10.1 BRIDGING THE CONCEPT - TECHNOLOGICAL AESTHETIC

Through the technical and detailed design of the building the vital ideas of shelter, protection and Mthunzini are expressed and in the process they create, rhythm, pattern, texture, colour and curve. The spaces are woven out of overlaying timber into a curved arch form. This brings both the curvilinear and natural into the room while insulating, protecting, warming and brightening the interior. Yet even though these form are complex the techniques behind building them are kept as simple and pure as possible, using limited material palettes in order to embody a more monastic an elemental feel to the design.

10.2 MATERIALITY

The material palette is kept simple using only four basic elements those of wood, steel, blocks and concrete, in various combinations and forms. This allows for simpler construction methods, increased speed in building and a lower cost of the complex as a whole. But the choice was made for different reasons. By decreasing the number of different elements, a simpler and more cohesive look is achieved - despite the differences between the building forms. Every building uses the same elements that the others are created out of. This allows for a continuity that otherwise might not be achieved within the contrast of curvilinear and rectangular form.

TIMBER
Timber or wood is used as an internal space making element, arching in curves to form enclosing and woven wards or creating screening and shading elements that continue the internal arches externally.

STEEL
Steel takes the form of arching I-beams, solid portal frames or as a corrugated steel skin. The roofs pulls down over the sides of the building to merge into walls anchoring the scheme.

BLOCKS
Hydroform blocks made from the earth of the site itself bed the building into its natural surroundings, creating solid elements that intercede the curves.

CONCRETE
Concrete takes the form of self-supporting winblock windows, surface beds and floor slabs. Although the floor slabs see an amalgamation of steel in the guise of form decking. The windows create a repetitive, yet changing rhythm.
10.3 SUSTAINABILITY

The ideology of sustainability was approached not from the single angle of materials and construction, but from all three of its aspects - Social, Economic and Environmental. This allowed the design to be more completely sustainable than if it was just made from recycled or recyclable materials.

SOCIAL

One of the main design objectives was to create a facility that integrated itself with its’ surroundings and community through the provision of functions, as well as the spaces allocated for general use. Although this made for a more complex public - private relationship it meant that the facility in fact supports the surrounding community, rather than shutting itself off from it.

This is achieved through the various programs and educational opportunities provided through classes, functions, exhibitions, sports, permaculture gardens, education etc. They all combine around publicly accessible courtyards, amphitheatres and gardens, allowing for diverse social interactions and enriching the surrounding community. The outpatient facility also allows the hospice to reach out into the area, creating a network of those both supported and supporting the Hospice.

ECONOMIC

The facility does not rely solely on charity or governmental grants. The Hospice branches out into self sustainability through the provision of spaces and functions that draw in an income. Those of permaculture, green products and produce sales, sales of donated furniture and goods through the hospice shop, as well as the various functions, events conference and fundraising opportunities made possible through the inclusion of the educational courtyard, classrooms, functions venues and the hall.

ENVIRONMENTAL

Passive design principles were employed. Most of the site is in constant year round shade from the numerous well established trees on site, that date back before the founding of Mamelodi. To maximise available light, the Hospice wards have northerly facing clerestory windows, shaded northern walkways and passages and shaded indirect Southern light through the glass balcony doors.

Figure 204 below depicts the solar infiltration at noon during the winter solstice and at noon on the equinoxes. As one can see, the solar gain decreases rapidly during the equinoxes and is not even present at noon on the summer solstice. It also depicts the natural ventilation of the building. Cross ventilation is drawn through the
northern windows along the passage and the side windows in the paediatric wards or the balcony doors in the adult wards. Ventilation is further enhanced by the provision of clerestory openable windows at the highest point of the building. Unfortunately, because of the high level of shading, solar water heaters and panels became inefficient and uneconomical.

A three layered insulation method was also opted for. Starting just under the external skin an industrial grade Sisolation is employed with a 75mm air gap, under which a 75mm reinforced Aerolite blanket is attached to the third layer of insulation - the wooden slats that create the internal finish.

*Material usage* was well-considered when implementing the design, technology and details. Environmental products such as hydroform blocks, which consist of soil reclaimed from the site mixed with a low percentile of cement compressed in portable machinery and cured on site. They are dry stacking blocks that can be assembled in a much shorter time period, have superb strength and a facebrick like finish when sealed which means they are low maintenance. They can also be reclaimed and reassemble easily.

Other environmentally friendly materials such as bamboo were used as well. The other materials employed particularly steel, are recoverable and recyclable. While the self supporting Winblok windows could easily be salvaged and reused through a planned deconstruction of the facility.

*Through servicing* another level of sustainability can be achieved. Through the use of an above ground bio-reactor such as the Liliput Bio-reactor sewerage is harnessed from around the site and is converted into safe irrigation water for the permaculture gardens, as well as protecting the nearby river tributary from harmful pollution.

“The sewage from the septic tanks (pre-digestion) is pumped at a constant rate to the LILLIPUT BIO-REACTOR. The effluent enters the bio-reactor ... and is discharged to the garden for irrigation or rivers and streams or dams and storm water systems ... The plant does not require continuous supervision and minimal maintenance. All pumps are sealed units rated for continuous use. The chlorine disinfection unit should be topped up intermittently to ensure optimum efficiency. All mechanical / electrical components are readily available off the shelf from local shops. All plant and equipment is supplied in non-corrosive or corrosive protected material. As the entire plant can be constructed above ground, the necessity for extensive earth works and civil requirements is curtailed.” (LILLIPUT 2010)
PERMACULTURE GARDENS

The permaculture garden becomes central to all three of the ideals of sustainability. It is used within this facility to not only be an environmental rehabilitation of the site but also to fulfill the needs of economic and social sustainability through the integration with the community, creation of jobs and sale of produce. It will also provide choice for the patients in the facility physically capable of exploring and helping with the work in the gardens, giving them purposeful pursuits.

The aims of the gardens and education program are:

• To rehabilitate the existing site and provide integration into the existing green space.

• To help people find out more about the mental and physical benefits of food growing and a healthy balanced diet, and how this can particularly help those community members in terminal condition.

• To create jobs for those in the surrounding community and such education as to allow people to start their own profitable gardens at home, empowering the community.

• To allow for the manufacture and sale of environmentally friendly products such as worm farms.

• To provide a space within which patients can interact with the surrounding community

This will be achieved through the offering guided tours, workshops and classes (FOOD VISION no date) in the provided
classrooms, outdoor covered education space overlooking the permaculture gardens and the amphitheatre for larger crowds and school tours. While the sale of produce and products to the community will bolster the centre's self-sustainability and monitored open access will allow all those who wish to participate or view at their pleasure. The permaculture garden also helps to achieve the aims of the proposed linear nodal development framework for the area, those of integrated urban agriculture, green space rehabilitation and definable urban edges.
10.4 STRUCTURAL SYSTEMS

The Primary structure consists of ground floors slabs, concrete foundations and a lightweight steel structure with galvanised steel I-beams measuring 144 by 254mm. Cross beams support walls and form decking floor slabs, while the main arch beams are placed along a structural grid of 2000mm centre to centre.

The Secondary structure is the ‘woven’ timber lattice that forms the interior treatment of the arch, as depicted in figures 206 and 208. These require prior assembly, before the skin of the building is erected, in order to fix the 75 by 114mm planed all round timber.
pieces into their cleats as well as attach the bent battens and siding.

While the Tertiary structure consists of the skin of the building in the form of steel c purlins, curved steel roof sheeting and Hydraform block walls punctured by Winblock windows. The roof sheeting is pulled down on sections of the building to not only form the roof, but the walls of the structure as well.
10.5 CREATING CONNECTIONS - SECTION A-A & DETAIL A

SECTION A-A

213. Section A-A

240x220x115mm Hydraform interlocking blocks, to be mortared with brickmuffle 1 course above the window top. To be plastered inside and out.

Winblock high density, low permeability, unreinforced 30 MPa smooth finish pre-cast concrete window surround. 800x800x260mm. With galvanised steel window insert, fitted to rebate of surrounding using non-ascetic silicone sealant.

Clotan Steel 0.58mm galvanised steel headwall flashing 305mm girth bent twice along girth.

Clotan Steel Craftlock profile, 0.58mm thic ISQ 300 z275 spelter galvanised steel roof sheeting. Bent to angle specified, fixed with 5mm Ø 12mm long s.s. self tapping screws to steel c purlins at 2000mm centers.
10.5 CREATING CONNECTIONS - SECTION B-B & DETAIL B

DETAIL B

- P.A.R. timber purlins 114x75mm in lengths of 1950mm
- Eco-Logic Bamboo strand woven bamboo planks with flat edge. 102x20mm in suitable lengths, screwed to supporting P.A.R. bent timber brackets at 500mm centers
- Ceiling Insulation 75mm thick Isover Aerolite flexible non-combustible lightweight fiberglass reinforced insulation blanket. Closely fitted, ends butted firmly and fixed to the top of branding between structural steel members at approximately 2000mm centers.
- 100mm concrete floor slab with 25mm polished cement screed on 250 micron DPM and 50mm blinding layer
- 152x64x2mm Hot dipped galvanised steel c-purlins fixed at 2000mm centers
- Sisalation 420 heavy industrial grade reinforced aluminium foil insulation double sided.
Winblock high density, low permeability, unreinforced 30 MPa smooth finish pre-cast concrete window surround. 800x800x260mm bedded on a continuous strip of class 1 mortar, with vertical joints filled after the whole row has been placed with no-fines concrete (13mm stone) between vertical frogs. Back grout vertical joints with class 1 mortar. With galvanised steel window insert, fitted to rebate of surrounding using non-ascetic silicone sealant.

- 114x254 galvanised steel I beam
- 114x254 galvanised steel I beam

Form decking to be Brownbuilt 0.8mm thick bond-dek Z275 spelter galvanised ASTM 446 grade C troughed interlocking permanent formwork fixed at 2000mm centers to steel I beams with concrete slab depth of 140mm.

- 114x254 galvanised steel I beam
SECTION D-D

P.A.R. steam treated and bent timber pattersn
32x32mm at 500mm centers

P.A.R. timber purlins 114x75mm in lengths of
1950mm

75x120x80mm galvanised mild steel C cleat,
butt welded to steel I beam at specified
centers and predrilled

114x254 galvanised steel I beam

Form decking to be Brownbuilt 0.8mm thick
bond-dek 2275 spelter galvanised ASTM 446
grade C troughed interlocking permanent
formwork fixed at 2000mm centers to steel I
beams with concrete slab depth of 140mm.

Sisalation 420 heavy industrial grade
reinforced aluminium foil insula
Ɵon double

32x32mm at 500mm centers

75x120x80mm galvanised mild steel C cleat,
butt welded to steel I beam at specified
centers and predrilled

114x254 galvanised steel I beam
10.6 SERVICES - FIRE PLAN
10.6 SERVICES

FIRE PLAN
The fire plans have been completed in accordance with section T of the National Building Regulations. Two or more fire escape routes have been provided when necessary. And a fire hose reels or alternately fire extinguishers of sufficient number have been accommodated in all the buildings.

In the Hospice sections of the facility the hose reels etc. have been place within the sluices rooms allowing for more efficient water provision and centrality to the building.

CATERING PLAN
The Kitchen is placed within the service building and has access to a service entrance for the removal of waste and to take delivery of supplies. The kitchen is also optimally placed to serve into the outpatient courtyard as part of the Hospices feeding scheme. Food is then delivered in individual servings to Hospice wards and bain-maries to the day rooms, for those patients who are able and prefer to eat in a conventional dining setting, rather than in bed.
WASTE PLAN
Waste and laundry are collected for the facility and brought, in the case of medical and normal waste to the waste management centre, while laundry would proceed to a sluice room adjoining the waste centre. The medical waste is collected by specialised companies that deal with its disposal or incineration off site. Laundry then passes from the sluice room (after bio hazardous waste is removed) to a section in the laundry for cleaning and then eventually into an area for drying and ironing.

DRAINAGE PLAN
Drainage from the service building is unfortunately too remote to be harnessed cost-effectively and is therefore linked to the municipal connection. While the rest of the site’s sewerage is channelled down to the sub floor plan of the hospice into an above ground bio-reactor, the Lilliput system mentioned before in 10.3 SUSTAINABILITY. The resulting water is then safe to use for the irrigation of the permaculture garden.