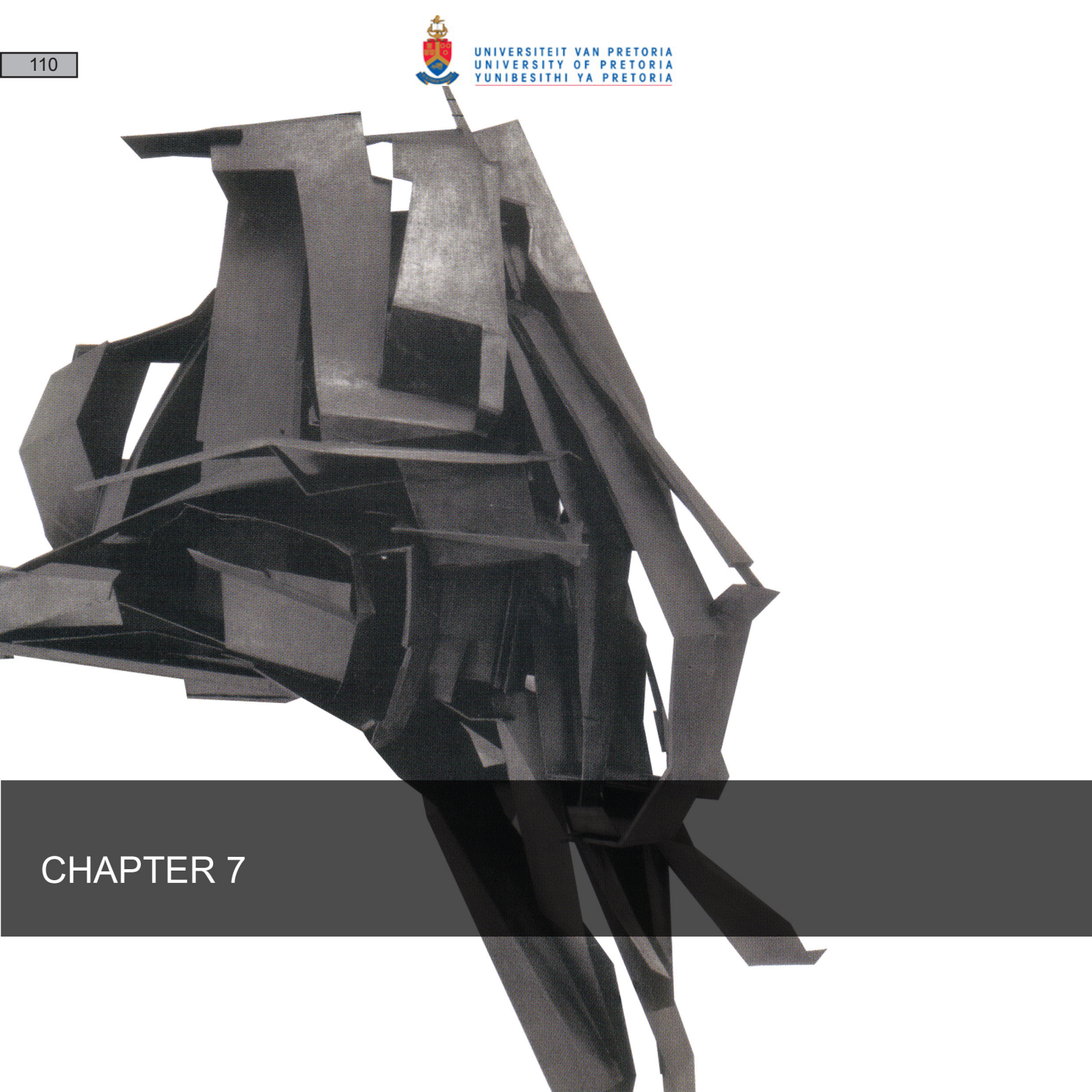


CHAPTER 7

TECHNICAL DOCUMENTATION

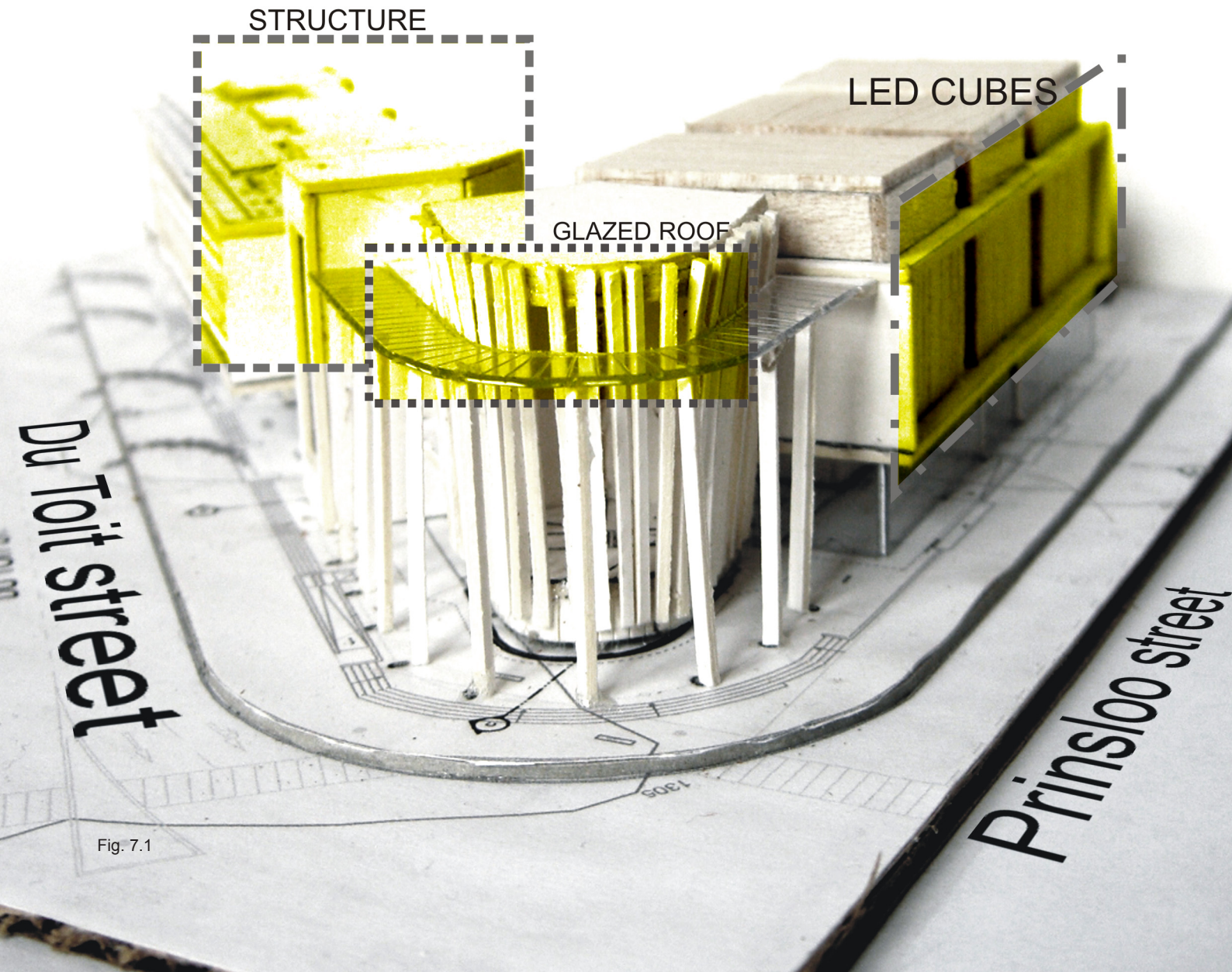

STRUCTURE
LED CUBES
GLAZED ROOF
Du Toit street
Prinsloo street

Fig. 7.1

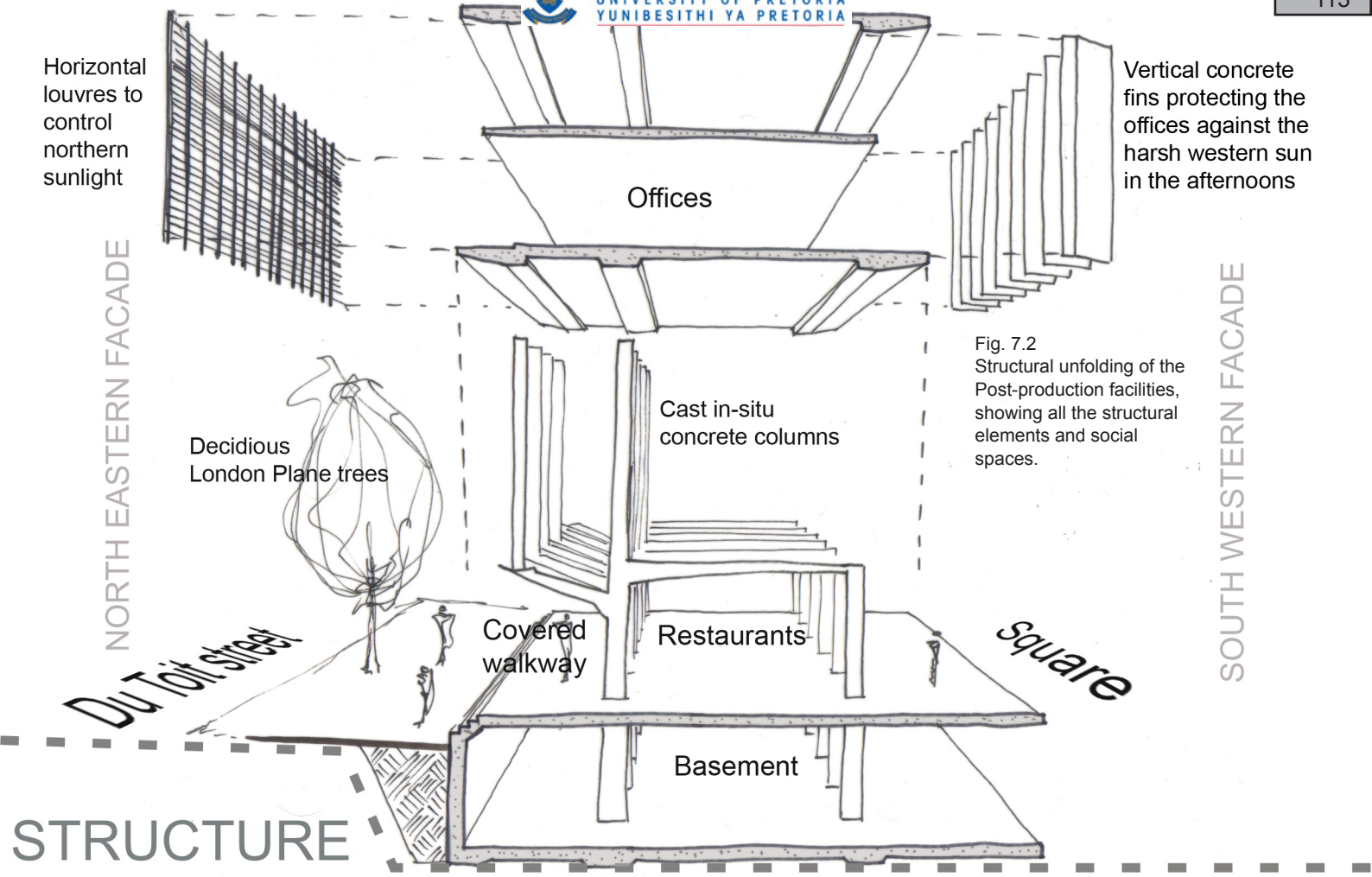


Fig. 7.2
Structural unfolding of the Post-production facilities, showing all the structural elements and social spaces.

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.

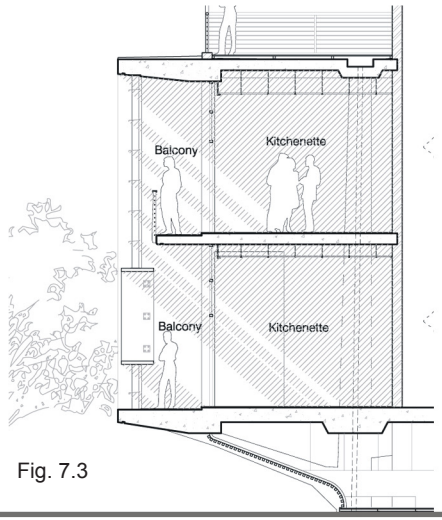


Fig. 7.3

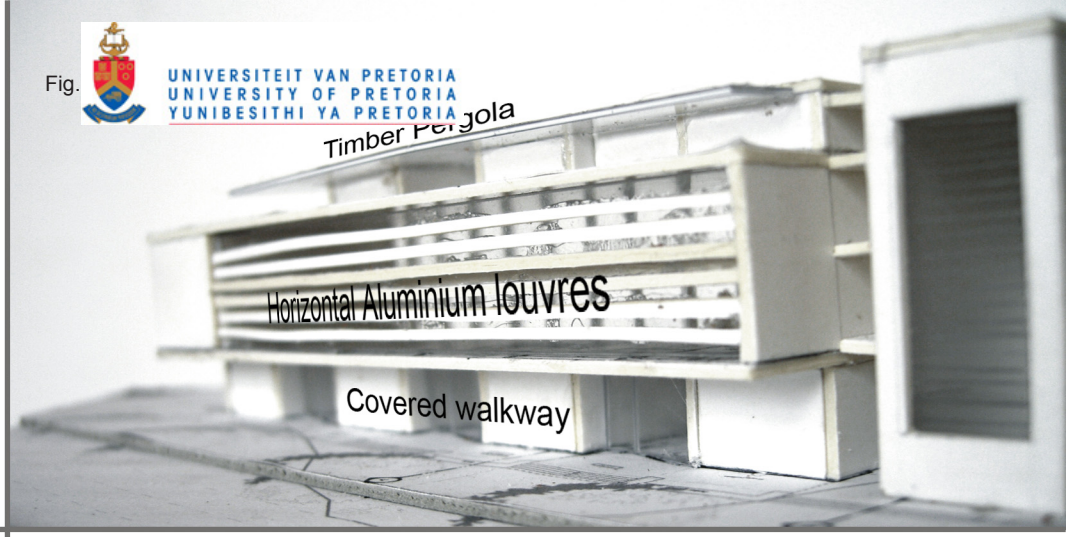


Fig.

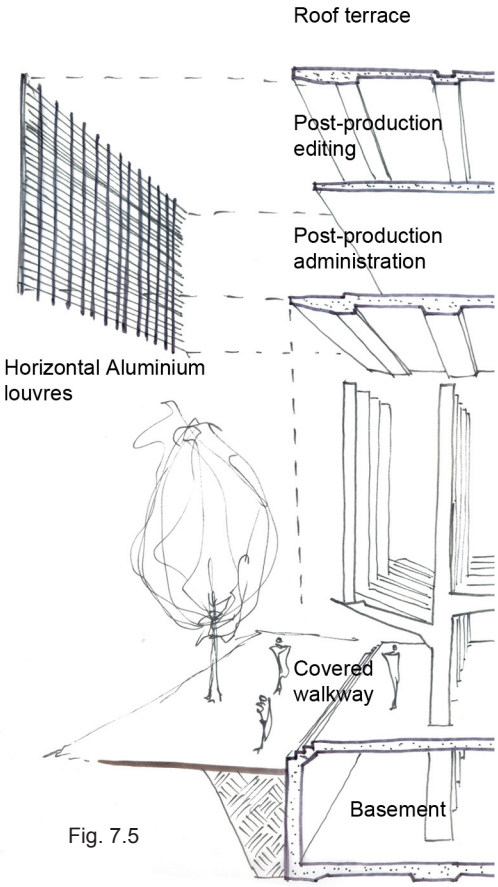


Fig. 7.5

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

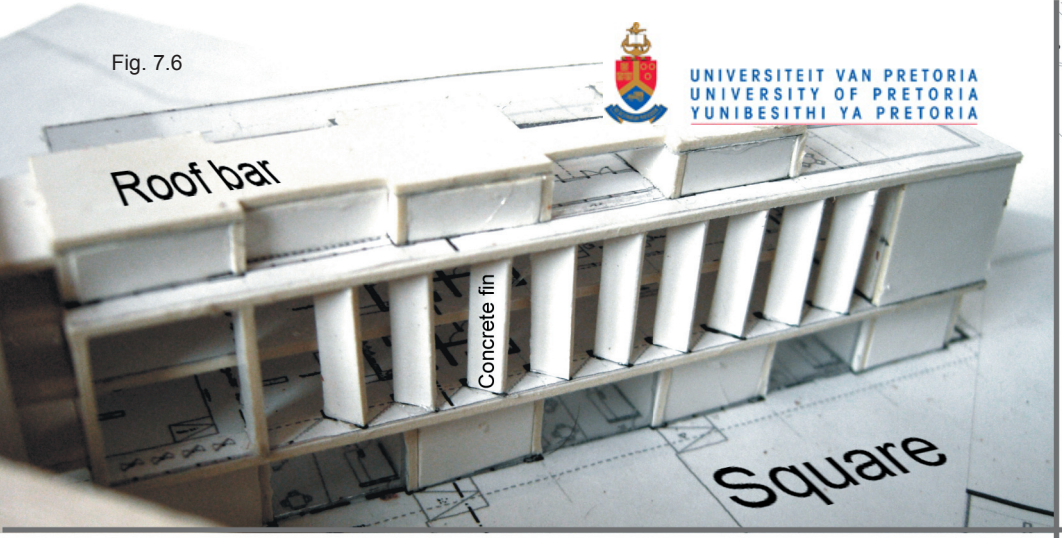


Fig. 7.6

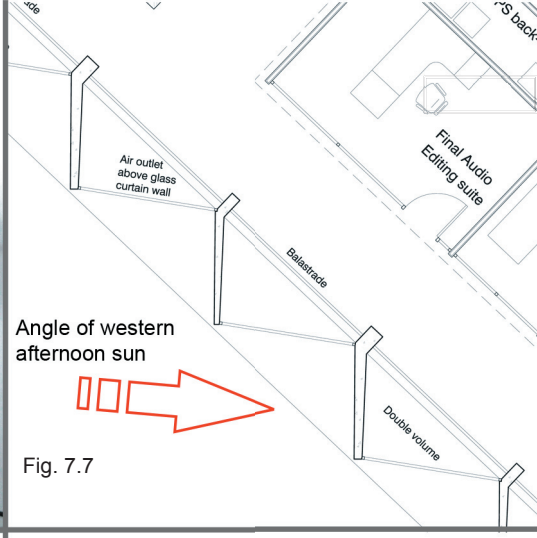


Fig. 7.7

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.

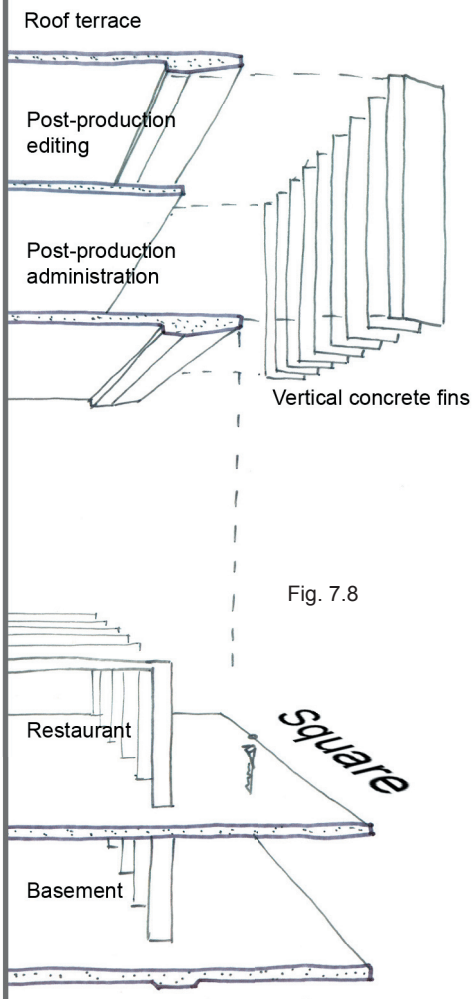


Fig. 7.8

Fig. 7.6 Concept model showing the south western facade
Fig. 7.7 Plan indicating the position of the concrete fins in relation with the angle of incidence of the western afternoon sun.
Fig. 7.8 Structural unfolding of the south western facade

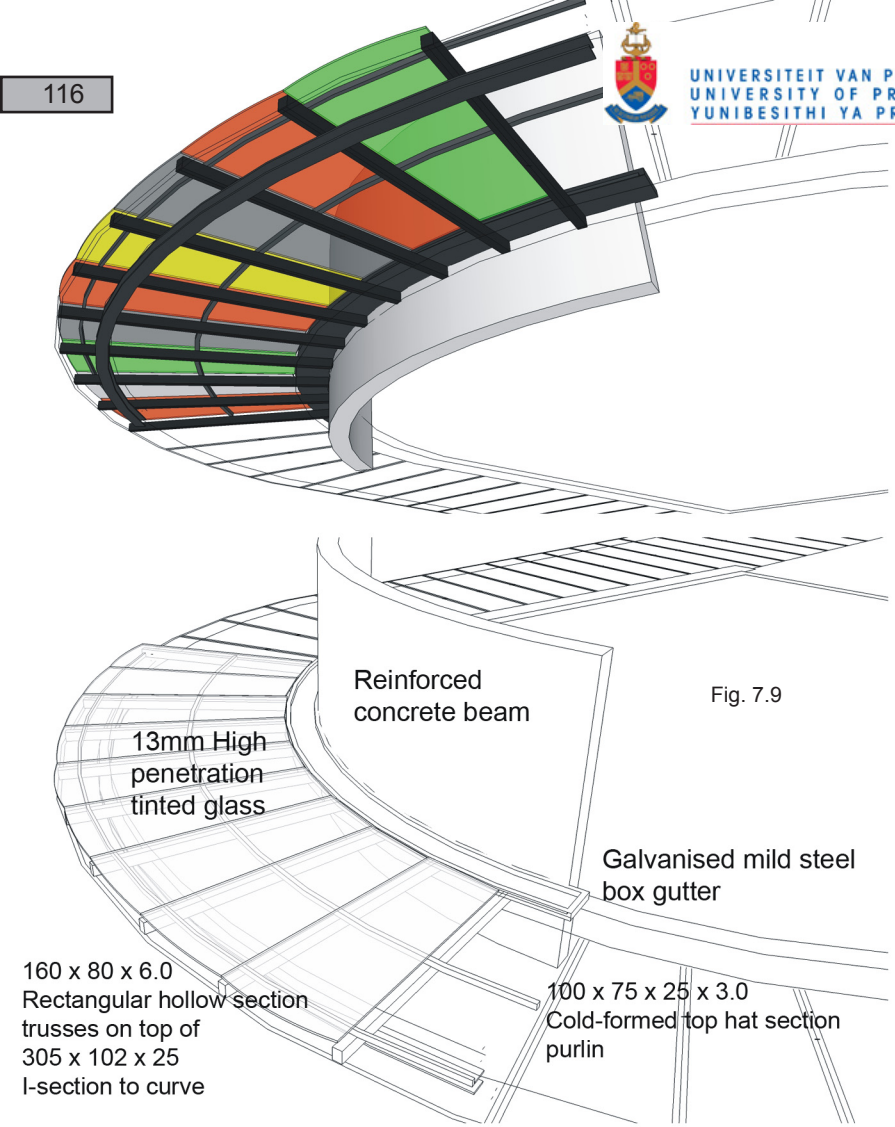


Fig. 7.9

Fig. 7.10

Fig. 7.11

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

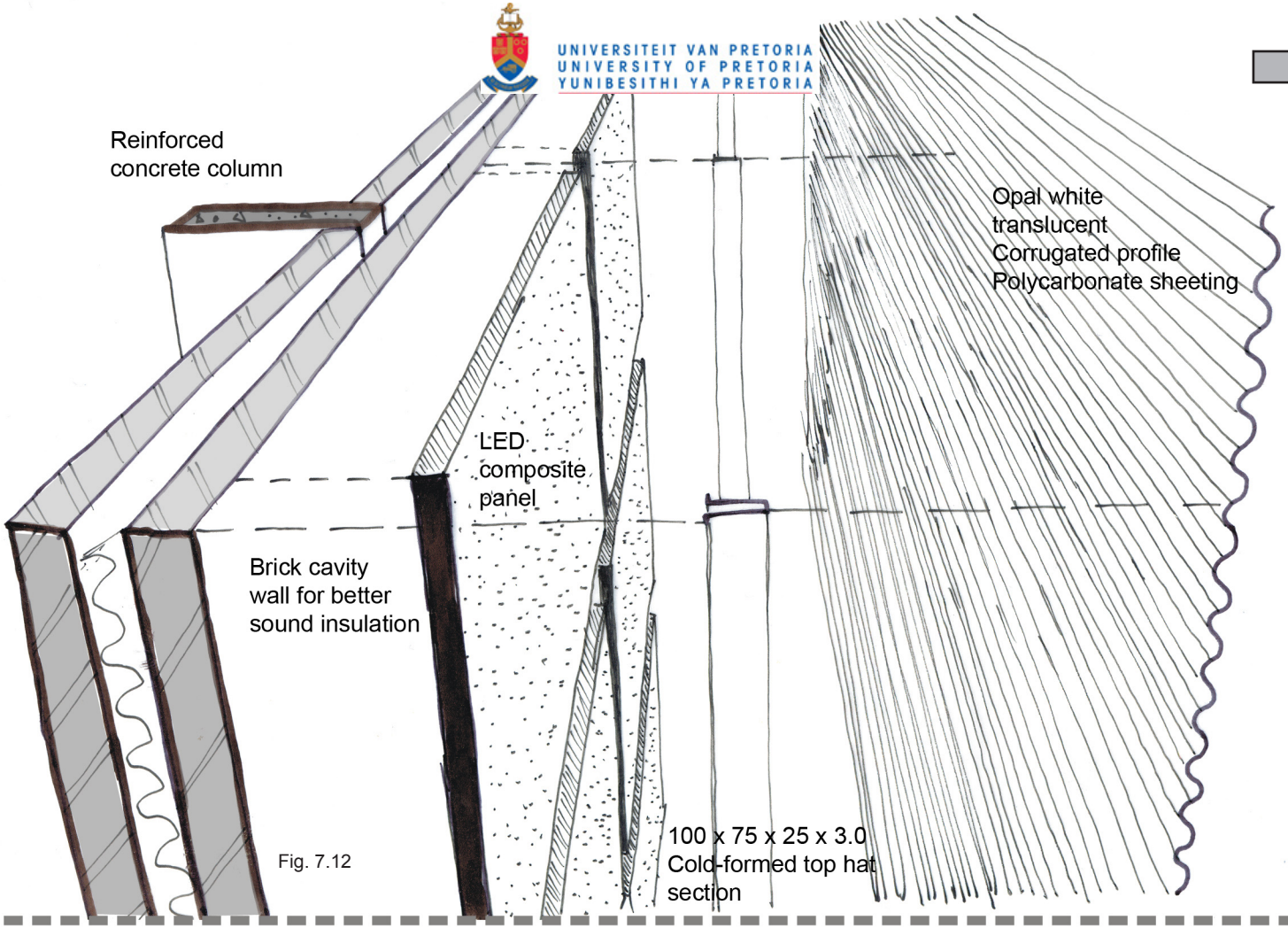
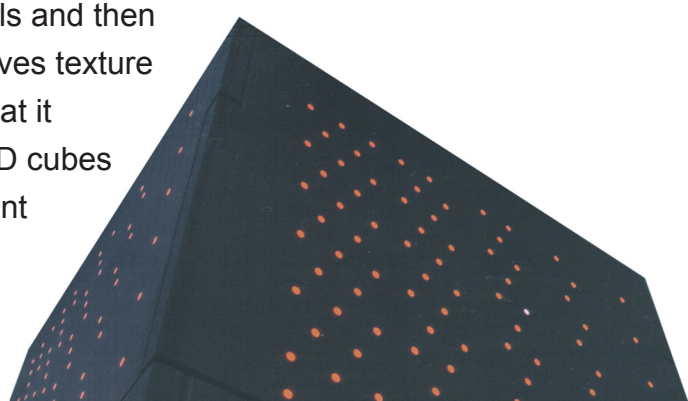


Fig. 7.12

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.

Fig. 7.12 Detail of LED and polycarbonate cladding to recording studios



_ Media facade

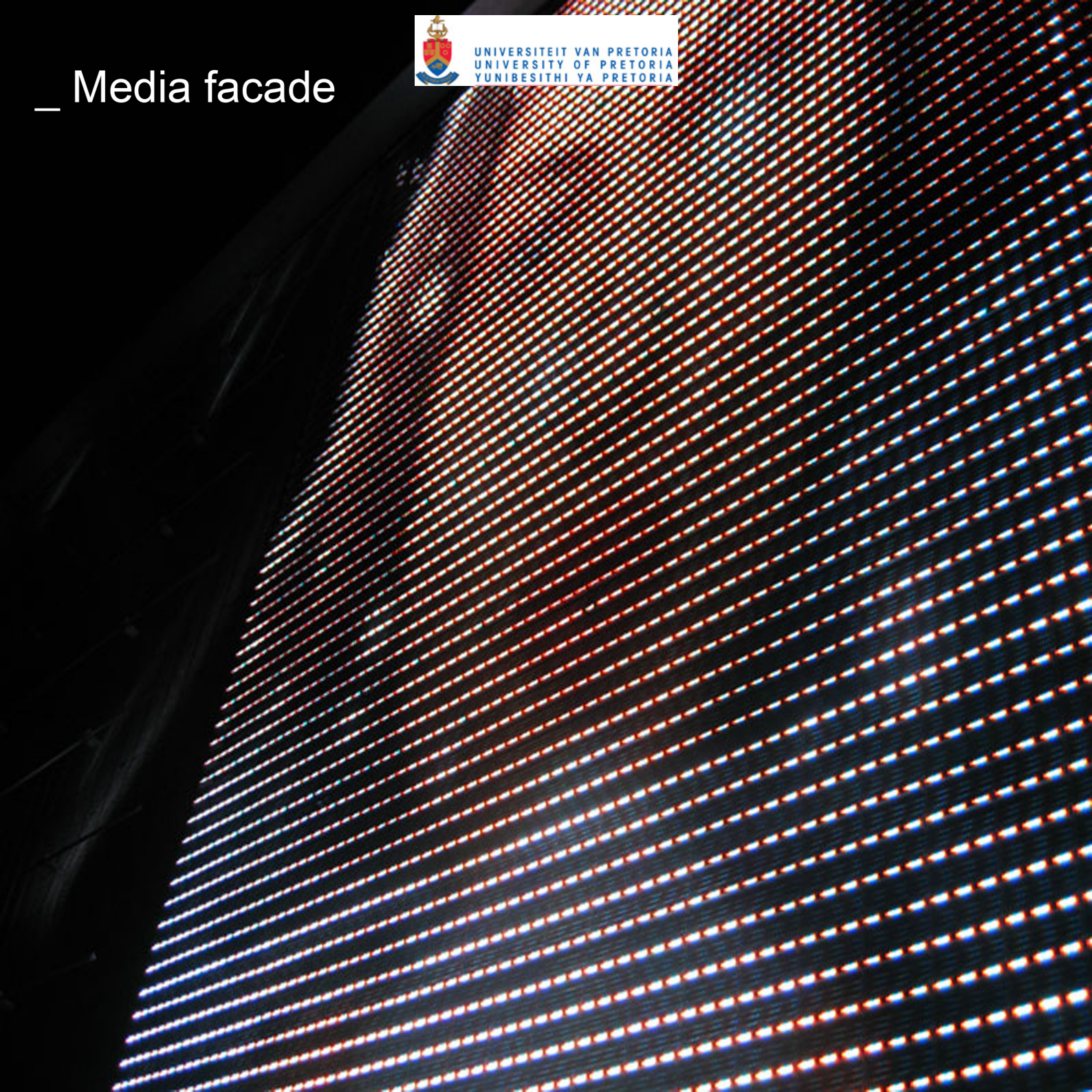
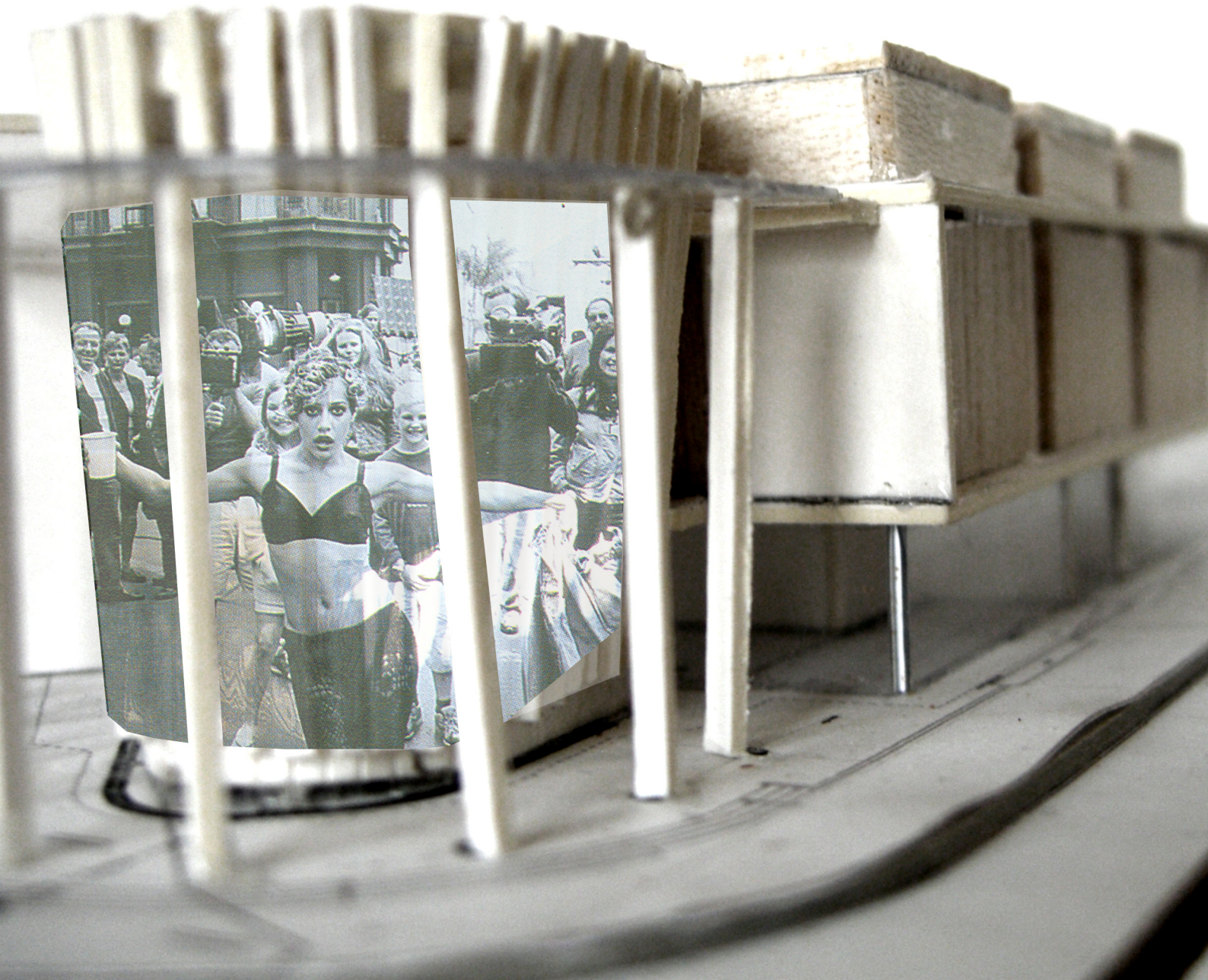


Fig. 7.13 Concept model showing the intent of the media facade



Mediamesh

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 then 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.

Fig. 7.14 Mediamesh system applied on the facade of the T-Mobile Headquarters in Bonn, Germany

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

Fig. 7.15 Close-up of the Mediamesh system
Fig. 7.16 Concept facade
Fig. 7.17 Merck Serono Headquarters in Geneva

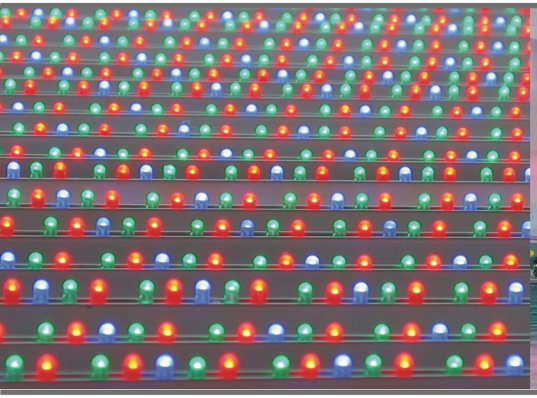


Fig. 7.15

Fig. 7.16

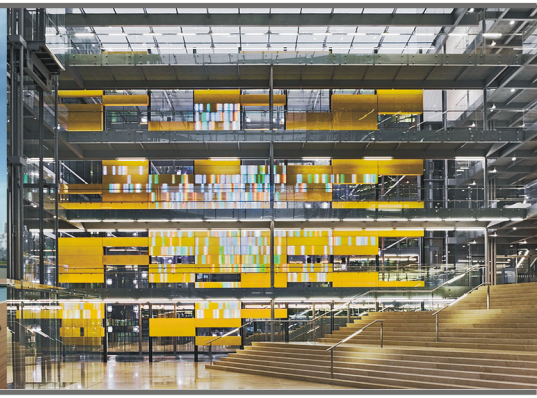


Fig. 7.17

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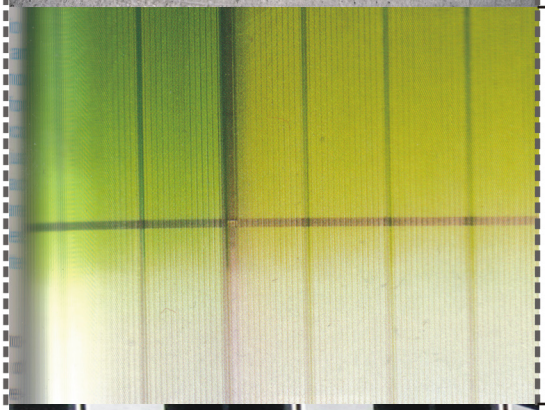
OFF SHUTTER CONCRETE

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.



TINTED GLASS

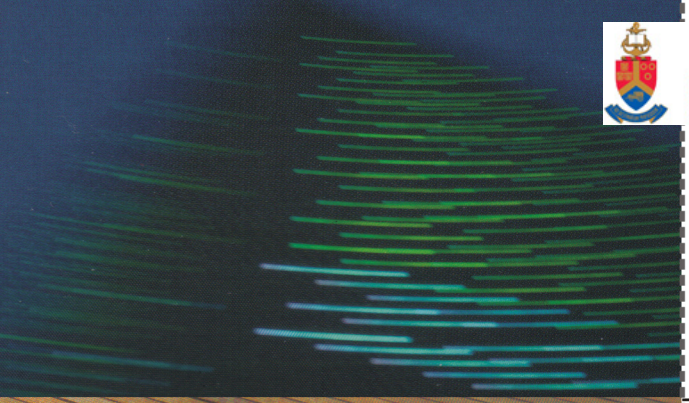
High penetration tinted glass is used for the roof covering the entrance to the development. Although it is more expensive than polycarbonate sheeting, it is more durable and is able to keep its properties during the life of the product.

ALUMINIUM LOUVRES

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.

LED MEDIA MESH

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.

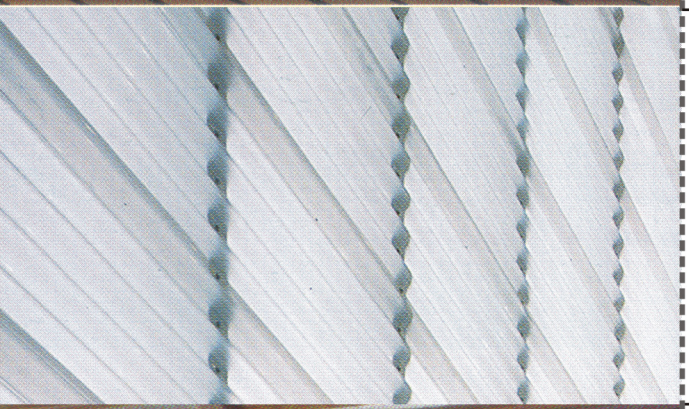


LED LIGHTS

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

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.



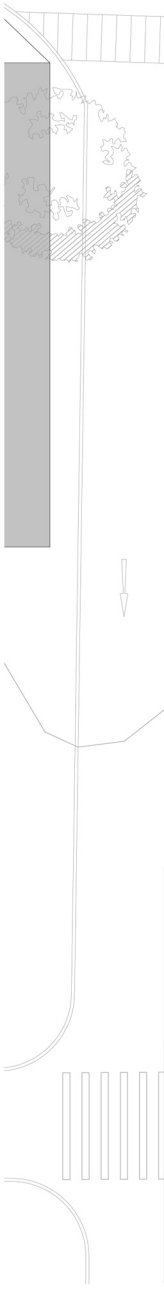
POLY-CARBONATE SHEETING

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.

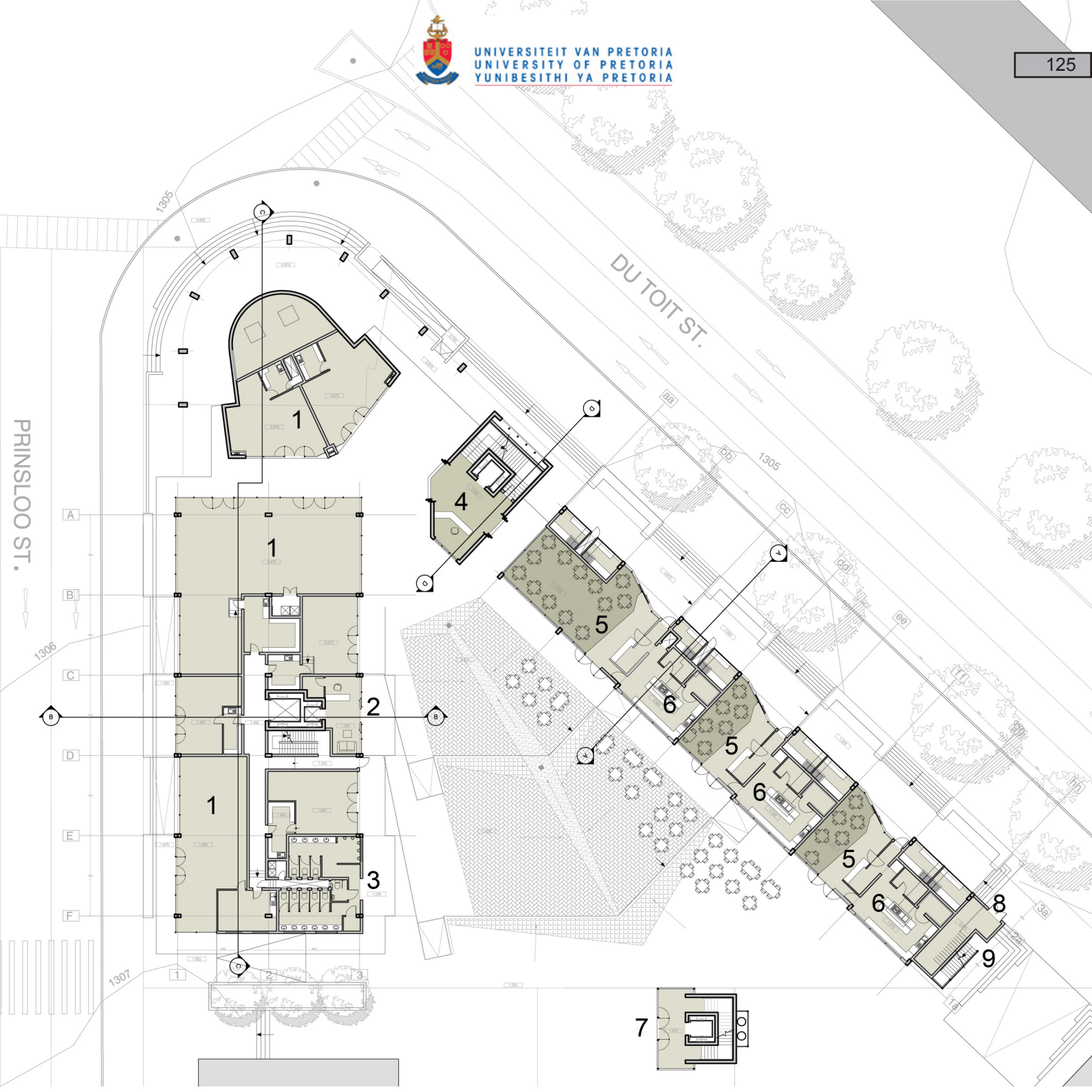
IBR METAL SHEETING

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


DU TOIT ST.
PRINSLOO ST.
1305
1306
1307
A
B
C
D
E
F
1
2
3
4
5
6
7
8
9

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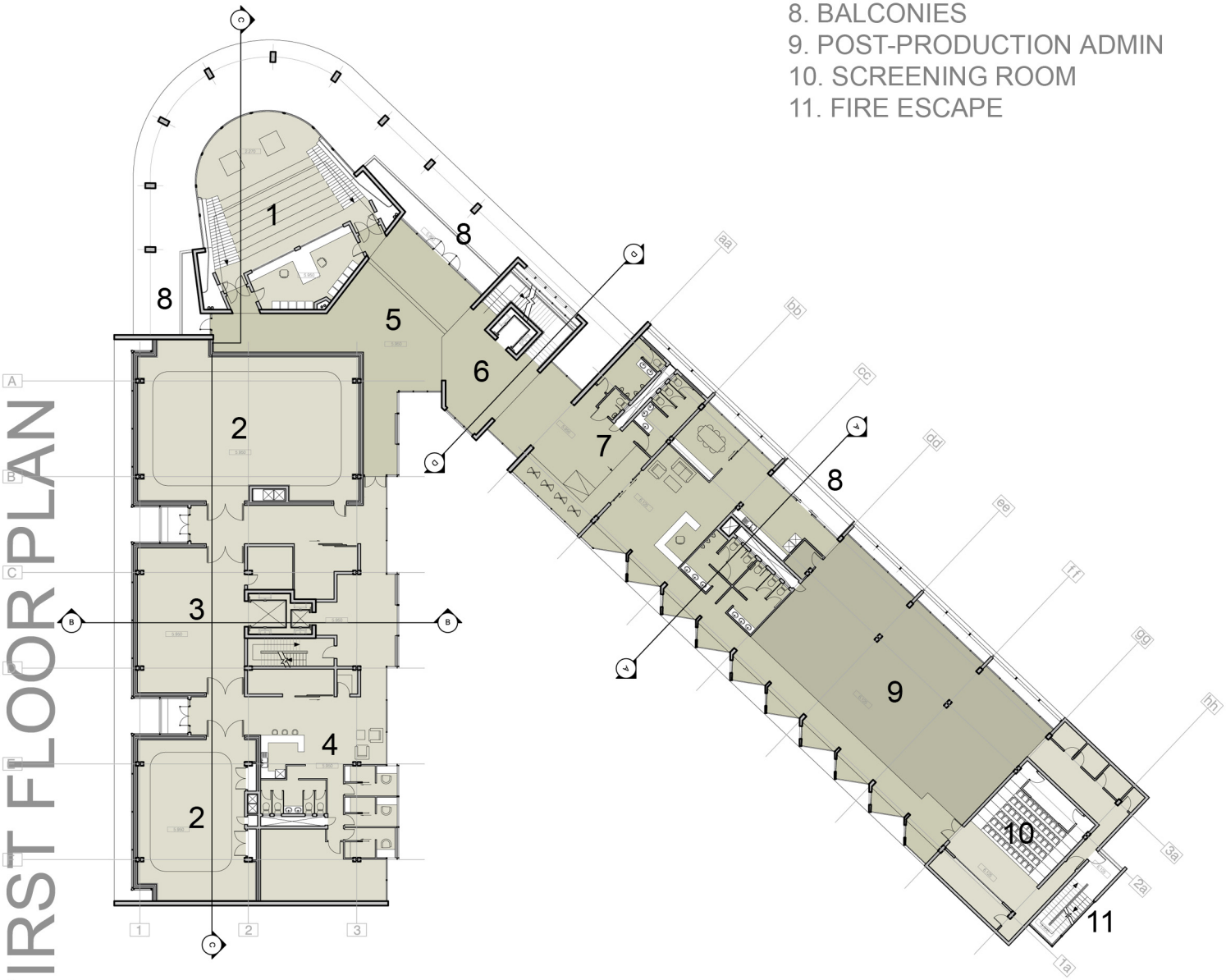
1. LIVE STUDIO
2. GENERAL STUDIO
3. STUDIO STORAGE
4. PRESENTER AREA
5. AUDIENCE HOLDING
6. CIRCULATION
7. PUBLIC TOILETS
8. BALCONIES
9. POST-PRODUCTION ADMIN
10. SCREENING ROOM
11. FIRE ESCAPE

FIRST FLOOR PLAN



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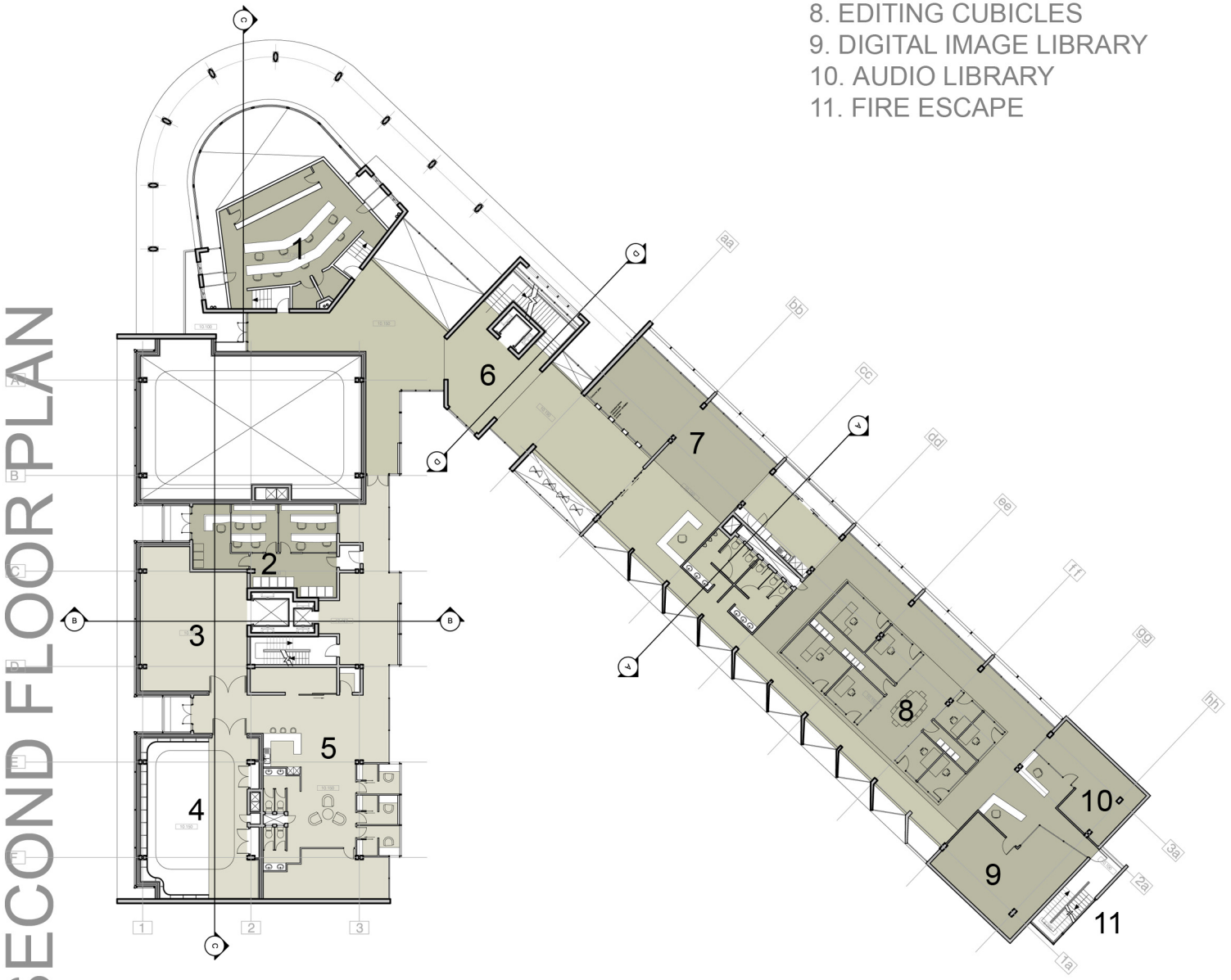
1. MASTER CONTROL ROOM
2. PRODUCTION CONTROL ROOM
3. STUDIO STORAGE
4. GENERAL STUDIO
5. PRESENTER AREA
6. CIRCULATION
7. PRODUCTION DESIGN STUDIO
8. EDITING CUBICLES
9. DIGITAL IMAGE LIBRARY
10. AUDIO LIBRARY
11. FIRE ESCAPE

SECOND FLOOR PLAN



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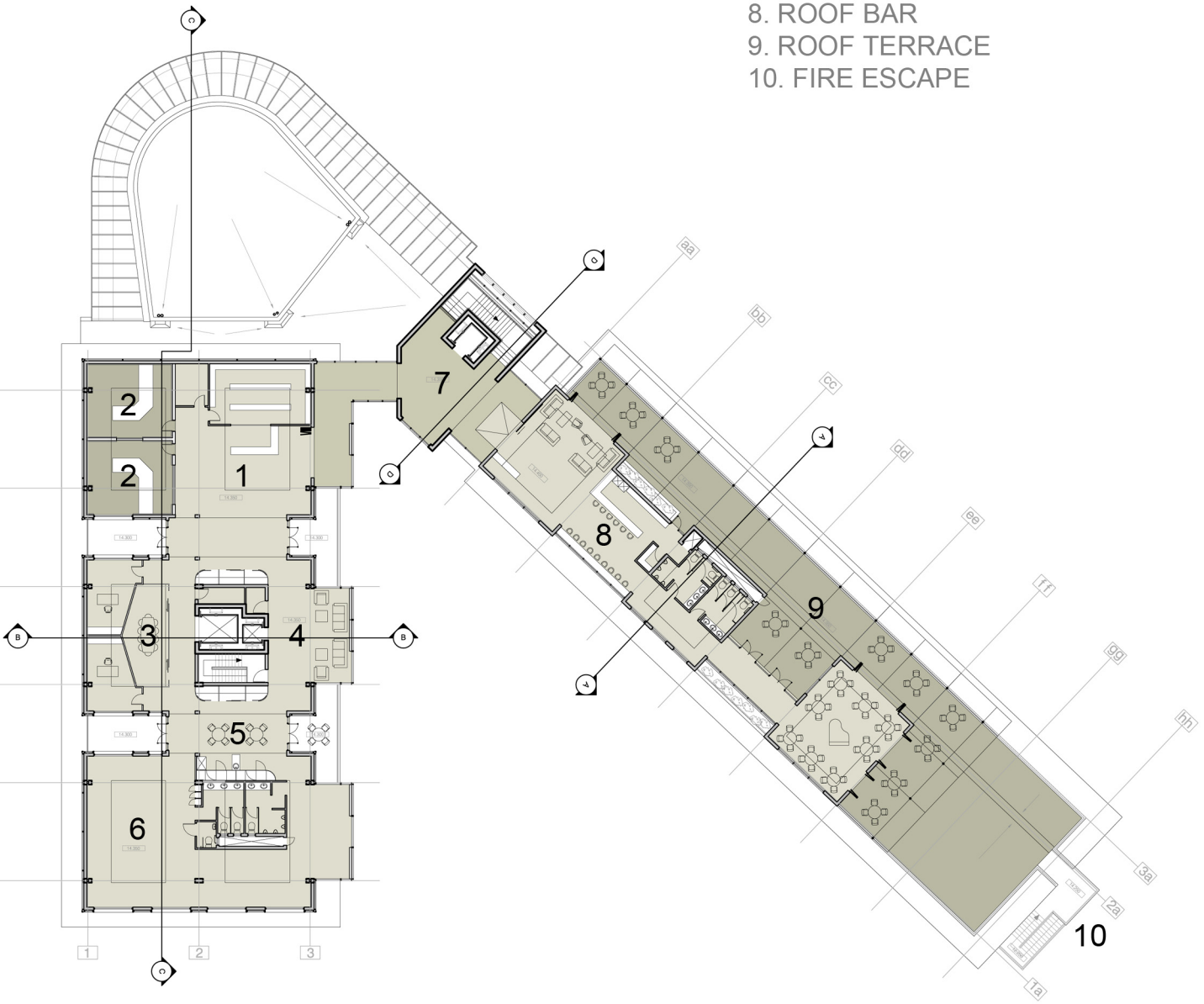
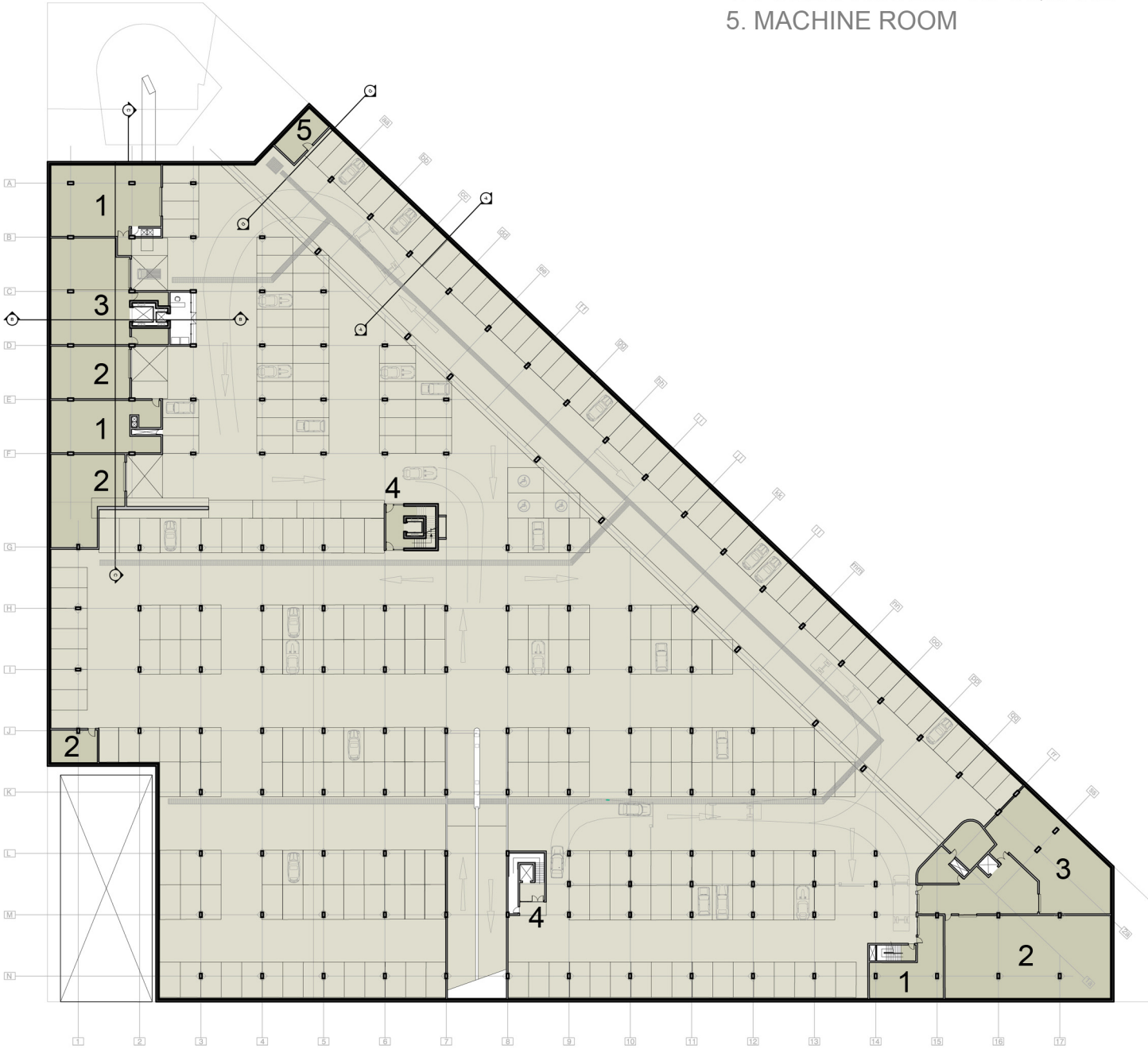
1. RADIO STATION RECEPTION
2. BROADCASTING STUDIO
3. BOARDROOM
4. STAFF LOUNGE
5. KITHENETTE
6. RADIO ADMIN OFFICE
7. CIRCULATION
8. ROOF BAR
9. ROOF TERRACE
10. FIRE ESCAPE

THIRD FLOOR PLAN



1. PLANT ROOMS
2. STORAGE
3. WORKSHOPS
4. PUBLIC ACCESS TO SQUARE
5. MACHINE ROOM

BASEMENT PLAN



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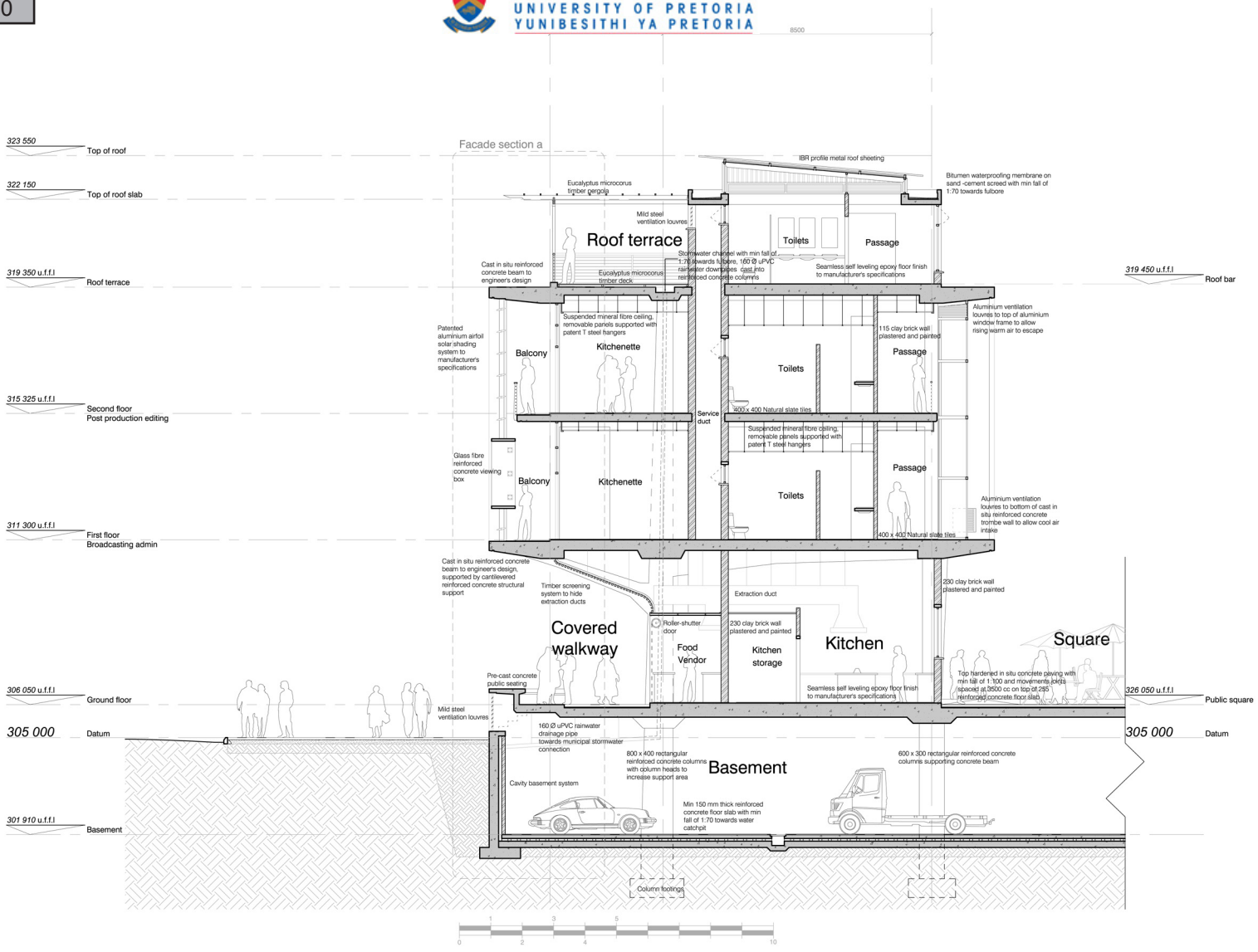
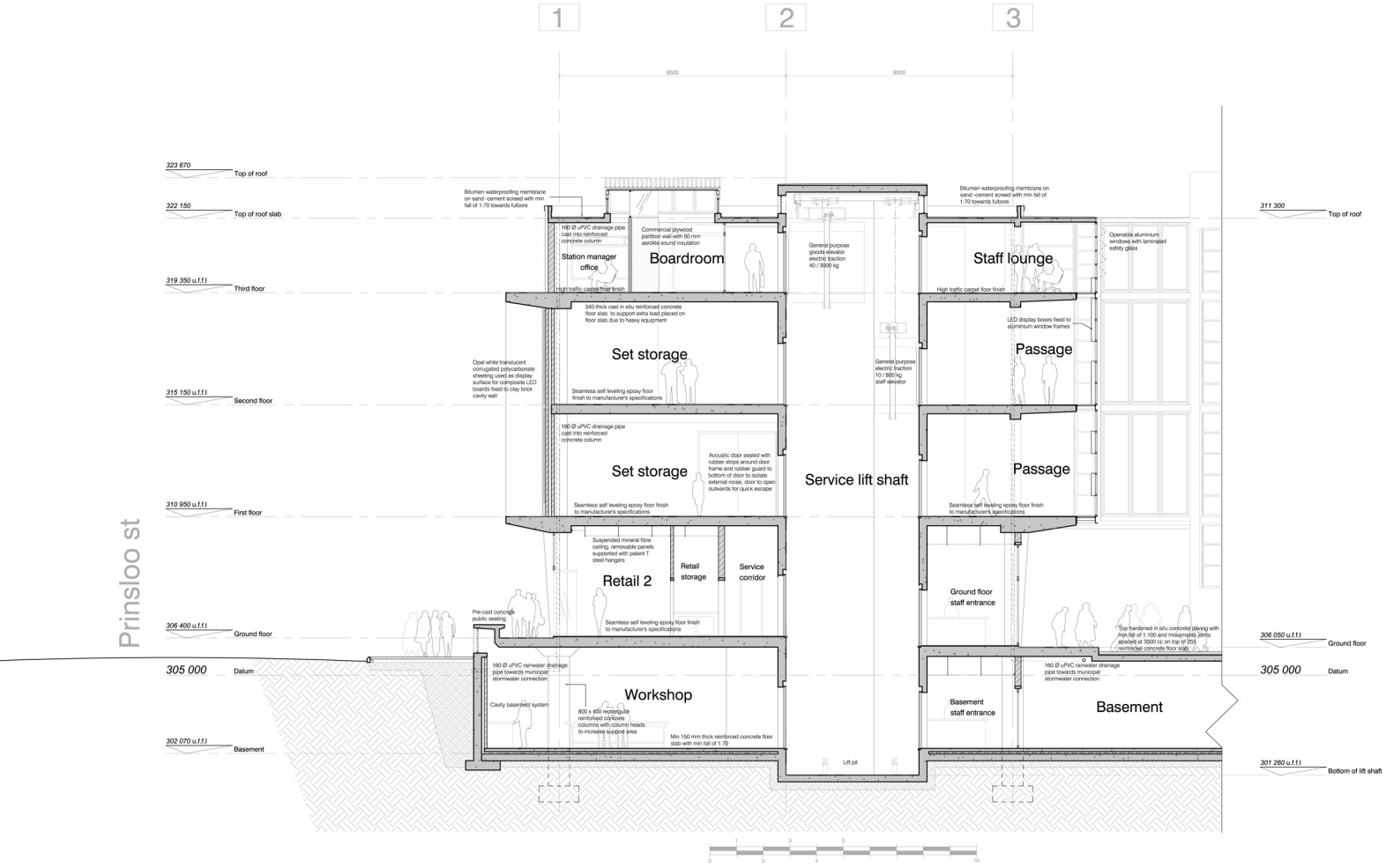
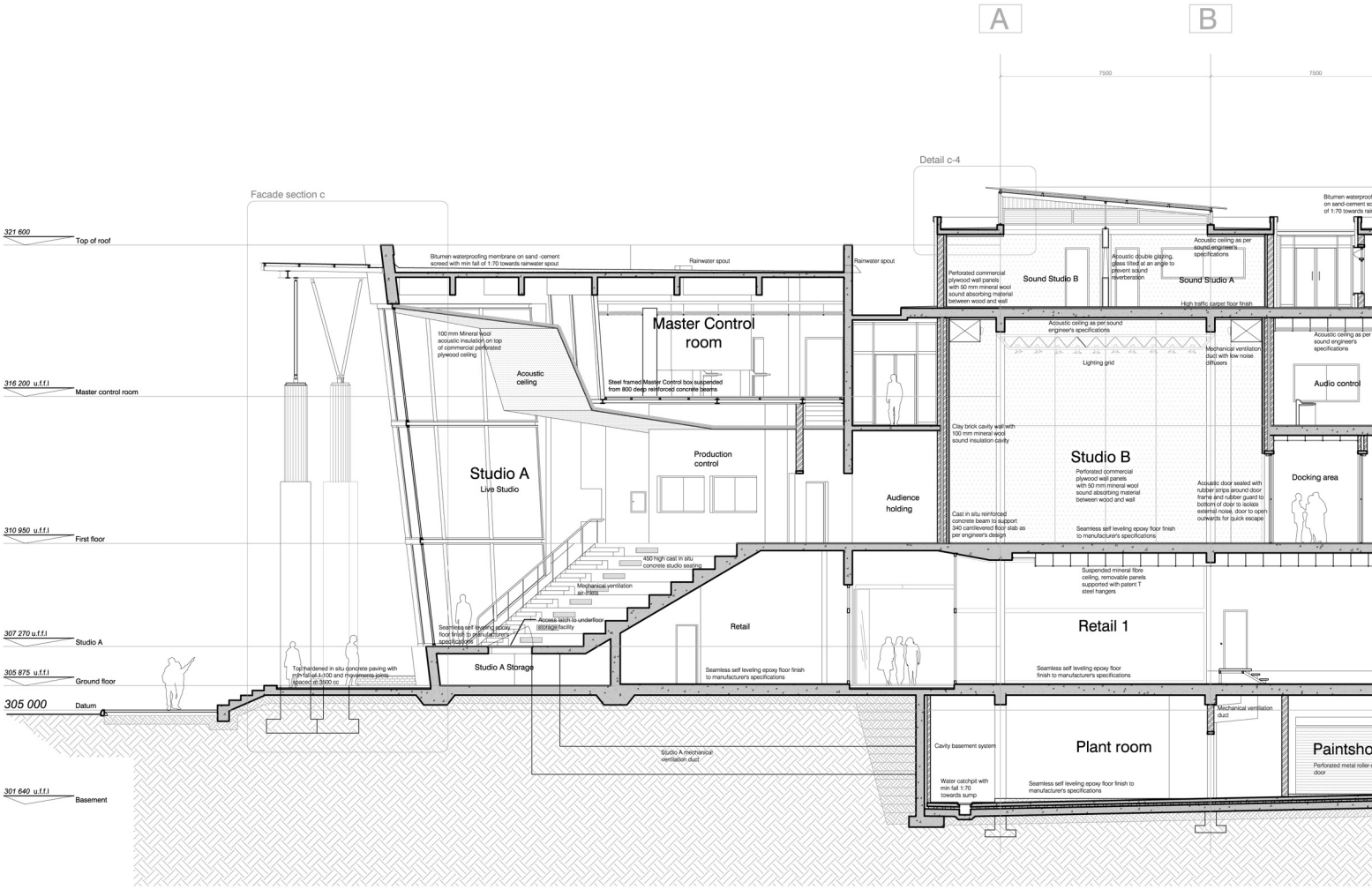


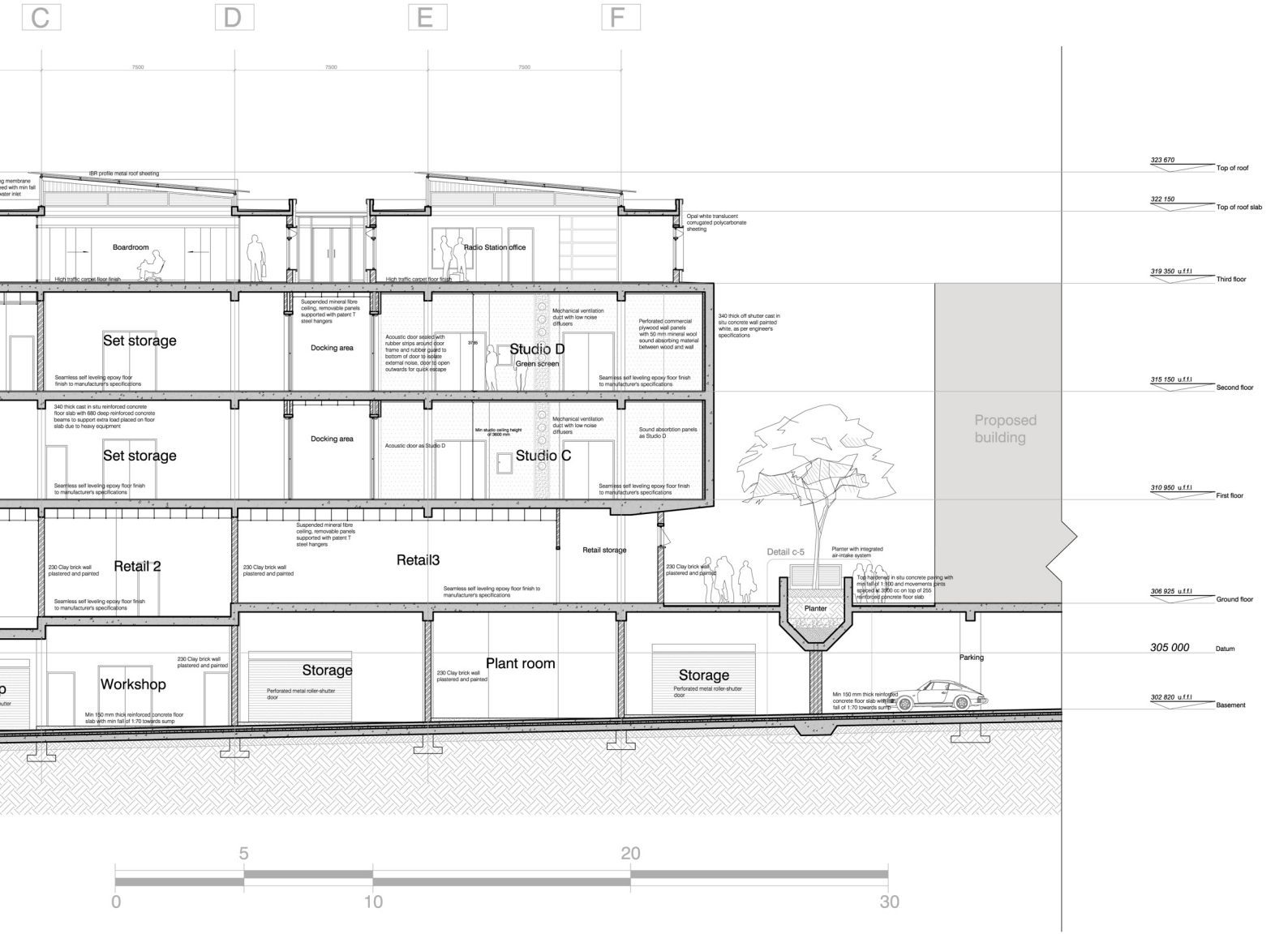
SECTION A-A


1
2
3
8500
8500
323 670
Top of roof
322 150
Top of roof slab
319 350 u.f.f.l
Third floor
315 150 u.f.f.l
Second floor
310 950 u.f.f.l
First floor
306 400 u.f.f.l
Ground floor
305 000
Datum
302 070 u.f.f.l
Basement
Prinsloo st
Bitumen waterproofing membrane on sand -cement screed with min fall of 1:70 towards fulbore
160 Ø uPVC drainage pipe cast into reinforced concrete column
Station manager office
Commercial plywood partition wall with 50 mm aerolite sound insulation
Boardroom
High traffic carpet floor finish
340 thick cast in situ reinforced concrete floor slab to support extra load placed on floor slab due to heavy equipment
Set storage
Opal white translucent corrugated polycarbonate sheeting used as display surface for composite LED boards fixed to clay brick cavity wall
Seamless self leveling epoxy floor finish to manufacturer's specifications
160 Ø uPVC drainage pipe cast into reinforced concrete column
Set storage
Acoustic door sealed with rubber strips around door frame and rubber guard to bottom of door to isolate external noise, door to open outwards for quick escape
Seamless self leveling epoxy floor finish to manufacturer's specifications
Suspended mineral fibre ceiling, removable panels supported with patent T steel hangers
Retail 2
Retail storage
Service corridor
Pre-cast concrete public seating
Seamless self leveling epoxy floor finish to manufacturer's specifications
160 Ø uPVC rainwater drainage pipe towards municipal stormwater connection
Cavity basement system
800 x 400 rectangular reinforced concrete columns with column heads to increase support area
Workshop
Min 150 mm thick reinforced concrete floor slab with min fall of 1:70
General purpose goods elevator electric traction 40 / 3000 kg
Service lift shaft
General purpose electric traction 10 / 800 kg staff elevator
Lift pit
Bitumen waterproofing membrane on sand -cement screed with min fall of 1:70 towards fulbore
Staff lounge
High traffic carpet floor finish
Openable aluminium windows with laminated safety glass
LED display boxes fixed to aluminium window frames
Passage
Passage
Seamless self leveling epoxy floor finish to manufacturer's specifications
Ground floor staff entrance
Top hardened in situ concrete paving with min fall of 1:100 and movement joints spaced at 3500 cc on top of 25Ø reinforced concrete floor slab
160 Ø uPVC rainwater drainage pipe towards municipal stormwater connection
Basement staff entrance
Basement
311 300
Top of roof
306 050 u.f.f.l
Ground floor
305 000
Datum
301 260 u.f.f.l
Bottom of lift shaft

SECTION B-B


A
B
7500
7500
Detail c-4
Facade section c
321 600
Top of roof
316 200 u.f.f.l
Master control room
310 950 u.f.f.l
First floor
307 270 u.f.f.l
Studio A
305 875 u.f.f.l
Ground floor
305 000
Datum
301 640 u.f.f.l
Basement
Bitumen waterproofing membrane on sand -cement screed with min fall of 1:70 towards rainwater spout
Rainwater spout
Rainwater spout
100 mm Mineral wool acoustic insulation on top of commercial perforated plywood ceiling
Acoustic ceiling
Master Control room
Steel framed Master Control box suspended from 800 deep reinforced concrete beams
Studio A
Live Studio
Production control
Audience holding
450 high cast in situ concrete studio seating
Mechanical ventilation air inlets
Access latch to underfloor storage facility
Seamless self leveling epoxy floor finish to manufacturer's specifications
Studio A Storage
Top hardened in situ concrete paving with min fall of 1:100 and movements joints spaced at 3600 cc
Retail
Seamless self leveling epoxy floor finish to manufacturer's specifications
Studio A mechanical ventilation duct
Perforated commercial plywood wall panels with 50 mm mineral wool sound absorbing material between wood and wall
Sound Studio B
Acoustic double glazing, glass fitted at an angle to prevent sound reverberation
Acoustic ceiling as per sound engineer's specifications
Sound Studio A
High traffic carpet floor finish
Acoustic ceiling as per sound engineer's specifications
Lighting grid
Mechanical ventilation duct with low noise diffusers
Acoustic ceiling as per sound engineer's specifications
Audio control
Clay brick cavity wall with 100 mm mineral wool sound insulation cavity
Studio B
Perforated commercial plywood wall panels with 50 mm mineral wool sound absorbing material between wood and wall
Acoustic door sealed with rubber strips around door frame and rubber guard to bottom of door to isolate external noise, door to open outwards for quick escape
Docking area
Cast in situ reinforced concrete beam to support 340 cantilevered floor slab as per engineer's design
Seamless self leveling epoxy floor finish to manufacturer's specifications
Suspended mineral fibre ceiling, removable panels supported with patent T steel hangers
Retail 1
Seamless self leveling epoxy floor finish to manufacturer's specifications
Mechanical ventilation duct
Cavity basement system
Plant room
Water catchpit with min fall 1:70 towards sump
Seamless self leveling epoxy floor finish to manufacturer's specifications
Paintsho
Perforated metal roller-s door

SECTION C-C


C
D
E
F
7500
7500
7500
IBR profile metal roof sheeting
Boardroom
High traffic carpet floor finish
Radio Station office
High traffic carpet floor finish
Opal white translucent corrugated polycarbonate sheeting
323 670
Top of roof
322 150
Top of roof slab
319 350 u.f.f.l
Third floor
315 150 u.f.f.l
Second floor
310 950 u.f.f.l
First floor
306 925 u.f.f.l
Ground floor
305 000
Datum
302 820 u.f.f.l
Basement
Set storage
Docking area
Suspended mineral fibre ceiling, removable panels supported with patent T steel hangers
Acoustic door sealed with rubber strips around door frame and rubber guard to bottom of door to isolate external noise, door to open outwards for quick escape
3795
Studio D
Green screen
Mechanical ventilation duct with low noise diffusers
Perforated commercial plywood wall panels with 50 mm mineral wool sound absorbing material between wood and wall
340 thick off shutter cast in situ concrete wall painted white, as per engineer's specifications
Seamless self leveling epoxy floor finish to manufacturer's specifications
Seamless self leveling epoxy floor finish to manufacturer's specifications
340 thick cast in situ reinforced concrete floor slab with 680 deep reinforced concrete beams to support extra load placed on floor slab due to heavy equipment
Set storage
Docking area
Min studio ceiling height of 3600 mm
Acoustic door as Studio D
Studio C
Mechanical ventilation duct with low noise diffusers
Sound absorbtion panels as Studio D
Seamless self leveling epoxy floor finish to manufacturer's specifications
Seamless self leveling epoxy floor finish to manufacturer's specifications
Proposed building
Suspended mineral fibre ceiling, removable panels supported with patent T steel hangers
Retail 2
230 Clay brick wall plastered and painted
Seamless self leveling epoxy floor finish to manufacturer's specifications
230 Clay brick wall plastered and painted
Retail3
Seamless self leveling epoxy floor finish to manufacturer's specifications
Retail storage
230 Clay brick wall plastered and painted
Detail c-5
Planter with integrated air-intake system
Top hardened in situ concrete paving with min fall of 1:100 and movements joints spaced at 3000 cc on top of 255 reinforced concrete floor slab
Planter
230 Clay brick wall plastered and painted
Workshop
Min 150 mm thick reinforced concrete floor slab with min fall of 1:70 towards sump
Storage
Perforated metal roller-shutter door
Plant room
230 Clay brick wall plastered and painted
Storage
Perforated metal roller-shutter door
Parking
Min 150 mm thick reinforced concrete floor slab with min fall of 1:70 towards sump
0
5
10
20
30

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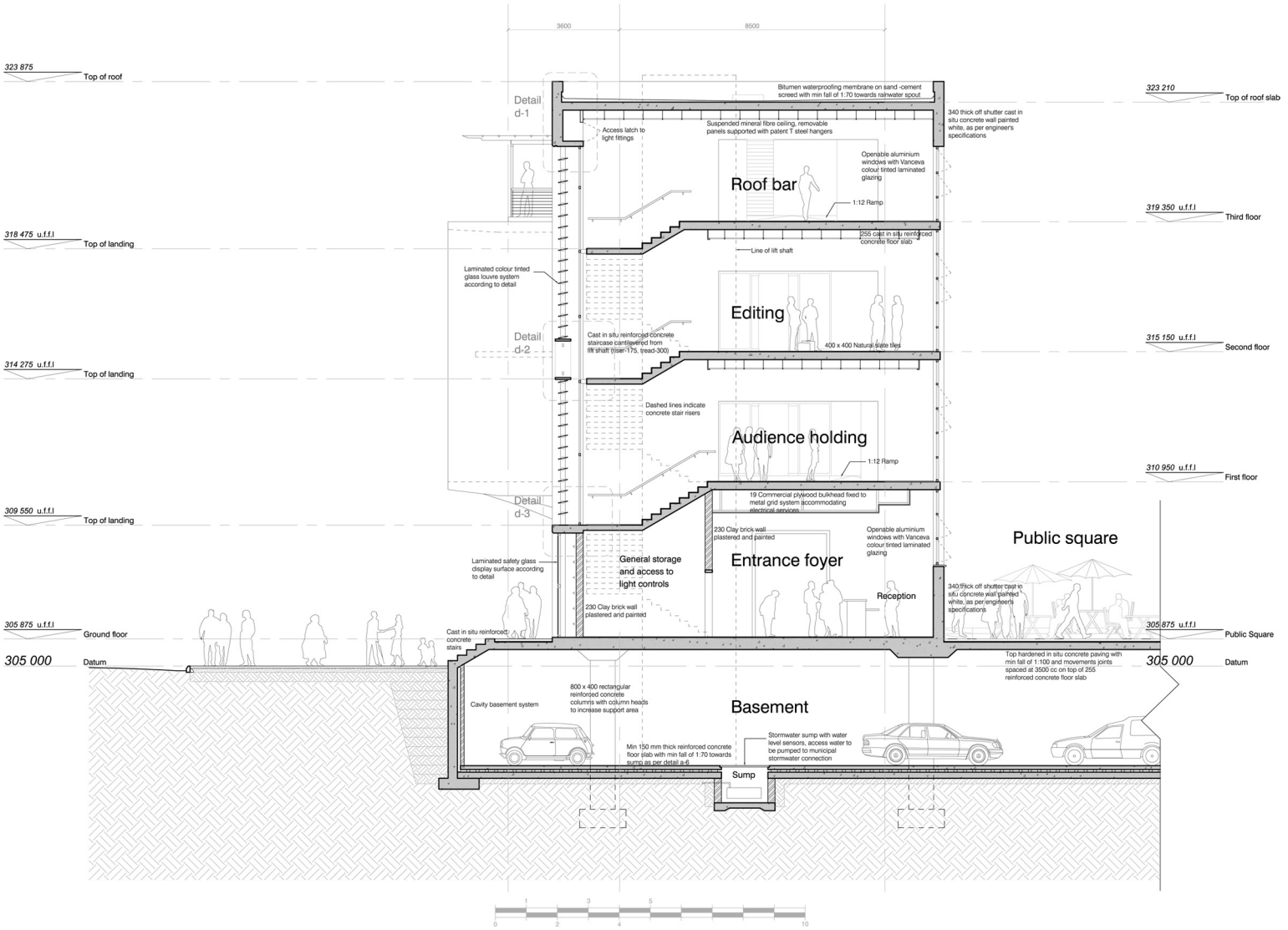
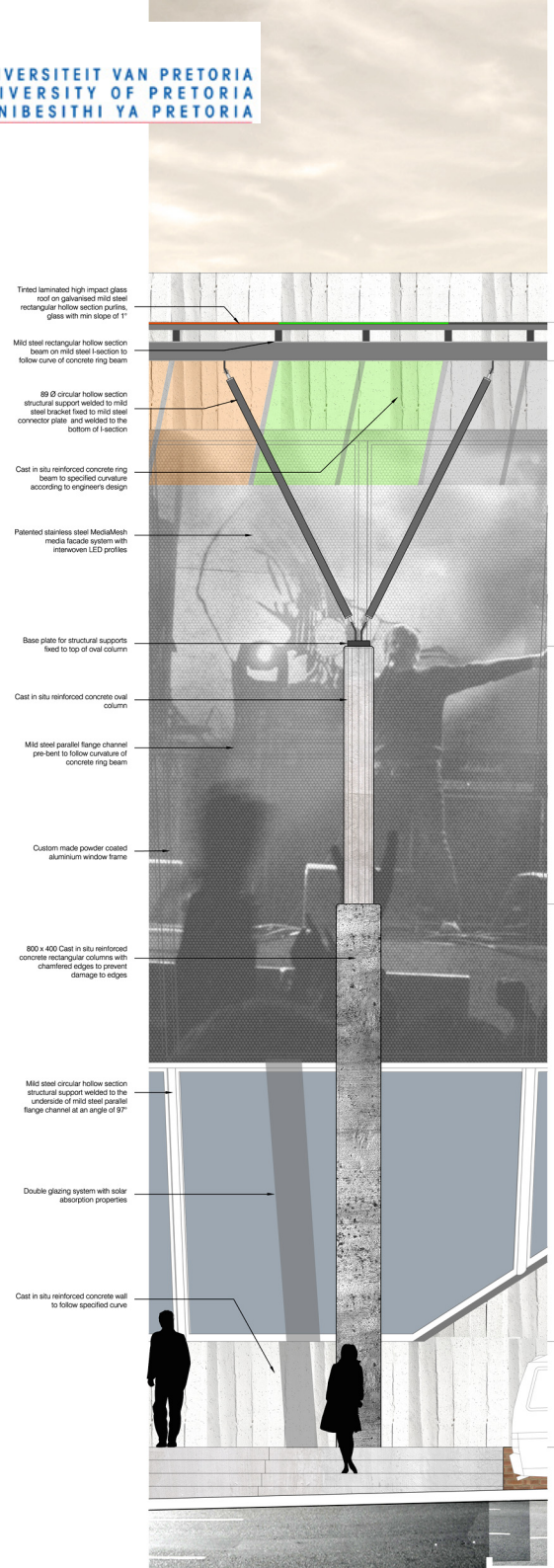
3a 2a 1a

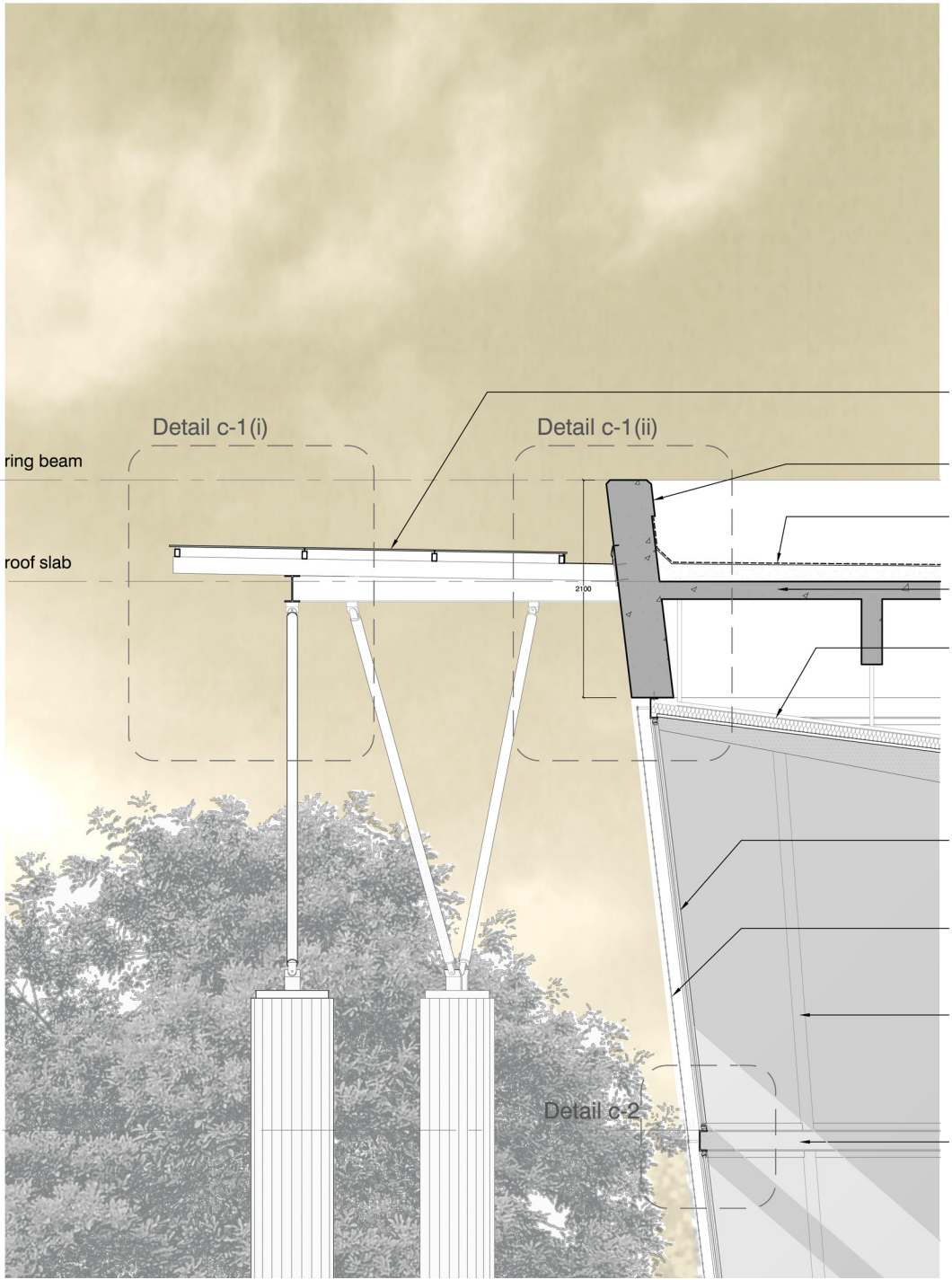


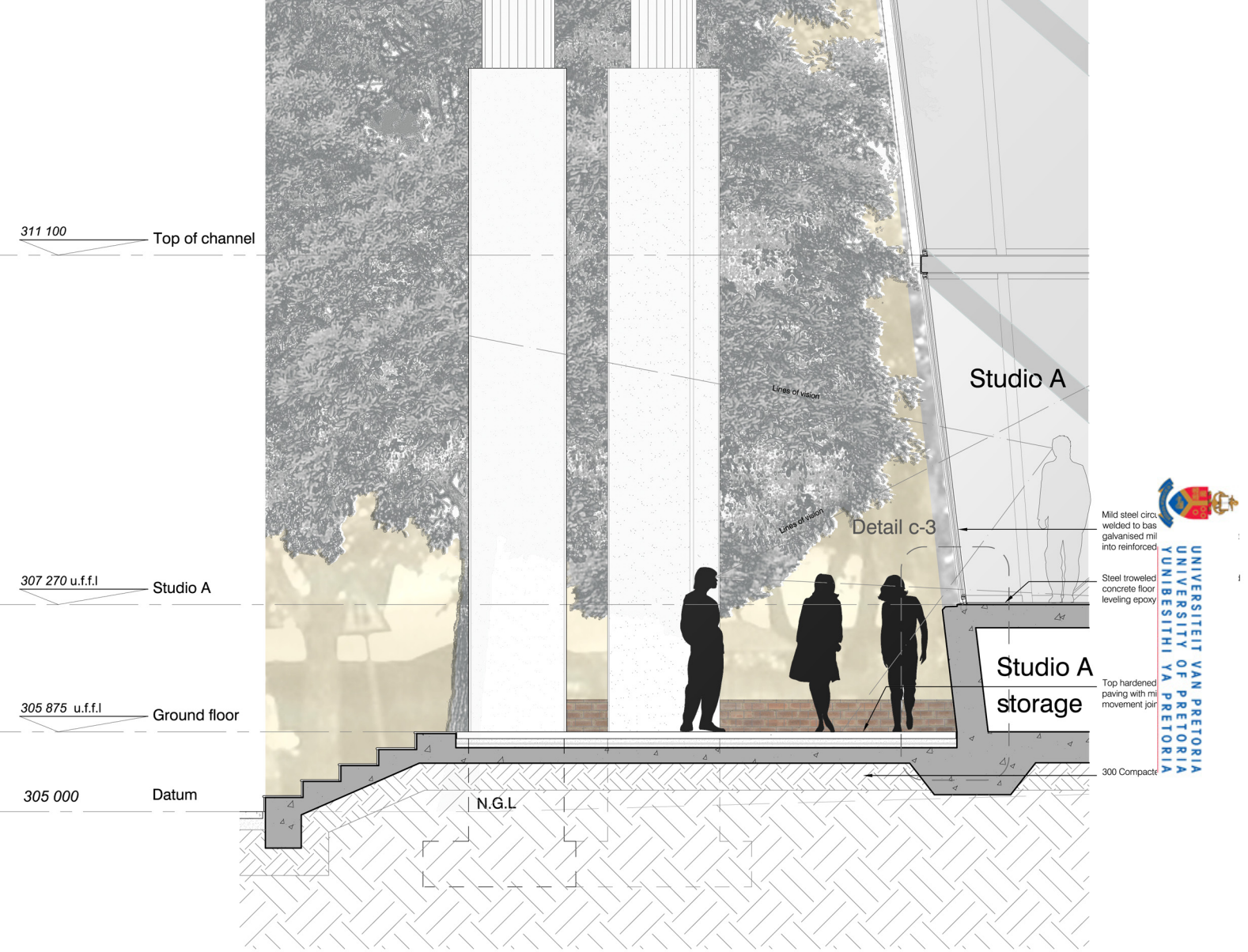
SECTION D-D

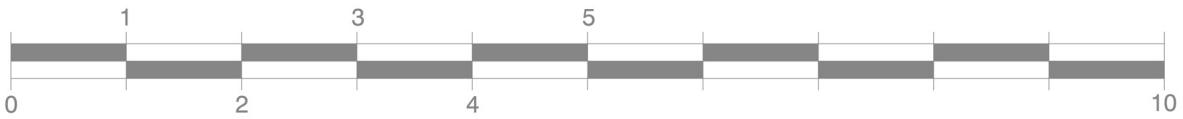
COLUMN ELEVATION



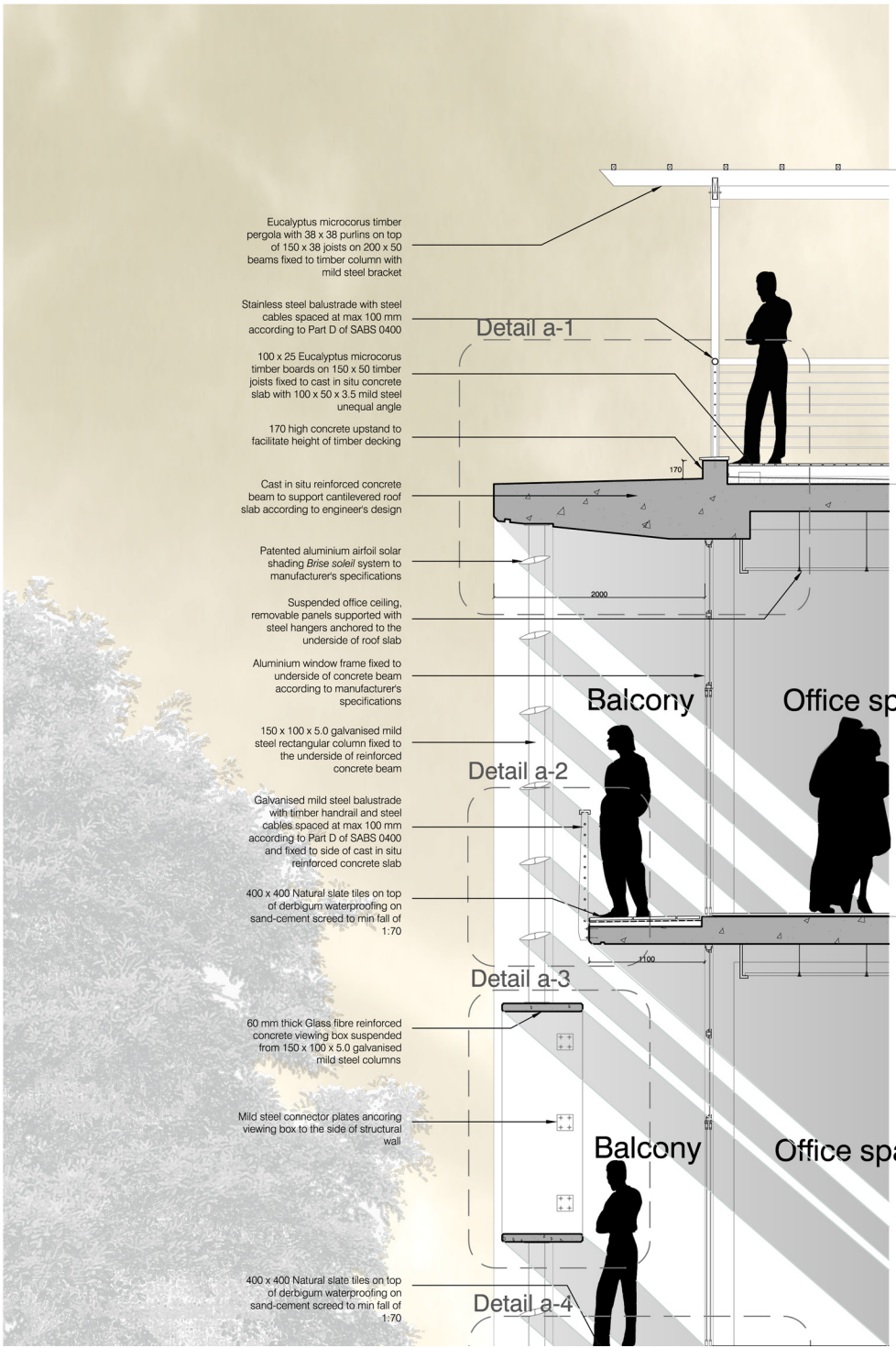
FACADE SECTION C







FACADE SECTION A



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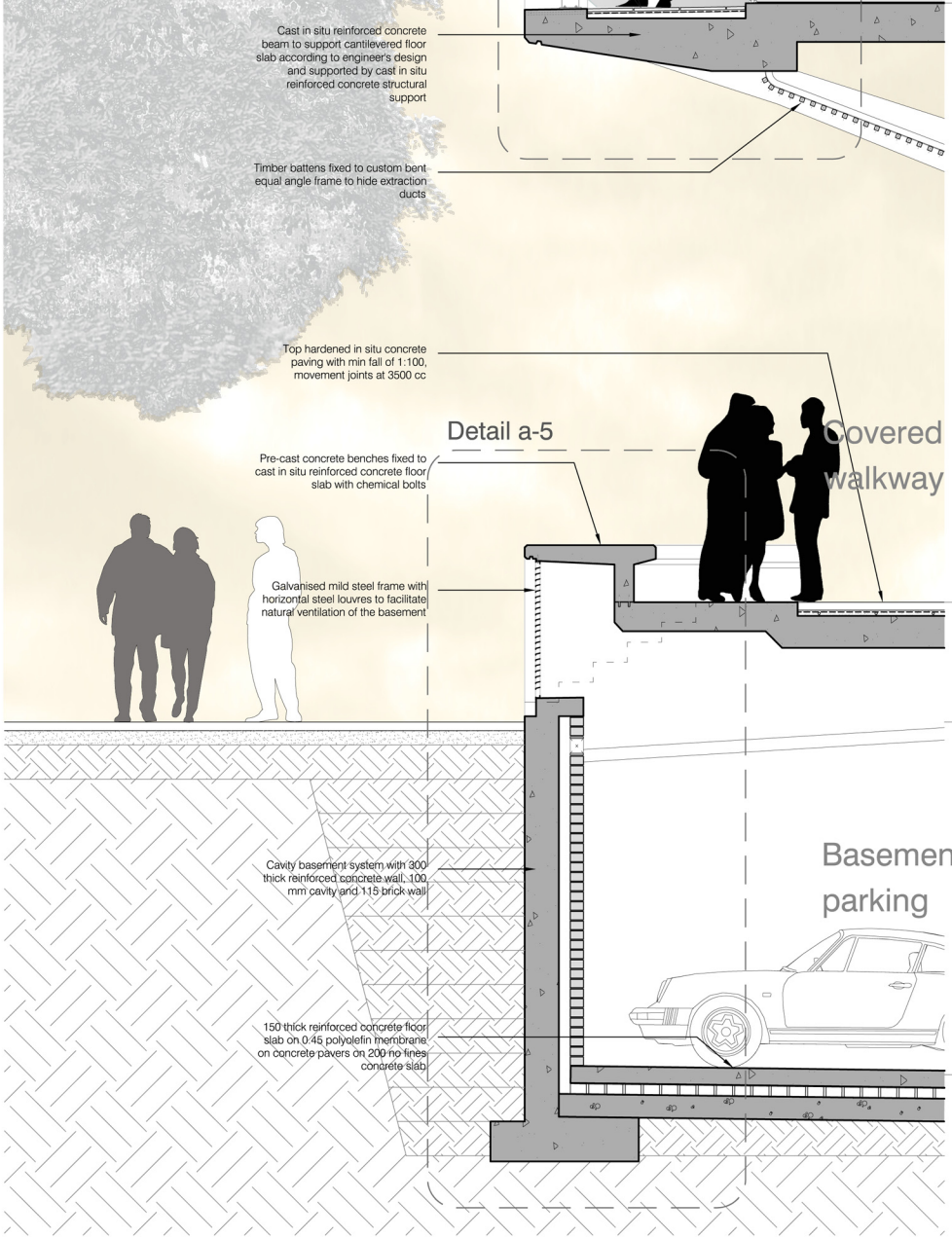
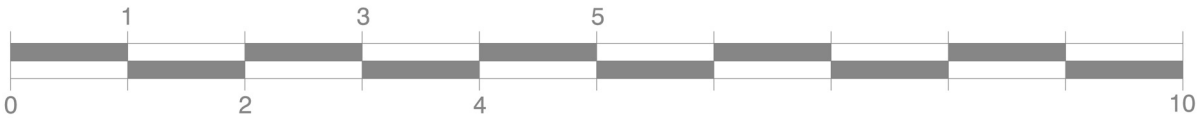
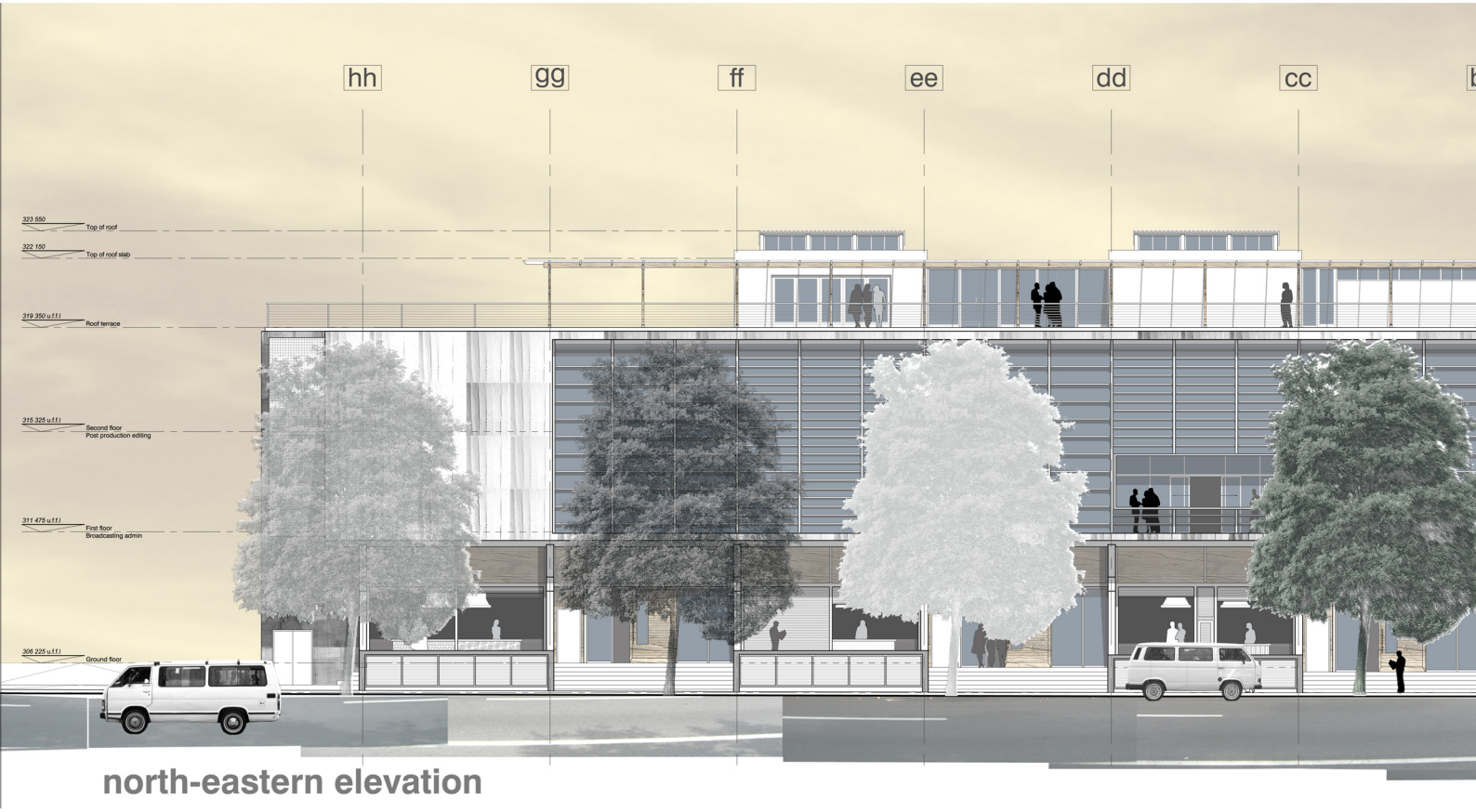


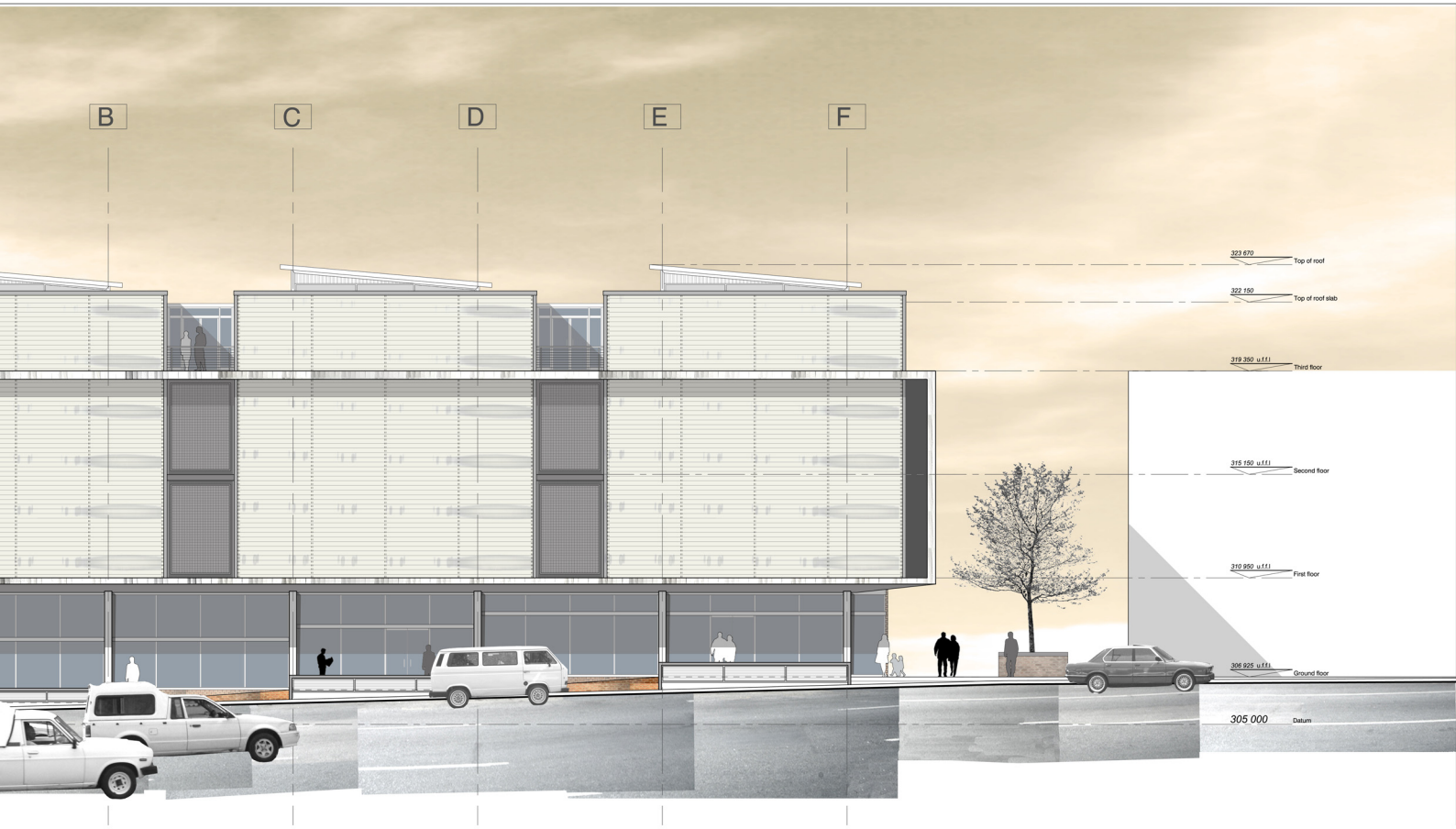


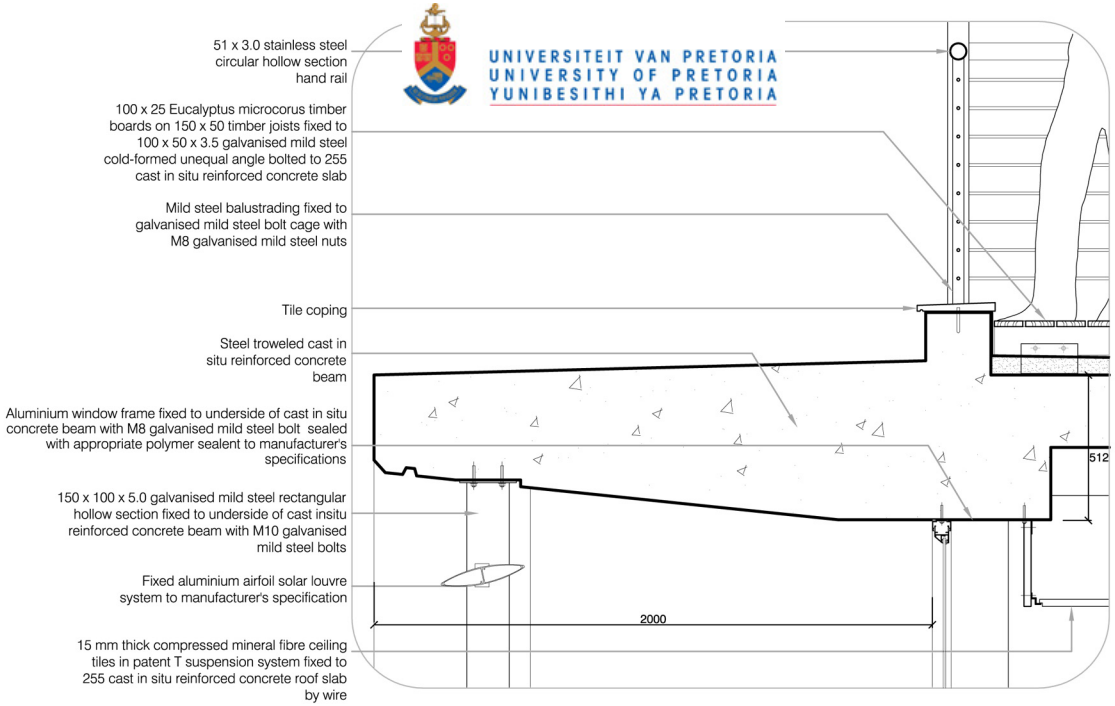


north-eastern elevation

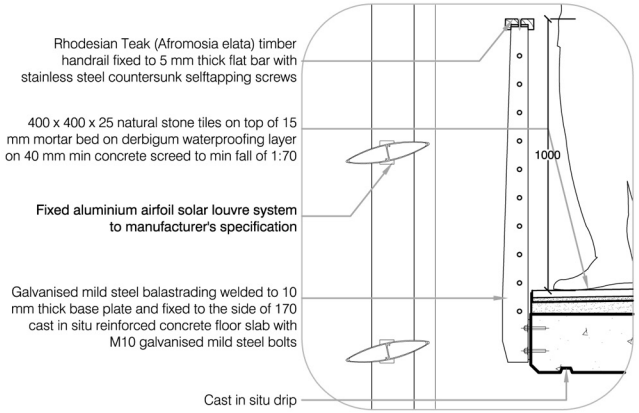

bb
aa
321 600
Top of roof
316 200 u.f.l.
Master control room
310 950 u.f.l.
First floor
MUSIC TELEVISION
TAXI RANK
BUT

western elevation

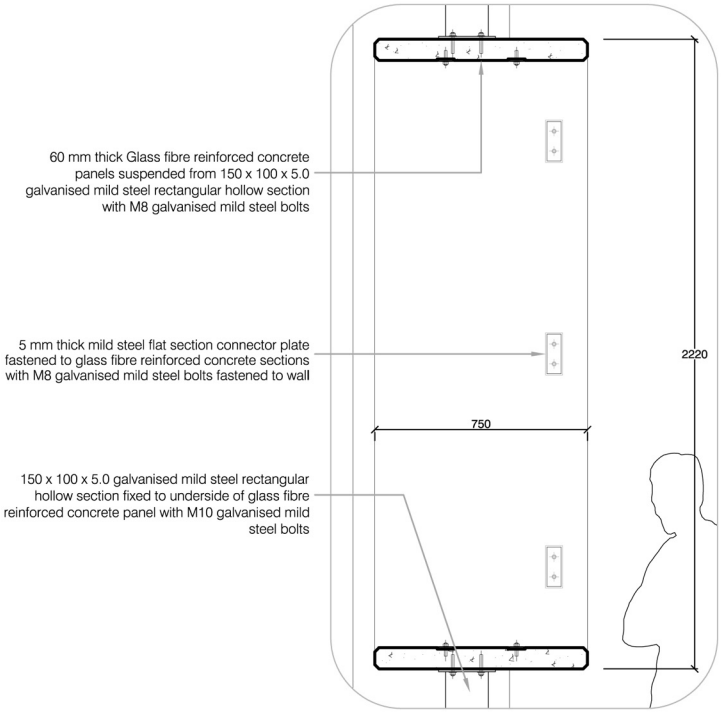

B
C
D
E
F
323 670
Top of roof
322 150
Top of roof slab
319 350 u.f.f.l
Third floor
315 150 u.f.f.l
Second floor
310 950 u.f.f.l
First floor
306 925 u.f.f.l
Ground floor
305 000
Datum



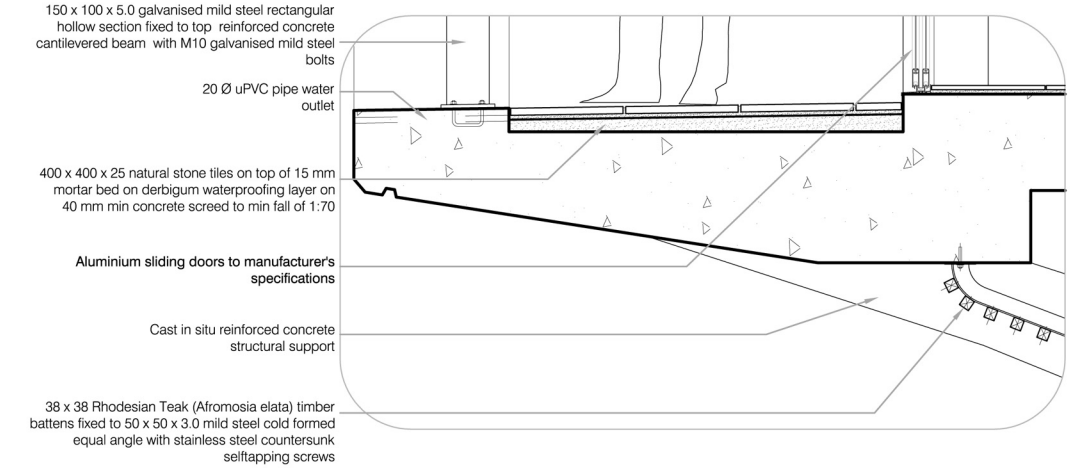
detail a-1



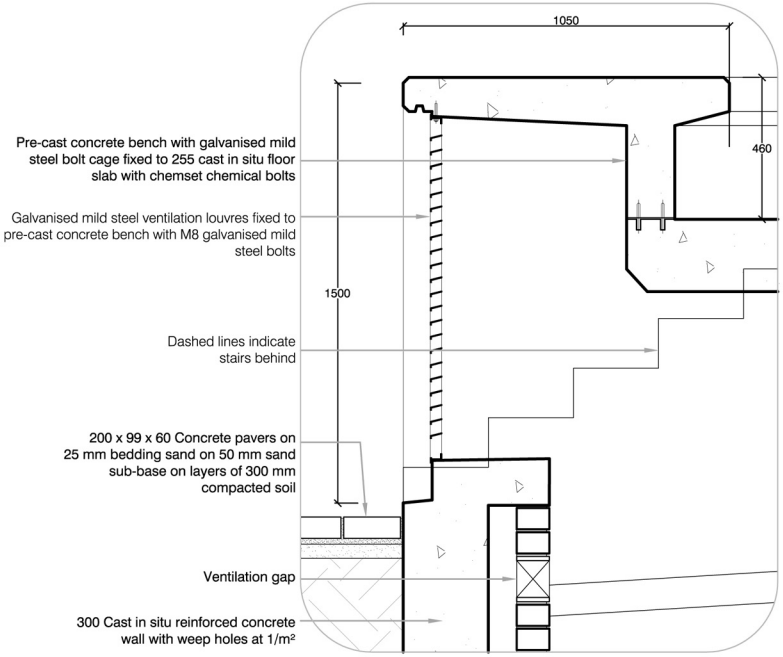
detail a-2



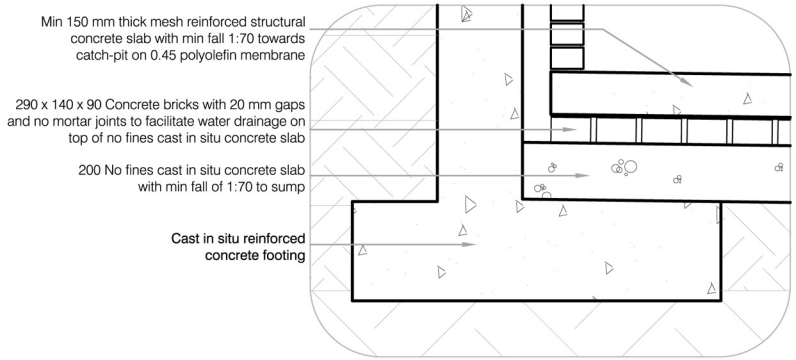
detail a-3



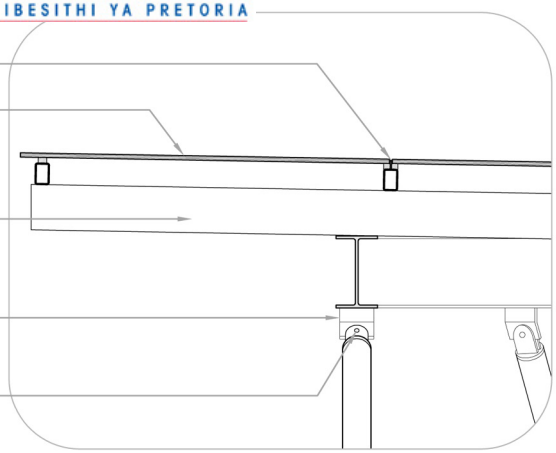
detail a-4



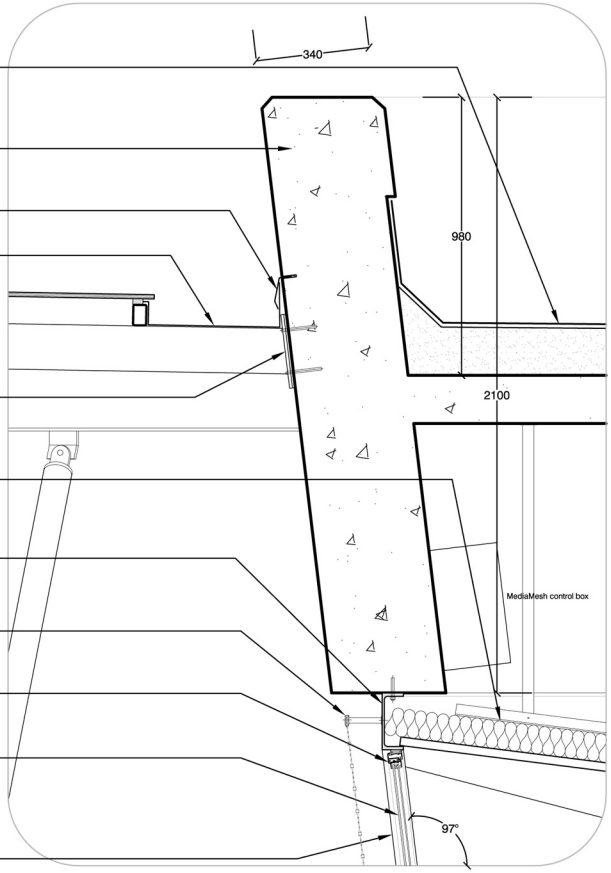
detail a-5



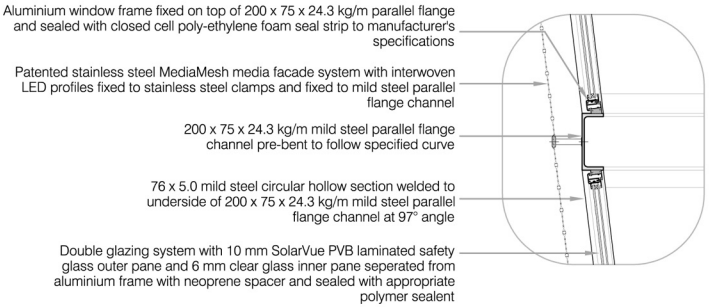
detail a-6



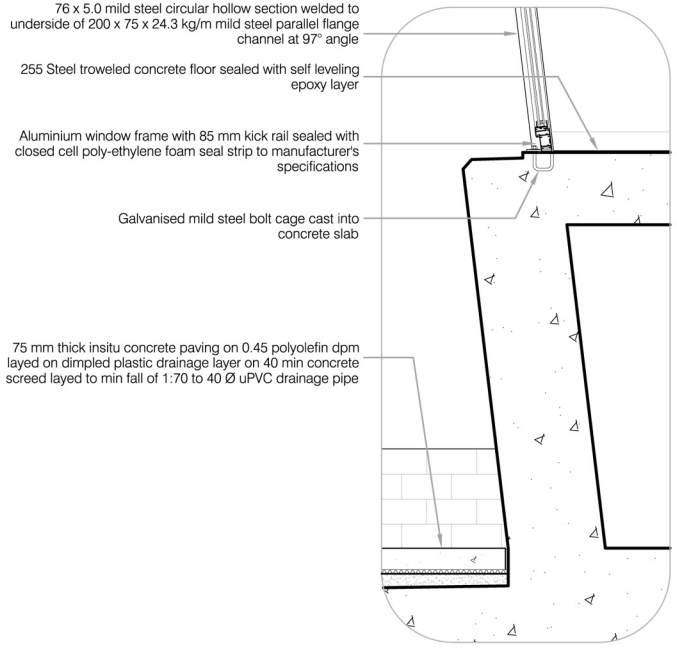
detail c-1(i)



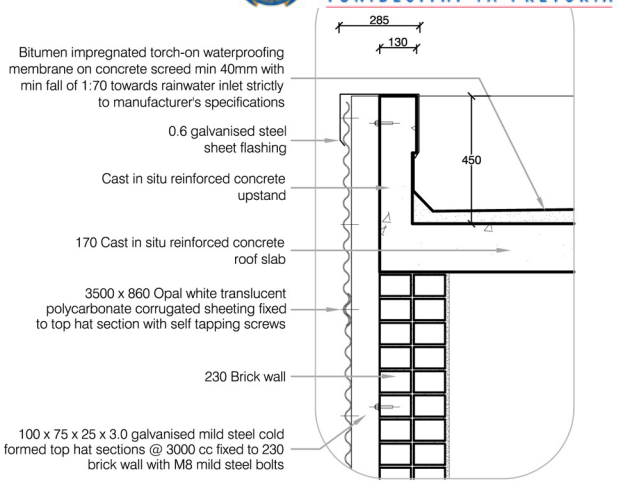
detail c-1(ii)



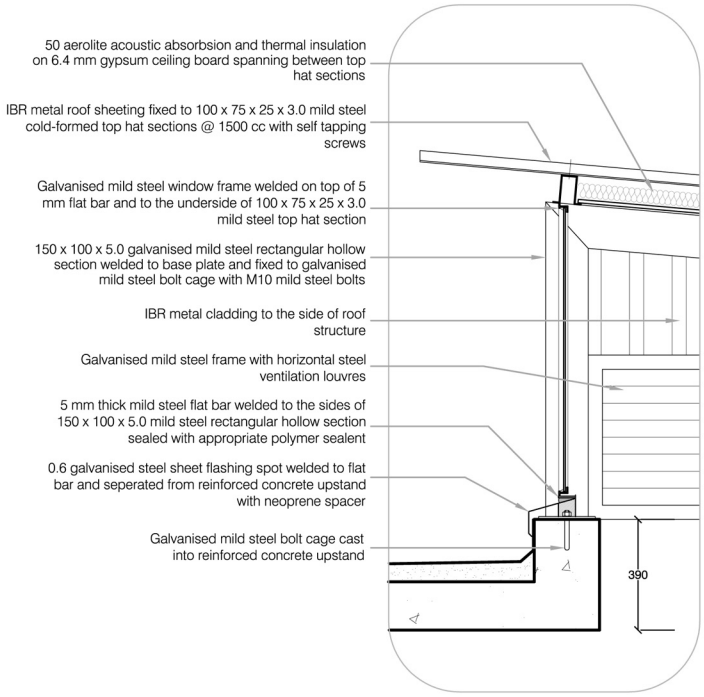
detail c-2



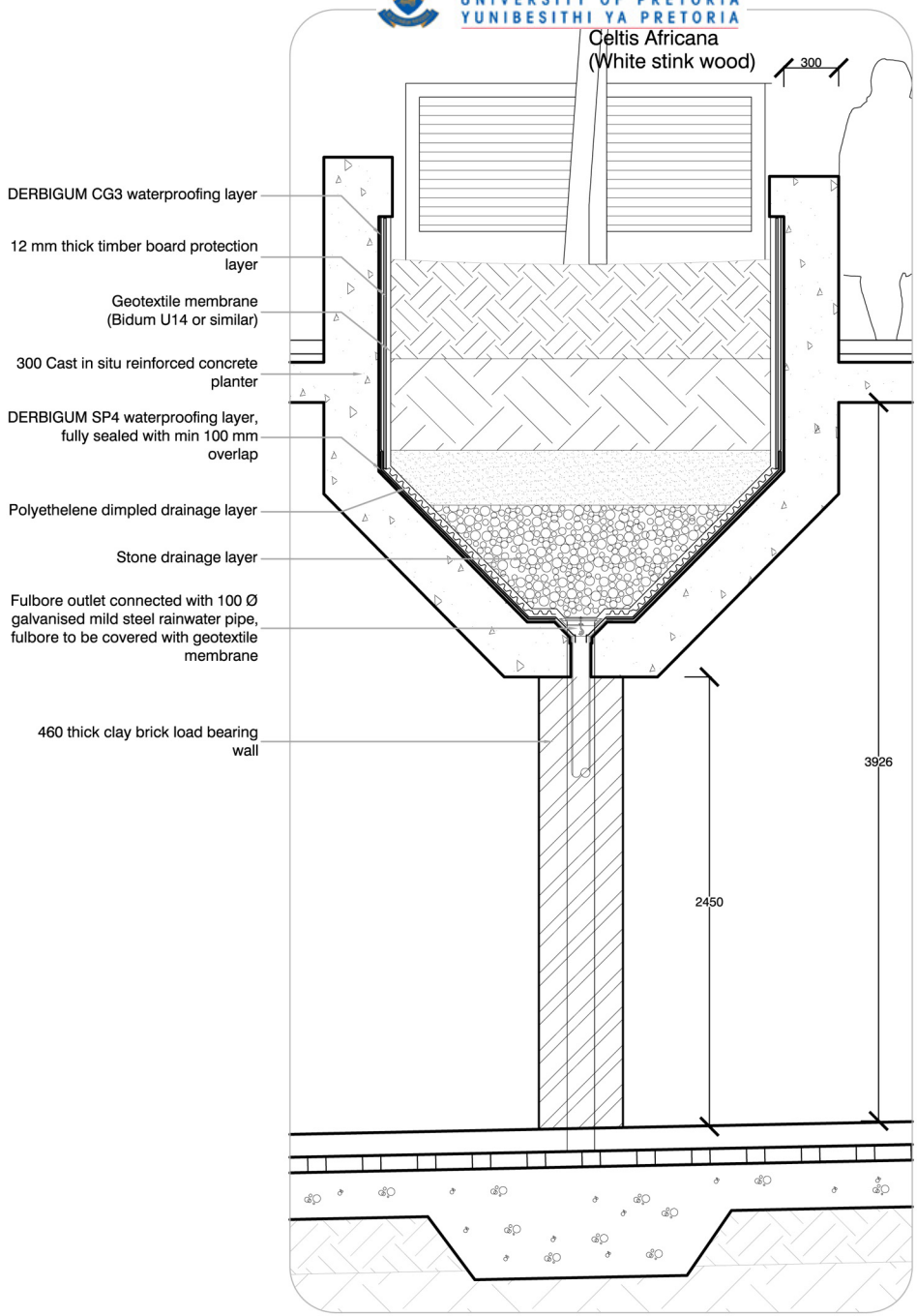
detail c-3



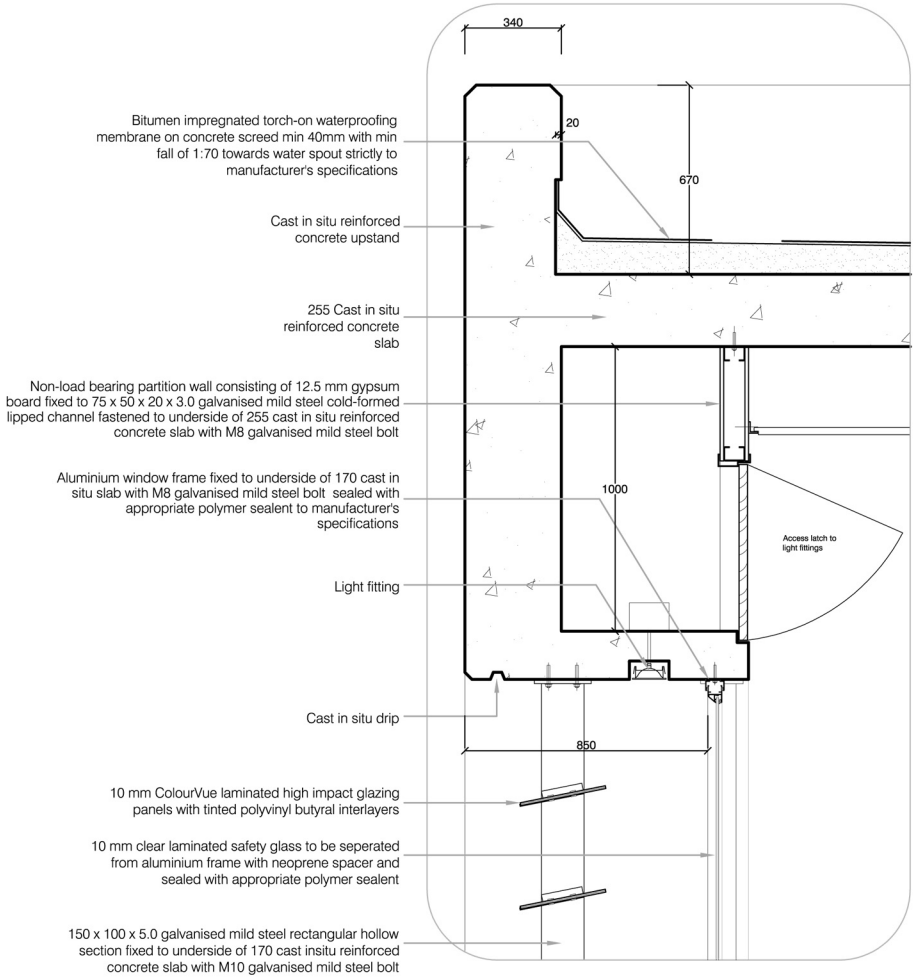
detail c-4(i)



detail c-4(ii)

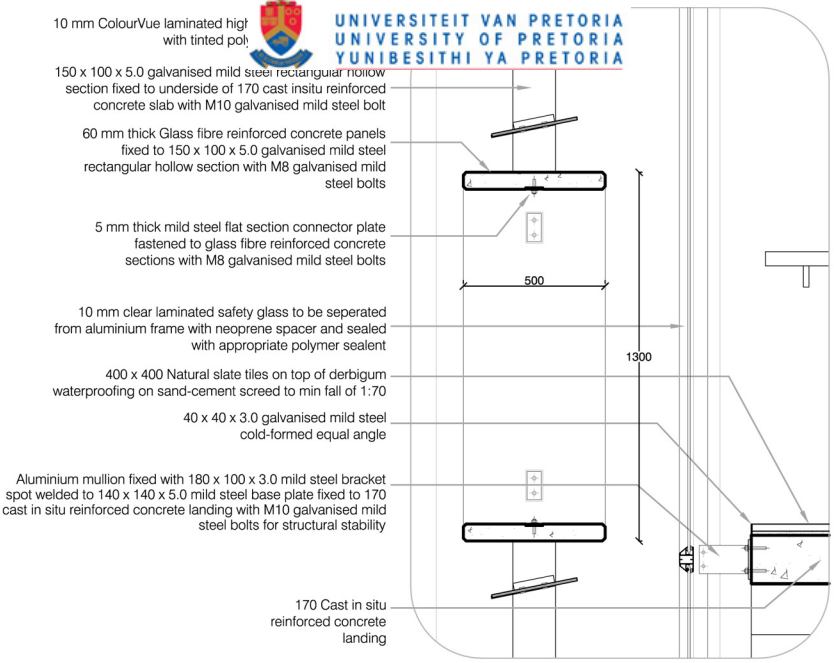

Celtis Africana
(White stink wood)
300
DERBIGUM CG3 waterproofing layer
12 mm thick timber board protection layer
Geotextile membrane (Bidum U14 or similar)
300 Cast in situ reinforced concrete planter
DERBIGUM SP4 waterproofing layer, fully sealed with min 100 mm overlap
Polyethelene dimpled drainage 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
3926
2450

detail c-5

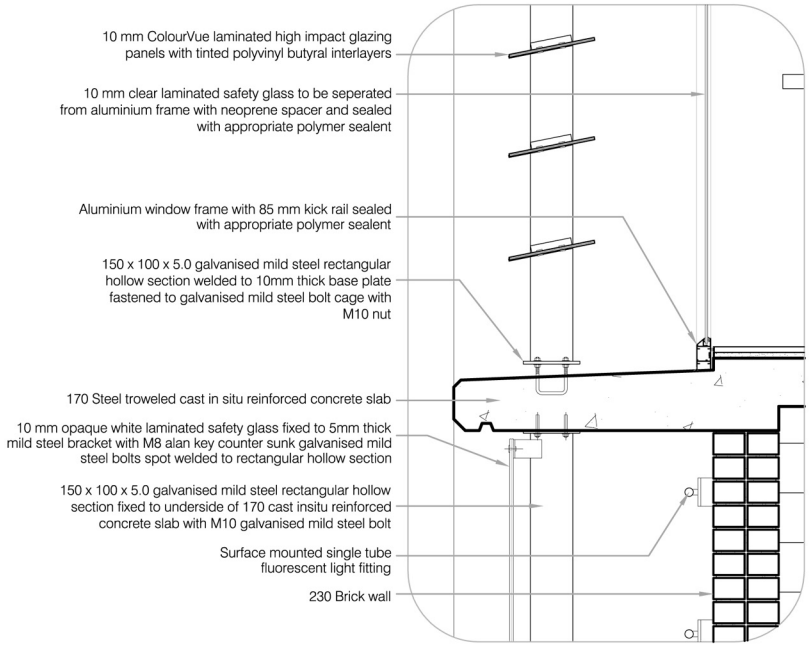

340
20
670
1000
850
Access latch to light fittings
Bitumen impregnated torch-on waterproofing membrane on concrete screed min 40mm with min fall of 1:70 towards water spout strictly to manufacturer's specifications
Cast in situ reinforced concrete upstand
255 Cast in situ reinforced concrete slab
Non-load 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 sealent to manufacturer's specifications
Light fitting
Cast in situ drip
10 mm ColourVue laminated high impact glazing panels with tinted polyvinyl butyral interlayers
10 mm clear laminated safety glass to be seperated from aluminium frame with neoprene spacer and sealed with appropriate polymer sealent
150 x 100 x 5.0 galvanised mild steel rectangular hollow section fixed to underside of 170 cast insitu reinforced concrete slab with M10 galvanised mild steel bolt

detail d-1

detail d-2



detail d-3



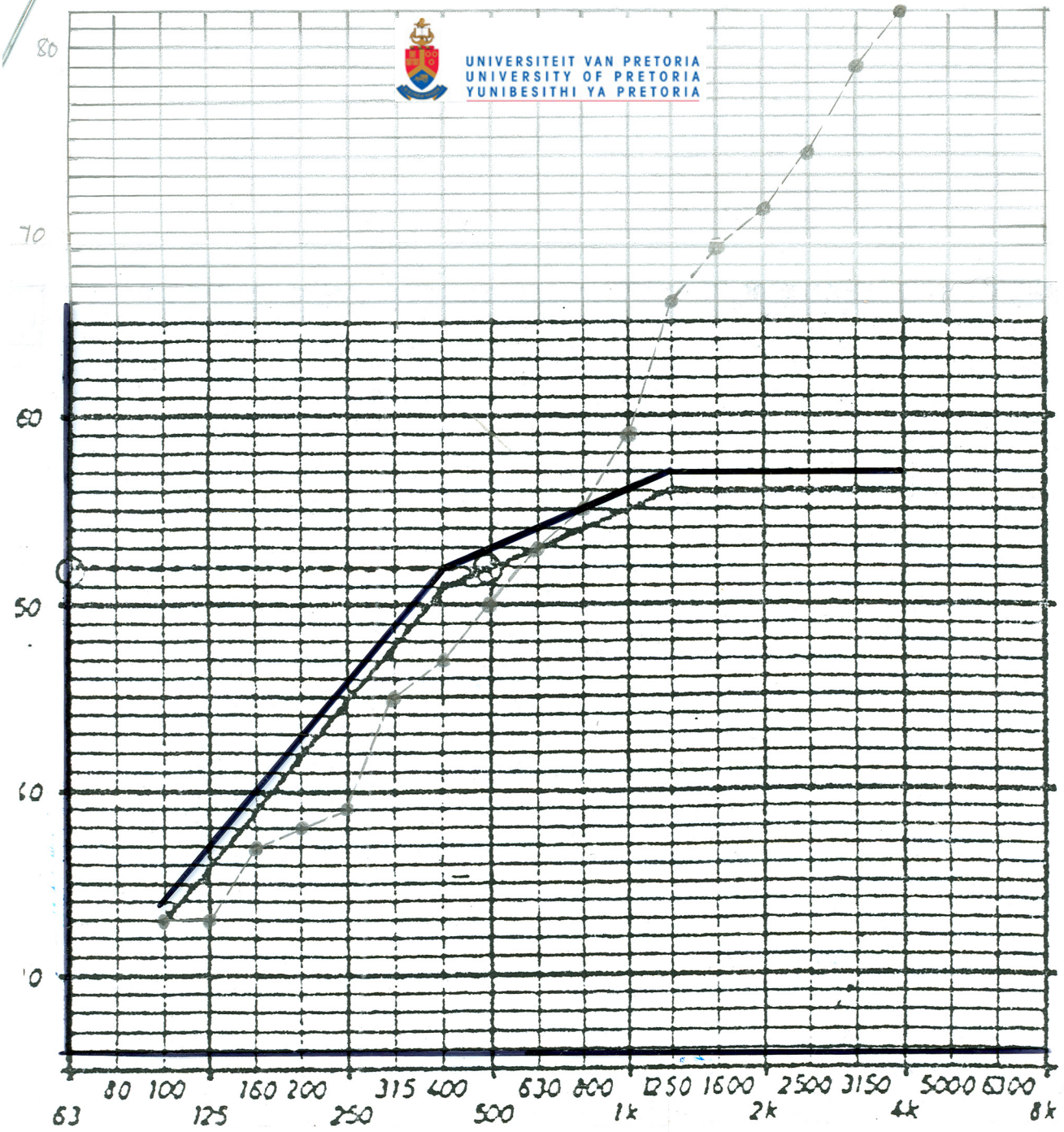
It is of crucial importance for television studios to have the desired sound levels in order to achieve the optimum quality product. Intrusive external noise as well as structure-borne sound transmissions should be kept to a minimum. This can be best achieved by creating a structurally solid structure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

The wall construction of the recording studios consist 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.



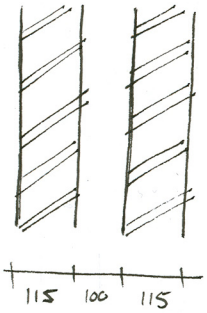
I_a-standaardkromme

Move up 1dB : average deviation = 1,94

I_a = standardised level difference

I_a = 53 dB

M_a = +1



Cavity width	Increase of $\bar{R}$ in dB
100 mm	+ 8 dB

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

	Design Rating level Lr for ambient noise dBA	Max Rating level Lr
Television Studio	25	30

	Rating level Lr for ambient noise dBA
Urban districts	60

I_a = 53 dB

$\therefore$ 60 − 53 = 7dB Intrusive external noise entering the recording studio

Noise generated by lighting and HVAC

$$Lr = 10 \log \left(10^{\frac{7}{10}} + 10^{\frac{x}{10}}\right)$$

x = noise in dB generated by lighting + HVAC.

$Lr = 25$ dB

$$Lx = 10 \log \left(10^{\frac{25}{10}} - 10^{\frac{7}{10}}\right)$$

$= 24,9$ dB

Maximum noise generated by lighting and HVAC is 24,9 dB.

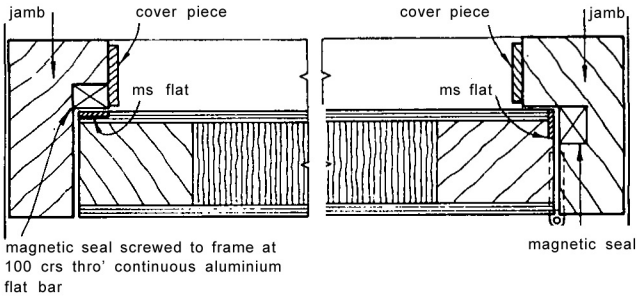


Fig. 7.18 Typical plan and section through an acoustic door