

# TECHNICAL INVESTIGATION

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## Stereotomic

### Structure

The columns are 230x460mm in-situ cast, reinforced concrete columns.

The in-situ cast beams are 510mm thick and span in a north-south direction on the north section of the building and in an east-west direction on the south section of the building.

The slab is a 340mm thick in-situ cast, one way reinforced, solid concrete slab. It can host a roof garden and has space for services on the top level.

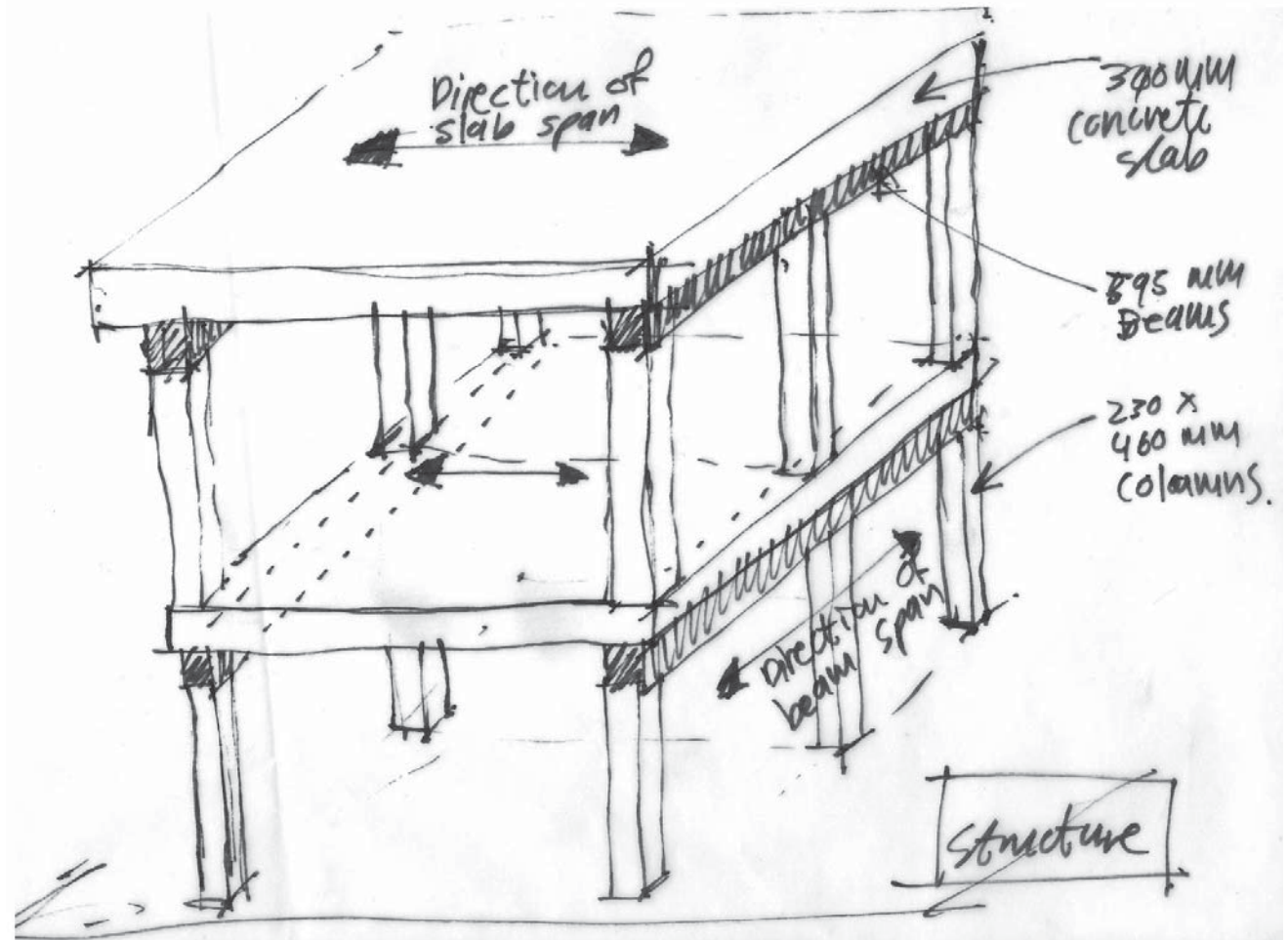


Figure 148: Structure.

The building consists of different levels on the ground floor to emphasise the slope of the contours, but also contribute to the playful atmosphere and organic touch of the building.



Figure 149: Plan indicating different levels.

Technical Precedents:

School of dramatic Art, TEN Architects (Mexico City, 1994)

This building's main element is the large tubular metal roof. As seen from the images, the tubular beam is bolted into a concrete slab at the bottom and is supported by a column at the top. Beneath this are a series of seemingly arbitrary volumes and planes, containing and defining their own function. (Cerver 2000:326)

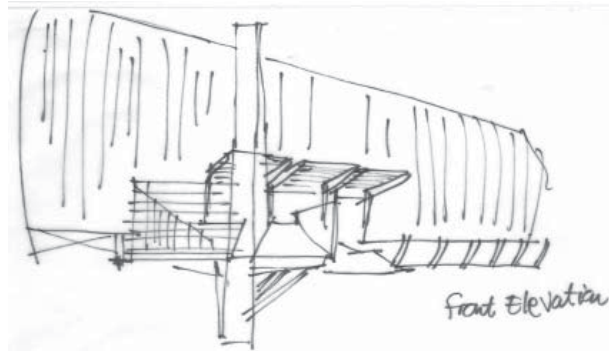


Figure 150: Front elevation.

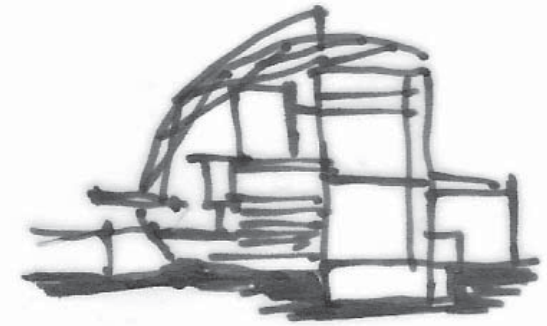


Figure 151: Cross section showing roof structure.

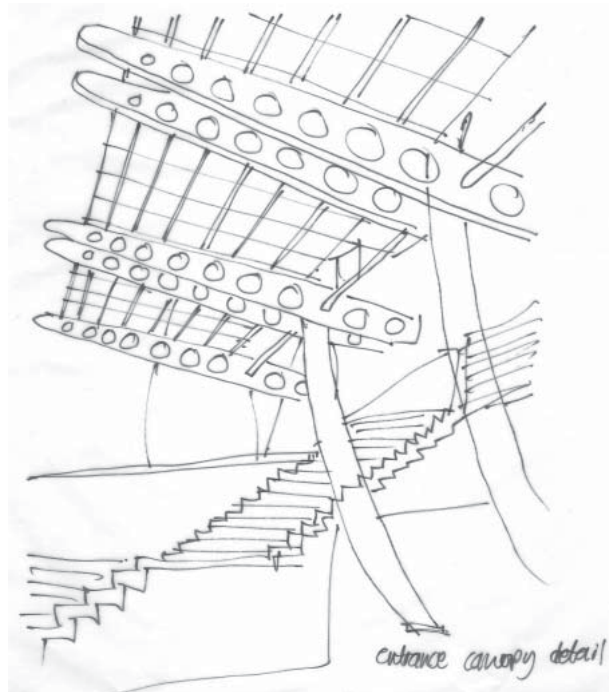


Figure 152: Perspective detail of entrance canopy.

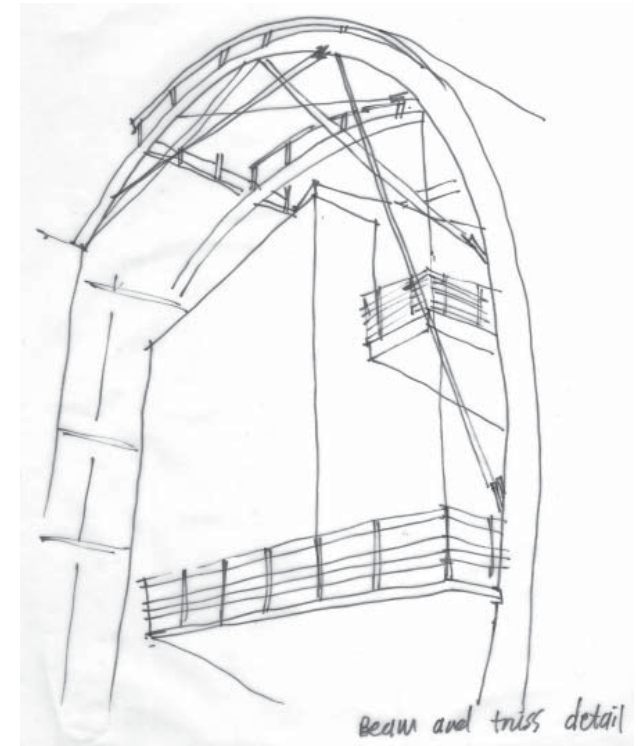


Figure 153: Perspective detail of curved roof structure.

Stratford's Guesthouse, Al Stratford (East London)

This building has a stress skin composite roof/wall solution. It has no internal framing, but is supported between the floors and the ridge. It has drywall and paper tube insulation on the inside. Since the roof has no rafters, the metal roof sheeting resulted being 'rolled-over' at the ends into gutters. (Unknown 2006:35)



Figure 155: Perspective view of vehicular entrance to guesthouse.

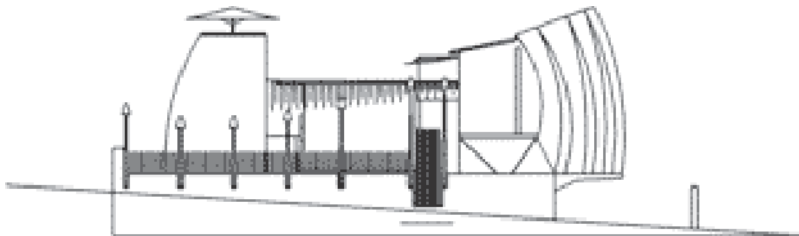


Figure 154: Side elevation indicating curved walls.



Figure 156: Aerial view of guest house.

The roof:

The mentioned precedents inspired the design of the roof. The roof is divided into three arched sections:

- it helps in regulating the air flow;
- creates a big volume for holding many functions;
- It also has an organic feel to it, which complements the theme and function of the building.

The arch contributes to the tension in the climbing centre. The main arch over the climbing centre is constructed of 950mm deep mild steel beams with 150x100mm purlins and covered with corrugated metal roof sheeting.

The second arch on the east side has a dual function. It acts as a roof and a sun shading device. The arch on the west side acts only as a sun shading device. These two arches are both constructed of 400mm deep mild steel beams with 76x52mm purlins. Aluminium louvers and corrugated metal roof sheeting are fixed with galvanised screws where specified.

There are different volume profiles within the roof, some of which can be seen and experienced from the outside. On the east side the building pulls up close to the arch and users and passers-by are in direct contact with the inside, whereas

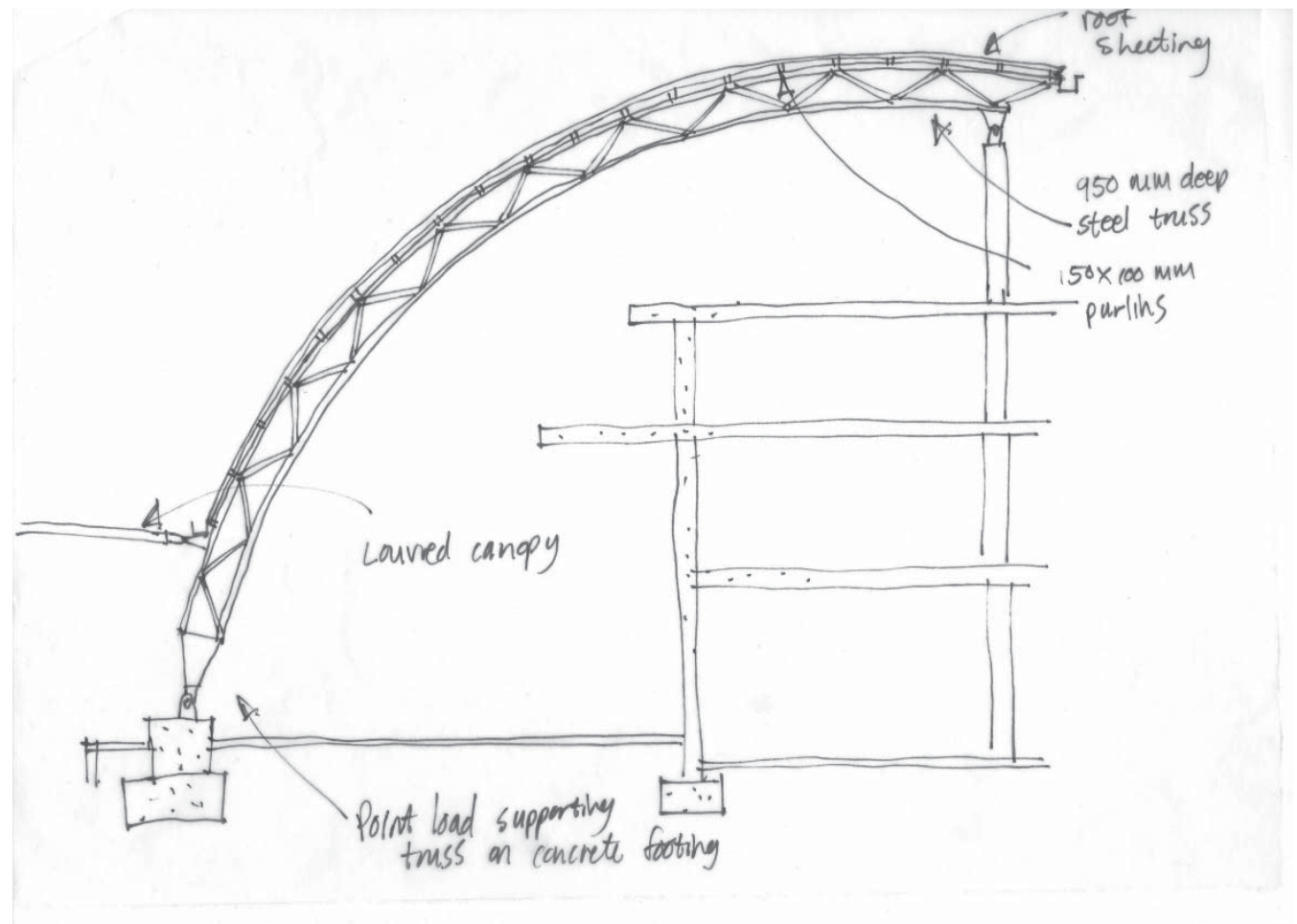


Figure 157: Sketch of proposed roof structure.

on the west side, the building on the upper levels pulls away from the arch and only the user has a clear feel of the interior.

#### Skin

Face brick extras are used as main external wall material. The internal walls are non-face plastered bricks. The ground floor retail areas have aluminium shopfronts at a general height of 2550mm.

## Services

### Service cores:

There are three service ducts running the full height of the building, providing entry for sewer pipes and water supply. The building has one central staircase and a passenger lift giving access to all floors.

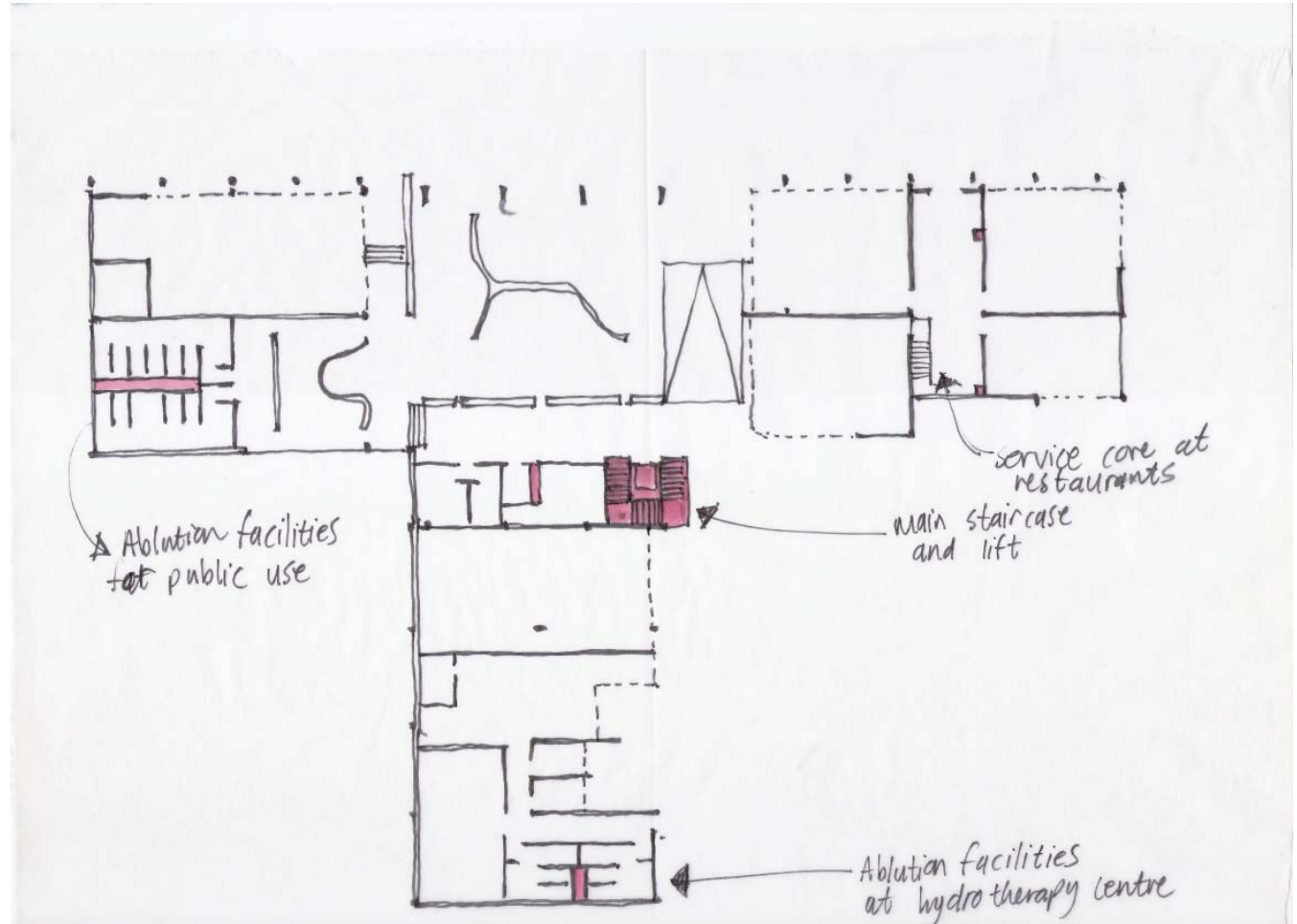


Figure 158: Plan indicating services.

Rain and storm water:

Rain water is harvested from all the roof areas and stored in a 980 000L underground water tank. The water is available for irrigation purposes for the herb garden, semi internal garden and court yard gardens. The rain water is guided through 100mm Ø downpipes along the façade and then underground towards the tank as shown on the drawings.

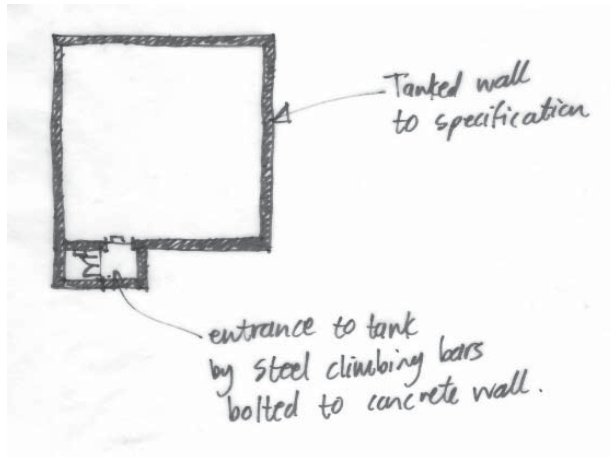


Figure 159: Plan of underground water tank.

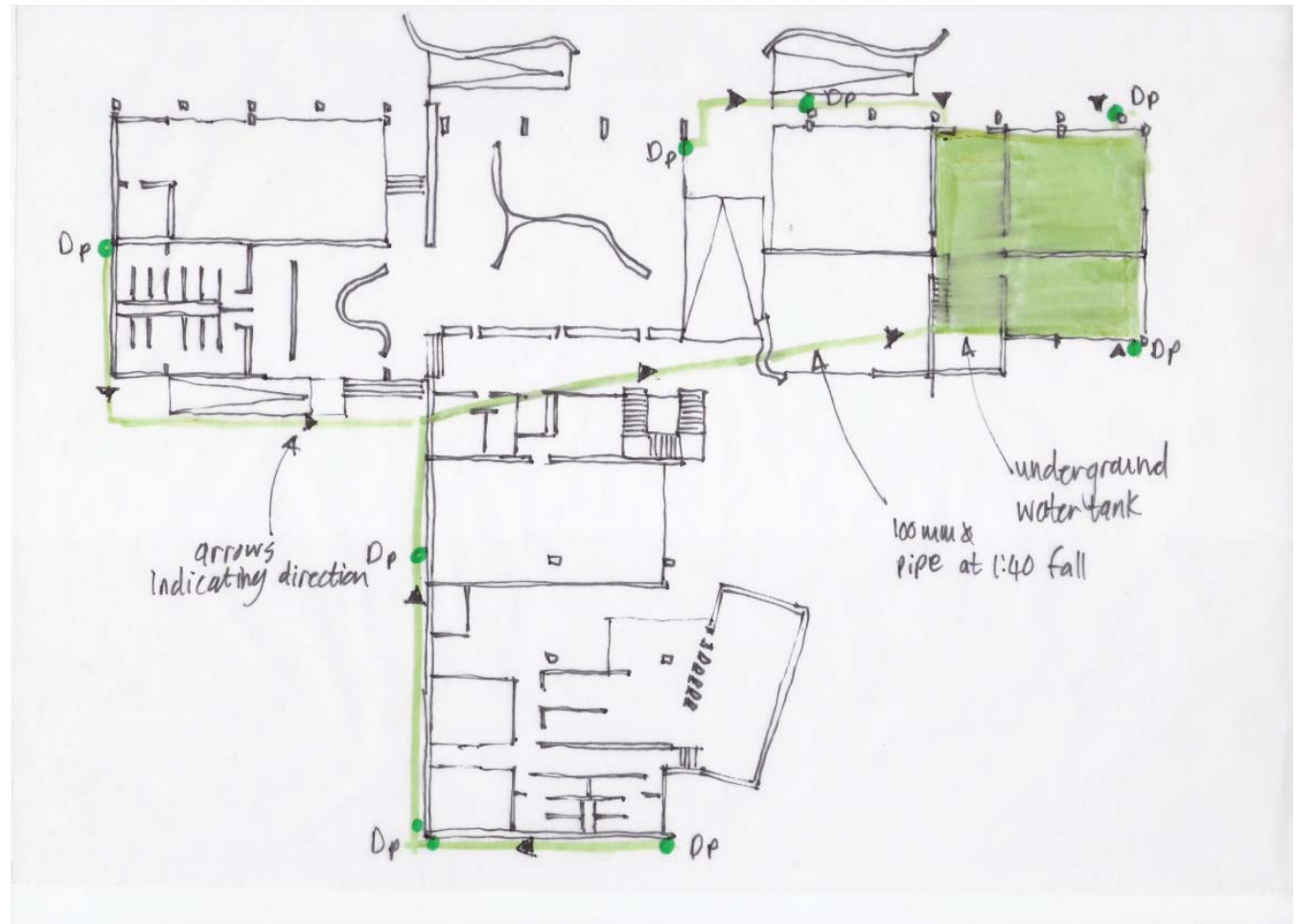
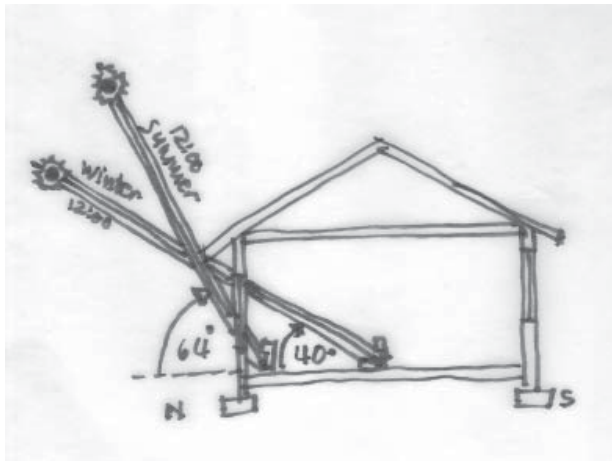


Figure 160: Plan indicating collection of rain water.

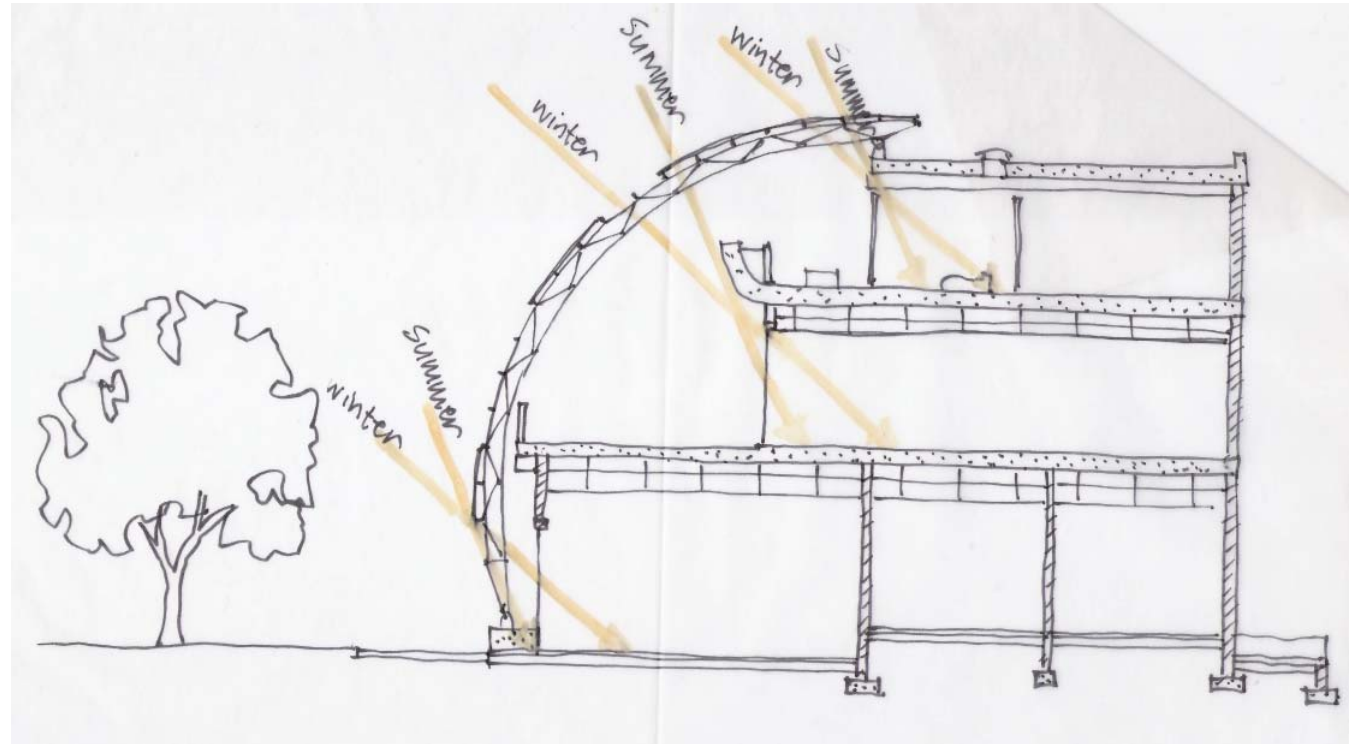


### Solar shading:

The north façade is shaded by fixed aluminium louvers as described under structure. The east façade has timber slats as sun shading louvers, only on a smaller scale. The west façade consists of a 340mm brick wall with minimum window openings for light and ventilation.



**Figure 161:** Diagram indicating sun angles in the Pretoria region.



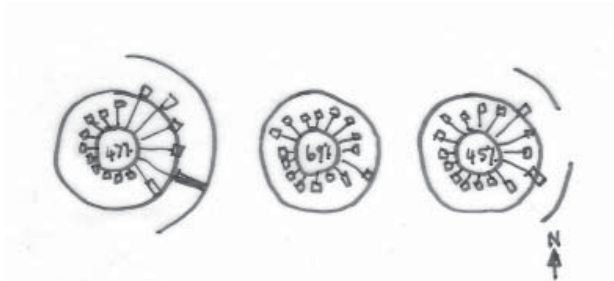
**Figure 162:** Cross section through proposed building indicating solar shading and control.

### Ventilation:

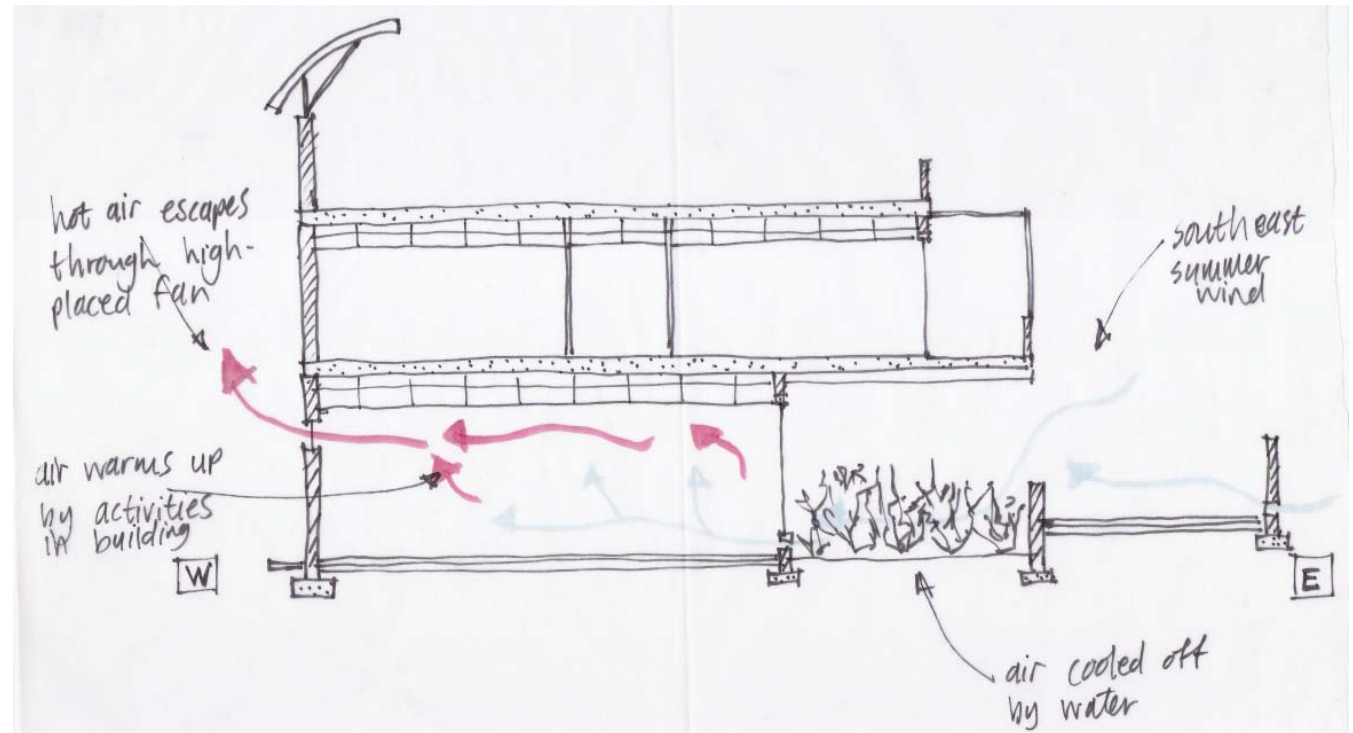
Pretoria has north-east to south-east winds, therefore maximum use through evaporative cooling has been made to use these winds for cross ventilation.

- A semi internal court yard with water feature cools down the wind;
- a funnel, created by the overhanging balcony forces it through the building;
- A fan sucks out the heated air to the outside.

The climbing centre, although situated in a north-south direction, have cross ventilation. The canopy, acting as a funnel, forces in cold air, while heated air escapes at the top opening at the other end.



**Figure 163:** Diagram indicating mainly south-easterly winds in the Pretoria region.



**Figure 164:** Cross section through proposed building indicating ventilation and air flow control through evaporative cooling.

Tectonic

Point loads

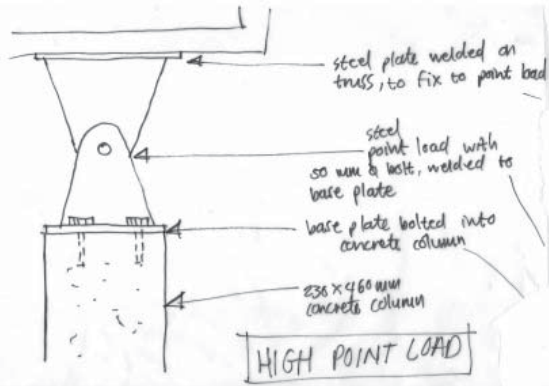


Figure 165: High point load detail - side elevation. Fixing truss to column.

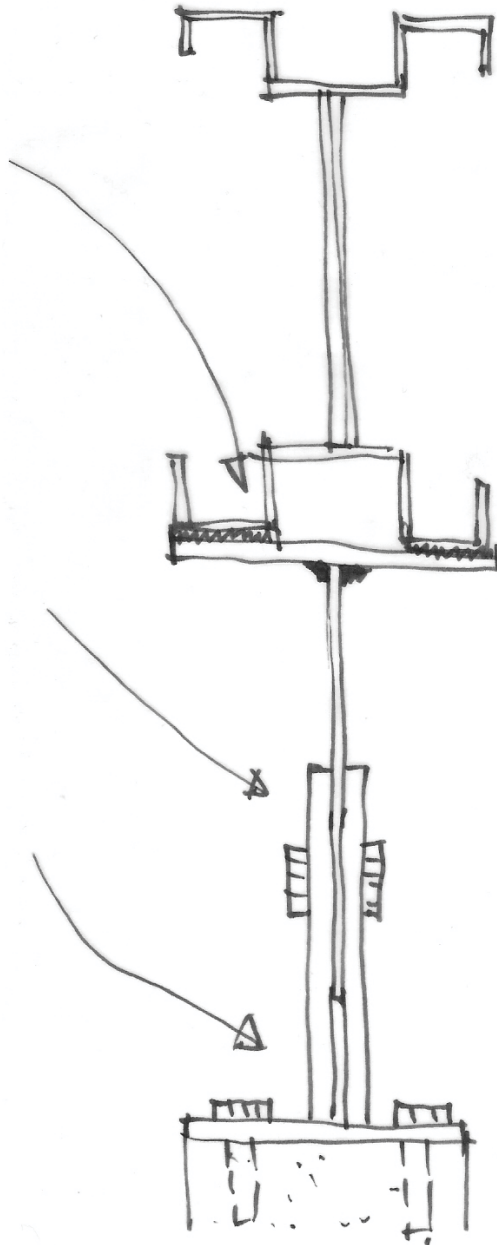


Figure 166: High point load detail - front elevation. Fixing truss to column.

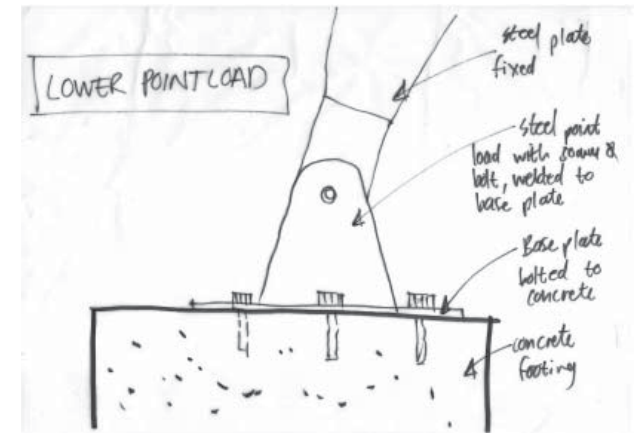


Figure 167: Lower point load detail - side elevation. Fixing truss to concrete footing.

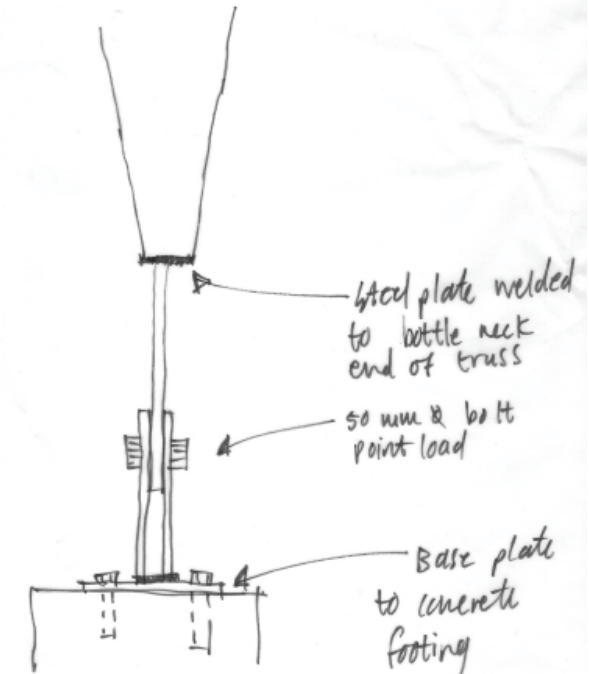


Figure 168: Lower point load detail - front elevation. Fixing truss to concrete footing.

Gutters

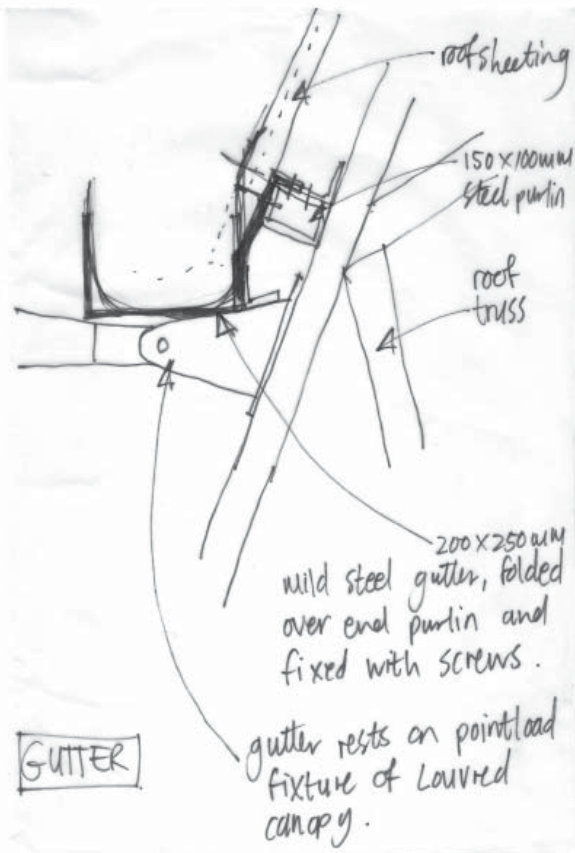


Figure 169: Gutter detail indicating gutter folded over and screwed to end purlin.

Downpipes

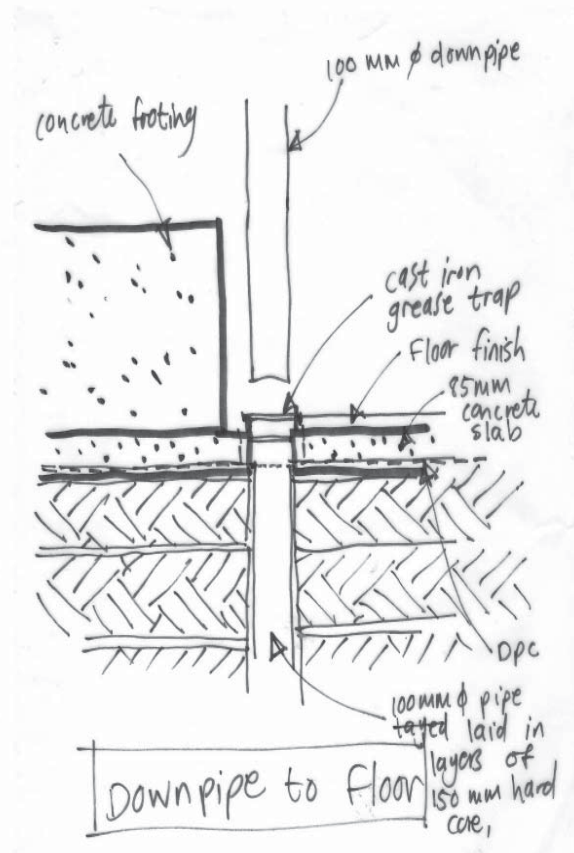


Figure 170: Rain water catchment in concrete floor.

Full-bore outlets

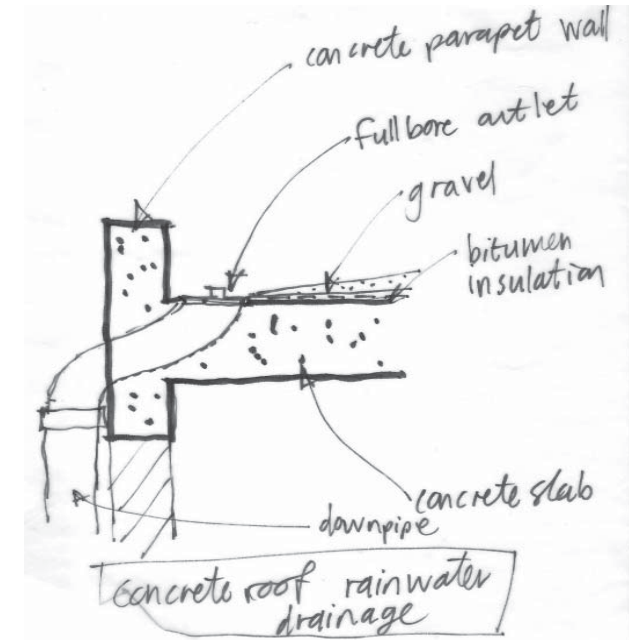


Figure 171: Fullbore outlet from concrete roof.

Ceiling insulation

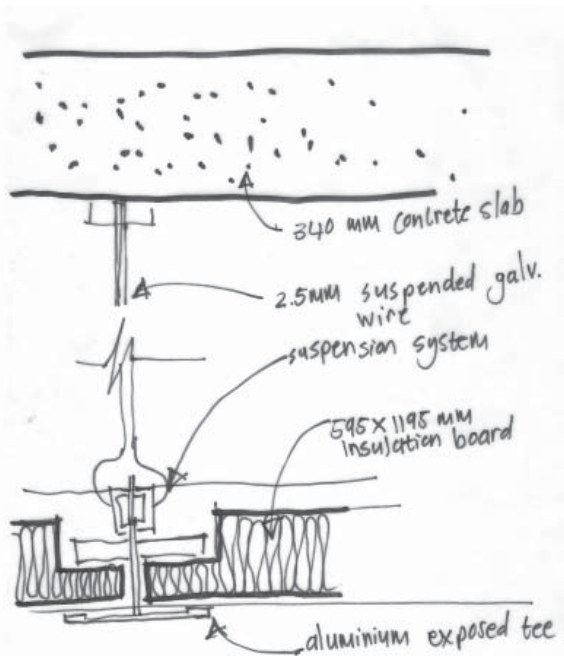


Figure 172: Suspended ceiling detail.

Skylights

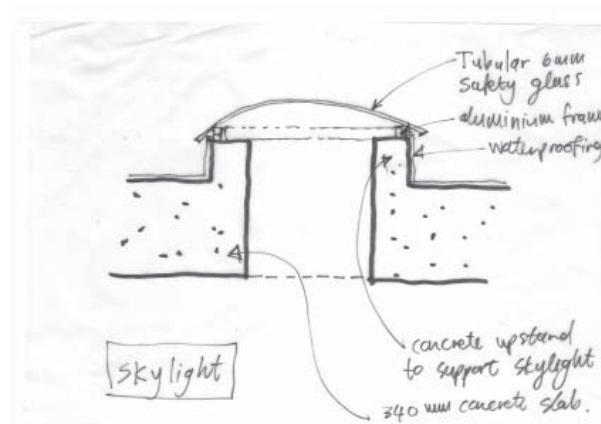


Figure 174: Skylight detail on concrete roof with upstands.

Louvers

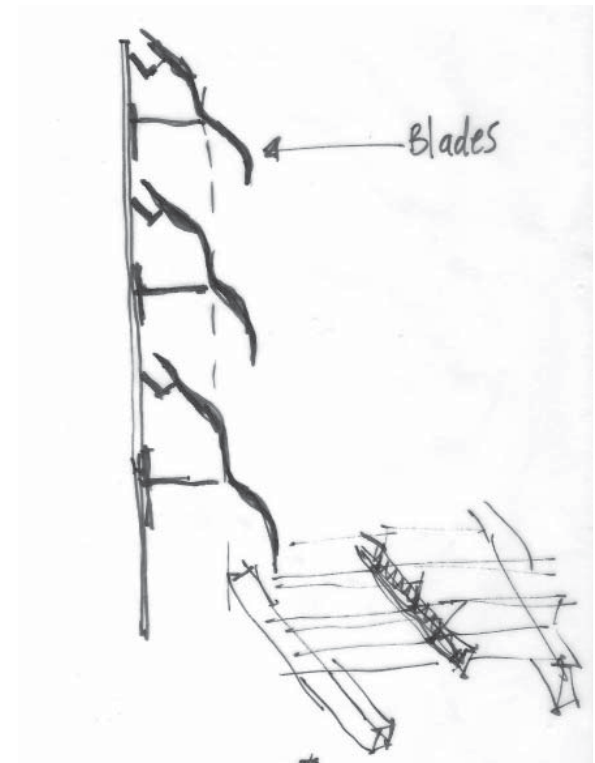


Figure 175: Louvre detail.

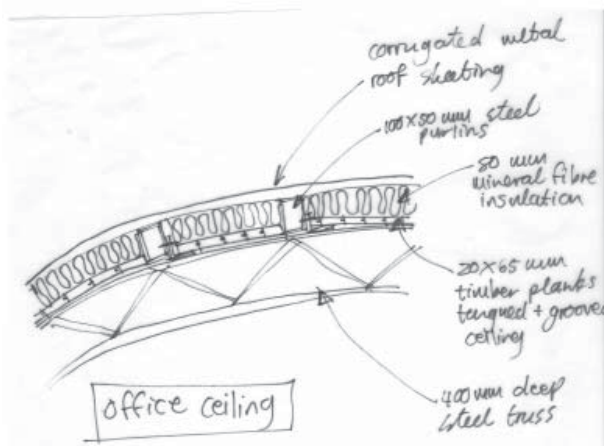


Figure 173: Timber ceiling detail to curved roofed consulting rooms.

**Materials**

Concrete

Concrete is used for the main structural system and in the climbing centre as wall material. The concrete will have an off-shutter finish.

Brickwork

All exterior walls will be face brick extras with flush joints. All interior walls will be non-face plastered bricks with 15mm cement plaster and painted.

Natural Stone

Stone is used as garden wall material.

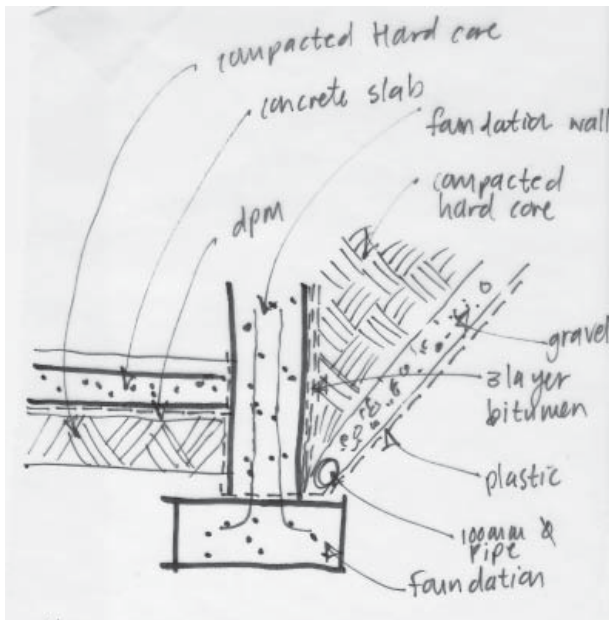


Figure 176: Under ground tanking detail.

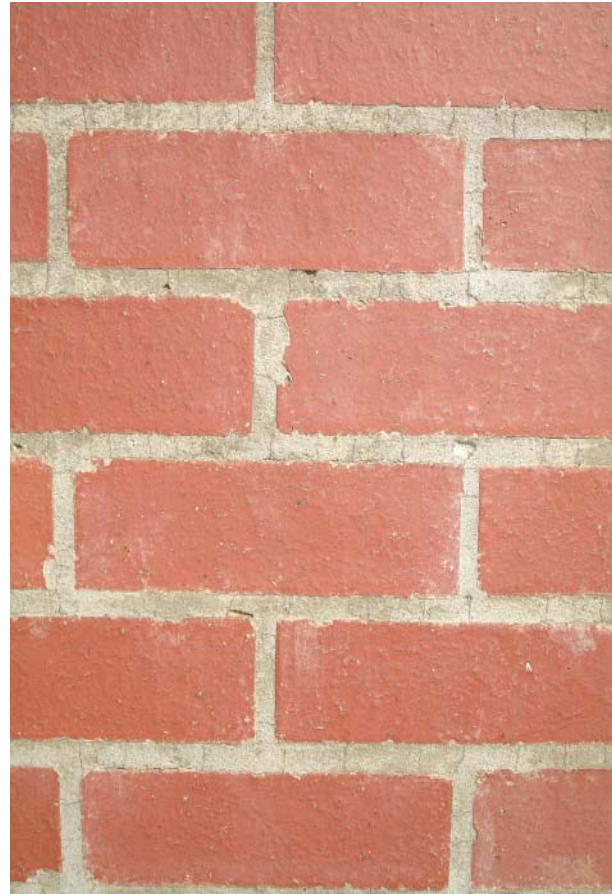


Figure 177: Brick wall with flush joints.



Figure 178: Stone wall.

### Steel

Steel is used for the roof structure.

### Glass

Glass is used as skin infill to let in light and control natural ventilation. The main staircase is enfolded by a green tinted glass skin.

### Timber

A timber screen shades the treatment rooms facing the courtyard to the east. These timber slats are laid horizontally to emphasize the horizontal movement behind it.

Recycled timber slats are used as screens on balconies between consulting rooms. Recycled timber slats are also used in the meditation space as screens to create different corners for privacy.

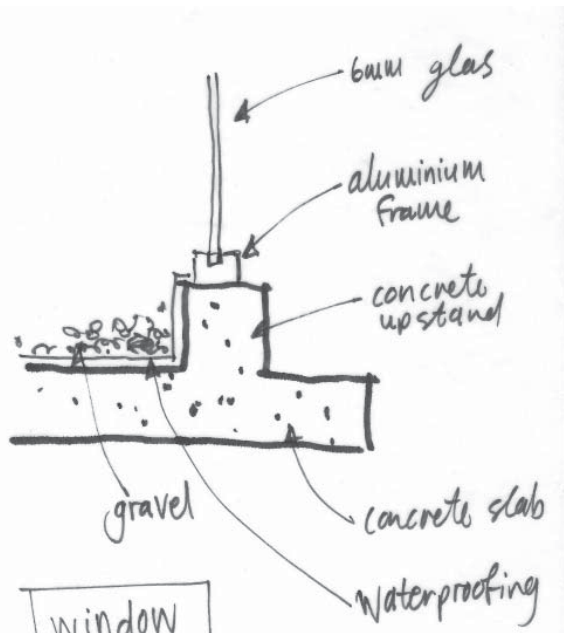


Figure 179: Aluminium framed window fixed to concrete upstand on roof.

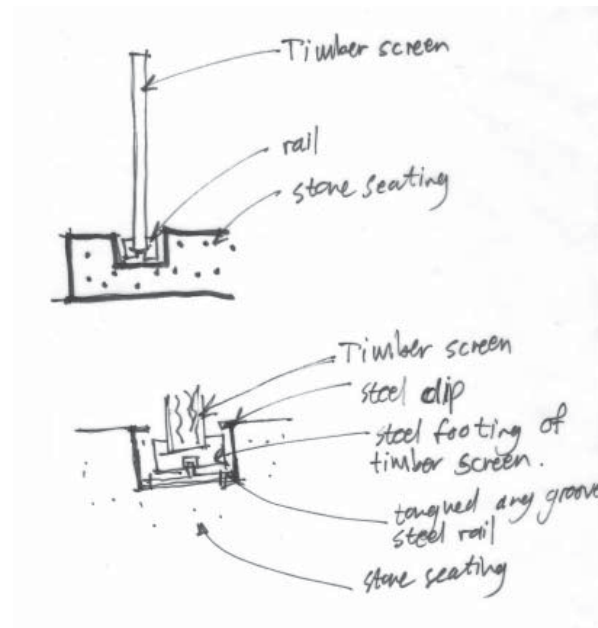


Figure 180: Timber screens fixed with steel railing to stone.

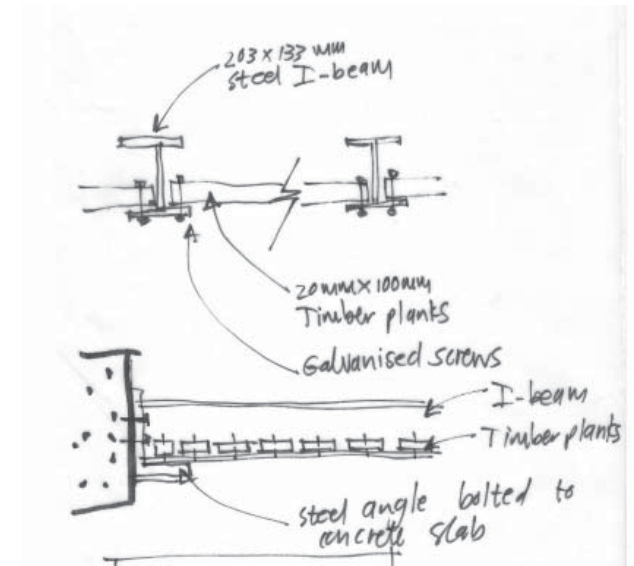


Figure 181: Timber louvres fixed with steel angle to concrete beam.

Surfaces

Different floor surfaces are used to indicate layering of movement. Main pedestrian routes are paved with standard concrete pavers. Sections closer to the building are paved with smaller pigmented clay pavers.

The retail spaces, climbing centre and service cores have a seamless epoxy mortar finish in different colours.

The climbing centre has a 150mm foam rubber mattress onto of the epoxy finished floor, to give falling climbers a 'softer' landing.

The treatment and consulting rooms on the first floor have carpet as a floor finish to create a more welcoming atmosphere.

The meditation area gives the opportunity for different floor finishes. The private corners are finished with hard wood plank, glued directly onto the concrete floor, whereas the areas of movement are tiled with a variety of natural stone and mosaic tiles.

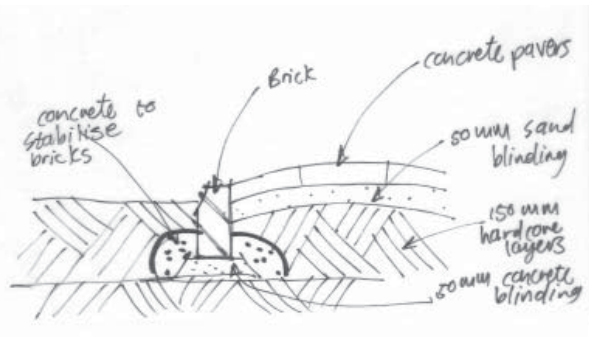


Figure 182: Construction of garden walkway.



Figure 184: Existing surface detailing found on site. (2)



Figure 183: Existing surface detailing found on site.

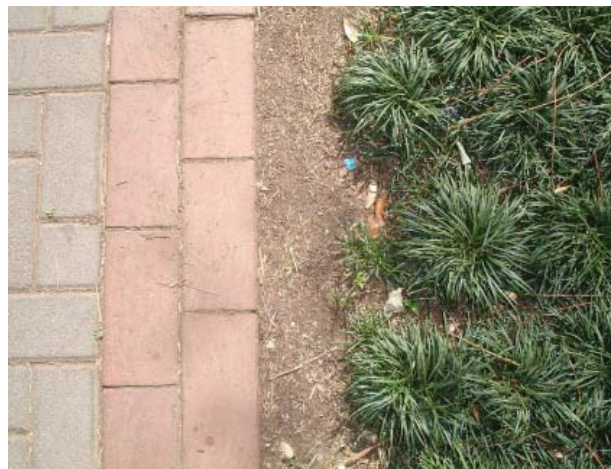


Figure 185: Existing surface detailing found on site. (3)

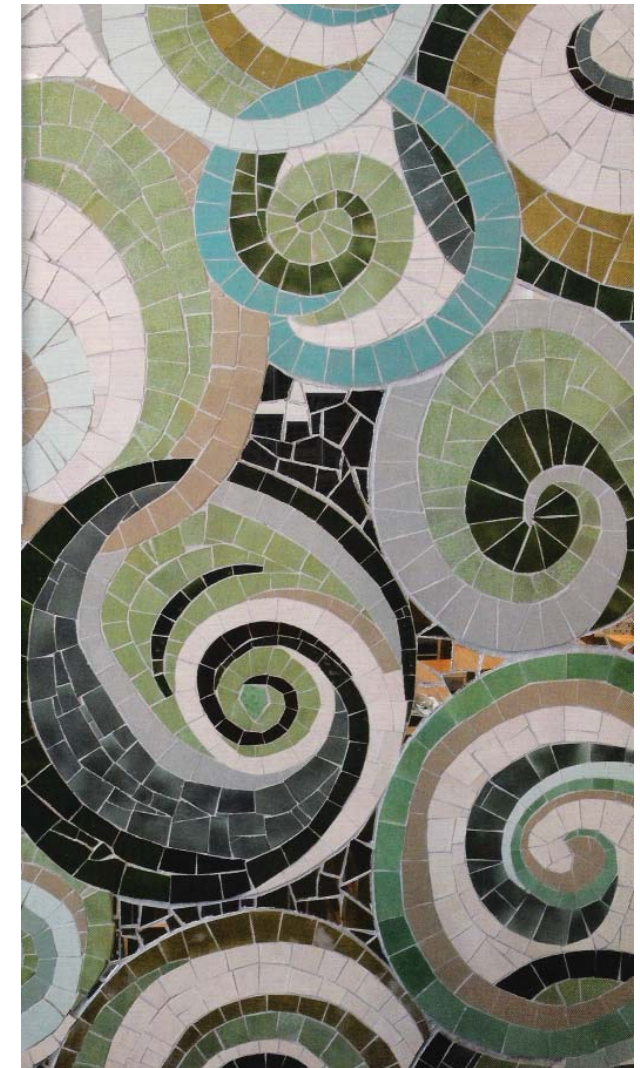


Figure 186: Mosaic pattern to be used in meditation space.



Vegetation

Flower garden:

The flower garden has a variety of plant with colourful and fragrant flowers. There is a narrow line of stepping stones that lead to benches in between the flowers, giving the opportunity to hide behind a wave of colour.

Semi-internal court yard at Hydrotherapy

Centre:

Since these plants would receive minimum sun, foliage plants would suit this area best.



Figure 187: Sterlitzia to be planted in flower garden.



Figure 188: Typical plants to be planted in flower garden.



Figure 189: Yesterday, today and tomorrow.



Figure 190: Peach blossoms



Figure 191: Bouganvillea.



Figure 192: Typical plants to be planted in flower garden 2.



Figure 193: Succulent with pink flowers.

### Water garden:

Next to the flower garden is the water garden. A strip of water flows underneath the walkway and then through the openings in the wall separating the lower level timber deck from the upper level gardens, creating a small waterfall. The sound of falling water creates a tranquil atmosphere to the users and passers-by.

The surface of the garden is covered with gravel and a variety of size and coloured stones. Bigger flat stones serve as seating areas. These seating stones have curved sliding timber screens fixed with a steel railing in a channel that is cut into the stone. The seated can slide the screen to give shade or privacy and still has a view of the flowing water.



Figure 194: Water



Figure 195: Existing use of materials on site



Figure 196: Proposed walkway border detailing.



Figure 197: Existing curved brick wall on site.

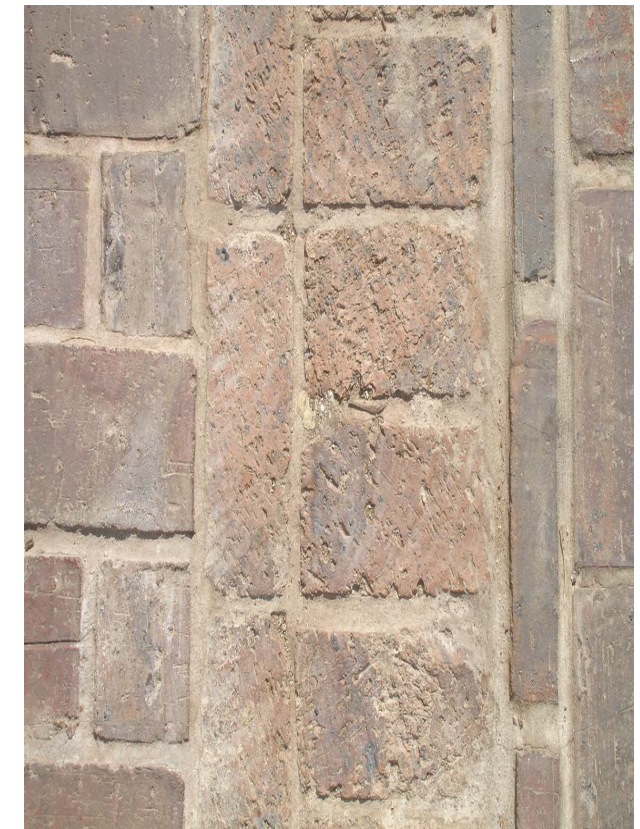


Figure 198: Existing surface detailing on site.

Japanese garden:

This garden next to the water garden has the traditional elements of a Japanese garden: water symbolised by pebbles, rocks, a pavilion, vegetation, stepping stones and an enclosure. The pavilions on both ends provide a space to sit underneath a low curved roof. The pavilion is raised from the ground on a timber deck. The seating area and roof supports are all constructed of timber elements. The roof covering is corrugated metal roof sheeting to provide a solid cover. The plants used here would predominantly be foliage plants.

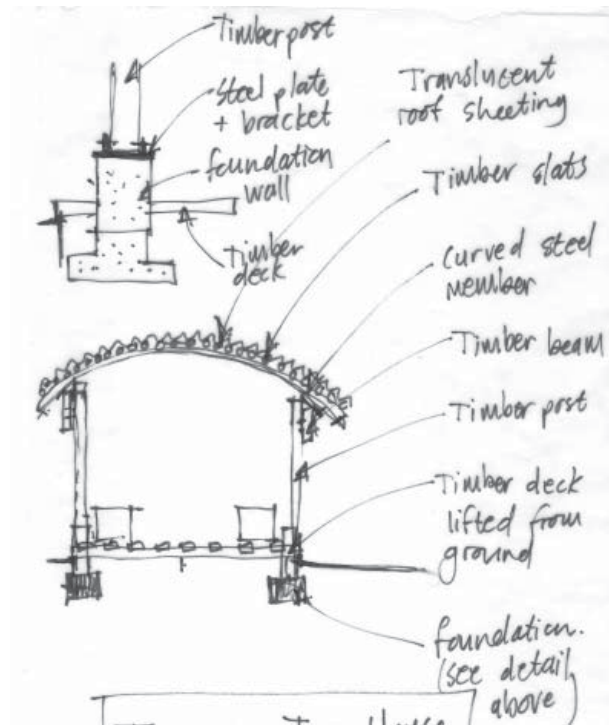


Figure 200: Detailing of proposed Japanese tea house.



Figure 202: Typical surface detailing in water garden.



Figure 199: Water 2.



Figure 201: Typical creepers to be used in gardens.



Figure 203: Wild jasmine creeping on timber screen.

### Succulent garden:

The succulent garden is on the west side of the building and will constitute to a desert landscape. The climbing centre spills out on this end and big boulders rule this landscape that pushes into the succulent garden. The surface is bordered off with a single row of bricks and the rest is covered with sand. The composition of different sized rock, succulents and cacti is softened with a single stream of water which thickens as it comes closer to the boulders. A fountain pump is used to push the water up and over the rocks.

The use of different gardens symbolises the variety of landscapes found in South Africa. The choice of gardens was selected to enlighten the senses and mood of the users and passers-by.



Figure 205: Surface detailing in succulent garden.



Figure 204: Typical succulents planted in succulent garden (1).



Figure 206: Typical succulents planted in succulent garden (2).



Figure 207: Surface detailing in succulent garden (2).



Figure 208: Typical succulents planted in succulent garden (3).



Figure 209: Typical succulents planted in succulent garden (4).

