# SITE

## HISTORY & BACKGROUND

The site appears unique on Crowndale Road, due to its Victorian facade juxtaposed to the bordering 1950's council estates. The original building was erected as part of a row of terrace houses supporting the local railway infrastructure.  in 1870 and in 1910 the church of England purchased the site re designed facade to what we see today.

In 1950 the council reclaimed the land leased to the railway to construct council housing neighbouring the church. As the church was privately owned (now expanding its land to the north for the church hall) the council chose not to purchase it as it was deemed an asset to the local community.


Fig. 03 - 1870

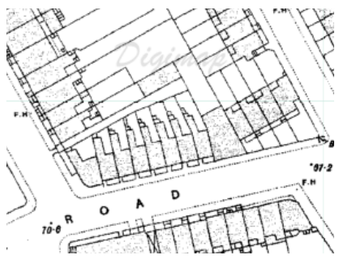



Fig. 04 - 1910

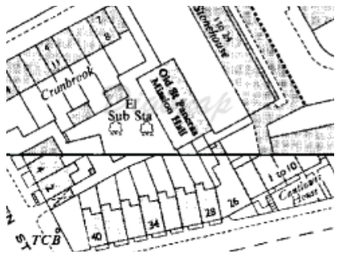
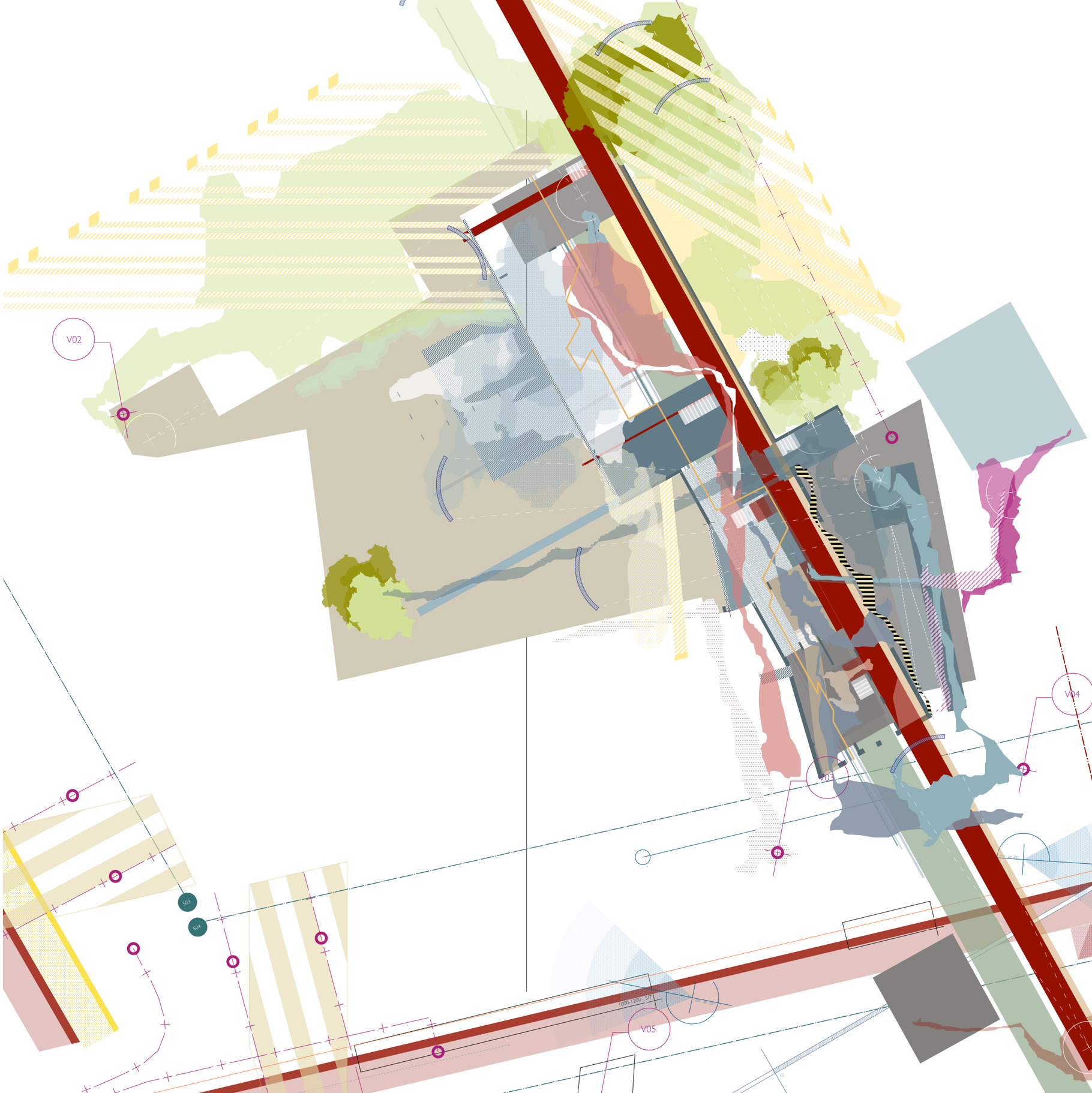



Fig. 05 - 1940

View from the junction of Chalton Street and Crowndale Road -  aligning the datum through the site

View from the neighbouring council housing on south side of Crowndale Road

Aerial view of the site showing the proposed datum to connect Chalton Street to the theatre and beyond.

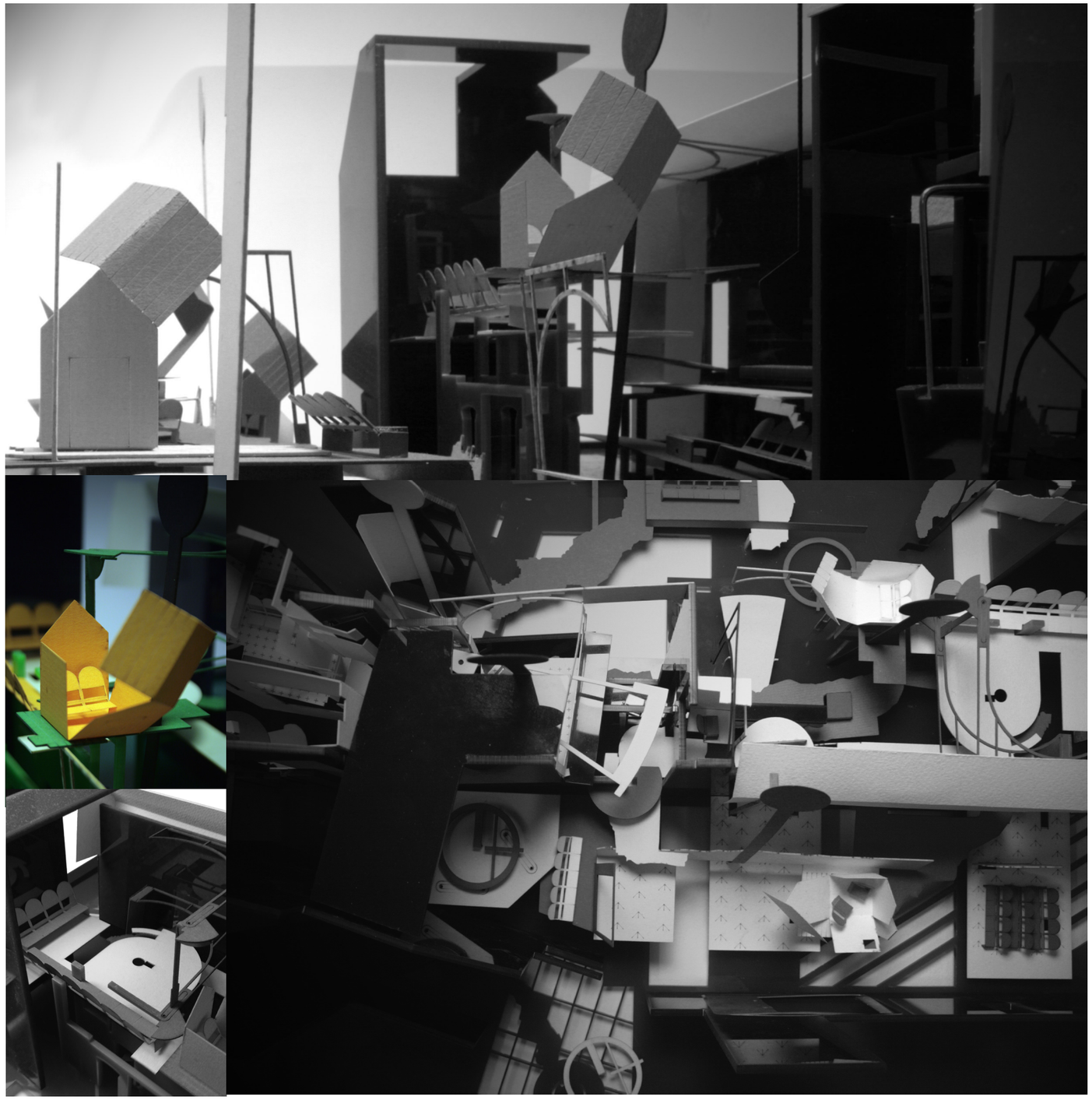



1.30

# SITE

## EARLY SCHEMATIC STRATEGY

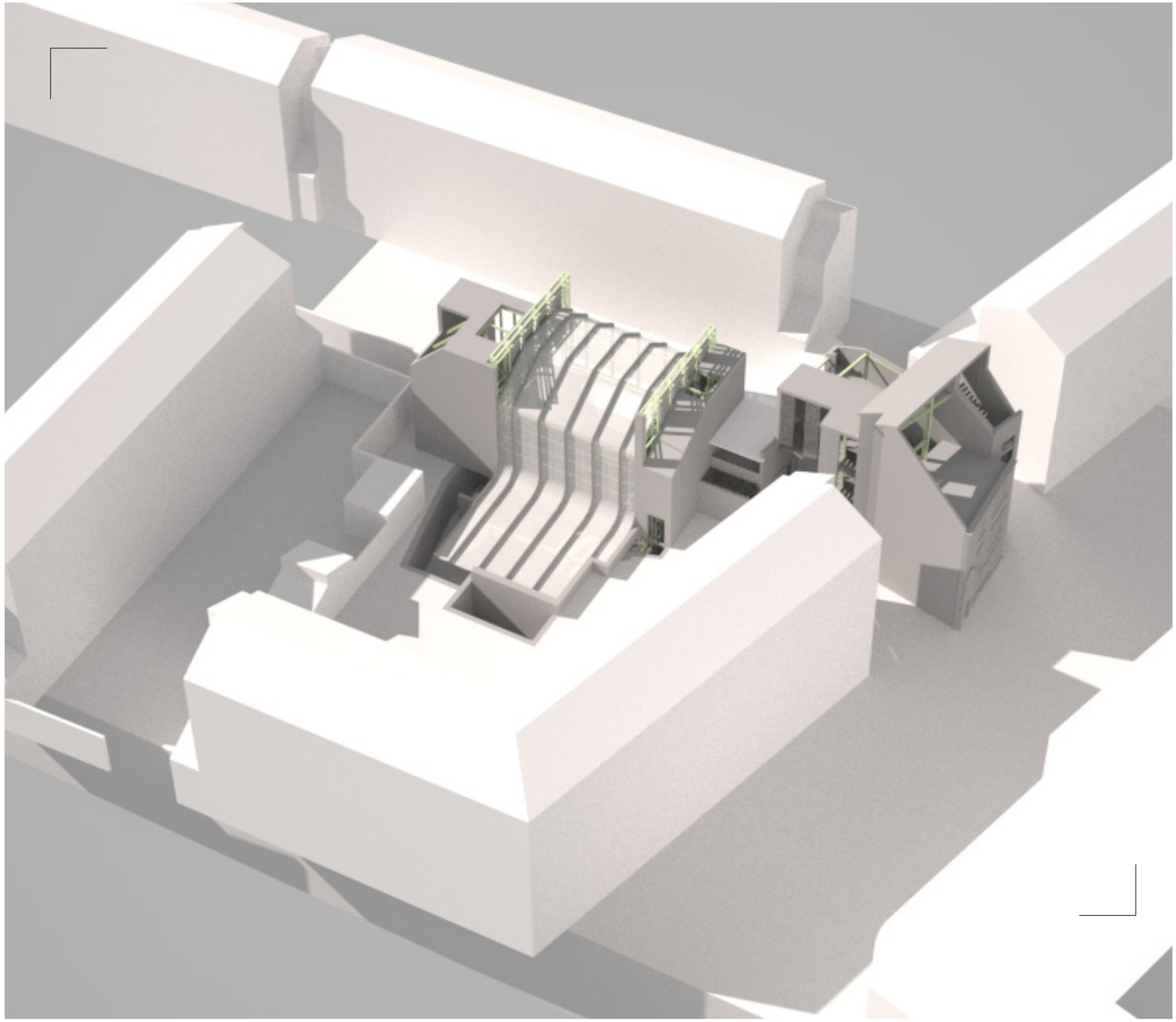
This drawing shows the fluctuations of varying groups of people visiting the site and how it opens up to accept them.



## MODEL 01

SKETCH OF SCHEME

The model show how the western side of the theatre will be open to playground creating a relationship between outside audience and inside.

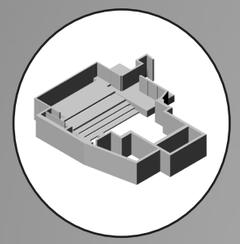


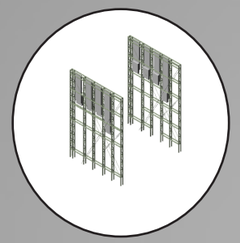
SKETCH
RENDER
IMAGE: AERIAL

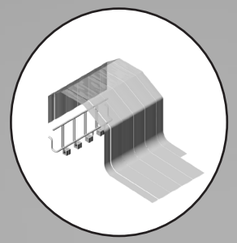
NOT TO SCALE

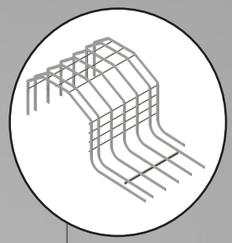
## ELEMENTS OF INVESTIGATION

AREAS OF THE THEATRE
WHICH WILL BE
INVESTIGATED









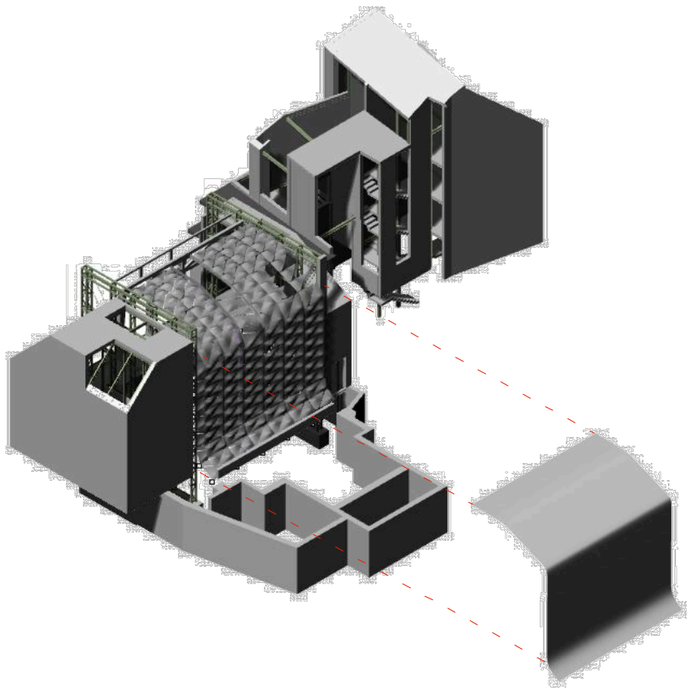
## RENDER
## IMAGE: REAR OF STRUCTURE

EXPOSED VIEW OF
STRUCTURE
FROM GARDENS

## 2.22

# ACOUSTICS SKIN

## ALTERING THE SIZE OF ETFE PANEL TO ADJUST THE ACOUSTIC SCAPE



### EARLY ACOUSTIC INVESTIGATIONS USING ETFE AS AN ACOUSTIC SKIN

THE ACOUSTIC MEMBRANE CAN BE VARIED BY THE AMOUNT OF AIR WHICH INFLATES IT, BY DOING THIS ALTERS THE ACOUSTIC PROPERTIES.

**THE MORE AIR UNDER GREATER PRESSURE IS MORE DENSE THE ETFE PANEL - THEREFORE THE MORE SOUND ABSORBING IT IS.**

THIS MEANS IF WHEN HAVE RESTRICTIONS ON THE SIZE THE PANELS WHICH CAN BE MADE THE PROVIDES US WITH PERIMETERS WHICH TO ALTER THE SOUND ABSORBING NATURE OF THE PANELS.

### EFTE RESTRICTIONS

THE MAXIMUM WIDTH OF AN ETFE PANEL CAN BE 2M -

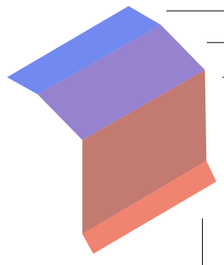
### VARYING THE PRESSURE - SURFACE AREA

BY VARYING THE SIZE EFFECTS THE PRESSURE RATIOS IN THE CUSHIONS WHICH EFFECTS THE SOUND DIFFUSION. Eg. A PANEL FILLED WITH LESS AIR WILL BE HAVE A GREATER SURFACE AREA AS THERE WILL BE FOLD IN THE ETFE (EVEN SLIGHT) THIS MEANS THERE WILL BE GREATER SOUND DIFFUSION.

## R1 [L2]
## ACOUSTIC SCAPE

### 4 SECTIONS - VARYING THICKNESS

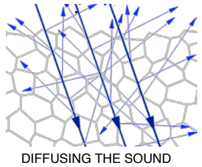
THE THICKNESS IS ALTERED AT EACH LEVEL IN ORDER TO EITHER ABSORB MORE SOUND OR VARY LIGHT LEVEL



P5 - THE NEED OF THE SOUND DIFFUSION HERE IS NOT NEEDED THEREFORE CAN REMAIN OPEN

P4 - VARYING SIZE HOWEVER THINNER ALLOWING A LESS DISTURBED VISTA OF SKY

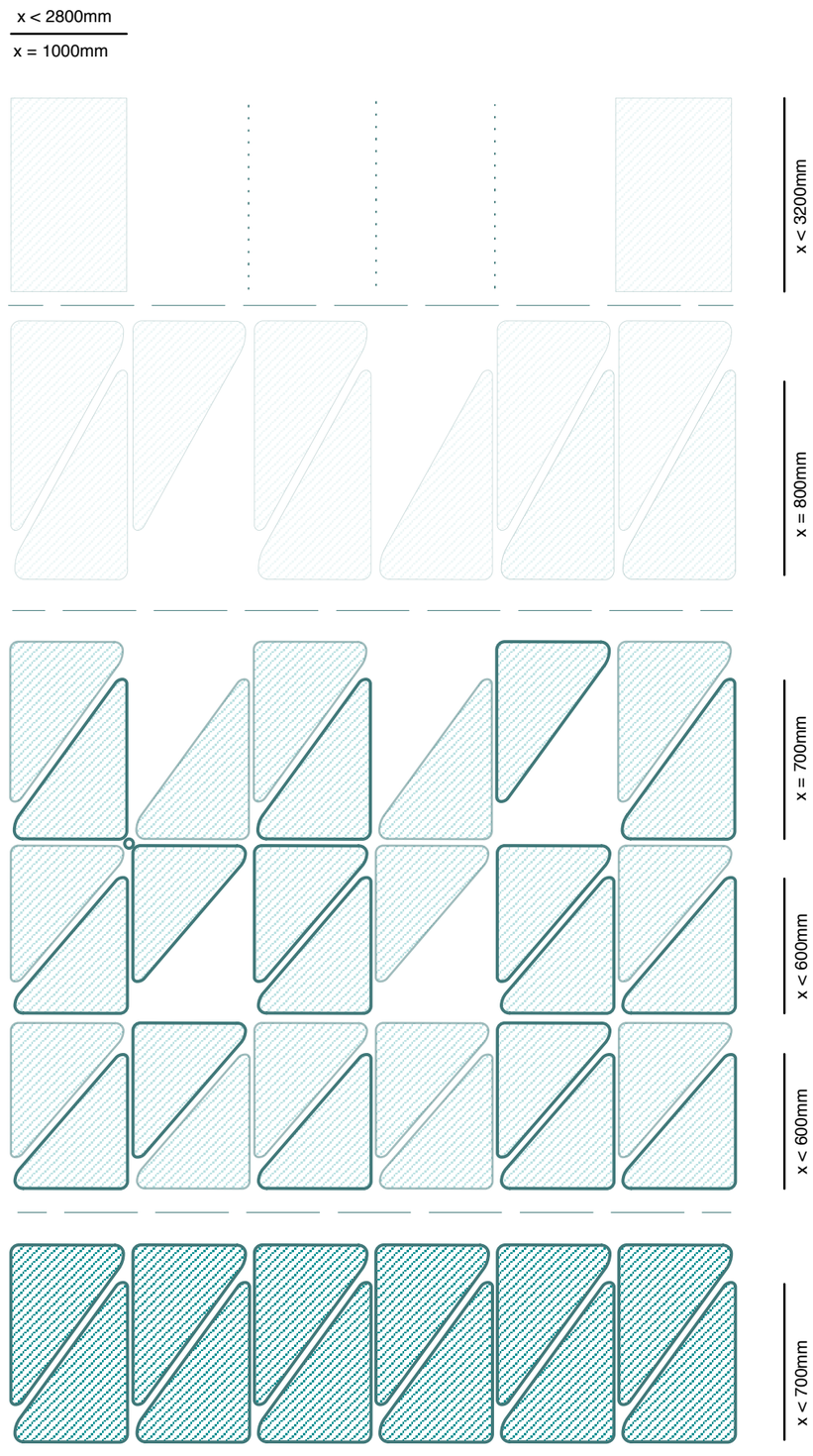
P3 - VARYING THE SIZE TO INCREASE DIFFUSION OF SOUND IN THE AUDITORIUM



DIFFUSING THE SOUND

P2 -AS THESE ARE REFLECTING THE SOUND FROM THE PERFORMANCE THEY ARE LARGER CONSTANT PANELS

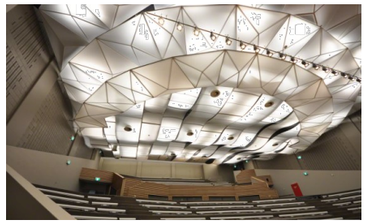
SKETCH LAYOUT OF ETFE ACOUSTIC PANELS

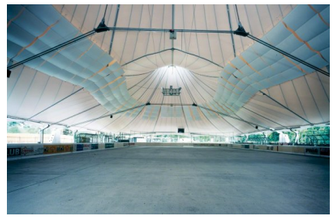


# L2 [P1/4]
## ACOUSTIC SCAPE

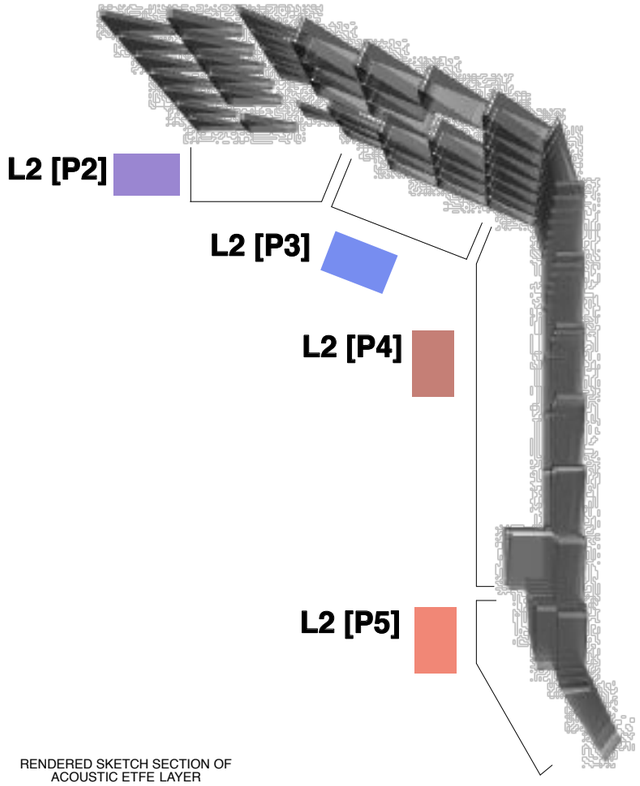
EARLY INVESTIGATION - VARYING THICKNESS FOR ACOUSTIC PERFORMANCE

THE THICKNESS IS ALTERED AT EACH LEVEL IN ORDER TO EITHER ABSORB MORE SOUND OR VARY LIGHT LEVEL

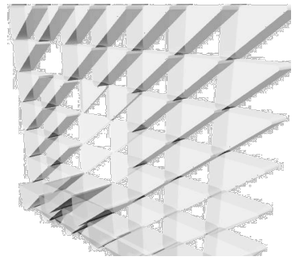




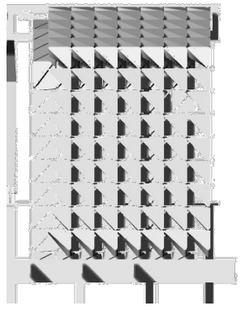
EXAMPLES OF USING ETFE AS AN ACOUSTIC SKIN TO DIFFUSE SOUND IN A SPACE




RENDERED SKETCH SECTION OF ACOUSTIC ETFE LAYER

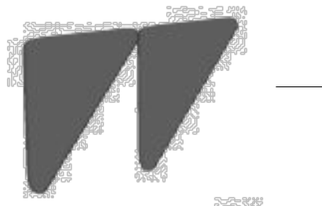


LIGHTING QUALITY OF THE ETFE PANELS



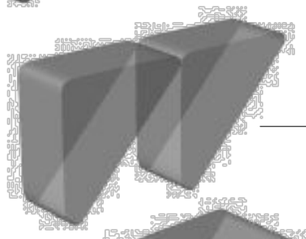
SKETCH ELEVATION OF ACOUSTIC LAYER

# PANEL SIZE
## ACOUSTIC PROPERTIES



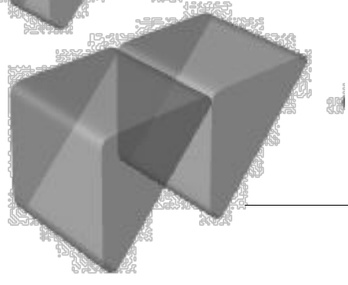
**A)** LARGEST PANEL - THINNER DEPTH THEREFORE LESS AIR PRESSURE - LESS DENSE - LESS SOUND ABSORBENT, LESS SOUND REFLECTIVE HOWEVER APPEARS TO LET MORE TRANSPARENT

D- 150mm
W-1200mm
H - 800mm



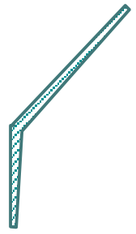
**B)** MEDIUM PANEL - GREATER DEPTH THEREFORE MORE SOUND ABSORBENT AND WILL REFLECT MORE SOUND

D- 250mm
W- 1200mm
H - 700mm



**C)** THICKEST PANEL - GREATER AIR PRESSURE THEREFORE GREATER ABSORBANCY AND THE SMOOTHER THE SURFACE SO MORE SOUND REFLECTIVE THEREFORE GOOD FOR DIFFUSING SOUND TO THE AUDIENCE

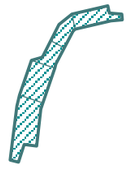
D- 400mm
W-1200mm
H - 600mm



## P1 [L2]
FIXED SECTION

MAIN ACOUSTIC ABSORBANCY SECTION TO THE REAR OF THE THEATRE

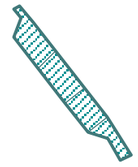
AS THE REAR WALL OF THE THEATRE WILL BE IN INTERACTION WITH THE SOUND IT IS IMPORTANT FOR THIS WALL TO ABSORB LARGE PROPORTION OF THE SOUND. IT WILL BE CONSTRUCTED OF PLY ACOUSTIC PANELS - THESE WILL BE BACKED WITH SOUND INSULATION. THE PLYWOOD WILL BE DRILLED WITH HOLES AT SELECT POINTS TO ABSORB SOUND.



## P2 [L2]
ETFE REFLECTION

FOCUS THE SOUND TOWARDS THE SPACE IN THE ACOUSTIC TRAP TO REDUCE THE ECHO

THE INEVITABLE ECHO IS PREVENTABLE BY TRAPPING THE SOUND, FORCING IT TO DIFFUSE. DIRECTING IT TOWARDS THE SPACE IN THE LAYERS ACTS AS AN ACOUSTIC TRAP.



## P3 [L2]
ETFE ABSORPTION

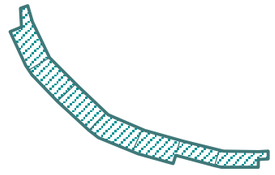
INCREASED THICKNESS TO ABSORB SOUND

THE THICKNESS PROVIDES GREATER ABSORPTION TO REDUCE THE ECHO

## P4 [L2]
ETFE TRANSPARENT

THINNER TO PROVIDE CLEARER VIEW

THE THINNER PANELS ALLOW A CLEARER VIEW TO THE OUTSIDE



## P5 [L2]
ETFE REFLECTION

REFLECT EARLY SOUND TO REAR OF THEATRE

AS CHILDREN ARE PERFORMING IT IS IMPORTANT TO INCREASE DISTRIBUTE AND ENHANCE EARLY SOUND TOWARD THE REAR OF THE THEATRE

## P6 [L2]
STAGE SECTION

SOLID FORM OVER PLAYGROUND

THE PLAYGROUND ABOVE WILL CREATE A LOT OF SOUND NOISE THEREFORE THIS SECTION WILL BE HEAVILY INSULATED

## L2 [P1]

FIXED ABSORBING PANELS TO REAR OF SECTION

THE REAR OF THE THEATRE WILL BE HIT BY THE MAJORITY OF THE SOUNDWAVES PROJECTED FORWARD THEREFORE CLADDING IN ACOUSTICALLY ABSORBENT PANELS ATTACHED TO THE STEEL WORK WILL MINIMIZE DISTURBING REFLECTIVE WAVES

## L2 [P2]

FOCUS THE SOUND TOWARDS THE SPACE IN THE ACOUSTIC TRAP TO REDUCE THE ECHO

THE INEVITABLE ECHO IS PREVENTABLE BY TRAPPING THE SOUND, FORCING IT TO DIFFUSE. DIRECTING IT TOWARDS THE SPACE IN THE LAYERS ACTS AS AN ACOUSTIC TRAP.

## L2 [P3]
ACOUSTIC SCAPE

INCREASED THICKNESS TO ABSORB SOUND

THE THICKNESS PROVIDES GREATER ABSORPTION TO REDUCE THE ECHO

## L2 [P4]
ACOUSTIC SCAPE

THINNER TO PROVIDE CLEARER VIEW

THE THINNER PANELS ALLOW A CLEARER VIEW TO THE OUTSIDE

## L2 [P5]

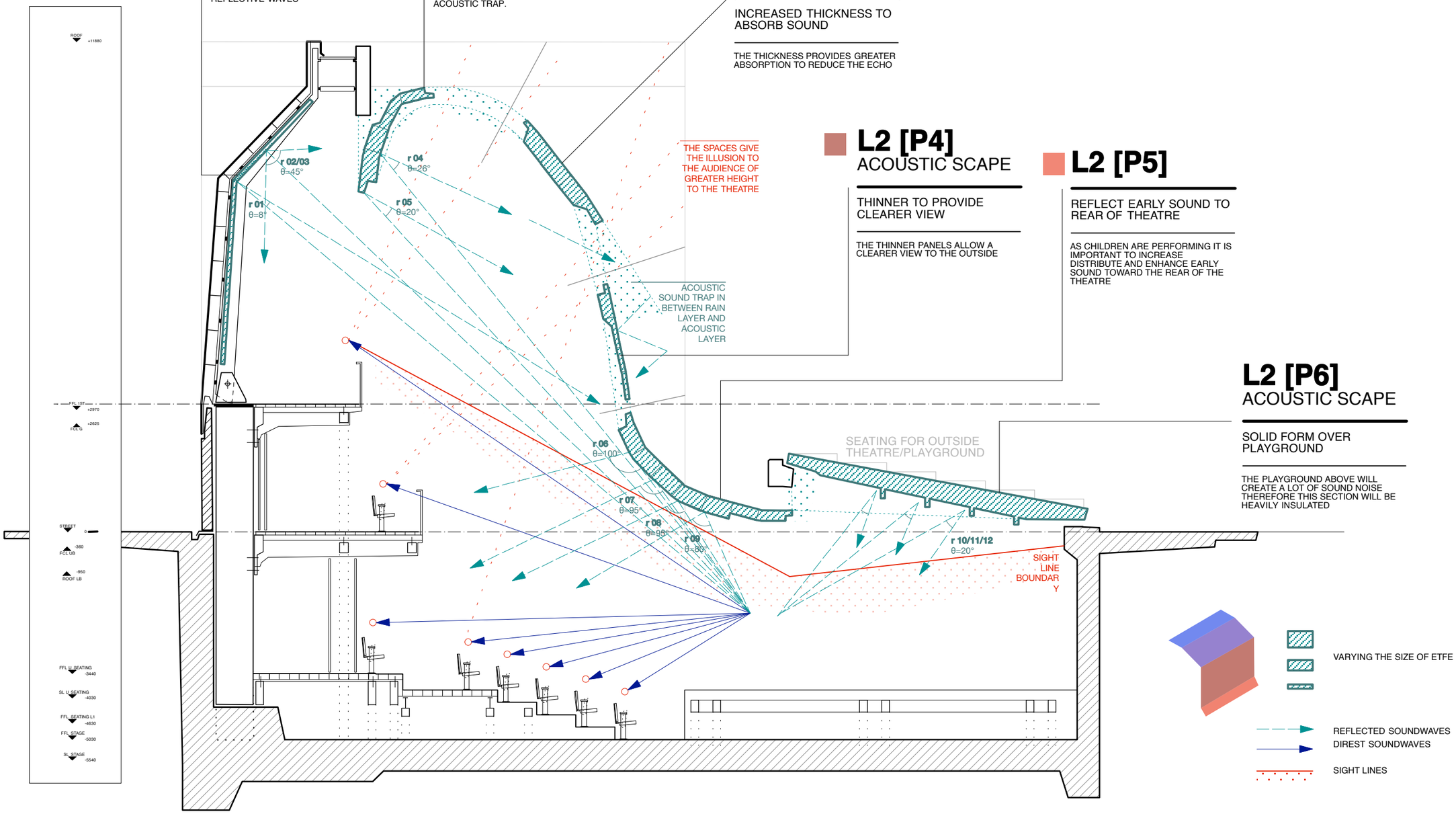
REFLECT EARLY SOUND TO REAR OF THEATRE

AS CHILDREN ARE PERFORMING IT IS IMPORTANT TO INCREASE DISTRIBUTE AND ENHANCE EARLY SOUND TOWARD THE REAR OF THE THEATRE

## L2 [P6]
ACOUSTIC SCAPE

SOLID FORM OVER PLAYGROUND

THE PLAYGROUND ABOVE WILL CREATE A LOT OF SOUND NOISE THEREFORE THIS SECTION WILL BE HEAVILY INSULATED




VARYING THE SIZE OF ETFE

REFLECTED SOUNDWAVES
DIREST SOUNDWAVES

SIGHT LINES

## RATIONALIZING THE FORM OF ETFE

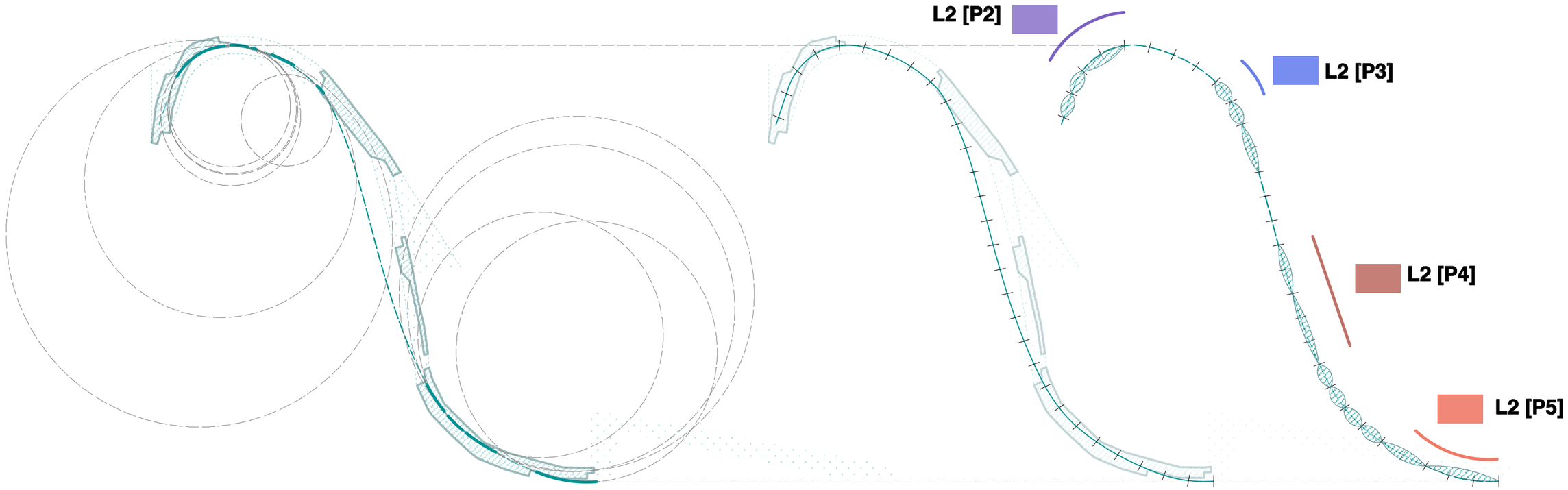
THE STRUCTURE WHICH SUPPORTS THE ETFE NEEDS TO BE CREATE A FORM WHICH CAN BE POSITIONED WITH THE ETFE OUTER RAIN LAYER

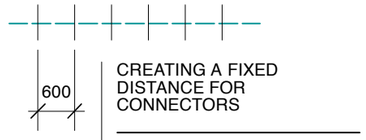
## DIVIDING THE CURVE TO PANELS

THE SPLITTING A 600MM GRID ALLOWS FOR THE DIFFERENT SIZED PANELS TO BE INSERTED INTO THE GRID TO CREATE DIFFERENT SOUND QUALITIES.

## APPLYING ETFE TO THE GRID AND CURVE

USING THREE DIFFERENT FIXED SIZES TO CREATE THE DESIRED ACOUSTIC PATTERN

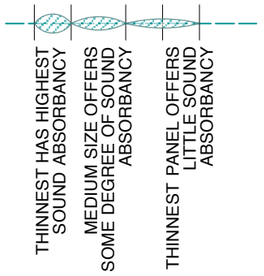



CREATING A FIXED DISTANCE FOR CONNECTORS

BY CREATING A GRID SYSTEM IT MAKES IT EASIER TO ALTER THE LAYOUT WHEN DIFFERENT SOUND QUALITY IS NEEDED

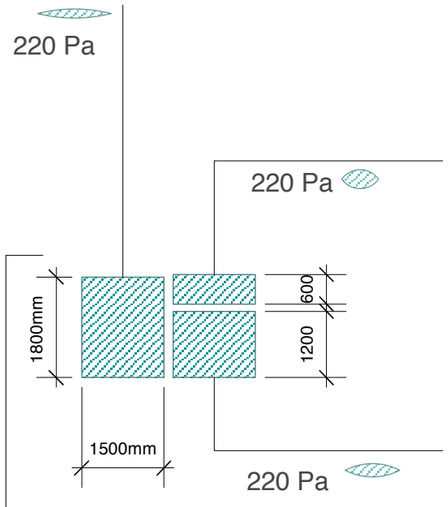
**PANEL SIZE**
ACOUSTIC PROPERTIES



# VOLUME

ETFE VOLUME IS CONSTANT HOWEVER CHANGING THE SIZE EFFECTS THE SOUND ABSORBANCY

In the case of ETFE cushions, they are kept continually pressurized by a small inflation unit which maintains the pressure at approximate. 220 Pa and gives the foil a structural stability and the roof some insulation properties.

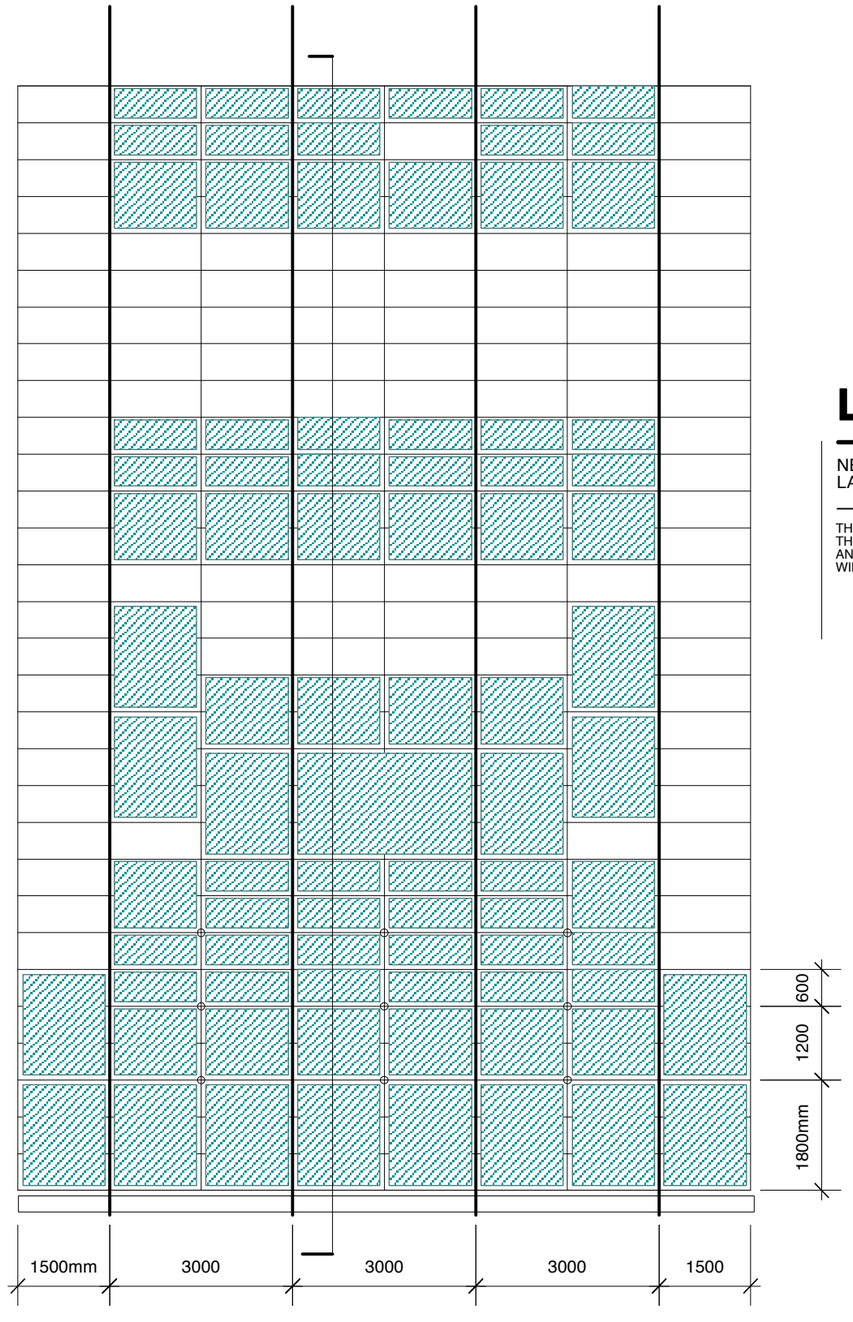



**L2 [P2]**

**L2 [P3]**

**L2 [P4]**

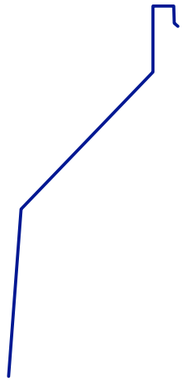
**L2 [P5]**




# L2

NET OF THE ACOUSTIC LAYER SCALE 1:100 @ A3

THE NET OF THE ACOUSTIC SHOWS THE DISTRIBUTION OF THE PANELS AND HOW THE STRUCTURE BEHIND WILL OPERATE



## L1 [P1]

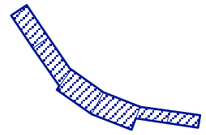
FIXED ZINC STANDING SEAM CLADDING TO REAR

THE ZINC CLADDING WILL BE MOUNTED ON A DOUBLE LAYER OF PLYWOOD AND THEN FIXED BACK TO STEEL CONNECTIONS.

## L1 [P2]

THICKER ETFE - MINIMIZING ECHO REVERBERATION FROM RAINFALL

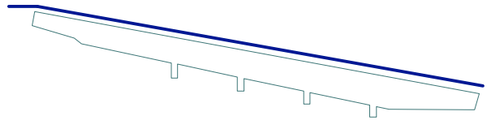
THE RAINFALL IS A MAJOR FACTOR THEREFOR IF A LARGER THICKENED OF ETFE CAN BE PLACED IN THIS SECTION THEN LESS SOUND WILL BE TRANSMITTED TO THE INSIDE



## L1 [P3]

GUTTER POSITION TO COLLECT RUN OFF RAIN WATER

THE LARGE AMOUNT OF RAIN WATER WHICH IS COLLECTED OFF THE ROOF NEEDS TO BE COLLECTED IN A LARGE GUTTER SYSTEM.



## L1 [P4]

RUN OFF FROM CONCRETE PLAYGROUND

DESIGNING THE INDIVIDUAL STEPS TO FALL WILL IMPROVE THE DRAINAGE FROM THE PLAYGROUND ROOF

# THERMAL/RAIN LAYER

## EXPLORING HOW THE RAIN SCREEN CAN BE OFFSET FROM THE ACOUSTIC SKIN TO REDUCE EXTERNAL NOISE

THE SECTION SHOWS THE DIFFERING SIZES OF THE ETFE WHICH WILL BE APPLIED TO THE LAYER

## L1 [P1]

FIXED ZINC STANDING SEAM CLADDING TO REAR

THE ZINC CLADDING WILL BE MOUNTED ON A DOUBLE LAYER OF PLYWOOD AND THEN FIXED BACK TO STEEL CONNECTIONS.

## L1 [P2]

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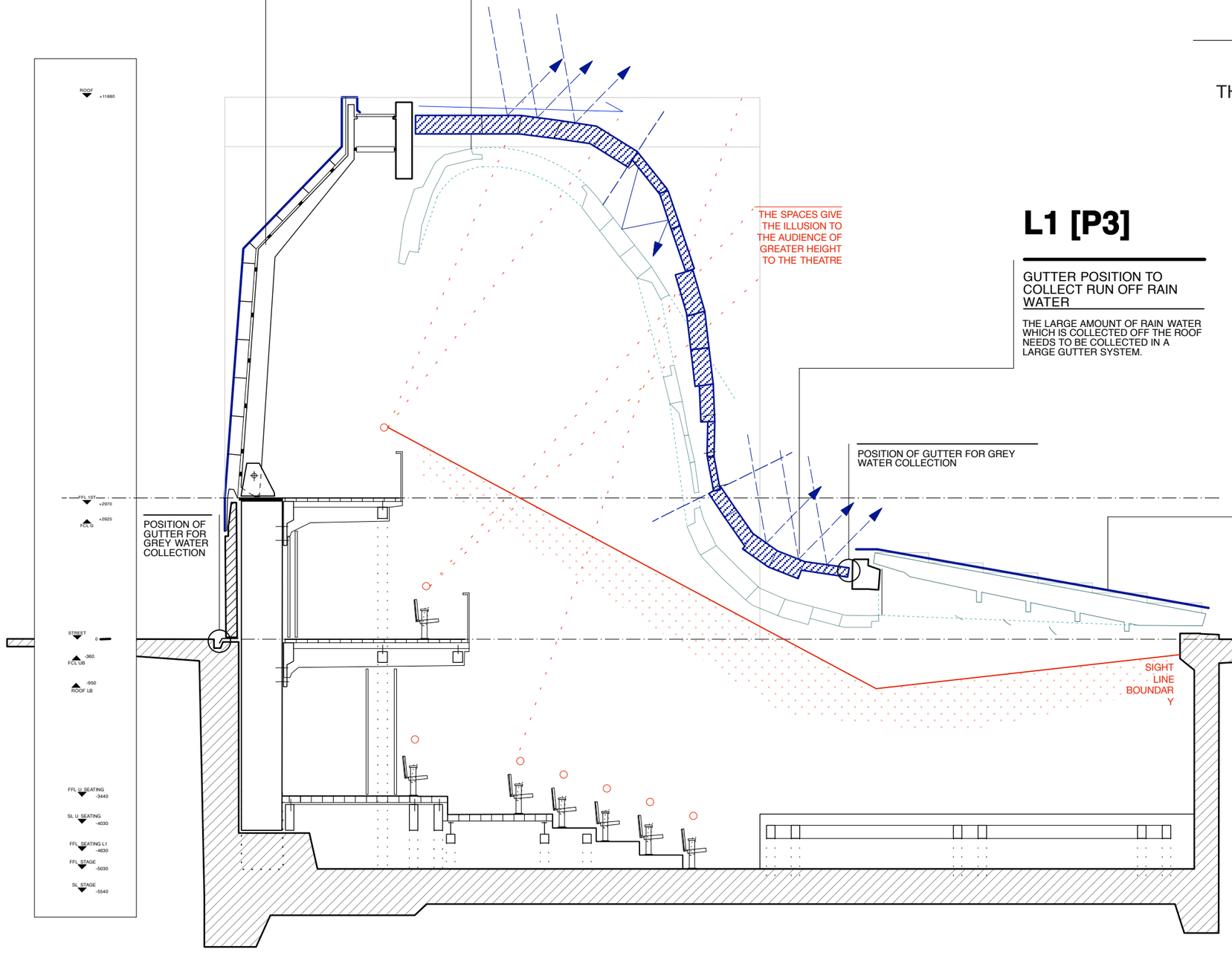


## L1 [P3]

GUTTER POSITION TO COLLECT RUN OFF RAIN WATER

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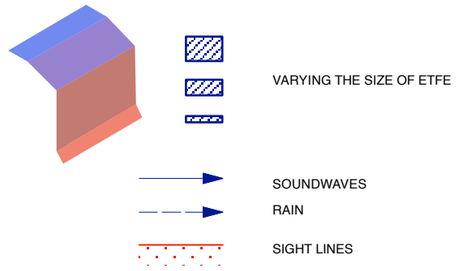
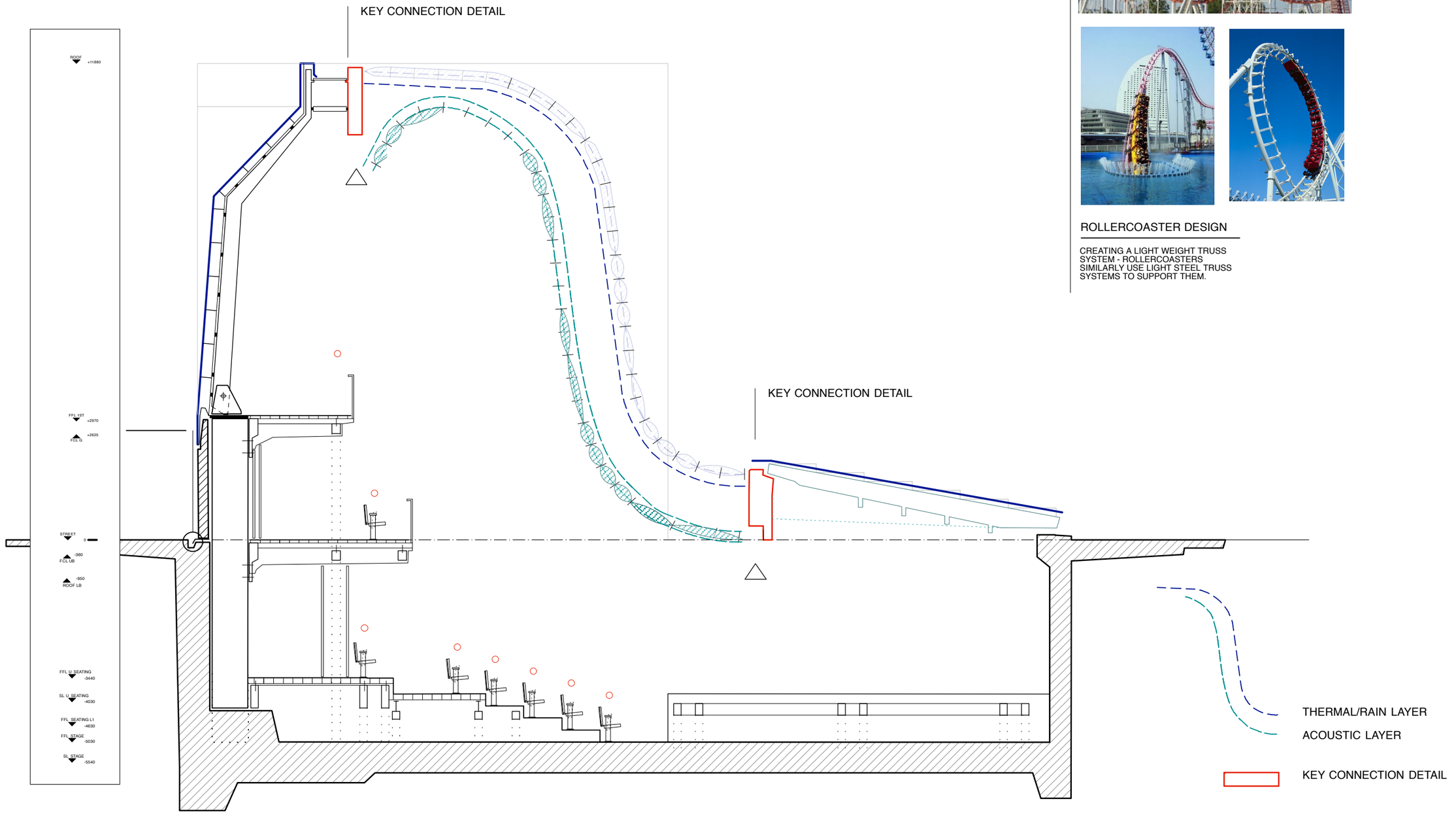
RUN OFF FROM CONCRETE PLAYGROUND

DESIGNING THE INDIVIDUAL STEPS TO FALL WILL IMPROVE THE DRAINAGE FROM THE PLAYGROUND ROOF



## 2.50

# DESIGNING THE STRUCTURAL SYSTEM







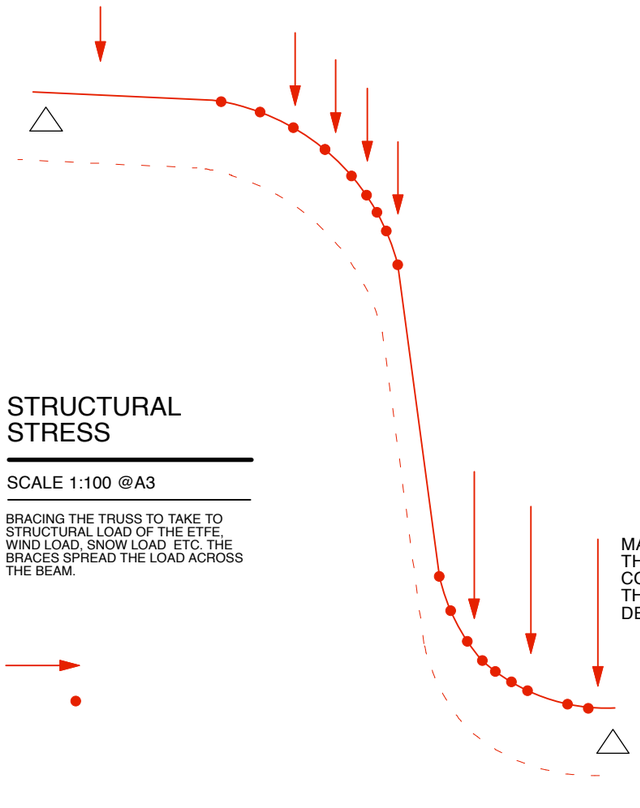

ROLLERCOASTER DESIGN

CREATING A LIGHT WEIGHT TRUSS SYSTEM - ROLLERCOASTERS SIMILARLY USE LIGHT STEEL TRUSS SYSTEMS TO SUPPORT THEM.

## STRUCTURAL STRESS

SCALE 1:100 @A3

BRACING THE TRUSS TO TAKE TO STRUCTURAL LOAD OF THE ETFE, WIND LOAD, SNOW LOAD ETC. THE BRACES SPREAD THE LOAD ACROSS THE BEAM.



MAJOR STRESS POINTS OF THE CURVE - THESE CAN BE COUNTERED IS BY THICKENING THE TRUSS DEPTH

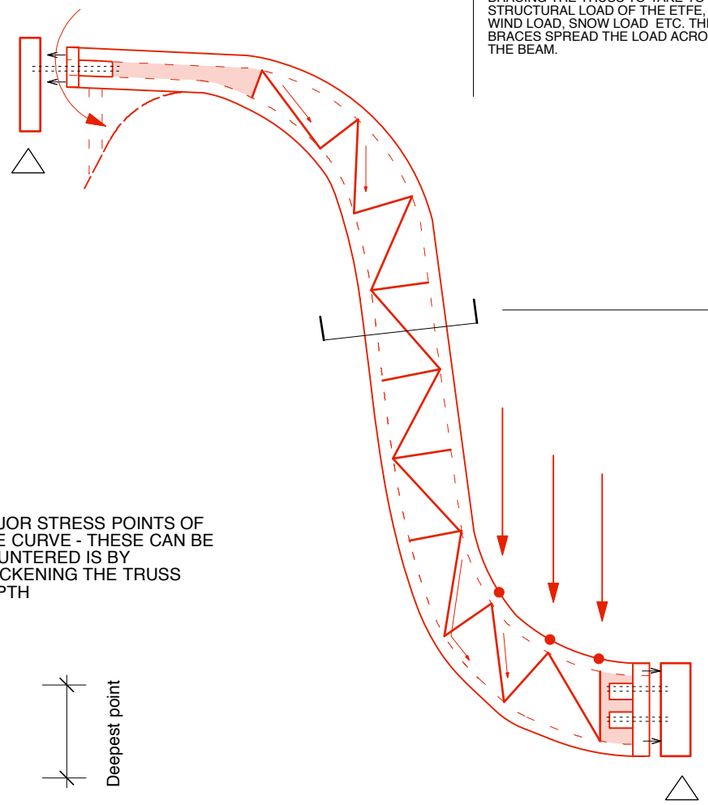
Deepest point

THE TWISTING FORCE WILL INCREASE TENSION ON THE TRUSS THEREFORE THIS CAN BE COUNTERED BY BRACING THE STRUCTURE HORIZONTALLY.

## SETTING OUT STEEL TRUSS

SCALE 1:100 @A3

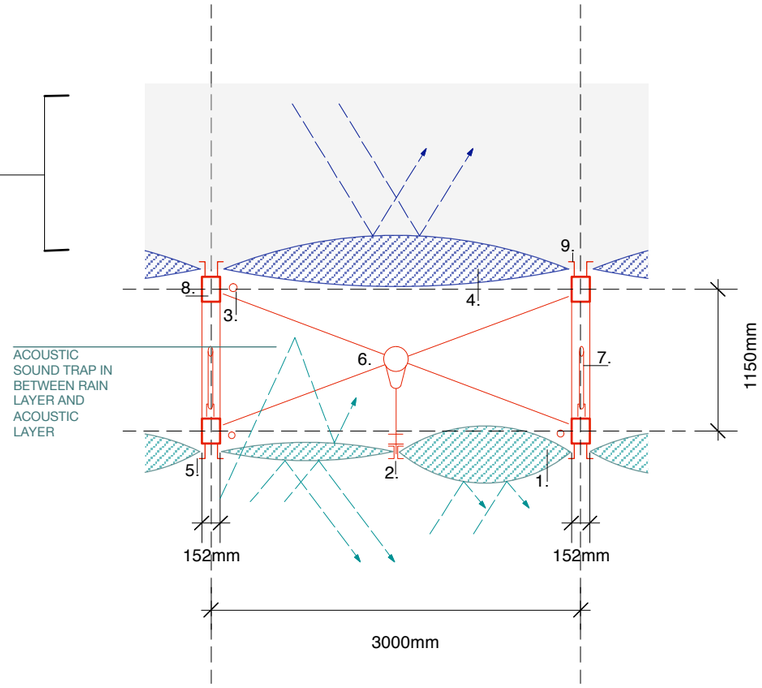
BRACING THE TRUSS TO TAKE TO STRUCTURAL LOAD OF THE ETFE, WIND LOAD, SNOW LOAD ETC. THE BRACES SPREAD THE LOAD ACROSS THE BEAM.

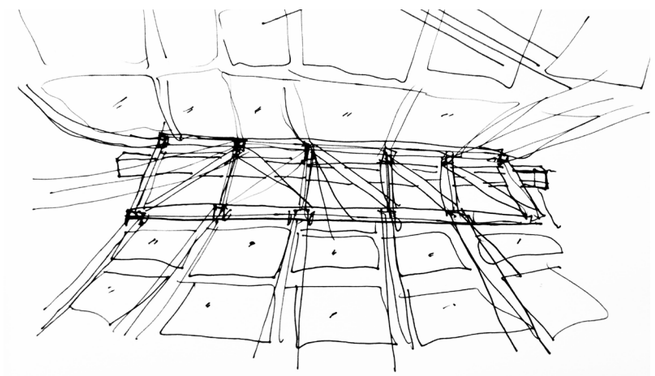


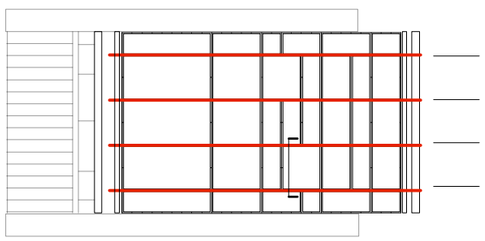
## SKETCH DETAIL AA ETFE SKINS REDUCING THE ECHO

SCALE 1:50 @A3

THE SPACING OF THE TRUSS BEAMS SUPPORTING THE ETFE SKINS ALLOWS FOR SOUND TO REVERBERATE . THIS DIFFUSES THE ECHO THE PERFORMANCE.



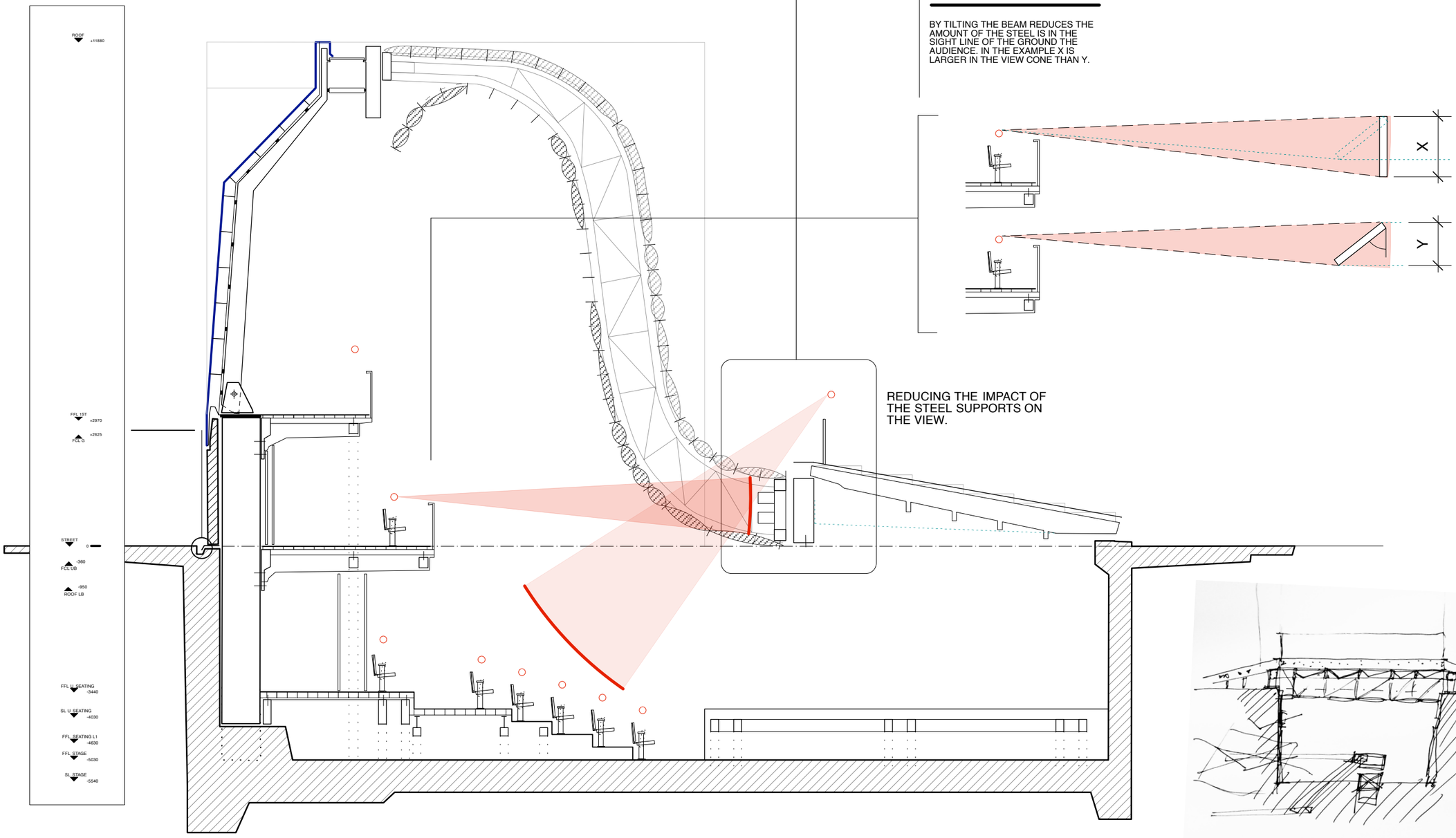


PLAN OF THE TRUSSES

1. Acoustic ETFE Layer
2. Acoustic ETFE Bracket
3. ETFE Air Duct
4. Rain/Thermal ETFE Layer
5. ETFE Bracket
6. Center Tension Pin
7. Tensile Bracing Wire
8. 152x200mm Steel SHS
9. ETFE Bracket

## 2.51

# CRANKING THE STEEL TRUSS AND BEAM

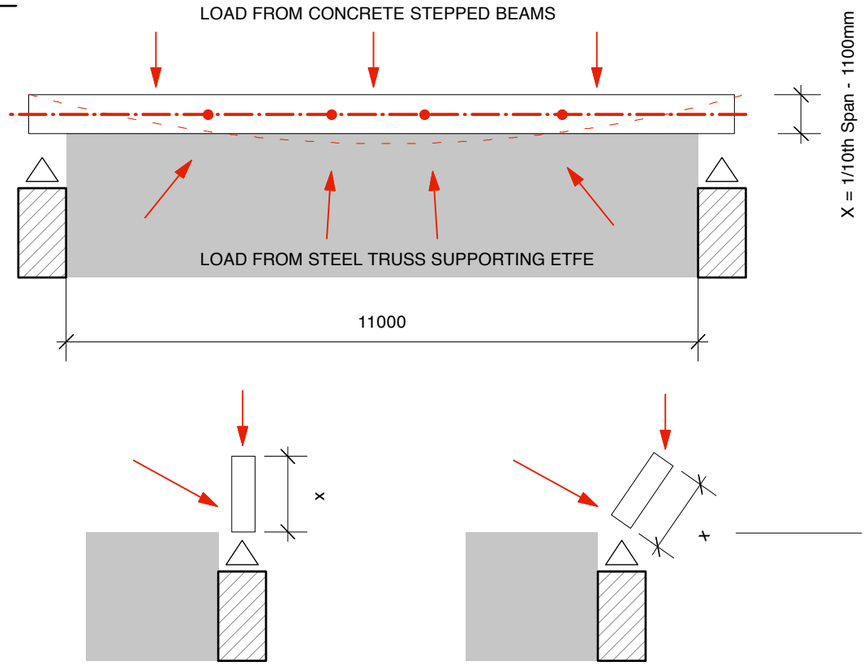



## TITLING THE STEEL

BY TILTING THE BEAM REDUCES THE AMOUNT OF THE STEEL IS IN THE SIGHT LINE OF THE GROUND THE AUDIENCE. IN THE EXAMPLE X IS LARGER IN THE VIEW CONE THAN Y.




REDUCING THE IMPACT OF THE STEEL SUPPORTS ON THE VIEW.

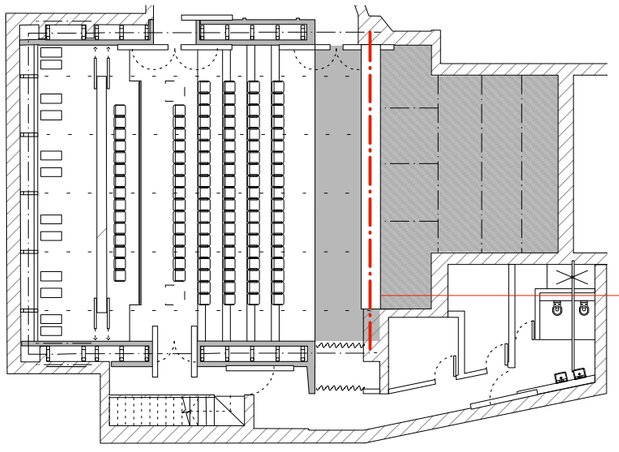



## COUNTERING DEFLECTION WITH DEPTH OF STEEL

IF 1/10TH THE SPAN IS TAKEN FOR THE DEPTH OF THE STEEL AS A RULE OF THUMB FOR COMPONENTS BEING EFFECTED BY LOAD IN TWO DIRECTIONS THEN THIS WILL ALLOW ENOUGH DEPTH TO COUNTER THE NATURAL DEFLECTION.

## ROTATING THE BEAM TO MINIMIZE THE VIEW OF THE STRUCTURE.

IF THE STEEL IS ROTATED THROUGH LESS THAN 45 DEGREES THEN THE DEPTH OF THE BEAM (X - IN THIS DIAGRAM) DOES NOT HAVE TO INCREASE TO TAKE THE LOAD.



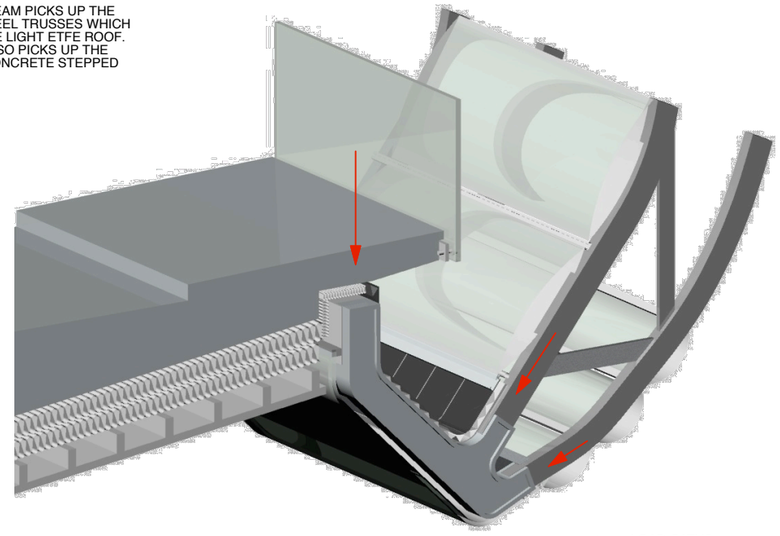
## BASEMENT PLAN

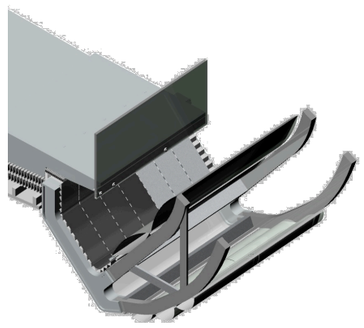
THE POSITION OF THE BEAM WHICH WILL TAKE THE LOAD OF THE CONCRETE PLAYGROUND AND THE STEEL TRUSS TAKING THE LOAD OF THE ETFE.

## CRANKED STEEL - REDUCING VIEW OF THE STRUCTURE

### RENDERED CUT SECTION

THE STEEL BEAM PICKS UP THE VERTICAL STEEL TRUSSES WHICH SUPPORT THE LIGHT ETFE ROOF. THE BEAM ALSO PICKS UP THE SPANNING CONCRETE STEPPED PLATES.



## DESIGNING THE CRANKED STEEL COMPONENT

### RENDERED CUT SECTION

THE STEEL BEAM PICKS UP THE VERTICAL STEEL TRUSSES WHICH SUPPORT THE LIGHT ETFE ROOF. THE BEAM ALSO PICKS UP THE SPANNING CONCRETE STEPPED PLATES.

VIEW OF THE INTERNAL SIDE OF THE ACOUSTIC LAYER OF ETFE TOWARDS THE PLAYGROUND.

# CONSTRUCTION DETAILS

## KEY CONSTRUCTION DETAILS
1:20 @ A3

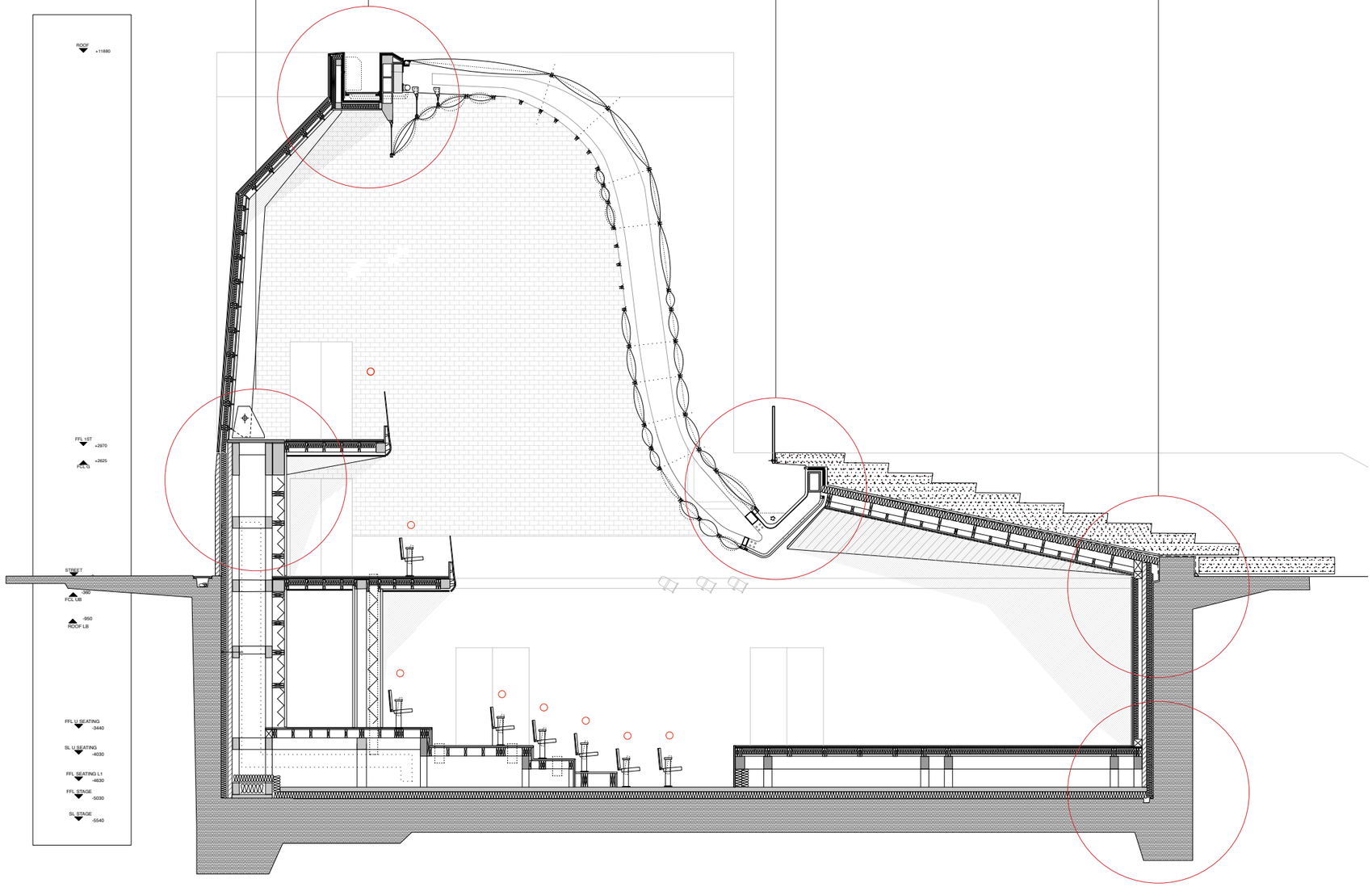
THIS SECTION SHOW THE KEY CONSTRUCTION DETAILS OF THE THEATRE SECTION WHICH HAVE BEEN DEVELOPED. THERE ARE FIVE POINTS WHICH HAVE BEEN EXPLORED AND WORKED UP TO DETAIL.

DETAIL 05

DETAIL 01

DETAIL 02

DETAIL 03/04

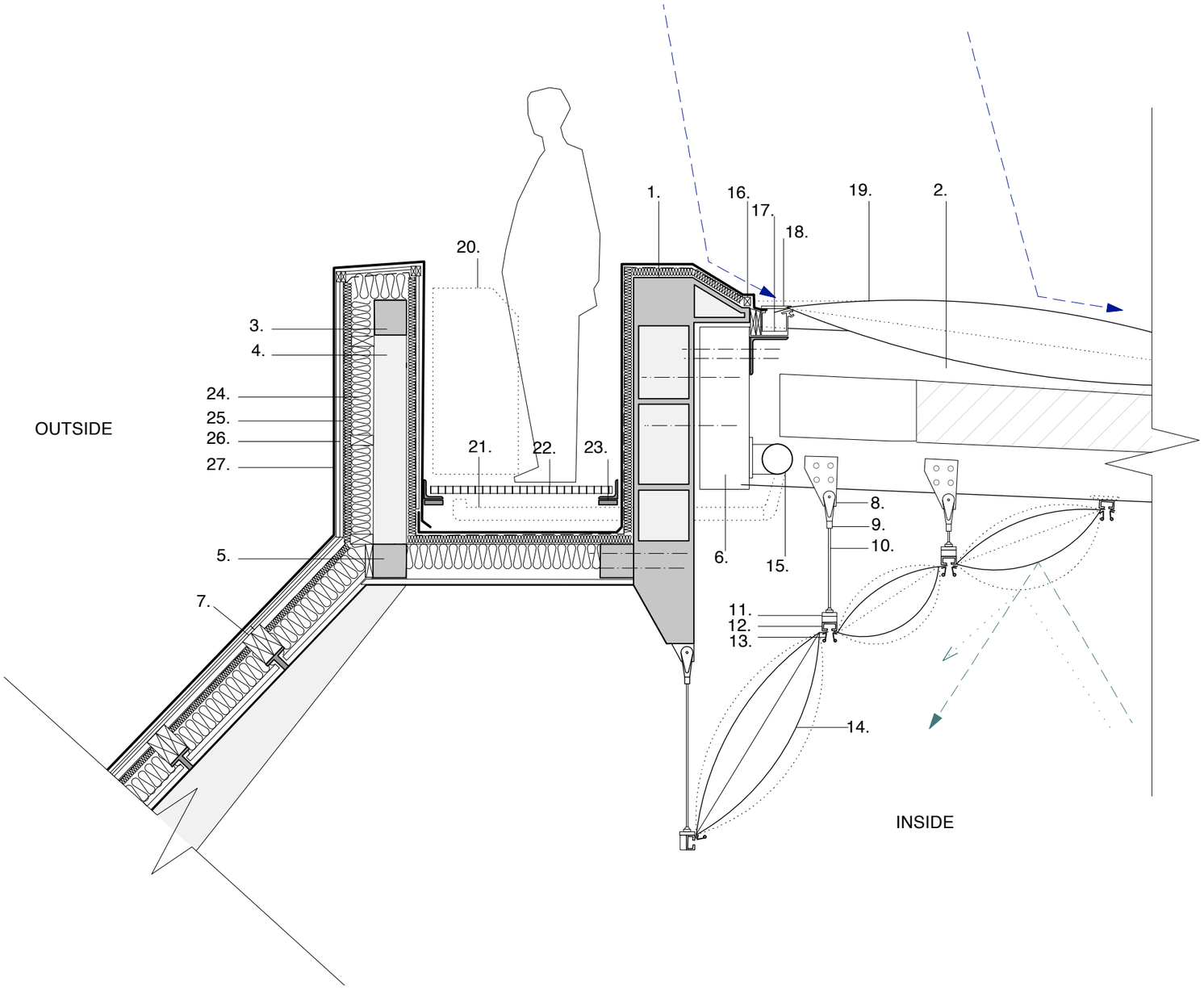


# DETAIL 01

TOP OF ROOF - CANOPY MEETS STEELWORK

SCALE 1:20 @ A3

THE JUNCTION OF THE CANOPY MEETING THE STEEL STRUCTURE AT ROOF LEVEL IS AN IMPROTANT DETAIL. THE THERAML AND RAIN BARRIER IS RELIANT ON THE ETFE CONECTOR BLOCK AND THE STEEL JUNCTION




**PRIMARY STRUCTURE**

1.Bespoke steel truss
2.Bespoke steel Beam
3.152mm SHS
4. Bespoke Steel Column
5. 152mm SHS - Welded Steel 6mm plate to top surface.
6. Steel Truss End Plate
7. Steel Flange 6mm

**L2 - ACOUSTIC ETFE SKIN**

8. Bolted steel Plate
9. Steel Pin and Grip
10. Steel Cable 6mm
11. Conector Plate
12. Extruded Aluminum Section
13. Tie Pins
14. ETFE Panel
15. ETFE Air Inlet Pipe

**L1 - THERMAL / RAIN ETFE SKIN**

16. Timber Spacer
17. Extuded Aluminum Gutter
18. Aluminum Capping Element
19. ETFE Panel

**OTHER**

20. Air Pumping Plant
21. Inlet Piping
22. Elephant Grating
23. Steel Angle

**RAIN SCREEN**

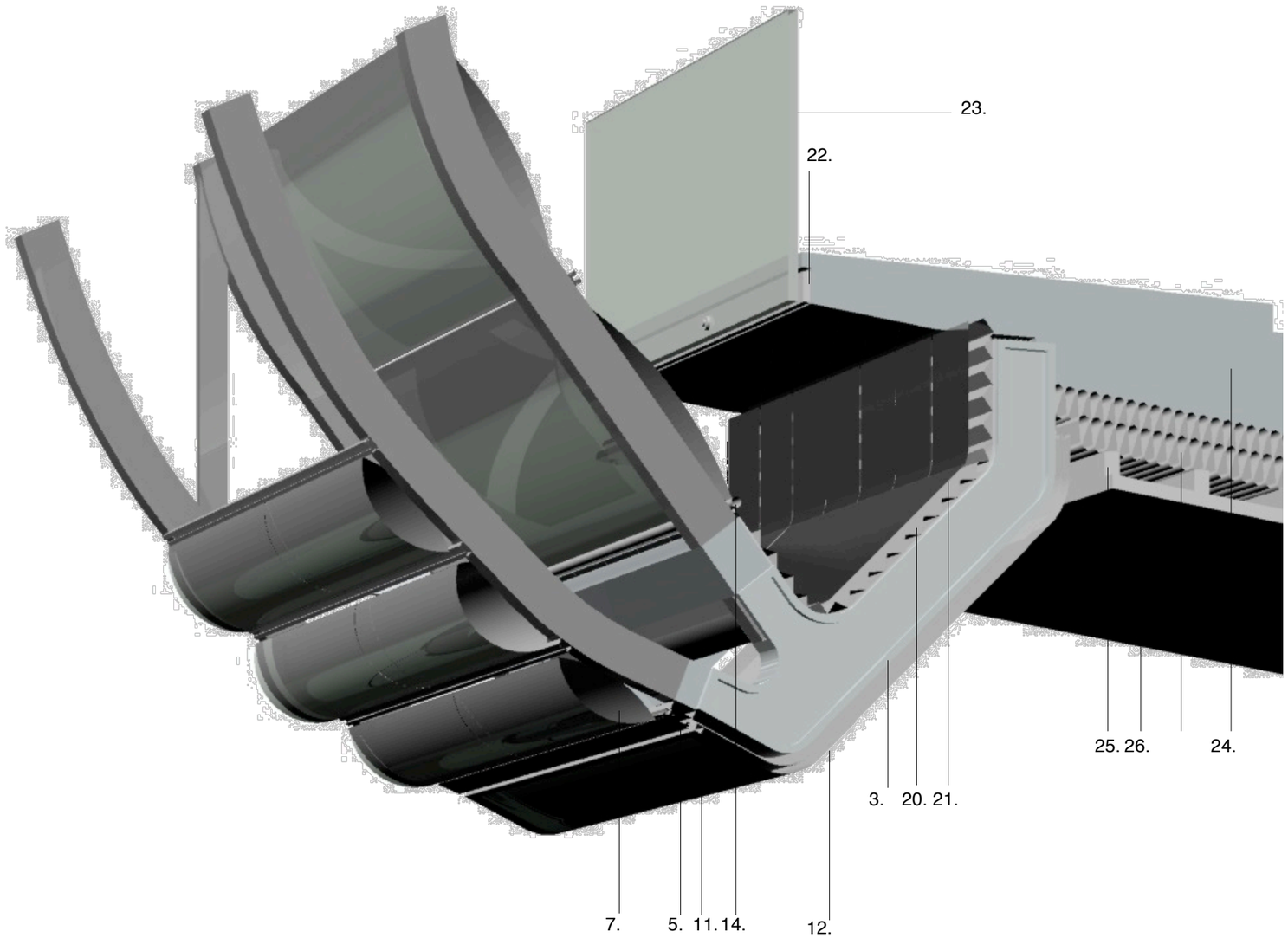
24. 160mm Insulation / 50 mm Insulation
25. Damp Proof Membrane
26. 2 No. Plywood backing
27. Standing Seam Zinc Cladding

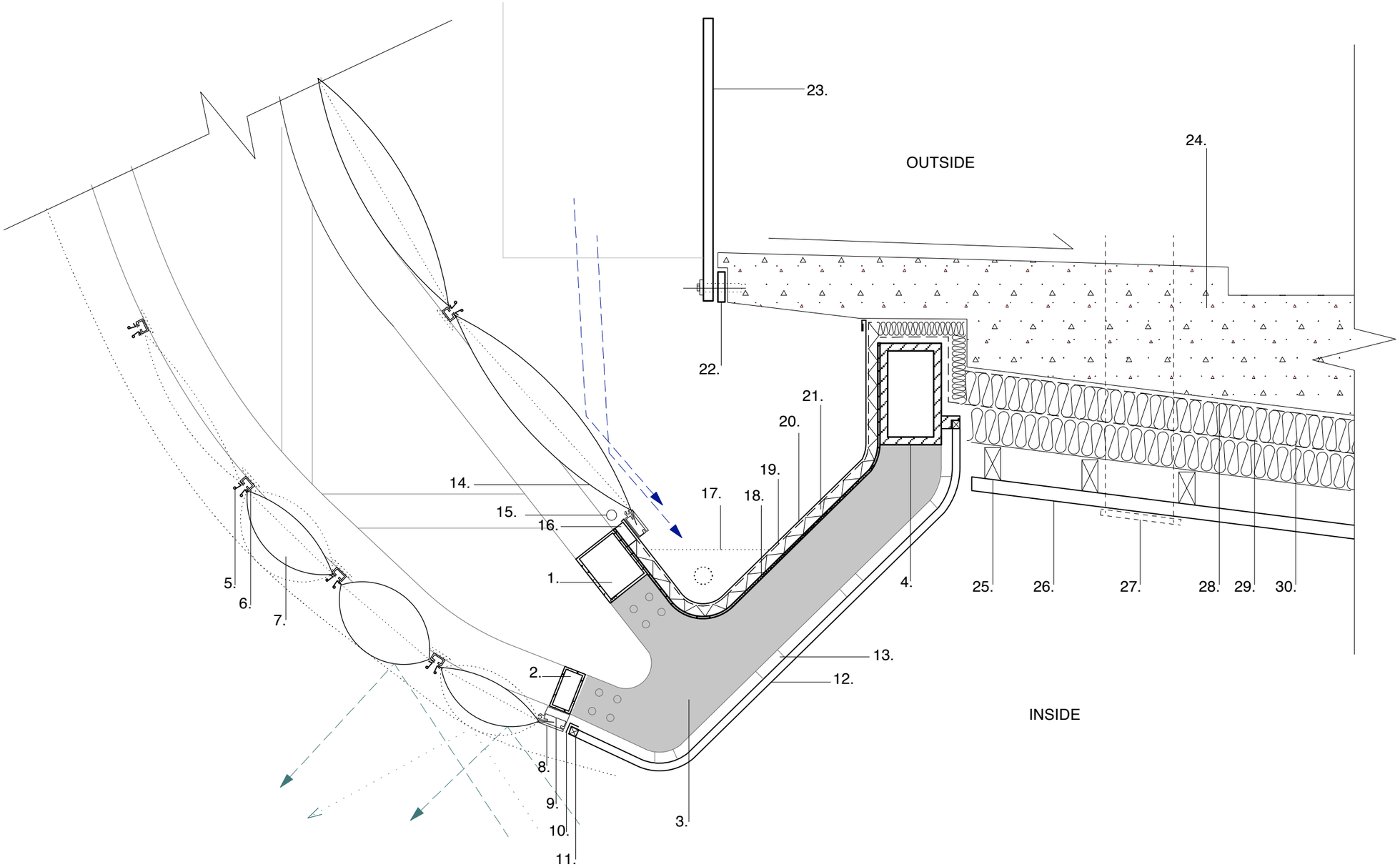
# DETAIL 02

STEEL JUNCTION /GUTTER DETAIL AND ETFE SKINS

RENDERED DETAIL

THE JUNCTION OF THE STRUCTURAL BEAMS SPANNING TO SUPORT THE ETFE WILL BE PICKED UP BY A STEEL BEAM SPANNING IN TH EHORIZONTAL DIRECTION. THIS BEAM WILL ALSO COLLECT THE RAIN WATER AND CHANNEL IT HORIZONTALLY TO THE WATER TANKS FOR THE GREY WATER RECYCLING SYSTEM. THERE WILL BE A CONCRETE PANEL SYSTEM WHICH WILL FORM THE ROOF OVER THE STAGE AND A STEPPED SEATING ARRANGEMENT FOR THE OUTDOOR PLAY AREA.






# DETAIL 02

STEEL JUNCTION /GUTTER DETAIL AND ETFE SKINS

SCALE 1:20 @ A3

THE JUNCTION OF THE STRUCTURAL BEAMS SPANNING TO SUPORT THE ETFE WILL BE PICKED UP BY A STEEL BEAM SPANNING IN TH EHORIZONTAL DIRECTION. THIS BEAM WILL ALSO COLLECT THE RAIN WATER AND CHANNEL IT HORIZONTALLY TO THE WATER TANKS FOR THE GREY WATER RECYCLING SYSTEM. THERE WILL BE A CONCRETE PANEL SYSTEM WHICH WILL FORM THE ROOF OVER THE STAGE AND A STEPPED SEATING ARRANGEMENT FOR THE OUTDOOR PLAY AREA.

**PRIMARY STRUCTURE**

1.325x330mm RHS
2.165x215mm RHS
3.Bespoke steel truss
4.460x280mm RHS

**L2 - ACOUSTIC ETFE SKIN**

5.ETFE Clip System
6. Extruded Aluminum Section
7. ETFE Panel
8. Aluminum Flat
9. Extruded Aluminum Section
10. Aluminum Bracket
11. Barisol End Plate
12. Barisol ETFE Acoustic Membrane
13. Welded Steel Tab

**L1 - THERMAL / RAIN ETFE SKIN**

14. ETFE Panel
15. ETFE Vent Cord
16. Aluminum Packer

**GUTTER DEATIL**

17. Water Collection Point
18. Welded steel Plate
19. Dam Proof Membrane
20. Zinc Gutter Pressing
21. 50mm Insulation

**OTHER**

22. Steel Plate
23. Thickened Glass Handrail
24. Cast Concrete
25. Timber Stud
26. Acoustic Panels
27. Vent Position
28. Damp Proof Membrane
29. Ventilation Membrane
30. 2 no. - 160mm Insulation