This chapter deals with the technical development of the design, focusing specifically on the detailing of the triangulated display system. Further investigations into acoustics, artificial lighting and passive systems will be presented in the final exam.
7.1 FLOOR PLANS
Figure 7.4 Iterated Section A-A showing relationship between zones (Author, 2016)
FLOOR PLANTER DESIGN

1. Medicinal Herbs (as specified by Margaret Roberts)
2. 3D Printed Planting base container
3. Organic fibre composite shell

1. Air plants inserted into the vertical display
2. 3D Printed Planting base container
3. Coconut husk felt kept moist to provide moisture to the plants
4. Wire mesh for plants to attach to

Figure 7.7. Air plants planting strategy (Author, 2016).
Figure 7.7. Perspective of point of view from Mezzanine (Author, 2016).
7.2 MATERIAL PALETTE

- Frosty Carrina Caesarstone Quartz
- White bevelled metro tile
- Organic Fiber Composites board
- White textured metro tile
- Calcium African Cotton

Figure 7.8. Collage of material selection (Author, 2016).

**Material Texture** | **Material Description** | **Application** | **Design Considerations** | **Thermopile** | **Acoustical Consideration** | **Environmental Impact**
--- | --- | --- | --- | --- | --- | ---
**Flooring** | Hardwood floor | Selection: timber over floated or wet floor sealed with floor finishes | No water leakage in the floor system | Fire resistant | Sound reduction | Low environmental impact
**Ceiling** | Suspended ceiling 300 x 600 | 3D Printed Natural Stone | - Rhinoboard is used for the ceiling - a lightweight and sustainable product
- The look and feel of a timber floor | Robust | Durable | Easy to clean
**SANITARY FITTINGS** | 4.8 L Flush Concealed cistern toilet | 280 x 280 x 650 (White Shimmer) | - Caesarstone Quartz countertops are used to create a crisp and fresh feeling to the space.
- The suspended ceiling installation is to easily manipulated to create the sloped lightweight ceiling structure which has a visual connection
- A porcelain tile with a natural stone finish is used to create bathroom facilities that have a visual connection
- A non-porous porcelain tile with a natural stone finish
- A non-porous porcelain tile with a natural stone finish | Thermal insulation | Sound insulation | Fire resistant
**FURNITURE** | Eco Furniture | (Johannesburg, SA) | - The timber bar stools have a triangulated leg structure which resonates with the triangulated display system
- The caprice chairs provide comfort and relaxing seating for guests who are in the waiting area
- A porcelain tile with a natural stone finish
- A non-porous porcelain tile with a natural stone finish
- A porcelain tile with a natural stone finish
- A non-porous porcelain tile with a natural stone finish | Robust | Durable | Easy to clean
**ADDRESS** | EChoWood | (Centurion, SA) | - Union Tiles (Fine African 120x) is chosen for the ceiling
- EChoWood is Green Star certified and pose low environmental impact
- The materiality of the timber floor finish is used to create natural finish to the retail space.
- The look and feel of a timber floor | Raw and natural finish | Compliant with numerous Green Star Criteria | Low environmental impact
**FABRICS** | Photanganic Sustainable Fabrics | (Johannesburg, SA) | - Gobain Gyproc Rhinoboards are Green Star certified and pose low environmental impact
- Gobain Gyproc Saint London 3D Printed Natural Stone | Thermal insulation | Sound insulation | Fire resistant
**WALL FINISH** | Exposed brick wall | Full body R10 PORCELAIN TILE | - A deconstructed and reused exposed brick wall structure reduces material consumption and has a low environmental impact
- A high efficiency/ low-flow toilet is specified to reduce water consumption in the ablution facilities
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- A high efficiency/ low-flow toilet is specified to reduce water consumption in the ablution facilities
- A high efficiency/ low-flow toilet is specified to reduce water consumption in the ablution facilities | Non-slip | Easy to clean | Reduced water consumption
**INTERIOR TILES** | Metro wall tiles | - A porcelain tile with a natural stone finish
- A non-porous porcelain tile with a natural stone finish
- A non-porous porcelain tile with a natural stone finish | - The look and feel of a timber floor makes for an interesting back drop and fresh feeling to the space
- A porcelain tile with a natural stone finish
- A non-porous porcelain tile with a natural stone finish
- A non-porous porcelain tile with a natural stone finish | Thermal insulation | Sound insulation | Fire resistant
**CEILING** | Exposed brick wall | Full body R10 PORCELAIN TILE | - A deconstructed and reused exposed brick wall structure reduces material consumption and has a low environmental impact
- A high efficiency/ low-flow toilet is specified to reduce water consumption in the ablution facilities
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- A high efficiency/ low-flow toilet is specified to reduce water consumption in the ablution facilities | Non-slip | Easy to clean | Reduced water consumption

**SPECIAL CONSIDERATIONS**
- Accessible bathroom seating
- Accessible toilet and shower facilities
- Ablution counter tops
- Waiting area bar counter top
- POS/ Reception counter
- Skin bar counter top

**LOCAL SOURCING**
- Cathco (Blue Ridge African 120x)
- Cape Concepts (Cape Concepts
- Bathroom Bazaar
- Eco Furniture
- Caesarstone
- Union Tiles
- Sustainable Fabrics
7.3 SERVICES

7.3.1 ACOUSTICS

Figure 7.9. Diagram showing acoustic considerations (Author, 2016).
7.3.2 DAYLIGHT STRATEGY

In order to maximise the benefits of daylight in the interior space, the design strategy has made provision for Solatubes which will reduce the artificial lighting required.
G/F ARTIFICIAL LIGHTING

MEZZANINE ARTIFICIAL LIGHTING

Figure 7.12. Artificial lighting plan
(Author, 2016).
7.3.3 Passive Ventilation Strategy

- Passive ventilation: turbine extracting air from interior space
- Suspension sloped ceiling
- Daylight: solar light tube allows natural light to penetrate interior space
- Passive ventilation turbine extracting air from interior space
- Roof ventilation turbine extracting air from interior space
- Gap between wall and mezzanine level allowing flow of natural ventilation

Figure 7.13: Diagram showing passive systems design (Author, 2016).
Figure 7.14. Artificial lighting plan (Author, 2016).
7.4 DETAIL INVESTIGATION OF DISPLAY DESIGN

Figure 7.15. Packaging within display system (Author, 2016).

Figure 7.16. (Left) Vertical Display Grid (Author, 2016).

Figure 7.17. Axonometric of Vertical Display (Author, 2016).
Figure 7.18. Iteration of connection joints and display panels (Author, 2016).
Figure 7.19. Detailing of connection joints (Author, 2016).
Figure 7.20. Detailing of ‘Kit of Parts’

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PRODUCTS DISPLAY

ORGANIC FIBER COMPOSITE BOARD

3D PRINTED JOINTS

FRACTAL STACKING OF TRIANGULATED PACKAGING

PRODUCTS DISPLAY
Figure 7.21. Axonometric of vertical display to wall connection (Author, 2016).

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Figure 7.22 Section through vertical display (Author, 2016).

- DETAIL 1: J6: 3D printed PET recycled plastic 6-point joint
- DETAIL 2: 220mm brick existing brick wall
- DETAIL 3: 25mm pressed smooth screed floor
- DETAIL 4: 10 x 305 x 410mm engineered laverdiere fiber composite board
Figure 7.23. Detail 1: Vertical display
Connection detail (Author, 2016)

DETAIL 1
VERTICAL DISPLAY CONNECTION DETAIL
not to scale

10 x 305 x 440 mm organic lavender fiber composite board

8 x 15 mm steel connector cap

J6: 3D printed PET recycled plastic 6-point joint

8 x 15 mm steel flat head connector bolt

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DETAIL 1
VERTICAL DISPLAY CONNECTION DETAIL FRONT ELEVATION
not to scale

10 x 305 x 440 mm organic lavender fiber composite board
J6: 3D printed PET recycled plastic 6-point joint
8mm steel flat head connector bolt
8mm steel connector cap
DETAIL 2
VERTICAL DISPLAY WALL CONNECTION
not to scale

Figure 7.25. Detail 2: Vertical display wall connection (Author, 2016)

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Figure 7.26. Detail 3: Dry wall connection (Author, 2016).

**DETAIL 3**

**DRY WALL CONNECTION**

not to scale

- 18mm SA pine plywood sheet
- 10 x 305 x 440 mm organic lavender fiber composite board
- J6: 3D printed PET recycled plastic 6-point joint
- 5 x 50 x 50 mm 3E Printed PET recycled plastic cap
- 6 x 12 mm self tapping screw
- 8 x 15 mm steel connector bolt and cap
- 50 x 50mm SA pine batten

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Figure 7.27. Section through vertical display (Author, 2016).

DETAIL 4
FLOOR CONNECTION
not to scale

10 x 306 x 440 mm organic lavender fiber composite board

J3: 3D printed PET recycled plastic 3-point joint

12mm rawl bolt fixing display structure to concrete floor

25 mm existing power floated screed floor

170 mm concrete slab

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Figure 7.28. Section through vertical display behind Skin Bar (Author, 2016)

VERTICAL DISPLAY - DRY WALL CONNECTION
not to scale
7.5 ENVIRONMENTAL POTENTIAL ASSESSMENTS

7.5.1 GBCSA GREEN STAR RATING

The GBCSA Green Star Interior rating tool was used to assess the environmental impact of the proposed design solution. The design of Margaret Roberts skincare servicescape achieved a 6 Star World Leadership rating, which was achieved through the implementation of Biomimicry and Biophilia design principles.
## MANAGEMENT
> The design strategy aims to employ GBCSA professionals to accompany the design process to ensure implementation of sustainable building practices throughout the design and construction phase.
> Management strategies aim to educate users and occupants of the space about the buildings sustainable initiatives.

## INDOOR ENVIRONMENTAL QUALITY (IEQ)
> The application of Biophilic design principles in the space aids the fulfilment of the IEQ requirements. Fresh air is circulated through the space through passive ventilation systems.
> The large shopfront windows and the specification of SolaTubes allows the space to reap the benefits of natural lighting.
> Ergonomics have been considered throughout the design creating a comfortable space for occupants.
> The use of air-plants throughout the interior space improves indoor air quality and creates a connection between nature and the occupants.

## ENERGY
> Energy efficiency is achieved through employing processes that sequestrates carbon and reduces greenhouse gases (i.e. closed-loop system).
> The specification of photovoltaic solar panels to be installed on the roof supports the use of renewable energy sources.

## TRANSPORT
> Low points were scored in the Transport category since Irene Mall does not encourage the use of public transport since there are no formal bus terminals, taxi ranks or facilities that cater for cyclists.

## WATER
> Water saving fittings are included in the design strategy to reduce water consumption.
> Additionally, a water metering system will be installed to allow the users of the space to monitor water consumption.

## MATERIALS
> Operational waste is reduced through the resource efficient design strategy.
> A large percentage of the furniture and fittings specified is from renewable/ recycled resources.

## LAND USE
> Irene Mall as a whole does not employ sustainable practices. However the outdoor nature of the mall allows the stores to make use of natural light and ventilation contributing to the design strategy of Shop 150.

## EMISSIONS
> The store aims to prevent light pollution through minimising the use of artificial light. The maximum operating hours of the mall (09h00 to 20:00) does not allow for night time activity of retail stores, therefore indirectly reducing light pollution in the night.

## INNOVATION
> The design employs innovative design strategies such as Biomimicry and Biophilia that supports sustainable practices.

### Table 7.1: Green Star Rating Justification (Author, 2016)

<table>
<thead>
<tr>
<th>GBCSA CATEGORY</th>
<th>DESIGN APPLICATION / JUSTIFICATION OF POINTS AWARDED</th>
<th>POINTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>MANAGEMENT</td>
<td>&gt; The design strategy aims to employ GBCSA professionals to accompany the design process to ensure implementation of sustainable building practices throughout the design and construction phase. &gt; Management strategies aim to educate users and occupants of the space about the buildings sustainable initiatives.</td>
<td>12.5</td>
</tr>
<tr>
<td>INDOOR ENVIRONMENTAL QUALITY (IEQ)</td>
<td>&gt; The application of Biophilic design principles in the space aids the fulfilment of the IEQ requirements. Fresh air is circulated through the space through passive ventilation systems. &gt; The large shopfront windows and the specification of SolaTubes allows the space to reap the benefits of natural lighting. &gt; Ergonomics have been considered throughout the design creating a comfortable space for occupants. &gt; The use of air-plants throughout the interior space improves indoor air quality and creates a connection between nature and the occupants.</td>
<td>20</td>
</tr>
<tr>
<td>ENERGY</td>
<td>&gt; Energy efficiency is achieved through employing processes that sequestrates carbon and reduces greenhouse gases (i.e. closed-loop system). &gt; The specification of photovoltaic solar panels to be installed on the roof supports the use of renewable energy sources.</td>
<td>10</td>
</tr>
<tr>
<td>TRANSPORT</td>
<td>&gt; Low points were scored in the Transport category since Irene Mall does not encourage the use of public transport since there are no formal bus terminals, taxi ranks or facilities that cater for cyclists.</td>
<td>1</td>
</tr>
<tr>
<td>WATER</td>
<td>&gt; Water saving fittings are included in the design strategy to reduce water consumption. &gt; Additionally, a water metering system will be installed to allow the users of the space to monitor water consumption.</td>
<td>5</td>
</tr>
<tr>
<td>MATERIALS</td>
<td>&gt; Operational waste is reduced through the resource efficient design strategy. &gt; A large percentage of the furniture and fittings specified is from renewable/ recycled resources.</td>
<td>22</td>
</tr>
<tr>
<td>LAND USE</td>
<td>&gt; Irene Mall as a whole does not employ sustainable practices. However the outdoor nature of the mall allows the stores to make use of natural light and ventilation contributing to the design strategy of Shop 150.</td>
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<td>EMISSIONS</td>
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<td>3.5</td>
</tr>
<tr>
<td>INNOVATION</td>
<td>&gt; The design employs innovative design strategies such as Biomimicry and Biophilia that supports sustainable practices.</td>
<td>5</td>
</tr>
</tbody>
</table>
7.5.2 SBAT Rating

The objective of the SBAT tool is to evaluate the design of the building in terms of sustainability. The tool measures the performance of the building according to the three pillars of sustainability including Social, Economic and Environmental influences. The outcome of the SBAT assessment on the design of Margaret Roberts skincare servicescape suggests that sustainable practices have indeed been employed. High scores are achieved for Adaptability, Efficiency, Material & Components and Occupant Comfort, which was part of the design strategy from the beginning. Unfortunately, lower scores are achieved for the Water and Participation & Control categories due to the fact that the site does not allow for water treatment plants and since the space is retail orientated, occupants do not have control over the interior environmental conditions. The score achieved in the Waste category is relatively high but was restricted since sewerage waste cannot be recycled on site.

(See Appendix for full SBAT report)