INHABITING
The Transitional Loctions of Urban Settings
THE IN-BETWEEN

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declaration

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***Figure 0.1**: People walking in the city (by Author, 2014).*

abstract

Movement between spaces ordinarily creates an in-between place in space, a place which is neither the precise place of departure nor the precise place of arrival, but is related to both. This generates another reality, a short-lived, momentary transitional place. Every day people travel great distances from one edge of the city to another by means of public transportation. We move through spaces such as airports, train and bus stations which exist as purely transitional spaces, and ironically many of these environments have certain emptiness about them even though there is a large convergence of people that come through these spaces on a daily basis.

This thesis presents an architectural proposal that addresses the issues of transitional locations, by identifying the architectural possibilities within a liminal context. I investigate how architecture and infrastructure can be integrated by allowing for programmatic hybridization in a South African urban context of the Johannesburg inner city. I propose a multimodal transit station where different modes of public transport intersect. The site is the existing Westgate station in the south western corner of the inner city of Johannesburg. The objectives of the building are to facilitate the functional aims of a multimodal transit station, to establish the station as a destination and to enable connection and exchange between different people. These are achieved by upgrading the existing public transport facilities and introducing educational, commercial, and recreational functions.

This architectural exploration aims to enrich public life in transitional spaces of urban settings. Many of the challenges associated with the typology of transit, including the sense of void and isolation that comes with mobility nodes that act as merely a transit zone, are addressed through the integration of mixed programmes that will enhance public space and create opportunity to linger. The aim is to provide an attractive and lively pedestrian environment starting at the transit station to make the experience of arrival and being in the area a satisfying one.

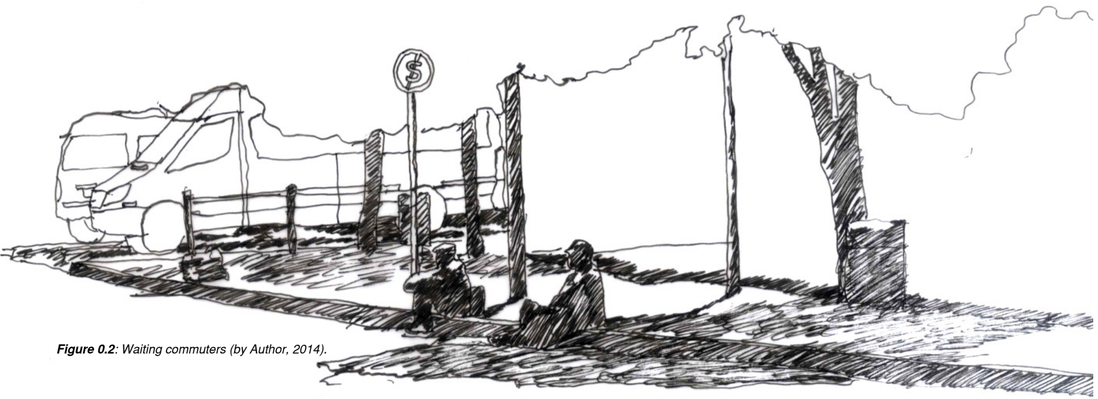


***Figure 0.2**: Waiting commuters (by Author, 2014).*

My thesis is dedicated to my family. To my loving parents Joseph and Violet
and my brother Tanaka thank you for all your enduring support and endless encouragement.

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01 | Theory & Research

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Figure 1.1: *Transitional space (Wakeling, n.d.).*

1.1 | Introduction

"Urban mobility and transport is critical for the functioning of our cities" (Smart Cities, 2012), but notably it also has negative impacts for urbanised and densely populated areas. The problems include air and noise pollution, greenhouse gas emissions, traffic congestion, rapid land consumption, separation of living spaces and alienation. The current transport infrastructure, particularly highways and rail lines, create uninhabitable leftover areas and incoherence in the physical, social and temporal fabric of the contemporary city (Crisman, 2013). The challenge becomes how we use the current infrastructure more efficiently so we can reduce the impacts of mobility, while maintaining and possibly increasing mobility for people and goods. A key approach being used in today's cities to tackle this challenge is the encouragement of *multimodality*, which refers to the use of more than one mode of public transport and discourages the use of individual cars (Smart Cities, 2012). Along with *multimodality*, transport nodes and transport oriented developments are terms being used a lot around this issue and they were key to my investigation for my thesis but first I felt I needed to understand the existing conditions, I needed to understand transitional space.

For my thesis I have designed a multimodal transit station where different modes of public transport intersect. My intention for this space was for it to be a destination; a place which brings people from diverse backgrounds together and fosters social interaction between them. Currently, spaces such as airports, train stations and bus stations exist as purely transitional space, ironically many of these environments have a certain emptiness and a sense of isolation about them even though there is a large convergence of people that come through these spaces on a daily basis. Could there be more that can come out of these spaces? Rather than being just a space can they be or have a 'sense of place'. The main characteristic of contemporary city culture is the constant change in our everyday life. Luz (2006), argues that the city is characterised by "movement and mobility, by a continuous flux of people, things, events and information, which determine new spaces of exchange and social networks" (Luz, 2006:145). In other words, the mobile individuals who inhabit the city's transitional spaces through the performance of their everyday activities can create new spaces, places which offer new opportunities even though they are transient spaces. Movement between spaces ordinarily creates an in-between place in space, a place which is neither the precise place of departure nor the precise place of arrival, but is related to both. This generates another reality, a short-lived, momentary transitional place. This transitory space is essentially a space in which "several incongruous sites and moments in time are juxtaposed, co-existent and layered together" (Luz, 2006:148).

Contemporary urban mobility is generating "continuous spaces of exchange, shifting the philosophical and built environment discourses from the fixed spaces of staying to a new perspective regarding the spaces of going — the spaces of passage, nomadism, transition and circulation"

(Luz, 2006: 145). My intention for the essay portion of my thesis was to gain a better understanding of the dynamics transitional space people move through on a daily basis. Spaces that become places we movement intersects, a crossroads where people cross each other at different speeds on their way to different places. The most straightforward approach to understand these spaces was by asking and answering the following four questions why do transitional locations exist, where do they occur, who occupies them and what objects populate them, so I could answer the question of how to potentially rethink and develop transitional spaces.

1.2 | People, Cities and Transportation

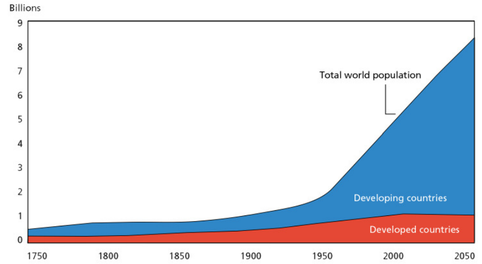


***Figure 1.2**: World population, 1750-2050 (World Bank, 2010).*

1.2.1 Why do transitional locations exist?

As inhabitants of cities we are constantly in motion, we transit so frequently that we are not even aware of the presence of transitional space, as our travelling experiences change from one place to another. As cities expand, huge demands are placed on existing infrastructure particularly transport systems which needs to be able to transport increasing numbers of people because the world's population is rapidly growing. Throughout human history, the world's population has grown slowly, but according to the United Nations Population Fund (UNFPA) (2008), the past 50 years has seen it more than double to reach 6 billion in late 1999 and surpass 7 billion in late 2011. This rapid population growth is due to lower mortality rates, longer life expectancy and high fertility rates (United Nations Population Fund, 2008). This increase in the population together with increasing living standards has put more demand on our cities and the environment. According to Tsay and Herrmann (2013), 2010 saw the world experience a great transition, as for the first time ever more than 50 percent of the world's population were living in urban areas. They go on to say that "each week more than 1 million rural residents move to cities around the globe" and "over the next four decades billions of people will continue to migrate to urban areas until more than 75 percent of the global population lives in cities" (Tsay and Herrmann, 2013:3).

Cities historically "were created for mutual defence as well as for market

exchange," (Tsay and Herrmann, 2013:4) with transportation being by foot or oxcart. Just over 150 years ago, we were an agricultural species, tied to the land for our sustenance. Then came the Industrial Revolution which was built on technologies and ideas that changed how we lived, freeing us from the land and pushed us toward urban living (Freedman, 2012).Transportation soon developed to include canals, steamboats, rail, and eventually private motorized transport (Tsay and Herrmann, 2013). Early industrialization also brought about new problems resulting from factories housing all sorts of production being located in close proximity to many of the workers settlements. Problems such as intense crowding, unsanitary living conditions, inadequate light, air, clear water, or sewage and garbage disposal were common (Freedman, 2012).

Architects and planners of that time were thinking about the development of alternative ideas and designs for human settlements. These ideas focused on providing the increasing number of people in the city with an alternative to the crowded centres of the early industrial cities by locating in new model communities on outskirts of large cities. These communities were in a sense the first 'suburbs' and were initially inhabited by those wealthy enough to afford the associated land and transportation costs. Among the most influential urban design publication of the new century was *Garden Cities of To-morrow* by Ebenezer Howard, which promoted the replacement of the monolithic growth of big cities with a decentralized pattern of smaller cities. Howard's Garden City concept proposed building smaller satellite towns to accommodate the growing population in a more equitable, aesthetically and spiritually pleasing fashion. The spread of the same technologies that instigated the growth of the industrial city – railroads, streetcars, and automobiles, acquired the role of transporting people and goods, as cities sprawled. (Freedman, 2012)

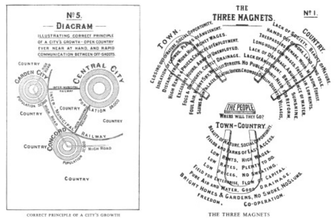


***Figure 1.3**: Garden city concept by Ebenezer Howard, was one of the most influential models for new settlements (Howard, 1902).*

All the urban design and planning innovation that flourished early in the 20th century was tragically cut short by World War I, the traumas of the depression and World War II. After World War II, families reunited and a 'baby-boom' ensued, which gave rise to a growing demand for housing. The market demands gave city building professionals the context in which to embark on a radical experiment with a completely new kind of city. The most prominent advocates of the new city form were the members of Congress International d'Architecture Moderne (CIAM), whose most prominent members included Le Corbusier, Water Gropius, Mies van de Rohe, and Ludwig Hilberseimer. CIAM's 'Modernist City' shifted the focus of city design away from historical precedent and was distinguished by strict functional separation of building type and land use. The form of the new city was entirely oriented around the automobile, and new roads played a major part in the form of the modernist city. Wide high-speed roads were essential to connect the widely separated residential, shopping and workplace precincts. Buildings were oriented to the landscaped interior of supersized block and away from city streets fundamentally separating the building from the street. The modernist city altered the role of the street, which had always been designed to accommodate mobility, commerce and social interaction. The purpose of the street became limited to mobility alone, as commerce was moved to the shopping centre and community to a facility elsewhere along the wide roads. The streets became fewer and wider, designed for high speed automobile traffic, not for pedestrians or commerce or socializing. (Freedman, 2012)

Modernist city planning was suitable for the major forces that were transforming the world at mid-century. The post-war industrial economy was based on the production of automobiles, roads, fuels, housing construction, home appliances, electrification, and cheap energy. These industries fuelled enormous growth and prosperity, particularly in developed countries, and inevitably transformed the conditions of life and economic development. However by the end of the century the Modernist City had lost much of its fit with the economy and its physical manifestation on the ground. As a result, problems such as traffic congestion, long commutes, rising fuel prices, rapid land consumption, and climate change have begun to accumulate. (Freedman, 2012)

Unfortunately we cannot replace our entire mobility infrastructure by putting everything everyone needs in close proximity. We cannot all work in the same neighbourhood that we live in, even if we do, we want to have the flexibility to change jobs without moving our homes. We need mobility and the city must provide this service, so we can get access from homes to jobs and other things not in our neighbourhoods. As we have realised in today's cities, providing mobility exclusively by cars and wide roads is resulting in congestion and contributing to climate change. According to Tumlin (2012), we need to provide mobility in a sustainable way, we need to employ mass transit effectively in our growing cities. Transit systems provide essential urban mobility while generating much less energy consumption and much less land consumption per person than any other form of mobility other than walking and bicycle riding (Freedman, 2012).



Figure 1.4: *Movement between spaces ordinarily creates an in-between place in space (derived from EschCollection, n.d.).*

1.3 | Transitional Locations of In-betweeness

The place of the in-between is theoretically related to the notions of liminality and the movement of people, our everyday routines of coming and going. As inhabitants of cities we are always in a transitory state, always on the move, exploring the city, moving between different locations, interacting with different people, objects and spaces on a daily basis. Luz (2006), claims that this "act of producing, consuming and using" of these city spaces during the transitory state "constitutes the starting point to characterise the in-between place" (Luz, 2006:150). Fully understanding and defining this place requires answering three more questions – where, who and what.

1.3.1 Where do transitional locations occur?

"There is no site-specific place or precise point in the city map that corresponds exactly to the in-between location" (Luz, 2006:150).These transitional locations in city settings are places of short-stays that vary in scale ranging from small corners to big spaces allowing us to discover and experience the in-between in various places. I have made a selection of places we can find or experience the in-between based on the temporal nature of momentary places in which the users are defined by their bodily movement. One of the most common places is the spaces between buildings. These are the residual spaces next to, behind, in front and on top of buildings. People in transit frequently move amongst buildings and are constantly in a dynamic state of in-between. These spaces between buildings are streets, alleys, squares, parking areas and parks. Other spaces I have I identified that we can experience the in-between, and which will further elaborate on the where question are:

a) The liminal space of transition

Liminality refers to the "in-between situations and conditions that are characterised by the dislocation of established structures, the reversal of hierarchies and uncertainty regarding the continuity of tradition and future outcomes" (Steenkamp 2012: 31). The concept of liminality was developed by anthropologist Arnold van Gennep in his study of cultural celebrations, *Les rites de passage* (1909). Van Gennep defined rites of passage as "rites which accompany every change of place, state, social position and age" (Turner, 1967:94). Van Gennep (1960), described rites of passage as being subdivided into three phases, separation, transition (liminal) and reincorporation. "The first phase of separation comprises symbolic behaviour signifying the detachment of the individual or group either from an earlier fixed point in the social structure or a set of cultural conditions (a 'state'); during the intervening liminal period, the state of the ritual subject (the 'passenger') is ambiguous; he passes through a realm that has few or none of the attributes of the past or coming state; in the third phase the passage is consummated." (Turner, 1967:94)

Anthropologist Victor Turner further developed Van Gennep's concept of liminality, first introducing his interpretation in 1967 in paper titled *Betwixt*

and Between: The Liminal Period in Rite de Passage. Turner drew heavily on Van Gennep's three phase structure for rites of passage, concentrating entirely on the transitional (liminal) stage of rites of passage. He identifies the state of liminal individuals as being socially and structurally ambiguous, "the subject of passage ritual is, in the liminal period, structurally, if not physically, 'invisible'" (Turner, 1967:95).

Van Gennep and Turner both use liminality to describe the transitory stage characteristic of rites of passage in various cultures. The general rational given by the subject of liminality is that it can only be verified by the presence of two set entities and as a transitory space it sits in an in-between position. Cultural theorist Homi K. Bhabha views liminality as an important concept with strong ties to his idea of hybridity. For him, liminal space is an "interstitial passage between fixed identifications and opens up the possibility of cultural hybridity that entertains difference without an assumed or imposed hierarchy" (Bhabha, 1994:4). The hybridity he talks about is located in an in-between position, always changing itself according to how different users interact within the in-between. He equates it to his concept of the 'third space'. Hernandez (2010), argues for this claiming that the 'third space' offers spatial connotations to the liminal position where hybridisation occurs.

According to Bhabha the 'third space' is a passage, "a liminal site between contending and contradictory positions. Not a space of resolution, but one of continuous negotiation" (Hernandez, 2010:95). In the context of cities the 'third space' is a space people move through on a daily basis, a space of encounter where people from different backgrounds intersect, facilitating the development of economic and cultural operations that become available to the inhabitants. In the everyday lives of the inhabitants of cities they intersect and engage with many different and complicated mixtures of objects, people, activities, spaces, and events, providing for a "possibility to inscribe, and to validate architecturally, the actions of the people as producers of their own inhabitable space, as true agents in the continued reshaping of cities around the world" (Hernandez 2010:95).

b) The transitional localities of transportation

We spend substantial portions of our modern lives in a netherworld of highways, airports, railway stations, hotels, supermarkets and shopping malls, in liminal moments between other places and events. French anthropologist Marc Auge called these places 'non-places'. In his book *Non-Places: Introduction to an Anthropology of Supermodernity*, Auge elevates these non-places to the status of high theory through a discussion of the interrelationship of space, culture, and identity (Collins, 1996). Auge's hypothesis is that "supermodernity produces non-places, meaning spaces which are not themselves anthropological places and which, unlike Baudelairean modernity, do not integrate the earlier places: instead these are listed, classified, promoted to the status of 'places of memory', and assigned to a circumscribed and specific position" (Auge, 1995:78).

Supermodernity's most important quality is excess. Auge splits excess into three categories – excess of time, excess of space and the individual, which are the main characteristics of our daily urban lives. According to Buchanan (1999), Auge sees time as being theoretically the same as progress and, therefore, Auge argues that time has suffered the same fate as progress which is seen as an omen of all the twentieth century ills such as nazism, communism, capitalism. Auge, however, does not see this as the main problem. He identifies today's instant telecommunications as a bigger problem as it makes it extremely difficult to separate what are worthless events from significant moments, because it gives us events in abundance and time itself appears to have been spatialised by digital technology. Auge points out, that today it is the fact that we constantly feel the need to give the world meaning, which is what he is actually trying to address, and not that it lacks meaning. (Buchanan, 1999)

For Auge, in the category of space, the spaces he calls non-places, bring a sense of disassociation which is slightly compensated for by nostalgia (Buchanan, 1999). Auge states that, "the distinction between places and non-places derives from the opposition between place and space" (Auge, 1995:79). Non-place is defined in its opposition to place. Place is a standard anthropological concept meaning a concrete and symbolic construction of space, and Auge reminds us that it is an anthropologist's tool, not the social group said to inhabit it, its role is to name a relational system that integrates people with a region, their past with a present to be fashioned, and their sense of self with a future they are determined to live (Buchanan, 1999).

In Micheal de Certeau's analysis of the notions of place and space, he does not oppose place and space in the way that Auge opposes place and non-place. For de Certeau, "space is a practiced place", meaning that a place such as "the street geometrically defined by urban planners is transformed into a space by walkers" (de Certeau, 1984:117). Auge however states that, the place he is talking about "is not quite the place de Certeau opposes to space (in the same way the geometrical figure is opposed to movement, the unspoken to the spoken word or the inventory to the route): it is place in the established and symbolized sense, anthropological place" (Auge, 1995:81). He hypothesises that, "if a place can be defined as relational, or historical, or concerned with identity, then a space which cannot be defined as relational, or historical, or concerned with identity will be a non-place" (Auge, 1995:77). In Auge's opinion, spaces such as airports, hotels and train stations are non-relational, unhistorical and unconcerned with identity. Passengers on an aeroplane or a train for example, do not share any relation with each other outside the ultimately coincidental fact that circumstances have brought them together for the length of the journey. (Buchanan, 1999)

In the case of the third category of excess, the individual, Auge claims that non-places assist in creating, and daily reinforcing, individualism by

offering a kind of anonymous space that cannot be owned or invested in emotionally, but which is able to make one feel modern, important, and at home (Buchanan, 1999). "The frequentation of non-places provides an experience of solitary individuality combined with non-human mediation between the individual and the public authority" (Buchanan, 1999:396). Meaning that while "anthropological places create the organically social, non-places create solitary contractuality" (Auge, 1995:94).

Supermodernity equals solitude, a solitude which is not feared because it is never fully felt. As Buchanan states, "the success of the mechanism called the non-place is its ability to stand in for and to improve upon, human interaction – the automatic turnstile is faster than the conductor, the ATM more convenient than the bank, and the credit card simpler than cash" (Buchanan, 1999:396). We are accustomed to welcoming the inhuman; we feel comfortable in its recognised oddness, for example, when travelling abroad we find that the familiarity of a generic airport space can be reassuring. Despite the fact that we may be in a foreign land, with a foreign language, we can still find our way around a busy airport because its main features are the same as every other airport. When traveling, no matter how unfamiliar a place maybe, if we simply follow an already all too familiar itinerary we will get through. First, we present our ticket at the check-in desk, where we are given a boarding pass; then, we put our luggage through; next, we proceed to the customs checkpoint, followed by the immigration control point; then, finally the departure lounge. (Buchanan, 1999)

The spaces within a city are used by the public who are strangers to each other. Public transport increases the chances of the city's inhabitants having access to the same spaces and in that regard public transport is critical to the functioning of a city. Auge views the increased levels of mobility as having resulted in all space being seen as "a transit zone: a mere interval in our state of continuous movement" and such architecture then generates a sense of 'non-place', which changes the "way we experience the physical environment and condition our expectations" (Crisman, 2013:123). Transportation buildings usually work like an input-output device, one arrives and then departs. These building have a very clear orientation of where to enter and exit, but can transportation infrastructure operate as more than just a gate? Around this constant field of movement I think it can.

1.3.2 Who inhabits the transitional location?

City centres are by definition the places where people gather together in large numbers to engage in wealth creation. Cities must be able to provide a variety of basic services to assist this important wealth creation function. These basic services include mobility to provide access to goods, services and people; public localities to accommodate trade, idea exchange, and socialising; institutions to facilitate the growth of the city, insure the health and maintenance of the environment. These basic services must exist in a setting of relative safety that can be used simultaneously by people who are strangers to each other.

According to Luz (2006), studies on cities associate urban mobility with the concept of intimate anonymity and human interaction which follow German sociologist Georg Simmel's concept of the stranger. She goes on to argue that, "the future of urbanism lies in understanding the city not as a fixed sculpture of urban patterns, but as a human event" (Luz, 2006:152). Cities hold rich potential within their urban spaces. As places that bring people together in a variety of predictable and unpredictable ways, they are likely to be places for impulsive events, activities and use of services, places that allow for connecting movement of various people with experience of place and social interactions while allowing people to remain anonymous. Simmel (1950), perceives the stranger as a wander who comes today and may stay tomorrow, and not a drifter who here today and gone tomorrow. The stranger is defined by being a blend of nearness and remoteness, meaning that the stranger can be physically close but socially distant, which gives him the ability to move between different social and spatial positions. As we interact with strangers we get the impression of being close to someone from a distance, but at the same time being far away from someone who is in our immediate environment.

The person who inhabits the transitional location, therefore, is the anonymous public man or the unidentified pedestrian, or merely the walker. The walker is sometimes labelled as the wanderer, the drifter, and the ambler. However, these terms imply randomness in intention whereas pedestrian or walker clearly suggests the ordinary and simple act of travelling by foot. Everyday pedestrians are travellers or more commonly known commuters, they are urban dwellers who travel between one point and another with purpose, even if in the beginning unclear or later on changed. As everyday pedestrians within the urban setting our most important features are our bodies, our spatial language and behaviour. We use our bodies as vehicles to get us to our destinations, as we do so we encounter an entirely new and authentic sensory experience as we walk, run, cycle and skate, our bodies are constantly in motion. In modern urban culture, however, the reality is that we travel by others means, be it by car, train or airplane, because of two main reasons, the time it takes to reach destinations and the distances that have to be covered to reach destinations. The pedestrian journeys provide what the other means of travel cannot, through the act of moving on foot from place to place the pedestrian experiences an active instance of being in place. (Luz, 2006)

The pedestrian, as Luz (2006) describes it, experiences different rhythms, paces and capabilities of locomotion, which stands for local (locus, place) and motion (motio, movement), which by definition means the ability to move from place to place, but also a self-propelled movement and a motive. There are two conditions of locomotion that have to be considered.

Firstly, the condition of being in motion – walking, rushing or running, and secondly, the pause condition – lingering, waiting, slowing down – which is often followed by the stop condition of literally stopping, staying longer, sitting and resting (Luz, 2006). As we walk between one point and another with a purpose we use time and space to experience, pause and engage with the surroundings. The transitional location allows us to constantly be between the walking and the pause condition, walking or not walking therefore becomes the spatial practice that embodies the in-between.

1.3.3 What are the objects or non-objects that occupy the transitional location?

Despite the use of different terms and approaches, urban studies as well as experimental work of the Situationists and even several other literary works on city and travel, all suggest the same potential line of thought with regard to experiencing the city. They propose a new exploration of the city and urban forms established on the active engagement of everyday use, in particular on the pedestrian walking mode of discovering the city. It is the pedestrian who ultimately explores the city to find new opportunities of use and occupation, engage and find new incentive, new objects and sometimes non-objects, for unexpected appropriations in the urban situations of the disconnected city. (Luz, 2006)

The idea of a bench is that it is an object on which to sit and rest, however in our modern public spaces we find that the form of an object does not necessarily dictate its conventional use. For example, we find people sitting on a doorsteps and windowsills, or leaning on a railing and walls, giving a new meaning to these objects and their use. Dutch architect Herman Hertzberger when discussing habitable space between things mentioned that "we must take care not to leave any holes and corners behind which are lost and useless, and which, because they serve no purpose at all, are uninhabitable" (Hertzberger 1991: 186). Danish architect and urban designer Jan Gehl sustains these claims in his book *Life Between Buildings: Using Public Space*, he argues that "if spaces are desolate, two-dimensional and empty and if the facades lack interesting details – niches, holes, gateways, stairs, and other semi-public, semi-private situations – it can be very difficult to find places to stop" (Gehl 2001: 155).

Based on the appropriation of these engaging forms for different uses, the objects that populate the in-between are not just simple urban furniture – benches, lampposts or bins. The innovation in our modern urban materiality is established around the momentary and undetermined event-like things, everything is changeable and on the move. As the notion of transitional places also comprise of several references from social and cultural studies, architecture, urbanism and applied arts, Luz (2006) suggests that the term urban artefacts should be put forward as the definition of what organises the in-between.

1.4 | Conclusion

The aim of the essay is to study why these transitional locations exist, where they occur, who occupies them, and what objects populates them. My investigation will assist me in addressing how to potentially rethink and develop these transitional locations of urban settings. Every day we travel great distances from one edge of the city to another by means of public transportation. Transit-oriented developments are developments that form around transit stations and international research indicates that people living within walking distance of modern and convenient commuter rail transit are five times more willing to take transit (instead of driving) than people who live farther away from the station (Freedman, 2012). Walkability is absolutely critical to the success of transit stations. My multimodal transit station is therefore shaped by pedestrian movement. The building operates with very clear orientation in terms of departures and arrivals, and circulation literally shapes the spaces.

On a daily basis commuters go "from walking to waiting at a train platform or a bus stop, or stopping at a traffic light, or waiting for a friend, or lingering while smoking a cigarette" (Luz, 2006:153). The way people transition from walking to momentary non-walking pauses becomes important. Without disrupting the flux of movement I would like to bring a sense of place to the monotonous everyday urban routine of transitional locations. The essay shows that, as is the case with numerous other places in urban everyday life, the transitional locations of 'in-betweeness' remain as spaces of mobility and of exchange. In the nodes of transition and in-between places that exist within our cities, there are movement generators, but also a place that activates pause to enjoy the moment, to smile and look at something or someone. If the in-between stage of our mobility can provide us with places that encourage momentary stops, as well as stopping conditions that encourage potential enjoyable movements and activities, then the design of transitional spaces will be progressing.

This urban condition suggests that the streets within transit-oriented developments must be easy to walk or to bicycle to and from destinations otherwise transit riders will be stranded at the end of their transit ride, making them less likely to ride the train or bus again (Freedman, 2012). An attractive and lively pedestrian environment should be on display starting at the transit station to make the experience of arrival and being in the area a satisfying one. The design of the transitional location of urban settings lies in the urban details that we as inhabitants appropriated from architecture and urban spaces – thresholds, steps, protrusions, walls, fences – as well as, the exploration of the almost invisible elements of mobility such as crowds, tiredness, sweat, weather conditions, wind, light and shadow, emptiness, thoughts, dislocations and misplacements (Luz, 2006).

02 | Context

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***Figure 2.1**: Morning walk Johannesburg (by Author, 2014)*

2.1 | Movement in Johannesburg

Johannesburg, South Africa's economic hub presents itself as an "African city emblematic of a new way of being in the world, a city of migrant life, of new relationships and porous boundaries, at once dangerous and exhilarating, chaotic and productive" (Law-Viljoen, 2011:1). The linear cuts through the urban fabric by railway lines and highways have shaped Johannesburg by bisecting through and bordering the inner city and subsequently urban mobility is a critical component to the city's functioning. The inner city of Johannesburg, an "urban agglomeration – crowded, dirty, noisy, disorganized, and pulsating with life – is home to more people of different ethnic and religious backgrounds than anywhere else on the African continent" (Murray, 2008:169). It may not be the central business area that it was but the inner city continues to attract shoppers, businesses and acts as a terminus for people moving between places of employment and their homes. Trains, buses, taxis and private cars bring people to the end of their journey in Johannesburg's inner city, a place has long been a place of new beginnings for travellers and migrants form across Africa and a key arrival point on the continent. Johannesburg is therefore not only a transitory city but also an arrival city, and as such the various stations people arrival become more than just a transit point but have an opportunity to be a place of connection and exchange.

What began as a fairly desolate setting, a predominantly agricultural landscape that at the time was virtually without trees, soon had tents, wagons and permanent tin structures spread across it. Early mining settlements had initially been shaped by farm boundaries, but the surrounding reefs and the discoveries of gold had determined their growth. With the discovery of gold in 1886, the area of twenty farms had developed into a thriving and growing town. The extent of the Main Reef road was a key factor in the development of the town as it ran along an east west axis and "virtually followed the line of the gold reef and provided the mining industry with a connecting route to transport the gold" and also linked "the original sites of discovery to the base of the official mining camp" (Prasad, 2008:20).

However, with the developments on the mines and the growth of the town, it was evident that better transportation services, other than wagons and animal power, were required for mobility in and out of the Witwatersrand. In 1890 a light railway system termed tramway commenced its operations between Boksburg and Johannesburg with the objective of transporting coal to the mines. In the Rand tram's first year of operation it not only managed carried 65 000 tons of coal to the mines, buts also carried 66 000 passengers, which had a positive impact on shopping patterns in downtown Johannesburg. Many passengers who used the Rand tram to commute to Johannesburg for shopping would have arrived or boarded the train at Park Station and then continued on foot. Increased levels of potential spenders in Johannesburg encouraged the opening of new business and the expansion of the town. The Witwatersrand basin was not only rich in gold, but it was also characterised by coal deposits located 27km east of Johannesburg in what was soon to be the town of Boksburg.

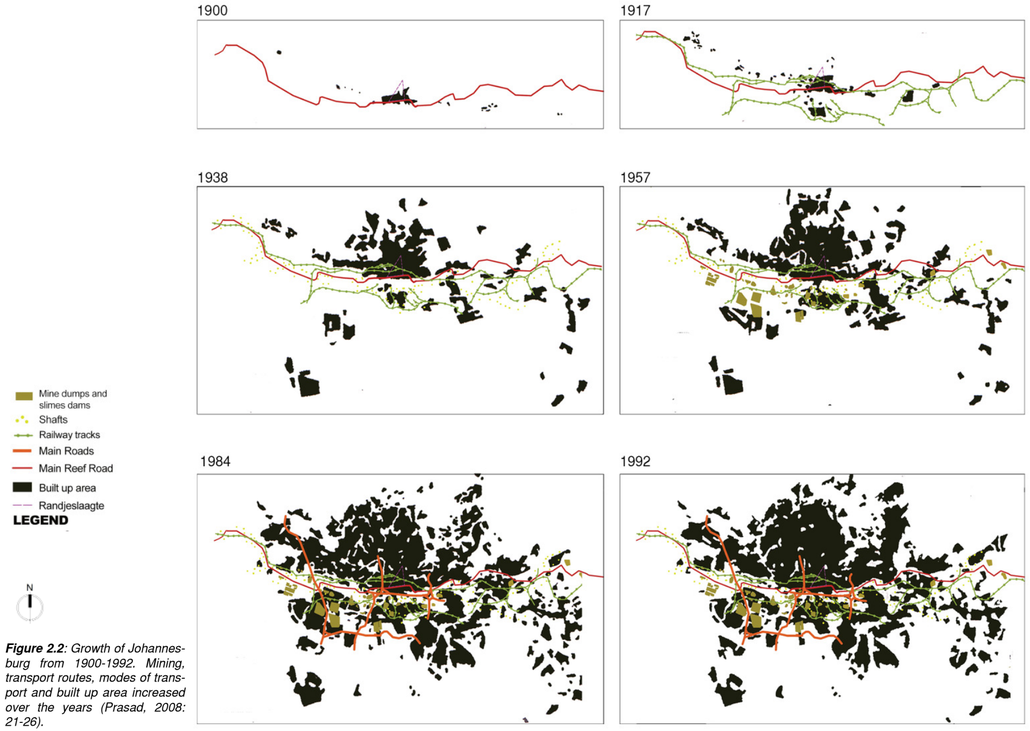


***Figure 2.2**: Growth of Johannesburg from 1900-1992. Mining, transport routes, modes of transport and built up area increased over the years (Prasad, 2008: 21-26).*

Coal provided the necessary solution to the existing slow and small scale transportation. It provided the fuel for generating steam, which could then be harnessed and put to work in the form of locomotive and the railway system. (Beavon, 2004)

During 1901-1910, as Johannesburg's population grew the city expanded outward beyond the city boundaries with northern suburbs starting to attract the higher income groups. The introduction of the electric tramway and rapid increase in private motor cars enhanced the appeal of the northern suburbs for the wealthy as they could still access Johannesburg's downtown retail and offices with ease using either mode of transport. Although some improvements in terms of access to the Johannesburg CBD had been made, the city was growing outwards in all directions, improved access particularly from the north and south, and provision for increased passenger traffic on the railway were needed. The importance of railways for the inter-city movement of people meant that the improvements to Park Station required "dropping the level of the railway lines in order to construct bridges that would be at grade on either side of the crossings" (Beavon, 2004:160). Five bridges were built over the 300m wide railway lines between 1951 and 1954 providing an unobstructed route for motor traffic in and out the city and linking the city with Braamfontein, an extension of the CBD. (Beavon, 2004)

The improved access into the CBD meant that the number of motor vehicles entering the city on a daily basis grew quickly within a short space of time, with private car ownership increasing amongst white people who lived in the expanding northern suburbs. The replacement of the tram system with buses further encouraged the use of private cars on some routes and also provided an opportunity to widen some of the roads that led to and from the city. In 1956, of the vehicles including buses entering the Johannesburg CBD during the day, 47% were headed for places on the other side of the CBD and 50% with destinations in the CBD were headed for the opposite side from which they had entered (Beavon, 2004). The city had no bypass for drivers whose destination was beyond CBD. The City engineer drew up a new traffic plan for the city following advice from America, "the country where the private auto mobile was being well catered for through the efforts of the traffic engineers" (Beavon, 2004:161). The City engineer believed that this would be most suitable solution. The subsequent plan and freeway system consisted of elevated highways (the M1 and M2 highways) with on and off ramps around the CBD and links to the radial arterial routes from the suburbs. (Beavon, 2004)

In 1976 the taxi industry grew out of the need for an inexpensive but rapid mode of commuter transport between the African townships and specific nodes in the city and other nodes in Johannesburg. As the taxi industry provided an essential service to the African community it grew rapidly and at least 40 per cent of the African commuting public used taxis every day in a market previously dominated by the railways and a state-subsidised



***Figure 2.3**: Waiting for taxi Johannesburg sidewalk (by Author, 2014)*

bus company. According to Beavon (2004), in the late 1970s there were a handful of regular six-seater vehicles used as taxis, but the change to mini-buses in Soweto saw the numbers increase to a ratio of 1,4 per thousand people in 1980, and 3,5 per thousand in 1990 and by 1991 there were 7000 mini-bus taxis operating in and from Soweto alone. By mid-1998 the number of licensed and unlicensed taxis operating in Johannesburg had reached 35000. Most of these taxis started operating early in the morning carrying commuters between the township and the CBD and after the morning peak most of the taxis remained parked until the late afternoon rush home. As a result taxi ranks, much like bus stations, become necessary to accommodate the stationary taxis during the day. Accompanying most of the taxi ranks were street traders, "pavement-based businesses that fulfil the commuters' needs for refreshments and convenience items such as a single cigarette or razor blade, unobtainable from most formal businesses" (Beavon, 2004: 247).

As a result of Johannesburg's long historical process of transportation and human movement, the city provides the ideal setting to investigate the transitional locations in it.

2.2 | Site

2.2.1 Site Selection Criteria

The aim my thesis was to present an architectural proposal that addresses the key issues I identified and so a typology of site that can act as a canvas on which the issues could be tested was required. I established the following criteria to focus the selection of site:

1. The site should be in an urban area.
2. The site must have existing public transport infrastructure.
3. The site must be easily accessible to different modes of public transport such as rail, bus and taxi.
4. There must be future initiatives for development in the area

2.2.2 Site Selection

My investigation began by looking at potential sites around the Johannesburg CBD. This led me to an area located in the south-western corner of the inner city of Johannesburg that met the criteria set up. This area is the Westgate Station Precinct. The precinct has been identified as having a unique opportunity to operate as a visual and physical gateway to the Johannesburg inner city and to transform into a high intensity Transit Oriented Development node. The focus for my thesis is the existing Westgate station.



***Figure 2.4**: South Africa with Gauteng Province as indicated (by Author, 2014).*



***Figure 2.5**: Gauteng Province with City of Johannesburg Metropolitan Municipality as indicated (by Author, 2014).*



***Figure 2.6**: City of Johannesburg Metropolitan Municipality with the inner city as indicated (by Author, 2014).*



***Figure 2.7**: Aerial photo of Johannesburg inner city with the Westgate Station Precinct and Westgate Station as indicated (Google earth image edited by Author, 2014).*

2.3 | Macro Analysis

2.3.1 Urban Analysis

a) Existing Movement Network

The existing movement network in the Johannesburg inner city is critical to how efficiently the city functions, particularly the ease, comfort and safety of mobility and access. Private transport, public transport, non-motorised transport and pedestrians need to be integrated and coordinated for maximum efficiency. A more sustainable and environmentally friendly strategy for cities today involves moving away from private transportation to public transport and pedestrian movement.

Private Transport

Most of the people that enter the inner city during the morning peak and the evening peak hours using private transport are people traveling to and from work. They enter the city via the M1 highway, which runs in a north-south direction and provides access to the inner city from the northern and western side, and the M2 Highway, which runs in an east-west direction and provides access to the inner city from the southern side. Other major through roads into the city include, Bree, Jeppe, Albertina Sisulu, Commissioner, Marshall, Anderson and Rissik Streets (Fig.2.8). (VISI Africa Strategic Planners CC et al. 2009)

The inner city consists of grid network of approximately 60m x 60m, which was originally designed for pedestrians and this dense character is not suitable for high levels of private vehicle use, because of the numerous intersections and the resultant slow traffic conditions and congestion. Less than a third of commuters use private cars, yet currently private cars dominate large parts of the inner city contributing to pollution and unsafe pedestrian environment. Parking for private vehicles it another problem in the inner city as there is generally not enough parking or parking spaces are used inefficiently, for example in some instances it is not a requirement to provide parking or parking is reserved for building tenants only. Most of the streets accommodate on-street parking which is well-used, but has a negative impact on the space available for pedestrians and other modes of transport. (VISI Africa Strategic Planners CC et al. 2009)

In the city's effort to provide more effective public transport, the pedestrian network should be the movement dominant layer and not private cars. Access for private cars should be facilitated but mobility should be limited.

Pedestrians

All users of the inner city are at some point in their daily routine a pedestrian. Pedestrian movement is the only form of movement that is available to all users, the most environmentally friendly and the most efficient. However, according to VISI Africa Strategic Planners CC et al. (2009), the pedestrian environment receives little to no attention in most areas and the existing pedestrian network is insufficient, as most:



***Figure 2.8**: Existing Road network (Google earth image edited by Author, 2014).*

- Are often incomplete, non-existent or of poor quality and too narrow, forcing pedestrians into the street;
- Are often cluttered with street furniture and services resulting in a narrow effective sidewalk width;
- Are often not graded or designed with wheelchair users in mind;
- Do not offer protection against the weather;
- Are often ill equipped in terms of lighting, Closed Circuit Television (CCTV), and direct sight lines – this presents an environment that is unsafe for pedestrians and a haven for criminals, especially in hours of darkness;
- Are often not continuous and fail to link areas and reflect pedestrian desire lines; and
- Do not make provision for safe crossing of roads and busy intersections are often difficult for pedestrians to cross. (VISI Africa Strategic Planners CC et al. 2009)

The success of the inner city as well as the various modes of public transport depends on the improvements to the pedestrian environment with interventions that look to address things such as effective sidewalk width, paving, lighting, street furniture, street crossings and pedestrian-building interface.

Public Transport

Public transport consists of buses, taxis and trains. According to ASM Architects and Urban Designers & Arcus Gibb (2010), 54% of daily trips in the inner city are by public transport. The public transport system is therefore a critical to the efficient functioning of the inner city and is inherently connected to pedestrian movement. The link between public transport facilities and high quality pedestrian networks is thus very important.

Minibus-Taxis

The mini-bus taxi service consists of both long and short distance taxis. Inaccessibility to other modes of public transport during early morning hours encouraged the use of taxis. Many of the taxis serving the inner city are from the townships, compared to a percentage of taxis that originate from Johannesburg's northern and southern Suburbs. For many commuters entering the inner city, the city is a transfer point to other various destinations, which mainly include the northern suburbs because many activities, such as employment, education and recreation are found there. Various long-distance taxi routes are served from the ranks in the inner city, ranging from destinations within Gauteng, to destinations within South Africa, to international destinations. There are several formal minibus taxi ranks in the inner city which include Park Station, Metro Mall, Westgate, Faraday, and Jack Mincer. Informal taxi ranks are also found scattered throughout the inner city commonly found in the road reserve, because of limited space available for ranking activities this creates serious congestion problems. (VISI Africa Strategic Planners CC et al. 2009)



***Figure 2.9**: Existing Pedestrian Links (after Gapp Architects and Urban Designers, 2011).*

Trains

The passenger railway network passes through the central portion of the inner city in an east-west direction culminating at Park Station, towards the north of the inner city. There are four stations located in the inner city but Park Station is by far the busiest station and forms the centre of the intermodal transfer facility, where linkages to other modes of transport like the Gautrain are readily available. (VISI Africa Strategic Planners CC et al. 2009)

Buses

There are a number a subsidised bus services serving the inner city which include Metrobus and Putco. Metrobus operates throughout the day from a number of termini within the inner city, starting before 8:30 in the morning up until late afternoon, making a total of 557 trips daily. The Putco Soweto service offers a limited service to the inner city, making a total of 22 trips daily. (VISI Africa Strategic Planners CC et al. 2009)

BRT

The Johannesburg BRT system (Rea Vaya) makes use of large buses travelling on trunk routes in dedicated median lanes, with smaller, complementary buses operating on BRT routes without dedicated lanes, feeding commuters into the trunk routes. The important BRT routes are Main, Commissioner, Market, Plein, Wolmarans, Smit, De Korte, Jorissen, Kotze, Mooi, Troye, Rissik and Miriam Makeba Streets. (VISI Africa Strategic Planners CC et al. 2009)

***Figure 2.10**: Existing Movement Networks (derived from VISI Africa Strategic Planners CC et al. 2009: 37)*

b) Development Initiatives

In a 2010 Johannesburg Inner City Traffic & Transportation Study by Albonico Sack Mzumara Architects and Urban Designers and Arcus Gibb, a series of public transport orientated development initiatives were identified, which focus on the integration of public transport facilities and associated land use activities, enabling development synergy. The initiatives are structured into the following categories:

Strategic Focus

That is the east-west transport and development axis along Carr & Noord Streets, which includes the Park Station at its centre, the Metro Mall, Kazerne, and Jack Mincer facilities. The two supporting public transport orientated precincts of Braamfontein and Doornfontein, respectively form the western and eastern ends to the axis. (ASM Architects and Urban Designers & Arcus Gibb, 2010)

Gateway Precincts

The second order of initiatives encompasses the development of the two gateway precincts, focused on the Westgate and Faraday stations. They are structured around specific public transport facilities, public space systems and supporting community facilities, enabling access to the inner core and facilitating the development of mixed use environments appropriate to their locations. (ASM Architects and Urban Designers & Arcus Gibb, 2010)

Neighbourhood Precincts

The third order of initiatives encompasses the development of neighbourhood precincts. These are focused on Mayfair and Jeppe stations. They offer the opportunity for transit-orientated development, centred around a mixed use core with public transport facilities, and supporting higher density residential development. (ASM Architects and Urban Designers & Arcus Gibb, 2010)

Further actions include the introduction of a public transport facility near the ABSA office campus, to serve the south-eastern quadrant of the inner core.

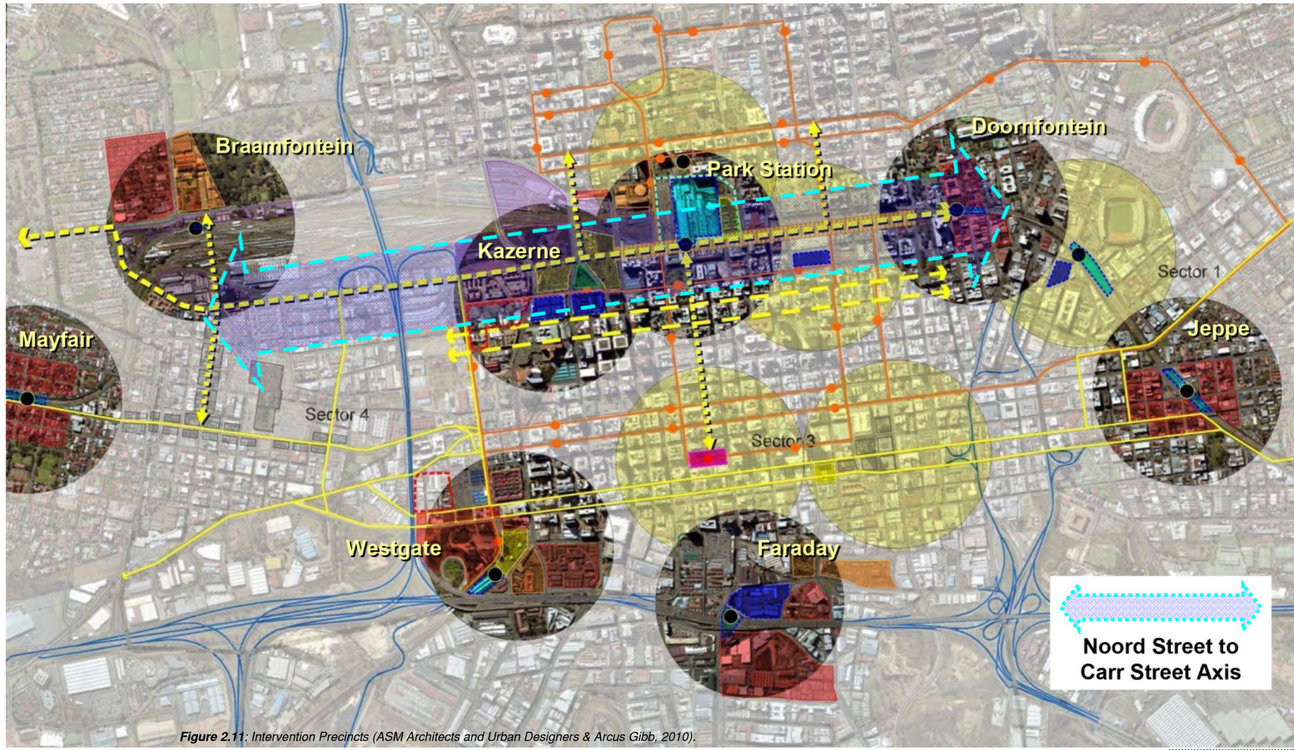


***Figure 2.11**: Intervention Precincts (ASM Architects and Urban Designers & Arcus Gibb, 2010).*

c) Existing Open Space

Open space is a critical component in the creation of a liveable environment. The inner city however is seriously lacking in the provision of open space. According to VISI Africa Strategic Planners CC et al. (2009), there are an estimated 401 904 residents in the inner city and if the international standard of 2.4 ha of public open space per 1 000 population is applied, 964.57 ha of public open space should be provided. If the local standard of 1 ha of public open space per 1 000 population is accepted, 401.90 ha of public open space should be provided, however, the zoned open space in the area adds up to only 46,67 ha. This is less than 5% of what is required by international standards and just more than 10% of what is required by local standards. (VISI Africa Strategic Planners CC et al. 2009)

The existing open space network comprises of the following main open spaces:

- Squares: Mary Fitzgerald Square (Newtown); Gandhi Square (Marshalltown) and Beyers Naude Square (Marshalltown).
- Urban Parks: Joubert Park (Hillbrow), which is the main park; Pieter Roos Park (Hillbrow); End Street Park (Joubert Park); Alexander Park (Jeppestown); Observatory Ridge Park (Yeoville); Donald McKay Park (Yeoville); Mackie Niven Park (Yeoville); Yeoville Square (Yeoville); De Villiers Park (Berea); Alec Gorschel Park (Berea); and Mitchell Park (Berea).
- Sports fields: Ellis Park Sport Stadium (New Doornfontein); Fuller Park (New Doornfontein); Maurice Freeman Park (Troyeville); Bertha Solomon (Jeppestown); Murray Park (Jeppestown); Abe Bailey Park (Jeppestown); Vickers Park (Jeppestown); Technikon WITS (Marshalltown); and ESAP Sports Ground (Westgate).
- Observatory Ridge is the largest natural green open space in the Inner City. (VISI Africa Strategic Planners CC et al. 2009)



***Figure 2.12**: Public Squares (Google earth image edited by Author, 2014).*



***Figure 2.13**: Vegetation and Parks (Google earth image edited by Author, 2014).*

2.3.2 Precinct Analysis

a) History

The Westgate Precinct is situated in one of the oldest parts of Johannesburg, in what was originally part of Ferreira's camp which was established in 1886. Named after Colonel Ignatius Phillip Ferreira, one of the first pioneers to arrive on the reef, Ferreira's camp was one of the original mining camps, and "where the first gold diggings started and where the first diggers initially settled" (Otto et al. 2010:149). The area today is known as Ferreirasdorp. According to Swardt (2011), Ferreira not only formed the miner's camp but also formed the Ferreira Gold Mining Company in 1896 when he struck gold. However, having lost his share the mine was abandoned and then forgotten until in 1986 when Standard Bank, the first bank to establish itself in the new mining town of Johannesburg in 1886, built its head office over this mine finding an old access tunnel during excavation. (Swardt, 2011)

Situated on the periphery of the main development regions of Johannesburg, the area stretches over the boundary between the original farms Turfontein and Braamfontein, and is bisected by the main reef leader which was the focus of the initial mining in Johannesburg. The area is for that reason strongly linked to what was to become the driving force behind the development of the city. (Dike, 1994)



***Figure 2.14**: Ferreira's Gold Mine in 1886 (Geocities n.d.).*

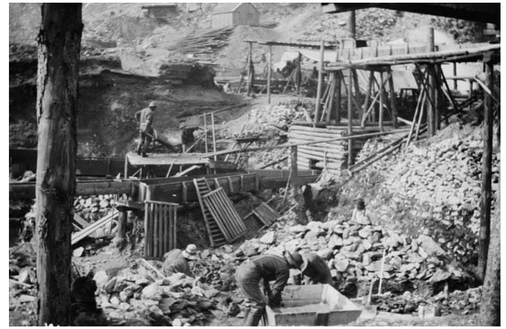


***Figure 2.15**: Ferreira's miner's camp (Leighton, 2011).*

In 1890, many of the poorer immigrants in Johannesburg searched for cheaper accommodation away from the city's prominent streets. According to Dike (1994), speculators bought whole blocks of cheap land and built apartment houses and quadrangle yards, which were occupied by mainly polish and Lithuanian immigrants. These immigrants move to the coast with refugees during the Boer war, but when they later returned they once again inhabited the poorer regions of the city such as Ferreirasdorp. The directory of 1899 showed that the area was racially mixed (Dike, 1994). A large coloured community lived in the area and in 1898 a site was identified for a church, St. Alban's Anglican Mission Church, to service the coloured Anglican community. The church's original wood and iron structure was replaced by the present structure built in 1928. According to the City of Johannesburg (2012), Ferreira's wagon is believed to have stood a block away from St Alban's Church, where the present bus station stands, and in time, the Main Street wagon may possibly be moved there. The area to the west of Ferreira's camp was mainly populated by Chinese and Arabs and by 1913 Ferreirasdorp contained the largest concentration of Jews, although the more affluent Jewish families moved into the new suburbs of Orphirton and Fordsburg. (Dike, 1994)

Ferreirasdorp deteriorated quickly into a slum area, which was largely bought by Anglo-America in the 1930's to build their headquarters. Together with the Magistrates court, which was built in 1934-38, the Anglo-American headquarters assisted in establishing the eastern parts of Ferreirasdorp as a financial district (Dike, 1994). In 1958 the Anglican diocese was stationed at St Alban's Church, under bishops Desmond Tutu and Duncan Buchanan, but in the 1960s, under the Group Areas Act, the coloured community was forcibly moved (Newtown Heritage Trail, 2010).



***Figure 2.16**: Ferreira's Camp, 1886 (City of Joburg, 2014).*

Ferreirasdorp has an interesting historical development and is rich in historical sites. The area has a long history and association with the underprivileged members of the community, and also a history of cultural mixing despite limitations by the laws. The planning and design of the Westgate Precinct represents an opportunity to memorialise the historic sites and to protect, reutilise and contextualise the remaining historic buildings.

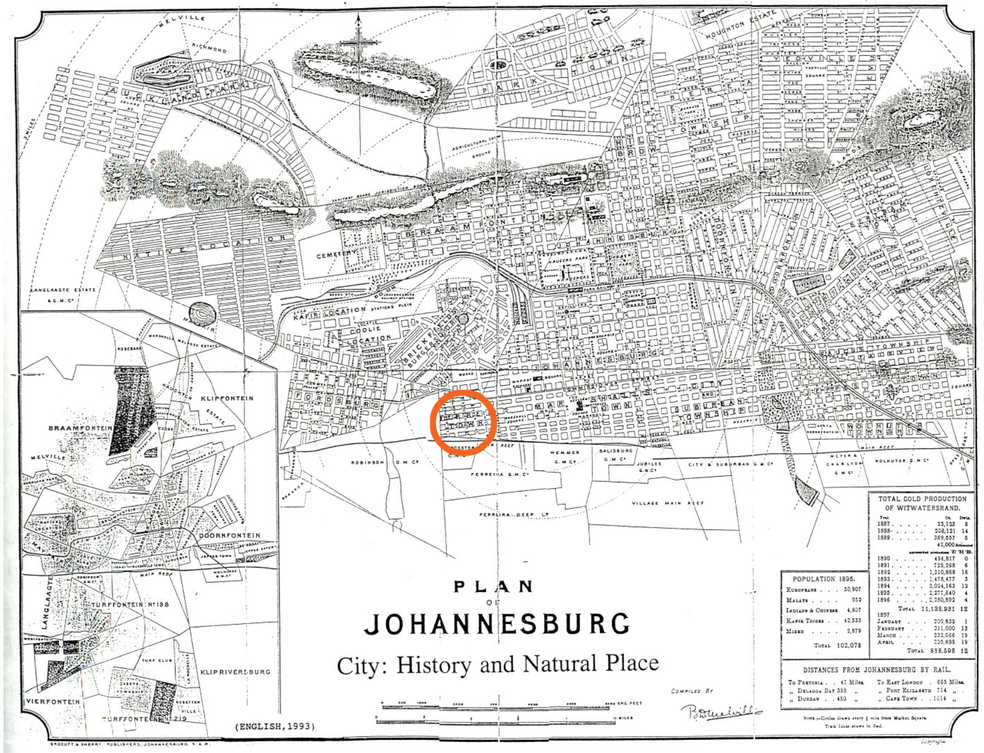


***Figure 2.17**: Johannesburg historical map with Ferreirasdorp as indicated (Dike, 1994:25).*

***Figure 2.18**: Key features photos (by Author, 2014).*



***Figure 2.19**: Key Features in the precinct (Google earth image edited by Author, 2014).*



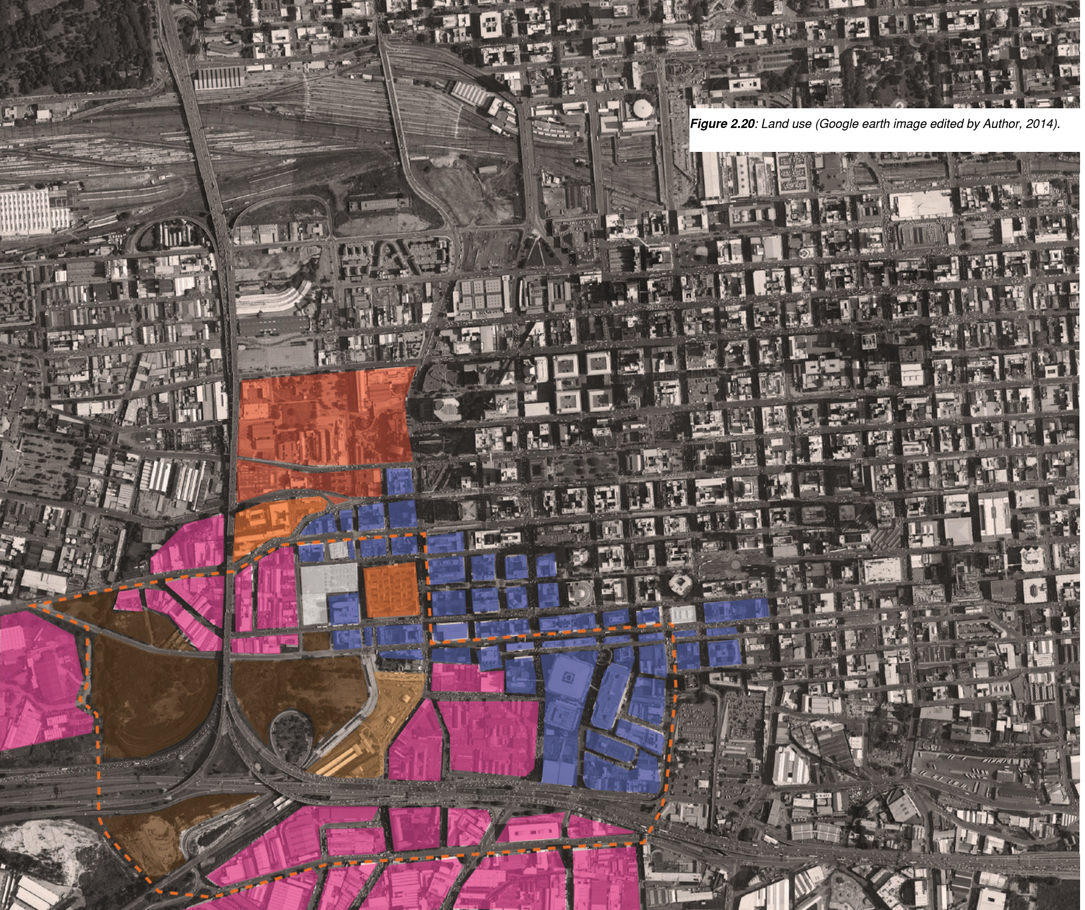


***Figure 2.20**: Land use (Google earth image edited by Author, 2014).*

b) Land Use

The Westgate Precinct is a major public transport node trying to capture people moving through it. The precinct from a land use point of view is a meeting place for big businesses, small traders, light industrial, banking district and all these different uses converge on my site. The majority of the precinct has light industrial land use with pockets of vacant land. The business uses are found towards the northern and western edges of the precinct (Fig.2.20).

c) Grain

The footprints of the buildings represent the grain and are differentiated by size and density (Fig.2.21). Due to undermining, the development of land stretching from Main Reef Road in the west to the Standard Bank Precinct in the east is influenced by geotechnical constraints. The size and density of the grain in the Westgate Precinct therefore differs from the adjacent city's grain. This sets up a tension between an immediately recognisable archetypal order of a city north east of the precinct and a seemingly random system within the precinct. The mining activities of the past and the accommodation of the highway system have resulted in a largely industrial area with coarse grain and loosely packed structures used for light industrial purposes.

d) Internal Space Pattern

The internal space pattern reflects a grid network of approximately 60m x 60m, which contributes to the dense character of city (Fig.2.22). Originally designed for pedestrians the grid is not suitable for high levels vehicular movement. Traffic congestion has in the past been addressed by creating a super grid of wide one-way streets. To the south the grid becomes less formal due to the past mining activities. The transition between the inner city and the industrial areas to the west and south are made by the multilevel M1 and M2 highways, which become spatial barriers between the inner city and the industrial areas.

e) Land Forms

The land form of the area has a gradual slope falling from the east to the west (Fig.2.23). The Westgate Precinct has several significant natural features. Firstly it is bisected by the main reef leader (Fig.2.24), which is the main line on which gold was found and therefore has a lot to do with the beginnings of Johannesburg. This forms the east west spine to the city. The undermined ground in the area requires an assessment of the area to determine what restrictions are laid down in terms of development potential. For example, the undermined ground requires a limit on building heights, where the reef is closest to the surface no building is allowed at all, and as the reef disappears further underground the heights of the buildings may increase. The M2 highway marks the end of limits on building heights giving another layer to its function as city boundary. The precinct is also close to the watershed in Johannesburg. (Beningfield, 1993)



***Figure 2.21**: Grain (by Author, 2014).*



***Figure 2.22**: Internal Space Pattern (by Author, 2014).*

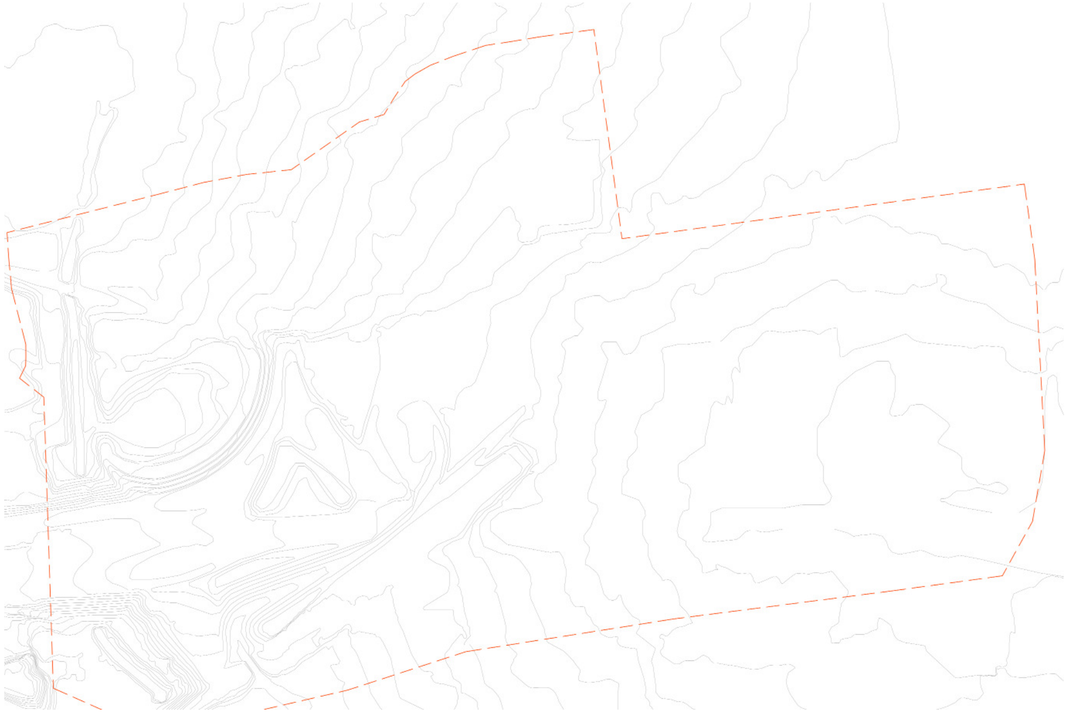


***Figure 2.23**: Topography (by Author, 2014).*

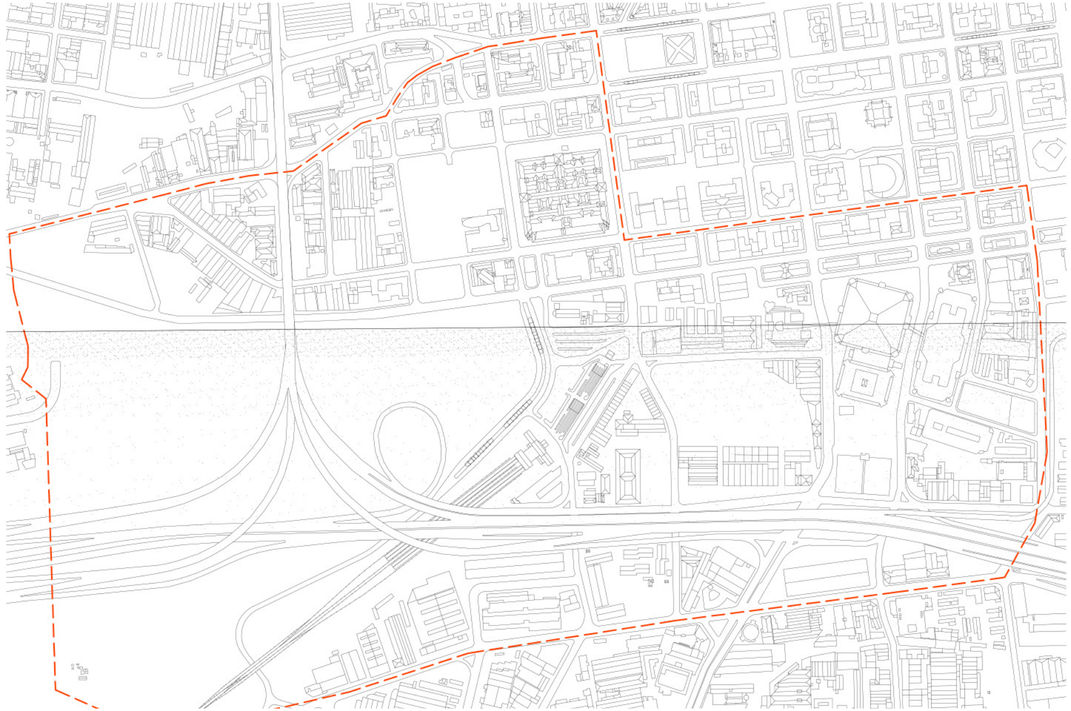


***Figure 2.24**: Gold Reef (after Beningfield 1993: 54).*

f) Existing Spatial Development Framework

The 2010 Westgate Station Spatial Development Framework and Implementation plan, prepared by Khuthele Projects, Jaksa Barbir Spatial Planning and Urbanism, BKS and Demacon, intends to assist the city to create the environment required to ensure that the Westgate Precinct develops into a vibrant and quality transit oriented node, a destination itself and a place where people will enjoy living and working. The intention is to transform the Westgate Precinct over the next few years into a newly developed high-density mixed use transit oriented node which provides for the public transport user as well as the private developer and acts as a gateway to the inner city of Johannesburg. Through the implementation of the SDF, pedestrian movement and access to public transport will improve and will kick start private sector investment in the precinct. The main strategic focuses for the Westgate Station Precinct include public transport users, private property investment and gateway to the inner city of Johannesburg. (Otto et al. 2010:149)

The following objectives and principles were applied during the development of the framework:

Objectives

- Provide for the needs of public transport users departing and arriving in the Precinct
- Ensure the maximization of rail, bus and taxi patronage to Westgate
- Develop Westgate into a destination
- Change Westgate into a liveable, active mixed use precinct
- Create a sense of place and community
- Leverage private sector investment within the Precinct
- Balancing public and private sector requirements
- Establish a south-western gateway into the Johannesburg Inner City
- Facilitate the sustainability of development practices and a quality urban environment, and
- Ensure effective urban management.

Principles

- High density development
- Convenient pedestrian and vehicular movement routes;Distinctive and attractive communities built around the location of the transit node
- Transit supportive land uses
- Adequate supporting land uses to provide amenity
- Mixed-use activities
- Increased densification and a range of housing options
- Reduce dependency on private cars and manage parking
- Adequate service provision and urban management
- Engagement, communication and Sustainable Urban Management

In order to achieve the identified objectives the following strategies have been developed:

- Define and delineate the Transit Oriented DevelopmentArea
- Support and facilitate an efficient movement system
- Identify critical services and catalytic projects
- Electricity Supply
- Relocate Pikitup Selby Depot
- Improve Public Transport Sustainability
- Mitigate the geotechnical impact on development
- Improve and enhance the public open space system
- Develop a TOD supportive land use and activity system
- Use the built form to establish a visual gateway

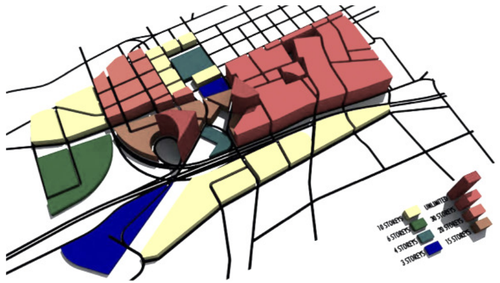


***Figure 2.25**: Building heights (Otto et al. 2010: 238).*

Zone No.	Use Zone
1	Mixed Use - predominantly office
2	Mixed Use - predominantly residential
3a	Mixed Use - predominantly community facilities, residential and retail (New PPP)
3b	Mixed Use - predominantly community facilities, residential and retail (New PPP)
4	Mixed Use - predominantly offices, retail and residential (Iconic Buildings)
5	Transport Interchange and Plaza
6	Westgate Rail Station
7	Mixed Use - predominantly residential and / or office
8	Mixed Use - predominantly residential and office
9	Museum, "hard open space"
10	Mixed Use - predominatly office and business purposes
11	Mixed Use - predominantly office
12	Business Services, Depots and Light Industrial
13	Business Services, Depots and Light Industrial
14	Medium to High Density Residential
15	Light and Semi-Industrial, Services, Depots, Public Transport Holding Areas

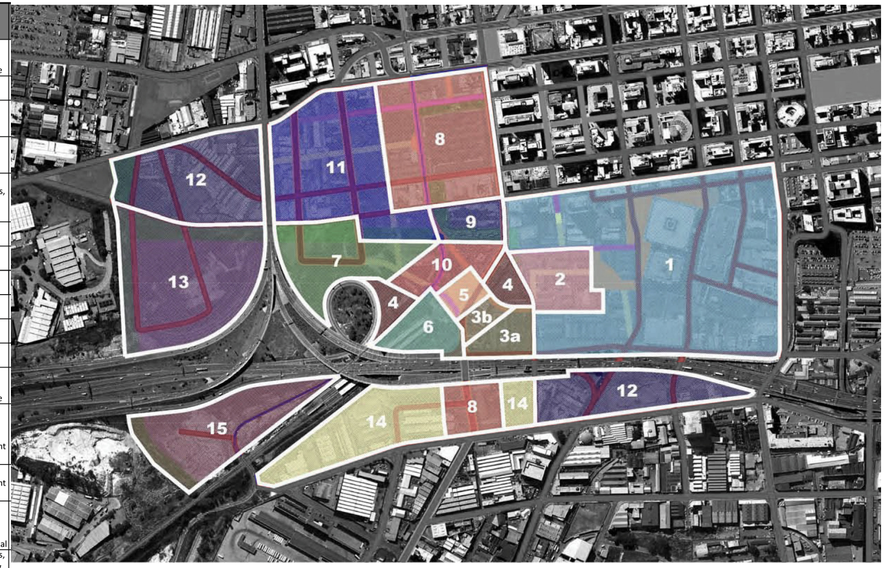


***Figure 2.26**: Zoning overlay (Otto et al. 2010: 224).*

g) Gapp Public Environment Upgrade

GAPP architects and urban designers are currently busy with a public environment upgrade in the Westgate Precinct to assist in improving the movement systems in the precinct. The upgrade focuses on:

- Place identity
- Creation of high quality public environment
- Transit oriented development

The aim of the upgrade is to produce a safe, attractive, liveable environment that encourages further investment in the area and also encourages owners to upgrade their buildings therefore promoting improved social cohesion as well as public transport and pedestrian movement.

The upgrade of the precinct started in 2011 with phase one of the upgrade north of the precinct in the Chinatown precinct area. Phase two then followed in 2012/2013 focusing their work on the area between Johannesburg Central Police Station and the Magistrates Court. Phase three of the upgrade, which began in 2013 and is coming to a conclusion this year, focuses on the Westgate Station area. The work they have done includes providing new lighting, paving, street trees, benches, bins, bus shelters and pedestrian guard railings on streets, sidewalks, parks and squares.



CONGESTION AND CONFLICT WITH PEDESTRIAN MOVEMENT



POOR STREET CHARACTER



POOR DEFINED SPACE



LITTER



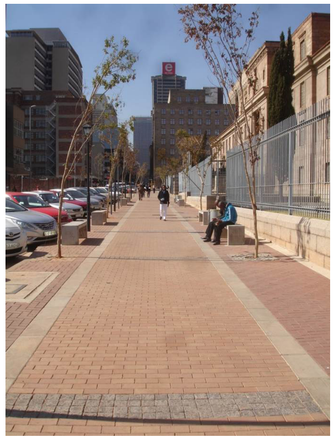
DAMAGED STREET TREES



NO PROPER STRUCTURE

***Figure 2.27**: Key issues and general built environment character before upgrade (Gapp, 2011).*

There are major pedestrian links (Fig 2.9) that exist around the precinct and there is an opportunity to complete and connect to these links which the public environment upgrade is attempting to do. My project builds upon the work done by Gapp, by upgrading the Westgate Station facilities into a multimodal transit station.





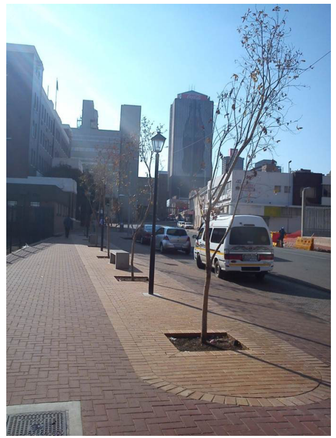


***Figure 2.28**: Improved environment phase one and two* (Gapp, 2011).

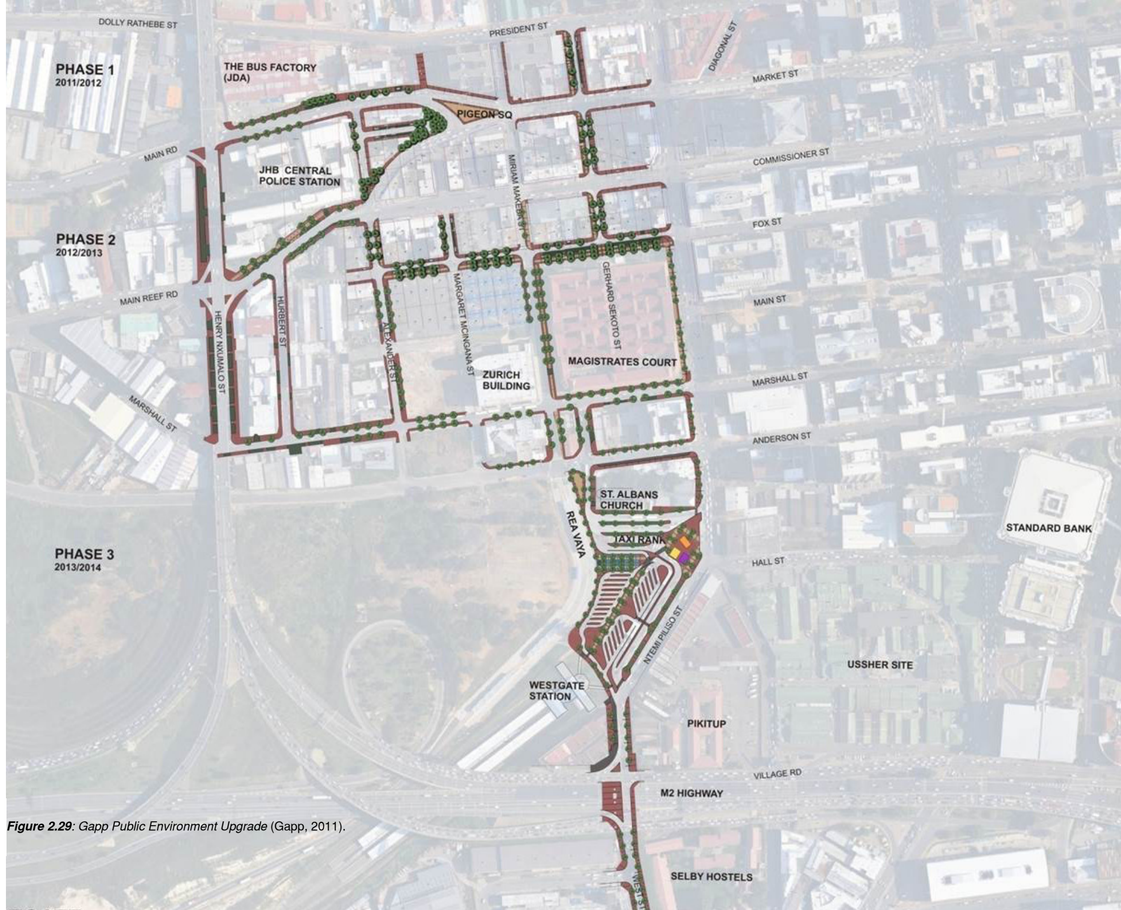


***Figure 2.29**: Gapp Public Environment Upgrade* (Gapp, 2011).

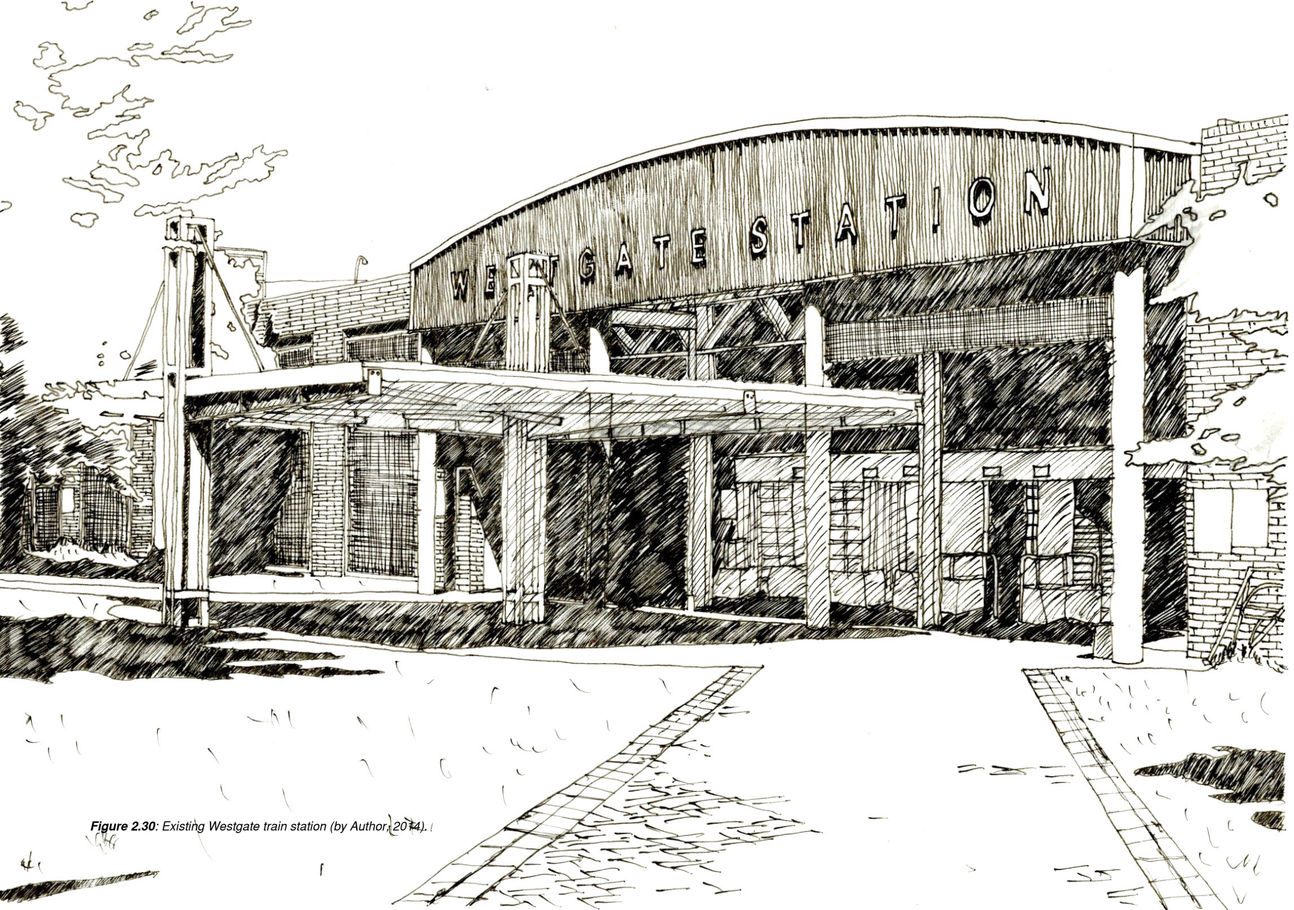


***Figure 2.30**: Existing Westgate train station (by Author, 2014).*

2.4 | Micro Analysis

2.4.1 Site Analysis

The site is the Westgate Station which is an arrival point for people coming into the inner city of Johannesburg. It is a transport node that contains the primary movement structures of the city, the M1 and M2 highway and the Westgate Rail, Ntemi Piliso Street (which feeds the majority of taxis towards the city) as the eastern border and the Pat Mbatha Bus Way (which serves the BRT buses in and out of Soweto) as the western border.

The elevated highway is a fixed structure which is visually expressive of the horizontal movement that animates it in varying numbers and speeds. The highway forms a physical and visual barrier which is permeable at certain points between the inner city and the industrial and mining belt in the south. The looped on-ramp allows vehicles approaching from the west to re-join the highway at a higher level so they can off-ramp and head into the city along Ntemi Piliso Street at a reduced speed.

The train enters the city at the southern edge of the site under the structure of the elevated highway and terminates at Westgate Station. Opposed to the imposing scale of the highway the railway lines and platforms are sunken and have a relatively low presence. Commuters on the train arrival at a lower level and progress on to the long platforms which provide a strong directionality towards the steep flights of stairs that take the comm-



***Figure 2.31**:Existing public transports facilities and routes (Google earth image edited by Author, 2014).*



***Figure 2.32**: Existing pedestrian movement and street traders (Google earth image edited by Author, 2014).*



***Figure 2.33**: Existing taxi rank (by Author, 2014).*

uter up to the city ground plane and the city becomes visible as they exit the station. Westgate Metrorail Station has about 6000 passengers either boarding or alighting daily (Otto et al. 2010).

The Pat Mbatha Bus Way that runs along the western edge of the site is a thoroughfare into the CBD. The road forms part of the BRT network and has three stations that sit parallel to my site. The calculated pedestrian projection for these stations is 4433 boarding per day. The site also has taxis and buses that operate from there. The Westgate Station has a formal taxi rank that has a capacity of 24 vehicles, with holding facilities that hold 234 vehicles. According to Otto (2010), the holding facilities are judged on capacity to be the 4th largest in the Johannesburg inner city. Buses are held in a small terminal, but because the terminal is underutilised as a public transport facility, it operates as an informal holding facility for buses.

Most of the people arriving at the Westgate Station, through different modes of transport, continue their journey to their destination on foot. The majority of these pedestrians, mostly on their way to work, formed a pattern of movement towards the central regions of the inner city. Walking north along the Pat Mbatha Bus Way or through the site and then joining Ntemi Piliso Street. There is a strong north-south movement line through the site on a daily basis. Such movement lines must have a strong visual power, meaning they must be clear to the commuter when they arrive



***Figure 2.34**: Activities (by Author, 2014).*



***Figure 2.35**: Existing BRT station (by Author, 2014).*

where to go or what to do next, but the unstructured disorder of the facilities as a whole do not allow for this. The vehicles dominate the commuter or pedestrian on the site, as access and movement around the site is difficult, unclear and a safety concern with vehicles given priority.

Pedestrian movement is important also in establishing market and trade areas. Street traders are located along the northern edge of the site between the taxi and bus terminus, and along Ntemi Piliso Street. As movement of people through the site is high during peak times, street trade tends to be sporadic. Public toilets are provided between the taxi rank and bus terminus, but with the large number of commuters passing through the area, this is insufficient. Also on my site, next to the train station, is an existing building that accommodates a liquor store, a bar and other shops. The activities that happen in the Westgate precinct, particularly in the immediate surroundings of my site are of the economic kind. These activities are mainly street trade and small businesses.

The area is very much a transitional. People walk through the site, there is no reason for them to be there, other than the fact that they arrive and leave the city at this location. There is a sense of emptiness in the area, empty sites, empty sidewalks, abandoned or closed buildings and shops. There are opportunities to build the precinct around a multimodal station in the form of a Transit Oriented Development, which will bring a lot more life to the area. There are opportunities to build the precinct around a multimodal station in the form of a Transit Oriented Development, which will bring a lot more life to the area.



***Figure 2.36**: Character (by Author, 2014).*



***Figure 2.37**: View of site from highway (by Author, 2014).*





***Figure 2.38**: Photos of site from Pat Mbatha Bus Way before and during public environment upgrade by Gapp Architects and Urbarn Designers. (after Gapp, 2011) (by Author, 2014).*

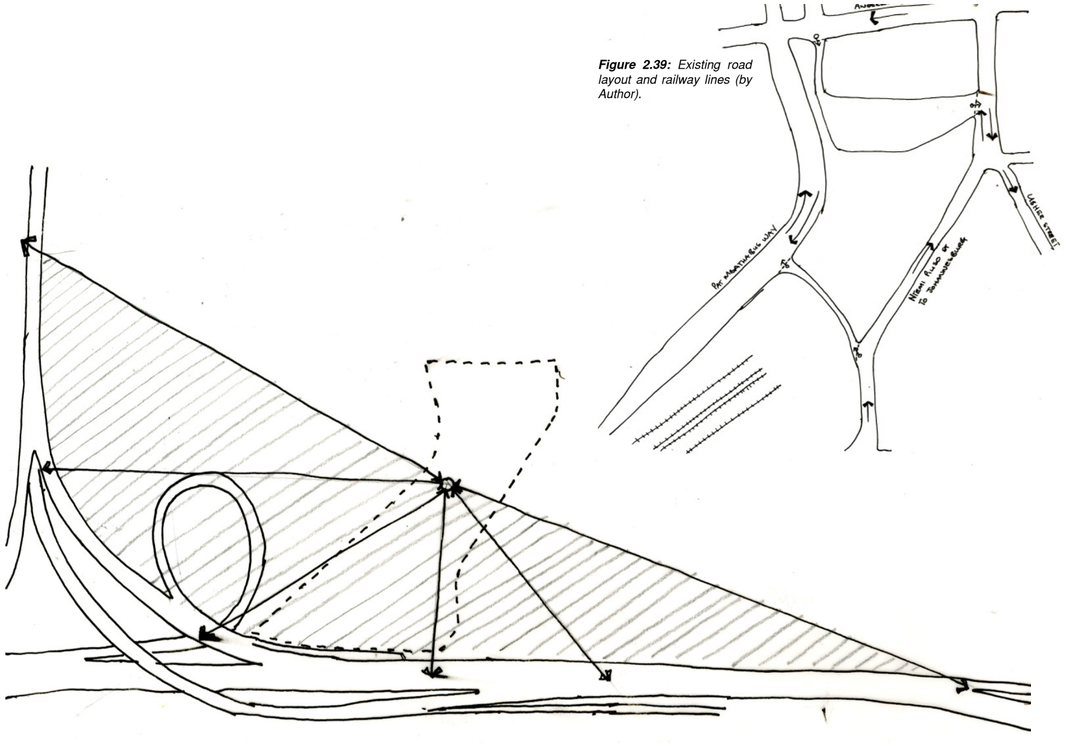
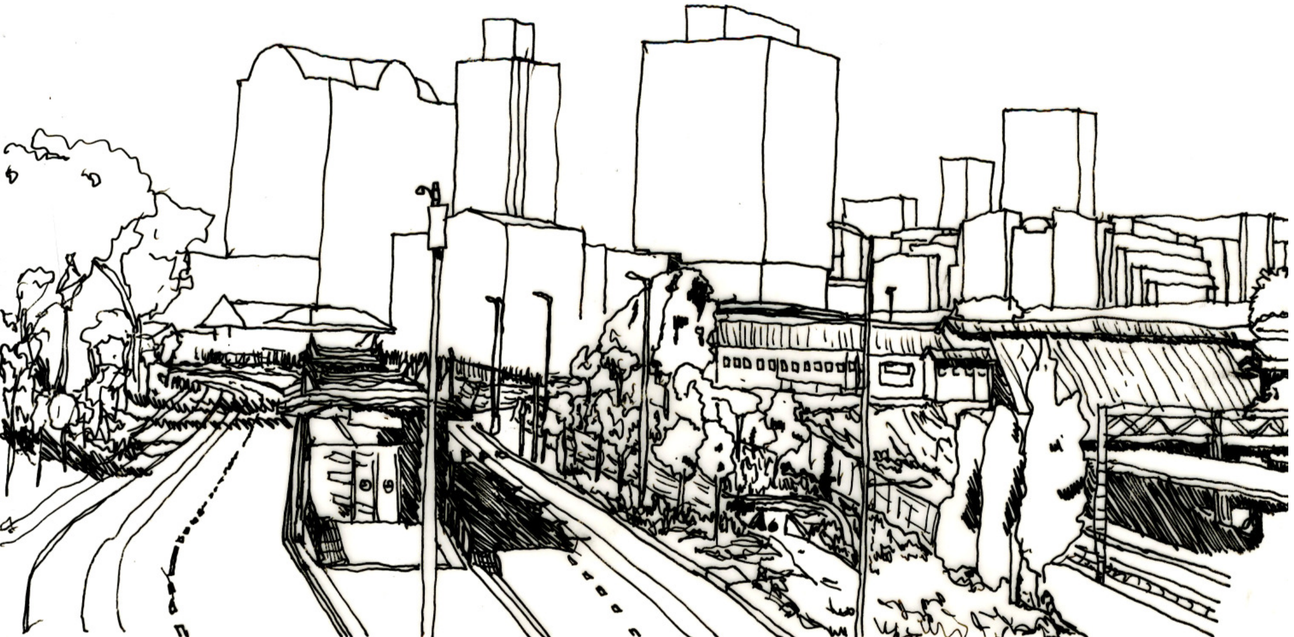


***Figure 2.40:** Visual connection, visibility from M1 and M2 highway (by Author, 2014).*

***Figure 2.39:** Existing road layout and railway lines (by Author).*

***Figure 2.41**: View from M2 highway towards Johannesburg inner city, with the Westgate Train Station and BRT Station along Pat Mbatha Bus Way in the foreground. (by Author, 2014).*



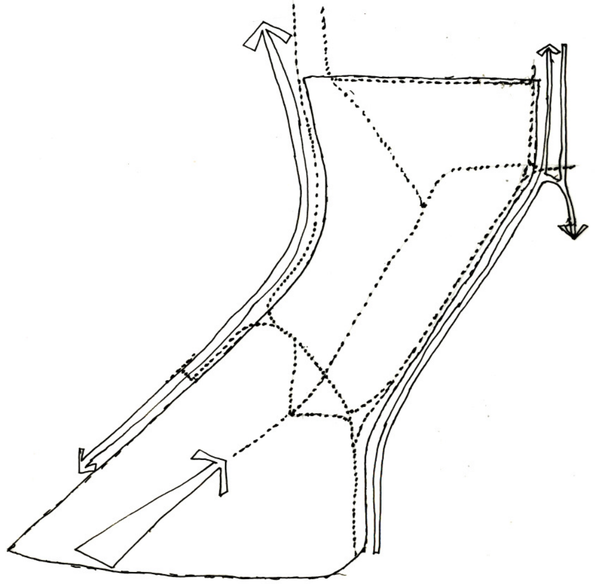


***Figure 2.42**: Movement of people across site is generally parallel to vehicular movement close to the edges. Movement of people is also through the middle of the site from the train station to different modes of transport (by Author, 2014).*

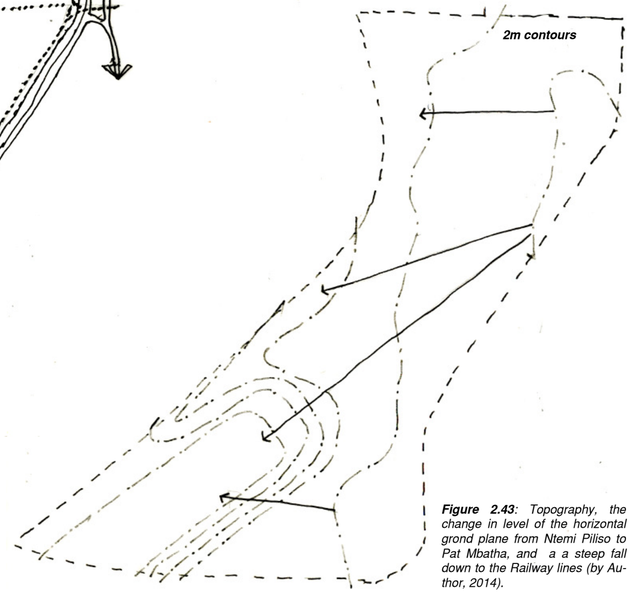


***Figure 2.43**: Topography, the change in level of the horizontal grond plane from Ntemi Piliso to Pat Mbatha, and a a steep fall down to the Railway lines (by Author, 2014).*



***Figure 2.44**: Development of the Westgate Station Precinct (derived from Gapp,2011)*

2.5 | Conclusion and Development of the Brief

It is evident that access to the Westgate Precinct is obtained via a range of movement networks (train, BRT, buses and taxis) with major through roads and regional access via the M1 and the M2. The precinct's high levels of accessibility are encouraging especially for existing and potential commercial and residential developments. Situated in prominent location, the site has the potential of shaping the first sight of the inner city of Johannesburg on arrival from a south-westerly direction. The precinct connects commuters who travel to and through Westgate to Eastgate Mall, Sebokeng, Vereeniging, Vanderbijlpark, Evaton, Palm Springs, Johannesburg CBD and Soweto.

The establishment of the Westgate Precinct as a Transit-Oriented Development requires it to be built around a multimodal transit station. The success of the development can not only be about the provision of efficient public transport, but it must also include the densification and mixing of uses around the station in order to bring more people and activities closer to public transport.

Developing the Westgate station site reveals the potential for it to become a destination point and not just a transitional space. The precinct is in need of a civic space, which provides a public space, as there are no public and very little retail facilities in the area. The site is at crossroads of people's different movement lines, people on their way to their different destinations, providing an opportunity to create a meaningful open civic space for the public. In providing this the transit station begins to engage in 'place-making'.

The public environment upgrade is an attempt to improve upon this, but the existing Westgate Station facilities do not allow for this and the upgrade proposal for taxi and bus facilities by Gapp still has the same issues as the existing facilities in prioritising the vehicle over the pedestrian/commuter. Walkability is critical to the success of transit stations. Meaning that the streets must be easy to walk or cycle to and from destinations otherwise commuters will be stranded at the end of their journey. An attractive and lively pedestrian environment should be on display starting at the transit station to make the experience of arrival and being in the area a satisfying one. Currently the area's potential is underutilised as the precinct is largely vacant and most of the buildings that do exist are lower than the two highways.

Major design objectives are to facilitate:

1. The functional aims of a multimodal transit station
2. Establish the station as a destination and not just a transit zone
3. Spaces for connection and exchange between different people

03 | Design

contents

3.1 | **Precedents**
McCormick Tribune Campus Centre
Yokohama International Passenger Terminal
The Markets of Trajan

3.2 | **Programme**

3.3 | **Design Development**

3.4 | **Technical Investigation**

3.4 | **Conclusion**

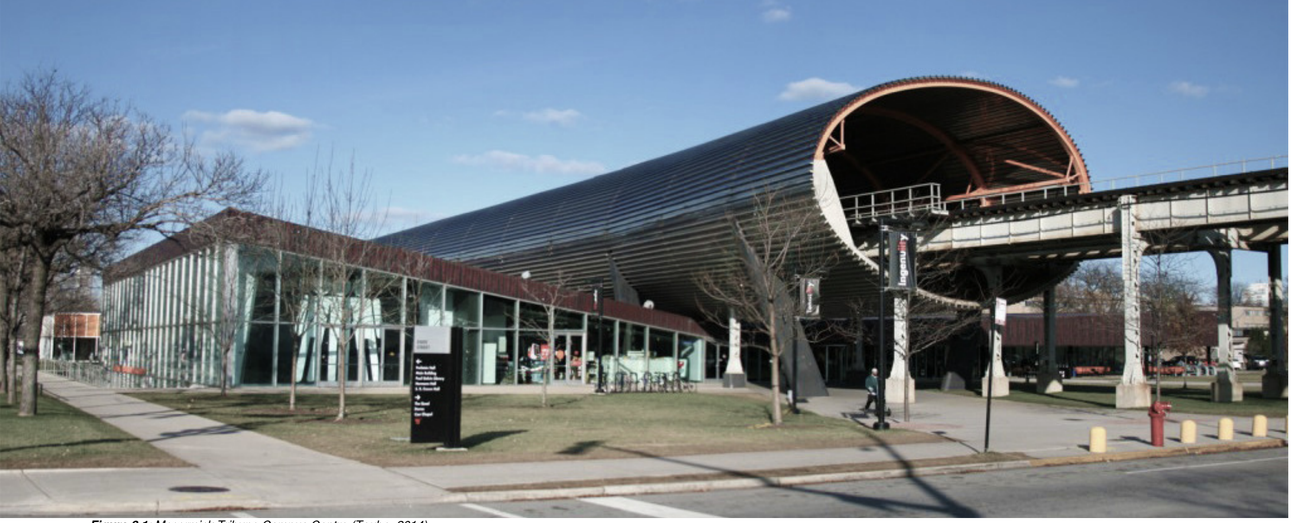


***Figure 3.1**: Mccormick Tribune Campus Centre (Taube, 2014)*

3.1.1 McCormick Tribune Campus Centre

Chicago, Illinois, USA
OMA, 2003

The McCormick Tribune Campus Centre is a large single storey building that is a focal point for the Illinois Institute of Technology campus. The building is located at the heart of campus and underneath an elevated railway line that links the campus to the rest of Chicago. The centre has multiple programs inside it, including a bookstore, food court, auditorium, computer centre, meeting spaces, and a noise-absorbing steel tube wrapped around the railway that runs over it, allowing a previously noisy dead space to become a bearable and attractive environment. (OMA, 2014)

The programmatic components of the Campus Center are arranged in a dense single plane to foster an urban condition and are linked by a network of intersecting diagonal paths, which were inspired by the desire lines of student foot traffic across the campus. The sloping concrete roof slab of Campus Centre unifies the spaces below and also protects against the noise of the train. (OMA, 2014)

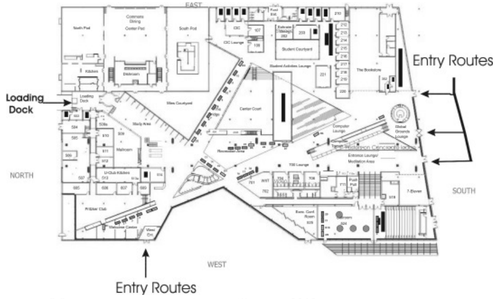


***Figure 3.2**: Floor plan showing entrances (Sullivan, 2013)*

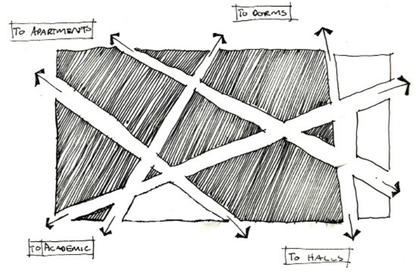


***Figure 3.3**: Connections - The movement patterns create the geometry of the building with the frequency of movement also determining the width of the path (derived from OMA, 2014).*

Findings

- Movement lines link and define spaces
- Clear pedestrian route
- Arrange programme in a way that attracts people along the length of the route

The transit stations circulation must be easy and clear to follow. Pedestrian paths in the Campus Center link and define spaces along these movement lines. The activities that sit along these paths play a significant role as they allow and encourage continuous usage to keep the pedestrian routes active.

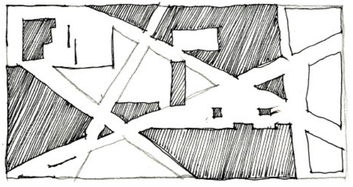


***Figure 3.4**: Public space - The intersecting diagonal paths inside the Campus Center link different activities through a network of interior streets, plazas, and urban islands (derived from OMA, 2014).*

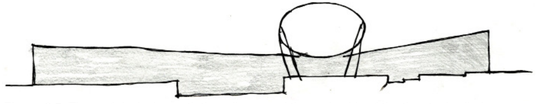


***Figure 3.5**: The roof ducks beneath the railway, and the underside of the the steel cylinder juts through the concrete as a reminder of what's above (derived from Barnes, 2014)*



***Figure 3.6**: Yokohama International Passenger Treminal(Tse, 2014)*

3.1.2 Yokohama International Passenger Terminal

Japan
Foreign Office Architects, 2002

The Yokohama International Passenger Terminal, a major port where foreign cruise ships dock, is organized in three vertical levels. A parking garage sits below a large middle level which contains the terminal's administrative and operational areas, restaurants, shopping, and waiting areas. The third level is a fully accessible public plaza, which consists of an intricate series of surfaces that gradually curve and fold into a trafficable topography that allows for pathways and openings into the enclosed spaces below. These three levels are connected by a series of gently sloping ramps which preserve a continuous flow of circulation. (Langdon, 2014)

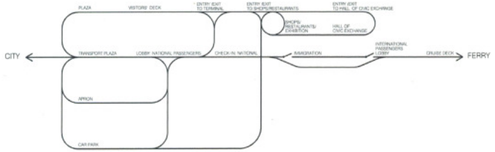


***Figure 3.7**: No-return cirulation daigram (Ferre, Sakamoto, Kubo, 2002: 10)*

The curves of the building were generated by a circulation pattern that dictates spatial organisation, with circulation functioning as a continuous looped diagram. Compared to the complexity of the materials and formal gestures, the diagram is simple and clarifies the method from which the building developed. (Langdon, 2014)

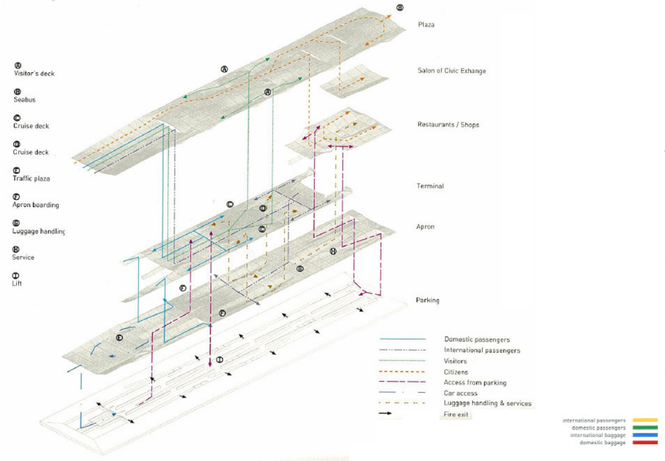


***Figure 3.8**: Three dimensional circulation diagram(Ferre, Sakamoto, Kubo, 2002: 11)*

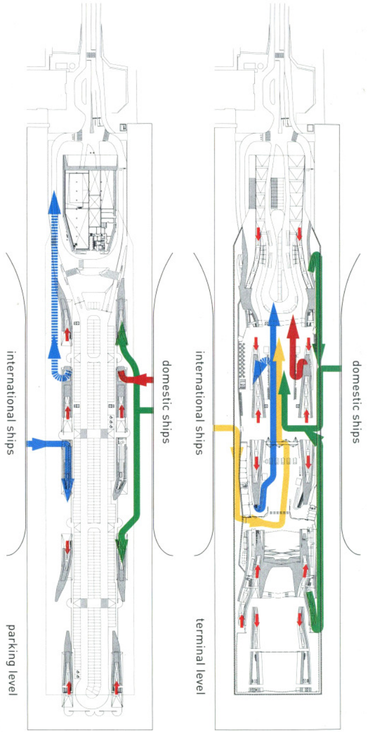


***Figure 3.9**: Terminal passenger and baggage circulation (Ferre, Sakamoto, Kubo, 2002: 264)*





***Figure 3.10**: Public plaza (Ferre, Sakamoto, Kubo, 2002: 218)*

The building's structural system was designed to deal with the lateral forces of seismic movements. It is made of folded steel plates and concrete girders, which reduces the need for vertical supports allowing for an open concourse. The steel beams that span the ceiling add a sense heaviness to the space compared to the light feel of the roof. (Langdon, 2014)

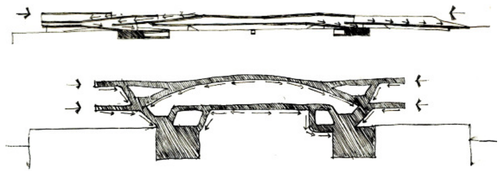


***Figure 3.11**: Transmission of lateral loads through surface (Ferre, Sakamoto, Kubo, 2002: 11)*

Findings

- Spatial interconnectivity
- Circulation
- Mixed functions meaning that the terminal is not just a gate but also a destination

Circulation and form are merged in the Yokohama International Passenger Terminal, as the buildings architecture is deployed on the circulation diagram and thus literally shaping space. The structure of the building responds to the circulation allowing for continuous and fluid links through and on the building.

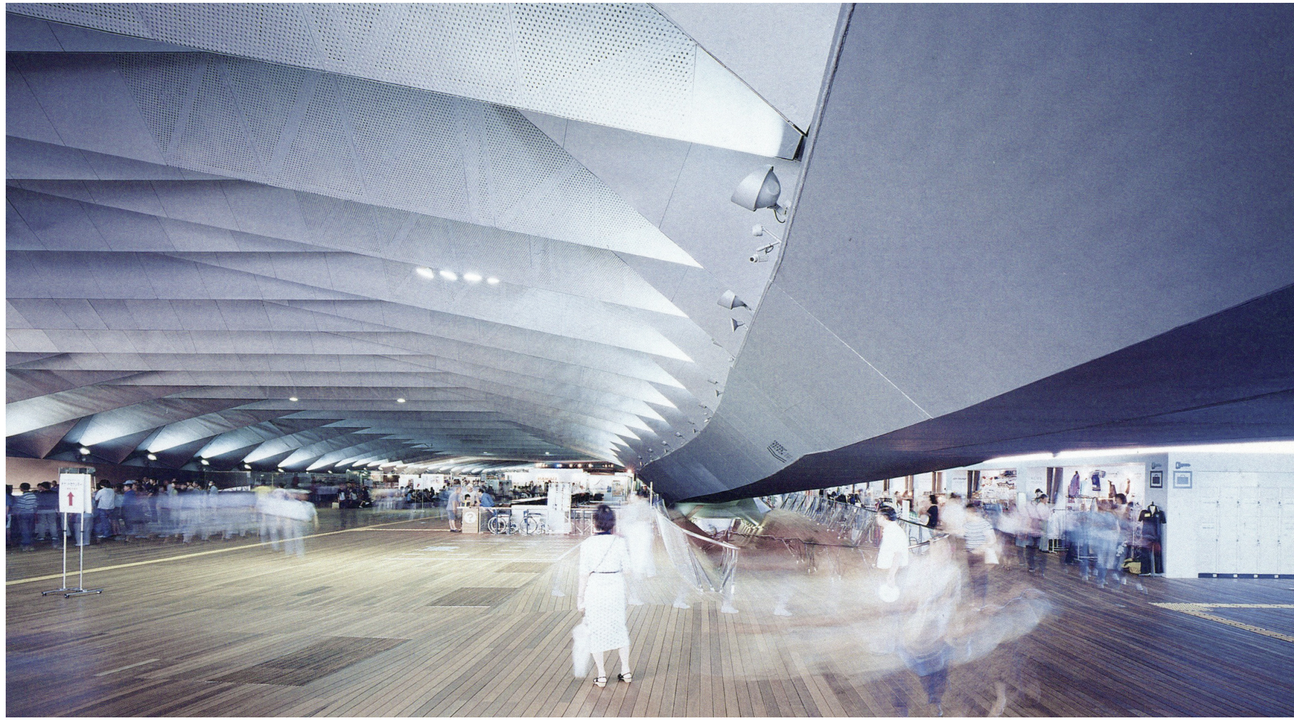


***Figure 3.12**: Terminal concourse - the height of the structure allows for a spectacular variety of ceiling conditions. (Ferre, Sakamoto, Kubo, 2002: 290)*



***Figure 3.13**: The Markets of Trajan (Bardwell, 2007).*

3.1.3 The Markets of Trajan

Rome, Italy
Apollodorus, 100-112 AD

Located in ancient Rome on the slopes of the Quirinal Hill, the Markets of Trajan were constructed "for the simple yet essential domestic ritual of going to the urban market to the shop" (McCarter & Pallasmaa, 2012:295). The markets were built with 200 rooms rising 35m on six primary levels embedded in the steep hillside. (McCarter & Pallasmaa, 2012)



***Figure 3.14:**Semi cylindrical brick-faced outer wall (Dudziak, n.d.).*

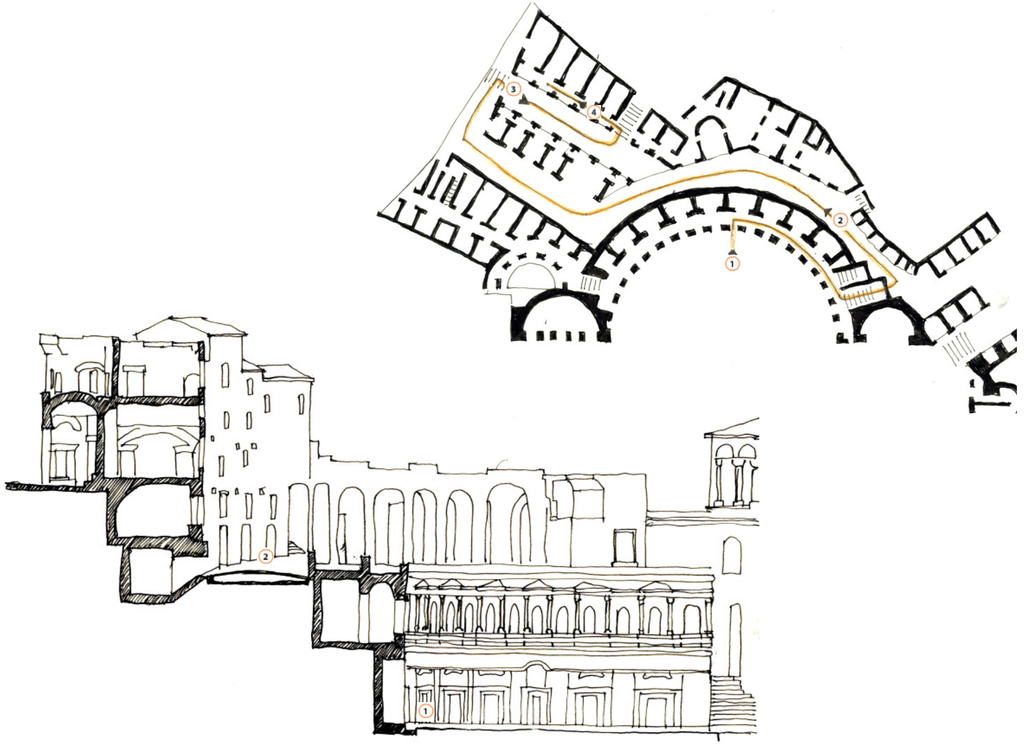


***Figure 3.15**: Plan with movement as indicated (derived from McCarter & Pallasmaa, 2012: 294) and section (derived from Great buildings, 2012).*

(1) Circulation through the markets starts with walking along a curving two level wall of shops accommodated within a semi cylindrical brick-faced outer wall. (2) Moving up one level there is an open street with two-storey brick walls on the downhill side, and three- to four-storey brick walls on the uphill side. (3) Moving up another level higher is Hall of Trajan, the primary market space, which is a 9m wide, 33m long and 12m high space. (McCarter & Pallasmaa, 2012)

According to McCarter & Pallasmaa (2012), the main hall and the surrounding shops give views to the sky and surrounding urban spaces through 3m wide unroofed hallways of (4) the upper level that allow light into the space, and the shops have openings in the exterior wall that overlook the main space below. Cool breezes from the large openings and the cool shadows of the massive walls effectively deal with the warm climate of Rome. "This most urban of public rooms, embedded in the hillside and opened to the sky above, is dedicated to the daily ritual of shopping, and evokes in us a powerful sense of being in place" (McCarter & Pallasmaa, 2012:296).



***Figure 3.16**: Hall of Trajan (Brennagraham, 2013).*



***Figure 3.17**: View from Hall of Trajan upper level (Brennagraham, 2013).*

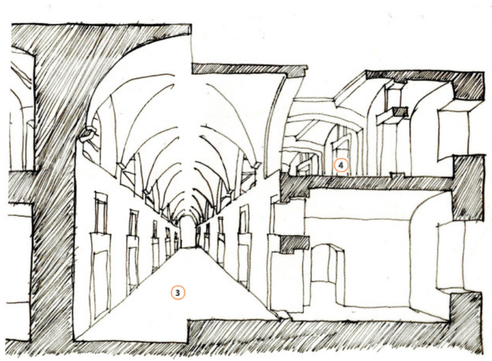


***Figure 3.18**: Section through Hall of Trajan (derived from Great buildings, 2012).*

<u>Findings</u>

- Place making

The markets filled with light and air, with large openings everywhere despite the massive walls that support and give the markets unity of surface and space. The market becomes a perfect public place that gives countless opportunities for meeting, sharing and a comfortable place to gather during the daily routine of shopping.

3.2 | Programme

The existing transit related facilities that occupy the Westgate Station site include the train station, BRT stations, bus terminal and holding facilities for privately owned national long distance buses and cross border buses, and taxi rank and holding facility. To achieve the major design objectives of the multimodal transit station the following was required (shown in fig. 3.20):

1) Moving the taxi and bus **holding facilities** off the site. The Trump street site (shown in blue) becoming a holding facility for the buses and Transport house (shown in green) as the holding facility for the taxis (shown in fig. 3.19), as suggested in the 2010 Westgate Station Spatial Development Framework and Implementation plan.
2) The addition of new **support facilities** to the existing transit facilities forms the core programme for the functional needs of the station.
3) **Educational functions** such as a media centre/library, **commercial functions** such as shops and market space, and **recreational facilities** such as a public square are introduced to assist in establishing a place that is not merely a transit zone.

Introducing mixed uses at the station, in this case social and commercial uses, I believe is important. People coming from work can do some shopping on their way home. I have not accommodated residential uses in the building because I believe other sites are more suitable for residential like the hostel site can be upgraded into family units. The precinct is mixed use and my building is the heart of it. I have only accommodated limited staff parking in the building as I anticipate that people using the station will be using public transport. Parking can possibly be accommodated elsewhere in the precinct in a multi-storey car park.

The users of the multimodal transit station include the staff that work at the station, the commuters who use public transport, and the visitors who come to the station to use facilities not directly related to transit.



***Figure 3.19**: Relocation of holding facilities (Google earth image edited by Author, 2014).*

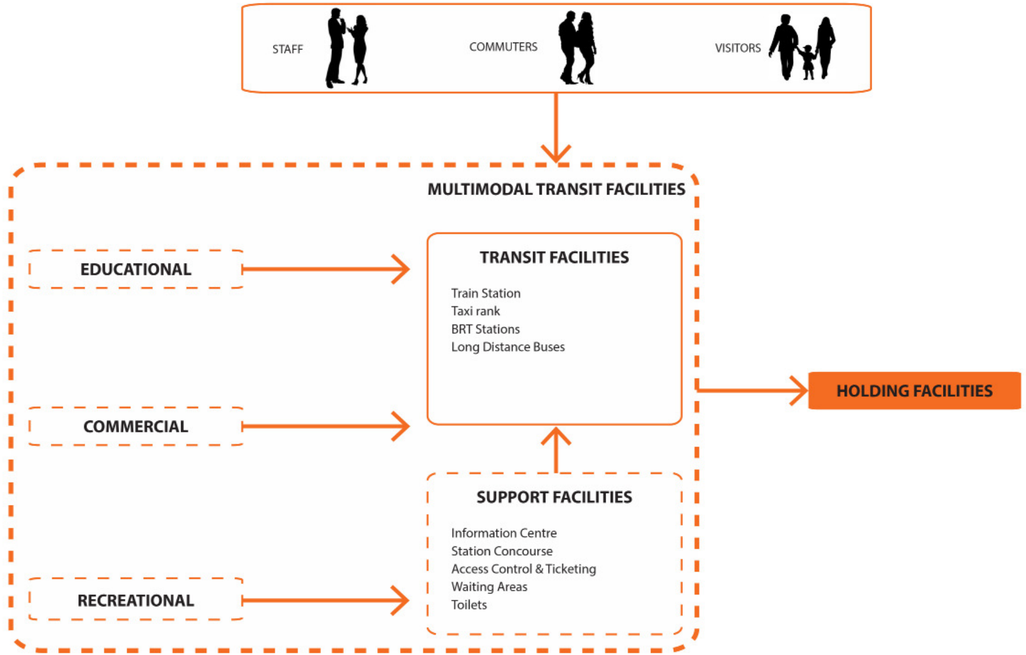


***Figure 3.20**: New multimodal transit station (by Author, 2014).*

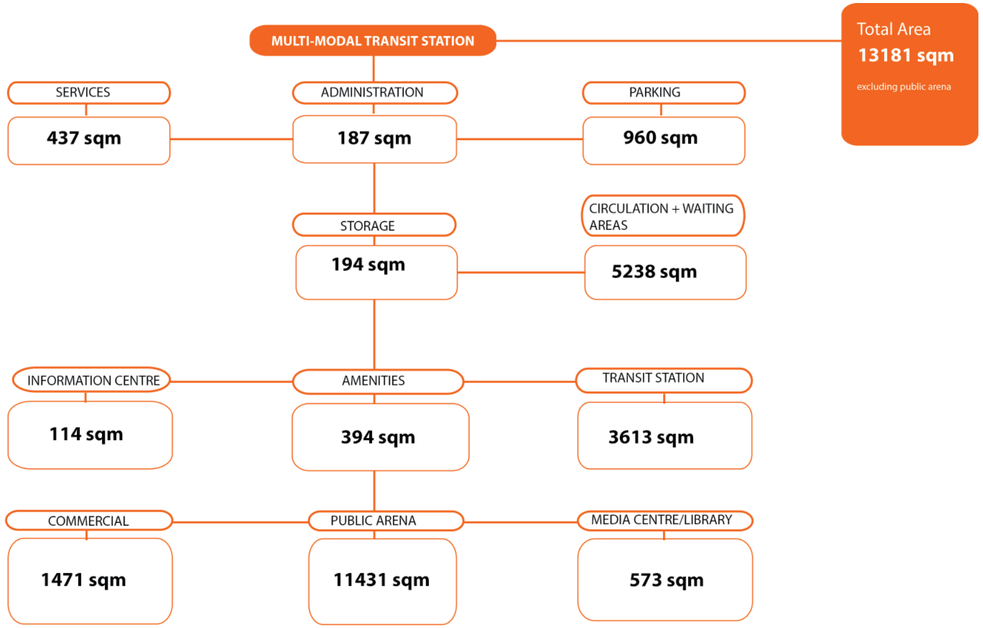


***Figure 3.21**: Accommodation schedule (by Author, 2014).*

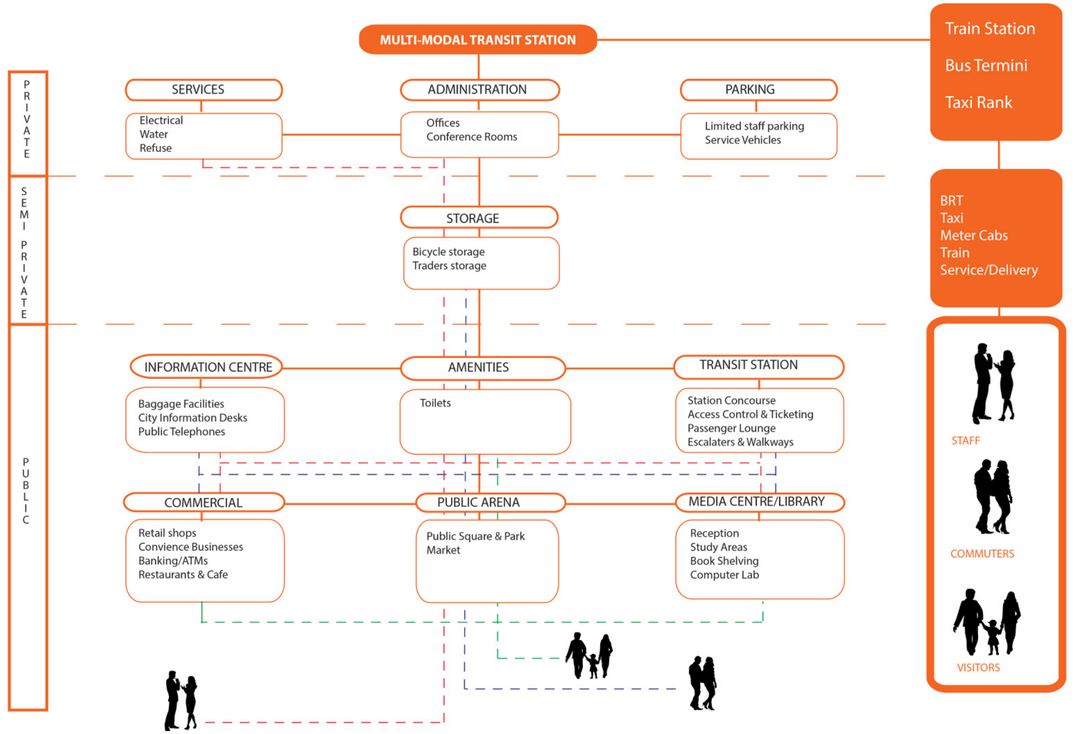


***Figure 3.22**: Programme organisation (by Author, 2014).*

3.3 | Design Development

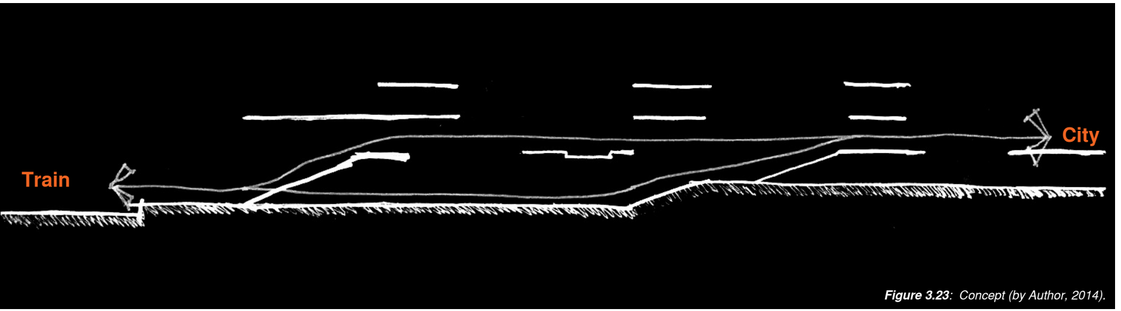


***Figure 3.23**: Concept (by Author, 2014).*

3.3.1 Concept

The concept of the building is movement and fluency. The architectural language of the building's exterior as well as its interior focuses on the articulation of movement. The development of the Westgate multimodal transit station started around the possibility of generating organisation from a circulation pattern, in a way that circulation can literally shape space. Transportation buildings operate as input-output devices with very clear directionality to departures and arrivals. A person must be able to enter the station and walk to the end and leave on which ever mode of public transport, or return on their movement lines, which imposes a strong orientation on the space.

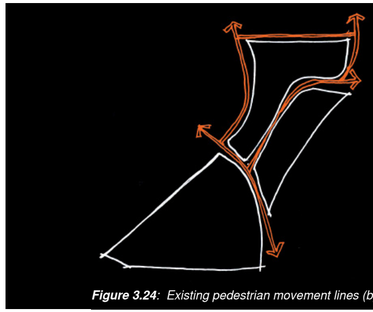


***Figure 3.24**: Existing pedestrian movement lines (by Author, 2014).*

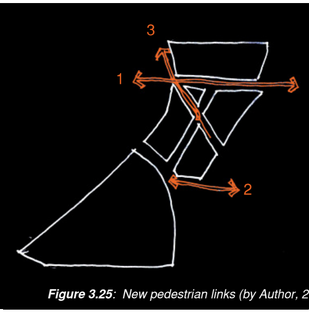


***Figure 3.25**: New pedestrian links (by Author, 2014).*

3.3.2 Design Response

1 My first move was to organise the vehicular and pedestrian movement through and around the site, with the intention of improving on the commuter experience of arrival into the city, and also providing safer accessibility to the site. Vehicular movement and pedestrians clash on the site, so there was a need to provide clarity and simplify movement for a better and safer pedestrian environment.

The removal of the taxi and bus holding facilities made it possible for the site to act less as parking, and free up more space for the pedestrian. Pedestrian movement in a north-south direction though and along the site is strong, however, pedestrian movement in an east-west direction is very weak. As a result of this I introduced three new pedestrian links through the site, allowing for improved accessibility.

The first link continues the line of movement from Hall Street through the site and across the Pat Mbatha Bus Way to the vacant land on the other side. The second link is the pedestrianisation of the road that provides vehicular access to the taxi rank and connects Ntemi Piliso Street and Pat Mbatha Bus Way. The link will also extend to pavement across Ntemi Piliso Street. The third link runs diagonally across the site in a north-westerly

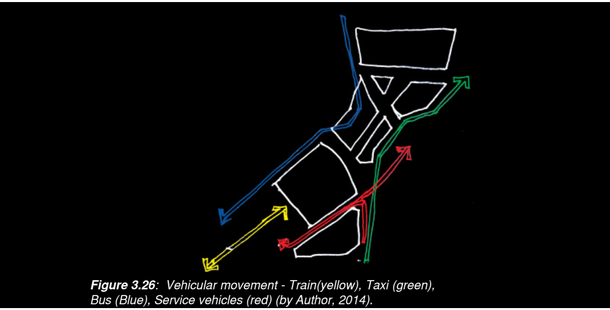


Figure 3.26: *Vehicular movement - Train(yellow), Taxi (green), Bus (Blue), Service vehicles (red) (by Author, 2014).*



Figure 3.27: *Option 1 (by Author, 2014).*

direction from the Ntemi Piliso Street.

Organising the vehicular movement into the site involved moving the taxi ranking bay (green) to the perimeter along Ntemi Piliso Street with one way movement for the taxis in a northerly direction. The buses (blue) were moved to the perimeter along the Bus Way, with one way movement for the buses in southerly direction. By doing this it opened up space for the pedestrian on the site. Service vehicles access to site is off Ntemi Piliso Street. This organisation means that vehicles and pedestrians do not cross paths on the site.

2 The second move was deciding were the main public space would be positioned in relation to the station building. This is the pause space, the point where people intersect. Four options were explored.

Option 1

Public space centrally located on the site with the station functions either side of it.

Option 2

Public space between three zones of station functions.

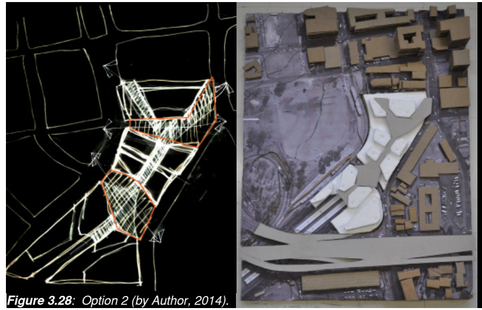


Figure 3.28: *Option 2 (by Author, 2014).*

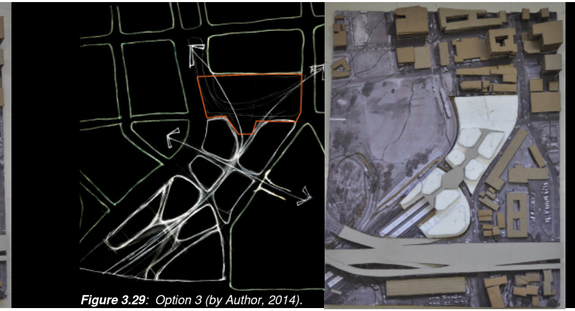


Figure 3.29: *Option 3 (by Author, 2014).*

Option 3

Public space on the north end of the site.

Option 4

A variation of option 3 extended public space.

I decided to develop option 4 as it provided a much better placing of the public square with the station building closer to the railway.

3 The third move was to set the circulation pattern of the transit station as the structure interwoven loops that allow multiple return paths. The building programme was then articulated along the circulatory system. The intention was to understand movement first and use movement to create the backbone of the building. The building attaches itself to the movement lines. The main circulation space of the building is the station concourse, which runs the length of the station connecting to different space and holding the building together.



***Figure 3.30**: Option 4 (by Author, 2014).*



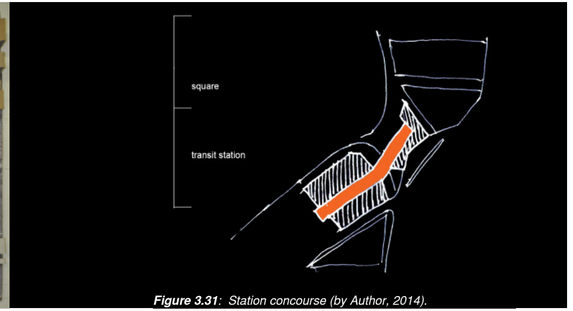


***Figure 3.31**: Station concourse (by Author, 2014).*

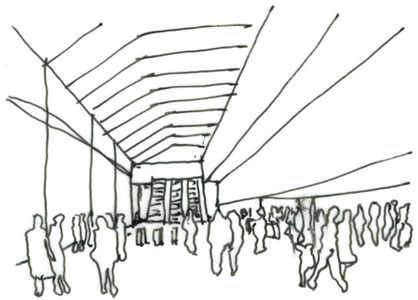




***Figure 3.32**: Station concourse sketches (by Author, 2014).*

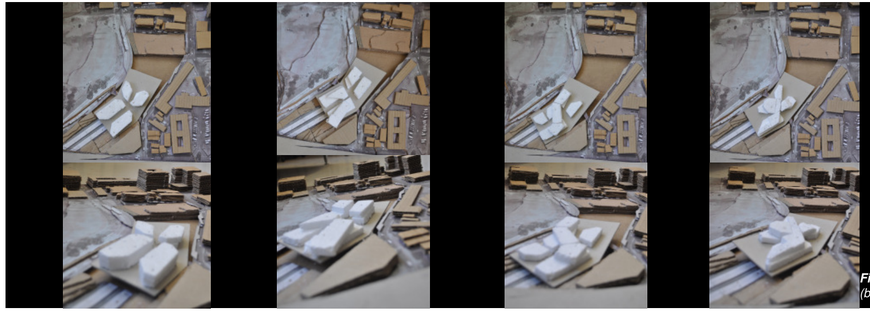


***Figure 3.33**: Massing models (by Author, 2014).*

4 The fourth decision in the process was the thought that the building should not appear in the skyline. The building takes advantage of horizontal movement and the intention was for the building to accommodate and reflect this movement. This has shaped the station resulting in a fairly flat building, which also fits in which the scale of the building in the area. The building has two levels lower than the ground plane as a result of the topography there is 6m drop to the railway and station platforms. The building at its highest is two storeys high.

3.3.3 Design Process

CIRCULATION AND PROGRAMME

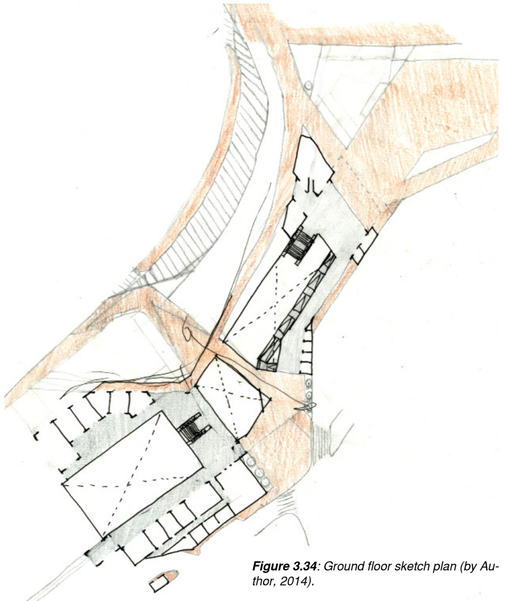


***Figure 3.34**: Ground floor sketch plan (by Author, 2014).*

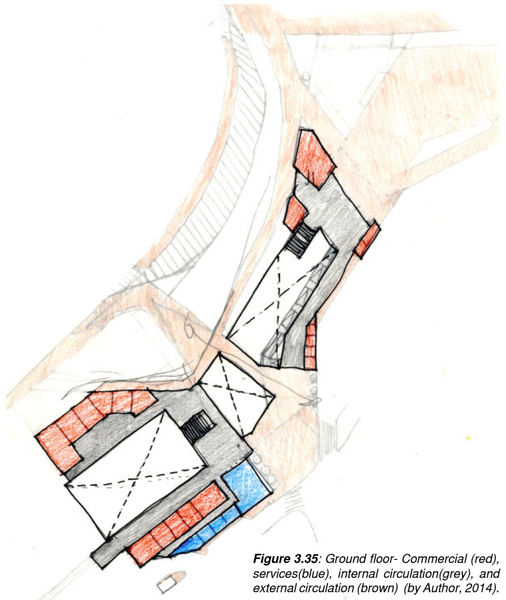


***Figure 3.35**: Ground floor- Commercial (red), services(blue), internal circulation(grey), and external circulation (brown) (by Author, 2014).*

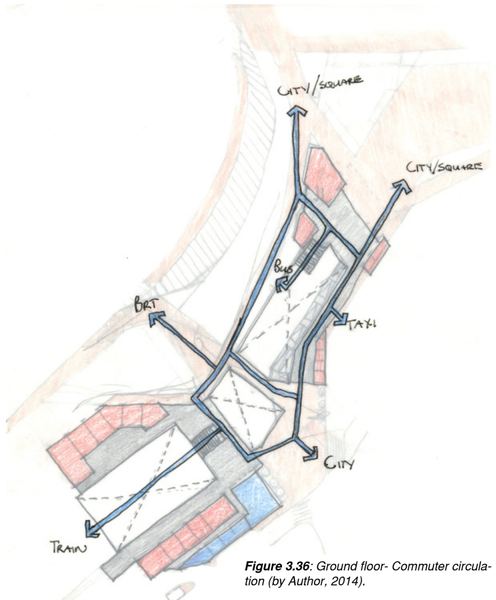


***Figure 3.36**: Ground floor- Commuter circulation (by Author, 2014).*

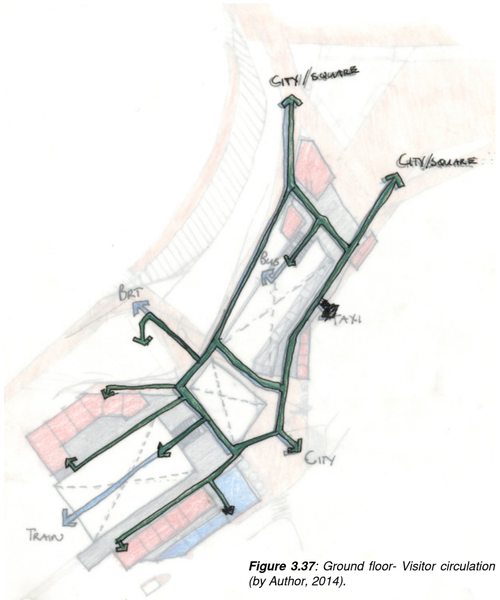


***Figure 3.37**: Ground floor- Visitor circulation (by Author, 2014).*

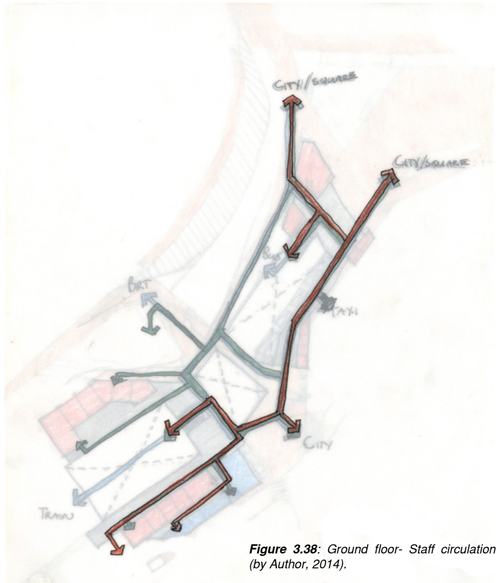


***Figure 3.38**: Ground floor- Staff circulation (by Author, 2014).*

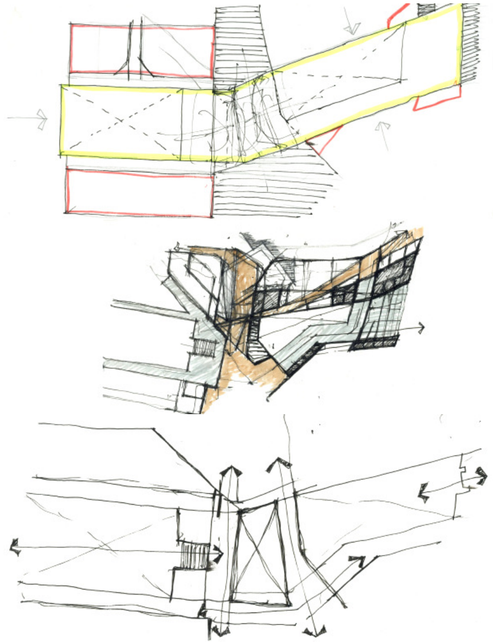


***Figure 3.39**: Development sketches of station concourse and crossing movement paths (by Author, 2014).*

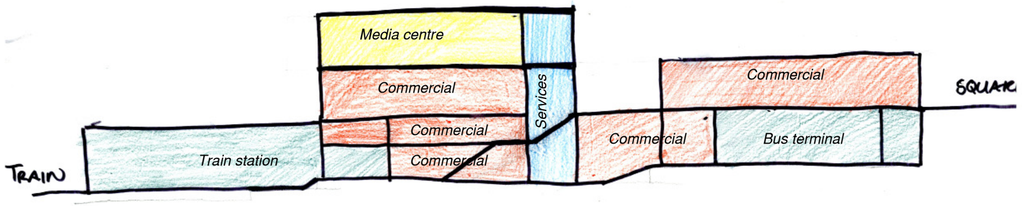


***Figure 3.40**: Section - Programme (by Author, 2014).*

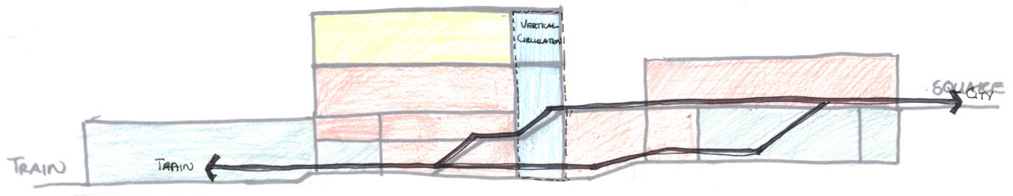
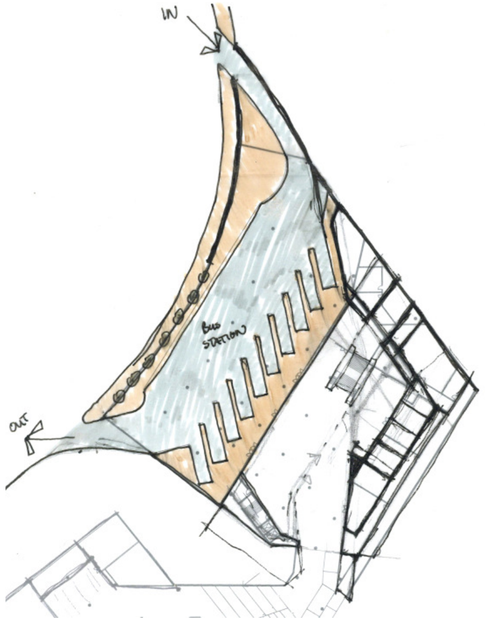


***Figure 3.41**: Section - Circulation (by Author, 2014).*





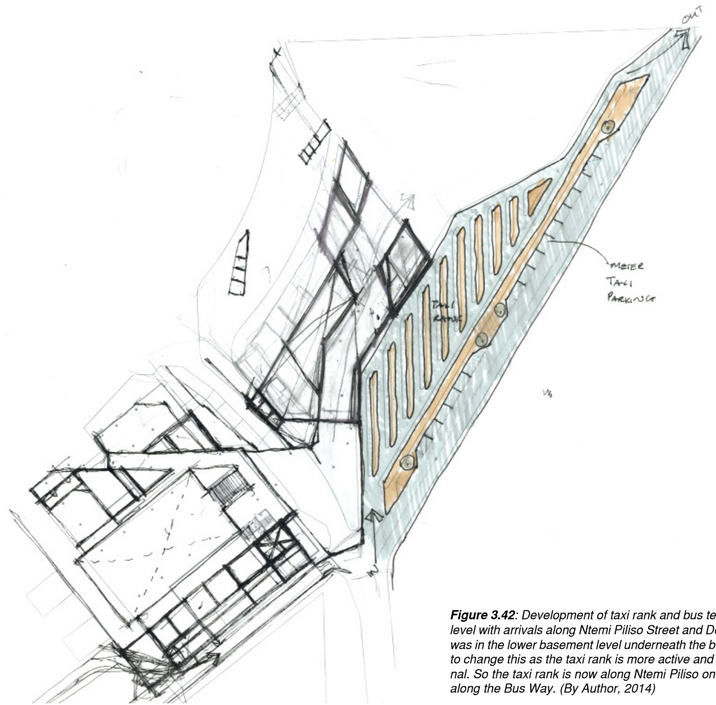


***Figure 3.42**: Development of taxi rank and bus terminal. Initially I had placed the Bus terminal on ground level with arrivals along Ntemi Piliso Street and Departures along the Pat Mbatha Bus Way. The taxi rank was in the lower basement level underneath the bus departures, with access from the Bus Way. I decided to change this as the taxi rank is more active and has a higher change-over of people than the bus terminal. So the taxi rank is now along Ntemi Piliso on ground level, and the bus terminal in a basement level along the Bus Way. (By Author, 2014)*

3.4 | Technical Investigation

The focus of the study was the composition of the structural system I chose to use for my building. The station concourse requires a long span roof structure that unifies different spaces into a single space and allows a continuous perception of through the whole building with minimal support. The chosen structure is a portal frame structural system. I conducted case studies on buildings that make use of steel portal frames as the main structural system. The main objective of the investigation was how the basic portal frame has evolved and what innovations are there in terms of architectural design and structural performance.

The buildings studied were the following:

- Nestle Chocolate Museum by Rojkind Arquitectos
- Sainsbury Centre by Foster & Partners
- IBM Sports Hall by Grimshaw Architects
- Waterloo Channel Tunnel Terminal by Grimshaw Architects
- Great Glasshouse by Foster & Partners
- Leipzig Trade Fair Building by Von Gerkan, Marg & Partners

3.4.1 Factory Portal Frame

A portal frame structural system may be defined as "a continuous or rigid frame which has the basic characteristics of a rigid or restrained joint between the supporting members or column and the spanning members or beam" (Pokhare, 2011:1). The portal frame's structural configuration consists of supporting members and spanning members which are connected to each other by fixed joints at the frame's elbow. There are three types of portal frame which include fixed or rigid portal frame, 2-pin portal frame, and 3-pin portal frame. Soil types, site topography, climatic conditions, and building functions influence which type of frame is used (Pokhare, 2011).

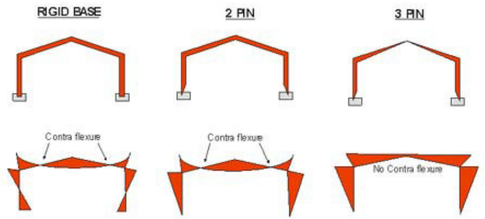


***Figure 3.43**: Three types of portal frame (Fitzgerald et. al, 2004).*

Portal frames can be constructed from reinforced concrete, timber and steel, taking form of roof profiles used for single or multi-span buildings. The frames are normally connected over the spanning members with purlins intended to carry lightweight roof coverings. The walls can have similar material fixed to sheeting rails attached to the supporting members or alternatively clad with brick or infill panels (Pokhare, 2011).

According to the Institute for Steel Development & Growth (n.d.) the need to achieve the low cost building envelope resulted in the basic structural form of portal frames, which was developed during World War II. Today they are the most commonly used structural forms for medium span, rectilinear single-storey industrial structures. Constructed of mainly hot-rolled sections with cold-formed purlins and sheeting rails that support the roof covering and cladding.

Fixed or Rigid Portal Frame
• All connections between frame members are rigid.
• Bending moments of lower magnitude are more evenly distributed.
• Used for small to medium size frames where moments transferred to the foundations will not be excessive.
Two Pin Portal Frame
• Hinges used at base connections to eliminate the tendency of the base rotating
• Bending moments resisted by the supporting members, greater than rigid frame.
• Used where high base moments and weak ground conditions are encountered.
Three Pin Portal Frame
• High hinged joints at the base connections and at the centre of the spanning member.
• Bending moments are reduced in the spanning member and deflection is increased as a result of the third hinge.
• To deal with the deflection, a deeper beam must be given a moderate pitch to raise the apex well above the eaves level.
• The design is simplified since the frame is statically determined.
• They are easy to erect on site , particularly when preformed in sections

***Figure 3.44**: Characteristics of the three types of portal frame (Derived from Pokhare, 2011: 1).*

3.4.2 From Factory To Innovative Structure

The full potential of the steel portal frames has been realised by today's architects and engineers who have unearthed numerous architectural designs and structural possibilities for the structural system. The three structural types of portal frame and the many ways steel can be used as structural element has aided this.

a) Type of portal frame



***Figure 3.45**: Sainsbury Centre - rigid portal, also Nestle Chocolate Museum, Great Glasshouse, and Leipzig Trade Fair Building (Structurae, 2014)*



Figure 3.46: IBM Sports Hall- 2 pin portal (Grimshaw Architects, 2014).

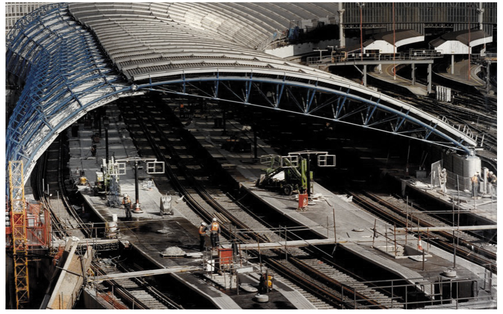


***Figure 3.47**: Waterloo Channel Tunnel Terminal - 3 pin portal (Rex, 2014).*

b) Form of structure

The form of the steel portal frame may consist of the following structure:

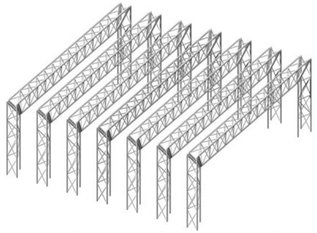


***Figure 3.48:** IBM Sports Hall- Built-up lattice, also IBM Sports Hall, Waterloo Channel Tunnel Terminal, and Leipzig Trade Fair Building (Boake & Hui, 2014).*

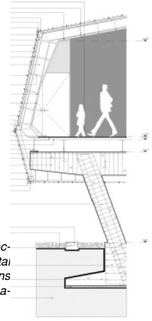


***Figure 3.49:** Nestle Chocolate Museum - Solid portal constructed from I-sections welded together. (Karmatrendz, 2009).*



***Figure 3.50:** Great Glasshouse - Hollow portal constructed from circular-hollow-sections. (Foster & Partners, 2014).*

c) Position of portal frame in relation to building envelope



***Figure 3.51:** Nestle Chocolate Museum - the portal frame is placed inside the building envelope, aslo Sainsbury Centre and Great Glasshouse (Karmatrendz, 2009).*



***Figure 3.52:** Leipzig Trade Fair Building - the portal frame is outside the building envelope, aslo IBM Sports Hall (Kiel , 2006).*

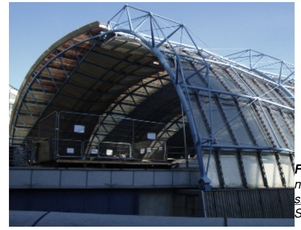


***Figure 3.53:** Waterloo Channel Tunnel Terminal - the portal frame is outside the building envelope, aslo IBM Sports Hall (Alex, n.d.).*

d) Difference in placement

A portal frame is always single storey, it does not support floors, and the building is usually on the ground. However, the building can be:



***Figure 3.54:** Great Glasshouse - submerged into the ground with only the roof being visible over ground (Foster & Partners, 2014).*

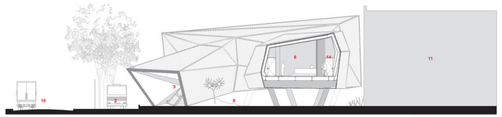


Figure 3.55: *Nestle Chocolate Museum - elevated above ground (Karmatrendz, 2009).*

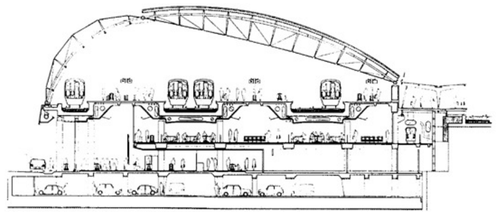


Figure 3.56*: Waterloo Channel Tunnel Terminal - the top floor of a multi-storey building (Abbott, n.d.).*

e) Shape of portal frame

Spanning members for most factory portal frames are usually pitched, but they can also be:

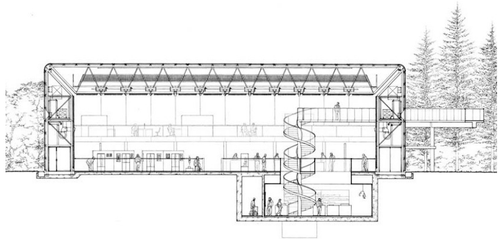


Figure 3.57*: Sainsbury Centre - horizontal spanning member, also IBM Sports Hall (Foster & Partners, 2014)*



Figure 3.58*: Leipzig Trade Fair Building - arch rib because the portal frame is arched, also Waterloo Channel Tunnel Terminal and Great Glasshouse (Leipziger Messe GmbH, n.d.).*

f) Size and span of portal frame

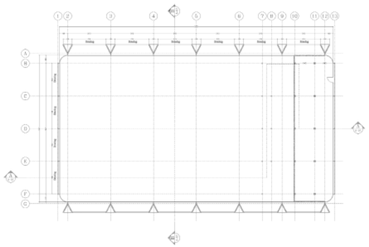


Figure 3.59: IBM Sports Hall- all the portal frames within the structural bay are normally of a similiar size and span, resulting in rectangular plan forms. Also Sainsbury Centre, IBM-Sports Hall, and Leipzig Trade Fair Building (Nasrollahi, 2008).

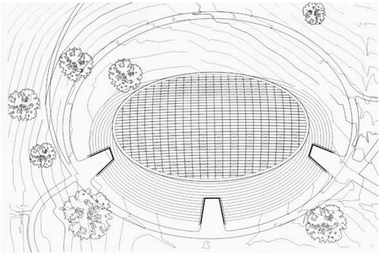


Figure 3.60: *Great Glasshouse - portal frames can also have different sizes and spans and can result in an elliptical plan for example. Also Waterloo Channel Tunnel Terminal.(Foster & Partners, 2014).*

g) Asymmetrical portal frame

Most portal frames are symmetrical, but there are also asymmetrical portal frames.

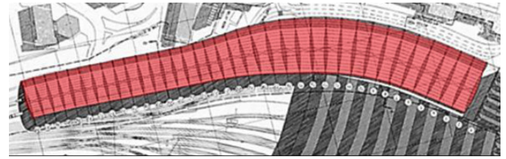


Figure 3.61*: Waterloo Channel Tunnel Terminal - the asymmetrical 3 pin portal frame with variable sizes and spans (Steel: my, 2014)*

h) Freeform portal frame

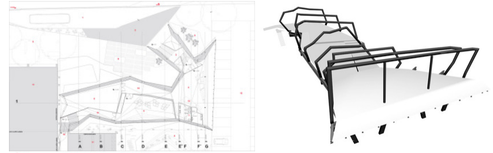


Figure 3.62: *Nestle Chocolate Museum - free form portal frame with variable shapes, sizes and spans (Karmatrendz, 2009; Fairs, 2007).*

3.4.3. Conclusion

The portal frame structurally has two constant characteristics, firstly a rigid elbow joint between supporting and spanning members, and secondly it is a single-storey structural system. The other structural and architectural features can vary, as shown in the case studies. The steel portal frame has progressed architecturally from factory to aesthetically pleasing buildings that require column-free spaces and long span construction.

The Westgate multimodal transit station I have designed has a free form steel portal frame structure with variable shapes, sizes and spans. The frame sits the top floor of the station and inside the building envelope. The portal frame structure carries the roof that covers the station concourse. The intention the roof is to give a sense of lightness to the space and reflect the movement it houses. The outer layer (roof covering) consists of a modular system of corrugated multi wall translucent polycarbonate sheets that allow light inside. The inner layer (ceiling) is made up of perforated steel plates which gives a uniform appearance.

Steel, concrete, brick and glass are the materials used in the station building. These materials go with the industrial aesthetics I wanted to achieve, as the Westgate precinct itself is very much an industrial area.

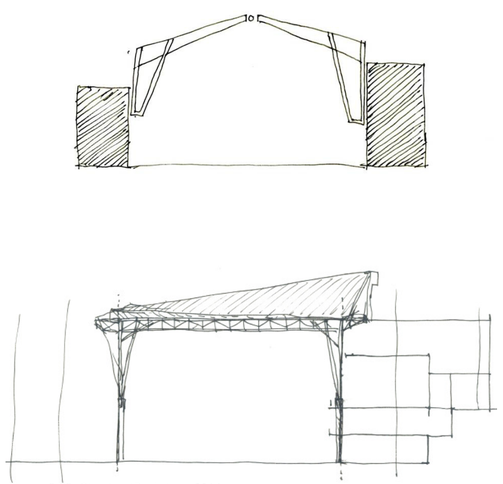


Figure 3.63: *Structure(By Author, 2014).*

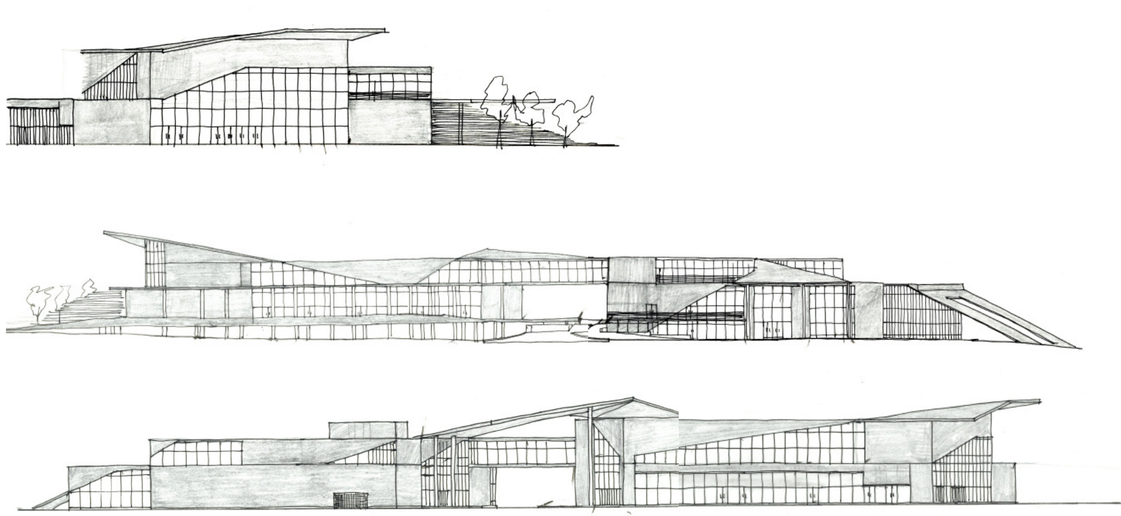


Figure 3.64: *Sketch Elevations(By Author, 2014).*







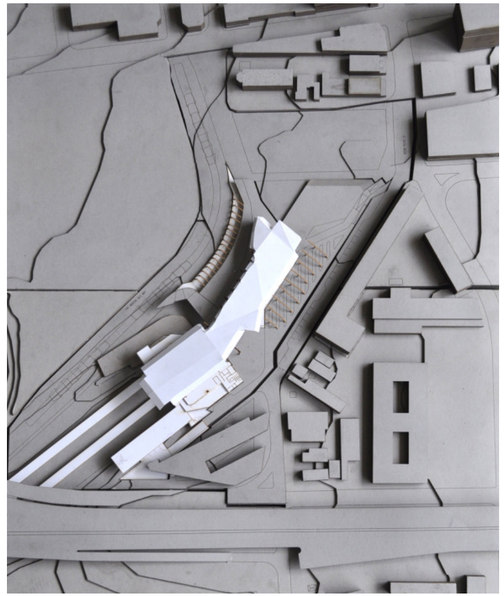


Figure 3.65: Development of the Westgate ultimodal ransit station and the roof over station concourse shown in plan view of process models *(By Author, 2014).*

3.5 | Conclusion

The thesis investigation reveals the opportunities presented by liminal spaces of transportation. It indicated that the transitional locations of urban settings should be altered to provide us with places that encourage momentary stops, as well as pause conditions that encourage potential enjoyable movements, activities and social interactions.

The investigation of the Westgate precinct and station indicated a need for the establishment of the Westgate Precinct as a Transit-Oriented Development built around the station. The proposed Westgate multimodal transit station aimed to be a destination, a place that fosters connection and exchange between different people. While train stations and airports are often read as 'non-places', Westgate multimodal transit station can challenge that categorisation because of it having the potential to be a transit point and terminus, a meeting place, mall, and station all in the same space.

04 | References & Appendices

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4.1 | References

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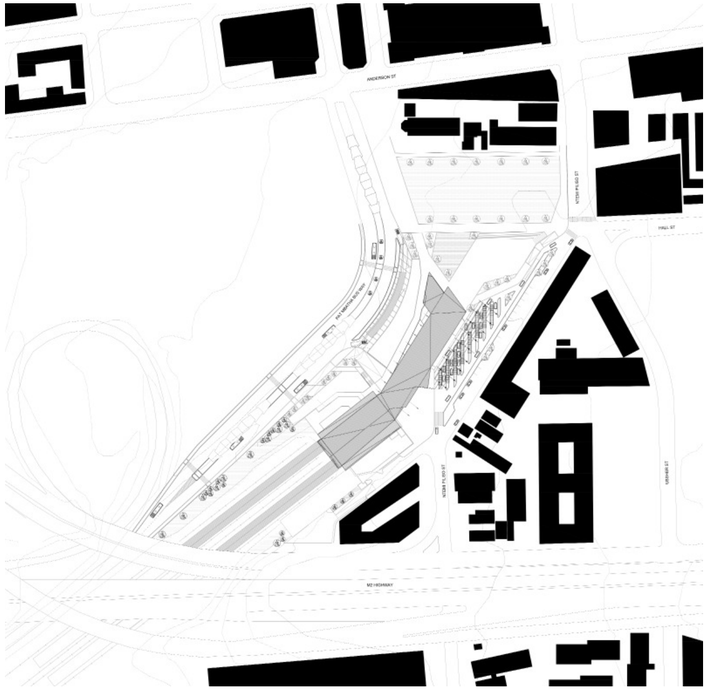
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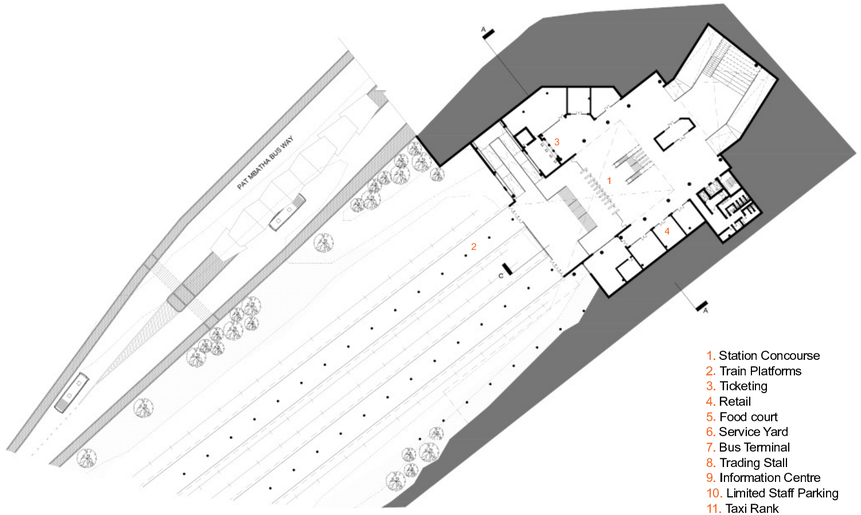
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4.2 | Appendices



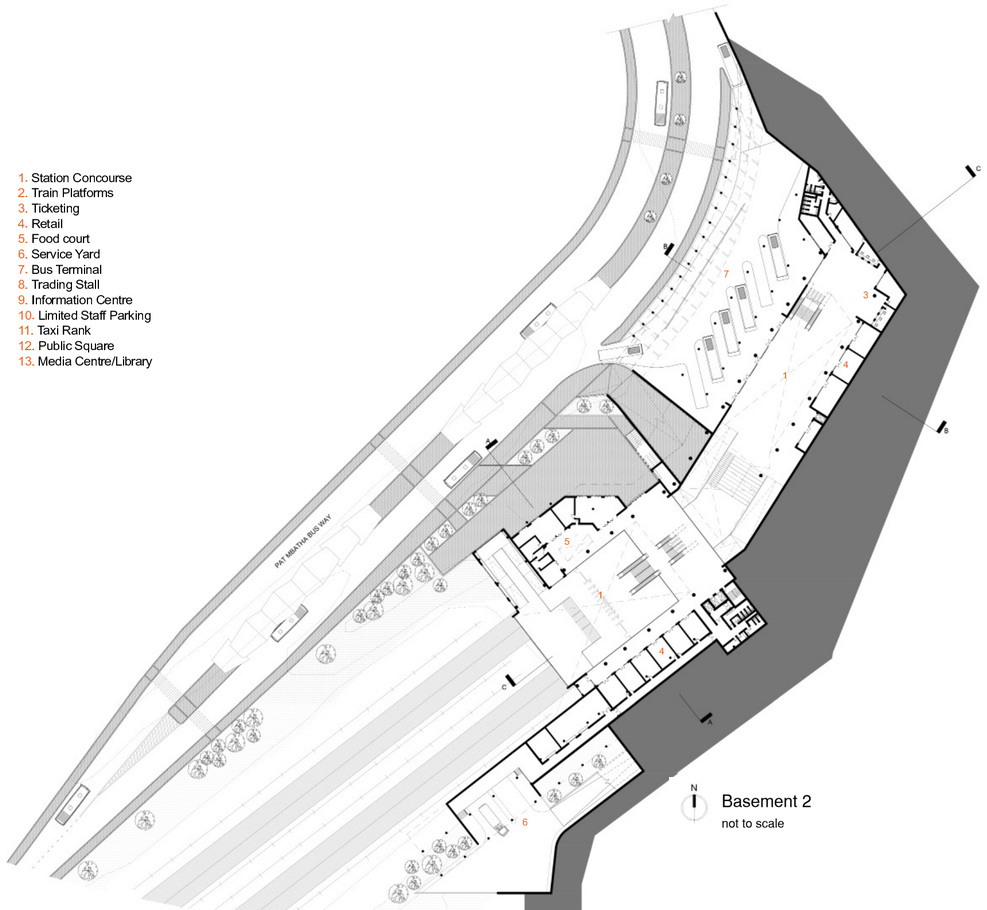
Site Plan
not to scale



1. Station Concourse
2. Train Platforms
3. Ticketing
4. Retail
5. Food court
6. Service Yard
7. Bus Terminal
8. Trading Stall
9. Information Centre
10. Limited Staff Parking
11. Taxi Rank
12. Public Square
13. Media Centre/Library

Basement 1
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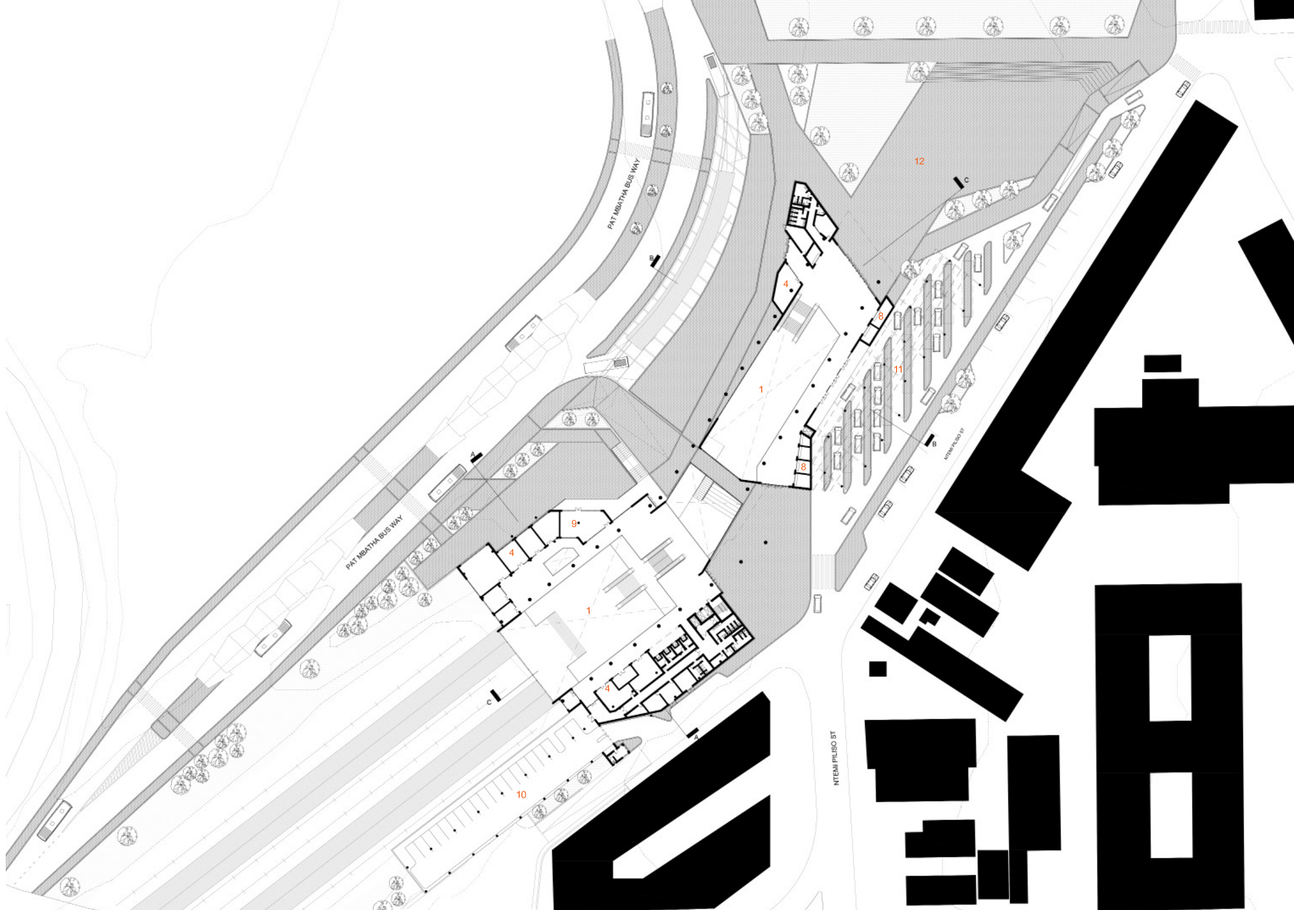
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5. Food court
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8. Trading Stall
9. Information Centre
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11. Taxi Rank
12. Public Square
13. Media Centre/Library



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Basement 2

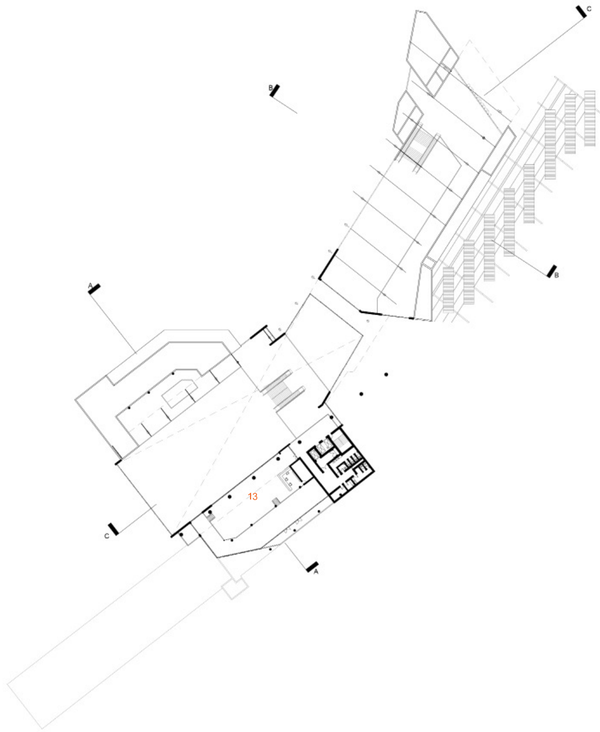
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Ground Floor

not to scale

1. Station Concourse
2. Train Platforms
3. Ticketing
4. Retail
5. Food court
6. Service Yard
7. Bus Terminal
8. Trading Stall
9. Information Centre
10. Limited Staff Parking
11. Taxi Rank
12. Public Square
13. Media Centre/Library



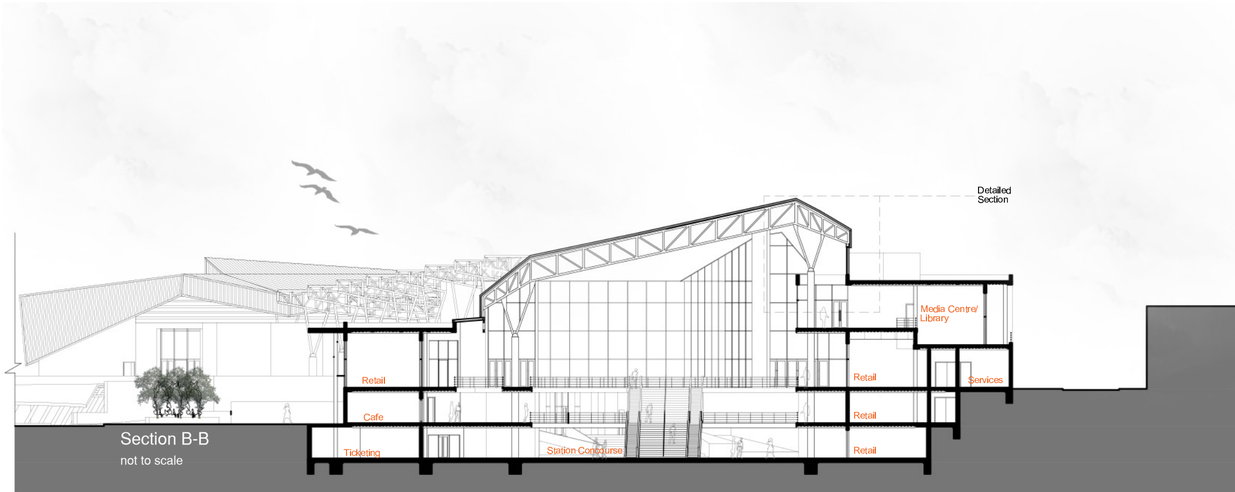
Basement 2

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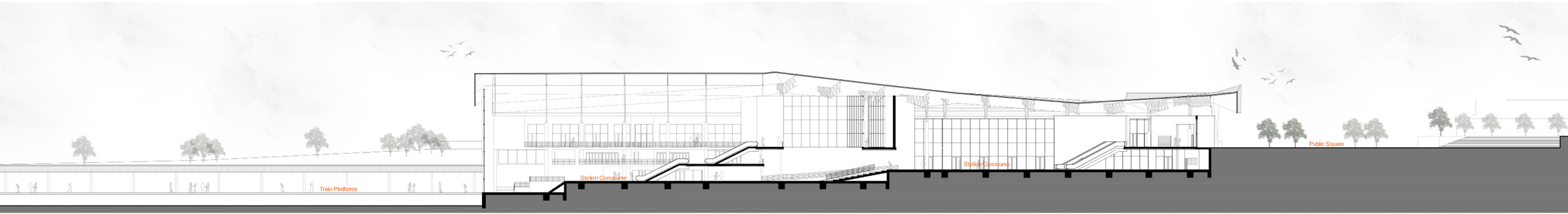
Section A-A

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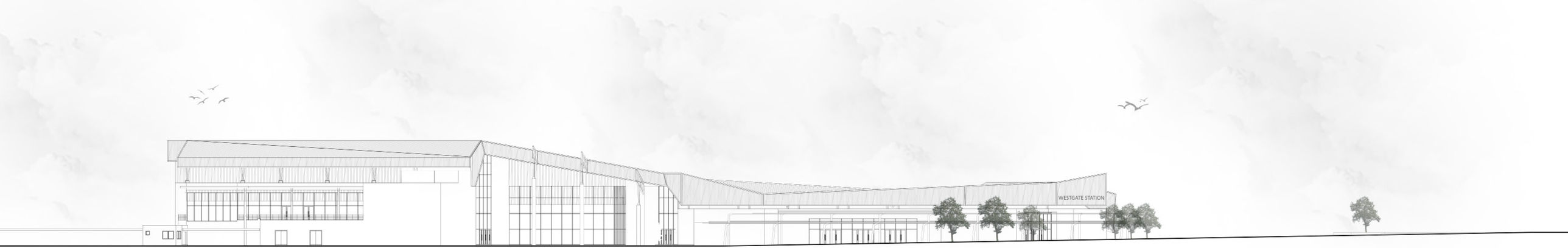
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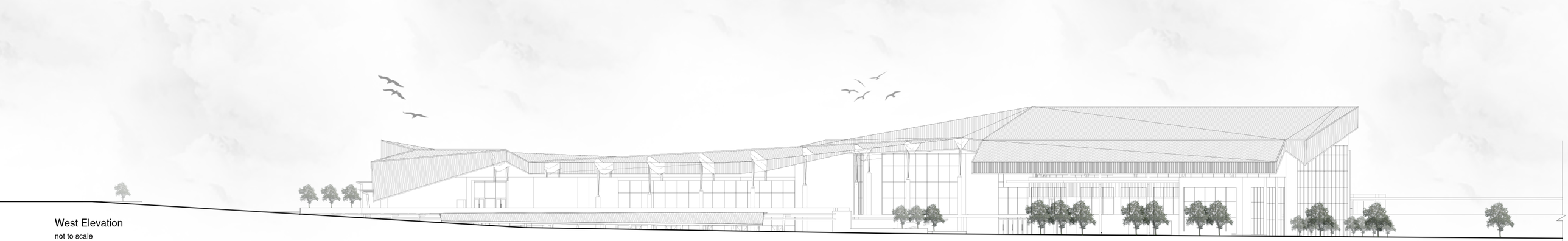
Section C-C

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East Elevation

not to scale



West Elevation

not to scale



North Elevation

not to scale



View of main station entrance from puplic sqaure



View from Ntemi Piliso Street



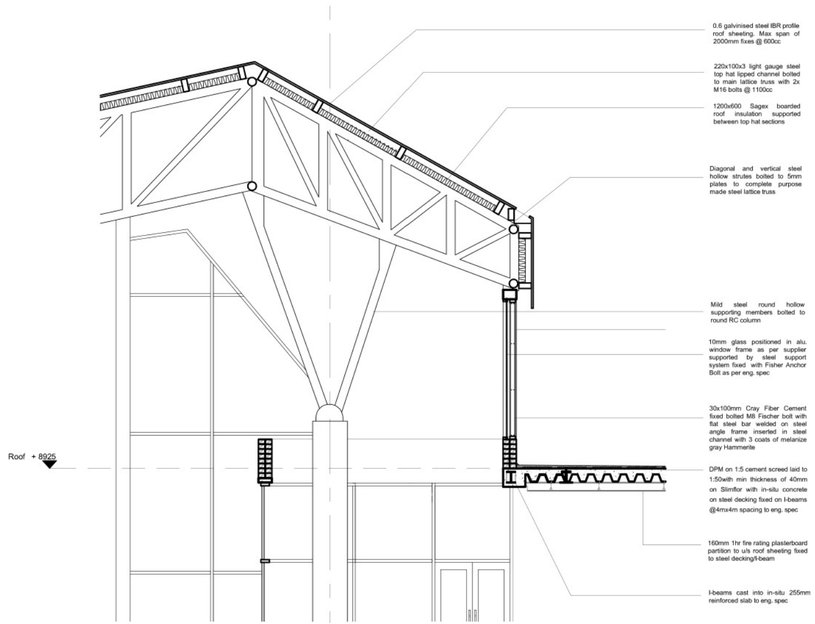
View from from above Bus terminal



View of station concourse

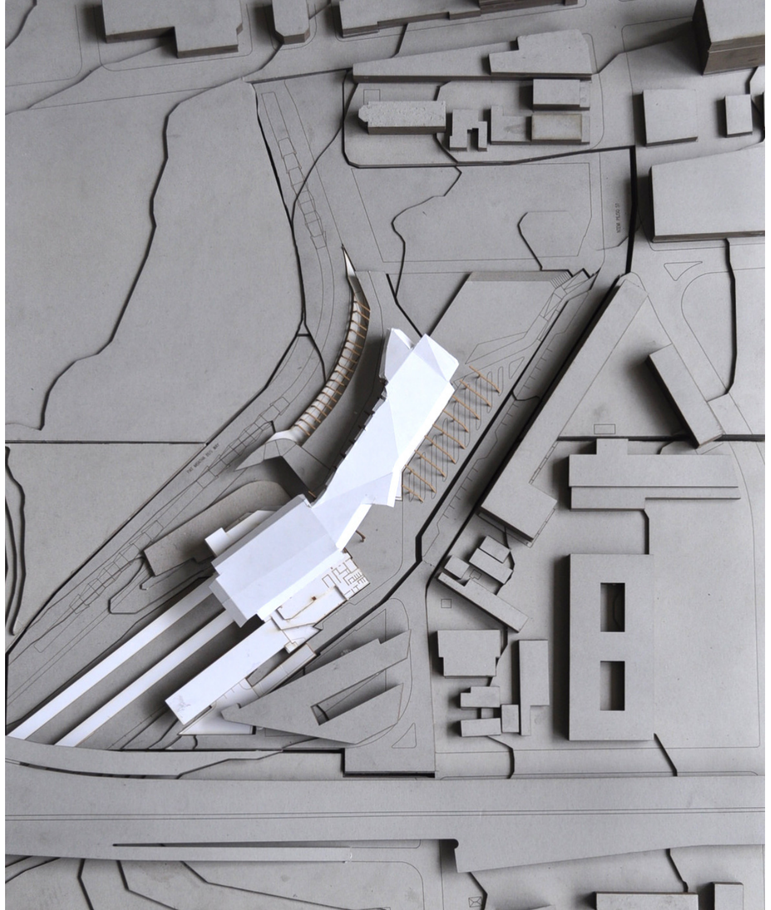


View of station concourse



Detailed Section

not to scale



Site Model