5. DESIGN ENRICHMENT

In this chapter the technology that is used to realise the spatial principles of Chapter 4 is elaborated on. Technology is unpacked in materials and composition. The Material Library Table on pg. 90 is a compilation of significant materials in the design and their intrinsic values. The table forms the vocabulary that articulates the relationship between the materiality of the spaces and their natural environment. These values range from the quantitative to the qualitative and are arranged in a manner that highlights each material's relation to the natural elements of water and the sun. Of this compilation of materials, concrete is elaborated on for its critical role as water container in the scheme and clay brick technology is further investigated for the value it adds to the relationship between city users and their natural environment. The pallet of materials are then brought into composition at critical points in the design to illustrate the concepts that drive the experience of and connections between the materials.

5.1. MATERIALS

The water plane is a monolithic concrete element. The rationale of the water container gives form to its navigation which in turn conceals and erodes the container according to the programmes in its adjacent courtyards. A brick skin mediates the interstitial spaces between the courts, users and the water plane. The modular nature of the brick plane allows a plastic manipulation of the skin to facilitate interaction with the water reservoir and its users.
<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>APPEARANCE AND TOUCH</th>
<th>PERMEABILITY</th>
<th>WATER VAPOUR RESISTANCE FACTOR</th>
<th>DENSITY KG/M³</th>
<th>THERMAL CONDUCTIVITY W/(M K)</th>
<th>SPECIFIC HEAT CAPACITY J/(KG K)</th>
<th>THERMAL MASS (kJ/M³.K)</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1 CONCRETE</td>
<td>MEDIUM DENSITY</td>
<td>WATER VAPOUR IS TRANSPORTED THROUGH POROUS MATERIALS PREDOMINANTLY BY VAPOUR DIFFUSION. A HIGH DENSITY INDICATES A HIGHER HEAT CONDUCTIVITY. LOW DENSITY MATERIALS MAY CONTAIN AIR WHICH HAS A LOW CONDUCTIVITY. THE RATE AT WHICH HEAT PASSES THROUGH A SPECIFIED MATERIAL. THE ABILITY OF A MATERIAL TO STORE HEAT. BUILDING MASS PROVIDES THERMAL DAMPING.</td>
<td>60,000</td>
<td>100</td>
<td>0.23</td>
<td>1000</td>
<td>2060</td>
<td>CONCRETE IS STEREOSTATIC AND DOES NOT DISCLOSE ITS INNER WORKINGS. ITS SURFACE LAYER WITHHOLDS AN UNDERSTANDING OF ITS COMPOSITION AND HOW IT WORKS AND PORTRAYS ITS CONSOLAMERATE NATURE. THE QUALITY OF THE CONCRETE SURFACE CHARACTERIZES THE SPACE AS A WHOLE AND IS PREDISPOSED TO THE ABSTRACT. CONCRETE IS MALLEABLE DURING CONCEPTION BUT TURNS INTO ROBUST MATERIAL WHEN CAST GIVING IT A SENSE OF PERMANENCE.</td>
</tr>
<tr>
<td>R2 BRICK MASONRY</td>
<td>FIRED CLAY MASONRY</td>
<td>WATER VAPOUR IS TRANSPORTED THROUGH POROUS MATERIALS PREDOMINANTLY BY VAPOUR DIFFUSION. A HIGH DENSITY INDICATES A HIGHER HEAT CONDUCTIVITY. LOW DENSITY MATERIALS MAY CONTAIN AIR WHICH HAS A LOW CONDUCTIVITY. THE RATE AT WHICH HEAT PASSES THROUGH A SPECIFIED MATERIAL. THE ABILITY OF A MATERIAL TO STORE HEAT. BUILDING MASS PROVIDES THERMAL DAMPING.</td>
<td>16</td>
<td>20</td>
<td>0.44</td>
<td>1000</td>
<td>1360</td>
<td>BRICK MASONRY IS A WEAVER STEREOGRAPH WITH A NETWORK OF JOINTS IN THE IMAGE OF RHYMTHIC ROWS OF KNOTS. THIS GIVES IT A RICH TEXTURE DEFINED BY THE LIGHT AND SHADOWS CAST ON THE NETWORK OF COUNTLESS JOINTS. WHEN BRICK IS MADE FROM THE EARTH IT GIVES FORM TO, IT BECOMES OF THE PLACE AND A CONTEXTUAL INTERVENTION. THE FORM OF BRICK IS CHARACTERISED BY MODULARITY AND STANDARDISATION ITS SMALL</td>
</tr>
</tbody>
</table>
### Ferrous Metals

- **Steel**
  - Stainless Steel
  - Cast Iron, Wrought Iron, Corten

Treated steel has no discoloration as water doesn’t penetrate the material. Smooth and treated steel is slippery when wet. The sound of water may also resonate on the material. Untreated steel will corrode leaving a patina of rust and a rough, weathered surface.

Steel is non-permeable but untreated steel will corrode due to oxidation when the steel is exposed to oxygen. Protection from water, waterproofing, and corrosion protection measures for steel include:
- Hot dip galvanising
- Powder coating
- Copper or brass plating
- Painting and baked enamel

### Non-Ferrous Metals

- **Aluminium Alloys, Zinc, and Chromium**

Aluminium alloys, zinc, and chromium have no discoloration. The sound of water may resonate on the material. A green-blue patina appears on the surface of copper and brass which is an alloy of copper and zinc over time.

WATER DOESN’T PENETRATE THE MATERIAL AND NO WATERPROOFING MEASURES ARE APPLIED.

### Timber

- **Soft Wood**
  - 0.14
- **Hard Wood**
  - 0.16
- **Hard Board**
  - 0.20

Timber has a porous structure that is degraded by water that can lead to rot and decay. Water proofing timber includes a surface coating (sealants and varnishes) that can prevent moisture from entering the surface of the timber. Adequate ventilation and a vapour barrier is necessary in cold interior zones to protect the timber against condensation.

### Glass

- **Soda Lime Glass (Including Float Glass)**

Glass has no discoloration. Visibility is impaired when it is wet and it is extremely slippery when wet. Glass can indicate the presence of water in other physical states such as condensation. The sound of water resonates on the material with a damped effect.

Glass is non-permeable and waterproof.

---

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5.2. COMPOSITION
The materials are brought together at critical points in the composition to illustrate the concepts that drive the experience of and connections between the materials. The composition characterises the form of spaces and guides the structure of the technology. The concept of composition is best described by the user’s procession through the spaces in the scheme. The role that water plays in structuring the spaces is evident from Chapter 4. Now a tectonic skin, brick and concrete materialises the procession. In the procession, taken at any point in the design, the user’s experience of the composition of materials can be placed on a spectrum which at one end, will start with the tectonic (or lightness) and end in the stereotomic (or heaviness). This spectrum also helps to give structure to the procession through space through the notion of moving from one extreme to another. This procession will see the relationship with water start from a formal one (water collection) to a haptic one (water use). To best illustrate these two spectrums and their spatial material implications, the diagram indicates how circulation is experienced at the concave form of water collection and treatment, and progresses to the convex form of spaces where water is used and touched.
COMPOSITION OF MATERIALS

At the beginning of this spectrum of composition, a tectonic structure frames the circulation that leads the user form the most public ends of the context to water spaces. The frame is a steel column and beam structure that allows a layered skin to protect the users from the natural environment. The frame gives support to the concave form that transports roof water runoff to the reservoir. The convex steel bend forms the roof. The composition has a strong linear character and is based on repetition. Its form scales the circulation routes with the larger presence of the structures surrounding courts and scales it to a more intimate interior experience.

The next material in the procession of spaces is brick masonry. The connection between the steel circulation tectonic element and brickwork is expressed as being disconnected and dissimilar and achieved through shadow lines and convex turns and bends towards brickwork. Brickwork gives form to the interstices/conversion between circulation and water spaces. Brickwork is also an important contextual reference that it ties in with the historic masonry built fabric from the context. It acts as a lining membrane and finds application as a carpet that reaches out through the circulation arteries and courts. It also becomes a vertical lining membrane for interstitial programmes. Its structure consists of self supporting walls, reinforced walls and rectangular columns. These ranges of columns gives control over sight lines from the public courts and controlled overlooked views from inside the spaces. The last and perhaps most prominent role of brick masonry is its connection with the next material in the procession composition - concrete. Here it acts as a mediating membrane between the user and concrete surfaces. It becomes a haptic membrane that brings concrete work to the scale of the individual. The membrane peels away from the concrete from where access to water is gained.

The final material that marks the destination in the composition of procession is concrete. It is the functional and monolithic container for water and water-based use spaces. Its convex nature results in vaulted spaces. It is cast in situ that lends a sculptural nature to the most private spaces. It is the central element to the design with a strong axis/alignment with the east west street. Its exterior is rough bush-hammered appearance that transforms into smooth and polished surfaces on its interior.
EXISTING POOL

OCTAGONAL RESERVOIR

Reinforced one-way solid slab
typical length/depth of slab = 20 -> 30
design length/depth of beam: 2400/100 = 24.00

STEEL HORIZONTAL BEAM
Deep rolled steel section
typical length/depth = 18 -> 26
design length/depth: 10800/406 = 26.60

member 406 x 178 x 54

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EXISTING TENNIS COURTS

SECTION A-A 1:100 NTS

CONCRETE HORIZONTAL SLAB ROOF
Reinforced one-way solid slab
typical length/depth of slab = 20 -> 30

design length/depth of beam: 3300/ 150 = 22.00

CONCRETE HORIZONTAL BEAM
Reinforced t beam
typical length/depth of beam= 14 -> 20

design length/depth of beam: 13850/ 850 = 16.29

SECTION B-B 1:100 NTS
STEEL HORIZONTAL BEAM
Deep rolled steel section
typical length/depth=18 -> 26
design length/depth: 9650/406 = 23.76
member 406 x 178 x 54

STEEL VERTICAL SUPPORT
Rolled hollow steel section
typical length/depth=20 -> 35
design length/depth: 3900/200 = 19.5
member 200 x 100 x 4.5

CONCRETE HORIZONTAL BEAM
Reinforced t beam
typical length/depth of beam= 14 -> 20
design length/depth of beam: 8450/ 800= 10.56
depth of concrete t beam excluding slab = 700
overcompensation for heavy gymnasium equipment

CONCRETE HORIZONTAL SLAB FLOOR
Reinforced one-way solid slab
typical length/depth of slab= 22 -> 32
design length/depth of beam: 6875/ 255= 26.96
CONCRETE HORIZONTAL SLAB FLOOR
Reinforced one-way solid slab
typical length/depth of slab= 22 -> 32

TE HORIZONTAL SLAB ROOF
done-way solid slab
gth/depth of slab= 20 -> 30
gth/depth of beam: 6875/ 255= 26.96

DAY CARE STUDIOS

STEEL HORIZONTAL BEAM
Deep rolled steel section
typical length/depth=18 -> 26
design length/depth: 8200/356 = 23.03
member 356 x 171 x 45

COMMUNAL AREA

SECTION C-C 1:100 NTS

SECTION D-D 1:100 NTS
DEVELOPMENT OF THE 1:20 SECTION
DEVELOPMENT OF THE 1:20 SECTION
steel base plate on levelling grout bolted to concrete base with M16 bolts

400x400x600 reinforced concrete footing with 20D holding-down bolts

160x80x4 rectangular hollow section mild steel column @2000mm c/c, welded to steel baseplate and bolted to concrete footing

160x800x10 rectangular hollow section mild steel beam @2000mmc/c, bolted to steel gusset plate to concrete downstand beam, powder coated

80x40x3 rectangular hollow section mild steel vertical dressing cubicle substructure, bolted to rectangular hollow section beam via mild steel cleats, powder coated

4mm mild steel plate modified to form the gutter, welded at end laps and welded to unequal leg angle supports

80x60x6 unequal leg angle mild steel supports welded to steel circulation member

wired mesh glass vanity panels fixed to steel subframe

clear glass panels fixed to steel subframe

anodised aluminium mesh vanity panel fixed to vertical members of steel subframe with separation membrane to combat bi-metallic corrosion

220 x 30 x10 vitrified clay tile on edge

10mm thin bed mortar

bitumen based waterproofing membrane

thick bed mortar to fall 2° (levelling course)

100mm reinforced concrete surface bed cast in situ

40mm sand blinding layer

graded and compacted fill in layers of 150mm max to 90% modAAShto to engineers specification

polished concrete finish

clay brick on edge,

10mm thin bed mortar

bitumen based waterproofing membrane

thick bed mortar to fall 2° (levelling course)

sanded and sealed

stretcher course

vibrated compacted in layers

screed to fall 2° with waterproofing admixture

200mm reinforced concrete slab cast in situ

modified mild steel ledge to create water cascade effect

polished concrete finish

160x40x5 rectangular hollow section side plate for leaning over to create water cascade effect

80x40x3 rectangular hollow section side plate for leaning over to create water cascade effect

80x40x3 rectangular hollow section side plate for leaning over to create water cascade effect

900x900x150 reinforced concrete pedestal

800x800x150 reinforced concrete pedestal

160x40x5 rectangular hollow section side plate for leaning over to create water cascade effect

160x40x5 rectangular hollow section side plate for leaning over to create water cascade effect

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1. 250 REINFORCED CONCRETE RESERVOIR SKIN CAST IN SITU
2. 220 BRICK SKIN SUPPORTED BY CONCRETE LEDGE AND 30 WIDE GALVANISED HOOP IRON BOLTED TO CONCRETE EVERY 3RD COURSE
3. ENAMEL COATED CUSTOM SHEET METAL PROFILE FIXED TO CONCRETE
4. SHOWER ROSE SECURED THROUGH UPPER FLAT
5. LED STRIP LIGHTING
6. SAFETY GLASS SLOTTED INTO ALUMINIUM FRAME AND FIXED TO LOWER FLAT SHEET PROFILE
7. HARD DRAWN COPPER PIPING
8. OFF SHUTTER CONCRETE FINISH
9. ENAMEL COATED CUSTOM SHEET METAL PROFILE FIXED TO CONCRETE
10. TAP FITTING SECURED THROUGH FLAT SHEET PROFILE
11. VITRIFIED CLAY LAYED ON EDGE IN MORTER BED
12. GALVANISED STEEL DRAINAGE CHANNEL AND GRATE CAST INTO CONCRETE
13. VITRIFIED CLAY TILES LAYED ON EDGE IN MORTER
RESERVOIR

- 30mm wide galvanised hoop iron bolted to concrete face every 3rd course
- Double leaf brick FBS skin with flush pcp ends and reinforced 3.5 ladder type galvanised wire brickforce every 3rd course
- Soldier course - single cant solid brick (FBS) (MTO Corobrick)

SHOWER

- Mild steel flat sheet bent and welded to equal leg angle 30 x 30 x 3 mild steel equal leg angle cast into concrete ledge with fish tail hold down rod @ 300 c/c, powder coated finish
- Vandal resistant shower head - single function, adjustable spray trajectory mounted on rectangular hollow section
- Cobra stop tap under tile metering with non-hold open feature and flow controller mounted on rectangular hollow section brushed bronze finish
- Stainless steel drainage channel laid on a mortar bed to fall 2° to drainage outlet
- Vitrified clay tile on edge
- 10 thin bed mortar
- Thick bed mortar to fall 2" levelling course

120 x 60 x 3.5 mild steel rectangular hollow section bolted to concrete surface housing copper supply pipes to stop tap

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soldier course: single cant solid brick (FBS) (MTO Corobrick)

double leaf brick FBS skin with flush perp ends and reinforced 3.5 ladder type galvanised wire brickforce every 3rd course

30mm wide galvanised hoop iron bolted to concrete face every 3rd course

vandal resistant shower head, single function, adjustable spray trajectory, mounted on rectangular hollow section mild steel flat sheet bent and welded to equal leg angle 30 x 30 x 3 mild steel equal leg angle cast into concrete ledge with fish tail hold down rod @ 300 c/c, powder coated finish

vandal resistant shower head, single function, adjustable spray trajectory, mounted on rectangular hollow section mild steel flat sheet bent and welded to equal leg angle 30 x 30 x 3 mild steel equal leg angle cast into concrete ledge with fish tail hold down rod @ 300 c/c, powder coated finish

cobra stop tap under tile metering with non-hold open feature and flow controller mounted on rectangular hollow section brushed bronze finish 120 x 60 x 3.5 mild steel rectangular hollow section bolted to concrete surface housing copper supply pipes to stop tap

120 x 60 x 3.5 mild steel rectangular hollow section bolted to concrete surface housing copper supply pipes to stop tap

stainless steel drainage channel laid on a mortar bed to fall 2° to drainage outlet

mild steel drainage channel laid on a mortar bed to fall 2° to drainage outlet
RESERVOIR

soldier course: single cant solid brick (FBS) (MTO Corobrick)

double leaf brick FBS skin with flush head ends and reinforced
3.5 ladder type galvanised wire ties/bondbars every 3rd course

30mm wide galvanised hoop iron bolted to concrete face every 3rd course

mild steel flat sheet bent and welded to equal leg angle
30 x 30 x 3 mild steel equal leg angle cast into concrete ledge with thin tail
fold down node Ø 250 x 0.85, powder coated finish

150 diameter copper pipe fixed to concrete surface with pipe clamps
125 x 75 x 8: mild steel unequal leg angle chemically bolted in intermittent
spacing to concrete surface

cobra stop tap under tile metering with non-hold open feature and flow
controller, mounted on flat sheet, brushed bronze finish

3mm thick galvanised flat sheet drain member bolted to unequal leg
angle and resting on drainage profiles, powder coated finish

3mm thick galvanised flat sheet drain member bolted to equal leg
angle supports at an angle of 2° to drainage outlet, powder coated finish

70 x 70 x 6: galvanised mild steel equal leg angle bolted to concrete bed
125 x 75 x 8: mild steel unequal leg angle fixed to anchor bolts in concrete
surface

vitrified clay tiles on edge

10 thin bed mortar

100mm reinforced concrete bed cast in situ
SKYLIGHT DETAIL

- **1.** 0.6 GALVANISED STEEL FLASHING TO SLOPE 2°
- **2.** 75X60X6 UNEQUAL STEEL ANGLE FRAME
- **3.** ALUMINIUM WINDOW FRAME FIXED TO UN-
- **4.** 0.6 GALVANISED STEEL FLASHING
- **5.** BITUMOUS WATERPROOFING MEMBRANE SEALED AND APPLIED BY TORCHFUSION
- **6.** 100 THICK REINFORCED CONCRETE VAULT CAST IN SITU FINISH
- **7.** 30X30X2 EQUAL LEG ANGLE STEEL BAR BOLTED TO FLAT BAR WEB AND UNEQUAL STEEL ANGLE
- **8.** 80X60 MILD STEEL FLAT BAR WEB MEMBER BRIDGING THE OPENING BETWEEN THE SIDE
- **9.** 80X6 MILD STEEL FLAT BAR BOLTED TO SIDES OF OPENING IN CONCRETE VAULT
- **10.** OPENING ANGLED AT 64° TO ALLOW FOR MAXI-
MUM WINTER LIGHT (SEE APPENDIX 2)
**Waterproofing Concrete admixture**

An integral crystalline waterproofing admixture is added to the concrete mix at batching stage of the material mix to yield weight from 1.5% of the concrete. It consists of Portland cement, very fine treated silica sand and various active proprietary chemicals. These active chemicals react with moisture and the chemical by-products of cement hydration to create a catalytic reaction that generates a non-soluble crystalline formation throughout the pores and capillary tracts of the concrete that becomes impermeable to water and other liquids.

**Johannesburg**

**Latitude** 26° 08' S

**Longitude** 28° 14'E

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1. 200 THICK REINFORCED CONCRETE
2. CIRCULAR MILD STEEL HOLLOW SECTION SPOUT
3. 100X55X4 STEEL I-SECTION WEB MEMBER BOLTED TO
4. 6 THICK STEEL FLAT SHEET CUSTOM PROFILE GUTTER TO FALL

5. 160X80X4 RECTANGULAR HOLLOW SECTION CIRCULATION COMPONENT WELDED TO WEB MEMBER
6. 200X200X10 STEEL BASE PLATE ON LEVELLING GROUT BOLTED TO CONCRETE BASE WITH M16 BOLTS
7. 400X400X600 CONCRETE BASE
8. RIGID BRICK PAVING LAYER ON 100 CONCRETE BED
1. CATCHMENT AREA
   The surface on which the rain falls - the roof

2. CONVEYANCE
   Manner of transportation of water from catchment area to storage

3. STORAGE
   Reservoir where rainwater yield is kept, settlement

4. PURIFICATION
   Sand filter for physical particles, chemical additives to disinfect

5. DISTRIBUTION
   The system that delivers the water via pump

6. SECONDARY STORAGE
   Elevated smaller reservoir periodically filled to gravity freed water under

7. TOP UP POOLS
   Fill once off (main pool already filled)

8. GREY WATER
   Purification

9. HAND WASH
   Shower

10. WATER CLOSET
   Black water to municipal line

11. POLLUTION DISCHARGE
    Manual maintenance: removal of discharge in filtration

12. OVERFLOW
    Backwash overflow

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## STORAGE

**CALCULATING THE AMOUNT OF FACILITIES AND THEIR WATER DEMAND**

**UNDERSTANDING THE WATER DEMAND OF THE BUILDING**

<table>
<thead>
<tr>
<th>PROGRAMME</th>
<th>AREA (M²)</th>
<th>WATER AREA</th>
<th>SANS OCCUPANCY</th>
<th>POPULATION</th>
<th>SERVICES</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>STUDIOS</td>
<td>180</td>
<td>A3</td>
<td>36</td>
<td>1 2 3 2 2</td>
<td>TOILETS</td>
<td>1 PERSON/ 5M²</td>
</tr>
<tr>
<td>MAIN HALL</td>
<td>200</td>
<td>A2</td>
<td>120</td>
<td>1 3 5 1 3</td>
<td>HAND WASH</td>
<td>1 PERSON/ M² OR CHAIR</td>
</tr>
<tr>
<td>PERFORMANCE</td>
<td>200</td>
<td>A2</td>
<td>120</td>
<td>1 3 5 1 3</td>
<td>CHANGING</td>
<td>MAIN HALL PERSONNEL</td>
</tr>
<tr>
<td>GYMNASIUM</td>
<td>210</td>
<td>A3</td>
<td>42</td>
<td>3 3 6 3 3</td>
<td>SHOWERS</td>
<td>1 PERSON/ 5M² PEOPLE/HOUR</td>
</tr>
<tr>
<td>EXISTING POOL</td>
<td>2200</td>
<td>726</td>
<td>145</td>
<td>3 4 8 4 4</td>
<td></td>
<td>5M²/PERSON STEADY STATE</td>
</tr>
<tr>
<td>POOL SURROUND</td>
<td>700</td>
<td>A5</td>
<td>70</td>
<td>2 2 5 3 3</td>
<td></td>
<td></td>
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<td>WADING POOL</td>
<td>300</td>
<td>70</td>
<td>23</td>
<td>1 1 2 2 4</td>
<td></td>
<td>3M²/PERSON 9 PEOPLE/HOUR AND</td>
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<tr>
<td>INDOOR LAP POOL</td>
<td>110</td>
<td>150</td>
<td>28</td>
<td>2 2 3 3 4</td>
<td></td>
<td>3M²/PERSON 10 PEOPLE/45MIN</td>
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<tr>
<td>HYDROTHERAPY</td>
<td>280</td>
<td>55</td>
<td>18</td>
<td>1 1 2 2 3</td>
<td></td>
<td>3M²/PERSON 33 PEOPLE/HOUR</td>
</tr>
<tr>
<td>CARETAKER</td>
<td></td>
<td>H3</td>
<td>2</td>
<td>1 1 1 1</td>
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<td></td>
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<td>OFFICES</td>
<td>100</td>
<td>G1</td>
<td>7</td>
<td>1 1 2 1</td>
<td></td>
<td>1 PERSON/ 15M²</td>
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<tr>
<td>DAYCARE</td>
<td>300</td>
<td>A3</td>
<td>60</td>
<td>2 3 5 3 3</td>
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<td></td>
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</tbody>
</table>

POOL CAPACITY - BATHING LOAD FOR UN-PROGRAMMED RECREATIONAL SWIMMING: A MINIMUM WATER AREA (OCCUPANCY RATIO) OF 3M² PER BATHER SHOULD BE ALLOWED TO ENSURE PHYSICAL SAFETY. PP 11 THE SPORT ENGLAND FACILITY PLANNING MODEL USES A FIGURE OF 6M² PER BATHER.

TABLE 8 PP48 CHANGING ROOMS AND SHOWERS

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**SOUTH AFRICAN NATIONAL STANDARD**


**PART A: GENERAL PRINCIPLES AND REQUIREMENTS**

SANS 10400-A: 2010 EDITION 3

**A20 CLASSIFICATION AND DESIGNATION OF OCCUPANCIES**

TABLE 1 - OCCUPANCY OR BUILDING CLASSIFICATION (PP43)

**A21 POPULATION**

POPULATION PER CLASS OF OCCUPANCY OF ROOM OR STOREY OR PORTION THEREOF

TABLE 2 - DESIGN POPULATION (PP 45)

---

**PART P: DRAINAGE**

SANS 10400-P: 2010 EDITION 3

THE MINIMUM NUMBER OF SANITARY FITTINGS TO BE PROVIDED IN ANY BUILDING

4.11 PROVISION OF SANITARY FIXTURES

FIXTURES PER TYPE OF OCCUPANCY AND POPULATION

TABLE 4 — PROVISION OF SANITARY FIXTURES (PP29)

TABLE 6 - PROVISION OF SANITARY FIXTURES FOR PERSONNEL (PP 31)

TABLE 7 - PROVISION OF SANITARY FIXTURES FOR PUBLIC, VIS-
### Potential Rainwater Harvesting Capacity

<table>
<thead>
<tr>
<th>TOTAL AREA OF THE ROOF (M²)</th>
<th>ANNUAL RAINFALL (MM)</th>
<th>POTENTIAL RAINFALL HARVESTING CAPACITY (L)</th>
<th>RUNOFF COEFFICIENT FOR A ROOF</th>
<th>ACTUAL RAINFALL HARVESTING CAPACITY (L)</th>
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</thead>
<tbody>
<tr>
<td>A</td>
<td></td>
<td></td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>1670</td>
<td>0.714</td>
<td>1192 M³</td>
<td>0.9</td>
<td>1073 M³</td>
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</table>

<table>
<thead>
<tr>
<th>AVERAGE MONTHLY PRECIPITATION (MM)</th>
<th>AVERAGE MONTHLY PRECIPITATION (M)</th>
<th>ROOF YIELD (M³)</th>
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<tbody>
<tr>
<td>P</td>
<td>P X A X C</td>
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<td>JAN 126</td>
<td>0.126</td>
<td>189.378</td>
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<tr>
<td>FEB 90</td>
<td>0.090</td>
<td>135.270</td>
</tr>
<tr>
<td>MAR 91</td>
<td>0.091</td>
<td>136.773</td>
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<td>APR 52</td>
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<td>78.156</td>
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<tr>
<td>MAY 13</td>
<td>0.013</td>
<td>19.539</td>
</tr>
<tr>
<td>JUN 8</td>
<td>0.008</td>
<td>12.024</td>
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<tr>
<td>JUL 4</td>
<td>0.004</td>
<td>6.012</td>
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<td>AUG 6</td>
<td>0.006</td>
<td>9.018</td>
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### WATER BALANCE AND RESERVOIR SIZE

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The reservoir size was determined by allowing a volume that will contain the maximum monthly water demand per month as well as the maximum amount of surplus water from the yearly water balance:

\[
\text{length x breadth x height}
\]

\[
30\text{m} \times 2.5\text{m} \times 5\text{m}
\]

375m³