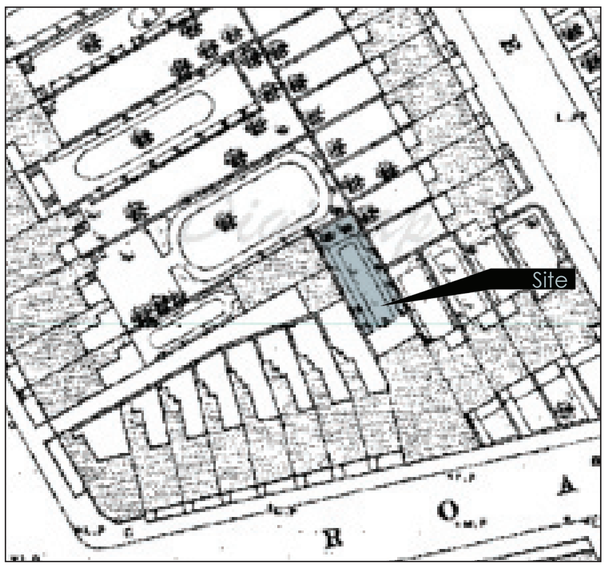
Deconstructing the Existing

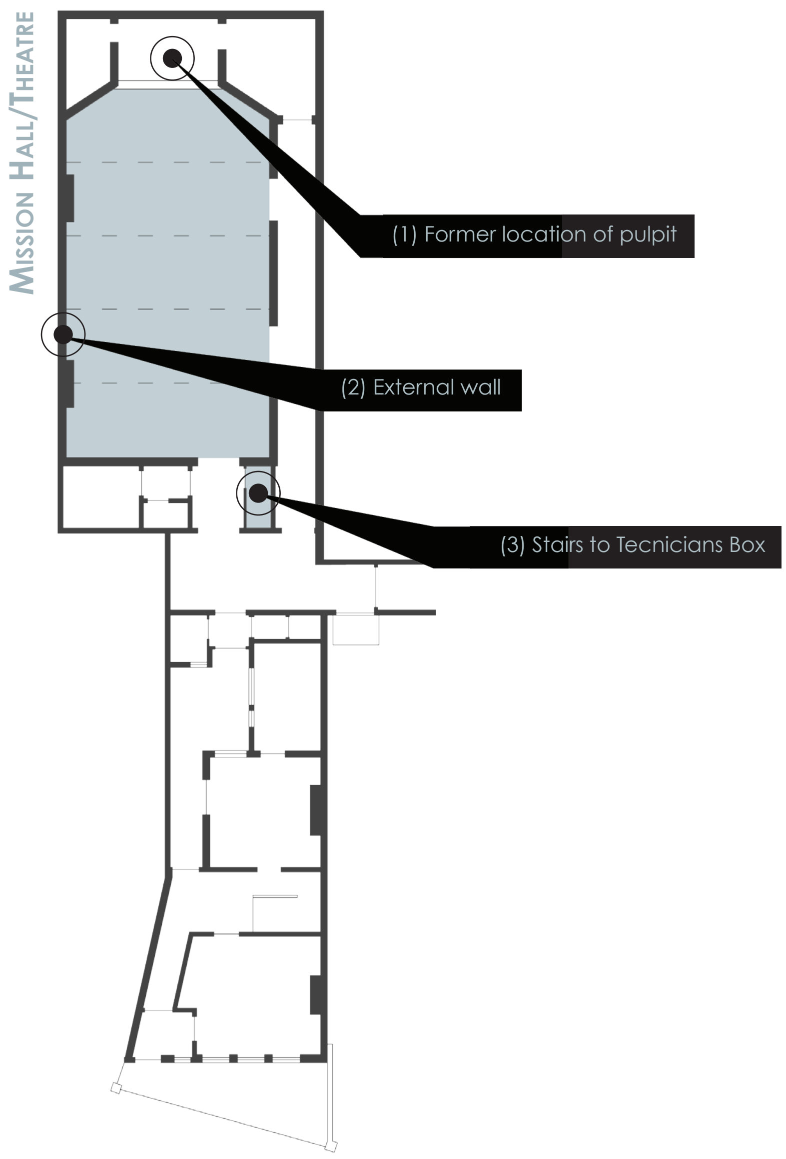
Back Building

On the two historic maps below it can be seen how the building that was to become the mission hall and later the theatre appears sometime between 1870 and 1890. On the plan below the mission hall is highlighted and the location of key features are marked in reference to the diagram on the left hand page.



Map 1870

Map 1890



Plan diagrams not to scale.

Key Elements

The exploded diagram picks out key elements of the mission hall and technicians box that are intended to be preserved in some form in the building proposal.
The front and back wall of the hall defines the space and contain imprints of the rooms former incarnation. Windows, boarded over doors and the barn like shape of the room are visible in these elements.
The view from the hidden technicians box is indicated by the view cone.


Defining back wall


Defining front wall to tecnicians box


Ceiling

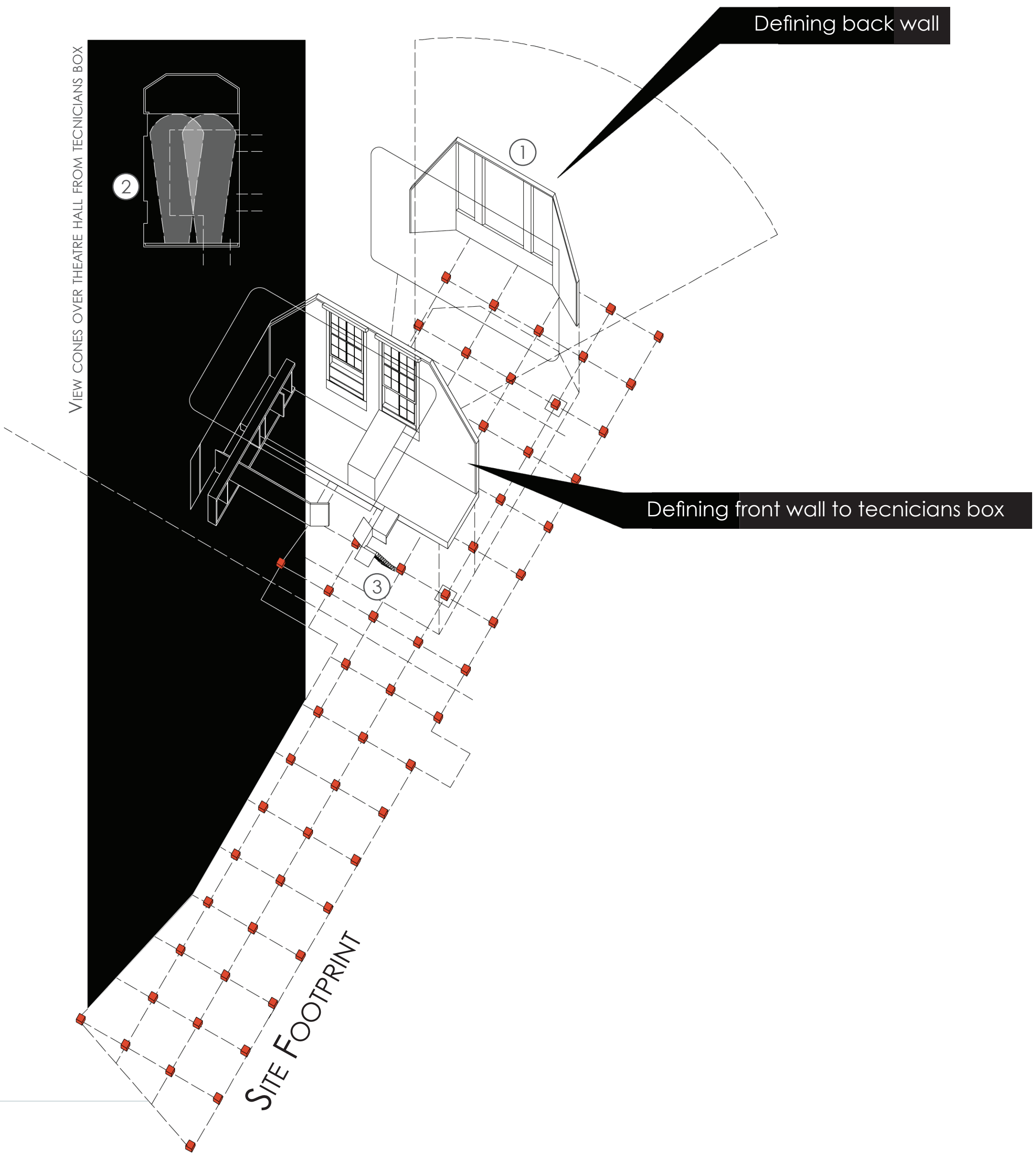


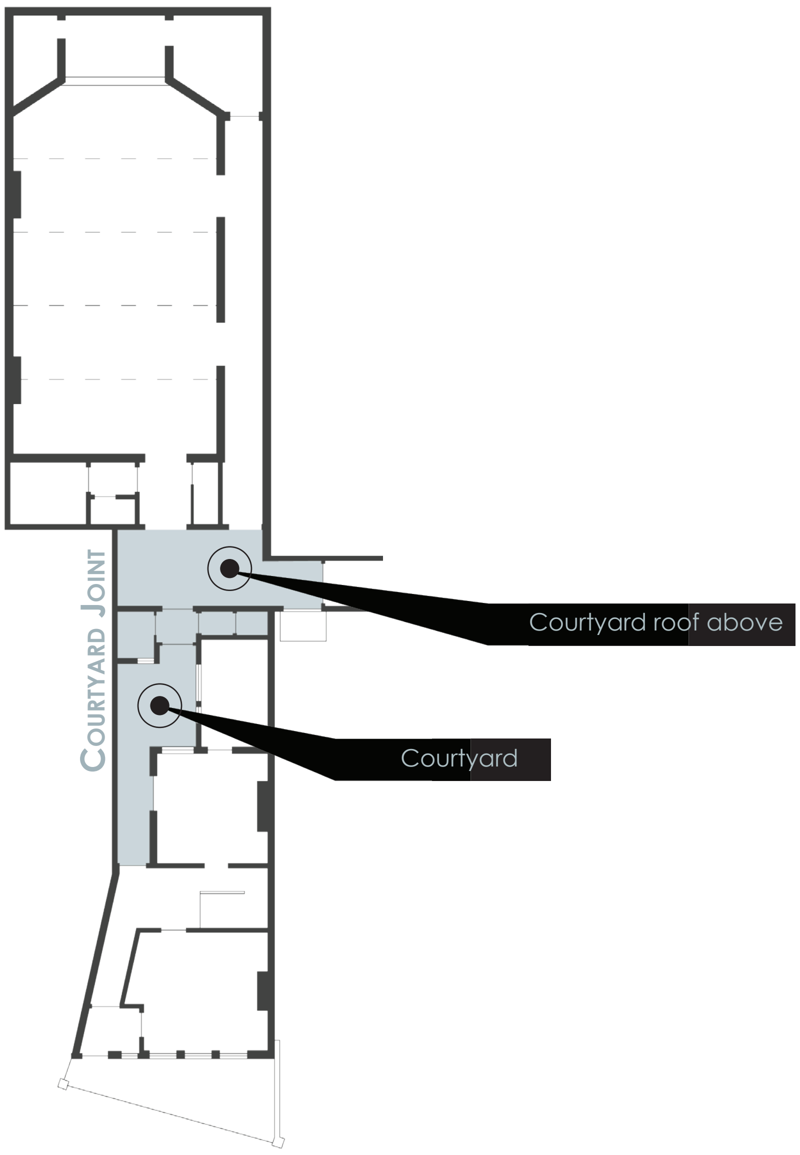
Diagram 1:250

Courtyard joint

Below is shown the courtyard joint and the courtyard rooftop in the middle of the buildings plan. Currently the joint functions as a breaking point between the two parts of the building, separating the administrative and performance functions of the building. The courtyard also gives light and air to the back of the front building.
The diagram to the left shows the configuration of the courtyard and its relationship to the front and back buildings.

View over courtyard roof from technician's box.

Courtyard roof. Door is leading to the technician's box.



Plan diagrams not to scale.

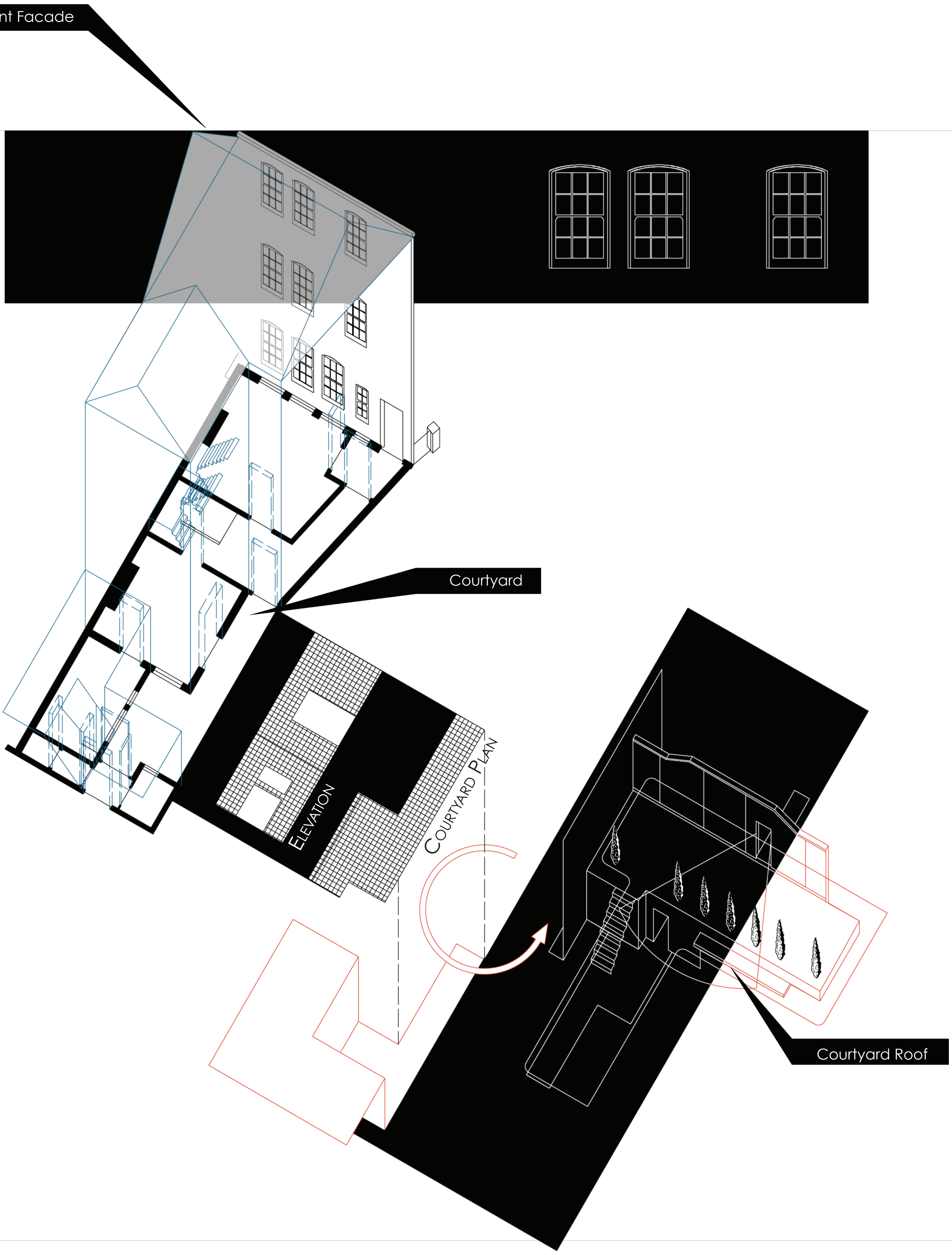
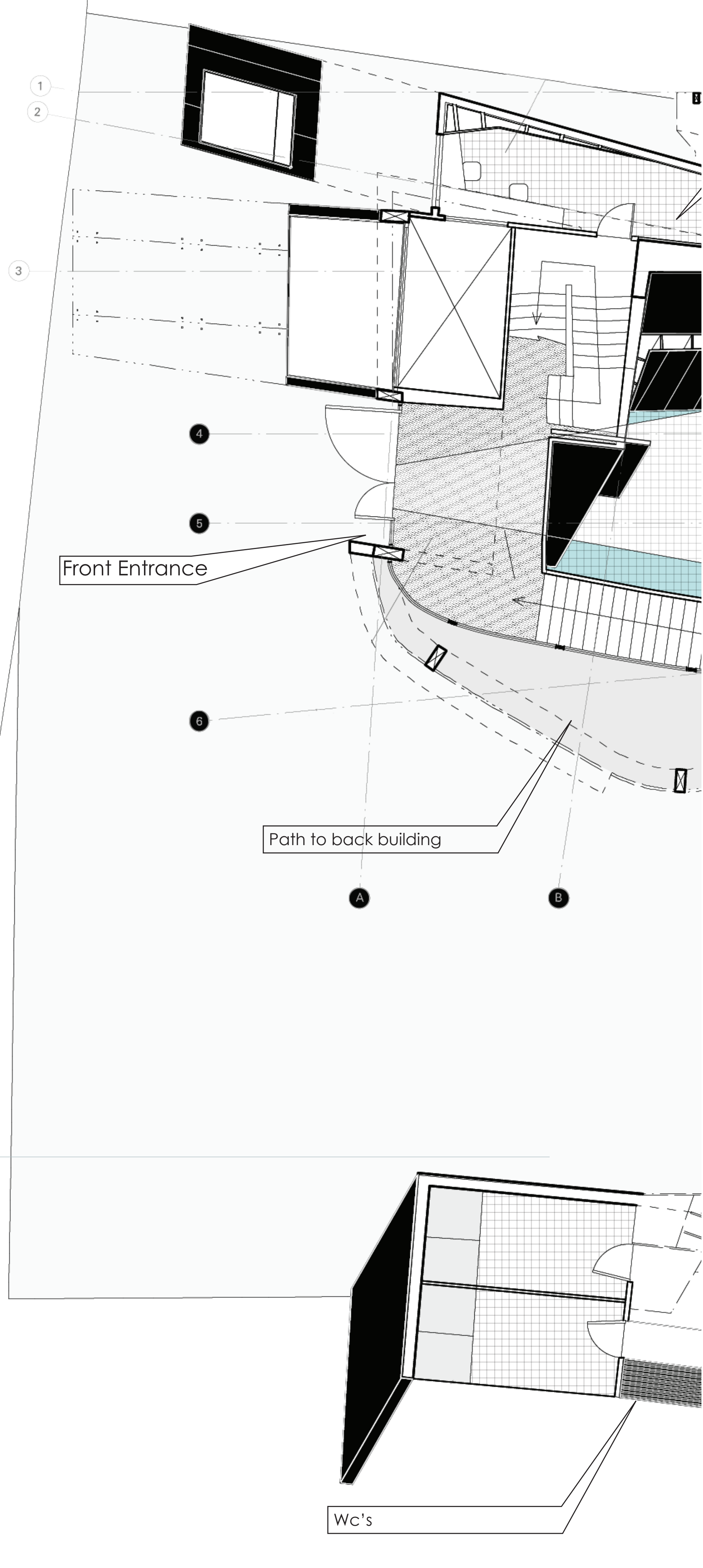


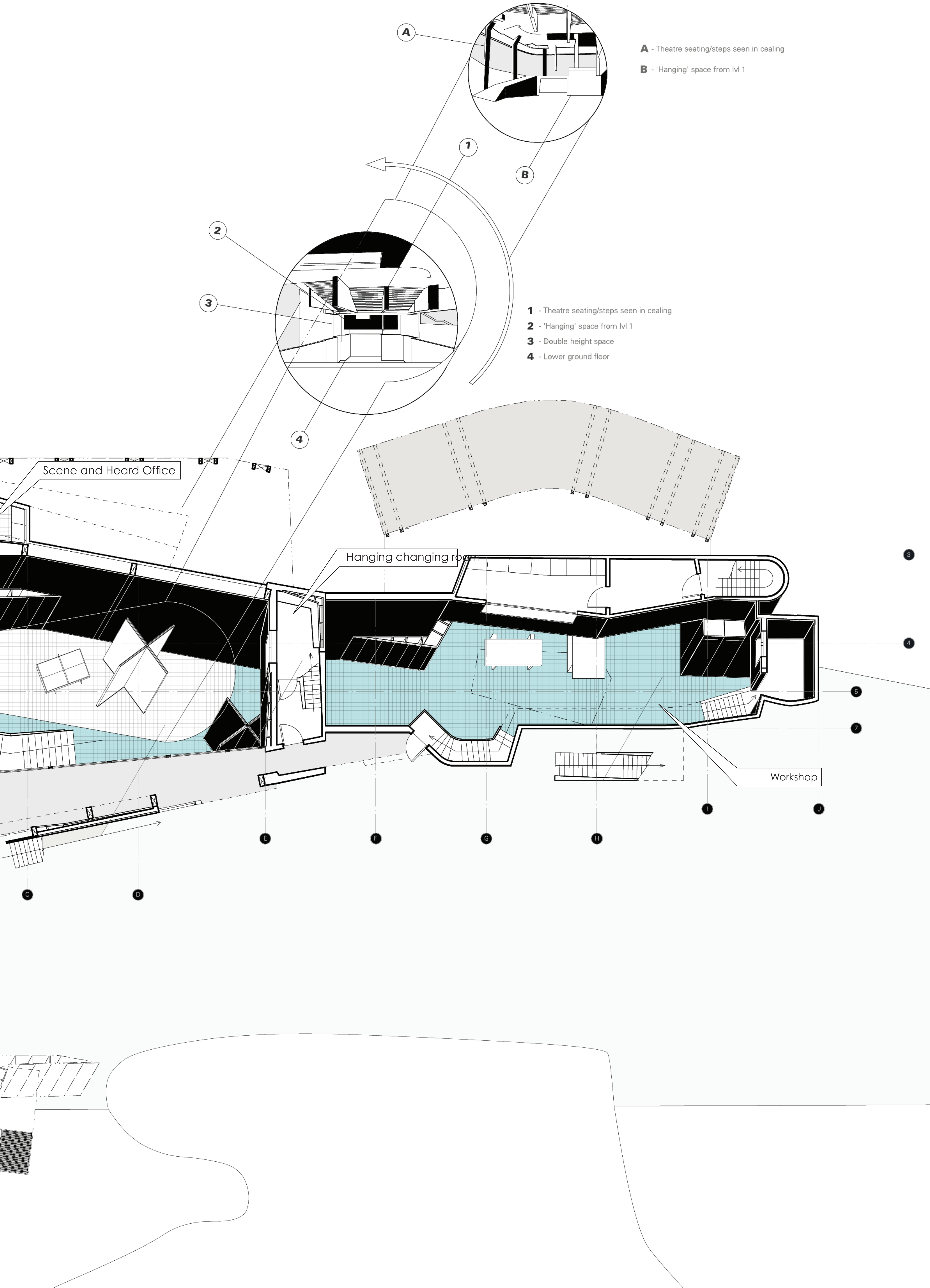
Diagram 1:250

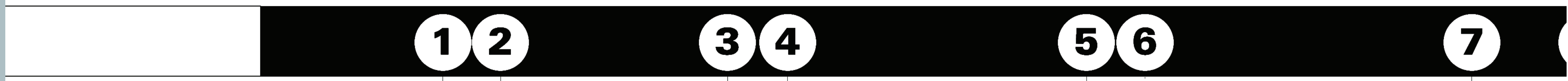
Ground and Lower Ground - Overview

The ground floor area of the proposed building serves as a link between the first floor and a new lower ground floor. Most of the ground has been excavated to make room for a large community hall. Above the hall the underbelly of the theatre is visible as an inverted sculpture of the space above. Seating rows, changing rooms and the stage itself are hanging between the two outer walls and create a dramatic spatial view that is visible immediately upon entering the building. The large double height spaces make a stark contrast to the narrow and dense surroundings of Somers Town and are visible from the outside through the glazed parts of the facade.
The main office of Scene and Heard is located one flight of stairs above street level again Crowndale Rd. The office's location makes it easy to identify if the building is occupied and for the children involved in the theatre groups work to find the place they need to go to.
The Community hall on the lower ground floor can be used for an array of public functions, but specifically as a place to teach and interact with the children involved with Scene and Heard.

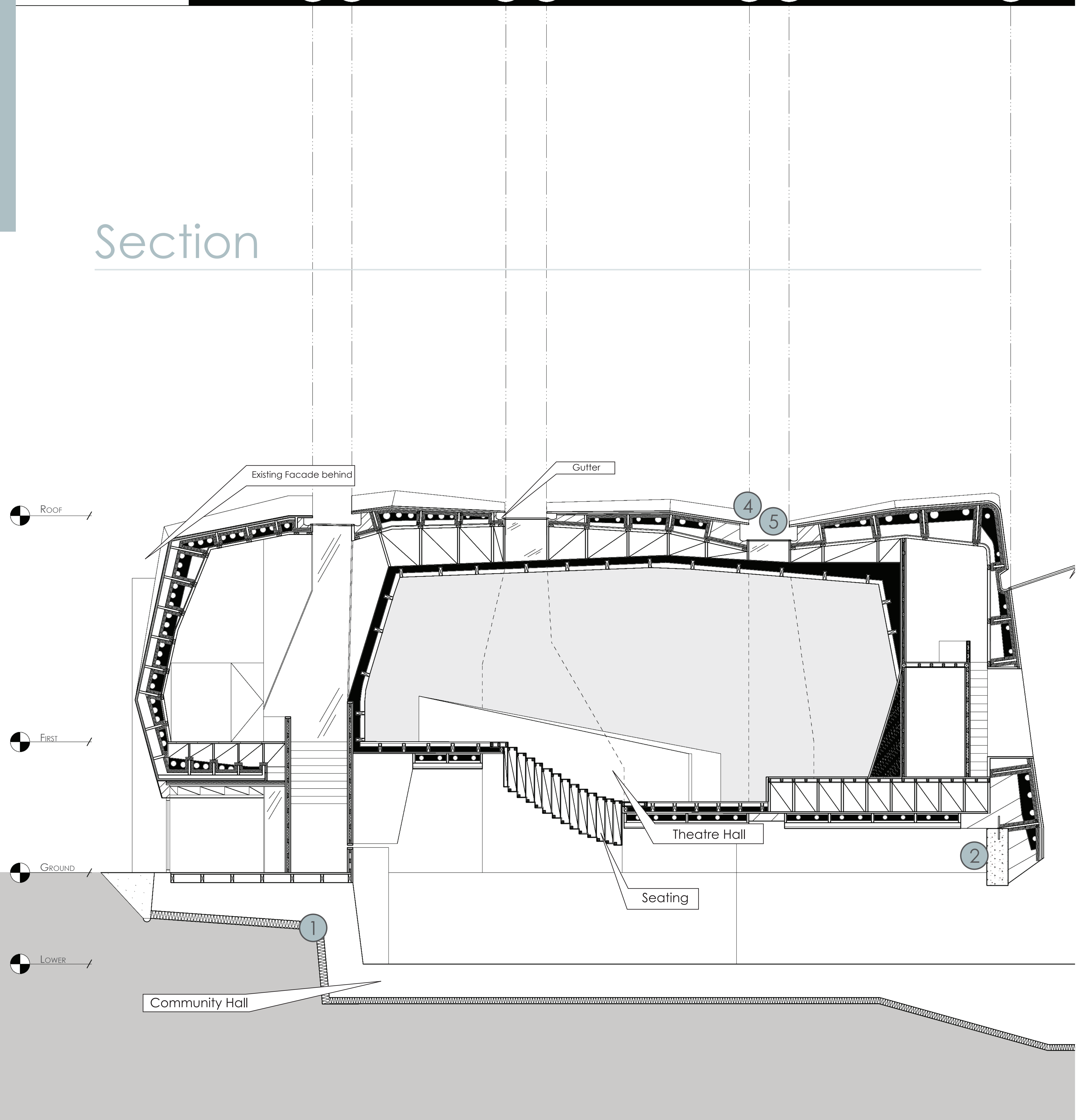
Like on the upper floors the back of the building is reserved for the more private functions of the building. On the lower ground floor most of the area is occupied by a workshop with facilities to produces theatre props, costumes or be rented out for purposes related to anyone renting offices/studios or rehearsal spaces on the upper floors.
This part of the building is accessed through the path leading under the cantilevering theatre right of the main entrance.



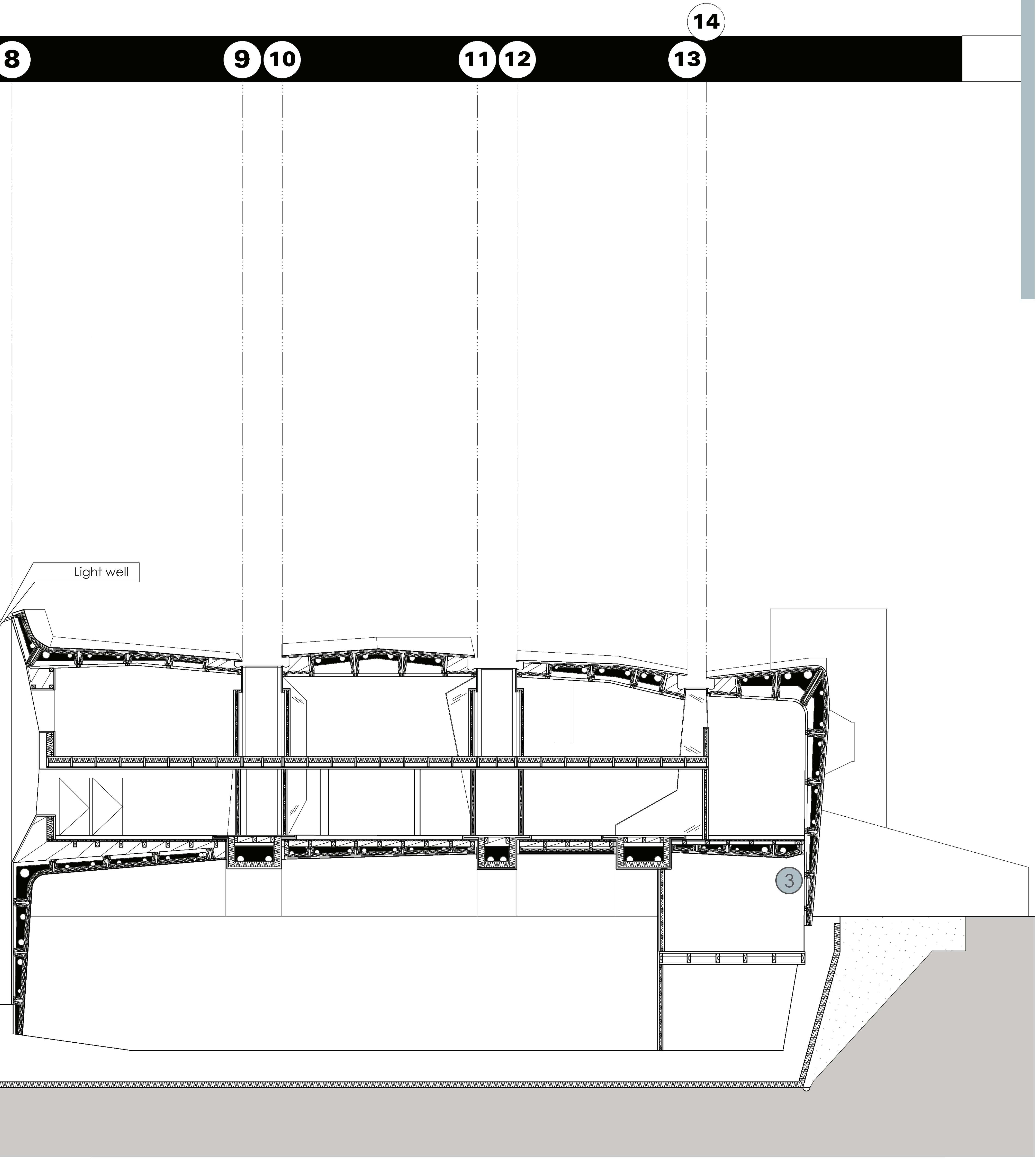

A - Theatre seating/steps seen in cealing
B - 'Hanging' space from lvl 1
1 - Theatre seating/steps seen in cealing
2 - 'Hanging' space from lvl 1
3 - Double height space
4 - Lower ground floor
Scene and Heard Office
Hanging changing room
Workshop



Section



Issues to be considered in upcoming chapter:
1: Basement excavation. Retaining wall / foundations.
2: Framed and moved existing wall piece.
3: Vertical supports and structure rising from basement.
4: Ribbed/semi monocoque pieces; rigidity, thickness, cold-bridging.
5. Glazed slots and gaps.

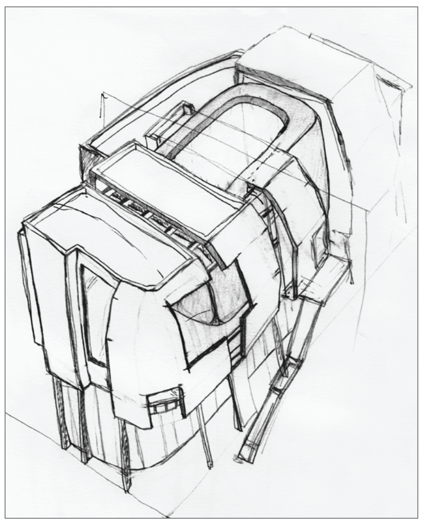


Section - 1:125

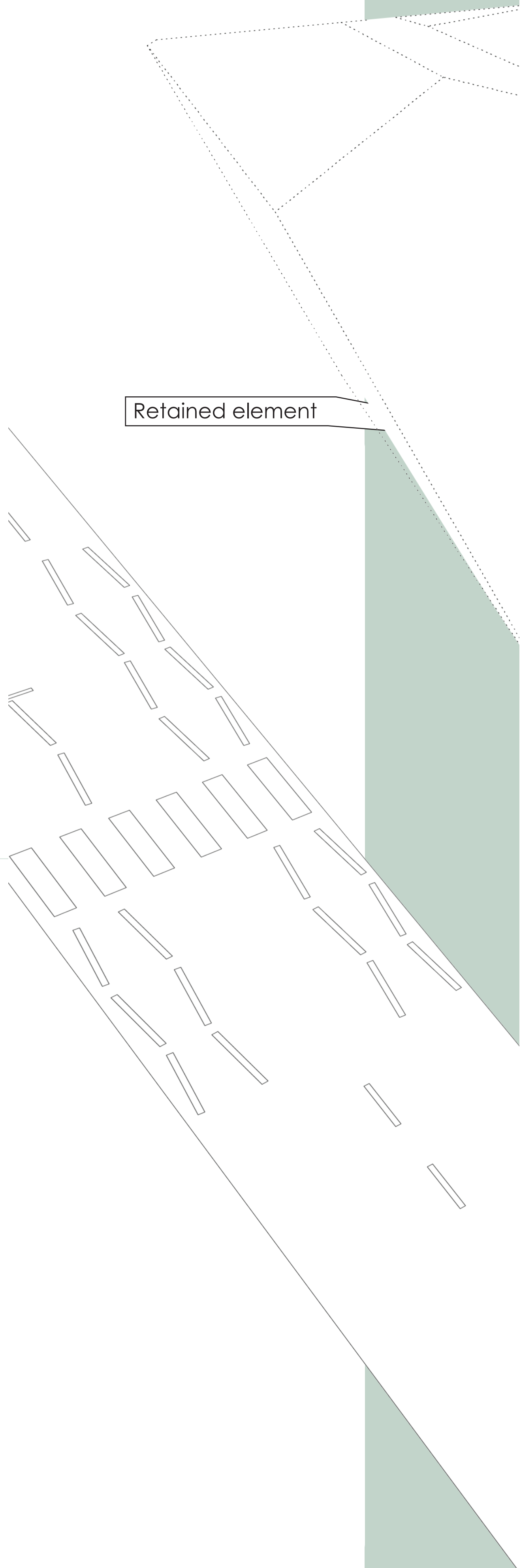
Building Construction

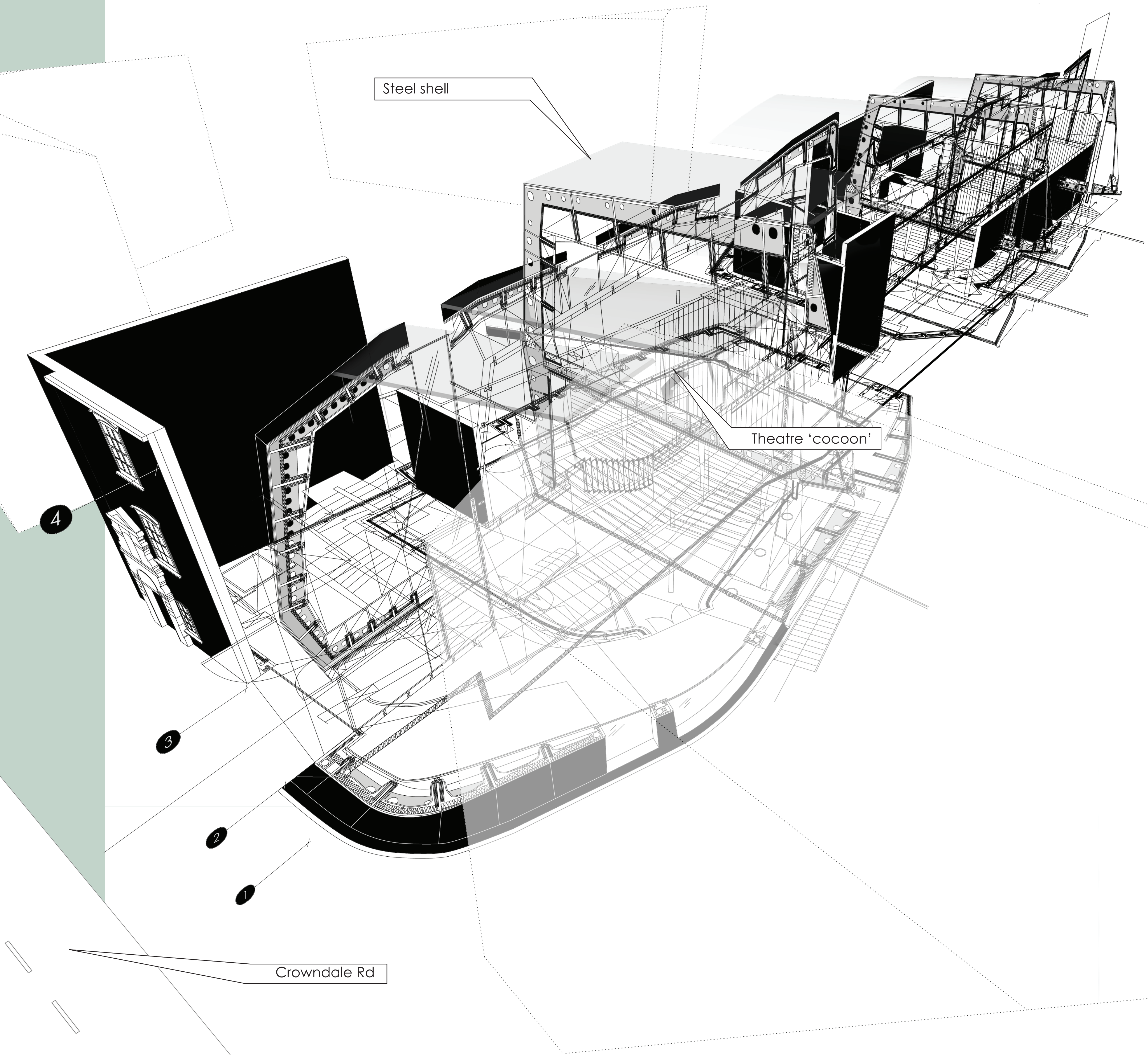
Steel Shells

The most complex and unusual part of the building design is the semi-monocoque steel skin that forms much of the buildings exterior. This chapter, which is the focus of this report, will concentrate on the design, assembly, construction and detailing of this steel skin.



The skin is divided into sections to be manufactured off-site and later assembled.
The concept sketch on the left shows these separate shells connecting to each other and a second skin within them forming the theatre space.
The shells are designed to contain and support selected elements of the existing building as well as key features like glazed links and internal guttering systems.
To the left is an overview of the building showing how long and short sections are placed in relation to each other.




Steel shell
Theatre 'cocoon'
4
3
2
1
Crowndale Rd

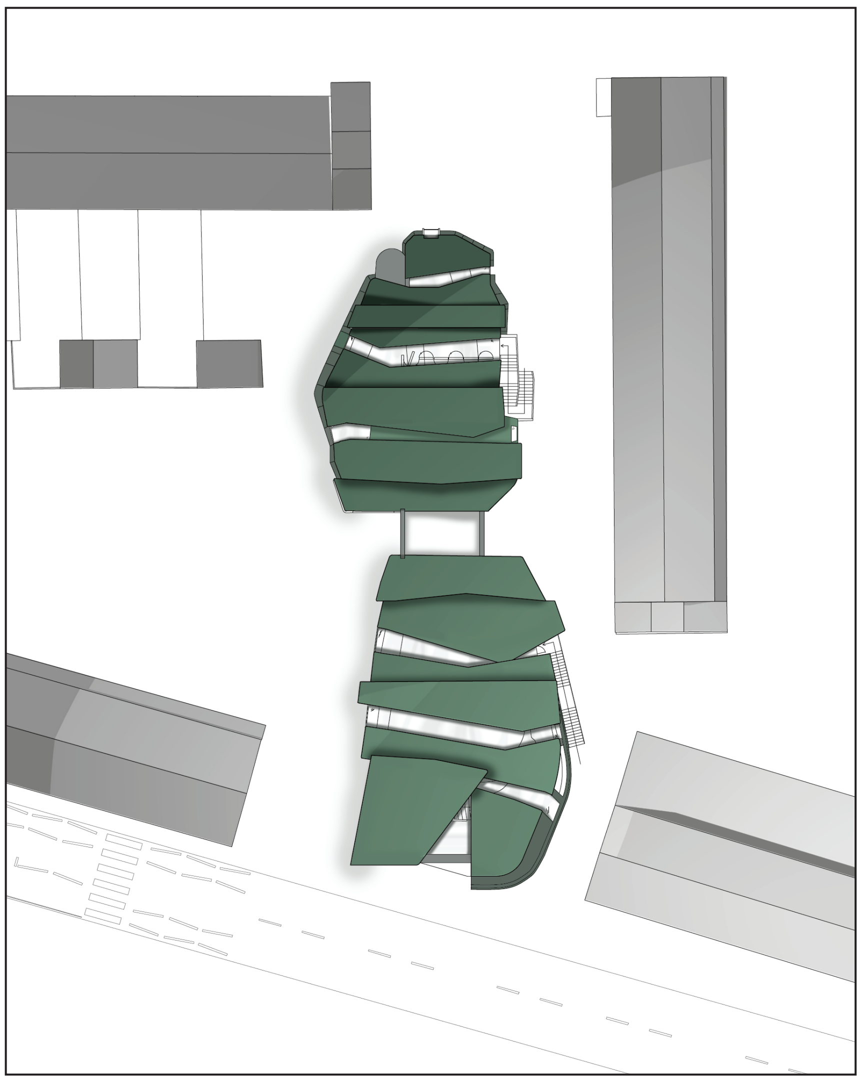
Construction Overview

Phase Two

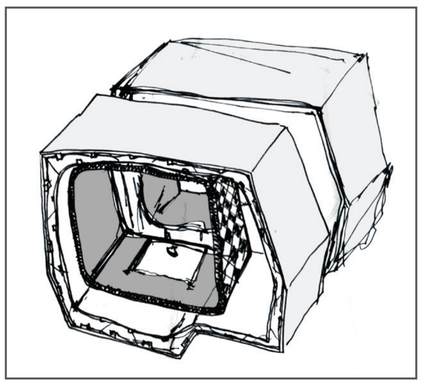
The nine shells that form the structure and external skin of the building are prepared off site and transported to site. The site has been prepared to receive the half-finished pieces that will be hoisted into place and lock around existing wall pieces where the two meet. Columns, foundation and load bearing walls are in place and only the shells need to be positioned correctly.

Once the placement is done glazed joints are put in place between the shells and the internal works begin. Apart from wall finishes and insulation the main part of the internal works consists of constructing the theatre space as a hanging object within the front five shells.

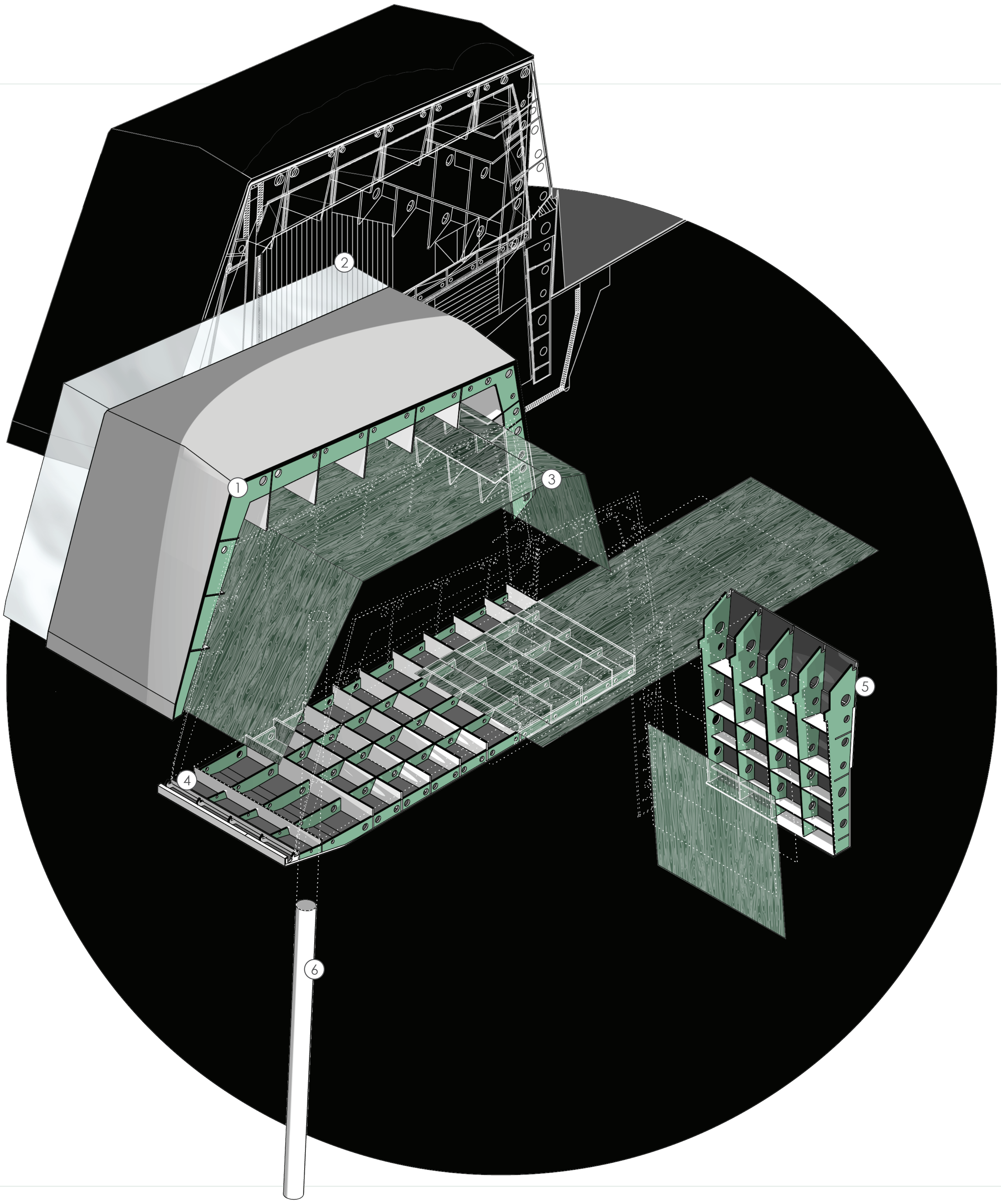
The diagram on the left hand page shows only the top parts of the nine shells to reveal the first floor plan below.



Plan view of Phase Two - Nine shells marked in green (not to scale).



Concept sketch of the theatre 'cocoon' within the steel shells.



Assembly diagram - not to scale.

1. Top piece; external steel skin and steel section.
2. Glazed joint
3. Internal finish joint to extended horizontal steel sections.
4. Jaw piece with pre-shaped gutter profile.
5. Footing piece shaped to receive jaw and top piece.
6. Supporting column

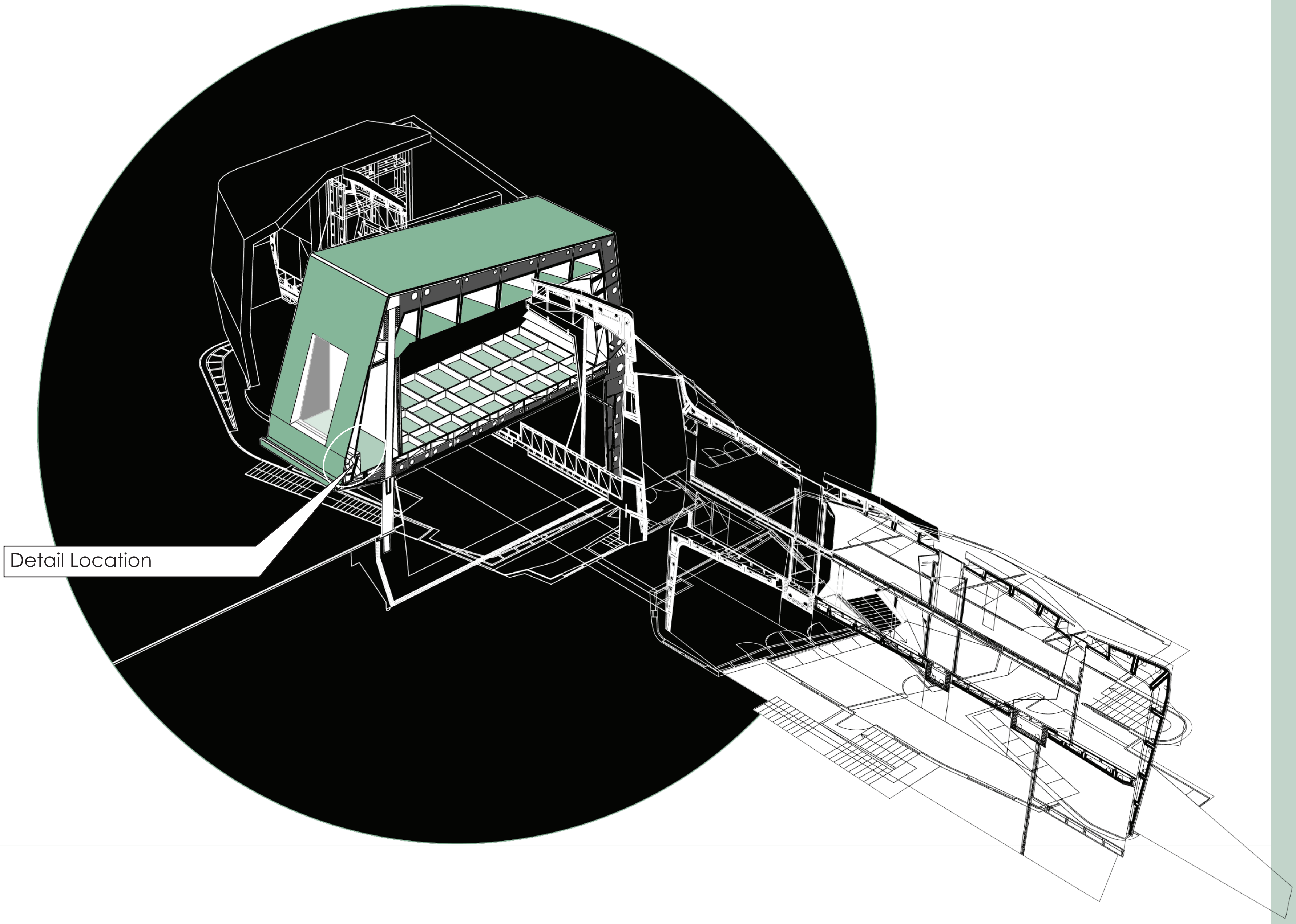
Key Details

Shell Joint

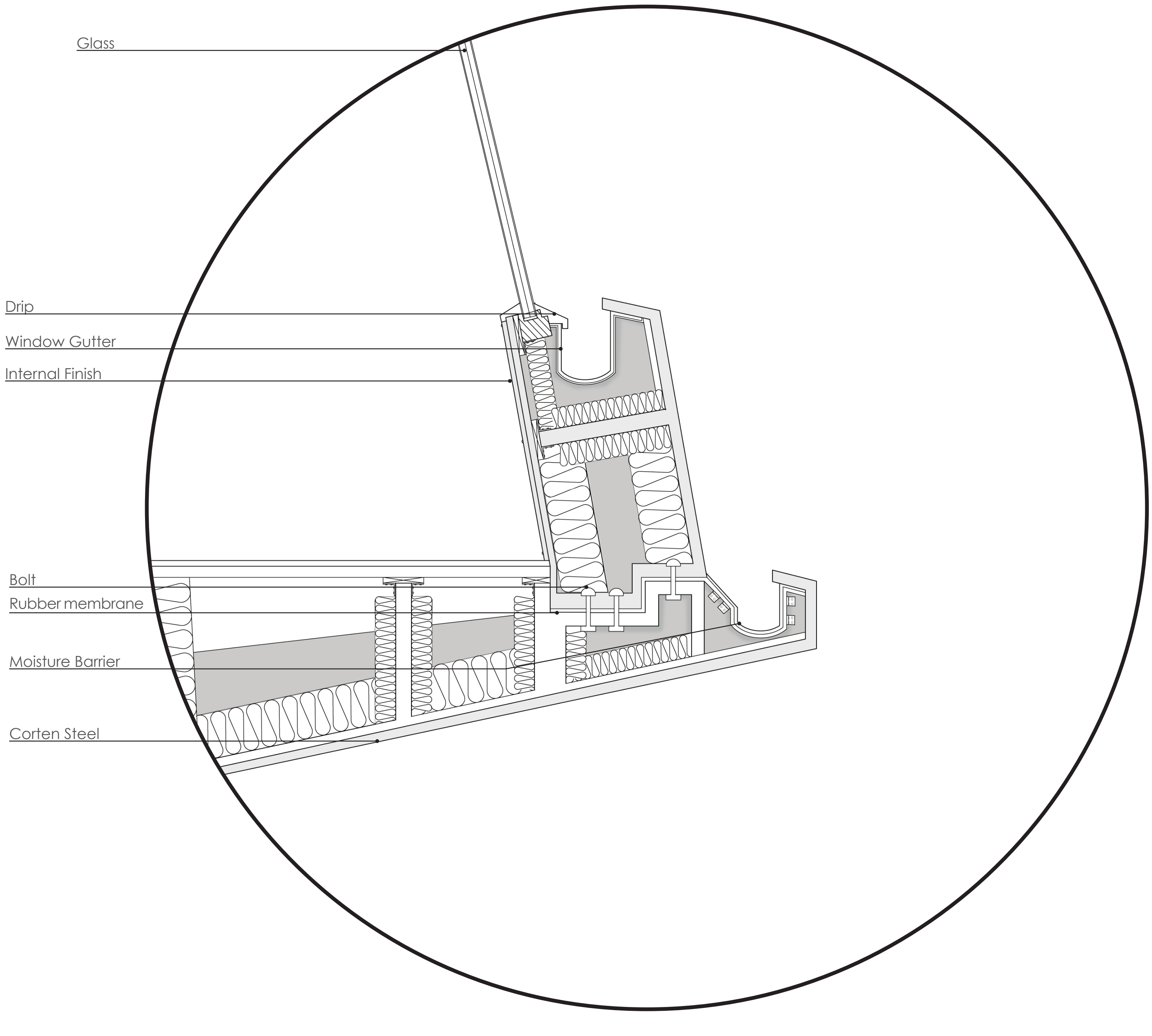
As previously described the typical shell consists of three pieces. The detail to the left shows how the jaw piece receives the top piece and the internal finish.

The two pieces fit together in designed slots that are covered with a rubber membranae to avoid slippage and water seepage from the outside.

Two gutter profiles are visible on the exterior. The top one insures water is guided away from the window and the lower one collects water from the entire length of the shell.



Diagrams not to scale.

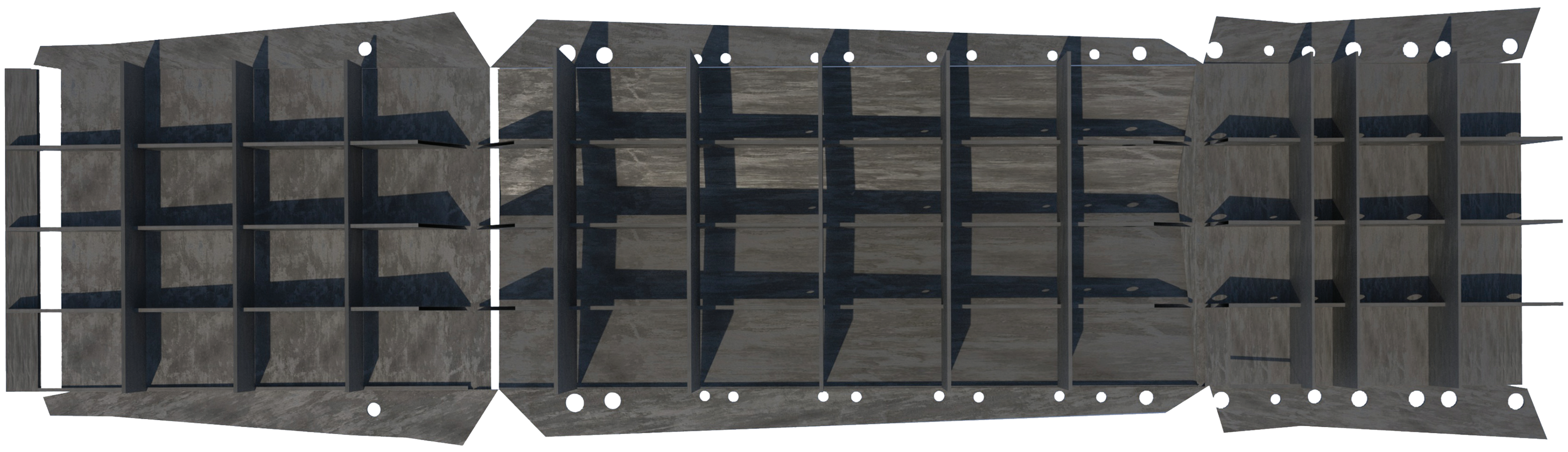

Glass
Drip
Window Gutter
Internal Finish
Bolt
Rubber membrane
Moisture Barrier
Corten Steel

Detail 1:20

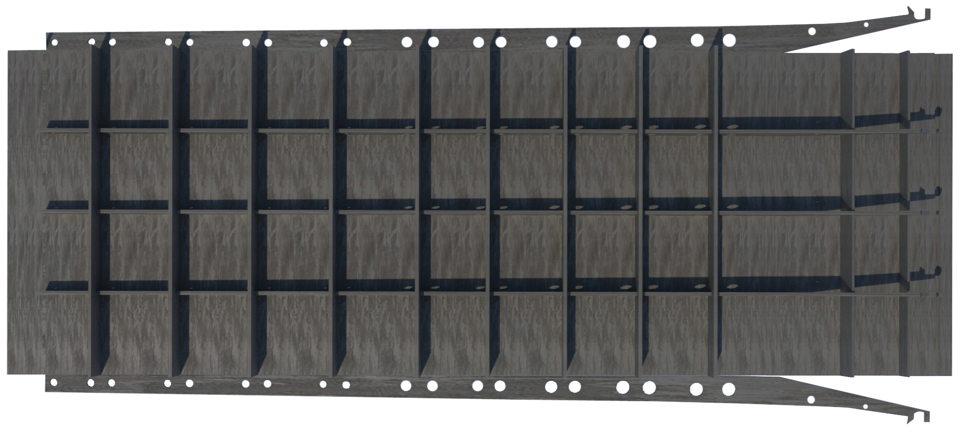
Unfolding

Typical Shell

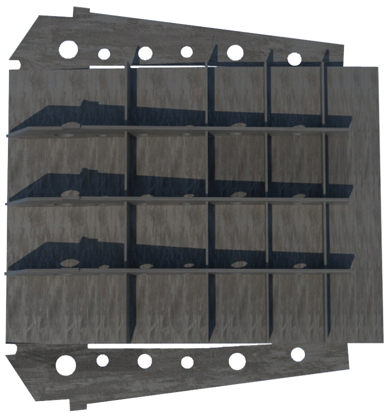
Bellow the three parts of a shell can be seen unfolded. The steel section grillage can be seen with circular perforations. These serve partly to preserve material but also to ensure air circulation within the walls and so avoid build-ups of condentation on the inside of the skin. The profile of the gutter is visible on the jaw piece - ready to hold a waterproof pipe.



Unfolded top piece in untreated steel. This is how the piece would look during manufacuturing.



Unfolded top jaw piece. Gutter profile visible to the left.



Unfolded footing piece.

Diagrams not to scale.

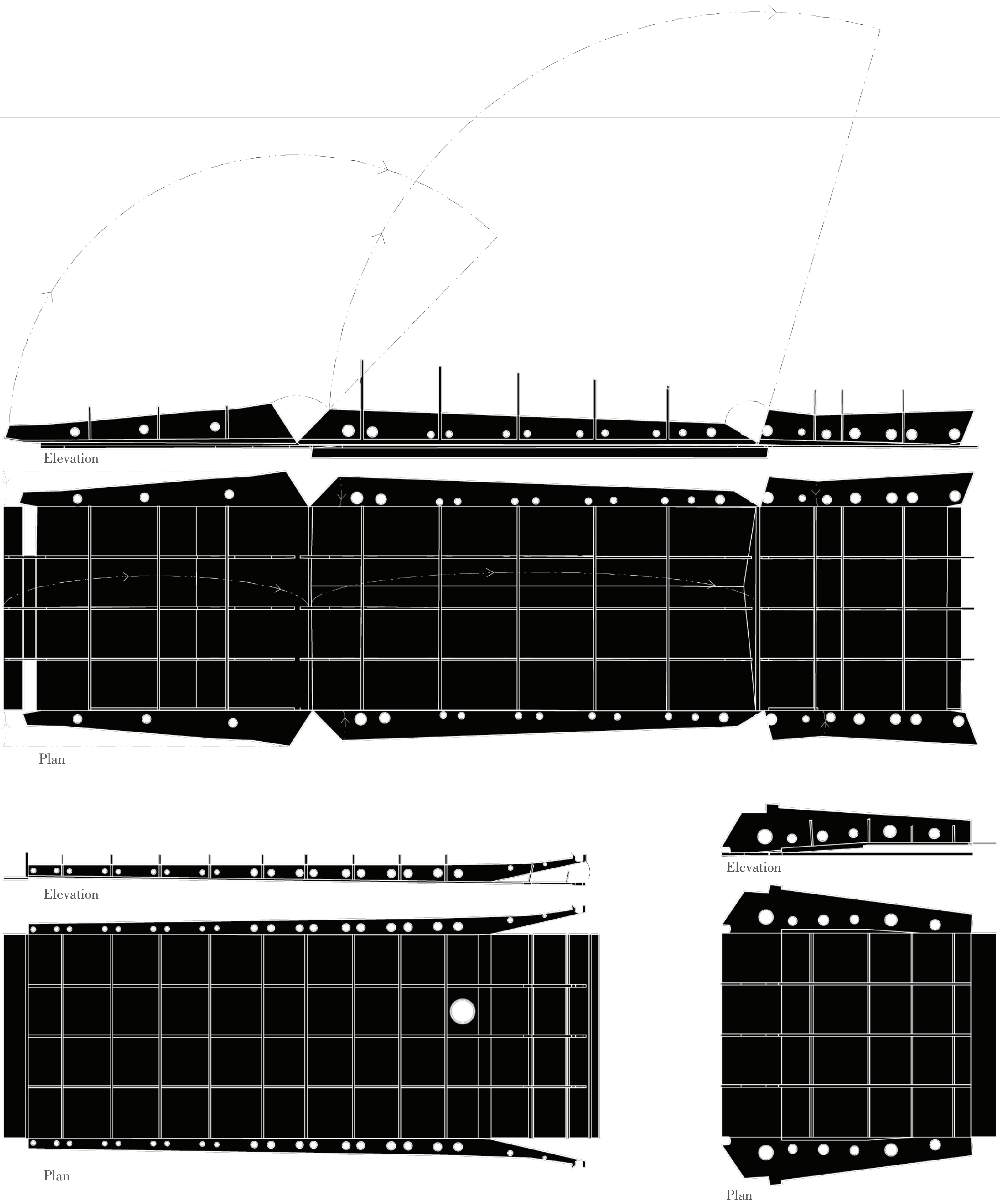


Diagram 1:200

Unfolding

Largest Piece

The largest shell is located at the back of the front part of the building. It is a complex piece that holds part of the theatre space on its inside and secures a piece of retained wall at its back. The three parts of the of the piece measure unfolded 400 m^2 for the top piece, 76 m^2 the footing and 190 m^2 for the jaw (excluding horizontal and vertical sections). These surfaces are all 6mm Corten steel. The weight of the largest piece is (with the weight of steel pr m^3 being 780 kg):

400*0.006*780 = 1872 kg. or 1.872 tons.

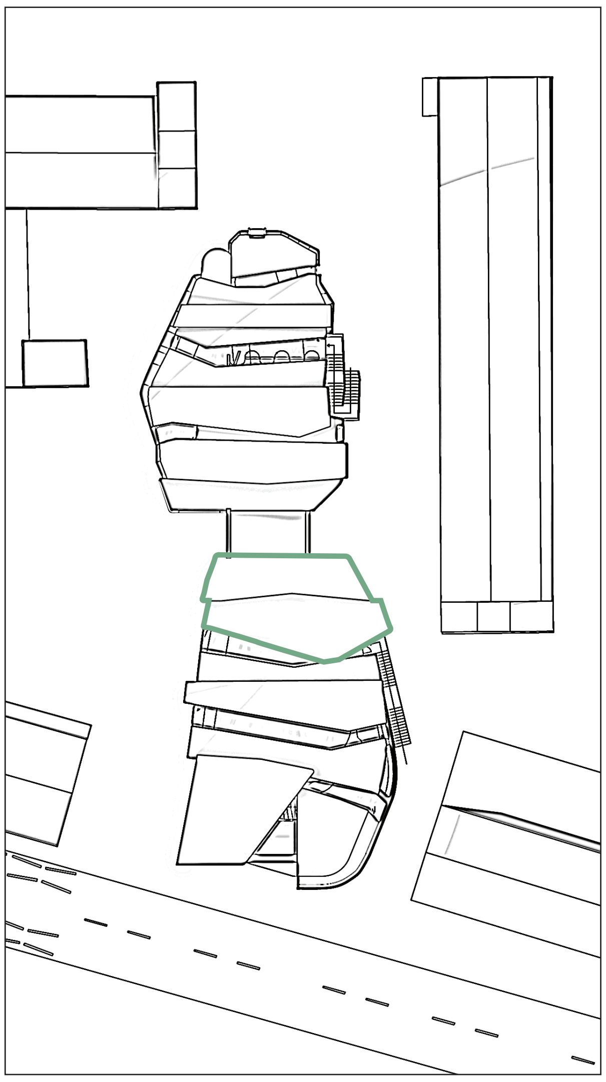
The maximum load liftable by a tower crane is 19 tons for reference.

The length of the joining seam is 38 m long. Assembled this piece is too large to transport within London and must therefor be subdivided into 4 pieces. The jaw and footing pieces, transported on the side are both below the dimensions for what is considered an 'abnormal' load by the UK ministry of transport.

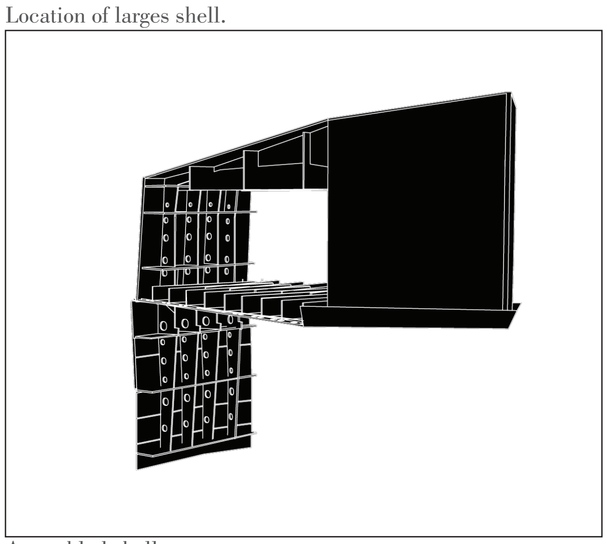
1. Abnormal loads

An 'abnormal load' is a vehicle that has any of the following:

- a weight of more than 44,000 kilograms
- an axle load of more than 10,000 kilograms for a single non-driving axle and 11,500 kilograms for a single driving axle
- a width of more than 2.9 metres
- a length of more than 18.65 metres



Location of larges shell.



Assembled shell.

The top piece however must be divided into two pieces to be below 2.9 m when loaded on its side.

It is possible to obtain a permit to transport abnormal loads, however either lane of Crowndale Rd is only 4 m wide and the shortest dimension of the assembled top piece is 7.8 m wide, making this highly unpractical.

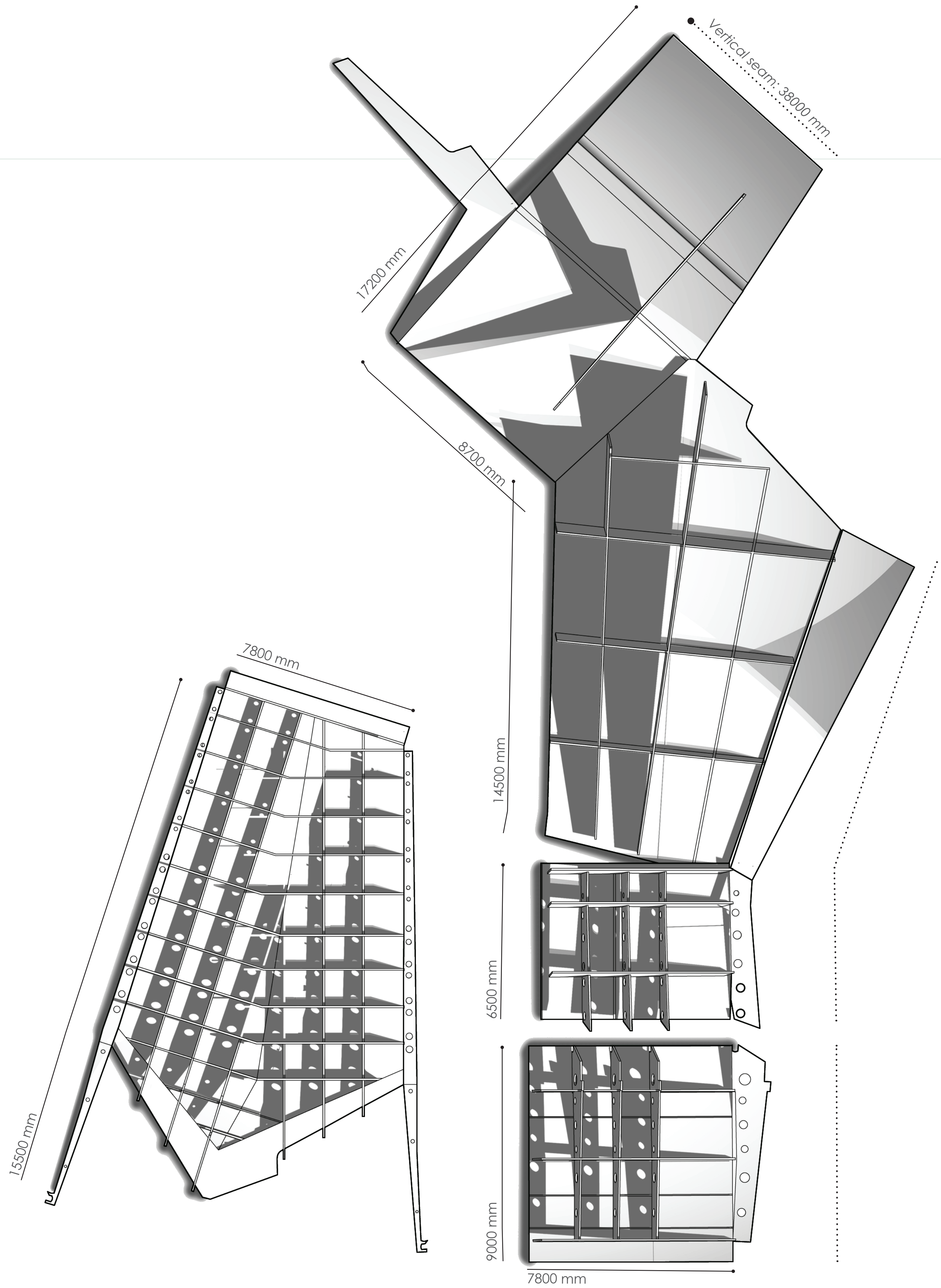


Diagram 1:200

Thermal Resistance

U-Value

The approximate R-value of steel is 0.003 pr inch making it a highly efficient thermal conductor. Unfortunately this property is undesirable for the thermal envelope of the building and a thorough insulation system is needed.
The limiting U-value in England and Wales is 0.35 W/m2K for walls and 0.25 W/m2K. A more ambitious standard is the passivhaus standard of 0.1 W/m2K for walls and 0.066 W/m2K for roofs.

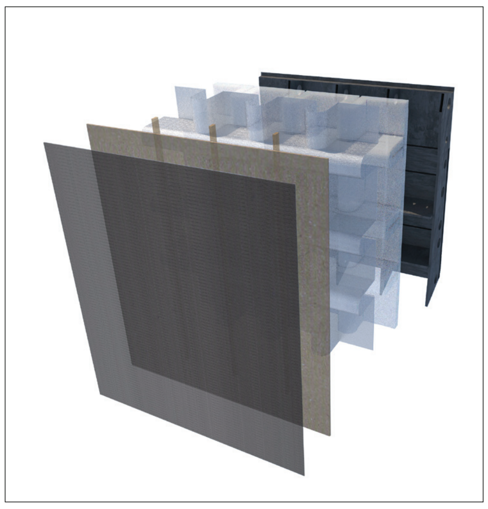
The buildings thermal envelope constists of:

- 6 mm steel - R-value vertually 0
- 200 mm Rockwool (R-value 3.7 pr Inch) - R-value 29.1

The U-value for this is:

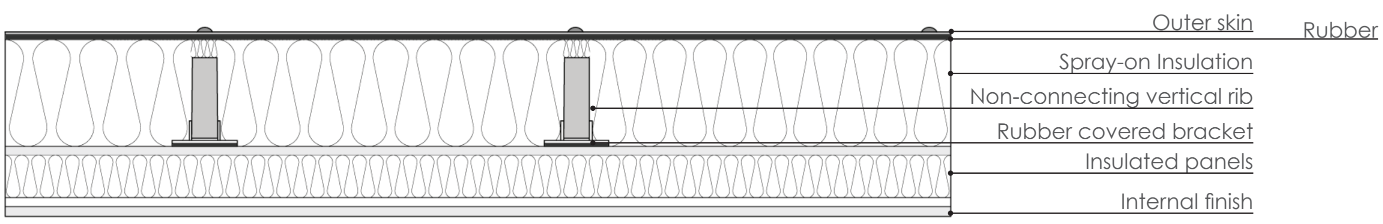
$$\frac{1}{0+(7.87\text{in} \times 3.7)} = 0.13$$

Compared to the England and Wales maximum this U-value is satisfactory, but almost twice the passivhaus standard requirement. Furthermore the metal connections from the outer to the inner skin of the building introduce several potential cold bridges that must be eliminated. At these points the U-value most also be expected to be higher and therefore the overall U-value pr m^2 somewhat higher than 0.13.
It should be noted that the passivhaus standard is not achieved solely through these U-values, rather a maximum level of energy consumption for the building determines if the standard is attained.
In the previous chapter two different approaches of insulation has been described, resulting in the above U-value of 0.13. On the left hand page is shown an alternative system that would achieve the passive house U-value of 0.066 and eliminate cold bridges.
While a passivhaus theatre does not seem like a realistic goal, measures could be taken to take the building in this direction. With a super insulating system like the one on the left page, it could be imagined that the building only consumes energy when performances take place - through ventilation. The rest of the time the structure would be so airtight that body heat and peripheral electronic equipment alone would heat the building with only occasional heating top-ups.

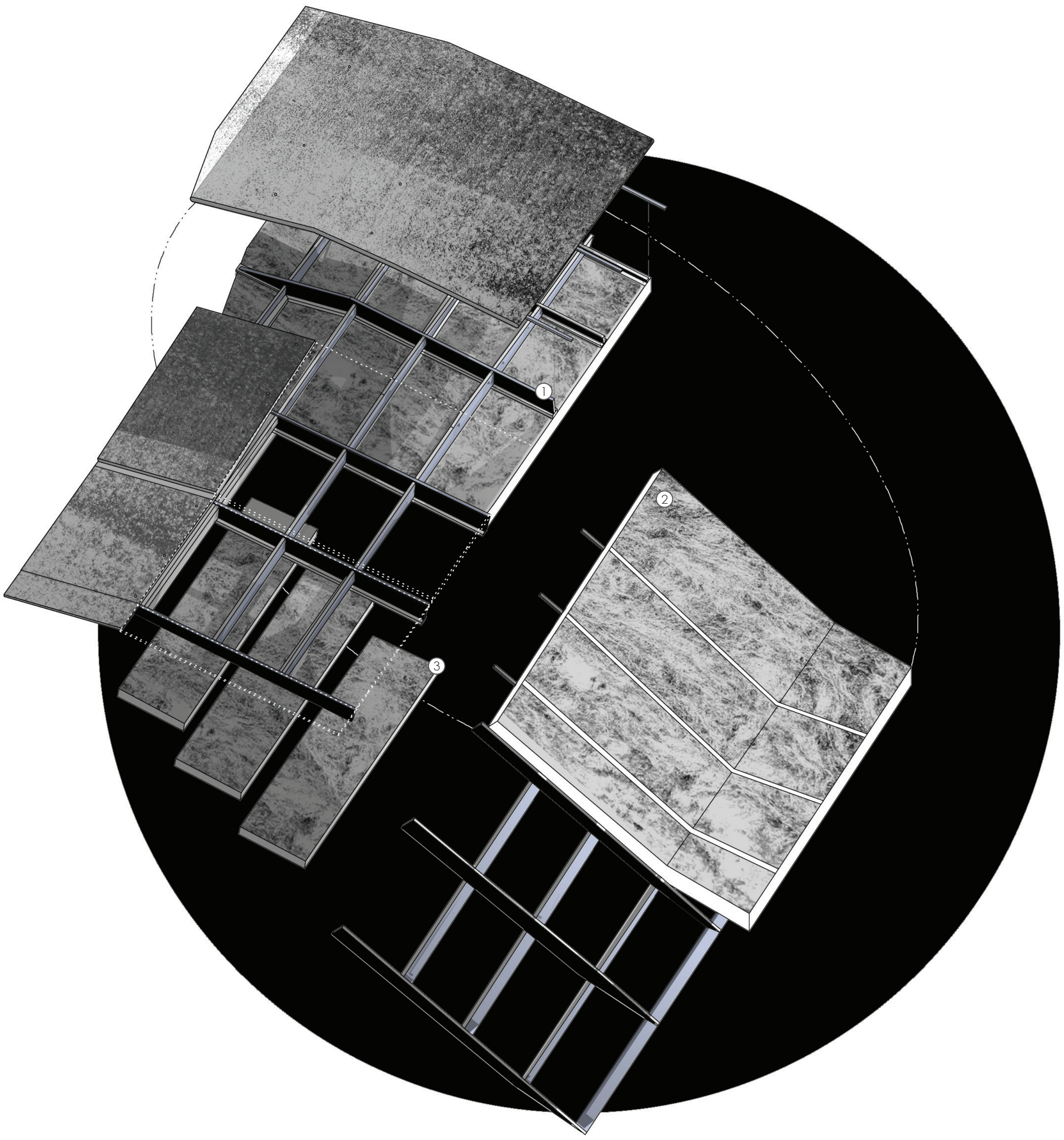


Wall build up.

Spray-on insulation.



Alternative wall build up - detail 1:25



Alternative wall build up - diagram not to scale.

1. Horizontal ribs are covered with a rubber membranae before the skin is bolted on. This minimizes cold transferred from the skin to the rips.

2. Spray-on insulation is applied to fill all cavities and cover all metallic surfaces.

3. Further insulation panels are placed behind the internal finish to cover all joints from the rips to the internal skin.