05. Technology

The manifestation of the technical detailing of the project is derived from the same concept which drove the design process, namely; healing through empowerment by means of connection, independence and transition. The independence of elements and materials are expressed through the manner in which they are connected. These connections are elaborated and celebrated. Structural elements are also used to illustrate the directionality of the building’s transition from public to private.

Figure 5.1: The roof construction is independent from the concrete frame structure (Author).

Figure 5.2: Individually units are positioned independently from the structure (Author).

Figure 5.3: By celebrating the connections different elements and materials are joined to illustrate their independence (Author).
Figure 5.4: Structural elements are used to illustrate the directionality of the building’s transition from public to private (Author).
This chapter investigates the technical resolution of the shelter in terms of the concept of healing through empowerment by means of connection, independence and transition as explain above. The technical resolution is expressed through the following illustrations:

- Section AA, scale 1: 100
- Section BB, scale 1: 100
- Section CC, scale 1: 100
- Section AA, scale 1: 50
- Structural system
- Rain water collection
- Natural light
- Ventilation
- Material palette
- Sustainability: passive design
- Details A-E

Figure 5.5: Structure and internal space (Author)
SECTION AA
scale 1: 100

Figure 5.6: (Author)
SECTION BB
scale 1: 100

Figure 5.7: (Author)
SECTION CC
scale 1: 100
Figure 5.8: (Author)
SECTION CC
Barge board
Solar water heaters, hot water pipes insulated and built into walls
Class A IBR metal roof sheeting @ 7°, galvanized and painted.
Screwed to purlins with roof screws with cup washer and seal, on ridge
Galvanized steel gutter
Fascia board
203x133x30kg/m steel I-beam @ 3220 centres, painted
100x75x20x2 cold-formed steel lipped channel purlin, @ 1100 centres, bolted to cleat with 4 M16 bolts, painted
Insulation laid on battens
38x38 timber ceiling battens @390 centres
6.4 gypsum ceiling board nailed to battens
203x133x30kg/m steel I-beam, painted
M30 nut and bolt
16 plate, 375 x 230, painted
1380 roof over hang
Aluminium frame window 570 serious
Mezzanine level
22 x 96 PAR tongue and groove boarding
79 x 220 PAR joist @ 570 centres (6200 span)
Planter with waterproof membrane and 32 weep hole to RWDP
30 screed with fall away from opens towards drain, leading to RWDP
Rain water down pipe in column
Concrete lintel
Steel frame window, painted
Window sill with DPC
Timber shutter on steel track
345 x 230 concrete column
Solid brass weather bar, 50 step in slab and
1:60 fall in screed away from openings

Plastered and painted interior walls, stopped 125 above FFL
Face brick recessed joint
255 concrete slab
steel balustrade with timber grip, to detail
30mm thick screed
75 Concrete floor cast in bays
0.375 polyolefin damp proof course
230 brick foundation

0.25 polyolefin damp proof membrane
730x250 concrete strip foundation 15Mpa, to eng. spec.
Clean earth filling compacted in layers of 150mm max.
MODAASHTO 90%

SECTION AA scale 1:50

Figure 5.9: (Author)
STRUCTURAL SYSTEM
of northern units along Church Street

The figures below illustrate the different components of the structural system. Although the concrete structure consists of various components namely columns, beams and slabs, it functions as one system. Figure 5.10-13 (Author)
5.12 Concrete slabs

5.13 Full structural system. Infill and coverings omitted for clarity.
- Rain water collection to irrigate gardens, particularly in dry winter months

- Average annual rain fall for Pretoria: 674 mm (0.674m)
- Volume of water tank: 3.5m diameter, 3m height = 28.8m³

- Roof area A, for water collection: 240m²
  240m² × 0.674m = 161.76m³
  Therefore water tank can be filled and emptied 6 times annually (regular use)

- Roof area B, for water collection: 174m²
  174m² × 0.674m = 117.276m³
  Therefore two water tanks (volume 57.6m³) can be filled and emptied twice annually (long term storage)

- Roof area C, for water collection: 82m²
  82m² × 0.674m = 55.268m³
  Therefore two water tanks (volume 57.6m³) can be filled and emptied once annually (long term storage)
1. Units

2. Units

3. Lecture Hall

Direct light

Indirect light

Shutter

Reflective light

NATURAL LIGHT
Figure 5.15 (Author)
VENTILATION: KITCHEN, COMMUNAL ABLUTION FACILITIES & UNITS

Figure 5.16 (Author)
VENTILATION: EDUCATIONAL COMMUNITY CENTRE & EXHIBITION SPACE

Figure 5.17 (Author)
VENTILATION: KITCHEN

Figure 5.18 (Author)
MATERIAL PALETTE

Figure 5.19: Shelter entrance – timber screen, transitional layers (Messadat, 2007: 223)

Figure 5.20: Timber shutters for units (Online)

Figure 5.21: Roof covering IBR (Online)

Figure 5.22: Brick infill (Online)

Figure 5.23: Structural System – Concrete columns (Online)

Figure 5.24: Roof structure - I-beams (Online)

Figure 5.25: Herring bone paving used in space designed to linger: entrance of shelter and Educational Community Centre (Online). Walkways on ground floor - stretcher paving.
Open building design for prolonged future use

Building orientated north

Material:
- Limited use of concrete, merely concrete frame, for the reason that the manufacturing process of concrete has a large environmental impact.
- Infill: Locally produced bricks. Although a significant amount of energy is used for the firing of clay bricks it is still less than the energy consumed by comparable concrete masonry (Thompson & Sorvig, 2000: 314)
- Local materials
- Durable materials
- Low maintenance materials
Solar water geyser, panels at 36° for optimal use, hot water pipes insulated

- Opens on northern façades for heat gain in winter
- Limited openings on eastern and particularly western façades to limit excessive heat gain and glare

Natural day lighting

Natural cross ventilation

deciduous trees
- Aluminium Frame Window 570 Series
- Par 22 x 108 Timber Sill Rounded
- 50 x 100 Timber
- DPC
- Plaster + Paint

- Spacer
- Screw
- 10 x 30 x 3 Aluminium Angle
- Face Brick Skirting
- Non-Slip Ceramic Tiles
DETAIL A: WALL/ FLOOR
Figure 5.27 (Author)
DETAIL B: COLUMN/ FLOOR
Figure 5.28 (Author)
DETAIL C: BALCONY BALUSTRADE
Figure 5.29 (Author)
- 203 x 133 x 30 kg/m I-beam, painted
- 10Ø steel wire cross bracing attached to I-beam web with eye bolt + nut + thimble
- 425 x 230 concrete beam
- 16 sole plate, 375 x 230, painted
- 345 x 230 concrete column

- Remove portion of web + weld in 12 gusset plate
- 2 x 6 steel plate welded to sole plate, painted
- M30 bolt galv.
- M30 nut galv.
- 3Ø Li-bolt cast into concrete column or M30 rawl bolt.
DETAIL D: ROOF STRUCTURE
Figure 5.30 (Author)
CLASS A IBR, GALV. METAL ROOF SHEETING @ 7.
SCREWED WITH ROOFING SCREW WITH CUP WASHER + SEAL ON RIDGE
- 100 x 75 x 2 COLD-FORMED LIPPED CHANNEL
  @ 1120 CENTRES BOLTED

- 4 M10 x 25 mm BOLTS, WITH NUT + WASHER
- 65 x 50 x 6 STEEL ANGLE CLEAT WELDED TO RAFTER
- 203 x 133,3 kg/m STEEL I-BEAM, PAINTED
- 133 WEDGE
- 12 GUSSET @ 3220 CENTRES WELD
- 16 PLATE, WELDED + PAINTED
- 10 Ø STEEL WIRE - FOR CROSS BRACING ATTACHED TO I-BEAM WEB WITH EYE BOLT + NUT, THIMBLE + TURNBUCKLE
- 203 x 133 x 30 kg/m STEEL I-BEAM @ 6440 CENTRES, PAINTED.
DETAIL E: ROOF STRUCTURE
Figure 5.31 (Author)