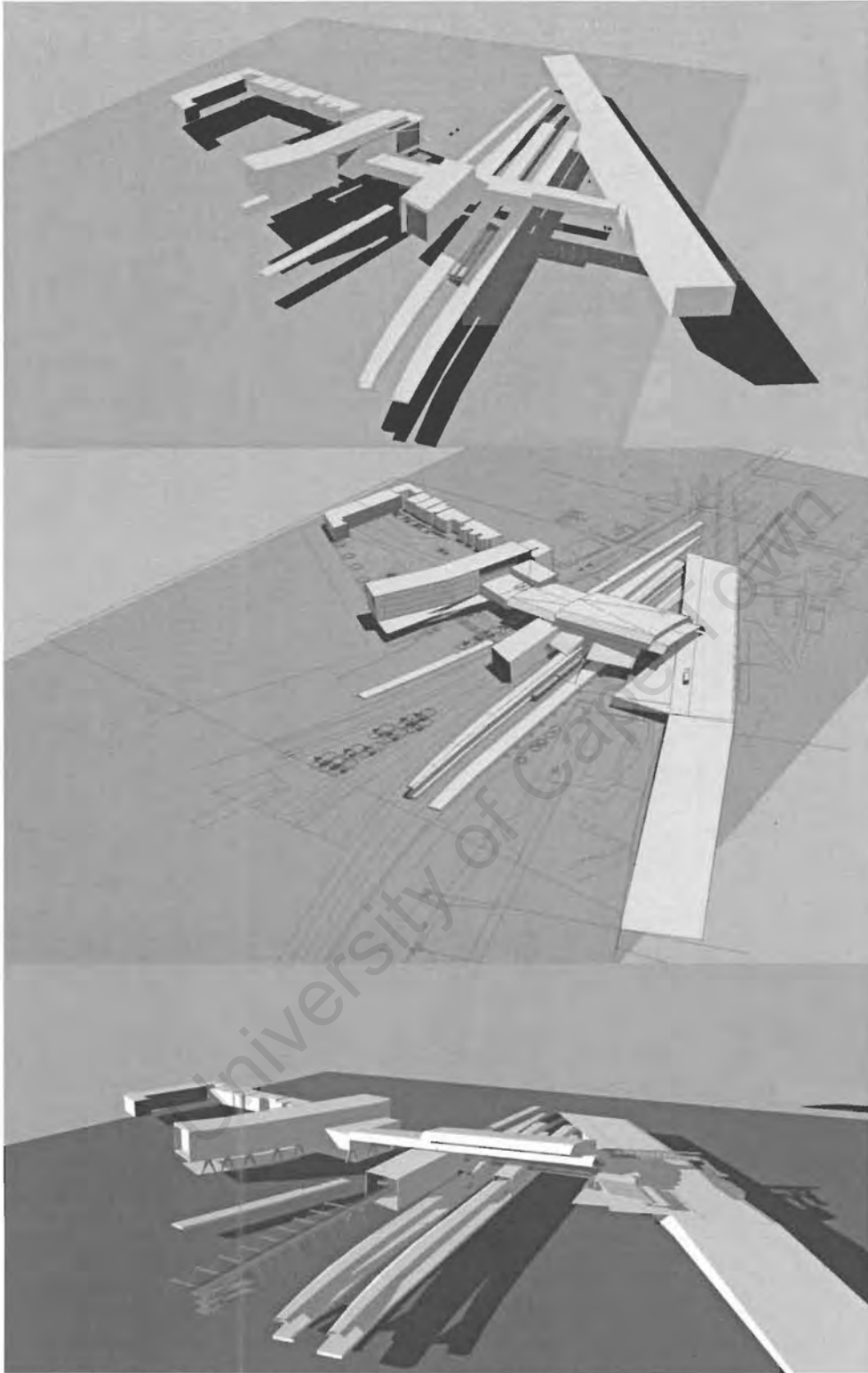


Image33 Early conceptual 3D computer model exploring volume, scale, and formal qualities



## Early materiality



Image35: Initial drawing indicating truss and girder exploration as structural element for the main link.

Initially, I was inspired by the precedent studies undertaken in my technical research. I explored the possibilities of using steel as the primary building and construction material. The steel would be used due to its flexibility and relative ease of construction while accentuating some of the industrial qualities inherent to the site. Steel truss and girder systems would form the primary structural elements or framework while the building would also be clad in aluminium and/or zinc sheeting. I also explored the idea of simultaneously hiding and exposing the primary frame or skeletal elements within the 'skin' or cladding elements to create a varied and rich expression of the material.

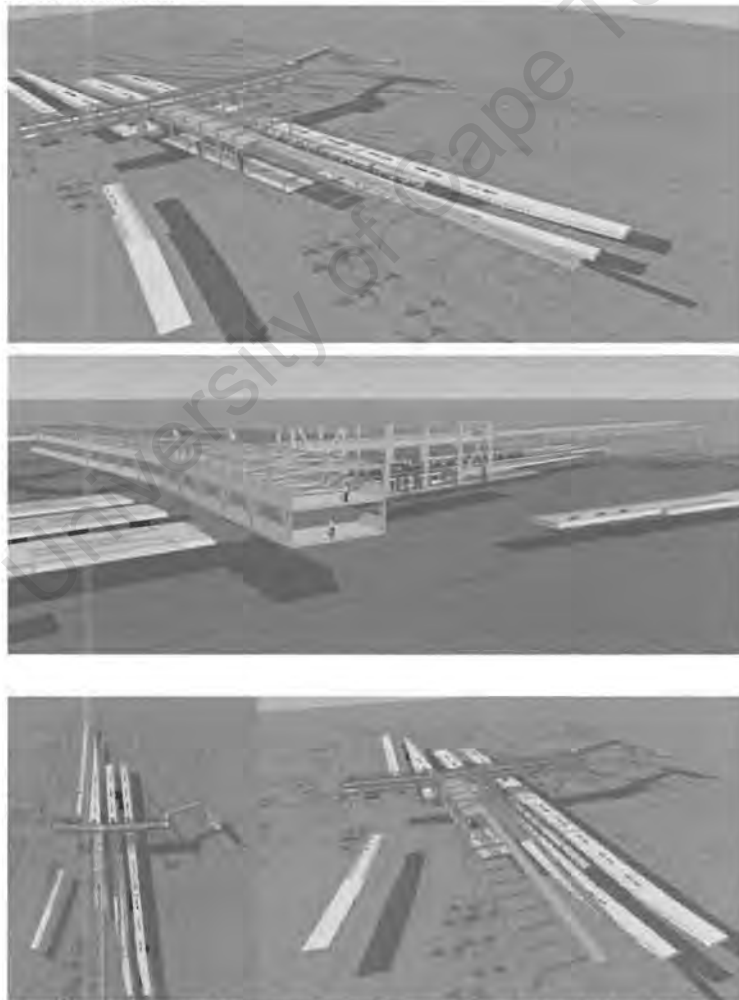


Image36: 3D model indicating truss and girder exploration forming the main structural element and frame for the building.

## Further design explorations

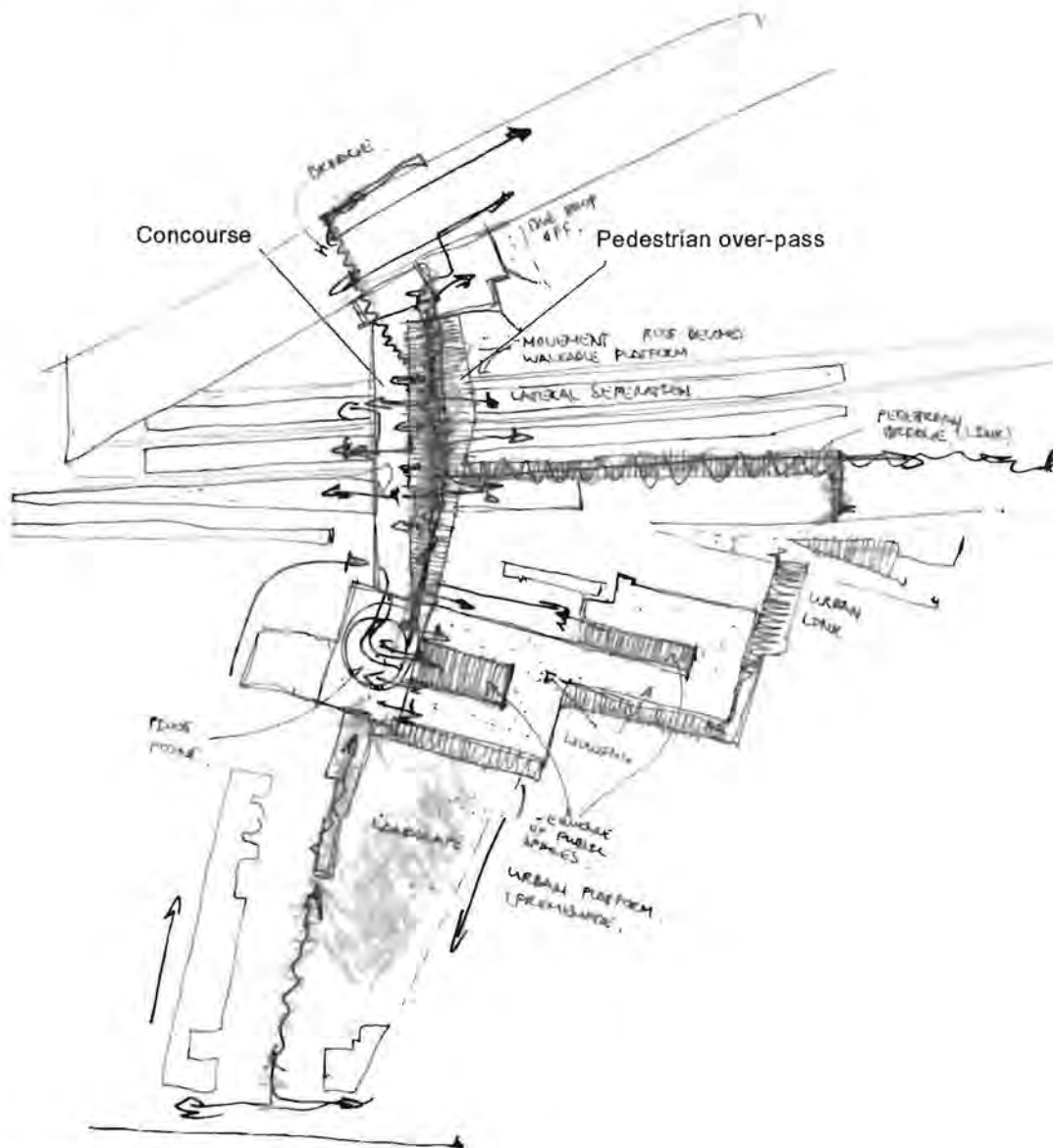


Image37: Design exploration and development

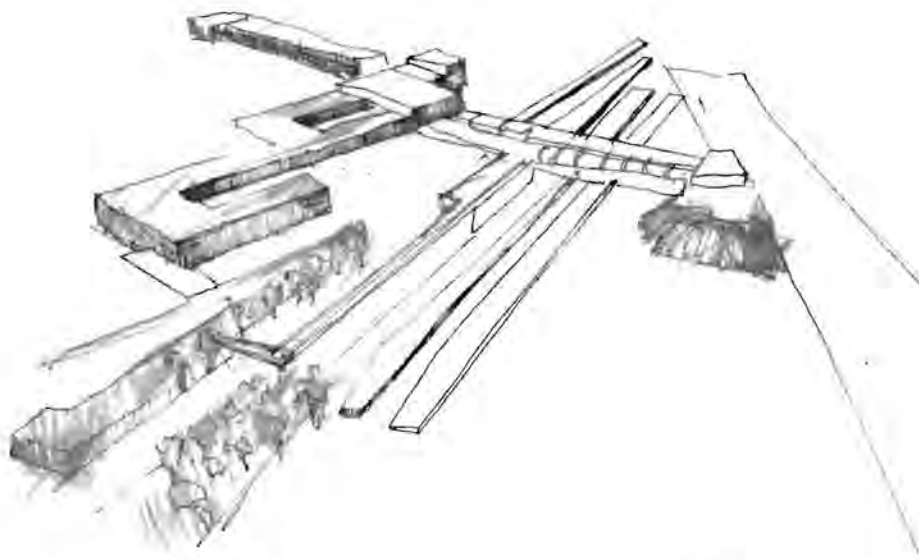
During this design stage the urban and architectural principles were set in place and relatively well integrated. I therefore wanted to advance and design the architectural project to a next level of development. Due to the large size of the project, it could be divided into building or development phases of which the detailed design focus for this project would be phase 1.

I wanted to create a building that was of a more 'human' and tactile nature. In addition to all the very essential functional requirements that need to be fulfilled in a building of this nature, I also wanted to create a building that had a strong sense of identity. The intention is to design an infrastructural building that is functional but at the same time experientially rich and that evokes the human senses. I wanted it to be a building that belongs to the site and captures and contributes to its sense of place. By it evolving and grabbing hold of the site, the design also needs to instil additional sensual qualities of the place that currently seems hidden and suppressed. As mentioned, an important focus of the site and therefore the design is located at the concourse and pedestrian over-pass. Due to the fact that this area contains the most

movement and interaction, I decided to create a generous bridge that ties the Salt River end to Voortrekker Road. The bridge is laterally split into two halves, the one half roofed and contained, acting as the 'concourse' that gives access to the platforms, the other acting as an over-pass and which is open to the air. This allows passengers to cross over and board trains as easy as possible on the 'concourse side' while passengers leaving and entering the station as well as pedestrians wanting to cross the site can do so by moving as freely and fluently as possible on the 'over-pass' side. This also helps to free up congestion. (Refer to *Image 34*)

Conceptually, the building can be described as an urban promenade growing from, accentuating and interacting with the site and in the process tying various infrastructural as well as natural urban elements together. It is the first phase where the natural system of the plaza architecturally starts to link with the riverfront promenade by setting up a system of public spaces as part of the larger urban scheme. (Refer to *Image 26*) The elevated 'promenade' thus creates a link between the landscaped plaza which will be a more hard wearing public space and the landscaped urban park area which will act as a recreational entry point to the station from the rolling stock end of the site. (This will be phase 1 of the overall development)

The urban promenade thus extends its arm and embraces the plaza where pedestrians can access it and gradually move onto it at an elevated level that allows for uninterrupted movement free from any other modes of transport or traffic. It eventually settles, or begins, at the opposite end of Voortrekker road and in the urban park area. From here passengers/pedestrians experience a variety of programmatic activities including both formal and informal trade while it simultaneously allows easy cross access to the various modes of transport, including bus, train, tram and taxi on the ground floor. The promenade allows for easy and quick directional movement between transport modes, while, at the same time also providing various pausing opportunities, allowing users to rest, shop or socialise. Appendix 6 on page 51 indicates the plan development at this stage in accordance to its programme. A housing component was also explored at this stage placed over the bus station that set up the second link to the rolling stock site by creating a sequence of public spaces.



**Image38:** Perspective indicating extended concept development of the building in becoming an 'urban promenade'. The architectural experience is as much the utilitarian and infrastructural use of the building facilities as it is about the sensual experience of 'being' on the promenade and interacting with the views, its activities and with other users. A 'place' comes into existence only because of the building (bridge) and allows a site for the fourfold. (Heidegger,1971)

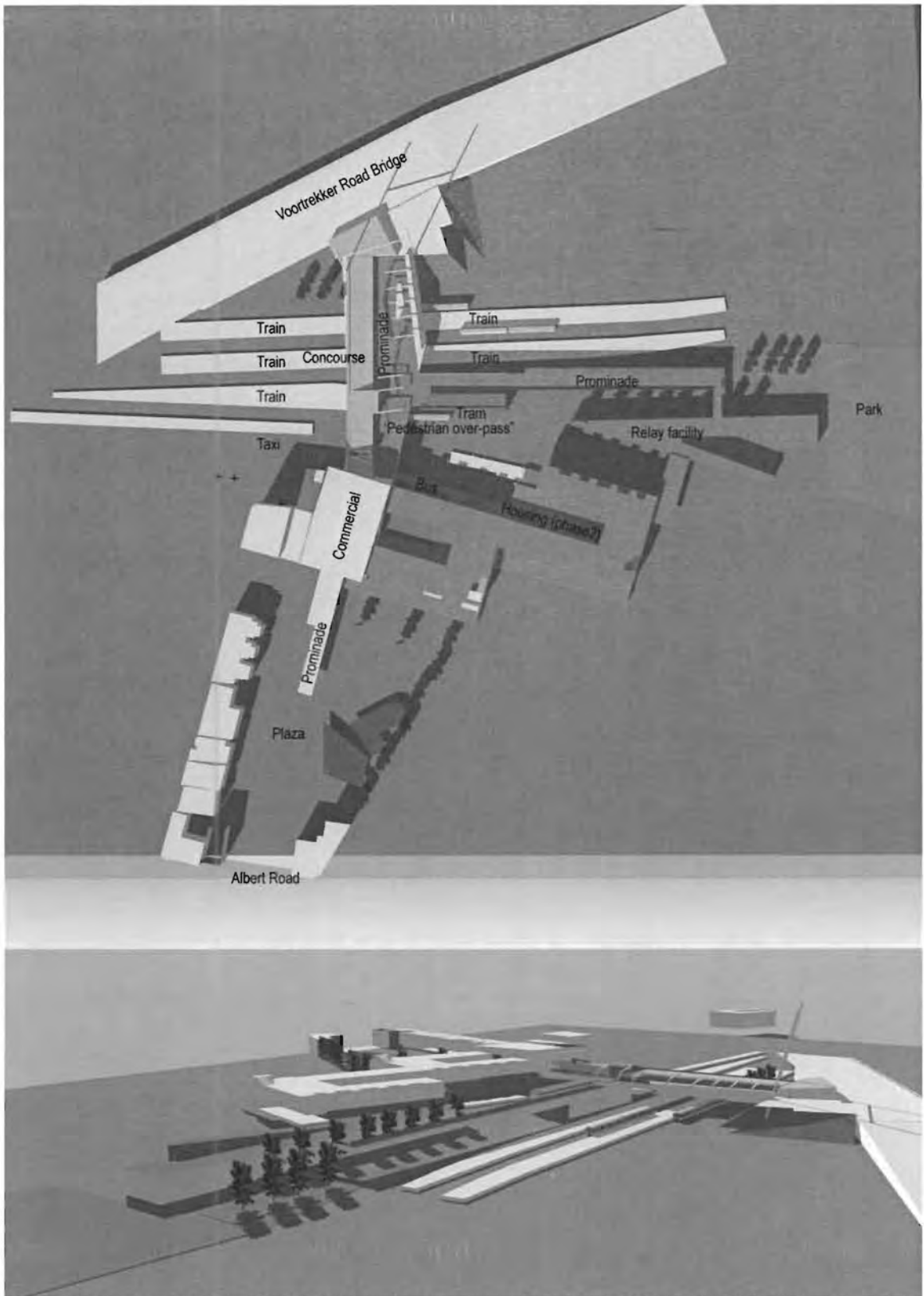


Image39: 3D computer model exploring further development and programme. A housing component as part of phase 2 is also added to create a second link to the rolling stock site through a sequence of public spaces. Also refer to Appendix 6.

## Materiality and tectonic development

During this stage, I also decided to change the materiality of the building. I decided to use a combination of materials to express a textural and experiential richness. The primary structure exists of concrete while steel is mainly used for secondary bracing and fixing purposes. The overall cladding of the building consists of a combination of timber, glass and metal sheeting. Not only will this add to the overall expressive pallet of the building, but it also speaks and blends with the multitude of materials present in the surrounding – and sometimes harsh - urban landscape. The technical approach also embraces a landscape sensibility where nature and tectonics merge together. This allows the building design to articulate the overall urban concept of the fusion of natural and infrastructural elements.

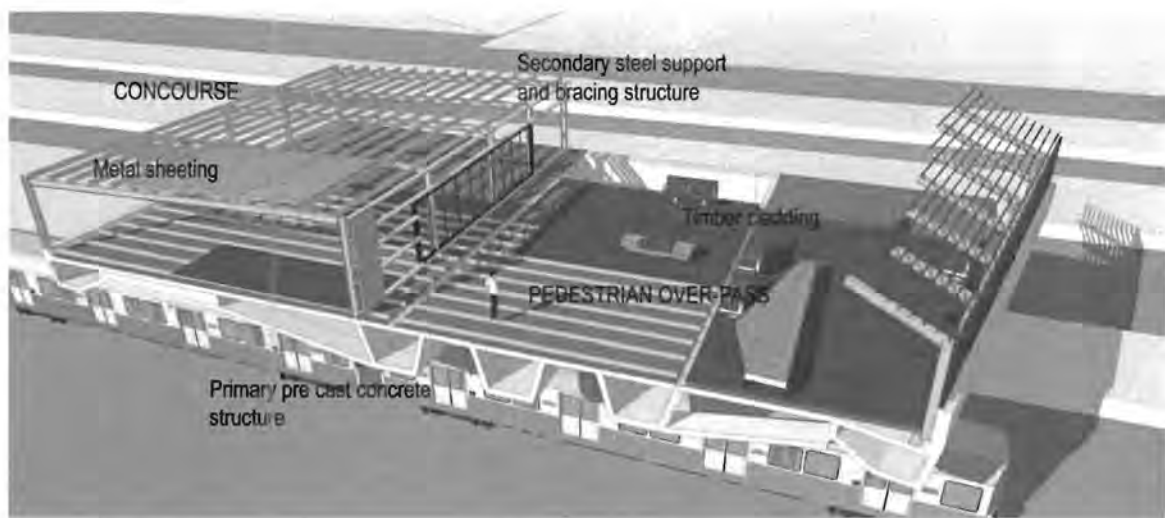


Image40: 3D computer model exploring structural principles. The images explore a sectional bay cut through the promenade as it crosses the rail platforms. A combination of materials are explored to capture the infrastructural and almost industrial nature of the place, but at the same time attempting to instil a 'human' and tactile nature giving the building it's hybrid characteristics.

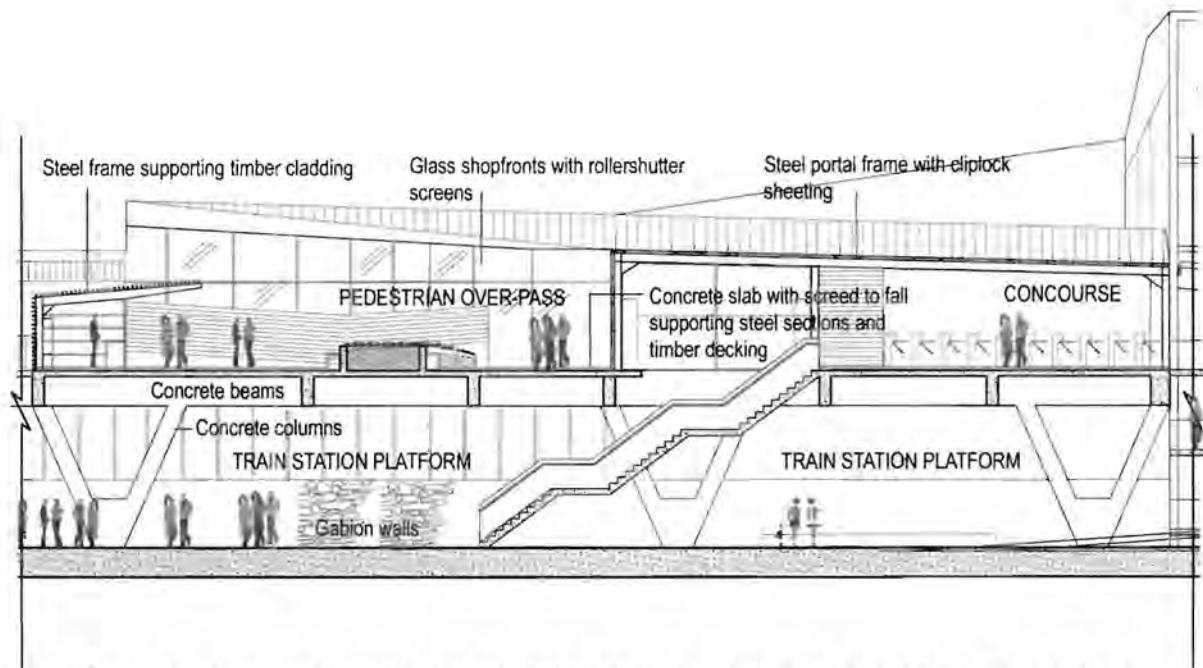


Image41: Section through promenade indicating structural principles. At this stage the structural principles are more rationalised using standard concrete and beam construction principles for the primary structure. Standardised materials are used for the secondary and tertiary structure for ease of construction.

During this final design phase I attempted to merge the architectural programme and the overall architectural character of the building. Although the architectural principles and intent was established at this point, the building still seemed static and not convincingly integrated in its conditions. I further wanted to create a sense of fluidity and movement out of the building in order to capture the spirit of the place. I again undertook a process of drawing, mapping and model building to achieve this goal and to take the building to the next and final conceptual design level.

My intention here was thus to create a sense of spatial thickness by employing gradations of transparency, reflection, overlay and juxtaposition as well as subtle and changing sensations of movement and light.

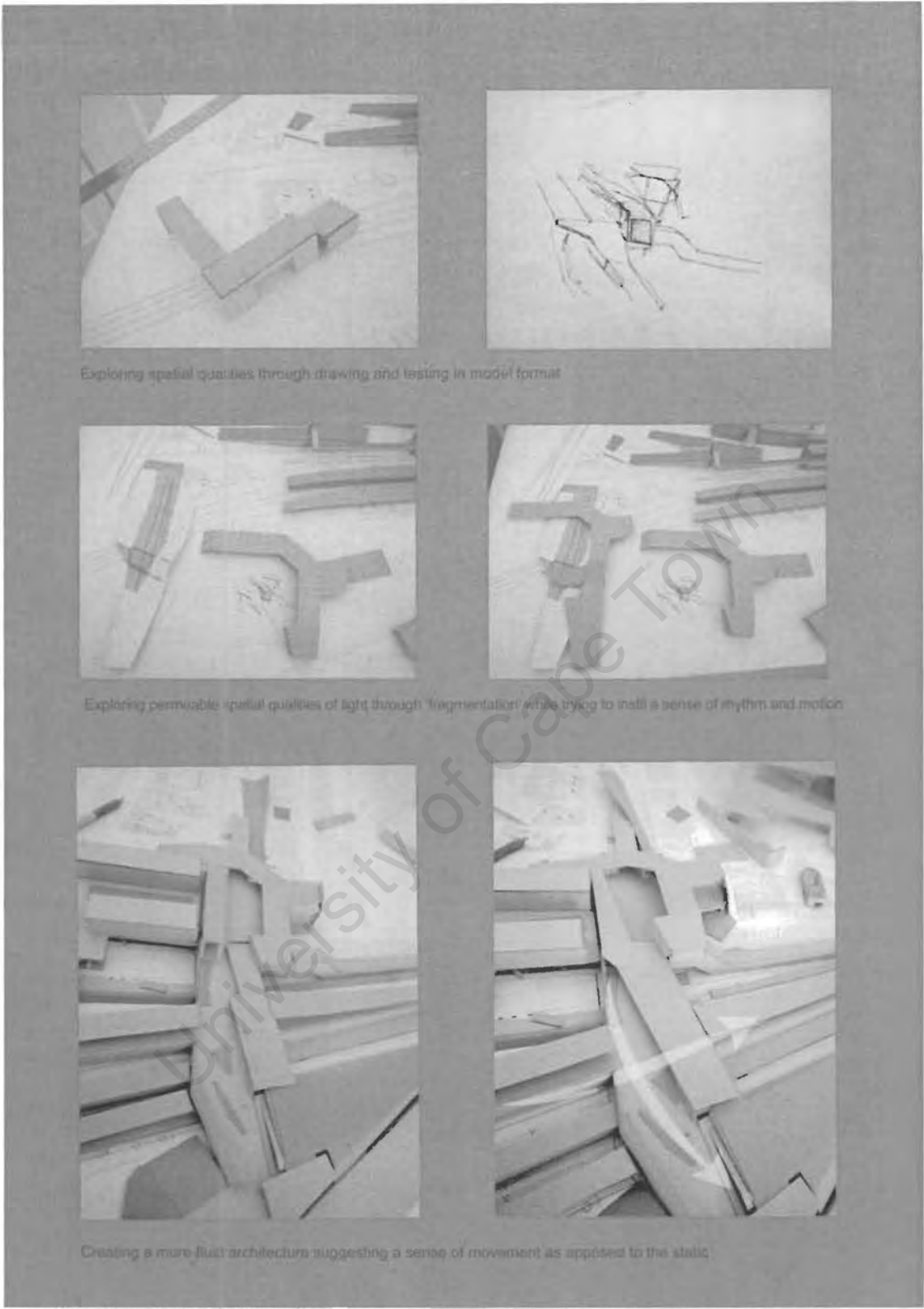


Image 42: Design exploration through model building process. Merging architectural character with programme and site

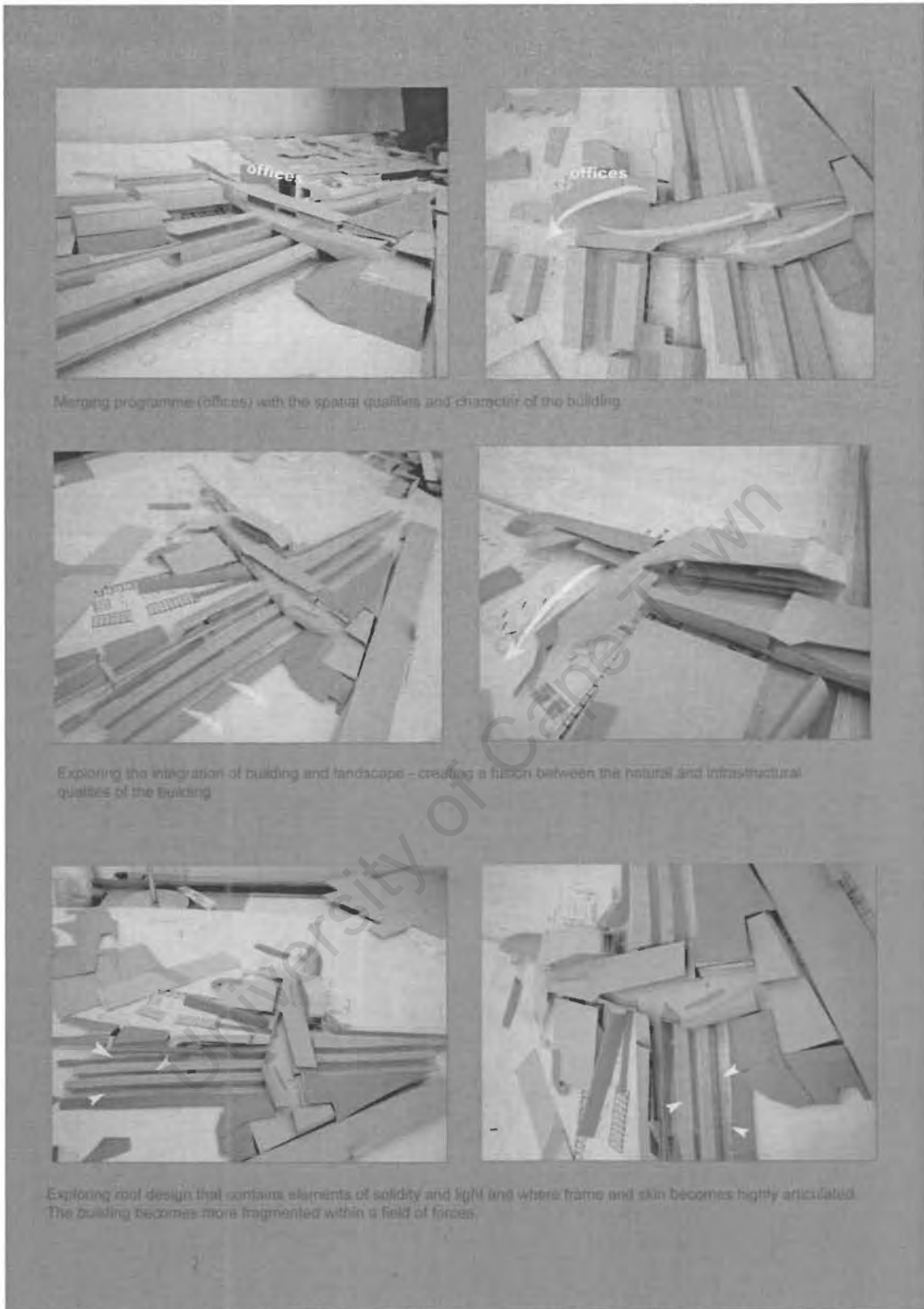


Image 43: Design exploration through model building and drawing processes. Merging architectural character with programme and site

At the same time, the final programme was added and adapted into the design. (Refer to Appendix 7 to 10 on pages 52-55 for plans and sections) As explained before, the various transportation modes are programmed on the ground floor, while pedestrians pass over on an upper level. The promenade extends from the plaza and enters the building envelope through a double volume foyer and into the retail area. The foyer also acts as the entrance to the bus station as well as the relocated offices that vertically extend over two storeys. The retail and ticketing area extends into the concourse and pedestrian over-pass that connects with the train and taxi platforms as well as a bus stop across Voortrekker Road bridge.

The final stage was to design and technically resolve the roof structure that will cover the train platforms. As with the rest of the building design, I wanted to design the roof to play with permeable elements of solidity and light. The construction is kept as simple as possible allowing for the implementation of standardised materials. Primary concrete columns support concrete beams across the length of the platforms. Secondary steel beams are bolted to the primary concrete beams and support tertiary steel purlins that are fixed to the steel beams. A combination of glass and zinc alumine cladding is fixed onto the purlins. This creates a rhythmical and variable interplay of patterns of light and movement during the course of the day.

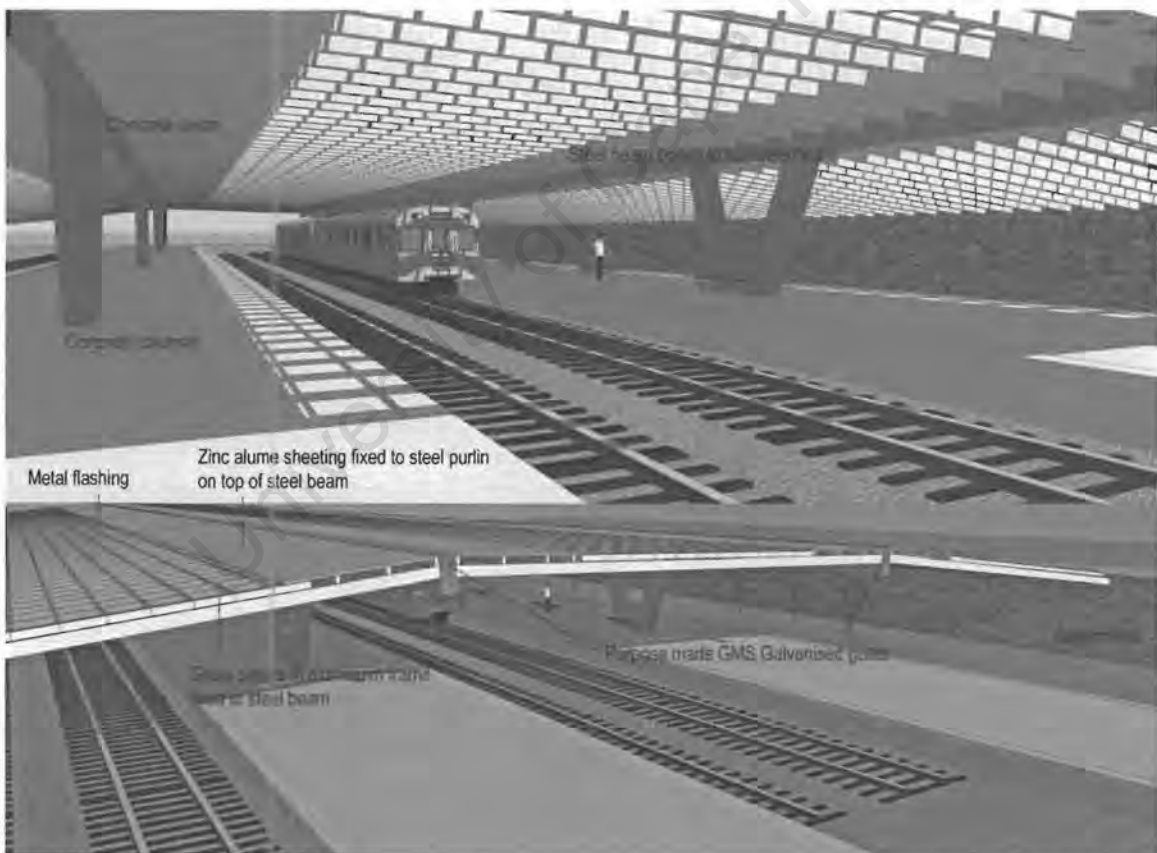


Image 44: Train station roof construction.

## Design summary

I have attempted to install a more 'rooted' sensibility within the building's architectural expression. The juxtaposition of rough and smooth, heavy and light, figured and plain makes the bodily experience of the interchange building more direct and more complex. Much importance in this design is placed upon the tactile. The building incorporates a construction palette that is rich and varied, with materials used as much for their sensate qualities as for economy or utility.

Frame and skin becomes highly articulated elements that register the topographical forces at work and enhancing the physical experience of space. Hard headed and pragmatic construction techniques and methods are used that embrace the ubiquitous products and processes of industrialized building systems as the source of its expression. This is achieved through the layering of standard systems in conventional and sometimes unconventional ways as apposed to the design of purpose-made systems.

The design takes a critical stance with regard to typology. Instead of being an idealized object superimposed on the land, the building grows out of the land, being shaped by and amplifying the topography of the site and almost blurring the boundary between site and built form.

The building reads less clearly as a figural whole and more as fragments in a field of forces as it becomes more topographical. The disembodiment of the building is achieved as the monolithic gives way to the multilayered; and homogeneity is superseded by differentiation. As figure dissolves into field, the building is comprehended less through fixed perspective and more through the unfolding, internalized experience of the body moving through space.

## Conclusion

The building attempts to address issues of unsustainable land-use and transportation in the City of Cape Town. It is strategically located in an important junction within the city and on the overall train network. Thousands of commuters pass through and cross over at the station on a daily basis. The multi-modal transport facility is therefore designed to be in line with the City of Cape Town's future transportation plans. The design attempts to address the immediate needs of its transportation and programmatic functions on a smaller scale while simultaneously interacting with urban systems and developmental issues on a much larger scale.

The building is conceived from the idea of the merging of natural and other infrastructural urban systems present at the overall site. It grows out of a meticulous reading of the ground and incorporates a rigorous mapping of imprints, rhythms, traces and tendencies, which emerge to shape a social landscape in which institutions, context and nature are cast in an interactive relationship. It therefore attempts to unveil inherent potentials of the site in order to create a sensibility that promises a positive architectural experience of space, place and meaning.

The multi-modal interchange attempts to be highly functional and efficient in order to fulfil the fast-paced requirements of contemporary transportation needs. At the same time the building attempts to be rooted and aspires to be local, yet avoiding to be parochial and without nostalgia for a vernacular past. The design is guided by theories of dwelling where the art of building is revealed as an expressive language through which experience and meaning are communicated. The architectural promenade is emphasized experientially and tectonically as the locus of heightened bodily experience. The design and tectonic approach is therefore not a style, but a sensibility, a way of working with many possible manifestations.

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**Appendix 1**

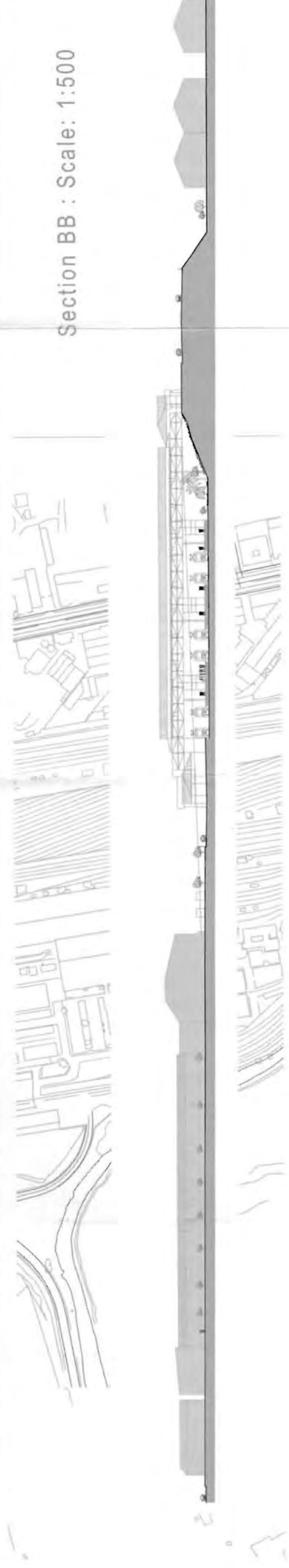


Plan of Salt River  
Scale : 1: 2000

Section AA : Scale: 1:500

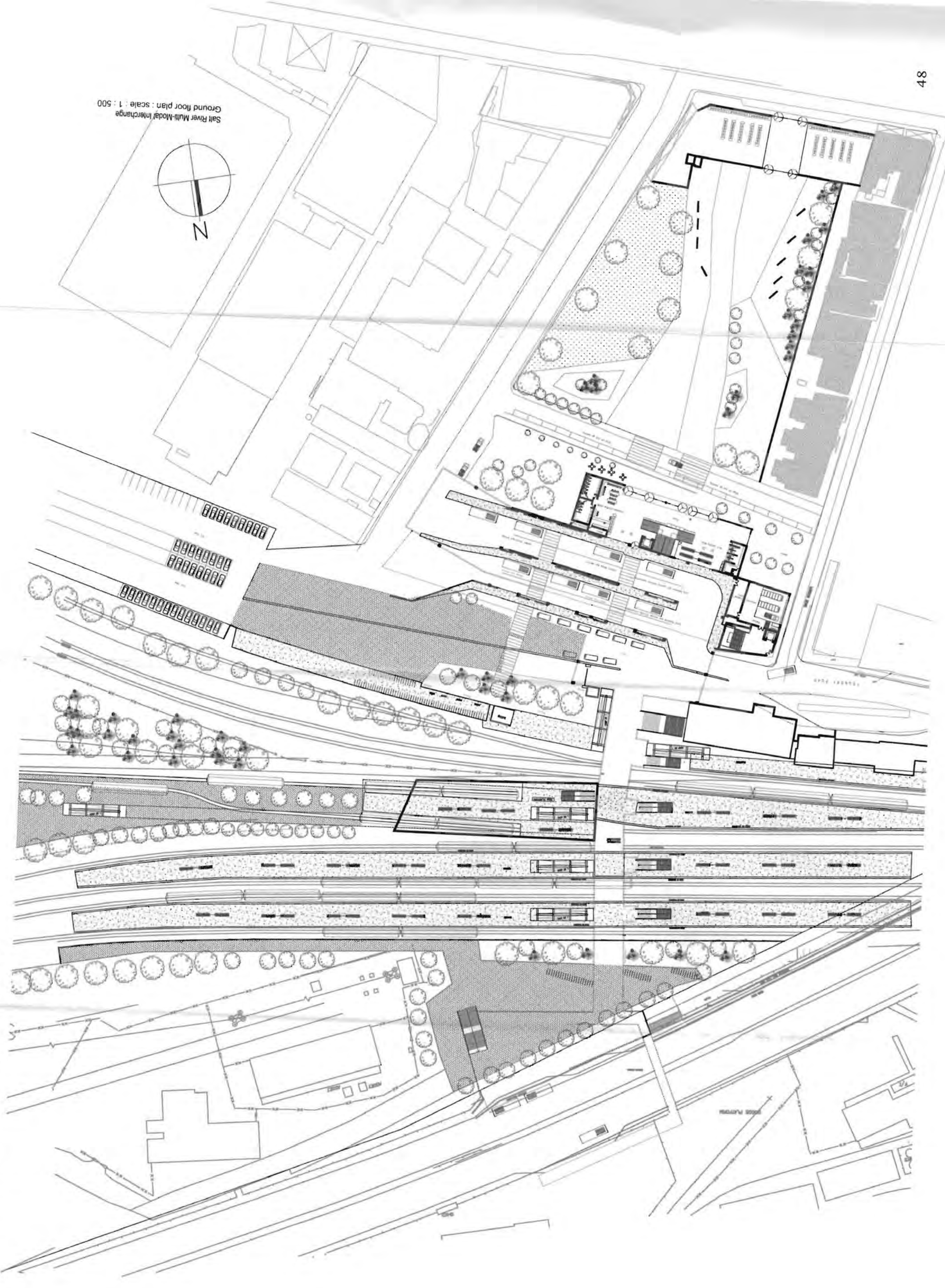
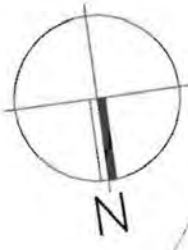


Section BB : Scale: 1:500

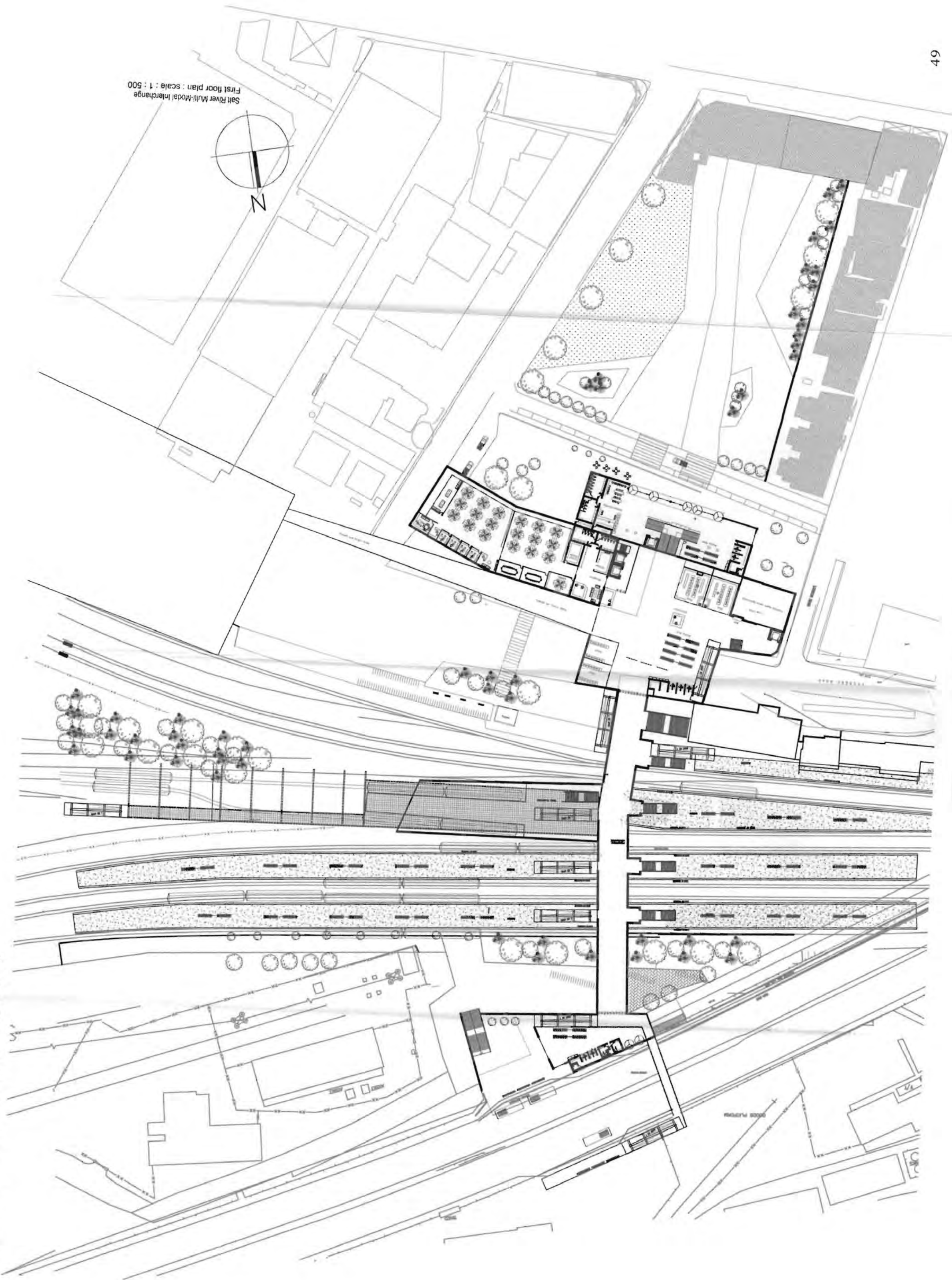




Salt River Multi-Modal Interchange  
Ground floor plan : scale : 1 : 500

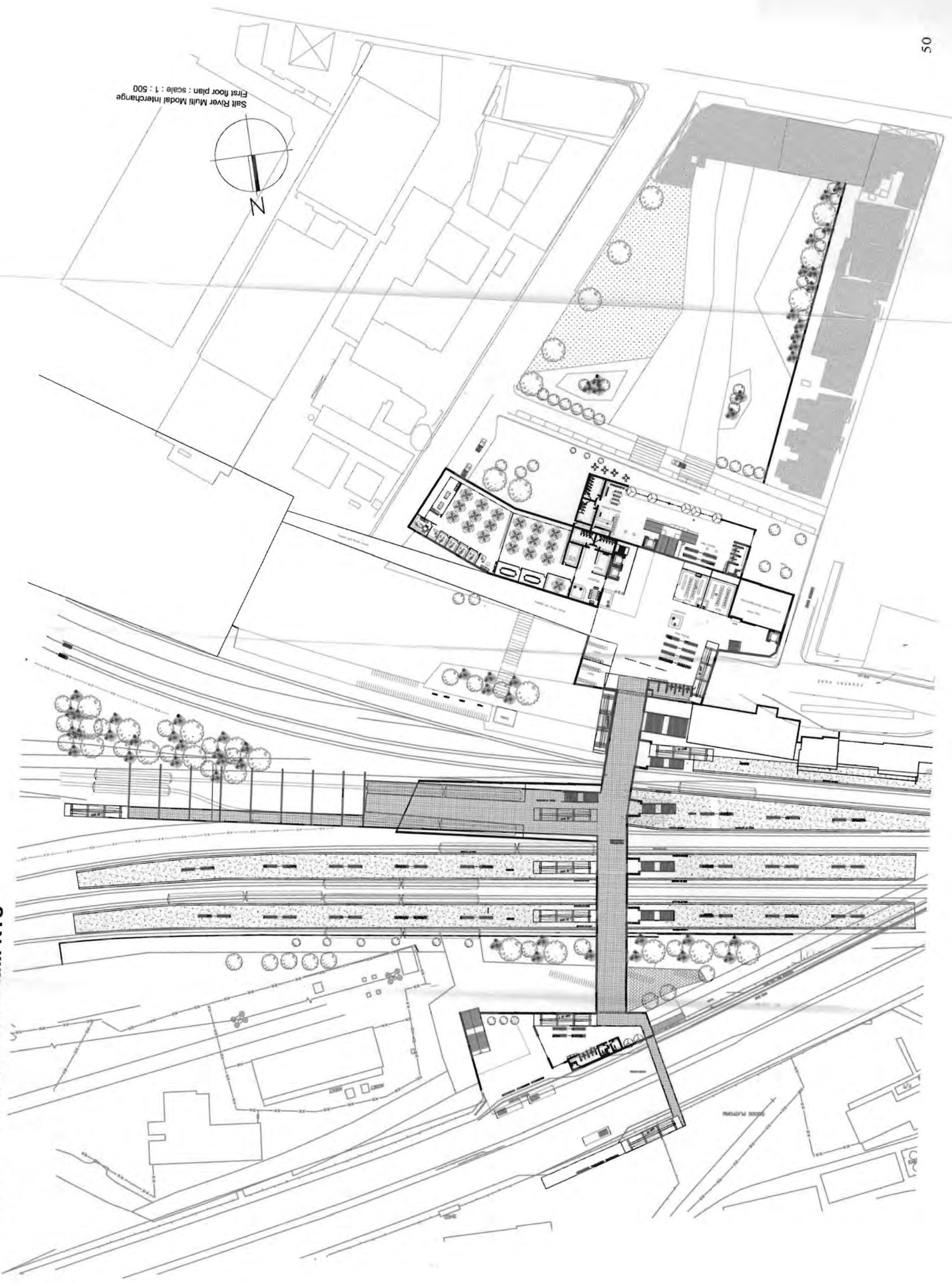
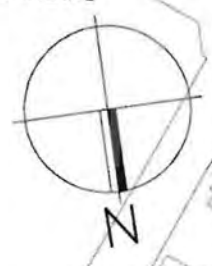


Appendix 3: Ground Floor Plan : NTS

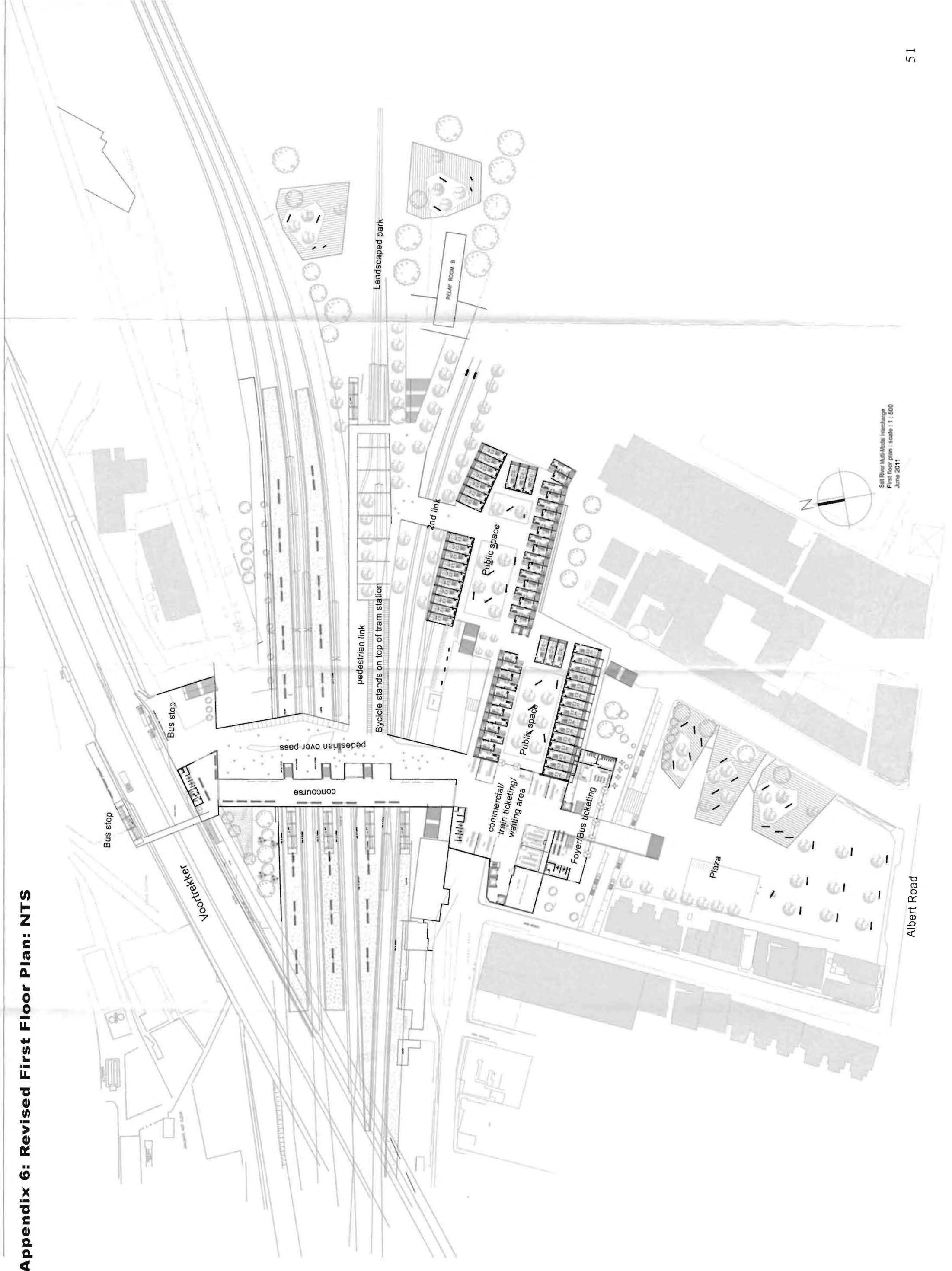


Salt River Multi-Modal Interchange  
First floor plan : scale : 1 : 500

Salt River Multi Modal Interchange  
First floor plan : scale : 1 : 500

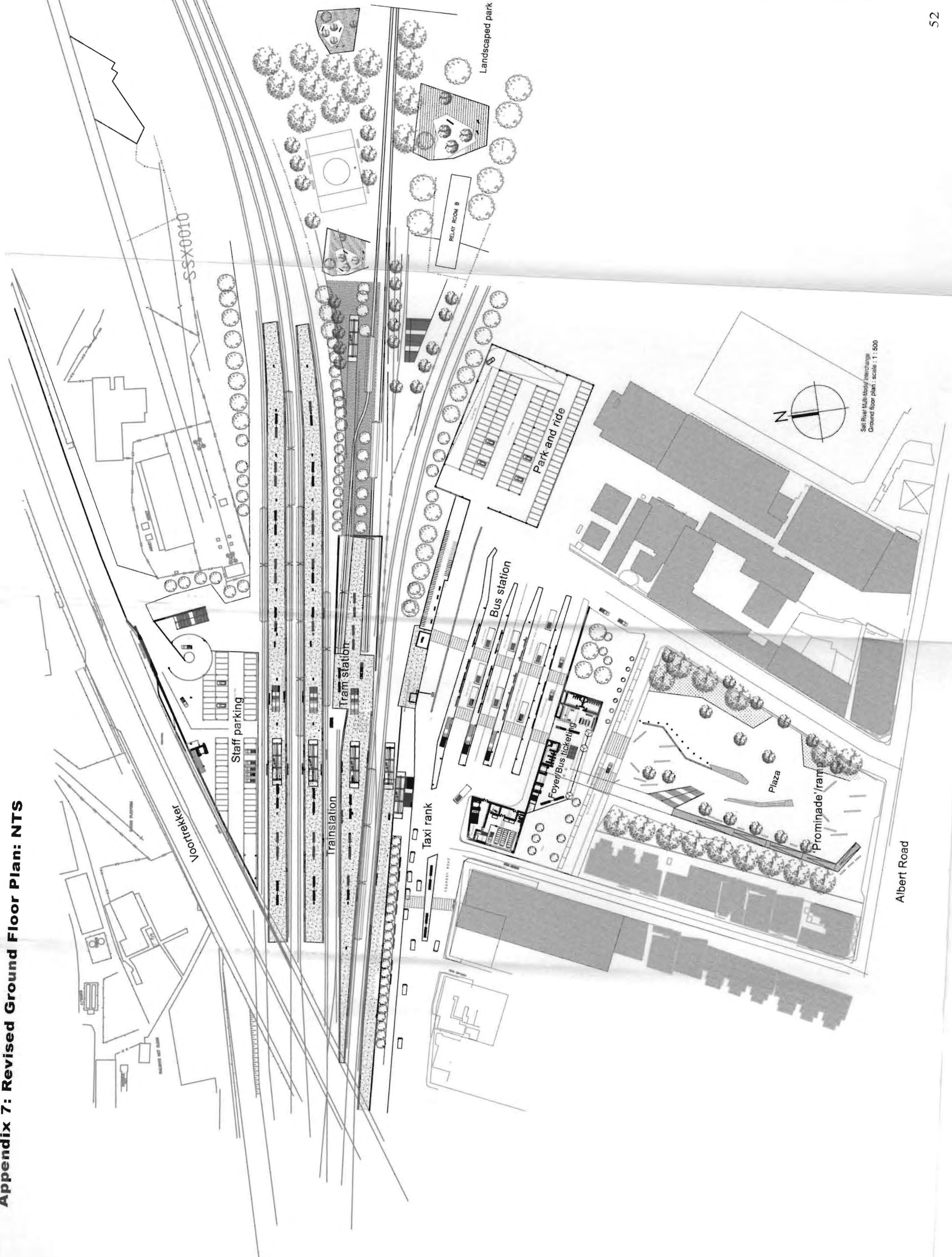


**Appendix 6: Revised First Floor Plan: NTS**

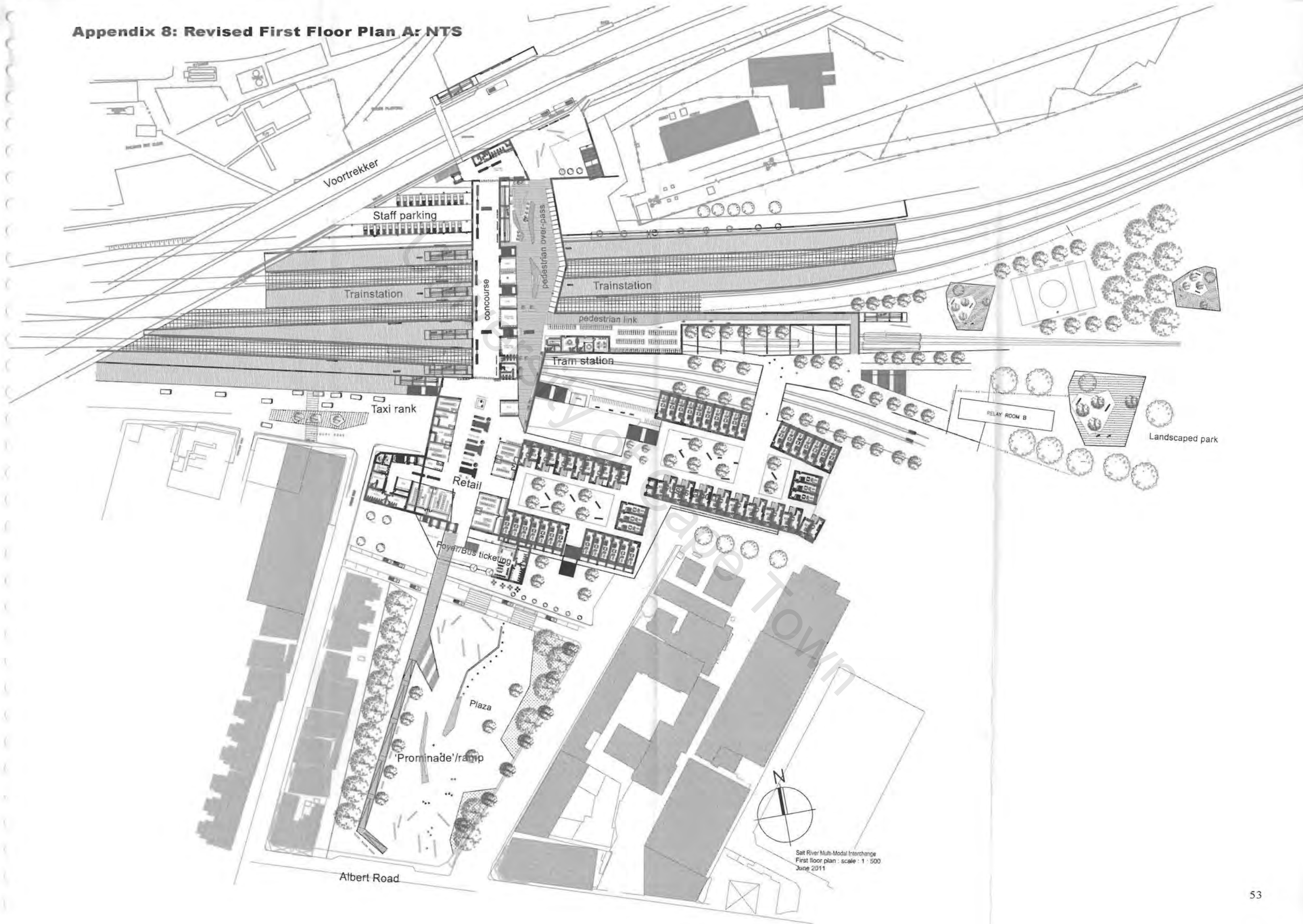


Salt River Multi-Modal Interchange  
First floor plan : scale : 1 : 500  
June 2011

**Appendix 7: Revised Ground Floor Plan: NTS**

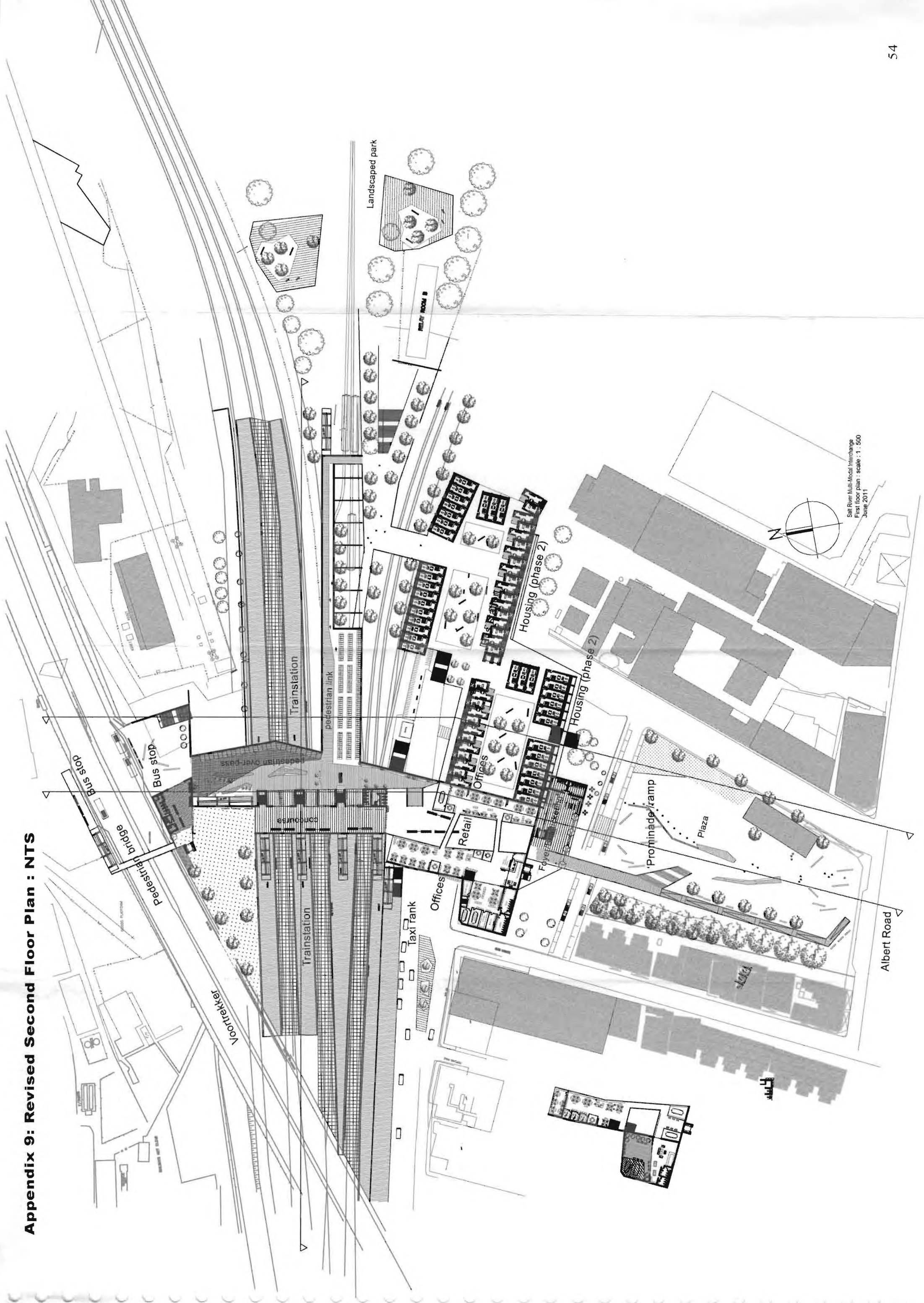


**Appendix 8: Revised First Floor Plan A: NTS**



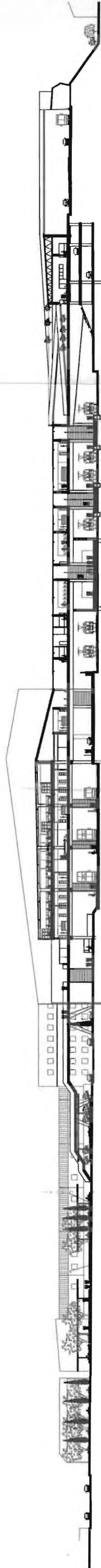
Salt River Multi-Modal Interchange  
First floor plan : scale : 1 : 500  
June 2011

**Appendix 9: Revised Second Floor Plan : NTS**



Salt River Multi-Modal Interchange  
First floor plan : scale : 1 : 500  
June 2011

**Appendix 10: Section A, B and C : NTS**



**Section A : NTS**



**Section B : NTS**



**Section C : NTS**