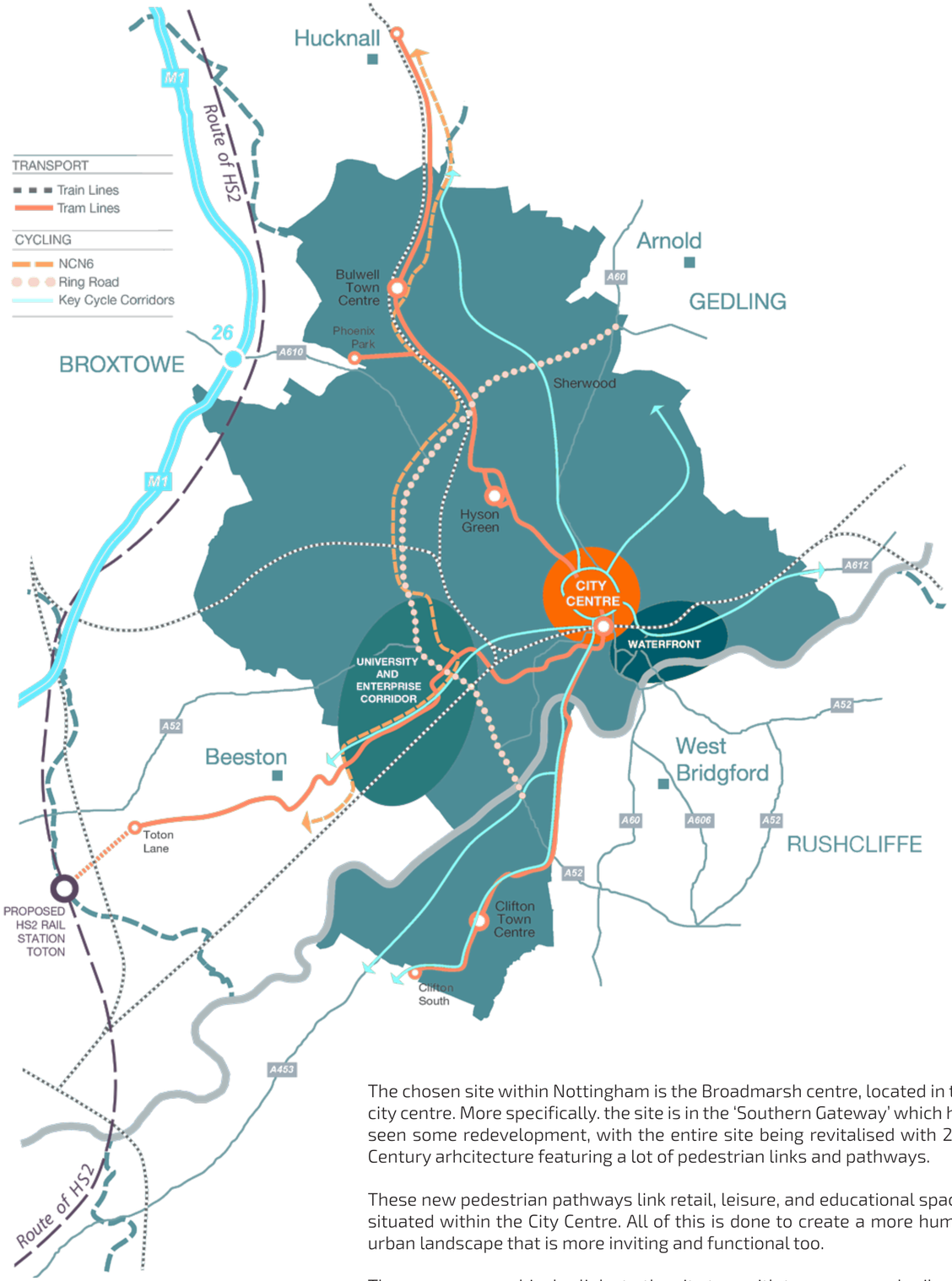
THE LOTUS THEATRE

REGENERATING LIFE INTO BROADMARSH

SITE LOCATION

The site is located in the UK, in Nottingham, which is situated in the central region of the country. Nottingham has been known for its creativity and affection for the arts with many local art galleries, theatres and even museums showcases all of this to a high degree.

However, since the pandemic the city has become less vibrant and many local places had to be shut in accordance to the lockdown regulations. This has put a significant damper on the extent of activities taking place within the city.



The Nottingham City Council is preparing to undertake a city-wide regenreation scheme that will see major improvement by the year 2030. The aims of the regeneration are to improve the financial stability and economy within the city, and create a healthier and more prosporous population residing in the city.

There are four major areas of focus within the city, which all aim to provide a “new buzzing economy and sustainable, healthy and high quality opportunities for residents”.

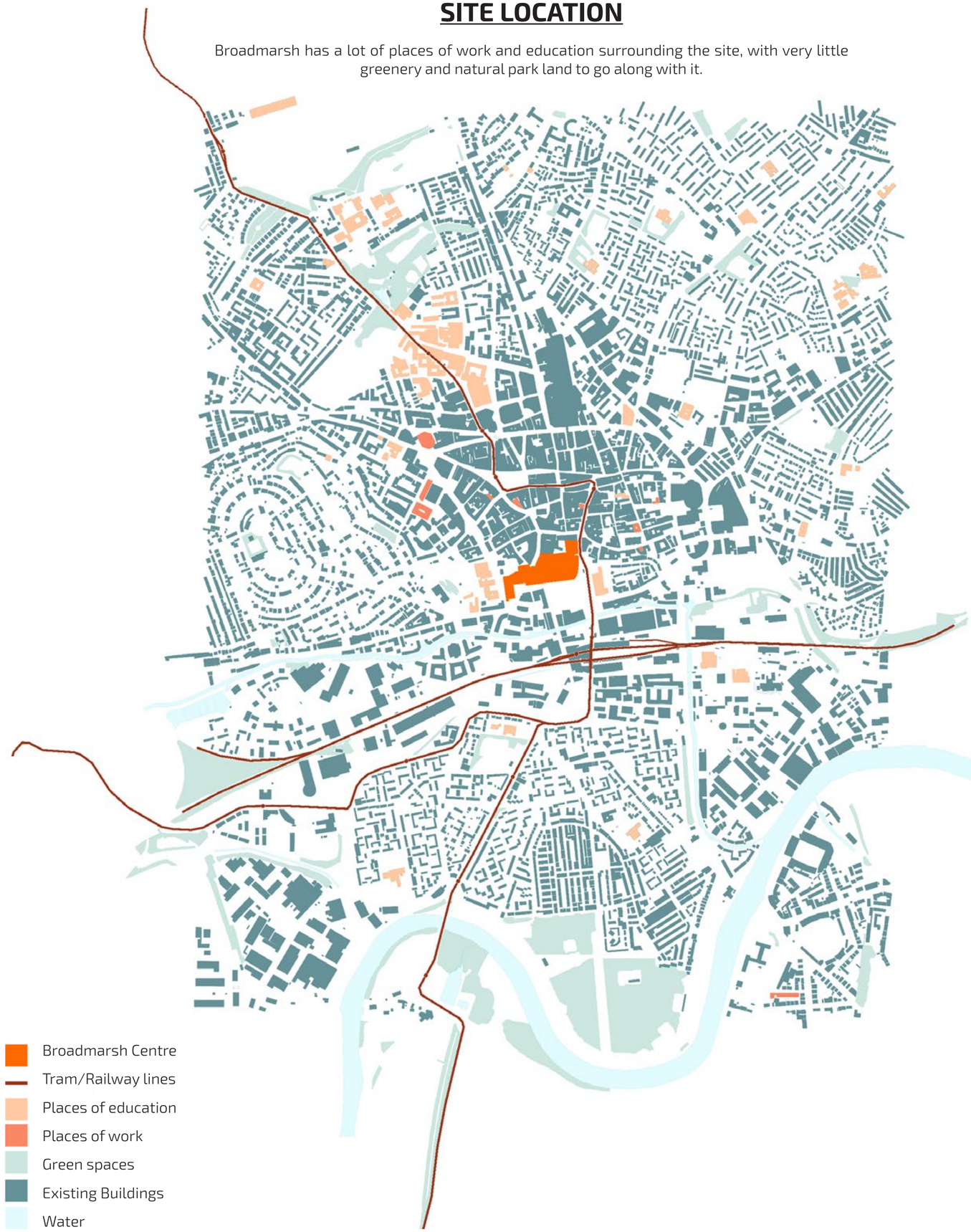
The chosen site within Nottingham is the Broadmarsh centre, located in the city centre. More specifically. the site is in the ‘Southern Gateway’ which has seen some redevelopment, with the entire site being revitalised with 21st Century arhcitecture featuring a lot of pedestrian links and pathways.

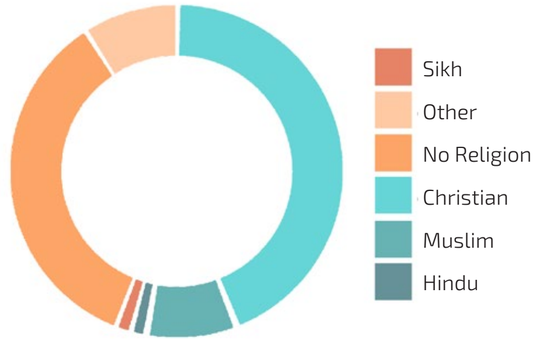
These new pedestrian pathways link retail, leisure, and educational spaces situated within the City Centre. All of this is done to create a more human urban landscape that is more inviting and functional too.

There are many vehicular links to the city too, with tramways and railways spanning the city, as well as the M1 running just west of Nottingham.

SITE LOCATION

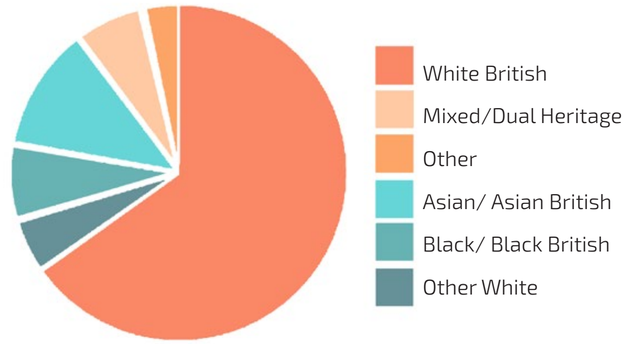
Broadmarsh has a lot of places of work and education surrounding the site, with very little greenery and natural park land to go along with it.





Religion

Nottingham is mostly Christian, with little proportion of other religions in between and another large proportion of people without any religion.



Heritage

Nottingham is a heavily white city, but has a fair distribution of many races and can be considered diverse in nature, boosted by the students too.

Age Range

Most people living in Nottingham fall within the 18-64 age range, as expected, with very little proportion of people over retirement.

DEMOGRAPHICS

The economic struggles around the Broadmarsh site have also been magnified in recent months due to the outbreak of the COVID-19 pandemic, affecting the population demographic in a disadvantageous way for Nottingham, as majority of the student population has left the city to be isolated in lockdown with their families.

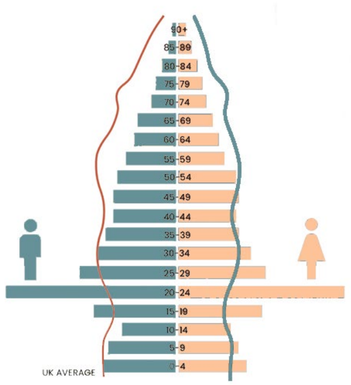
For Nottingham this meant losing almost 1/8 of its population and the economy that they would have bought to the city.

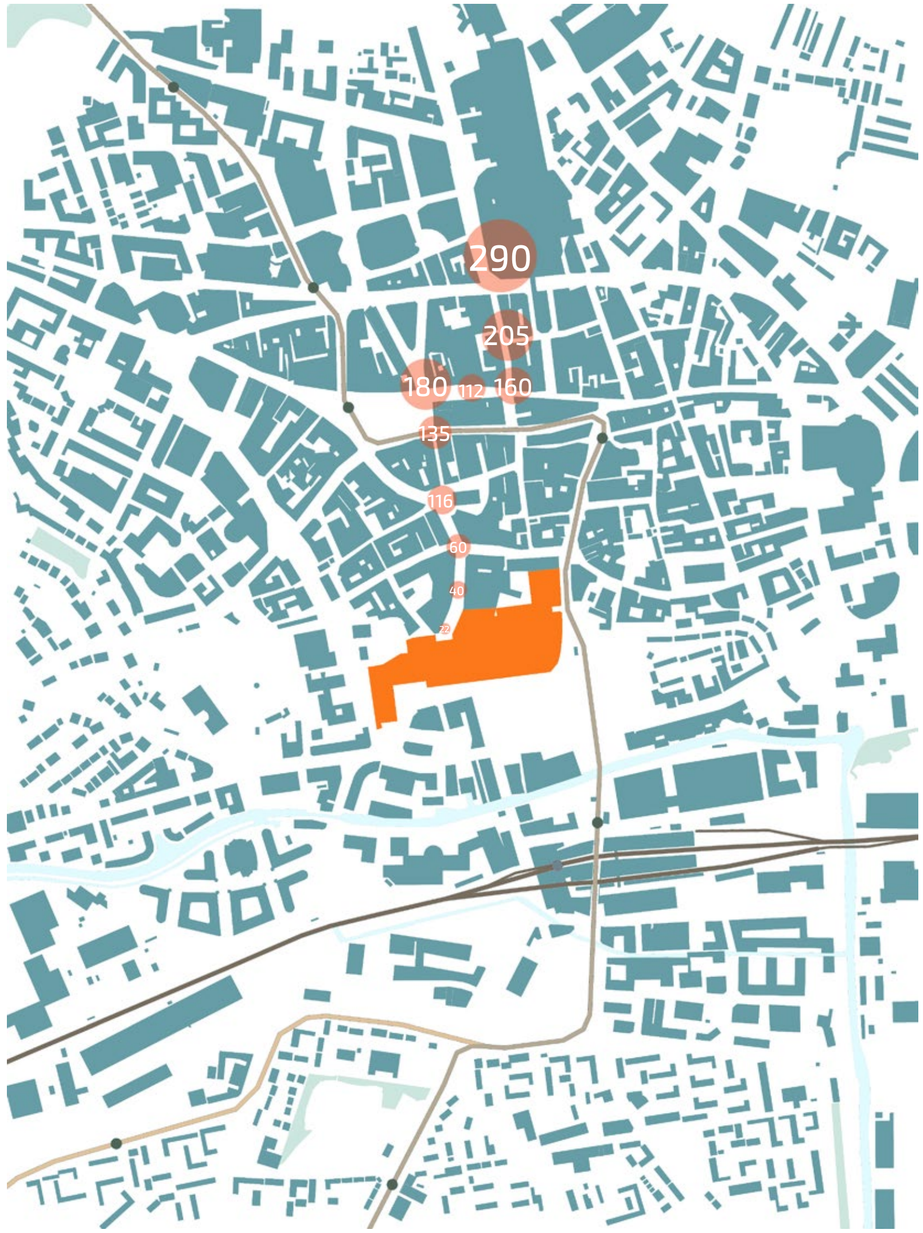
KEY WORKERS AMOUNT TO
35%
OF THE EMPLOYED WORKFORCE

Nottingham is ranked 11th as most deprived districts in England and since the pandemic, it is estimated the unemployment rate is 17% in 2020.

Furthermore, the recession brought on by the COVID-19 pandemic has led to the biggest fall in quarterly GDP on record, falling by 20%. Nevertheless, Nottingham's percentage of economically active people is 8% higher than national average.

Moreover, the proportion of students in the city could benefit the economy if they remain in Nottingham as newly qualified graduates.

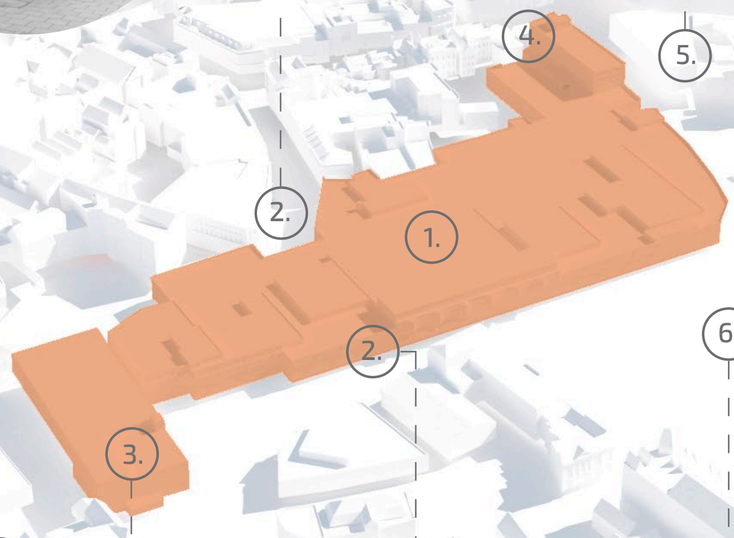




The project aims to act as an anchor point, providing a catalyst for urban regeneration in life onto the site. Therefore, it is important to note the current state of the site, with measured footfall dropping heavily as you approach the site from the much larger and more well known Victoria Shopping Centre.

This has led to a major decline in the Broadmarsh site, prompting many proposals to redevelop the site, which have all fallen through to various economical difficulties. The project will aim to reverse this decline and bring prosperity and vibrant life back into this forgotten site within the City Centre.

BROADMARSH SITE



1. Broadmarsh Centre

The Broadmarsh Shopping Centre is in a current state of demolition, which will continue as part of the project and open up space for the Urban Park.

2. Lister Gate

Lister gate is currently a main access point through the city to connect the north and south. It is a key axis which will need to be upheld.

3. NCP Car Park

The car park has been voted as one of the ugliest buildings in Nottingham, and will be removed as part of the Broadmarsh site demolitions, opening up the view.

4. Year 2 Housing Project

The second year housing project will take place north of the site, and will need to be considered to work cohesively with this project.

5. Nottingham Contemporary

The nottingham contemporary showcases the artistic nature of the city and will act in tandem with the project to bring like-minded people together.

6. New bus station building

The new bus stop building is currently under construction and will build upon the pedestrianised nature of the site, also featuring a public library.

7. New Peoples College

The New Peoples College currently under construction will provide more educational spaces around the site, and will feature a small auditorium space.

8. Maid Marian Way College

The Maid Marian Way College site to the west features classes in science, health and social care, as well as photography.

MASTERPLAN YEAR 10

Upon completion, the Project 1 masterplan for broadmarsh created a new urban park for the residents of Nottingham City. This urban park features a flexible temporary architecture units forming work places, places to eat, workshops and studios, as well as a flexible and constantly changing daily market.

Work Building

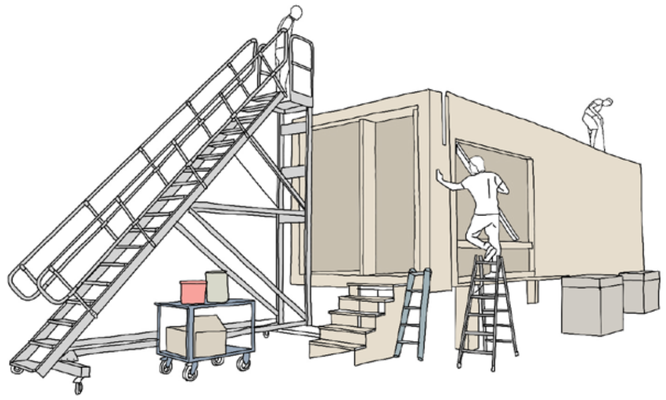
The Market

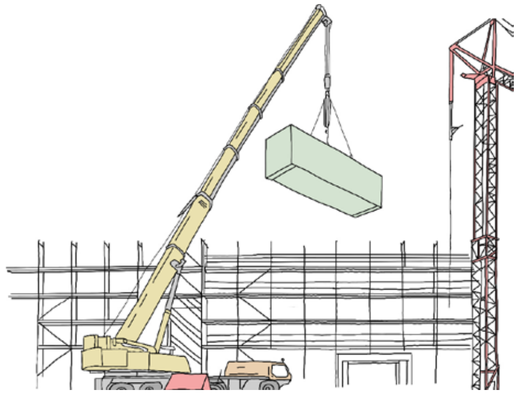
Landscaping

Play Building

MASTERPLAN DETAILS

The masterplan was designed using temporary architecture, to keep it very flexible so it can react to public needs both socially and economically with ease. The building frames were made from steel and the pods out of timber, constructed by students of the Peoples College. This allowed the public more control and ownership over the project.



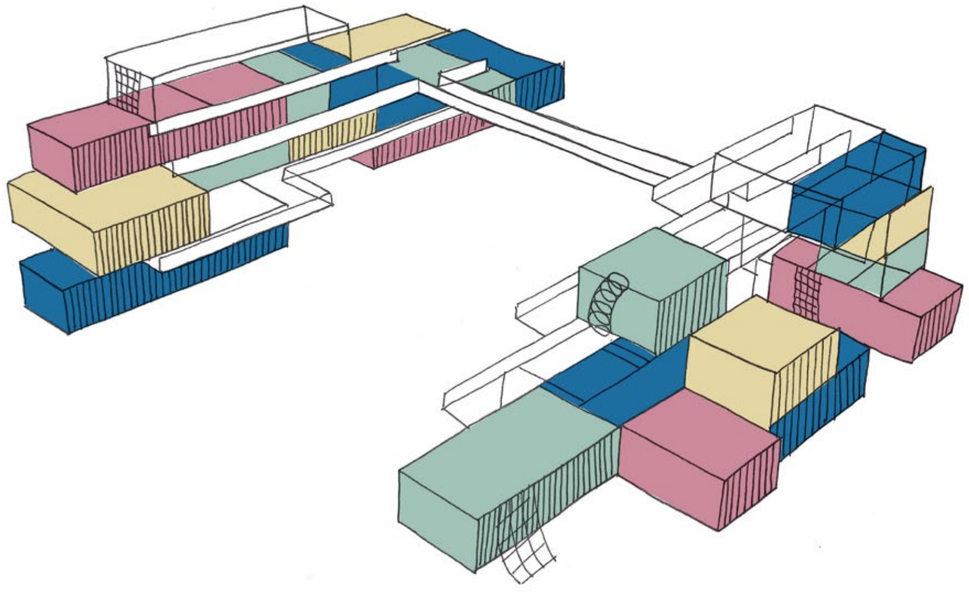


Construction:

- Quick and easy construction of timber frame pods using prefab units, by students of the People's College just west of the site
- Carbon footprint of project was also reduced by using locally sourced timber and constructing it offsite.
- Pods are craned into place to allow flexibility and interchangeability
- Masterplan grows with needs of society and economy, with few permanent features

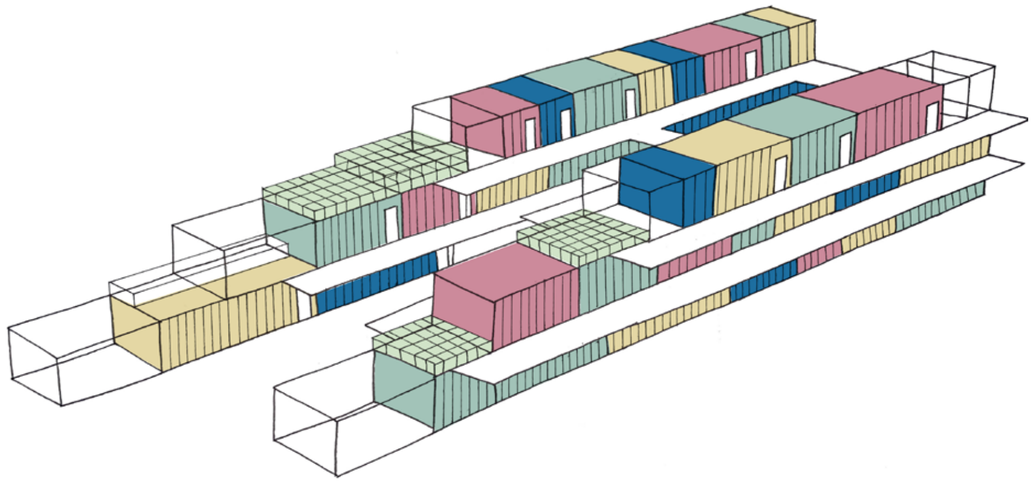
Market:

- The market sells local food and produce everyday, changing to cater for needs of all different ethnicities within Nottingham
- The market also changes seasonally, to adapt to the weather
- Seating is provided for visitors who want to consume their food in place and overlook the busy marketplace in use
- The marketplace is also constructed using steelframing and is flexible to adapt to changes in societal needs



Play Building:

- The play building features pods used for ammenities such as cafes and bars
- Will also feature a rooftop bar when weather permits for its use
- It will be running late into the night to liven the nightlife and attract people to the site at all times through the day and night.
- The larger pods may be used as workshops, or even as a yoga studio

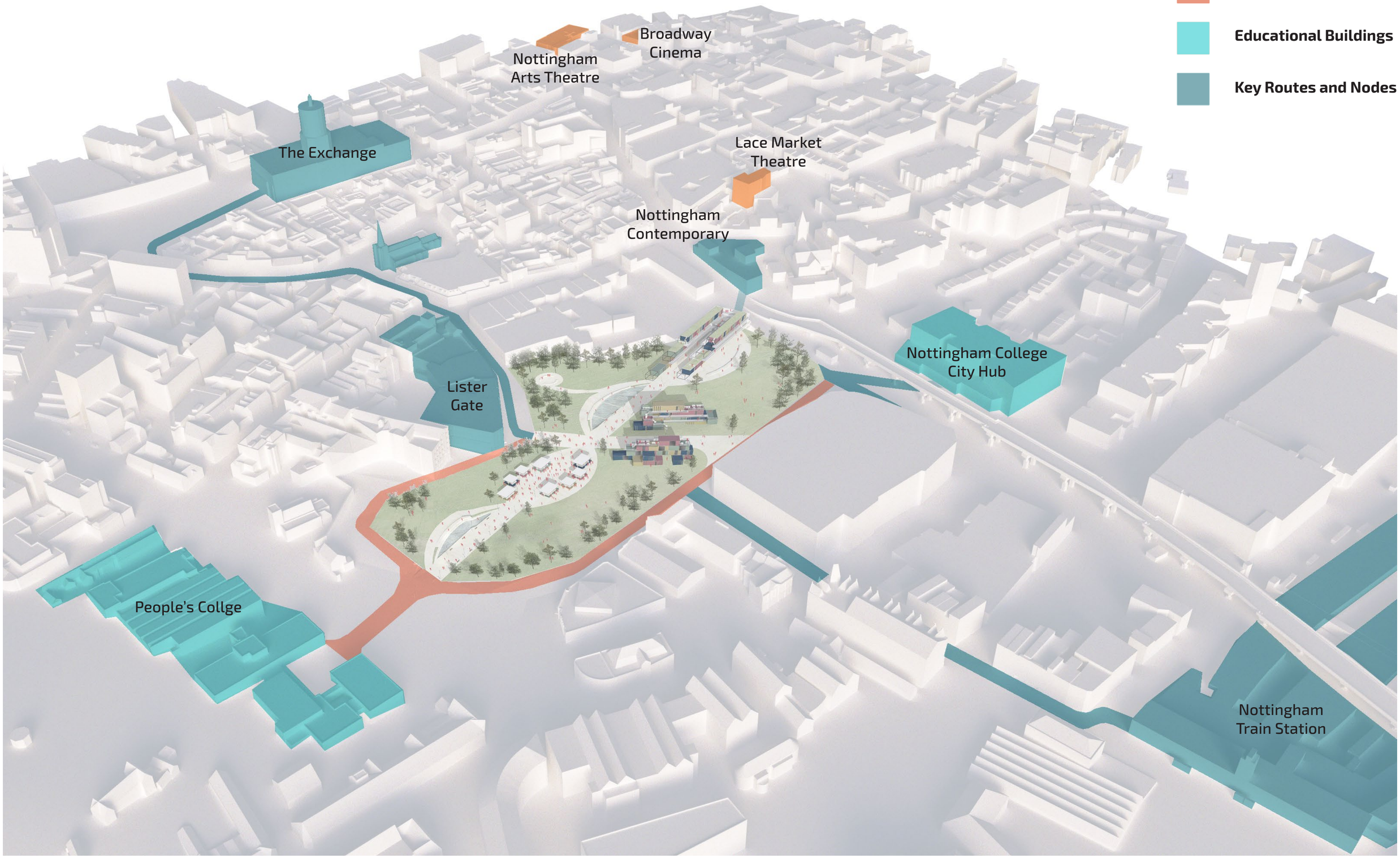


Work Building:

- The play building features pods used for individual and group work
- Will also allow for businesses to set up flexible work places
- There will be green roofs on top of the pods to provide breakout spaces and help integrate nature into the project
- The building will provide access for the newly positioned tram stop at the east end of the site

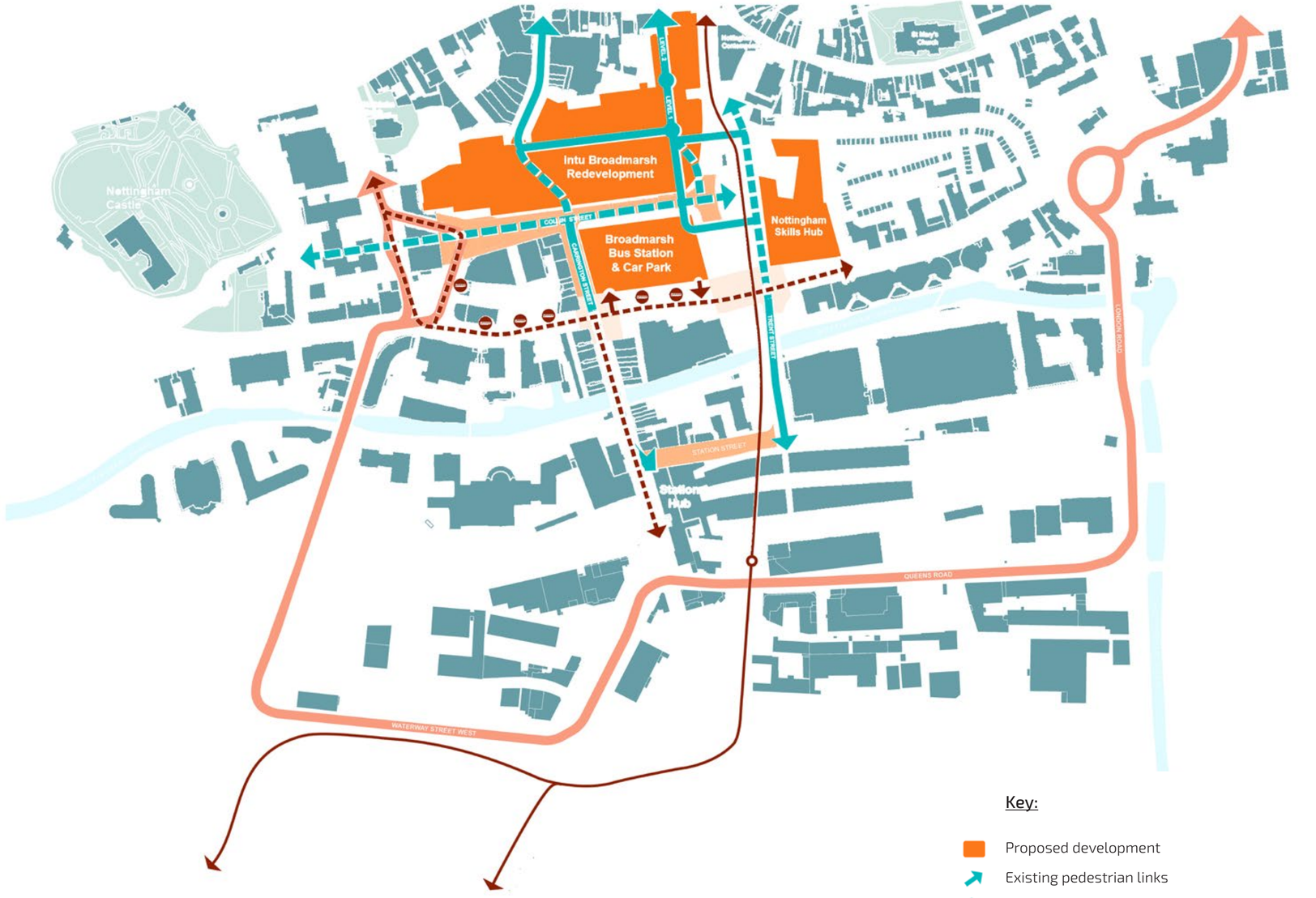
SITE CONNECTIVITY

The proposed masterplan for Project 1 introduces a new pedestrianised street, which will help reduce noise along the southern boundaries, making the site more suitable for a performance space. The site is bookended by educational buildings, whose students could make good use of a multiform theatre for lectures or could lend photography experience during performances for the photography students in the Peoples College.



SITE ANALYSIS

The Broadmarsh site has seen many redevelopment proposals, but each one has fallen through due to various economic struggles. However, there are some nice elements that are worth keeping and thinking about for this project, such as the most recent development plan that looked to revitalise the area with the introduction of pedestrian paths, new library, car park and bus station.



Key:

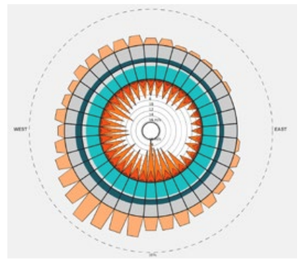
- Proposed development
- Existing pedestrian links
- New pedestrian links
- Pedestrianisation
- Less managed junctions
- Southern relief route
- Proposed bus route
- Proposed new bus stops
- Tramline and stops

The design will implement the road changes set out by the most recent redevelopment proposal of the Broadmarsh Shopping Centre. This includes the redirection of traffic away from the site and the introduction of a pedestrianised zone and new pedestrian streets to the south of the site.

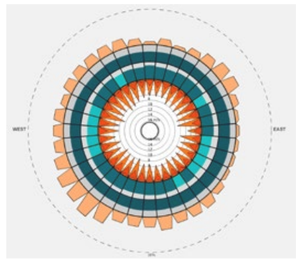
The site being located in City Centre attract a lot of noise attributed to the traffic, which also increases pollution levels.

The redirection of traffic will aid the relief of pollution and noise around the site, making for a more desirable site condition.

Winter



Summer

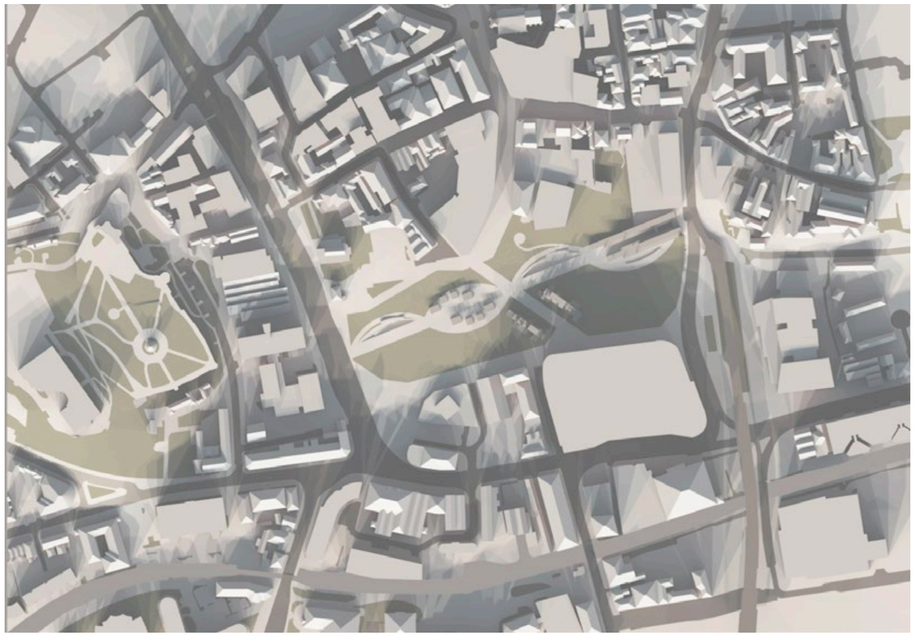


Wind around Nottingham typically arises from south-westerly direction and is much stronger in winter months than summer ones. The wind can also carry the sound and pollution surrounding the site.

SOLAR ANALYSIS

Overlayed shadows for the Summer Solstice

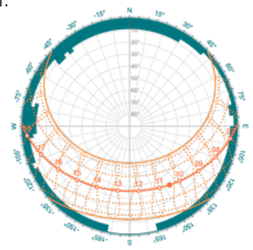
Overlayed shadows for the Spring Equinox



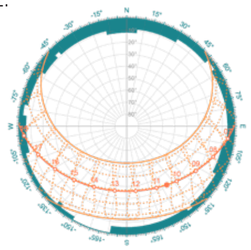
Overlayed shadows for the Winter Solstice

Overlayed shadows for the Fall Equinox

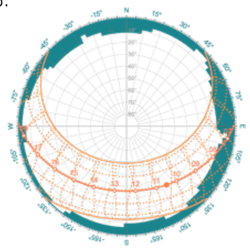
1.



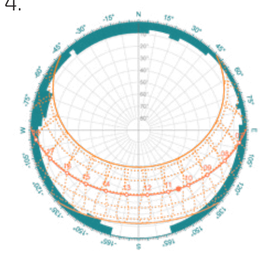
2.



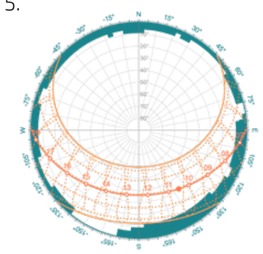
3.



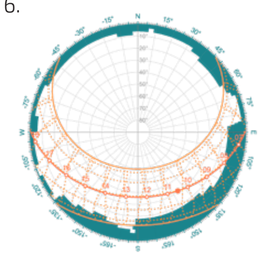
4.



5.



6.



Shadow masks taken around various points on the site, to highlight the exact luminious conditions and show the open areas of the site that may need potential shading elements.

The solar study undertaken at various key points in the year has revealed that the site gets a lot of solar radiation and has very minimal shading. There are more shadows in the winter months, as expected, but for the majority of the year the site is left exposed to the sun.

The shadow masks also show that the site is very open with little to no coverage from the east and some more coverage (but still minimal) towards the south and west. This means that solar gain is not majorly inhibited, and may need to be addressed by implementing shading devices. However, the openness of the site will benefit the building with passive solar gains during winter.

The building on site will recieve most solar radiation on the roof, solar panels will be most effective here orientated towards the south. The roof should also have a high thermal mass to reduce risk of overheating. The southern facade also recieves a lot of radiation so glazing should be limited and shading devices may be needed in the summer. The building should also be orientated to help limit solar gains and overheating in summer months.

1:2000 Site Plan

THEATRE MAPPING

Nottingham has quite a few different sized theatres and cinemas near its city centre. These include:

- 2000+ seating capacity Royal Concert Hall
- 1,100 seating capacity Royal Theatre
- 750 seating Nottingham Playhouse
- 300 seating capacity Arts Theatre
- 124 seating capacity Lace Market Theatre

The cinemas range from 100-400 seating capacity as well, varying from screening room to screening room. Interestingly, none of the aforementioned theatres or cinemas are open air, with the only operating open air theatres around Nottingham being the ones in Wollaton Park and Newstead Abbey both only operating in summer.

Therefore, there is a great possibility to set up a multiform theatre to:

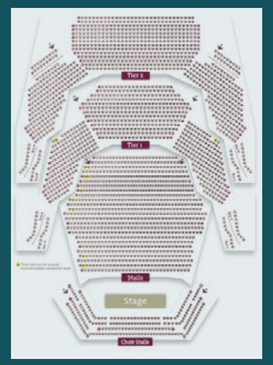
- Provide connectivity to the City Centre and very easy accessibility
- Enhance nightlife around the park
- Showcase local aspiring artists to perform in various acts such as musicals, dramas and concerts
- Provide a chance to collaborate with and expand some of the smaller venues outward

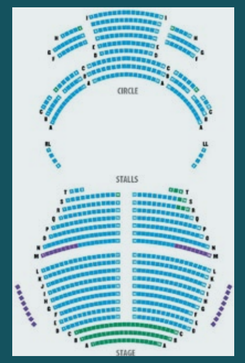
Theatre Royal and Concert Hall

The Royal Theatre hosts up to 1,186 people over 4 levels: the stalls, the dress circle, the upper circle, and the balconies.

The Royal Concert Hall can host up to 2,257 people over 3 levels: the stalls, tier 1 and tier 2

Together they host a range of events from dramas, opera, ballet, musicals and even an annual pantomime.





Nottingham Playhouse

The Playhouse hosts up to 770 people along 2 levels: the stalls and dress circle.

The Playhouse features a variety of performances like: drama, musical, comedy, film and dance. It also specialises in children's theatre with a variety of different pantomimes.

Nottingham Arts Theatre

The theatre can seat up to 300 people and has a proscenium arch and an orchestra pit.

The theatre programme features mainly amateur performances , showcasing some local talent.

Lace Market Theatre

This is the smallest of the local theatres, and is run independently. It can only seat 124 people and is perhaps starting to outgrow the size of its venue.

The theatre has a varied programme that showcases amateur talent.

CLIENT PROFILES

Kim and Jennifer

A young couple who enjoy fine arts and love to check out new performances in theatres. They enjoy seeing local amateur talent to experience a raw and authentic performance, as opposed to world renown professionals. The development of a new multi-purpose theatre will be perfect for them.

Laura and Connor

Newly joined students to the Peoples College in Nottingham, studying photography at the Maid Marian Way Building. The new multi-purpose theatre will give both of them ample opportunities to hone their skills in photogrpahy by attending spectacular live performances of all types of entertainment.

Elizabeth

Native to Nottingham her whole life, Elizabeth has been attending the Nottingham playhouse and Royal Concert Hall for years and is ready to see something fresh and new that has not been regularly featured in Nottingham before. This new multi-purpose theatre will be the perfect venue for her and her family.

Ellie

An aspiring young artist, who has formed a band along with friends from school, and is now looking for her big break. She often cuts across the newly developed park and has been waiting for the opening night of the theatre to showcase the talents hiding in Nottingham.

Brad, Rachel, Savannah, and Luke

Young family visiting their relatives in Nottingham and looking for something to spend their day and later their evening. The various outlets of entertainment found within the multi-purpose theatre will be more than enough to cater for their needs.

PRECEDENT STUDY

Architect: Haworth Tompkins
Project: Regents Park Open Air Theatre
Date: 2012
Location: London, UK

The regent park open air theatre is medium scale seating about 1,200 people. It is open only when the weather permits for reasons clear to infer, but is one of the best theatres when it is operating. The construction fits seamlessly into its surroundings, masked by the trees, which help to integrate the structure into its immediate natural context.

The sense of discovery upon arriving at the theatre, finding it hidden amongst the trees adds to the theatrics of it and heightens the experience. It is combining landscaping with the architecture and seamlessly creating a single shared environment.

The back of house and offices were installed separately in order to keep the theatre in the same location year round, not having to move off site during winter. Some of the structures were left unfinished to better integrate them back into the nature as the elements become weathered throughout the years.

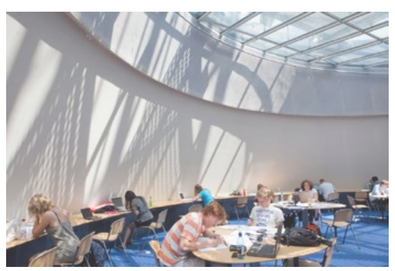
PRECEDENT STUDY

Architect: Mecanoo
Project: Library Delft University of Technology
Date: 1997
Location: Delft, Netherlands

The library slots into the space created when the auditorium is tilted at one point. All of this is covered by the landscaped green roof, which helps to soften the visual impact of such a big building by blending it into its surroundings. The central space is illuminated through top lighting created using the cone piercing through the roof.

The roof can be accessed and used as a place to hangout/ study with friends. The slope is gentle enough to be easily traversed and makes the building operate as a sort of park as well as a library. This duality of indoor and outdoor function for the space makes the project work very well and creates an attractive point to be at on campus.

The natural greenery is paired with brutalist concrete structures, making the building feel as if it was carved out of the landscape. However, the glazed facade provides a light touch, as well as illuminating the spaces.



PRECEDENT STUDY

Architect: Snohetta
Project: Theodore Roosevelt Presidential Library
Date: 2020
Location: North Dakota, USA

The Library is perfectly submerged into its surroundings, almost completely hidden from view until taking a closer look. The design is more than a building: it is a journey. One can traverse along the rooftop's green landscape as if it was a hill, whilst small pavilions beneath provide reflection spaces and places for activity. The main aim of this design is to preserve the natural landscape.

The materiality of the building showcases timber, further building on the sense of naturality. The rigid geometry of the ceiling/canopy balances and contrasts the organic curves of the landscape very well.

Spaces created on multiple levels to be descovered and used simultaneously split the site and building functionality, effectively amplifying the experience. The rooftop offers great views onto the valley during a nice hike, as well as a place for stargazing at night.

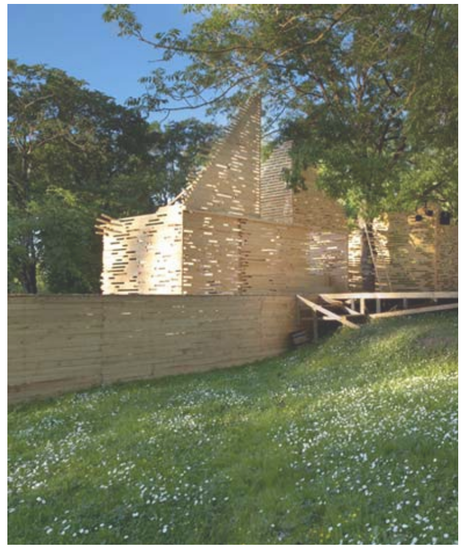
PRECEDENT STUDY

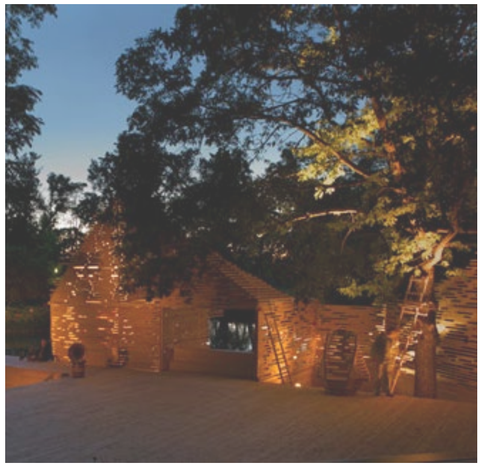
Architect: Kadarik Tuur Arhitektid
Project: Rakvere Summer Theatre
Date: 2011
Location: Tallinn, Estonia

Specially built for 12 plays during summer, this outdoor theatre can seat up to 420 people. The theatre is located near a pond and is hidden by the woods, to make the theatrical experience more isolated and feel more intimate.

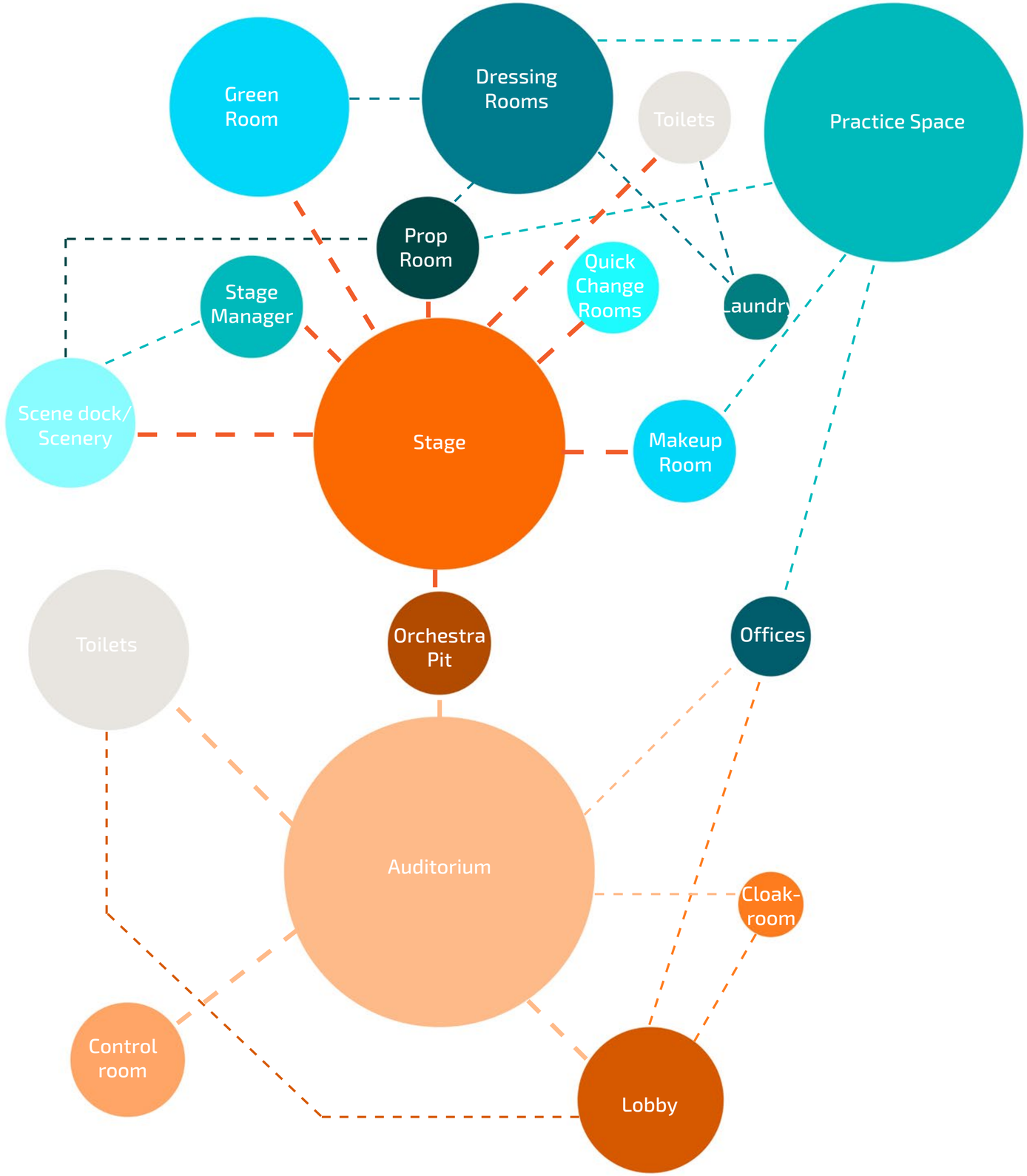
The stage and seating is built temporarily from 50x50 wooden battens and is left untreated so it can be weathered naturally. After all the plays are conducted, the theatre is disassembled and the parkland returns to its original format. The timber can then be recycled and used for different purposes in other projects, making it a very environmentally friendly and sustainable design.

There is a clear sense of integration with nature through the choice of location as well, carefully placing the stage directly between the trees to create a masking layer around the theatre.





ADJACENCY DIAGRAM



Multiform theatres accomodate for a range of different performances, such as theatre, ballet, musical, concerts, opera, and even cinema. They are made to be very flexible and share very similar spaces that are used in different ways. The spaces in common generally are: the stage, the seating area, the green room/waiting area for performers, dressing rooms, storage spaces for instruments or props, practice spaces, control rooms and etc.

The spaces here can typically be categorised into two types: front of house or back of house, with only the performers and those associated with the production allowed access to the back of house. Much of what happens in a theatre needs preparation, which requires its own space that has to be separate from the public eye so as to not shatter the illusions created by performances.

Having considered minimum spatial standards, the adjacency diagram shows the comparative sizes of the various spaces relative to each other and shows how the spaces would need to interlink together, alllowing for easier positioning on site.

The Front of house spaces are:	**Area (m^2)**
Stage	250-300
Seating/Atrium	450
Lobby	100
Cloakroom	20
Orchestra Pit	50
Control room	60
Lavatories	120
Sub-total	1100

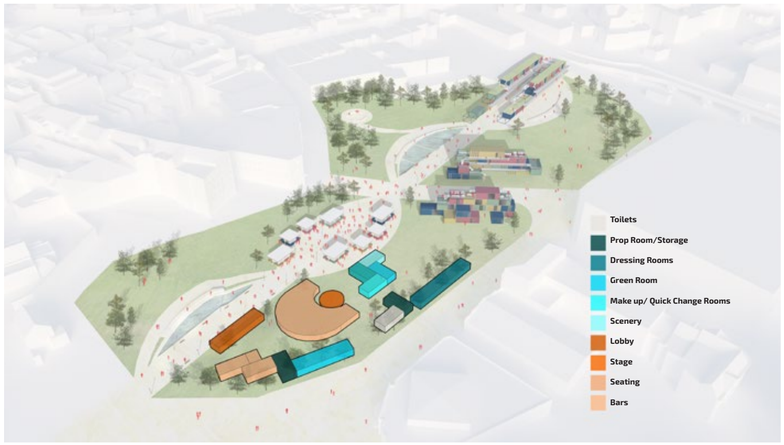
The Back of house spaces are:	**Area (m^2)**
Quick change rooms	40
Dress rooms	170
Prop room directly off stage	50
Scene dock/Scenery	80
Stage manager	50
Laundry/repair room	20
Specaliast makeup room	50
Pre performance practice room	320
Green room	150
Offices	30
Lavatories	40
Sub-total	1000
Circulation	+10%
Internal wall area	+10%
Grand Total	**2500**

Key:

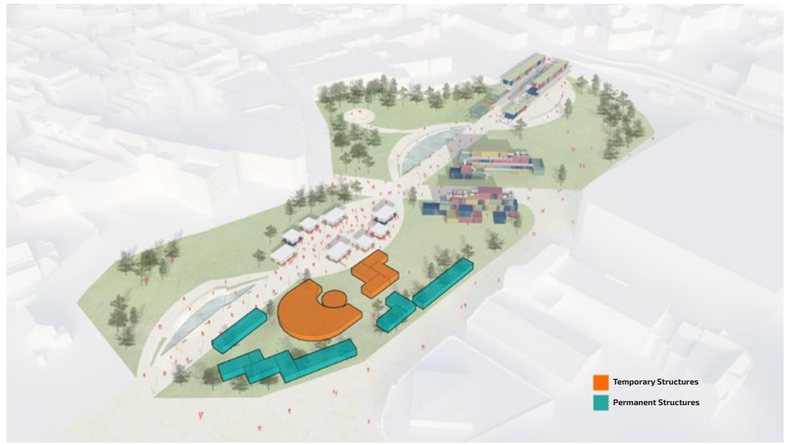
- Lavatories
- Prop Room/Storage
- Dressing Rooms
- Practice Space
- Scenery/Office
- Make up/ Quick Change Rooms
- Green room/ Cafe
- Orchestra Pit
- Lobby
- Stage
- Seating
- Cloakroom
- Main public route
- Secondary public route

1:500 MASSING LAYOUT

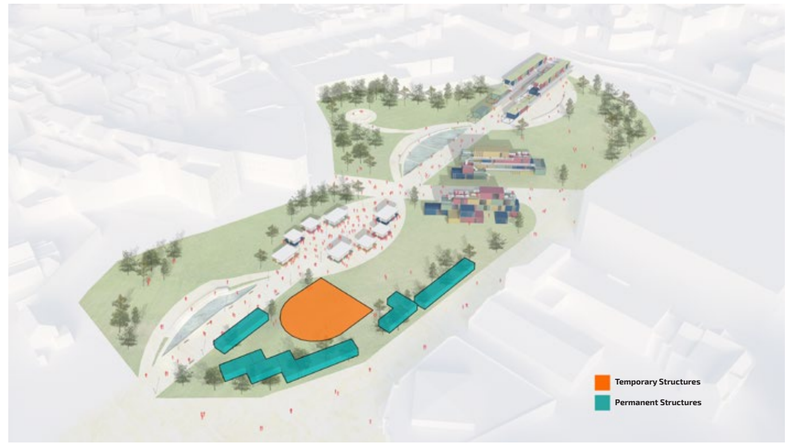
MASSING ITERATIONS



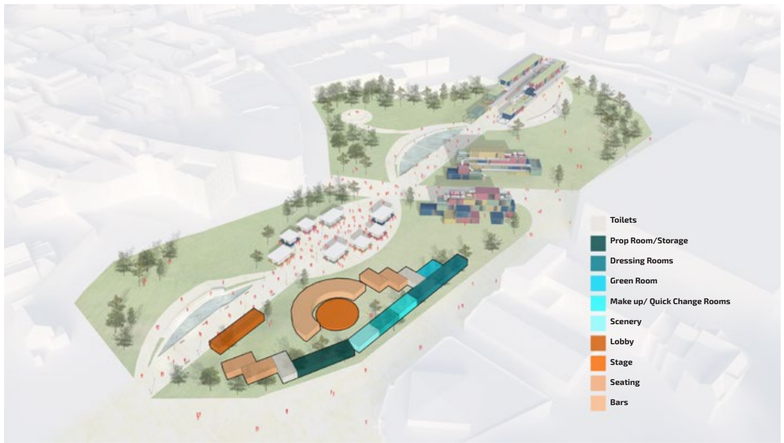
Massing looking at separate building structures for back/front of house.



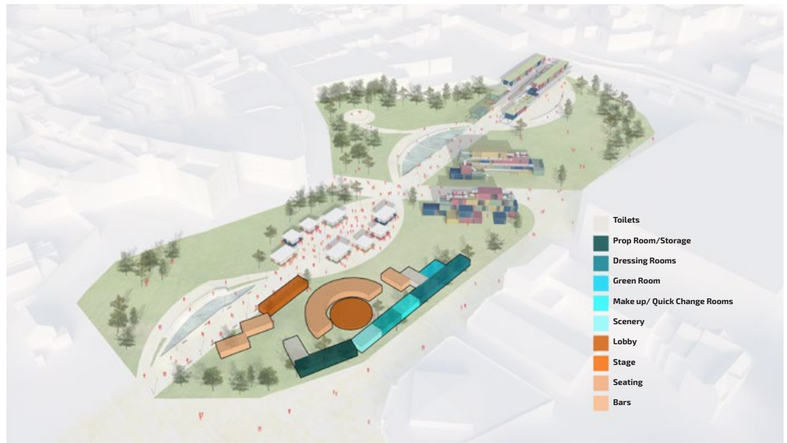
Massing layout for summer open air theatre with temporary stage and seating



Massing layout for winter ice rink and winter with temporary structure

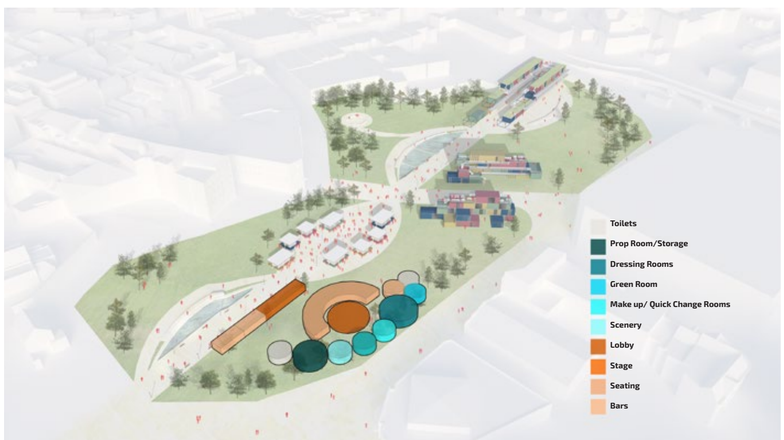


Massing layout enclosing the stage area for a more private and intimate feeling

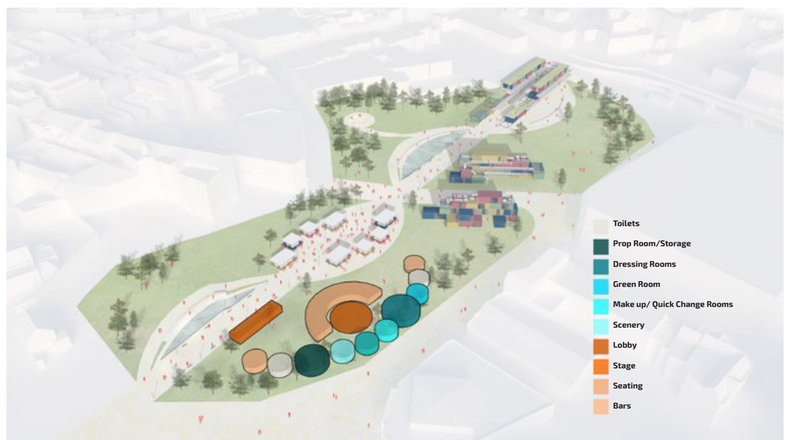


Massing layout creating a separate lobby/entrance ‘gate’ to get to the stage

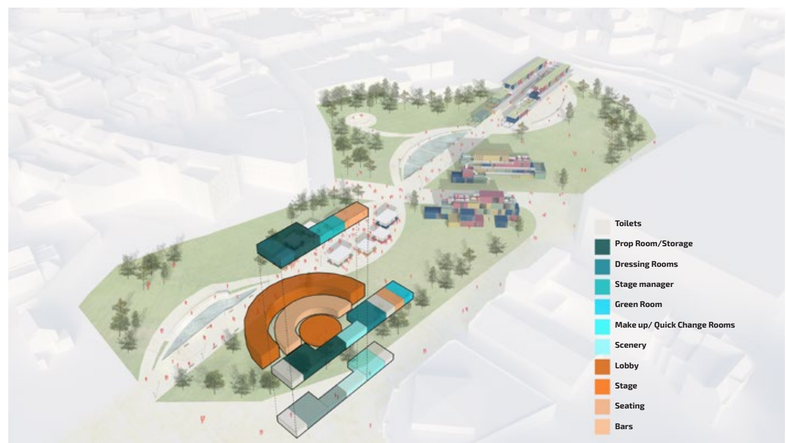
Massing looking at incorporating a pre performance practice spce



Massing combining linear entrance space with more playful circular stage areas



Massing encompassing stage with circular elements in a crescent shape

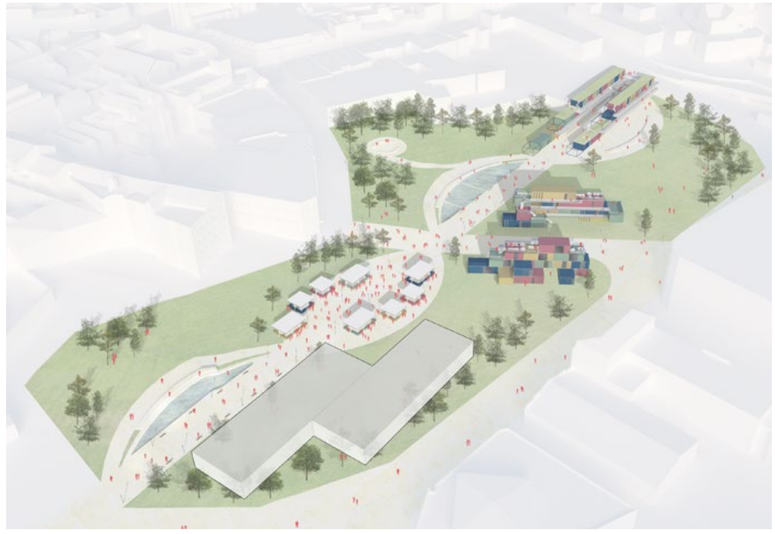


Multi-level massing combining linear back of house with circular front of house

VOLUMETRIC MASSING

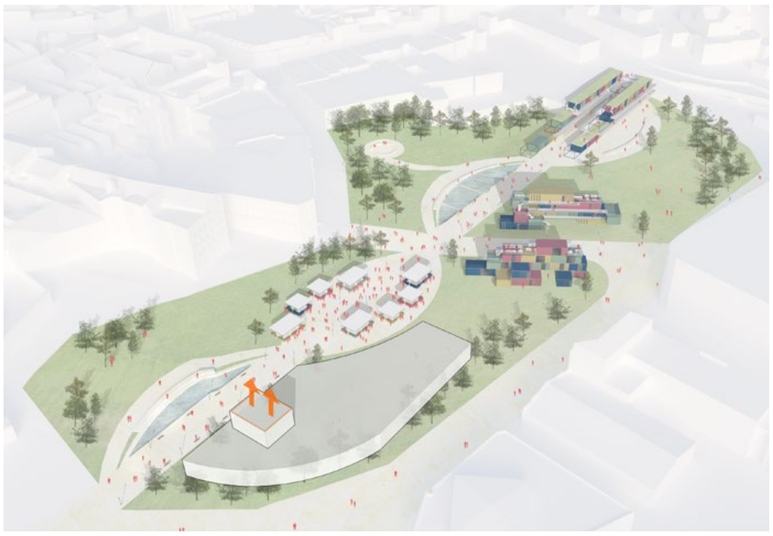
DEVELOPMENT: FORM FINDING

Initial massing configuration with volumes

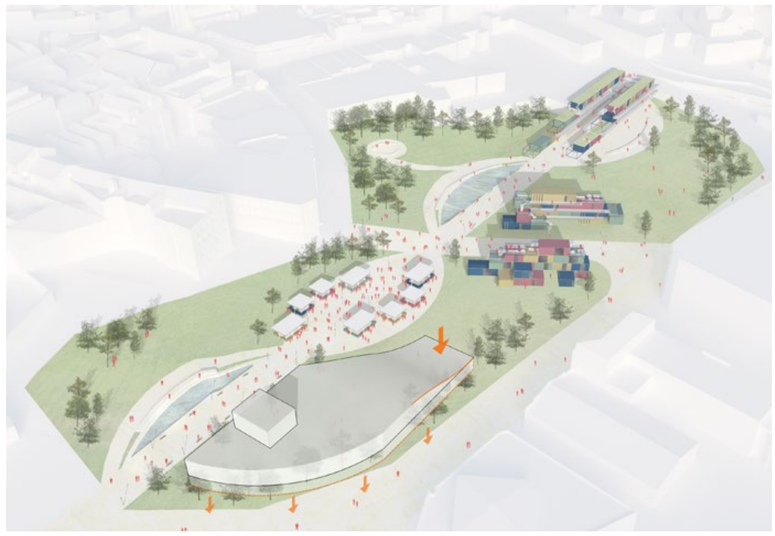


Simplified massing

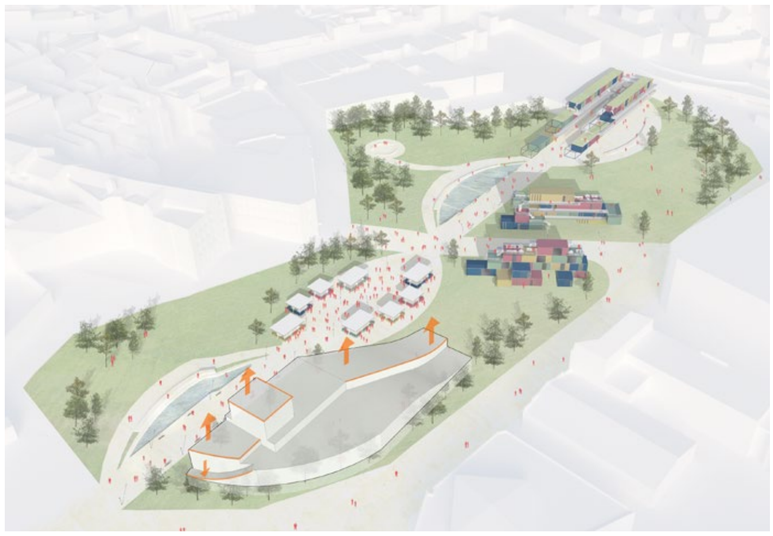
Finding the edges of the site



Adding verticality with flytower

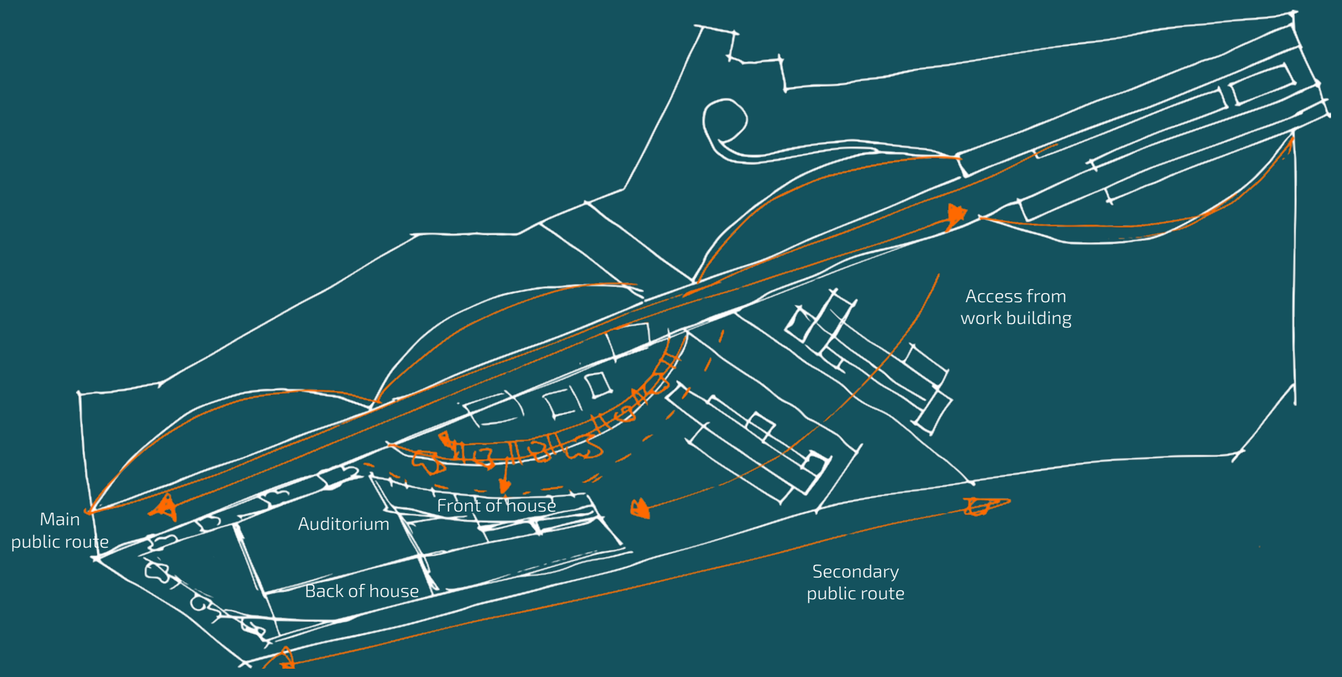


Sloping the roof to meet the site and going underground for additional space

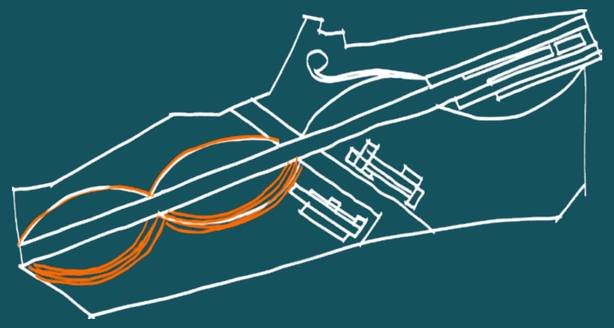


Raising the roof for more verticality and creating another access point to roof

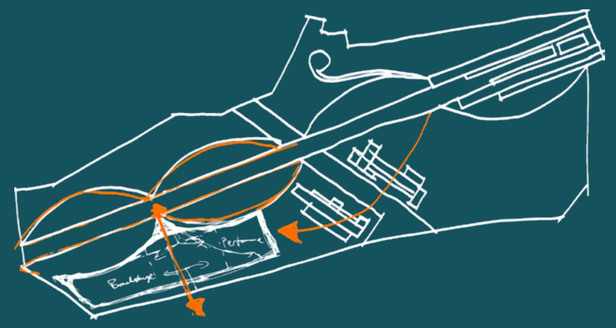
DEVELOPMENT: PLAN



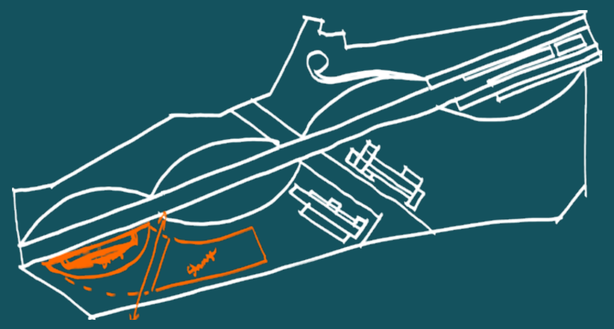
Picking up pathways to relate the building to, mirroring the site conditions and integrating the building into the park fully.



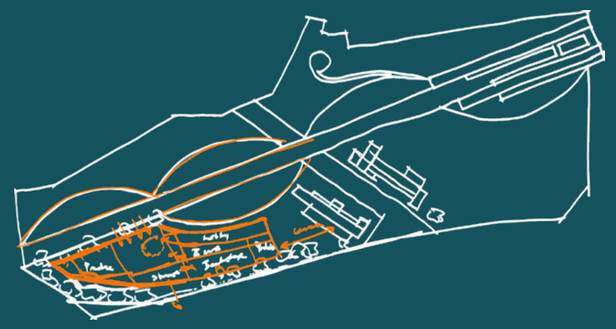
Mirroring the pathways opposite to find form



Picking up access points and orientating spaces to it

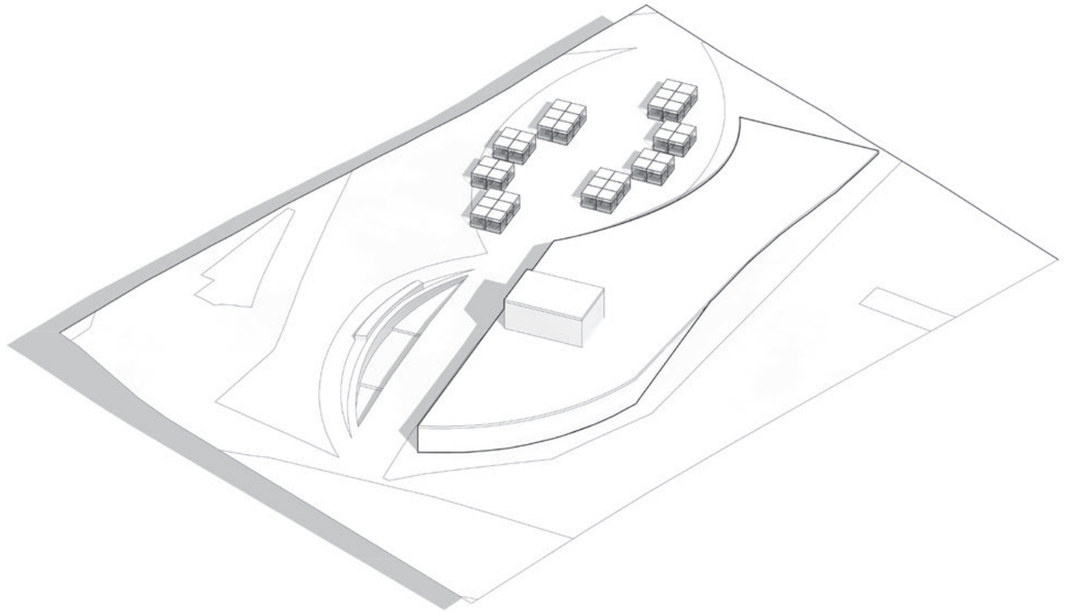


Experimenting with splitting the building in two halves



Placing spaces to grab people from surrounding buildings

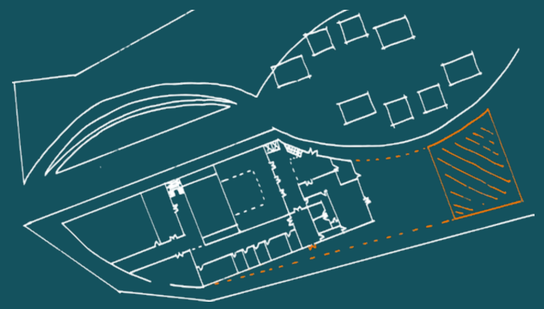
AXONOMETRIC VIEW



Picking up the form of the site and following the curves of the pathways to dictate the shape of the building, so as to fit seamlessly into its surroundings and feel like it is embedded and carved out from it.

DEVELOPMENT: PLAN

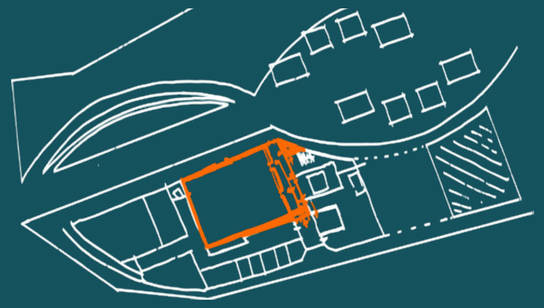
Developing the spatial arrangements on plan to reflect the massing studies and investigating how the building will be accessed by different people with different needs.



Orientating walls to be parallel for easier use of space

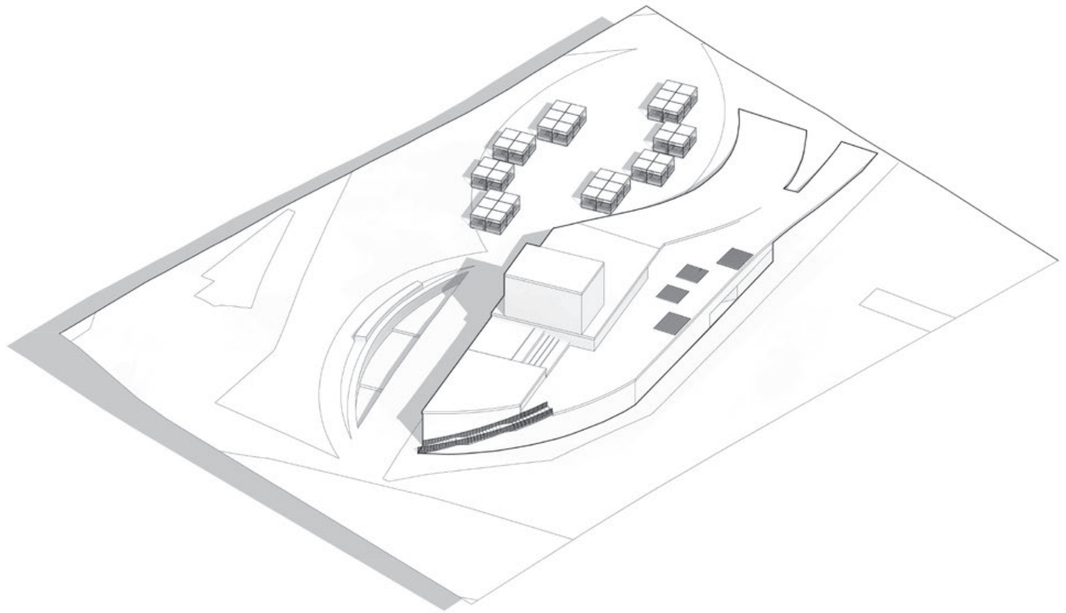
Setting up the main access points into the building

Introducing fat walls to orient the building towards the edge of the site without losing functionality



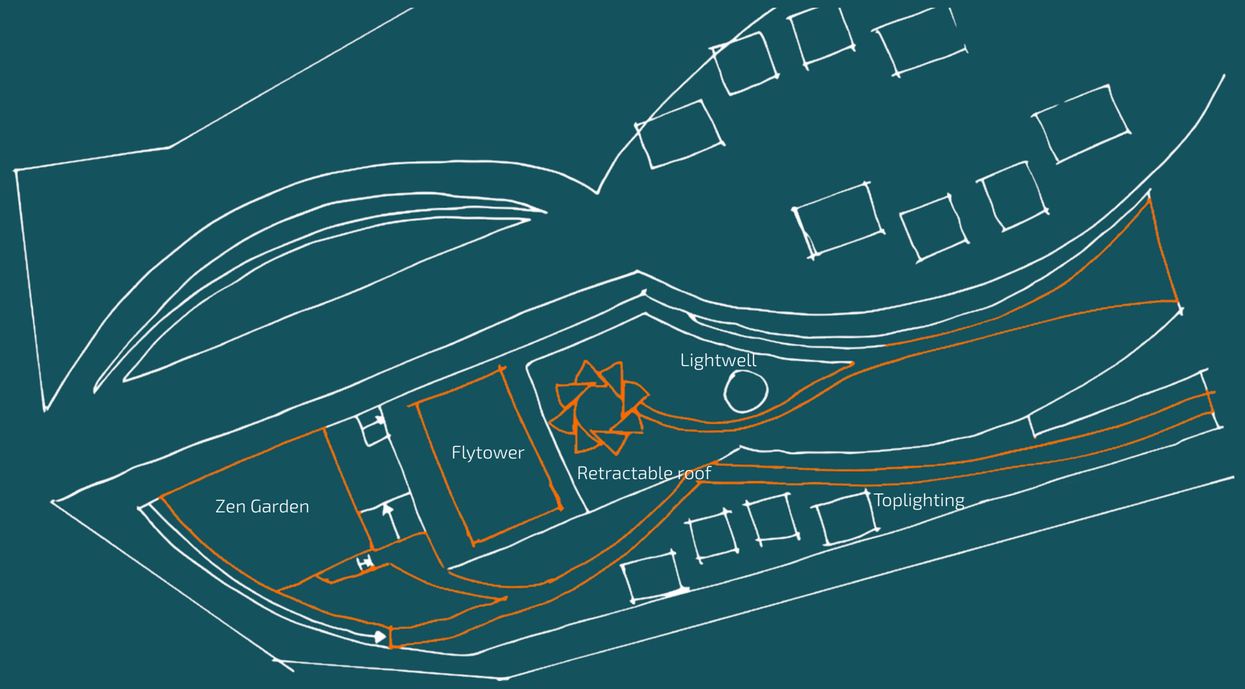
Trying out another variation of fat walls with a carved in exhibition space around the auditorium

AXONOMETRIC VIEW

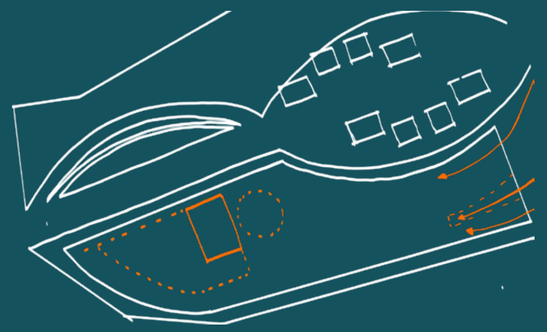


Adding changes in height to spaces like the practice room, the flytower and auditorium. Introducing new access points into the building and developing the internal form.

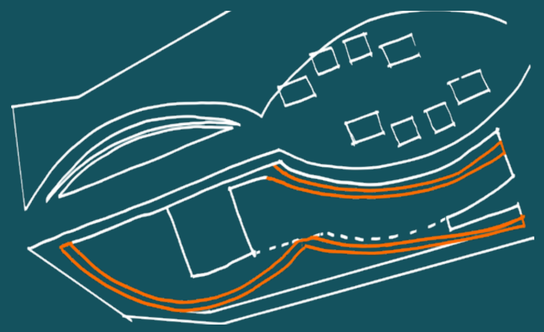
DEVELOPMENT: ROOFTOP



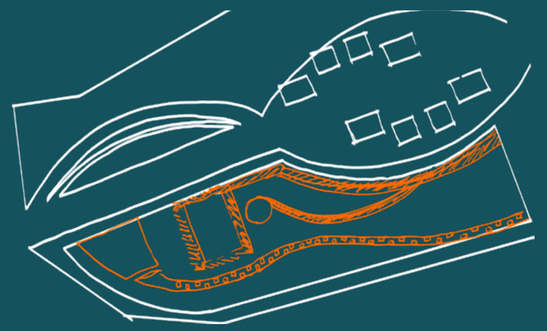
The rooftop design evolved to showcase the curved paths found in the park on top of the roof, mirroring its surroundings.



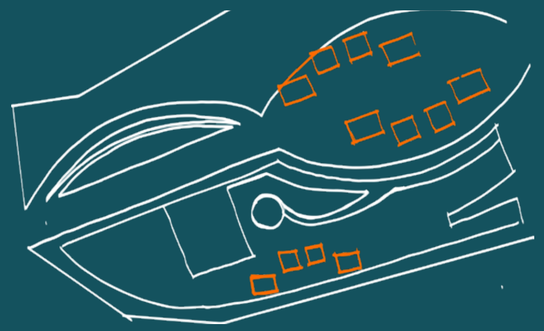
Introducing more access points onto the roof and splitting the end into two parts.



Adding access from the west end and forming paths mirroring that of the park.

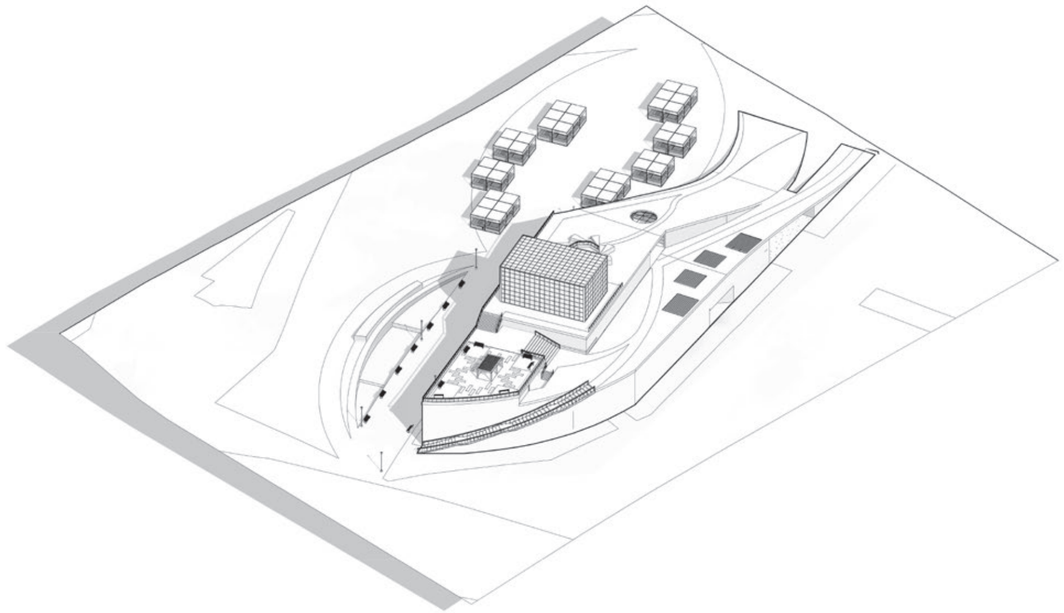


Experimenting with water features for the zen garden flowing down the entire building.



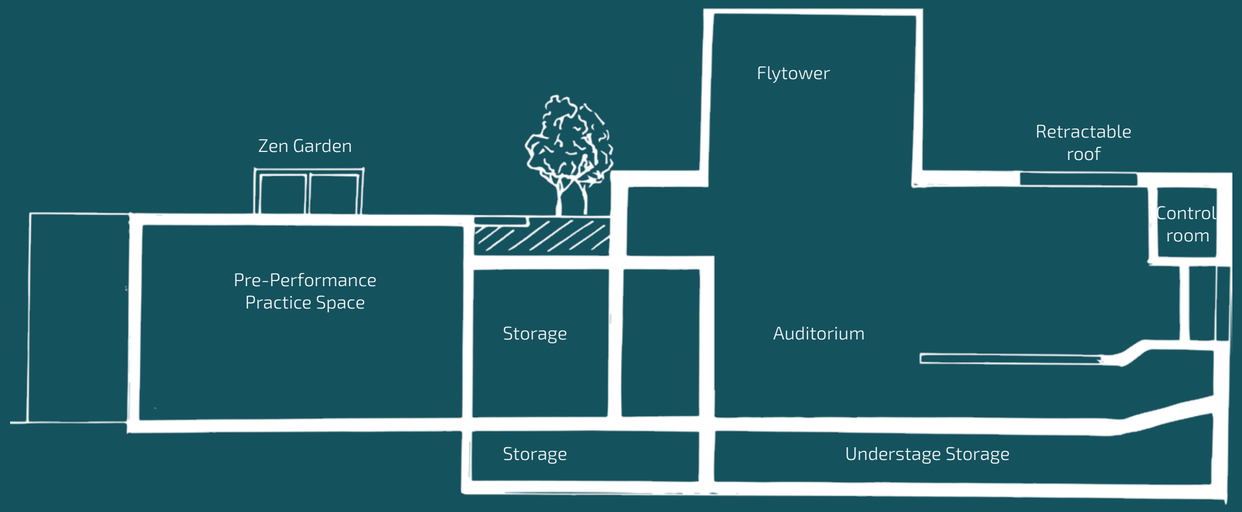
Introducing toplighting to the cafe spaces in the shape of the market stalls geometry.

AXONOMETRIC VIEW

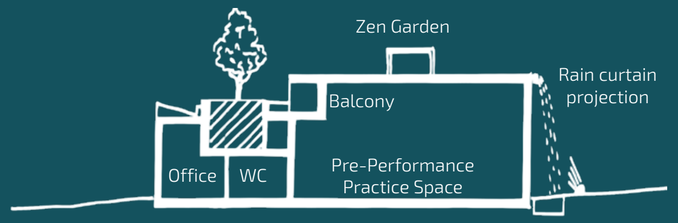


Developing the rooftop to follow the curved paths of the parkland set out in Project 1, and picking up features like the market stalls geometry and water elements, to integrate into the design.

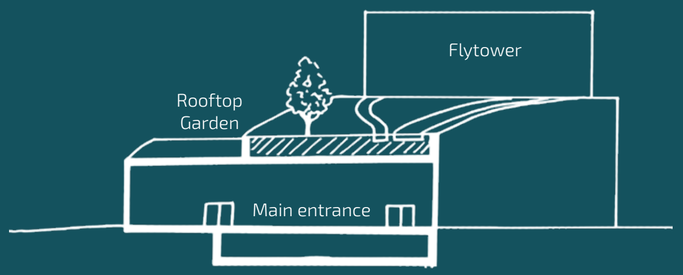
DEVELOPMENT: SECTION



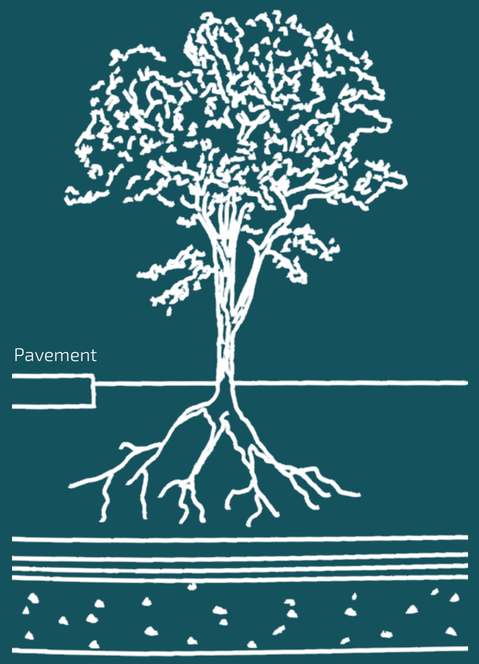
Section A-A shows the auditorium and practice space in relation to each other, separated by the storage space with an intensive green rooftop supporting some trees.



Section B-B shows the practice space, with the zen garden above, and rain curtain down the side with live performances projected onto it.



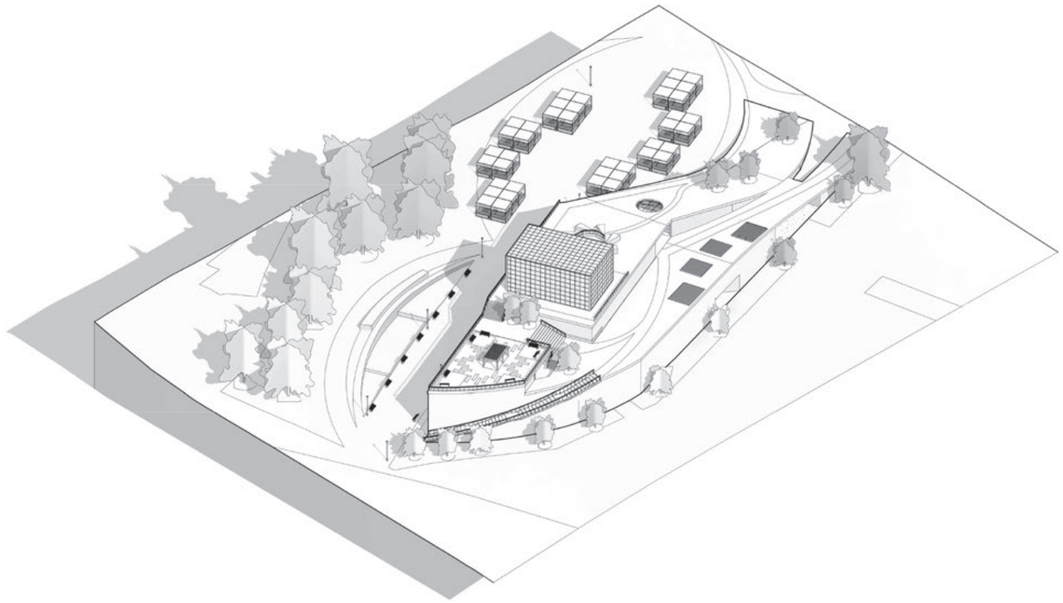
Section C-C shows the main entrance with the parkland on top, supporting trees for full immersion.



A rough sectional detail of an intensive green roof, showing the general layers needed:

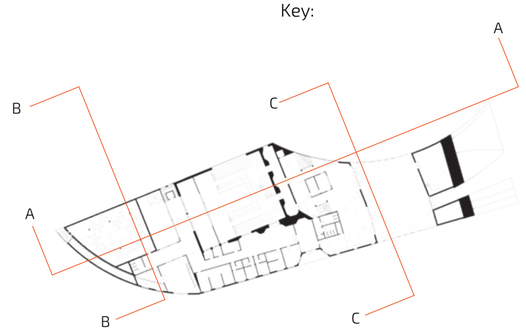
- Concrete slab (300mm)
- Insuation and screed (150mm)
- Copper root inhibitor (1mm)
- Drainage Layer (25mm)
- Growing medium (500mm+)

AXONOMETRIC VIEW

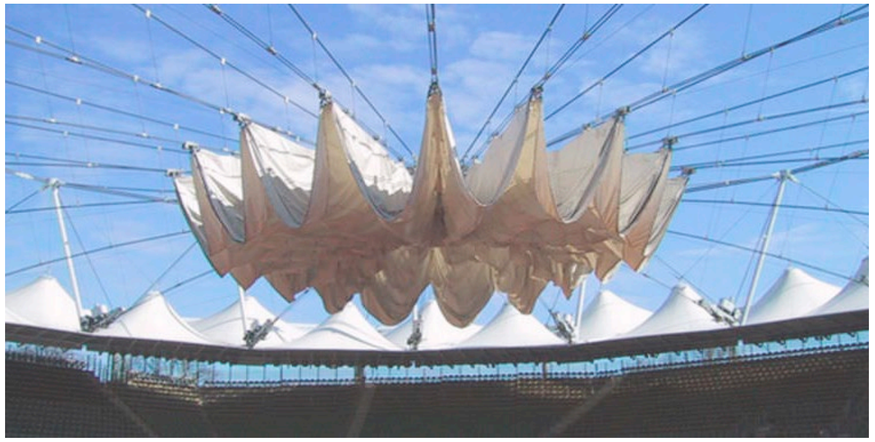


Placing trees around the site and on the roof allows for more integration into the park, some solar shading and creating more privacy as well.

Key:

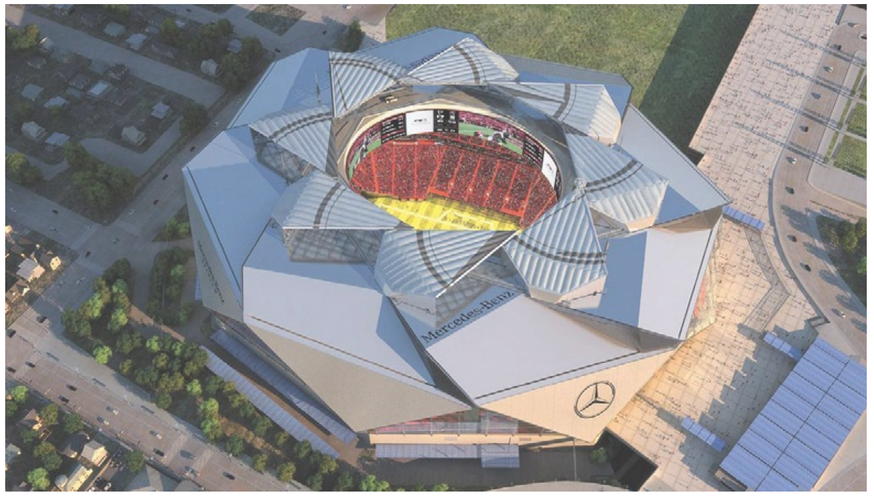


DEVELOPMENT: RETRACTABLE ROOF



Architect: ASP Schweger
Project: Am Rottenbaum
Date: 1999
Location: Hamburg, Germany

By using a tensile polyester canvas material, the roof of this tennis court can be covered when needed, or drawn open as the weather permits. This flexibility is made possible by the wires and steel framing keeping the canvas in place.



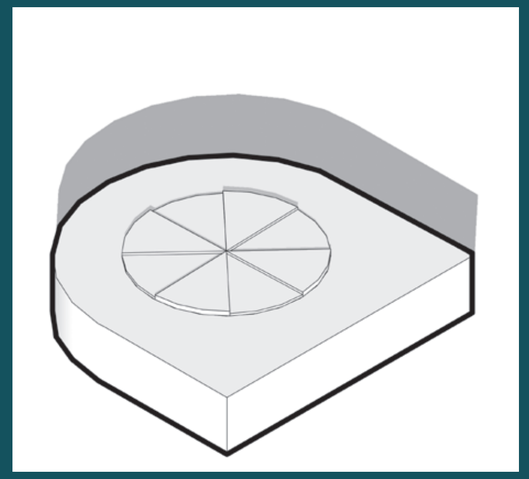
Architect: HOK Architects
Project: Mercedes-Benz Stadium
Date: 2017
Location: Atalanta, USA

This NFL stadium uses a roof that can slide open when the weather permits it, transforming the enclosed space into an open air stadium. It was designed based on a camera lense and how it operates to open and close using segments. The eight roof segments are also semi-transparent, letting in some natural light even when closed. They operate by sliding on tracks.

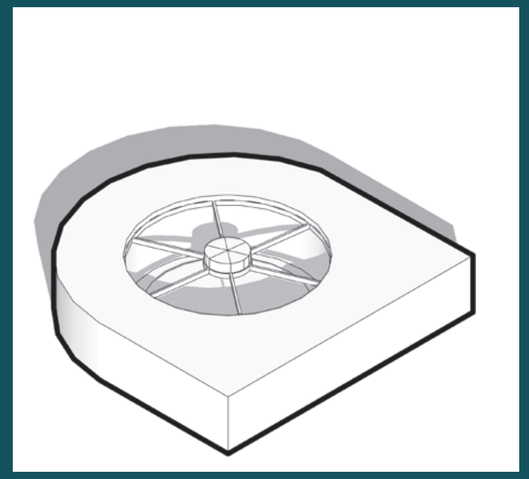
Architect: Studio Gang
Project: Starlight Theatre
Date: 2003
Location: Illinois, USA

The Starlight Theatre roof was designed to open up like petals of a flower, to allow for open air performances when the weather permits. By being able to open up, the flexibility of performances have been enhanced and the fact that the roof can close allows the theatre to run year-round. The roof opens during night performances for a starlit theatrical experience.

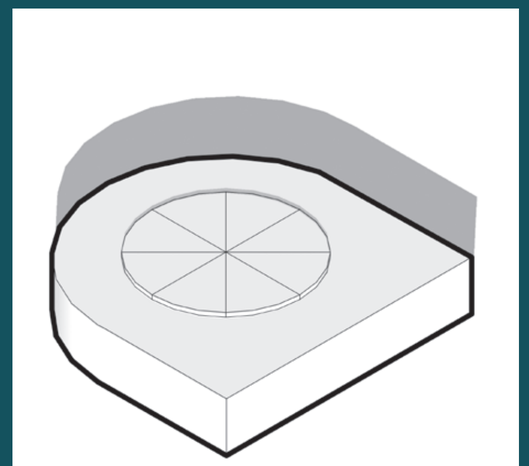
Textile roof closed



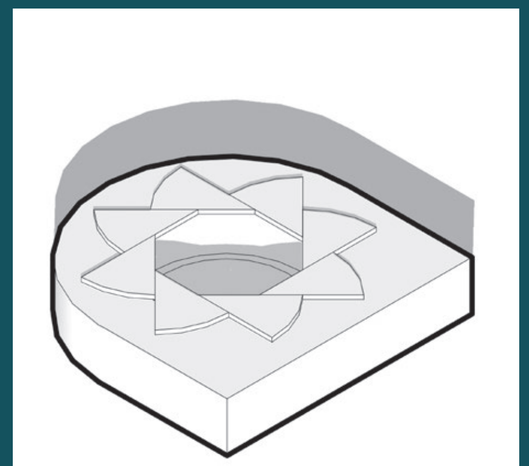
Textile roof opened



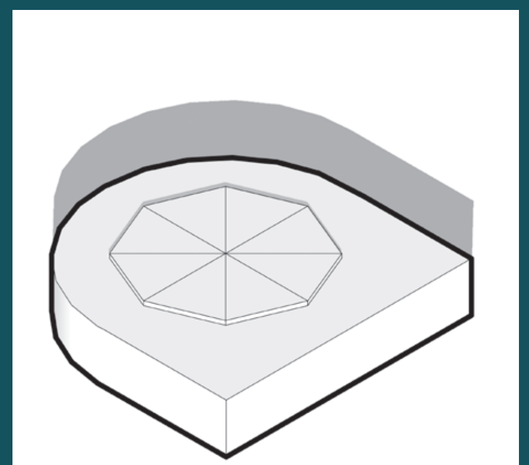
Roof leaves closed



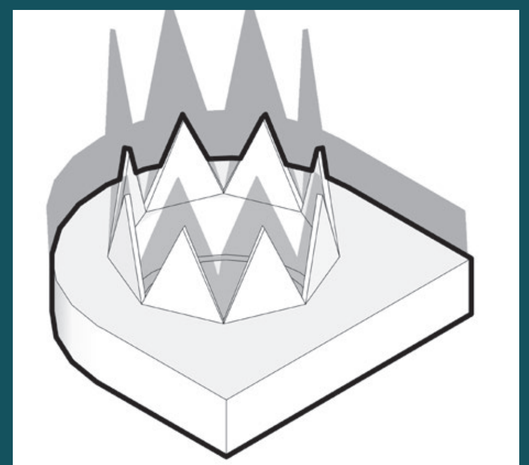
Roof leaves open



Petal roof closed



Petal roof open

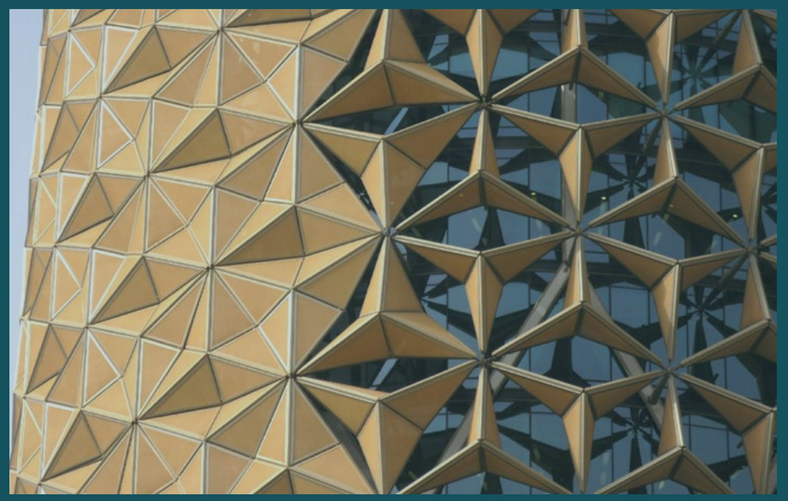


PRECEDENT STUDY

Architect: BIG Architects
Project: Maison des Fondateurs
Date: 2014
Location: Le Chenit, Switzerland

BIG Architects designed a spiralling glass pavilion building to house Audemars Piguet watchmakers museum in Switzerland. The spiralling design helps keep the spaces compact, with access to natural lighting and also provides plenty of viewing opportunities.

The spiral conncets all the workshops and galleries in a logical sequence, as required by the exhibition, yet does so in an economical fashion with regards to space. Part of the building includes a guest house which is subterranean, making use of the vast greenery near the site.



PRECEDENT STUDY

Architect: Wingårdh Arkitektkontor
Project: Sundbyberg Cemetery Pavilion
Date: 2018
Location: Sundbyberg, Sweden

For this pavilion in Sweden, the architects worked with cross-laminated timber clad with emerald green glass panels, which reflect their surroundings and blend the building into its surroundings.

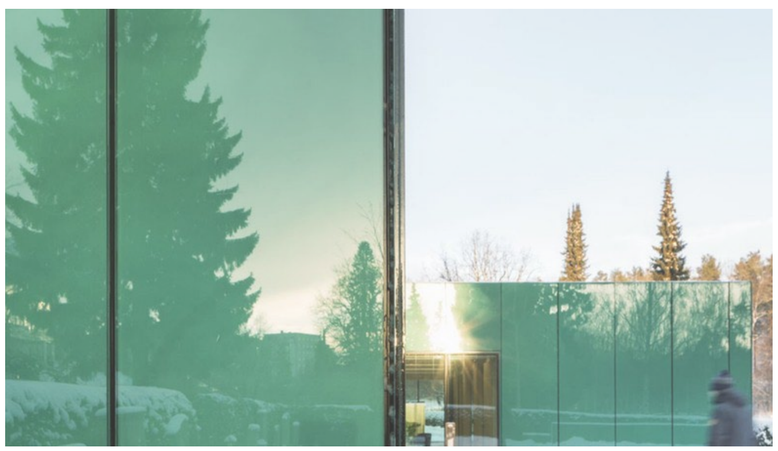
This feature also allows for year-round camouflage, as it can always reflect back its surroundings and so its appearance will change and morph with its context. During summer months, the green panels help blend in even more to the surrounding green parks and trees, whereas in winter months, the surrounding snow is reflected back from the panels.

PRECEDENT STUDY

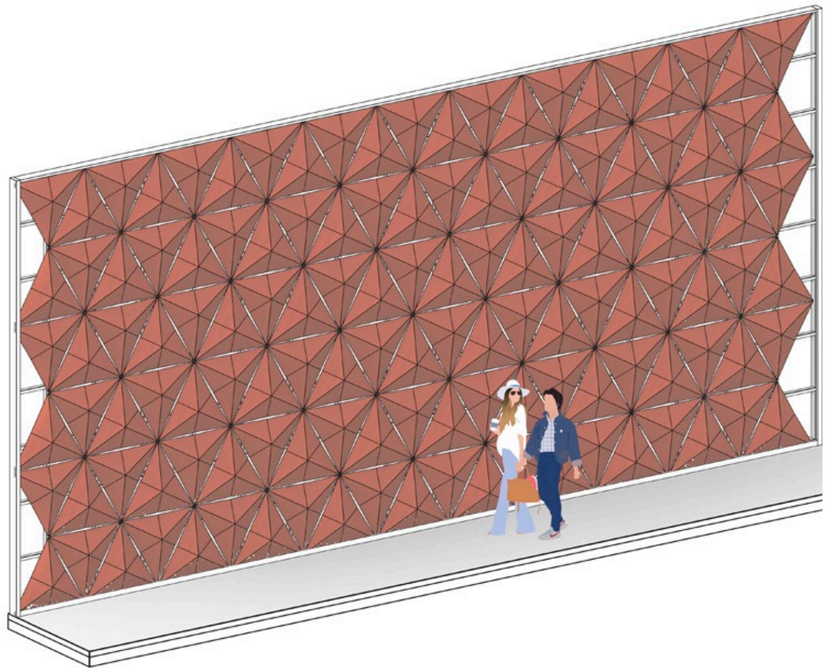
Architect: Aedas Architects
Project: Al Bahar Towers
Date: 2012
Location: Abu Dhabi, United Arab Emirates

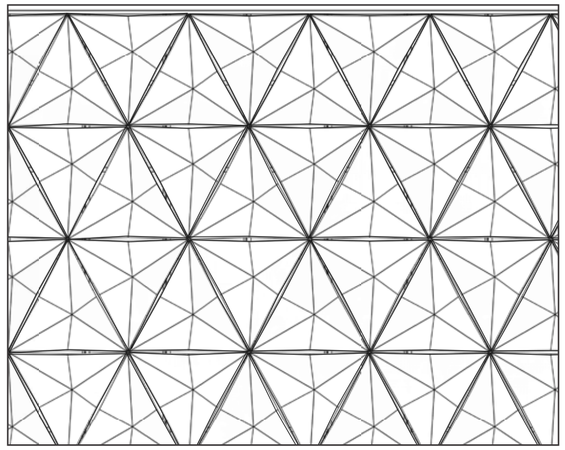
The Al Bahar Towers feature a new and unique innovative facade systems that changes in accordance of the sun path and limits any unwanted solar gains. It was developed to reduce the cooling loads and risk of overheating in the deserts surrounding Abu Dhabi.

The mechanism works by changing the angle of opening of the parametric elements and sits outside the tower, acting as a curtain wall. It is estimated that the screen can reduce solar gains by up to 50%.

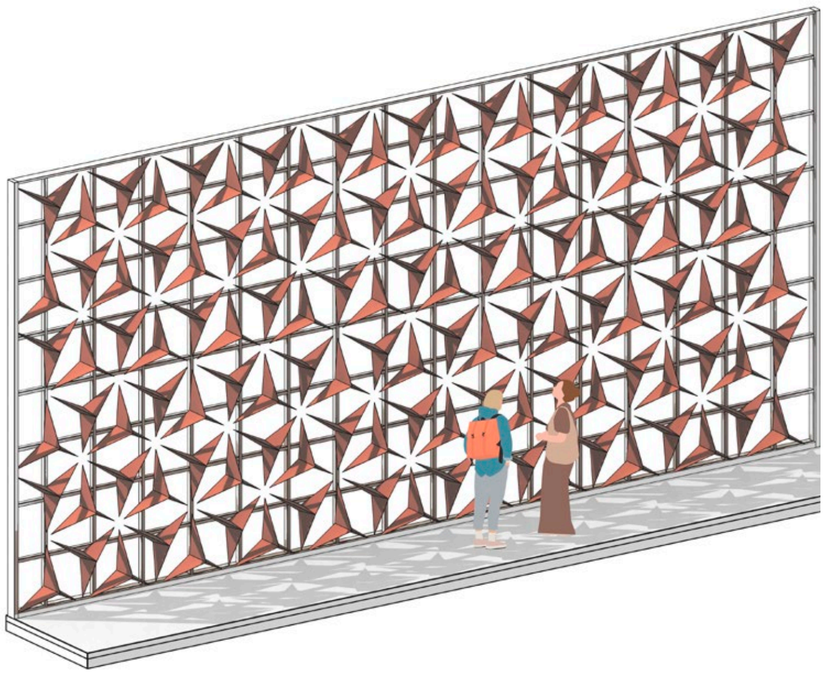


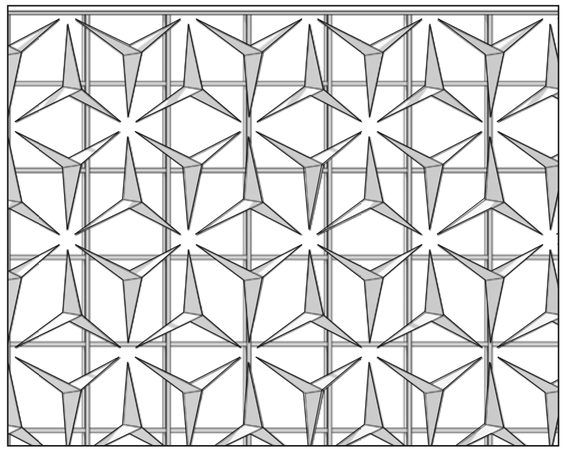
DEVELOPMENT: KINETIC FACADE





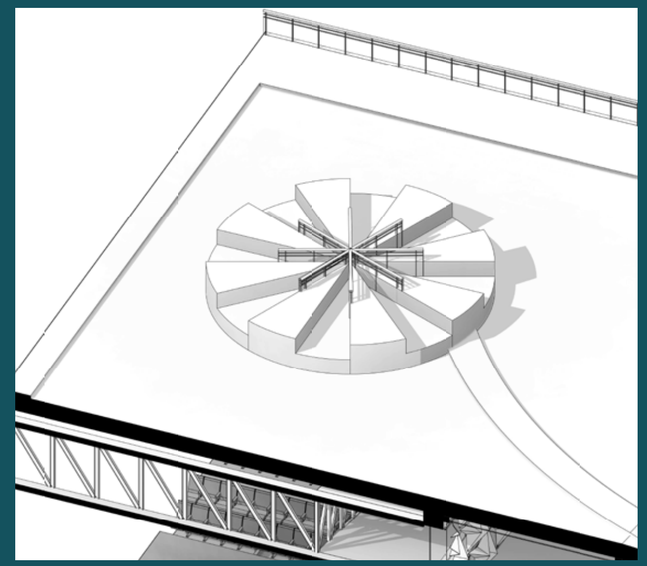
When the facade is closed, the mechanical parts form a triangle by sliding down the framework and flattening. This prevents views into the building and allows for more privacy.





When the facade is open, the mechanical parts form a triangle reminiscent of the Mercedes-Benz logo by sliding up the framework and protruding. This allows views into the building and invites more interaction with it.

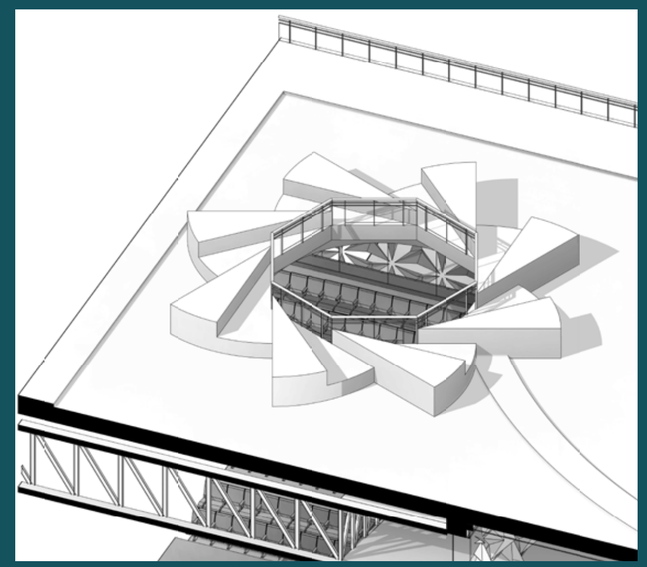
RETRACTABLE ROOF



By default, the roof is closed, but still offers functionality as park benches to sit on.

Roof closed

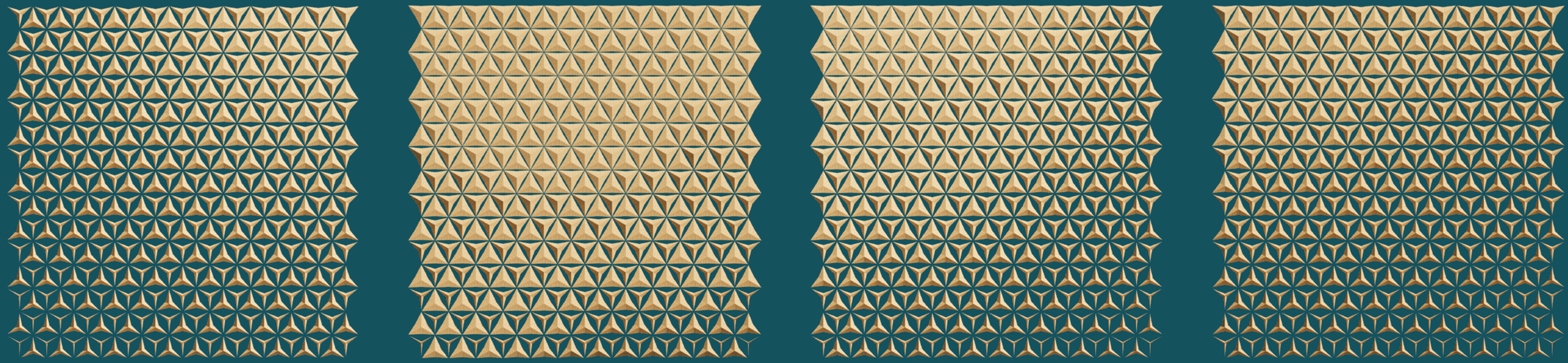
Roof open



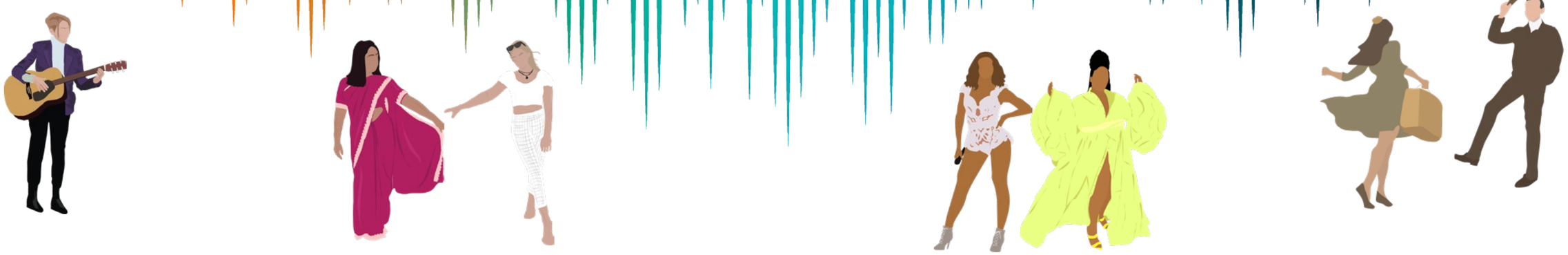
When needed, it can slide open on tracks and allow views onto the stage.

DEVELOPMENT: FACADE DESIGN

Kinetic facade moves to reflect the performance in harmony with frequency of sound measured by sensors, to control the opening and closing of segments. The pulsating facade will give life to the building, a heartbeat, unique to each performance.



Frequency (Hz)



Frequency (Hz)

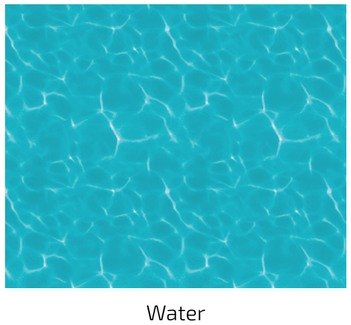
DEVELOPMENT: MATERIALITY

For the materiality of the theatre, I have considered colour theory to ensure the materials complement each other and will create an aesthetic building, to reflect the aesthetics and though that goes into designing the sets of various plays and productions that will be showcsed in the theatre. The chosen colours are teal and orange for its wide representation within the film industry and theatre, the colours will be emphasised alongside other monochrome materials.

Transparent Glazing

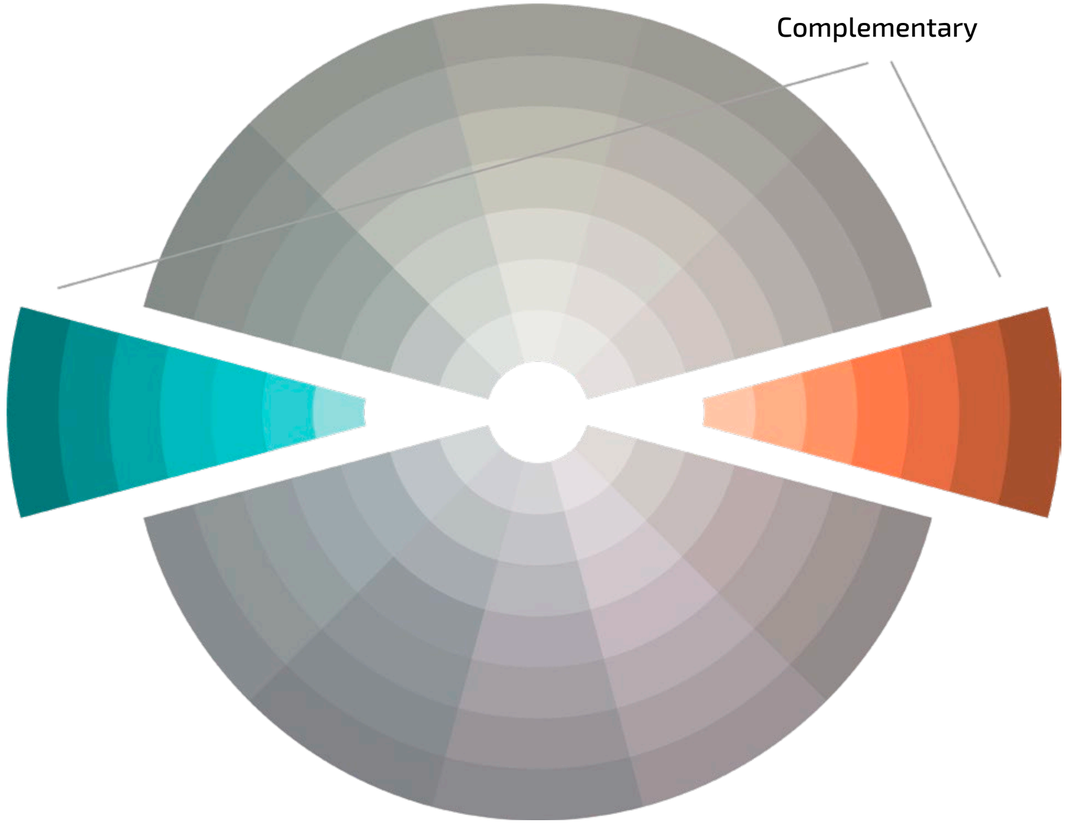
Blue Tinted Transparent Glazing

Blue tinted Opaque Glazing



Water

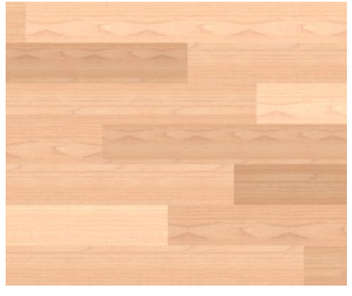
Glass 100% recyclable after end of building life



Orange Translucent Glazing

Timber mechanical facade

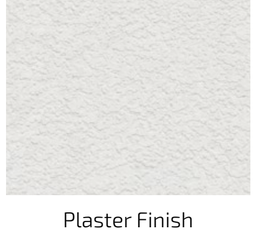
Locally sourced



Timber flooring

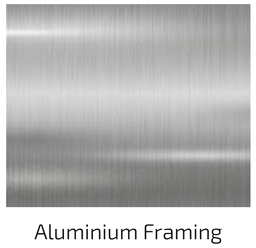
Re-use from demolition of Broadmarsh shopping centre. Metals 100% recyclable after end of life

White concrete



Plaster Finish

Paving Tiles

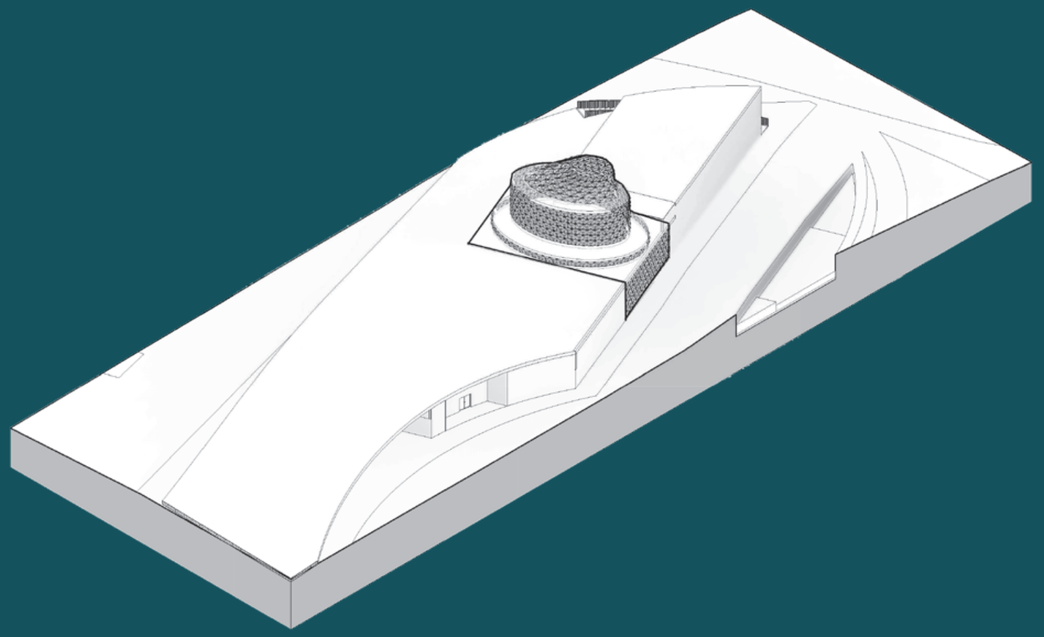


Aluminium Framing

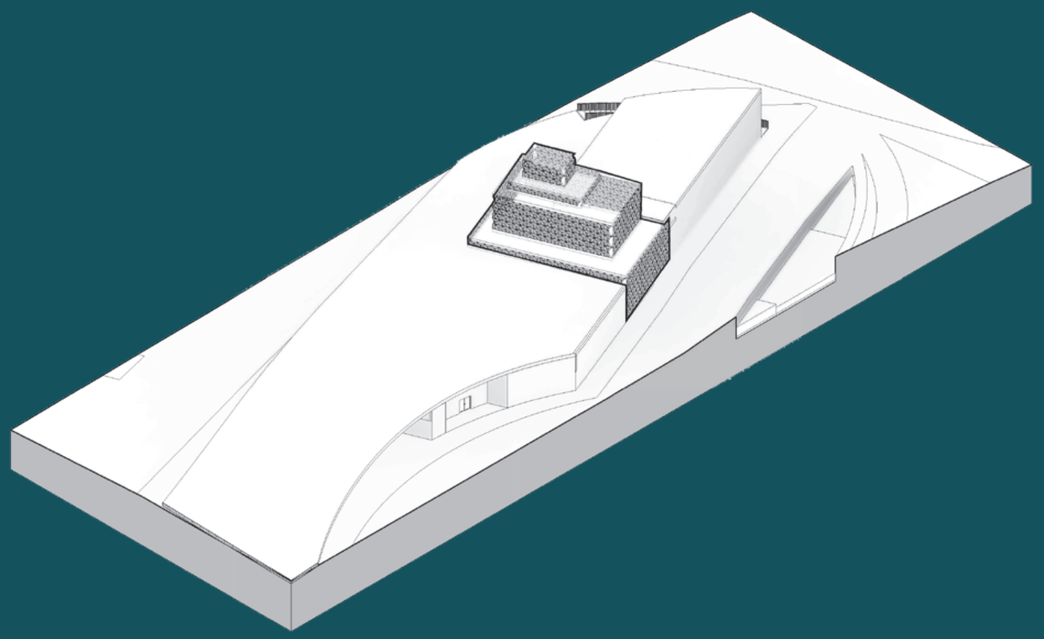
Copper Flytower Facade

DEVELOPMENT: FLYTOWER DESIGN

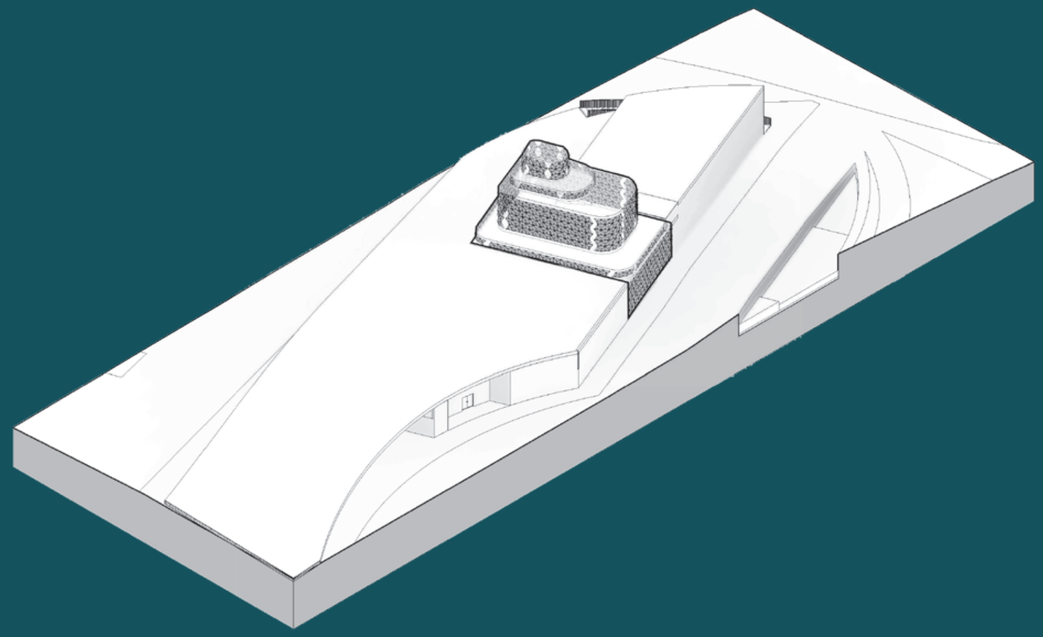
The flytower is a prominent feature of the design and will be the main focal point, seen from far away that attracts people to the building, with its everchanging copper mechanical cladding. So, finding the correct form to fit this function will be important. Working with the required minimum dimensions, many different iterations and forms have been tried out.



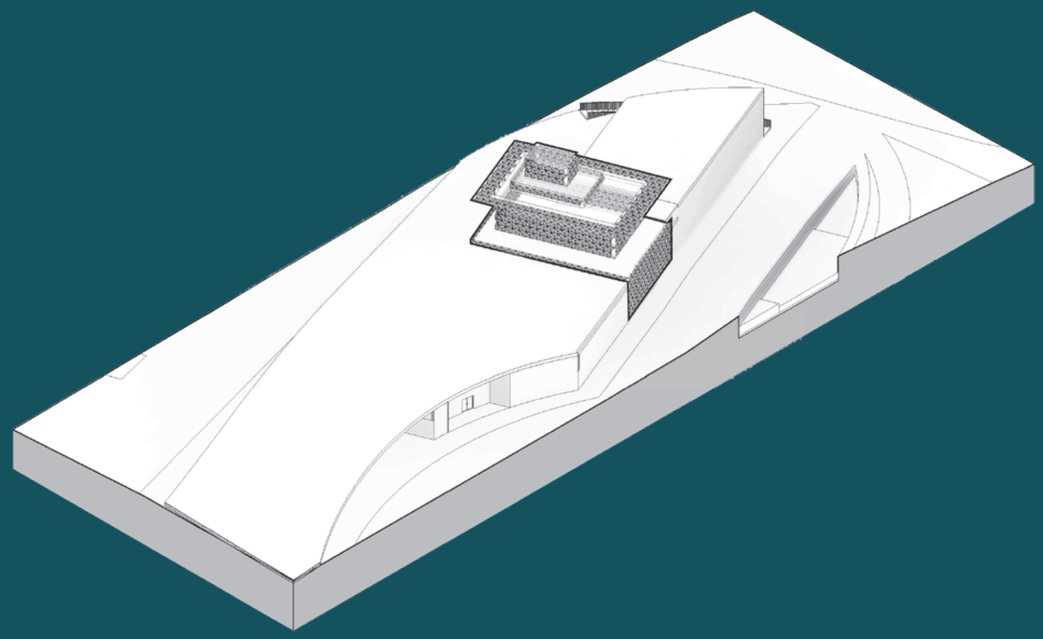
Experimenting with organic forms for the flytower, to reflect the curved nature of the pathways surrounding the building, and stepping the tower to reflect buildings around it.



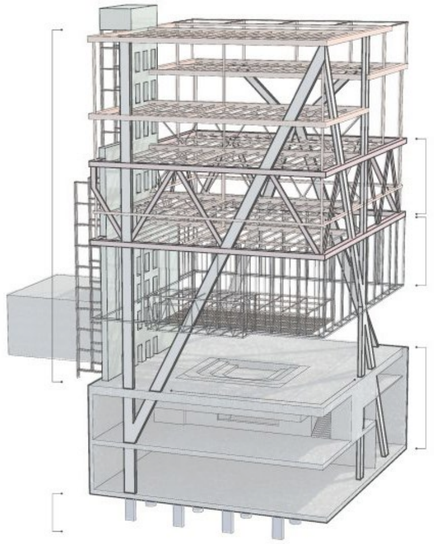
Totally rectilinear design, gives the tower the most prominent look. The strong angles add to the grandness of the tower, making it more of a focal point amongst the curves of the building and surroundings.

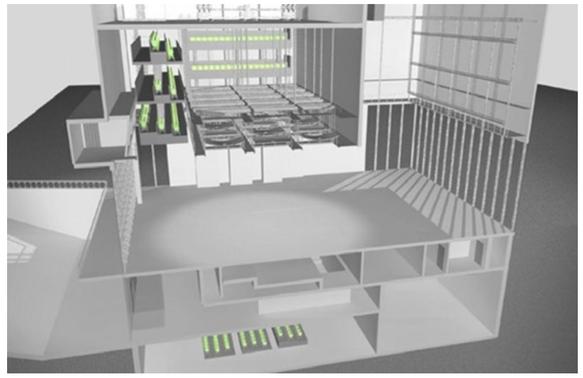


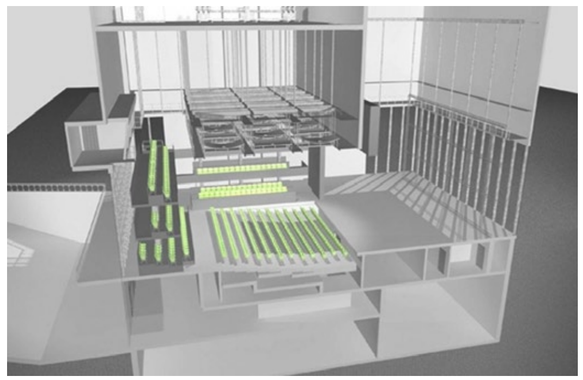
Moving towards a more angular design, this iteration smooves the corners of the tower but keeps the hard edges, to give it more presence. Stepped feature maintained.

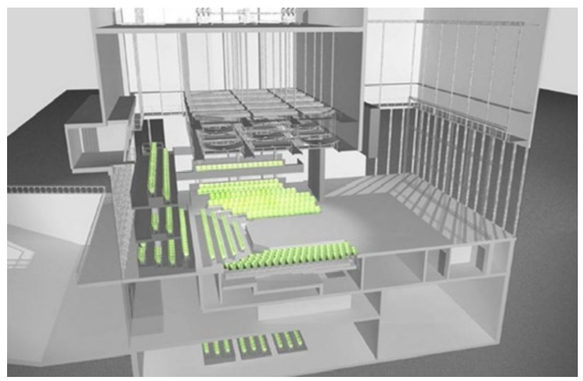


Experimenting with an openable feature on the tower providing shading and protection from the weather for people who come to the rooftop.









PRECEDENT STUDY

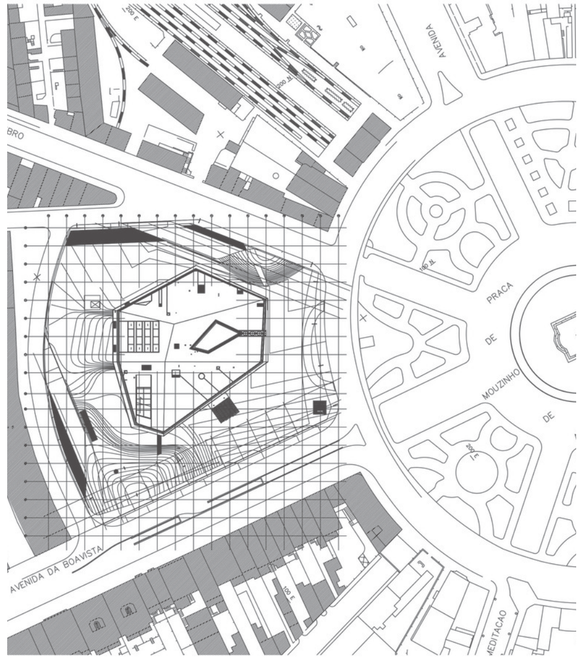
Architect: Joshua Prince-Rasmus, Rem Koolhaas
Project: Dee and Charles Wyly Theatre
Date: 2009
Location: Texas, USA

The Dee and Charles Wyly Theatre was the first 'vertical' theatre, introducing a new concept using 'top of house' and 'bottom of house' instead of 'front' and 'back'. This allowed them to save a lot of space and make a highly adaptable theatre space.

The balconies are stored folded above the seating area and are folded down when they are required. The main floor can be sunken into the ground to provide raking for the auditorium and different flanks can be created by rotating the separate floor elements.

The walls around the stage can also be opened like blinds to allow for more direct access, ventilation and views outward.

The high flexibility of the space allows for quick and easy change between many stage formations, including thrust, proscenium, arena, and traverse. These require minimal manpower and time, providing opportunities to use different stage layouts within the same drama performance.

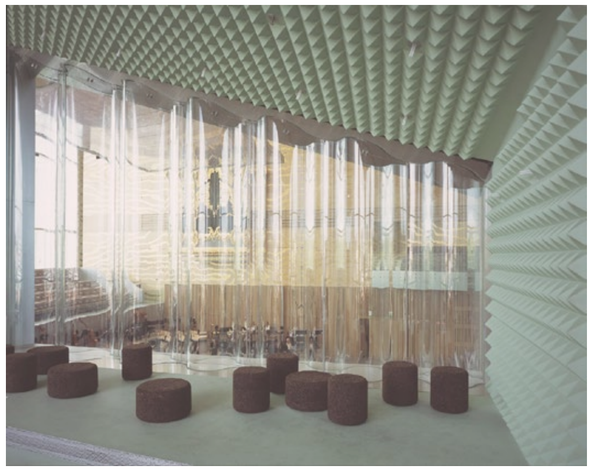


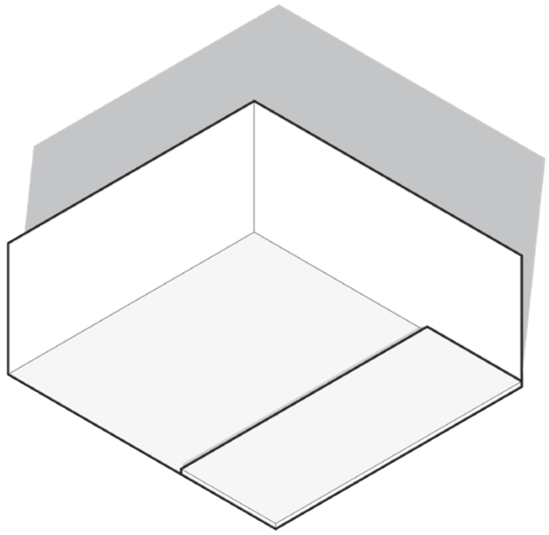
PRECEDENT STUDY

Architect: OMA Architects
Project: Casa da Musica
Date: 2005
Location: Porto, Portugal

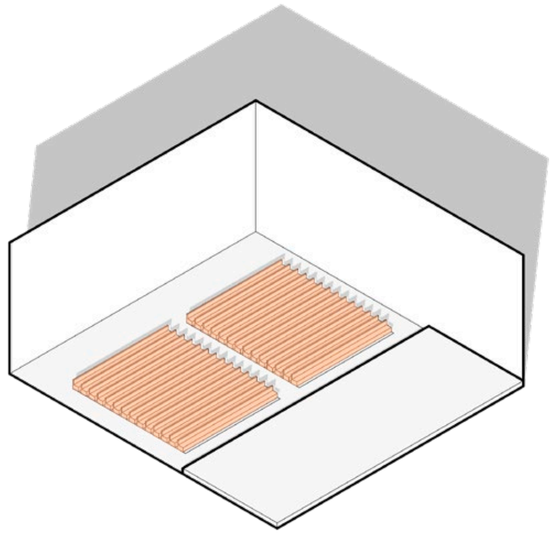
The Casa da Musica sits at the intersection of two streets running at an angle to each other, meeting in the heart of the City, which created awkward angles to work with. This was solved by implementing fat walls surrounding the auditorium, that help to shape the spaces in the building in a more natural and comfortable way.

The theatre was developed with the aims of creating a more involved building with its surroundings that exposes the theatre to the public and makes a statement. this has carried over to the interior spaces as well, featuring spaces like the balconies that allow views into the main auditorium slightly distorted through the curved panes of glass. This helps to create a connection with the space whilst not revealing too much and taking away from the experience of seeing the performance from the main space itself.

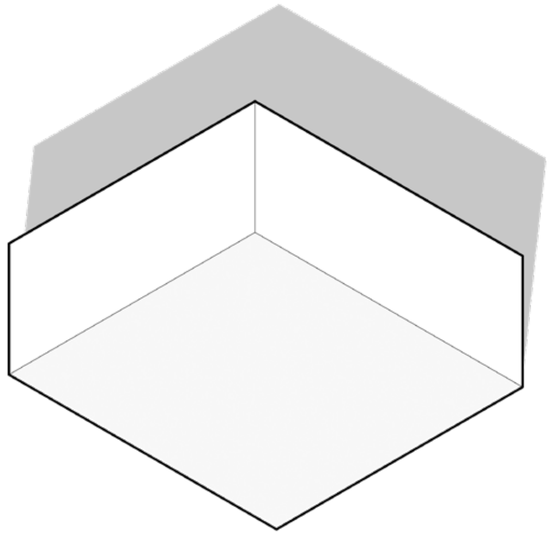




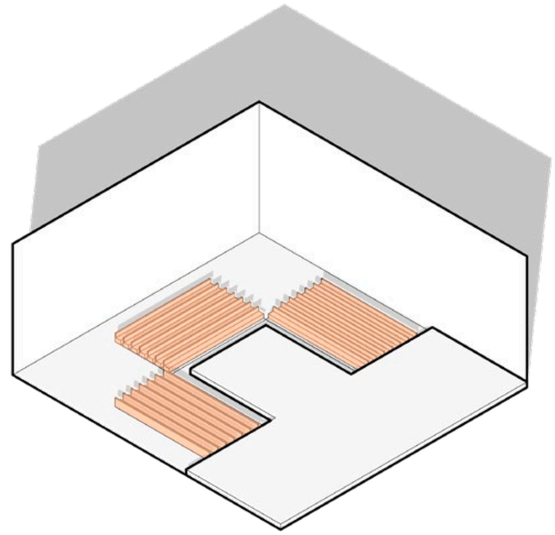
9:00 am
Focal Layout
Entrance space/ready for setup



1:00 pm
Proscenium Layout
Performance



5:00 pm
Flat floor/ Open Layout
Exhibition/ Event space



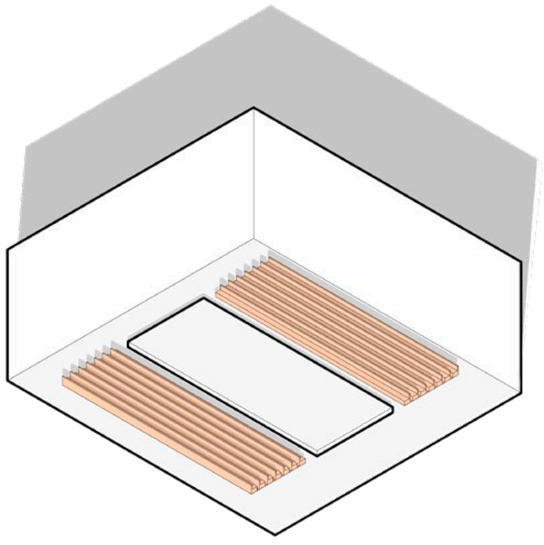
9:00 pm
Thrust Layout
Performance

Opening

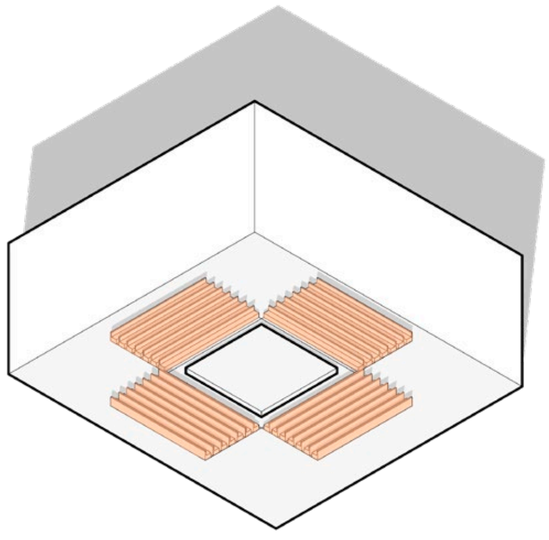
DAY IN THE LIFE OF THE STAGE

Closing

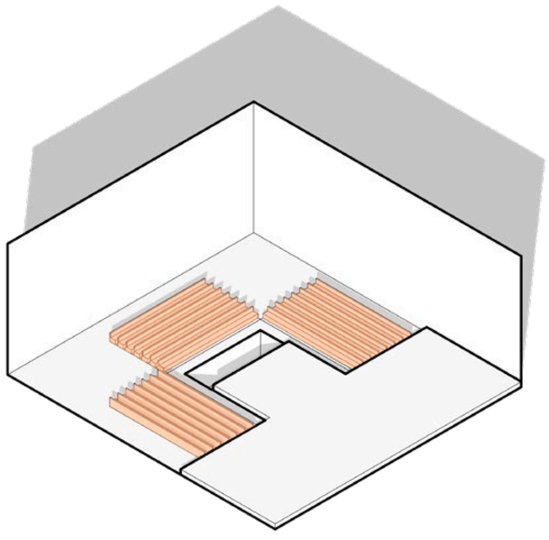
11:00 am
Traverse Layout
Performance



3:15 pm
Arena Layout
Performance



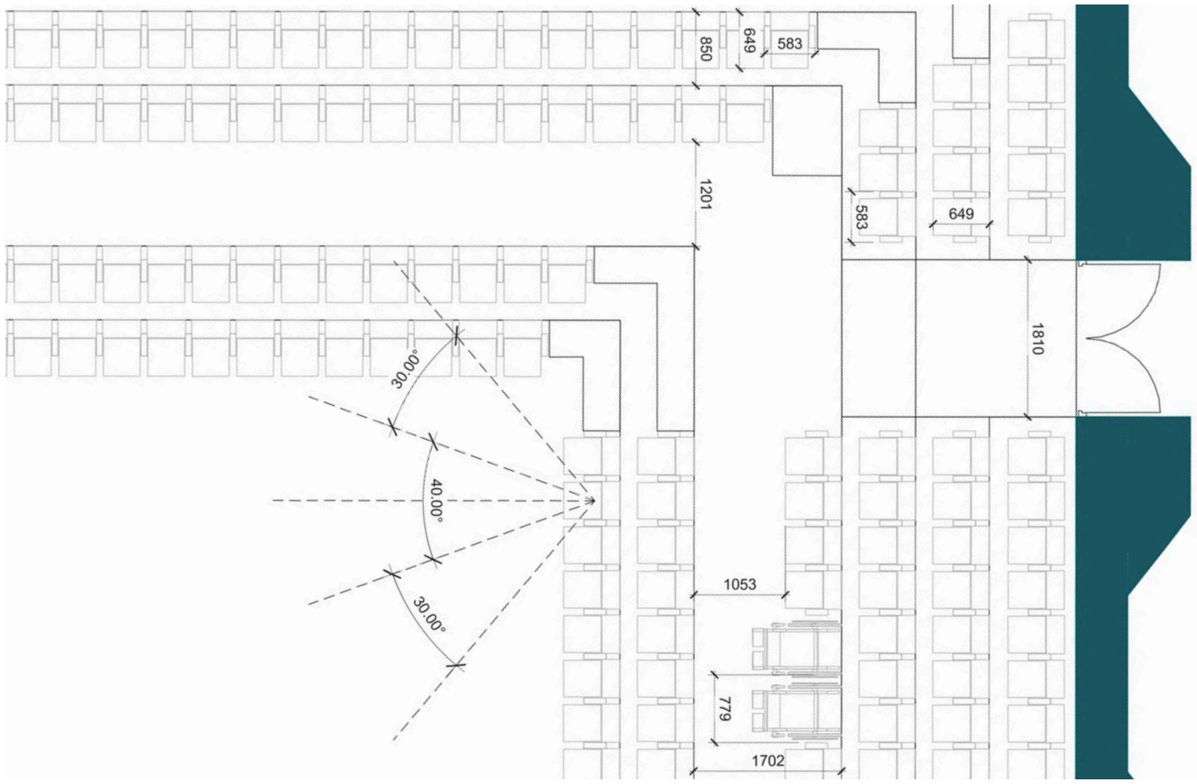
7:30 pm
Thrust with orchestra pit
Performance

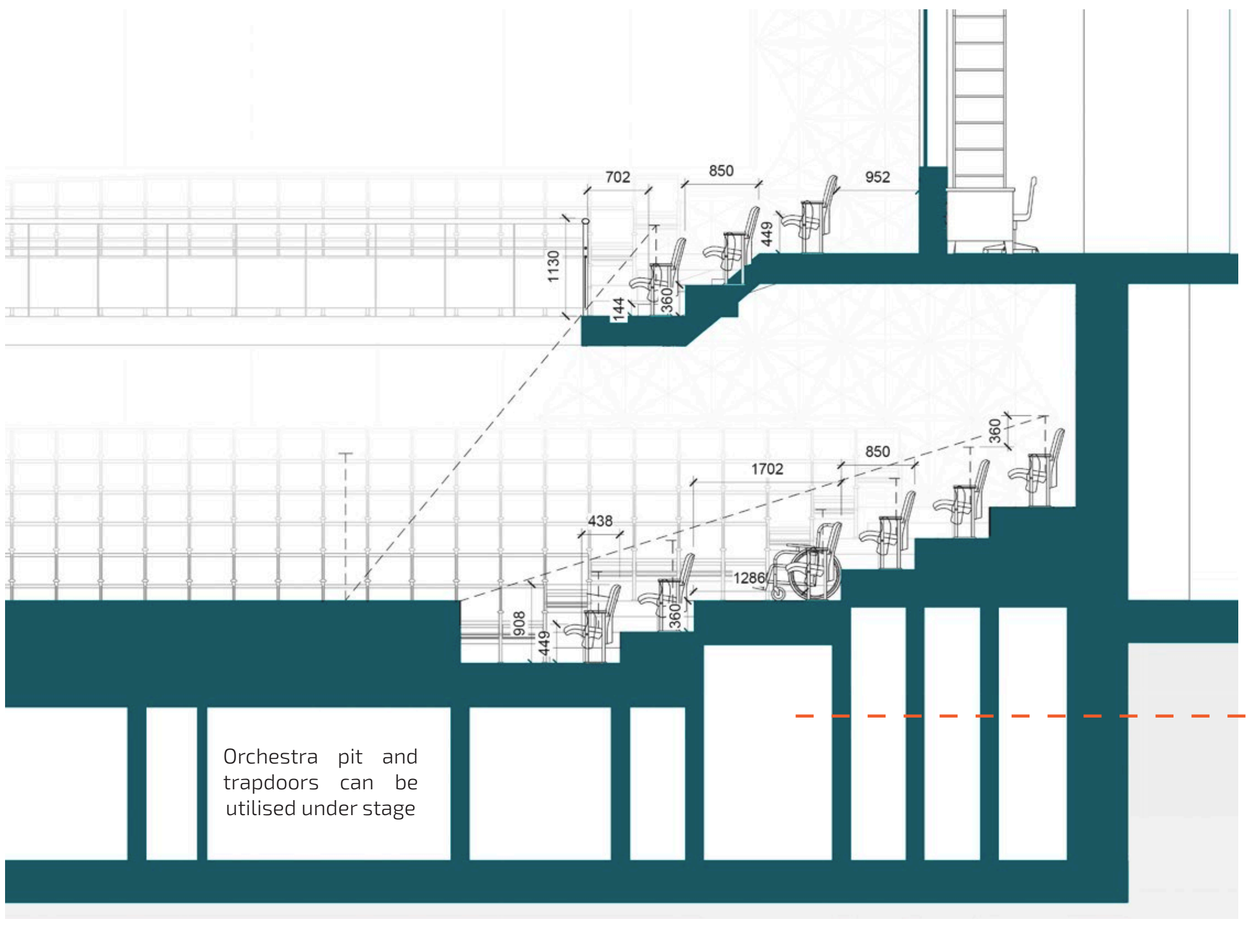


STAGE AND SEATING ERGONOMIC STUDY

Careful consideration has been put into the stage and seating design within the auditorium, to ensure that the minimum space standards are met in all configurations. The seating is designed to allow for all of the various stage layouts such as: arena, traverse, thrust and flat layout.

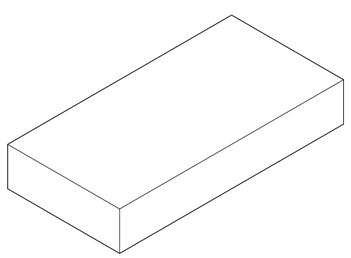
The flexibility of the stage allows the rake to be set at the required angle for optimum use and will allow for the incorporation of orchestra pits and trapdoors underneath the stage.



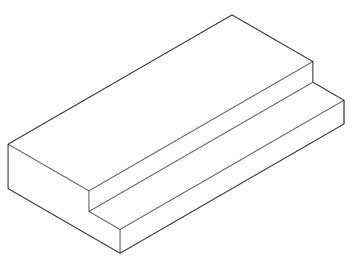


Orchestra pit and trapdoors can be utilised under stage

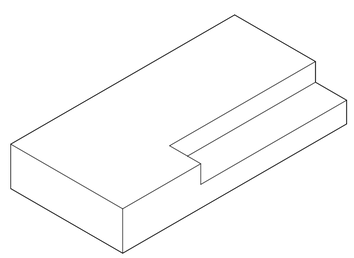
Flat stage top for flat floor layouts

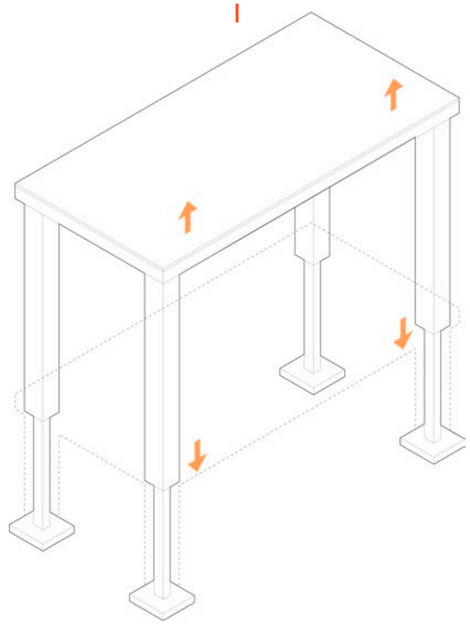


Stepped stage top for stepped seating rows



Stepped corner stage top for joints

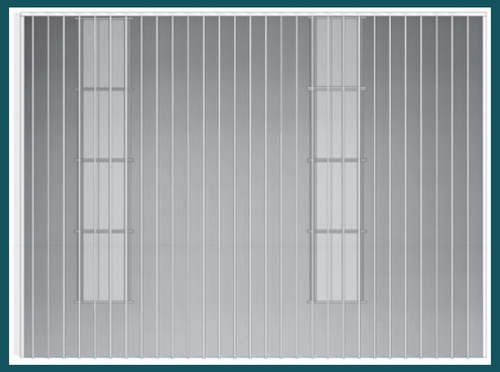




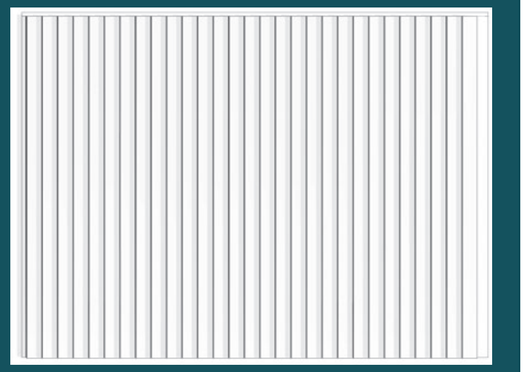
Telescoping stage seating, rises to the desired level for maximum seating flexibility

ENVIRONMENTAL STRATEGY: REDUCING SOLAR GAINS

Reducing solar gains help minimise cooling loads and the energy required to run the building, thus reducing carbon emissions too. The building has implemented many features to help aid in this.

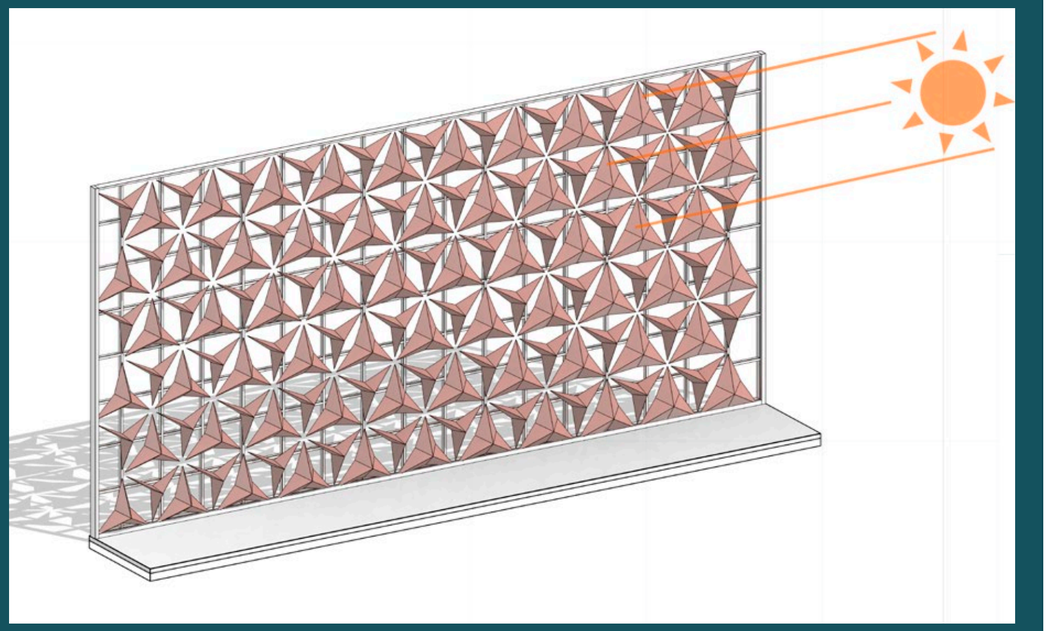


Louvred open



Louvred closed

The toplighting into the cafe is paired with horizontal louvres that can be rotated to control the solar gain, and indoor luminious environment as needed. This gives the space flexibility as well as minimising the cooling loads of the building.

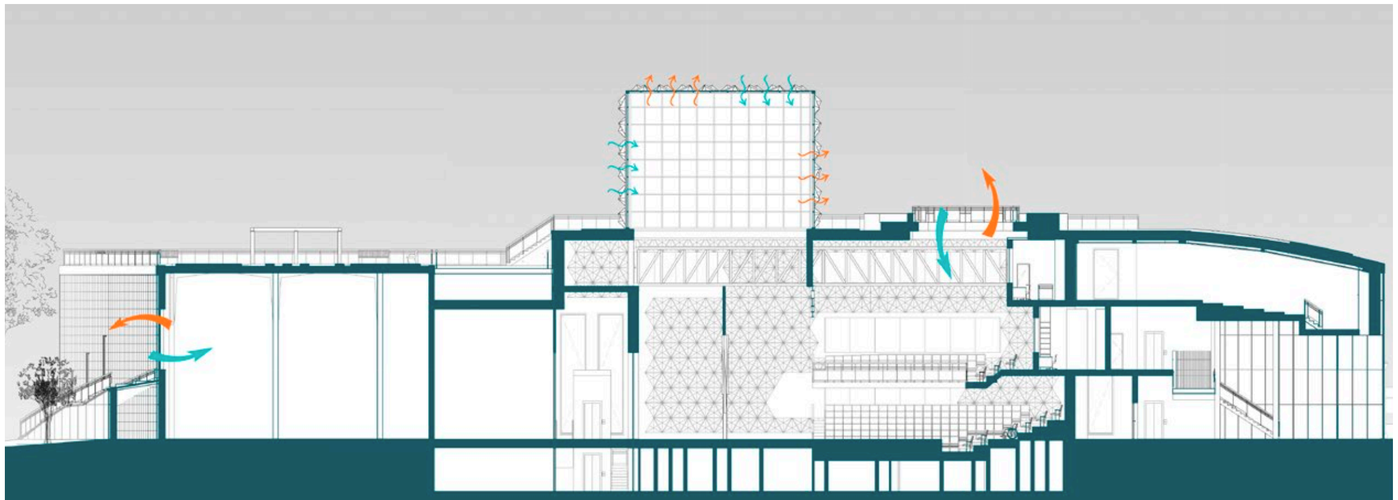


The mechanical facade can be used to inhibit solar gains on the south facade, whereas the north facade can still move and react to the frequency of sound inside the auditorium.

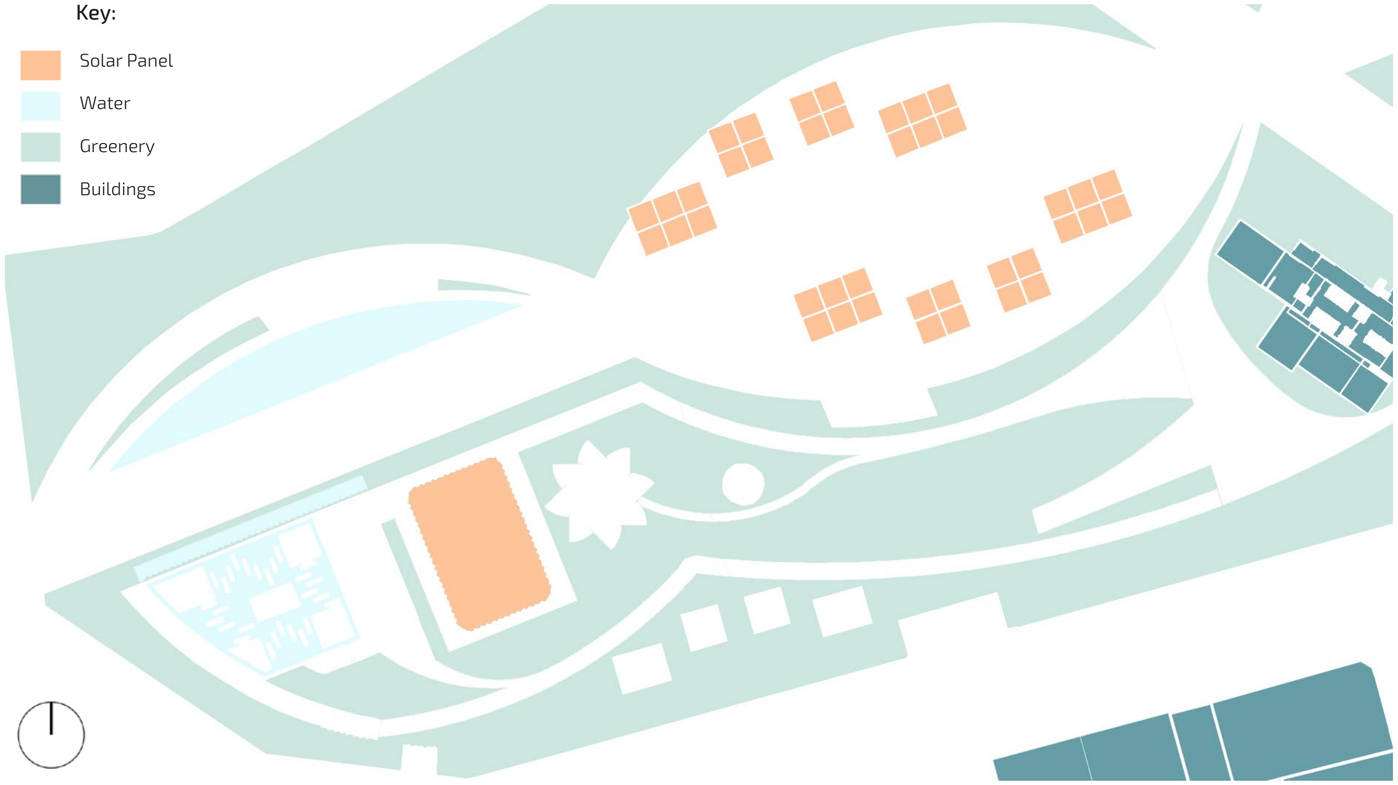
The south facade can utilise a sensor and control mechanism based on the sun position, to inhibit any unneccesary solar gains and help minimise the cooling load and operational carbon emissions.

In summer months strategic solar gains will be enough to heat the building, whereas heat recovery ventilation can be used in winter to help out.

ENVIRONMENTAL STRATEGY: REDUCING OPERATING CARBON EMISSIONS



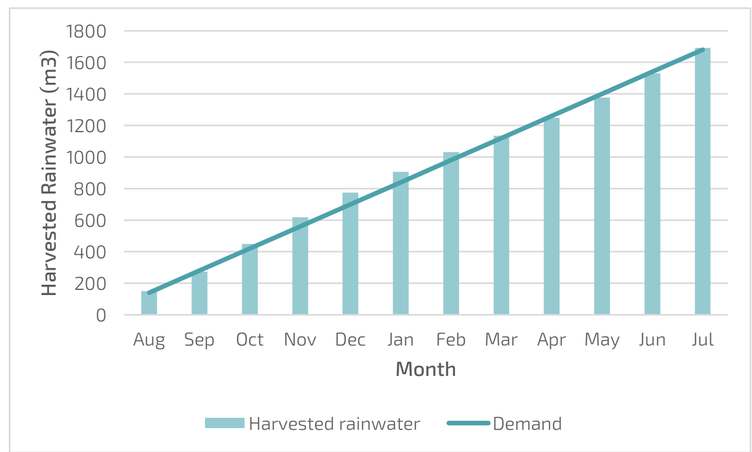
Natural ventilation can help cool down the building, especially the stage with internal gains from lighting and people. Top down ventillation can be utilised to flush out the auditorium quickly, whereas the height of the practice space allows for single sided ventillation strategy. This also helps the air quality of the space and is more sustainable than using only mechanical ventilation systems.



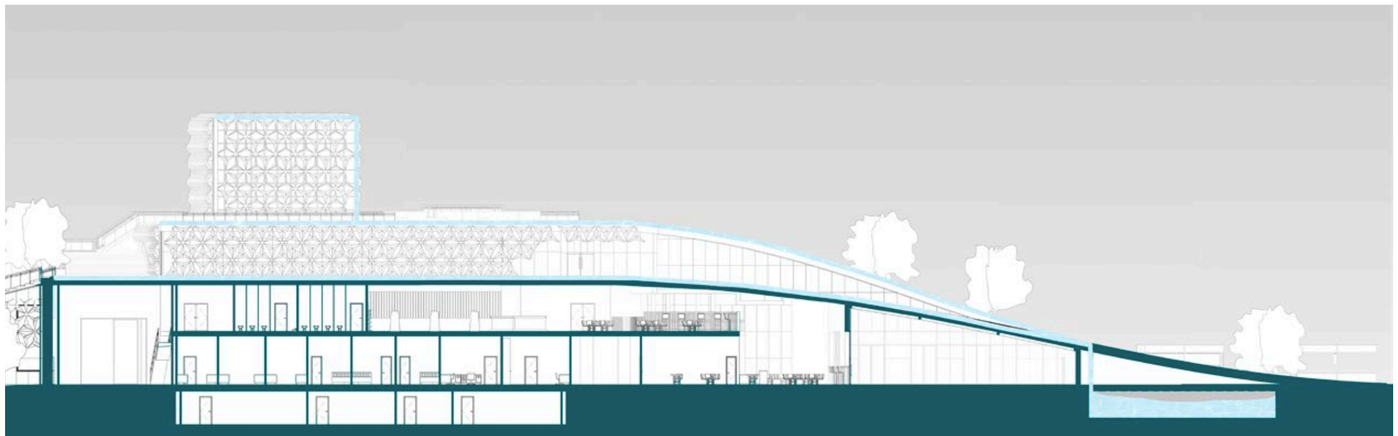
Solar panels can be implemented into the project to help generate the energy needed to operate the building. Running on clean energy will substantially reduce the operational carbon emissions and help move towards net zero carbon.

ENVIRONMENTAL STRATEGY: RAINWATER HARVESTING

In order to harvest the rainwater, the gutter has to be designed to collect the water at a single point, flowing underground into the storage tank.



Using annual precipitation data, the amount of collectible rainwater has been calculated. With an average annual precipitation level of 680mm, assuming that 75% of the roof can be used to collect water, a total of 1700 m^3 of water can be collected annually. The estimated demand has been used to then size the water storage tank, to ensure enough water is stored for year round use.



An underground rainwater collection tank can be used to reduce the environmental impact of the building and use less water from the mains water system. Some filtration of the collected water is needed before it can be used. However, since it will be used mainly to flush toilets and not for drinking, this is only minimal.

The sloping building geometry will help guide the water towards the tank, and where necessary, additional slopes will be added to drain the water easier. The green roof system can be used in tandem will SUDS for a more sustainable drainage design.

1,700m^3 Harvested Rainwater Annually

Enough for 280,000 Toilet flushes

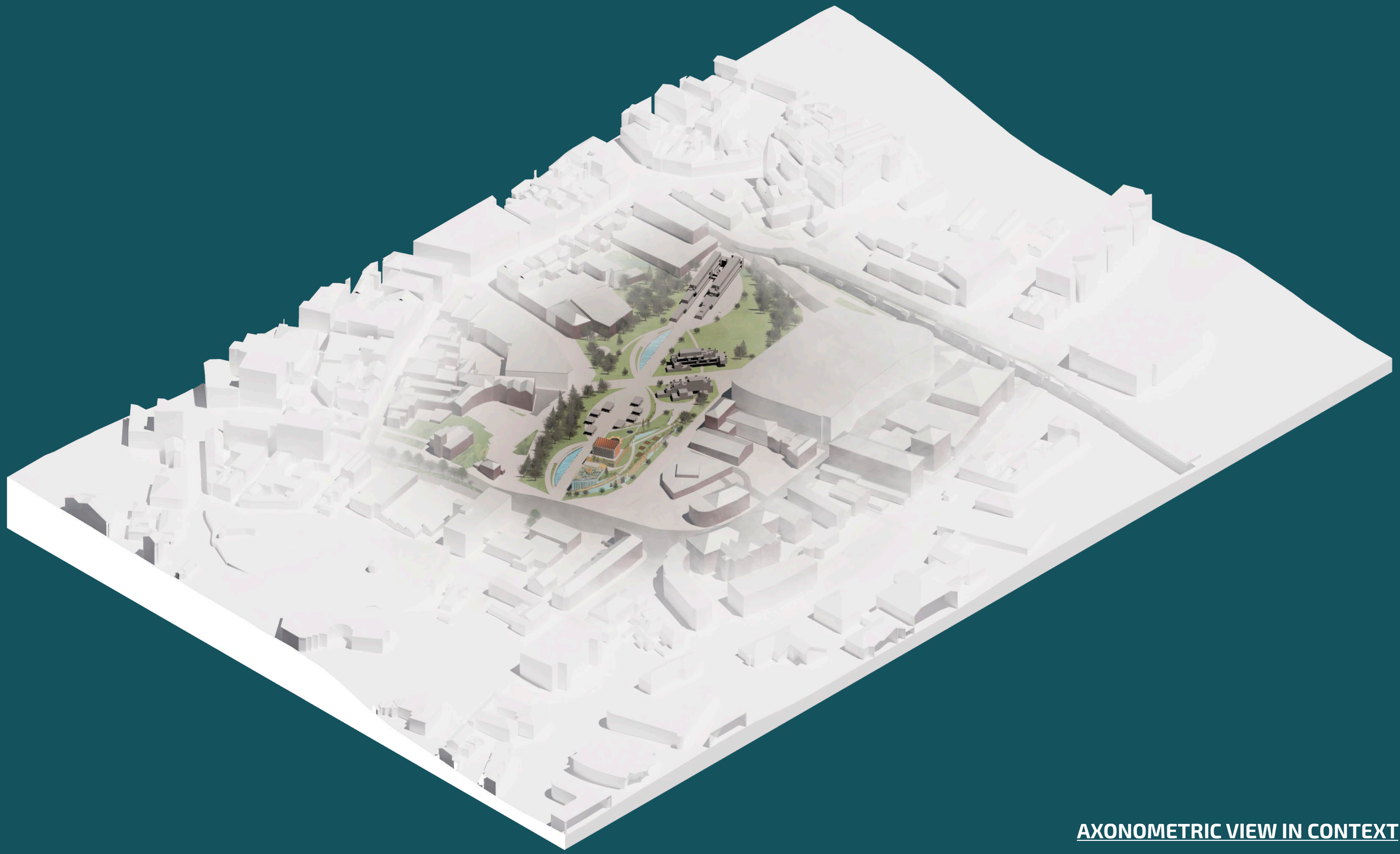
70,000L Storage tank needed

68%

Of the roof is natural greenery

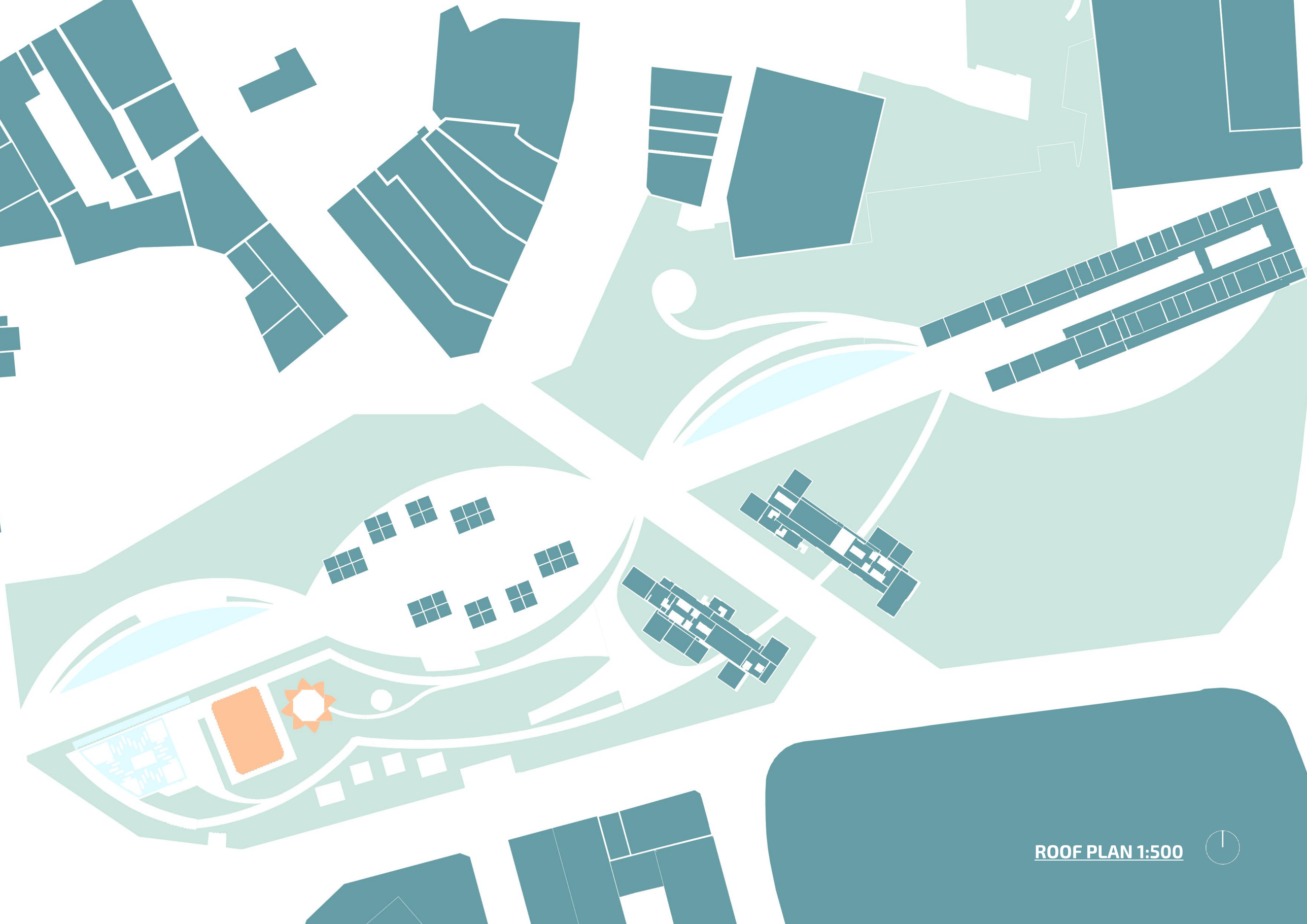
Trees planted on intensive green roof

Boosts ecosystem around building

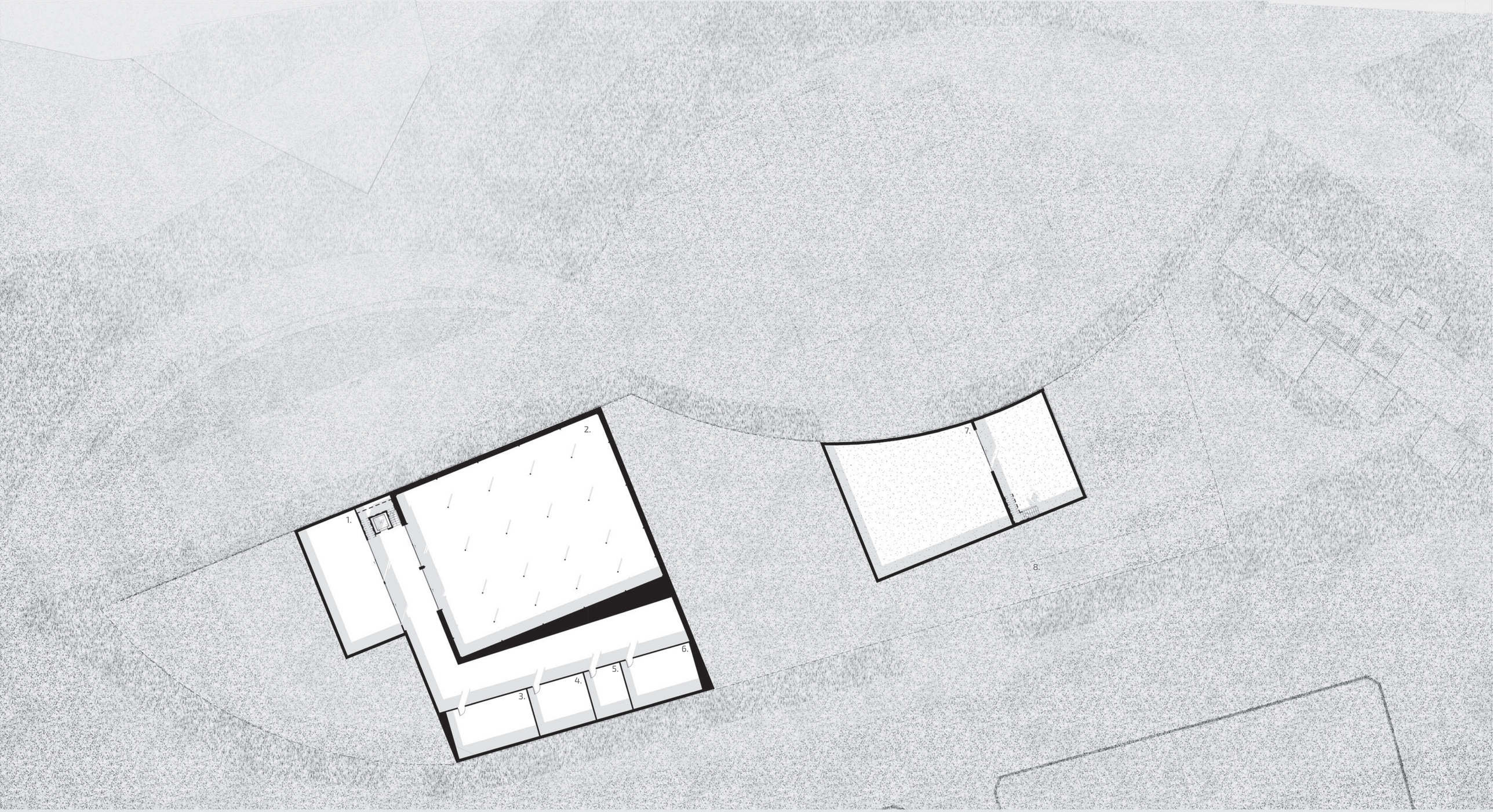


AXONOMETRIC VIEW IN CONTEXT

The Lotus Theatre brings a burst of colour to its surroundings with the rich orange copper cladding and the cyan blue glazing playing off each other harmoniously, whilst also remaining embedded in its context under the sloping green roof.



ROOF PLAN 1:500



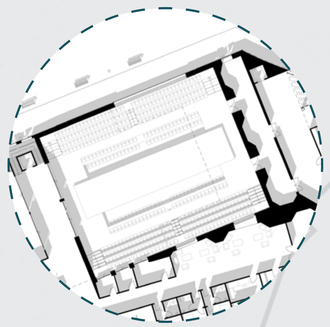
Underground Floor Plan 1:200

0 5 10 20 30 40

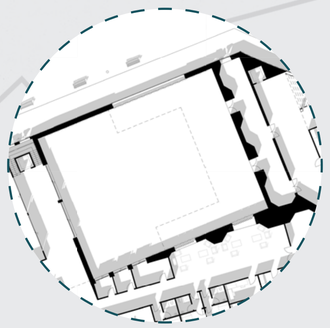
Key:

1. Prop room/Scenery
2. Stage seating storage
3. Storage
4. Light Stoage
5. Plant room
6. Sound Equipment Storage
7. Market Storage
8. Rainwater Storage Tank

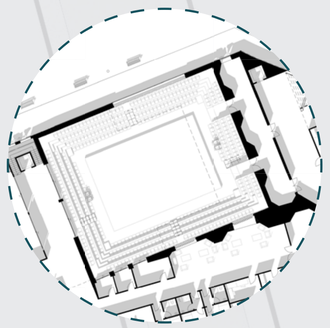
Alternate Auditorium Layouts:



Traverse



Flat



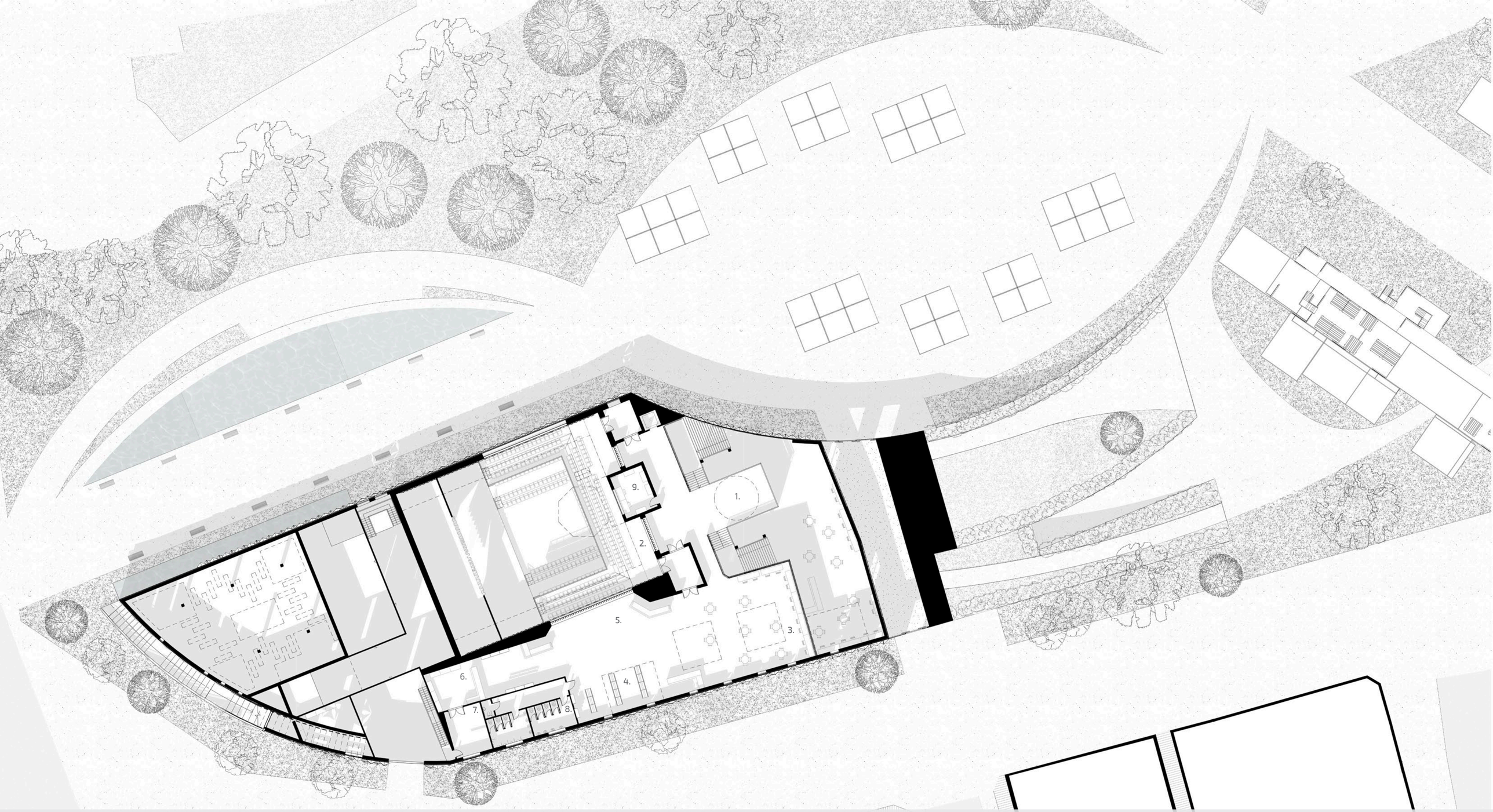
Arena

Key:

1. Lobby
2. Box Office/ Cloakroom
3. Cafe
4. Auditorium
5. Toilets
6. Green room
7. Quick change rooms
8. Office
9. Makeup room
10. Single changing rooms
11. Group changing rooms
12. Scene Dock
13. Storage/ Scenery
14. Admin
15. Pre-performance Practice room
16. Market storage
17. Rain water drainage
18. Market
19. PlayBuilding

Ground Floor Plan 1:200

0 5 10 20 30 40

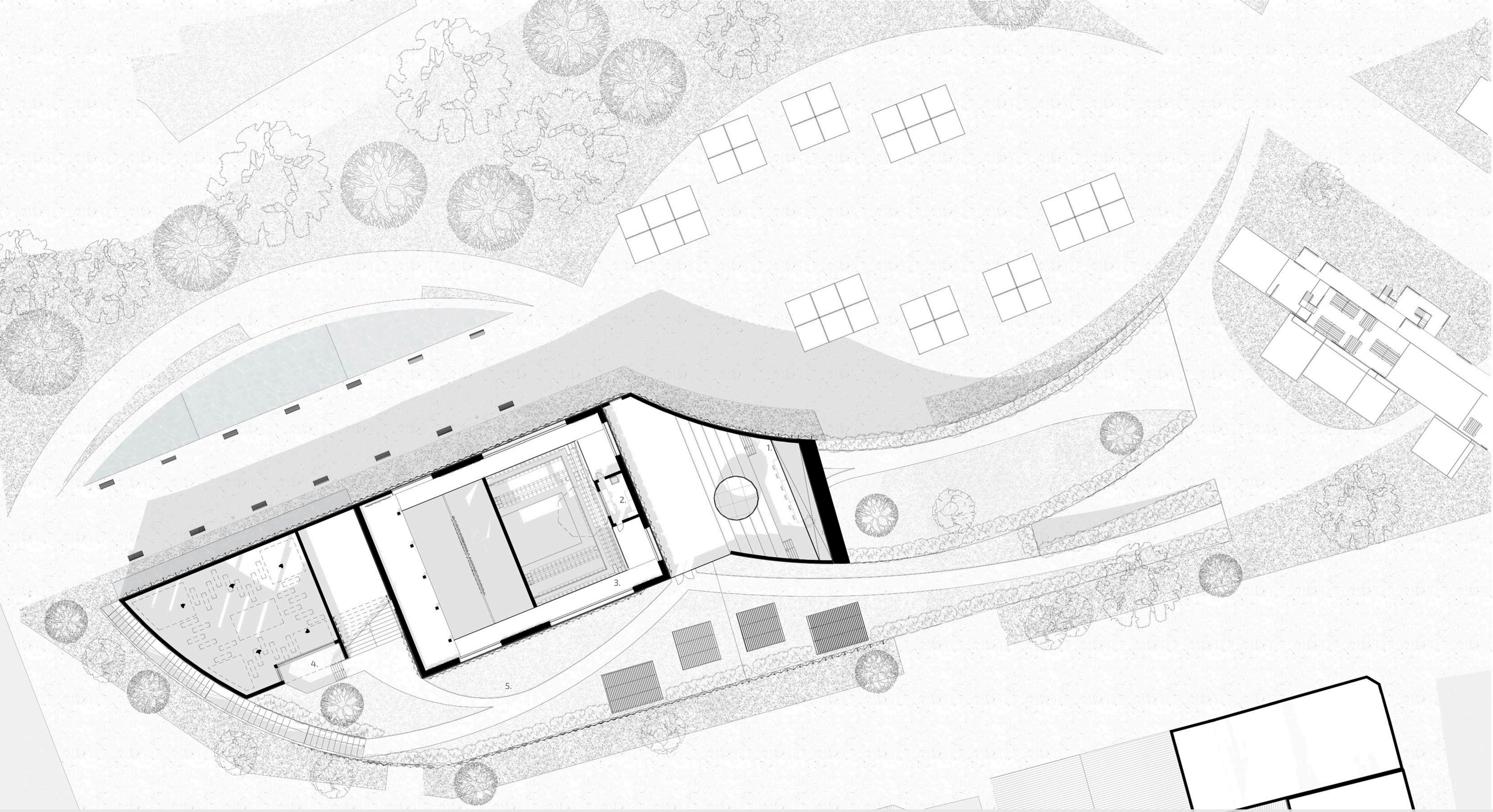


Key:

1. Lobby/Exhibition Space
2. Auditorium
3. Cafe
4. Merchandise
5. Bar
6. Store
7. Storage
8. Toilets
9. Control Room

First Floor Plan 1:200

0 5 10 20 30 40



Key:

1. Viewing Platform
2. Control Room
3. Catwalks
4. Practice Space Balcony
5. Rooftop Garden

Second Floor Plan 1:200

0 5 10 20 30 40

1.

2.

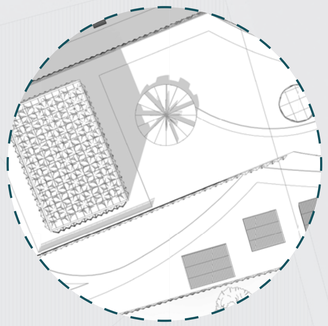
3.

4.

Roof Plan 1:200

0 5 10 20 30 40

Alternate Roof Layout:



Closed Roof

Key:

1. Lobby Lightwell
2. Retractable Roof
3. Flytower Viewing Platform
4. Zen Garden

LONG SECTIONAL PERSPECIVE

Key:

Public Entrance

The main entrance to the theatre is situated along the key north-south axis of the site, bringing people in going to and from Lister gate.

There is an opportunity for the adjacent marketplace to flow into this space when necessary due to bad weather, or to expand the cafe out into this weatherproof space.

Main Lobby

The main lobby connects four different levels with a lightwell running down the middle, strategically positioned above an exhibition space that showcases current performers' props, posters and etc.

A glimpse of this exhibition can be caught when travelling along th green roof atop the building, giving a flavour of the happenings of the theatre.

More exhibition spaces are found between the buffer zone leading into the auditorium, building up the tension and atmosphere of the performance.

Auditorium

The auditorium boasts a highly flexible mechanical seating system that can cater for any stage layout and even change mid performance during an intermission break. This feature allows the building to truly act as a multiform theatre space, equipped for any occasion.

The auditorium is clad in acoustic timber elements that mirror the external cladding on a smaller scale, but provide a different functionality for this space.

A retractable roof allows for amazing starlit theatre performances, as well as letting the public peer into the production.

Flytower

A mechanical flytower above the stage helps bring the performance alive for those who miss out on the opportunity to witness the event inside the building.

As the performance unfolds inside, the flytower and the kinetic cladding on the facade dance along with the performance inside.

As the facade moves and the flytower morphs in shape, people are drawn towards it. The flytower is glazed to act as a beacon of light during night performances, illuminating the city and to allow views into the stage.

Storage

The scene dock is situated nearest to the scenery and storage to allow for quick delivery, and is situated closest to Maid Marian Way running alongside it.

A double height storage space next to the stage area allows for quick and easy transfer of big props, whereas a single height storage space beneath is used for smaller props perhaps used in tandem with the trapdoors under the stage.

Pre-Performance Practice

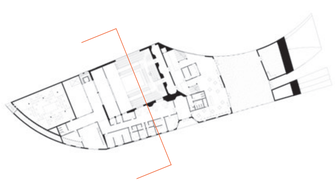
The pre-performance practice space is clad entirely in locally sourced timber to help create a natural and comfortable environment for the performers doing their final rehearsals before the big night.

The practice space is situated underneath the Zen Garden, featuring a shallow pond with a glazed bottom. This helps in creating mesmerising water reflection patterns as well as a natural calming effect, whilst also allowing visitors to the garden to partially see through and witness the final rehearsals.

There is also a balcony and spiralling staircase around the space providing viewing platforms onto the rehearsal area.

SHORT SECTIONAL PERSPECIVE

Key:



Supporting Spaces

The auditorium is surrounded by the green room for the performers awaiting their entrance onto the stage. There are windows with one way glazing that allow them to peer into the space and see how the performance is unfolding. The glazing is orange to contrast the external cladding. A similar space is created for the public on the first floor, with stores and bar spaces to go along with the view.

The dressing rooms next to the green room are clad in one way glazing again, to keep the sense of privacy and comfort for the performers.

Underground storage spans the lower floor level, providing adequate space for all props.

Rooftop

The roof maintains the curved paths of the park and seamlessly transitions onto the building, providing easy access to the retractable roof and flytower that provide chances to view the performance from a different angle.

There are many paths one can take along the roof, all offering different glimpses into the auditorium space, connecting the public with the performers even if they are not inside the auditorium to witness the performance.

The cladding around the auditorium moves mechanically to reveal different aspects of the space, creating an interesting walkway up the roof that is unique each time.

Park

The parkland adjacent to the building provides the main access route from the east to west of the site, attracting a lot of people and so is the best place to show off the everchanging beating heart of the theatre that is the mechanical cladding sitting on the north facade.

This allows for glimpses and views onto the stage from outside looking in, to give a small taste of what the theatre is about.

The water features and curved paths found in the park will also be very familiar for those who check out the rooftop, as they are emulated in the design of the theatre. The park is integrated seamlessly into the building, as if it was always a part of it.

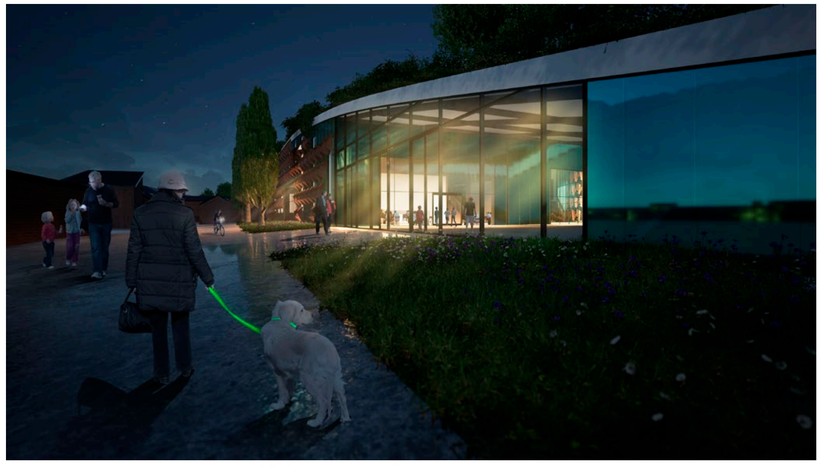
AERIAL VIEW OF BUILDING IN CONTEXT

Taken from the drone footage showing the building in its context, surrounded by the public on its way through the main axis on the site. The daily market also attracts people to the site but is only secondary to the theatre, stealing the spotlight. The sloping roof carries the parkland over to the top, fully immersing itself in natural greenery.

Approaching the building through the park

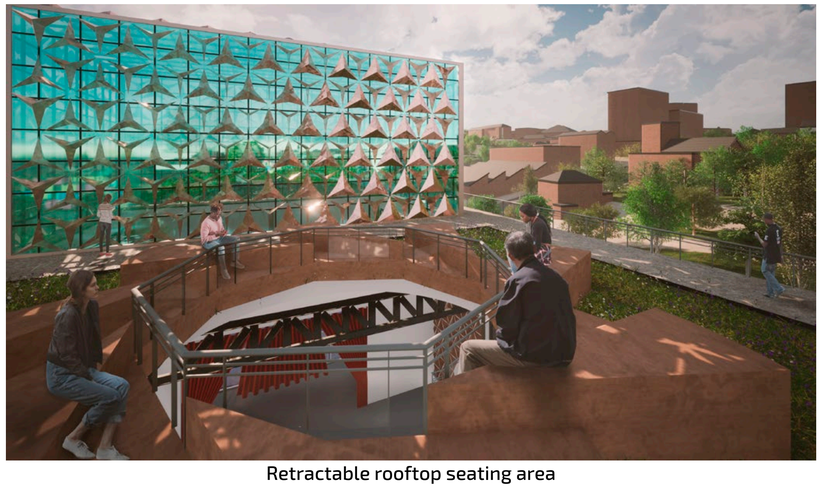
Approach from Maid Marian Way College

Water curtain performance projection on a perfect summer day



Main entrance illuminated at night

View of the rooftop pathways from the Play Building on a snowy winter day



Retractable rooftop seating area

Zen Garden

Rooftop pathway on a misty day

MECHANICAL FACADE COMES TO LIFE

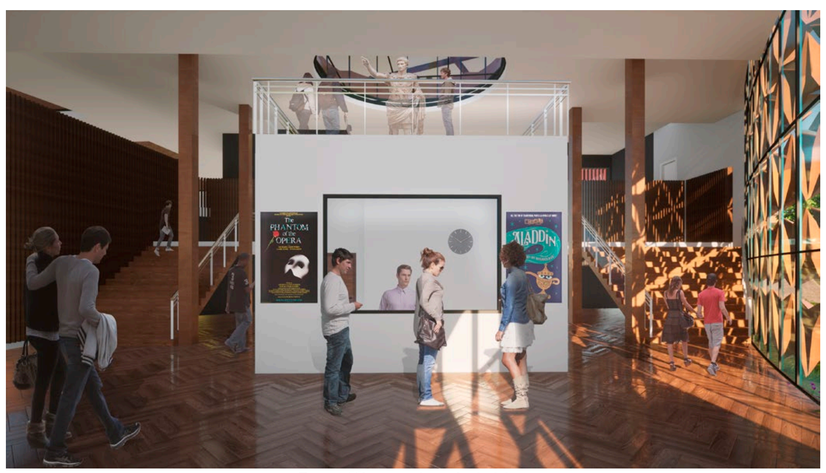
Mechanical cladding mostly shut on a nice summer day, with the daily market operating at full potential

Mechanical cladding slightly open,on a horrendous rainy day. The market is moved inside the building and flytower opens out to provide shelter for those still looking to experience the rooftop.

Mechanical cladding slightly open on a nice autumn day, allowing more views into the auditorium space.

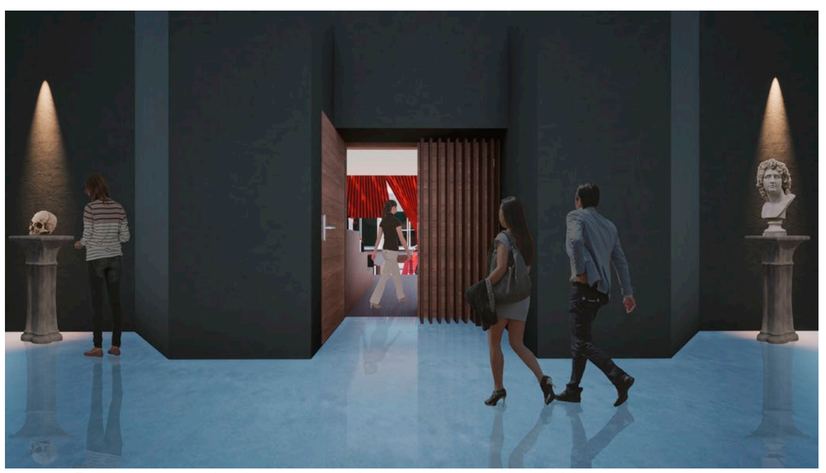
Mechanical cladding fully open,on a wet winter night. The market still operates late at night, as the building illuminates the night sky and acts as a beacon to attract people towards its activity.

Main stage in thrust layout for traditional ballet performance



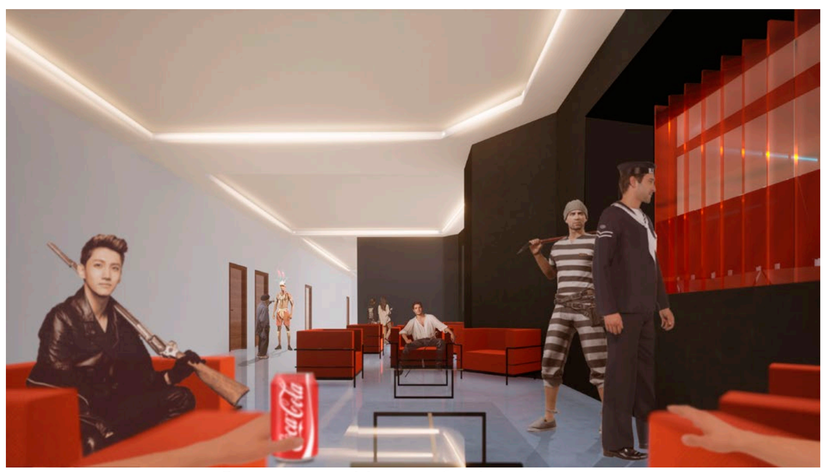
Box office and main lobby

First floor bar and cafe space outside the auditorium



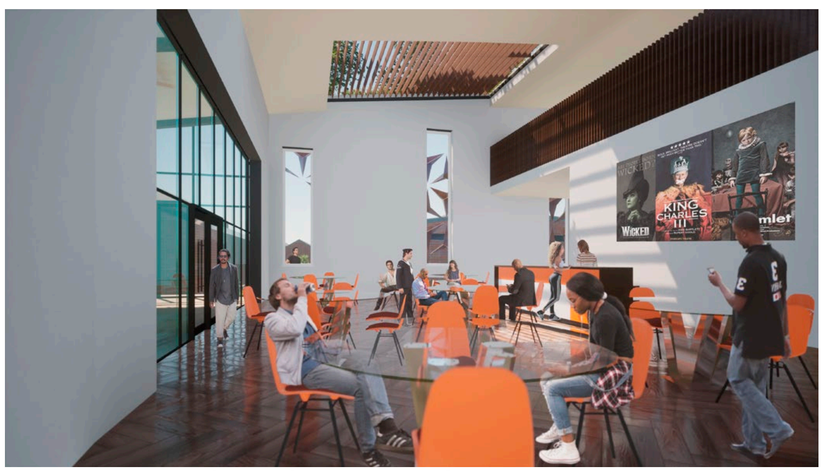
Entrance to auditorium surrounded by carved out exhibition spaces for props

Main stage in arena layout for holographic circus performance



Green room waiting area for the performers

Practice space below the zen garden pond



Main cafe space for public and performers to meet each other