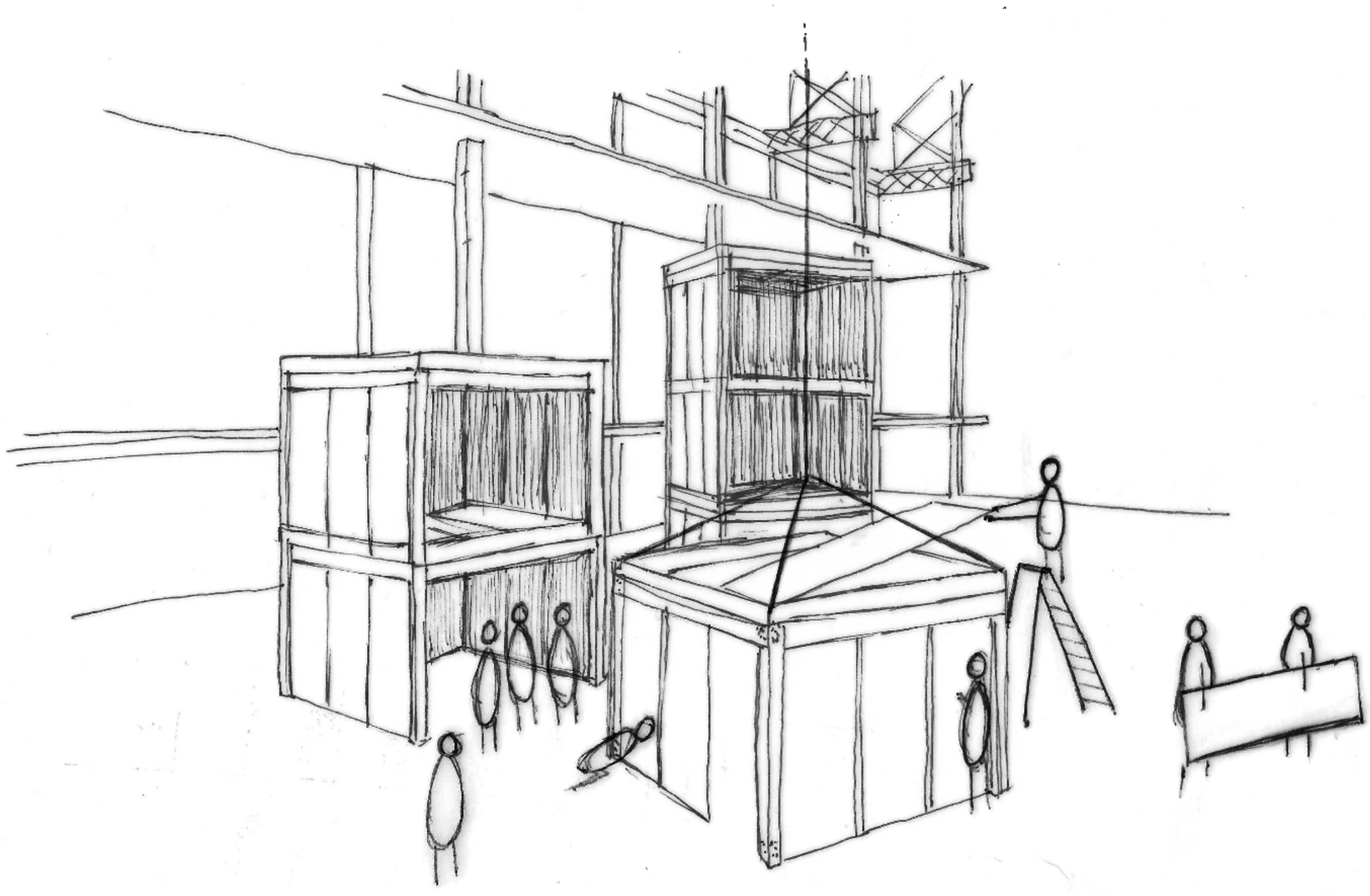
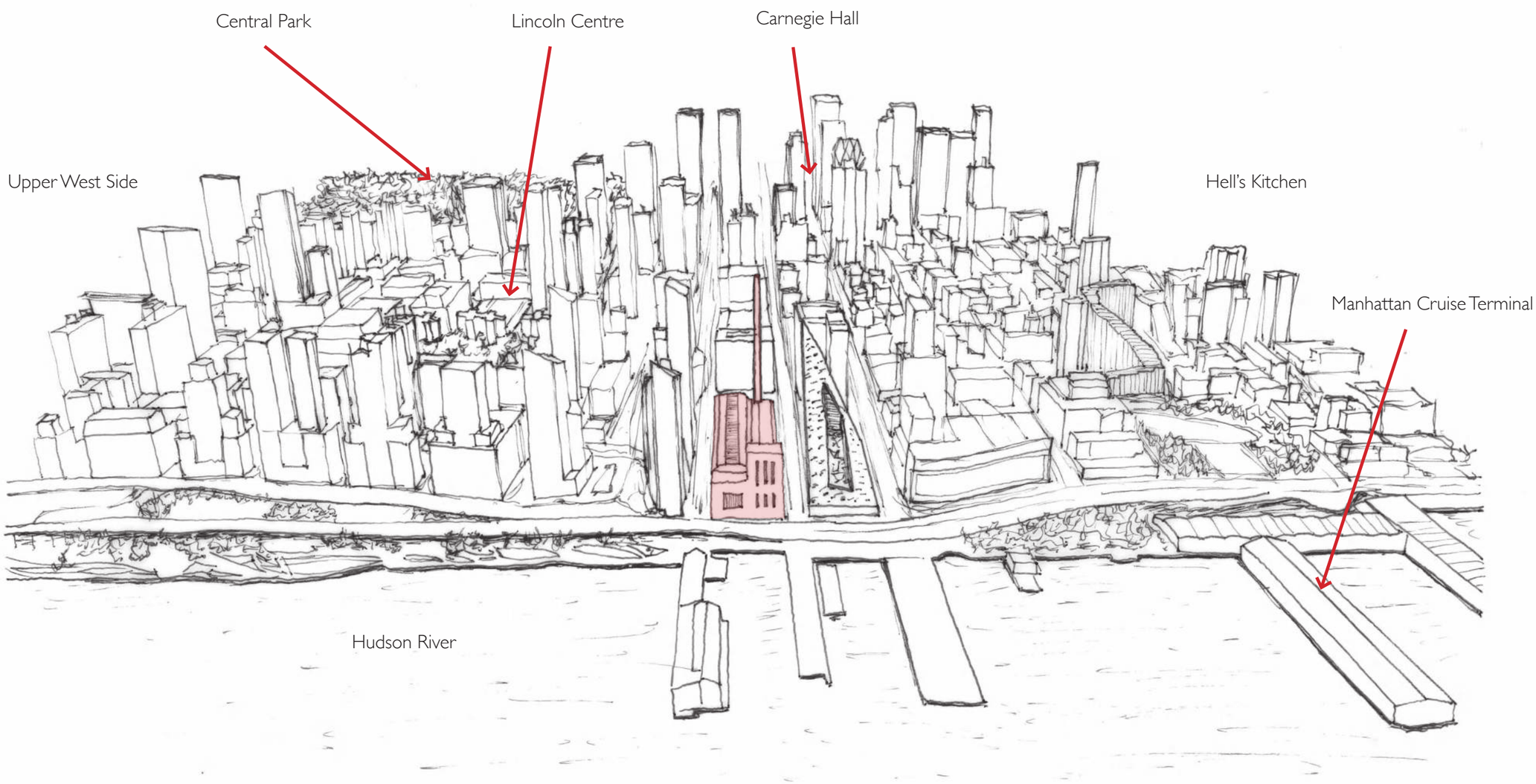
[Sub]Culture





"Only in New York has architecture become the design of costumes that do not reveal the true nature of repetitive interiors but slip smoothly into the subconscious to perform their roles as symbols."

Rem Koolhaas (Delirious New York, 1994)[1]

IRT Powerhouse

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Vision for a new cultural space

Brief

The Municipal Art Society of New York (MAS) has asked for proposals for the re-development of the IRT Powerhouse as a community cultural space. Located on the dividing line between Hell's Kitchen and the Upper West Side, the Powerhouse was constructed to power New York's emerging underground transport network in the early 20th century. The Powerhouse is protected by the Landmarks Law, a piece of legislation fought for by the MAS in 1965.

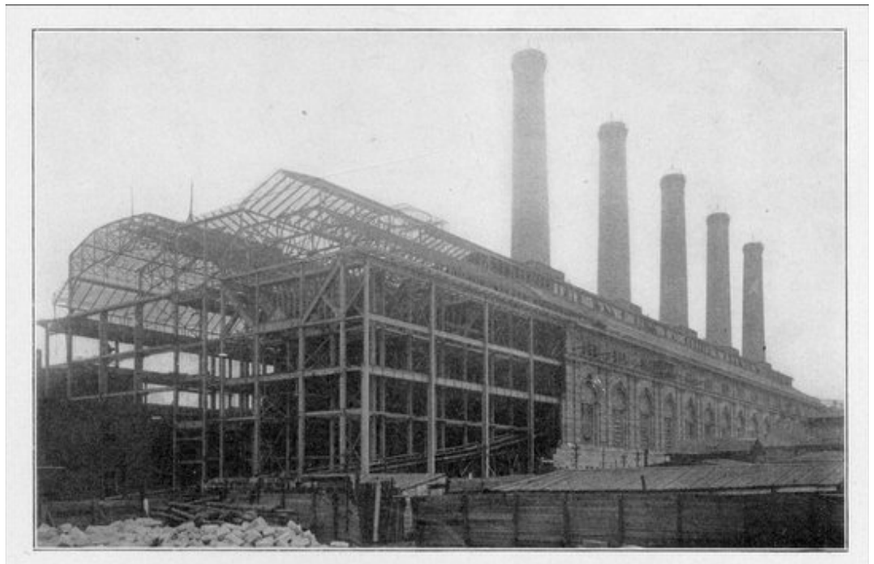
The MAS is an organisation supported by diverse group of staff representative of the vibrant background of New Yorkers from all five boroughs of the city. The group was founded in 1893 by Richard Morris Hunt and a number of civic activists with the aim of "beautifying" New York.[2]

Fight for Light

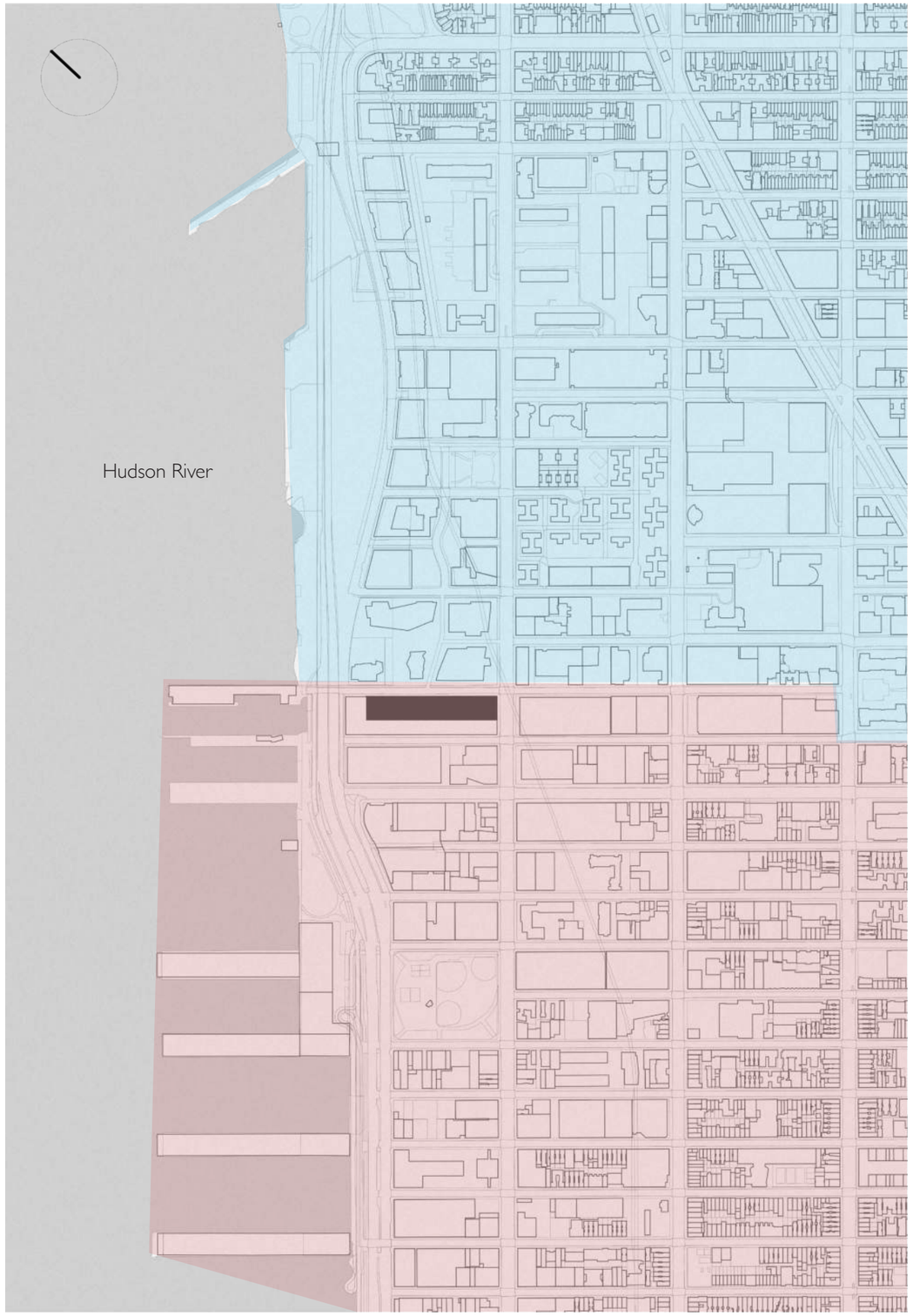
New Yorkers for Parks (NY4P) and the MAS have built a campaign to advocate for greater access to sunlight, an essential component for an "equitable, sustainable and economically vibrant city" that contributes to the health and happiness of residents. This is being achieved through legislative protections, incentives, regulations as well as design quality and coordinated planning.

Carbon Challenge

In New York, 68% of emissions come from buildings. The Carbon Challenge is a voluntary leadership initiative and public-private partnership between the Mayor's Office of Sustainability and leaders in the private, institutional, and non-profit sectors who have committed to reduce their greenhouse gas emissions or more over 10 years. [3]



EXTERIOR VIEW OF THE POWER PLANT DURING CONSTRUCTION, SHOWING STEEL WORK



Stakeholders

West side Neighbourhood Alliance

Hell's Kitchen has been considered a dangerous place to live up until the 1980s and sits in one of NYC's largest transportation hubs for train, bus and commuter rail. The neighbourhood has undergone rapid gentrification with many old buildings being converted into high-end residential for higher rent gains. Many residents have been pushed into smaller spaces and retailers have dispersed smaller services such as laundromats.

The Alliance is an independent, member-run organisation that mobilises the residents of the neighbourhood to take charge of community planning.

"We advocate for a diverse, affordable, liveable neighbourhood that preserves the mixed-income character of today's west side, and we work to guarantee that the ongoing development of our neighbourhood serves community members of all races, incomes and backgrounds." - WSNA

Historically, the West Side has been a mixed-use, mixed-income community that includes immigrants, artists, civil servants, families, individuals and middle-class New Yorkers of all types. Campaigns ensure that new developments are designed appropriately and contextually, with permanently affordable housing, reasonable building heights and public open space that truly serves the community.

The Alliance has also fought hard to improve quality of life and quality of air around the community, reducing the effect of pollution and other threats. One detrimental practice was the idling of buses near schools, providing a space where children can play away from traffic could be one use.[4]

WEST SIDE NEIGHBORHOOD ALLIANCE

Affordable Housing | Community Development | Social Justice

The Artist Co-op

The mission statement of the Artist's Co-op is to create a thriving environment that nurtures the innate multidisciplinary nature of the artist community. A not-for-profit that provides a platform for all artists with well over 175 members not including the wider NYC artist community. Located on 500 W 52nd St. Hell's Kitchen, Midtown West.

They provide a number of services including: co-working spaces, rehearsal rooms and studios as well as a resource library and curated member services such as networking and workshops.

The Artist Co-Op has had to go exclusively online as a result of Covid-19. Our proposal provides them with a replacement space.[5]

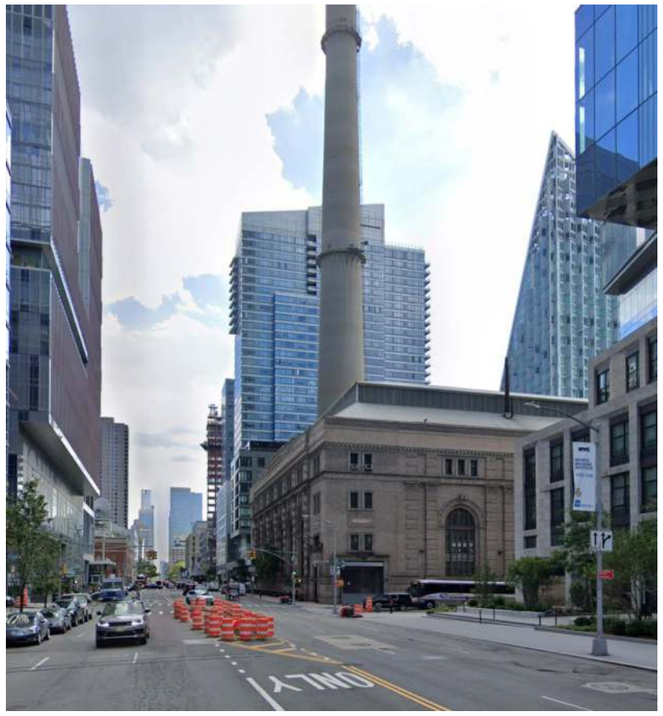
West 44th Street Block Association - Pier 84 Community Garden

Maintained by a group of local volunteers all over Hell's Kitchen, the garden has been a modest community meeting spot for many years, allowing volunteers to enjoy the benefits of gardening and being outdoors.[6]

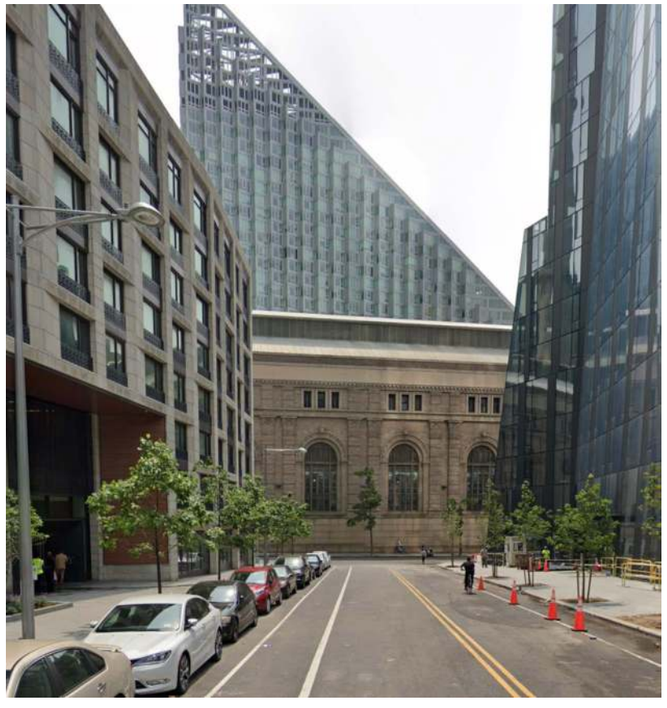
Pier 84 Community Garden, West 44th Street Block Association.

Site

Hell's Kitchen & The Upper West Side



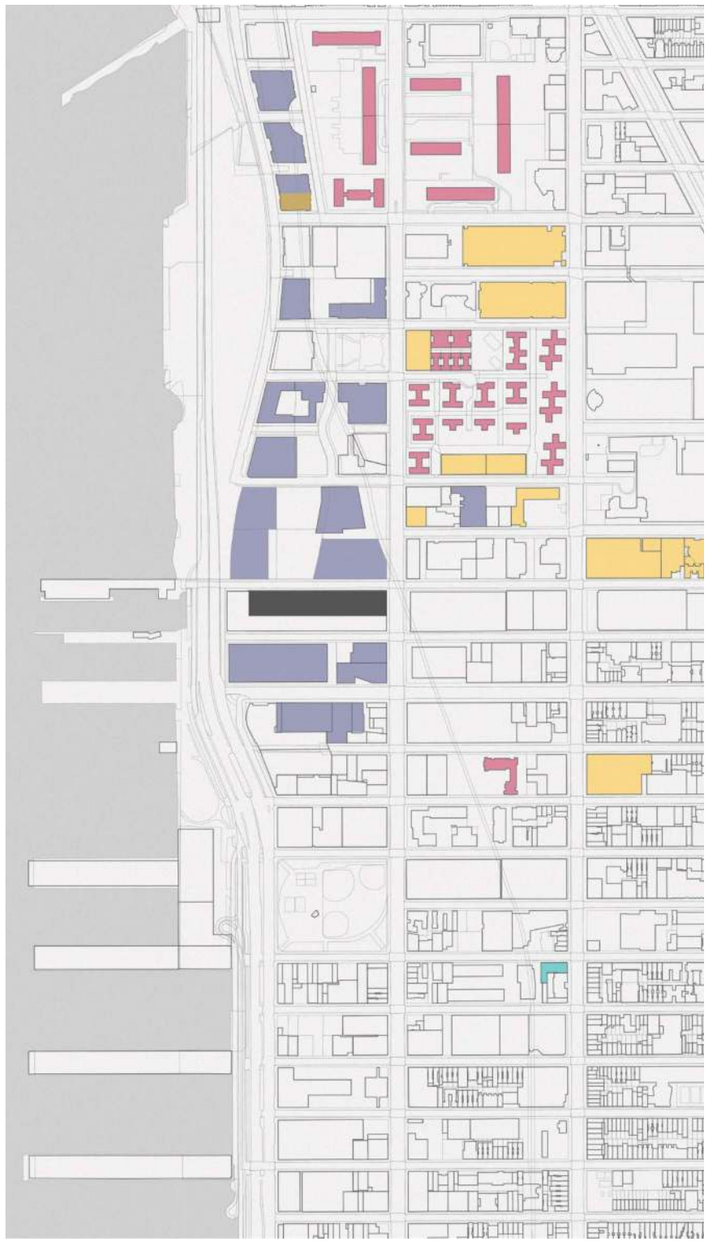
1. The corner of W 59th and 11th Avenue.



2. Approach from Freedom Pl.

Immediate Context & Access to the IRT Powerhouse

Point of Confluence / Access



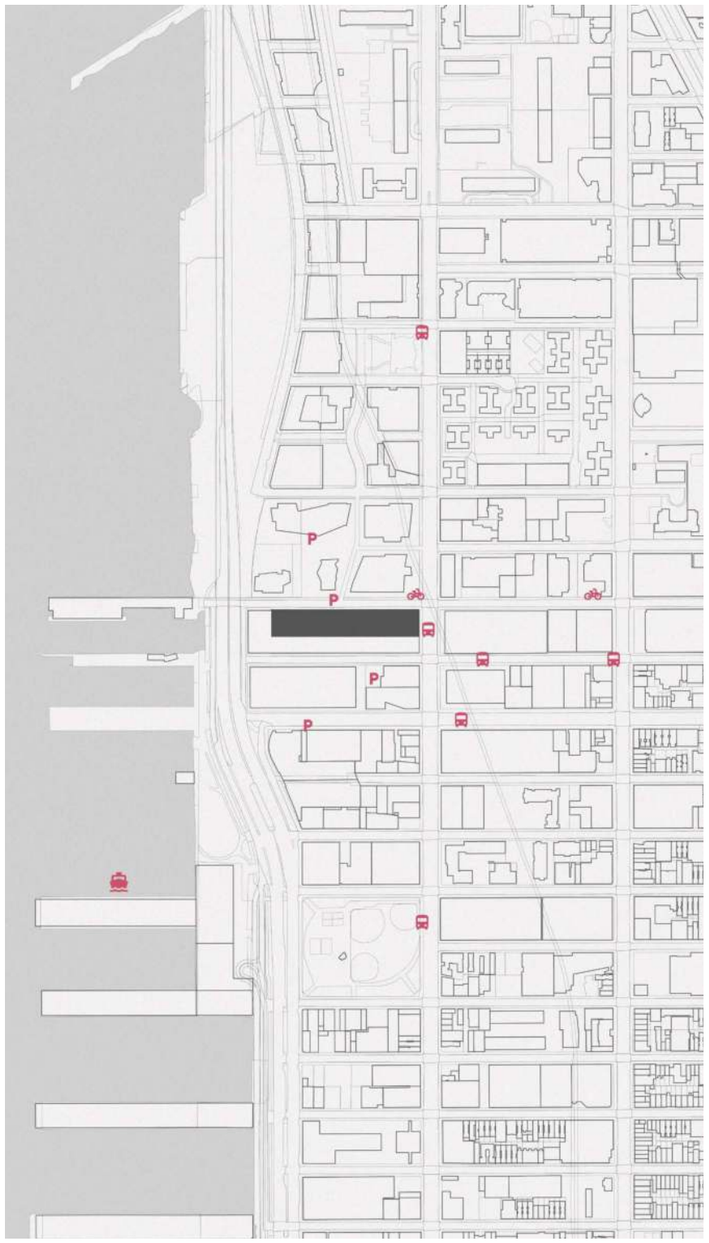
Usage

Land use is dominated by high-rise luxury apartment buildings. This is a densely populated neighbourhood with a high proportion of public housing and a significant number of mixed education buildings.

- Public Housing
- High-End Luxury Apartments
- Education / Community
- The Artist Co-Op

Distribution of Green Space

Although there are parks nearby, facilities are often insufficient or offer space for a limited number of activities. Clinton Cove for example is purely green lawn. There is an opportunity to provide a more engaging and community driven green space to people who don't have access to outdoor space close to where they live.



Transport Access

New Yorkers predominantly commute and travel via public transport, bicycle or on foot, with only a third of the city population owning a car. In 2017, citizens are making more than 450,000 trips by bike per day. Providing access for pedestrians and the possibility for cyclists to store their bikes could be easily possible with such a large space. [7] This store would also prove useful for the neighbouring apartments, which have minimal bike storage currently.

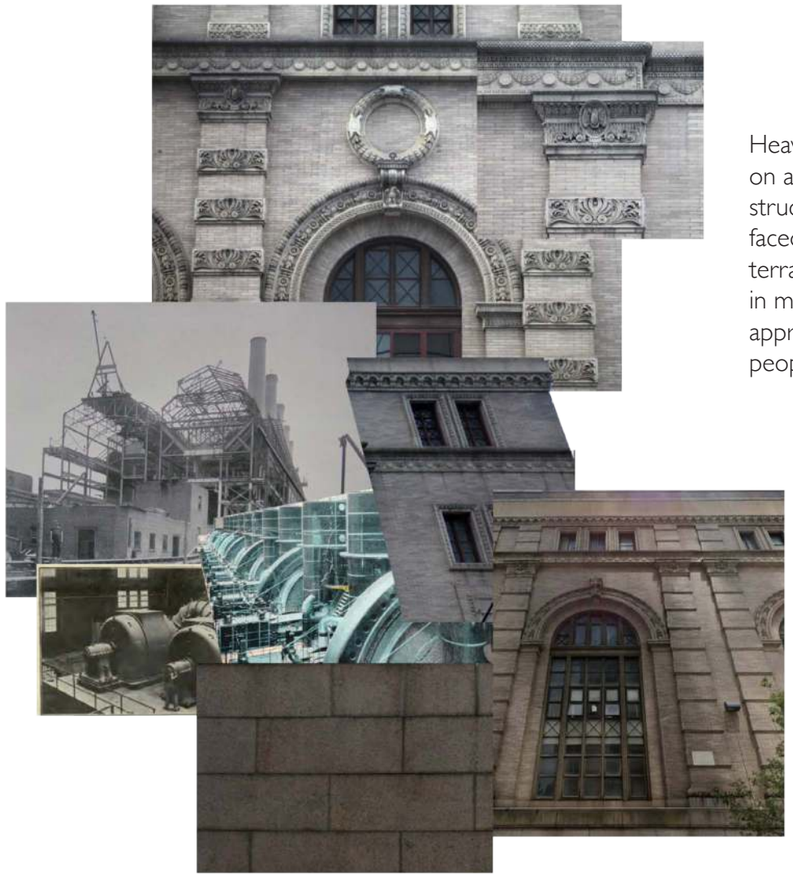
IRT Powerhouse

Scale, Formality & Materiality

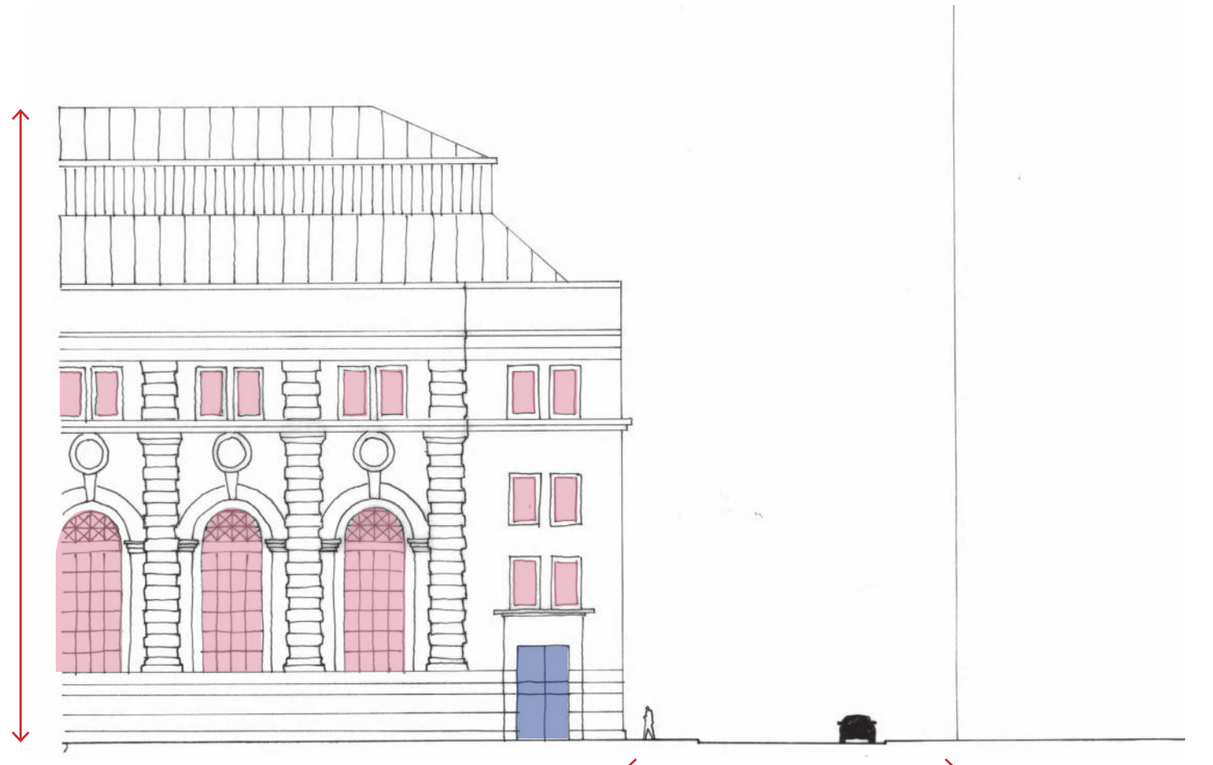
The formality of the IRT Powerhouse is very clear. The neoclassical facade is repetitive with glazing and ornamentation along the Northern and Eastern elevations. There is a key importance in retaining the formal outlook onto the street.

The IRT is dwarfed on the southern, eastern and northern façades by very tall opposing buildings. The strong and powerful civic nature of the facade should be retained as much as possible but should also incorporate direct public access from the street, in line with the Landmark Preservation guidelines.

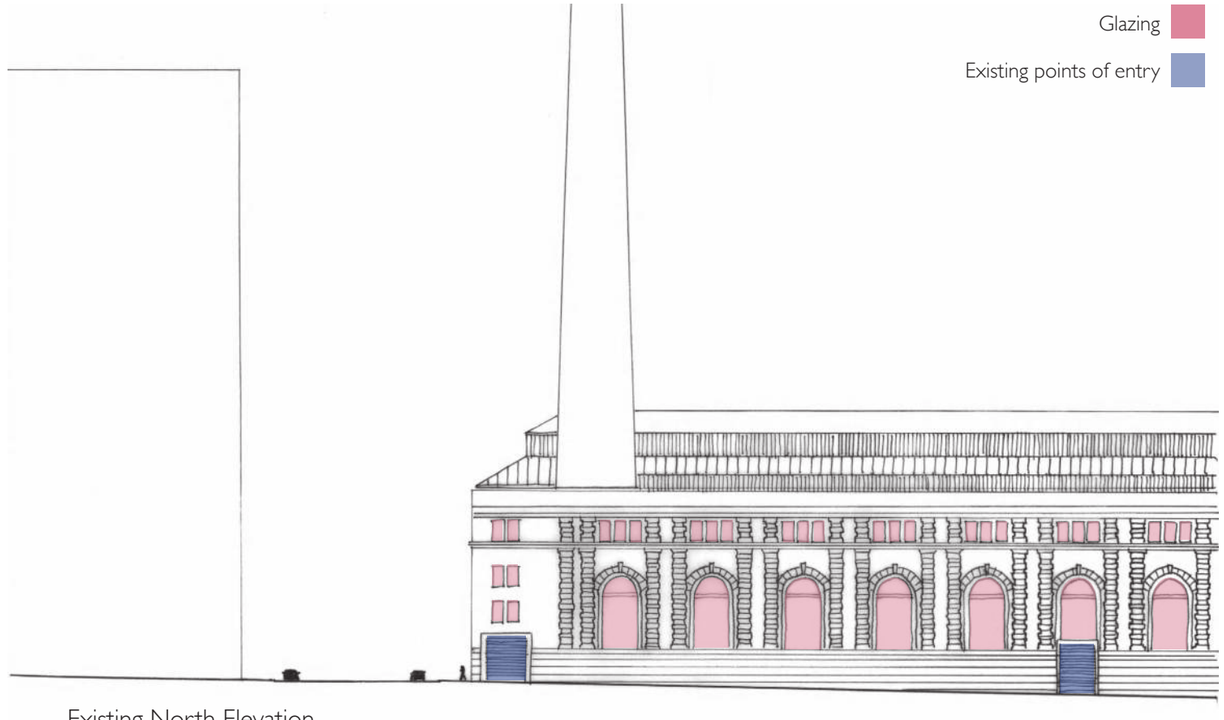
The building scale is significant. An issue to consider is how the Powerhouse can be made more approachable at a human scale.



Heavy existing masonry sitting on an extensive steel frame structure. The masonry is faced with granite, brick and terracotta. Providing a contrast in material could create a more approachable environment for people using the building.



Existing East Elevation



Existing North Elevation

Existing Structure

Feasibility & Concerns

Current Structure

The structure consists of a steel frame supporting the roof, reinforced concrete floors, and a barrel-vaulted ground floor. The façades are self-supporting brick walls on top of granite plinths, fixed to the steel frame for lateral stability. Steel trusses span the width of the building at roof level, carrying the roof load to the steel columns.

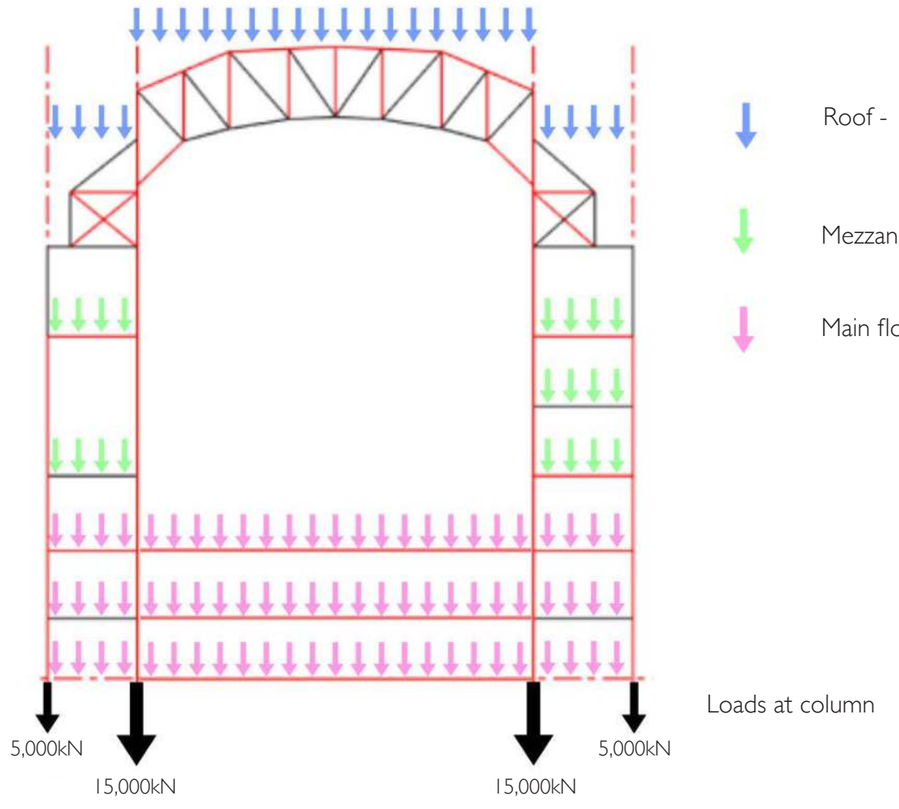
Stability Considerations

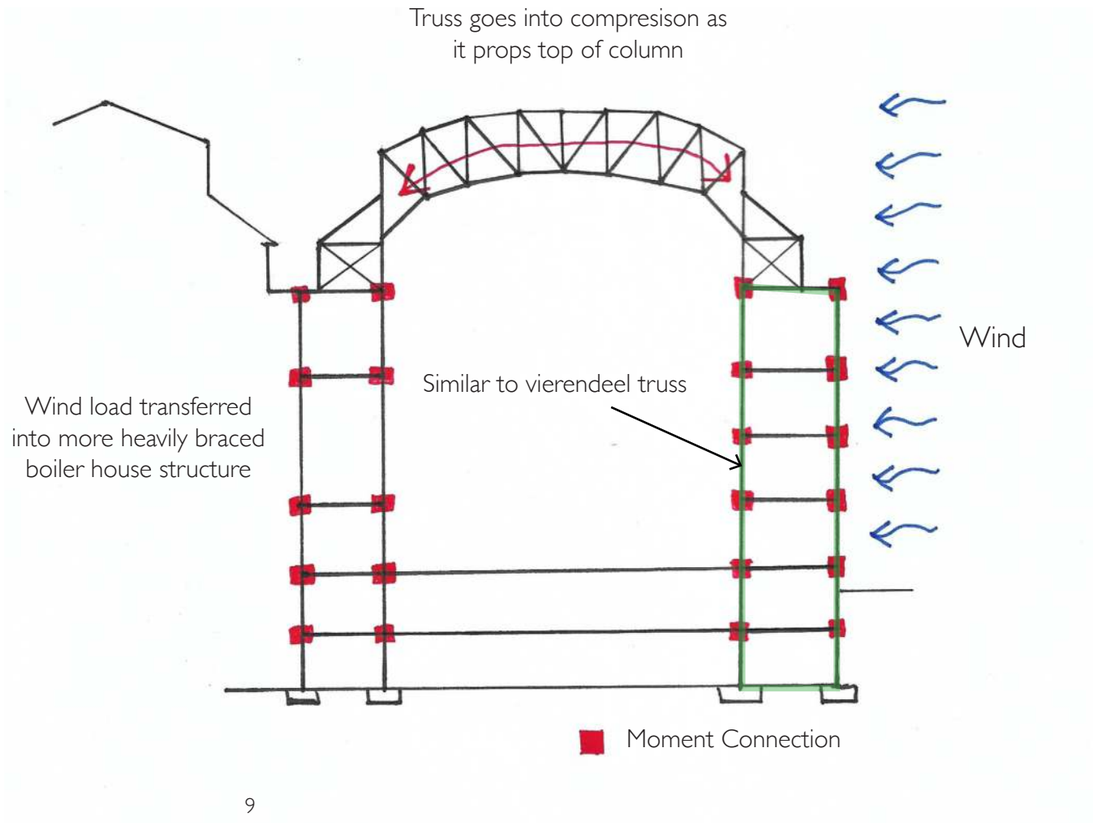
Some cross bracing is visible in photographs, but only in the longitudinal direction. This suggests that in the short section there must be moment connections between the columns and mezzanine beams, providing lateral stability under wind loading. This effectively forms a vertical Vierendeel truss, propped at the top by the roof truss. This carries the horizontal load to the neighbouring steel frame which is more heavily braced. Therefore keeping these mezzanine beams intact helps maintain lateral stability.

The mezzanine floor beams also provide restraint for the columns, so retaining these will keep the columns' vertical capacity, reducing risk of buckling failure. The floor slabs at ground and basement one level provide horizontal propping for the northern retaining wall.

Live Loads

Some of the live actions affecting the IRT power station include snow and wind. Whilst the west side of the building is exposed to the Hudson river, the remaining three sides are protected from wind by high rise buildings. Overall, wind is unlikely to significantly affect the stability of the power station since it was designed at a time where it would have been less protected by surrounding structures.





Aims

Concept - An Informal Community Art Space

The reversal of a Manhattan landmark as a purely aesthetic symbol. The interior of the Turbine Hall will house a dynamic assemblage of multi-use and informal community spaces, exhibitions and garden under the existing shell of the historic steelwork.

Social Aspiration - Inclusion

Driven by the West Side Neighbourhood Alliance (WSNA) and West 44th Block Street Association, the community garden is available to all members of the community. Local residents can apply to be volunteers in the garden or to maintain an allotment. Arts spaces are free to use for local schools and clubs. This also includes subsidised artist residencies.

Economic Aspiration - Sustainable Growth

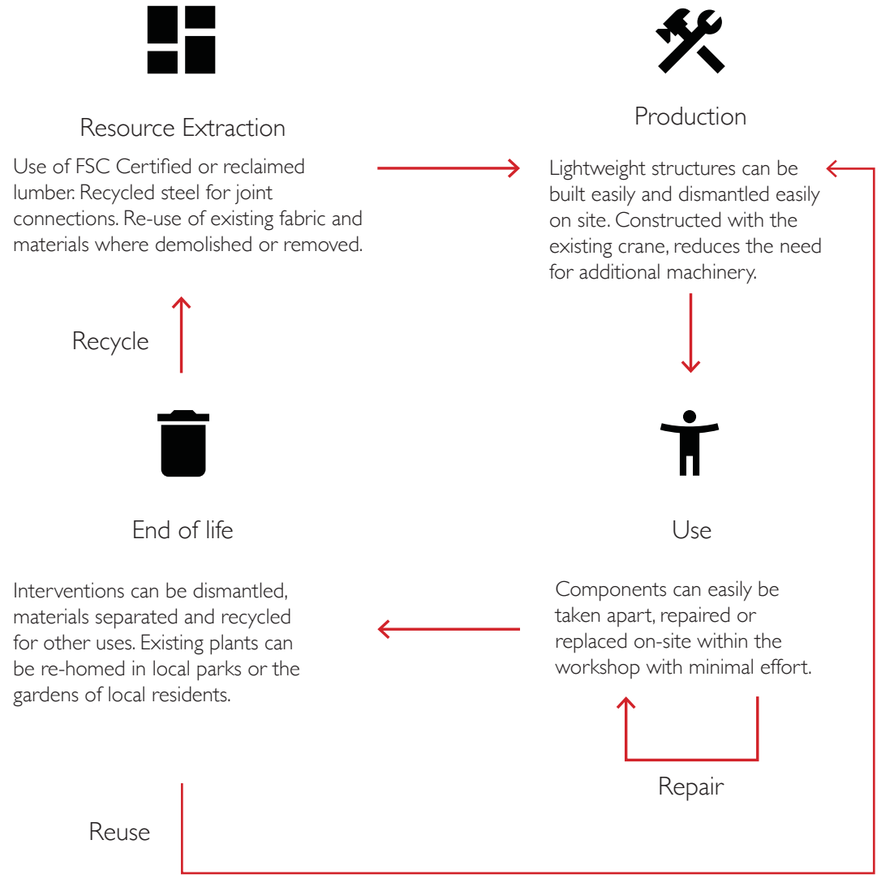
Enabling artists to produce and sell work in the same space. A portion of commission is reinvested back into services allowing subsidised residencies and free booking of exhibition space and studios.

Sustainable Aspiration - Adaptability & Longevity

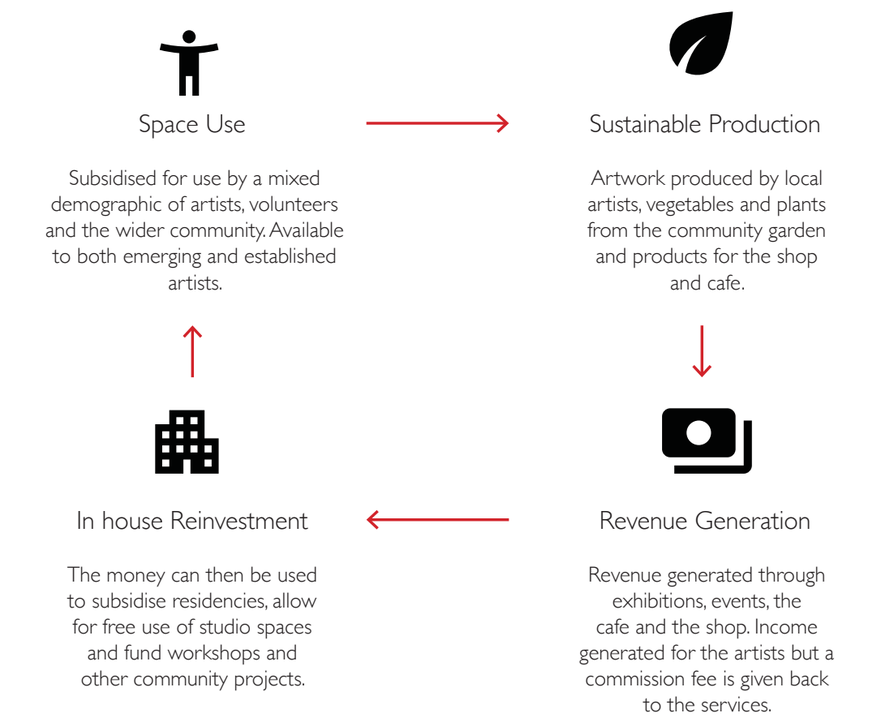
Low embodied carbon materials and maintenance of the existing fabric are key to keeping the space adaptable and extending its longevity. Lightweight structural interventions allow for easy configuration over the lifespan of the building and straightforward dismantling at the end of life. An extensive public green space within the existing hall addresses wider NYC issues such as the Carbon Challenge, MAS' "Fight for Light" and the WSNA's focus on reducing air pollution. The proposal seeks to give a net positive back to the community that both reinforces and enables it.

Sustainability Strategies

Life Cycle - Cradle to Death



Social & Economic Strategy



Reuse & Large Scale Exhibition

Pirelli Hangar, Milan. April Architects, 2004

Originally a manufacturing plant for locomotive parts and farm machinery, the Hangar was instrumental in making the Bicocca area of Milan one of the most important industrial centres in Italy. It has since been converted in one of the largest European centres dedicated to contemporary art. It houses both spaces for ongoing, large-scale exhibitions as well as the ability to host more private initiatives and events that allow for flexibility in artistic programming.

Shown in the far right image is Anselm Kiefer's permanent installation "The Seven Heavenly Palaces." The towers stand at between 14 and 18 metres tall, making full use of the height of the space.[8]

Community Garden Space

Dalston Curve Garden, Muf & J&L Gibbons, 2010

The curve garden was built as a free-to-enter public space along the Eastern Curve railway line that made its way through Hackney, which was left disused since the 1950s. A collaboration between the architects, Hackney council and local residents, the garden addressed a growing need for more green space in the Dalston area.

It is run by a team, including volunteers, who have designed a garden that ensures year round greenery with trees, shrubbery, herbs and perennials. Timber shelters are sat amongst the greenery that cover a cafe, seating areas and a pizza oven. The Pineapple House conservatory is one of these structures and is used regularly as a space for creative classes and outdoor performances.[9]

The Pineapple House Conservatory

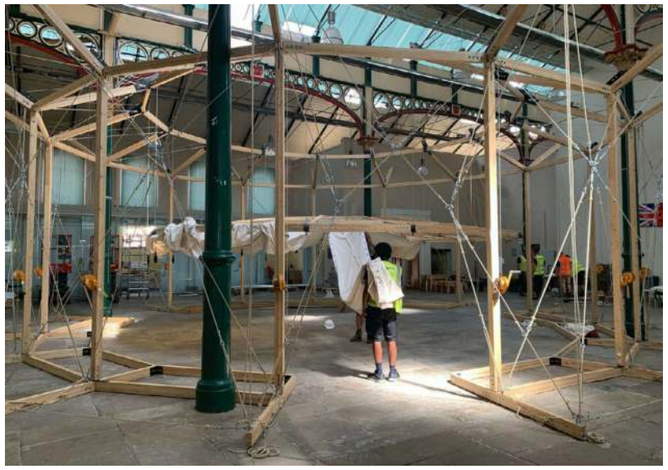
Temporary Timber Structures

Launch Labs, Stereo Architektur, 2014

Designed within the existing assembly hall of the original Burckhardt machine factory in Basel, Switzerland, the space needed to serve as a multifunctional work environment. The aim was to create a flexible space that offers multi-use activities such as: co-working, office space workstations, areas for more casual interactions, cultural activities and workshops but also flexible enough to provide for larger events. A lightweight timber structure was inserted into the original shell of the building, with all construction using laminated veneer lumber with all joinery visible. [10]

The Den, HaworthTompkins, 2019

The Den, commissioned for the Manchester Royal Exchange Theatre, is a temporary theatre space that can be dismantled and rebuilt in between events and hosts performances, debates and various community events on a regular schedule. A circular theatre with a roof that is raised by a series of 15 pulleys and ropes around its perimeter. The materials are recyclable and compostable, with the fixings being simple and exposed allowing for easy dismantling. [11]



Black Maria, Richard Wentworth & Gruppe, 2013

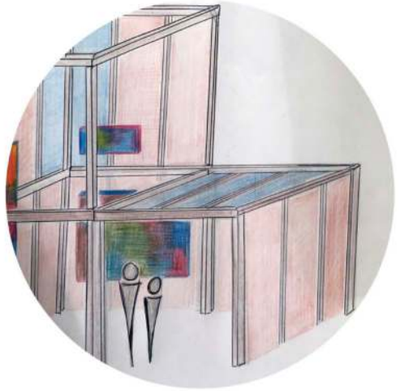
A timber structure inspired by the timber scaffolds historically used in the industrial areas of King's Cross. Designed to be a wooden pop-up auditorium in the atrium of Central Saint Martins.

Large audiences are able to surround the structure during open presentations or talks, whilst more intimate events can take place inside where the façades can be closed off from the surrounding space. [12]

Initial Ideas

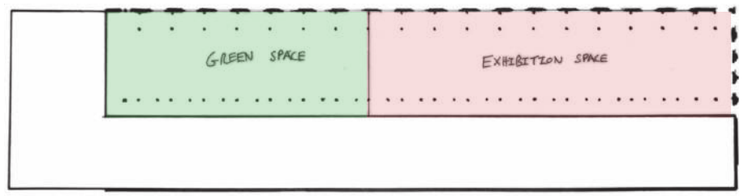
Public access from the street

Configurable Exhibition Space

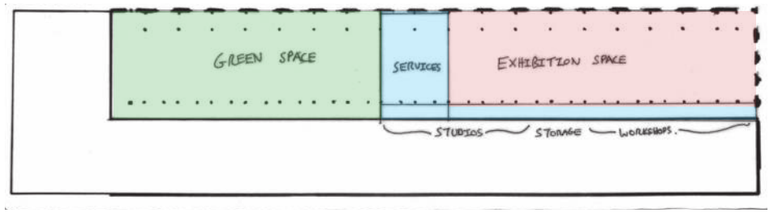


Community Involvement in the Green Space

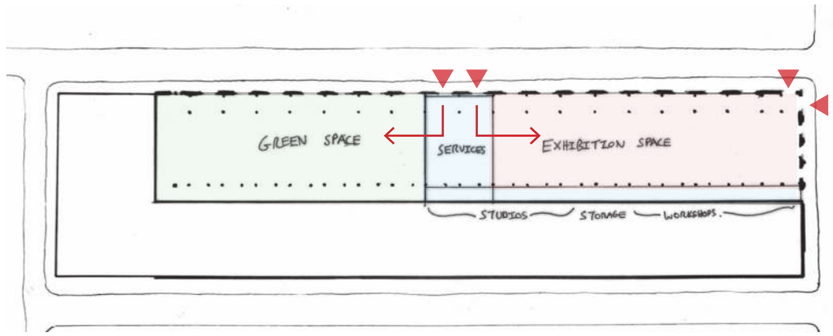
1. **Division** - The existing turbine hall is split in two forming a large open green space and a space for both large and small scale exhibition.



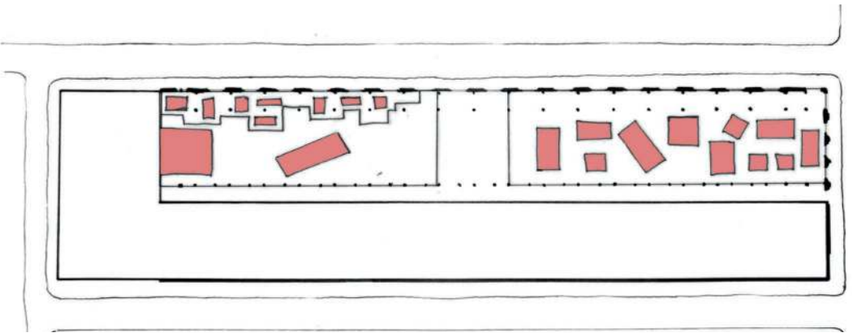
2. **Service** - Services divide the spaces in the centre, which includes space for a shop and cafe. Artist studios and workshops are placed on the South wall along existing mezzanines.



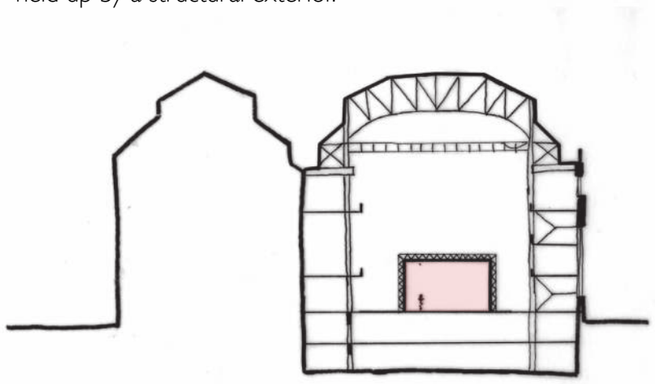
3. **Access** - Provision of access along the North elevation at the turning onto Freedom Pl. as well as the corner of the East elevation between 11th Avenue and 59th Street.



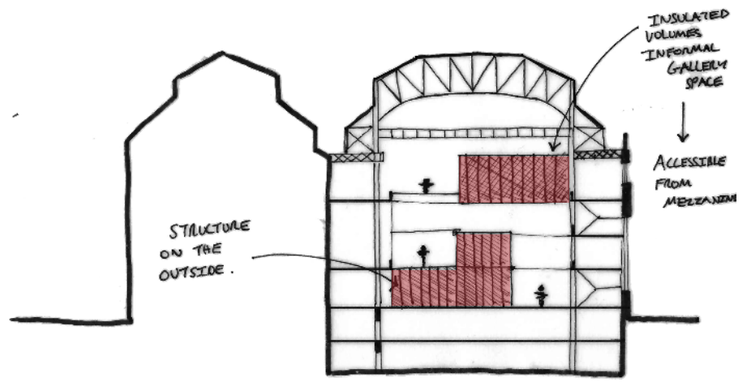
4. **Informal** - Introducing human scale exhibition volumes that break the orthogonal rhythm of the existing building.



5. **Exposed Structure** - In line with our concept, the structure of the exhibition volumes forms a reverse of the existing building structure with a formal interior being held up by a structural exterior.



6. **Suspension** - Volumes are made double height as well as some being cantilevered to emphasise the dynamic nature of the existing space. These volumes can be accessed from mezzanines.



Plan Development

A major change from the initial design was made to address public access into the building, improve circulation around the studios and serviced spaces as well as make the green space more directly accessible from 11th Avenue and 59th Street. Mirroring the plan of the building enabled better access into the Green Space from the street. A new inhabited partition at the scheme's centre, condenses services into a hub, creating a more vibrant social atmosphere at the core of the building, whilst reducing excess circulation.

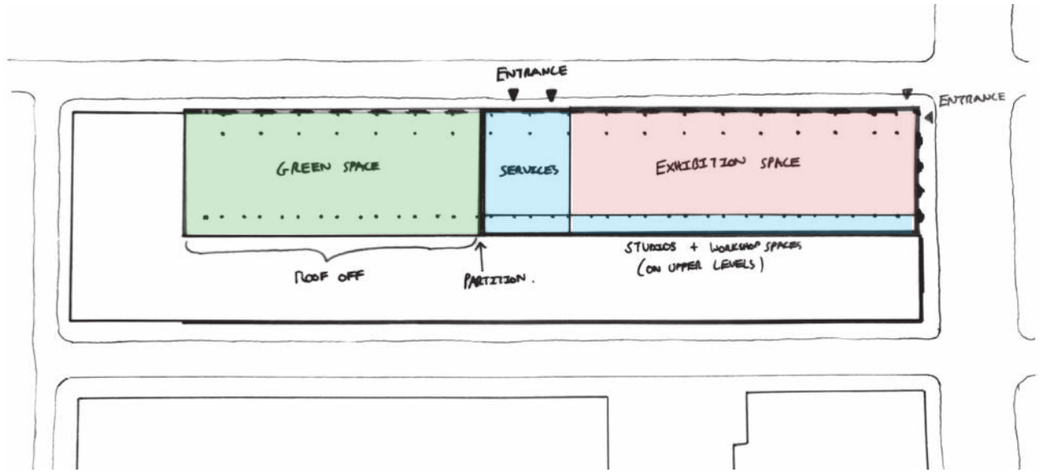
Exhibition Space

Green Space

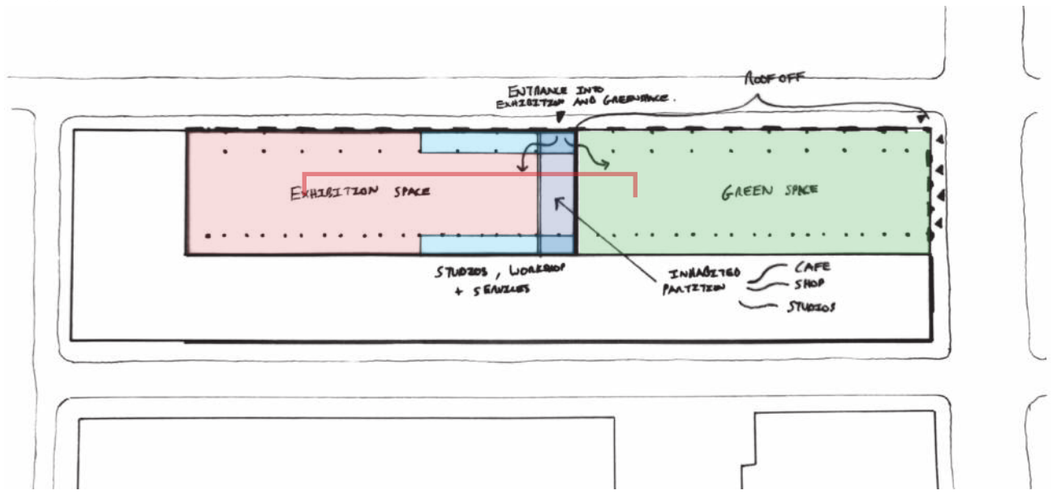
Studios, Cafe, Shop & Services

Inhabited Partition

Performance Space

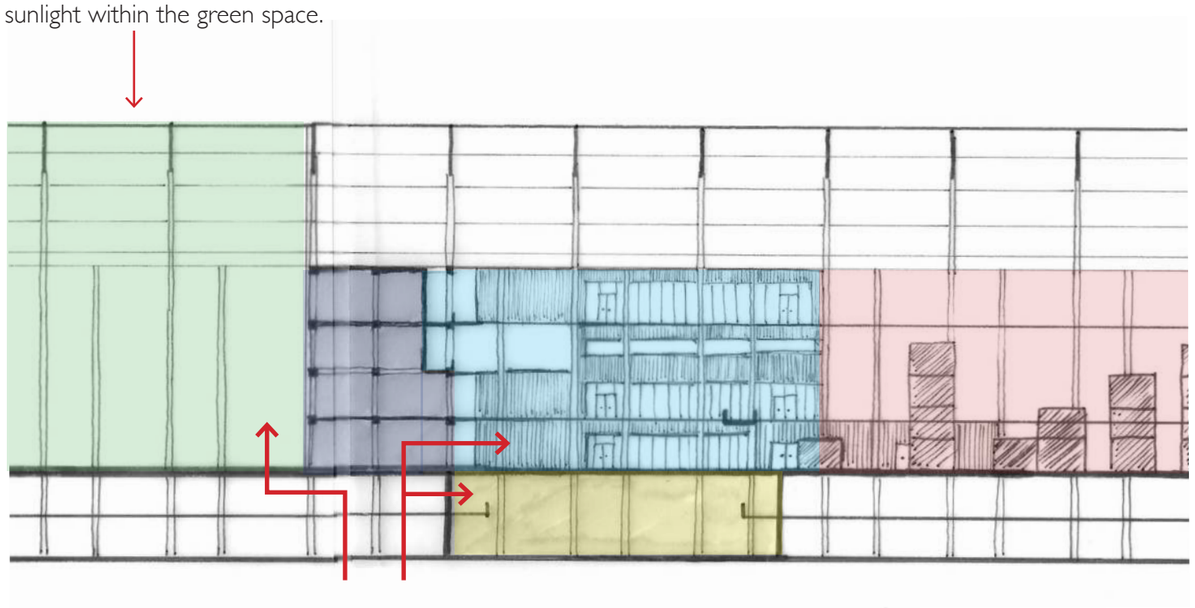


Original Ground Floor Plan



Mirrored Ground Floor Plan

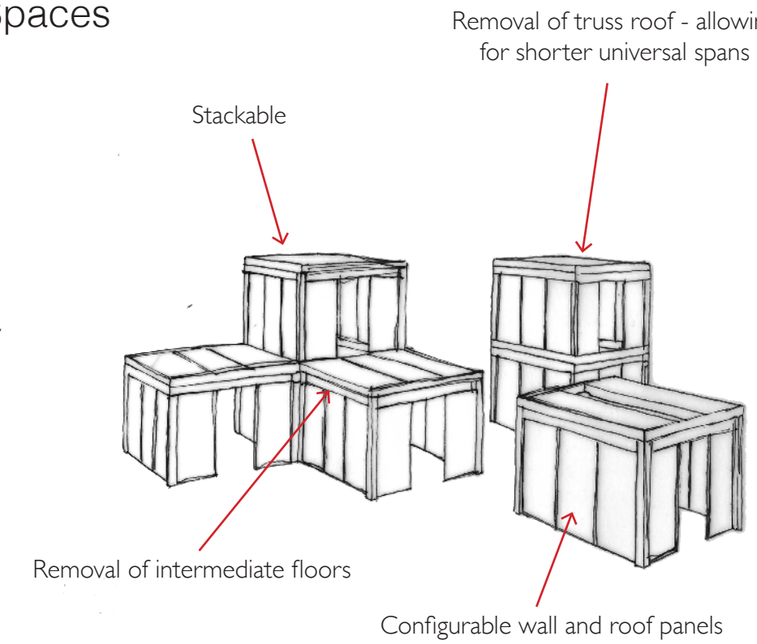
Roof skin removed to increase sunlight within the green space.



Key spaces of the building, the exhibitions, green space and performance space are independently accessible from one another directly from the North elevation entrance. This allows parts of the building to close off, whilst others stay open. An example might be a late night music gig in the performance space.

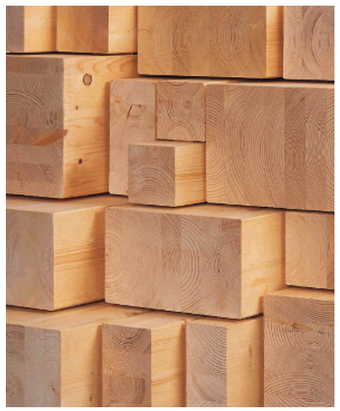
Modular Exhibition Spaces

Another major alteration was made to our exhibition volumes transforming them from an arbitrary arrangement of fixed sizes to a more configurable and modular system. The new volumes come as a kit of parts with which the artists design a bespoke gallery space for their individual needs. In line with our original concept, this system allows artists to dictate the arrangement of this human scale, informal exhibition space - contrasting the existing building. The structure remains on the outside of the boxes.



Materials

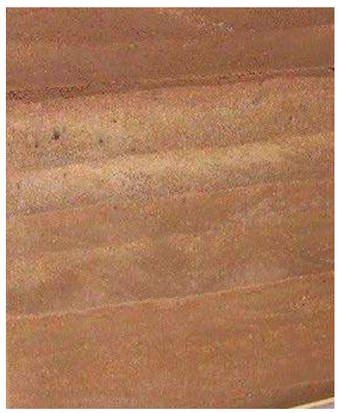
Glulam & Timber - Ensuring that all timber comes from FSC certified, sustainable sources or is re-purposed from a local project.



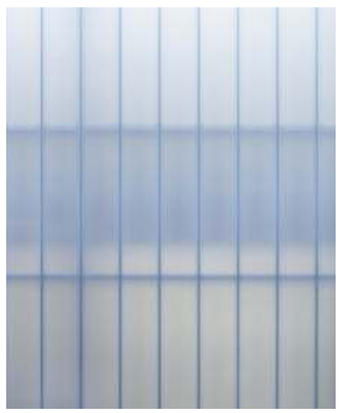
Recycled Steel- Using recycled steel bolts and plates as connections due to their long life spans, high strength, and ease of reuse and disassembly.

Reclaimed Timber - For planters on the allotment levels. More lightweight than rammed earth thus reducing loads on the upper mezzanines.

Rammed Earth - To be used in the planters within the community garden space.

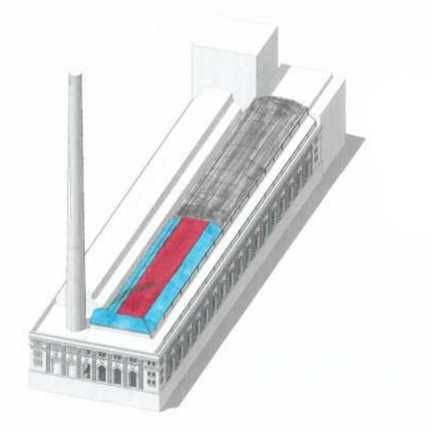


Polycarbonate - Re-purposed from the IRT roof to form panels for the exhibition volumes and as a cladding material for the partition.



Existing Fabric

Concrete removed from mezzanines is recycled as material for the pad foundations in the propping for the partition wall as well as new walls and floors in the basements. Our major intervention will be the removal of the roof skin over the green space, however the steel superstructure is retained. The exposed steelwork will be hot zinc sprayed to protect it from the weather.



Corrugated iron removed

Polycarbonate removed

Roof covering remains over exhibition space

Removed polycarbonate is to be used as a panel material in the exhibition volumes as well as, the walls of the inhabited partition.

Embodied Carbon

Total embodied carbon equivalent of our intervention over the course of 60 years (A1-A5, B4):

Including sequestered carbon:
- 900 tonneCO_2e

Sequestered carbon:
- 1850 tonneCO_2e

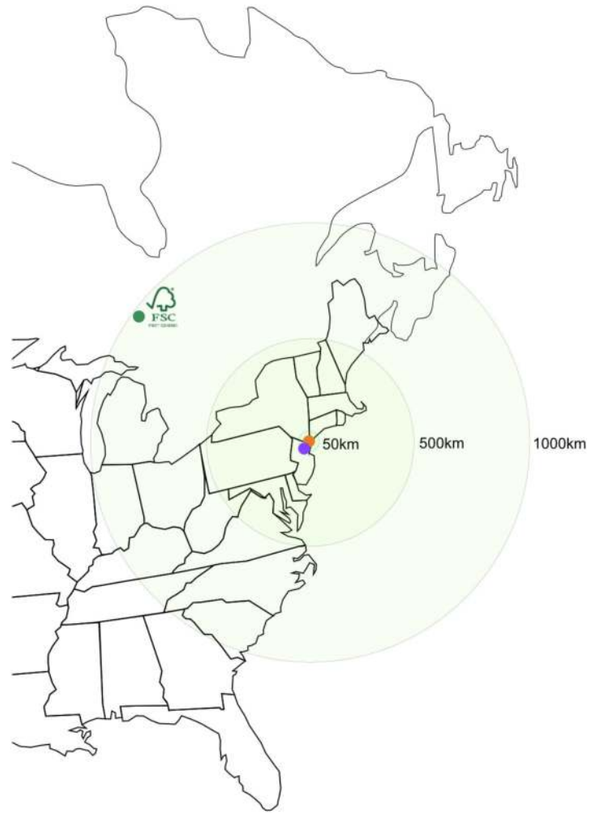
Operational Carbon (B6) (over 60 year period, factoring in grid de-carbonisation):
+ 975 tonneCO_2e

Therefore the whole-life carbon emissions of our building over stages A1-A5, B4 and B6 comes to +75 tonneCO_2e.

Sourcing

Choosing locally sourced materials is beneficial as this reduces transport emissions between manufacture and site.

- Demolished & Recycled Materials from the IRT - Polycarbonate from the roof and recycled concrete aggregate.
- Locally sourced materials such as reclaimed timber and rammed earth for the planters as well as the recycled steel for the connection joints.
- Timber is sourced from FSC certified Boreal forests in Canada.



Our proposal seeks to maximise the use of sustainable materials and avoid unnecessary interventions. Timber members have been simplified as much as possible to allow for easier re-purposing, reuse and recycling. Recycled steel has been used where appropriate in bolt and plate connections due to efficiency and extended lifespan. Interventions maximise the use of timber and has been sourced from a FSC certified supplier. All materials will be recycled at the end of life.

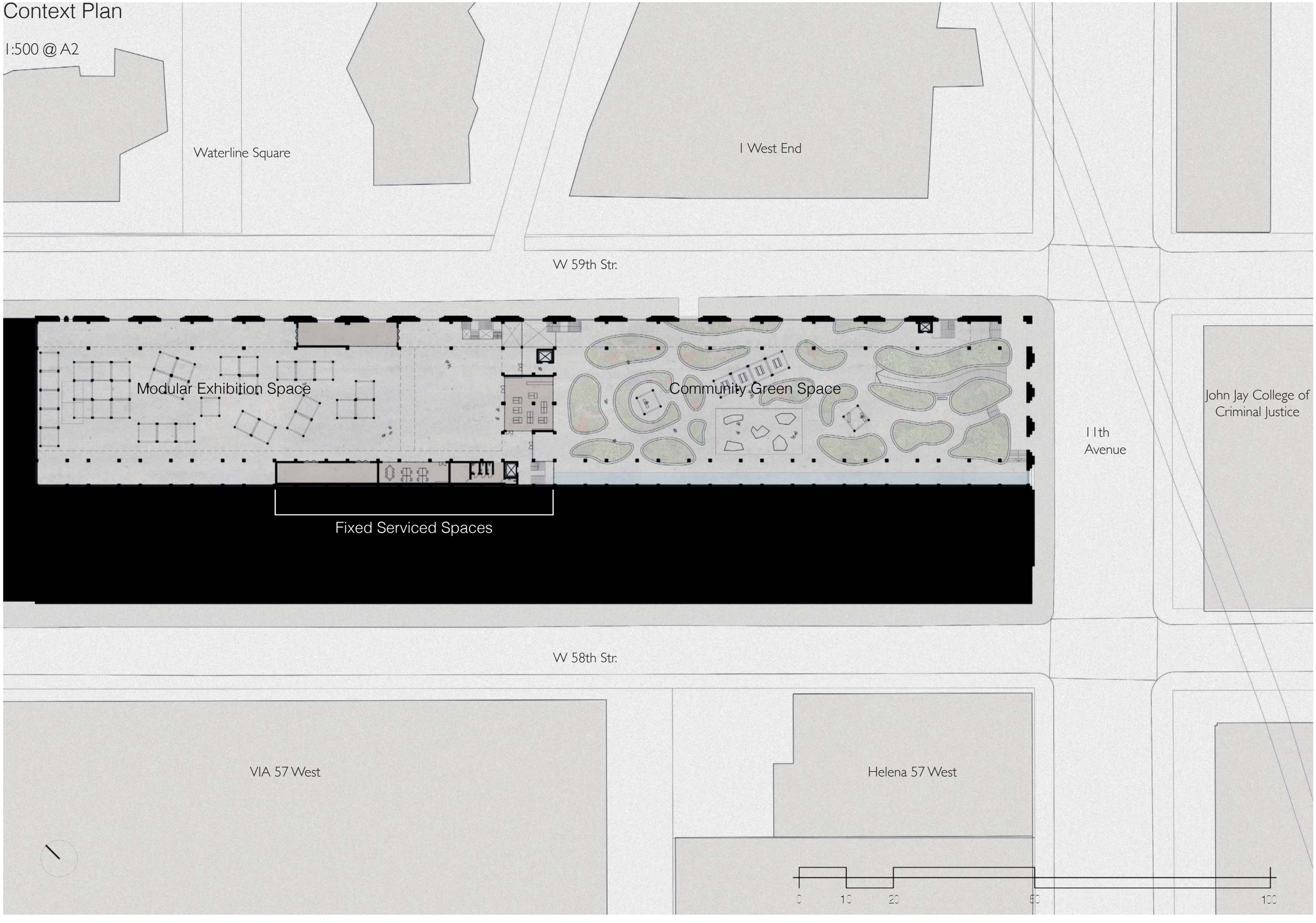
11 SUSTAINABLE CITIES AND COMMUNITIES

13 CLIMATE ACTION

12 RESPONSIBLE CONSUMPTION AND PRODUCTION

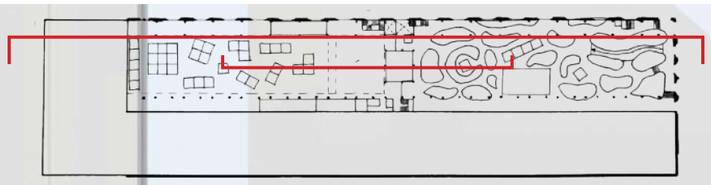
Context Plan

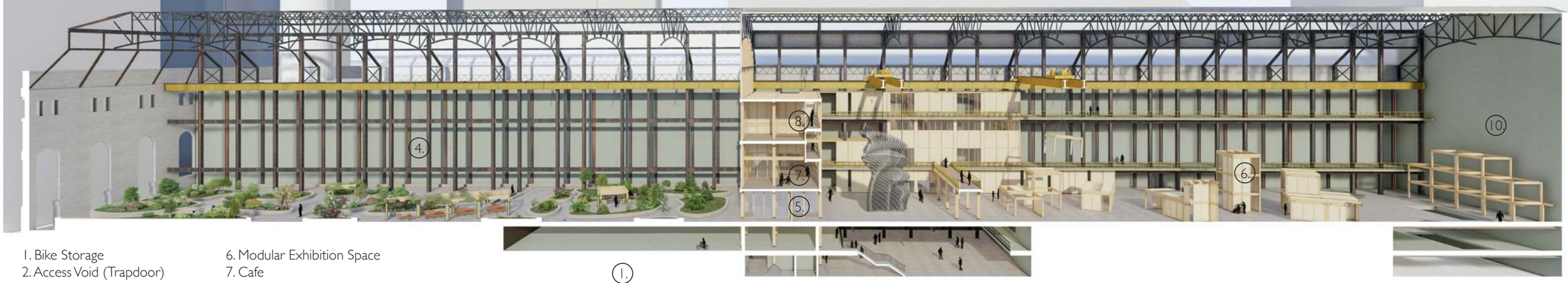
1:500 @ A2



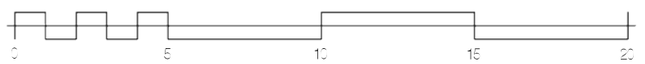
Context Section

1:200 @ A0





1. Bike Storage
2. Access Void (Trapdoor)
3. Performance Space
4. Public Garden Space
5. Shop
6. Modular Exhibition Space
7. Cafe
8. Studios
9. Allotments
10. Box Storage

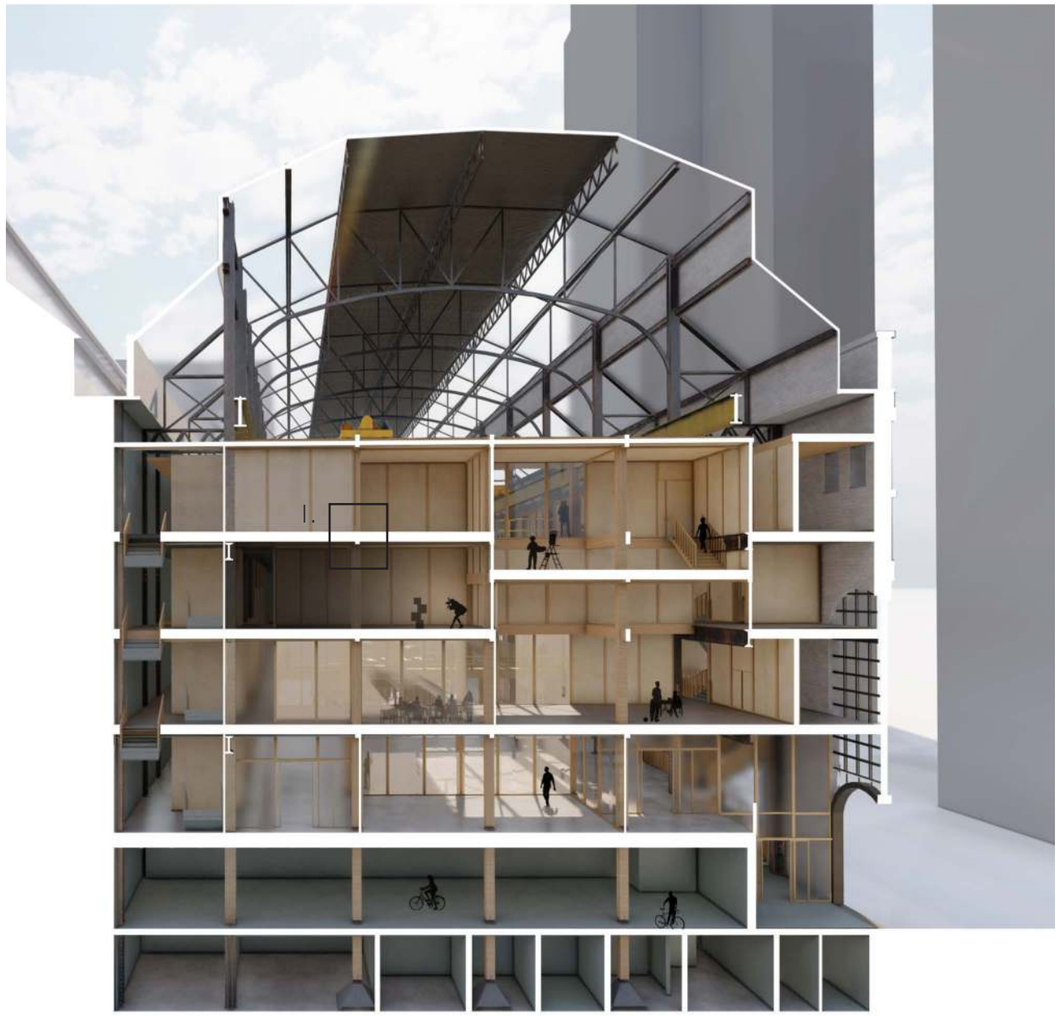


Long Perspective Section

1:100 @ A0

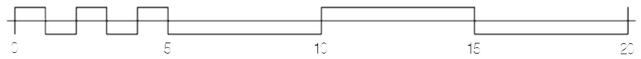
A. Short Section

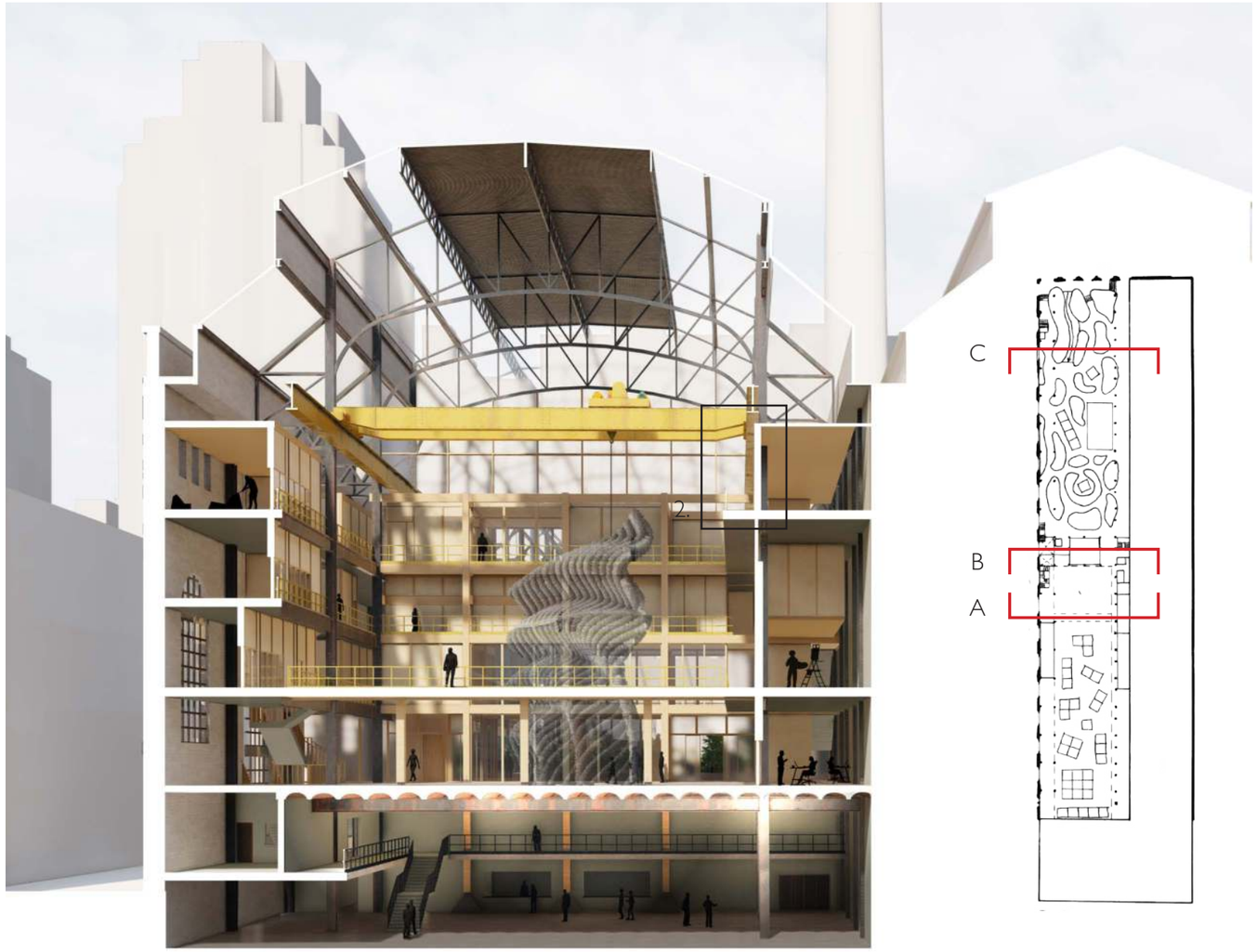
1:100 @ A0



B. Short Section

1:100 @ A0



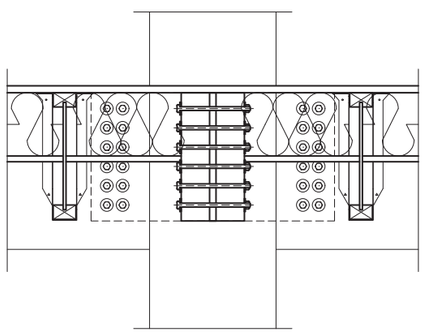


1: PARTITION DETAIL

Floor build-up (Top to bottom):
22mm Plywood
Engineered timber floor joists (@ 400mm c/c)
18m Plywood ceiling
Joist hangers

Connections:
Floor beam – Column connection (shown in elevation): 12No. M12 bolts through steel flitch plate (Shear connection)

Portal beam – Column connection (shown in section): 3No. M12 bolts through steel flitch plate (moment connection)

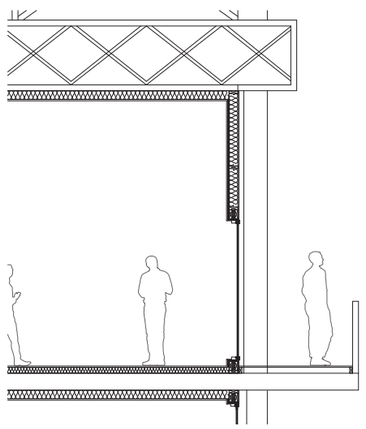


2: STUDIO DETAIL

Wall (Left to Right):
Plasterboard
Insulation board
200mm insulation
18mm Plywood
300mm deep exposed studs
Cavity closer

Ceiling (Top to bottom):
150mm insulation
22mm plywood

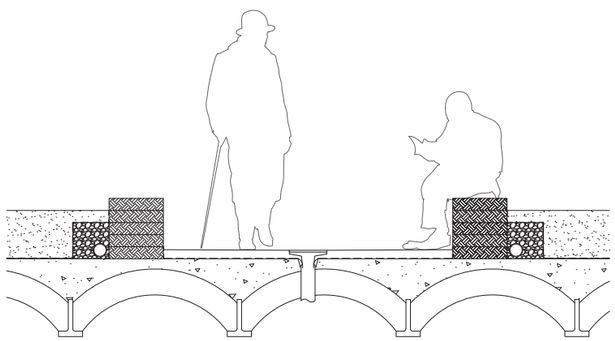
Raised floor (Top to bottom):
22mm Plywood deck
100mm insulation (internal only)
100mm deep Timber battens



3: RETAINING WALL DETAIL

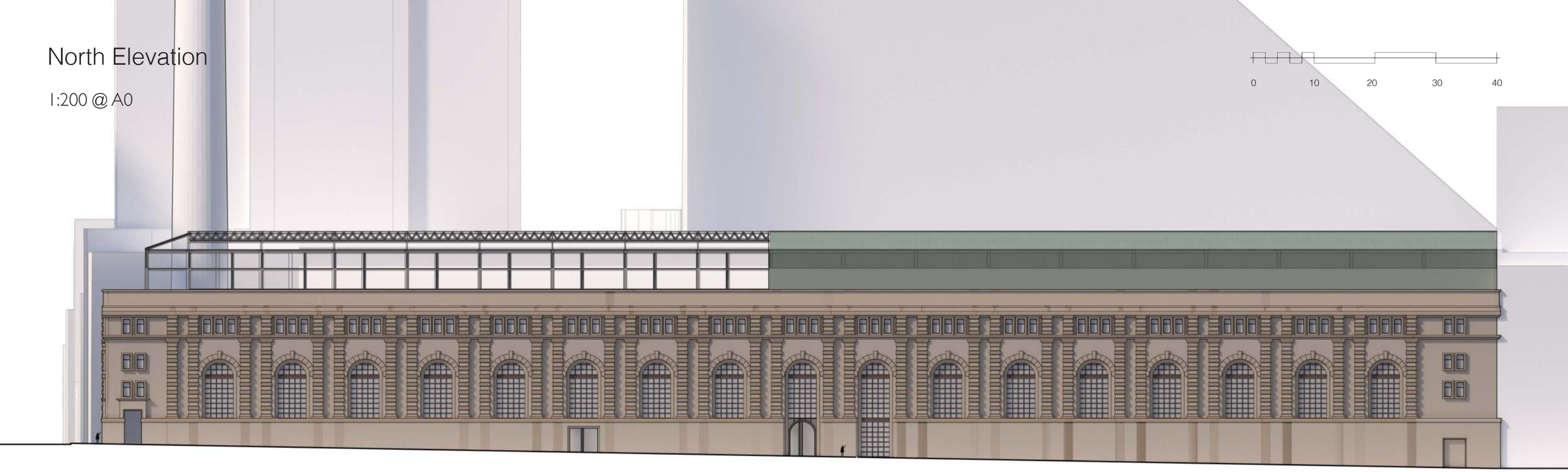
Wall (Top to bottom):
Rammed earth wall
Soil (400mm deep)
Filter fabric membrane
Gravel drainage fill
100mm slotted drain
Plastic membrane
Existing concrete floor

Drain (Top to bottom):
Drainage flange
Screed laid to fall
Waterproofing membrane
Pipe



North Elevation

1:200 @ A0

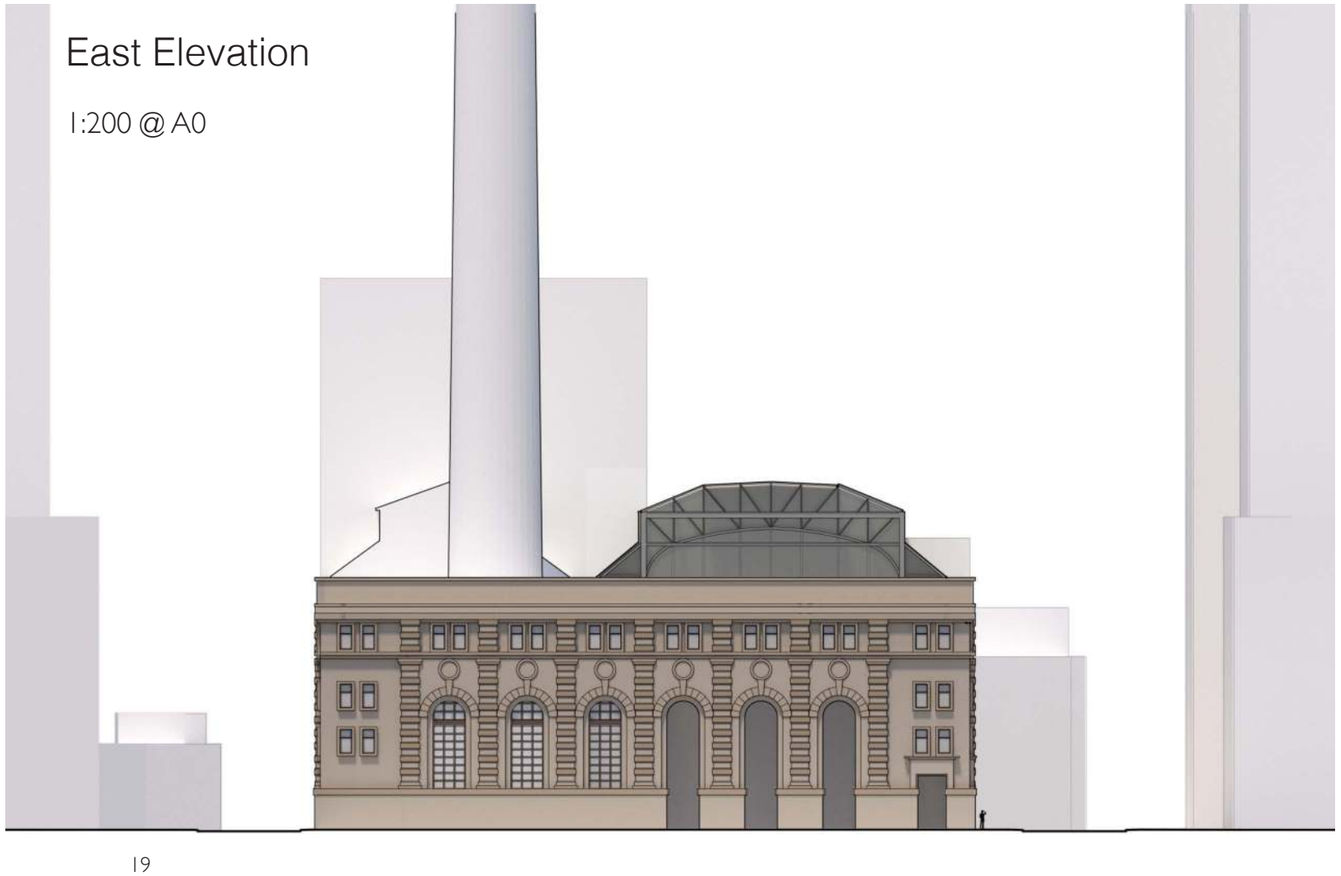


C. Short Section

1:100 @ A0

East Elevation

1:200 @ A0



Ground Floor Plan (Street Level)

1:100 @ A1

1. Community Garden
2. Shop
3. Workshop
4. Full Height Exhibition
5. Exhibition Volumes
6. Office
7. Plant & Toilets
8. Storage

59th Street

0 5 10 15 20

First Floor Plan

1:100 @ A1

1. Studio
2. Kitchen & Store
3. Cafe
4. Allotments
5. Plant & Toilets

59th Street

0 5 10 15 20

Second Floor Plan

1:100 @ A1

1. Studio
2. Photography Studio

59th Street

0 5 10 15 20

Third Floor Plan

1:100 @ A1

1. Studio
2. Co-Working Space
3. Public Workshop
4. Allotments
5. Plant & Toilets

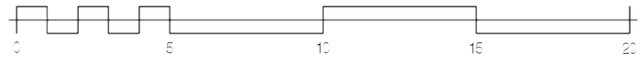
59th Street

0 5 10 15 20

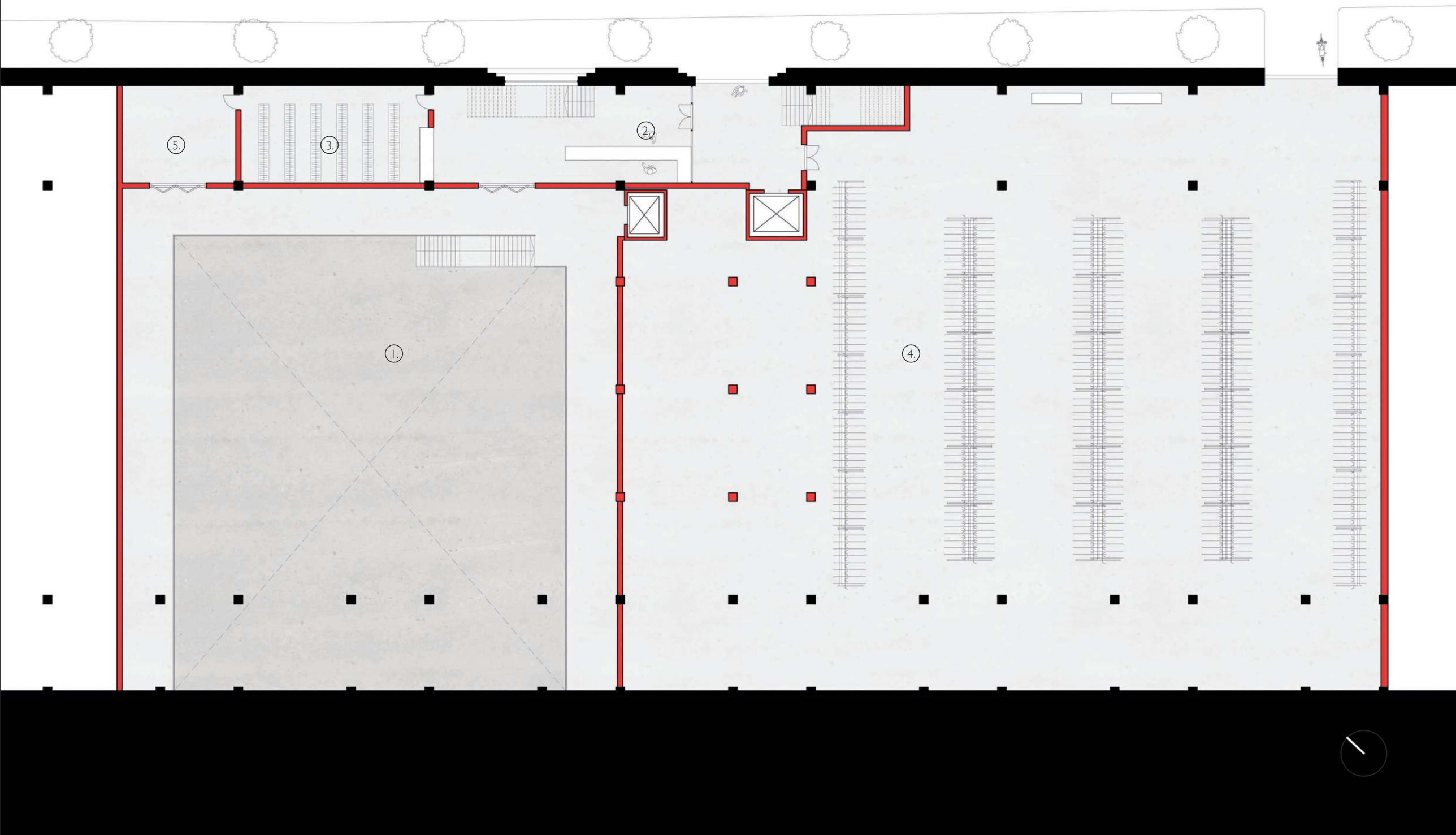
Basement One Plan

1:100 @ A1

1. Performance Space
2. Foyer
3. Cloakroom
4. Bike Storage
5. Storage



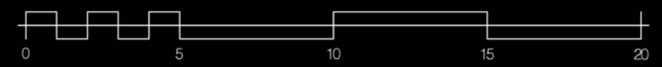
59th Street

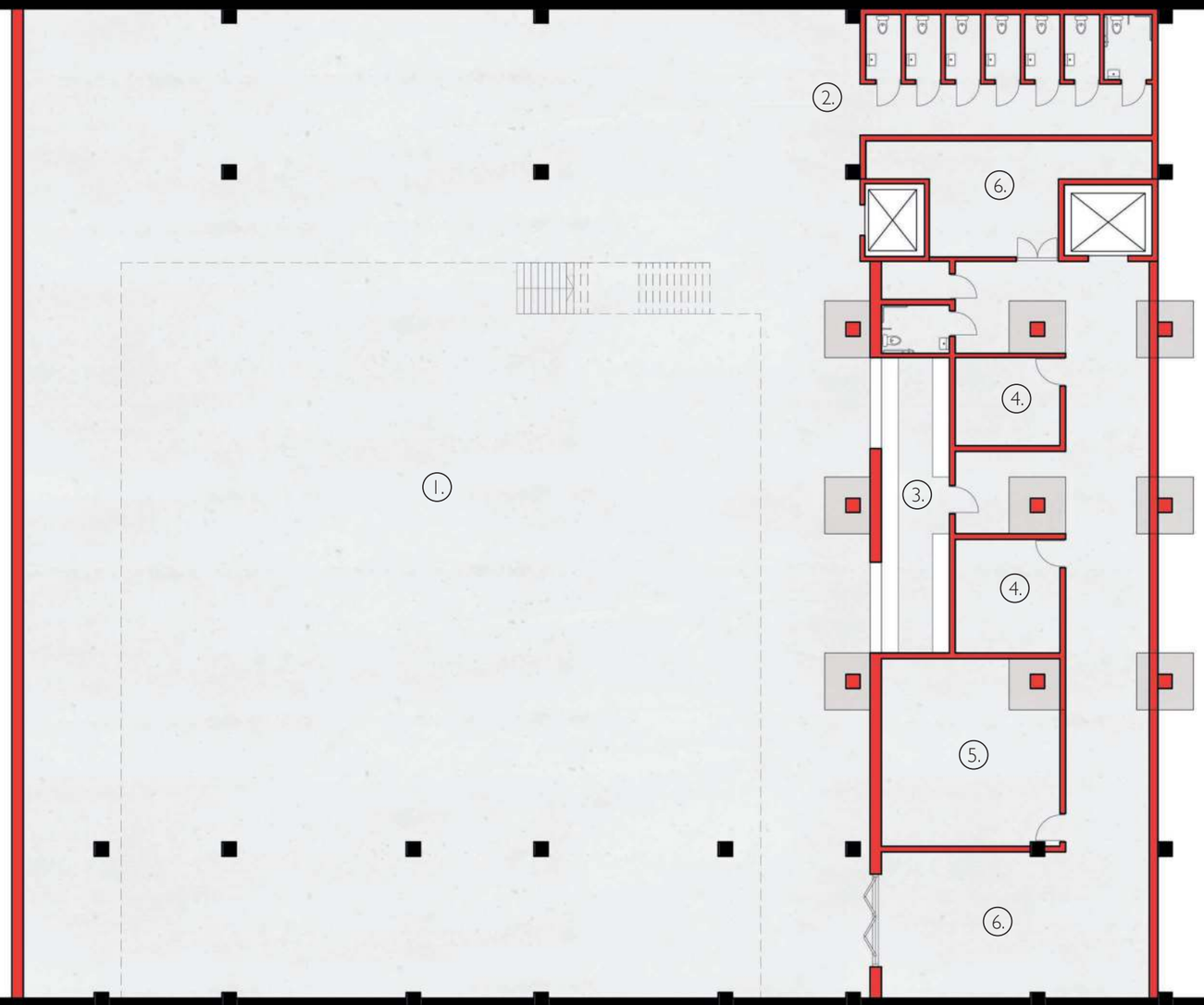


Basement Two Plan

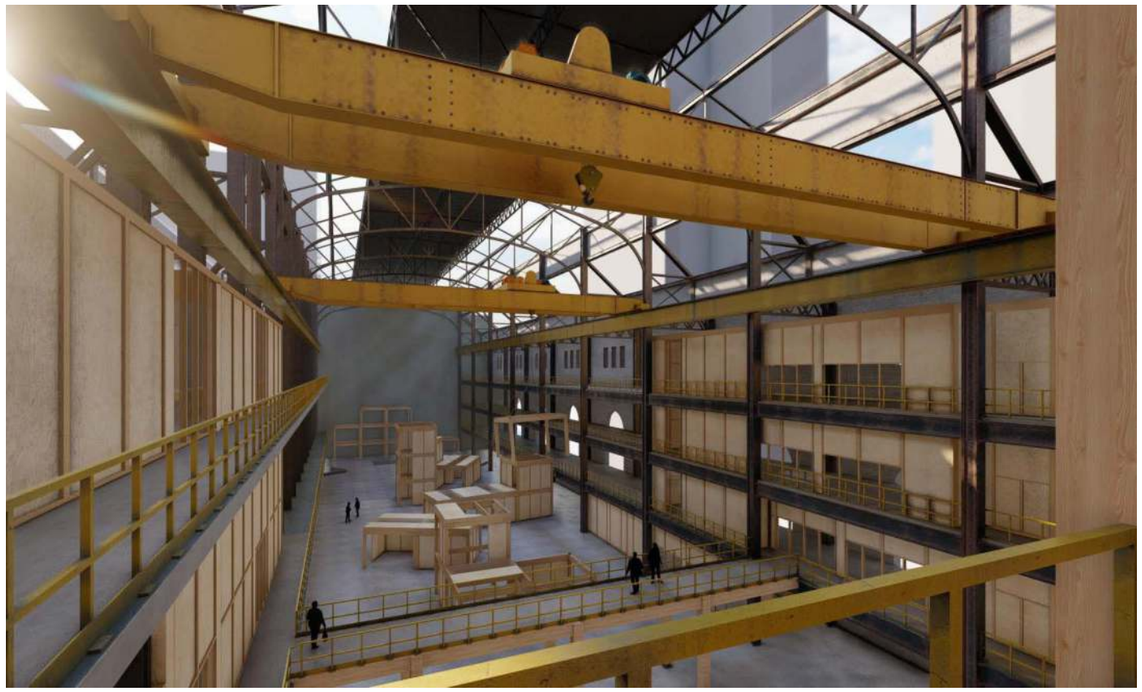
1:100 @ A1

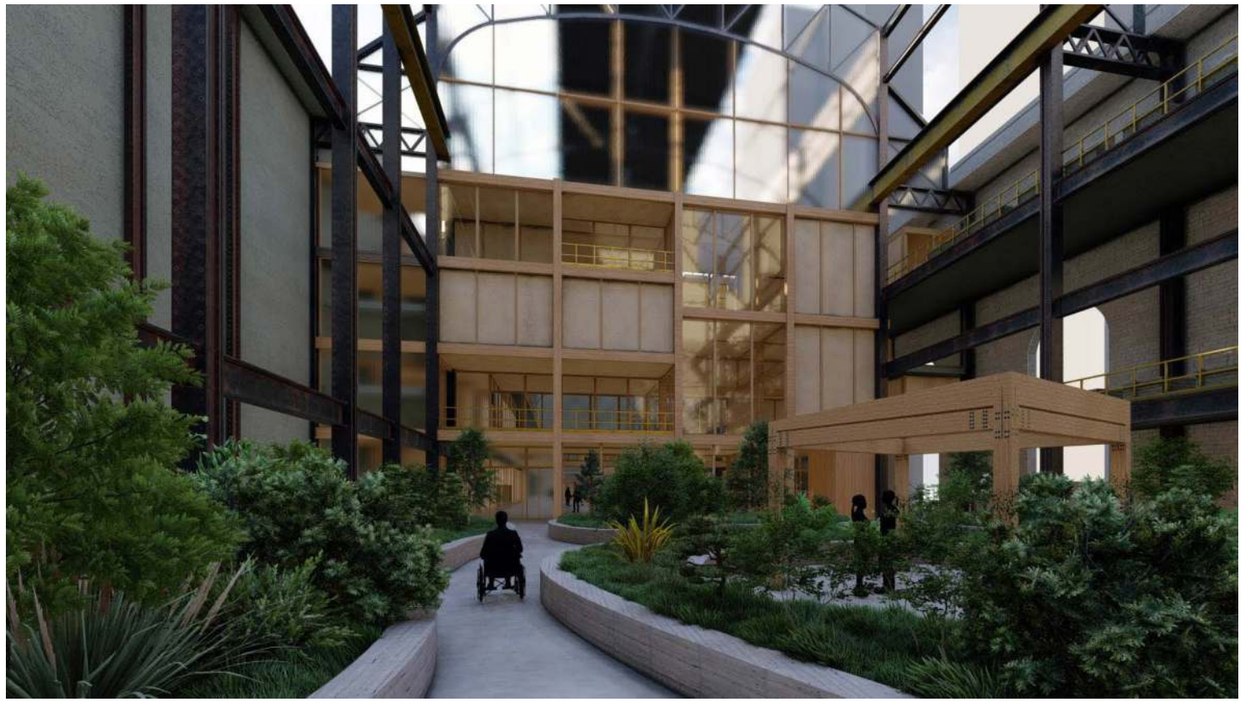
1. Performance Space
2. Toilets
3. Bar
4. Green Room
5. Plant
6. Storage

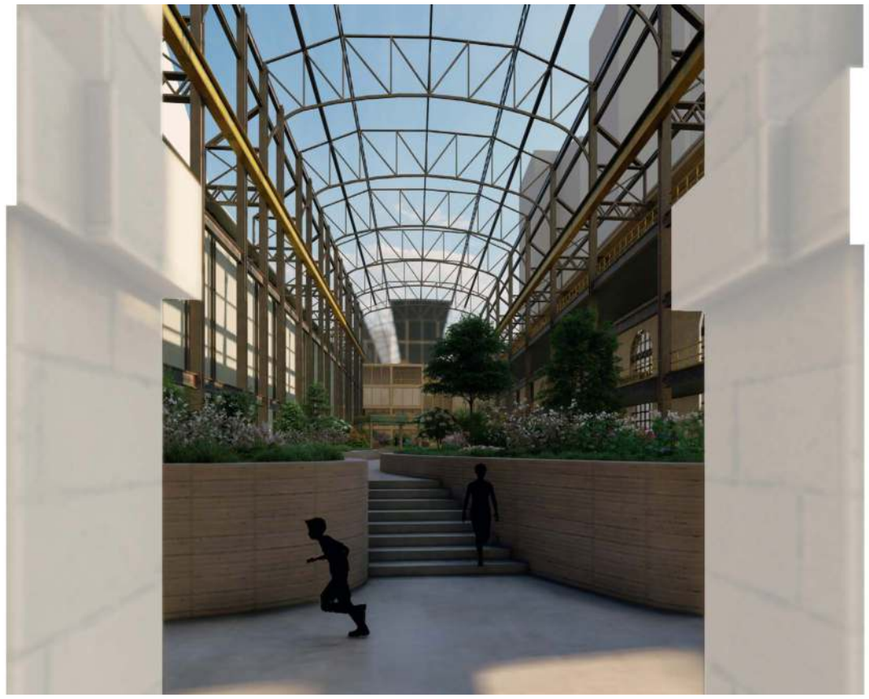




Perspectives



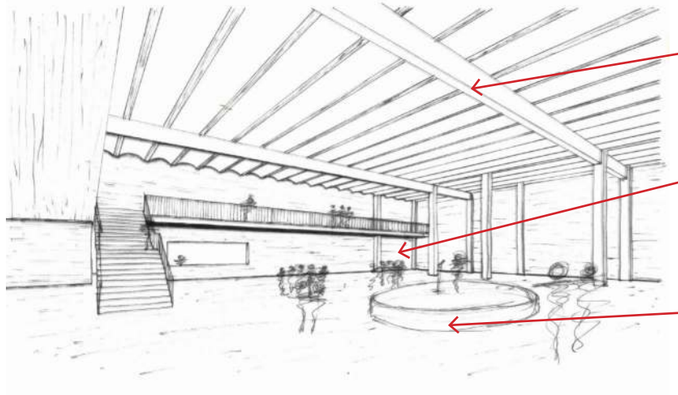




Performance Space

Located in the basement, the performance space allows for additional controls such as lighting. The atmospheric nature of the barrel vault ceiling and the steel columns adds character and depth to the space, which isn't experienced throughout the rest of the building.

A portion of the basement has been converted into bike storage that can be accessed independently to the rest of the building, directly from street level through an existing opening in the fabric.



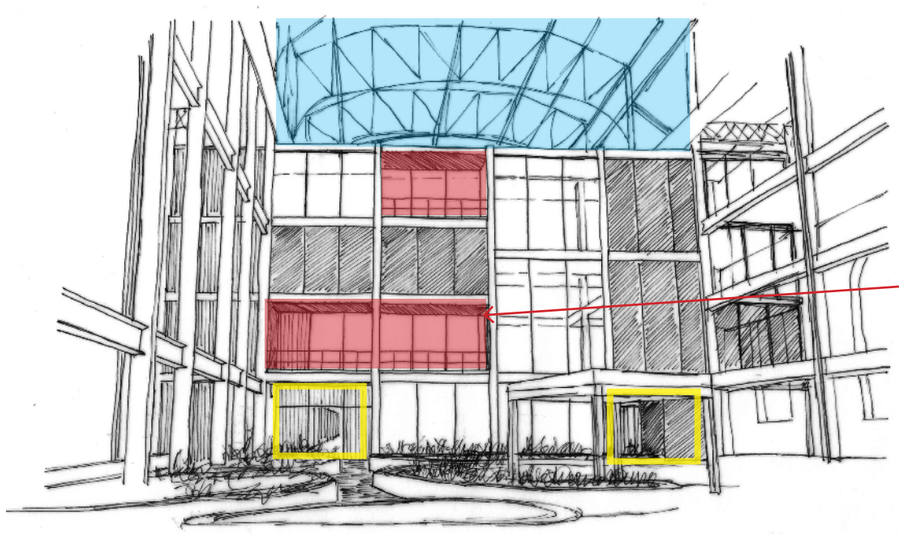
Ceiling beams allow for the support of a lighting gantry

Backstage area and bar allows this space to facilitate large music performances

Informal nature of the space allows for other activities such as private performance art exhibitions, film screenings and events.

Inhabited Partition

In order to provide a weatherproof barrier between the garden space and the exhibitions. A glulam timber structure has been erected in line with the existing structure, propped in the basement. The "inhabited" wall contains studio spaces, cafe and shop, allowing views into both the exhibition space and the garden. The wall also allows for a reduction in additional circulation and with the first floor bridge spanning across the exhibition space it provides a loop for visitors to enjoy the full height public exhibitions.



Space above the partition wall is weatherproofed with a polycarbonate curtain wall up to the roof truss. The polycarbonate has been reused after removing a portion of the roof.

Balconies step the wall back, breaking up the facade, whilst giving views across the garden space.

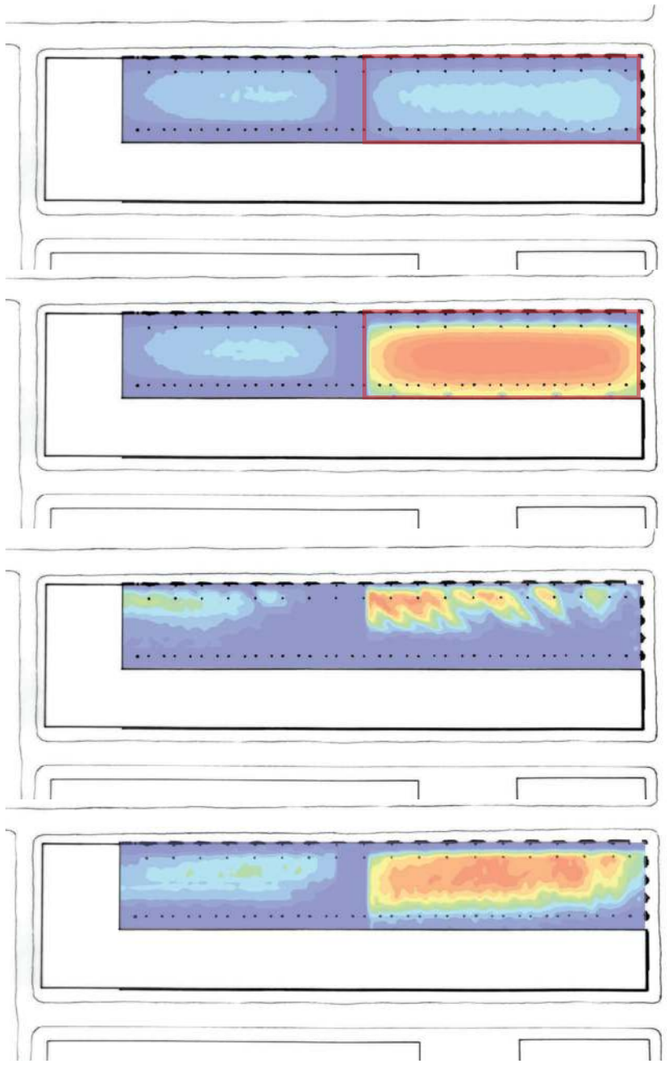
Entrances through the wall into the exhibition space.

Community Garden

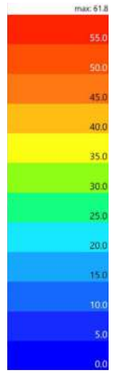
The green space remains as informal as the rest of the building. The most noticeable intervention is the removal of the roof. This allows more direct sunlight into the building across the year. A weaving public garden sits at ground floor level, whilst allotments are placed along mezzanines on the North of the building.

Daylight Factor & Sunlight Hours

Removing the roof skin over the garden space was crucial in order to achieve the light levels needed for planting on the ground floor of the building. The existing steelwork has been hot zinc spray galvanised in order to protect it from the elements.

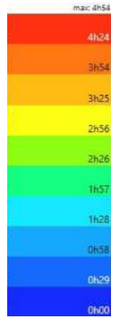


Daylight Factor (%) - Roof kept as existing



Daylight Factor (%) - Roof skin removed over the garden space.

Sunlight Hours - Winter (Roof Removed)



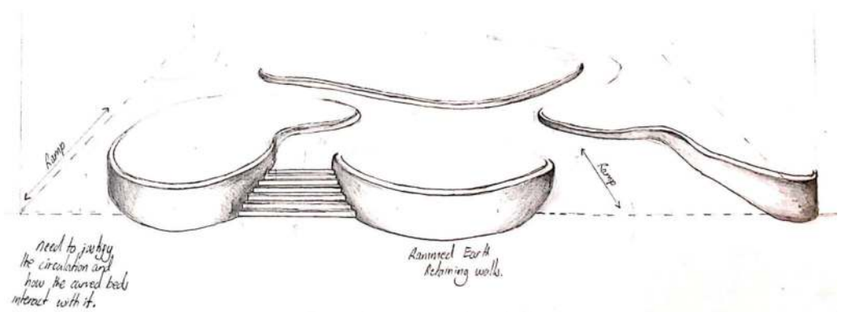
Sunlight Hours - Summer (Roof Removed)

Community Garden

The garden on the ground floor is divided into a series of weaving paths. Rammed earth raised beds provide spaces to sit and rest. The entire garden is fully accessible. The plants within the garden are chosen by the community but guidance is provided with which plants will grow best in different areas due to shading within the building.

Planting

Native species local to New York have been chosen to suit the variable lighting conditions within the space, with some responding to shade better than others. This reflects the analysis of the daylight factor within the building.



Entry Sequence & Level Change

Smooth Blue Aster

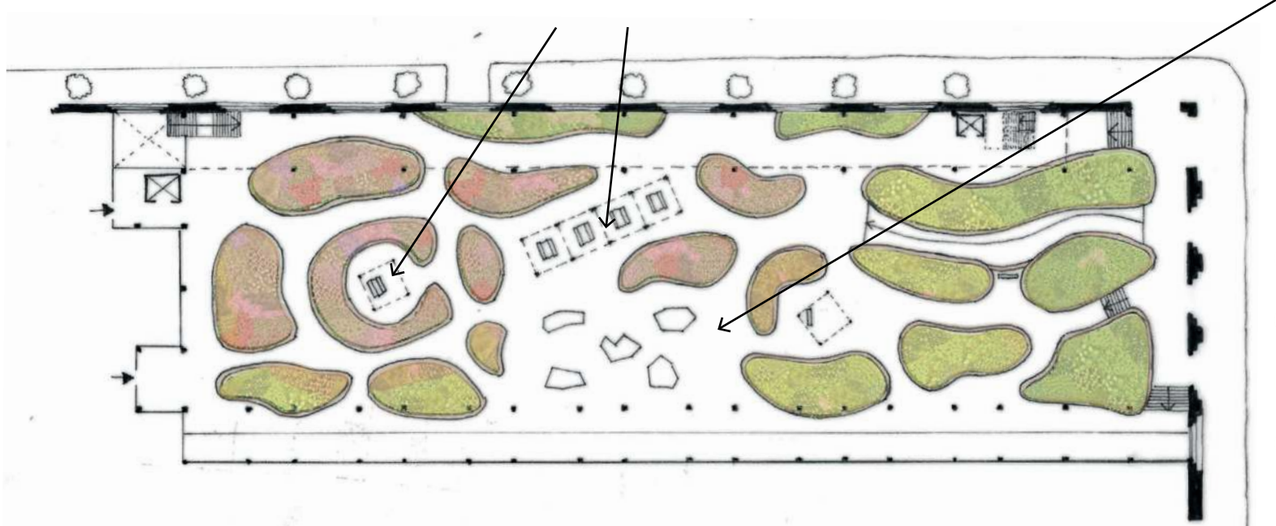
Broad-leaf Sedge

Buttonbush

Highbush Blueberry

Bottlebush Grass

Repurposed volumes from the exhibition space form spaces to meet or hold intimate outdoor performances or host events.



'Public square' can be used for outdoor exhibitions or performances. Buskers and performers can come and use the space as well.

Full Sun / Partial Shade

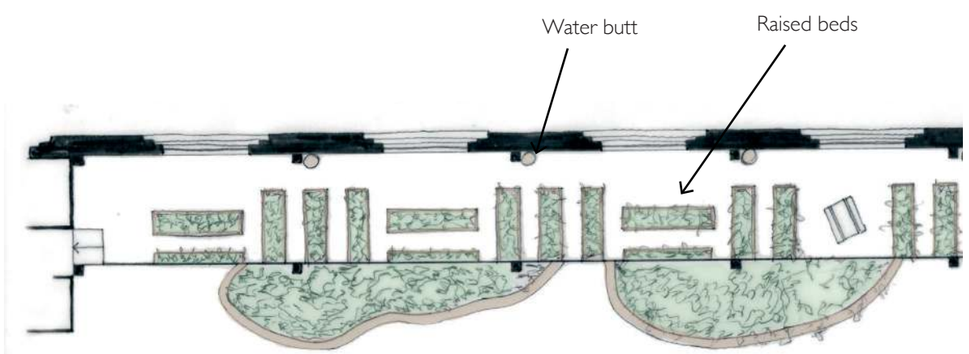
Sun / Full Shade

Partial / Light Shade

Partial / Full Shade

Allotments

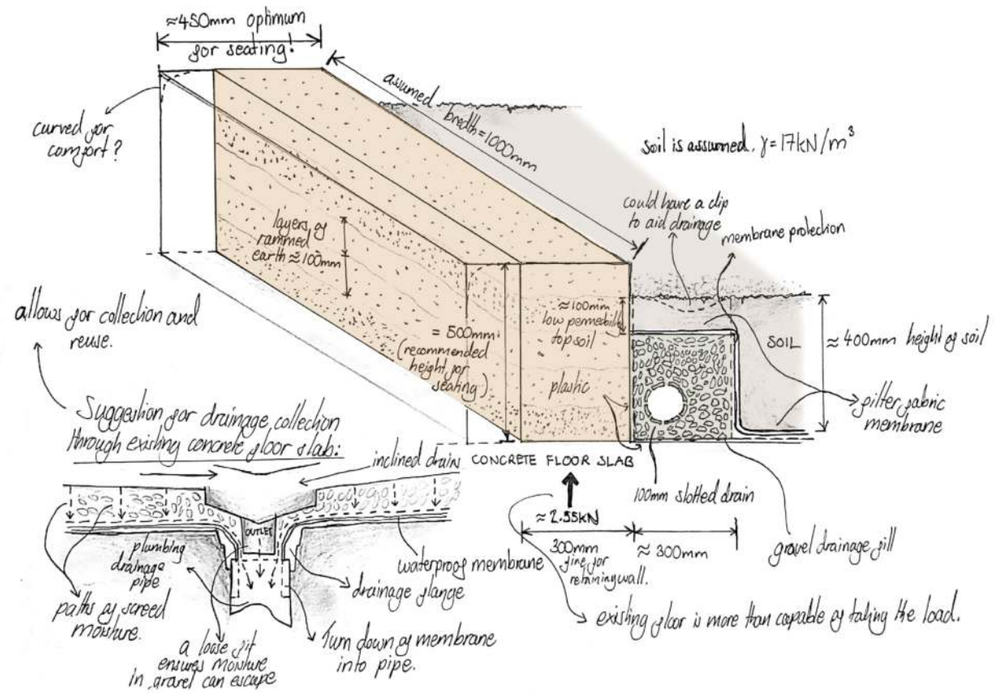
Allotments have been placed on the first and third floor mezzanines on the North side of the building to get the most sunlight, prioritising local residents in allowing them to grow their own plants and vegetables. Appropriate sizing of the beds allows anyone to use the allotments, with circulation provided at the street entrance.



Planter Detail & Irrigation

Water collected from the retained roof over the exhibition space is used to provide additional irrigation to the allotments and planting.

Rammed earth planters sit at a height appropriate for sitting.



Exhibition Spaces

Components

The exhibition spaces come as a kit of parts which the artists design for their specific needs. Primarily made from timber, the exhibition spaces are lightweight and versatile. The only steel used is within the moment connection joints, reflecting the structural strategy of the IRT. This maximises efficiency and allows the structure to retain stability without any infill panels. Up to 4 of these modules can stack on top of one another with a design load of 10kN hung from the roof.

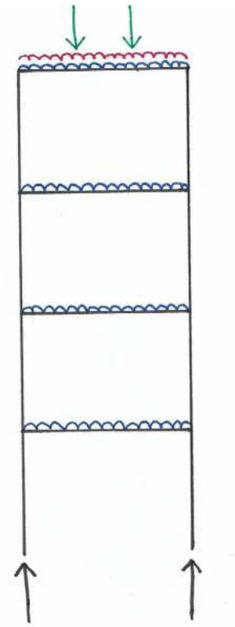
Single Module

Wall Panel Options
Plywood or Polycarbonate

Roof Panel Options
Plywood or Polycarbonate

Exploded Isometric showing volume construction

Vertical Loading Diagram



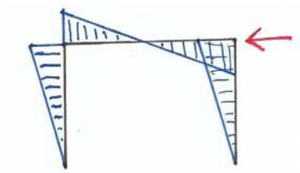
5KN - Point load from hanging exhibit.

Ply Roof Panel - 0.175KN/m^2

Ply Wall Panel - 0.175KN/m^2

42.5 KN - Reaction Force

Lateral Loading Diagram:



Structural Strategy

As the modular boxes will be positioned in the enclosed space behind the partition, wind loads have been assumed to be insignificant. Therefore, the frame has been designed to resist a balustrade load applied the side of box. If the boxes are stacked, this load is only applied to the bottom box.

Balustrade load: 1.5 kN/m2
Maximum moment applied: 9.22 kNm
Connection moment resistance: 10.4 kNm

Barrel vault floor capacity check :
Max column reaction: 46.8kN
Stress in masonry arch floor: 2.4 N/mm2 < 15 N/mm2 therefore O.K.

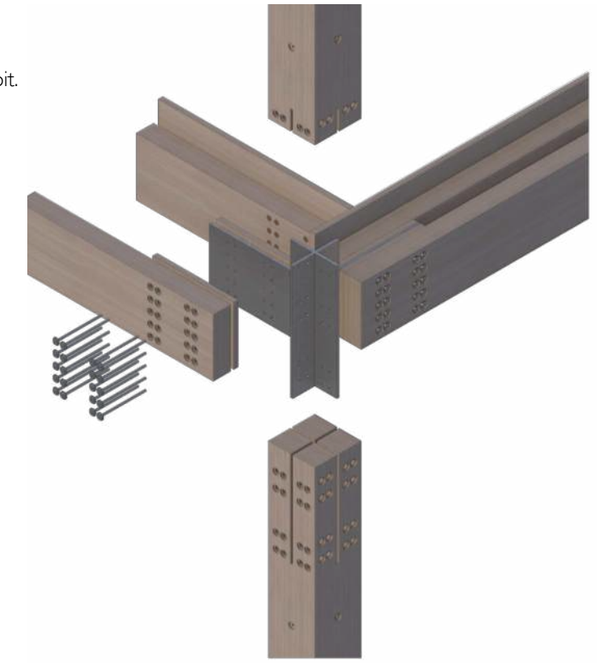
Columns :

Section size: 200mm x 200mm C24
Compression capacity utilised: 12%
Combined axial and bending: 69%

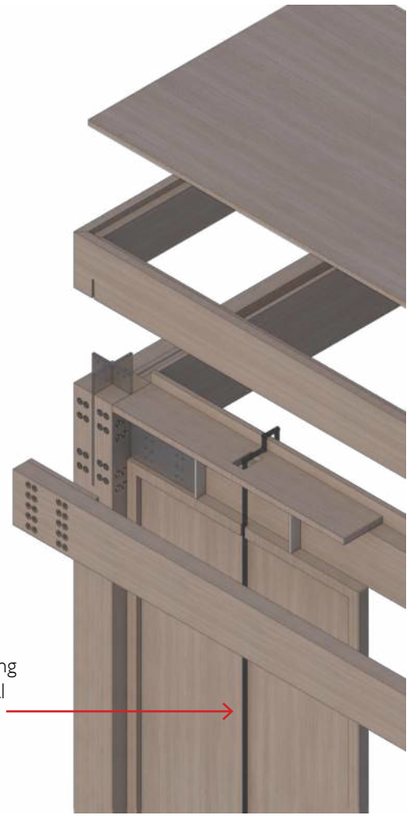
Beams :

Section size: 2No. 75mm x 250mm deep C24
Bending capacity utilised: 57%

Column Beam Junction 1:5



Slotting Panel Detail 1:5



Service groove for lighting cables, allows additional control of the internal spaces

Configurations

Each module measures 4m x 4m x 2.8m. This is in keeping with our initial concept of creating an approachable, human scale exhibition space within the vast volume of the IRT. It is up to the artists to determine the number and arrangement of these volumes but shown below are number of example combinations that can be created.

Double & Triple height

Modules can be stacked to create double or triple height spaces with internal roof joists able to support up to 500kg each for sculpture or installations.

Courtyards

Larger enclosed spaces can be created for theatre, performance or film screenings on a more intimate human scale.

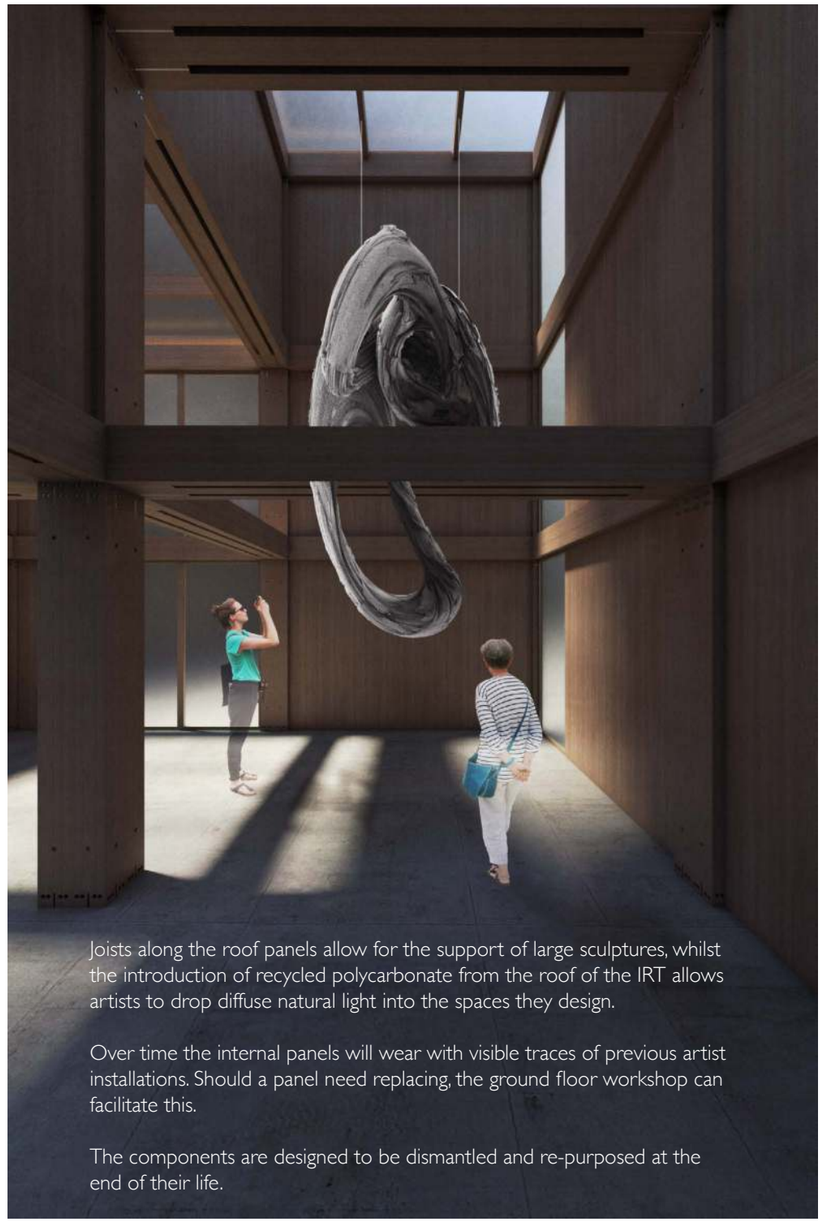
Open & Closed

Entire walls and ceilings of the boxes can be removed or kept. The frame keeps the structure together. This gives flexibility in terms of access for people entering the gallery spaces.

Panels & Materials

Panels can either be removed or replaced with translucent polycarbonate recycled from the roof of the IRT to provide diffuse natural lighting within the gallery spaces.

Physical Model 1:20



Joists along the roof panels allow for the support of large sculptures, whilst the introduction of recycled polycarbonate from the roof of the IRT allows artists to drop diffuse natural light into the spaces they design.

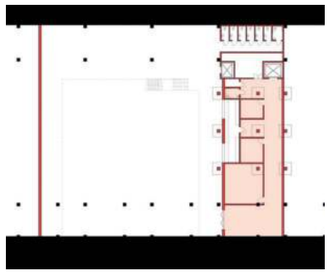
Over time the internal panels will wear with visible traces of previous artist installations. Should a panel need replacing, the ground floor workshop can facilitate this.

The components are designed to be dismantled and re-purposed at the end of their life.

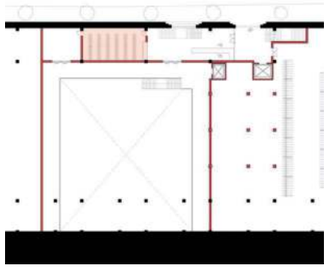
Environmental Strategies

Space Heating Strategy

Key spaces to be heated throughout the building include the studios, cafe, shop and the workshop. Additionally some of the support spaces close to the

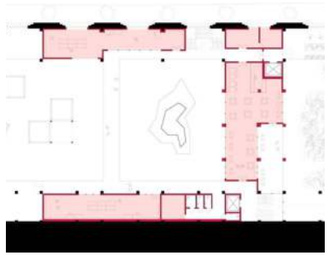


Basement Two

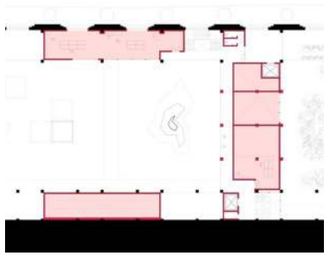


Basement One

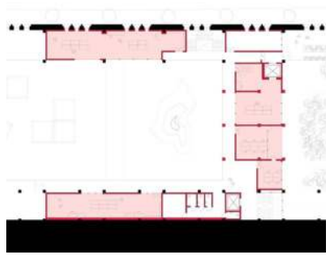
Ground Floor



First Floor



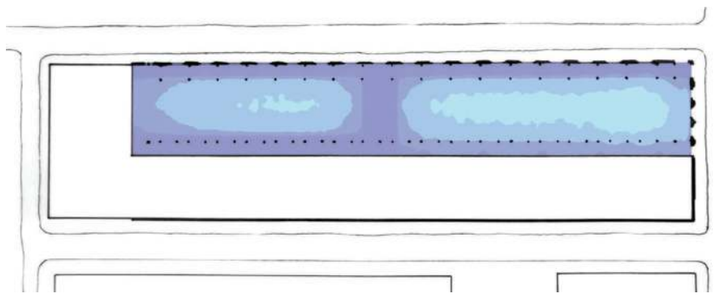
Second Floor



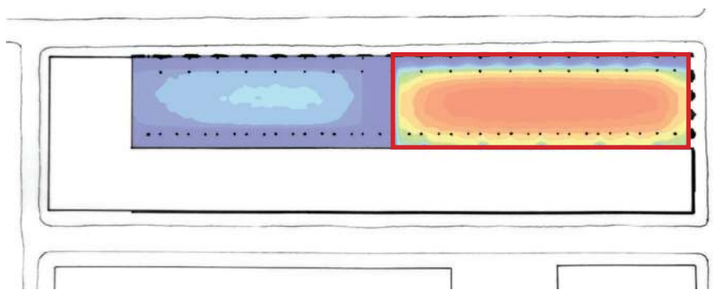
Third Floor

Increasing Daylight Factor

By removing the existing roof skin, over proposed community garden we can introduce much higher light levels into this section of the building, allowing more plants to grow.



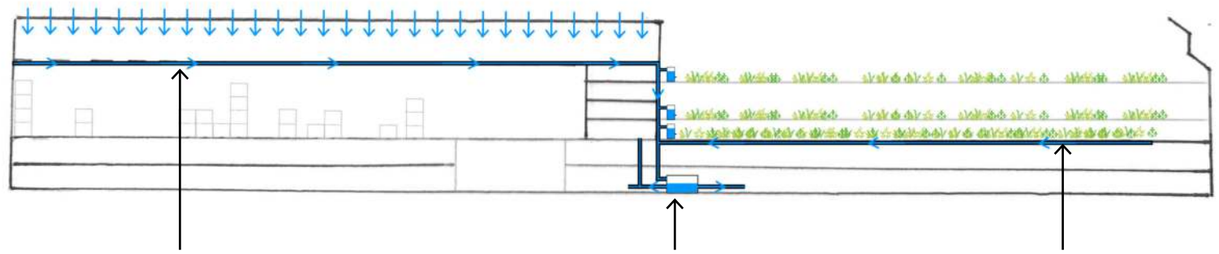
Roof kept as existing



Roof skin removed over the garden space.

Rain Water Harvesting Strategy

Drainage pipes guide rainwater down to a large water storage tank in the basement, filling up green space water butts along the way.



Gutters along rim of retained roof collect approximately 4.8 million litres of rain water annually.

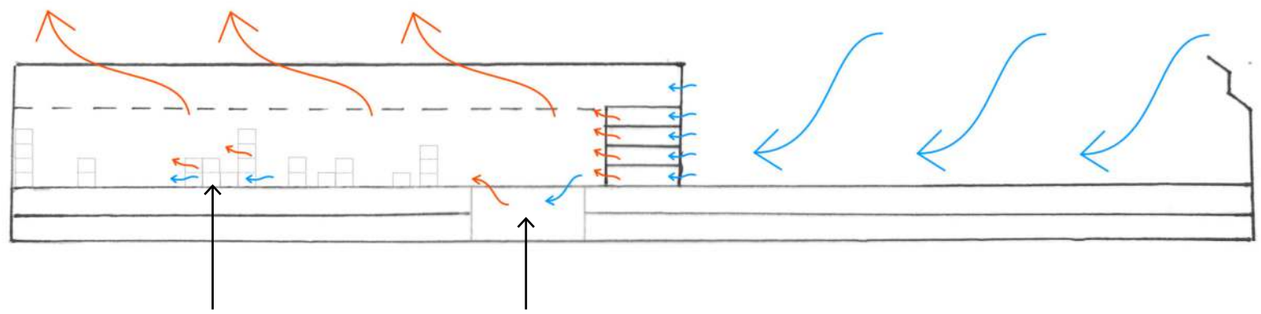
Grey water is stored then used to flush toilets (approx 3.8 million litres required per year) and water plants when necessary.

Excess water from green space is drained back into the water tank.

Stack Ventilation Strategy

Air warms up due to solar gains various other heat sources. It rises up to the roof where is it released through vents, drawing more fresh air into the building.

Fresh air enters the green space through the open roof, and supplies the living partition wall through vents.



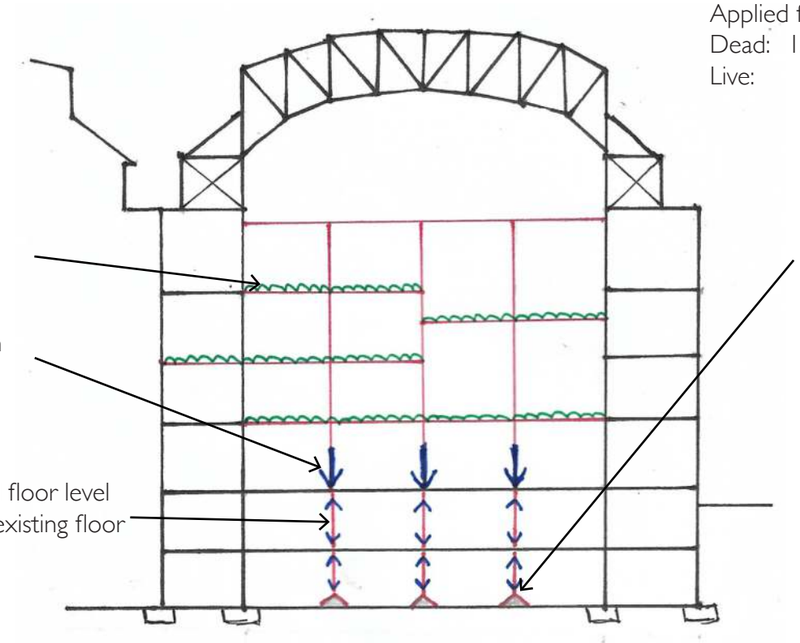
Exhibition volumes are open with high infiltration rates.

Fresh air enters the exhibition space, basement performance space and bike store through the north entrance and through infiltration.

Air is mechanically extracted from toilets and the kitchen.

Structural Strategies

Inhabited Partition Structure :



Applied floor loads
Dead: 1.7kN/m²
Live: 3kN/m² (Classroom load)
2kN/m² (Cafe)

2m x 2m x 1m deep concrete pads spread the load onto the existing concrete slab (assumes 100 kPa allowable bearing pressure of soil)

Structure Sizing:

Columns
Section: 400mm x 400mm GL28 (Homogenous)
Compression capacity utilised: 29%
Combined axial and bending: 60%

Floor beams
Section: 300mm x 495mm deep GL28 (Combined)
Bending capacity utilised: 96%

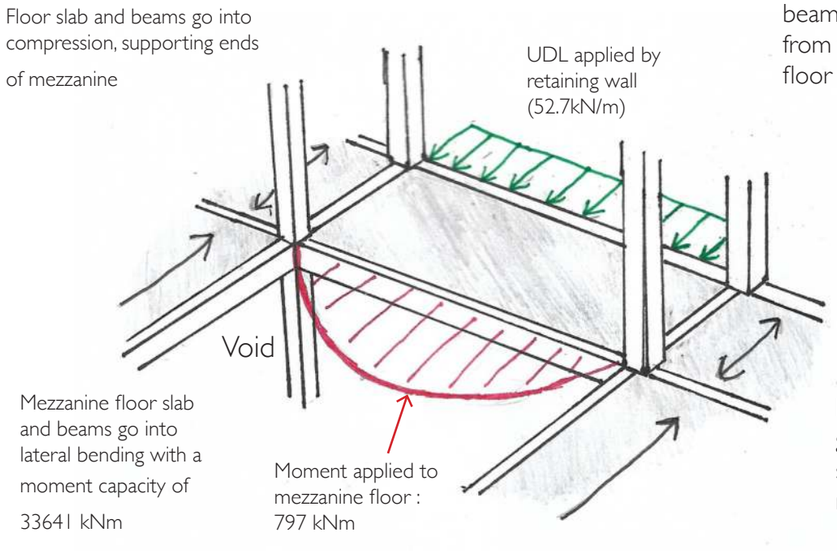
Portal beams
Section: 150mm x 360mm deep GL28 (Combined)
Bending capacity utilised: 87%

Wind load: 0.52kN/m²

Moment connections between columns and beams parallel to floor beams provide lateral stability under wind loading.

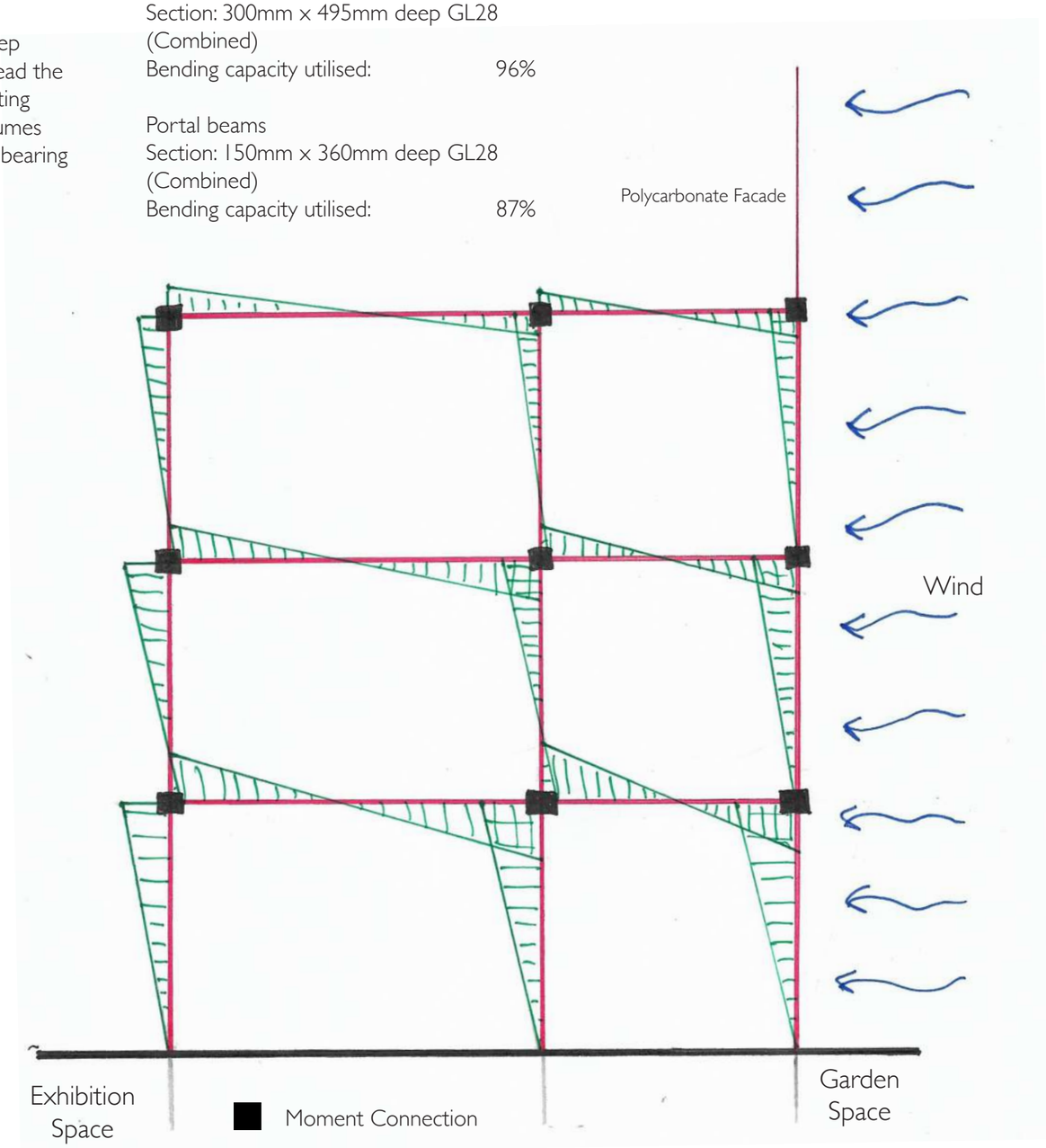
Max BM: 53kNm
Connection M_{rd}: 60.1kNm

Removal of Intermediate basement floor for the performance space :



The ground floor and basement 1 floor slabs provide propping for the northern retaining wall. By removing part of the basement 1 floor we will rely on the mezzanine floor slab and beams to transfer the lateral load from the retaining wall into the floor either side of the void.

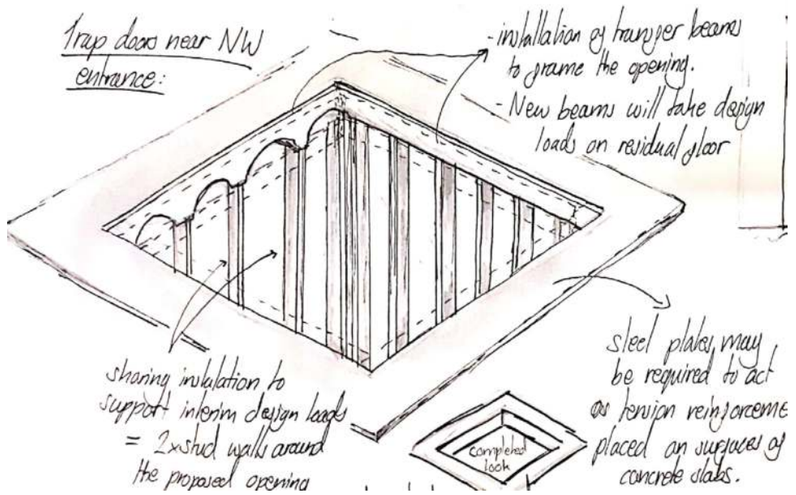
Floor slab and beams go into compression, supporting ends of mezzanine



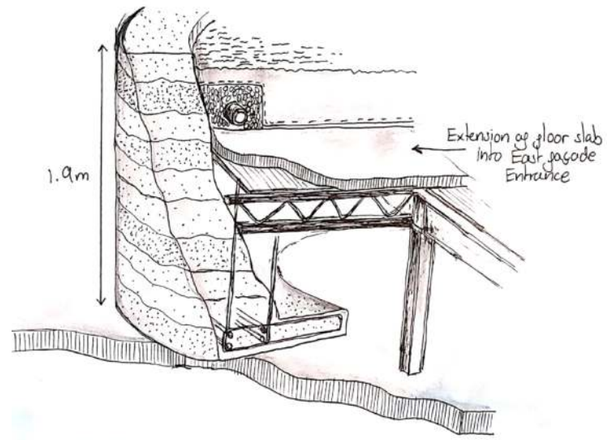
Construction Sequence

1. Changes to the existing structure - Removal of roof cladding, mezzanines, protection of existing steelwork as well as excavation down to street level. Propping and construction of additional foundations.

2. Creation of an opening in the existing ground floor down to basement two in the North West of the site. This enables entry of materials.

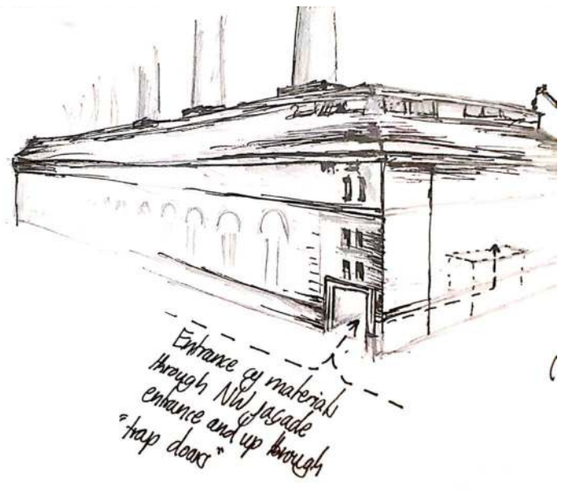


3. Construction of permanent interventions such as stairs and ramps as well as specialist curved form-work and filling of the rammed earth retaining walls. This will also include the construction of support structure for the extension of the floor slab to the 1.9m section of rammed earth wall.

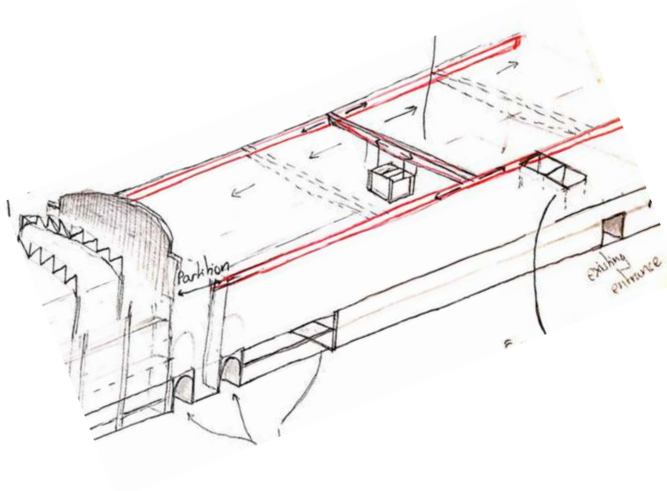


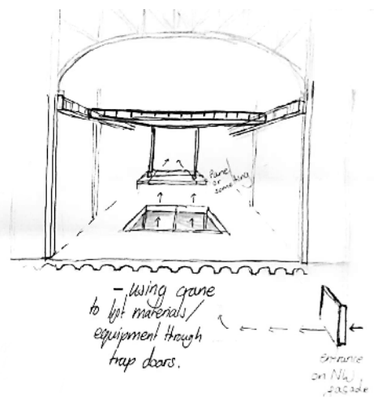
Rammed Earth Timber Formwork

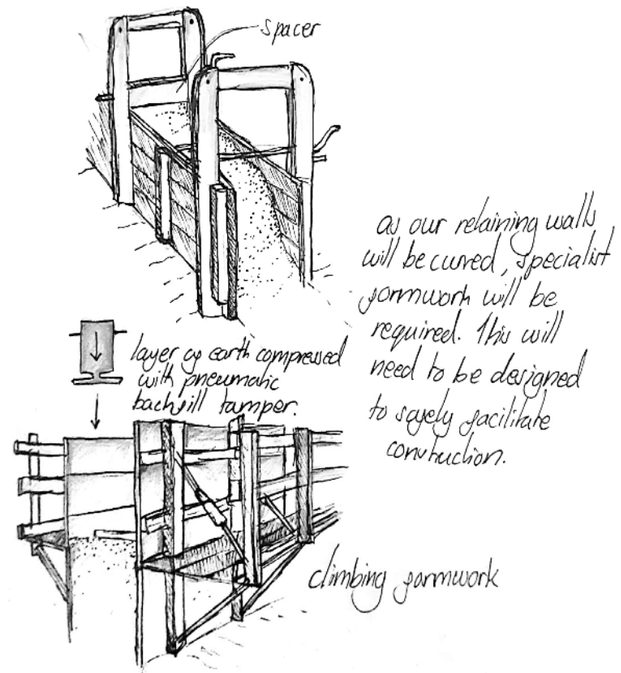
4. Construction of the main partition wall - All prefabricated components are brought directly to the site minimising time spent in construction.



5. Construction of timber volumes, lightweight interventions and finishing - All components are prefabricated allowing for efficient, time-saving construction. The existing cranes will be used to configure the volumes within the space.





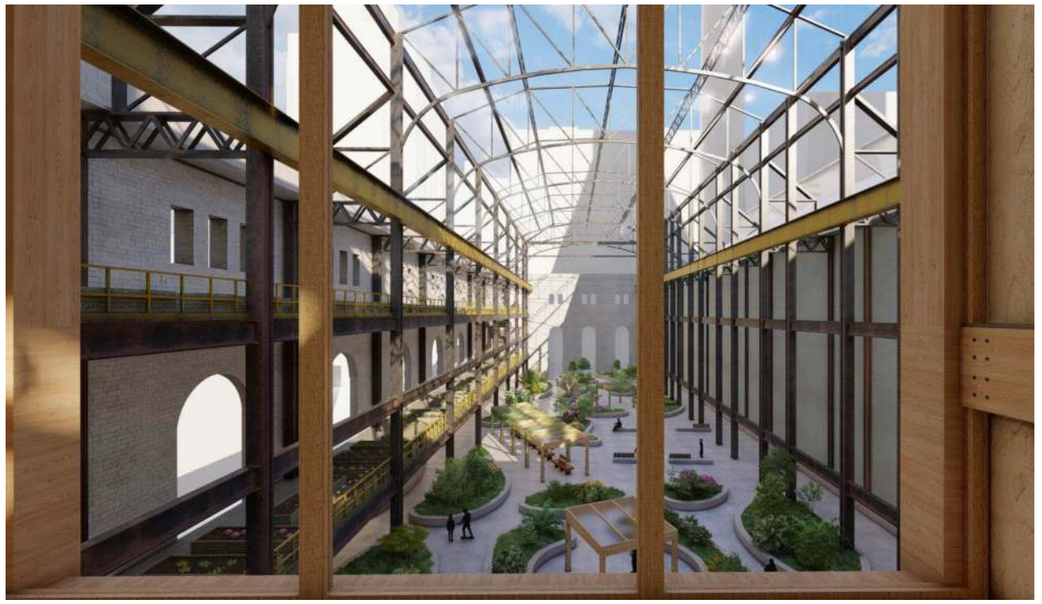


Reflection & References

One of the key discussion points during the final review was the longevity and future use of the building. If time for the project was extended, it would have been interesting to explore the idea of the garden space reclaiming the IRT Powerhouse as an urban ruin, with the garden space overtaking the existing structure and spilling out into the public realm. Similarly, the materials could also spill out from the studio spaces as a visual archive of the various artists that have exhibited their work over the course of the building's lifetime.

5 Years

10 years



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