The structure comprises mostly out of reinforced concrete floors and columns. The use of concrete ensures that the building is rigid and capable to carry the loads imposed on it by the functions of the building. The building is structured on a grid network that is determined by the grid of the basement structure. The post-production section is supported by a primary cast in-situ concrete column. A cantilevered beam supports the northern façade and is balanced by a counter beam tying it back to the secondary columns in the grid.
As mentioned in the previous chapter the Post-production section of the building facilitates the majority of the habitual spaces (offices, restaurants and social spaces). It is required to keep the occupants of these spaces as comfortable as possible.

**North Eastern façade**

Due to the large northern aspect of this façade, it was essential to be able to regulate the amount of direct sunlight allowed into the office spaces. A fixed aluminium louvre system as well as the deep setback of the windows, prevents the harsh Highveld sunlight to penetrate the interior spaces throughout most of the year. Due to the angle of solar incidence during the winter months, sunlight is able to infiltrate the office spaces and heat it up from within.

The first and second floor cantilevers over the walkway on the ground floor, giving generous shading to the food vendors and protecting them against precipitation.

Fig. 7.3 Portion of Section A indicating the solar infiltration during the winter months.
Fig. 7.4 Concept model showing climatic features of the facade
Fig. 7.5 Structural unfolding of the north eastern facade
South Western façade

This façade was originally designed with a large glass curtain wall, enabling the occupants of the office spaces to have a visual connection with the square below. Due to direct solar radiation of the western afternoon sun, these spaces (offices) would become unbearably hot. Vertical concrete fins are proposed to keep most of the western sun out. Because of its mass, these concrete fins are able to absorb most of the harsh afternoon sunlight. Glass curtain walls are placed between these fins and faces southwards to keep the idea of a visual connection with the square. Hot air behind the concrete fins will rise against the glass curtain wall and be expelled through louvres overhead. Cold air will be drawn through louvered windows on the north eastern façade, ensuring cross-ventilation.
Glazed Roof

The glazed roof’s primary function is to protect people against the natural elements. The idea of the glazed roof is to soften the intensity of the sunlight as one enters the building. This is essential as people will not be able to experience the images displayed on the Media screen if the light contrasts are too much. Diffused coloured light patterns will fall on the pavement of the entrance to the building. This might give the idea of pixels on the floor or a television test pattern. This diffused light will make the entrance to the building more inviting to visitors and gives the building a vibrant and humoristic character.

Fig. 7.9 Detail of the tinted glass roof.

Fig. 7.10 Internal courtyard of Town Hall/Hybrid Hotel in Innsbruck, Austria by Dominic Perrault

Fig. 7.11 IDEA Store, London by David Adjaye
**LED Cubes**

The monotonous walls of the studios are created into interactive cubes. LED composite panels are fitted to the studio walls and then cladded with translucent polycarbonate sheeting. This gives texture to the oversized cubes during the day, but it is at night that it becomes interactive. Through the use of sensors the LED cubes become pixilated information boards, indicating movement patterns, noise levels and important messages.
Media facade
Fig. 7.13 Concept model showing the intent of the media facade
The use of media facades helps contemporary architecture reflect the ideals of the communication era. It gives the architecture a dynamic appeal that is more attractive to passers-by than traditional static display systems.

The Mediamesh system is essentially a transparent media screen, which is applied to the facades of buildings. The principle of the façade is a stainless steel wire mesh with interwoven LED (Light Emitting Diodes) profiles. This system is programmed by media controls installed behind the screen. The LED’s reflect images from the media controls onto the façade, enabling it to display a variety of images, text and video.

These images are created by the LED’s in the colours red, blue and green. The grouping of three or five of these colour-combination LED’s, creates one image pixel. The resolution of the image is dependant on the distance and density of these pixels. This is determined by the vertical distance between the lamella (stainless steel band housing the LED blocks) and the horizontal distance between the LED blocks.
The higher the resolution, the smaller the viewing distance and higher the cost will be. A general viewing distance of 30-40 meters is adequate to view the image displayed.

Due to the transparent nature of this façade, the view from the outside into the building, as well as from the inside outwards, is still possible. The Mediamesh façade is superior to a conventional self-contained LED board in terms of cost efficiency, size and the variety of applications. The transparent system does not close-off the façade of a building, keeping the integrity of the architectural design as it forms part of it.

Further advantages include:
- daylight capability
- pixel pitch can be chosen
- low power consumption and long service life
- very low maintenance effort
- specifically designed for the field of architecture
- aesthetically pleasing appearance
Off shutter concrete is used on all structural elements as well as external walls. Concrete was chosen as a structural material due to its ease of construction and availability. Its plasticity makes it easier to construct difficult forms. It is also a material that is synonymous with Modern architecture.

High penetration tinted glass is used for the roof covering the entrance to the development. Although it is more expensive than polycarbonate sheeting, it is more durable and is able to keep its properties during the life of the product.

Aluminium louvres are applied to the northern facade of the post-production office spaces as solar control elements. The aluminium louvres are powder coated in white to allow for solar reflection into the office space, creating an optimised daylighting factor.

A LED Mediamesh is applied to the glazed facade of Studio A. This enables the northern corner to act as a large media screen that responds to the intersection from a distance. The nature of the mesh also allows people close by to look through the mesh and observe the activities within the studio.
LED lights are used for screens that do not need to display a clear image. The lights are grouped in clustered panels to give an optimum effect. The individual LED lights will then act as pixels of a large screen.

Timber decks are used on the roof terrace. The timber floor boards is visually pleasing and hides storm water channels running underneath. Because of the gaps between the individual boards, rainwater is still able to filter through.

Polycarbonate sheeting will be used as cladding for the clustered LED panels. The polycarbonate will act as a projection canvas for the LED lights during the night.

IBR sheeting is used as roof cladding to the Radio station and Roof bar. IBR sheeting is chosen for its light weight, ease of construction, and relevance to the construction industry in South Africa.
GROUND FLOOR PLAN

1. GENERAL RETAIL
2. STAFF ENTRANCE
3. PUBLIC TOILETS
4. ENTRANCE FOYER
5. RESTAURANT
6. KITCHEN
7. PUBLIC ACCESS TO BASEMENT
8. REFUSE STORAGE
9. FIRE ESCAPE
1. LIVE STUDIO
2. GENERAL STUDIO
3. STUDIO STORAGE
4. PRESENTER AREA
5. AUDIENCE HOLDING
6. CIRCULATION
7. PUBLIC TOILETS
8. BALCONIES
9. POST-PRODUCTION ADMIN
10. SCREENING ROOM
11. FIRE ESCAPE
1. MASTER CONTROL ROOM
2. PRODUCTION CONTROL ROOM
3. STUDIO STORAGE
4. GENERAL STUDIO
5. PRESENTER AREA
6. CIRCULATION
7. PRODUCTION DESIGN STUDIO
8. EDITING CUBICLES
9. DIGITAL IMAGE LIBRARY
10. AUDIO LIBRARY
11. FIRE ESCAPE
1. RADIO STATION RECEPTION
2. BROADCASTING STUDIO
3. BOARDROOM
4. STAFF LOUNGE
5. KITHENETTE
6. RADIO ADMIN OFFICE
7. CIRCULATION
8. ROOF BAR
9. ROOF TERRACE
10. FIRE ESCAPE
north-eastern elevation
51 x 3.0 stainless steel circular hollow section hand rail
100 x 25 Eucalyptus microcarpus timber boards on 150 x 50 timber posts fixed to
100 x 50 x 3.5 galvanised mild steel
cold-formed unequal angle bolted to 255
cast in situ reinforced concrete slab
Mild steel balustrading fixed to
galvanised mild steel bolt cage with
M8 galvanised mild steel nuts
Tie coping
Steel troweled cast in
situ reinforced concrete beam
Aluminium window frame fixed to underside of cast in situ concrete beam with M8 galvanised mild steel bolt sealed with appropriate polymer sealant to manufacturer’s specifications
150 x 100 x 5.0 galvanised mild steel rectangular hollow section fixed to underside of cast in situ reinforced concrete beam with M10 galvanised mild steel bolts
Fixed aluminium airfoil solar louver system to manufacturer’s specification
15 mm thick compressed mineral fibre ceiling tiles in patent T suspension system fixed to 255 cast in situ reinforced concrete roof slab by wire

Rhodesian Teak (Afromosia elata) timber handrail fixed to 5 mm thick flat bar with stainless steel countersunk self-tapping screws
400 x 400 x 25 natural stone tiles on top of 15 mm mortar bed on derbigum waterproofing layer on 40 mm min concrete screed to min fall of 1:70
Fixed aluminium airfoil solar louver system to manufacturer’s specification
Galvanised mild steel balustrading welded to 10 mm thick base plate and fixed to the side of 170 cast in situ reinforced concrete floor slab with M10 galvanised mild steel bolts
Cast in situ drip
150 x 100 x 5.0 galvanised mild steel rectangular hollow section fixed to underside of glass fibre reinforced concrete panel with M10 galvanised mild steel bolts

20 Ø uPVC pipe water outlet

400 x 400 x 25 natural stone tiles on top of 15 mm mortar bed on deribgum waterproofing layer on 40 mm min concrete screed to min fall of 1:70

Aluminium sliding doors to manufacturer's specifications

Cast in situ reinforced concrete structural support

38 x 38 Rhodesian Teak (Afrotomos elata) timber battens fixed to 50 x 50 x 3.0 mild steel cold formed equal angle with stainless steel countersunk selftapping screws
**Detail A-5**

- Pre-cast concrete bench with galvanised mild steel bolt cage fixed to 250 cast in situ floor slab withchemset chemical bolts.
- Galvanised mild steel ventilation louvres fixed to pre-cast concrete bench with M6 galvanised mild steel bolts.
- Dashed lines indicate stairs behind.
- 200 x 99 x 60 Concrete pavers on 25 mm bedding sand on 50 mm sand sub-base on layers of 200 mm compacted soil.
- Ventilation gap.
- 300 Cast in situ reinforced concrete wall with weep holes at 1/m².

**Detail A-6**

- Min 150 mm thick mesh reinforced structural concrete slab with min fall 1:70 towards catch-pit on 0.45 polyethylene membrane.
- 290 x 140 x 90 Concrete bricks with 20 mm gaps and no mortar joints to facilitate water drainage on top of no fines cast in situ concrete slab.
- 200 No fines cast in situ concrete slab with min fall of 1:70 to sump.
- Cast in situ reinforced concrete footing.
detail c-1(i)

3 mm thick mild steel flat bar welded on top of 76 x 50 x 3.0 galvanised mild steel rectangular hollow section purlins @ 1200 cc

2300 x 1200 x 13 ColourVue tinted polyvinyl butyral laminated high impact glazing separated from galvanised mild steel purlins with neoprene spacer and sealed with appropriate polymer sealant

160 x 80 x 5.0 galvanised mild steel rectangular hollow section beam on top of 254 x 146 x 37 kg/m galvanised mild steel parallel flange I-section pre-bent to follow curve

10 mm thick galvanised mild steel connector plate welded to the underside of I-section

Purpose made 10 mm thick galvanised mild steel bracket welded to 89 x 5.0 galvanised mild steel circular hollow section structural support and fixed to connector plate with M12 mild steel bolts

detail c-1(ii)

Bitumen impregnated torch-on waterproofing membrane on concrete screwed min 40mm with min fall of 1:70 towards rainwater inlet strictly to manufacturer’s specifications

340 Cast in situ reinforced concrete ring beam

0.6 galvanised steel sheet counter flashing

0.6 galvanised steel gutter

160 x 80 x 5.0 galvanised mild steel rectangular hollow section welded to 10 mm thick galvanised mild steel base plate fixed to concrete ring beam with chemset chemical bolts

100 mm thick mineral wool acoustic insulation on top of 19 mm perforated commercial plywood ceiling boards fixed to metal steel grid system and suspended from concrete roof slab

200 x 75 x 24.3 kg/m mild steel parallel flange channel pre-bent to follow curve of concrete ring beam and fixed to cast in situ concrete ring beam with M16 galvanised mild steel bolts

Patented stainless steel MediaMesh media facade system with interwoven LED profiles fixed to stainless steel clamps and fixed to mild steel parallel flange channel

Aluminium window frame fixed to underside of 200 x 75 x 24.3 kg/m parallel flange and sealed with close cell poly-ethylene foam seal strip to manufacturer’s specifications

Double glazing system with 10 mm SolarVue PVB laminated safety glass outer pane and 6 mm clear glass inner pane separated from aluminium frame with neoprene spacer and sealed with appropriate polymer sealant

76 x 5.0 mild steel circular hollow section welded to underside of 200 x 75 x 24.3 kg/m mild steel parallel flange channel at 90° angle
Aluminium window frame fixed on top of 200 x 75 x 24.3 kg/m parallel flange and sealed with closed cell poly-ethylene foam seal strip to manufacturer's specifications.

Patented stainless steel MediaMesh media facade system with interwoven LED profiles fixed to stainless steel clamps and fixed to mild steel parallel flange channel.

200 x 75 x 24.3 kg/m mild steel parallel flange channel pre-bent to follow specified curve.

76 x 5.0 mild steel circular hollow section welded to underside of 200 x 75 x 24.3 kg/m mild steel parallel flange channel at 97° angle.

Double glazing system with 10 mm SolarVue PVB laminated safety glass outer pane and 8 mm clear glass inner pane separated from aluminium frame with neoprene spacer and sealed with appropriate polymer sealant.

76 x 5.0 mild steel circular hollow section welded to underside of 200 x 75 x 24.3 kg/m mild steel parallel flange channel at 97° angle.

256 Steel troweled concrete floor sealed with self leveling epoxy layer.

Aluminium window frame with 85 mm kick rail sealed with closed cell poly-ethylene foam seal strip to manufacturer's specifications.

Galvanised mild steel bolt cage cast into concrete slab.

75 mm thick in situ concrete paving on 0.45 polycellin dpm laid on dimpled plastic drainage layer on 40 mm concrete screed laid to min fall of 1:70 to 40 Ø UPVC drainage pipe.
detail c-4(i)

Bitumen impregnated torch-on waterproofing membrane on concrete screed min 40mm with min fall of 1:70 towards rainwater inlet strictly to manufacturer’s specifications

0.6 galvanised steel sheet flashing

Cast in situ reinforced concrete upstand

170 Cast in situ reinforced concrete roof slab

3500 x 860 Opal white translucent polycarbonate corrugated sheeting fixed to top hat section with self tapping screws

230 Brick wall

100 x 75 x 25 x 3.0 galvanised mild steel cold formed top hat sections @ 3000 cc fixed to 230 brick wall with M8 mild steel bolts

50 aerolite acoustic absorbtion and thermal insulation on 6.4 mm gypsum ceiling board spanning between top hat sections

IBR metal roof sheeting fixed to 100 x 75 x 25 x 3.0 mild steel cold-formed top hat sections @ 1500 cc with self tapping screws

Galvanised mild steel window frame welded on top of 5 mm flat bar and to the underside of 150 x 75 x 25 x 3.0 mild steel top hat section

150 x 100 x 5.0 galvanised mild steel rectangular hollow section welded to base plate and fixed to galvanised mild steel bolt cage with M10 mild steel bolts

IBR metal cladding to the side of roof structure

Galvanised mild steel frame with horizontal steel ventilation louvres

5 mm thick mild steel flat bar welded to the sides of 150 x 100 x 5.0 mild steel rectangular hollow section sealed with appropriate polymer sealant

0.6 galvanised steel sheet flashing spot welded to flat bar and seperated from reinforced concrete upstand with neoprene spacer

Galvanised mild steel bolt cage cast into reinforced concrete upstand

detail c-4(ii)
DERBIGUM CG3 waterproofing layer

12 mm thick timber board protection layer

Geotextile membrane (Bidum U14 or similar)

300 Cast in situ reinforced concrete planter

DERBIGUM SP4 waterproofing layer, fully sealed with min 100 mm overlap

Polyethylene dimpled drainage layer

Stone drainage layer

Fulbore outlet connected with 100 Ø galvanised mild steel rainwater pipe, fulbore to be covered with geotextile membrane

460 thick clay brick load bearing wall

Celtis Africana (White stink wood)
Bitumen impregnated torch-on waterproofing membrane on concrete screed min 40mm with min fall of 1:70 towards water spout strictly to manufacturer’s specifications

Cast in situ reinforced concrete upstand

255 Cast in situ reinforced concrete slab

Non-load bearing partition wall consisting of 12.5 mm gypsum board fixed to 75 x 50 x 20 x 3.0 galvanised mild steel cold-formed lipped channel fastened to underside of 255 cast in situ reinforced concrete slab with M8 galvanised mild steel bolt

Aluminium window frame fixed to underside of 170 cast in situ slab with M8 galvanised mild steel bolt sealed with appropriate polymer sealant to manufacturer’s specifications

Light fitting

Cast in situ drip

10 mm ColouVue laminated high impact glazing panels with tinted polyvinyl butyral interlayers

10 mm clear laminated safety glass to be separated from aluminium frame with neoprene spacer and sealed with appropriate polymer sealant

150 x 100 x 5.0 galvanised mild steel rectangular hollow section fixed to underside of 170 cast in situ reinforced concrete slab with M10 galvanised mild steel bolt

detail d-1
Recording Studio Acoustics

It is of crucial importance for television studios to have the desired sound levels in order to achieve the optimum quality product. Intrusive external noise as well as structure-borne sound transmissions should be kept to a minimum. This can be best achieved by creating a structurally solid structure which houses the recording studios.

The wall construction of the recording studios consists of a 330 mm brick cavity wall with a 100 mm mineral wool sound insulation cavity. This prevents the majority of external noise entering the recording studios. Fixed to the internal face of the cavity walls are 50 mm mineral wool blankets with black fabric covering; 125 x 50 x 25 x 2.5 cold-formed top hat sections are fixed to the cavity wall but isolated from the structure with neoprene seals to prevent the occurrence of structural noise; 8 x 2500 x 2000 perforated commercial plywood panels are fixed to the top hat sections, with a gap of 75 mm between the plywood and the mineral wool blankets. The perforated panels allow sound to enter the panels and dissipate between the plywood and the mineral wool blankets, giving the recording studio the desired sound absorption qualities.

The glass façade of studio A consists of a double glazing system angled at 97° to prevent the occurrence of standing waves. Double glazing is a good insulator against external noise. The cavity between the glass panes is supplied with copper sulphite in order to absorb any moisture within the cavity. Studio A is also supplied with an acoustic ceiling consisting of 8 mm thick perforated commercial plywood panels fixed to steel grid and suspended from the concrete roof slab. 100 mm mineral wool sound absorption blankets are placed on top of the perforated plywood panels.

The equipment used within the recording studios requires a level floor surface. A seamless self leveling epoxy floor finish is applied to the reinforced concrete floor structure to minimise discrepancies in floor level differences.

All studio access points have acoustic double doors with a cavity between them. The acoustic doors are sealed with 25 mm neoprene seals between the door and the doorjamb.
BAND-MIDDELFREkwENSIE IN Hz

I_a-standaardkromme
Move up 1 dB: average deviation = 1.94

\[ I_a = \text{standardised level difference} \]

\[ I_a = 5.3 \text{ dB} \]

\[ M_a = +1 \]

<table>
<thead>
<tr>
<th>Cavity width</th>
<th>Increase of ( R ) in dB</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 mm</td>
<td>+8 dB</td>
</tr>
</tbody>
</table>

| Frequency [Hz] | 100 | 125 | 160 | 200 | 250 | 315 | 400 | 500 | 630 | 800 | 1K  | 1250 | 1600 | 2K  | 2500 | 3150 | 4K  |
|----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 115 - 100 - 115| 33  | 33  | 37  | 38  | 39  | 45  | 47  | 50  | 53  | 55  | 59  | 66  | 69  | 71  | 74  | 79  | 82  |

Plastered: with wall ties

<table>
<thead>
<tr>
<th>Television Studio</th>
<th>Design Rating level ( L_r ) for ambient noise dBA</th>
<th>Max Rating level ( L_r )</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>25</td>
<td>30</td>
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</tbody>
</table>

Urban districts 

<table>
<thead>
<tr>
<th>Rating level ( L_r ) for ambient noise dBA</th>
</tr>
</thead>
<tbody>
<tr>
<td>60</td>
</tr>
</tbody>
</table>

\[ I_a = 5.3 \text{ dB} \]

\[ 60 - 53 = 7 \text{ dB} \]

Intrusive external noise entering the recording studio
Noise generated by lighting and HVAC

\[ L_r = 10 \log \left( 10 \frac{7}{10} + 10 \frac{x}{10} \right) \]

\[ x = \text{noise in dB generated by lighting + HVAC.} \]

\[ L_r = 25 \text{ dB} \]

\[ L_x = 10 \log \left( 10 \frac{25}{10} - 10 \frac{7}{10} \right) \]

\[ = 24.9 \text{ dB} \]

Maximum noise generated by lighting and HVAC is 24.9 dB.

Fig. 7.18 Typical plan and section through an acoustic door