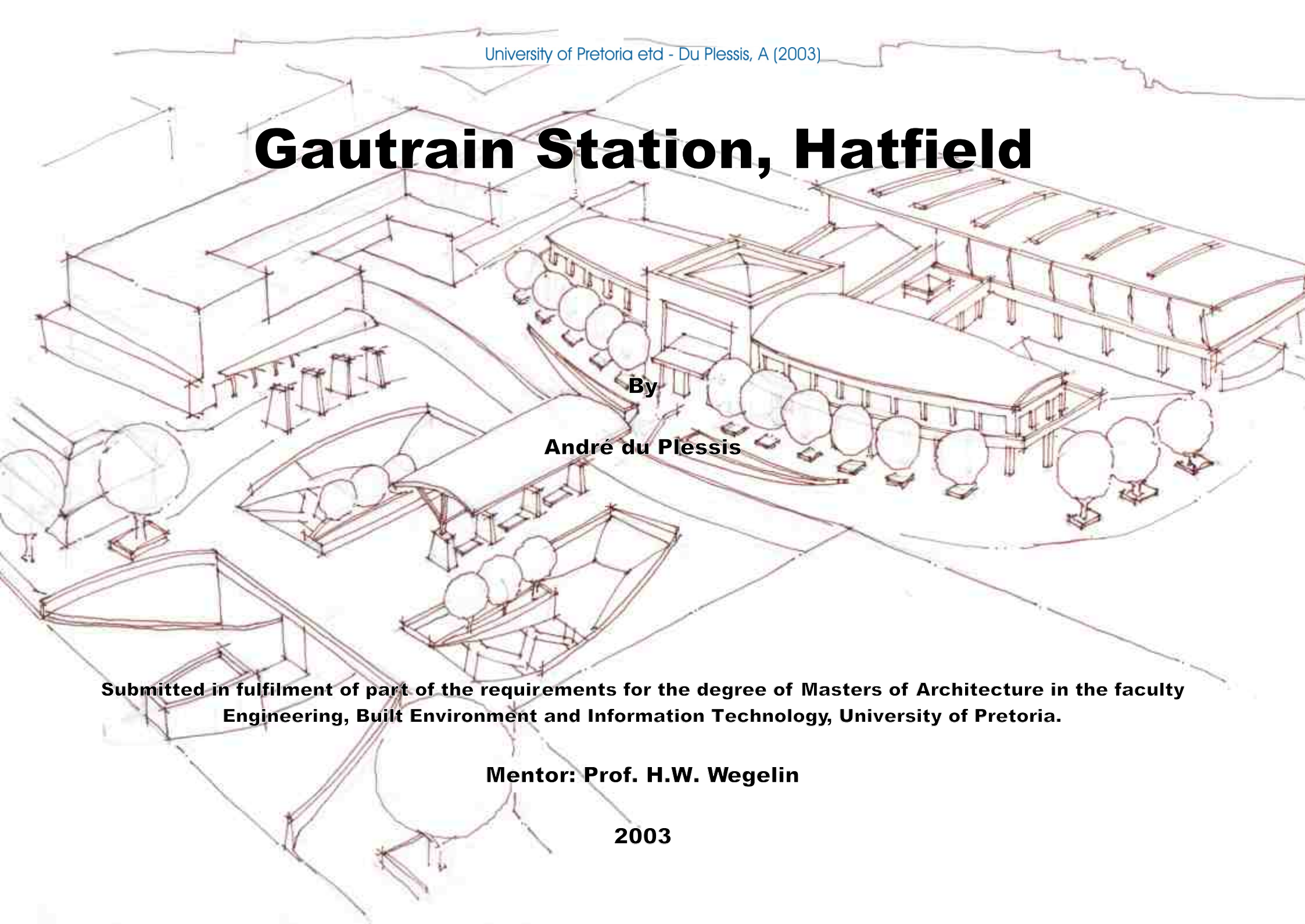
Gautrain Station, Hatfield



By

André du Plessis

Submitted in fulfilment of part of the requirements for the degree of Masters of Architecture in the faculty Engineering, Built Environment and Information Technology, University of Pretoria.

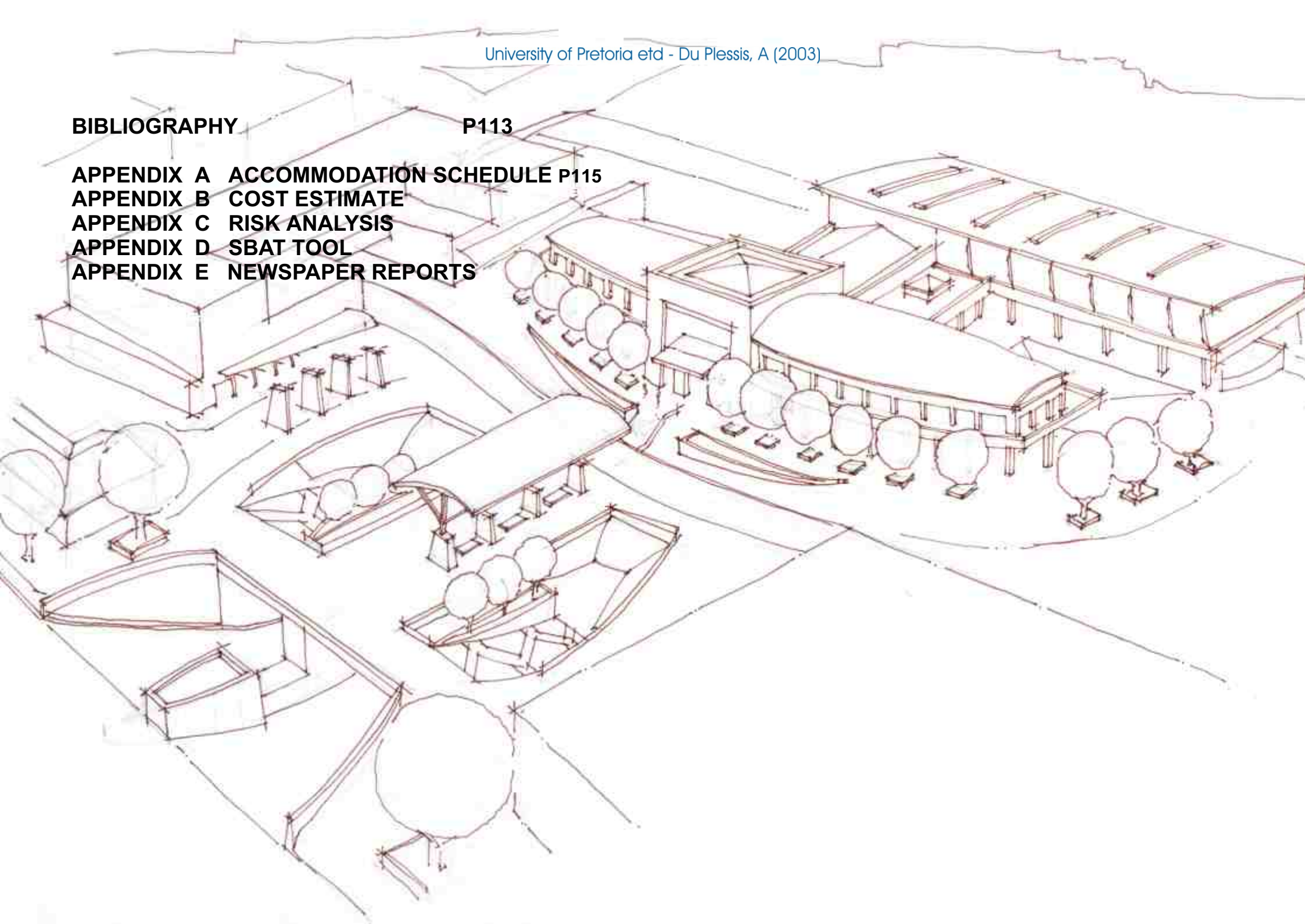
Mentor: Prof. H.W. Wegelin

2003

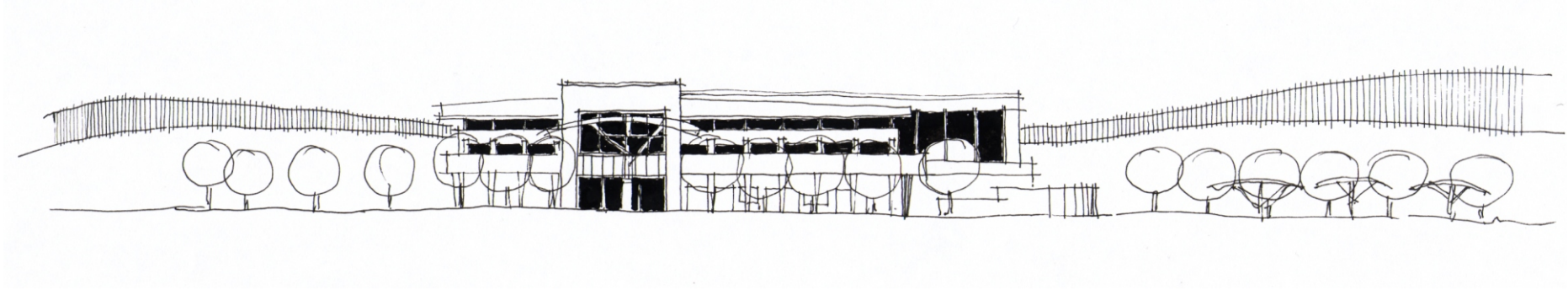
Abstract

Station buildings across the world have always been the epiphany of efficiency with the coldness associated with this building type. With the Gautrain Station, Hatfield, Pretoria, the efficiency of the machine is effectively combined with the humanity of nature – the abundance of the South African natural world is allowed to bleed into all spaces normally seen as the exclusive domain of steel and concrete.

André du Plessis, 2003



Go to
Chapter 1: The Problem



Chapter1 The Problem

1.1 INTRODUCTION

One recent Friday night in central London, Corinne Truss spent 4½ hours driving five kilometres to one of her catering jobs. "I called the police, and they said people had been sent out to direct traffic, "she remembers. "But they where stuck in traffic" ... During the salad days of London traffic in the 1970s, when Margaret Thatcher proclaimed that "nothing should be allowed to stand in the way of the great car economy," cars blazed through London at 12-14km/h during rush hour…Today, however, the average traffic speed in London is just over 9km/h. On some key roads, it has slowed to 2.9 km/h- slower than horse-and-cart days, slower than the rats running in the gutters…
Traffic is like water: it oozes across all available surface." (Time : 38)
This is the truth and irony of traffic in the great cities off our globe. This is also true in South Africa.

1.2 REMEDIES TRIED

Some desperate attempts to solve this problem included closing the city centre for cars for 2½ hours in Athens, September 2002. The aim: to encourage Greeks to use public transport.The traffic jams caused by this rough medicine made the carbon monoxide level to spike by 50%.

Another Greek attempt entailed alternate-plate driving days, where number plates are allowed every other day. This only resulted in car ownership to rise: drivers simply purchased another car with another number plate so that they could drive every day

Other examples include a charging scheme as in Singapore where each car that enters the city passes a sensor that reads a "smart card" installed in the dashboard .0,5 To 3 Euro, depending on the time of the day is automatically deducted.

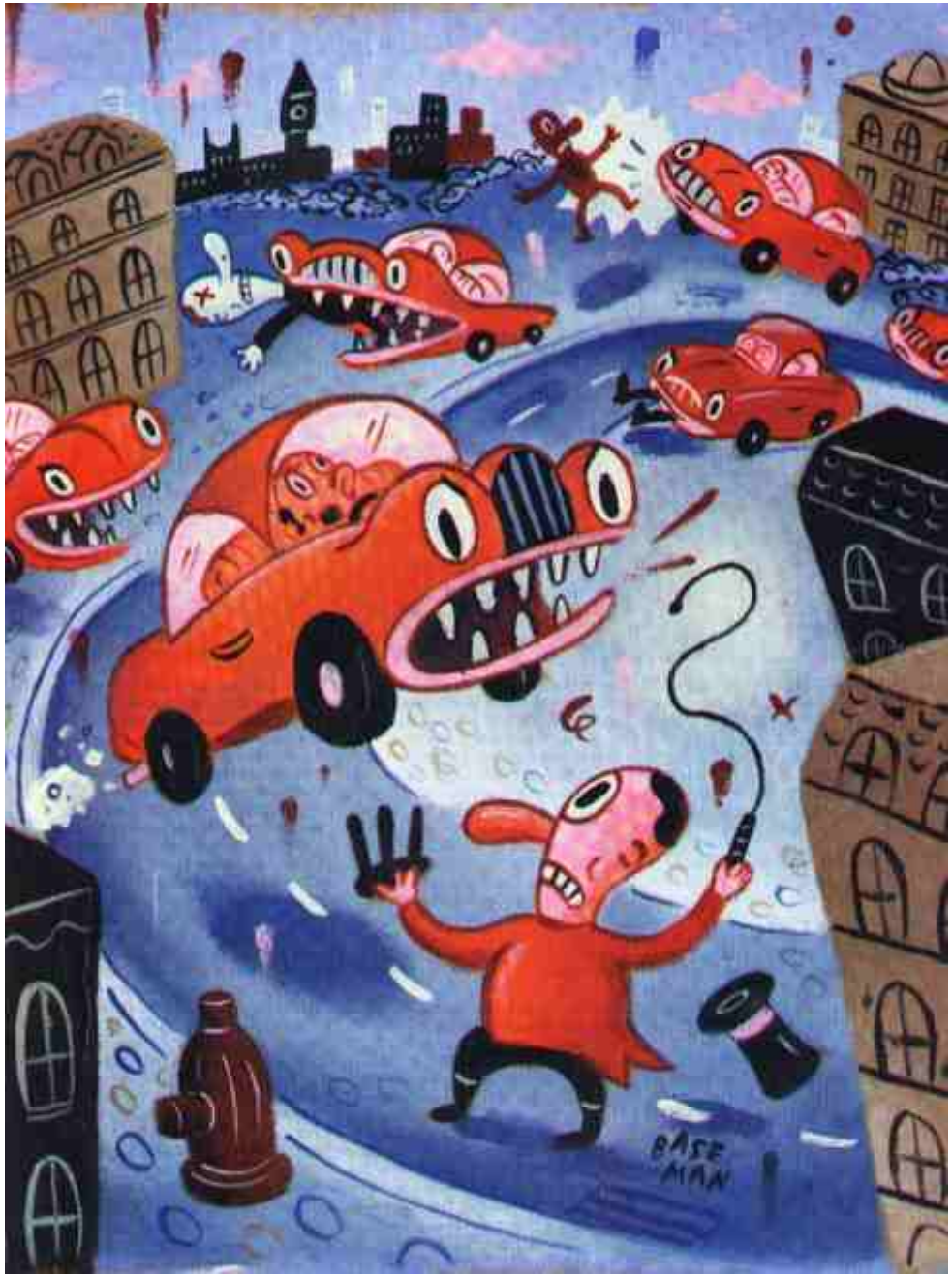


Fig 1.1 Time p36

This method seems to work, but drivers resent the system and sometimes simply pulls over to the shoulder of the road waiting for 7pm when they can get by for free.
(Time: 40)

It is evident that rough medicine is not the solution, and that the challenge still exists to find a solution for this global problem.

1.3 THE SOUTH AFRICAN CONTEXT

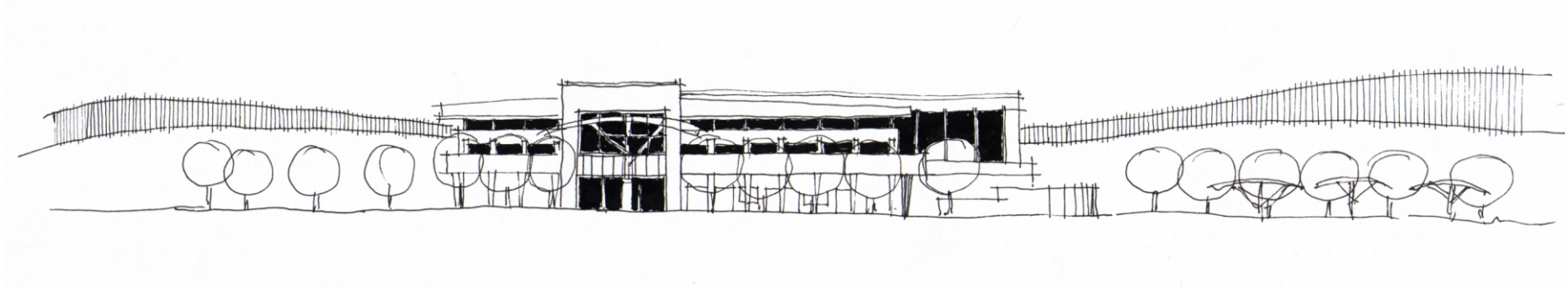
The phenomenon of traffic congestion is also present in South African cities, especially in the Gauteng area, the economic hub of South Africa responsible for 36% of the Gross Domestic Product whilst covering only 2% of the total surface of the country.

The Johannesburg to Pretoria corridor is the fastest growing development hub in South Africa. Increasing road traffic congestion in this area is constraining the development. (Gauteng Department of Public Transport,Roads and Works,October 2002, Vol 2: 1-4).

Making matters worse are the high incidence of accidents due to factors like deteriorating roads, unroadworthy vehicles, and fraud when it comes to the issuing of drivers licenses, roadworthy tests, etcetera.

An announcement was made in February 2000 by the Premier of Gauteng Province, Mbhazima Shilowa , that could be the solution to South African and probably
International traffic problems. This will be discussed in chapter two.

Go to:
Chapter 2: A traffic solution for the Gauteng area



CHAPTER 2
A TRAFFIC SOLUTION FOR THE GAUTENG AREA

2.1 GAUTRAIN.

"The Premier of Gauteng province, Mbhazima Shilowa, announced the intention of a Rapid Rail Link early in 2002, connecting Pretoria, Johannesburg, and Johannesburg International Airport (JIA) as one of 10 Spatial Development Initiatives (SDIs)-also known as Blue IQ-of the Gauteng Government". (Gauteng Department of Public Transport, September 2002: 1-1)
This project intents to attract private car users to public transport in the Gauteng area in order to lessen traffic congestion where traffic increased at a rate of 7% per annum between 1992 and 200.
.

2.1.1 OBJECTIVES AND PURPOSE

The objectives for the Gautrain project includes the following:

- Stimulating economic growth, job creation, and development.
- Lessen traffic congestion between Johannesburg and Pretoria.
- Must aid in the goals of national Government (Black empowerment, small medium enterprise (SME) promotion and business tourism.
- Government's commitment to the promotion of public transport must be illustrated.
- Improve the image of public transport to attract private car users
- Business tourism to be promoted by linking JIA with other stations.
- Improve city sustainability by shortening travel distances.
- The Gautrain must link with the Tshwane Ring Rail Project which links Soshanguve, Atteridgeville, and Mamelodi. (Appendix A)
- Stimulate the revival of the Johannesburg and Pretoria Central Business District (CBD).
- Linking the main economic nodes in Gauteng with JIA.

The Project is integrated with other public transport nodes at all the stations, thus assisting in a holistic transport plan for Gauteng. (Gauteng Department of PublicTransport, Roads and Works,Ocktober 2002, Volume 1: 2).
The purpose of Gautrain is thus to develop a public transportation system that supports the optimization of landuse and minimise traffic congestion. This will lead to a reduction in road accidents as well as pollution levels from motor vehicles.

2.1.2 THE GAUTRAIN CONCEPT.

According to Gauteng Department Of Public Transport (Gautrain Rapid Rail Link, September 2002: 1-16) a feasibility study was done in 2000 to 2001 by the Gautrain technical team appointed by Gautrans before any proposals for the Rapid Rail Link were made. Bohlweki Environmental was appointed by Gautrans to undertake numerous environmental studies in accordance to Environmental Impact Assessment (EIA).

Key authorities provided input to the EIA. The consultation was steered by the EIA's interaction with the Gauteng Department of Agriculture, Conservation, Environment and Land affairs (GDACEL). The public was informed about this project via public meetings in April 2002. Input from the public could also be given on these meetings.
A draft EIA report has been made available to the public from 21October 2002 to 21 November 2002 in libraries and the project website.
Proposals regarding the Gautrain was based on the findings of the Environmental Impact Assessment (EIA)

The proposed Gautrain Rapid Rail Link will be a state-of-the-art rail network. It will consists of two spines namely the east-west spine linking Sandton and the East Rand at Rhodesfield in Kempton Park (a commuter service) together with an airline passenger service linking Sandton and Johannesburg International Airport (JIA). Secondly a north-south spine links Johannesburg and Pretoria Central Business Districts (CBDs). This will also be a commuter service.

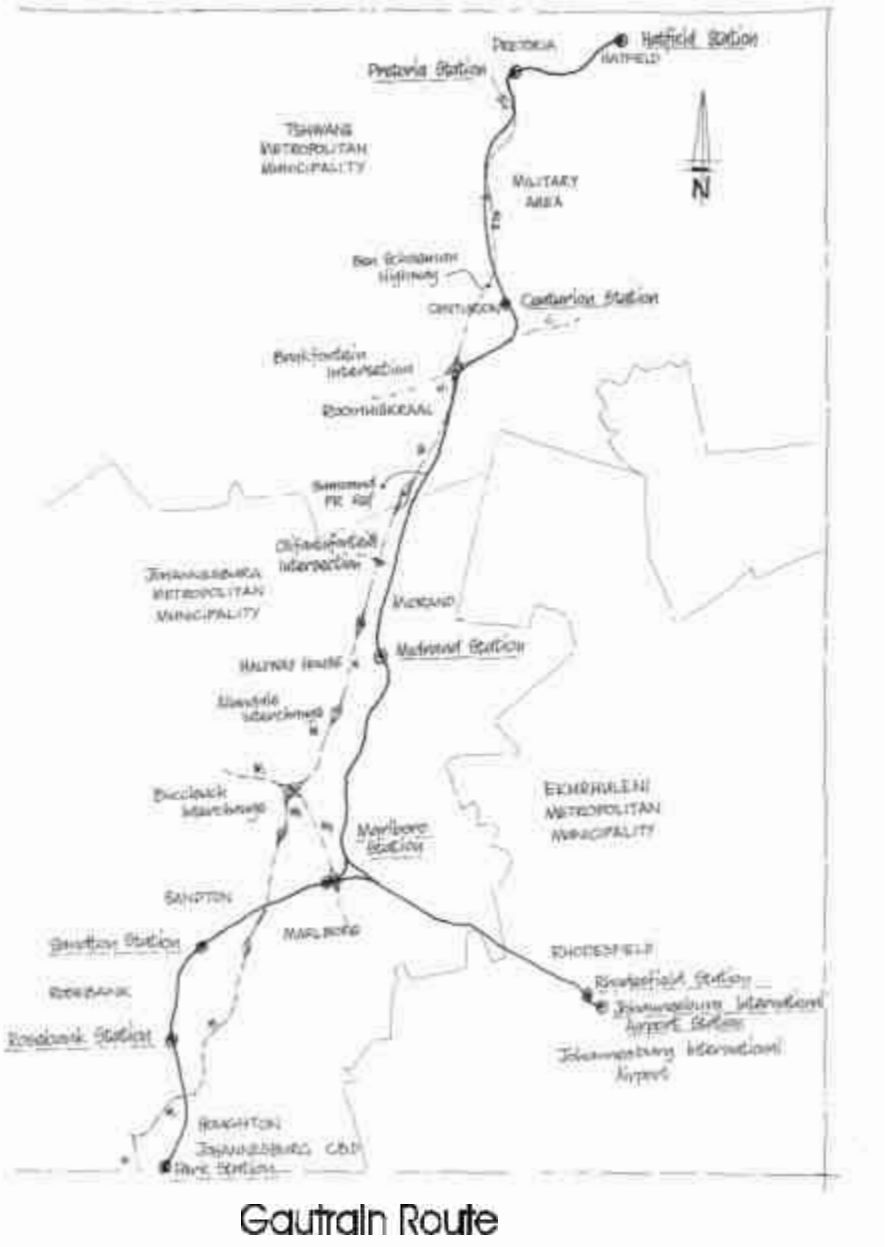


Fig 2.1 Map explaining proposed Gautrain Rapid Rail Link Route.

2.1.2.1 SERVICES

An attractive image is planned for the Gautrain as a safe, comfortable and predictable alternative to private car usage.
The length of the network planned will be approximately 80km.
The Gautrain will travel at between 160 and 180km/h.
The estimated travel time between Pretoria CBD and Johannesburg CBD will be approximately 35 minutes.
Premium services will apply for the general passenger and premium plus services to the airline passenger
(Gauteng Department of Public Transport, Volume 1 October 2002:4)

2.1.2.2 INFRASTRUCTURE.

TRAIN.

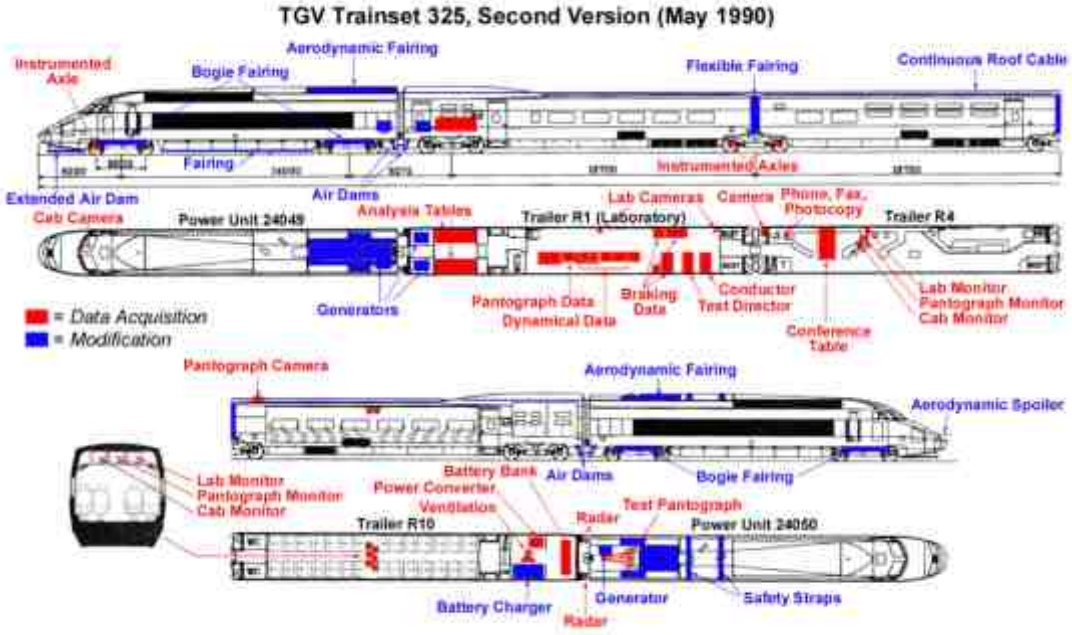


Fig 2.2 The schematic drawing of the TGV Power unit 24049, which set the speed record at 515.3km/h(TGWweb,Basics:1)

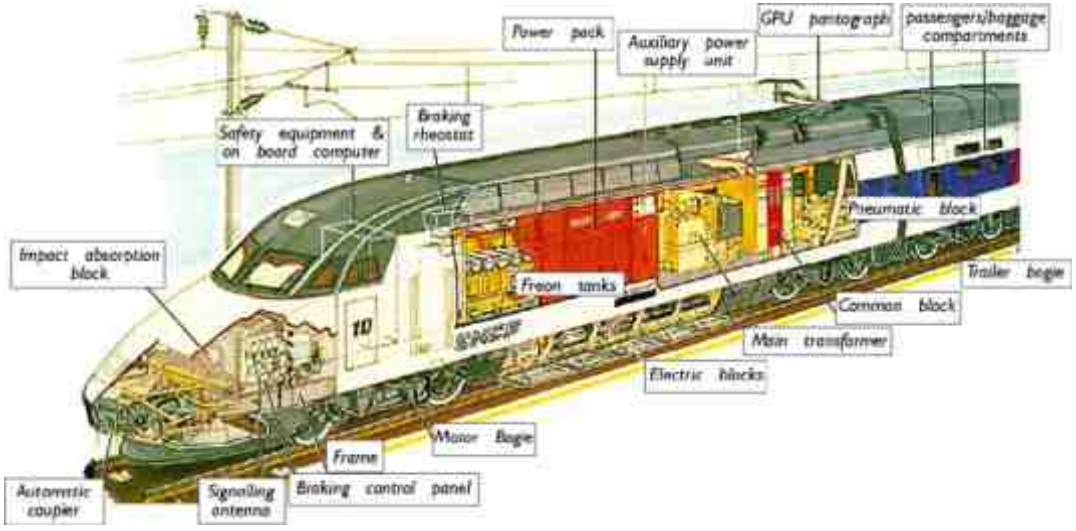


Fig 2.3. Cut-away of the TGV train Locomotive showing the radical difference from traditional diesel locomotives.(TGVweb.Basics:2)

The preliminary train set that will be used in the proposed Gautrain Project will be the TGV Atlantique, developed in France(figure 2.3).

TGV stands for “Train à Vitesse, meaning “high speed train.”
The most striking aspect of the train is the aerodynamic design of the nose, but perhaps the most innovative part is the articulation of the trainsets. The cars are semi-permanently attached to each other ,instead of just merely coupled,as seen in figure 2.4.

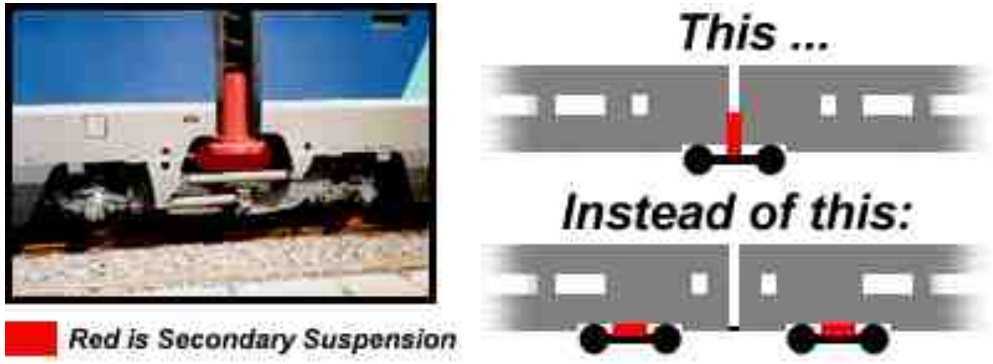


Figure 2.4. Explanation of the articulation of the trainsets in the TGV.

On the commuter services seating space for eighty passengers and standing space for twenty passengers will be provided
On the airline passenger service seating space for fifty passengers will be provided.

Twenty to twenty five train sets will be required to accommodate the expected number of passengers during the first year.

The trains will consist of three or four-car units and a drivers cab at both ends of the unit

The train will be powered by electricity supplied by Eskom while municipal electricity will be used at the stations.
Cooling fans will be used for both motor cooling and air conditioning.(Gauteng Department of Public Transport, Roads and Works, Vol1:4)

RAIL

The Gautrain gauge (distance between tracks) will differ from conventional rail systems in South Africa, which uses Cape gauge (1065mm)
The International Standard Gauge (1435mm) allows for faster speeds of up to 160km/h or more the wolrd record currently is held by the TGV train set on the left at 515.3km/h.
The proposed Gautrain stations will have a uniform length dictated by the length of the maximum predicted rolling stock envisaged on this track in the future with enough to spare at full capacity of approximately 250-300m.

The rail reserve in South Africa is a leftover from Colonial days when British Standardization dictated the width; subject to the distance an ember can travel from the stack of a steam engine
This had to be disregarded in the planning for the Gautrain, as it would pass through or near built-up areas. The adherence of this archaic rule would have meant the destruction of too many homes resulting in the viability of the project affected adversely. Thus the decision was made to make the new rail reserve 30m wide with room for two tracks (one in each direction), and a service road running parallel to the rail line

Tunnelled sections such as the planned one at Muckleneuk will consist of two tunnels approximately12.5 m apart. In accordance with international safety standards these tunnels would either be bored, using tunnel boring machines such as the ones used on the Channel Tunnel project under the English Channel, or by the more familiar method to South Africans namely drilling and blasting (as used in the mining industry) The method used will depend on the bidding consortia.

Ventilation shaft reaching to the surface, up to a maximum diameter of 18mØ, will be spaced at approximately 1km intervals o the tunnelled sections, to allow for air circulation through the tunnels and for emergency evacuations via stairwells to the surface. These would have definite impact on the development of any land parcels adjoining the tunnels, as it would have to be major design element.

Train tracks on the surface would cut beneath roads, or above them on bridges structures depending on the local topography
Deep valleys would for instance be traversed with structures

STATIONS

Anchor nodes for the Gautrain project will be developed at Pretoria CBD , Johannesburg CBD and JIA.AA
Other key nodes identified were Rhodesfield , Rosebank,Sandton, Marlboro, Midrand, Centurion and Hatfield .(Gauteng Department of Public Transport,Roads and Works,October 2002:2-7)

For the purposes of this document, there will be zoomed in on the Hatfield station as study area.

2.1.3 THE CLIENT

The client for the proposed new Gautrain Transport Station in Hatfield can be described as being a partnership of a number of role players in the Provincial Government of Gauteng Provence as well the Private Sector and the Thswane (Pretoria) City council.

The Gauteng Provincial Government.

The Gauteng Provincial Government will contribute a sum to the capital infrastructure costs.

The Private Sector.

The private sector will partially fund, design, build and operate the rail system under a concession contract with the Provincial Government.

Companies from the private sector were requested to pre-qualify for consideration to bid for the Gautrain project.
Two consortia have been short-listed and asked to submit proposals for the implementation of the project.
Their proposals will be based on or adjusted to take account of the recommendations contained in the Environment Impact Assessment (EIA) report on the project, and the content of the Record of Decision (ROD) to be issued by the Gauteng Department of Agriculture, Conservation, Environment and Land Affairs (GDACEL).(Gauteng Department of Public Transport, Roads and Works October 2002Vol1:3)

2.1.4 The User

The User is defined as any person liable, in the lifetime of the built fabric (buildings and created infrastructure), to use the creation for his / her personal betterment.
This may also entail Judicial Persona (legal entities) using the built fabric for such stated purpose.

The list of users entails the following:

The shopkeepers and lessees who trade in the built area, as well as the informal traders keeping formalised stalls in the periphery.

Service personnel and staff occupied in the daily running of the buildings and related activities.

Commuters will use this building during the running time for the Gautrain (05:30 to 20:30)

Commuter A (Business Traveller)
This commuter will probably be an upper middle class business traveller that will use the building at peak time intervals.

Commuter B (Tourism Traveller)
This type of commuter is seen as the ultimate type of user to grace the seats of the Gautrain, as this user would ensure a maintained economic injection into the Gauteng Province

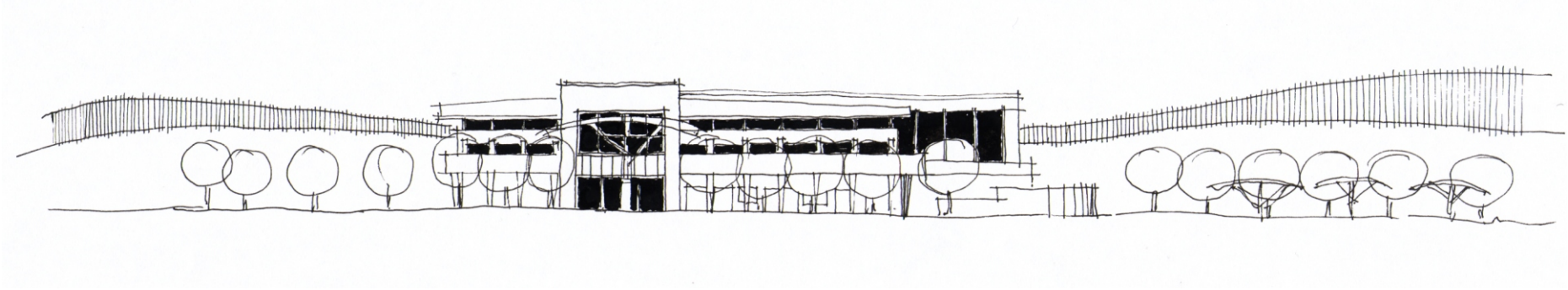
Local Resident (Student, Middle Class young Professionals).
The name being fairly self-explanatory, denotes the after hours user of the restaurant and entertainment sectors contained in the building complex.

The Maintenance Staff and workers.
This group of people is often the forgotten ones when it comes to the user profile of service type buildings, as they seam ubiquitous and somehow without needs. This however cannot be further from the truth, as the successful functioning of any building relies on the happiness of its working population.

External Support Servicing Personnel.
In this group the most important sector would be the Satellite Police Station and its personnel.

Others include servicing sub-contractors namely air-conditioning specialists, proprietary train systems specialists and the operators of the technical infrastructure to maintain the Running Gear of the Gautrain Rapid Rail System.

Go to:
Chapter3: Hatfield in context



Chapter 3 Hatfield in context

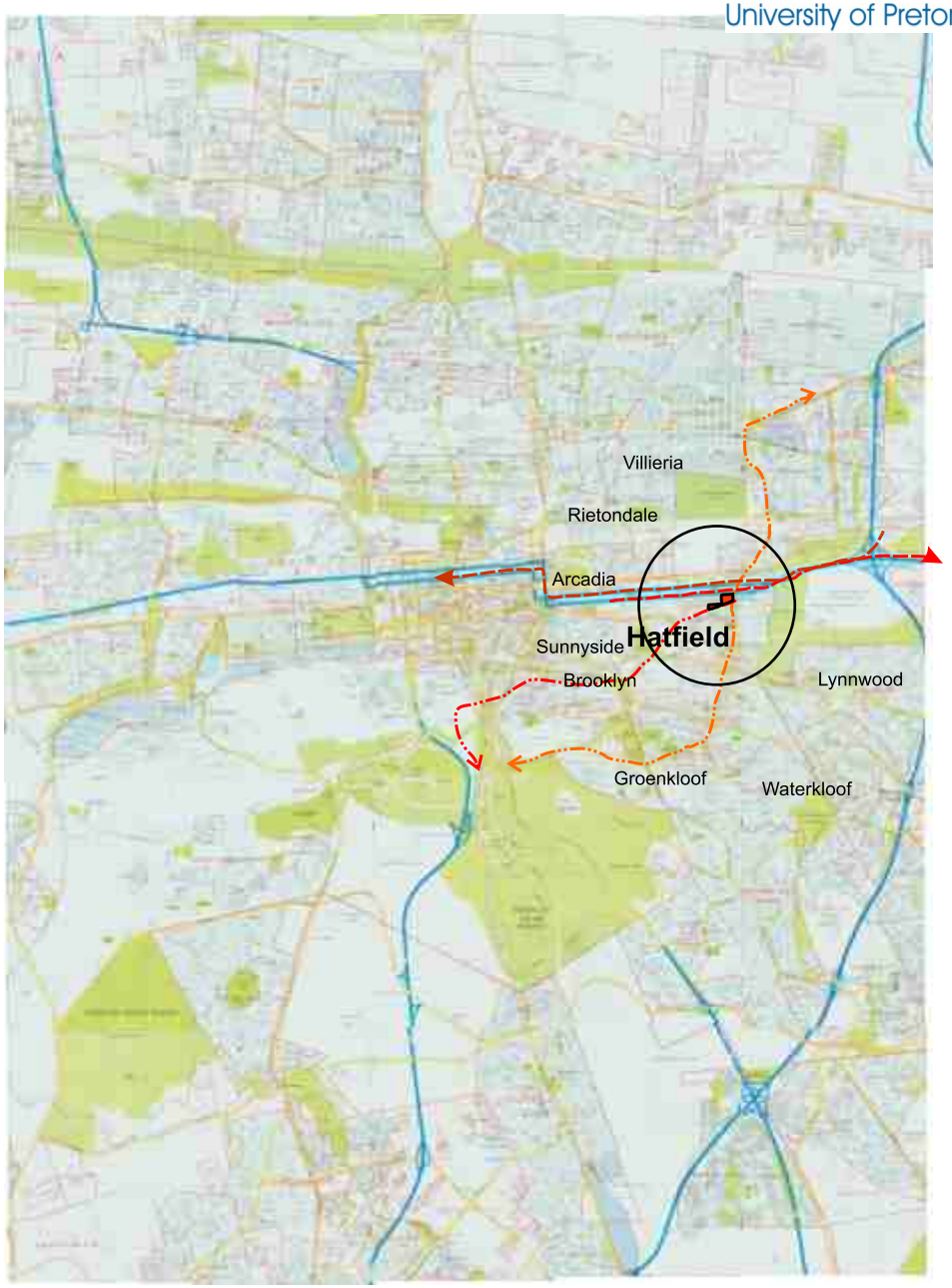


Figure 3.1
Explanation of the location of Hatfield in the urban context of Pretoria.

CHAPTER 3

HATFIELD IN CONTEXT
3.1LOCATION

The location of Hatfield in the urban context of Pretoria is graphically explained in fig 3.1
The far northern street in Hatfield is Church Street, which forms a natural boundary between the residential areas of Colbyn and the Presidency to the north and the offices and residential area to the south
The Western boundary is delineated along Hill Street and along Roper Street between Pretoria University and the student accommodation node
The Southern boundary comprises of Boundary Street and Lynnwood Road, including the residential area north of St Mary's Diocesan School for Girls.
The area between the University sport grounds (LC de Villiers) and the residential area of Hatfield Village make up the Eastern boundary of this suburb

The area consists of 2 districts namely North and South Hatfield that functions separately due too the division by the existing railway(figure3.5)

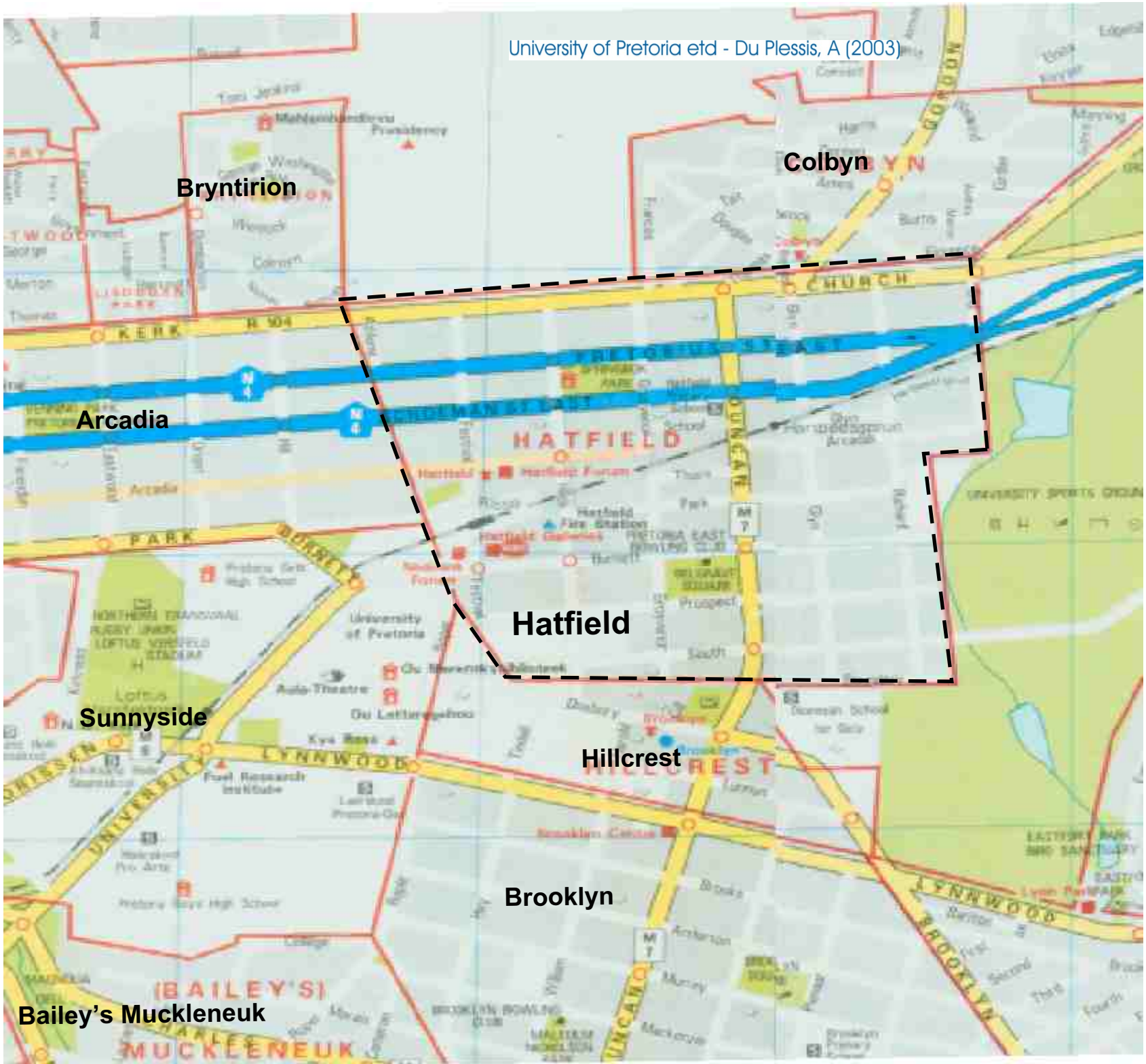


Figure 3.2 Hatfield within its boundaries.

3.2 HATFIELD: NOW AND THEN

3.2.1THE FOUNDATION OF A SUBURB

The suburb of Hatfield was first proclaimed on a portion of the farm “Koedoespoort”.
In 1859 “Koedoespoort” was allocated to Lourens Cornelius Bronkhorst,whose heir sold the farm to the Wesleyan Methodist Society in 1885.
The church established a hospital camp on this land during the Anglo Boer War.
After the war in 1903,the Church sold the portion of land on which Hatfield would be established to the Colonial Secretary of Transvaal, Patrick Duncan.

At first, Hatfield was measured out on 240 morgen 160 square rood.The new suburb was named Hatfield, after an estate in Herfordshire, England that belonged to the Second Earl of Selbourne whom became Governor of Transvaal in 1905.

A flood hit Pretoria in 1909 and on 8 July 1911, the Supreme Court ruled that no erven would be measured out next to the Hartbeesspruit.The Court held the opinion that the erven next to the Hartbeesspruit held potential danger to prospective buyers since it fell within the boundaries of the 50year flood line.

The suburb were completely occupied residentially in the mid thirties, but the location of Hatfield on the peripheries of the city isolated it from the CBD, resulting in its character staying the same until the erection of a multi-storey building at Hatfield Galleries with later buildings also assuming this scale.

The first business in Hatfield was Hatfield Bakery, founded by Sakkie Andrews in 1932.
The first block of shops in Hatfield was Rissik Station Stores, built north of the railway line.

Since the late eighties, the business district of Hatfield developed rapidly.

During 1990-2000 numerous office blocks and buildings for retail purposes sprang up in Hatfield.

Today this suburb is uniquely multi functional.(Laubscher1992:1-3)

3.2.2 STREET NAMES.

The two main routes from north to south are Duncan- and Burnett streets.

Duncan Road was named after Patrick Duncan, the Colonial Secretary of Transvaal during 1905, when Hatfield was founded.

At first, only the piece of road between Church- and South Streets was called Duncan road. The part from South Street and Duxbury Road was known as Nixon street, and from Duxbury- and Lynwood Roads it was called Lunnon Road. South of Lynwood Road it was known as James Street.
In 1930 the City Council of Pretoria decided to name the entire road Duncan Road.

The main route from East to west, Burnett Street, was named after the Reverend Amos Burnet. The “tt” in the street name is a spelling mistake that was never corrected.
Amos Burnet was the second Wesleyan Reverend in Pretoria.

From the east, the first north to south road is End Street. This was, as the name explains, the last street in Pretoria at the time.

Secondly, Richard Street was called after Sir Richard Solomon, the Attorney-General of Transvaal at the time.

Glyn street was named after Lieutenant-Colonel Glyn, private secretary of Arthur Lawley

Next on the map is Duncan Road, that was already discussed.
Grosvenor Street was first called Lawley Street, after Arthur Lawley, but was later called Grosvenor Street after his mother, Lady Elizabeth Grosvenor. This was done to prevent confusion with a street of the same name in Waterkloof.

Hilda street was named after a lay preacher of the Wesleyan Church, Hilda Caley.

Festival Street, originally Station Street, ends at Rissik Station and received its current name in 1930, during the 75 years anniversary of the Cities founding.

The last street in the west is Athlone Street, named after the Earl of Athlone, Governor-General of the Union of South Africa from 1924 to 1930.
Church Street is the most northern of the east-to-west routes in Hatfield and was named after the church that stood on Church Square

Pretorius Street is situated further south and was named after the founder of Pretoria, M.W. Pretorius.

Schoeman Street was named after Stephanus Schoeman, Commander of the " Zuid-Afrikaansche Republiek"

School Street, previously Middle street, received its name in honour of the Hatfield Primary School situated here.

Arcadia Street was named after the suburb west of Hatfield.

Park Street originate at the Caledonian sport grounds.

Burnett Street was already discussed.

Prospect Street was named after the first hostel of the University of Pretoria.

South Street and Boundary Street are found on the southern border of Hatfield. (Laubscher1992:3-11)

3.2.3 CHURCHES

Built in 1923, the Presbyterian Church was the first church in Hatfield and still exists today. Later in the same year, the Wesleyan Methodist Church was built on Grosvenor Street, also still in use today.

The Roman Catholic Church was built in 1925 on Duxbury Road. Today, it is used as a chapel by the University Of Pretoria.

The St Wilfred's Anglican Church was built on Duxbury Road in 1925.Another Anglican chapel is found at St Mary's Diocesan School for Girls, also on Duxbury Road.

In 1947 the Dutch Reformed Church of Hartbeesspruit was the first Afrikaans church to be built in Hatfield.
Both the Dutch Reformed Church, Philadelphia on Lynwood Road and the Reformed Church, Brooklyn on Duxbury Road was built in 1951.

The Dutch Reformed Church, "Universiteitsoord" on Duxbury Road was built in 1967.

The Second Church of Christ is situated where Grosvenor Street ends in the south.

The Full Gospel of God had its Elim Christian Centre built in the eighties, also on Duxbury Road.(Laubscher1992:11-13)

3.2.4. EDUCATIONAL FACILITIES.

The University of Pretoria was found on 17May 1910.At the time it was known as the "Transvaalse Universiteits Kollege" (TUK).
In the early days thecampus was situated on the area from Roper Street to University Road .

Over time it extended to cover the entire area from Prospect Street in the north, Lynwood Road in the south, University Road on the west and Harold Street in the east.
The experimental farm as well as the L.C. De Villiers sports grounds of the University of Pretoria are situated east of Hartbeesspruit.

St Mary's Diocesan School for Gilrls was found by Bishop Henry Bousfield. In those days it was known as St Etheldreda's. When it was moved form the inner city to its current location it was renamed to St Mary's in honour of the Community of St Mary the Virgin that managed the education at this facility during the first 75 years. Today it is a private school under the auspices of the Anglican Church.
Hatfield Primary School, since 1916, is situated on the corner of Duncan Road and Schoeman Street.

The Christian Brothers College and the Convent of Loreto were once situated in this area. Today these buildings are used by the University of Pretoria.(Laubscher1992:13-14)

3.2.5. SPORT AND RECREATIONAL FACILITIES.

The first sport club in the area was the Pretoria East Bowling club on Burnett Street. It was found in 1923 and is still in use today.

The Belgrave tennis club is situated next to the bowling club.

The Hillcrest public swimming pool is situated on the corner of Duncan Road and South Street and is of olympic size. Four Squash courts are also situated on the pool grounds.

The L.C. De Villiers sports grounds ,named after Professor L.C. De Villiers, is situated east of South Street.It was found on 1 June 1959. Modern indoor sport facilities eight rugbyfields, an athletics field, 18 tennis courts, a driving range, seven squash courts, a swimming pool and three cricket field are available here.

At St Mary's Diocesan School for Girls, a swimming pool, two hockey fields, ten tennis courts, five netball courts and two squash courts are available.(Laubscher1992:18-19)

3.2.6. PARKS.

Three parks are situated in Hatfield namely Richard Street Park, Belgrave Square and Springbokpark.

Richard Street Park and Belgrave Square are both home to soccer teams.(Laubscher1992: 19)

3.3 THE CURRENT SITUATION

3.3.1Density

A density analyses for 100ha around the proposed new Hatfield Station was done after being identified as the main area affected by this development (functional area) the results can be seen in table3.1.

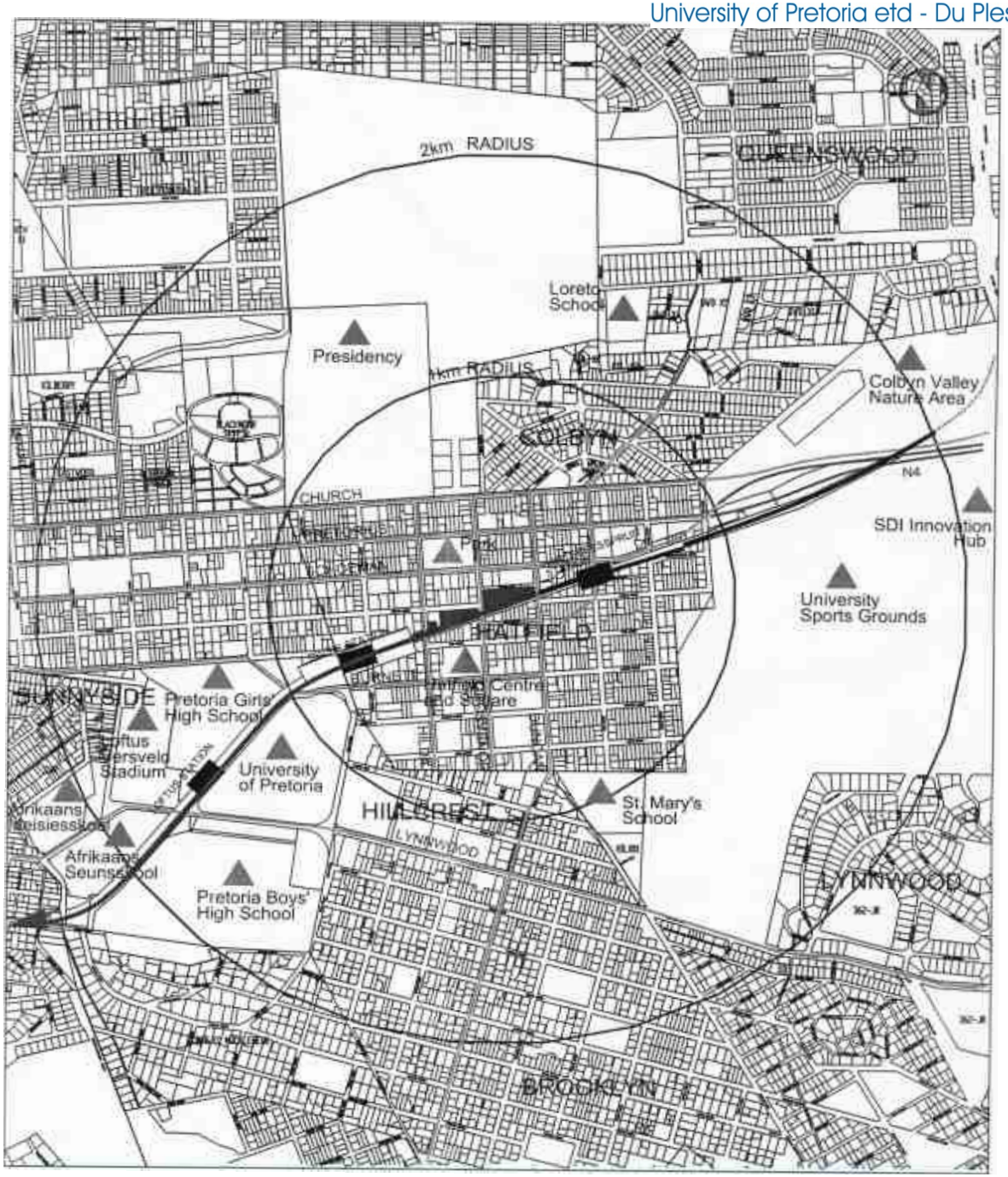
LAND USE	STATUS QUO		
	Total area (m²)	Current mix (%)	Average height
Residential	94,337	17.7	2.4
Offices	267,130	50.3	4
Retail	50,817	9.6	1.7
Industry	0	0.0	-
Community Fac	17,876	3.4	1
Recreation / Parks	60,073	11.3	1
Hotel / Conference	11,616	2.2	1
Transport / Parking	3,142	0.6	1
Vacant	26,534	5.0	0
TOTAL	531,525	100	-

Table 3.1 Shows the results of the density analyses for the functional area around the proposed Hatfield station.(Gautrain Rapid Rail Link, September 2002:9-3)

Hatfield is a low density area due to areas like motor vehicle showrooms, for instance Barlow World Delta (Figure3.3.) and large brownfield areas for instance the site for the proposed Hatfield Station .

Large parks for instance Springbokpark also contributes to the low densities in Hatfield

Figure3.3 Existing Barloworld Delta Showrooms and Workshops to the East of the proposed Site. Showrooms like these cause low densities in Hatfield (Field sketch done by the author)



N

Figure3.4. Shows the location of landmarks in and around the site for the proposed station for instance Springbokpark.
It also shows the railway cutting that divide Hatfield into a northern and southern district.(Gautrain Rapid Rail Link, September 2002:9-1)

3.3.2Landuse

The land use in Hatfield are very diverse and comprises of the following:
Residential areas with the highest concentration east of Duncan Road, Hatfield Village and south of Prospect Street including the student accommodation.
The student accommodation comprises of high rice blocks as well as alone standing units
Hatfield Village are characterized by single dwellings per erf
North of the railway line some residential areas exists, located between offices and other uses

Office blocks are found in high concentrations north of the railway line particularly around the proposed Hatfield Station for the Gautrain project
Newly developed office parks and blocks as well as homes and converted homes into offices make up this mixed-use area

Retail areas make up the centre of this area and include Hatfield Square and Hatfield Plaza and smaller retail areas along Burnett Street
This diverse mix of land use including commercial, residential educational an recreational activities makes Hatfield a highly effective core.(Gautrain Rapid Rail Link,September 2002:9-2)

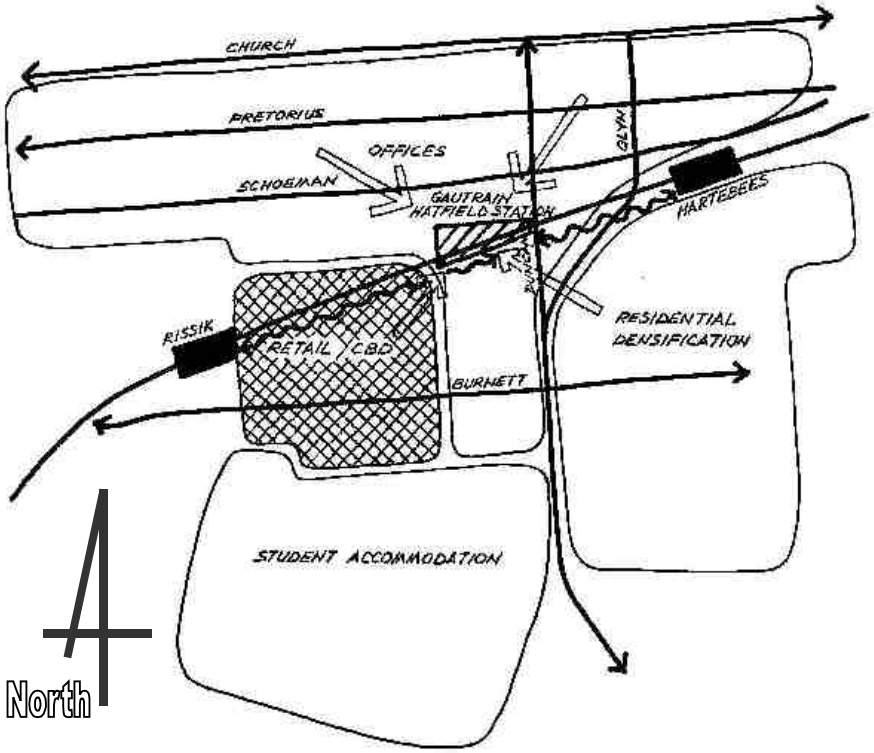


Figure3.5.The current land use pattern in Hatfield. Gautrain Rapid Rail Link, September 2002:9-8)

3.3.3ROAD LINKAGES AND TRANSPORTATION

3.3.3.1 ROUTES

Only limited through routes exists in the proposed Hatfield Station area due to the location of the University of Pretoria
The major road network consists of:

East-west routes:

- Schoeman Street (one way eastbound). Pretorius and Schoeman Streets provide direct access to the Pretoria CBD from the N4 in the east in addition to serving Hatfield.
- Pretorius Street (one way westbound)
- Church Street (two way). This route fulfils an important network function, as it is the only direct route from Silverton area to the CBD.It links the CBD to Silverton and Mamelodi and carries large volumes of taxi traffic.
- Burnett Street, which is not continuous to the east or west beyond Hatfield,but fulfils an
  important function as it serves a large proportion of commercial use in Hatfield
- . Lynnwood Road serves parts of the east of Pretoria to Sunnyside and the CBD

North-south routes

- Duncan Road is located to the east of the main commercial area, links the Brooklyn Node to the Hatfield Node and serves the area north of Hatfield via Gordon Street. Duncan Road thus provides a very important north-south mobility function due to the lack of other north-south routes due to the location of the University of Pretoria.

Other routes:

- Within Hatfield business area the South African Rail Commuters Corporation (SARCC) railway line forms a barrier with north-south links crossing the line at Duncan Road, Hilda Street and Festival Street. The only route without a north-south link in the business area is Grosvenor Road.
- A link is planned as part of a one-way system circulating through Hatfield.
- The north-south links across the railway line serve Hatfield area from the major east-west routes north of the business area.

The character of the streets directly adjacent to the proposed site is shown in figure 3.6. Note the abundance of adult Jacaranda trees, casting shadows over the entire street.

Figure 3.6 Arcadia Street as seen from the site.

3.3.3.2 TRANSPORTATION

The following roads accommodate municipal and private bus services and therefore accommodate bus stops:
- Park Street,
- Duncan Street,
- Lynnwood Road,
- Burnett Street.

Minibus taxis uses the following roads.
Lynnwood Road,
Hilda Street,
Schoeman Street,
Festival Street,
Pretorius Street,
Burnett Street,
Church Street,

Other public transport facilities
- A modal transfer facility at Rissik station north of the SARCC railway line in Festival Street are served by mainly buses during the peak hours.

Hartbeesspruit station is located in the east of the study area adjacent to the Duncan Road / Glyn Street one-way couplet. Bus and taxi facilities are not available here. Commuters distribute from here on foot. The station serves the business area in the east along Schoeman, Pretorius and Church Streets.

Pedestrians

There is strong pedestrian demand:
- Between the retail area south of the railway line and the office area north of the SARCC railway lines
- Along Hilda and Burnett Streets
- The University of Pretoria campus and residences
- Rissik station along Burnett Street into the Hatfield business area
- Hartbeesspruit station into the commercial and business areas in Church, Pretorius and Schoeman Streets
- Concrete sidewalks are found on one side of the roads in Hatfield with the exception of minor streets and the residential area east of Duncan Road.

In Burnett Street pedestrian sidewalk exists on both sides of the road.

Bicycles

Bicycles generally share the road space with cars. No dedicated facilities are available.

Traffic Congestion.

There is a large east to west demand on traffic in the morning peak placing pressure on Pretorius- and Church Streets, Lynnwood- and Duxbury Roads and Gordon and Duncan streets.(Gautrain Rapid Rail Link, September 2002:9-3 - 9-6)

3.3.4. Social and cultural composition

Students make up a majority of the residents in the central part of Hatfield, were the student accommodation are situated.

The predominant group is white females in the age groups 15-19 and especially 20-25. This is due to the presence of educational institutions with boarding facilities for girls.

Boarding facilities for male students are mainly situated in Lynwood Road, thus outside the boundaries of Hatfield. (Gauteng Department of Transport, Roads and Works, October 2002:10-10)

3.4. THE AFFECTED ENVIRONMENT

A broad study of the affected environment over the whole area of the Gautrain project was done.

3.4.1 TOPOGRAPHY

The proposed Hatfield and Pretoria Stations will be at approximately 1340 m above sea level.

3.4.2 CLIMATE

The area has a warm and moderate climate.

The mean daily sunshine factor is approximately8.7 hours per day.
Temperature averages ranges from11.8°C in June to 23°C in January (mean annual air temperature)

3.4.3 RAINFALL

The driest month is July with an average monthly total rainfall of 3mm.

The wettest month is January with an average monthly rainfall of 136 mm

The average annual rainfall is 674 mm

Occasional thunderstorms occur during the summer months

3.4.4 WIND

In Pretoria winds are mostly north-easterly with an average speed of 2 m/s

3.4.5 REGIONAL GEOLOGY

In Pretoria the proposed route is underlain by dolomite and chert, with a portion of the route traversing syenite. The dolomitic areas are prone to develop sinkholes.

The Pretoria Hatfield section of the Gautrain route passes over a diabase dyke near Pretoria station.
The Pretoria Group rocks and dolomites are intruded by a syenite dyke.

3.4.6 VEGETATION

Along the proposed Gautrain rail corridor the natural vegetation is described as Rocky Highveld Grassland or Bankenveld Central variation.

The character of Rocky Highveld Grassland may be described as bio-diverse, ascribed to many microhabitants formed by rocky slopes, streams, ridges and outcrops.

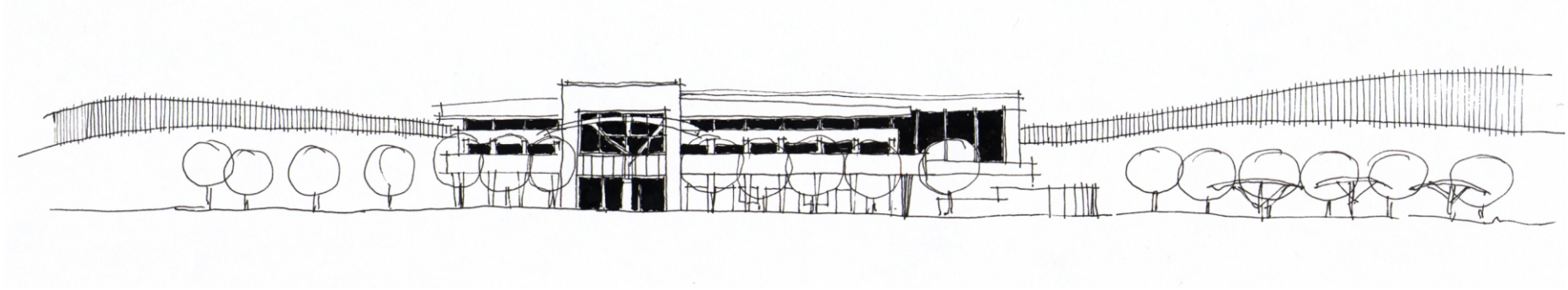
The site for the proposed Hatfield station is currently brownfield with the exotic Jacaranda trees scattered across the site as well as on the streetscapes surrounding the site

4.3.7 AIR QUALITY

The proposed Gautrain rail line crosses highly developed and urbanised areas and it may be assumed that the general air quality is poor.Pollutants emitted by vehicles includes primarily nitric oxide (NO), carbon monoxide (CO), nitrogen dioxide(NO2),carbondioxide(CO), hydrocarbons(HCs), sulphur dioxide (SO2) particulate matter and lead.

Secondary pollutants from vehicle emissions include nitrogen dioxide, photochemical oxidants (ozone)nitric or sulphuric acids and nitrate and sulphate aerosols.
(Gauteng Department of Transport, Roads and Works, October 2002:4-1 - 4-10)

Go to:
Chapter 4: Hatfield station



Chapter 4
Hatfield Station

4.1 LOCATION

The location of the proposed Hatfield station is explained in figure 4.1.

The section of the route in Pretoria starts at the proposed Pretoria station.
It follows the SARCC rail commuter corridor for much of the route towards the proposed Hatfield station.
The alignment passes over Railway Steet, Andries Street, Tulleken Street, van der Walt street, Nelson Mandela Drive and Joubert Streets
East of Joubert Street the route enters a cutting and crosses underneath the existing Metrorail line, entering Mucleneuk.
From there it commences in an open cutting across the north-eastern end of Muckleneuk and passes the northern end of Magnolia Dell.
From this point onwards it follows the existing rail closely.
From here it crosses Lynwood Road, Burnett Street, Festival Street and Hilda Street .(Gauteng Department of Transport, Roads and Works,October 2002,Vol1:22)

Interested and Affected parties gave their input in the decision making process. Alternative routes were debated through a public participation process.An extensive assessment on these alternatives where made that falls outside the scope of this thesis. If References to the route will be applicable on the reference route suggested by the Environmental Impact Assessment.

The route of the Gautrain ends at the proposed Hatfield Station.

The proposed new Hatfield Station for the Gautrain project involves a cut along the north of the already existing railway line between Hartbeesspruit and Rissik railway stations
It will take up the remainder of Erf 717 Hatfield and Portion 1 of Erf 656 .(figure 4.2.)

It was suggested through the results of the environmental assessment process that portion one of Erf 155. Portion 2 of Erf155, Erf 154,portion 1 of Erf 153,remainder of Erf153,remainder o fErf 152 and a portion of Grosvernor street must also be included in the site.(Gautrain Rapid Rail Link,September 2002:9-1)

This was opposed in this thesis, because the rail cutting, already on the edges of the proposed site, would be widened to 33 metres to accommodate the Gautrain , thus making the usable space left over on above said sites unusable for the creation of sufficient vehicular movement.

Furthermore it was suggested that portion one of Erf 717 and portion two of Erf 717 be included in the site for the purpose of this thesis
This would result in the demolition of the recently build Barloworld car dealership as well as the SAAB showrooms.
The Old School on portion two of Erf 717 will be retained for future development for future development into a tourist information office.

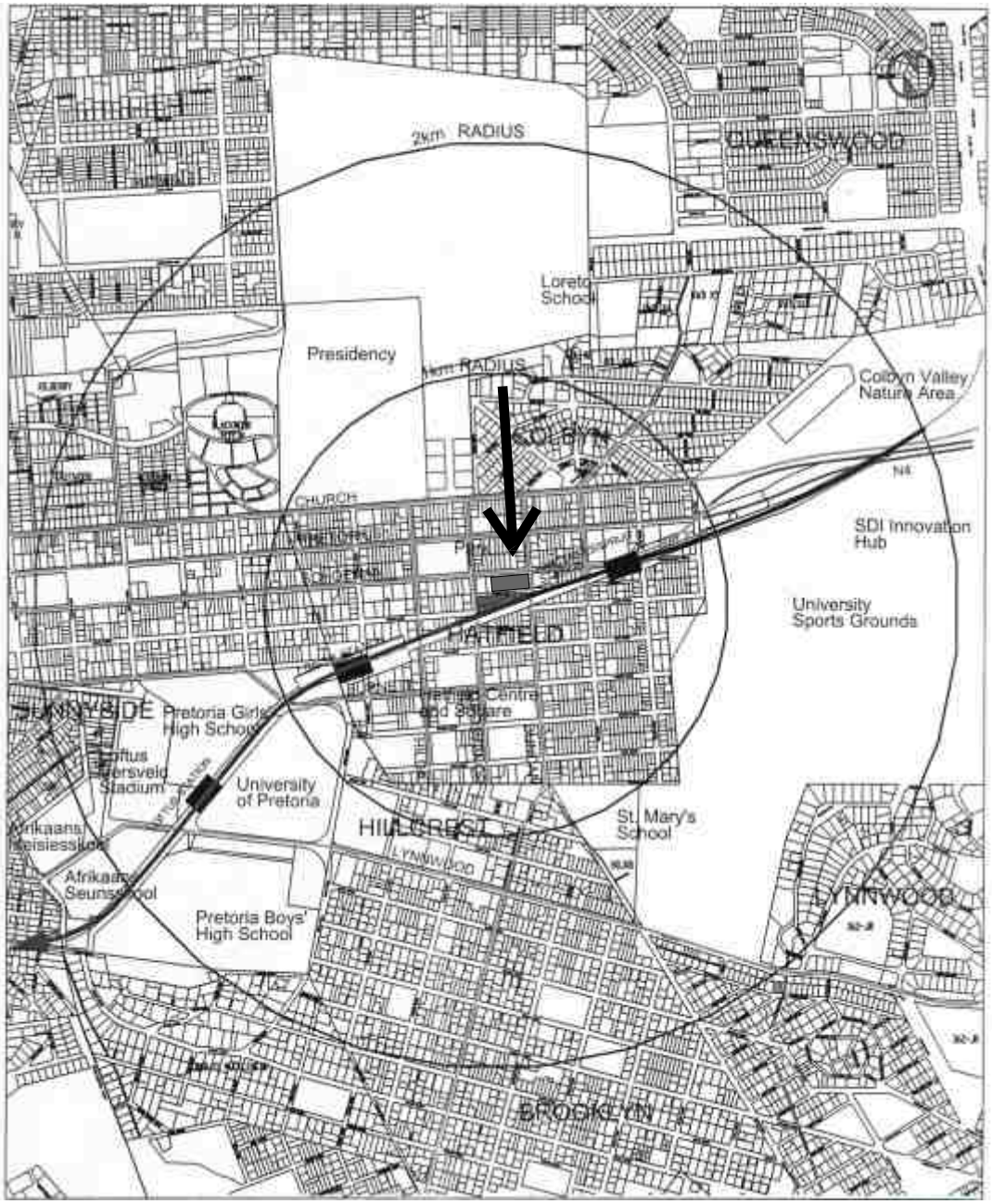


Figure 4.1.An explanation of the location of the proposed Hatfield station.(Gautrain Rapid Rail Link, September 2002:9-6)

Figure 4.2.A Cadastral map of the proposed Hatfield station and surroundings

4.2BUILT ENVIRONMENT

The visual characteristics of the site and its surrounding built environment is explained by means of field sketches done by the author.
The location of the building as well as the direction of the view are indicated on a thumbnail spatial orientation plan by means of an arrow.

Figure 4.3
Northern view down Grosvenor Street with Siemens building and site to the right.
Hatfield Gardens and Arcadia Street is situated to

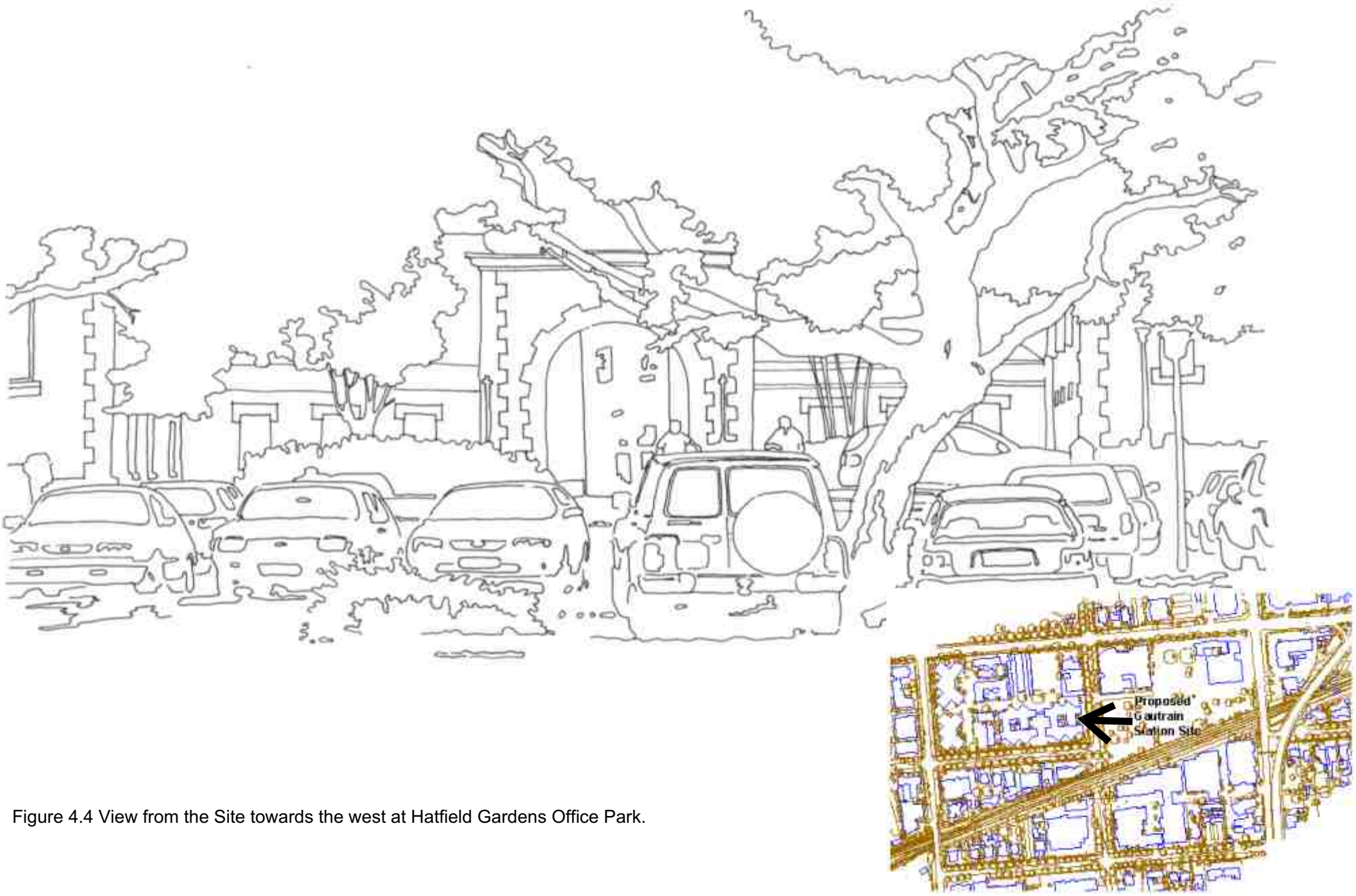
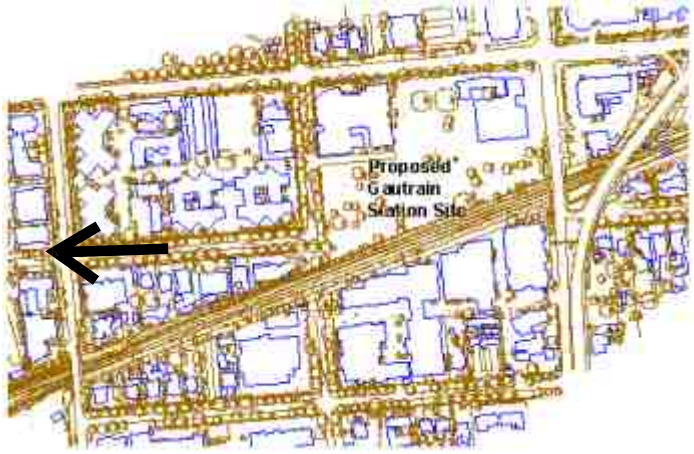


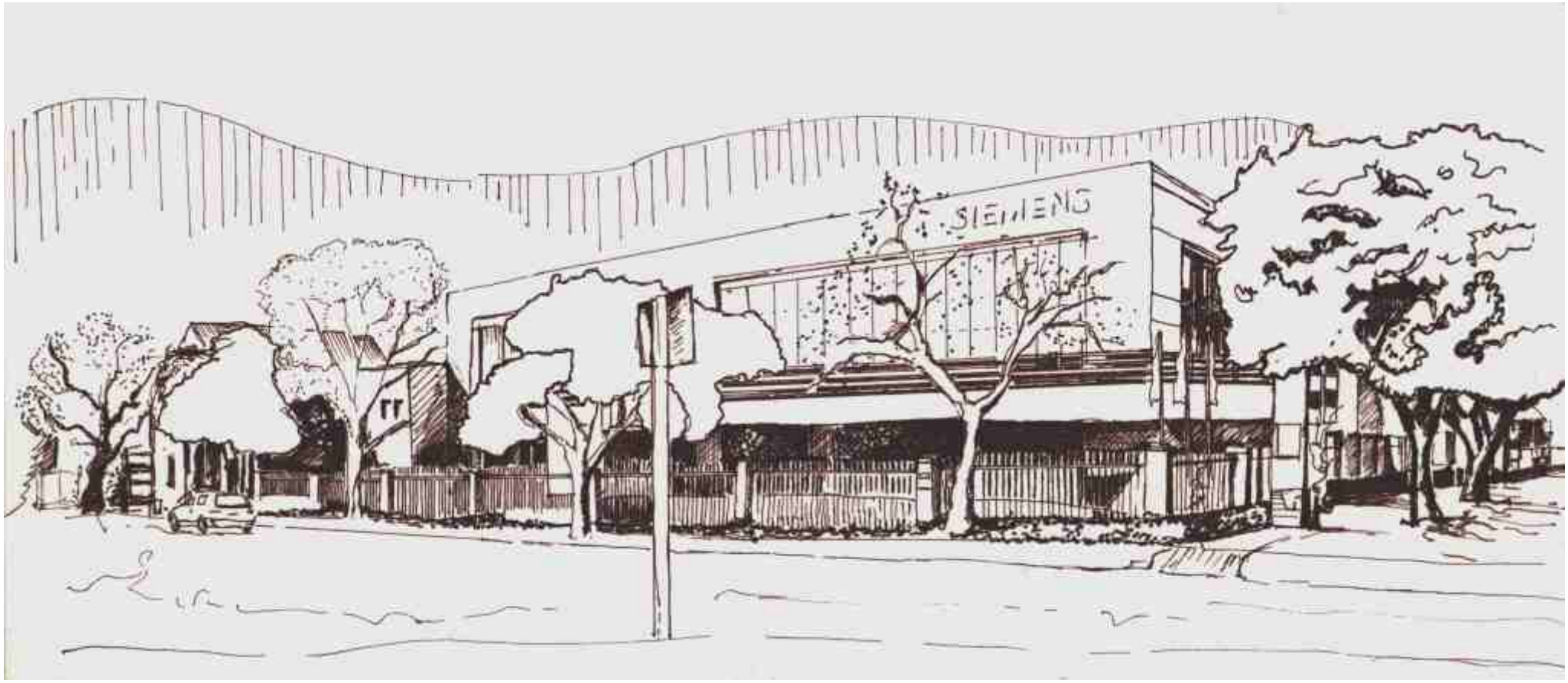
Figure 4.4 View from the Site towards the west at Hatfield Gardens Office Park.

Figure 4.5
Building types in the vicinity of the proposed new Gautrain Station include predominantly low-rise office type buildings and Student Accommodation.

This field sketch shows the Israeli Embassy Building on the right of the picture. The image is directed westward down Arcadia Street with Hilda street in the foreground. Low-rise student accommodation is situated to the left of this image and is not illustrated .

Street scapes in the area are dominated by Pretoria's now controversial exotic tree species namely the Jacaranda Tree, the retention of which would be of cardinal importance to the human acceptance of the urban intervention in the area.





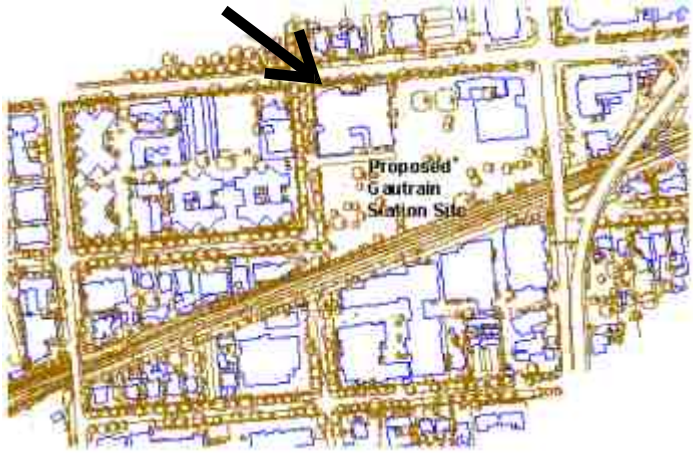


Figure 4.6
The Siemens Building to the northwest of the proposed new Hatfield Station.
This building represents a more modern approach to architecture than is prevalent in the area, with clean lines and decoration kept to a minimum.

The building to the left, the SAAB motor showroom will be demolished to make way for the proposed slipway from Schoeman Street leading into the “Super Basement”of the proposed Hatfield Station.
This sketch shows the Siemens Building’s northern facade and will be an important landmark for orientation towards the New Gautrain Station in Hatfield.

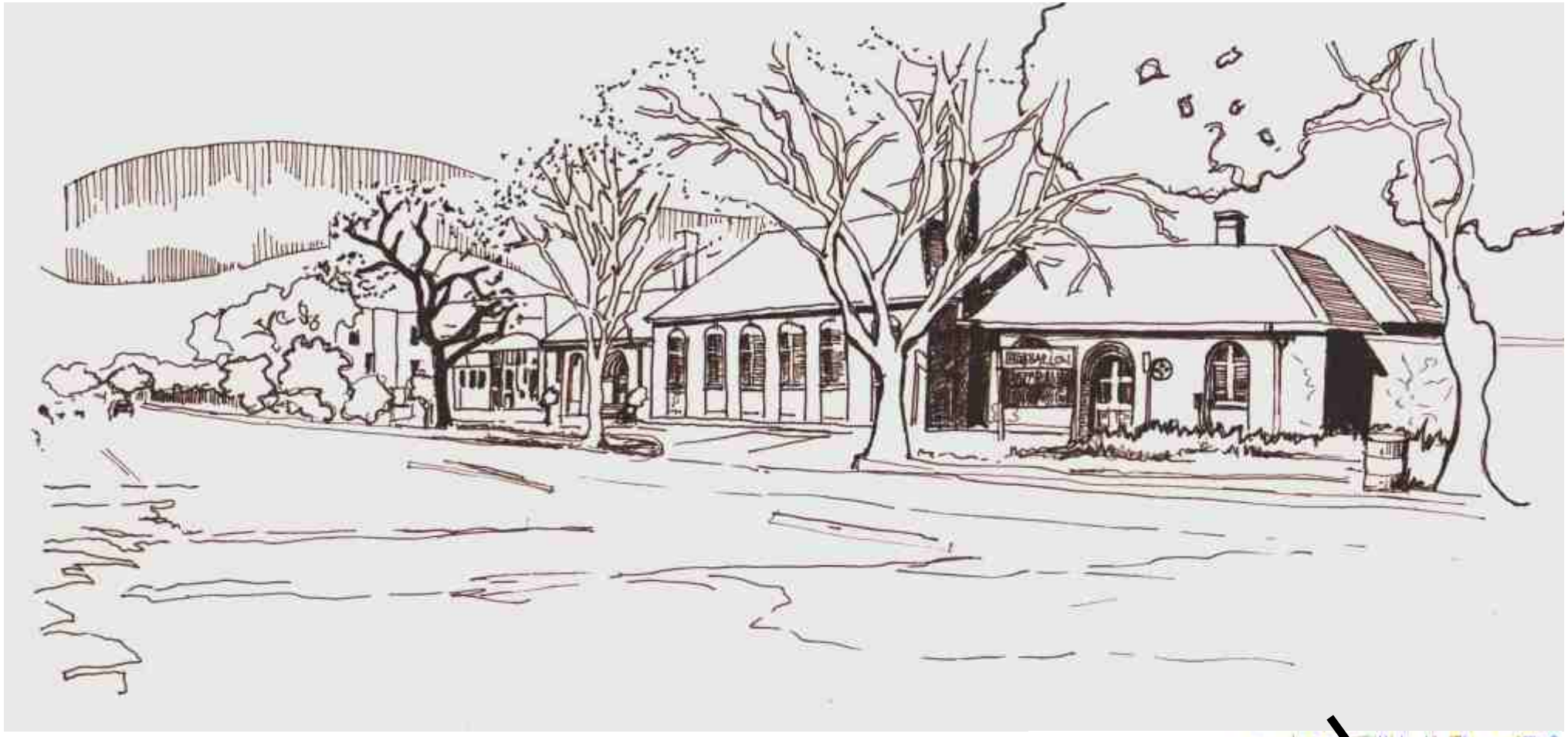


Figure 4.7
The Northern facade of the “Old School Building”, as referred to in the design, on Schoeman Street.

The building is currently occupied by the Barloworld Motor Dealership and used as back offices.

It was built in the early part of the 20th century (1910).It is proposed that this building would be retained and reconstituted to be a Tourist Information Centre.

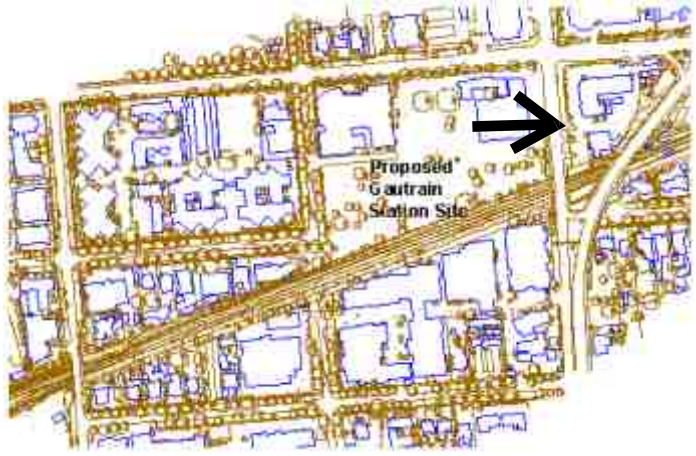
The Barloworld Dealership, left of the Old School in this scetch, would have to be removed to create a visible axis and link to the site. The permeability of the proposed building would also be adversely affected by the retention of the structure.

Figure 4.9
Standing on the Site looking East towards Duncan Street, one sees the Sanlam Building to the left and the Drain Surgeon Building to the right.

In this area the creation of a slipway / bridge to access the “Super Basement” would be called for from Gordon Road which passes to the opposite direction from Duncan Street at the back of the Sanlam and Drain Surgeon buildings.

The slipway would utilise the existing slipway from the Gordon Road as can be seen to the right of the picture.

This sketch clearly shows the untenability of the Barloworld Dealership as it cuts of the clearsight and legibility of the proposed new Gautrian Station Building



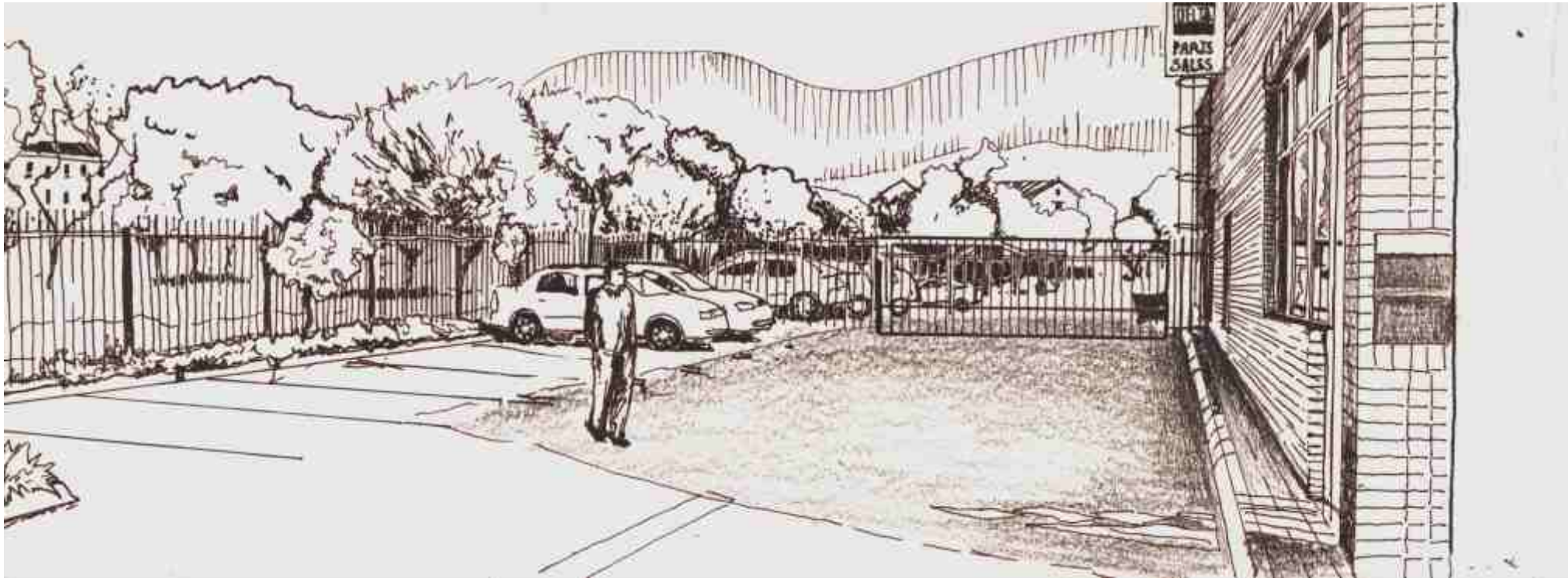
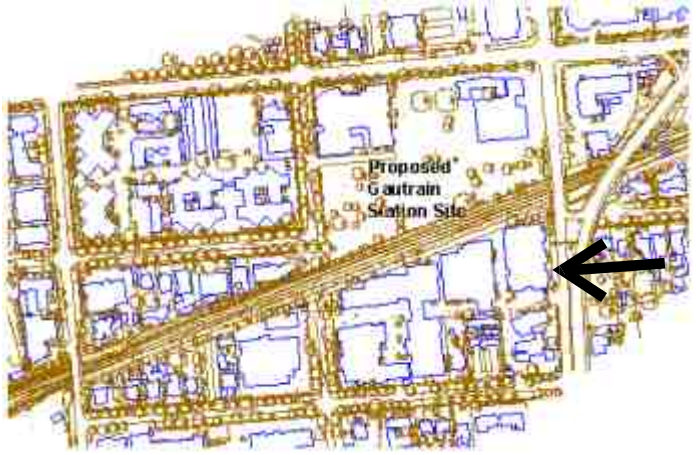


Figure 4.8.
This sketch shows the the Barloworld Motor Dealership showrooms to the right and the site for the proposed new Hatfield station to the left of the picture. The direction is westwards from Duncan Road down School Lane that was closed earlier. Today palacade secured parking for Barloworld Delta personnel is situated where School lane used to be. School Lane needs to be re-opened to support the “kiss-and-drop off” area of the new station.

The Barloworld Delta building cut the site on the left of the visual axis.
The proposed building for this site needs to be clearly visible in order for it to succeed.
Thus, this building will be demolished.



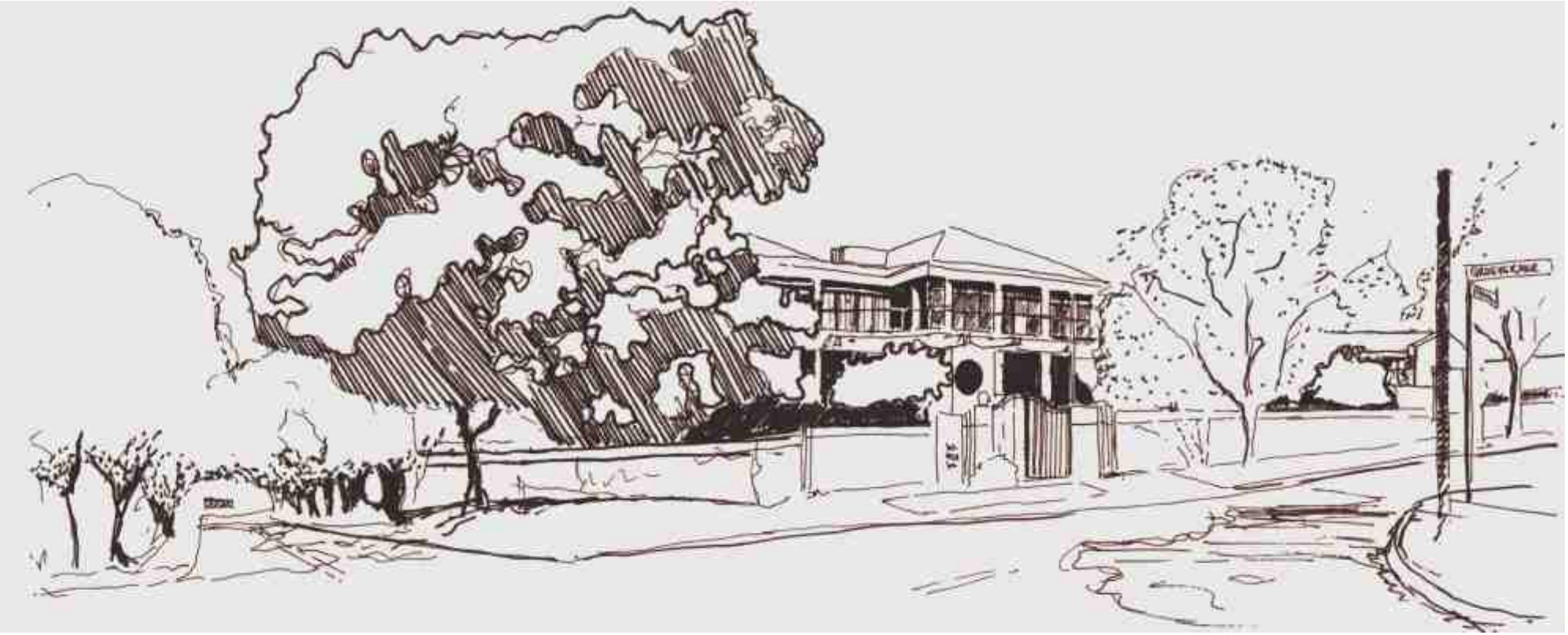
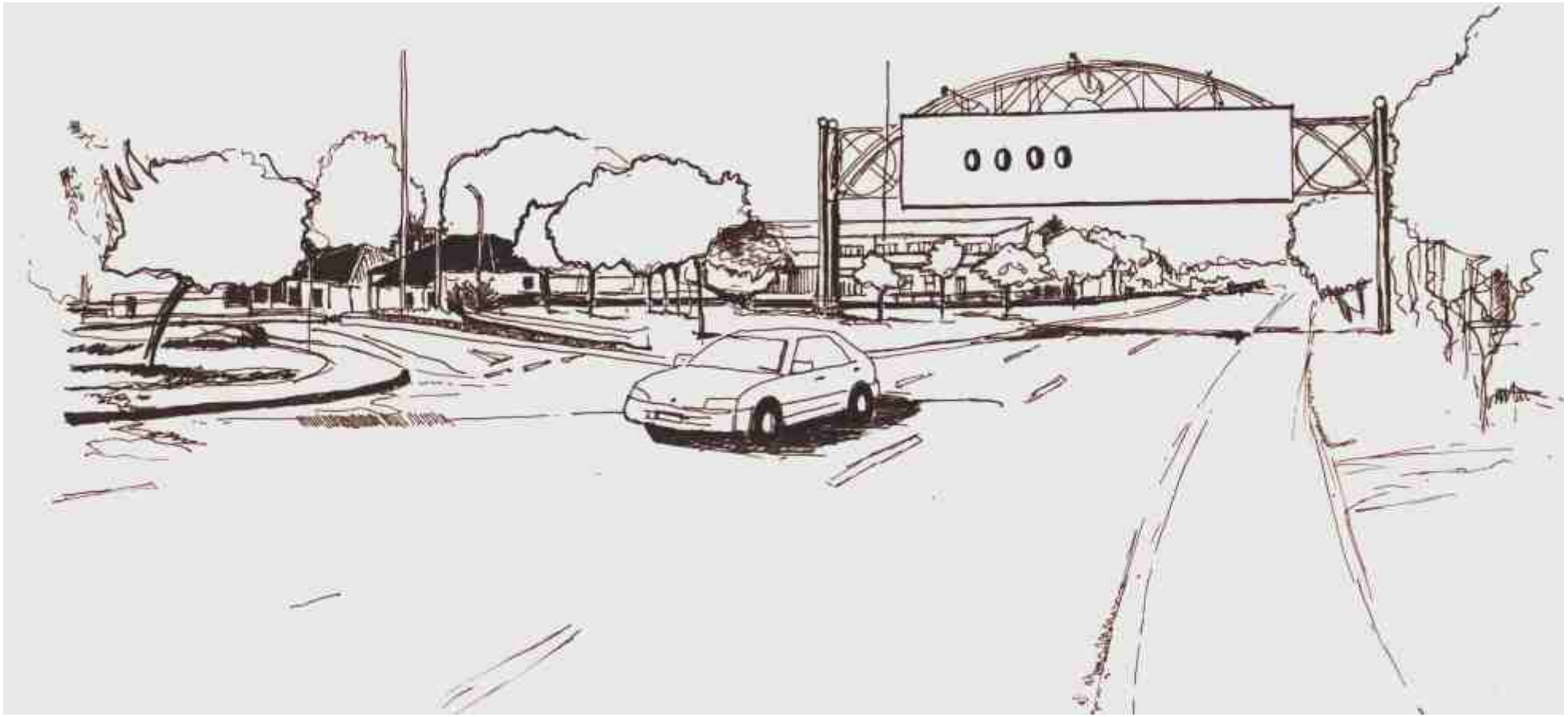


Figure 4.10
The Taiwanese Liaison Offices on the corner of Schoeman Street and Grosvenor Street.

The direction is southward down Grosvenor Street that was cut off due to the railway line. Schoeman Street is in the foreground.

Grosvenor Street will play an integral part in the vehicular access to the site and the working of the “Kiss-and-drop off” area of the building. It will be re-opened by means of a bridge, thus better the movement and accessibility to the station and re-establish the connection with Hatfield South.



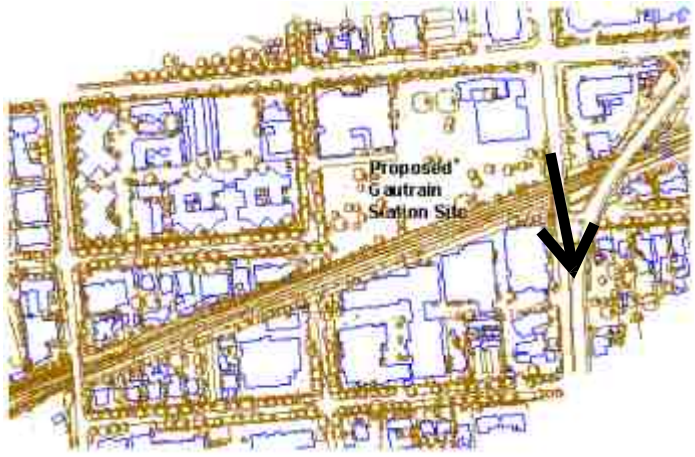


Figure 4.11
The view looking South down Duncan Road with the slipway of Gordon Road to the left. This slipway will be converted to act as a bridge into the “Super Basement” of the proposed Hatfield station.

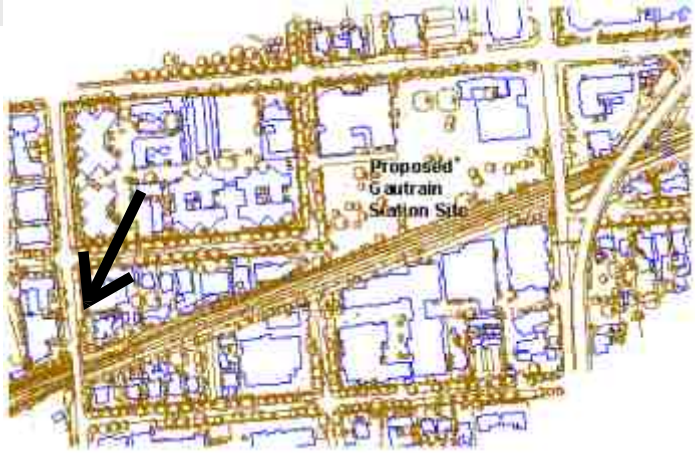


Figure 4.12
The Student accommodation on the corner of Hilda Street, to the left, and Arcadia Street, to the right of the sketch.
This building is an example of the scale of the urban fabric prevalent in Hatfield.
The density of the accommodation would have to be increased necessitating that the urban scale would have to change to a more vertical scale.

Figure 4.13
Hatfield Gardens Office Park as seen from the corner of Schoeman Steet to the left and Hilda Street to the right of the sketch.

Figure 4.14.
This sketch shows the the northern façade of the Barloworld Motor Dealership showrooms.

This building cut the proposed site of the visual axis.
The proposed building for this site needs to be clearly visible in order for it to succeed.
Thus, this building will be demolished.

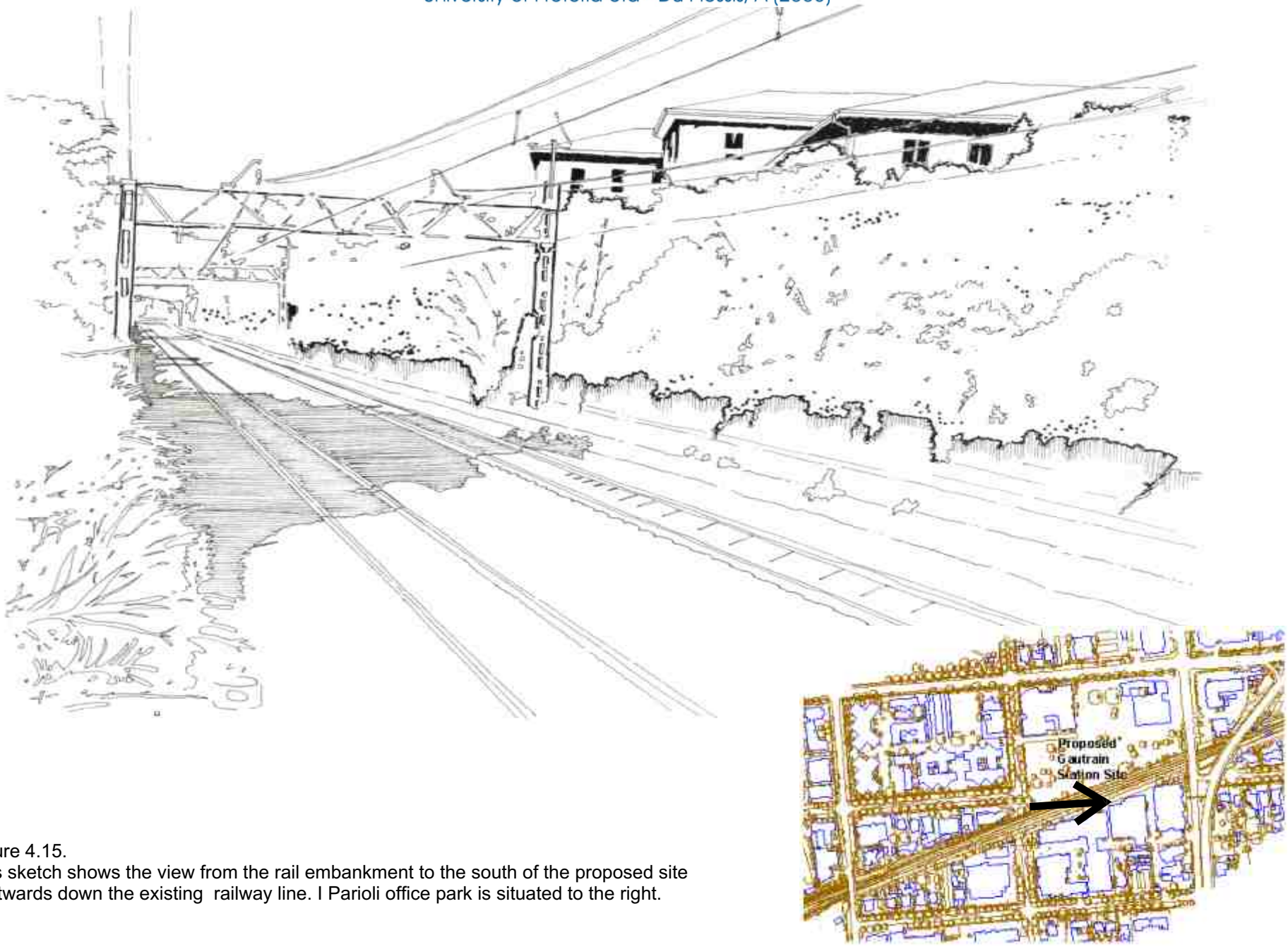


Figure 4.15.
This sketch shows the view from the rail embankment to the south of the proposed site eastwards down the existing railway line. I Parioli office park is situated to the right.

4.3PROPOSED SITUATION FOR HATFIELD STATION AND SURROUNDINGS

4.3.1 DENSIFICATION

A density assessment was made, and with the vision of the Hatfield station in mind, densification predictions for 100ha around the station were made.

The outcome is stated in table 4.1 .

LAND USE	STATUS QUO			QUANTIFIED FUTURE SCENARIO					
	Total area (m²)	Current mix (%)	Average height	Future bulk area (m²)	Future mix (%)	Required bulk (m²)	Desired height (storeys)	Desired coverage (%)	Required area
Residential	94,337	17.7	2.4	250,000	28.2	121,680	4	50	60,840
Offices	267,130	50.3	4	350,000	39.5	82,870	4	60	34,529
Retail	50,817	9.6	1.7	80,000	9.0	29,183	1	60	48,638
Industry	0	0.0	-	0	0.0	0	-	-	0
Community Fac	17,876	3.4	1	25,000	2.8	7,124	1	50	14,248
Recreation / Parks	60,073	11.3	1	100,000	11.3	39,927	1	-	39,927
Hotel / Conference	11,616	2.2	1	40,000	4.5	28,384	4	60	11,826
Transport / Parking	3,142	0.6	1	42,000	4.7	38,858	3	80	16,191
Vacant	26,534	5.0	0	0	0.0	0	-	0	0
TOTAL	**531,525**	**100**	**-**	**887,000**	**100**	**348,026**	**-**	**-**	**226,199**

Table 4.1 .Density proposals for the functional area around the proposed Hatfield Station (100ha around the station). (Gautrain Rapid Rail Link,

Out of the result, the following deductions can be made.

The current coverage is assumed to be 45%due to the availability of vacant land and potential for densification

Currently there are 472 units @200m² in the node

High-density developments are needed to densify the area.

2500 Dwelling units (du) are needed to obtain the density of 25du/ha (dwelling units per hectare) , meaning another 2500 units over and above the existing units in the 100ha around the station

Young and upcoming professionals and middle-income families with one or no car will be the expected residents in the node. These people will use dwelling places of 60m²

Coverage of 50% and a height of 4 storeys are assumed for residential buildings when paring and landscaping are taken into account. Thus, 6ha is required over and above the existing high-density residential buildings.

At 25m² 1500parking bays are required for the station. It is recommended that parking will be spread over three storeys

Other services such as crèches, clinics and schools that go hand in hand with densification should be incorporated in these areas

In the area around the station an extra retail space of 30 000m² with 4 levels above that followed by 1 residential level is recommended. Thus 4.8ha additional land is required if it is assumed that 60%is covered.

There is adequate hotel provision in this area.

4.3.2FEEDER AND DISTRIBUTION SYSTEM

Private vehicles

At Hatfield Station passengers will mainly use private vehicles for park-and-ride and kiss-and-ride purposes.

The demand modelling process conducted predicts that these car users will come from the northern and eastern suburbs of Pretoria.

The estimated infrastructure needed by the year 2011 will be 37500m²for parkades (1500 bays), for the kiss- and-ride area 400m² (16 bays) and for short term waiting bays 875m² (35 bays) will be needed.

This adds up to a total parking space of approximately
39 000m²

Public transport services and facilities

An extensive system of public transport exists in the Hatfield area (vide3.7.1)
For taxi and Metrorail services to become a role player in the Ring Rail Link system, it must be upgraded to meet the needs of passengers

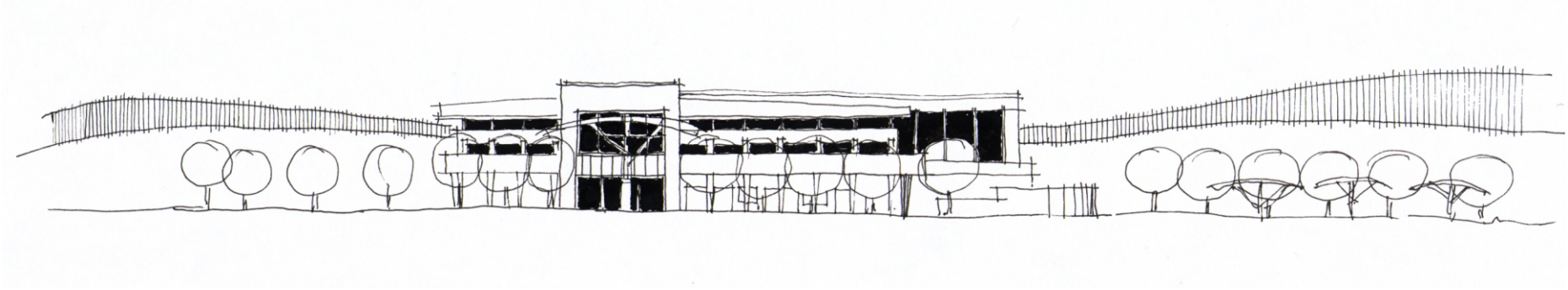
4.3.3.URBAN DESIGN POINT OF VIEW.

The approach to urban design of Dewar and Uytenbogaardt,1991 was studied and used in the context of this project to compile objectives for the station and its surroundings:

- Preconditions for intensity diversity and necessary complexity should be provided in the design, giving people real choices and opportunities
- Integration of different elements, for people benefit more from integrated opportunities than those in isolation
- Create a sense of identity and belonging by providing preconditions for socialization and a reflection of cultural expression in the built form.
- Equity should be promoted in that the place is easily accessible to pedestrians as well as vehicle owners.
- Balance between society and nature should be maintained, allowing people to be part of the totality of the place in which they live.
- Celebrate the natural, cultural and historical uniqueness of the place thus providing a cognitive landmark to the users of the place.
- Providing opportunities for small-scale self generated economic activity for the high number of unemployed people in the city.
- The energies and talents of many people should be used in making a positive environment by allowing freedom for people to act.
- The node should be introduced to more permanent residents. The current student accommodation is seasonal in nature and the station will depend on a more constant flow of users.
- Residential densification must be promoted to provide rider ship for the Gautrain and support additional functions at the station.
- Help fulfilling the objectives of the Gautrain Project. *(vide 2.2.1)*

In the next chapter, case studies will be analysed and the relevant design solutions that will answer to the objectives stated above pointed out and adopted in the design of the Gautrain Station, Hatfield.

Go to:
Chapter 5: Case studies



Chapter 5
Case Studies

5.1. Philippi Public Transport Interchange

The first most important aspect that is evident in this project and which we would like to replicate in the Gautrain Intermodal Transfer Station for Hatfield, is the community working together in response to the 'public' terrain.

It is of utmost importance that the site would also become vibrant to stimulate the local populace to make the created entities their own, thereby not only looking after the infrastructure, but also creating a sense of ownership.

figure 5.1.1
Above The vibrant market that was created.(The Digest Of South African Architecture:32)

In the Philippi Public Transport Interchange the formation of collective spaces off the streets and street corners, encrusted the sidewalks with diverse trade activities.
The focus from the city of Cape Town, Urban Design services Branch has been the reinforcement of collective spatial patterns with key pieces of public investment that are intended to support the community needs within a public spatial framework.(The South Afican Digest of Architecture:29)

figure 5.1.2
Above Trader Stalls with red signage band overhead.(The Digest of South African Architecture:32)

Urban Framework.

The focus was from the beginning to see what the natural response from the users was and to merely formalise the built fabric to support the pattern this is much the same way the settlements in Europe evolved over time to create the streetscapes we now use as models for successful urban living.

Over the years the response by the traders has been to establish a 200-metre by 70-metre outdoor space as an urban forecourt to the station.
The main objective here was to reinforce the scale of the urban space as to support the variety of activities that take place at the station.
The proportion of the urban rooms was thus retained.
The only important aspect from formal sector was to fill the forecourt with a vast amount of trees to cope with the wind in the region.

An urban veranda was created to define the space more by means of a colonnade.

The design of the interchange focussed on the outdoor areas where the opportunity for interactions was maximised, as the interchange wasn't merely the accommodation of taxi and bus requirements.
Because the outdoor space in its design is not prescribed in it use, the people have made the accoutrements their own, by appropriating the spaces for their own needs. This is a very important aspect to take into mind in the design of the Gautrain Intermodal Transfer Station.

"The design intervention is underpinned by an understanding that the architect intervenes in a short time interval after which the space is layered and defined by a number of people over time. The challenge of such design opportunities is to provide a layer of urban legibility within which a number of readings and interpretations can occur.
Weeks after the formal handover of the project, the urban spaces and surfaces of the Philippi Interchange reflected a remarkable ability of communities to respond to space.
The first level of articulation relates to how people provide legibility or codes within a network of spaces. Various actors begin to claim turf and daily patterns of trade and meeting find logic within the site. One of the most evident aspects of making an urban expression is the extraordinary range of signs that surface the red panels which were explicitly designed to receive layering.

In addition, a range of shop fronts are being established behind the roller-shutter doors. The making of the shop front by the traders expresses a level of service, status and aspiration; an indication that the community has claimed ownership of the interchange project." (The Digest of South African Architecture:32)

Figure 5.1.3
Above Informal Trader in front of formal Trader Stall.
(The Digest of South African Architecture:32)

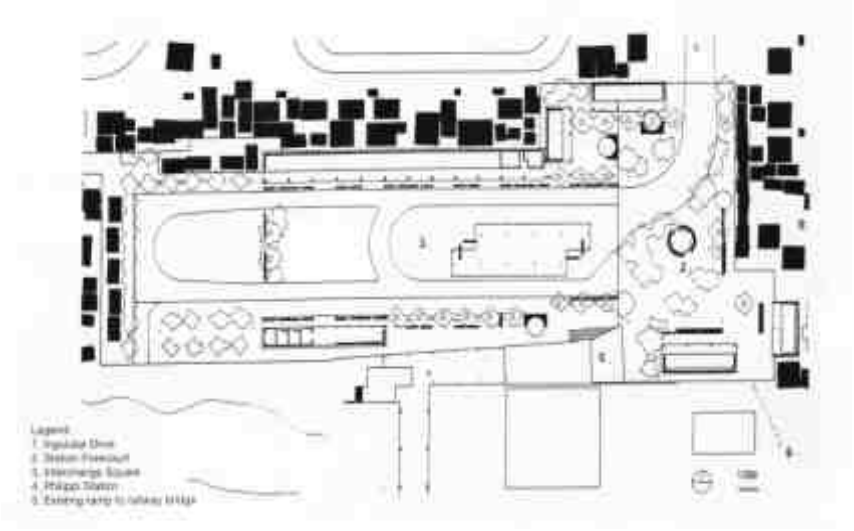


Figure 5.1.4
Above Ground Figure of the Interchange.(The Digest of South African Architecture:30)

5.2 Metro Mall, Newtown Johannesburg

The Johannesburg City Council owns the land parcel on which the new Metro Mall, Intermodal Transportation Hub,was built.

Since 1995 the Johannesburg Development Association employed Urban Solutions to design and develop the spatial framework for Newtown. From this departure the Metro Mall project were conceived.

The facility is in fact a nodal interchange for busses and taxis.

The brief was developed with consultation with the site users much the same course of action must be taken with the Gautrain Intermodal Transfer Station in Hatfield, with the only difference that with the Metro Mall project the site was already used for much the same purpose, whereas the Hatfield site is derelict land. Here the process would entail looking for the interested and affected parties to deliver their input to what from an urban design perspective would be desirable for the proposed new building.

Important in this building to incorporate into the Gautrain Intermodal Transfer Station is the use made of the site topography, with each vehicle type having direct access to pedestrians.
The use of material in the Metro Mall is also to be commended, as the robustness and practicality of the

surfaces are what is called for in such a building type, where undue decoration is undesirable. Thus brick, concrete (unpainted rough cast) and steel should be the choices made to facilitate a building of long lifespan, without undue maintenance to decorative surfaces.

As with the architecture of the building, the Metro Mall same as with the proposed Gautrain Intermodal Transfer Station, is layered away from the street edge inwards in a clear demarcation of the zones and their functions (trading as opposed to travelling).

The design has market orientation in its essence, with small stalls created with varying degrees of servicing to facilitate trade in the building. With the street character of Johannesburg taken into account it was decided to rather demarcate the trading areas away from the sidewalk area, and rather move the focus of informal trade inward to the traffic areas and the resultant “feet” it would create.(figure5.2.1)
This is the most important difference between the Metro Mall and the Proposed new Gautrain Intermodal Transfer Station, where the Gautrain building will enhance trade throughout its surface area to varying degrees.

The Metro Mall building does have more formal trading Shops to the street edge, but these do not entail the provisions for informal traders in front of their shop fronts.

In the Metro Mall the generation of enterprise is a ongoing theme, with even the public toilets run as a business.

A very ingenious aspect of the Metro Mall is the use of urban art by the community to liven up the built fabric, which because of its limited palette can become dull and sombre.(figure 5.2.4) What immediately springs to mind, is the beautiful underground train stations commissioned in the Soviet era for the cities of St. Petersburg and Moscow. The latter became the defining elements of a days travel to and from the grim soviet oppressive system where the ones commissioned for the Metro Mall has the opposite effect, to celebrate a nation's liberation from exactly such a fate.

As a point of interest to also take into account with the possible commissioning of artists in the Gautrain Intermodal Transfer Station, is that the artists were managed along the lines of selected sub-contractors. A system by which the performance of the artist should be closely monitored by the primary agent (architect).

Important architectural elements incorporated into the building are the towers demarcating the entrances to the building. These are a staple for the design firm Urban Solutions as the new Constitutional Court being erected has much the same elements used in its design

Also the monumentality of the built form, with high open spaces and almost cathedral like interiors, are to be incorporated into the Gautrain building as these can inspire people to use a building long after the intended purpose have been eclipsed. The example of Grand Central Railway Station in New York City can also be called to mind in the type of interior envisaged for the Gautrain Intermodal Transfer Station.(Leading Architecture:41-44)

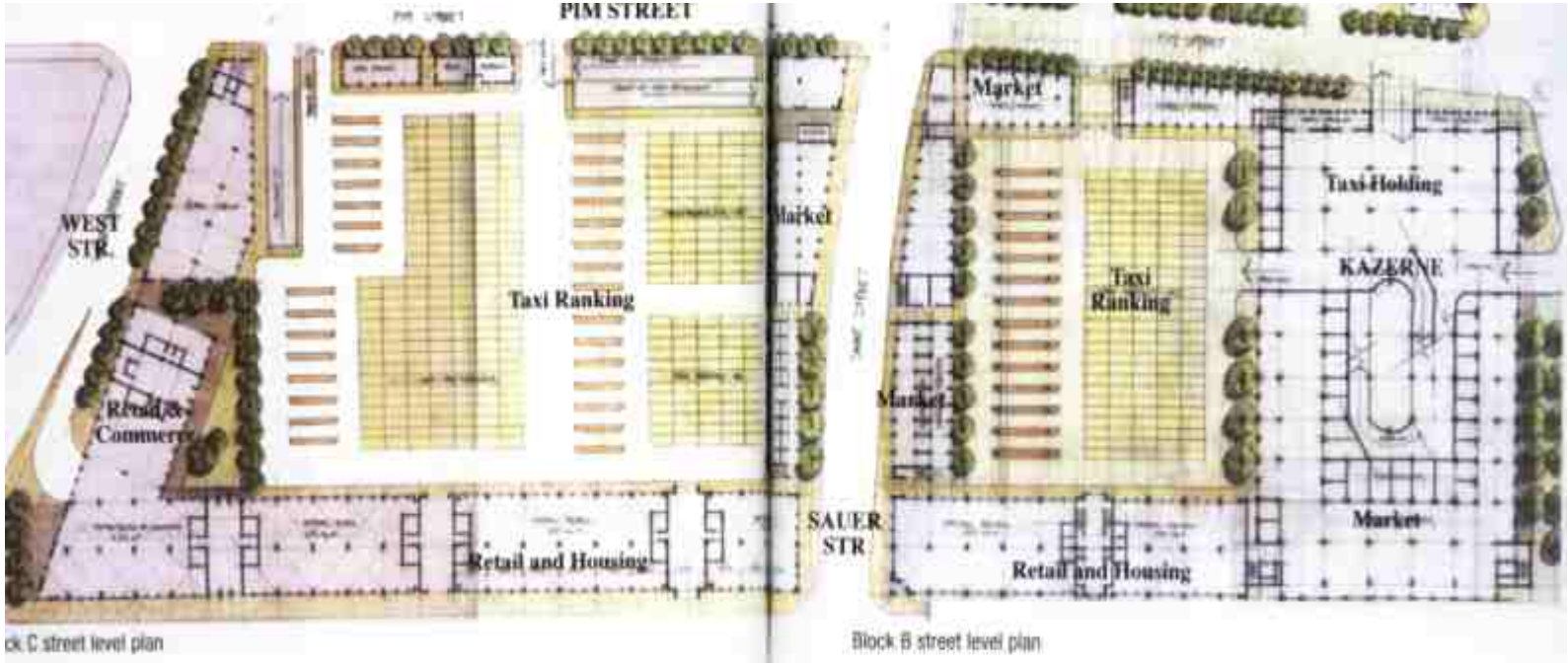


Figure 5.2.1 Shows the street level plan of block C(Soweto bound transport and block B(Lenasia bound transport) as well as the demarcation of retail, transport, housing areas etcetera.(Leading Architecture:42-43)

figure 5.2.2.
Above Internal arcade Pim Street, Metro Mall, Newton, Johannesburg.(Leading Architecture:41)

figure 5.2.3
Above Block C West Street entrance tower of Metro Mall, Newton, Johannesburg(Leading Architecture:43)

figure 5.2.4.
An example of the mosaic art work found in block C, Metromall, Newton, Johannesburg. (Leading

figure 5.2.5
West street facade,Metro Mall ,Newton, Johannesburg.(Leading Architecture:41)

5.3. Mapocho Station, Santiago, Chile.

In designing the proposed new Gautrain Intermodal Transfer Station to be erected in Hatfield one must ask oneself the important question of how long would the building remain in its current role, and is there scope for change?

Due to the character of technological change in the world, nothing can be seen as an absolute and set in stone. Even the rock of Gibraltar, a British protectorate, have seen the mother country make moves to return control back to Spain after 400 years of control.

For this reason one cannot see the built form to be erected as absolute. Precisely for this reason the re-invigorated station building of Mapocho Station in Santiago Chile has been selected to serve as a case study to show that the built form must lean itself to being reused into another function, long after the original function has been forgotten.

History of the building

The Mapocho Station building was imported in kit form from Belgium and designed by the architect of *Museo de Bellas Artes*, Emilio Jequier 1910-1913 in celebratoin of the centennial anniversary of Independence from Spanish rule.

"The irony of this "independence" is that, as in the north of Chile where there are churches by the French engineer, Eiffel, the pre-fabricated structural frame of the Mapocho station was shipped from Belgium. The turn of the century Chileans believed that imported "European" culture was more important than the context in which a building sat." (World Architecture July/August1996:57)

As is normally the case with transplanted organisms and architectural building styles, the finer nuances of the site's influences isn't taken into consideration, which often leads to problems not foreseen in the mother country cropping up and making the built fabric unsuitable to the conditions.

What happened with Mapocho Station is that the Belgium Steel wasn't forged to meet the conditions encountered in Chile, with its tectonic plate movement. The result was that the building became too weak for its intended purpose when the earthquakes regularly experienced in Chile weakened the frame. Only after it became a political set piece did the government of Chile decide to use the building in fostering national pride. The new government also sought to re-emphasise the need for public, rather than private spending.

The building was then re-evaluated and the community was contacted to lead in the re-development of the building.
It was then decided to make a national Monument out of the building by making it a national cultural centre, aimed at restoring confidence in the state.

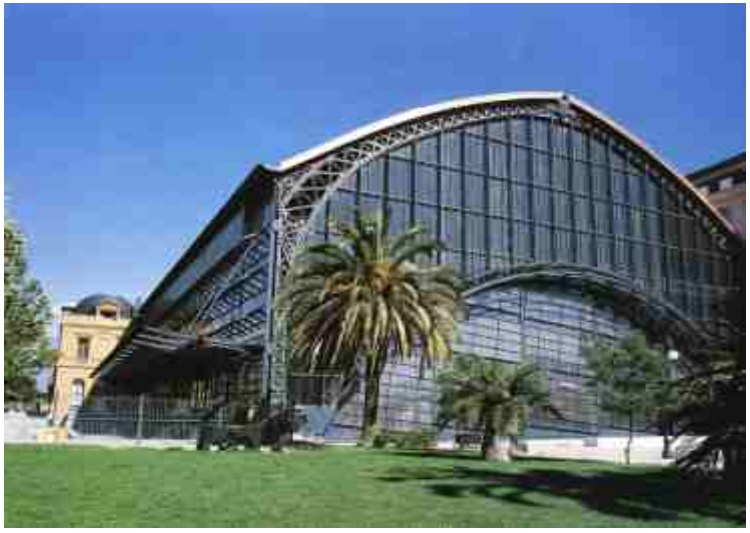


figure 5.3.1.
Above The track area at the back of the station has been transformed into a new city park. The main arched frame dates from the early 1900s. in contrast to its regular geometry, the angle of the horizontal cross bars of the semi-circular door provides a modern dynamic, and, for the first time, relates this important building to its site by echoing the gradient of the land on which Santiago was built.(World Architectue July/August 1996:56)

In other words,transforming a foreign functionless building into a popular space for the arts.

This was done by using glass and metal facades in the entrance hall and the sides of the station. These three storey spaces are available for rent. The main knave is split into two levels.
Under the entrance hall is an auditorium were shows, concerts and exhibitions take place

Adjacent to the building, lies the Mapocho river and the *“Parc deles Reyes”*
The masonry wall on this side of the building was replaced by a glass facade allowing natural light in, as well as for heat control.

The challenge, when the Gautrain Intermodal Transfer Station should ever become redundant in its function would not be to have a “foreign” building get a new lease of life, but to have the motifs for such a building be more sincere as what were evident in the Mapocho Station building. Where the dictates of the state, even ones so surreptitious as were employed here can only lead to a building not viable in its new function in the future.

The challenge then for the designers of the whole precinct would be to have the public on board from the beginning.
The new building should have intrinsically in its design the ability to morph into a new function not only for future, but also medium term changes, bound to take place.

figure 5.3.2. The glass river façade with louvred wall to control heating.(World Architecture July/August 1996:57)

figure 5.3.3. Interior showing the new glass doors.(World Architecture July/August 1996:57)

figure 5.3.4
Above The original station entrance with the glass portico showing.(World Architecture July/August 1996:57)

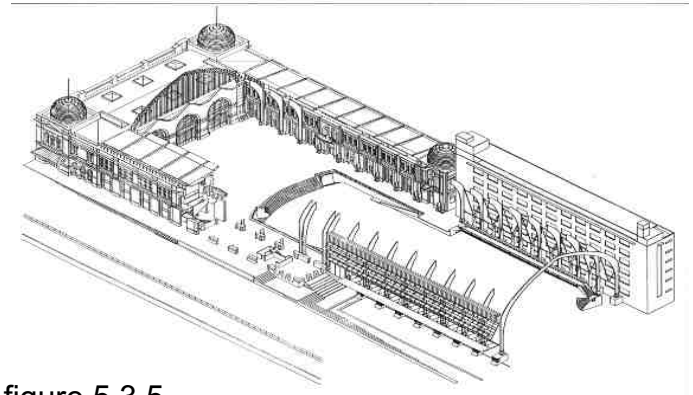


figure 5.3.5.
Above A cut-away axonometric showing the removed wall of the river façade to increase the amount of natural light into the building.(World Architecture July/August 1996:58)

figure 5.3.6.
Above Interior space showing the split passenger / train levels now used to define the auditorium and stage with entrance to the first floor offices in the far corner and commercial space under the arches.(World Architecture July/August 1996:57)

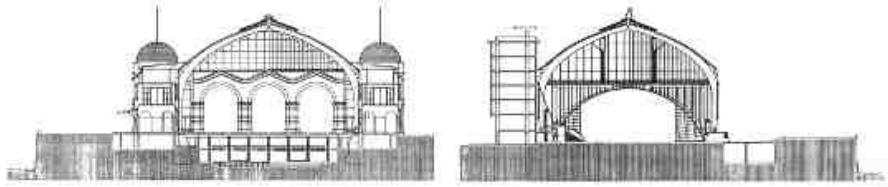


figure 5.3.7.
Above Sections of the building(World Architecture July/August 1996:58)

5.4. Bilbao Metro Railway System
Bilbao, Spain

When it comes to a case study closest in its applicability, this one with its public participation and industry support is the epiphany of what the Gauteng Provincial Government envisages for its Gautrain Rapid Rail network and more specifically the Different Station Concessionaires.

Basque country, much like South Africa is a place where years of strife often led to people pouring their creative impulses into civic projects.
What immediately springs to mind is the great masterpieces of Antonio Gaudi in Barcelona, capital of Catalonia. For precisely this civic-minded reason the building of this Metro Railway System in Bilbao were underpinned by the local community, with local industry cooperating with product suppliers and contractors.

Foster and Partners were the architects and primary agents on the scheme, where the Basque Government sought to invest in the regional infrastructure as they did earlier in Barcelona.

The Metro ,existing out of eleven stations, links the coastal villages, industrial zone, city centre and suburbs, serving the one million population of greater Bilbao, and connecting to an existing above ground railway system.
The street level glass enclosures are endearingly referred to as "Fosteritos" for the smaller curved canopies, and "Fosterazos" refer to the large canopy at Sarriko Station.

The type of design of the steel mezzanines used in the station platforms will be adopted in the design of the-proposed new Gautrain Station at Hatfield as they give a full appreciation of the volumes in the train movement areas crucial in the new station.

What the designers employed here, was to have the steel reinforced platforms (mezzanines) rather than supported from below by columns, and ultimately clogging up the free space, hang from the *"The mezzanines are suspended by stainless steel hangers over the tracks, and are kept short to allow full appreciation of the volume of the space from platform level"* (World Architecture July/August 1996:130)

This would also enhance legibility from the tourist perspective, as the paths to be followed can now be more clearly demarcated.

figure 5.4.1
One of the "Fosteritos", the curved glass and steel entrances to nine of the eleven stations.(World Architecture July/August 1996:130)

Figure 5.4.2
Interior view of typical station showing the steel mezzanine suspended over the tracks by stainless steel bars.(World Architecture July/August 1996:130)

Figure 5.4.3.
Interior view of one of the stations.(World Architecture July/August 1996:130)

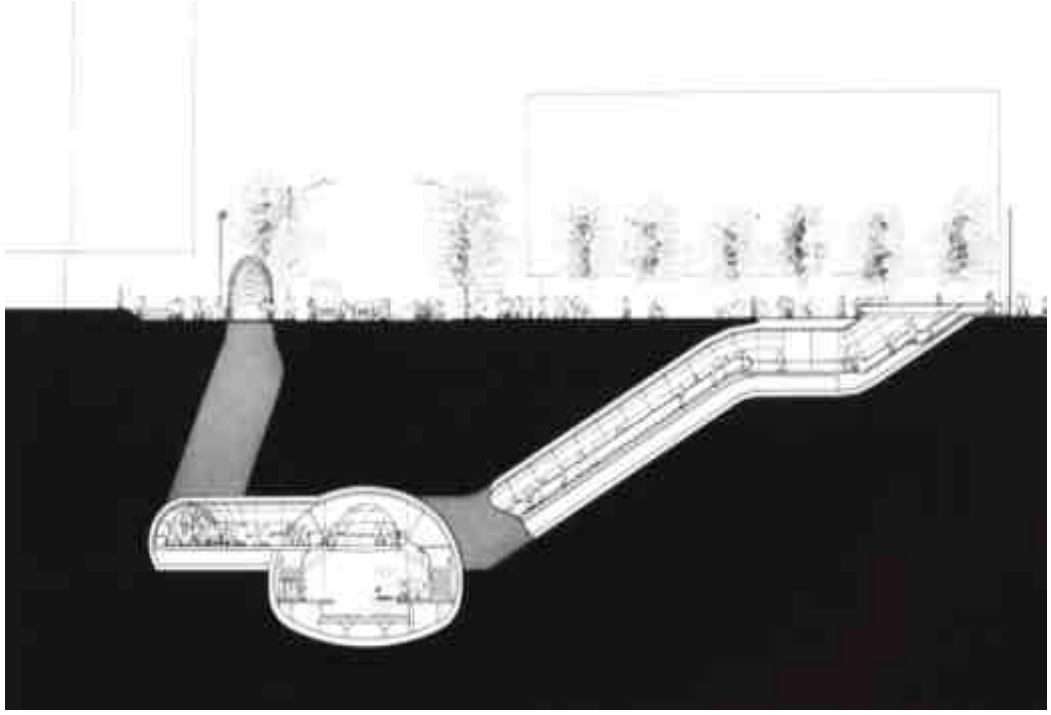


Figure 5.4.4.
Above Section of a typical Station.(World Architecture July/August

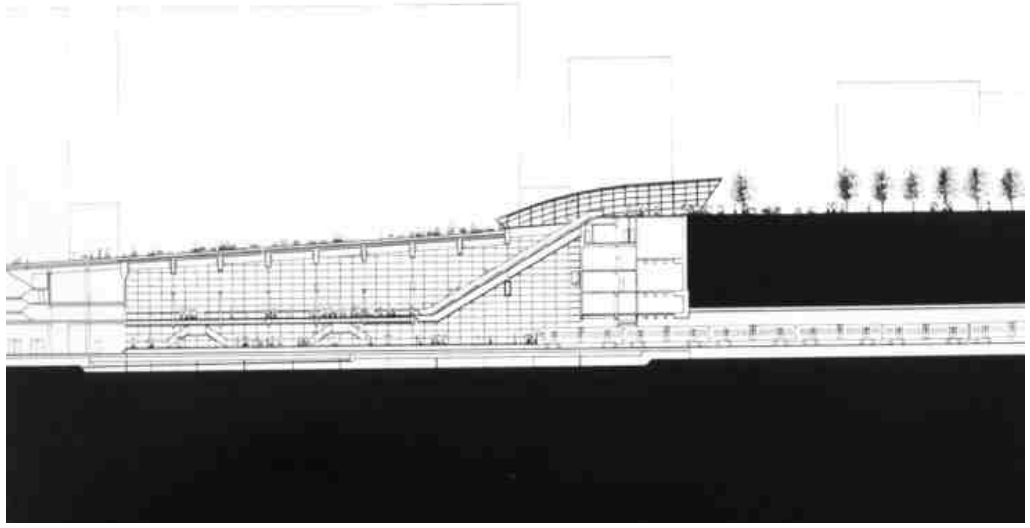


figure 5.4.5.
Section of Sarriko Station(World Architecture July/August 1996:131)

5.5 Brisbane International Airport Queensland, Australia

This airport is a good example of a new generation of international airports that break away from the norm; unfathomable and non-legible passenger routes leading to distant departure points.

It is modular, spacious, open plan and expandable.

Architects Blair Voller are responsible for Brisbane's new international terminal , which opened in 1995.

Important in this design, also applicable in the Gautrain Station in Hatfield is the legibility factor and the use of local cultural, horticultural and climactic characteristics.

Also applicable in the proposed building for the Gautrain Station, Hatfield, is the people moving mechanisms employed in the Airport terminal building. Passengers are moved between levels on escalators and lifts for the disabled, from a centrally easily legible transition space roofed over with a roof light and water features to calm the weary business travellers' nerves.

The “ugly” of the building namely parking, maintenance, services and baggage circulation areas are tucked away at semi-basement level.

In the proposed new Gautrain Intermodal transfer Station the only service tacitly excluded from the building, is the handling of baggage but as the scope of the traveller profile would show, these services would have to be incorporated into the building at some stage.

Arboreal references are seen in the white columns supporting the roof. These columns drive up through the floors and then fan out, representing the branches of trees.
These elements are accentuated by the presence of real trees and palms, which constitute part of the extensive landscaping scheme throughout the upper floors.

Elements of nature will also be used to soften the harshness of travel in the design of the Gautrain station, Hatfield.

Also commendable from the brief of the Airport building is the express challenge not to have too much signage, but rather have the structural devices denote the route to be taken, the passenger should find his / her circulation simple.

Another important aspect addressed in this project also pertinent to the Gautrain Station, would be the visual clarity of the interior, with integrated artificial and daylight design.(World Architecture July/August 1996:128-129)

figure 5.5.1.
Above View of the full height glazed walls and white colorbond roof.(World Architecture July/August 1996:128)

Figure 5.5.2.
Above The lighting as designed by Design Partnership, with artificial and natural lighting combined.(World Architecture July/August 1996:129)

Figure 5.5.3.
Above The Terminal Building by day(World Architecture July/August 1996:129)

Figure 5.5.4.
Above Passenger circulation was an important element of the design brief; minimal signage was the chosen method the yellow portals indicate passport / security areas for outward passengers.(World Architecture July/August 1996:129)

5.6 Holyhead Ferry Terminal

Holyhead, United Kingdom

As the centre of the industrial revolution, the British Midlands is familiar with innovation; bringing products to port have been a pre-occupation with transport engineers and architects in the region for many years.

In this light the Stena Line have commissioned the father and son Firm of Architects, Manser Associates to design the new port housing their high-speed sea service ferry between Dublin and Holyhead.

The project was completed within a very tight budget at a nominal cost of £550 per m².

This extraordinary “value-for-money” design was achieved By creating a generic design. This “ likeness” entails the use of curved roofs and sinusoidal profiled aluminium cladding in a silver colour.

The order that this curved rhythm created in this design, lends coherence to the terminal building, freight check, car and coach check and amenity centre, even thought his buildings have disparate functions.

The reason this case study has been included in this report had been precisely this, value for money by building type employed.

The same approach should be followed by the design of the terminal and related buildings on the Gautrain Intermodal Transfer Station Precinct. Not necessarily the re-invention of the wheel, but the creation of a whole by the building types employed.

The route from arrival to embarkation is quite straightforward. However, despite their functional approach, the architects adopted the luxury of airline travel with proper embarkation lounges, cafes, duty free shops. Connection from the embarkation lounge to the ship happens directly via a walkway bridge.

This it is not a landmark project, but the fact that it is a well-thought out design built on a low budget in a limited amount of time, make it a relevant case study to be referred to in the design of the proposed new Gautrain Intermodal Transfer Station in Hatfield.(World Architecture July/August 1996:126)

Figure5.6.1.
Above Exterior view of the main terminal Building. (World Architecture July/August 1996:126)

Figure 5.6.2.
Above Curving roofs create a feeling of movement. Inside the space is articulated to lead passengers through the terminal towards the ferry(World Architecture July/August 1996:127)

Figure 5.6.3 The interior Passenger Waiting Area showing how inventive use of natural light and simple materials can create the atmosphere of luxury travel in the manner of an airport lounge rather than a draughty seaport.(World Architecture July/August 1996:126)

Figure 5.6.4.
Above Curving roofs create a feeling of movement. Inside the space is articulated to lead passengers through the terminal towards the ferry.(World Architecture July/August 1996:126)

Figure 5.6.5
Left Arial view of Holyhead Ferry Terminal, the disparate buildings seem homogenous due to similarity of design. Manster Associates have attempted to create a “corporate” image for Stena Sealink throughout their ports in the UK.(World Architecture July/August 1996:127)

5.7. Kowloon Station

Hong Kong

The importance of this building designed by Terry Farrell & Company for the revitalisation of the Hong Kong District of Kowloon is that, the same as with our proposed new Gautrain Station it would serve as a focus for the re-development of the city district in which it would be situated. The building also has to tie in with the new rail link to Foster and Partners' new airport at Chep Lap Kok.

The Kowloon Station is a dramatic structure, with the above ground section consisting of two flat arches separated by an open concourse, housing ticketing and transport interchange areas.(Edwards 1997:143)

The station is not alone standing, but forms a part of a master plan consisting of 11 million square feet of mixed hotel, residential, retail and office space. This complex is planned around three public squares, providing open spaces as well as gardens, bringing natural elements into the design.(World Architecture, July/August1996:124)

Below ground, baggage-handling- and check-in facilities are housed, with two platforms below these.

The problem statements for Kowloon Airport Station and the Proposed Gautrain Station, Hatfield are remarkably the same in the sense that the volume of passengers to be handled over the course of the building's lifetime can be seen as the reason for its existence, and also the problem factor it would then be bound to handle.

The proposed Gautrain Station at Hatfield will be similar to Kowloon Station in that a major part of the building will be situated below ground.

The immediate question that springs to mind, is how the lighting aspect of such a building will be handled. At Kowloon Station light is taken to the catacombs of the lower levels by diagonal paths of deflected light.
Deflected light is harvested from the curved glazed walls of the office section.

At the Gautrain Station, natural light will enter lower levels through vehicular and pedestrian entrances, while the above ground areas will incorporate large areas of glass in aluminium window frames.

Another striking similarity between Kowloon Station and the proposed Gautrain station, Hatfield, is the fact that both embodies great functional complexity, even though the Gautrain Station will be of smaller, though significant scale.

Figure 5.7.1
Above Model of Phase 1 of Kowloon Station(World Architecture, July/August1996:124)

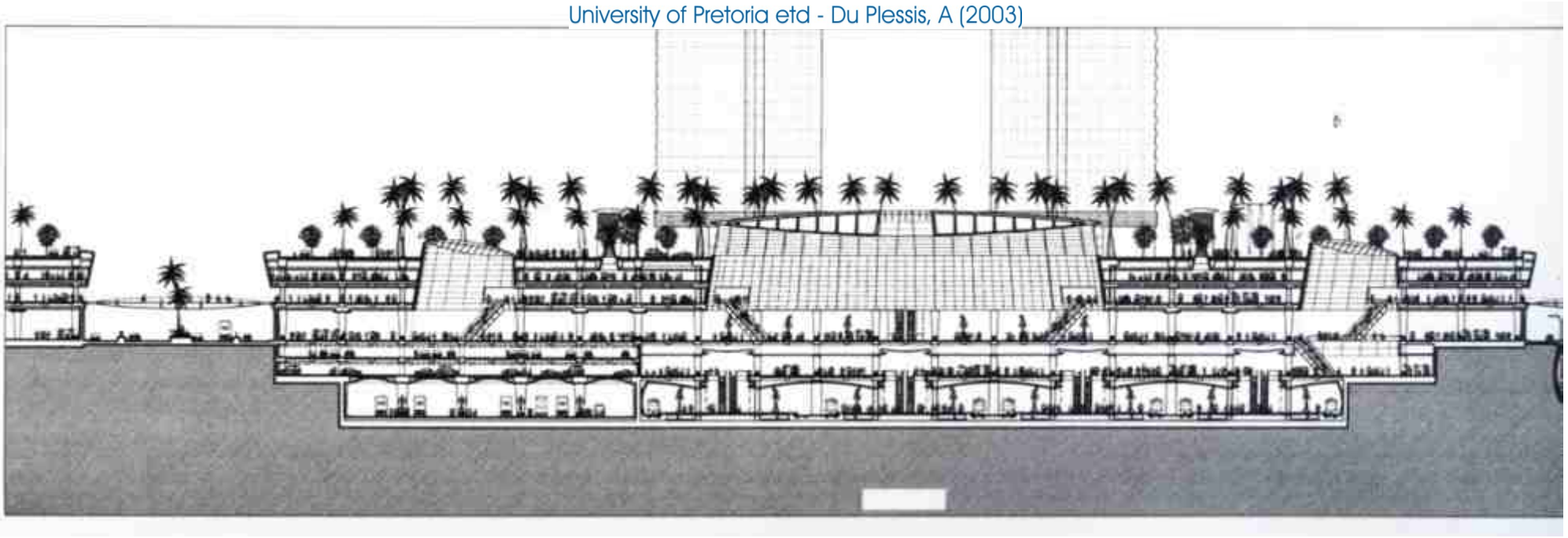


Figure 5.7.2.
Above Section through the master plan showing the hotel.(World Architecture, July/August1996:125)

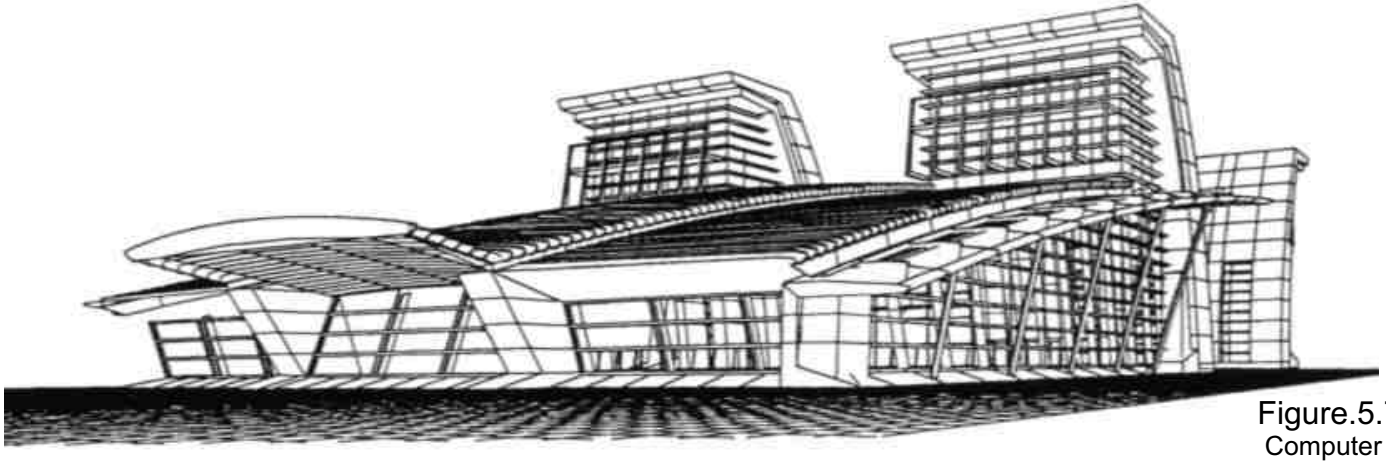


Figure.5.7.3.
Computer Rendering of the building shape(World Architecture, July/August1996:124)

5.8 Stratford Market Maintenance Depot, London 1998

Designed by the architects in association with Acer Consultants Ltd structural engineers, this building provides maintenance facilities to the Jubilee Line underground trains.

Much the same as with the Gautrain Intermodal Transfer Station, the design restrictions and compromises springs from the physical realities of the running stock employed on the new jubilee line the coaches and safety mechanisms on the new line does not conform with the existing London underground trains. A direct similarity can thus be drawn even here between the two projects.

"The plan of the building is in the shape of a parallelogram, 180meters long and 100 metres wide. This shape arose from the necessity for straight tracks inside the building coupled with the minimum curve radius permitted on the multi-track approach outside it. The result was a 28 degree splay which was increased to 30 degrees in order to permit a diagonal grid on plan." (World Architecture, April 1996:110)

The shape of the building was thus not a mere whim on the side of the designer, but a logical and beautiful response to the problem at hand.

Light distribution in this building was obtained by full width rooflights, crossing the roof at 90 degrees to the sidewalls in order for natural light to pour into the building.

The north elevation is fully glazed in order to harvest as much natural light as possible, wile a translucent fibreglass panel wall is used in the southern elevation to diffuse direct natural light.

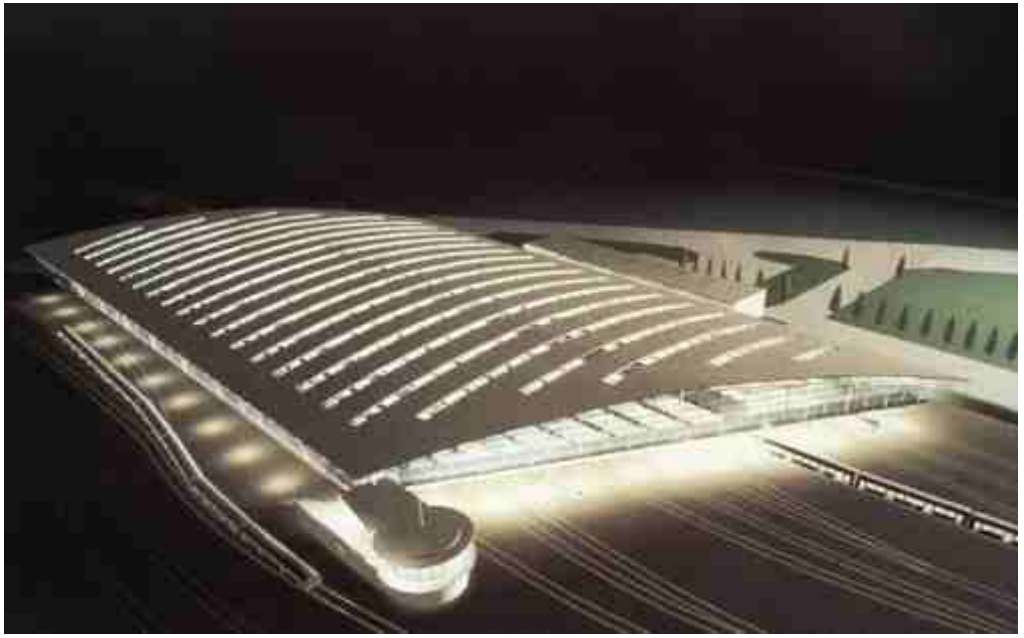


Figure 5.8.1
Above Computer image of completed depot.(World

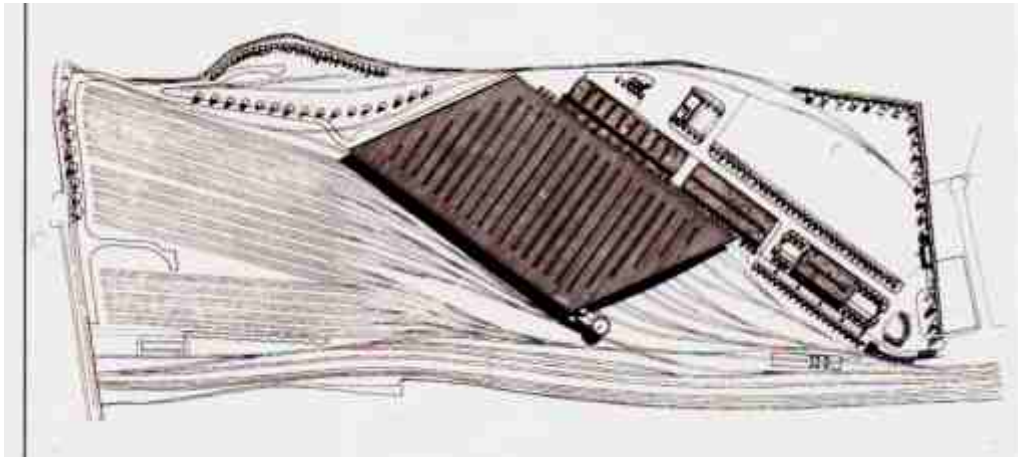


Fig 5.8.2
Above Ground plan and site plan showing approach tracks. (World

The sidewalls are constructed of PVF22 silver-coated horizontal-profiled sheeting. Clerestory glazing are used between the overhanging trusses, also allowing natural light into the building.(World Architecture, April 1996:110)

The use of these special materials should be taken into consideration in the roofing of the Gautrain Station, as the mere use of un-sustainable building materials cannot be justified. The building material should in conjunction of being a covering material also serve another function such as being a energy producing element (Photovoltaic Cells) or at the least be translucent to eliminate the use of too much electrical power in the lighting of the proposed building.

Figure5.10.4.
Above Section showing piling and column trees supporting space frame trusses.(World Architecture, April 1996:111)8

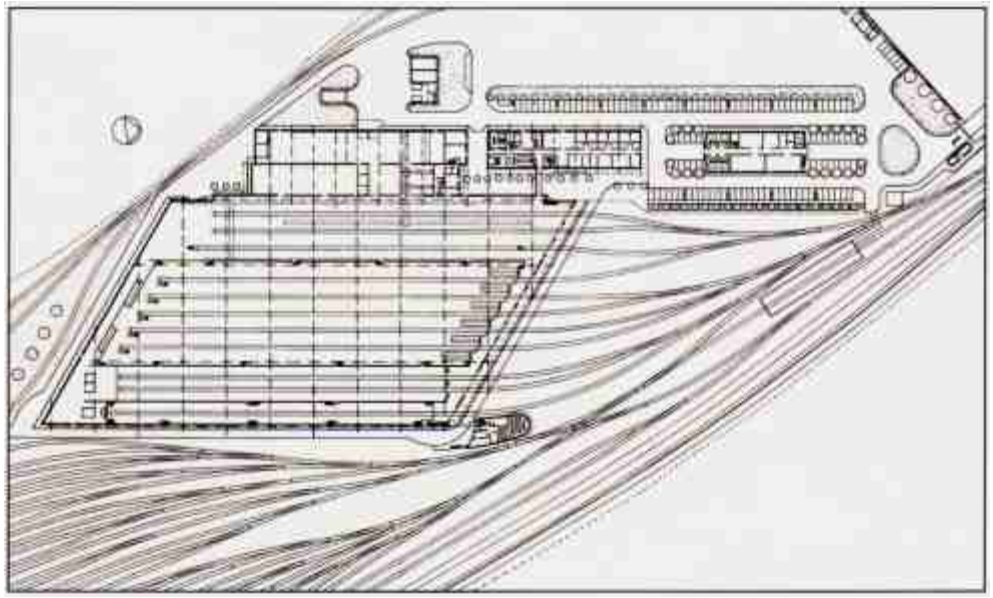


Figure 5.8.3
Above Ground plan
(World Architecture, April 1996:111)

Figure 5.8.5.
Above Elevation of the building.(World Architecture, April 1996:111)

5.9. Stratford Market Station Redevelopment London 1998

This building designed by Chris Wilkinson Architects in 1994, also serves the Jubilee Line Extension of the London underground. Completion was only in 1998, this in itself is testimony of how complex the whole project was.

Same as with the Gautrain Station the design is also problematic in the sense that the East-west Cross Rail link will tie in with it in the future. The Guatrain would have to extend in the future from its current stop and turnaround station in Hatfield to the eastern suburbs of Pretoria.

The building itself represents only 5% of the cost of the infrastructural work on the entire project.
The Gautrain Station building will also present a relatively low percentage of the total infrastructural costs

The walls of the building were constructed from glass to maximise daylighting and provide clear views.(World Architecture, April1996:112)

With sustainability of the built fabric taken into account as one of the most important pillars of the proposed new Gautrain Station, Hatfield, the solution in the Stratford Market Station is commendable.
Natural light is allowed into the building due to the shape of the roof This double skin roof also provides solar assisted ventilation by means of the stack effect ; hot, stale air will be drawn through the voids in the roof, and expelled at the highest point in the roof. Computer simulations were made of aerodynamic and thermal conditions and the design were done according to these findings in order to ensure comfortable conditions in the building even in mid summer

During night time the concourse is illuminated by high efficiency lighting and by day the daylight is supplemented by the use of low-voltage down lighters.(World Architecture, April1996:112)

Figure 5.9.1
Above Side elevation of the building. (World Architecture, April1996:113)

Figure 5.9.2.
Above Section through station, Jubilee Line to the left and main line to the right (World Architecture, April1996:113)

5.10 Liverpool Street Station Arcade Project 1992-1994

Commissioned in 1992 to provide a prominent gateway at the Liverpool Street end of the tunnelled section of the proposed CrossRail Line running east to west across London, is in its configuration much the same as the proposed new Gautrain Station in Hatfield. The original Liverpool Street Arcade was upgraded by the construction of a low level CrossRail Concourse, linking other railway lines and the Liverpool Street main line station itself.

The rail reserve with its restrictions on the built form carries on its top the residential and office components that needs to be created in the Gautrain project.

The problem with this project and the Gautrain project is the accommodation to be carried structurally overhead and the widely dispersed column spacing that the rail tracks would entail. The Gautrain project not only caters for the Rapid Rail Line, but also in it's reserve the Metrorail double lines need to be accommodated.(World Architecture, April1996:114)

Another striking similarity is that both the Liverpool Street Station arcade as well as the proposed Gautrain Station at Hatfield is not alone standing stations. Both are situated in close proximity of other built form. The precence of the liverpool street arcade

"Railways bring broad advantages to corridors of towns and also more immediate benefits to those nearby . The redirecting of pedestrian flows at station entrance, for example, to take people past new shopping arcades"(Edwards 1997:15)

It is evident from this case study that the proposed Gautrain Station will not only function as a successful station in this context, but will also play a role in the economic stimulation in the area it serves.

Figure 5.10.1
Above Artists impression of arcade.(World Architecture, April1996:114)

Figure 5.10.2
General view from
Liverpool Street

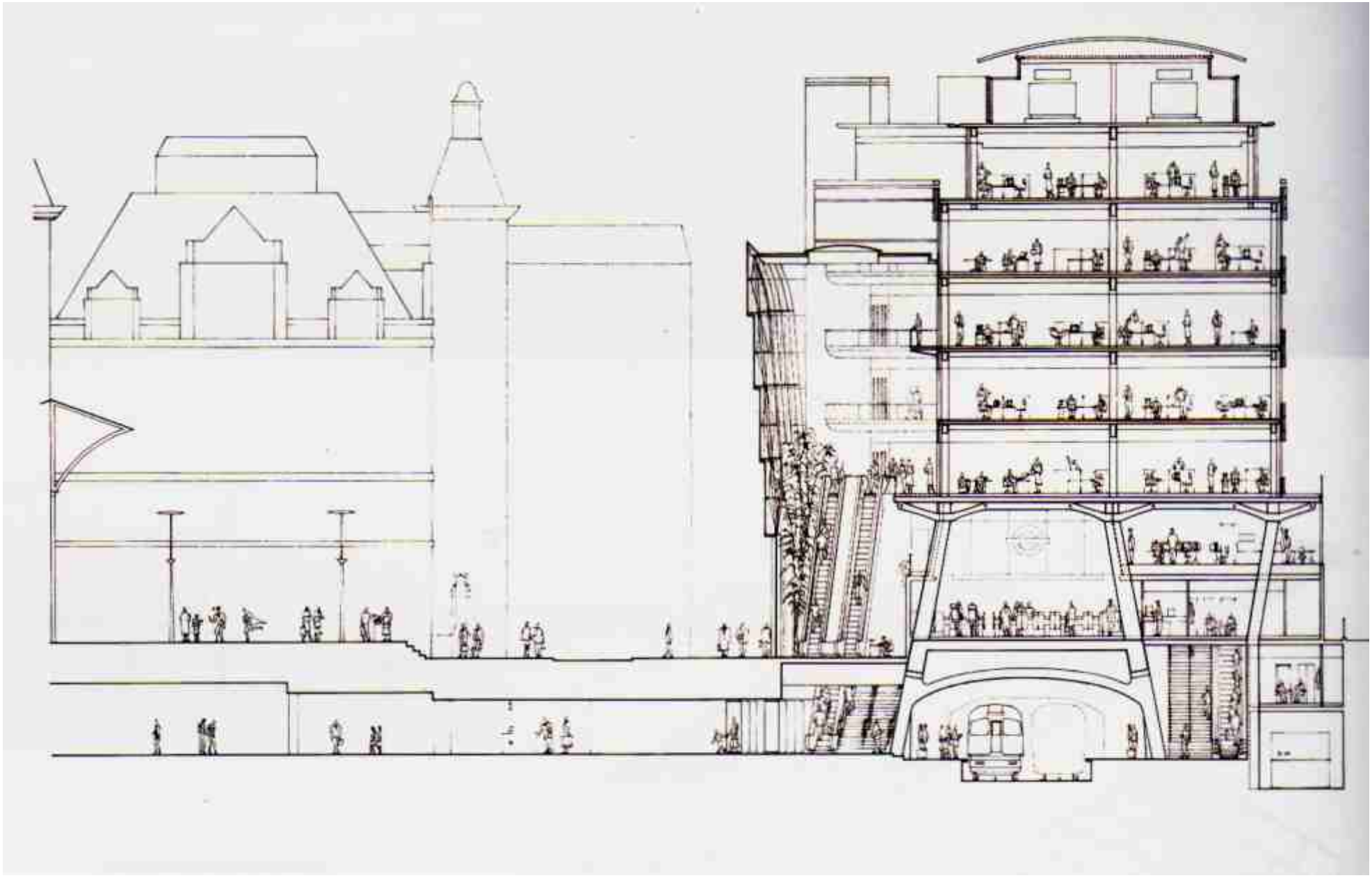


Figure 5.12.3 Section through development showing splayed column structure(World Architecture, April1996:114)

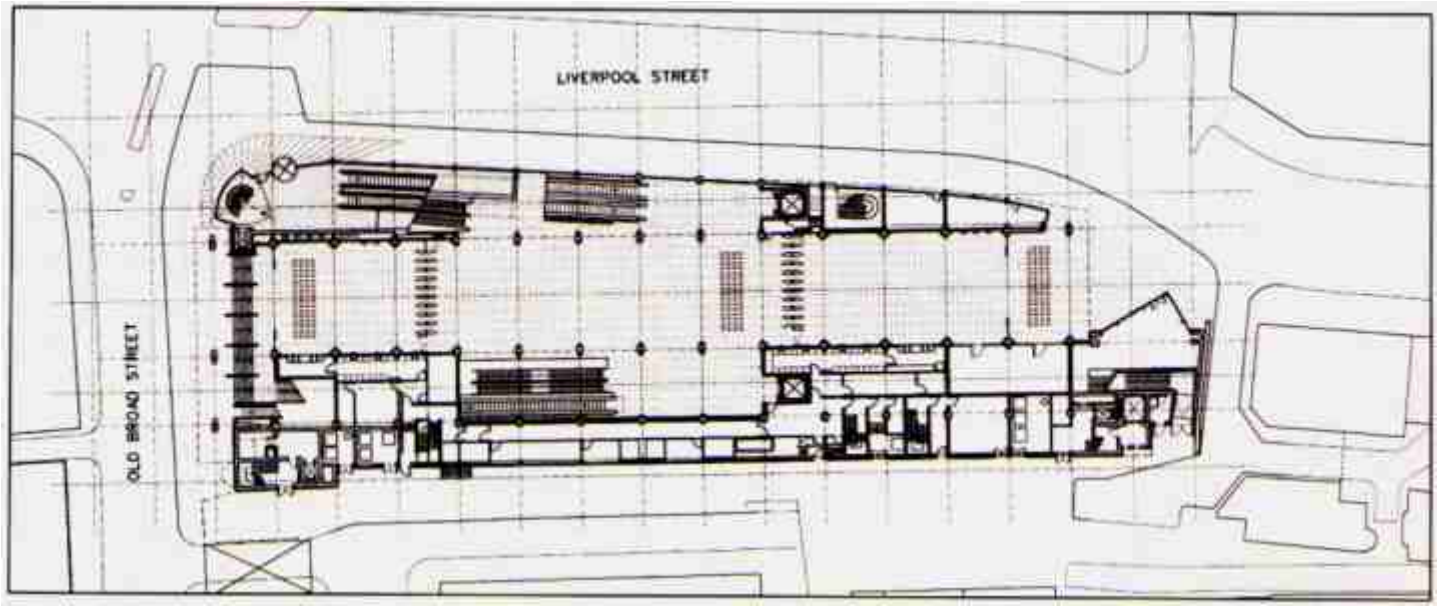
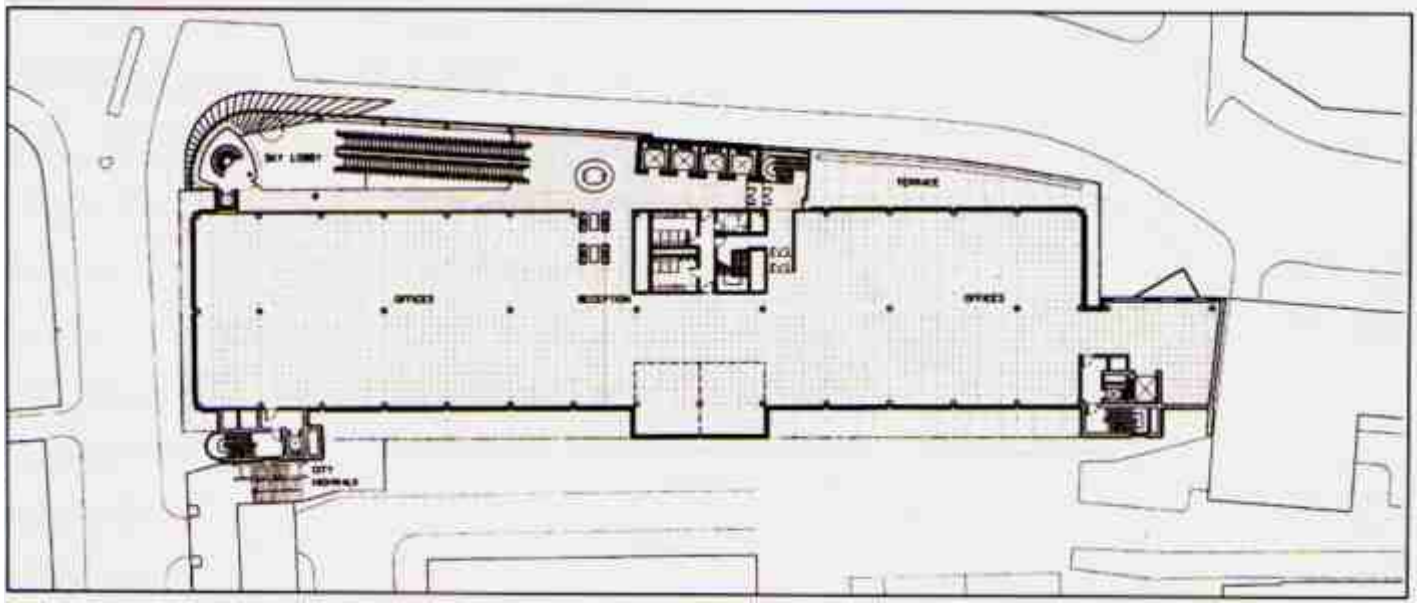
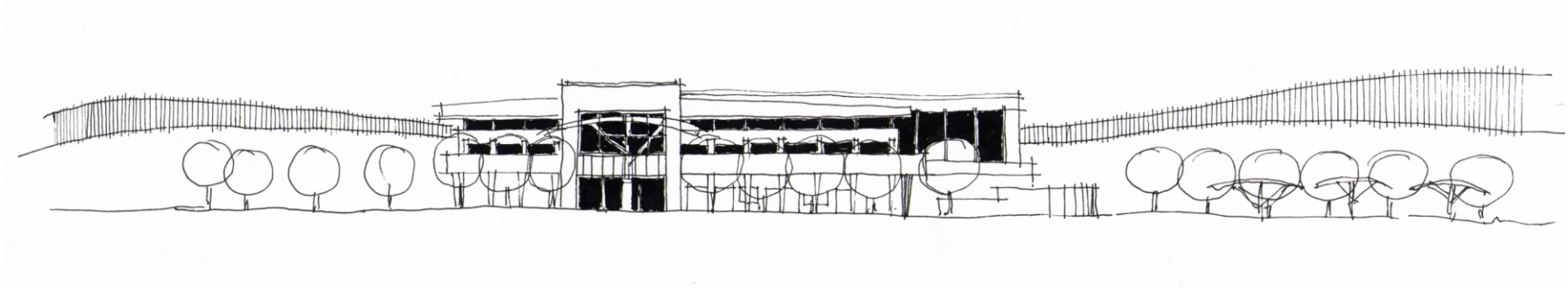


Figure 5.10.4.
Above New Ticket Hall and retail arcade plans.
Below Office floor level showing “sky lobby”.(World Architecture, April1996:114)



Go to:
Chapter 6: Design discourse



Chapter 6
Design discourse

Departure

The design of the proposed new Gautrain Station in Hatfied Pretoria can be likened to the design of a typical suburban intermodal hub where the different modes of transport converge and people move on foot from one point to the next.

This is a very simplistic view of this very complex building type. It was learned from the case studies that modern stations are more than just a mere departure and arrival depot.
Stations, not standing alone anymore, become part of the urban fabric, were it densify , diversify and revitalise the area that it serves, for instance Kowloon airway station, Hong Kong.*(vide 5.7)*

The proposed Gautrain Station, Hatfield must have at its core the important elements looked for in a station building, plus have the significance of the building of South Africa's first high speed rail link embodied in its design.

People all around the world are looking to our nation to see if the technological prowess exists to bring this feat to completion. The attention would also be clearly focussed on the spaces created around the building, which would make the building an icon to the new era of high-speed rail travel in Africa.

The design of the building must answer to responsible urban design approach explained in teachings of Dewar and Uytenbogaardt.

With all of the above said in mind, it was decided that the design would be seen from conception to be like a machine all be it one built to facilitate the efficient loading and unloading of passengers, but also the creation of viable commercial spaces in and around it to make the trading aspect surrounding travel a reality.

The local community needs to be drawn in at an early stage to ensure a sense of ownership, this feature also catered for in the medium and long run in the form of participation in vending and small and medium business facilities for these role players.

The built elements of the proposed Gautrain Station, Hatfield were the next subject under consideration.

Materials

What is called for in the elements were a sense of solidity, monumentality and lastly also respect for what has come before in the use of elements such as exaggerated steel splice joints that harks back to the bygone steam train era and the pre fabricated structures shipped to this country from abroad.

The use of concrete in the main structural elements would give the desired effect of solidity and oversized elements called for in the monumental aspects of the design.

Panels in the design were rough cast and certain elements given a rough texture with bush hammers to convey the sense of the building being founded like the plinths of great architects from the Roman era such as Andrea Palladio.

The use of these materials and elements gives recognition to the cultural and historical uniqueness of “station”.This creates a sense of place, making it a cognitive landmark to the users of this environment. (Dewar& Uytenbogaardt 1991:18)

Roofscapes

The major influences on the roof design can be seen in the Ferry Terminal Building at Holyhead in Britain.

The shape of the roof scapes can directly be attributed to this building the reason being that the modularity of the design in the Ferry Terminal Building and the modularity in construction in the Gautrain Station building are both very important elements.

In order to make the construction as economically viable as possible, the construction of the main elements had to co-inside with accepted and well understood construction principals prevalent in the construction community.

A major design concept were the definite use of copper as a roofing material on the most prominent roof spaces.
The decision to do so has a dual function-the mimicking of prestige as seen in the great public forum buildings of Europe, and the advantage of the roofing material to be moulded into the complex shapes called for in the design.

An unexpected advantage occurred later in the design in that the water harvested from the copper roofs were then ideally suited to be reclaimed and used to irrigate the planted areas of the design, as one of the characteristics of this metal is its anti bacterial properties.
It would then make it feasible to use the water directly on the planted areas without having to treat it.

Vertical circulatory area

A prominent vertical circulatory space houses stairs and elevators to reach the elevated office space above ground or the concourse below ground.

Figure 6.1The Holyhead Ferry Terminal Building.
The use of modular building methods inspired the curved roof shape in the design of the Gautrain Station. The ease of add-on in the building process would make it possible for the Station to be cost-effective.(World Architecture July/August 1996:126)

Figure 6.2.Holyhead Ferry Terminal Modular Roofing Construction.(World Architecture July/August 1996:126)

Office space

The office space is situated on the wings of the main vertical circulatory space. The walls of the office space incorporates oversized glass windows in aluminium frames and -visors , the latter for passive temperature regulation.
An open office plan makes maximum use of natural light pouring in through the glass windows.

Nature is brought into the office space by means of planters boxes outside the southern windows as well as next to the work stations. Floor covering consists of carpets, divided lengthwise by a curved decorative tiled area.

Connective space

The connective space between the vertical circulatory area and the canopy houses stairs as well as the entrance to the Gautrain Resaurant

Canopy

The canopy is historically the element that signals the presence of a station.
In the design of the proposed station , this visual code of railway architecture will be incorporated.(Edwards1997:27)

The form of this canopy is echoed in the canopies over the trader stalls, the office spaces and the axis defining canopy.(perpendicularly aligned north to the vertical circulatory area)This was decided upon because:

"Repetition, alignment and juxtaposition of identical elements and similar construction methods impose order on our buildings and our towns" (*Von Meiss1997:31)*

The Rail Canopy is situated to the south of the site and is in its design reminiscent to those of Stratford Market Maintenance Depot and The Oslo International Airport.(figure6.3)
The building form on plan forms the visual link between the Schoeman Street vista and the canopy. The axis defining canopy , as well as the slight offset of the rail canopy to the east, re-direct the attention of the pedestrian to the axial space leading north from the vertical space. Thus the route to be taken is clearly legible.

The design of the canopy as a floating roof over the platform area gives the design an airy feel as the curved trusses spanning the space creates a vast open area.

The addition of rooflights serves the dual purpose of aeration of the track spaces in the event of a fire and of the ingress of natural light into the public interchange spaces underneath.

Figure 6.3 The design of the canopy in the Gautrain Station, Hatfield will be similar to the canopy at Stratford Market Maintenance Depot. Note the use of rooflights. (World Architecture April1996;110)

Split level

The split level nature of the design where the sub-terrainian part of the building houses the working areas of the design can be seen in the successful use of a spilt level from platform to concourse level in the Santiago Chile station.*(vide 5.3)*
This aspect was incorporated into the design of the proposed Station. At the proposed station this design ensures that nobody can get onto the platform without a ticket from the concourse.
This in itself makes the building legible: if you don't have a ticket yet, you are not on the platform!

Super basement

The machine-like nature of the building's essence can here be discerned in that the direct route for pedestrians to and from their most important inter-city transport mode (the motorcar) has been kept unhindered. It is possible for the modern day traveller to directly from his vehicle step onto the platform for rapid transit to his ultimate destination, or the mull around in the building area to easy access to the park spaces above or the shopping spaces in the basement area. The possibility also exists to have easy access to the shopping district to the south of the site in Hatfield where the existing Hatfield Mall and Student District is situated.

One of the major decisions early on in the design proved to be a very contentious issue, and that is the definite realisation that the relationship between the motor vehicle and the change of transport mode from motorcar to High Speed Rail would be the prime design factor in the building's design.

The secondary design of the change of passenger from pedestrian mode to long-distance bus travel service or even to taxi or medium bus service would be of a smaller importance.

The person for which the building would ultimately function and would have to cater for in order to survive would be the Upper Middle Class business traveller or white collar office worker. This fact is clearly stated in the briefing documents received from the relevant authorities. The social responsibility element in the design of community involvement and catering for previously disadvantaged communities would the designers envisage the spin-off.

It is for this reason that the building in its original conception of being a machine had to take into account that the demographic of the traveller that would use the service would only do so when it becomes either impossible for them to do so because of inhibiting cost of the ease of the service forcing him to make use of the rail system.
Modern day South African business travellers find their automobiles as extensions of their own personalities; it would thus have to be extremely easier to take the train for them to abandon this status symbol.
For precisely this reason the connection between parking his/her car to stepping onto the train would need to be as seamlessly as possible. That would then follow that from street surface to parking bay to eventual seat on the train would have to be a clearly defined and easily executed route. The facilitation of this aspect came in the design of the Super Basement, where from the main feeding routes were mapped out clearly, with slipways into and out of the building.
An important shortcoming to the proposed design of the Gautrain Station as assessed by the Authorities if the situation of the proposed parking for the station on the wedge shaped piece of land to the east of the new building.
On the first level of the super basement ,a supermarket and smaller retail areas are also housed.

This piece of land were hastily acquired by the rail Authority to serve the 1500 parking bays needed for the station long-term parking needs.
The implication of the widened rail cutting to the north to accommodate the Gautrain Rail Tracks have however been neglected. This piece of land will be cut in half and would become useless to accommodate the vast amount of parking bays envisaged over three basement levels.

It was for precisely this reason that it was decided that the building should contain the required amount of parking on-site in the form of a "Super Basement", such as can be seen in the Melrose Arch Development in Johannesburg.

The site to the west would not go to waste, as it would be used to house the Informal Traders that would be housed in this area.

Public forum

The creation of a public forum in certain areas were a central design concept, the inclusion of public expression in the form of art work and sculpture gives from overseas experience the stark public spaces back to the masses to enjoy and to make their own.

Monolithic concrete elements have been created in the park-like spaces to give graffiti artists the space for expression, whilst the use of more settled artists in the interior public spaces have been catered for.

On the platform areas there will be baked enamel panels depicting scenes form southern African life by numerous artists.

The panels serve the dual purpose of also being vandal resistant the spaces would be well maintained, and any graffiti in these spaces would be expeditiously removed and the offenders dealt with.

Even floor covering have been included in the design with the public artist in mind. Floor covering material in certain public convergent spaces has been designed to be mosaic panels depicting different scenes in our culturally diverse community.

The panels serve the dual purpose of also being vandal resistant the spaces would be well maintained, and any graffiti in these spaces would be expeditiously removed and the offenders dealt with.

To brighten up the basement walls, extensive use will be made of public art with each basement level comprising a different theme. This will also assist in the legibility of the building.
.
An element designed for in the building is the use of African sunlight, and the utilisation of indigenous fauna as humanising elements in the built form.
The garden spaces around the building extent to underneath the built form creating a seamless entity from inside and outside space.

Park

This aspect of the building can be clearly seen in the elevated offices situated on the wings of the main vertical circulatory space situated as the centre point of the building.

Landscaping in the proposed design of the new Gautrain Station building has been one of the cardinal departure points in the design of the building.
The work of Peter Walker a famed landscape Architect has been used as a precedent to attempt the reconciliation of the two disparate worlds of technology and nature.

Because of his attempts to do the same in unrelated projects elsewhere in the world, most notably in the design of public parks and inner city squares where the often neglected left-over space between buildings were rejuvenated, the decision was made to use some of his ideas in the community forum park.

Justification of the park.

This park, a very contentious aspect of the design because of the proximity of Springbok Park to the North East of the site, a park that because of its position between two busy, high speed travel mobility spines, have been neglected over the years to become a unsustainable area in the Hatfield area.

The direct comparison of the two park areas cannot however be made Springbok Park has become a financial burden to the City of Tshwane (Pretoria), to such an extent that the Dros Resaurant franchise have been enlisted to serve as guardians of the Park in order to maintain it.

The same fate would however be impossible for the proposed new Public Forum Park situated on the Gautrain Station site, the reasons being:

This Park is situated on the corner of two very prominent roads intersecting at the visual hub of the site. This important visual hub had been expressly cleared of previous architect's detritus in order to enhance the visible impact of the proposed new Gautrain Station situated deeper into the site to the south.

The argument had been to clear the existing Barloworld Motor Dealership currently on the corner of Duncan and Schoeman Streets,

Figure 6.4The argument had been to clear the existing Barloworld Motor Dealership currently on the corner of Duncan and Schoeman Streets, in order to visual permeability of the park and building.

The Public Forum Park serves the secondary purpose of further provision of rentable trade space for vendors along the re-instated School Lane.

The pedestrianization of the park can thus be achieved, attaining the goal of placing the park and urban space back into the human scale realm so lacking in urban spaces.

At this point it should be clearly stated that after extensive scrutiny of the site and comparable examples in South Africa, the main reason was pinpointed why station buildings in our country are not utilised to its full potential.

Travellers all over when asked will tell you the same thing the places becomes too dark, people feel claustrophobic in the spaces and the result is few people habitate the spaces in the long run.

Station buildings on the rural areas on the other hand experience the opposite. Traders congest the platforms, people mull around and the whole space becomes what can only be likened to a Shouk (Arabian Traders market).

The linking factor between the two can then clearly be identified natural light.

People in Africa live close to nature, unlike people in Europe that are used to not seeing the sun for months on end. It follows then that in order for Africans to prosper they need to keep in close contact with nature and the light it provides. The design of the Proposed new Gautrain Station in Hatfield then becomes a very fine example of the opposing two factions.
Accepted thinking has it that the site should be packed tightly with functions, each intended to support the next.

Connectivity and Circulation

The connectivity of the site to the rest of Hatfield would be of cardinal importance.

The site had been divorced from the remaining urban fabric of Hatfield ever since the construction of the rail cutting to the south of the site. This cutting created the anomaly of what is currently the old Arcadia Primary School Site where the proposed new Gautrain Station would be situated.

I Parioli Office Park to the south of the site across the rail cutting was originally the school's sport field. After the rail cutting the continued existence of the school on the site became impossible leading to the school's relocation in the early 1990's.

It now becomes crucial to the success of the Station that a vehicular and pedestrian link to the south of Hatfield is re-established.

The construction of a bridge over the rail cutting in Grosvenor Street becomes part of the design solution. The design of the bridge compliments the canopy structure over the rails and uses elements used in bridges built by Santiago Callatrava. The main support column protrudes like a obelisk into the sky further enhancing the creation of “Place” and signifying the importance of the traders space created on the eastern edge of the site. It furthermore emphasises the space by drawing attention to the link created to the shopping areas and public areas to the south of the new building..

Access to the site is primarily designed for motor vehicles.

Two major points of entry to the super basement is in the form of two slipways from Schoeman Street and Ducan Road respectively.

Both these slipways lead to the first basement level were the main modal interchange facilities of the building are housed.
A consequence of this is the higher floor to ceiling ratio to give access to buses and heavy vehicle traffic.
The modal interchange on this level caters for long distance buses and delivery trucks.

The co-habitation between different modes has been a grave concern were the design calls for close proximity of all concerned. Yet the need for pedestrian safety were paramount.
This was achieved by giving precedence to pedestrians in this area.
In the basement the escalator core is a dominant visual element.

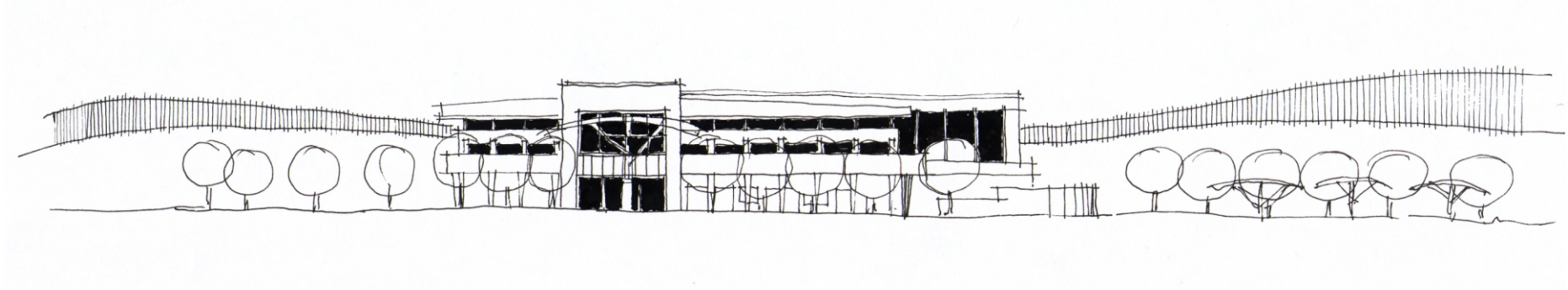
The circulation in the basement is situated around the elevator core .
It is closed of by a glazed wall and automatic double doors, creating an airtight seal that between the noxious gases of the basement and the pedestrian realm leading to the above surface.
The vertical pedestrian circulation towards Grosvenor Street is catered for between the western office wing and the rail canopy and.
This was achieved by creating an entrance from ground level to the top basement level.

Two entrances, similar to the one explained above, are situated north of the building alongside the axis defining canopy.
These elements ,unlike the escalator well previously described only leads to the upper basement level wile the escalator s reaches all the levels of the basement.
Kiss-and-drop of areas are accommodated in the reinstated School Lane, leading past the vertical circulation element above ground.

Scale

In order to make a building that is human scaled and respective to the built environment around the site, it was decided to not built past two storeys.

Go to:
Chapter 7: Design development



Chapter 7
Design development

Concepts

Through the design the main premise can be seen as the respect for the urban scale of the Hatfield Township, and the creation of vibrancy in the neighbourhood by enhancing pedestrianisation in the entire area.

The second most important aspect should be the creation of clear sight to the building as it is important as a beacon and design icon.

By doing that the creation of a new urban park and vibrant community square is the end result.

It may be argued that the creation of a secondary urban park to be maintained an kept vibrant flies in the face of the struggle to keep Springbok Park merely a block away alive, but the importance of the of this park and the meaning it has for the new ruling class in South Africa cannot be underestimated.

It follows also that position-wise in the urban frame of Hatfield this park (a corner site) as opposed to a hidden park such as Springbok Park stands a much better chance to be kept vibrant.

Being visible from three sides and having activities inter dispersed in and around it should make the experience of visiting the park an enjoyable one.

The above said can directly stave the decision to place most of the “ugly” of inner-city modal interchange underground, freeing up the sun to create a human-scaled and pleasant space for all city dwellers.

Important to remember that people using these parks would because of the heightened densification of Hatfied, be flat dweller, using the space as an extension of their own cramped personal space.

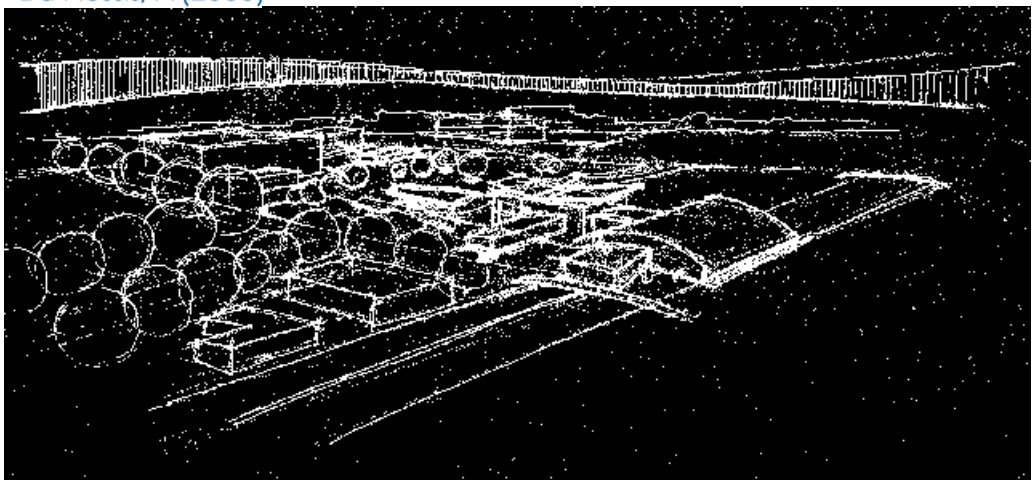


Figure7.1aProposed new Station Building in Early Sketch Phase
Aerial View from the South West showing early design decisions

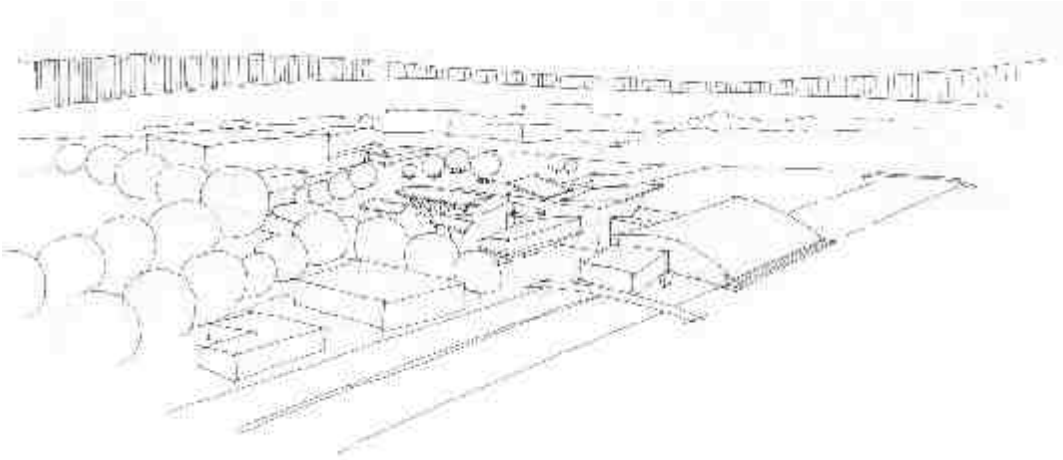


Figure 7.1 bProposed new Station Building in Early Sketch Phase
The same sketch inverted to show volumes more clear.

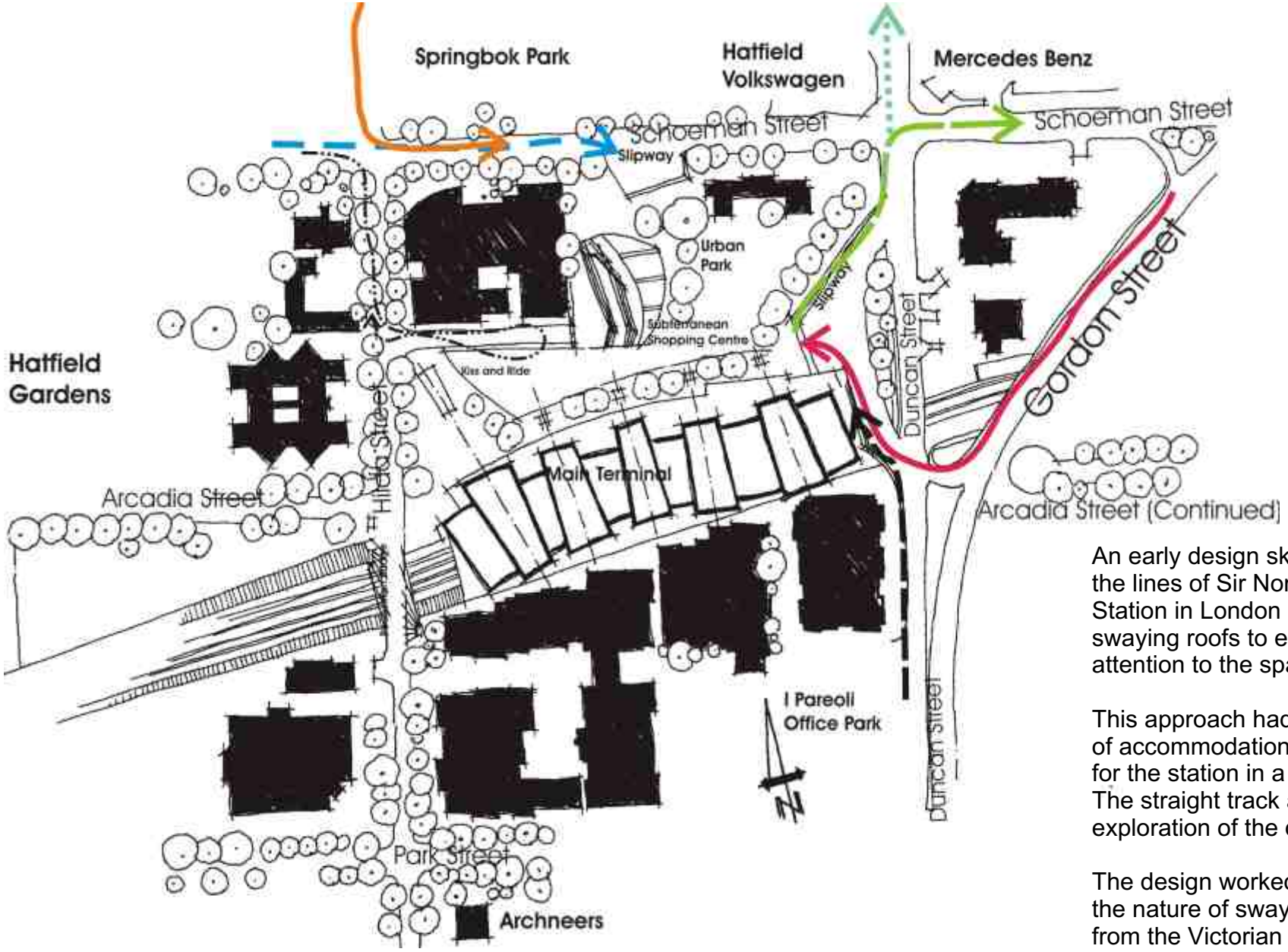
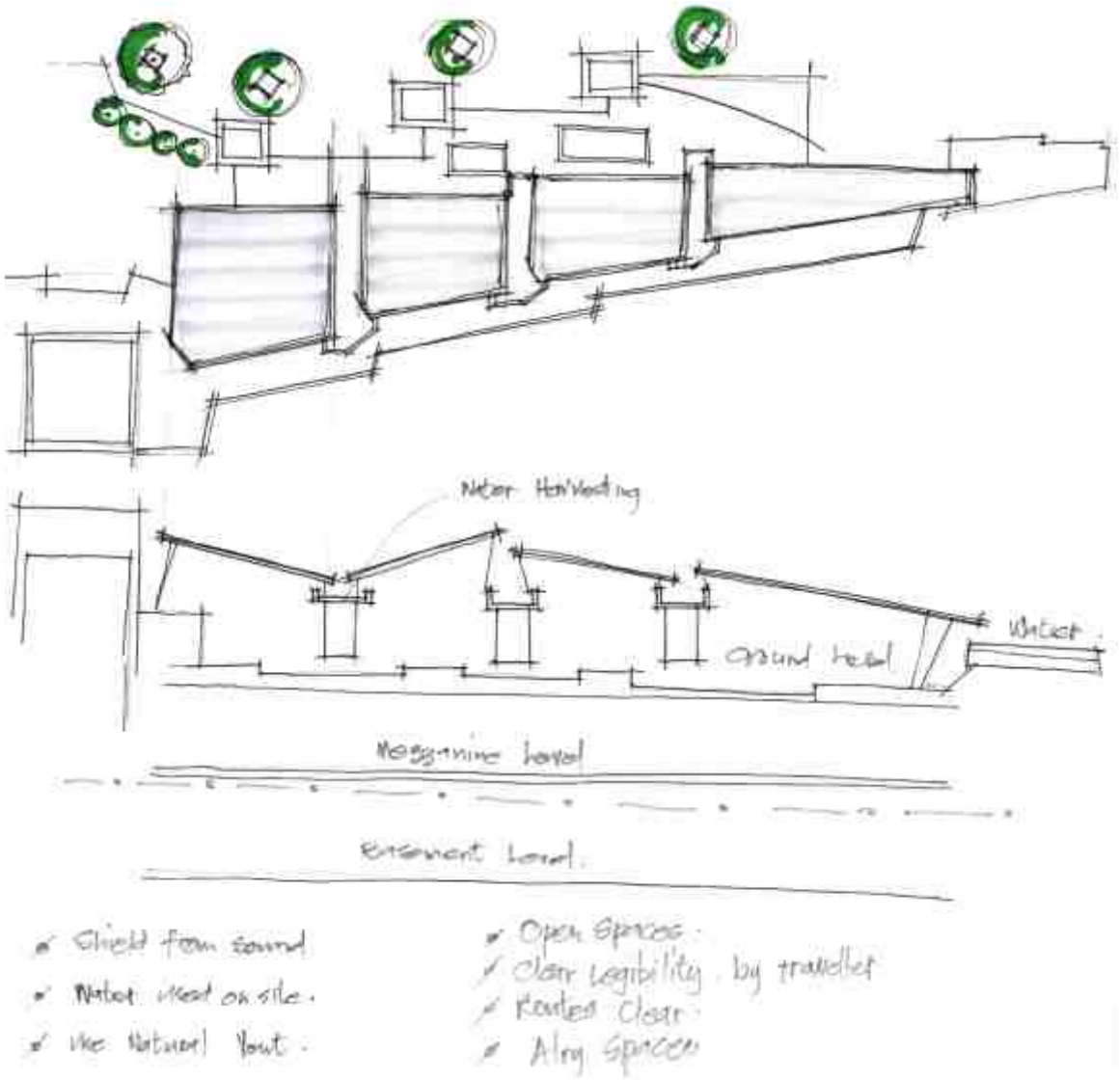


Figure 7.2 Proposed new Station Building in Early Sketch Phase as seen on plan.

An early design sketch approached along the lines of Sir Norman Forster's Waterloo Station in London England, utilising swaying roofs to enclose and to draw attention to the spaced spanned.

This approach had however the problem of accommodation the needed services for the station in a non-logical sequence. The straight track also inhibited the full exploration of the design.

The design worked in London because of the nature of swaying tracks, a left over from the Victorian Era's narrow antique dated track system



Early design sketches of the canopy system where the idea of water harvesting from rainwater were actively pursued.

This idea were however abandoned as the space possible under the roof could not accommodate the vast amount of clear space called for in a modern high speed rail system building.

Figure 7.3 Early concept sketches of the possibility of harvesting rain water from roof surfaces. This entailed the use of mono pitch roof surfaces, which however couldn't be successfully utilised because of the enormous scale of the building intended.

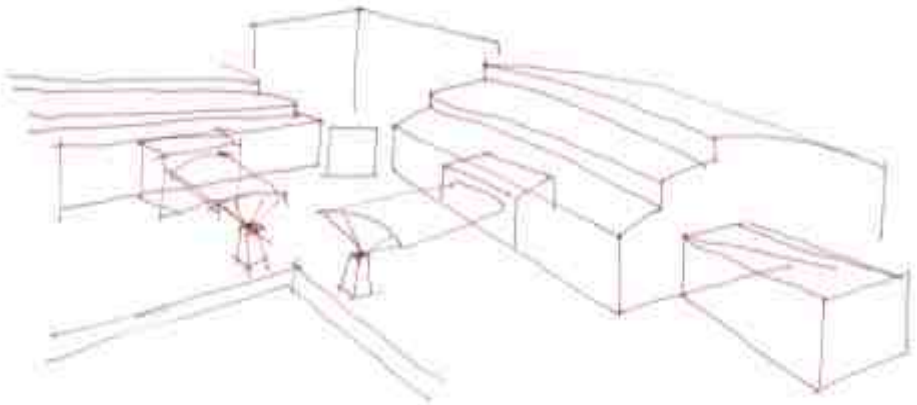


Figure 7.4 Early Design sketch

Fig 7.5 The vertical core idea further explored.

The idea of a vertical Office Core had been investigated early on in the design of the building. The reasons decided against the design of such a structure were mainly focussed on the restrictions placed on the amount of parking bays were possible on the site, the Gautrain demands 1500 bays exclusively for its operation.

The addition of any further bays would have entailed that the excavated depth of 22.0m would have had to be extensively increased to cater for the deficit - the problem would be in the sustainable design of reticulating the ground water seeping into the excavation.

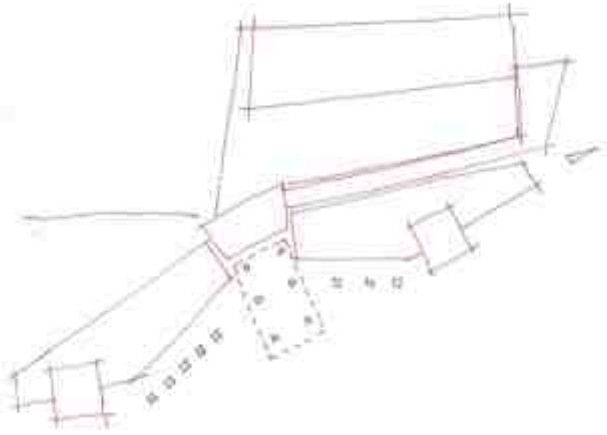


Fig 7.6 Early plan showing the massing of volumes arounf a central core

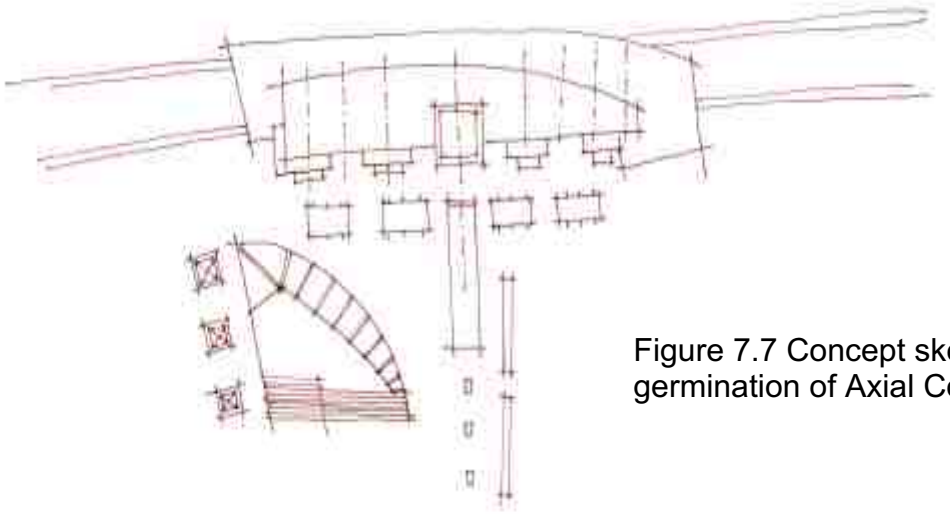


Figure 7.7 Concept sketch of building on plan showing the germination of Axial Concept in final design.

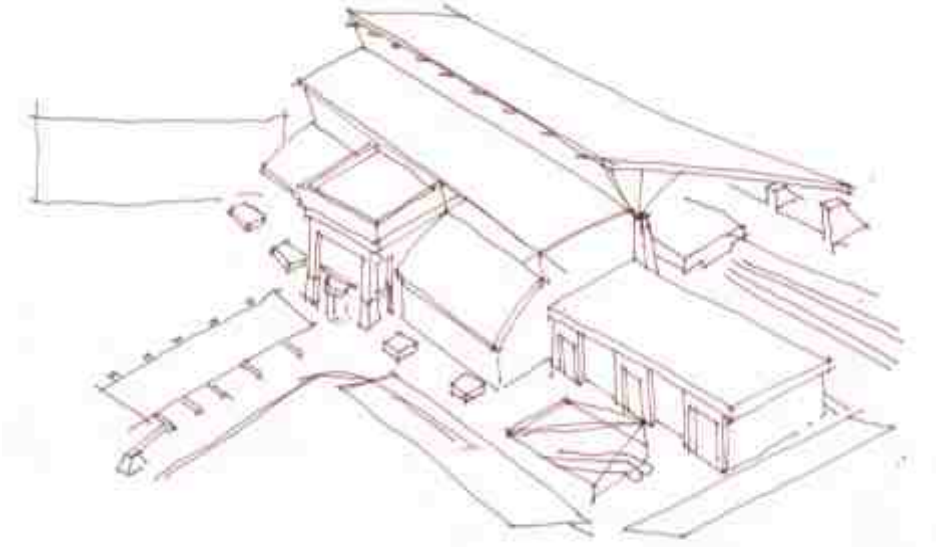


Figure 7.8 Massing of Station canopy in early design sketches showing the beginnings of the monumentality of scale called for in the ultimate design.

Early designs showing the evolution of the axis along the north south view line from the optimum space for the platforms in relation to the placement of the circulatory spaces. The need for an axis defining element was realized early on in the design process in order to focus attention to the rail canopy to the south

The placement of the roof massing were also explored in these sketches to emphasise the inviting aspect of a railway canopy.

For inspiration the tradition of rail architecture had served as a departure point with the use of massive steel sections as an design influence.

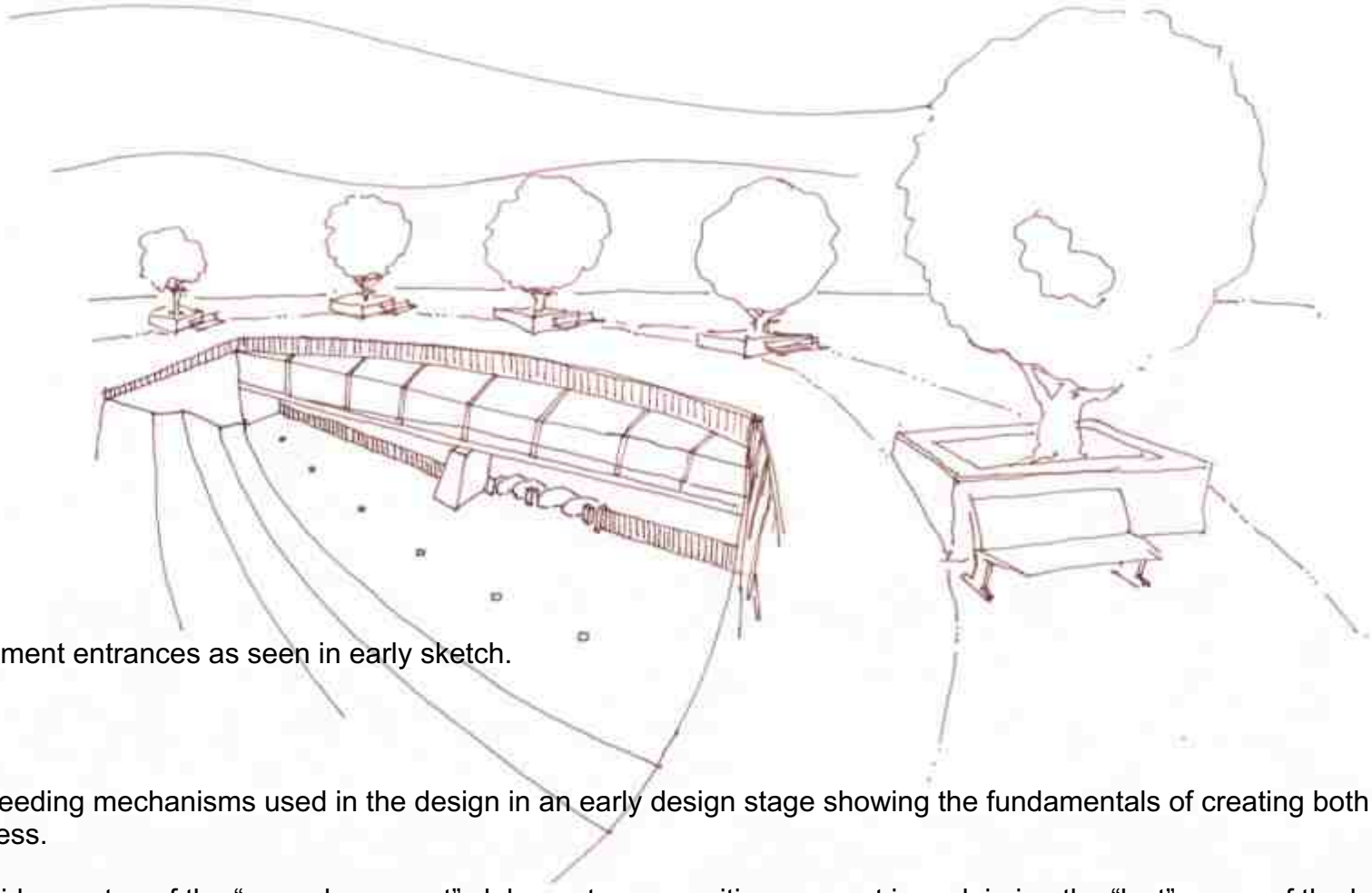


Figure 7.9 Basement entrances as seen in early sketch.

The basement feeding mechanisms used in the design in an early design stage showing the fundamentals of creating both shelter and also openness.

The urban park idea on top of the “super basement” slab creates an exciting concept in reclaiming the “lost” space of the basement roof to the urban dweller.

This element was used in the final design , but it changed shape and was mirrored around the axis defining canopy in order to emphasise the latter.

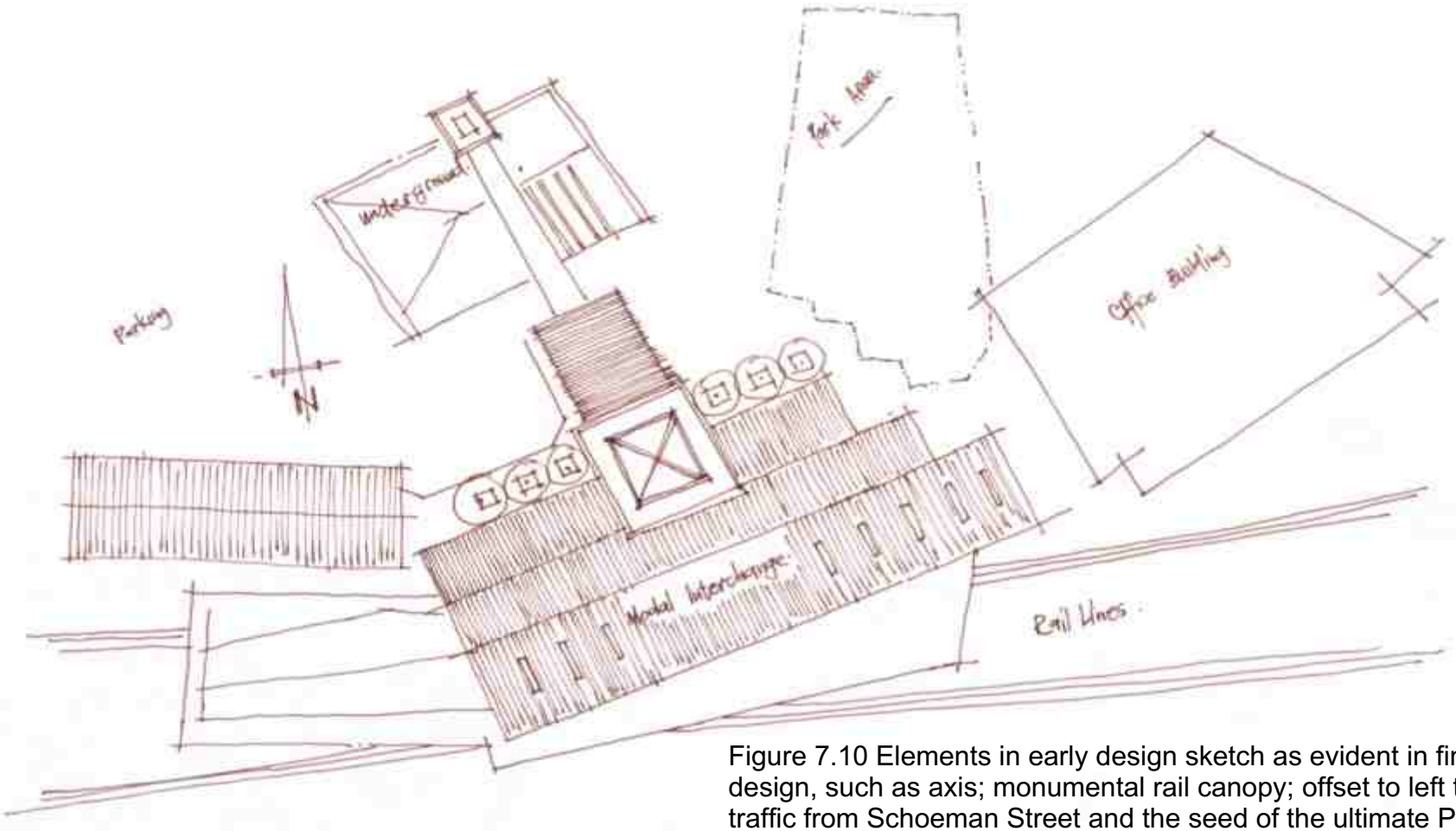


Figure 7.10 Elements in early design sketch as evident in final design, such as axis; monumental rail canopy; offset to left to invite traffic from Schoeman Street and the seed of the ultimate Public

Early sketch showing the massing of the building in relation to its site
Note the building north east to the station it was.
The line of thinking was to suggest such a building for hotel or residential use in order to densify the area.

This idea was discarded. On plan the building became overwhelming in its promotions due to the way it would have to be positioned. An additional problem was the inevitable noise experienced at stations and the discomfort it may have caused for residents basically living on the site.

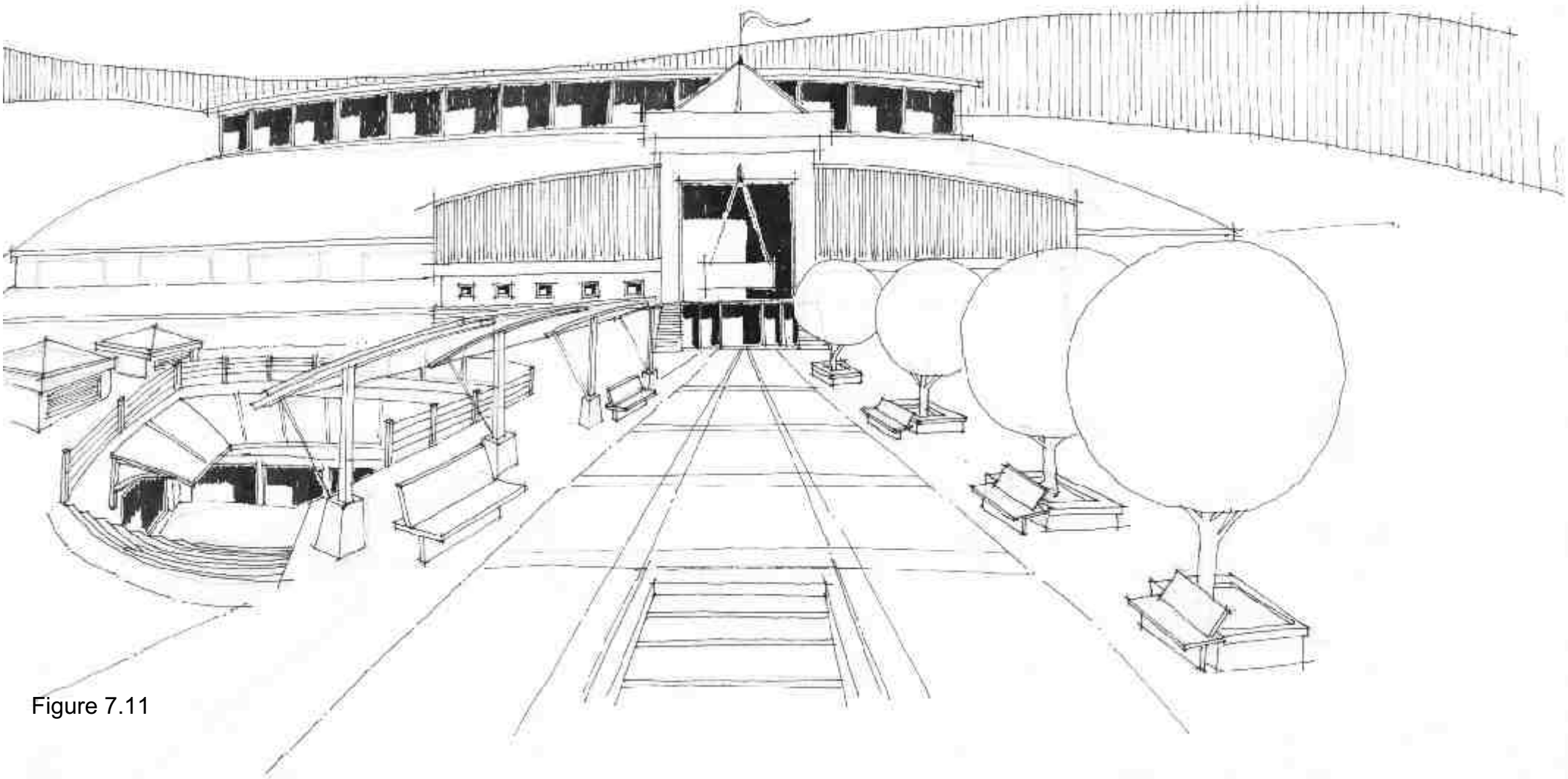


Figure 7.11

Early design sketch showing the axis created from North to South from Schoeman Street to the rail cutting where the Gautrain Station is situated. The important aspects retained can be seen as the Vertical Circulation Space and canopy language in the furniture.

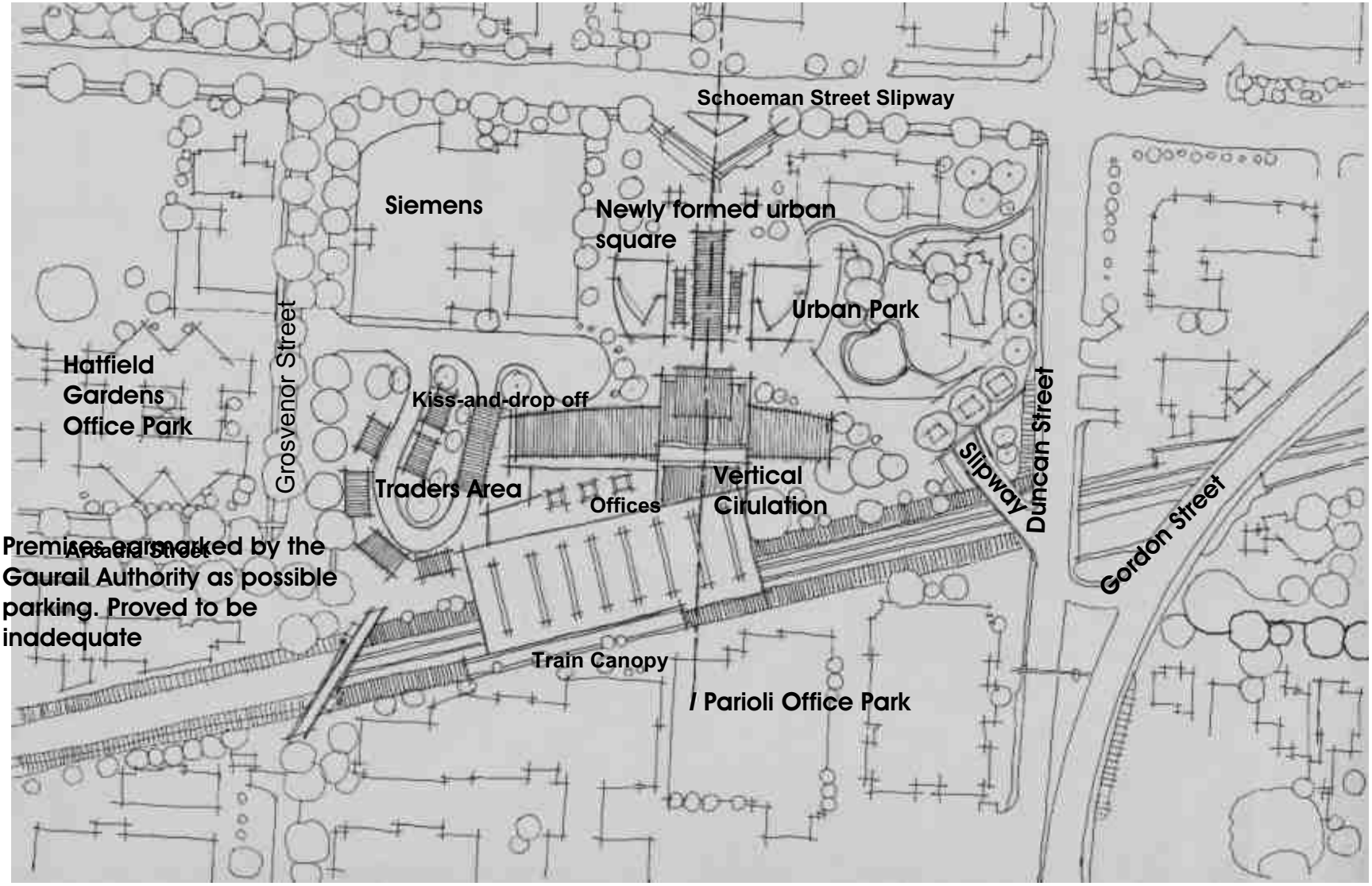


Figure 7.12 Early design of the Station with the open space created clearly shown. Kiss-and-drop-of areas was later moved to school lane that was also reinstated to improve circulation on and around the site, as well as to pedestrianize the public forum park.

The route from station to town centre should be a processional corridor marked by public space and civic events. *(The Modern Station, Brian Edwards)

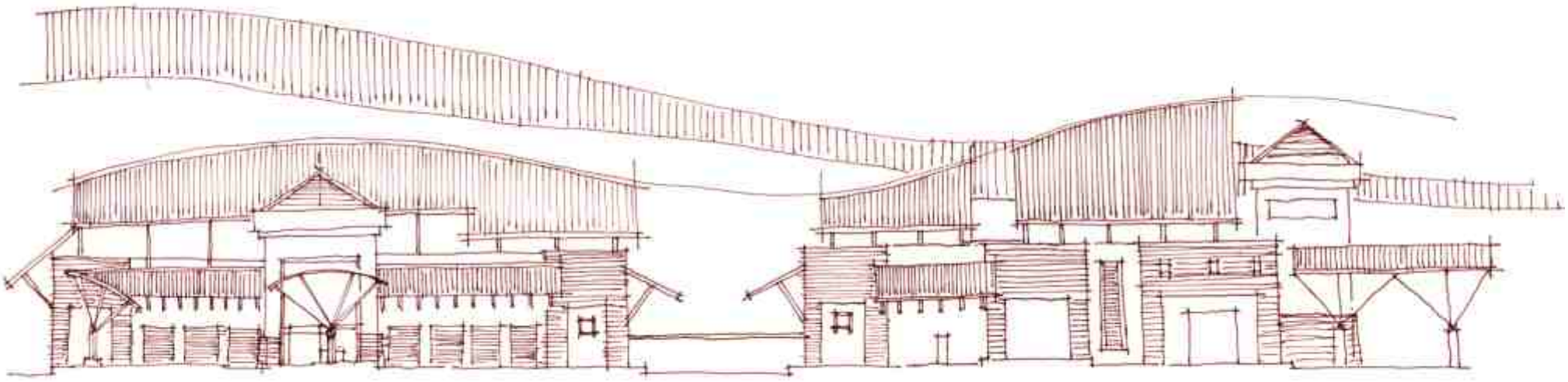


Figure 7.13 Early sketches with much of the design aspects evident in the final design evident. The use of inviting canopies are used extensively.
Swaying roof lines are emphasised, this was however decided as the desired urban scale could not be successfully achieved with this type of roof.

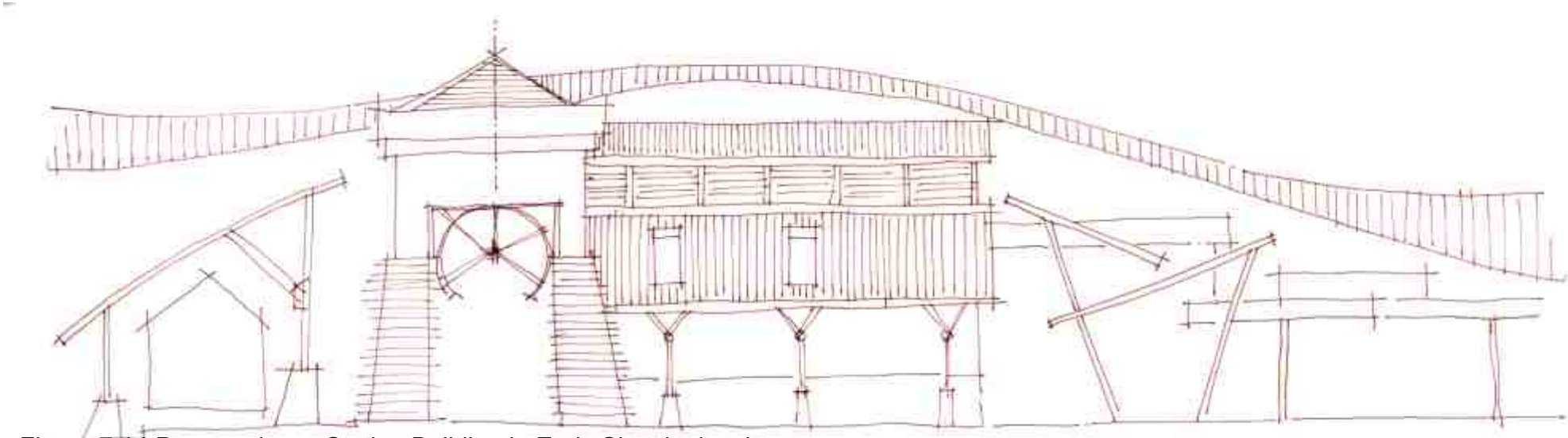


Figure 7.14 Proposed new Station Building in Early Sketch showing the design elements played with to create a sense of place to this important public forum building.

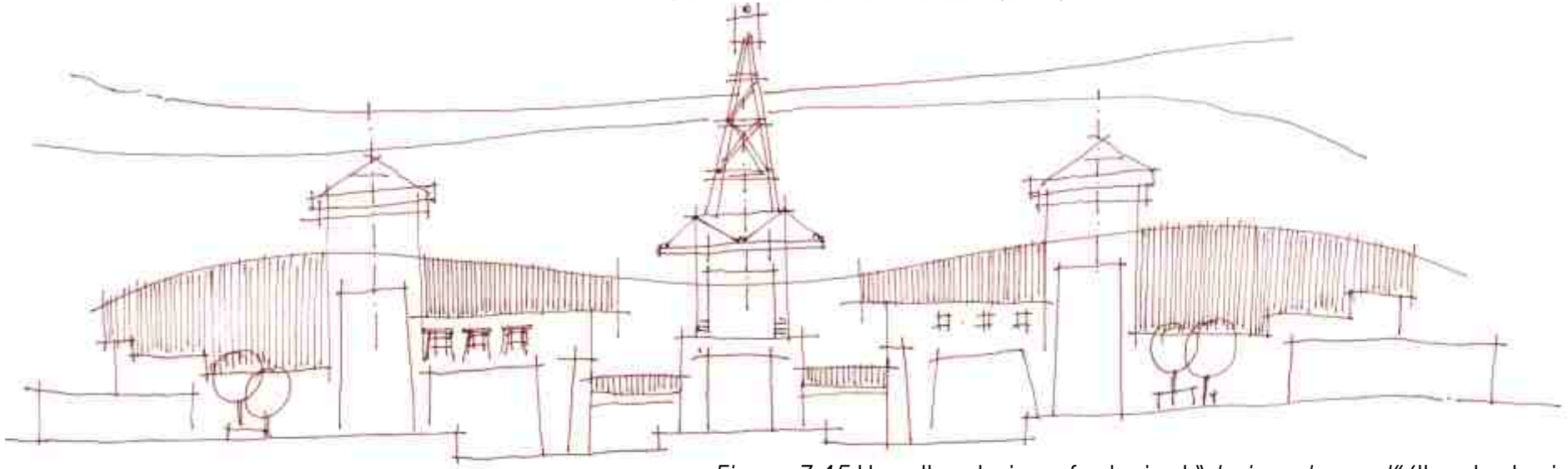


Figure 7.15 Here the design of a typical *"design element"* (the steel spire), to unify the urban square spaces desired for were attempted.
The core idea of using railway detailing in for instance splice joints were one of the emotive ideas of the design of the Gautrain Station.
The elimination of the swaying roof scapes made this idea obsolete however.

Figure 7.16 Along the same lines as the above abandoned design element, was the design of a glass domed copula. The vertical space created to accommodate the vast circulation space it spans made the use of glass to span over that great a distance untenable.

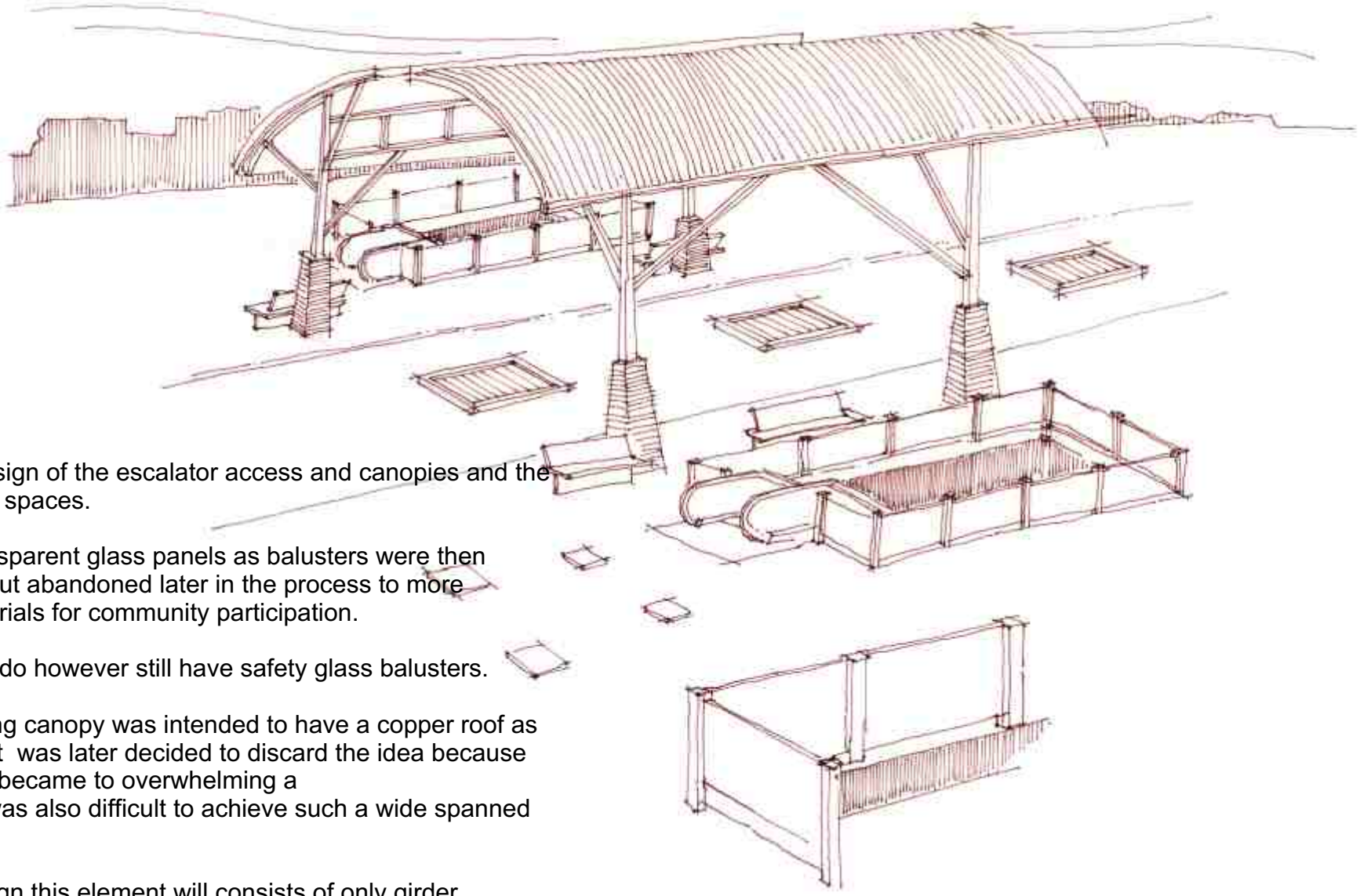


Figure 7.17 Design of the escalator access and canopies and the definition of the spaces.

The use of transparent glass panels as balusters were then contemplated but abandoned later in the process to more traditional materials for community participation.

The escalators do however still have safety glass balusters.

The axis defining canopy was intended to have a copper roof as in the sketch . It was later decided to discard the idea because this element to became to overwhelming a
Technically it was also difficult to achieve such a wide spanned element.

In the final design this element will consists of only girder trusses, suggesting space and axis, thus still fulfilling its function

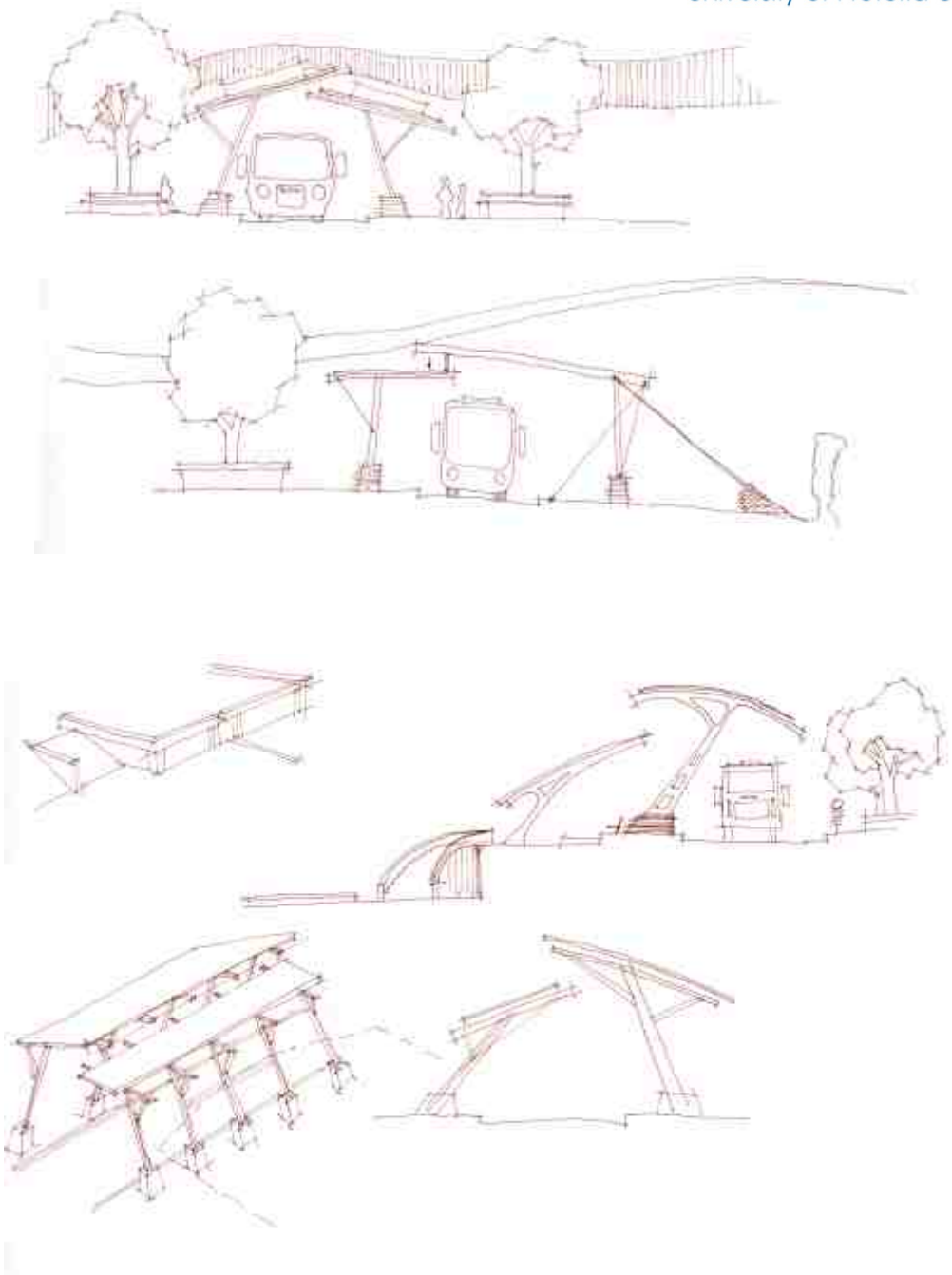


Figure 7.18 Early design sketches of Kiss-and-drop off pavilions suggested flat roofs .

It was decided to use the general language of canopy to be employed in the project. Repetition of elements create order. The curved canopy language also suggests movement. The ultimate reason for the existence of ‘station’

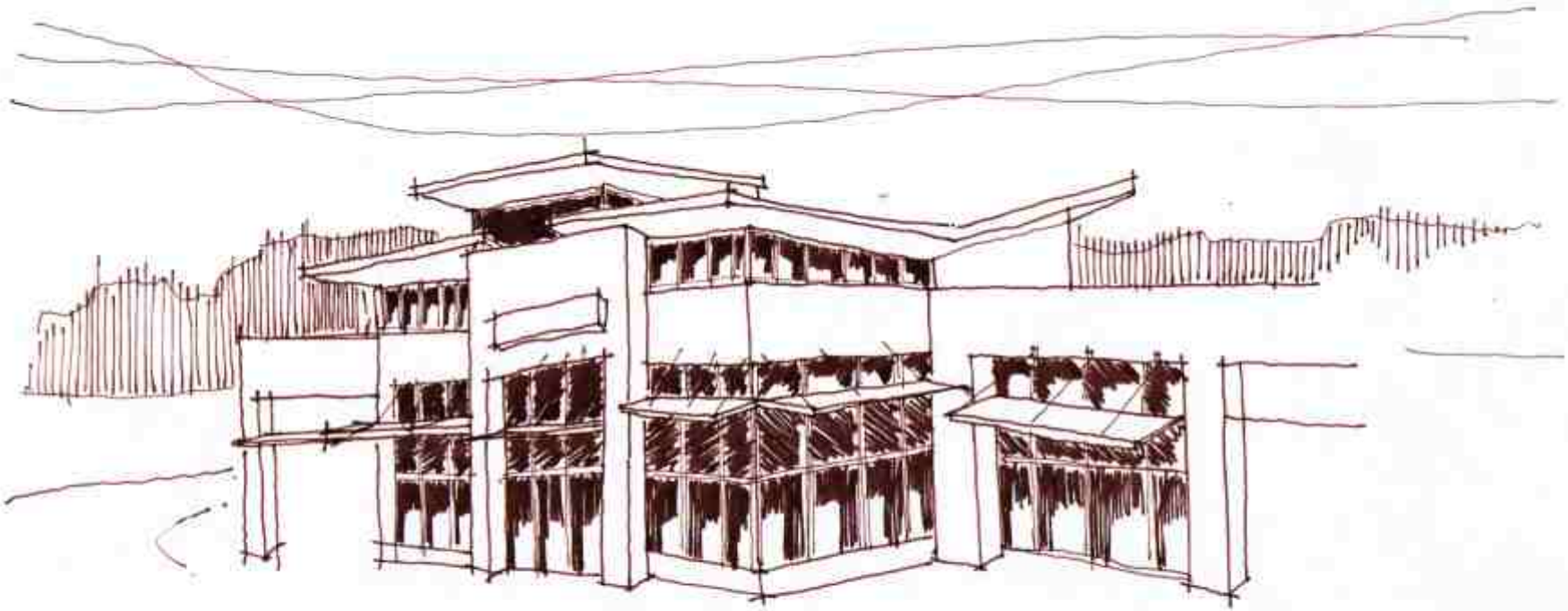


Figure 7.19 Early design influences can be seen in this example of the BMW Motor Dealership on the corner of Genl. Louis Botha and Lynnwood Drive.

Here the use of solar shields have been retained in the ultimate design of the Gautrain Station Office Areas.

Figure 7.20 Birds eye view of first concept model.

The majority of elements were used in the final concept model.

Major differences from this stage onwards is the roof element of the vertical circulatory are.

It was concluded that a pointed element would complement the rounded curves of the rest of the roofscape

Figure 7.21 A aerial view over the suggested urban park of the concept model showing the eastern office wing

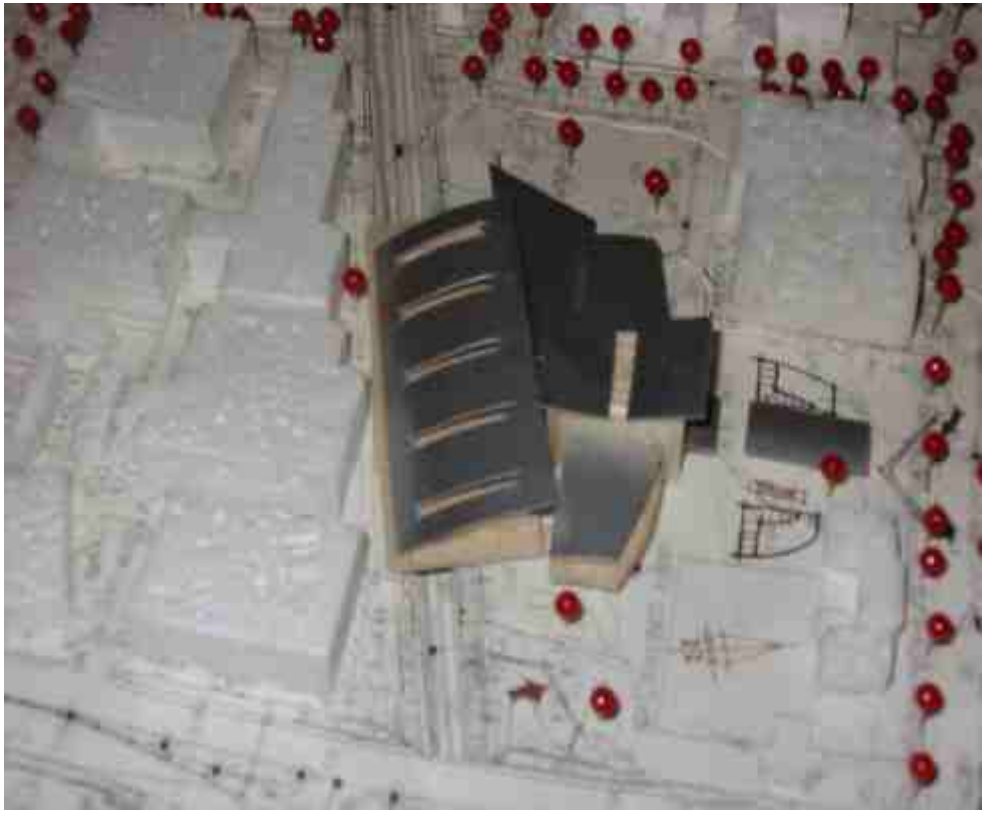


Figure 7.22 Aerial view of canopy

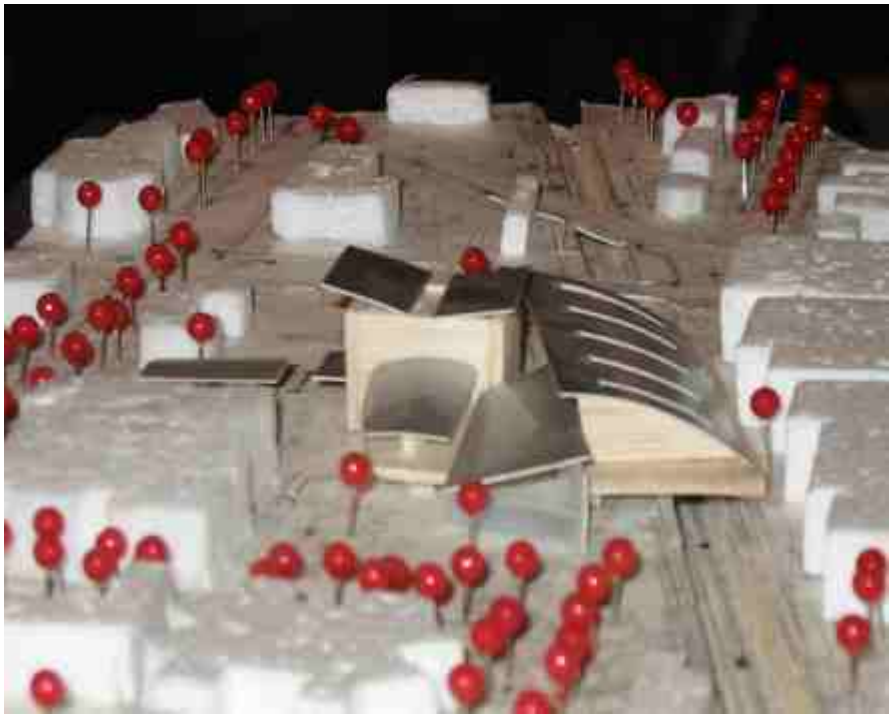


Figure 7.23 West elevation showing the initial supermarket element between the vertical circulation area on the left and the rail canopy on the right.

The idea of a supermarket situated there was discarded and a similar entrance element as situated alongside the axis defining canopy was installed in its place.

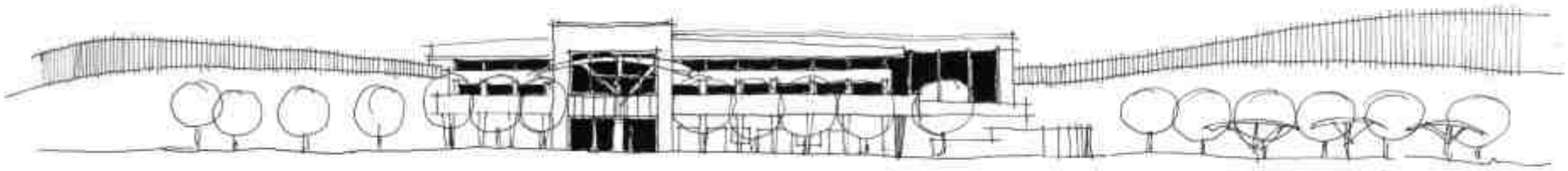


Figure 7.24 Design sketch of the North Elevation showing the vertical Circulation element and strong inviting canopy in front creating an axis to the innards of the building where the "machinery " of human transitory movement takes place.

The urban park is encouraged to 'bleed" into and underneath the building as the Office areas ate elevated on floating plinths. There is no definite devision between outside and inside in most spaces along the periphery.

Extensive use is made of tree avenues to direct and soothe, this serves also to bring the human aspect back into the design.

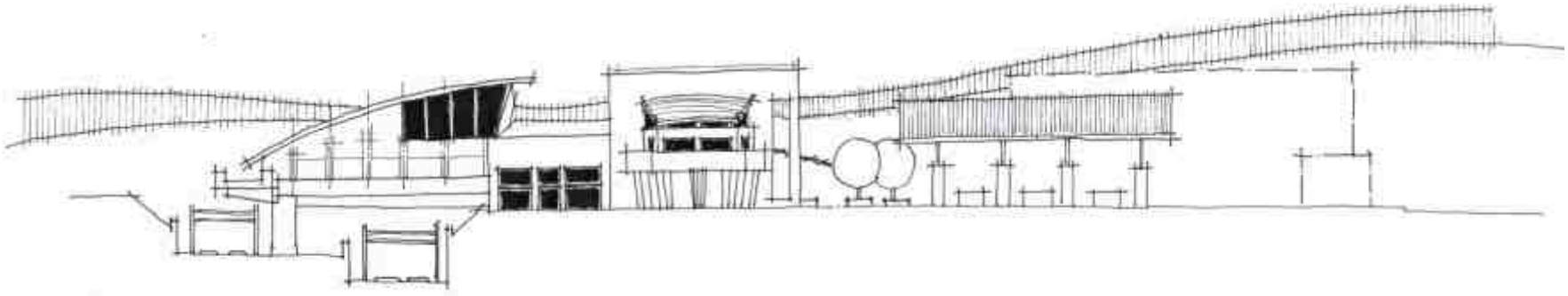


Figure 7.25 Proposed East elevation showing the reality of the deeper Gautrain Rail Cutting influencing the design, only realised later in the design. It places the "super basement" deeper and makes the design in section more complicated with regards the planning for high ground water

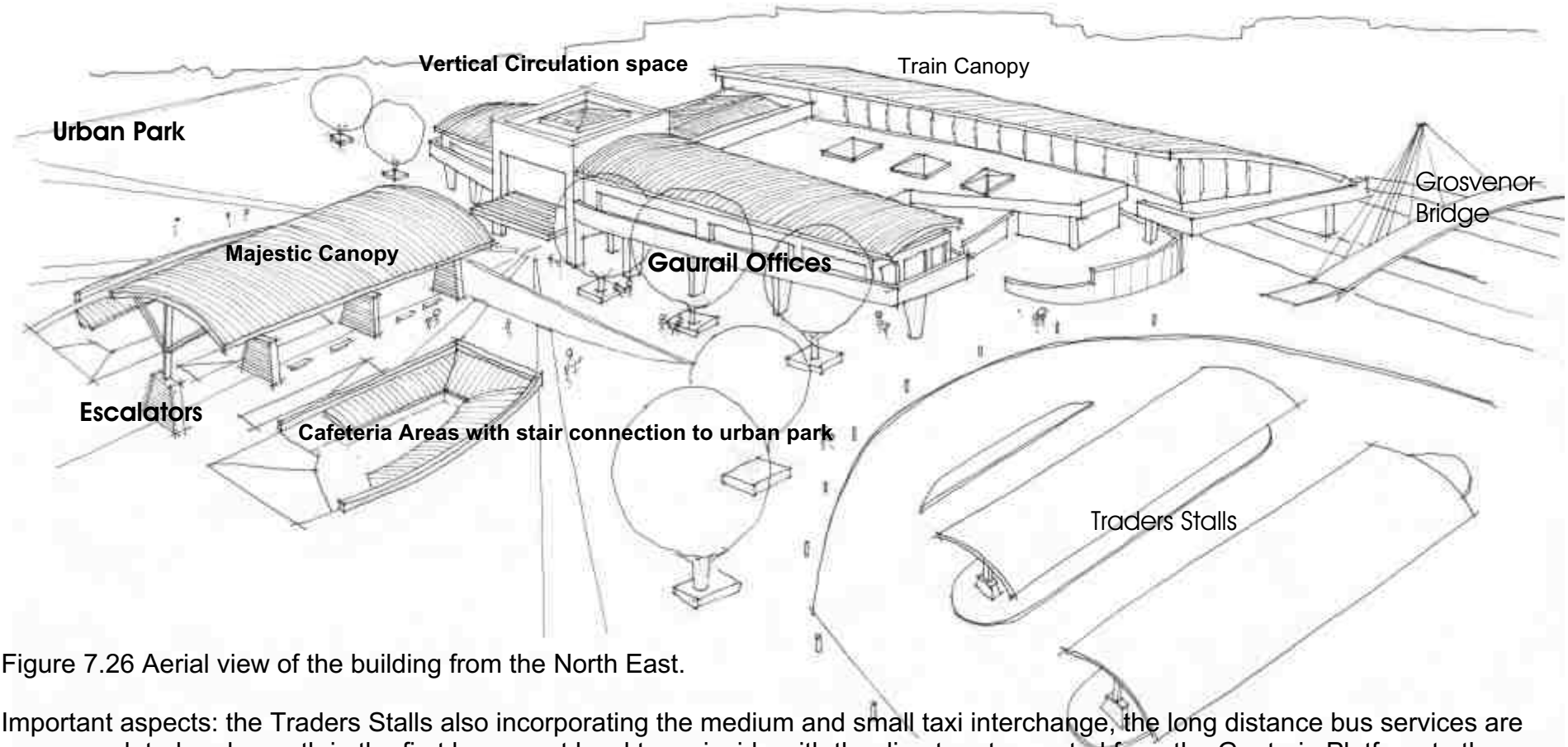


Figure 7.26 Aerial view of the building from the North East.

Important aspects: the Traders Stalls also incorporating the medium and small taxi interchange, the long distance bus services are accommodated underneath in the first basement level to co-incide with the direct route created from the Gautrain Platform to the new urban park.

The urban park is then directly accessed by means of a escalator system, with cafeterias situated on both edges of the symmetrical space.

The Tourist Information Centre situated in the Old School Building will direct international and domestic travellers.
The supermarket that was later designed to be contained in the supe basement can be seen between the western office wing and the rail canopy the desicion to remove the supermarket followed the decision to reinstate Grosvenor Street by means of a bridge.

Circulation would thus be optimal

The Final Result

Figure 7.27 Model photo of the proposed new Gautrain Station Building in Hatfield, Pretoria (Final Design).

Birds eye view of Final concept model in the context of its surroundings

Trader stalls to the left of the building with bridge over Grosvenor street to the south of the trader stalls.

Railway Canopy over railway cutting to the south.

The Public Forum Park to the North of the building, bleeding to the West where the re-constituted School Lane reconnects to Duncan Street.
The area directly to the South of the Old School buildings shows the Peter Walker inspired earth berms and gravel pathways lending a calming sense to the urban landscape.

To the right bottom edge of the site the new Slipway into the “Super Basement” can be seen with the result of the enlarged Rail cutting to the left of the Slipway Entrance.

In between the Office wings adjacent to the rectangular “Vertical Circulation Element” is the third basement entrance for pedestrians, making the site responsive to the pedestrian demands from Hatfield business district across the Rail cutting to the south. Access to the site from the Hatfield Business District is via a new vehicular and separate pedestrian Bridge over Grosvenor Street.

Figure 7.28 Model photo of the proposed new Gautrain Station Building in Hatfield, Pretoria (Final Design).
Aerial view from the South, seeing the Rail Canopy with its dual

Figure 7.29 Model photo of the proposed new Gautrain Station Building in Hatfield, Pretoria (Final Design).
Seen from the East looking South, showing the Negative area main

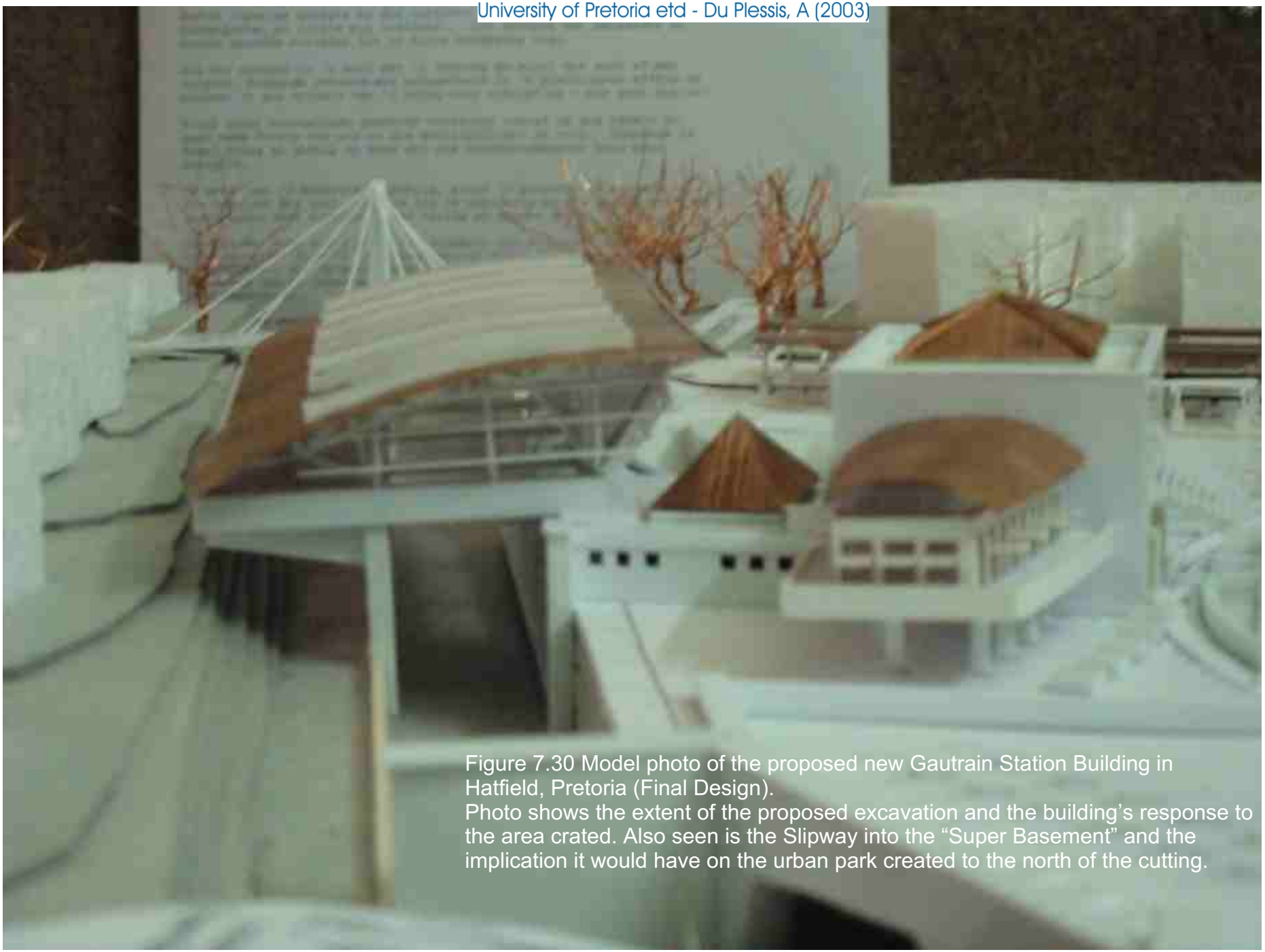


Figure 7.30 Model photo of the proposed new Gautrain Station Building in Hatfield, Pretoria (Final Design).
Photo shows the extent of the proposed excavation and the building's response to the area crated. Also seen is the Slipway into the "Super Basement" and the implication it would have on the urban park created to the north of the cutting.

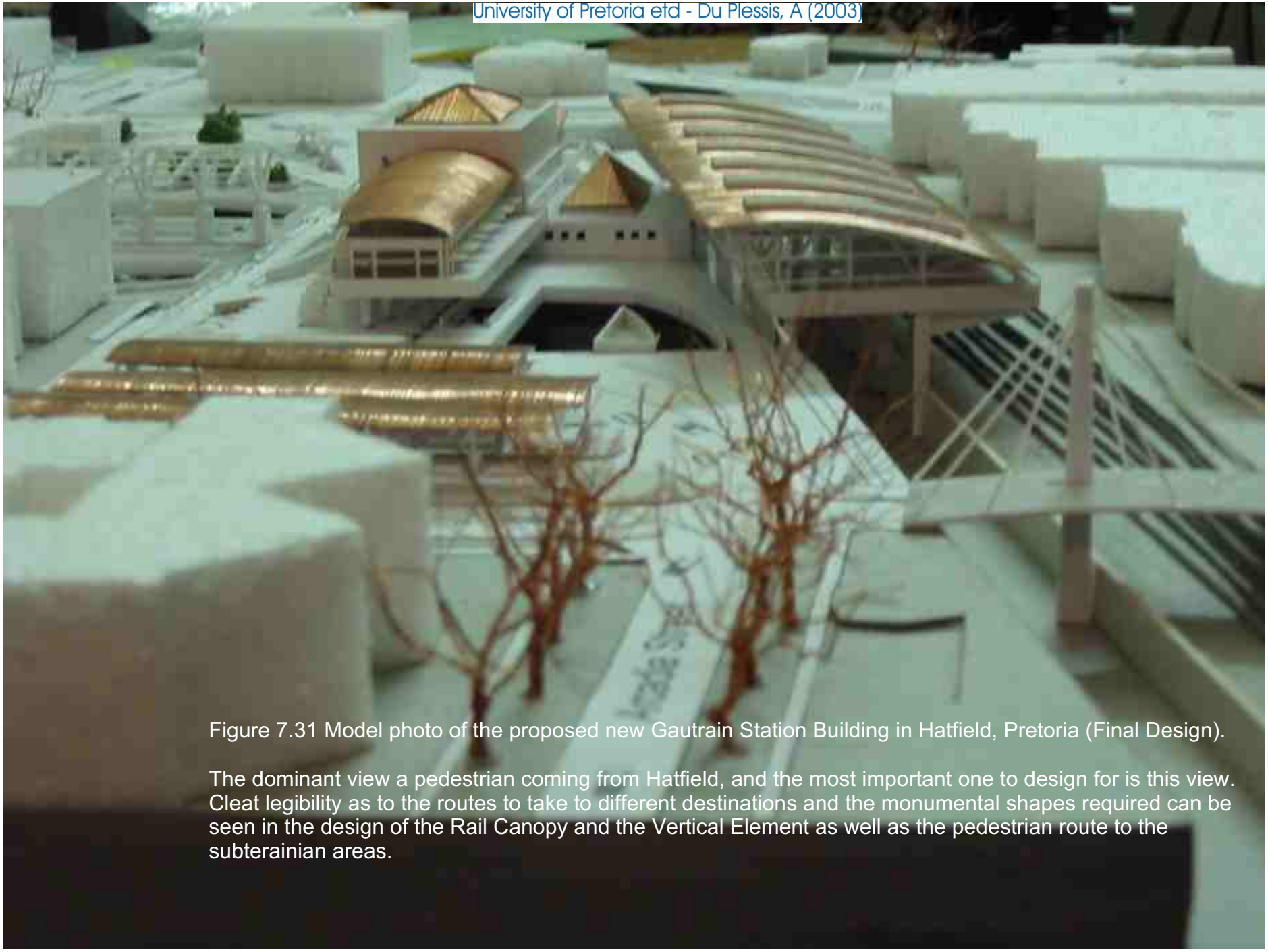


Figure 7.31 Model photo of the proposed new Gautrain Station Building in Hatfield, Pretoria (Final Design).

The dominant view a pedestrian coming from Hatfield, and the most important one to design for is this view. Cleat legibility as to the routes to take to different destinations and the monumental shapes required can be seen in the design of the Rail Canopy and the Vertical Element as well as the pedestrian route to the subterainian areas.

Figure 7.32 Model photo of the proposed new Gautrain Station Building in Hatfield, Pretoria (Final Design).

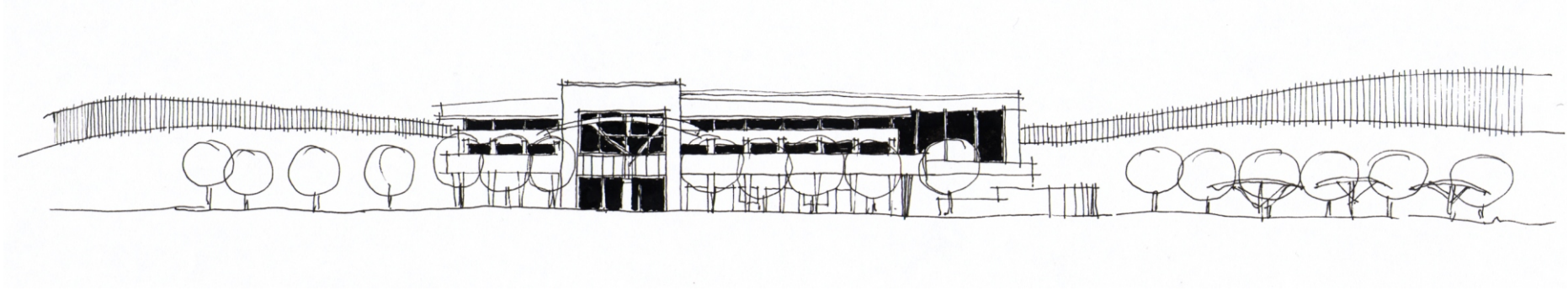
A more aerial view of the main pedestrian approach to the site. The axis to Duncan Street can be clearly seen as the re-constituted School Lane emphasises this aspect, essential in the Kiss-and-drop off function crucial to the building design.

Figure 7.33 Model photo of the proposed new Gautrain Station Building in Hatfield, Pretoria (Final Design).

The Building as seen from the conflagrations of Schoeman, Duncan Streets and School Lane. The importance of the Urban Forum Park can now be clearly seen in the clear sight lines needed to aid the building legibility, crucial in this type of building.

The position of the site on a corner makes the future of this building very bright indeed.

Go to:
Chapter 8 : Technical Detail



Chapter 8
Technical detail

8.1Site information

The proposed site for the new Gautrain Station, Hatfield invulves a cut along the north of the already existing railway line between Hartbees Spruit and Rissik Station.It will take up the remainder of Erf 717Hatfield and portion 1 of Erf 656 Furthermore it was decided that portion one and two of Erf 717 be included for the purpose of this thesis.

Major site interventions would include demolition of Barloworld delta and the recently built SAAB motor vehicle showrooms. *(vide 4.14)*

There is a fall of 3,5 metres from Grosvenor Street to Duncan Road to the east.

Major excavations will be needed for the construction of a super basement(At least 20 meters).

The site was previously a school playground , thus the need for trees to be removed will be sparse.

8.2Technical motivation

Elevators

According to lectures by Mr Paul Allen, director of Associated lifts, on elevators and escalators(13 August 2003),worldwide the elevator industry has experienced tremendous change over the last twenty years.
The biggest by far were the development of elevators utilising machinery incorporated into the lift shaft; with no motor room on top to clutter the skyline of lower rise buildings.

The proposed new Gautrain Station would have to use this technology, as one of the main premises of the design from an urban point of view is the respect for vertical scale predominant in Hatfield.

Having certain design limitations to the capacity of the lifts, the maximum amount of people the lifts can safely transport is 15 persons or 300kg. (14 persons EN-81)
Coupled with this the amount of people then catered for would be 15 persons per lift times six, as the lift banks cater for six lifts. (Allen2003)
The speeds at which they travel are 2.0 metres per second, generating enough speed to service the needs of the people occupying the areas of the building serviced by lifts.

The building would be serviced in one area with passenger lifts, only in the areas where disabled persons and office workers need to travel from the maximum point of the first level of the “super basement” to the fist floor offices or lobby area respectively.

It would thus be correct in assuming that the allowable area per person would be 15m².

The assumption would also be correct that 15% of the population would travel to the ground floor, and of this percentage some will use the stairs to the first floor , the unit would also be expected to stop at 70% of the floors at any one trip.

AnImportant aspect to remember here is that people in modern day society do not want to be inconvenienced in travelling form point A to B. People find waiting for lifts extremely frustrating. If the building is a low rise one, where the conflict can arise if it would indeed be quicker to take the stairs, this however in this building does not reflect the whole extent of the dilemma as the lifts are predominantly placed for the use of disabled people and persons travelling from the basement where no direct staircase link exists this is a fire safety aspect.

A traffic study by law requires the elevators to handle certain volumes in a specified period and research have determined acceptable waiting times and availability from the main lobby level. Important targets to achieve are as follows:

1. Lift system should be able to fill building in at least 30 Minutes.
2. The handling capasity should not be less than five minutes
3. Waiting time should be less than 30 seconds
4. The waiting interval should be less than 55 seconds, based on a lift available to dispatch from the main lobby during a peak periods.
5. The number of cars selected should not be less than the number of cars required.
6. handling capacity in 5 minutes should be more than 30 persons (Allen 13 August 2002)

By using these parameters , it was thus ascertained that the building only needed five lifts of the 15 person capacity tolerance, but due to the design symmetry called for in the lift lobby and the possibility of unusually large peak periods, it was decided to keep the initial gut-feel design of six lifts, three per side.

The basement area would be serviced by escalators for pedestrian travel in the major circulatory areas, and with a lift bank of six 12 person lifts leading exclusively from the first basement level to the main vertical circulation space of the station and further to the Gaurail Offices situated on the First Floor of the above ground building.

Escalators

The design of the escalators in the courtyard area and the two symmetrical entrances alongside the axis defining canopy north if the building, needed to be approached with diligence and care, as they not only represent a crucial aspect of the ultimate success or failure of the building from a people movement standpoint, but also in that they serve as an important expression of how dynamic the “building as a machine” must be.

Practical considerations about sheltering moving elements from the elements also needed to be addressed although there do exist escalators that can be operated in the open.
The consideration in this instance rests harder on the fact that in order to facilitate the movement of people in large numbers on these machinery, there cannot be any chance left open for accidents due to slipping, or miss-stepping due to glare, as these could lead to compensatory claims.

“With EN115 regulatory requirements once an escalator exceeds 6 metres in rise then on entry and exit at least 3 flat steps are required. Lower rises will have 2 flat steps. Furthermore the use of 35° units are not permitted over 6 metre rises, due to the sensation the angle creates on decent that the general public find uncomfortable” (Allen 2003)
For this reason the 30° angle have been used as these have no restriction on the amount of rise it can accommodate, as long as it is structurally possible.

Although it is structurally possible to push the envelope, the design have been kept to within floor-to-ceiling heights a s to stay within the

The escalator step width has been decided upon is 1000mm as this is the most commonly used spacing, and the widest available in the South African market.
The handrails would consist of illuminated safety glass balustrades, which will help, in the illumination of the treads in nighttime, as well as helping to clearly identify the vertical routes in and out of the “Super Basement”.

The system then decided upon is the Escalator Type JS-LE, Glass-panel Balustrades with illuminations by Mitsubishi Electric.

Fire escape

The design of the fire escape system serving the “super basement” had the be re-thought as the SABS 0400: do not permit escalators, even ones disabled from mechanical movement and thus serving as a stationary staircase to be deemed as being sufficient fire escapes.

For this reason the emergency escape stairwells have been designed to sit at the periphery of the “super basement” edges where anybody can access the sealed off wells and egress from the basement and were numbered to be at least three.

“In any building not classified as D4 or H4 (low fire load) any storey below the ground storey shall be served by not fewer than two separate emergency route stairways: Provided that where such storey is used for the parking of motor vehicles one such emergency route stairway may be replaced by a motor vehicle ramp.” (SABS 0400-1990: 186)

A nominal size according to sport stadium design have been assigned to Fire escapes to accept a flow of people of no less than 190 persons: thus making the minimum width 1800mm.
It further states that no individual escape route shall be designed to handle more than 190 persons egressing from it at one time.
(Table 9 width of escape routes, SABS 0400-1990: 185)

In the building above ground the application of two 1600mm wide escape routes would be sufficient as the maximum distance any office occupant would need to travel to reach an escape would only be 45 metres.

The Supermarket and Restaurant areas would both receive emergency stairways no less than 1800mm wide to also accommodate the possibility of persons waiting for the trains to arrive, also using them. The easiest access routes away from the platforms would be down the rail cutting and away from the building, this however is unacceptable for the danger involved electrocution. For this reason people will be directed to escape routes leading from the platform to the north to the landscaped garden area.

Ventilation

Aeration of the “Super basement' would be achieved in a number of ways overlapping to make the system redundant, in order to prevent failure of one to jeopardise the successful working of the building.

The high speed trains departing and arriving into the confined space designed for it underneath the dominating Architectural canopy typifying the structure, pushes in front of it a substantial amount of air, creating air pressure which is then utilised to act like a piston to push air through the basement areas. The air, which contains large amounts of oxygen, dispels the stale air, which settles at the lower areas of the basement to the top of the landscaped garden area.

The Carbon Monoxide gas dispelled in the Landscaped garden is then immediately re-circulated into the ecology, as the vegetation need these gasses in order to grow.
The grating vents to the landscaped garden is designed in such a fashion that it blends in with the garden furniture and design of the building elements.

These grated vents also houses the supplementary redundant system of extractor fans which job it would be to kick-start the circulatory system by using the stack effect to ventilate the spaces underneath.

The “Super Basement” would then in a further aspect also ventilate by means of the cross-flow of air created by the openings for vehicles situated on opposite ends of the site right in the path of the prevailing wind direction, aiding the extraction of noxious gasses.

The design of the super basement also incorporates a cavity wall and extractor fans on top, permitting ventilation by means of the stack effect.

Cross ventilation and passive temperatures control is possible in the office space due to its oversized shaded windows and high roof space. The air pocket under the roof serve as insulator.

Elements and Materials

Traditional elements

Coming back to the traditions of railway architecture, where steel is respected as a symbol of strength. Full utilisation of this aspect is made by the extensive use of “over designed” splice joints and other typifying elements to 'tip the hat' to previous generations. These elements come particularly strong to the fore in the interior architecture, where these elements were used in the design of not only the door fittings, but also the sanitary ware accommodated in the ablution facilities have a strong rail connection with Stainless steel units being used throughout.

Balustrades, much the same as would be the case in a semi workshop like environment of the stations of yesteryear, comprises of pre-fabricated proprietary units with customary ball-and stanchion constructions bolted to the floors by means of chemical anchoring threaded bars.

Materials

The construction of the main Station building and other structures on the site would mainly be in reinforced concrete.This reasoning is tempered with the firm economical in mind as the embodied energy of concrete in South Africa and the labour required to erect the structure need to take precedent in the choice of material.

The mere construction of the “Super Basement” can only be economically attained by the use of this material.

The secondary use of 300W structural steel elements comes closer in the ideal of creating an architecture relating to the rail heritage we enjoy in this country than any other material, and it is for this reason that the material is then used.

Roof

The most controversial material choice in the entire structure would be the use of Copper Roof Sheeting.

The Copper Roof Sheeting used, as roofing materials as well as a cladding material in certain areas need to be used as the uneven curve of the roof necessitates it. The organic shape of the roof also derived from the more natural / humane theme of this vast building is what drives the material choice.

A further reason not readily evident is in the inherent qualities of copper as a roofing material and as a historical roofing material.

As a hypoallergenic metal, which has the properties of destroying pathogens, it was used throughout the ages by kings as drinking challises. For precisely this reason one can safely use the rainwater harvested from such a roof in irrigation where possible human contact may be envisaged as in this instance.The tanked water don, however, does not represent a potable water supply, it merely suggests that the addition of chemicals to the water isn't imperative to prevent bacterial outbreak.

As a historical roofing metal the importance of this roofing material is however more desirable. Throughout the ages in Europe and other developed countries, the use of copper had had as a result the “patina effect” where prestigious building built up a layer of esteem by means of the “green” roofs they posses. It is this green patina that a prestigious building such as the Gautrain Station would like to aspire to, and its Government backers.

On the Office level the roof structure have been exaggerated to the extent that it concurs with the overall design scale of the building, yet it is sympathetic to the surrounding built fabric in vertical dimension. The services have been accommodated under foot in the coffered slab where the relatively new, but essential aspect of data transfer facilities take precedence.

Overhead the clear space lends itself perfectly to enhance the thermal performance of the building where the airspace acts as an insulation material. Mobiles can be added to accentuate the continuous flow of air through this space the workings of which can be understood in the analogy that Renzo Piano used in the design of Chep Lap Kok Airport Terminal in Japan in 1995, where huge funnels came from below to aerate the airspace under roofing material.

As for the construction of the Roof over the Office Area the Specification can be read as follows:

- Industrial Copper Roofing Sheets with in-situ bonded seamless bonds in an 385x40mm Proprietary Ribbed Pattern on;
- Proprietary clamps shot-fixed to the underlying purlins at the recommended spacing as specified by the manufacturer on;
- IPEAA 100 I-section 300W Mild Steel purlins, spaced at 1800mm ccs on;
- 305x165x41 I-section Main truss members at 5200mm ccs
- Trusses to be connected to underlying building structure by means of pre-drilled holes filled with a Proprietary chemical anchoring system, threaded bars, comprising of M16 four bolt configuration as specified by the structural engineer.

The construction of the composite truss to be referred to the pertinent detail drawing in Section E-E.
Herewith follows the specification:

- 305x165x41 I-section main arched member Radii to differ for every truss, as well as the size with,
- IPE200 I-section corner support unit comprising twin sets of IPE200 I-sections and,
    - IPEAA 100 I-section 300W Mild Steel, web stiffeners and Tie-beams with,
    - Jakob® Inoxline Proprietary Stainless steel cabling Stiffening members of size and fixing procedure specified by the manufacturer.

The construction of the truss system to be pre-manufactured completely in a factory environment where the member strengths can be monitored and evaluated as well as factory primed for durability. Assembly on site would merely comprise the craning into place and bolting together of members to specification.

The roofing material chosen for in the Canopy, (the area covering the rail tracks and which also serves as the piston area to the ventilation of the basement has been decided as a factory coated, continuous metal profiled roofing sheet with seamless bonding. The colour would thus also correlate with the ultimate hue of the copper roof sheeting used elsewhere.

Structural Steel in Canopy

The canopy would house the hidden plant paraphernalia of the building such as the air conditioning units to service the Gautrain Restaurant and Supermarket on the concrete slab roof space.
The canopy as stated earlier would then be comprised of curved I-Section members as main supporting members with progressively smaller leading sectional members as web stiffeners and tie-members, as determined by a structural Engineer.

All radii designed according to the specifications lain down on the relevant Sections.

Main truss spacing to be at 9500mm ccs with twin truss supported on a shared plinth (two trusses forks down to rest on one base)

Purlin spacing to be 1800mm ccs with the metal roof sheets comprising the thickest gauge accommodated by the manufacturer 1.8mm.

Infill panels between the trusses to be of 6.0mm Safety Glass panels suspended from their bearer frame by means of proprietary hangers and fixing systems, with aluminium louvred panels as facing material.
Ventilation of the canopy structure to be dealt with, with alternating infill panel containing remotely open able window sections.

The canopy shields which are a predominating feature on the building façade to the south comprises of Smoke Extractors of a proprietary nature to be triggered in the event of a catastrophic fire to open and release hot gasses away from the building.

The secondary function would definitely be the ingress of natural light into the canopy to limit the amount of artificial light required.

Aluminium

Further material use in the form of sunscreens and window- and door frames is Aluminium.
Aluminium represents a relatively high embodied energy level, but cancelled out by the advantages of solar radiation reduction and the resultant lowering of cooling costs to the building interiors, makes the choice a sensible one. The envisaged time span of the building is also seen as more than 30 years and for that reason we would need building materials of a high grade to facilitate longevity.

Landscaping

Monolithic Concrete blocks with delicately case fine grain concrete and chamfered edges.
These would be placed as a sacrificial element at strategic areas in the garden spaces. Their function is quite out of the ordinary.

Placed in such a way as to be no threat as a possible hiding place for muggers

Public spaces where the local community may lend their input is very rarely vandalised they would act as a lightning rod for these activities. They further provide a forum to the community to express themselves through art. An important building element in our modern television depraved society.

Floor covering

The choice of floor covering materials in the offices, restaurant and office areas have been predominantly one of economical viability and the ease of changing with the fashion trends envisaged to occur over the lifetime of the building.

Offices

For this reason the offices for example would contain carpet tiles in the main office area to ease access to the under floor trunking utilised there and to ease the replacement of carpeting as the wear and tear factor comes into play.
The formal meeting cubicles have mote durable floating wood proprietary floor panels to suggest a more expensive flooring system, yet keep the appearance to the visitor as very upmarket.

Cirlculation spaces

Main circulation spaces have the local artist "Terrazzo Cement Art " interlaced with high impact slate tile flooring.

The slate tile motif is also taken straight into the lift floors as they comply with the general pattern of the lift lobby where they stop, causing a seamless departure from lift lobby to lift.

Restaurant

The floor coverings in this area of the building would have to comply with the safety standards and specifications surrounding hygiene.

Kitchens

In the kitchen spaces and areas of food preparation the use of non-porous flooring materials, which are non-slip, needs to be adhered to.

While in the seating areas a easily cleanable carpet tile can be used.

Supermarket

The flooring in the supermarket would be of a proprietary nature with the company insisting on using Porcelain Tiles manufactures to fit their corporate image.To be utilised in both the public and non-public areas, while Granno will be used in the store room areas.

Refrigeration facilities would have the same porcelain tiles as used in the rest of the Supermarket.

Change

Of most importance is the need to have the building and its finishes open for changing use in the areas, which may be expected, such as the offices, restaurant and supermarket.

The design was thus approached from an open-ended scenario to have the spaces easily converted from use.
Thus what are now offices may one day be the talk of the town Art Gallery of Pretoria. The onus however lies on the anchor tenant, in this case the Gaurail Authority offices to use the building, in this way promoting its use.

To facilitate this feature of easy change the building has the load bearing members situated at the furthest extremes of the built envelope, with vast open spaces both vertically and horizontally to accommodate any design changes in future.

Cobbled Stone vehicle driveways

The importance of community involvement in the creation of a public building cannot be overseen. A community who helps to create a building tend to endorse it.

For this reason the cobbles will be laid by members of the local community in a community participation and job creation scheme. As an added bonus this also falls into the stipulation from Government that local communities that were previously disadvantaged should be given participatory roles.

Garden Furniture

Furniture pieces such as litter bins; benches and canopies would be of the same architectural language as the roofs in the building. The enclosed sheltering feel created by the canopies is what the design tried to achieve as were used in the Holyhead Ferry terminal, in Holyhead, Great Britain. The added advantage of “system Building” the elements to the same specifications as the roofs made the addition of relatively large quantities of these furniture pieces possible.

Benches

Pre-cast concrete benches according to the design details have a very fine abrasion resistant concrete aggregate of 7.0mm in dispersed with steel filings to create a very robust finish that would weather over time into an oxide finish complementing the building design.

The technology of steel filings in the screeds of factory floors have been around for numerous years and help to maintain good traction in high risk areas, as well as to enhance the abrasion durability of such flooring applications much the same as would be called for in this instance

Pedestrian High Traffic Areas

Terrazzo Cement Art. The art pieces by up-and coming artists would enhance the community ownership of the building, as well as give the artists a leg up in life.

Garden Areas

The garden areas would be laid out by qualified Landscape Architects with predominantly indigenous flora to be used, where possible enhancing the species diversification necessary to have the garden grow.

Wall Surfaces

Ticketing hall

Wall Surfaces inside the main ticketing hall are covered with ceramic mosaic designs by local artists.

Funnel area where the train arrives and departs

Baked enamel panels with designs of indigenous artists along a technological theme.
Factory made panels consist of 1.5mm thick mild steel panels of 1500x1500mm with hidden vandal proof fixing screws, painted with the artists' design and baked.

This method have been successful utilised in countries like England and Japan, with the added advantage that spray
paint graffiti tend to easily removable if attempted to be defaced at all.

Water

Potable water

Potable water distribution system to comprise of a proprietary copper system situated in services zones as indicated on plan.
Access via removable screen panels to be incorporated into the general design and finish of the interiors as specified and designed by an Interior Architect.

Ground water

Ground water conditions in Hatfield are notoriously severe. Ground water, and a lot of it, is present at depths as low as 1.0m below ground.

For this reason the basement would be of a double hull construction with sumps situated every 25m². These sumps would be serviced by sump-pumps triggered by a water level fangle automatically switching the machinery on and off as the level rises. The natural fall of Hatfield to the West enables the discharge of ground water build-up to be safely achieved into the rail cutting.

Stormwater

The handling of rain / storm water is for an entirely different scenario.

The storm water is prevented from ingress into the basement on levels three and two, but the first level is dealt with as a open air level, even as this level is sub-terrainean. Water ingress in this area is dissipated by means of storm water channels covered with grated materials leading to a catch pit area from where the water is directed to fall into the rail cutting and municipal drainage systems provided for this.

In the northwestern edge of the basement the storm water would be incorporated into a separate system working along the same lines as the ground water system, with the distinction that the high-speed pumps will be of much greater capacity.

Sewerage

The sewer system is accommodated in the headroom structures of the basement.
Main sewer lines consists of 160mmØ Marley Twin Wall ® uPVC pipes or similar approved product.
Secondary branches consists of 110mmØ Marley Twin Wall ® pipes.
Fall and hydrostatic loads to be approved by mechanic engineers.
Site sewerage discharge in municipality sewer lines as indicated on plan

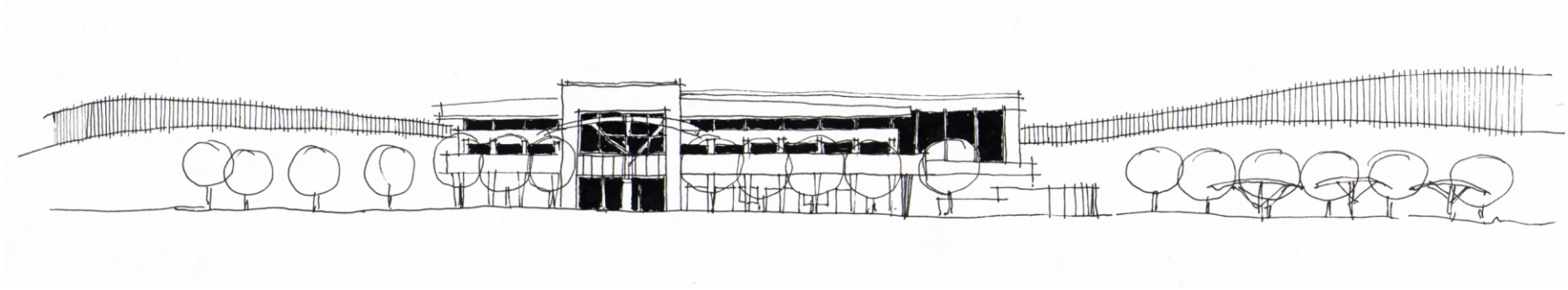
Lighting

Lighting systems to compose of ambient deflected light source systems where the artificial light sources would only be utilised as an enhancement to the natural deflected light utilised.
Because of the large overhangs, (1250mm); and the solar azimuth and incidence for Pretoria over the year, the only direct light to fall into the building would be highly weakened afternoon and morning rays, which could not significantly contribute glare or heat build-up in the building.
Yet the diffusion of light into the office spaces and public circulation areas would be sufficient to ensure the building would be well lit.

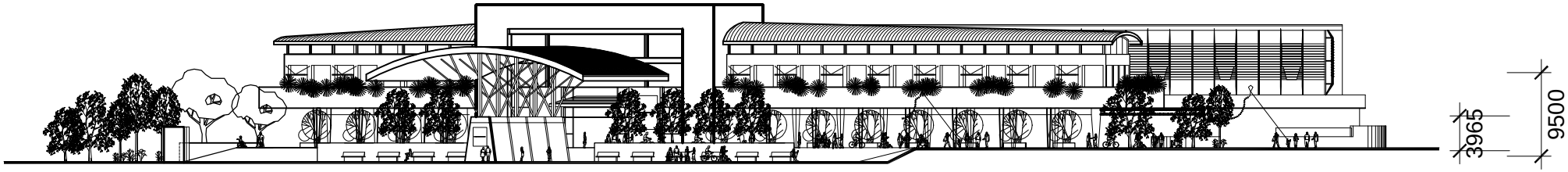
The extensive use of “floating” roofs can be seen not only as a very strong thermal design element, but also as an imposing element in night time as the massive copper roofs would be seemingly floating in mid air above the more grounded elements of the building enhancing the important monumentality aspect searched for in the building design.

Natural light also pours in from rooflights used in the canopy. This way track an platform areas get illuminated

Go to:
Chapter 9: Plans

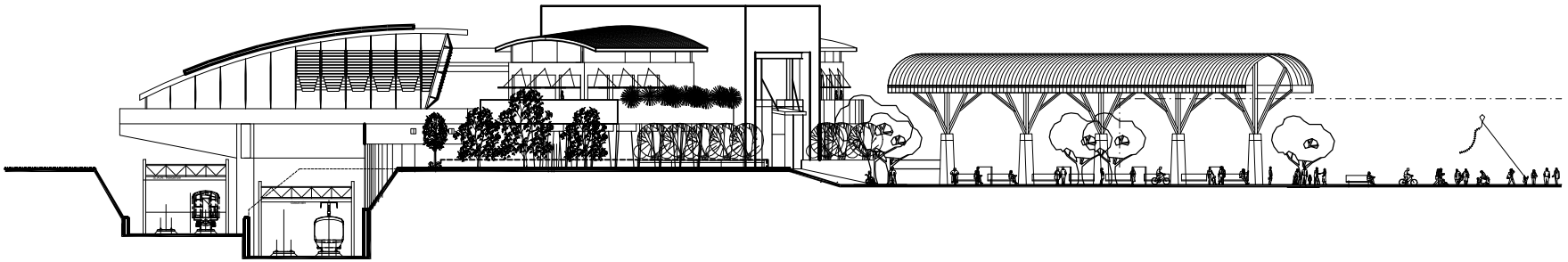


Chapter 9
Plans



North West Elevation

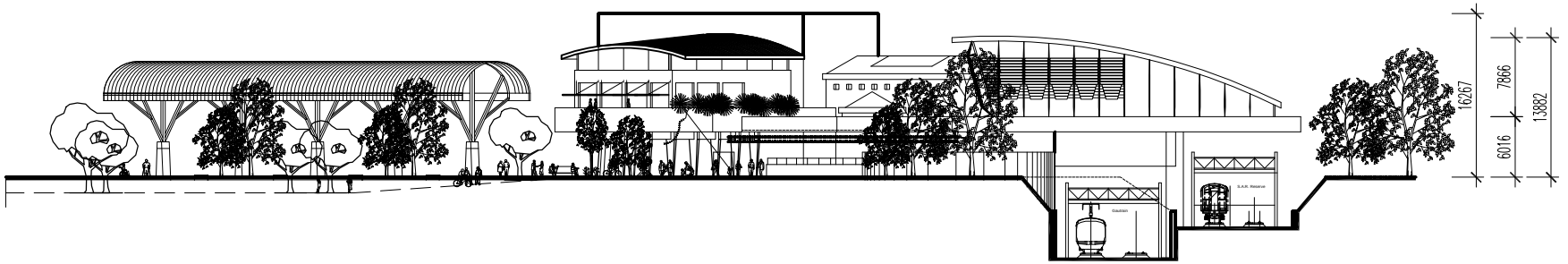
scale 1:200



North East Elevation

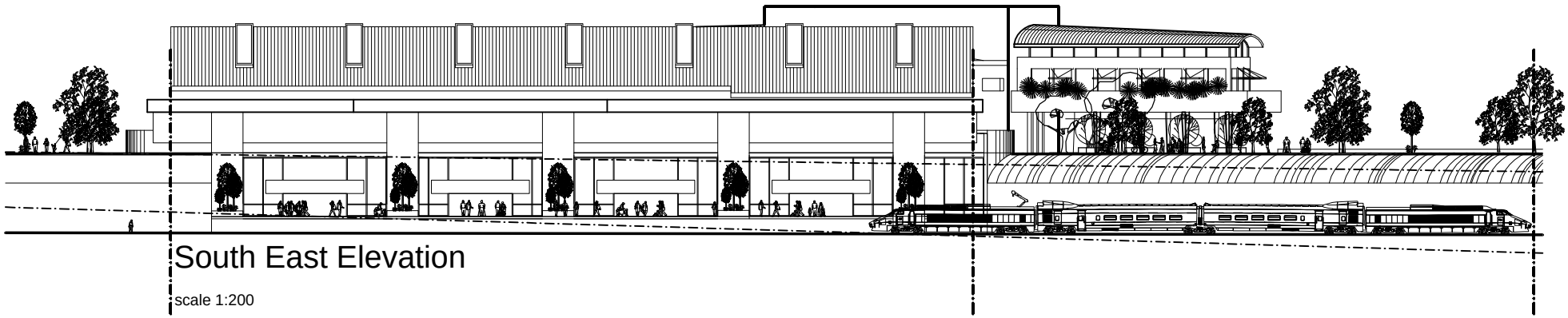
scale 1:200

Proposed Gautrain Station, Hatfield



South West Elevation

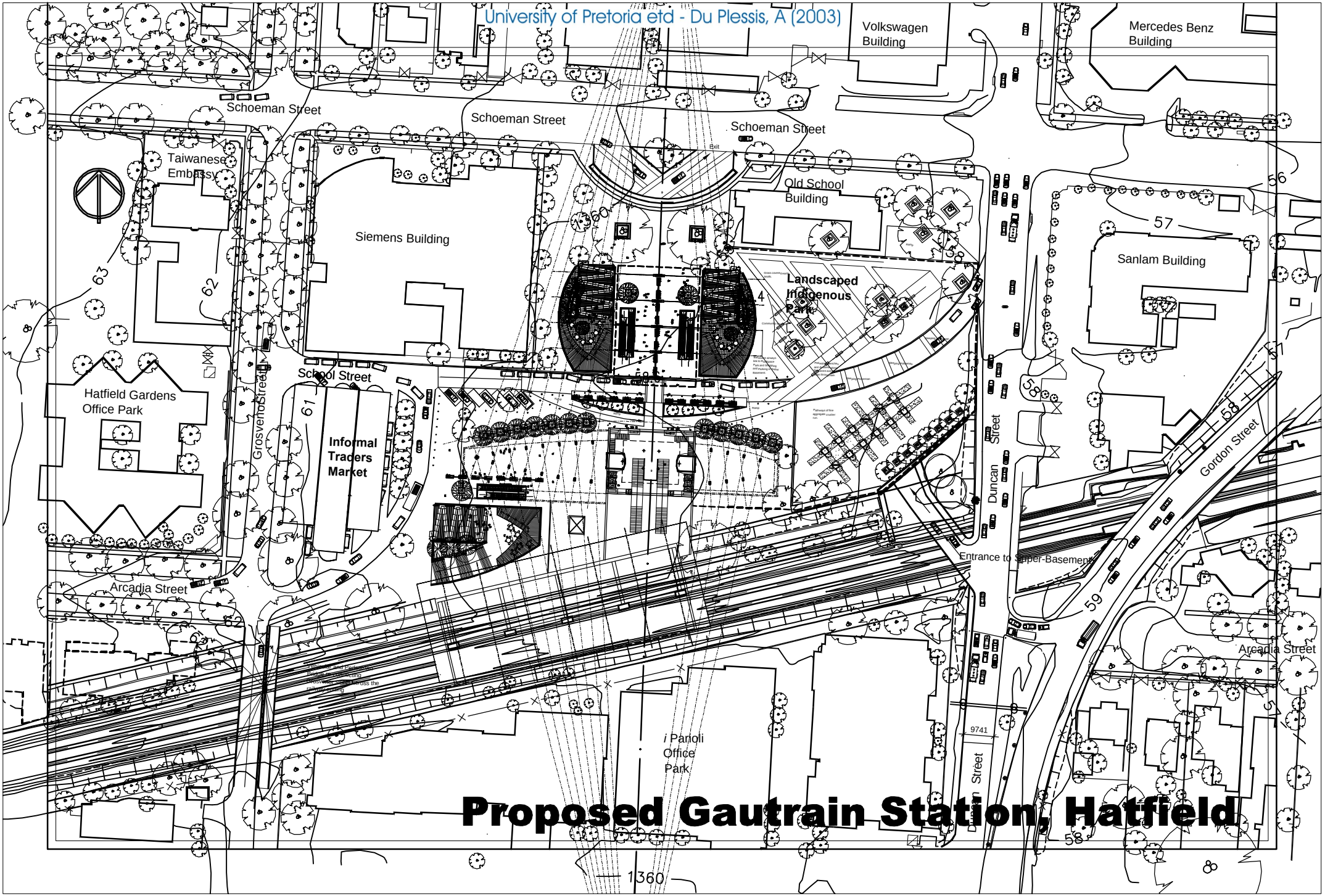
scale 1:200

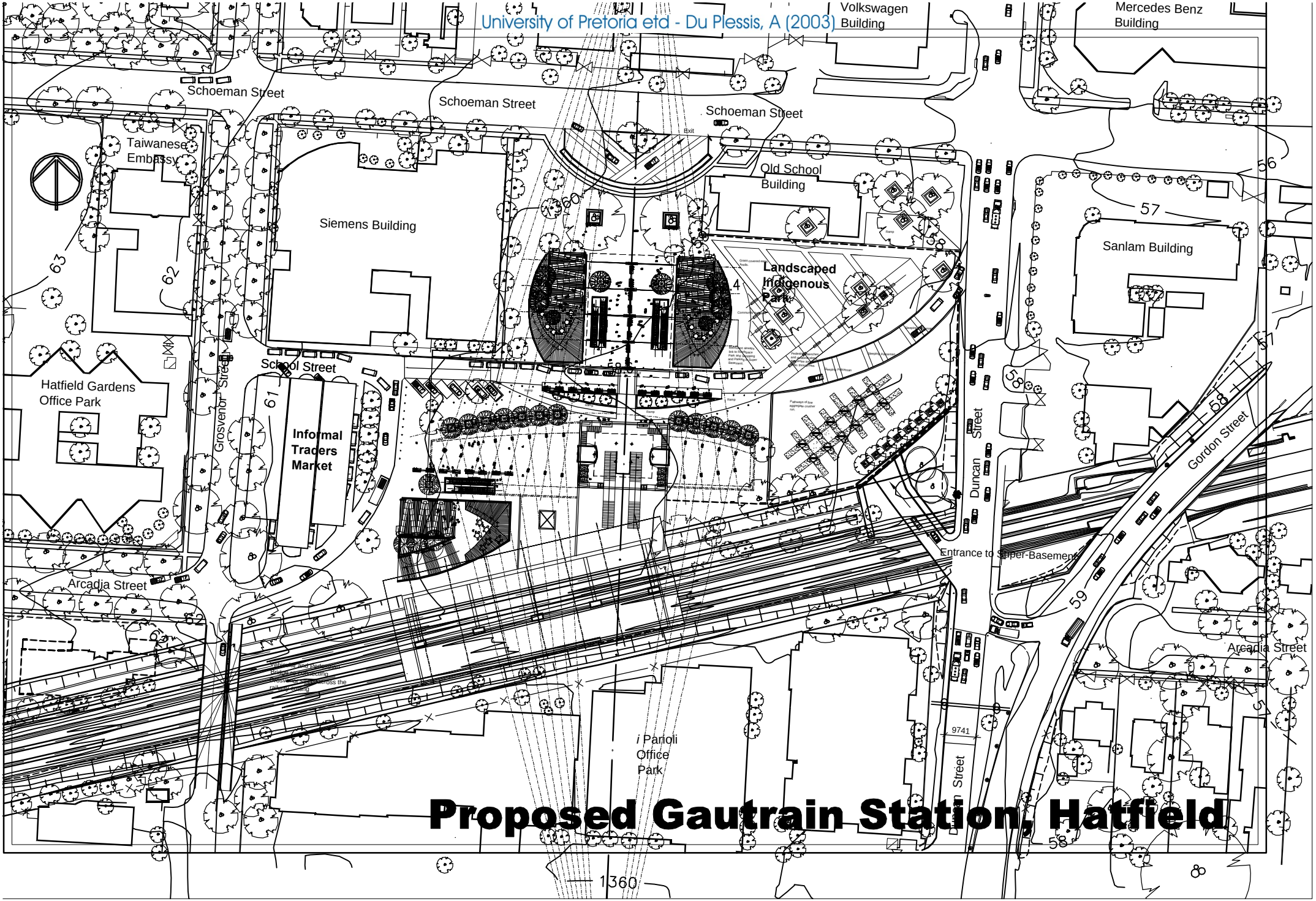


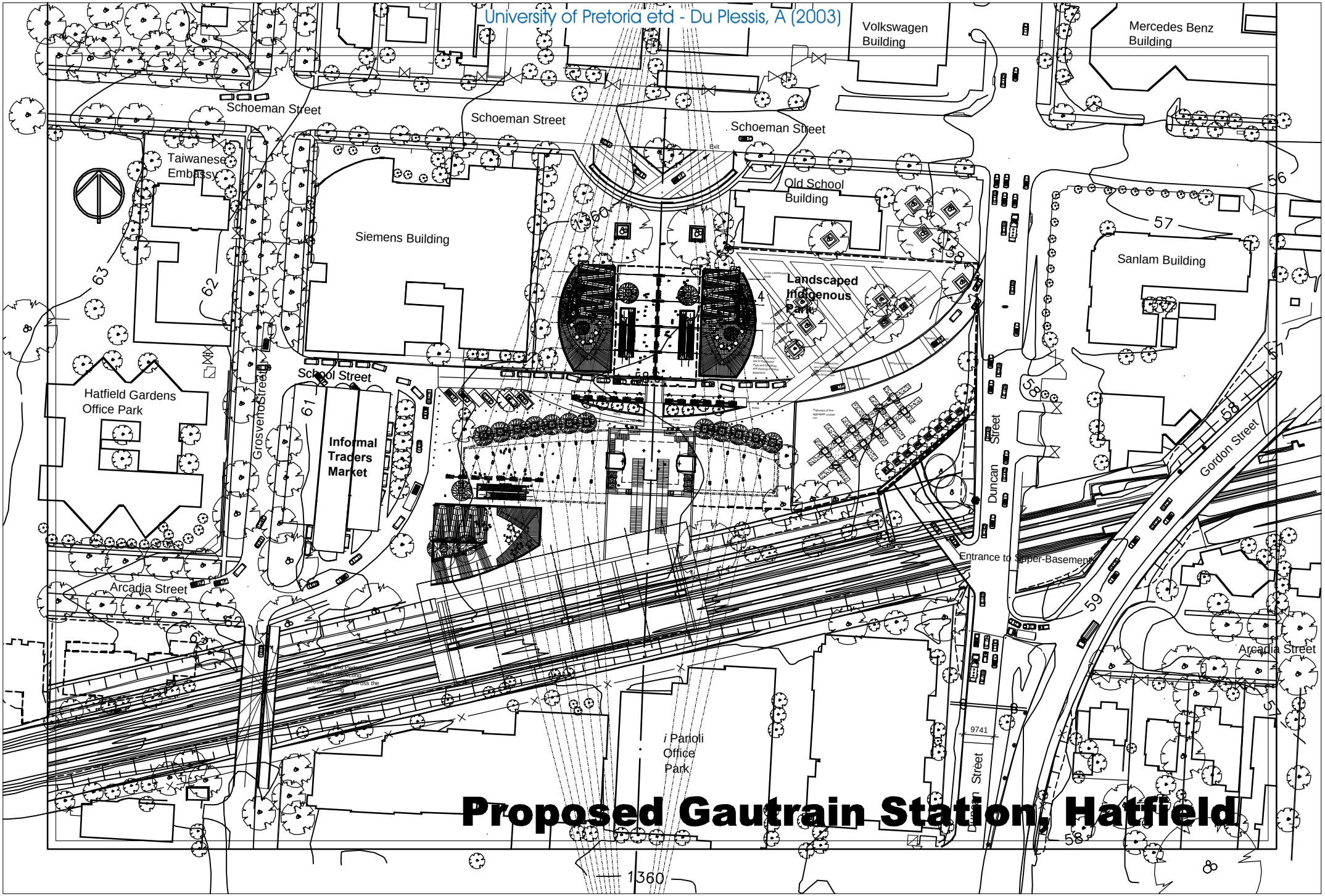
South East Elevation

scale 1:200

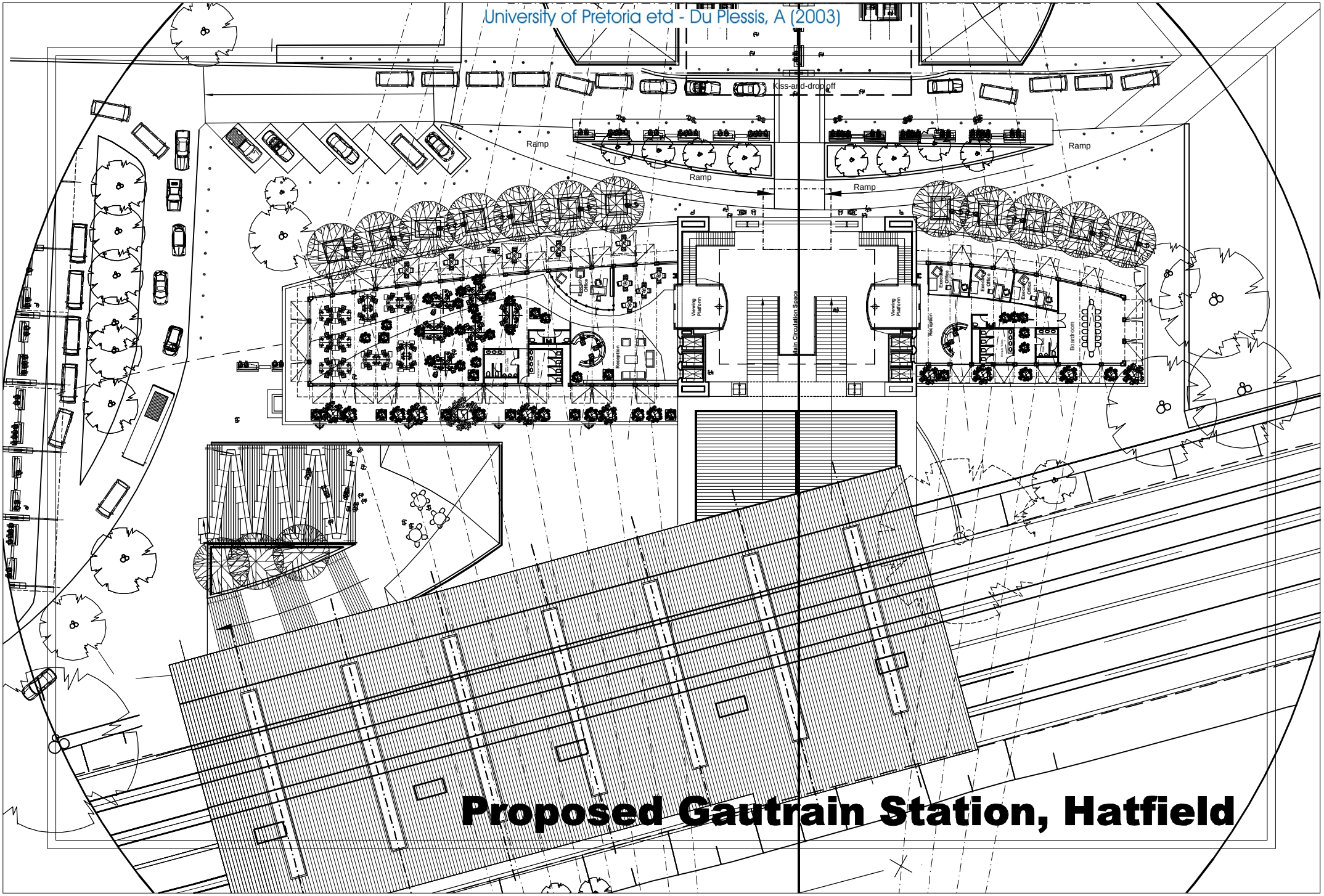
Proposed Gautrain Station, Hatfield



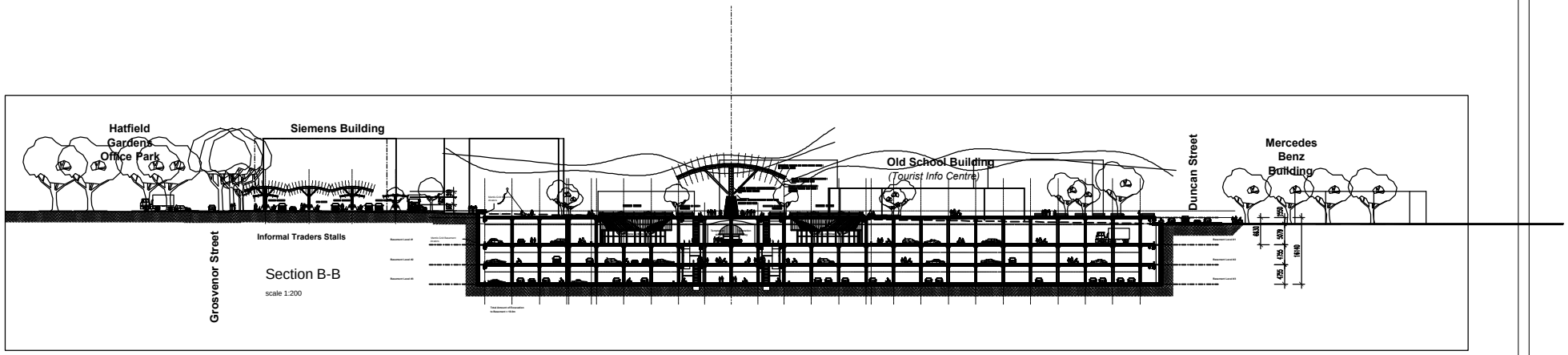




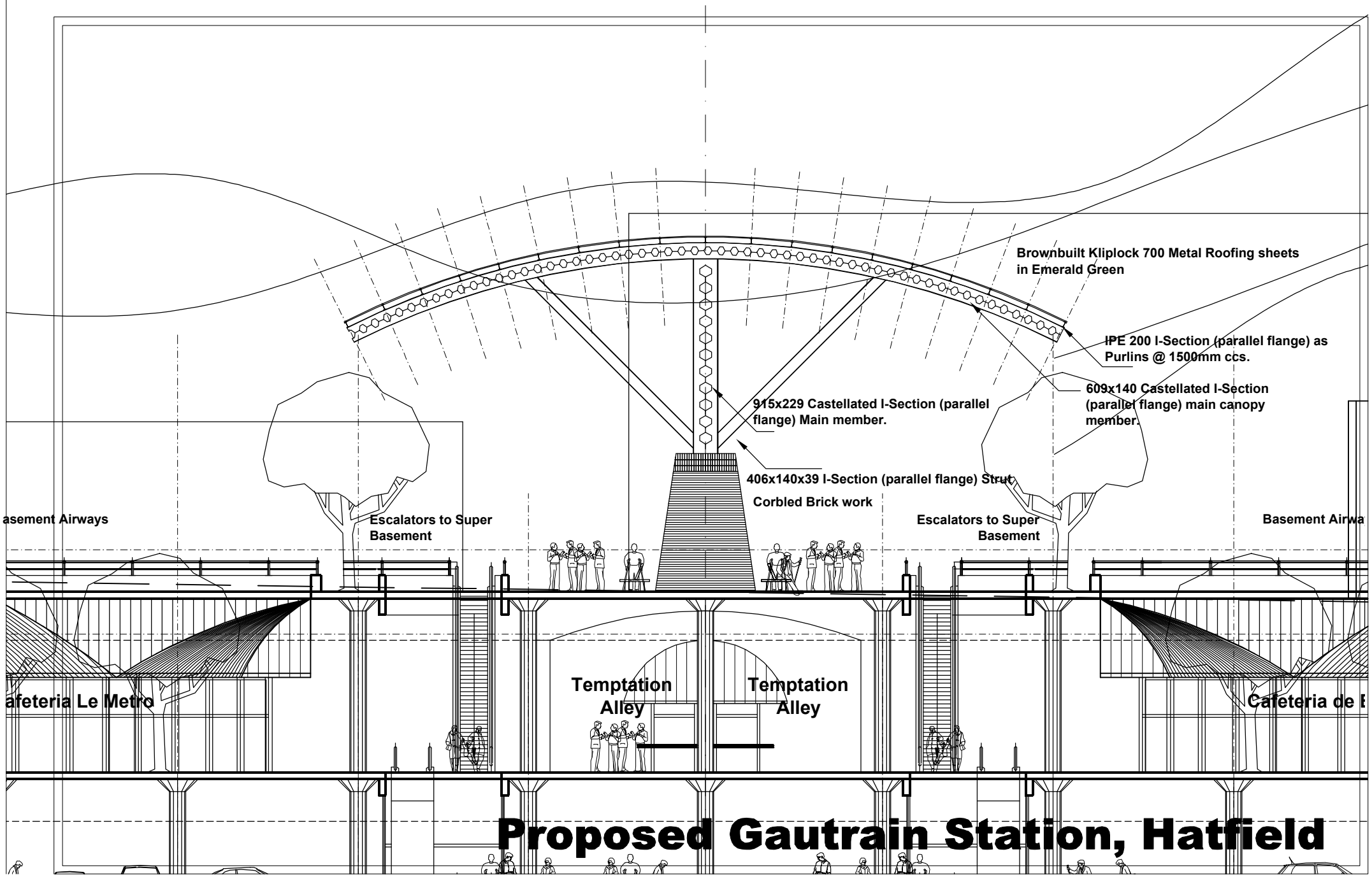
Proposed Gautrain Station, Hatfield



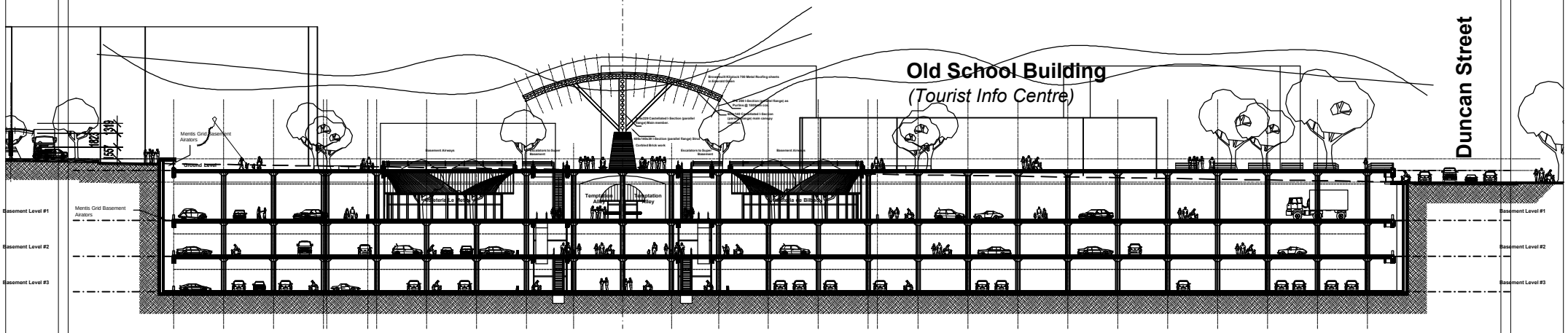
Proposed Gautrain Station, Hatfield



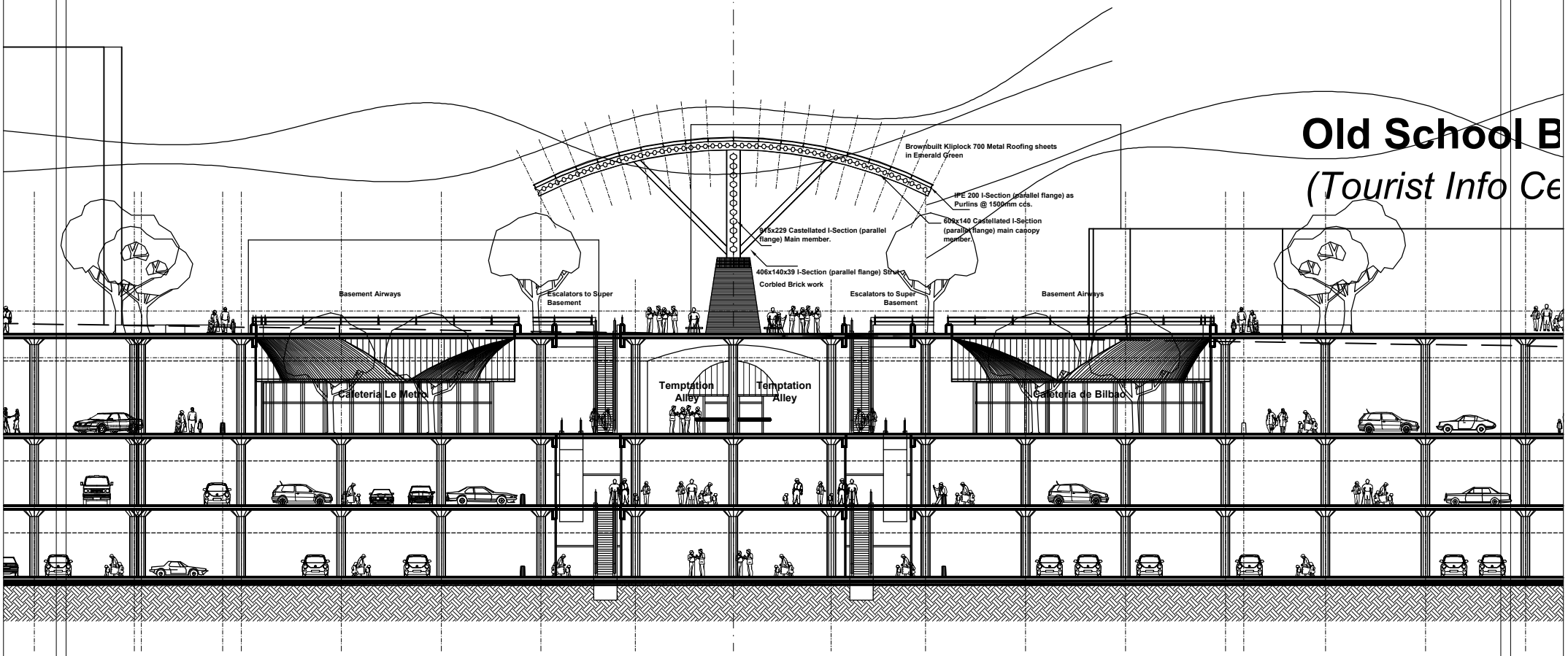
Proposed Gautrain Station, Hatfield



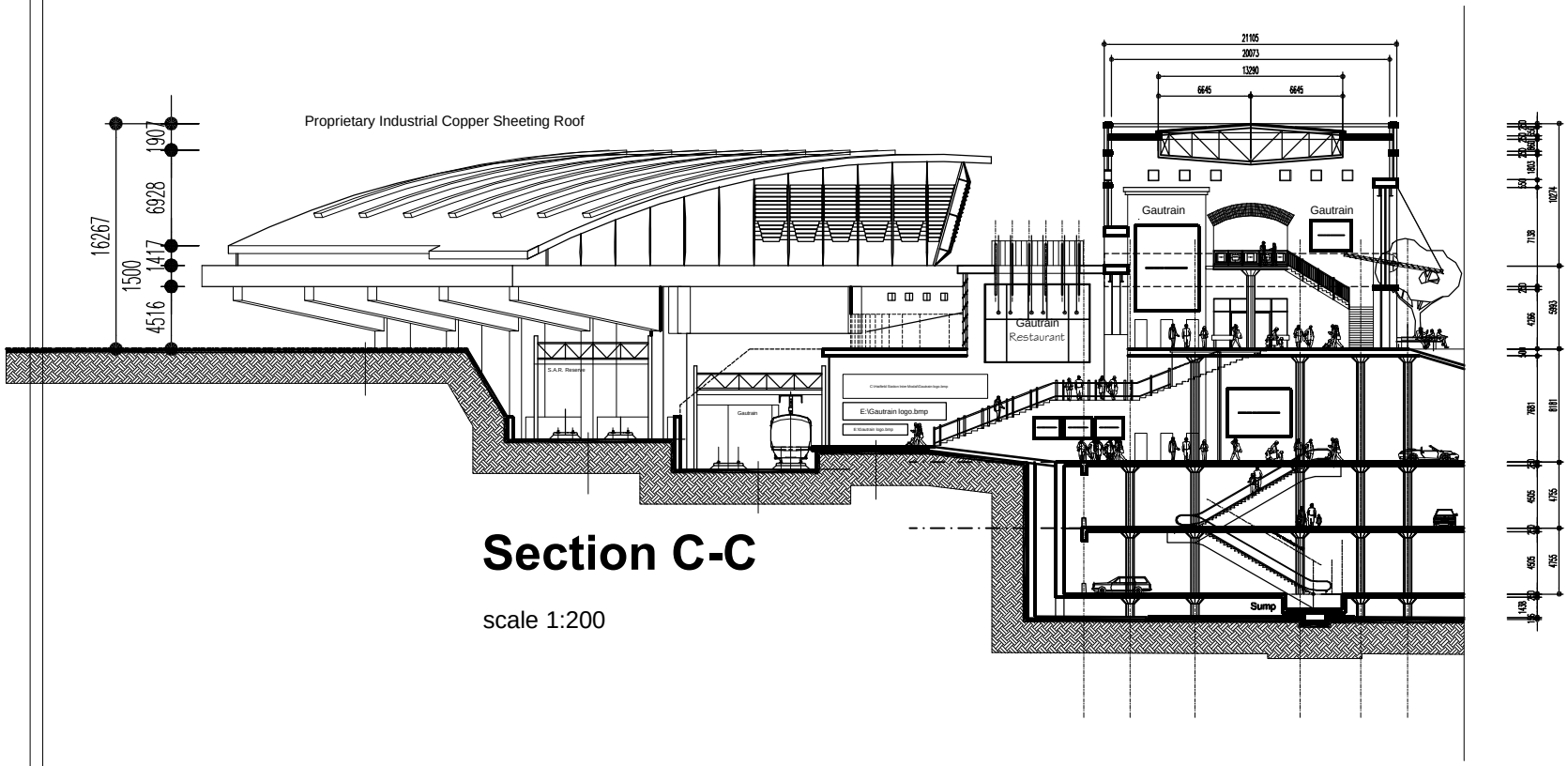
Proposed Gautrain Station, Hatfield



Proposed Gautrain Station, Hatfield



Proposed Gautrain Station, Hatfield

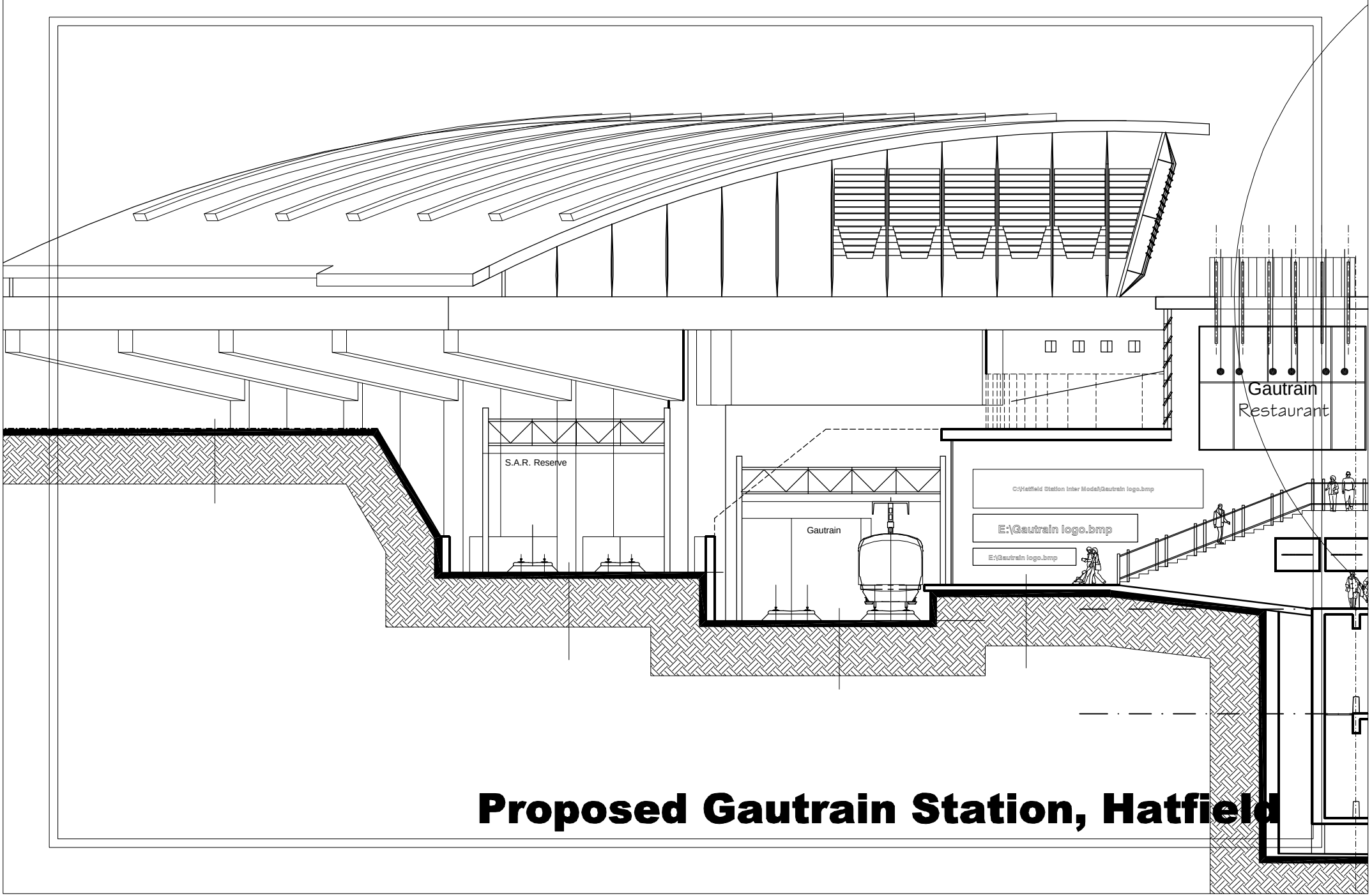


Reinforced concrete frame building with brick infill panels as main elements.
Roofing material: Industrail Copper Sheeting on rolled Steel Roofing elements

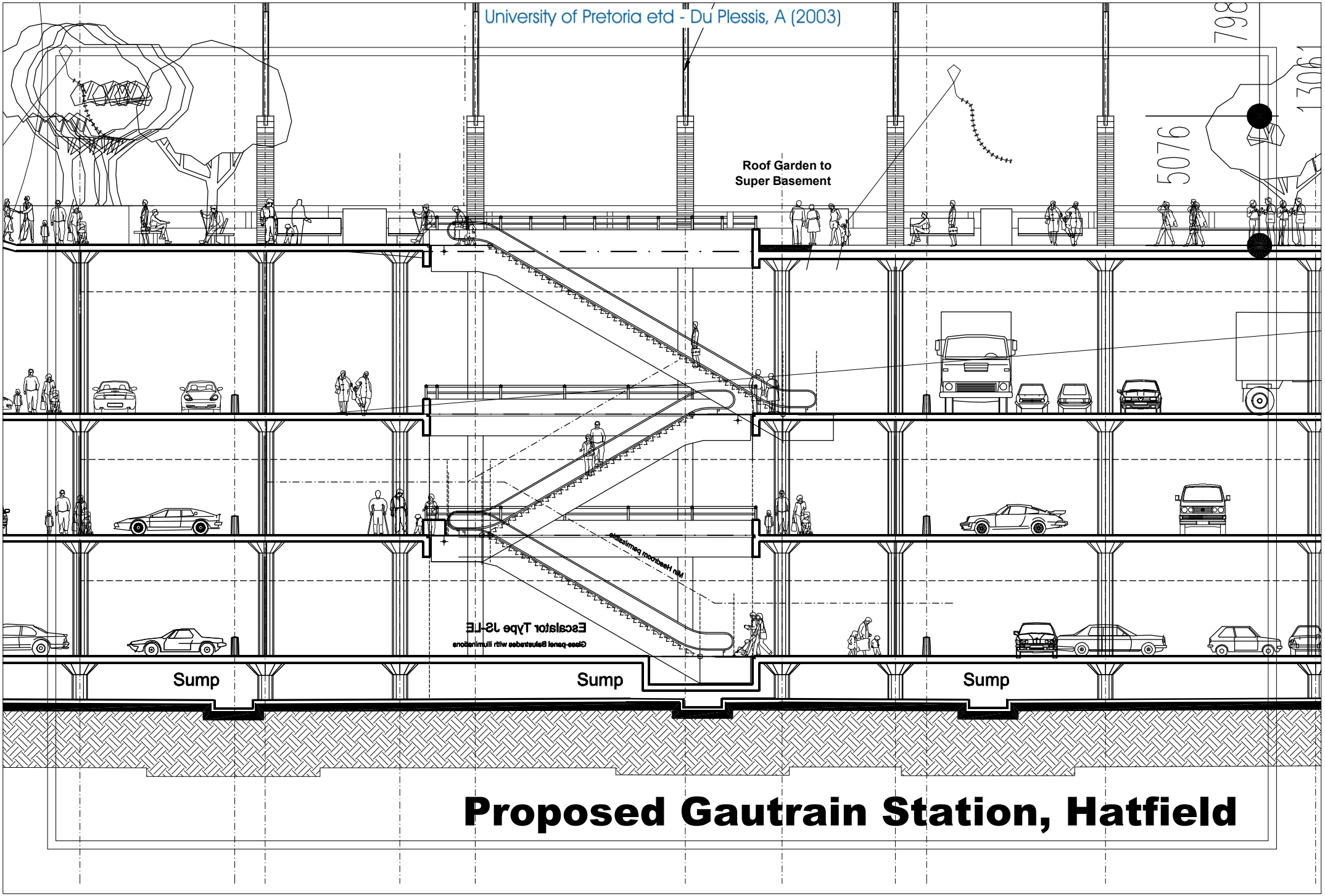
Section C-C

scale 1:200

Proposed Gautrain Station, Hatfield

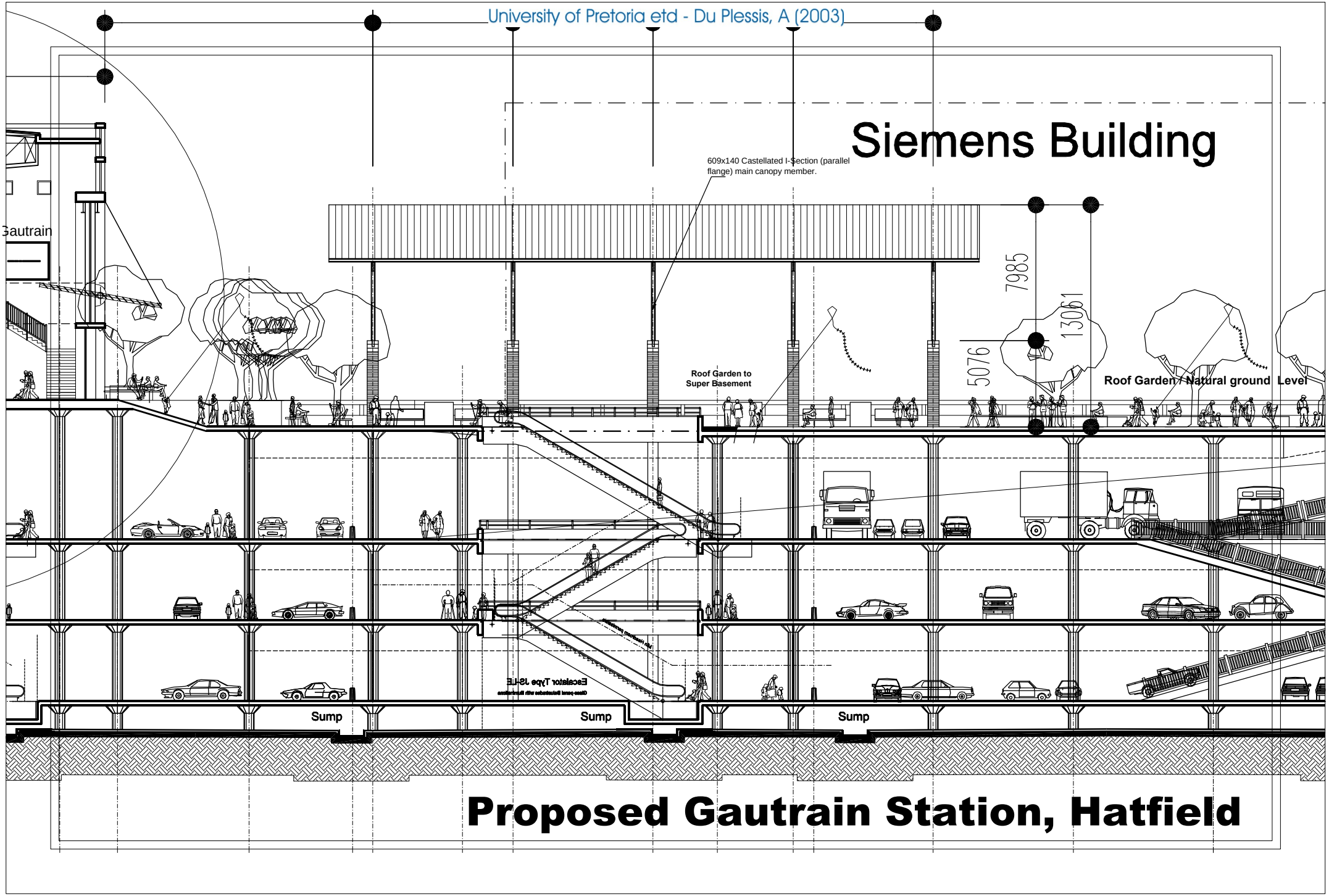


Proposed Gautrain Station, Hatfield

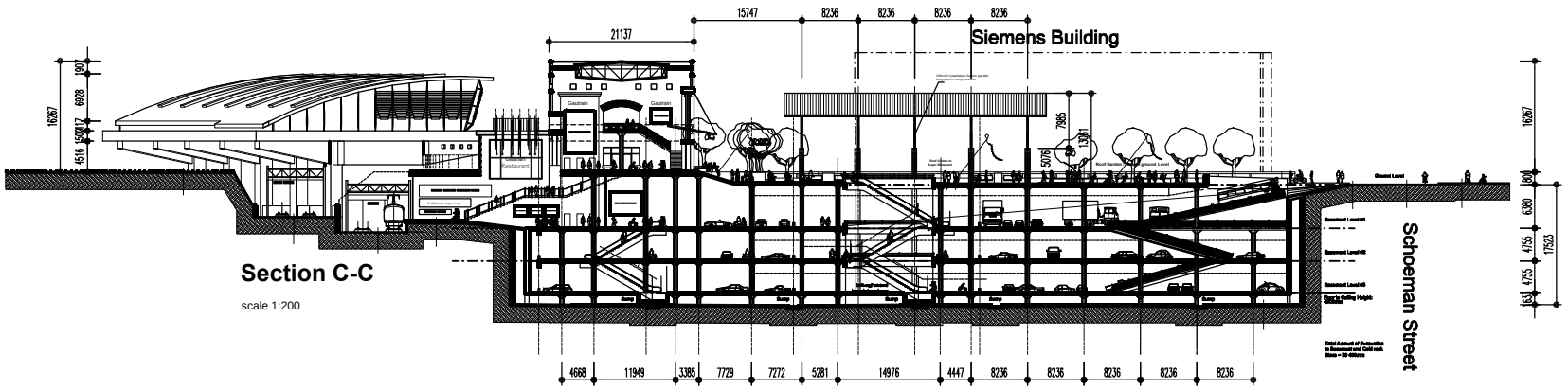


Proposed Gautrain Station, Hatfield

Siemens Building



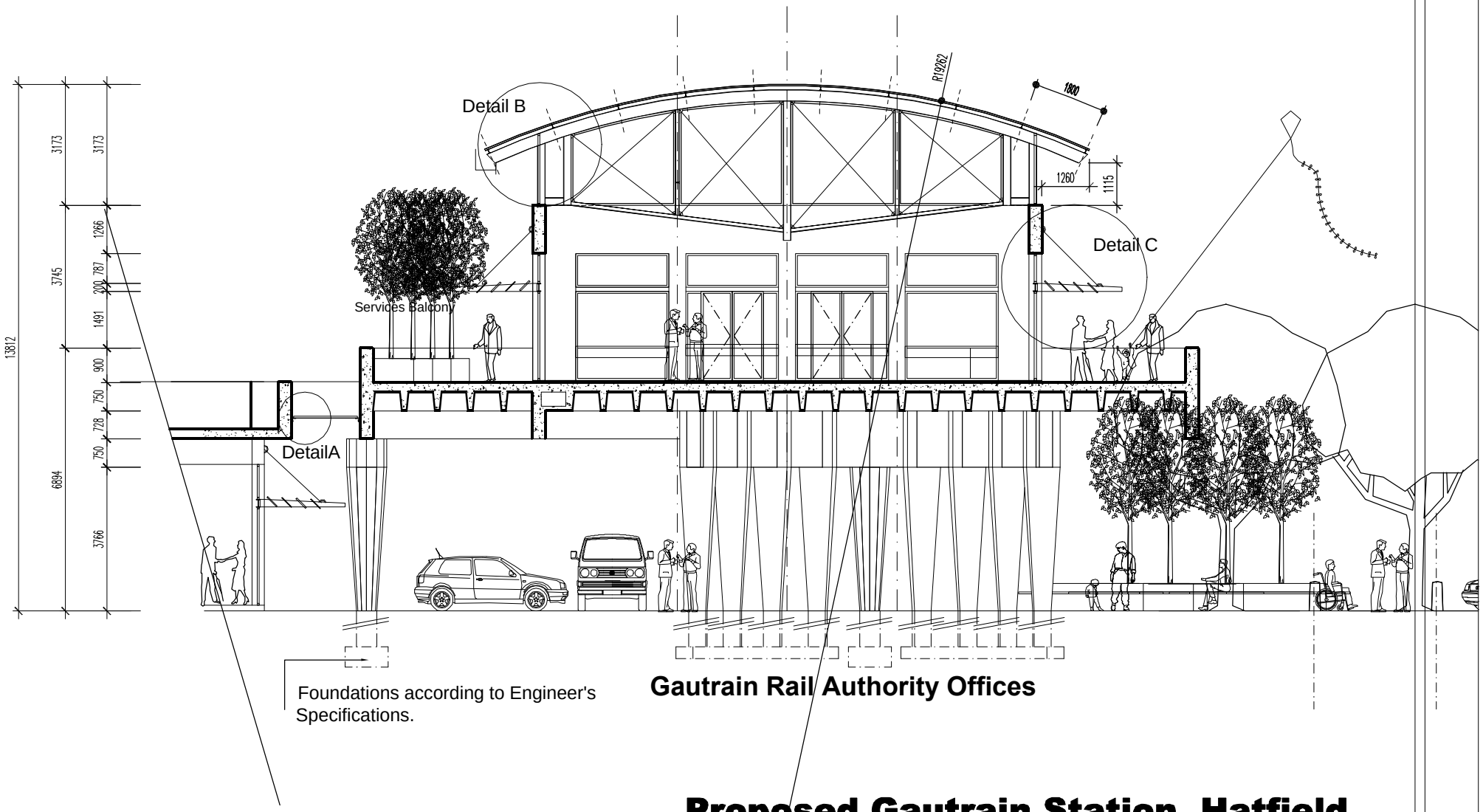
Proposed Gautrain Station, Hatfield



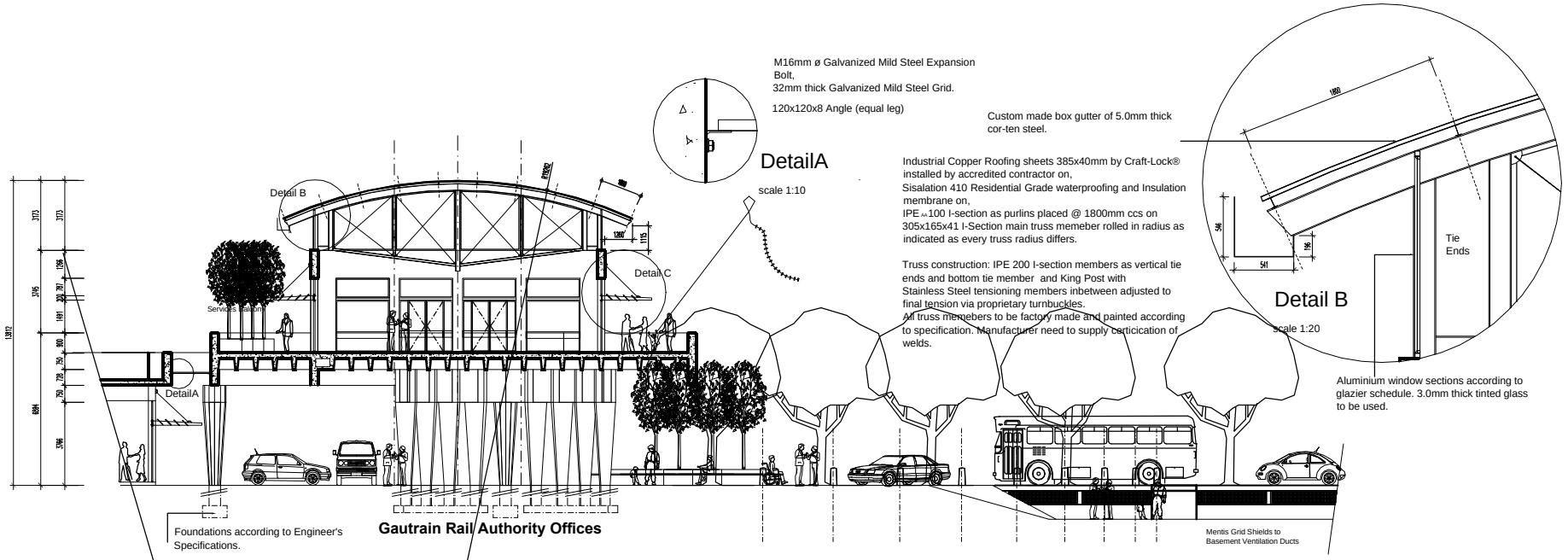
Section C-C

scale 1:200

Proposed Gautrain Station, Hatfield

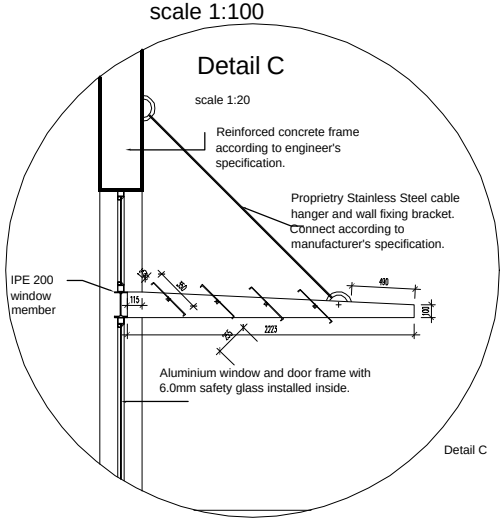


Proposed Gautrain Station, Hatfield



Section E-E

scale 1:100



Custom made Aluminium Louvres over fenestrated areas:
Pre-fabricated 1.3mm thick smooth plate bent into progressively smaller sections as dictated by the design of the Solar Azimuth study.
Commencing with 350x50x1.3mm panel leading down to 100x50x1.3mm panel.
(See Detail C).

Louvres to be suspended from re-inforced concrete frame by means of proprietary turnbuckle-type hangers as specified by manufacturer.

Aluminium Louvres to be natural finish as well as aluminium window and door frames utilised elsewere in the building.

Construction of the built frame:
Re-inforced concrete frame as designed and specified by Structural Engineer with clay brick infill panels. Plaster and paint the panels to co-incide with the finish as specified by the architect.

All services to be accommodated under foot in a floating floor construction. Floating floor to consist of approved proprietary system capable of moderate to high static loads, as per called for in Office criteria.

Floor slab spanning great distances in a cantilever form and as such calls for deep waffled slab configuration. Staggered column spacing essential in the legibility of the building, needs to clearly define the pedestrian traffic paths to be taken.

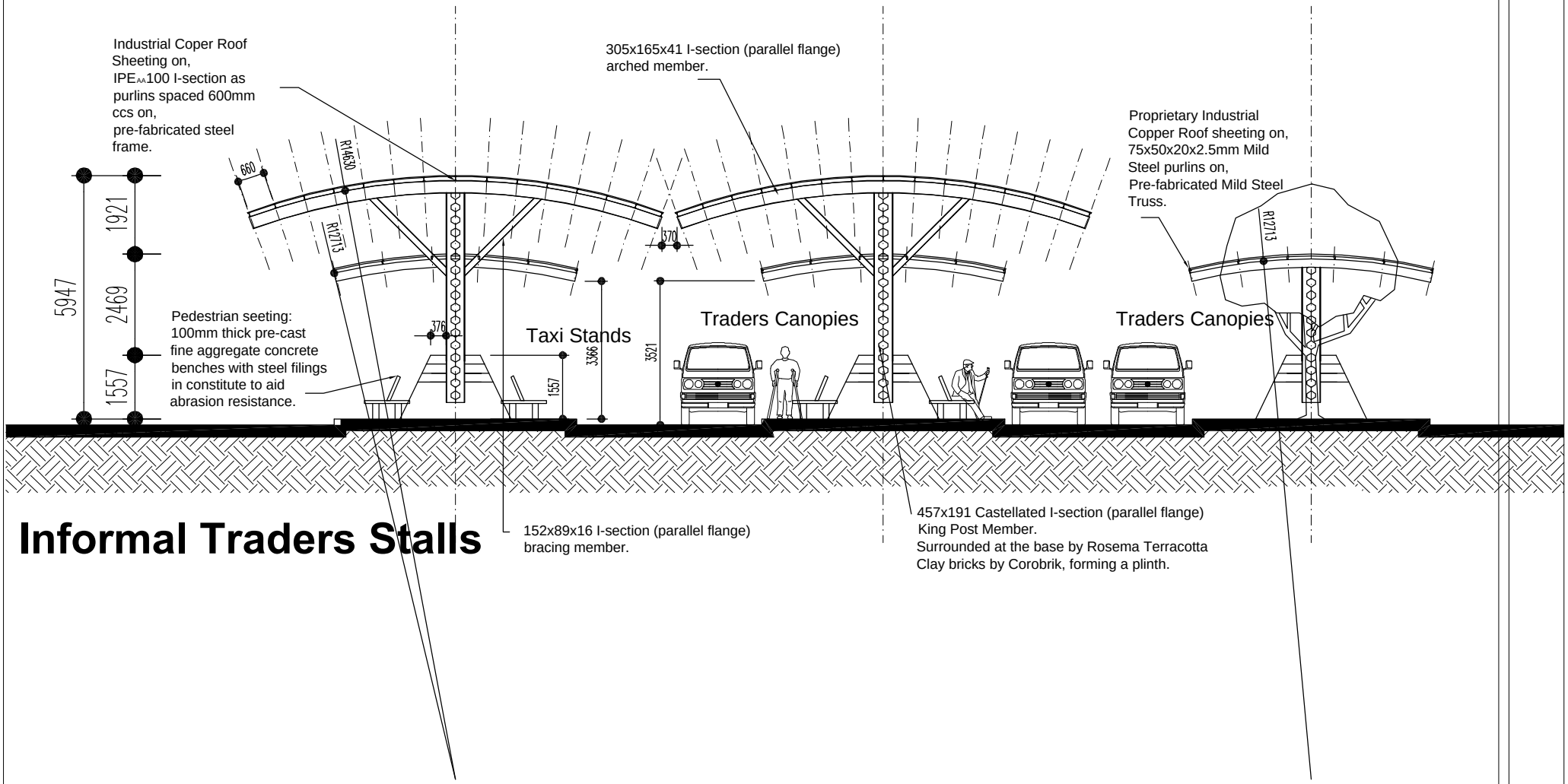
Building up to First Floor Level re-inforced concrete as per engineer's specification, above the use of composite materials (steel members and masonry) as called for in the specific designed area. ie Vertical Circulation area re-inforced concrete and brick infill with massively oversized steel members to co-incide with the railway theme.

Office spaces to consist of arched steel member composite trusses with progressively smaller radiai to facilitate the design, with steel I-section purlins and Proprietary Copper roofing sheets placed ontop.

Insulation in roof to consist of Sisalation 410 Residential Grade or similar approved product lain underneath purlin and truss space.

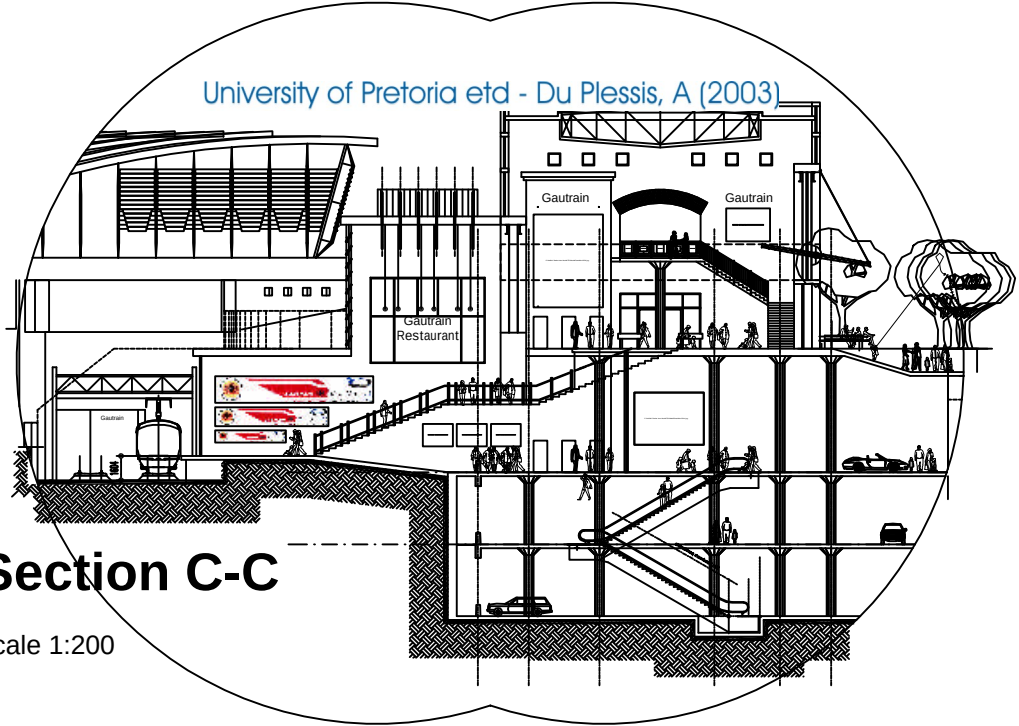
Truss construction:
I-section members with Stainless Steel tensioning cables as tension memebrs.
Cabling to be Proprietary nature.

Proposed Gautrain Station, Hatfield



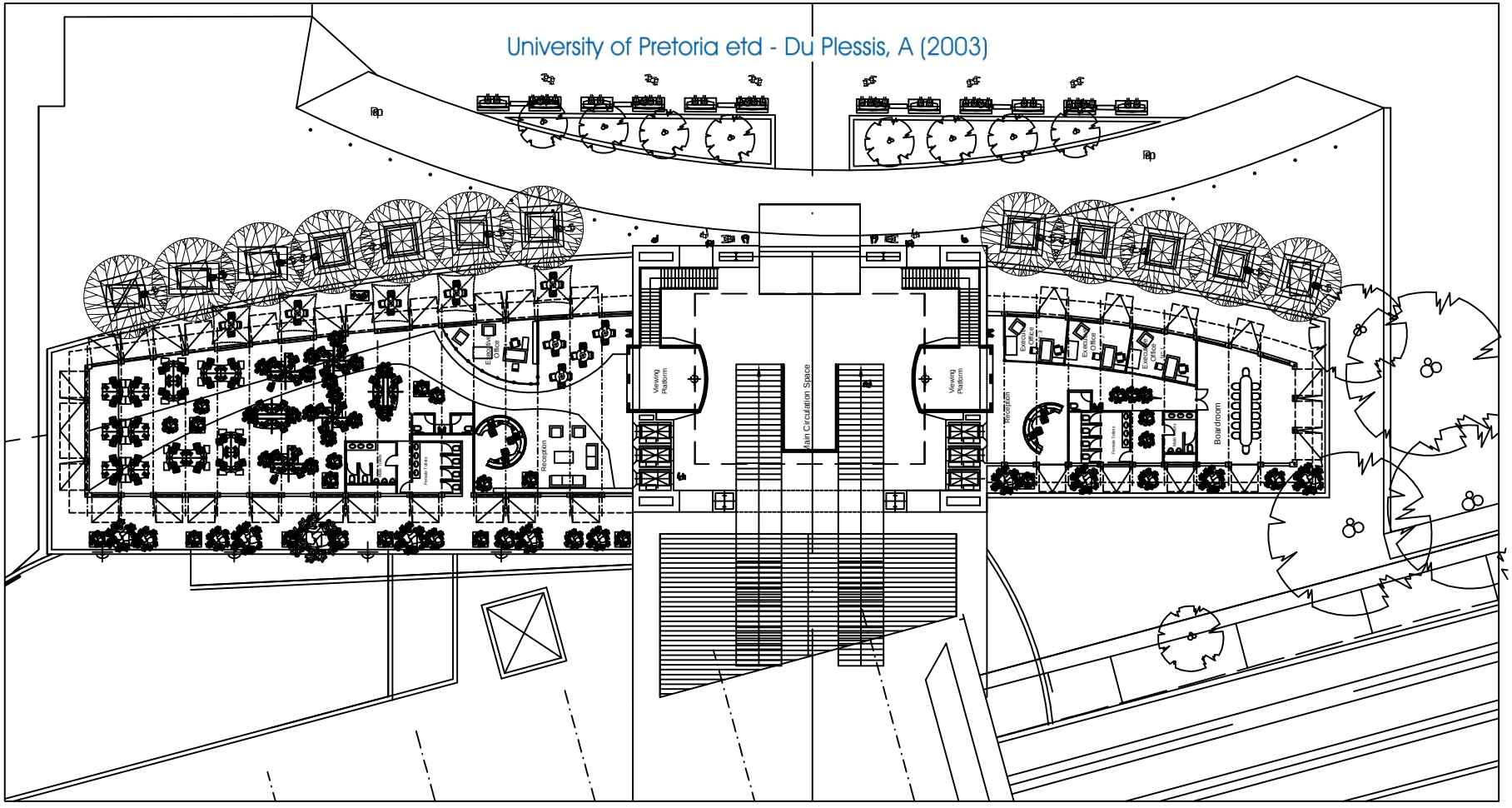
Informal Traders Stalls

Proposed Gautrain Station, Hatfield



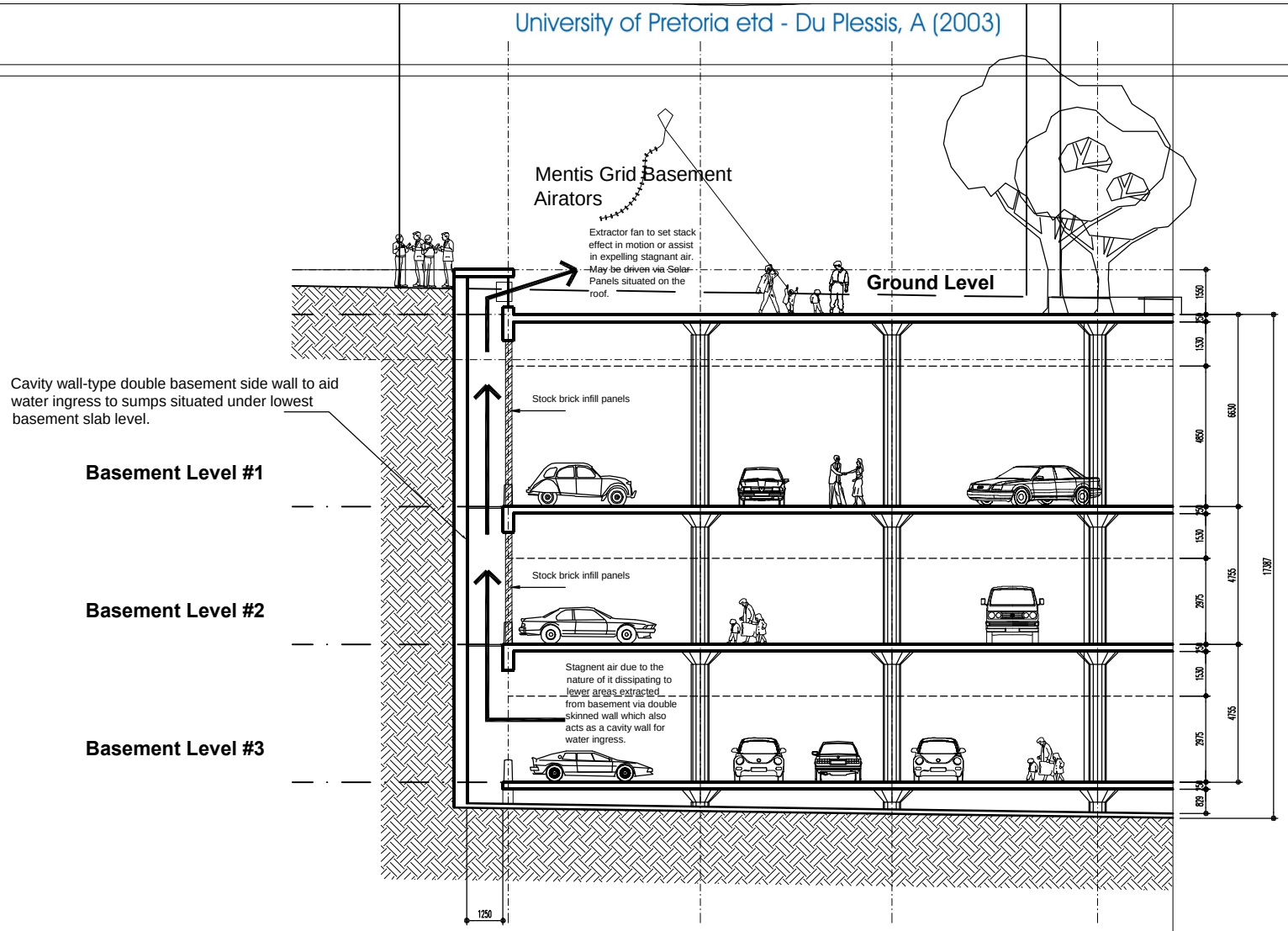
Section C-C

scale 1:200



First Floor Plan

scale not to scale

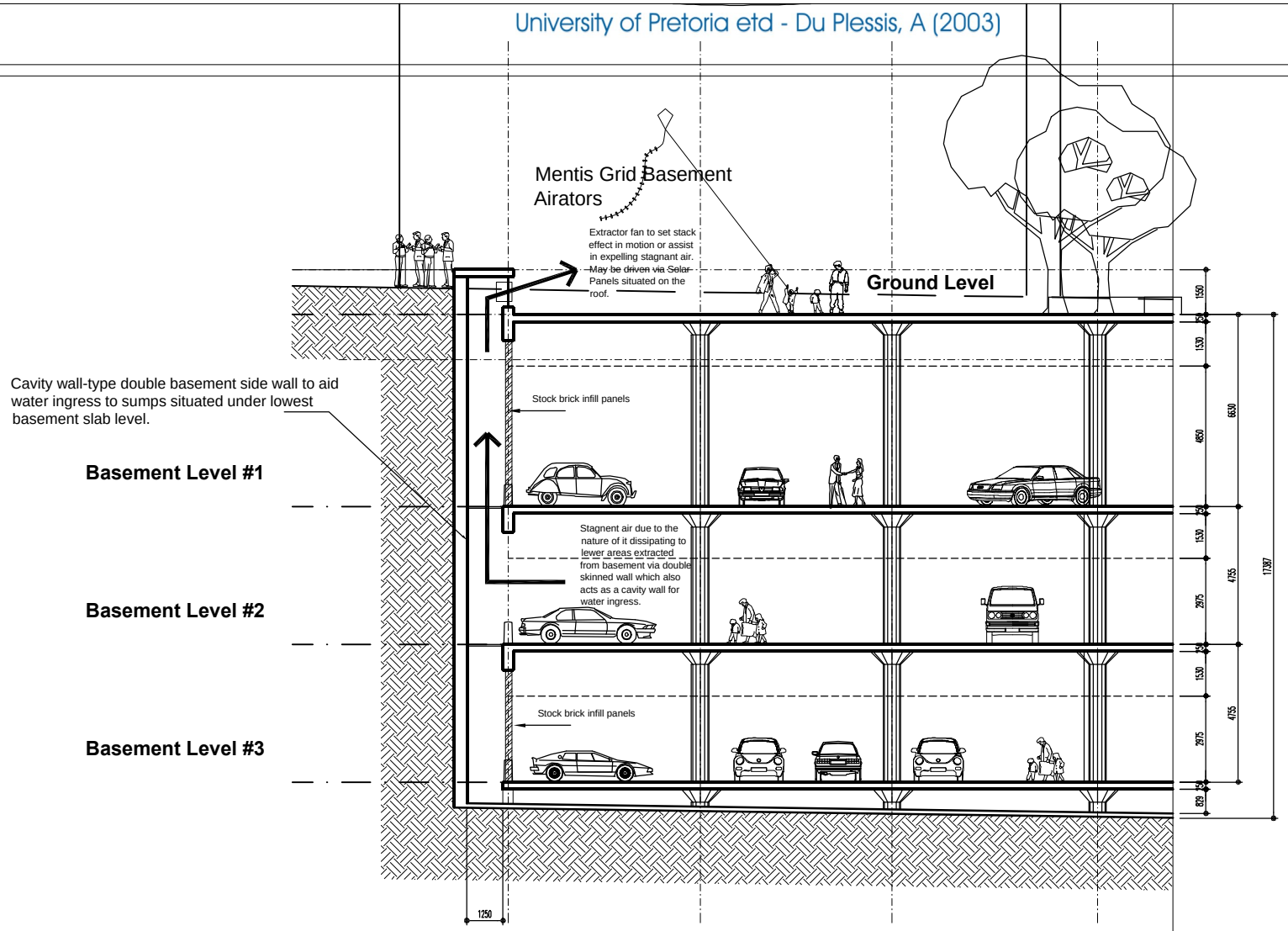


Aeration method employed in basement.

Ventilation method alternated in different bays to service all levels.
Level blocked off is thus aerated on next bay with dedicated extractor system.

Ventilation

Proposed Gautrain Station, Hatfield

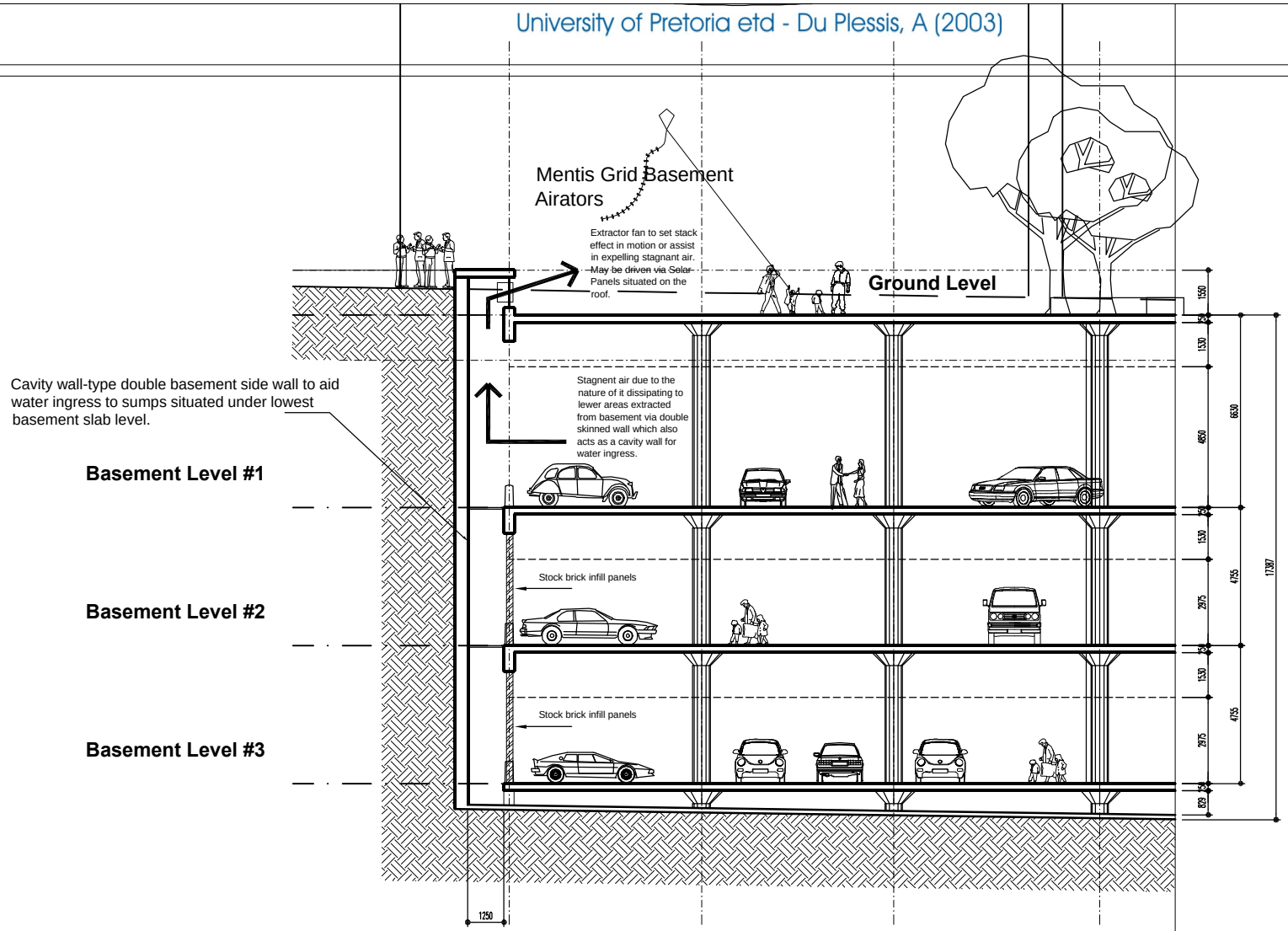


Aeration method employed in basement.

Ventilation method alternated in different bays to service all levels.
Level blocked off is thus aerated on next bay with dedicated extractor system.

Ventilation

Proposed Gautrain Station, Hatfield

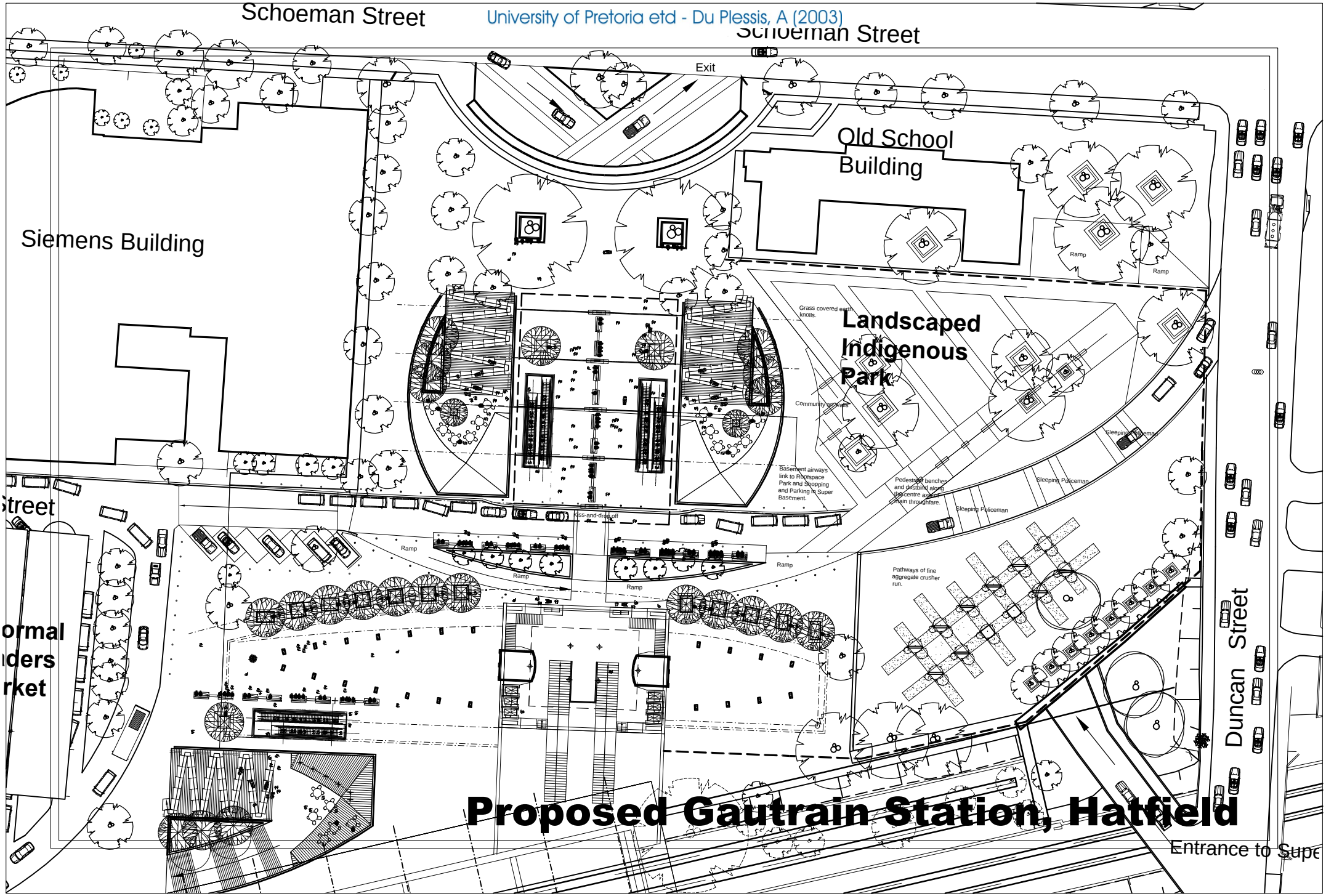


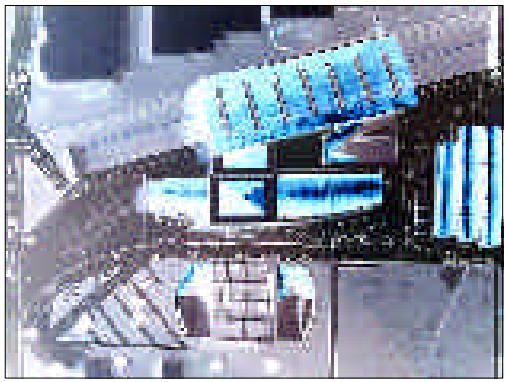
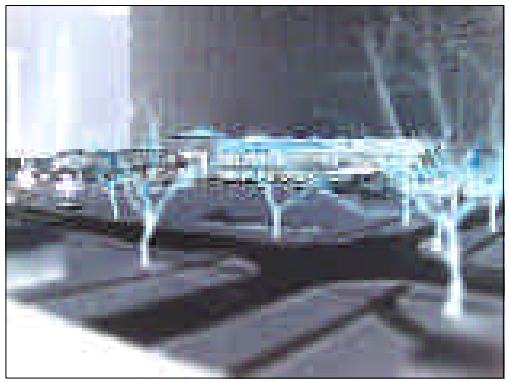
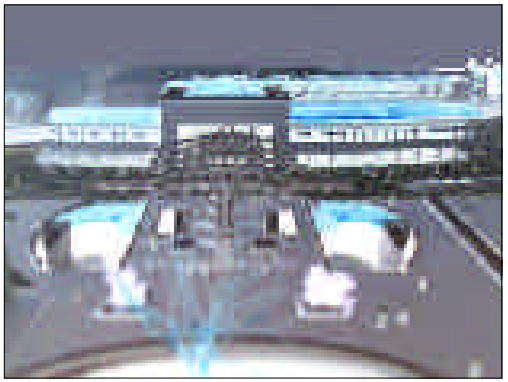
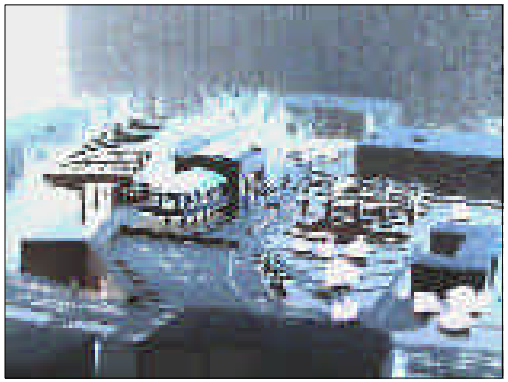
Aeration method employed in basement.

Ventilation method alternated in different bays to service all levels.
Level blocked off is thus aerated on next bay with dedicated extractor system.

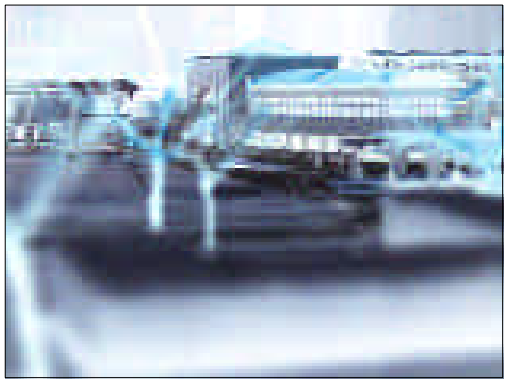
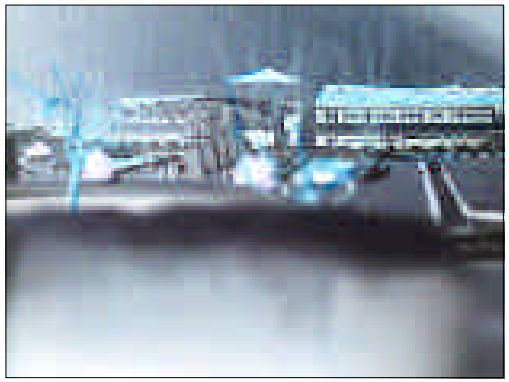
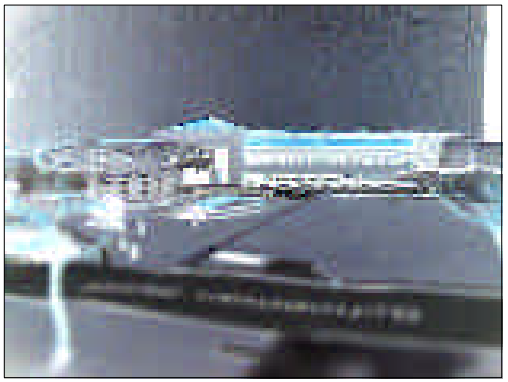
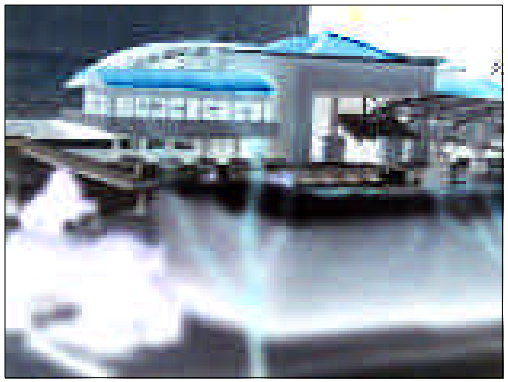
Ventilation

Proposed Gautrain Station, Hatfield



Proposed Gautrain Station, Hatfield

Proposed Gautrain Station, Hatfield

Go To:
Bibliography

BIBLIOGRAPHY

ALLEN,P. Director of Associated Lifts. Lectures-13 August 2003

DE VILLIERS, JF .1996.Intermodal Transfer Station Johannesburg International Airport. B.Arch-thesis document, University of Pretoria, Pretoria.

DEWAR, D., Uytenbogaardt, R.S.,199?Creating vibrant Places to live: A Primer. Cape Town.

DEWAR, D., Uytenbogaardt, R.S.,1991South African Cities: A Manifesto for change. Cape town.

DU TOIT, S and Perrin, J.2002. Philippi Public Transport Interchange (Northern Terminal). The Digest of South African Architecture,6:29-32.

EDWARDS, B.1997. The Modern Station. London: E & FN Spon.

FISHER, RC.2002.Metro Mall-Newton.Leading Architecture,:41-44.

FERREIRA, D. 1996.Metropolitan Transport Terminal. B.Arch-thesis document, University of Pretoria, Pretoria.

LINDE, E. Super Highway speeds of its tract Record Oos 27 Augustus 2003

Gauteng Department of Public Transport, Roads and works, October 2002.Volume 1.Executive summary. Environmental Impact Assessment For The Proposed Gautrain Rapid Rail Link Between Johannesburg, Pretoria and Johannesburg International Airport.

Gauteng Department of Public Transport, Roads and works, October 2002.Volume 2.Background information. Environmental Impact Assessment For The Proposed Gautrain Rapid Rail Link Between Johannesburg, Pretoria and Johannesburg International Airport.

Gauteng Department of Public Transport, Roads and works, October 2002.Volume3.Environmental Impact assessment-Social And Socio-Economic Environment. Environmental Impact Assessment For The Proposed Gautrain Rapid Rail Link Between Johannesburg, Pretoria and Johannesburg International Airport.

Gauteng Department of Public Transport, Roads and works, October 2002.Volume4:Environmental impact assessment-Biophysical Environment. Environmental Impact Assessment For The Proposed Gautrain Rapid Rail Link Between Johannesburg, Pretoria and Johannesburg International Airport.

Gauteng Department of Public Transport, Roads and works, October 2002.Volume5:Route Alignments Discarded by the Gautrain Technical Team and Costing of Feasible Route Alignments . Environmental Impact Assessment For The Proposed Gautrain Rapid Rail Link Between Johannesburg, Pretoria and Johannesburg International Airport

Gauteng Department of Public Transport, Roads and works, October 2002.Volume6:Synthesis of Environmental Impacts, Cumulative Impacts, Mitigation Measures, Conclusions and the Environmental Management plan. Environmental Impact Assessment For The Proposed Gautrain Rapid Rail Link Between Johannesburg, Pretoria and Johannesburg International Airport.

Gautrain Rapid Rail Link, October 2002.
Gautrain station functional guidelines.

LAUBCHER, C. H. P.1992 Die Verhaal van Hatfield/Hillcrest. Pretoria: Pretoria historica publishers

MAC INNES, K. 1996.A Station Without Trains.WorldArchitecture, 48:56-95.

PEARMAN, M.1996.Transportation.
World architecture, 48:116-129.

PRAWLEY, M. 1996. Chris Wilkinson.
World Architecture,45:110-115.

RIPLEY, A. 2003. Coming Unstuck.Time, 161(8),February 24:36-40.

South African Bureau of Standards.1990 The Application of the National Building Regulations. First Revision .Pretoria

The South African Institute For Steel Construction,1997.Structural Steel Tables Seventh Edition. Cape town

Basics. Http//www.TGWweb.com.200?Internet. Access 09 September 2003.

Under the hood of the TGV.http//www.TGWweb.Com2000 Internet Access 09 September 2003.

Go to:
Appendices

STRAUSS,H. Construction starts in June Record Oos,27 Augustus 2003

STRAUSS,H. Company unaware of rumours Record Oos,27 Augustus 2003

STRAUSS,H. Train part of bigger plan Record Oos,27 Augustus 2003

VON MEISS, P. 1997. Elements of architecture: From form to place. Southport. E&FN Spon

Appendices

Appendix A
Accommodation Schedule:

Gautrain Station, Hatfield, Pretoria

Building can be broken down into the following major elements:

- "Super Basement"
- Superstructure
- Railway cutting and furnishings
- Landscaping

Building Data:

1.) Site Area:	**24 754.56 m²**
2.) Building Footprint (without "super basement")	**11 399.88 m²**
3.) Building Footprint (with "super basement")	**20 117.43 m²**
4.) "Super Basement (13 876.53 m² x 3)	**41 629.59 m²**
5.) Traders Stalls / Taxi Rank	**1 692.31 m²**

1. "Super Basement"

a.) Basement Level One:

• Shopping Mall		6 530.50 m²
• Vertical Circulation Space		1 413.00 m²
• Warehousing		3 265.00 m²
• Vehicular Circulation Space		2 373.21 m²
• Parking Bays	**(172 bays)**	2 373.25 m²

b.) Basement Level Two

• Vertical Circulation Space		1 413.00 m²
• Vehicular Circulation Space		2 492.71m²
• Parking Bays	**(725 bays)**	9 968.75 m²

c.) Basement Level Three

• Vertical Circulation Space		1 413.00 m²
• Vehicular Circulation Space		2 492.71m²
• Parking Bays	**(700 bays)**	9 625.00 m²
• Plant Rooms		***(343.75 m²)***
- Ventilation		171.88 m²
- Water Treatment		85.94 m²
- Electrical		85.94 m²
Total		**41 629.59 m²**

2. Superstructure

a.) ***Cobbled road surface*** (School Lane)	***(1 089.05 m²)***
b.) ***First Floor Executive Offices***	***(457.40 m²)***
- Ablution Facilities (Male & Female)	46.02 m²
- Office Space	343.88 m²
c.) ***First Floor General Works Offices***	***(979.26 m²)***
- Ablution Facilities (Male & Female)	53.60 m²
- Office Space	691.33 m²
d.) ***Vertical Circulation Area***	***(1 226.24 m²)***
e.) ***The Gautrain Restaurant***	***(478.18 m²)***
- Ablution Facilities (Male)	12.29 m²
- Ablution Facilities (Female)	15.97 m²
- Store Rooms & Cold Storage	167.36 m²
- Kitchen	71.73 m²
- Serving Space	210.83 m²
f.) ***Ticketing / Curio / Small Shops***	***(1 956.59 m²)***
g.) ***Escalators and vertical Access ducts***	***(947.87 m²)***
h.) ***Railway Canopy***	***(2 973.47 m²)***
i.) ***Traders Stalls and Taxi Rank***	***(1 692.31 m²)***
Total	**11 399.88 m²**

3. Railway Works

a.) Rail Cutting (up to Grosvenor Street Bridge)	***(3 231.39 m²)***
b.) Catenaries	**13**
c.) Rail Lines (44 549.30 m x 457kg/m Rails)	**178 197.20 m**
d.) Bridge (Vehicular & Pedestrian) over Grosvenor Street	***(480.25 m²)***

4. Landscaping

a.) Indigenous deciduous trees	**63** trees
b.) Shrubbery	**250** scrubs
c.) Topsoil (500 mm deep)***(2 601.32 m³)***	***(5 202.64 m²)***
d.) Ground cover	***(958.35 m²)***
e.) Path ways	***(2 356.28 m²)***
f.) Cobbled areas	***(956.28 m)***
g.) Designed benches and canopies for pedestrians	**56**

Appendix B
Cost Estimate Analysis:

Gautrain Station, Hatfield, Pretoria

Building can be broken down into the following major elements:

- **"Super Basement"**
- **Superstructure**
- **Railway cutting and furnishing**
- **Landscaping**

1.) "Super Basement"

- Ground Floor Level R 500 p/m²
- First Basement Level R 350 p/m²
- Second Basement Level R 350 p/m²
- Third Basement Level R 350 p/m²
- Excavation R 1 500 p/m²

2.) Superstructure

- In-situ cast concrete R 650 p/m²
- Aluminium R4 500p/m²
- Steel Frame R4 000p/m²
- Brickwork R 250 p/m²
- Copper Roofing R1 520p/m²
- Finishes (Artists) R560p/m²

3.) Railway cutting and furnishing

- Earthworks R1 500p/m²
- In-situ cast concrete R 650 p/m²
- Steel Frame R4 000 p/m²
- Brickwork R 250 p/m²
- Finishes R 560 p/m²

4.) Landscaping

- Earthworks R 500p/m²
- In-situ cast concrete R 650 p/m²
- Trees R1 500 per tree
- Scrubs R 300 per unit
- Ground Cover R 150 p/m²
- Topsoil R 350p/m³
- Cobbles R 150p/m²
- Designed Pre-cast Benches R2 350 per unit

Basement Levels		
Ground Floor Level	13 876.53 m² @ R 500 p/m²	R 6 938 265.00
First Basement Level	13 876.53 m² @ R 350 p/m²	R 4 856 785.50
Second Basement Level	13 876.53 m² @ R 350 p/m²	R 4 856 785.50
Third Basement Level	13 876.53 m² @ R 350 p/m²	R 4 856 785.50
Excavation Cost	13 876.53 m² @ R1 500 p/m²	R20 814 795.00
	Total	**R42 323 416.50**
Superstructure		
In-situ cast concrete	11 399.88 m² @ R 650 p/m²	R 7 409 922.00
Aluminium	7850.23 m² @ R2 500 p/m²	R 19 625 575.00
Steel Frame	7850.23 m² @ R4 000 p/m²	R 31 400 920.00
Brickwork	11 399.88 m² @ R 250 p/m²	R 2 849 970.00
Finishes (Artists)	2 500 m² @ R 560 p/m²	R 1 400 000.00
	Total	**R 62 686 387.00**
Railway Cutting and Furnishing	(This item is normally not included in building cost estimates.)	
Earthworks	3 231.39 m² @ R 1 500 p/m²	R 4 847 085.00
In-situ cast concrete	3 231.39 m² @ R 650 p/m²	R 2 100 403.50
Steel Frame	2 350 m @ R1 230 p/m	R 2 890 500.00
Brickwork	350 m @ R 250 p/m²	R 2 849 970.00
Finishes	0 m² @ R 560 p/m²	R 0.00
	Total	**R 12 687 958.50**
Superstructure		
Earthworks	5 202.64 m² @ R 500 p/m²	R2 601 320.00
In-situ cast concrete	35 m² @ R 650 p/m²	R 22 750.00
Indigenous Trees	63 trees @ R1 500 per tree	R 94 500.00
Scrubs	250scrubs @ R 300 per unit	R 75 000.00
Ground Cover	958.35 m² @ R 150 p/m²	R 143 752.50
Topsoil	2 601.32 m³ @ R 350 p/m³	R 910 462.00
Cobbles	956.28 m² @ R 150 p/m²	R 143 442.00
Designer Pre-cast Benches	R 2 350.00 per unit	R 131 600.00
	Total	**R 4 122 826.50**
Estimated Cost of Building Project		**R 121 820 888.50**

Appendix C

Risk Assessment Framework

Summary of Extreme and High Risks Identified

Annexure A – Technical and Planning

Consequence Measure	*Likelihood Measure*	*Risk Result*
Catastrophic	*Likely*	*Extreme*
Major	*Moderate*	*High*
Moderate	*Unlikely*	*Medium*
Minor	*Rare*	*Low*
Insignificant		

Rank	**Description**	**Risk Self Assessment** *(Consequence)*	**Control Self Assessment** *(Likelihood)*	**Assurance Priority** *(Risk)*	**Mitigation Measure***
	Integration with Transnet, Metro,Eskom	Catastrophic	Moderate	Extreme	Increase awareness at Provincial and national level
	Schedule Management	Major	Unlikeky	High	Implement strict adhereance to tracking system and more feedback
	Cost Management	Major	Rare	High	Ensure integration of PM and Financial Systems and appointment of QS.
	Risk Management	Catastrophic	Unlikeky	High	Provincial external oversight.
	Procurement Management	Major	Likely	High	Provide external oversight and revised plan.
	Financial Reporting	Major	Unlikeky	High	Ensure clear ground rules and undertake audit.
	"Visioning" and Conceptional Planning	Major	Unlikeky	High	Provide external oversight
	Inadequate risk analysis	Catastrophic	Unlikeky	High	Provide external oversight

*Continuous review and improvement

MATRIX - RISK QUANTIFICATION					
Probability	5 Likely	4 Moderate	3 Unlikely	2 Rare	
Consequence					
5. Catastrophic	25	20	15	10	
4. Major	20	16	12	8	
3. Moderate	15	12	9	6	
2. Minor	10	8	6	4	
1. Insignificant	5	4	3	2	

Key		
	High Risk	15 to 25
	Medium Risk	8 to 14
	Low Risk	2 to 7

Risk Identification and Assessment Form Worksheet

Procedure: - Record risk identified under the description column. Carry out an assessment of the risk using the "Consequence Measure" and "Probability Measure" table set out below. Apply the weighted index number set against the chosen Consequence / Probability measure and apply the Risk Factor formula to get the Risk Factor (RF). (RF = C x P) From the risk factor refer to the Probability – Consequence Matrix and assign the risk category (high, medium, low)

Consequence Measure	C	Probability Measure	P	Risk Category	RF
Catastrophic	5	Likely	5	High	15-25
Major	4	Moderate	4	Medium	7 - 14
Moderate	3	Unlikely	3	Low	2 – 6
Minor	2	Rare	2		
Insignificant	1				

Rank	Description				
	DISCIPLINE: Management	Risk Assessment (Consequence) C	Control Assessment (Probability) P	Risk Factor (RF)	Assurance Priority (Category)
	Key personnel travelling together	**5**	**3**	**15**	**High**

RISK IDENTIFIED BY: Management & Notified by PM
Tabled at Risk Committee Meeting – 20/10/2003 DATE: 20/10/2003

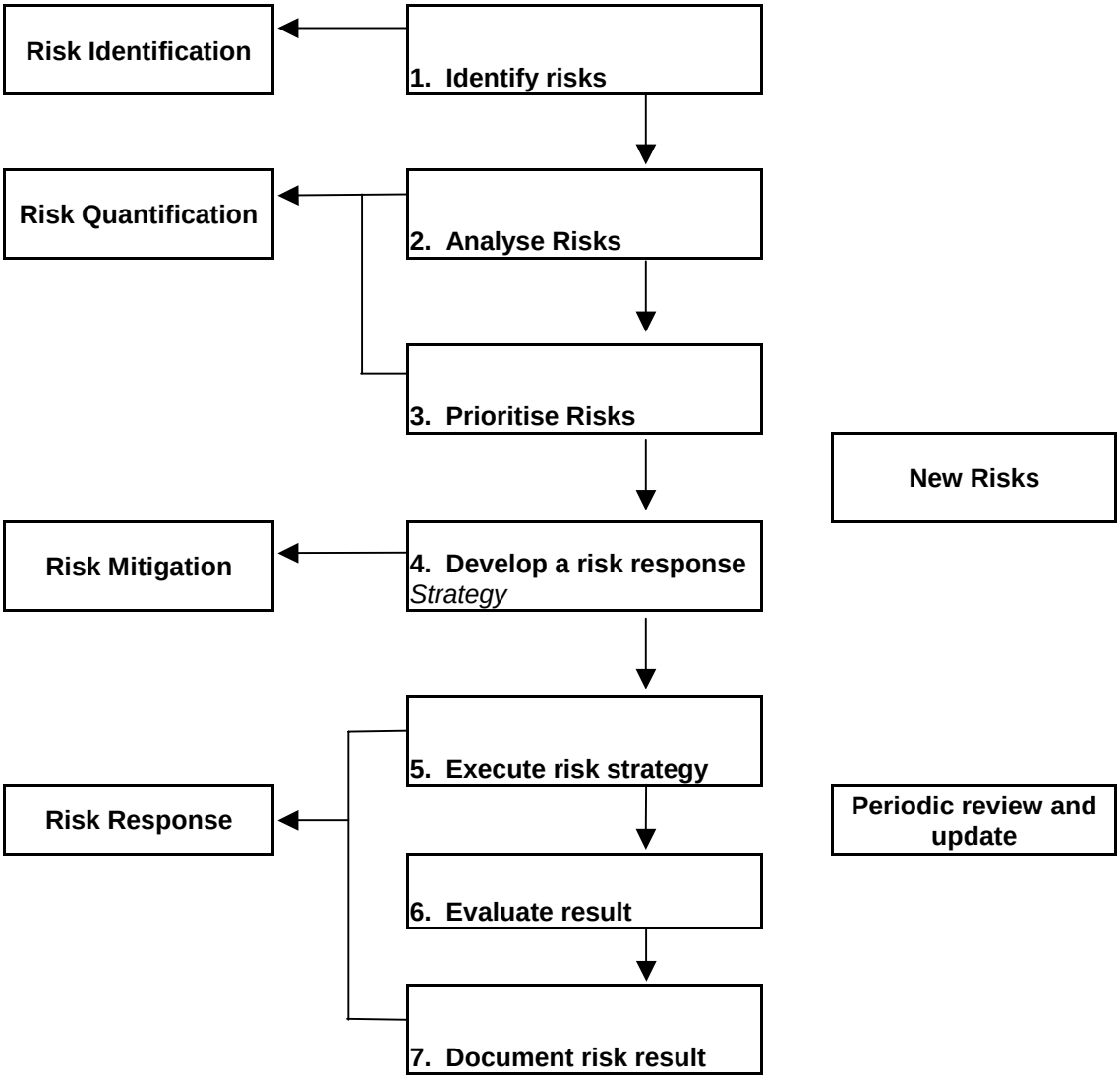
Risk Result Change Notification

Consequence Measure	C	Probability Measure	P	Risk Result	RF
Catastrophic	**5**	Likely	**5**	High	
Major	**4**	Moderate	**4**	Medium	
Moderate	**3**	Unlikely	**3**	Low	
Minor	**2**	Rare	**2**		
Insignificant	**1**				

Rank	Description	Risk Self Assessment (Consequence)	Control Self Assessment (Probability)	Assurance Priority (Risk)

Please note and accept the changes in the status of the above mentioned risks.

Executive manager: -
Risk Officer: -
Date:



Company unaware of rumours

Hettiën Strauss

Bohlweki Environmental is not aware of the recent rumours circulating about tunnelling the Gautrain in Pretoria and the acquisition of properties in the Pretoria area for this purpose - and thus cannot comment on such rumours.

So says Mark Freeman, director of Bohlweki Environmental, the company that handled the Environmental Impact Assessment (EIA) for the Gautrain project.

According to him the addendum to the draft EIA report was submitted to the Gauteng Department of Agriculture, Conservation, Environment and Land Affairs (GDACEL) in late April this year.

GDACEL is busy evaluating the EIA documentation and a Record of Decision (RoD) will be issued once the department's evaluation process is complete."

Process

Mark says the bidding process for the Gautrain project runs in parallel with the EIA process.

"Prospective bidders are working on the recommended route alignment contained in the EIA documentation, but the RoD will need to be issued before the submission and evaluation of the bids can be completed," he says.

Train part of bigger plan

Hettiën Strauss

The proposed Gautrain rapid rail-link project between Pretoria and Johannesburg is one of Gauteng Provincial Government's Blue IQ projects.

With these projects the government intends investing more than R3,5 billion in strategic economic infrastructure to kick-start eleven high profile projects, which will add value to the manufacturing and tourism sector.

President Thabo Mbeki recently said the country's road, air and port facilities are unable to cope with the country's economic growth and successes, which were the results of the country's tight fiscal approach.

In this regard, government committed itself at its recent 'Lekgotla' meeting to pump billions of rands into transport coffers to overhaul the infrastructure to equal the economic growth.

The money would be used to build, upgrade and maintain the country's roads, the lifespan of which is shortened by heavy vehicles transporting cargos in between cities and provinces throughout the country.

The country's railways network will also get a facelift.

Harbour authorities would acquire new cargo handling equipment, the introduction of improved cargo and passenger screening systems, as well as the upgrading of container terminals to ease congestion at the Durban, Cape Town and Port Elizabeth ports.

Construction starts in June

Hettiën Strauss

Everybody is holding their breath for the feedback on the Environmental Impact Assessment (EIA) for the proposed Gautrain rapid rail-link project.

The EIA is still being looked at by the Gauteng Department of Agriculture, Conservation, Environment and Land affairs.

In the meantime, it has been announced that construction of the Gautrain route - which will link Pretoria and Johannesburg - is due to start in June next year.

The winning bid for the project will be announced by early January next year.

Gauteng Finance and Economic Affairs Member of the Executive Committee (MEC), Jabu Moleketi says the winning bidder is expected to begin building the twelve-station track a few months later.

However, it will be up to the constructor to decide which route would be "rolled out "first.

The state-of-the-art train is likely to be in motion within five years to link Johannesburg and Pretoria in less than 35 minutes and at speeds of 160km/h or higher.

It is expected that about 43 000 jobs would be created during the construction phase, while security would be tight with closed-circuit cameras keeping an eagle's eye on the railway against criminals.

The economic activities related to construction are estimated at around R3,6-billion per year, resulting in an increase of between 0,7% and 1% of the province's economic growth during the implementation phase.

The minimum frequency between Johannesburg and Pretoria will initially be six trains per hour per direction and more trains will be operated as the number of passengers using the system increases, according to the Gautrain document.

Gauteng, the country's economic hub, is currently experiencing road congestion especially between Pretoria and Johannesburg.

Jabu says the train would not only clear the road congestion but would go a long way in cutting down on air pollution as many motorists would opt for the train.

It is believed that three million cars use the M1 freeway between Johannesburg south and Pretoria east during peak hours, while about 400 000 cars pass along this freeway each hou at very low speeds.

Metro se hulp vir tonnel gevra

Hettiën Strauss

Die Tshwane-metro moet die moontlikheid ondersoek om wel 'n finansiële bydrae vir die beoogde Gautrain te maak sodat die trein deur Muckleneuk getonnel kan word.

So sê Peter Kaufman, adjunk-uitvoerende beampte van die Pretoriase Kamer vir Handel en Nywerheid.

Want, sê Peter, indien dié beoogde treintonnel nie gebou word nie, sal die voorgestelde hoë mure wat gebou word om die treingeraas uit te hou, 'n tweede Berlynse muur in Pretoria wees.

"Die metro moet aan die toekoms van Pretoria en sy inwoners dink. Hoe gaan die onooglike mure vir ons nageslagte lyk?"

Peter sê hulle is nie teen die Gautrain nie, maar wil hê die trein moet ook in Pretoria getonnel word.

Belegging

"Die projek moet nie hier 'afgeskeep' word nie. Gautrain is 'n belegging vir die toekoms," sê Peter.

Felecia Fourie, sameroeper van die Gautrain-taakspan van die Muckleneuk Lukasrand Eiendoms- en Inwonersvereniging (Mlpora) sê Jack van der Merwe, hoof van die Gautengse Departement van Vervoer skep verwarring deur te sê die roete van die Gautrain is bepaal.

"Tans is die aanbevelings van die omgewingsimpakstudie by die hoof van die Gautengse Departement van Omgewingsake vir oorweging. Die uitslag word eersdaags verwag," sê Felecia.

Werklike probleem

Sy meen dat die aankondiging dat daar nou slegs 19 huise in Muckleneuk geraak sal word in plaas van die aanvanklike 119, nie die werklike probleem van die inwoners oplos nie.

"Die kern is nie die aantal huise nie, maar die totale impak wat die voorgestelde Gautrain op Pretoria sal hê."

Volgens haar raak dié trein die lewens van gemeenskappe in Bereapark, die suidelike gedeelte van Sunnyside, Unisa se Sunnyside-kampus, Muckleneuk, die drie hoërskole langs Universiteitsweg, Hatfield en die Universiteit van Pretoria (UP).

Raadslid Karen Meyer sê enige huise wat geraak word, is onaanvaarbaar.

Volgens haar sal die Gautrain Muckleneuk in twee skeur. "Die argument staan steeds vas. Hoekom kan Pretoria nie 'n tonnel kry as Johannesburg dit kry nie? "Tot dusver kon niemand nog met 'n rasionele, bevredigende antwoord vorendag kom nie."

Rdl Meyer meen vader Smangaliso Mkhatshwa, burgemeester van die metro, moet die belange van die inwoners op sy hart dra en sterk standpunt oor die beoogde Gautrain inneem om inwoners se saak te stel.

Super highway project speeds off its tracks

Elmarie Linde

The Super Highways project has come to a dead end.

This after the Gauteng Department of Transport (Gautrans) recently announced that there would be no super highway between Pretoria and Johannesburg.

"However, the Gautrain project is continuing and construction will start early next year," says Jack van der Merwe, head of Gautrans.

It appears as if the real reasons for the cancellation of this project are being withheld, although rumours are that the proje would not have been finan cially viable.

The Super Highway was supposed to connect Pretoria and Johannesburg with an extra lane in each direction along the N1 freeway.

Two of the north- and southbound lanes would have been tolled and motorists could choose whether they want to use the high-speed tolled lanes or not.

According to the initial plans the highway would have been completed in 2006 after spending an estimated R1,5 billion.

"I am surprised at the sudden decision to stop the unsolicited tender to toll the highway," says Manny de Freitas, spokesperson on transport at the Gauteng Provincial Legislature.

"However, there is still confusion whether the project is only postponed."

Councillor Philip Gohl says the Super Highway project was flawed right from the very start.

"At time of completion the freeway would have been just as congested as today.

"Two of the lanes would have been tolled and it would have put more pressure on the other lanes, causing more traffic back-ups and frustration.

"It is clear that this project has been used as a smokescreen to justify the viability of the Gautrain."

He says further he is not sure that the estimated 60 000 commuters will indeed use the train daily.

"In that case the train will become a white elephant just as the N1 toll road north of Pretoria."

Appendix D
Gautrain Station, Hatfield

Sustainable Building Assessment Tool (SBAT)

1 Contents

Introduction

Non-renewable resources are being depleted and there is increasing environmental damage as a result of human activities. It is therefore increasingly important that this is addressed, and sustainability becomes a key issue in the way we live and work. Buildings can play an important role in supporting sustainability. This is done through careful planning in which design decisions, material specifications and so on are carefully evaluated in terms of their long term impact on the economic, social and environmental sustainability of a society and the natural environment.

The Sustainable Building Assessment Tool (SBAT) assesses the performance of a building in relation to a number of economic, social and environmental criteria. The tool has been designed to be particularly appropriate for use in developing countries and therefore includes aspects such as the impact of the building on the local economy, as economic issues are often a priority.

The tool can be used in design stages of a new building, or for the refurbishment of an existing building. It is designed to encourage the development of more sustainable buildings by enabling different options to be evaluated rapidly and compared. The tool also enables a building to be rated in terms of its sustainability. This enables buildings to be compared to each other and to benchmarks.

The design of the Gautrain Station in Hatfield followed the requirements as set out by this document very closely and where possible implemented aspects into the finished product. It is however important to note that full compliance with the lofty ideals as set out in this document cannot be attained. Design in architecture as any creative enterprise, but certainly more pronounced, has the unenviable drawbacks as the need to compromise with reality is a constant. For this reason certain elements enjoy more prominence over others, and because of the building type (a Station), greater accent needed to be put on those elements that would aid in the ultimate full functioning of the building.

As stated early in the design of the building, the premise were accepted early on that the building must be; first and foremost, seen as a machine of the efficient engorging and disgorging of train passengers on and off the train – and further to and from their automobiles.

The tool is designed to be easy to use and generates graphical reports, which enable performance to be easily read. The tool is also not building type-specific and can be used on a variety of buildings such as offices, factories, schools, clinics and housing.

The SBAT provides a way of making a basic assessment of the sustainability of a building. It can be used alongside more complex assessment tool and can save time and expense by identifying the main problem areas, before these are used.

2 Social Issues

2.1 Occupant Comfort

The quality of environments in and around buildings has been shown to have a direct impact on health, happiness and productivity of people. Healthier, happier, more effective and people contribute to sustainability by being more efficient and therefore reducing resource consumption and waste. However the quality of this environment needs to be achieved with minimal cost to the environment.

2.1.1 Lighting

- All work and living environments are well day lit. Day lighting control and glare minimised. No spaces require constant electrical lighting.

In the proposed Gautrain Station building, extensive use has been made of diffused light at night, but the predominant lighting method during the day is by means of diffused sunlight brought into the building via adjustable louvers.

The louvers also serve the building in that they reduce the amount of uv-light damage to interior finishes.

2.1.2 Ventilation

- Required ventilation provided by natural means. No mechanical ventilation used in building other than in toilets and kitchens.

The building in areas such as the Office Spaces have natural ventilation with the added feature of small Boardroom spaces that is air-conditioned by means of small capacity split-units only serving those areas.

The rest of the office spaces have been designed to be open plan with extremely oversized headroom to facilitate an air cushion over the space that acts as a insulator to the spaces.

2.1.3 Noise

- Noise levels limited in work and living environments to acceptable levels.

The working areas in the building consist of offices, supermarket spaces, small shops and restaurant areas. In all of these spaces the efficient use of sound absorbent floor and wall surfaces would ensure that the ambient sound levels would be kept well below the acceptable 65 dB sound pressure level as stipulated in the National Codes.

The noise from arriving and departing trains would be dealt with by the screening doors to the platform, which also serve as safety barriers between the passengers and the oncoming train.

2.1.4 Views

- Work areas have access to a view out. All users located in 6m or less from a window.

The offices on the first floor comply with this stipulation with every occupant on these wings having a superb view of the whole station precinct.

2.1.5 Access to green outside

- Access to green outside spaces

The design of the building is such in its conception that the urbanity of the building would be mitigated by the extensive use of nature. The building is set in a park atmosphere and the boundaries between inside and out have been consciously blurred in order to bring humanity back into this building type.

The passenger waiting for the next train to arrive or the tourist traveller can now be in nature as opposed to the norm in Europe and elsewhere where the quest to get to nature would only start at the train station.

2.2 Inclusive Environments

Buildings can be designed to accommodate everyone, or specially designed buildings need to be provided. Ensuring that buildings are inclusive supports sustainability as replications is avoided and change of use supported.

2.2.1 Public Transport

- Building is located 100, or fewer metres to disabled accessible public transport

From the start the building had to cater for the disabled in this manner as it became law to do so and the use of all of the building is an important design premise. The creation of a design that is monumental needs the support from every person liable to use the building in the future. When certain sectors of the population feels disenfranchised by the building by for instance not being accessible to disabled people, it would have a negative effect on the image of the building, and ultimately the patronage of that sector of society.

2.2.2 Routes

- All routes between and within buildings of a smooth and even surface (i.e. easily navigable by wheelchair)

This aspect received great attention in that the design of the building had as one of the major concepts the elimination of level differences from motor vehicle to platform. This had been achieved by means of the of situating the major drop-off points for platform passengers and vehicular passengers on the same level, but divorcing the two from that point as to maintain safety. People now either step from their vehicles, or in the case of disabled people, lowered to the road surface via their mechanical apparatus – and from that point there would not be steps or even major inclines to contend with until they step onto the train. The whole departure and arrival interchange occurs on basement level one.

People wishing to move to the ground level would also not find themselves cut off as the use of “Stramps” (stairs with ramps incorporated in them) makes the upper areas accessible.

2.2.3 Changes in level

- No changes in level between or within buildings or,
- All changes in level catered for with appropriate ramps of 1:12 fall, or lifts

2.2.4 Edges

- All edges i.e. between walls and floor s and stair nosings clearly distinguished through the use of contrasting colour (For visually impaired)

2.2.5 Toilets

- Required number of disabled toilets provided

Ablution facilities designed for the projected load of passengers served in an hour period between 08:00 to 09:00 in the mornings and 16:00 to 17:00 in the afternoons with a over-design factor of 40% worked into the equation.

Gautrain envisages a passenger load of 800 people per hour i.e. 14 400 per working cycle which would be over an 18 hour period. If then we use the 40% over-design it would equal 1 120 people using ablution per hour. Divided 50/50 it would come to 560 male and 560 female passengers using ablution per hour.

According to the SABS 0400 – 1990: table 7,

Facilities subject to peak demand 1500 max population:

Male			Female	
WC pans	Urinals	Washbasins	WC pans	Washbasins
4	15	5	20	8

These facilities need to be properly policed and maintained. Access to the facilities need to be from every level of the station compound.
Provision for disabled persons needs to be achieved with three disabled toilets for every set of ablution facilities. The disabled toilets need to be placed away from the main pedestrian traffic stream to ease access to the less mobile.

2.3 Access to Facilities

Convention living and working patterns requires regular access to a range of services. Ensuring that these services can be accessed easily and in environmentally friendly ways supports sustainability by increasing efficiency and reducing environmental impact.

2.3.1 Childcare

- Childcare provided in building or close by (within 3km)

This aspect needn't be catered for, as the building is a station where people come to board or depart from trains.

The facilities need to be present on the periphery of the site, but due to the high demand on premium space on the station precinct it cannot be possible to cater for the demand of outdoor circulatory space necessary for toddlers and young children in a safe manner.

2.3.2 Banking

- Banking services (i.e. ATM) provided in building or close by (within 3km)

Banking facilities have been catered for in the building with major banking chains having machines at a central distribution point, close to the Travel Agencies that were designed to cater for the tourist traveller in mind.
The idea that a traveller would start his journey at the station is very important. It is thus important to note that one may arrive at the station and have one's whole journey to an overseas destination planned and booked at the central booking terminal in the station. This facility is situated in the main vertical route leading form the basement levels to the platform area.

2.3.3 Retail

- Grocery, items required on a day to day basis available in building or close by (within 3km)

The building in the escalator spaces a shopping mall where numerous shops are situated to cater for this need. In addition there is a supermarket on the ground floor level that would stock whatever isn't available on the basement shopping mall.

2.3.4 Communication

- Postal, telephone or email facilities provided in the building or close by (within 3km)

The proximity of numerous services both governmental and private in the Hatfield shopping precinct caters for these.
The inclusion of readily accessed post-boxes from both the governmental and private concerns can be catered for as the need to do so have been established by means of passenger surveys as the service comes into operation.

2.3.5 Residential

- Home, for occupants of the building is within 12km.

Occupants of the building live in a radius of 1.5km of the building.
With the densification of the Hatfield area the goals of residential occupation would be achieved.
Densities of 25du/ha are called for. This entails the addition of 2500 dwelling units created additionally of 60m².if it is accepted that there are 472 units in the 100ha area an additional 2028 units will be required.
A 45% coverage can thus be attained in Hatfield in available vacant land. Hatfield Village near Hartebeesspruit station is one area identified as being of high value.

At present the residential coverage is: 200 m²/unit with 472 units in the node.

The desired coverage would be 50% with a height of no more than four storeys for residential buildings – it would thus be unwise to make the proposed new building higher as this would adversely affect the urban character of the neighbourhood.

2.4 Participation & Control

Ensuring that users participate in decisions about their environment helps ensure that they care for and manage this properly. Control over aspects of their local environment enables personal satisfaction and comfort. Both of these support sustainability by promoting proper management of buildings and increasing productivity

2.4.1 Environmental control

- Users of building have reasonable control over their environmental conditions; this should include opening windows and adjustable blinds.

Office workers have the ability to open windows and doors leading to a green balcony area surrounding the offices. It is possible for the people to even step out and be in sunshine, an important design aspect in the building.

2.4.2 User adaptation

- Furniture and fittings i.e. tables, chairs, internal partitions designed or specified allow arrangement/rearrangement by user. Provision made for personalisation of spaces if desired. This may include provision for pin boards, choice of colours, places for plants and personal storage.

The office spaces have been designed to be open plan, and user alterable.
Layout of the interiors has been designed to be changeable as tenants and styles change. The envelope of the building caters for the ease of change by not having set partition walling in place. All division is by means of dry walling.

2.4.3 Social spaces

- Design for easy informal / formal social interaction. This could involve a tearoom with comfortable seating. Seating provided along regularly used routes. Spaces shared between occupants/users (i.e. photocopying rooms etc) large enough to allow for comfortable social interaction.

Due to the social nature of the building it is very geared for interaction. All spaces force people to intermingle.

In office spaces, due to the open plan nature of the building the interaction is ensured.

In the park like areas surrounding the building, designed seating benches and canopies have been created to ensure interaction spaces for not only the passenger, but also for the local residents.

The use of trees in these areas enhances the shade and hence the social gathering spaces of the building.

2.4.4 Amenity

- Easy access to refreshment facilities (tea point, kitchen, vending machines) and WCs for all users of the building

Amenities in the building due to the nature of the building would have to cater for the wims of the business traveller and discerning tourist.
For this reason the cafeterias and restaurant spaces would have to contend with vending machines placed in close proximity for those not inclined to have a sit-down dinner.
This competition can only be described as healthy.

2.4.5 Community involvement

- Spaces or services shared or made available to local community. This could include access to computers, teaching learning spaces, leisure facilities, and crèche.

The local community intrinsically shares in the ultimate success of the building, by means of the shared nature of the urban park surrounding the building, as well as the community forum spaces created for members of the community to express themselves through art in spaces provided for this function. Graffiti walls and community art mosaic panels throughout the building.

2.5 Education, Health and Safety

Buildings need to cater for the well being, development and safety of the people that use them. Awareness, and environments that promote health can help reduce the incidence of diseases such as AIDS. Safe environments and first aid can help limit the incidence of accidents and where these occur, reduce the effect. Learning and access to information is increasingly seen as a requirement of a competitive work force. All of these factors contribute to sustainability by helping ensure that people remain healthy and economically active, thus reducing the 'costs' (to society, the environment and the economy) of unemployment and ill health.

2.5.1 Education

- Access to support for learning provided. This can be in the form of Internet access, structured courses, or the provision of learning material such as books, journals and newspapers.

The building through the sub-terrainean mall and the commercial shops it would house will have due to its user profile have Internet Cafes. These could easily serve the local community in the training of computer literacy. The advantage of having these functions as private sector entities is that the operator can make profit from the venture ensuring growth if possible and prolonged use. If the market exists it would evolve naturally.

2.5.2 Security

- Measures taken to ensure that areas of the buildings and routes to and from the building are safe, and feel safe. Measures taken could include well lit routes, routes and spaces overlooked by occupied areas, clear visual links between spaces to ensure security measures can be effective.
- As seen in European examples the constant monitoring of the environment greatly cuts down on the petty crime aspect, which in turn leads to more serious crime.
- As seen in the example set by Mayor Rudolph Gullianni in New York, the clamping down on petty offenders eliminates the environment for serious crime. It would thus follow that in the proposed new Gautrain station the occurance of "Squeegee Men" (lapswaaiers) would have to be eliminated to create a safe station environment for the proposed end user.

As was shown by the esteemed ex-major of New York, simple measures such as these have even had an affect on the number of serious crime such as murders and rapes.

The security of the station precinct would be handled in conjunction with the SANPS and a concessionaire tasked with the security on the platforms.

The Policing Service would have a presence on the station with a satellite station on-site. The station would also comprise a holding area to confine offenders for

processing.

Passenger Safety

On-site police station ensures continuous monitoring of all passengers and people entering the building and station precinct. The police station also have holding cells in the event of an arrest in order to maintain a presence on site, and not to have personnel transport dangerous suspects to neighbouring police stations.

The monitoring of all people would be by means of close circuit television cameras places throughout the building and monitored in the police station in a dedicated monitoring facility. Added to this is the design of clear, unobstructed views in and around the building. Blind allies and corridors are eliminated.

2.5.3 Health

- First aid kit provided in a central location. Policy to ensure that this can be used effectively. Information readily available on health, education, and career development issues. This could be in the form of a well serviced notice boards located in a central position.

2.5.4 Smoking

- No smoking in public spaces, Space allocated for smoking where it will not affect other users, i.e. away from air intakes etc.

2.5.5 Safety

- Building complies with all health and safety requirements. Policy/regular checks in place to ensure that these are complied with.

The building, because it is a public transit building need to adhere to numerous important aspects as laid out in the SABS 0400, deem to satisfy regulations.

Fire safety

Materials used in the building should be fire retardant and have a fire rating of no less than 2.5hours in an event of a fire to ensure structural integrity and stability. This is to ensure maximum survivability in the event of a fire of as many individuals as possible.

Clear legibility – as were learnt from the Kings Cross Subway Fire in 1988, on the London Underground. People need to be aware of escape routes and alternative routes in and around the building.

Circulation in and around the building has been designed with the design guidelines of minimum 1.8m corridors being far exceeded – to some areas as much as 6.5m to 7.5m.

The structural material in the building is predominantly re-inforced concrete in the superstructure and structural steel members in the roofing elements.
The weaker of the two (structural steel) have been confined to the office areas and train canopy where it would not be a hazard to passengers in the event of a fire.
The main concourse areas have re-inforced concrete as its structural element – greatly increasing the survivability factor of the building in relation to its occupants.

Water sprinkler valves throughout the building.

People are given longer time to escape shorter distances over even terrain and wide corridors to safety.

Platform Safety

Passengers would be protected from malicious bumps by means of not only around the clock cctv but also platform screen doors that only opens simultaneous with the train doors to ensure nobody is shoved underneath moving trains.

3 Economic Issues

3.1 Local Economy

The construction and management of buildings can have a major impact on the economy of an area. The economy of an area can be stimulated and sustained by buildings that make use and develop local skills and resources.

3.1.1 Local contractors

- 80% of the construction has been carried out by contractors based within 40km of the building/refurbishment

This aspect was addressed in the use of both local artisans in the building of the structure as well as in the use of artists in the laying of the mosaic tile indigenous artworks. The use of varying levels of accomplishment in the artists used ensures that the procession of space from less to more important space is emphasised. The natural evolution of this would be that on the approaches of the station, less well-known artists' work are utilised and in more defined, important spaces the more prominent ones have their forum.

3.1.2 Local building material supply

- 80% of construction materials: cement, sand, bricks etc produced within 200km of site

Building material supplied to the site have been carefully looked at to comprise of materials that are indigenous to the area, and not as is the norm in other high ranking projects, the importation of exorbitant building materials such as marble to emphasise the importance of spaces.

3.1.3 Local component manufacturer (Furniture?)

- 80% of building components i.e. windows and doors produced locally (within 200km)

Construction and supply of the furnishings in the building closely follows these norms. The pedestrian benches in the public forum park are would consist of a composite of materials with the parts in direct abrasive contact with the public being concrete, and the less exposed materials in the smaller canopy structures having hardwood elements incorporated in it.

The hardwood areas have however the exclusive predominance in the tourist information centre and surrounds, while the less prestigious areas surrounding the

traders area where more wear and tear is expected the canopies would consist of steel section elements.

3.1.4 Outsource opportunities

- Opportunities created and provision provided for small emerging businesses. This includes outsourcing catering, cleaning services and security as well as making space and equipment available for businesses to use for retail, education etc.

The outsourcing of certain elements in the station design would mainly be in the every day running of the enterprise. Where the building is a joint venture between the Provincial Government and the Municipality of Tshwane, these decisions would be the domain of the chosen concessionaires operating the structure. Elements have however been put in place to ensure that the building lend itself to such outsourcing.

Elements such as cleaning and security would be major outsourcing elements in the design.

3.1.5 Repairs and maintenance

- All repairs and maintenance required by the building (including servicing of mechanical plant) can be carried out by contractors within 200km of site.

Due to the proprietary nature of the switchgear involved in the high-speed train layout the servicing of local contractors would for the foreseeable future of at least 15 years remain proprietary, before the technologies in place may be outsourced. This complication is however a function of modern day technological transfer, where the developing firm would have the right to protect its investment in the long term, by servicing the machinery in the short term.

3.2 Efficiency of Use

Buildings cost money and make use of resources whether they are used or not. Effective and efficient use of buildings supports sustainability by reducing waste and the need for additional buildings.

3.2.1 Useable space

- Non-useable space such plant, WCs and circulation does not make up more than 20% of total area.

The building being designed to be an efficient machine for the loading and unloading of passengers, the amount of space utilised to perform this function enjoyed a premium, with the result that the wasted space in the building not dedicated to circulation or retail have been kept to a minimum.

3.2.2 Occupancy

- Building and all working/living spaces are occupied for an average equivalent minimum of 30 hours per week.

Due to the office nature of the building this point would be dealt with in that the working time allowed for office workers is 410 hours per week, falling well within the confines set.

The continuous use of the building after hours to ensure safety and vandal prevention is by means of the situation of after work activities in the building – restaurants, this aspect provides vibrancy the project.

3.2.3 Space use

- Use of space intensified through space management approach and policy such as shared workspaces i.e. 'hot-desking'.

3.2.4 Use of technology

- Communications and information technologies used to reduce space requirements i.e. videoconference, teleworking etc.

The Proposed new Gautrain Station in Hatfield would in its essence be a highly technological building – showcasing the prowess of the South African building and engineering community. Seen in this light it would be unthinkable not to have Internet connectivity in the building as well as "Blue Tooth" technology where the wireless future of technology would be utilised.

The passenger / user profile of the high-speed train service would also have it that the provision of these and other cutting edge technologies would be inescapable. The business traveller using the service must use the 35 minutes it would take to commute from one station to the next to keep up to speed.

3.2.5 Space management

- Policy to ensure that space is well used. This may include regular audits, or space management system that charges space to cost centres.

3.3 Adaptability and Flexibility

Most buildings can have a life span of at least 50 years. It is likely that within this time that the use of the building will change, or that the feasibility of this will be investigated. Buildings, which can accommodate change easily supports sustainability by reducing the requirement for change (energy, costs etc) and the need for new buildings.

3.3.1 Vertical dimension

- Structural dimension (Floor to underside of roof, or slab of the floor above) minimum of 3m

The design of the Floor-to-ceiling heights in the built envelope called for the high provision of service space left open for future expansion upwards.
The plan would be to include in future, an Office Block over the Public Forum Park, and an Hotel of international Standard in the Station precinct catering for the International Business Traveller.

For this reason a space of 4.25m have been designed.

3.3.2 Internal partitions

- Internal partitions between living/work spaces are non-load bearing (ie non-load bearing brick / block or plasterboard partitions) and can be ‘knocked-out’ relatively easily.

3.3.3 Services

- Easy access provided electrical, communication and (and HVAC, where appropriate) in each useable space. Provision made for enabling easy modification of system (i.e. addition subtraction of outlets)

3.4 Ongoing Costs

3.4.1 Maintenance

- Specification and material specification for low maintenance and or low cost maintenance. All plant and fabric have a maintenance cycle of at least 2 years. Low or no maintenance components (i.e. windows, doors, plant, ironmongery etc) selected. Maintenance can be carried out cost effectively (i.e. replaceable items such as light bulbs can be easily reached and replaced).

3.4.2 Cleaning

- Measures taken to limit requirement for cleaning. Hard wearing solid flooring (limited or no carpeting) specified. Windows easily accessible for cleaning.

Extensive thought were given to this aspect of the building's design in that private firms creating job opportunities would be tasked with the cleaning of the building and surrounds.

3.4.3 Security / care taking

- Measures taken to limit the requirement and costs of security. This should include mixed-use development (area is always occupied), buildings and spaces overlooked by occupied neighbouring buildings.

3.4.4 Insurance / water / energy / sewerage

- Costs of insurance, water, energy and sewerage monitored. Consumption and costs regularly reported to management and users. Policy and management to reduce consumption (i.e. switching off lights on leaving building spaces) implemented.

3.4.5 Disruption and 'downtime'

- Electrical and communication services, HVAC and plant located where they can be easily accessed with a minimum of disruption to occupants of building. This should maximising access to this from circulation areas (rather than work/living areas) and lift off panels at regular intervals to vertical and horizontal ducting.

3.5 Capital Costs

Buildings are generally one of the most valuable assets that people, and often organisations and governments own. Money spent on buildings is not available for other uses such as health and education. Often too, the high cost of buildings results in the services (i.e. health and education) and the accommodation (for work and living) is beyond the reach of people with the lowest incomes. Buildings that are cost effective support sustainability by helping provide access to accommodation and services for low-income areas and by enabling money to be spent on other areas that support sustainability.

3.5.1 Consultant fees

- Consultant fees not just calculated on total project cost basis. Incentives provided to consultants to reduce capital cost and ongoing costs.

3.5.2 Build-ability

- Building designed to be easily and cheaply built. Building form simple. Replication of elements and components.
- For this reason re-inforced concrete were decided upon, as it is well known in this country and craftsmen readily adapt to the constraints thereof.
- In other countries it is more expensive to use concrete – but in South Africa it is deemed as a sustainable building method.

3.5.3 Construction

- Construction approach designed to reduce initial capital cost of building. Building undertaken in a series of phases. Building built as shell first with finishes to be added later.
- Phase building as understood in general cannot apply to this building, as the essence of the building would be its service to the community. As such it would have to be relatively finished to fulfil this function. Halfway-completed station does not function to full capacity – as this building is a machine it would have to be complete.
- What can well be attained is the phasing of larger expansionary elements, such as the before mentioned Hotel and Office Tower projects, which would be entities in themselves.

3.5.4 Shared costs

- Cost of building shared with other users
- The building costs would be effectively shared as it is a joint venture between the Government, Provincial Government and the City of Tshwane.
- The enormous costs involved in the creation of the building and Gautrain concept cannot be brought to fruition by a single role player bearing the financial cost of the project. For this reason, even the day-to-day running of the building would have to be shared financially in the interim period of 15-30 years planned.

3.5.5 Sharing arrangements

- Size and quantity of buildings reduced through arrangements to use existing spaces and buildings.

4 Environmental Issues

4.1 Water

Water is required for many activities. However the large-scale provision of conventional water supply has many environmental implications. Water needs to be stored (sometimes taking up large areas of valuable land and disturbing natural drainage patterns with associated problems from erosion etc), it also needs to be pumped (using energy) through a large network of pipes (that need to be maintained and repaired). Having delivered the water, a parallel efforts is then required to dispose of this after it is used, i.e. sewerage systems. Reducing water consumption supports sustainability by reducing the environmental impact required to deliver water, and dispose of this after use in a conventional system.

4.1.1 Rainwater

- Rainwater is harvested, stored and used.

4.1.2 Water use

- Water efficient devices

4.1.3 Grey water

- Grey water (water from washing etc) recycled (to flush toilets or water plants)

4.1.4 Runoff

- Run off reduced by using pervious or absorbent surfaces. Hard landscaping minimised, previous surfaces specified for car parking and paths.

4.1.5 Planting

- Planting has low water requirement (indigenous species)

4.2 Energy

Buildings consume about 50% of all energy produced. Conventional energy production is responsible for making a large contribution to environmental damage and non-renewable resource depletion. Using less energy or using renewable energy in buildings therefore can make a substantial contribution to sustainability.

4.2.1 Location

- Building located within 400m of public transport
- Very important as the building is a station.
- The interconnected-ness of the different modes and sixes of transport needs to be stimulated in the positioning of these aspects of the design
- Care needs to be taken not to cross-vulnerable pedestrian traffic flow with vehicular traffic such as busses or cars. For this reasons the step-over spaces need to be designed to facilitate the inter-flow.

4.2.2 Ventilation System

- The building can have areas such as in the Office Wings where passive ventilation can be utilised effectively, in the rest of the building the combined air-pressure created by the incoming and exiting trains, and mechanical ventilation systems would ventilate the basement areas.

Ventilation Requirements for the different activity functions

Toilets	10 l/s per m²
Offices	15 l/s per m²
Arrival and departure area	20 l/s per m²
Shops	10 l/s per m²
Platforms	20 l/s per m²
Stairwells (Fire Escapes)	Pressurized as per the Fire Regulations
Equipment Rooms	As per specifications lain down by manufacturer

Above table as per SABS 0400 - 1990

4.2.3 Heating and Cooling System

- The extensive use of mass in the walls of the above ground spaces combined with the use of insulated metal roof sheeting, creates effective thermal performance to the building.
- By using louvers the heat build-up can be minimised and encouraged in the colder months.

4.2.4 Appliances and Fittings

- Energy efficient fittings and devices specified. 80% of light fittings are fluorescent/low energy consumption

4.3 Recycling and Reuse

Raw materials and new components used in buildings consume resources and energy in their manufacture and processes. Buildings accommodate activities that consume large amounts of resources and products and produce large amounts of waste. Reducing the use of new materials and components in buildings and in the activities accommodated and reducing waste by recycling and reuse supports sustainability by reducing the energy consumption and resource consumption.

4.3.1 Inorganic waste

- Arrangements for sorting, storage and pick up of recyclable waste.
- The kitchen waste generated by the restaurant areas needs to be catered for here. Facilities were added to store and distribute waste to central collection points inside the basement, from where the contractors disposing of the waste would come and pick it up.
- Careful thought and planning needed to be handed into the local authority to prove that provision had been made for this.

4.3.2 Organic waste

- Recycled on site i.e. compost

4.3.3 Construction waste:

- Construction waste minimised through design careful management of construction practices. Design limits wastage by designing to comply with modular dimensions of materials etc

4.4 Site

Buildings have a footprint and a size that take up space that could otherwise be occupied by natural ecosystems which contribute to sustainability by helping create and maintain an environment that supports life. (By, for instance controlling the carbon dioxide and oxygen balance and maintaining temperatures within a limited range). Buildings can support sustainability by, limiting development to sites that have already been disturbed, and working with nature by including aspects of natural ecosystems within the development.

4.4.1 Brownfield site

- Building constructed on a site already previously built on.
- The selection of the site to place the main station complex closely followed the premise that previously disturbed ground must be used.

4.4.2 Neighbouring buildings

- Building does not have harmful affect on neighbouring buildings i.e. over shading, where access to sunlight is important.

4.4.3 Vegetation

- Site has extensive vegetation. Opportunities have been taken to plant in car parking areas, and in and around buildings i.e. atriums, window boxes and roof gardens.
- The concept of the Public Forum Park situated to the east of the station building were expressly due to the realization that vegetation needed to be brought into the design of the building.
- No clear demarcation between interior and exterior were made and as far as possible the design emphasizes the close co-operation between nature and this otherwise urban building type. Living in Africa one cannot follow the stodgy thoughts lain down dictating that urbanity must constitute concrete and steel without vegetation.
- With the use of grown trees transplanted onto site uniformity is created and an instant sense of permanence can be created.

4.4.4 Habitat

- Site has provided habitats for animals. This includes a coordinated landscaping strategy that takes into account planting, water and habitat etc.

4.5 Materials and Components

The construction of buildings usually requires large quantities of materials and components. These may require large amounts of energy to produce. Their development may also require process that are harmful to the environment and consume non-renewable resources.

4.5.1 Embodied energy

- 80% of the building materials and components made from materials and components with low embodied energy. Low embodied energy materials include locally (within country) made and sourced timber, concrete, concrete block timber windows and doors.

4.5.2 Material / component sources

- 90% of materials and resources from renewable resources

4.5.3 Manufacturing processes

- Environmental damage limited during product component development. No green house gases released, no pollution caused.

For this reason extensive use was made of concrete as a building element as the embodied energy of the material is low which means the amount of energy consumed in the manufacturing process, is mitigated by the volume of useful material created. The construction process in South Africa, with the extensive use of cheap un-schooled labour lends it to the use of this material in minimizing cost while maximizing the built dividend.

In manufacture of the aluminium elements of the building cladding elements and the louvered systems the argument can well be made that the elements consumed vast amounts of electrical energy. The flip side is the truth we should however pursue as the eventual re-use of those building element would in infinity be cheaper than the use of a more deteriorating element such as steel which cannot be re-used as it in some instances disintegrates due to corrosion. Steel if not treated must be re-smelted and can only then be re-constituted. This entails a further use of damaging green house gasses.

The steel in the building has been used in a protected environment predominantly, and where exposed to the elements due care has been taken in the specification

process to ensure protection to corrosion.

4.5.4 Recycled / reused materials and components

- 10% of building materials and components are reused or from recycled sources.

The building being a re-inforced concrete building in its superstructure lends itself perfectly to the utilization of reclaimed aggregate in the concrete. Concrete is one of the most recyclable products in the building industry, with an embodied energy that supports the goals of job creation crucial in third world countries such as South Africa.

The copper roofing material can if need be, be reclaimed at a later stage as was done by the Welkom Municipality in order to obtain crucially needed funds for redevelopment. The cost of removal and replacement with more conventional metal cladding would not be overshadowed by the dividends obtained from the selling of the product. This course of action is not advised however as the roofing material does not merely serve a aesthetic appeal, but it plays an integral part in the water harvesting system of the building.

4.5.5 Construction processes

- Building and construction process designed to minimally impact the environment. Requirement for large-scale vegetation clearing and earth movement minimised.

This point is impossible when it comes to the building as it entails the construction of vast basement areas. Due to the high water table in Hatfield the ensuing difficulty in disposing of the excess water without adversely affecting the water table in adjacent properties and in the surrounding ecosystem.

The impact of this should however be weighed against the advantages foreseen for the project for the community.

Building Sustainability **Outline SBAT Evaluation** **Student Design Scheme**

Project: Gautrain Station, Hatfield By: André du Plessis Date: 06 June 2003

1 Performance Prioritisation

Refer to site analysis, brief & client / building user priorities

	Criteria	No Requirement 1	Low Requirement 2	Medium Requirement 3	High Requirement 4	Essential 5
SO	**Social**					
SO1	Occupant Comfort					•
SO2	Inclusive Environments					•
SO3	Access to Facilities					•
SO4	Participation and Control	•				
SO5	Education Health and Safety			•		
EC	**Economic**					
EC1	Local Economy					•
EC2	Efficiency of Use			•		
EC3	Adaptability and Flexibility	•				
EC4	Ongoing Costs					•
EC5	Capital Costs		•			
EN	**Environmental**					
EN1	Water			•		
EN2	Energy	•				
EN3	Waste		•			
EN4	Site				•	
EN5	Materials and Components					•

2 Target Setting & Assessment

Refer to site analysis, brief & client / building user priorities, and benchmarks for building type

	Criteria	Target Set	Building Performance	Reference	Achieved? Y / N	Comment
S0.1	*Occupant Comfort*					
S0.1.1	Ventilation	Essential Requirement (5)	Essential Requirement (5)		Y	
S0.1.2	Thermal comfort	Medium Requirement (3)	Medium Requirement (3)		Y	
S0.1.3	Views	High Requirement (4)	High Requirement (4)		Y	
S0.1.4	Noise	Essential Requirement (5)	Essential Requirement (5)		Y	
S0.1.5	Indoor / Outdoor connection	Essential Requirement (5)	Essential Requirement (5)		Y	
S0.2	*Inclusive Environments*					
SO.2.1	Transport	Essential Requirement (5)	Essential Requirement (5)		Y	
SO.2.2	Entrance	Essential Requirement (5)	Essential Requirement (5)		Y	
S0.2.3	Circulation	High Requirement (4)	High Requirement (4)		Y	
S0.2.4	Furniture & Fittings	Medium Requirement (3)	High Requirement (4)		Y	
S0.2.5	Toilets & Kitchens	Essential Requirement (5)	High Requirement (4)		N	
S0.3	*Access to Facilities*					
S0.3.1	Childcare	Low Requirement (2)	Low Requirement (2)		Y	
S0.3.2	Banking	Medium Requirement (3)	Medium Requirement (3)		Y	
S0.3.3	Retail	High Requirement (4)	High Requirement (4)		Y	
S0.3.4	Communications	High Requirement (4)	High Requirement (4)		Y	
S0.3.5	Work / Residential	Low Requirement (2)	Low Requirement (2)		Y	
S0.4	*Participation & Control*					
S0.4.1	Environmental control	Low Requirement (2)	Low Requirement (2)		Y	

S0.4.2	User manual/training	Medium Requirement (3)	High Requirement (4)		Y	
S0.4.3	Social spaces	Essential Requirement (5)	Essential Requirement (5)		Y	
S0.4.4	Amenity	Essential Requirement (5)	Essential Requirement (5)		Y	
S0.4.5	Local community	Medium Requirement (3)	Medium Requirement (3)		Y	
S0.5	*Education, Health & Safety*					
S0.5.1	Education	Low Requirement (2)	Low Requirement (2)		Y	
S0.5.2	Safety & security	Essential Requirement (5)	Medium Requirement (3)		N	
S0.5.3	Smoking	High Requirement (4)	Medium Requirement (3)		N	
S0.5.4	Indoor air quality	Essential Requirement (5)	High Requirement (4)		N	
S0.5.5	Exercise & recreation	Low Requirement (2)	Low Requirement (2)		Y	
EC.1	*Local Economy*					
EC.1.1	Local contractors	Essential Requirement (5)	High Requirement (4)		N	
EC.1.2	Local building material supply	High Requirement (4)	Medium Requirement (3)		N	
EC.1.3	Local components	High Requirement (4)	Medium Requirement (3)		N	
EC.1.4	Repairs and maintenance	Medium Requirement (3)	Medium Requirement (3)		Y	
EC.1.5	SMME support	Essential Requirement (5)	Medium Requirement (3)		N	
EC.2	*Efficiency of Use*					
EC.2.1	Space Use	High Requirement (4)	Medium Requirement (3)		N	
EC.2.2	Occupancy schedule	Medium Requirement (3)	Low Requirement (2)		N	
EC.2.3	Management of space	High requirement (4)	Medium Requirement (3)		N	
EC.2.4	Use of technology	Essential Requirement (5)	Essential Requirement (5)		Y	
EC.2.5	Disruption & downtime	Essential Requirement (5)	Medium Requirement (3)		N	
EC.3	*Adaptability & Flexibility*					

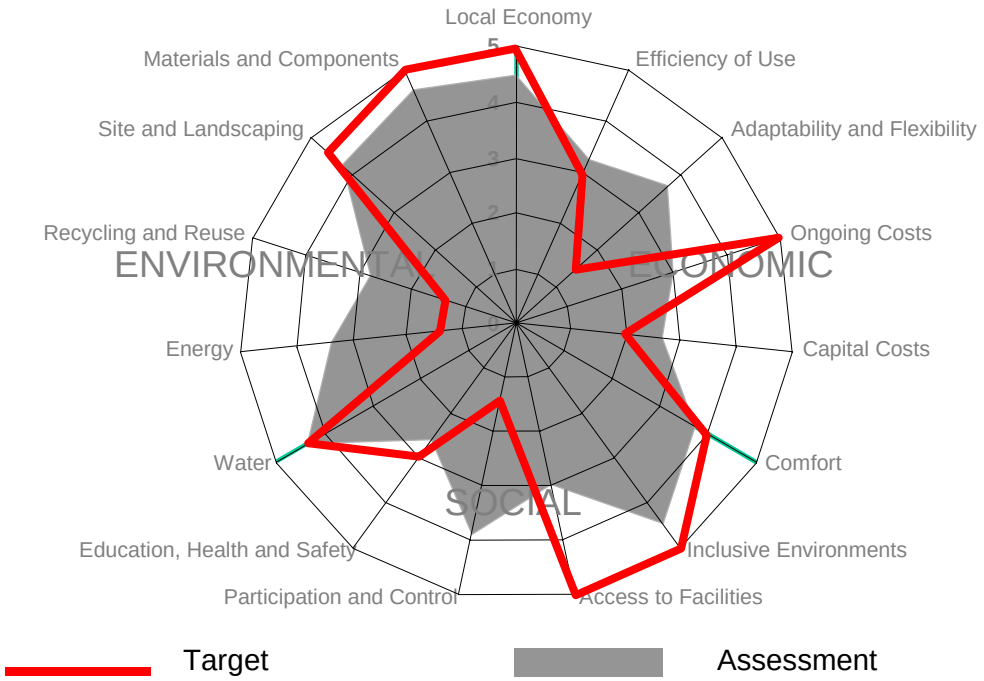
EC.3.1	Vertical dimension	Essential Requirement (5)	Essential Requirement (5)		Y	
EC.3.2	Internal partitions	Essential Requirement (5)	Essential Requirement (5)		Y	
EC.3.3	M&E Services	Essential Requirement (5)	Medium Requirement (3)		N	
EC.3.4	Structure	Low Requirement (2)	Low Requirement (2)		Y	
EC.3.5	Circulation & service spaces	High Requirement (4)	High Requirement (4)		Y	
EC.4	*Ongoing Costs*					
EC.4.1	Maintenance	High Requirement (4)	High Requirement (4)		Y	
EC.4.2	Cleaning	Medium Requirement (3)	Low Requirement (2)		N	
EC.4.3	Security / care taking	Essential Requirement (5)	Medium Requirement (3)		N	
EC.4.4	Shared costs	Medium Requirement (3)	Medium Requirement (3)		Y	
EC.4.5	Cost monitoring	High Requirement (4)	Medium Requirement (3)		N	
EC.5	*Capital Costs*					
EC.5.1	Use of existing	Low Requirement (2)	Low Requirement (2)		Y	
EC.5.2	Shared cost	Medium Requirement (3)	Low Requirement (2)		N	
EC.5.3	Plate efficiency	Essential Requirement (5)	Medium Requirement (3)		N	
EC.5.4	Ratio of capital to ongoing costs	Medium Requirement (3)	Medium Requirement (3)		Y	
EC.5.5	Proportions of cost / building size	Medium Requirement (3)	Low Requirement (2)		N	
EN.1	*Water*					
EN.1.1	Rainwater	Essential Requirement (5)	Essential Requirement (5)		Y	
EN.1.2	Water Use	Essential Requirement (5)	Essential Requirement (5)		Y	
EN.1.3	Grey water	Essential Requirement (5)	Essential Requirement (5)		Y	
EN.1.4	Runoff	Essential Requirement (5)	Low Requirement (2)		N	
EN.1.5	Planting	Essential Requirement (5)	High Requirement (4)		N	

EN.2	*Energy*					
EN.2.1	Transport	Essential Requirement (5)	High Requirement (4)		N	
EN.2.2	Ventilation	Essential Requirement (5)	High Requirement (4)		N	
EN.2.3	Environmental control	Essential Requirement (5)	Medium Requirement (3)		N	
EN.2.4	Appliances & fittings	Essential Requirement (5)	Medium Requirement (3)		N	
EN.2.5	Energy sources, Renewable energy	Essential Requirement (5)	Medium Requirement (3)		N	
EN.3	*Waste*					
EN.3.1	Organic waste	Low Requirement (2)	Low Requirement (2)		Y	
EN.3.2	Inorganic waste	High Requirement (4)	Medium Requirement (3)		N	
EN.3.3	Toxic waste	High Requirement (4)	Medium Requirement (3)		N	
EN.3.4	Sewerage	High Requirement (4)	Medium Requirement (3)		N	
EN.3.5	Construction waste	Medium Requirement (3)	Medium Requirement (3)		Y	
EN.4	*Site*					
EN.4.1	Brownfield site	Essential Requirement (5)	Essential Requirement (5)		Y	
EN.4.2	Neighbouring buildings	Medium Requirement (3)	Medium Requirement (3)		Y	
EN.4.3	Ecosystems	Low Requirement (2)	Low Requirement (2)		Y	
EN.4.4	Landscape inputs	High Requirement (4)	High Requirement (4)		Y	
EN.4.5	Construction processes	High Requirement (4)	Medium Requirement (3)		N	
EN.5	*Materials & Components*					
EN.5.1	Material / Component Sources	Low Requirement (2)	Low Requirement (2)		Y	
EN.5.2	Embodied energy	Medium Requirement (3)	Medium Requirement (3)		Y	
EN.5.3	Manufacturing processes	Low Requirement (2)	Low Requirement (2)		Y	

EN.5.4	Recycled & reuse of materials & components	Essential Requirement (5)	Medium Requirement (3)		N	
EN.5.5	Modular coordination	Essential Requirement (5)	High Requirement Requirement (4)		N	

3 SBAT Report

Develop with reference to 1. Performance Prioritisation and 2. Target Setting and Assessment (above)



Comments

SO: Social

EC: Economic

EN: Environmental