Design criteria

Interface of user and mode

The single platform battery system has been found to be the safest, most effective and understandable, and should therefore be used.

The more platforms will lead to more commuters being serviced by more taxis which results in a faster service to commuters.

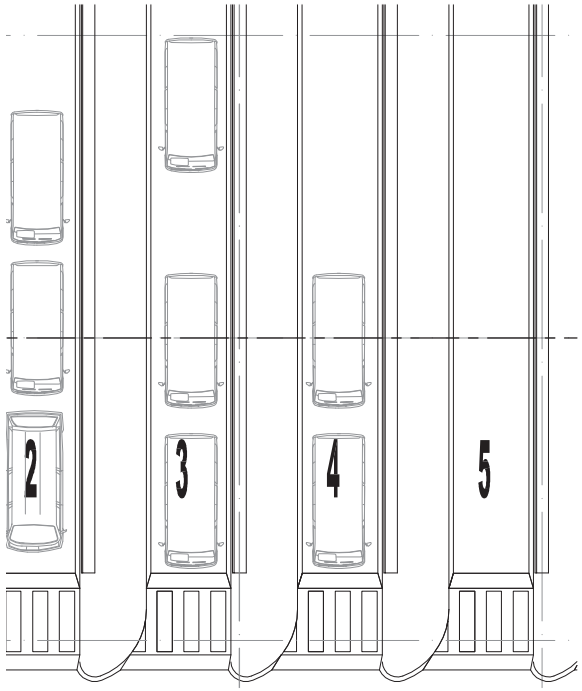
A single point at the end of the platform is to be used for embarkment or disembarkment, thereby first come first serve system will be achieved by both taxis and commuters. The rest of the platform should be used for awaiting commuters.

Robust seating should be provided on the platform for the waiting commuters.

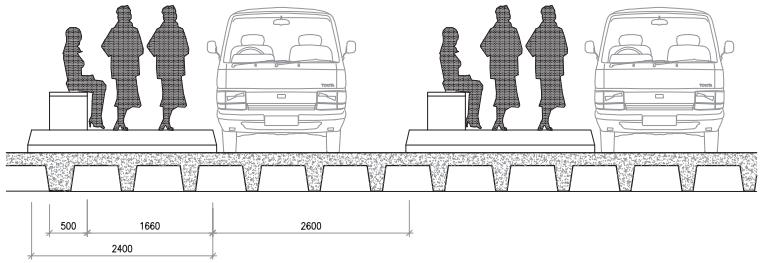
Platform should be raised to create a barrier for vehicles and a threshold for commuters, thereby removing the commuter off the road and keeping the taxi away from the platform.

Platforms are required to be wide enough for seating and a duel pedestrian walkway, to accommodate both embarking and disembarking commuters that may be there at the same time.

Trading should be prohibited on the platforms due to congestion at peak hours, as it would put pedestrian lives at jeopardy.



3_01 Battery platform system plan.
Scale 1:250



3_02 Elevation of battery platform system.
Scale 1:100

Circulation

Traffic must be channeled through a single entrance and exit to avoid weaving by Taxis. (vide figure 3_03)

Space needs to be provided before taxi entrance from street to allow for stacking vehicles prior to entering the terminal, in order that taxis do not obstruct the cities road system and cause congestion.

Both commuter and taxi need to move freely, any interaction would mean delay by either party.

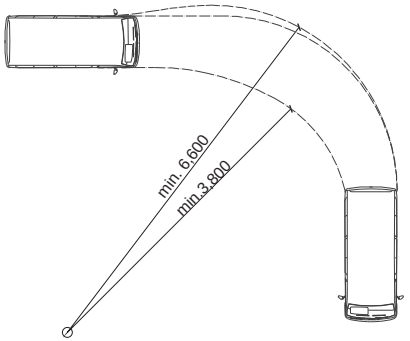
Double lanes for taxis are to be avoided, one way traffic only, for safety and clarity of taxi movement. Taxis would move into oncoming traffic if it means getting ahead of a queue. (Peska, P. 2007)

Sufficient space in corridors to be allowed for increase in commuter volumes, to avoid congestion.

Sufficient turning circle and road width for taxis must be planned for correct function of the building.

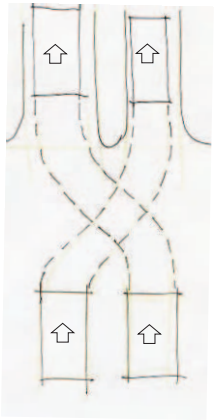
Design should be a single queue movement in holding areas to promote First come first serve basis for taxi holding areas.

Disabled people to have full access into all facilities. Floor height variations to be avoided, access ramp of no more that a 1:12 metre fall are acceptable.

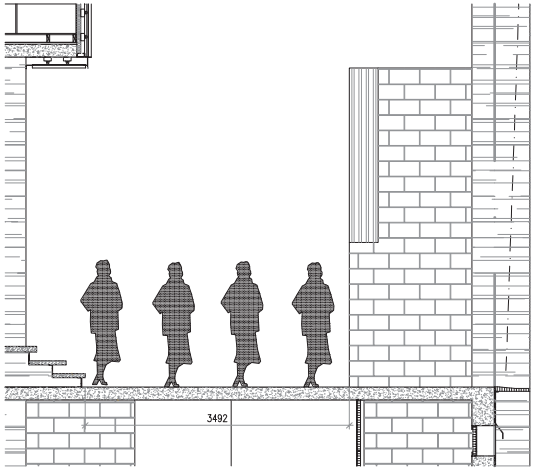


Min. turning circle =
3,8m internal
6,6m external
(Grobbelaar:1992)

3_04 Taxi turning circle.
Scale 1:250



3_03 Taxi weaving



3_05 Section through 4 breast walkway.
Scale 1:100

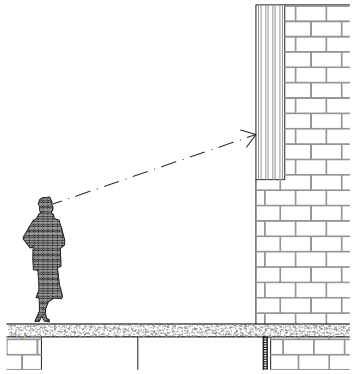
Coherency

The Building must notify users automatically as much as possible without signs, and if signage is used, it must be simple and comprehensive even with illiterate users.

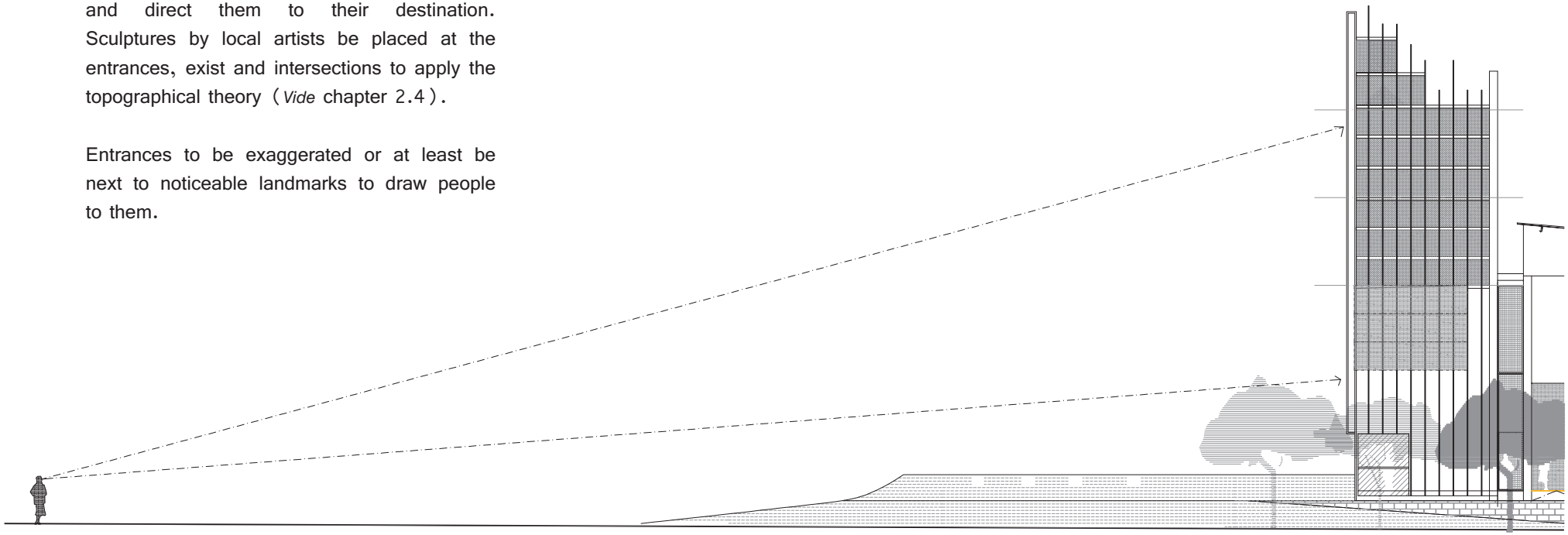
Different landmarks inform the users on where they are. These could consist of colour coding lights and signs, and applying different functions along the site.

The building is to inform users about the city and direct them to their destination. Sculptures by local artists be placed at the entrances, exist and intersections to apply the topographical theory (*Vide* chapter 2.4).

Entrances to be exaggerated or at least be next to noticeable landmarks to draw people to them.



3_06 Visual landmark. Scale 1:100



3_07 Visual landmark tower. Scale 1:200

Ability to generate activity

It is necessary to activate streets with adjacent parks, squares with shops, seating and traders stalls to improve the social image of urban areas.

Lighting is essential at night, all routes are to be illuminated including those going into the city. " By deliberately not providing lighting along a specific route, pedestrians could be directed away from potentially dangerous routes along safer, illuminated routes" (Kruger, Landman, Liebermann. *S.a.* :50).

This is similar to the practice found in most university campuses. The green route is a path that is always being patrolled and can be fitted with panic stations, so as to alert security and indicate where one is. Surveillance areas are therefore reduced, and are safe. These routes could be used into the late hours in the evening.

Safety and Security

Lines of sight should be kept clear for passive surveillance to be achieved

The design must support 24 hour functions such as cinemas hotels, shops and satellite police stations, in order to have the building used at night.

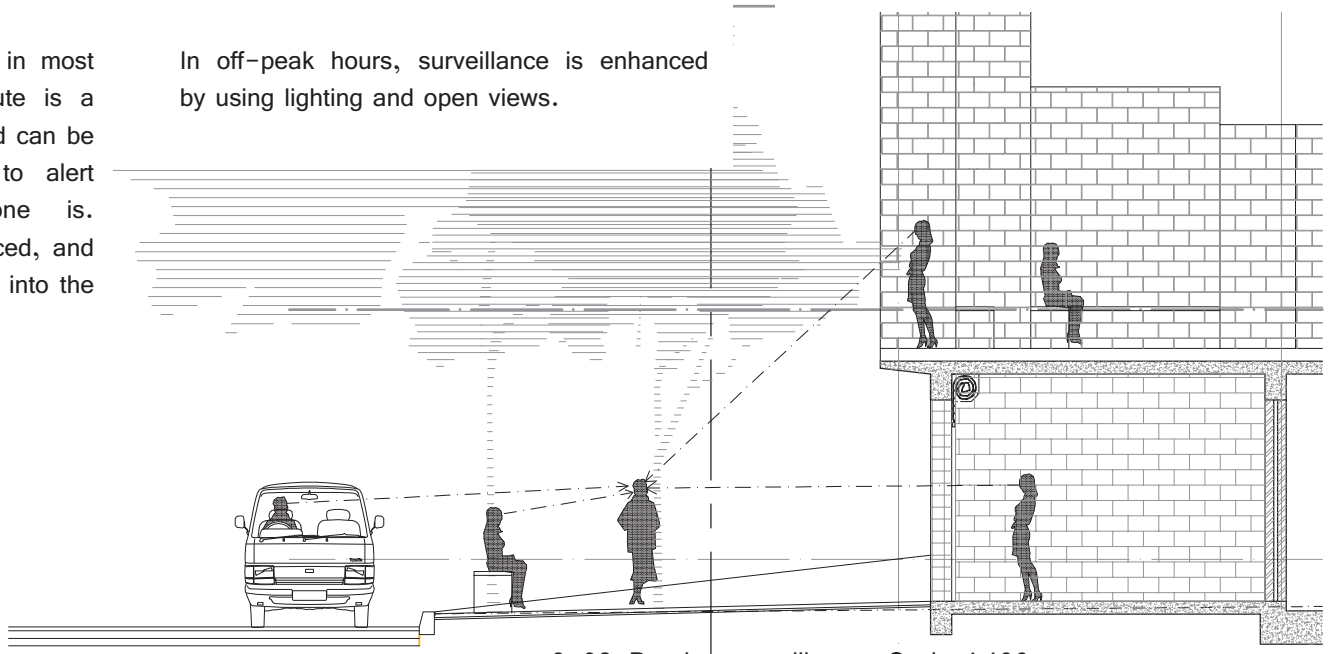
Waiting areas should be in clear sight in order to achieve passive surveillance.
Congestion of commuters is to be avoided to limit opportunities for pick pocketing and mugging.

In off-peak hours, surveillance is enhanced by using lighting and open views.

Specific areas to be demarcated for trading in order to prevent congestion.

A good management and maintenance system to be instated, in order to avoid the terminal from becoming derelict. Derelict buildings are seen as hostile and unwelcoming.

Communal areas must have a sense of being owned, so that they will be used more by a community. (Kruger, *et al*.38-81)



3_08 Passive surveillance. Scale 1:100

Social advantages

Traders to be allowed to trade, exposing them to the economic opportunities which are generated from a Terminal building.

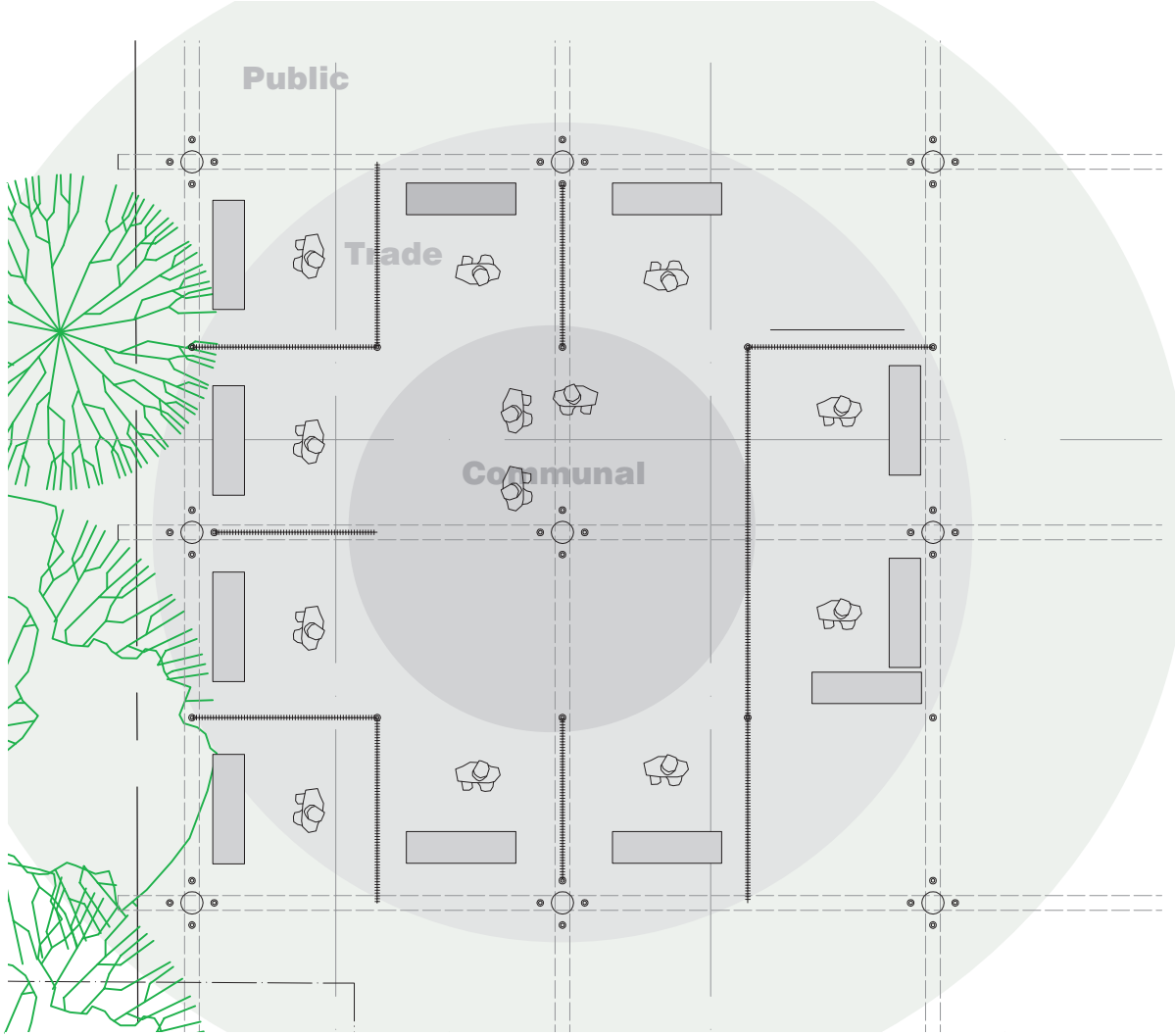
Traders require on site storage so that they do not need to travel far with goods or pay unregulated fees.

A 24 hour activity increases the use of the building and create a safer environment at night

There will be grand stands and large LED screens to entertain and inform users about the terminal and the world around them.

Ablution facilities and drinking fountain are essential.

Minute improvements to large places of rest such as benches and shaded parks, even bath houses and hotels are to be considered.



3_09 Traders communal area Scale 1:100

Materials

Materials and colours are to be as neutral as possible so that shops and traders kiosks dominate the visual arena.

Materials such as concrete, galvanised mild steel, Cor-ten steel, as well as sections to large for galvinising must be primed and painted. Roof sheeting to consist of polycarbonate sheeting alternating with embossed single span mild steel sheeting.

As a cost saving measure, individual shops can be plastered and pained by tenants Ownership will result in responsibility for maintenance and cleanliness

Wall surfaces in the public domain are to be finished with tiles or other surfaces that are easy to clean, in order not be detrimentally affected by graffiti or posters

Internal floor finishes to be tiled or have light tinted granothic finish, so as to avoid a grimy look.

Durable and non slip floors such as concrete slabs and brick pavers are to be used externally. Floor surfacing to change when floor becomes a ramp, or when an area changes function to facilitate a threashold.

Road surfaces are to be constructed of concrete and not asphalt due to chemical properties of petroleum products.

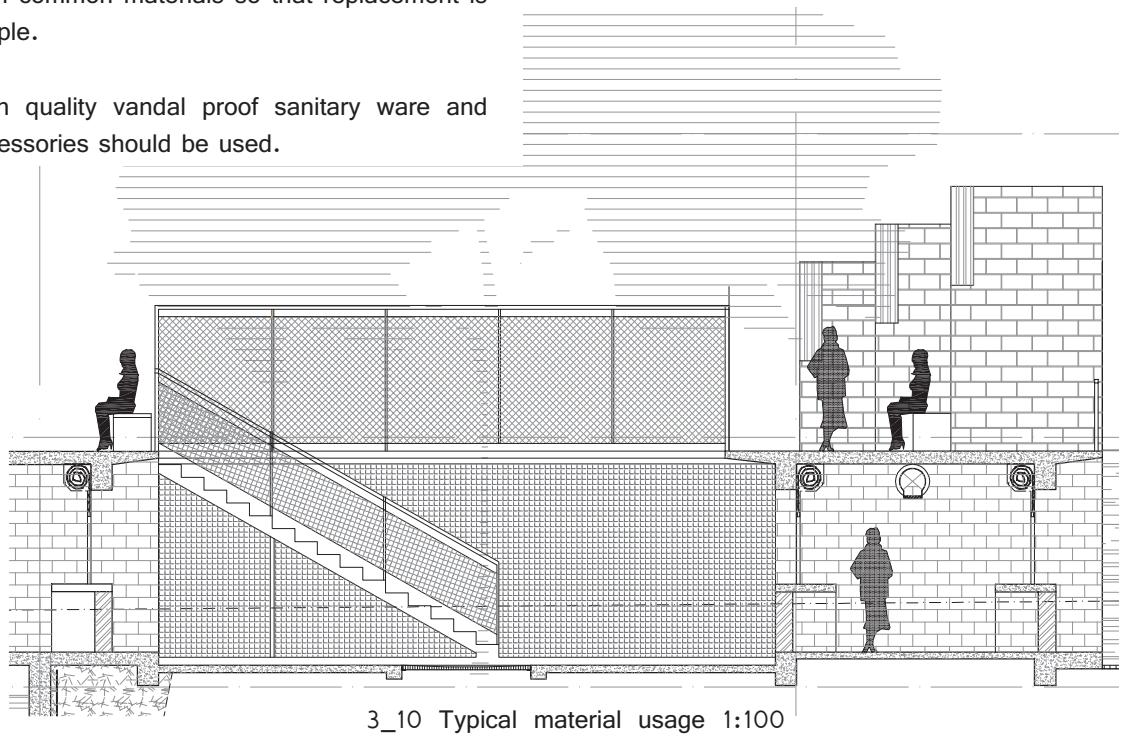
Heavy duty precast concrete barrier kerbings to be used throughout vehicle movement areas.

Light fittings are to be accessible, standard fittings. Light boxes are to be constructed from common materials so that replacement is simple.

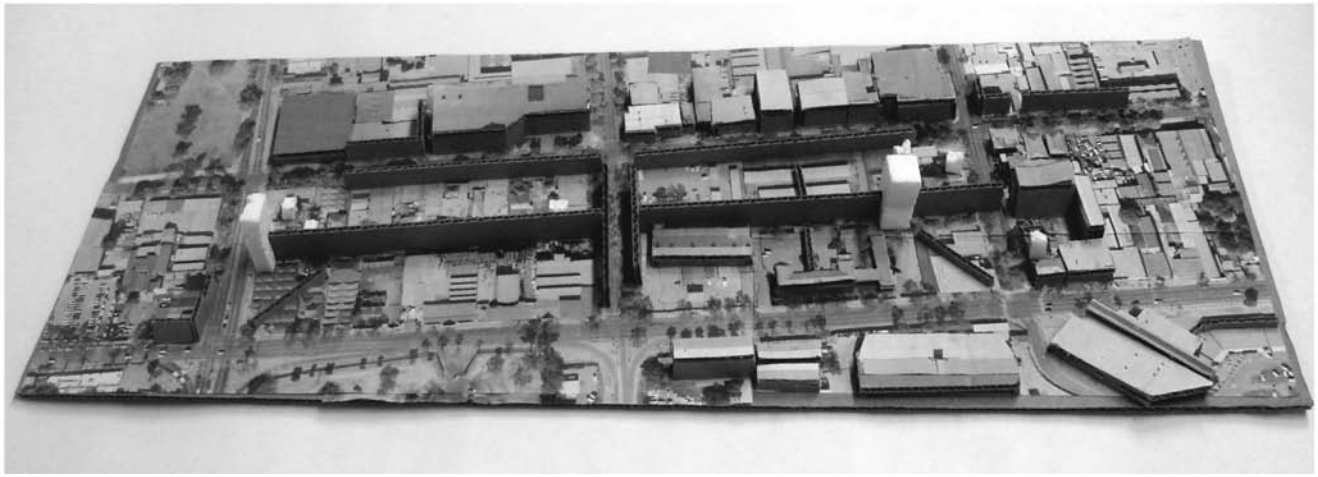
High quality vandal proof sanitary ware and accessories should be used.

Minimal use of glazing at walkways levels to avoid accidental or criminal breakage, shop-fronts to be protected by mild steel roller shutter doors during closed periods.

Pre manufactured Steel fire escapes to be installed on site. Double layered walls on stair wells, Fire resistant glazing internal skin and polycarbonate IBR profile sheeting to be used externally.



3_10 Typical material usage 1:100



3_14 Conceptual model

Concept

"Wayfinding is an activity that, like few others, demand a complete involvement with the environment. Perceptual and cognitive processes are constantly in action when a person sets out to reach a destination. The environment is scrutinised in order to extract information selectively. The information describing the setting is not just passively retained. It is interoperated, structured, and integrated to the already existing body of knowledge. Sometimes information is extrapolated from inconclusive evidence and verified at a later stage. This is particularly true when trying to gain an overall representation of complex layouts. It is important to stress that the environment in this process is just 'seen' but delt with, subjugated, and above all, experienced." (Passini 1992:160).

In this quote, Passini is explaining how a person's experience lead to cognitive mapping or wayfinding, this wayfinding draws images of the route, one follows in their daily lives and are a part everyday a routine.

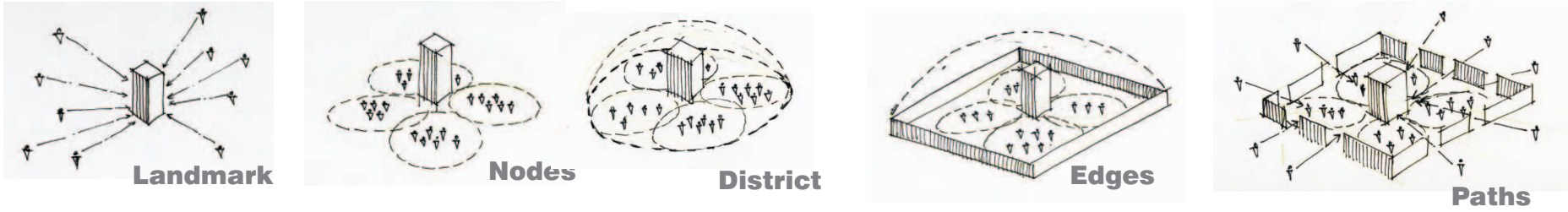
Lynch (1960:46) mentions that city image and its elements can be placed in the following five categories Paths; edges; districts; Nodes and Landmarks. These categories help individuals and communities to create images of their environment, in order to find their way around. Pretoria is a city full of images that people relate to. These images are necessarily appropriate, for a city of excellence.

The northern precinct of Pretoria has two of the three most important Public transportation nodes found in the city, Bloed Street Taxi Rank and Belle Ombre Railway station. These two nodes act as a gateway into the city but are in poorly maintained and underdeveloped area. Images such as these are in people's cognitive memory when they think of Pretoria.

This dissertation proposes a taxi terminal that could renew an area the northern precinct and replace some of the unbefitting images that exist in peoples minds.

The terminal will be a Landmark that people can use as a point of reference. The Landmarks can attract people to partake in the functions of nodes, around and represented by the Landmark. These nodes then can define a district and the district can use the existing edges, namely roads, to define itself. These edges are then penetrated by path and a image is born (*Vide* figure 3_11)

The concept uses towers with flashing images that act as focal elements in order to attract people to them and onto the new Grand parade pedestrian route which connects the whole north of the Pretoria. These towers can also function as an information and entertainment node, providing service that is not available to the many city dwellers.



3_11 Graphic concept of the image in the city.

Accommodation schedule.

Commuters

77 583 Household moving into Gauteng
(4 people/household)= 310 332 people.
17% moving to Tshwane = 52 756.
15% use Taxis = 7913 new commuters.

\+ 30 000 existing commuters
/ 4 existing transport nodes in PTA.
= 7500 existing commuters.

\+ 13 000 Train commuters
/ 2 train stations in PTA
= 6 500

Total serviced by Tshwane cental

21 913

ablutions/grandstands/parks/food courts

Table 3_01 Commuter population

Taxi operators

21913/12 Commuters/taxi
=1 826 Taxi/ 2 trips

Taxis require holding daily.

913

@25 routes =36,5 taxis/route
@2 minutes to load a taxi
= 1 hour 21 minutes to empty taxi terminal

Holding areas/carwash/ablutions/kitchens

Table 3_02 Taxi population

Retail

21913/100 Commuters/stall

220 Traders

21913/250 Commuters/shop

88 Tenants
66 Parking Bays

refuse/deliveries

Table 3_03 Retail population

Required Ablutions Male

	Taxi	Commuters	Total
WHB	13	24	37
UR	14	42	56
WC	11	24	35

(Table 7; SABS 0400-1990)

Drinking Fountains / disabled Toilets

Table 3_04 Ablutions-male

Required Ablutions Female

	Taxi	Commuters	Total
WHB	13	24	37
WC	17	46	63

(Table 7; SABS 0400-1990)

Drinking Fountains / disabled Toilets

Table 3_05 Ablutions-female

Yotel©

21913/200 Commuters/Room

110 Rooms

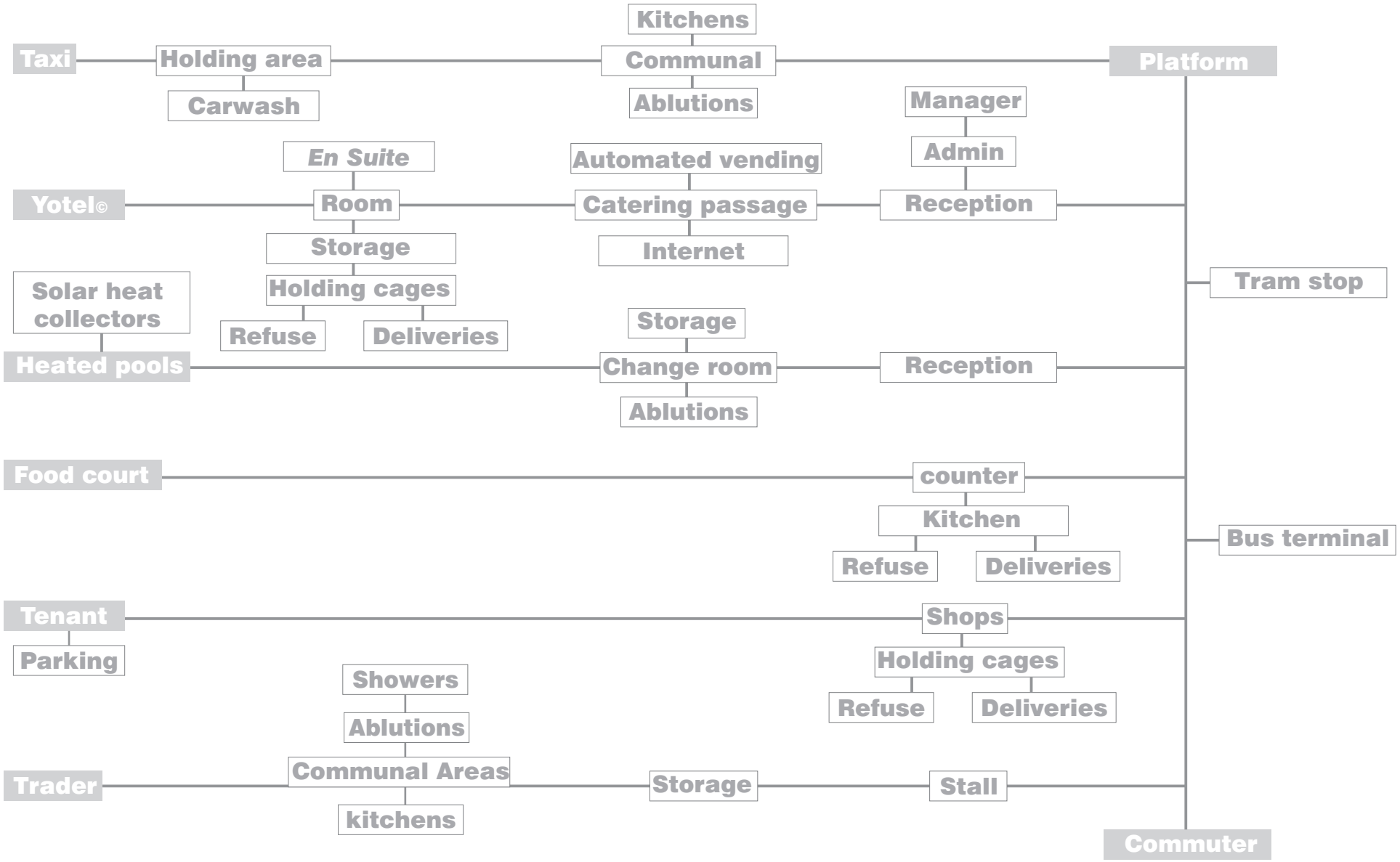
65% occupancy = 72 Guests
10% Staff = 8 Staff

25 Parking Bays

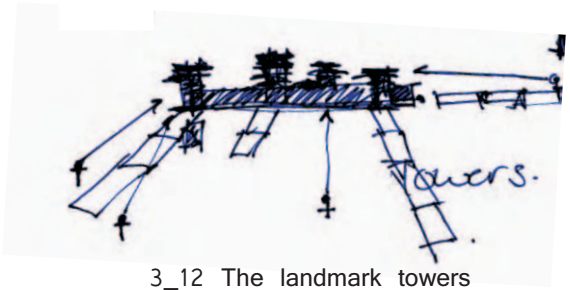
refuse/deliveries/laudry/reception/admin

Table 3_06 Yotel population

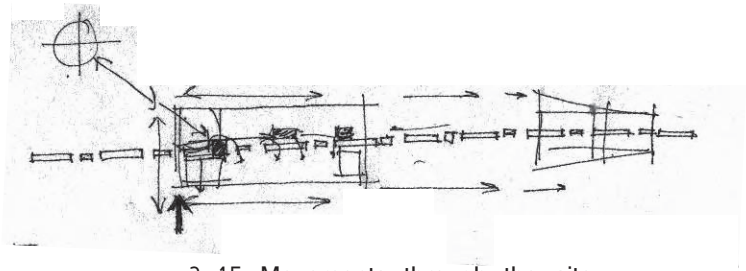
Movement diagram



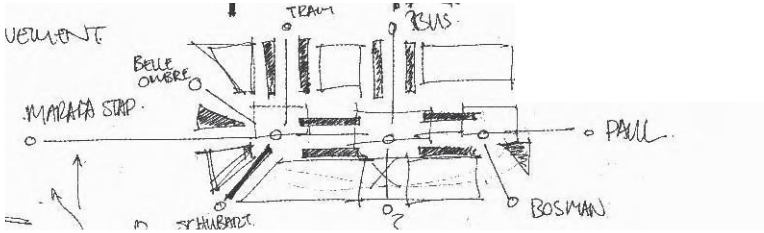
Design generators



3_12 The landmark towers



3_15 Movements through the site



3_16 Activity spines through the site

There are two main nodes of activity which are generated by the transportation terminals, Belle Ombre Railway Station, and Bloed Street Taxi Rank. The proposal is a partial connector of the two, feeding off the existing movement patterns of the precinct.

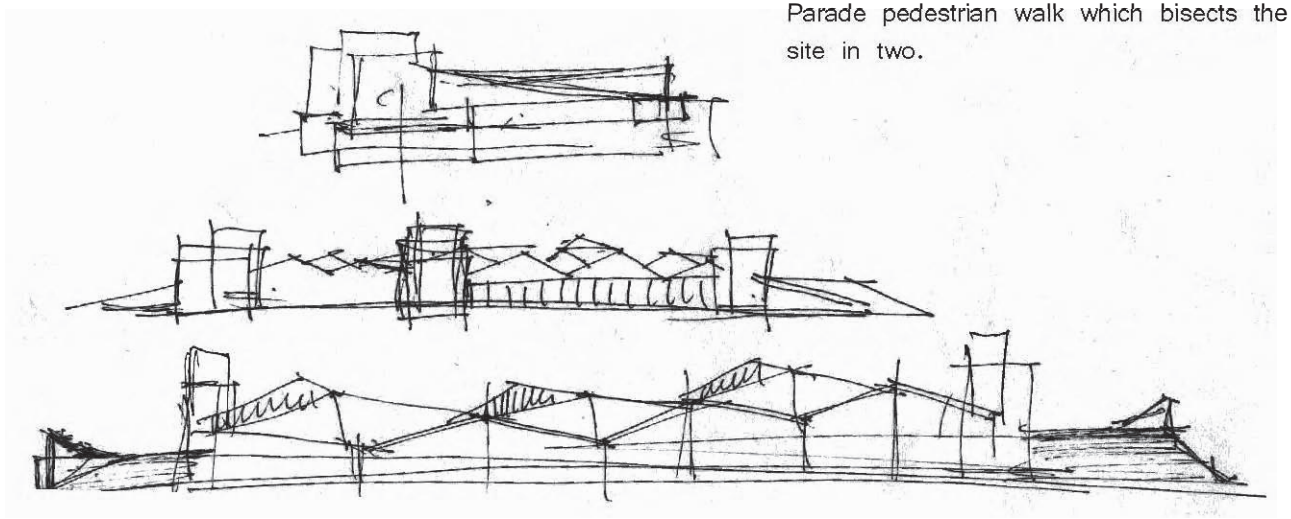
Another generator is the proposed Grand Parade pedestrian walk which bisects the site in two.

The site must accommodate for the alternative transport modes. These are the PICD Bus distribution systemTerminal (*Vide* 1.4) and a tram stop (proposal by C.Dill, fellow M (prof) student).

These connections generate commuter movement and therefore can create activity spines and retail opportunities for tenants and traders.

The site is located in an industrial area. Typographical features are applied to the proposal, with the intention of relating the sites to its context.

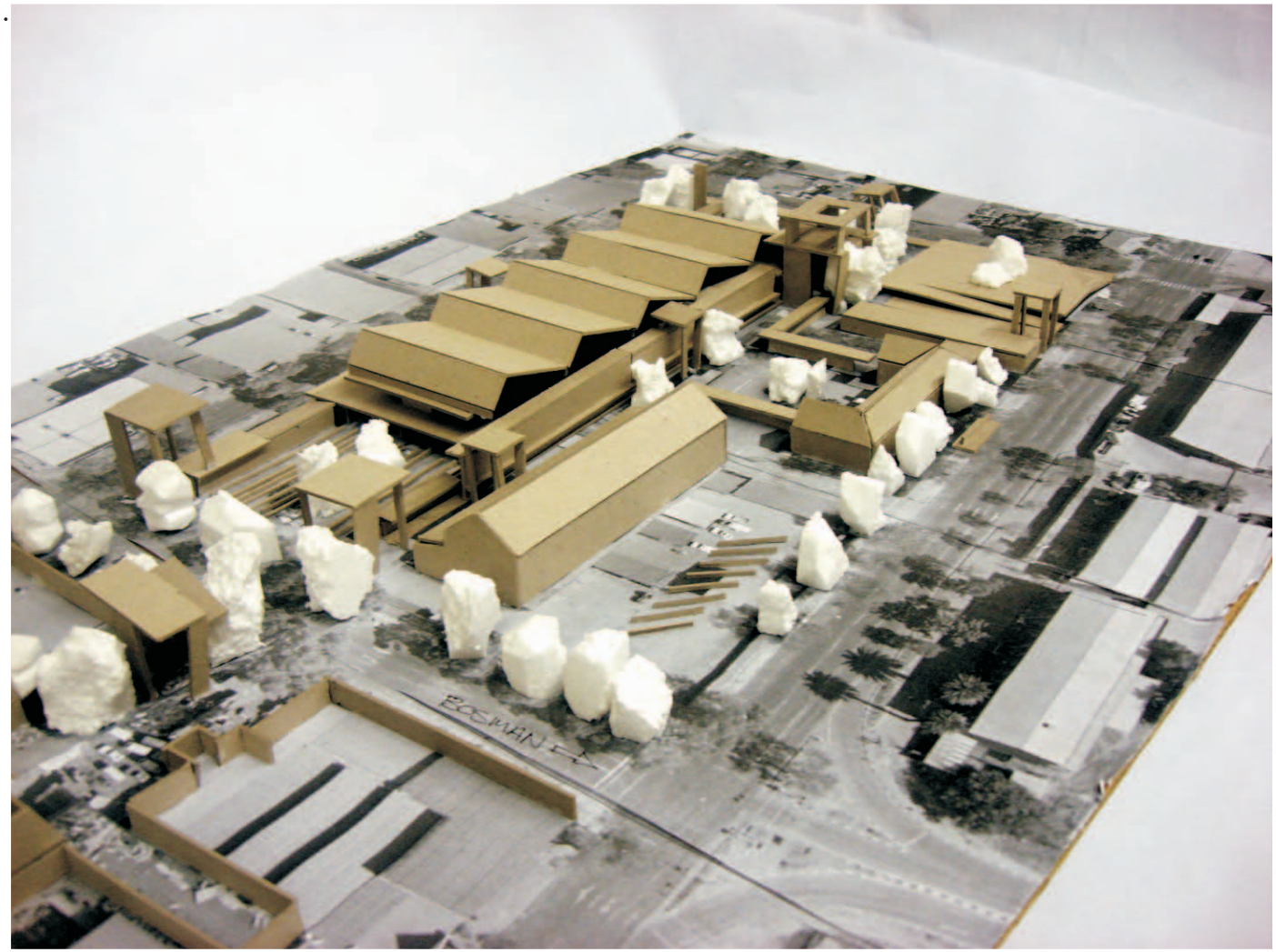
These applications would include a saw-tooth roof and materials which are commonly used in industrial construction.

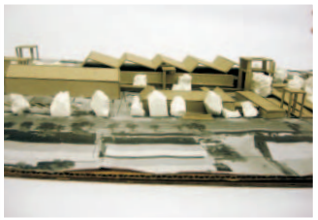


3_13 Preliminary sketch of elevations

Preliminary model

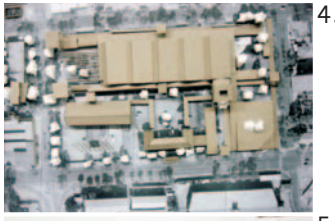
1.



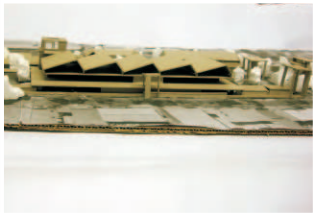


2.

3.



4.



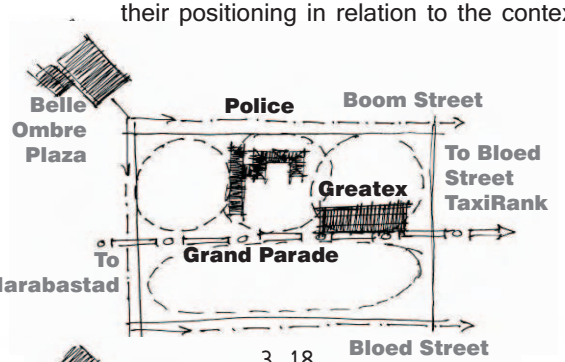
5.

3_17 Preliminary model compilation.

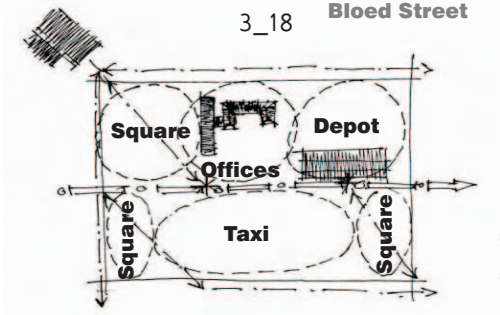
1. North-west view 2.North view 3.East view 4.Plan view 5.South view

Development sketches
Planning

A number of key influences such as movement patterns, proposed parade and the heritage buildings have separated the site into four different sectors. These sectors are able to assume different functions according to their positioning in relation to the context.

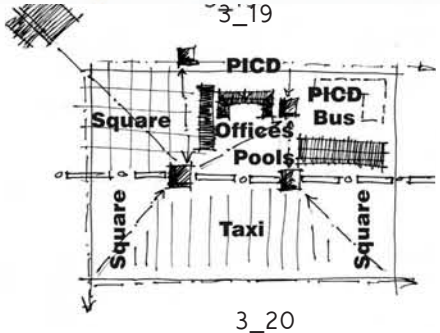


3_18



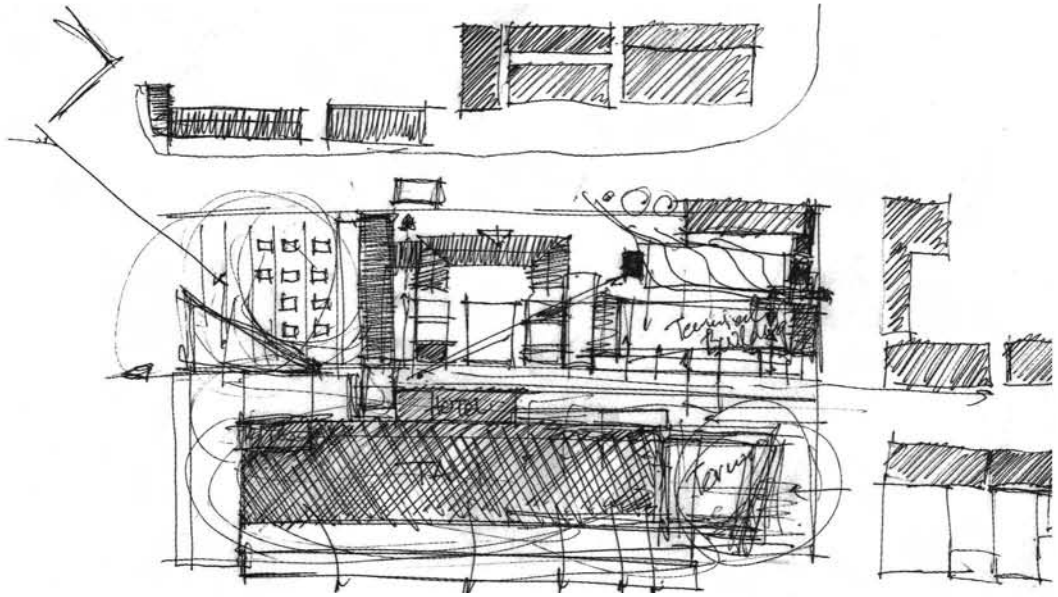
3_19

In response to typical pedestrian movement patterns, squares have been located in the corners, so that people can intersect the site.

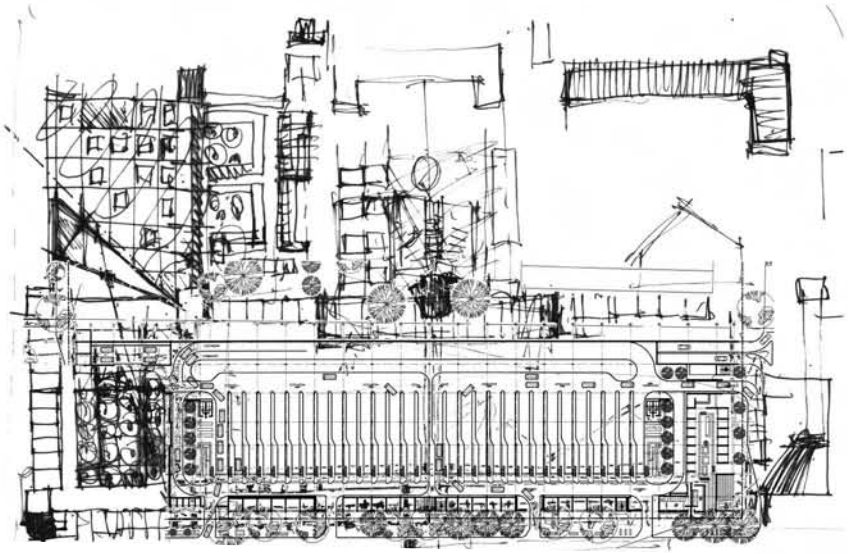


3_20

Furthermore a bus terminal and tram-stop offer two more destinations on the site and therefore more movement corridors can be generated.



3_21 Preliminary site plan sketch



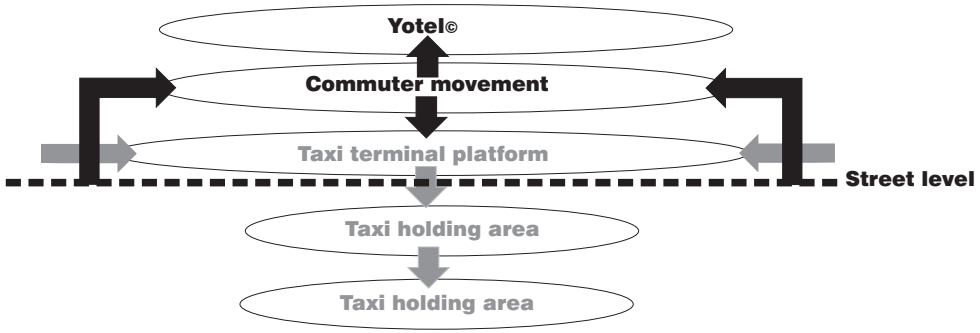
3_22 Detailed preliminary site sketch

Movement

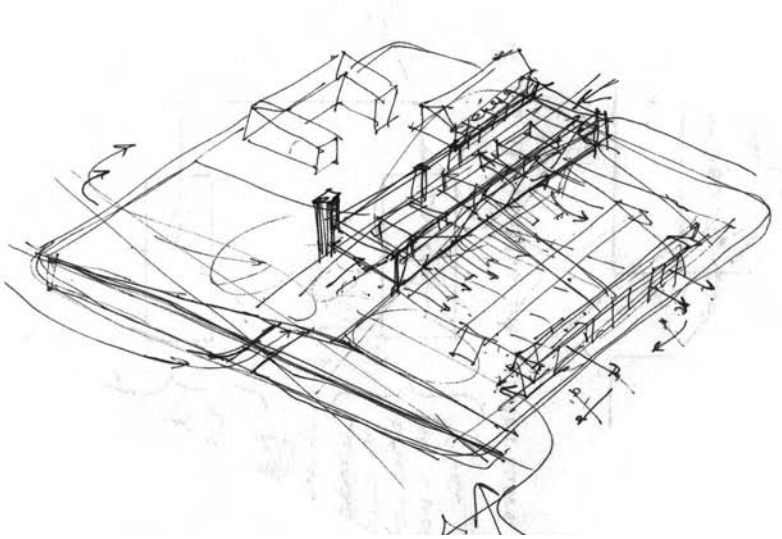
In order to accommodate the fundamental criteria of minimal interaction between taxi's and commuters, the planning became focused towards splitting the levels on which the two movements would operate independently.

A pair of options presented themselves, either have the taxis functioning on the ground level and the commuters moving above, or place the taxis including their holding areas above the movement of the commuters.

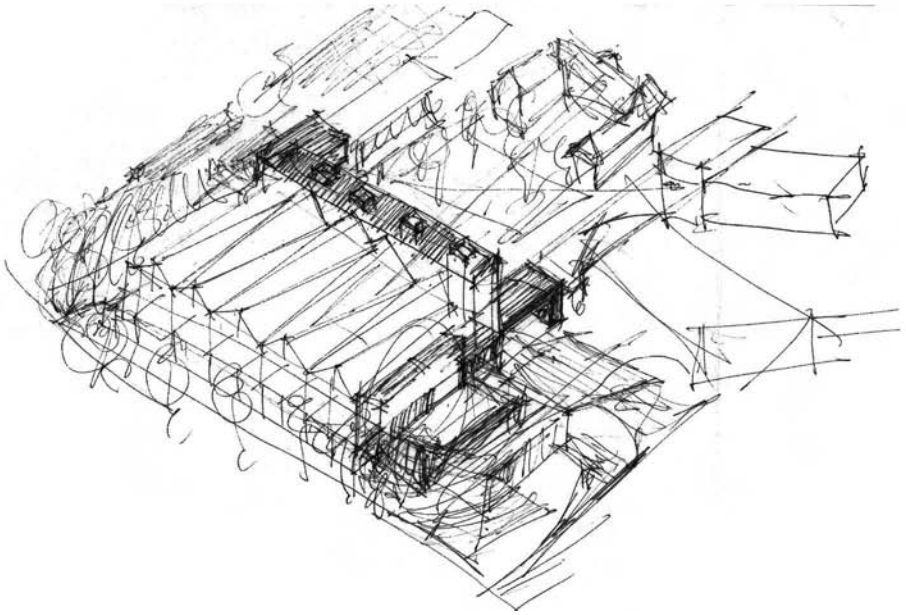
Commuters are the ones being served while the taxis are the service providers. The commuters are the priority and therefore their comfort and speedy transfer are the main considerations.



3_23 Vertical movement of modes.



3_24 Preliminary movement sketch.

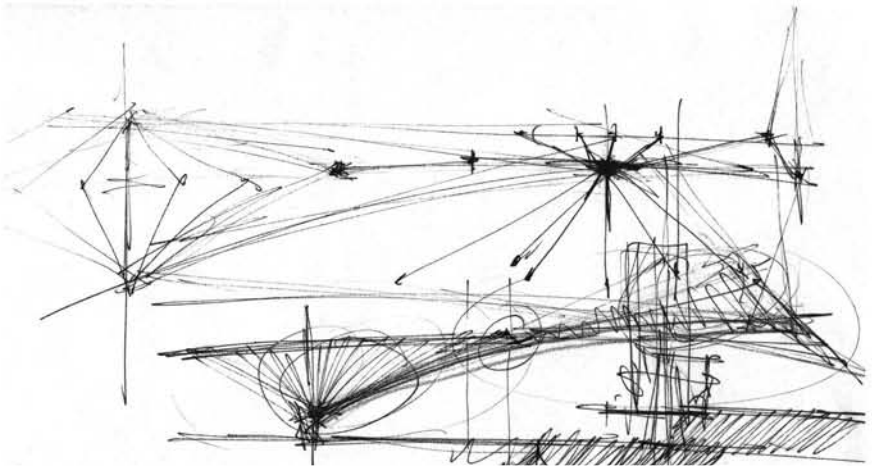


3_25 Preliminary sketch of building form

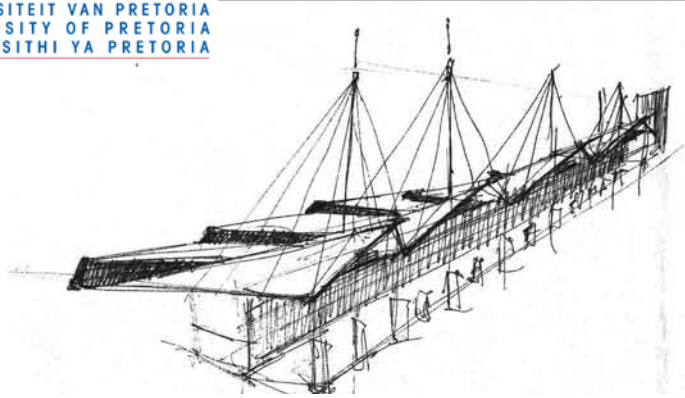
Roof Structure.

The roofing of the proposed structure became a complicated task when all columns were later removed from the terminal area. This change in design was made in order to alleviate constraints posed by construction of the taxi platform below. Removal of the columns also allowed the terminal to become a more grandiose design which will exemplify the importance of public transport.

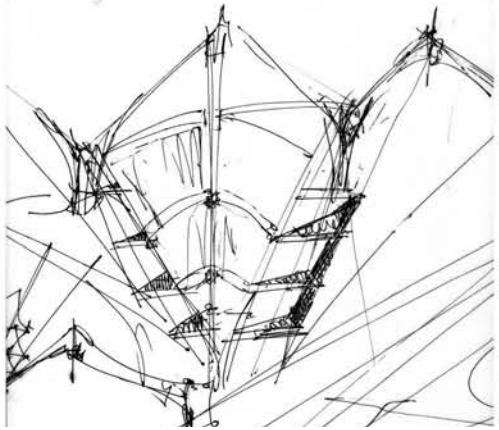
Massive structural beams will span a distance of 45m and will be about 2,25m deep. The roof construction will span 20m in two different configurations: one being a double pitch and the other a mono pitch construction. Both will be connected to the structural beams that will include a gutter.



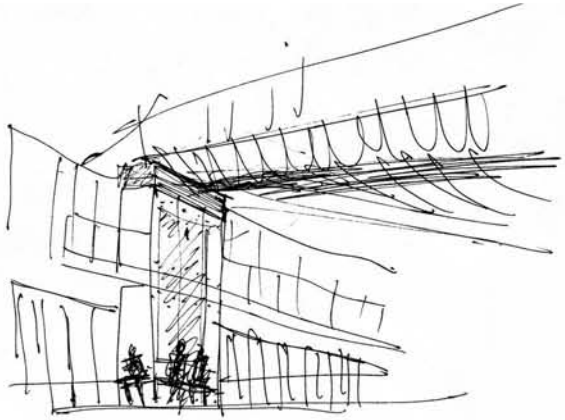
3_27 Preliminary sketch of roof structure



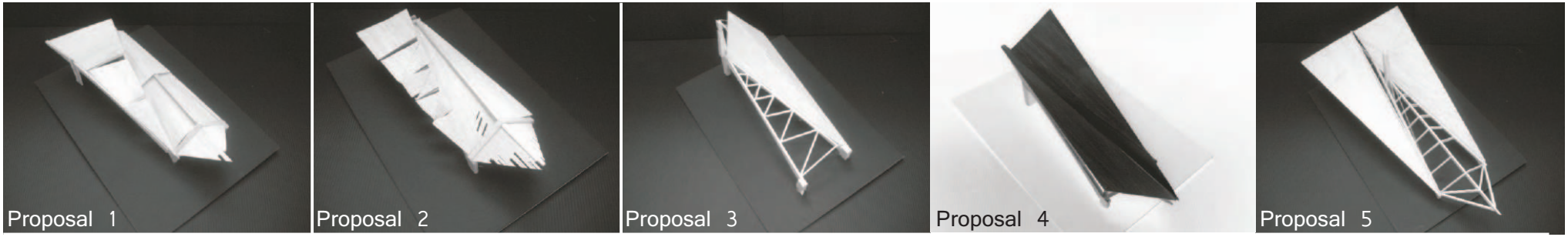
3_28 Suspend roof sketch



3_29 Underside of roof



3_30 Internal design proposal

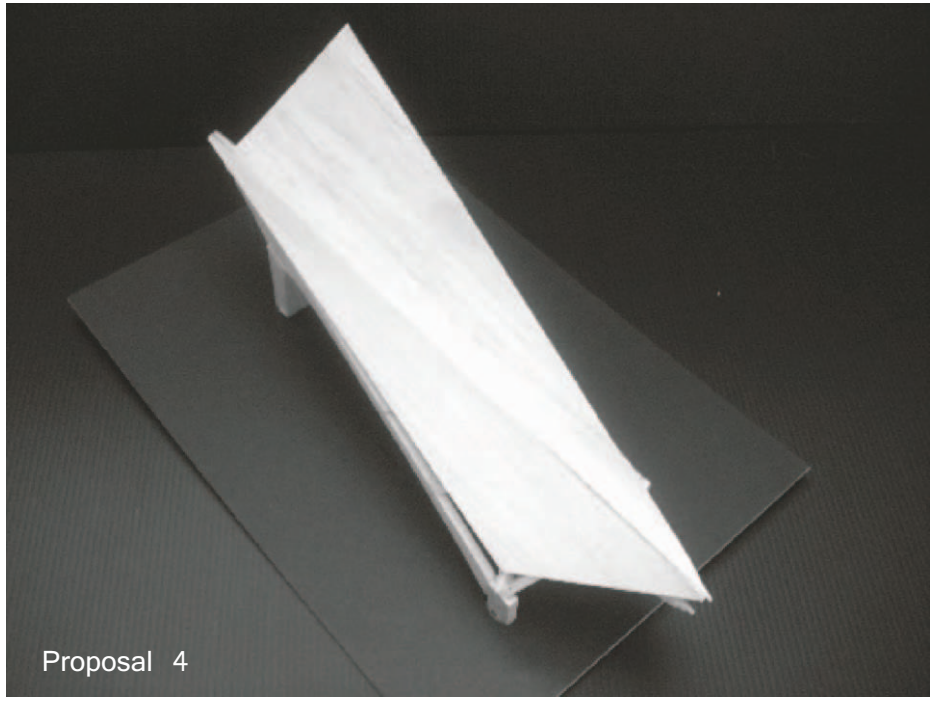


3_31 Roof models compilation.

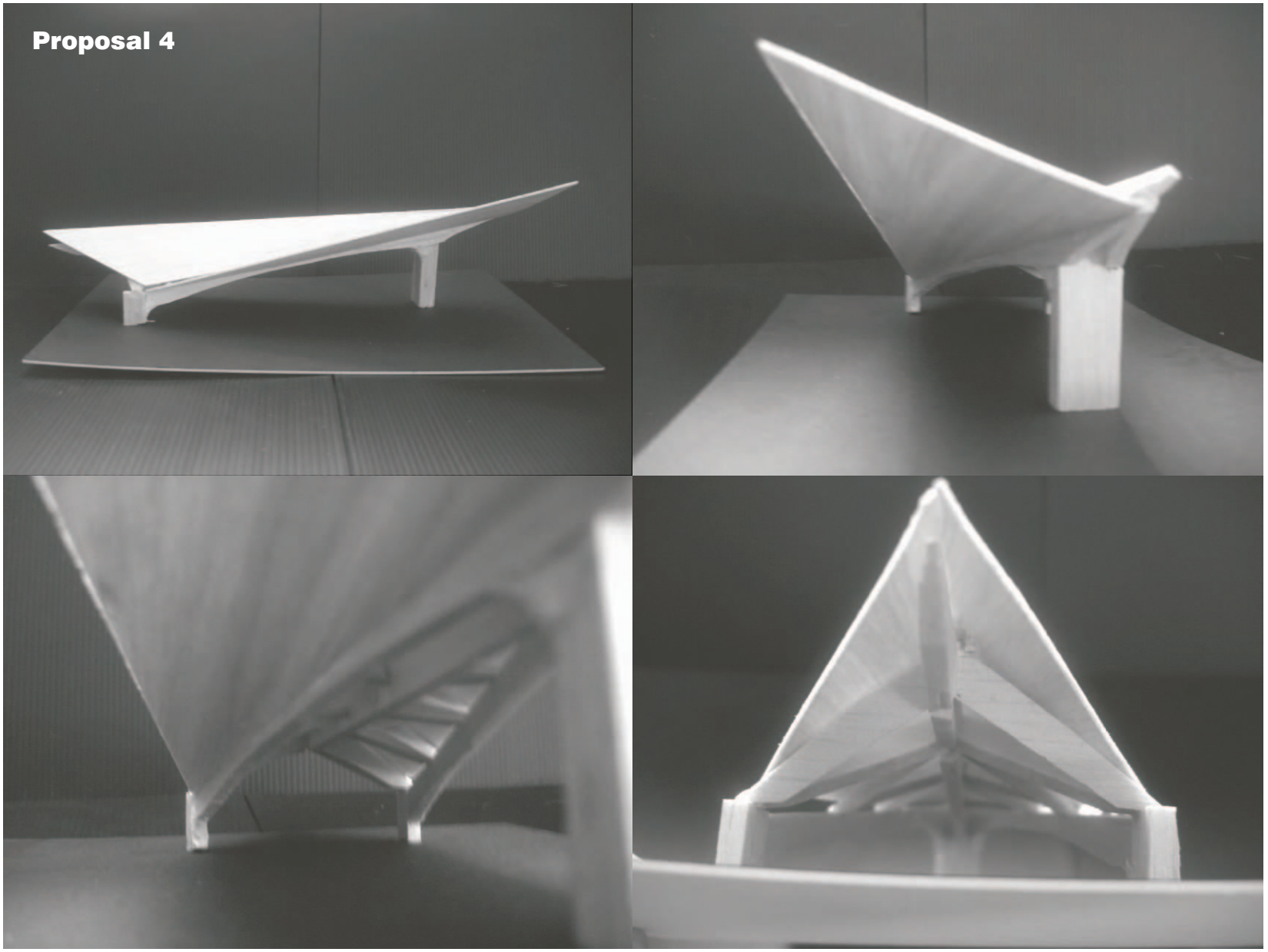
The design ended in the mono pitch section suspended structure and a double pitch structure as a compressive element. (*Vide* proposal 5)

The setback was that this structure was a contradiction to itself. The suspended area would have to be heavy due to wind forces that will act on the roof, tending the roof to lift. One would want it as light as possible so that the cabling system would be less strained. The compressive area, on the other hand, would have to be light when one could weigh it down heavily.

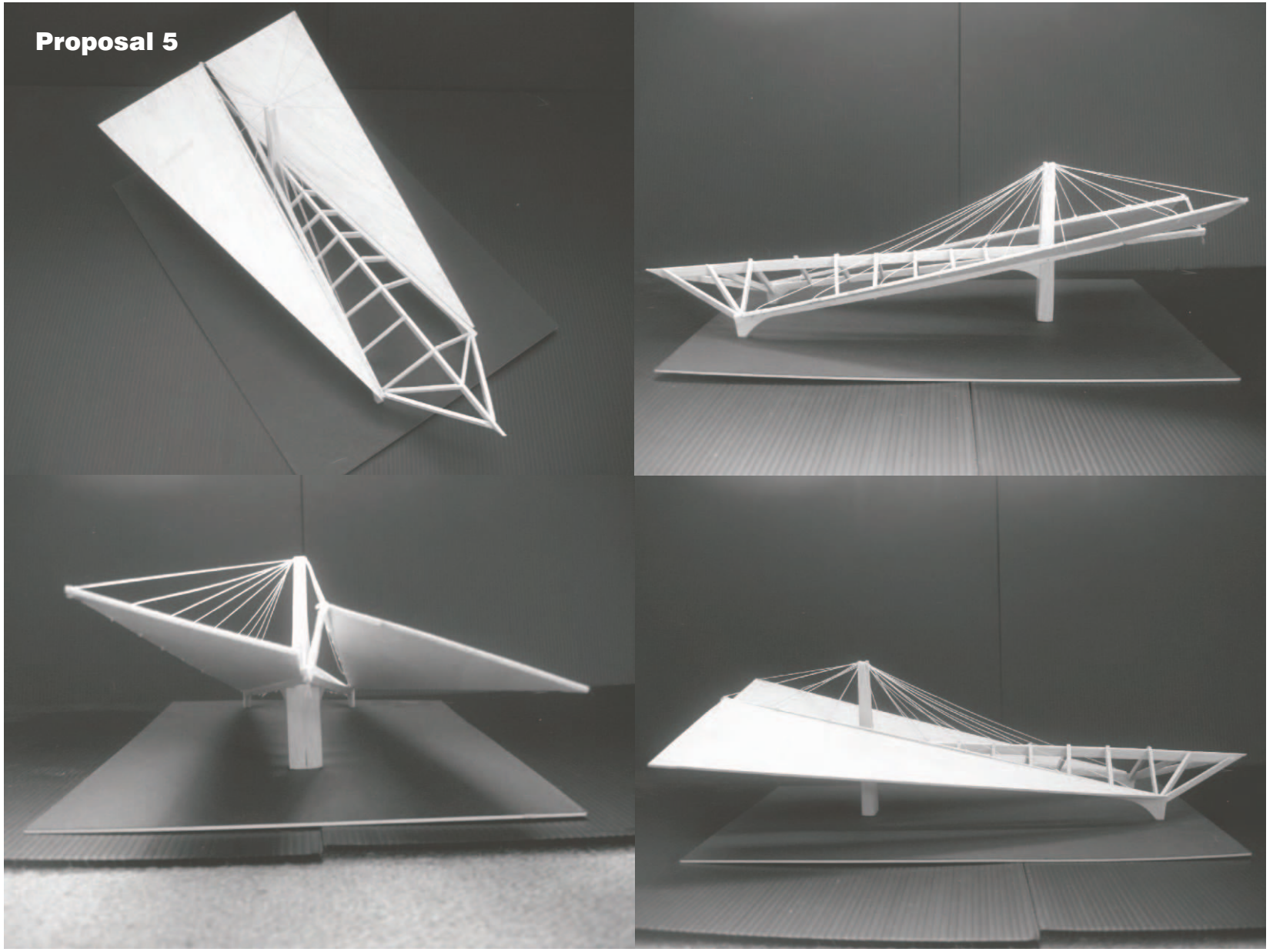
Proposal four was ultimately chosen for the design, however the ventilation system which was implemented with proposal five, was eventually developed.



3_32 Roof model Four



3_33 Roof model Four compilation



3_34 Roof model five compilation

Ventilation

The taxi terminal platform area is naturally ventilated. Two basement floors below are used as car parks and taxi holding areas. The need for these areas to have ventilation is essential due to the fact that vehicles produce toxic carbon monoxide fumes that are unnoticeable to the human sense of smell.

These areas will have to be well ventilated due to the volume of vehicles located inside the basements, it is highly unlikely that natural ventilation can accommodate all the ventilation requirements especially when the facility operates on peak or off-peak periods.

The peak periods occur in the mornings between 06h00 to 09h00 and in the afternoons at 15h00 to 18h00. During these times it can be assumed that all 913 taxis will arrive or leave the terminal. Before and after these hours there is no activity, except for the occasional taxi being driven to the carwash or leaving the premises. Therefore, a hybrid system has been developed to accommodate these fluctuations of fresh air requirements.

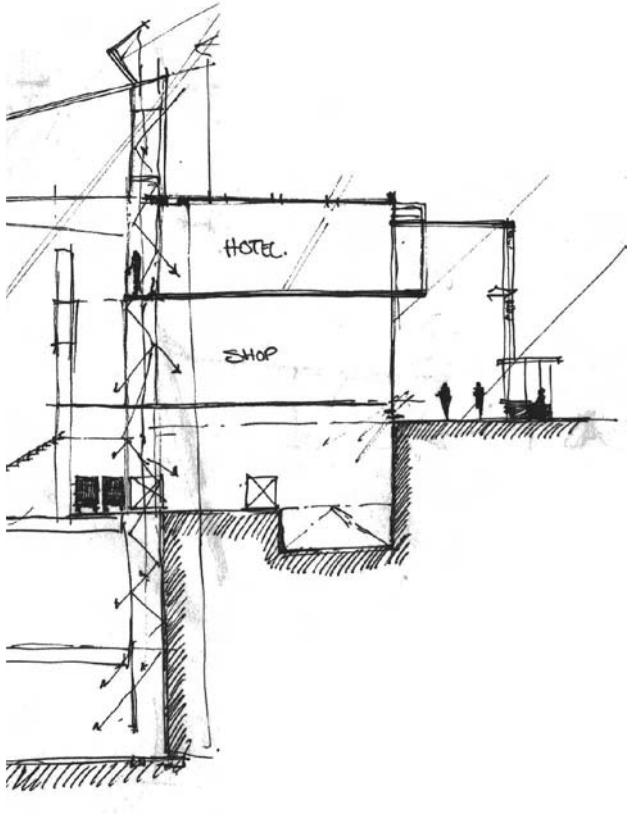
During the off-peak hours the combination of stack towers and tapered towers will naturally ventilate the building. This will occur by means of air convection and the Venturi effect. (*vide* figure 3_37)

Ventilation towers line both north and south peripheral walls of the basements, forming ventilation cavities. The south towers are used for supply of fresh air and the north towers are used for extraction of stale air.

Hassan (1996:15) recommends that to retain pressurisation of a space, it is customary for inlets to deliver 20% more volume flow rate than that of outlets.

A thyristor control switching device will be programmed to trigger inlet fans when concentration of toxic fumes increases. This will then change natural ventilation into a mechanical ventilation system that forces large volumes of air through the building and the required flow rate.

Futhermore these vents will allow for natural light into the basement. Although the distance is too long to be an effective light source, it will never-the-less improve conditions in the event of electrical supply failure (*vide* figure 3_35).



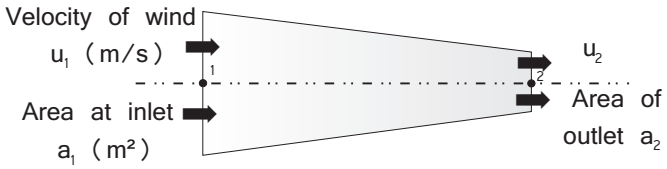
3_35 Vent towers used as light wells

Venturi effect

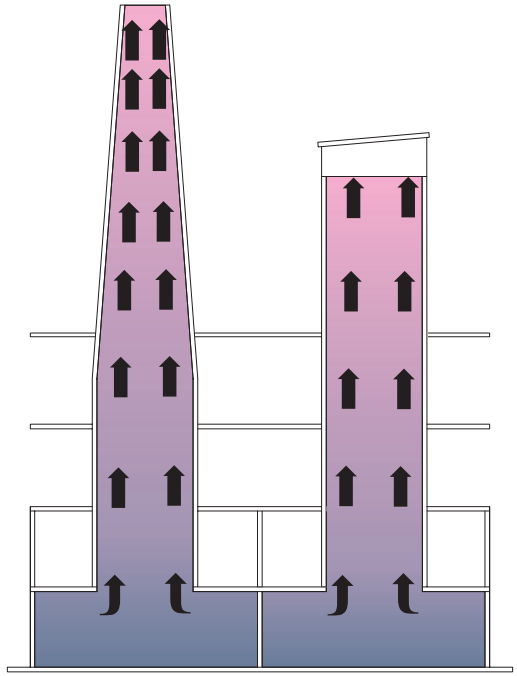
The theory of the venturi effect is: If air at a velocity enters into an inlet of a tapered pipe, the velocity of the air will need to increase to compensate for the loss of area, when exiting out of a smaller outlet. This is because the volume of air entering the pipe is the same as what is expelled. (*Vide* figure 3_36)

$$a_1 \times u_1 = a_2 \times u_2$$

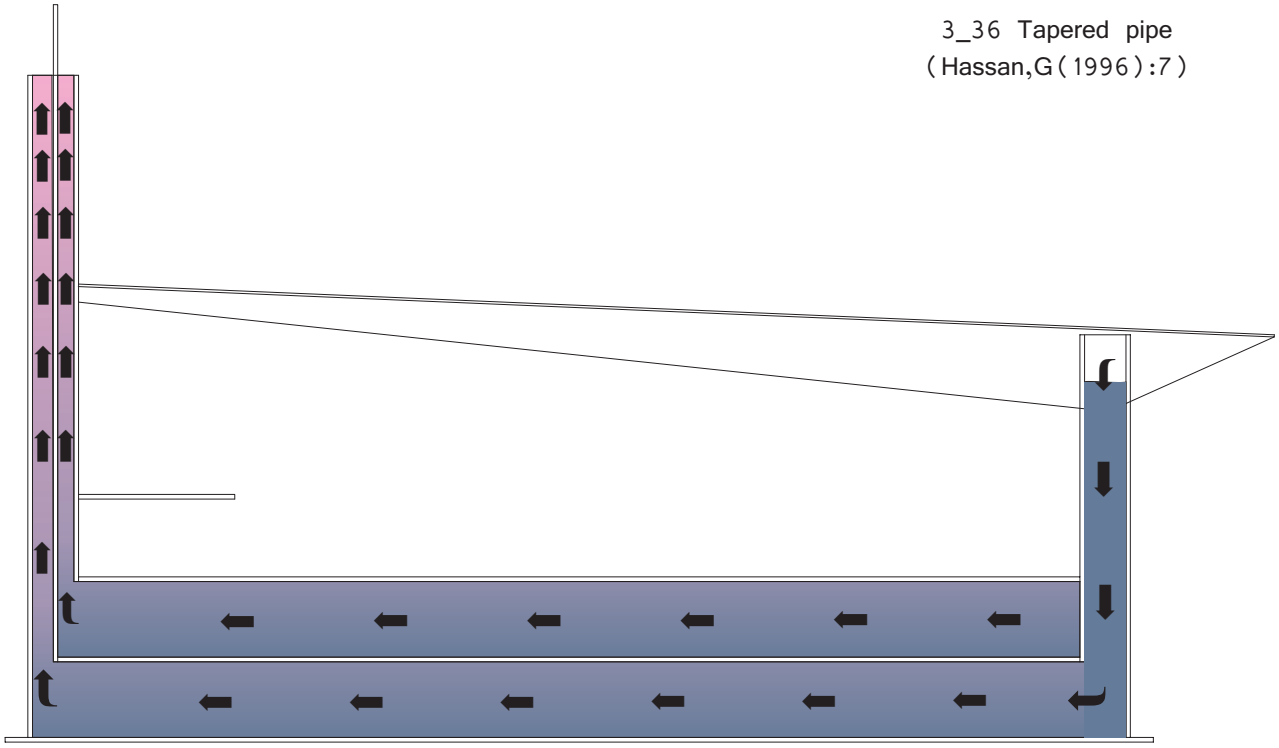
$$u_2 = a_2 \times u_2 / a_1$$



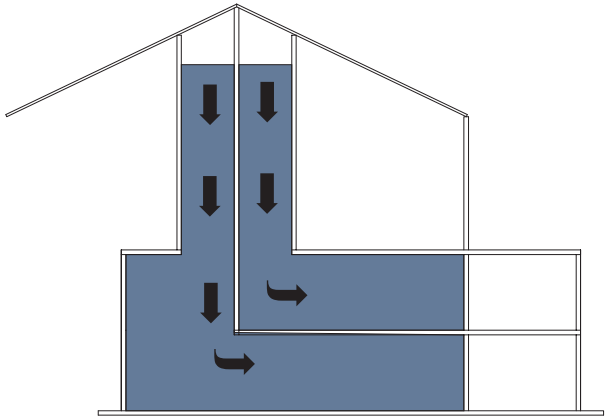
3_36 Tapered pipe
(Hassan,G(1996):7)



3_37 Tapered and stack towers
Intended flow diagram



3_38 Intended cross ventilation diagram



3_39 South inlet tower
intended flow diagram

Ventilation simulation

The experiment was divided into two simulations. The first simulation was to investigate the intended natural ventilation by means of air convection and the venturi effect. The second simulation was to test if mechanical ventilation would appropriately remove a large amount of polluted air.

A scaled perspex model of a single bay, in the design, was constructed to simulate the intended ventilation. In this bay, three towers where built into the model, one was a tapered outlet tower, a straight outlet tower and an inlet tower. Smoke was produced by burning incense and placed inside the model.

In the natural ventilation simulation the following air movement was observed:

The smoke was stagnant inside the model until air was introduced from the inlet tower, simulating mechanical intervention. Thereafter the air moved freely towards the outlet towers and out of the model (*vide* figure 3_41).

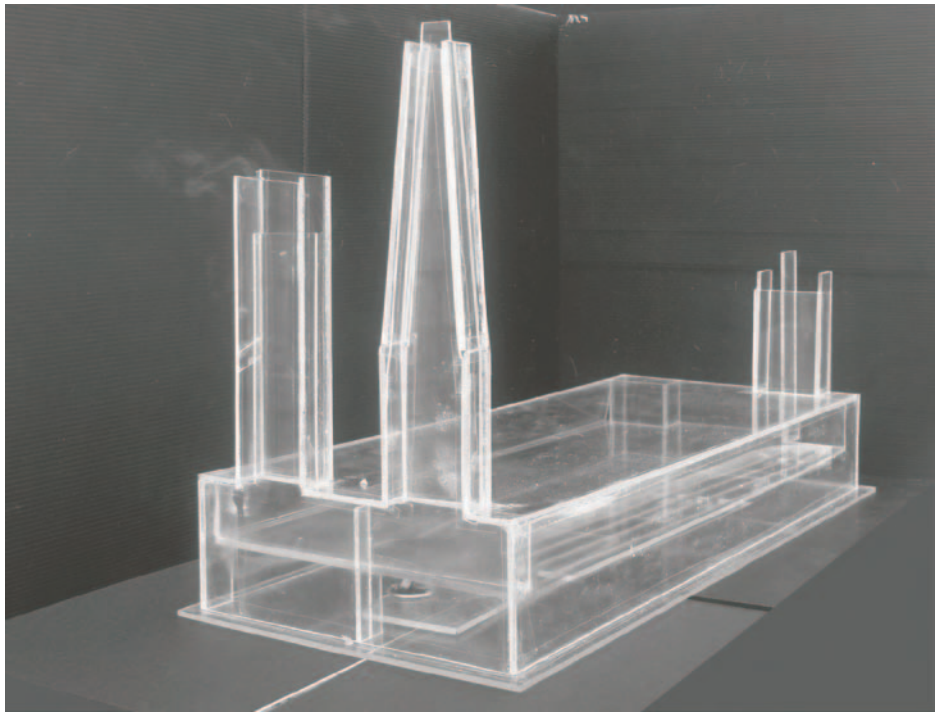
The tapered tower did not perform as intended, a minimal amount of air moved through the tower and it was not observed to be faster than the straight tower. However, the straight outlet tower proved to be more functional as it removed the majority of the smoke.

When air was blown past the outlet towers, to simulate wind on the tower, the velocity of the smoke increased (*vide* figure 3_42). An additional observation was when either of the two outlet towers were closed off the other would not function as effectively as when both were open.

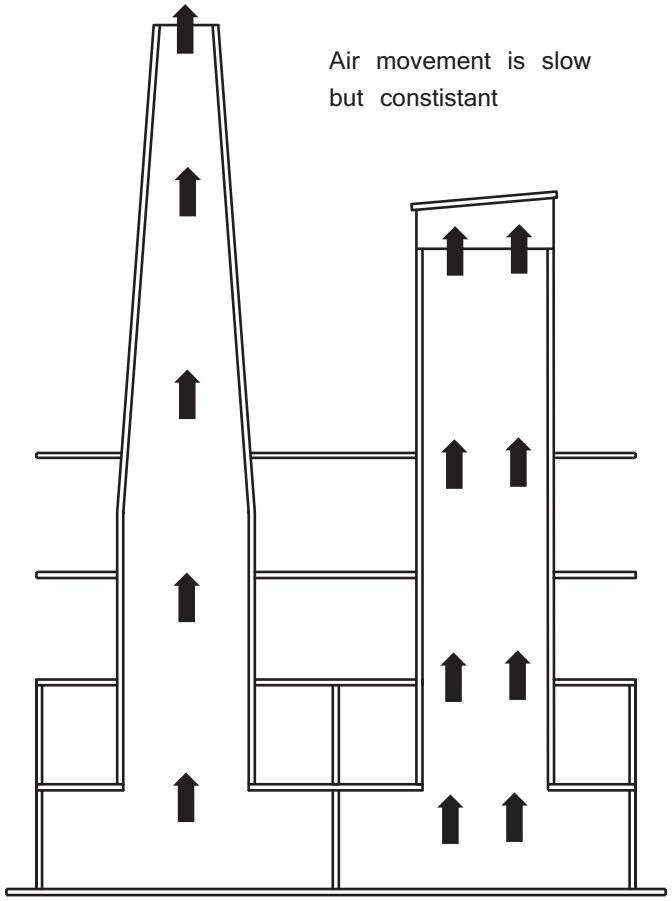
In conclusion, for air convection to occur auxiliary mechanical ventilation is necessary. However, Wind pressure on the outlet towers proves to be more important than air convection.

Therefore it is necessary to expose the towers to prevailing winds.

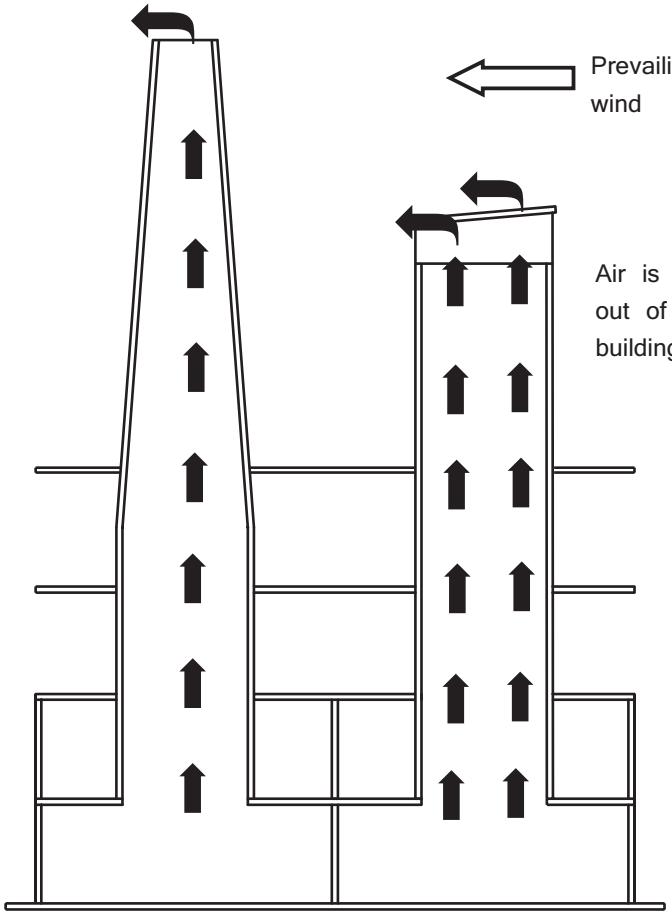
The mechanical ventilation simulation proved to be successful regarding their intended function. Sufficient air was found to be continuously removed as air was mechanically introduced into the inlet tower and expelled out of the two outlet towers. (*vide* figure 3_38).



3_40 Photograph of perspex model



3_41 Air convection flow diagram



3_42 Wind effect on flow diagram

Water harvesting

With the ecological deficit of the world rising it is of paramount importance to re-evaluate the amount of resources used in a building throughout its life.

One of the most important resources is water. It is astounding to find out the amount of water this facility uses on a daily basis. In table 3_03, one can see that the buildings water consumption is about 9,472 litres per day, and 6,972 litres of that can be grey or harvested water, and 2,500 litres will have to be potable water.

To harvest sufficient amount of rain water, the building will have to capture an area of 6,250m² The storage facilities must have a capacity of approximately 840 kilolitres to be able to sustain its grey water requirements throughout the dry winter months (*vide* table 3_02).

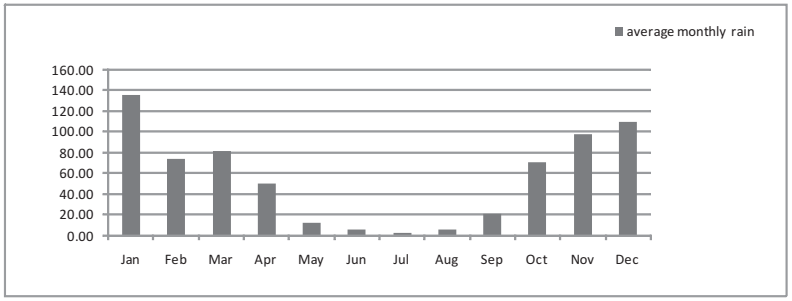


Table 3_01 Rainfall (mm) (Author)
(Http://www.weathersa.co.za/climat/climstats/pretoriastats.jsp)

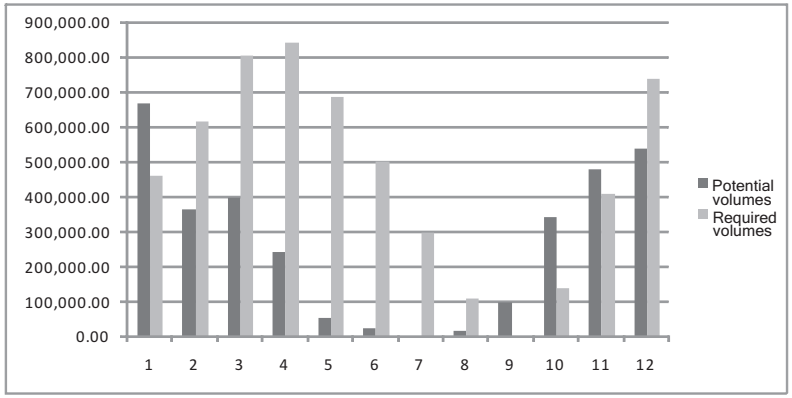


Table 3_02 Water harvesting volumes
(Crowley, B. 2005)

Commuters	21910	As per Table 7; SABS 0400-1990			Water Consumption		
		Males	Females	Total			
WC		4+1+19	20+1+25	70	2450	ltrs/day	Grey water
Urinals		15+1+26	0	42	588	ltrs/day	Grey water
WHB		5+19	8+1+15	48	384	ltrs/day	pottable water
taxi operators	900	As per Table 6; SABS 0400-1990			Water Cosumption		
		Males	Females	Total			
WC		3+8	9+8	28	980	ltrs/day	Grey water
Urinals		6+8	0	14	224	ltrs/day	Grey water
WHB		5+8	5+8	26	208	ltrs/day	pottable water
		Yotel		Total			
WC				78	2730	ltrs/day	Grey water
Shrs				78	468	ltrs/day	pottable water
whb				78	624	ltrs/day	pottable water
Car wash	17				816	ltrs/day	pottable water

total grey water	6972	ltrs/day	209,160 Ltrs/month

total potable water	2500	ltrs/day	75,000 Ltrs/month

Table 3_03 Water volume requirement of the building
(SABS 0400)

Light emitting diode displays

Black and white televisions work by using an electron beam that rapidly moves across the screen, energizing small dots of phosphor. These dots produce visible light.
Colour televisions function in the same way, but instead of a single beam, it contains three separate beams, red, green and blue.

However when the display monitors are placed outdoors the phosphor display cannot compete with the brightness of the sunshine. Different technology must be used to overcome this problem.

Large outdoor displays use light emitting diodes (LED) instead of phosphor layer to create images. LED's are small coloured bulbs that use relatively little power for the light they produce.

LED's are configured in red, green and blue modules which are called pixels. (*vide* figure 3_39) These pixels are arranged in a rectangular grid. The size of the pixels ultimately determines the dimensions of the screen. (*Vide* Table 3_07)

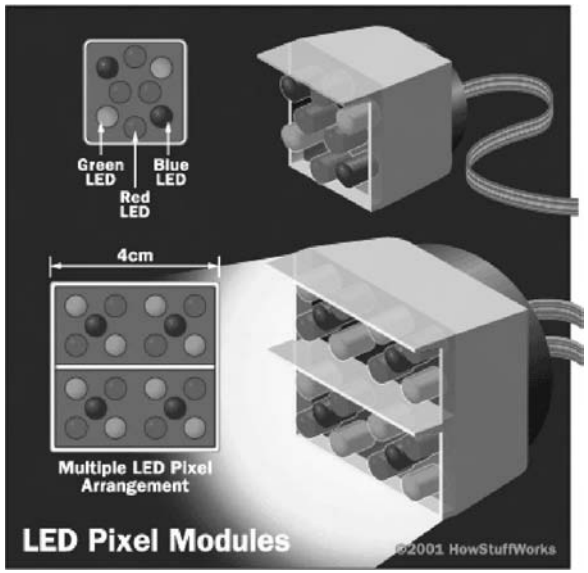
A computer and a large quantity of cabling is required to control the system. The computer receives video signals and decides which LED to switch on for how long and with what intesity. A typical large screen display can use up to 300,000 Watts at full display when large capacity is required.

LED displays have dropped in price and are a regular occurrence in malls and at events, their life span can possibly be as long as 11 years, proving to be a good investment (www.howstuffwork.com.)

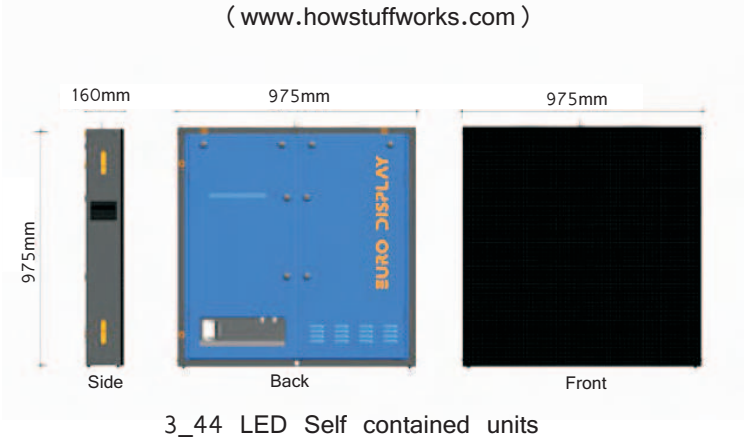
Regarding fixture and structure LED screen can be manufactured into robust aluminium self contained units that are fitted on a lightweight aluminium structure. The modules also help with ease of maintenance, the models can be placed on hinges for accessibility.

LED module size	Screen size (meters)
4 mm	2.56 x 1.92
25 mm	16 x 12
40 mm	25.6 x 19.2

Table 3_07 LED screen sizing
(www.howstuffworks.com)



3_43 LED Pixel modules
(www.howstuffworks.com)



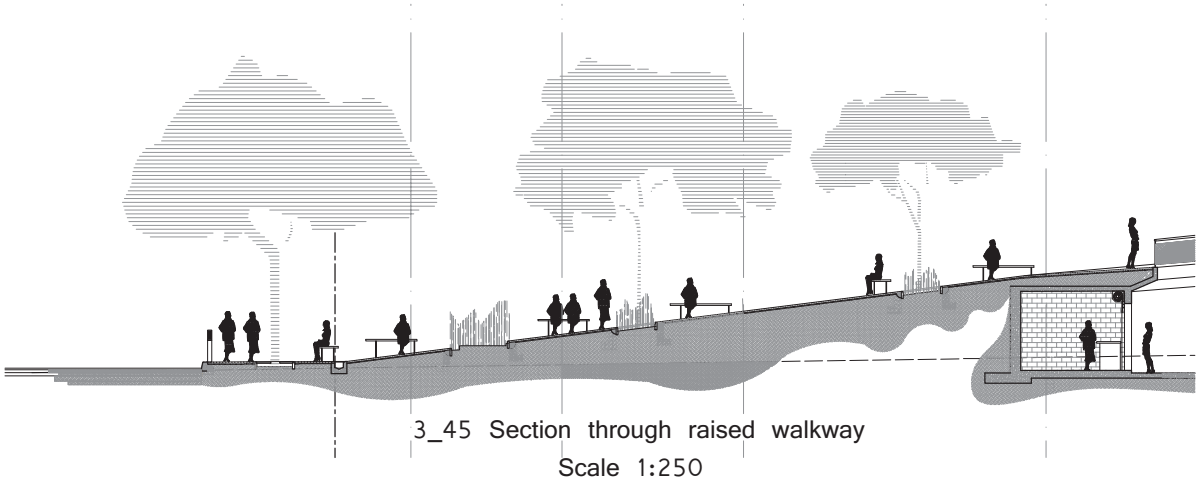
3_44 LED Self contained units
(www.eurodisplay.com)

Raised walkways

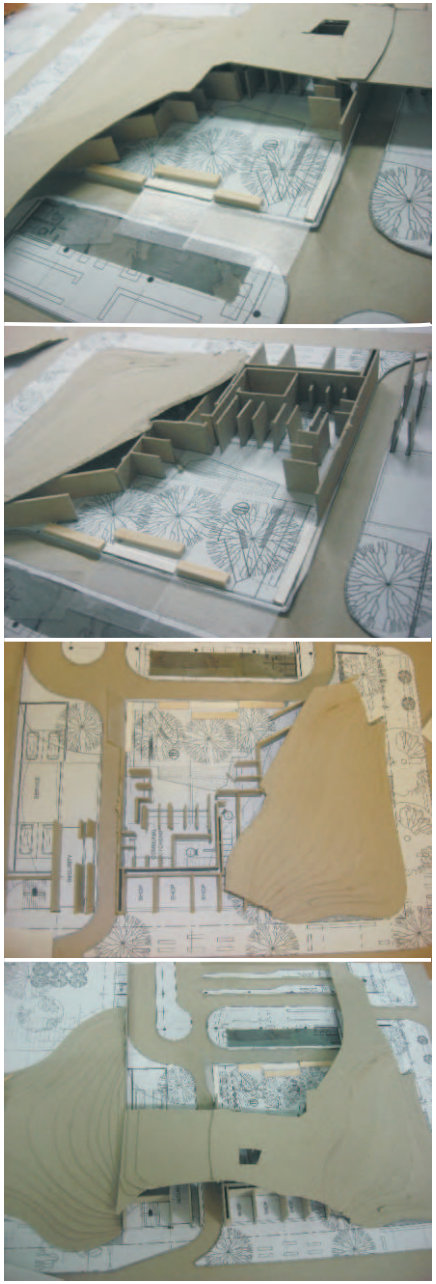
The raised walkways serve as the entrances to the terminal, they gradually ramp up at a gradient of 1 in 12m, allowing easy access for all commuters including disabled people. The walkway links the first floor to the Grand parade pedestrian walk.

The walkways are lined with robust ferro-cement seats that can either be used as seating, or as a bench for trading.

The gradient of the ramp allows for the insertion of a supplementary level beneath the walkways. This level is isolated from the busy pedestrian movements above, allowing a sense of serenity. This space then becomes appropriate for food courts and pause areas.



3_45 Section through raised walkway
Scale 1:250

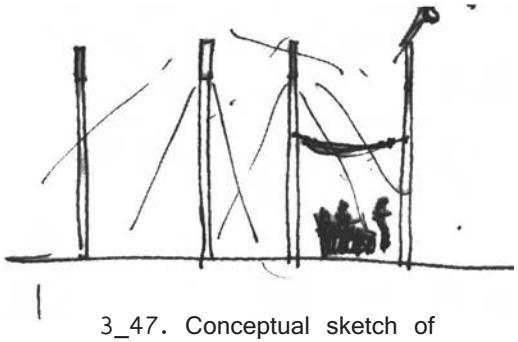


3_46 Compilation of interim model raised walkway

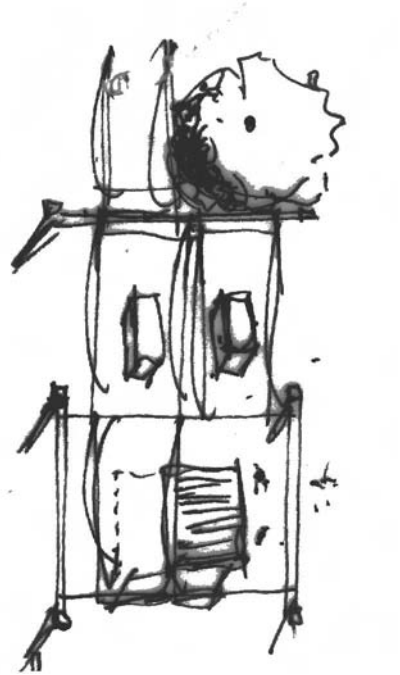
Traders Market

The traders market can be viewed as a plaza introducing commuters to the site. A medley of light posts illuminate the path towards the display towers. One can understand this path as a "melodic" sequence of form, that begins with an introduction which develops into a climax and ends with a conclusion (Lynch.K 1960:99)

The inspiration for shading of the traders market was inspired by Drill hall, in Johannesburg. This late addition to the Drill hall refurbishment project, comprises of a light weight shade netting. It is connected to a tensile steel cable, by means of cable clamps, and stretches some 25 metres across from one post to another.



3_47. Conceptual sketch of shade netting suspended from light posts.



3_48 Conceptual sketch of of shade netting in plan view

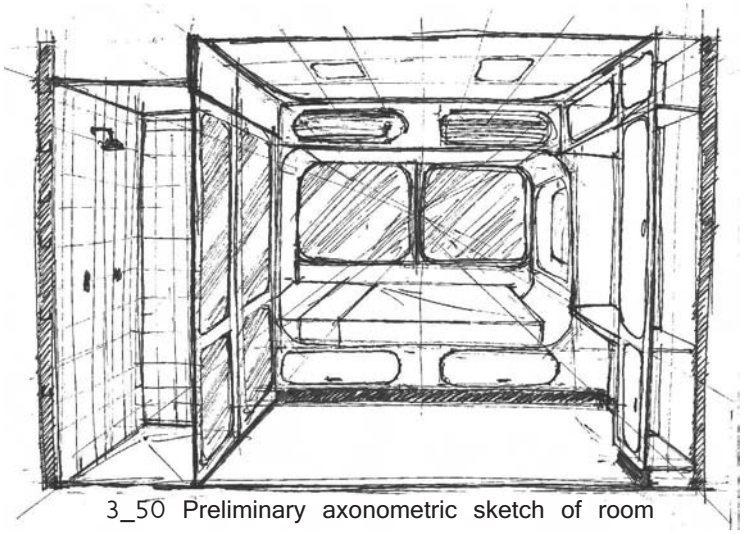
3_49 Drill hall, Johannesburg.
by Michael Hart Architects & Urban Designers.

Yotel

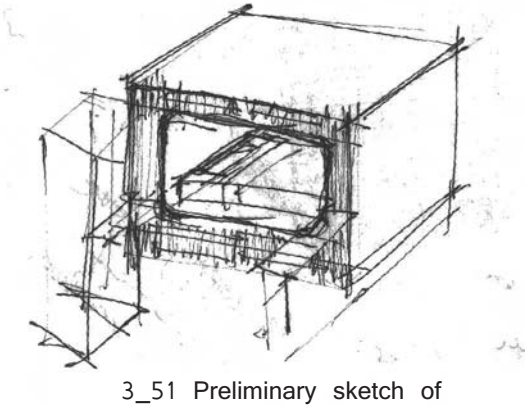
To enforce the space-age branding of the Yotel chain and for the contextual feel of light industrial environment. The rooms materials should be changed from the clinical white formica finish which is currently used, to more natural material feel.

Materials such as anodized aluminium for the doors and vents, cupboards and furniture from laminated timber. The Bed pod as shown in figure 3_51, to be constructed from Galvinised IBR sheeting on timber frame.

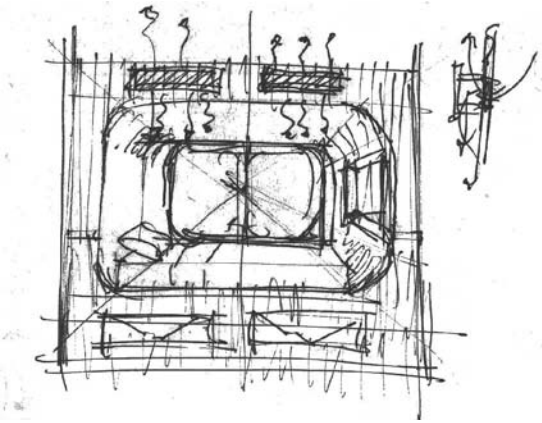
The suggested materials for the rooms are more robust and are less costly for both cleaning and maintenance.



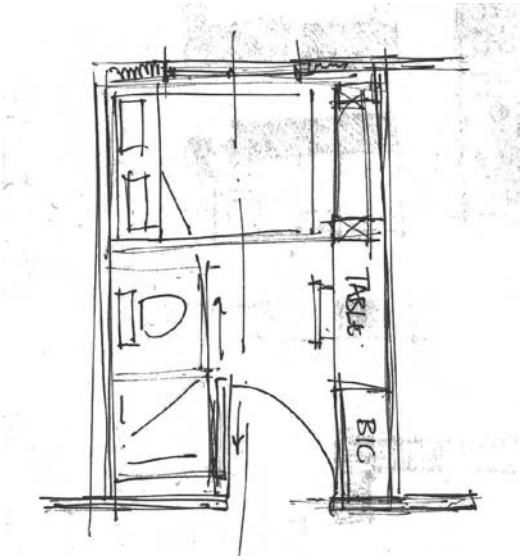
3_50 Preliminary axonometric sketch of room



3_51 Preliminary sketch of bed pod.



3_52 Preliminary axonometric sketch of bed pod.

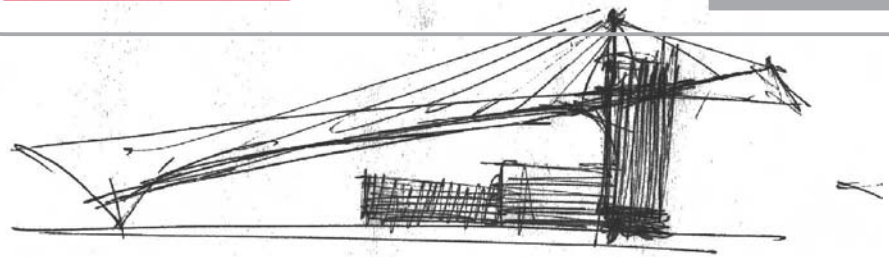


3_53 Preliminary sketch of room plan.

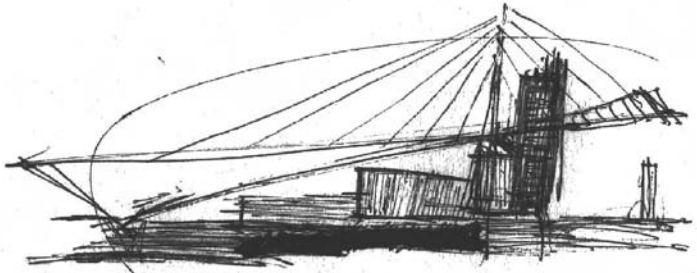
Elevations

The merger of the two roofing systems has resulted in the building presenting interesting but different north and south elevations, while still maitaining the industrial context.

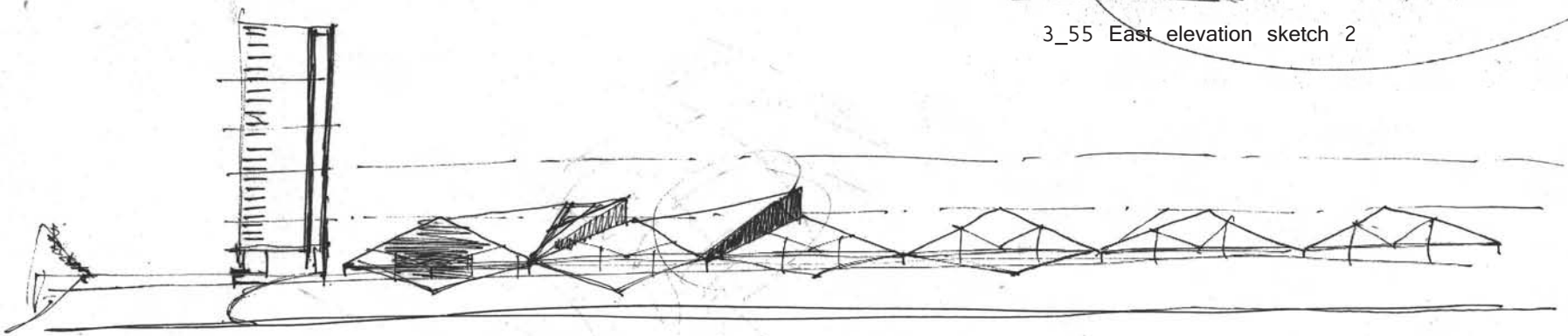
The ventilation towers would resemble smoke stacks and work on the same principle.



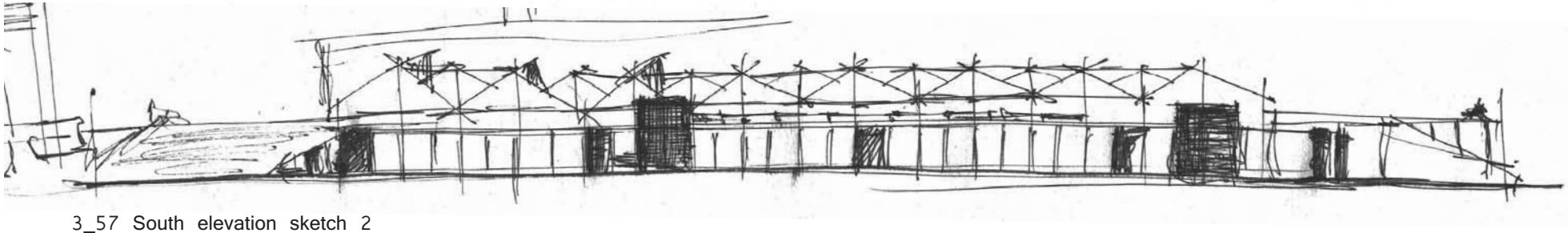
3_54 East elevation sketch 1



3_55 East elevation sketch 2

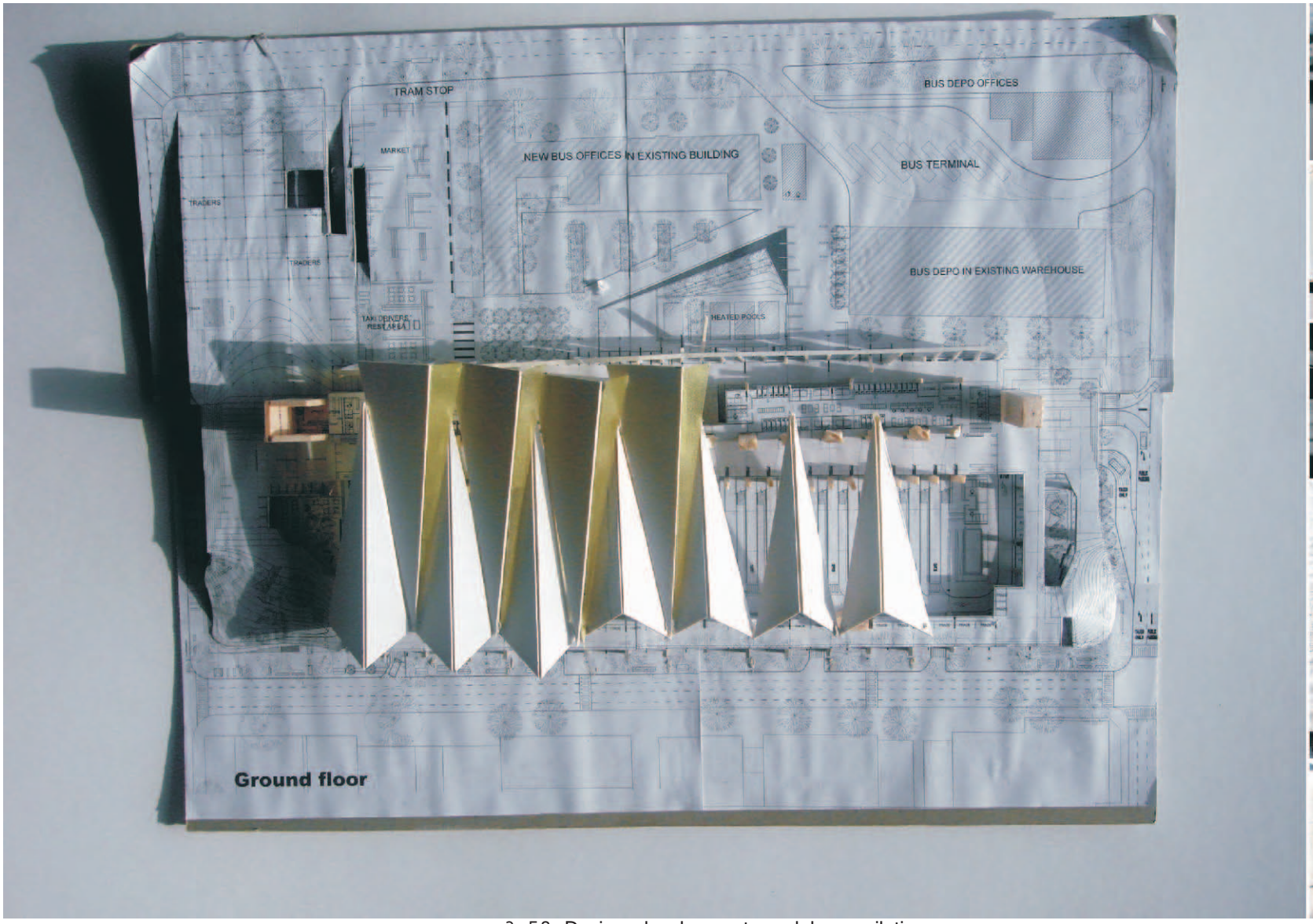


3_56 South elevation sketch 1



3_57 South elevation sketch 2

1.



2.

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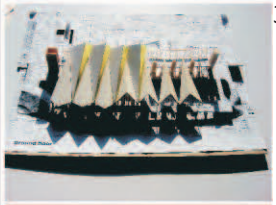

4.

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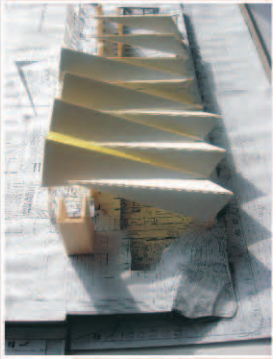

6.

3_58 Design development model compilation.

1. plan view (summer, morning) 2.South view (winter, mid day) 3.South view (winter, morning) 4.West view (winter, morning) 5.West view (winter, morning) 6.North view (winter, morning)