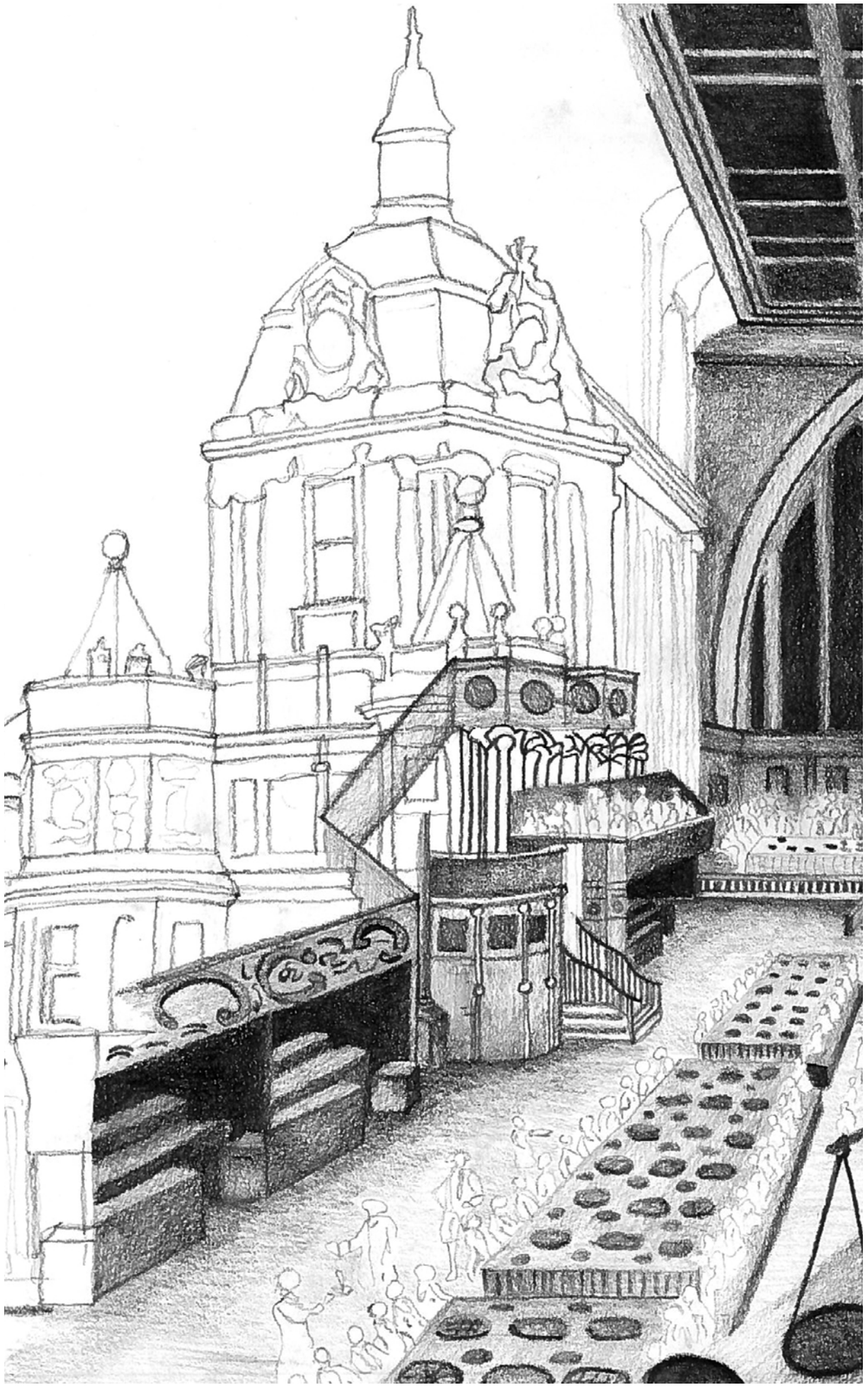


SMITHFIELD'S MINISTRY OF FOOD

INTEGRATED DESIGN IN ARCHITECTURE, TECHNICAL REPORT
ELECTRA PANGALOU 4186173

01 **INTRODUCTION: PROJECT & CONTEXT** p. **1**

1.1 Programme Manifesto
1.2 Site Conditions

02 **ENVIRONMENTAL STRATEGY & DESIGN** p. **11**

2.1 Noise
1.2 Daylight/Ventilation/Airtightness

03 **STRUCTURE** p. **21**

3.1 Site Considerations
3.2 Understanding Existing Structure
3.3 New Structure

04 **FACADE & ASSEMBLAGE** p. **34**

4.1 Materiality
4.2 Assembly
4.3 U-value Calculations

05 **THEMATIC INTEGRATION** p. **45**

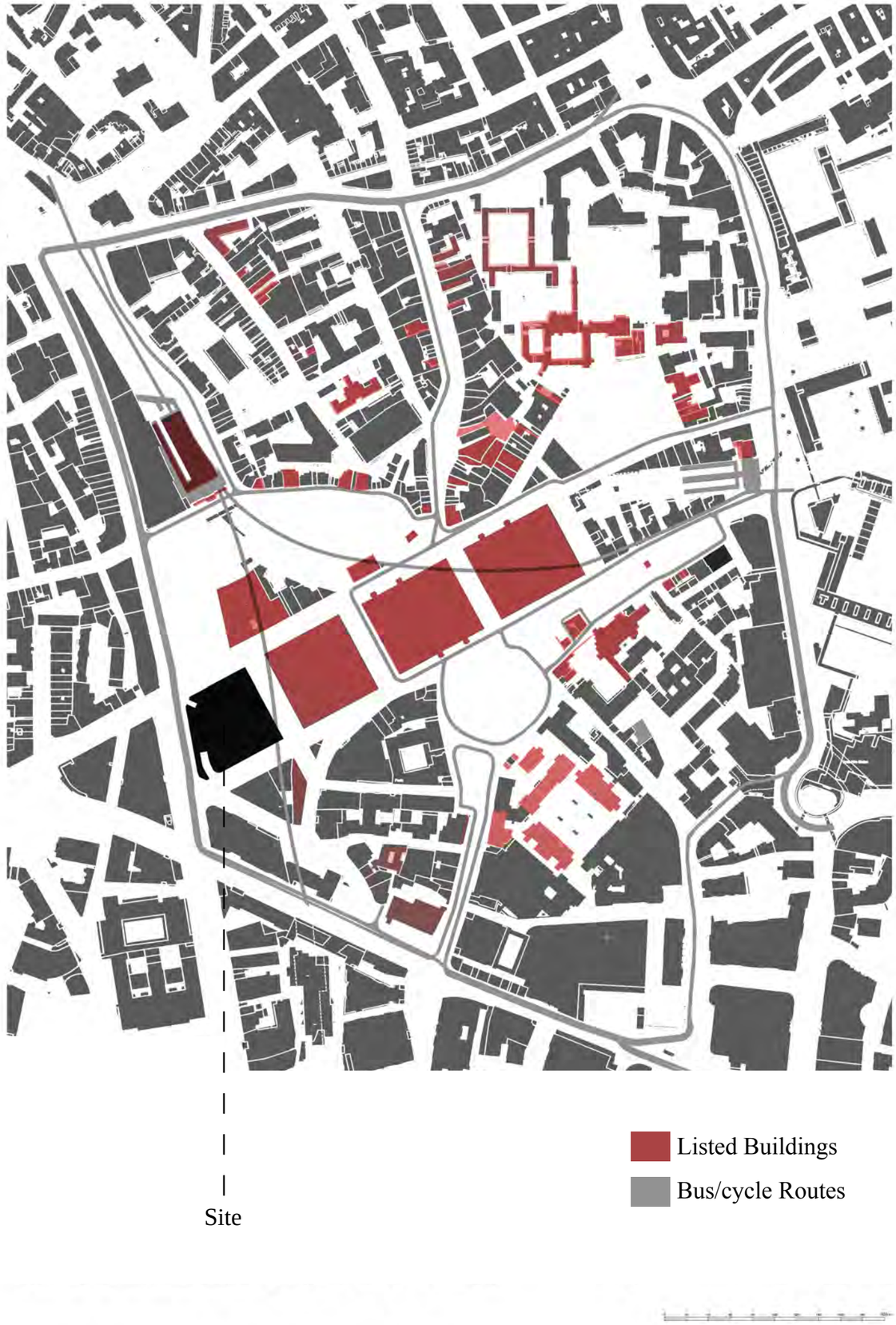
06 **REFLECTION** p. **54**

07 **BIBLIOGRAPHY** p. **56**

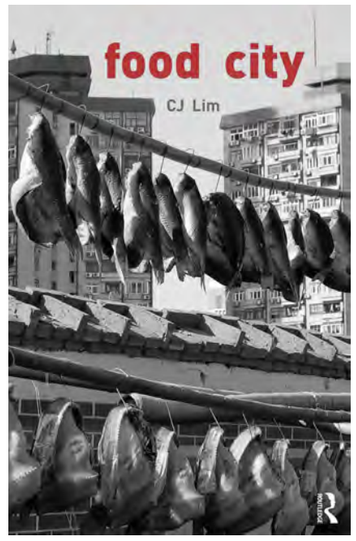
01 INTRODUCTION: PROJECT & CONTEXT

1.1 PROGRAMME MANIFESTO

The Manifesto of this project is to transform London's Smithfield Market into a 21st century Athenian Agora by proposing the separation of food from the current governmental Department of Environment, Food and Rural Affairs, so as to underline the importance of food in every aspect of our lives today, and thus the creation of a New Ministry of Food. It is a governmental department where government representatives are used for public governance and not for the expression of authority. For strategic oversight and coordination that will allow people from different backgrounds and social statuses to participate actively in the debates around food, to express themselves freely and unbiased to redefine their relationship with food and consequently to revive the principles of the [Athenian] democracy that has been lost throughout the years. Market stalls from street markets, commercial kitchens, educational active classes will share the same space with the governmental department underlining the power of food to bring people together. People buying or eating food will observe those making the decisions and vice versa. Key drivers of the design are accessibility, transparency and participation. As a result, this attempt to design an egalitarian-democratic building both in its philosophy and implementation, generates a beautiful complexity, orchestrated by social, political and environmental aspects which are derived and developed on two different axes, concept and site.



**for further information on my programme please refer to the Design Briefing Document.*



"The systemization of food production would sustain the birth and maturation of the city and its importance was such that it would shape the GOVERNANCE, religion, education, transport, health foreign affairs of urban existence."
Food city, CJ Lim

"The pivotal role played by markets in urban life made them inherently political. "
Hungry City, Carolyn Steel

"Everything will be for sale together in the same place at Athens: figs, summoners, bunched of grapes, turnips, pears, apples, witnesses, roses, meddlers, haggis, honeycombs, chickpeas, lawsuits, bee-stings – pudding, myrtle berries, allotments machines, irises, lamps, water clocks, laws, indictments."
Extract from Euboulos

1.

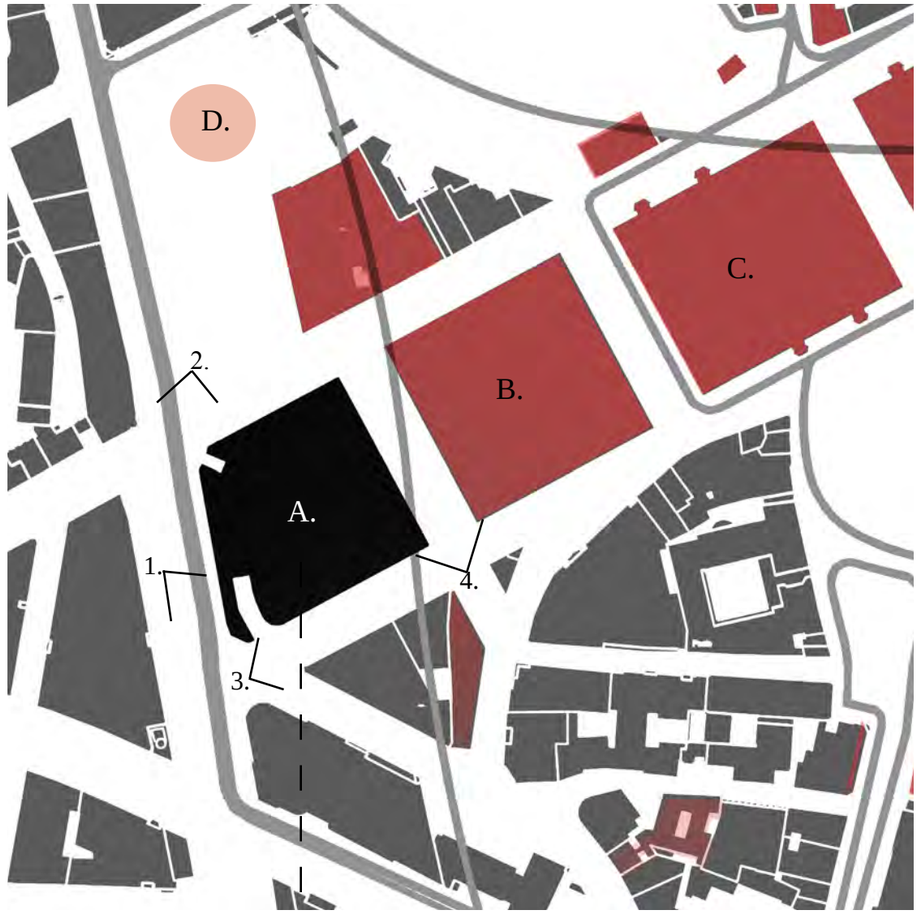
2.

1.2 SITE CONDITIONS

Smithfield area, located in the heart of the City of London, constitutes a conservational area and it is ideal for the realization of my project due to the existing livestock Smithfield Market, possibly the biggest aspect of UK food culture. The whole area has a tremendous historical background which serves the aims of this project. Smithfield Market's current position was initiated in 1860, after an initiation of the government through The Metropolitan Meat & Poultry Market Act of 1860. The Victorian design proposal came by Horace Jones. What was important even from that time - and still constitutes a key aspect of the area - is that the market buildings were constructed above the railway lines, connecting the market to every part of the city. More specifically, the site of my project is General Market that was initially constructed in 1883. This site in terms of design qualities is challenging both internally and externally. On one hand it is the intriguing existing fabric with its Victorian characteristics that my design aims at protecting and regenerating as much as possible and on the other hand the way it is linked to the surrounding buildings and street scape.

3.

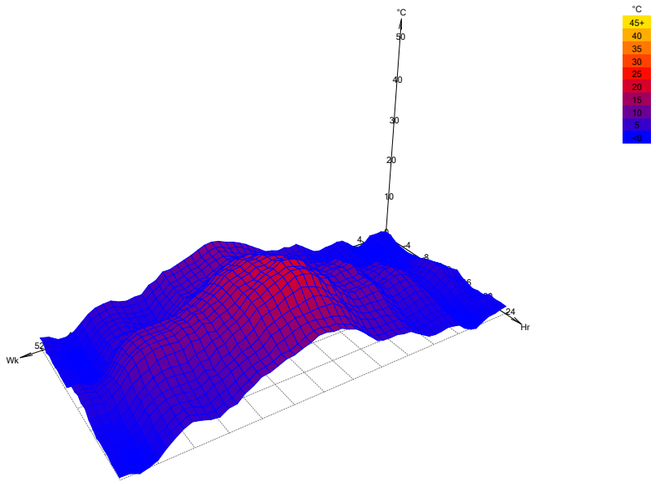
4.

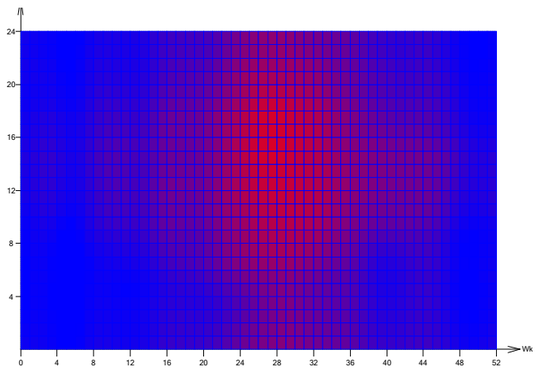


Site — — — — — — A. General Market 1883
B. Poultry Market 1875
C. Meat Market West 1868
D. New Farringdton Station

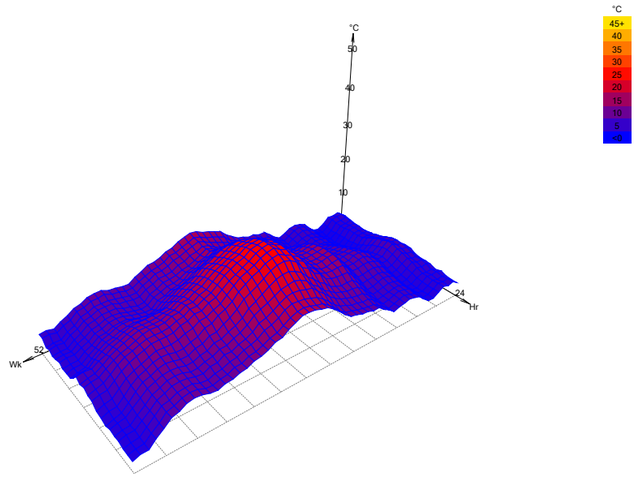
TEMPERATURE

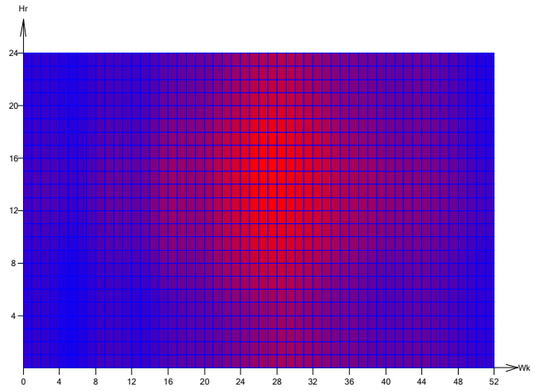
Weekly Summary - MINIMUM Temperature °C



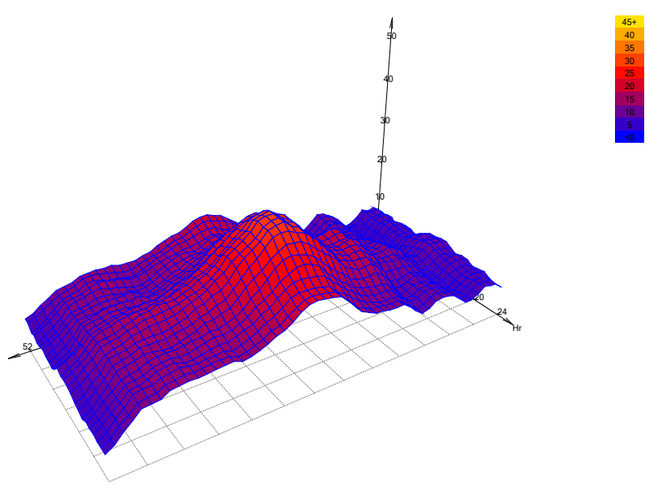


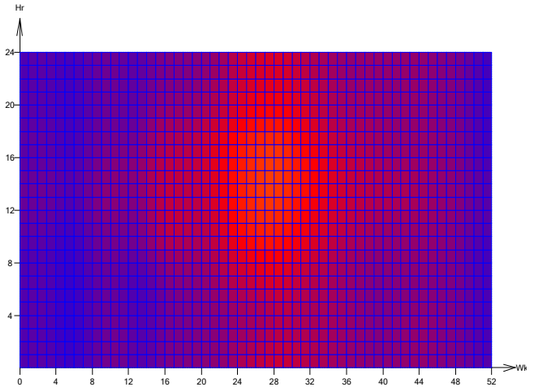
Weekly Summary - AVERAGE Temperature °C





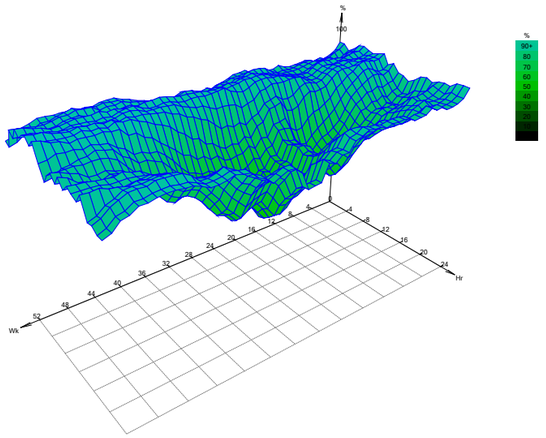
Weekly Summary - MAXIMUM Temperature °C



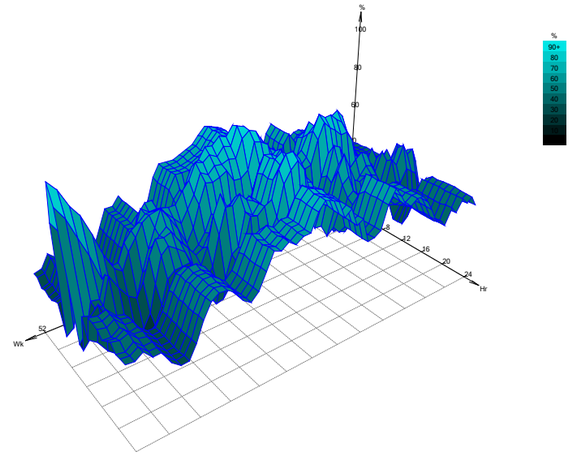


In order to understand the site conditions therefore I started by exploring the range of temperature to be experienced throughout the year. The Illustrated graphs were produced using Ecotect Analysis and Weather Tool in order to show an estimation of the minimum and maximum temperatures experienced in London during 52 weeks. The graphs show that with an average maximum temperature of 20 °C in London and fluctuations throughout the 52 week period it is an aspect that should be carefully consider so as to create comfortable environments for the occupants. Temperature higher that 20 °C implying the need of a cooling system while temperatures below 0 °C underline the importance of a mechanically operated heating system. to maintain thermal comfort. In order though to understand better this conditions wind, solar gains, daylight and shadow need to be explored in order to be in a position to draw conclusion about the desired daylight & ventilation strategies that need to be employed.

Weekly Summary - Relative Humidity



Weekly Summary - Average cloud cover



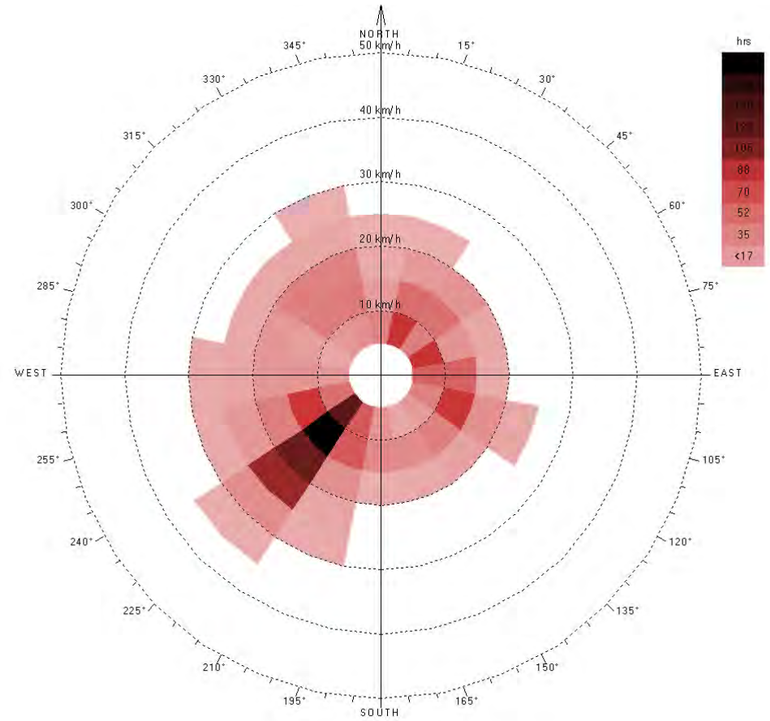
WIND ANALYSIS

From these data it is observed that most extreme winds come from South-west (West during winter months) Evidently, these data provide a first base analysis for the ventilations systems that can be used along with possible locations of external spaces.

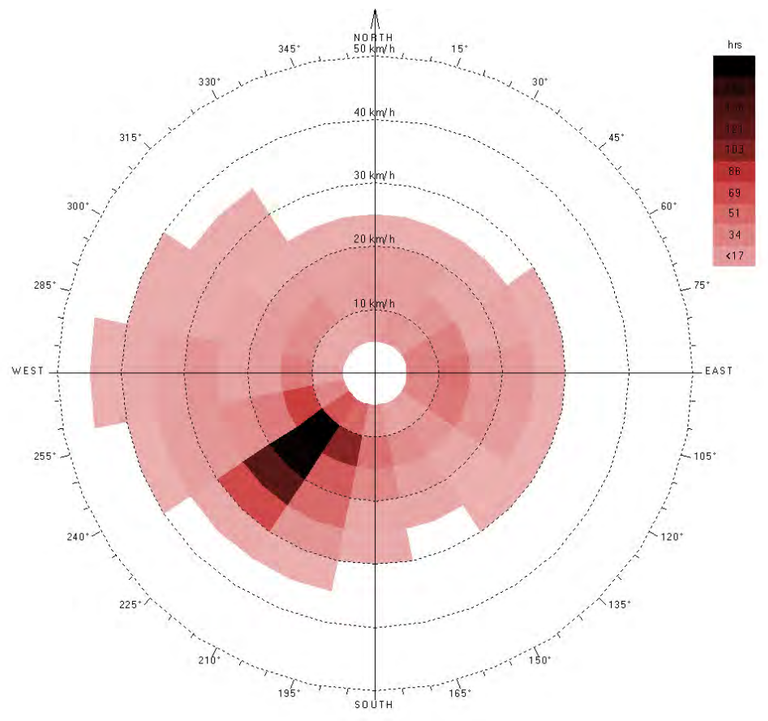
Advantages & Disadvantages

On one hand prevailing winds can be a helpful design tool for ventilation however the nature of the surrounding buildings particularly in the west-Southwest with their enormous height relative to my existing fabric may act as a wind barrier but may also create wind tunnels. The slightly curvature of their facades though may suggest this effect will be reduced. In any case, careful consideration should be given both in order to provide a successful ventilation system as well as a comfortable pedestrian route. The fact though that the existing facades already entail openings that my intentions is to keep for historic preservation reasons will pose a challenge. Furthermore, since the main activity will happen in the core the building in a vertical axis ventilations strategies need to be explored, possibly under the current circumstances, ways of combining both natural ventilation systems and mechanical systems.

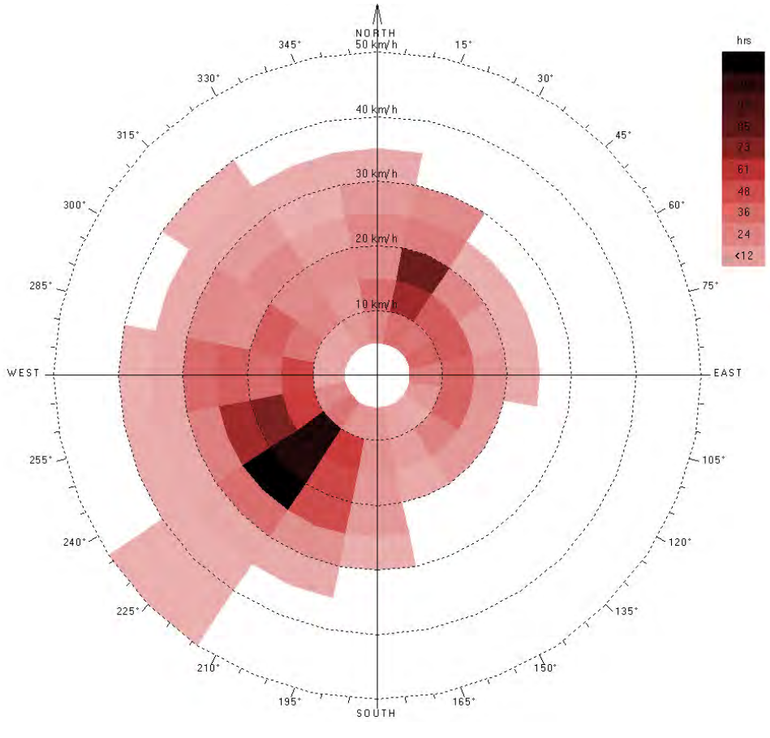
Autumn Prevailing Winds



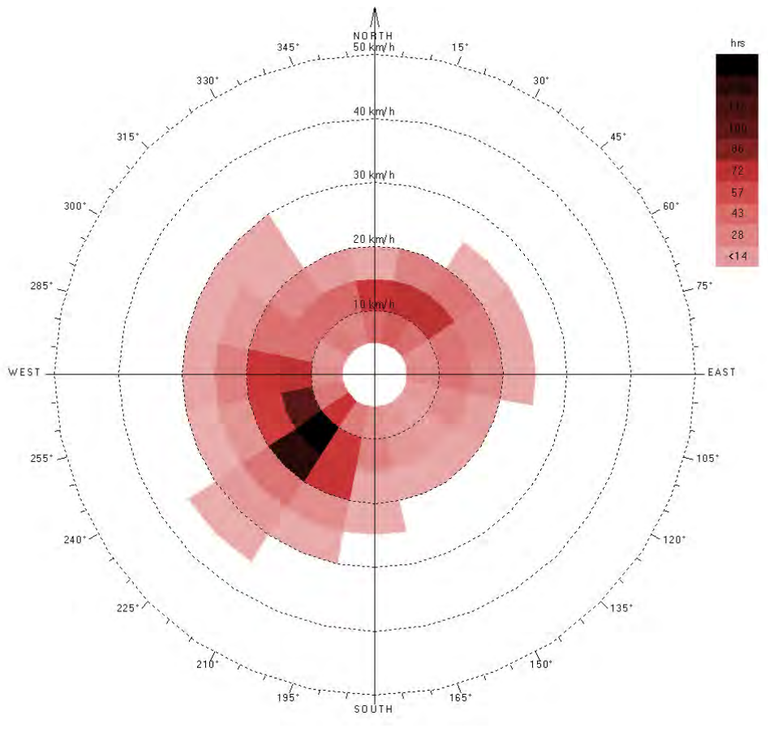
Winter Prevailing Winds



Spring Prevailing Winds



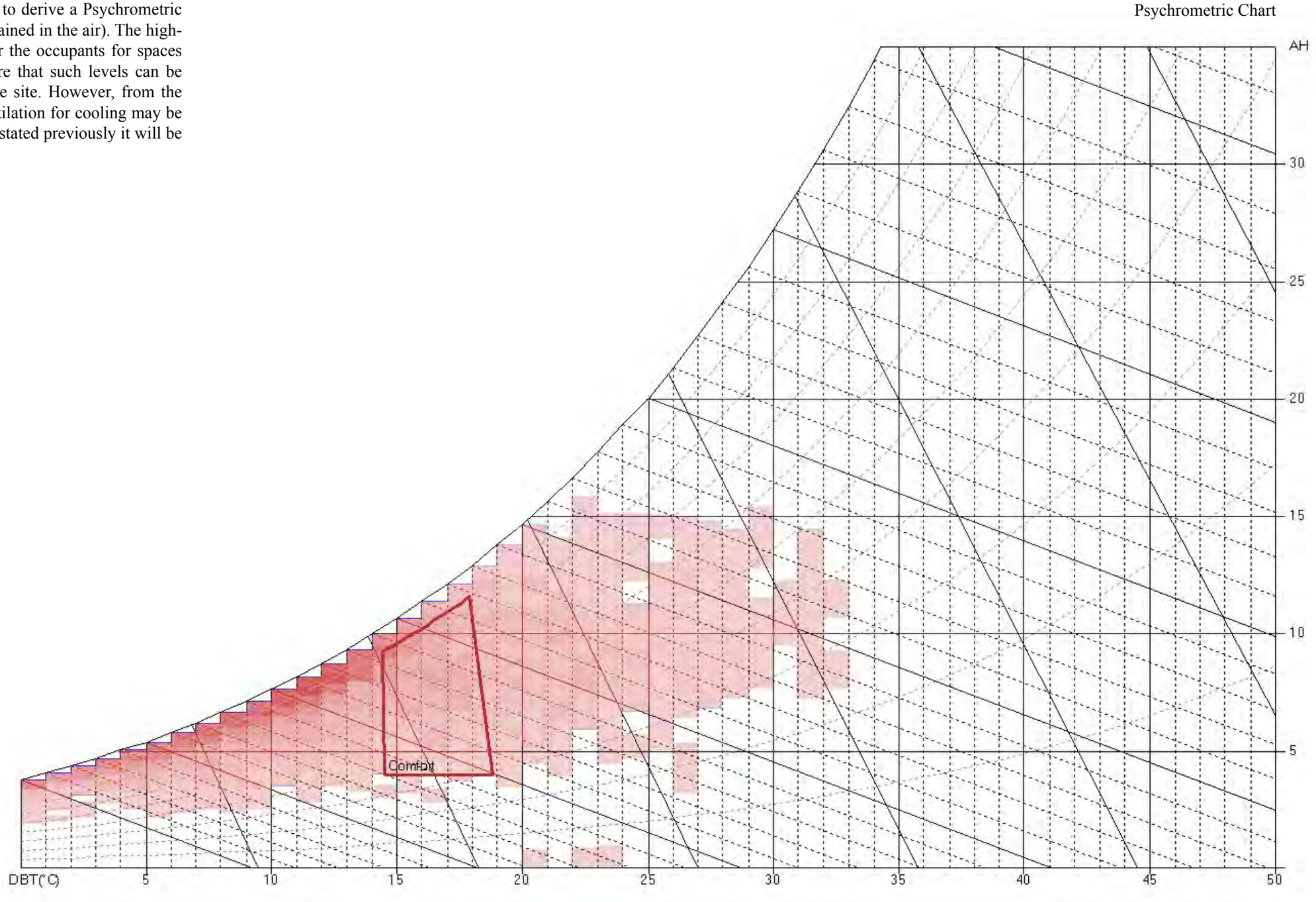
Summer Prevailing Winds

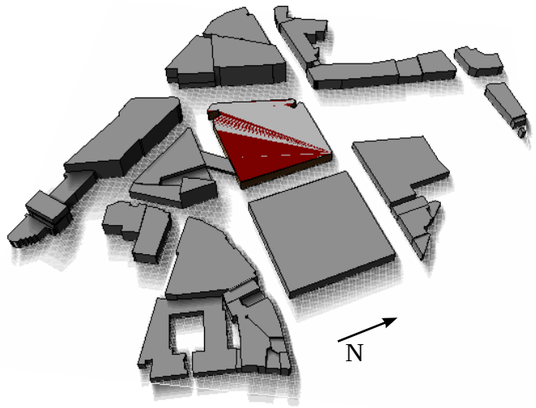


PSYCHROMETRIC ANALYSIS

In addition to the wind analysis i was able to derive a Psychrometric char (to see the water content and heat contained in the air). The highlighted area shows the level of comfort for the occupants for spaces of medium activity. It is observed therefore that such levels can be attained under the current conditions of the site. However, from the graph it is implied that for such spaces ventilation for cooling may be required. And along with all the other facts stated previously it will be explored later on.

Psychrometric Chart



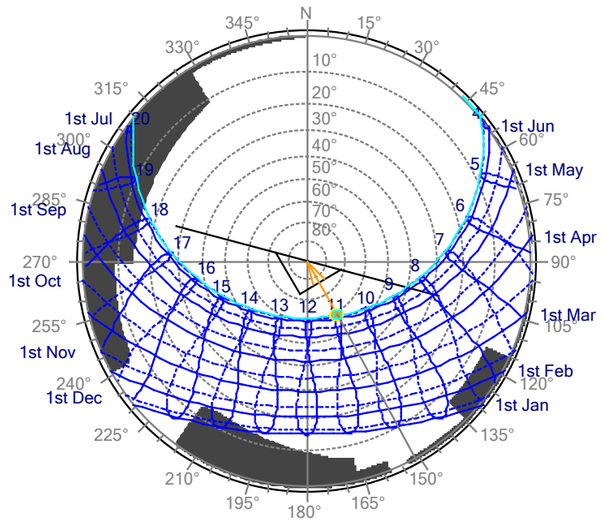


DAYLIGHT & SHADOW

The stereographic diagram on the left, indicates the solar shading that the site is exposed to due to the surrounding buildings. Similarly, the second graph, represents the solar shading distribution on the existing site throughout a day. At this point is important to note that the model used in Ecotect Software to conduct the following investigation was quite simplified compared to the actual site therefore this may have created a degree of inaccuracy.

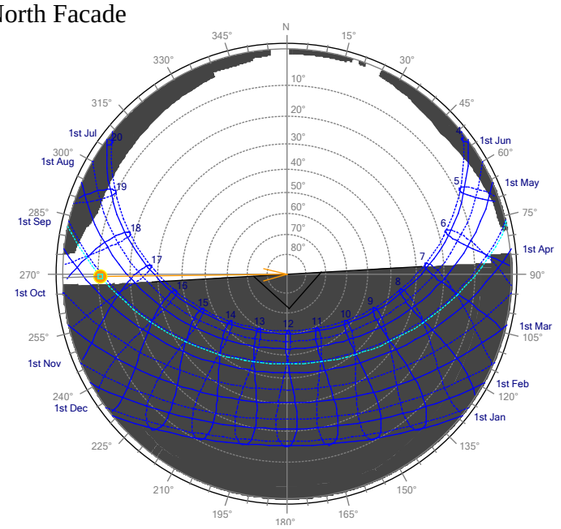
Advantages and Disadvantages

Designing in an urban context is on each own quite a complex method. Designing within an existing fabric in an urban context is even more complicated in order to take into account the site conditions and alter them according to the design intention.
From the diagrams on the right it is evident that the greatest shading effect is observed from the west side due to the enormous height of the surrounding office buildings. However, this may turn out to be a positive thing to avoid overheating from the low angle afternoon sunlight and thus the implication of expensive shading mechanisms on the Victorian existing facade. On the contrary, north and east elevations are evidently much more exposed to direct sunlight therefore careful consideration should be given to allocate spaces that required this type of light. Similarly, the south elevation, has access to direct sunlight throughout most of the day.
It also important to note, that the shadow range (bottom right) was derived for the Summer Solstice implying that during winter, autumn and spring months most of the site will be shaded. This highlights the need, of using and actually keeping the existing roof structure and adding window openings in order to allow light inside the building during those months.

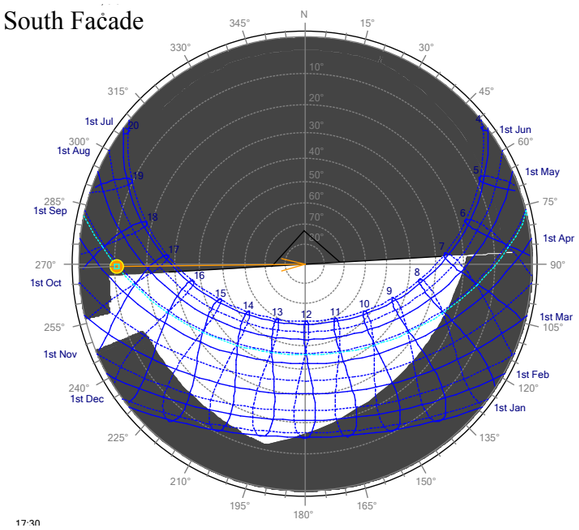


Stereographic Diagram
Location: 51.4º, 0.0º
Sun Position: 151.2º, 59.6º
HSA: -43.5º
VSA: 67.0º

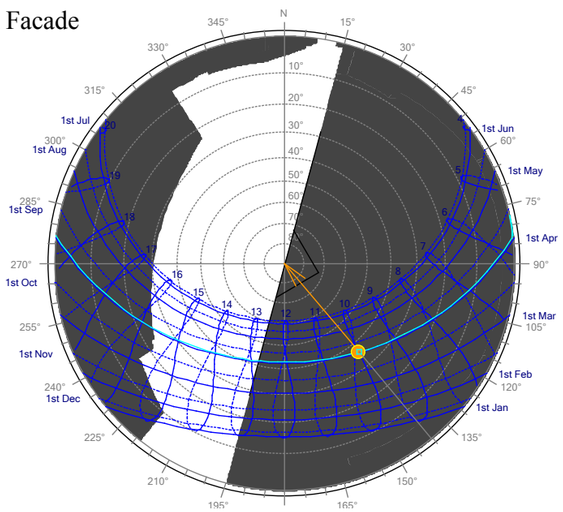
North Facade



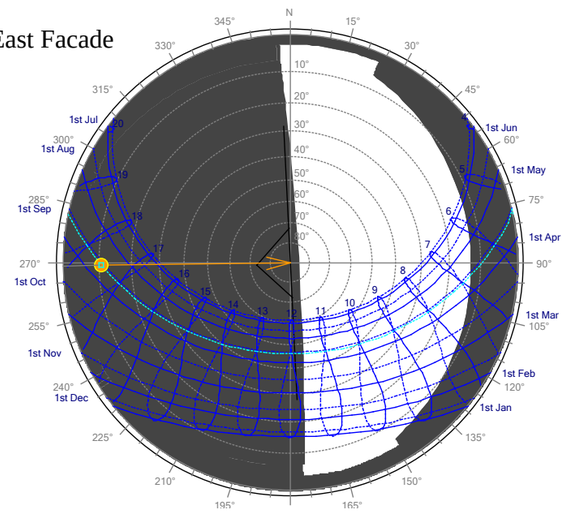
South Facade



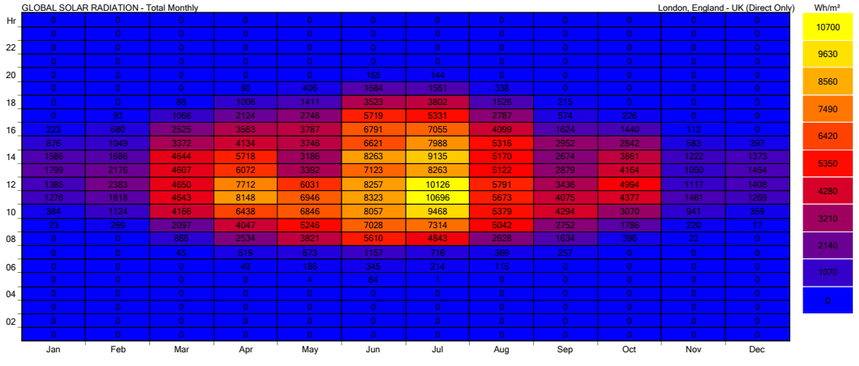
West Facade



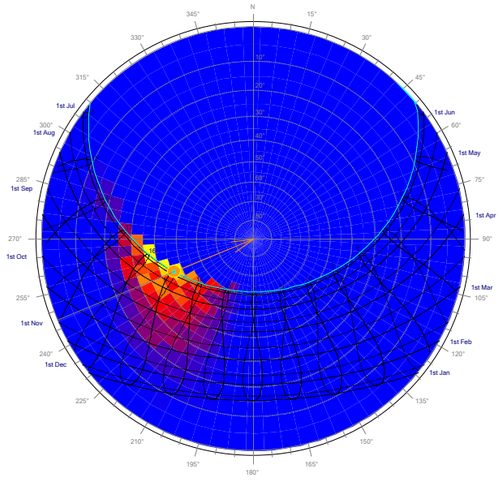
East Facade



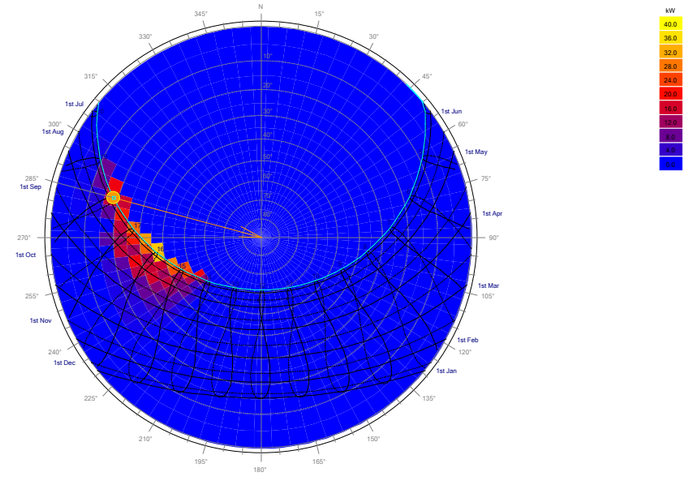
SOLAR RADIATION



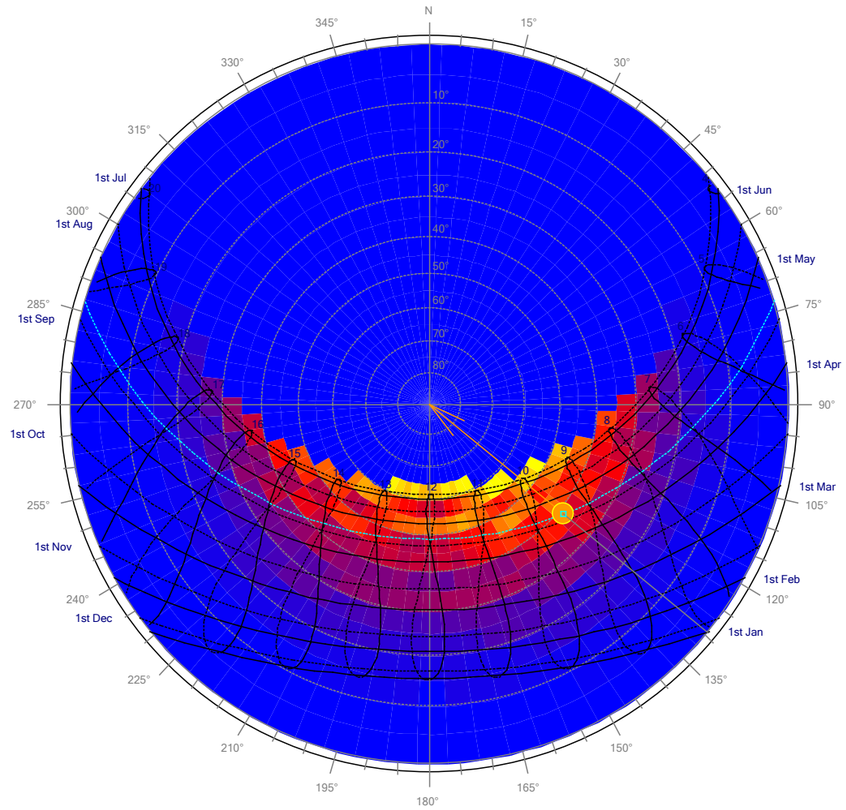
West Facade



Entrance Facade



Main space roof solar radiation

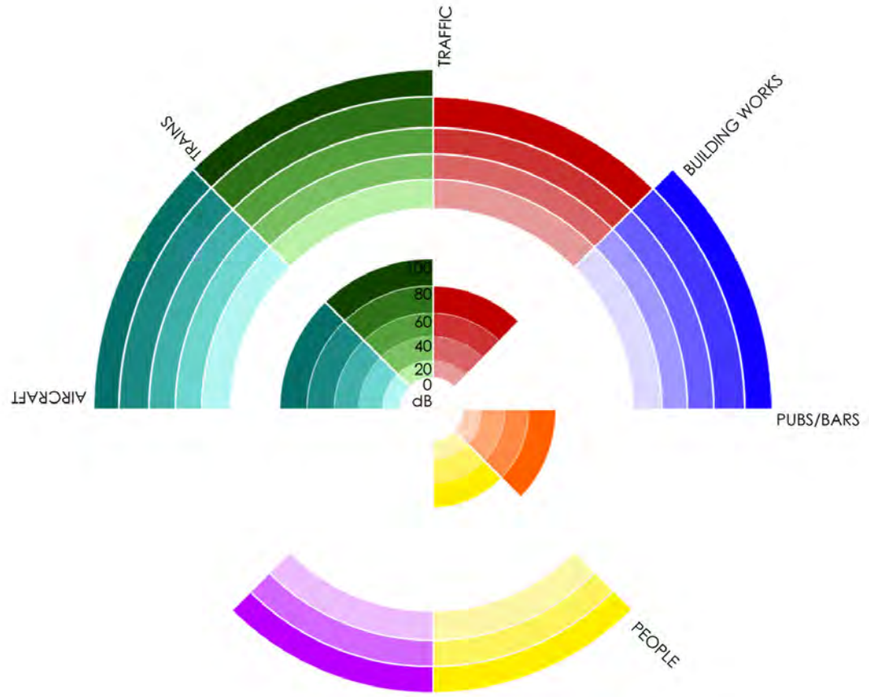


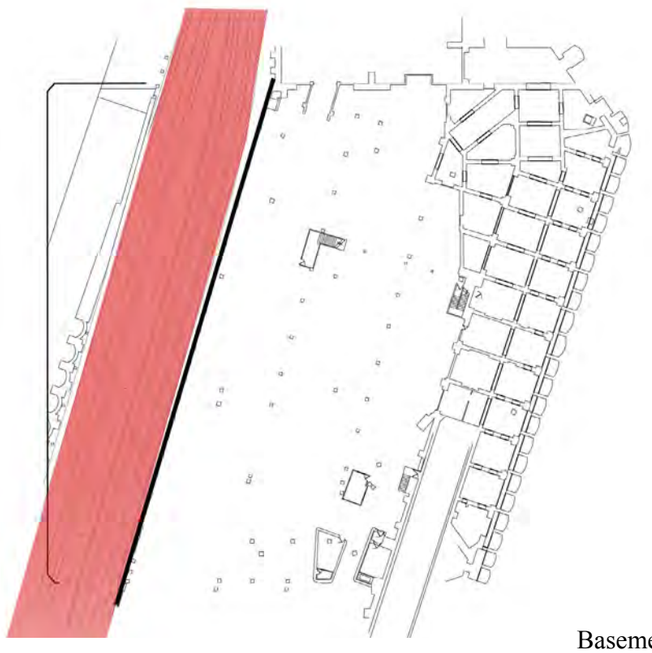
Moving on from the shadow analysis, the sun-path diagram was used in Ecotect to calculate the solar stress in the West facade which the mostly shaded facade as well as the facade of the main entrance of the building which will play a crucial role in the design and will be further explored in chapter 4. It is evident that the main entrance facade which is located North West will not receive excessive solar radiation in order to be a need of using a shading mechanism. Similarly the west facade evidently more exposed to solar radiation but still does not suffer from excessive heat gains. Finally, since I am dealing with an existing fabric I was also interested in the levels of solar radiation in the main core area of the market building. Where most of the public activity is considered to take place. The stereographic diagram to the right assumes that the central space is an external space, without any roof structure.

NOISE

Last but not least, the typology of the building that I want to design is directly affected by the noise levels both inside and outside of the building. Externally, Charterhouse Street is a street which represents the levels of activity of the surrounding area. Sheltering from office buildings to night clubs it increases the noise levels of the surrounding area throughout the day. Internally, Farringdon's train lines pass through the basement of the market building. As a result, in order to design a public building in which a variety of meetings are taking place, it is important to minimize noize levels. Different ways will be further explored in chapter 5.

Noise Map for DEFRA





Basement Plan

Rail Tunnels below Smithfield Market

02 ENVIRONMENTAL STRATEGY & DESIGN

As the scheme is part preservation of an existing structure, part new, a balance between the two needs to be reached in order to improve the building's performance without compromising its special character. By not altering most of the existing facades, shading mechanisms automatically are not an option therefore alternative solutions need to be implemented in order to acquire the desired comfort conditions for the occupants throughout the year. Decisions thus will be based on the initial analysis provided in Chapter 1 as well as the current performance of the building and its new proposed use, aiming at enhancing its energy efficiency and making as much as possible a more sustainable environment.

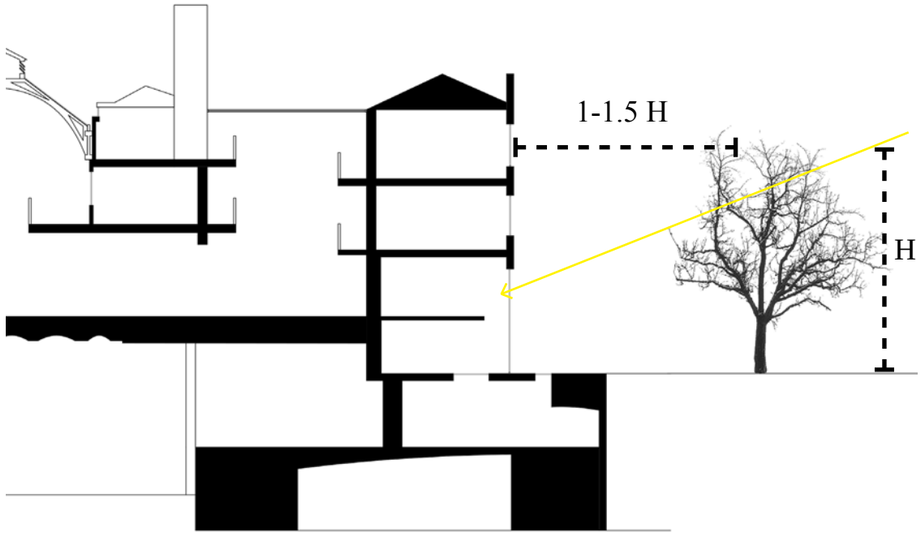
2.1 REDUCING NOISE LEVELS

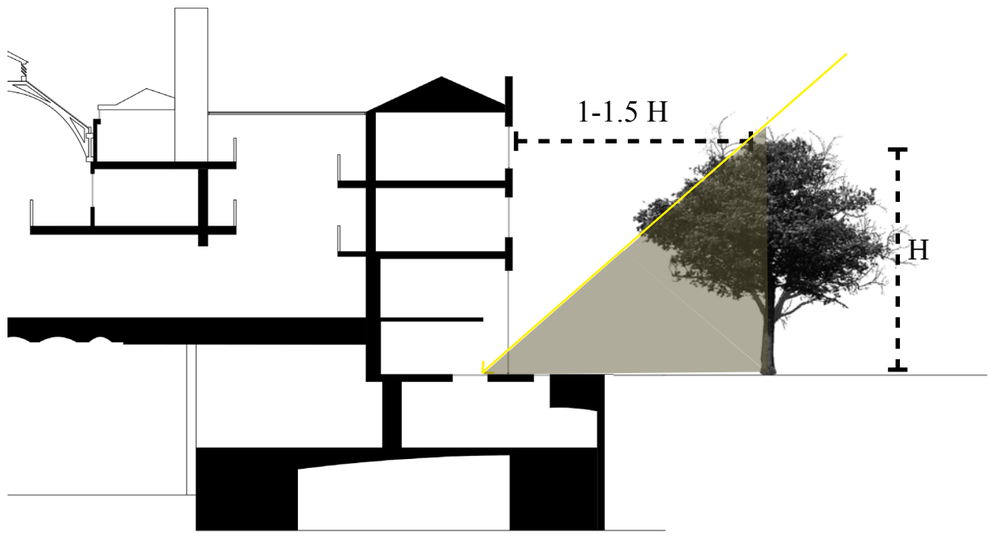
Scottish Parliament by Enric Miralles

London City Hall by Norman Foster

The Welsh National Assembly by Richard Rogers

Most governmental buildings are located in public squares or are surrounding by pedestrian routes. Smithfield market at the moment is surrounded by four different medium to high traffic streets. In order to reduced drastically the noise levels but also give the building the governmental prestige that it requires part of my proposal is to transform those streets to pedestrian routes. Furthermore, it will allow an increase in vegetation in the surrounding area, enhancing biodiversity and transforming the surrounding streets to a more pleasant and comfortable environment. Similarly, it will also influence solar gains throughout the year particularly for the east and west elevations Furthermore, it will allow multiple ventilation strategies to be explored, such as natural ventilation, which under the current circumstances would not be a wise option.





Maximum tree height under those instructions 9.0 meters.

2.2 DAYLIGHT/ VENTILATION /AIR TIGHTNESS

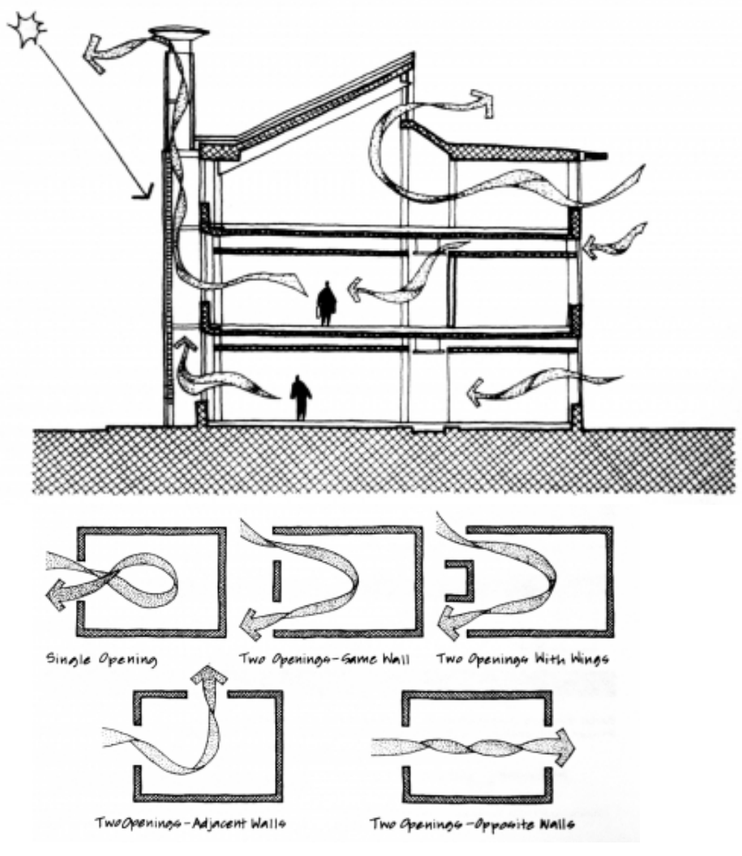
General Plan

Period	Requirements	Problems
Summer	Cooling	Overheating
	Ventilation	
Winter	Heating	Underheating
	Ventilation	

Period	Day	Night
Summer	Blocking Sun	Cooling/ Secure Ventilation
Winter	Solar Gains	Recapturing Heat

NATURAL VENTILATION STRATEGY

Natural ventilation makes use of natural exterior air movement and pressure difference to both passively cool and ventilate a building. Natural ventilation is desirable because it provides fresh air without the use of fans.
A kind of natural ventilations is Stack Ventilation that uses the air pressure difference as a result of a height difference to pull air through a building. Lower pressure, higher in the building help to drive air upward.



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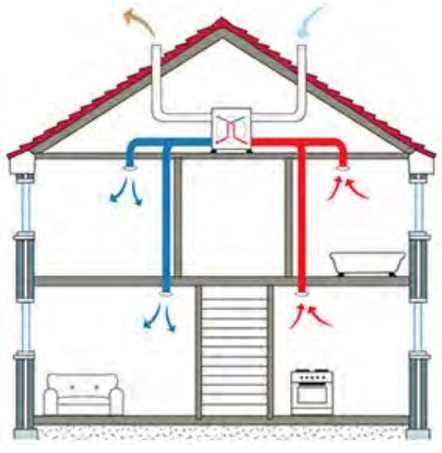
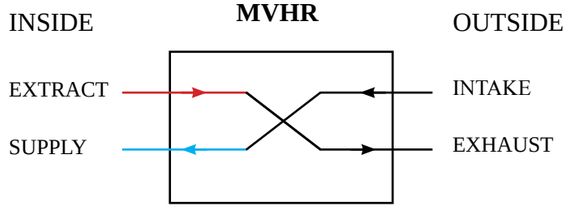
MECHANICAL VENTILATION STRATEGY WITH HEAT RECOVERY

Mechanical ventilation systems are using energy to pull air through vents/ducts in a continuous process through supply and extraction. The installed system however, consumes most of the energy. As a result a heat exchanger unit is employed where the warmth of the exhaust air is utilised in order to minimize waste energy. During this process air is supplied to offices and living spaces while it is extracted form bathrooms, kitchens and laundries . MVHR requires a minimum of 3 $m^3/(hr.m^2)$ of airtightness in order to be effective. The higher the performance of the fabric the greater the suitability for heat recovery.

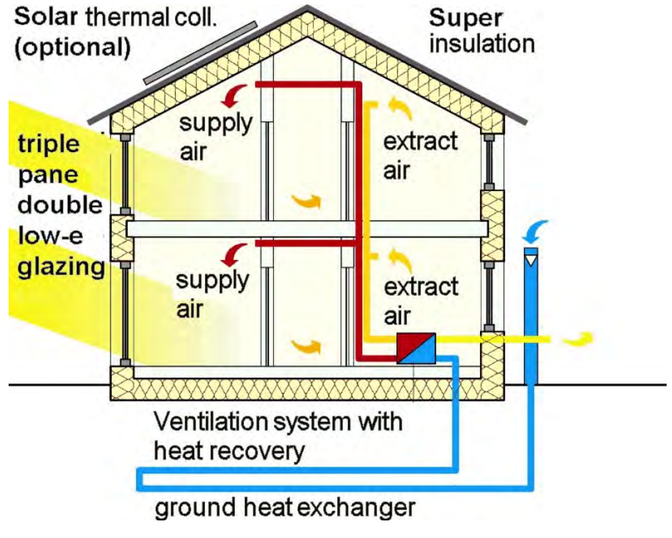


http://www.thefueleffect.co.uk/heatrecovery.html

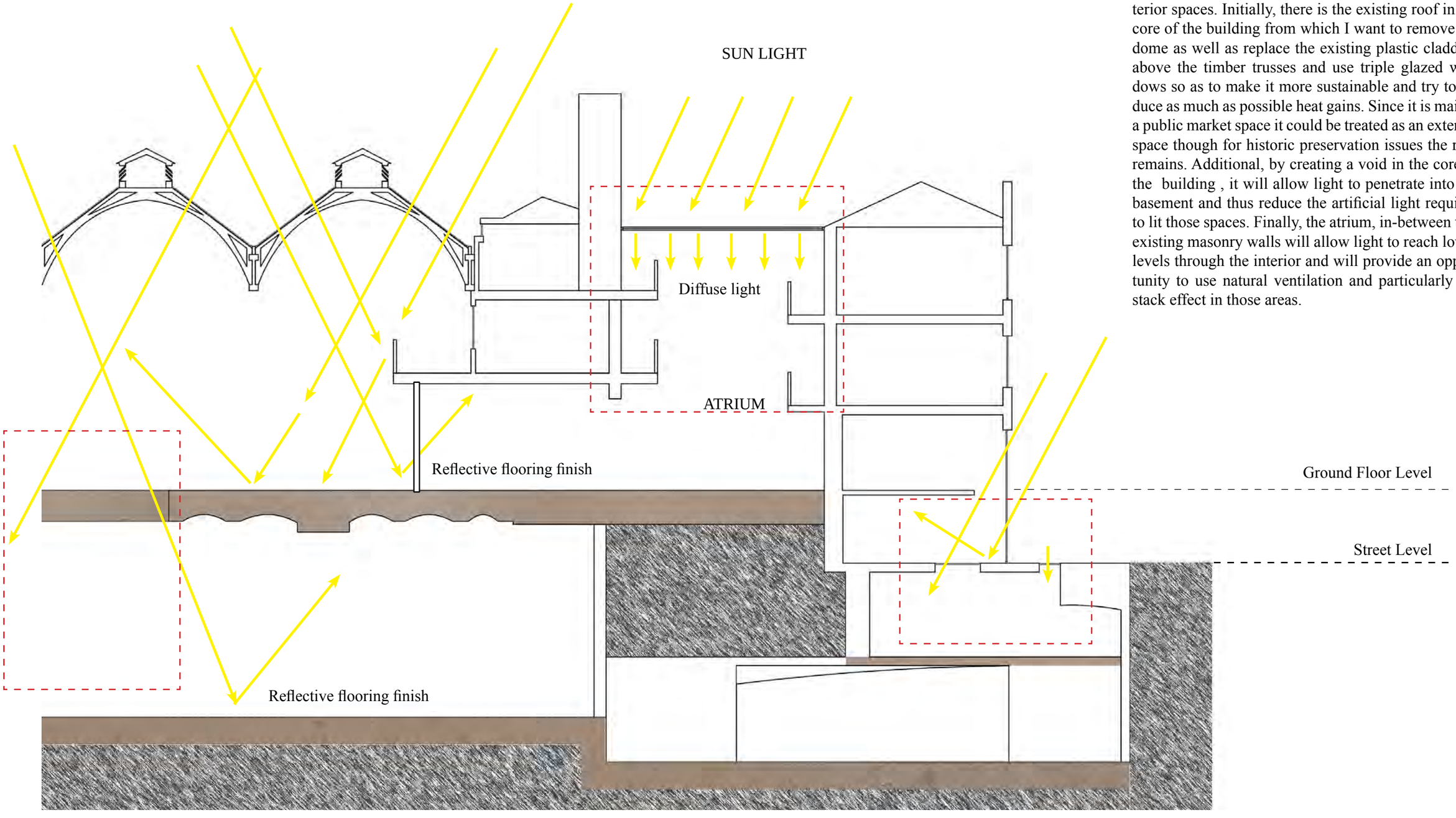


MIXED MODE

The Mixed Mode strategy brings together all the advantages of a natural ventilation system combined with those of mechanical ventilation to provide the best of both systems:
- Low energy use.
- Low running costs.
-Accurate temperature control.
- Improved comfort.
Again, however it is important to provide the required airtightness levels in order for the system to be successful and serve the needs of the occupants.

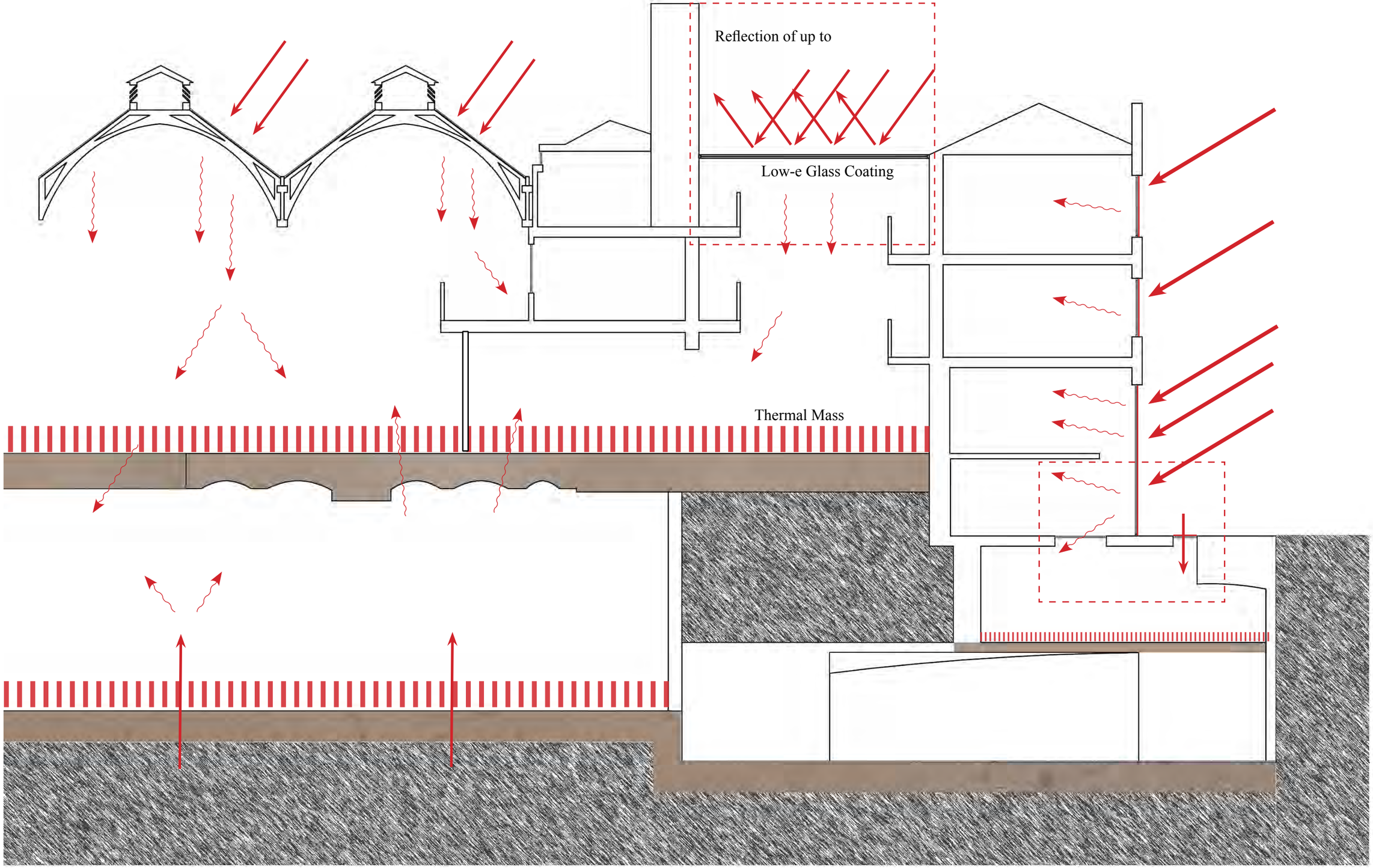


DAYLIGHT STRATEGY



In terms of the daylight strategy, since most of the perimeter of the building is retained existing walls altering the size of the windows is not an option. As a result, I decide to use the roof to bring light to the interior spaces. Initially, there is the existing roof in the core of the building from which I want to remove the dome as well as replace the existing plastic cladding above the timber trusses and use triple glazed windows so as to make it more sustainable and try to reduce as much as possible heat gains. Since it is mainly a public market space it could be treated as an external space though for historic preservation issues the roof remains. Additional, by creating a void in the core of the building , it will allow light to penetrate into the basement and thus reduce the artificial light required to lit those spaces. Finally, the atrium, in-between two existing masonry walls will allow light to reach lower levels through the interior and will provide an opportunity to use natural ventilation and particularly the stack effect in those areas.

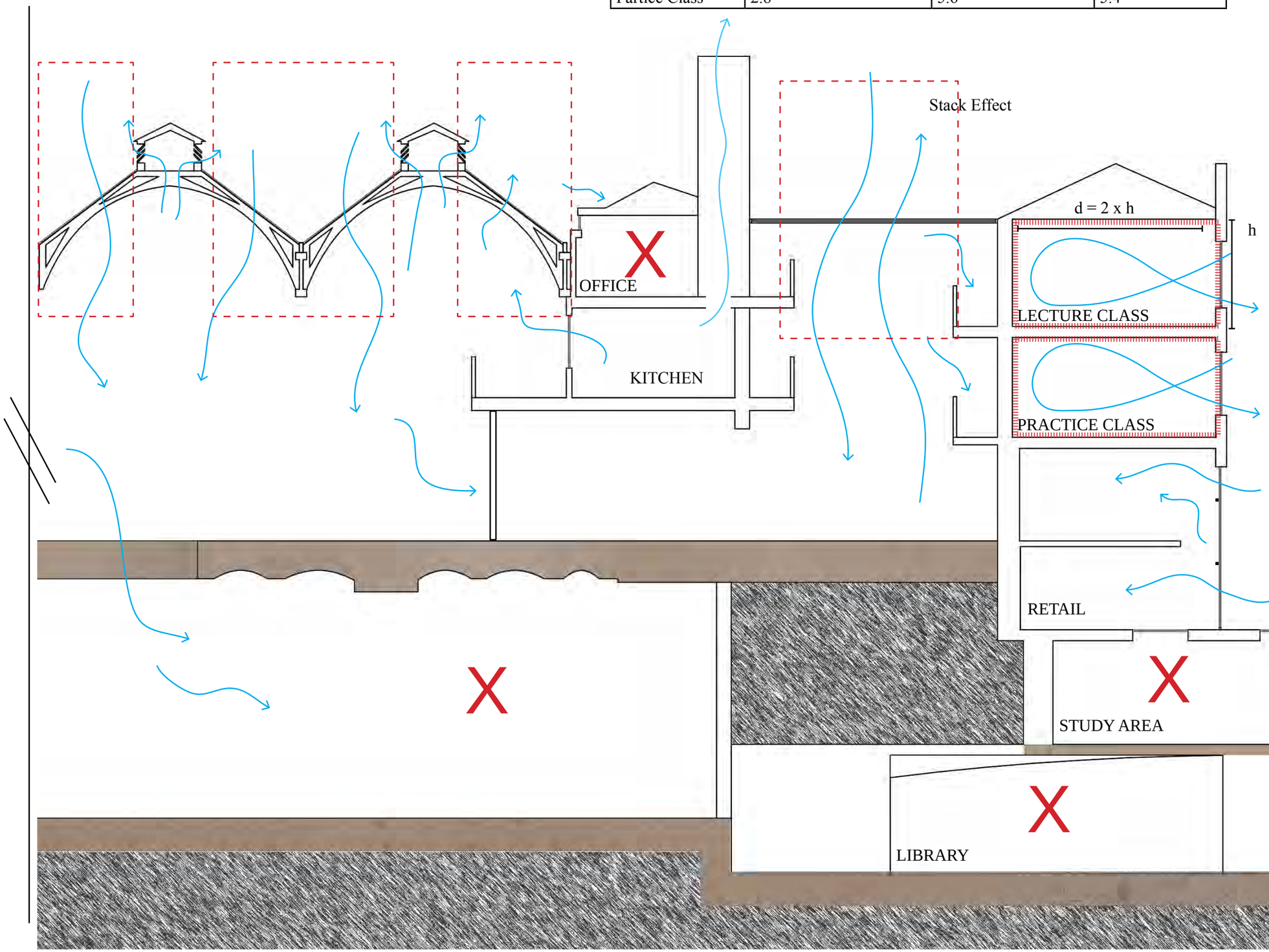
SOLAR HEAT GAINS



Part East- West Section, Scale 1:100

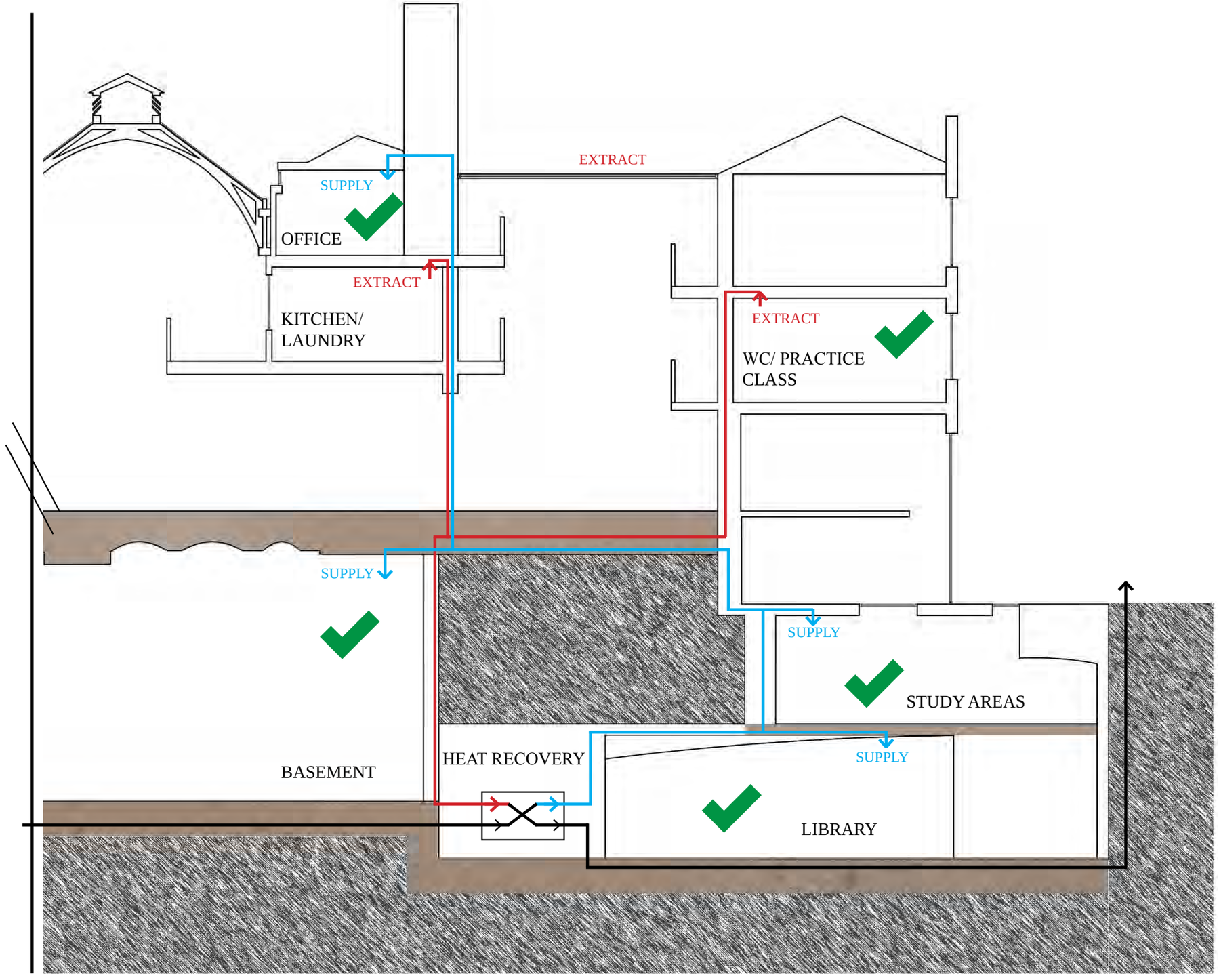
OPTION 1: NATURAL VENTILATION STRATEGY

Type of space	Height floor/ceiling (m)	Depth Optiomal (m)	Actual depth m)
Lectura Class	2.9	5.8	5.4
Partice Class	2.8	5.6	5.4



From this section it is evident that a combination of stack ventilation and single sided or in other cases cross ventilation can be effectively employed to ventilate and cool the various spaces through summer. However, there is a number of spaces mostly, located in the basement and basement mezzanine level where natural ventilation is not a feasible option, therefore other strategies should be combined in order to acquired the desired comfort levels. In addition, it seems that even if spatially, natural ventilation strategies are efficient, there is a great degree of dependance in the occupants for its successful implementation and the public nature of the scheme, with different people coming and go (apart from offices) there is a great chance of failure. Therefore, an immediate solution would be the use of automated windows particularly for the highlighted areas, where the placement of an actuator would enable it to open and close automatically.

OPTION 2: NATURAL VENTILATION + MVHR



In order to provide the required air movement and thus acquire the necessary comfort conditions for the occupants mechanical ventilation should be provided to accompany the natural ventilation strategies. In order to do so a MVHR system will be employed. Due to the nature of the project, there is a whole floor (1st floor) where Kitchens and Laundry facilities are placed and thus great amount of heat will be generated. Instead of simply extracting that heat through chimneys (stack effect), the energy provided can be used to heat incoming air and to provide the rest of the spaces with adequate fresh air.
MVHR is a sustainable option that reduces carbon footprint and reduces heating costs and thus enhancing the buildings overall performance.

INFILTRATION vs AIR TIGHTNESS

In order for an old building to be able to shelter modern activities and consequently to provide modern comfortable conditions for the occupants, ventilation strategies is one of the aspects the other is insulation. Only with the combination of the two can an old building improve its energy efficiency to modern standards. Currently, the General Market Building has no insulation. Therefore a number of options will be explored in order to find those that best suit the design intention.

External Insulation

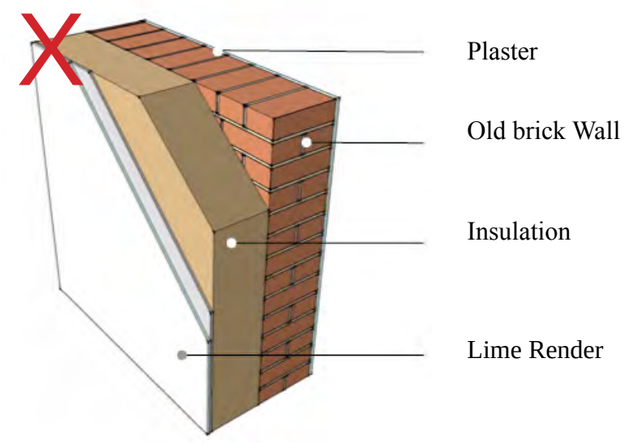
http://singletrackworld.com/forum/topic/talk-to-me-about-external-solid-wall-insulation

Internal Insulation

http://www.hdpropertyservices.com/barn-conversion.html

OPTION 1 - EXTERNAL INSULATION

- Prevents condensation
- Reduces heating bills
- Good air tightness
- Sound insulation
- Alters the external facade



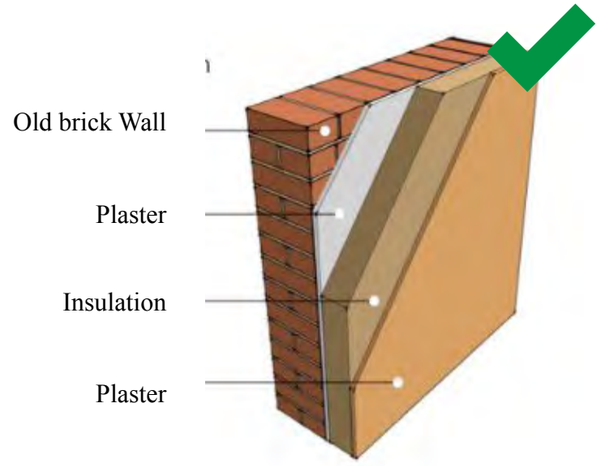
http://www.ecomerchant.co.uk/steico-protect-system-wood-fibre-board-lime-render-1083.html

Expected u values on Old Solid Brick Wall		
Build Up	Thermal Board Thickness (mm)	Thermal performance U value W/(m^{2}K)
Solid brick wall (225mm) Warmshell Board Lime green Render 15mm	0	2.02
	40	0.71
	60	0.65
	80	0.38
	100	0.26

Table derived from *http://www.thelimecentre.co.uk/*

OPTION 2 - INTERNAL INSULATION

- **SOLID**: less heat escapes thus cooler walls and thus risk of condensation
- **WOOD FIBRE AND LIME PLASTER** : direct to internal walls (a parge coat of plaster may be used to smooth the surface), vapour control is not required
- **LIME AND HEMP PLASTER** : modest insulating properties, very breathable combination with humidity regulating properties which can benefit and old building .



http://www.ecomerchant.co.uk/steico-protect-system-wood-fibre-board-lime-render-1083.html

Windows are perhaps the greatest source of the thermal bridges. Particularly through the frame and connection with the surrounding walls. There are various ways to treat windows in order to increase their performance and minimize heat losses.

Sash Window Replacement: Option	Visual Change	Cost/m^2	Disruption during installation	U-value	Embodied energy
1. Complete replacement with high performance triple glazed windows	Medium	High	High	Low	High
2. New sash window frame with double glazed windows	None	Medium	Medium	Low-Medium	High
3. Secondary glazing - double glazed	Medium	Low	Low	Medium	Medium
4. Window upgrade: slim double glazing and draught stripping	None	Low	Medium	Medium	Low

http://www.superhomes.org.uk/resources/sash-window-replacement/

OPTION 1 ✗

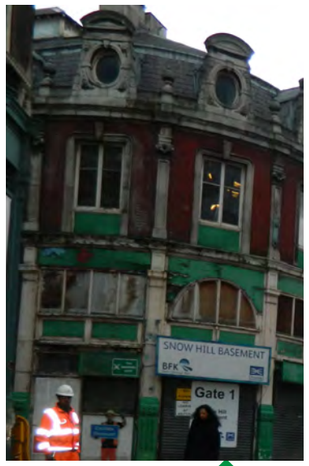
+ high energy efficiency
- high cost
- high risk of damaging the facade

OPTION 2 ✓

+ high energy efficiency
+ small risk of disruption
+ no visual change
- waste historic material
-

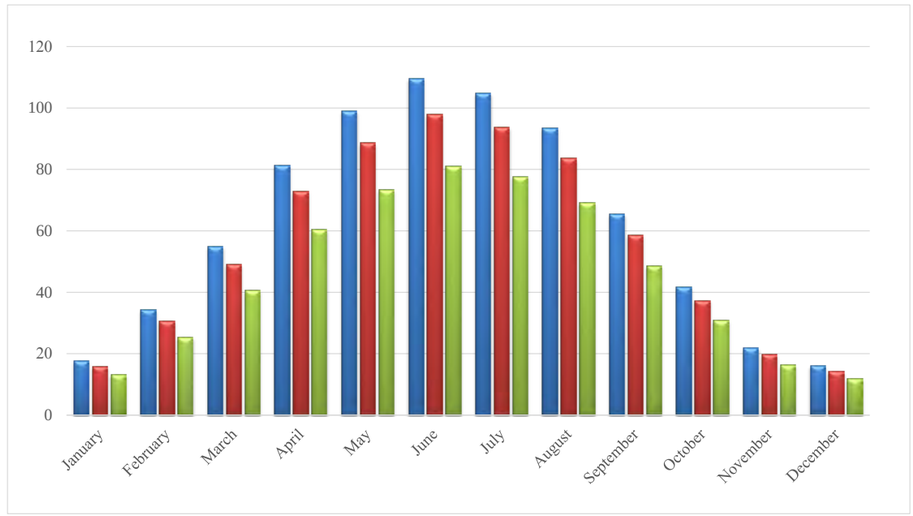
OPTION 3 ✗

+ low cost
+ better thermal performance than existing
- aesthetically unpleasant



OPTION 4 ✓

+ low cost
+ historic preservation
+ small risk of disruption
- low thermal performance



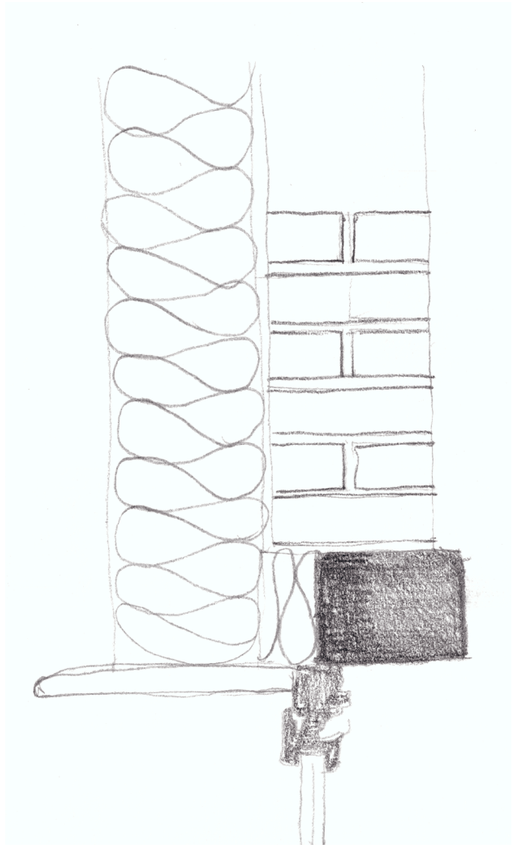
The above graph illustrates the difference in solar gains by a single window in the West facade of the market building.

It is thus evident that during winter months the difference between the two window types are less significant than during summer months and since various strategies against solar gains and ventilation have be previously mentioned it is reasonable to decide that the current window frames will be maintained and in cases where that is not feasible new sash windows that match the existing will be implemented.

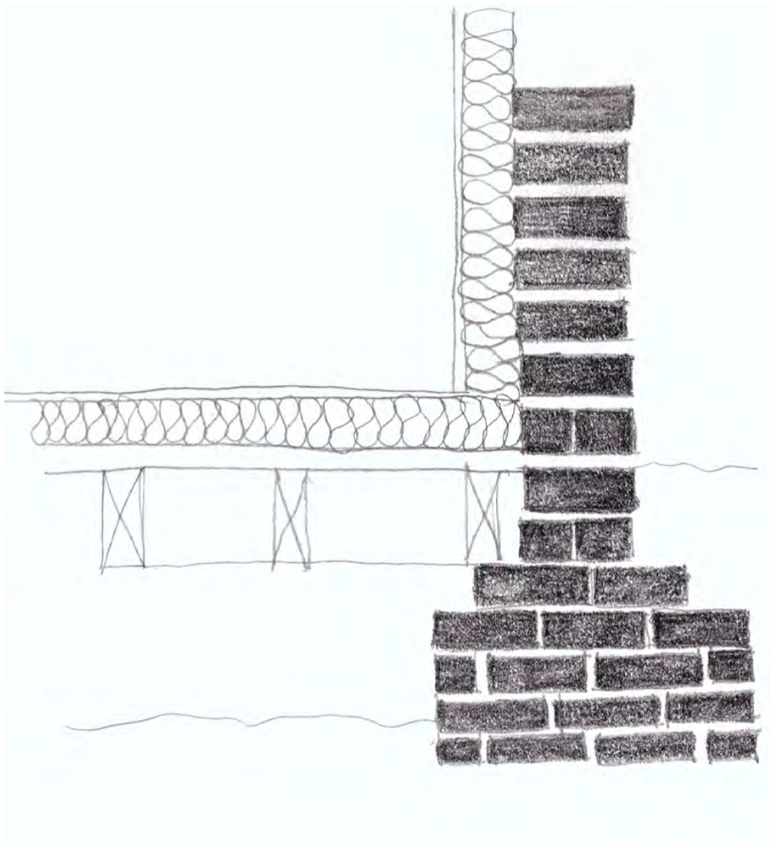
Sources:
OPTION 1: http://www.riverdalenetzero.ca/PHOTOS/WINDOWS/
OPTION 2: http://www.idostuff.co.uk/sections/DIY/Sash%20Windows/Sash%20History%209.html
OPTION 3: http://www.superhomes.org.uk/resources/secondary-glazing-for-windows/

DETAIL DRAWINGS

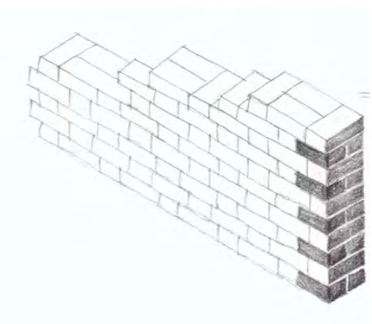
Roof Detail Insulated



Window section detail Insulated



Existing masonry wall / floor Insulated



Existing masonry wall

03 STRUCTURE

“ There is a huge amount of waste generated by the construction and demolition of buildings. Something like 24% of all waste is generated by demolition and construction. It is simply better in sustainability terms to reuse and recycle old buildings than to demolish them and building new ones. “

The Role of Historic Buildings in Urban Regeneration, ODPM

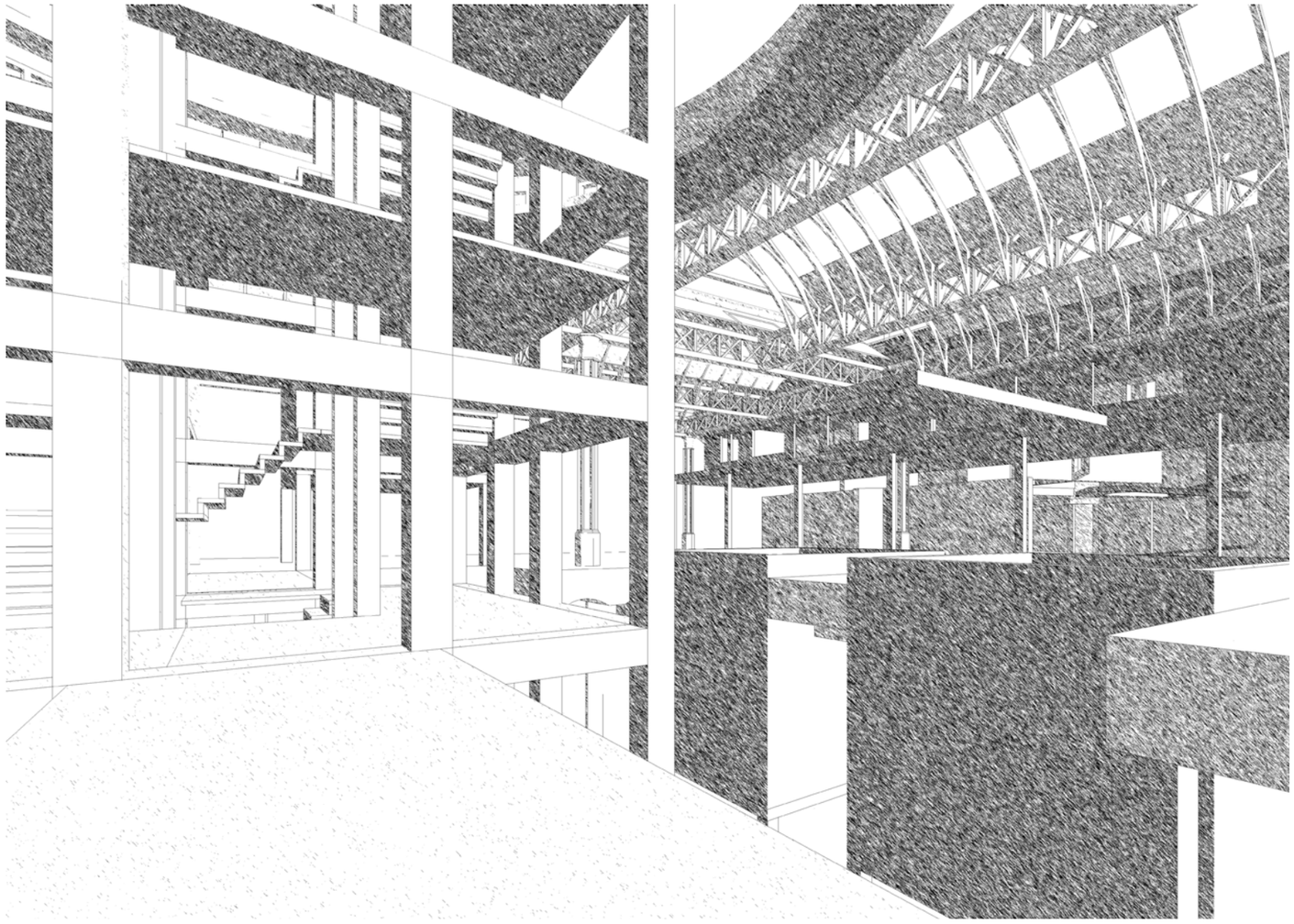
Introduction to Structure

As it has been previously stated in this report, this project is developed inside an existing Victorian structure thus the preservation of the existing fabric is one of the key drivers of the design. It is important to understand the existing structure with the opportunities or limitations that it may entail in order to make valid decisions about the new proposing structural elements. Moreover, it should be noted that most of the new structural elements have to do with the interior of the building therefore the structure should not be looked at only as a hidden “tool” to erect buildings rather as an exposed finish that creates the required environment for the occupants.

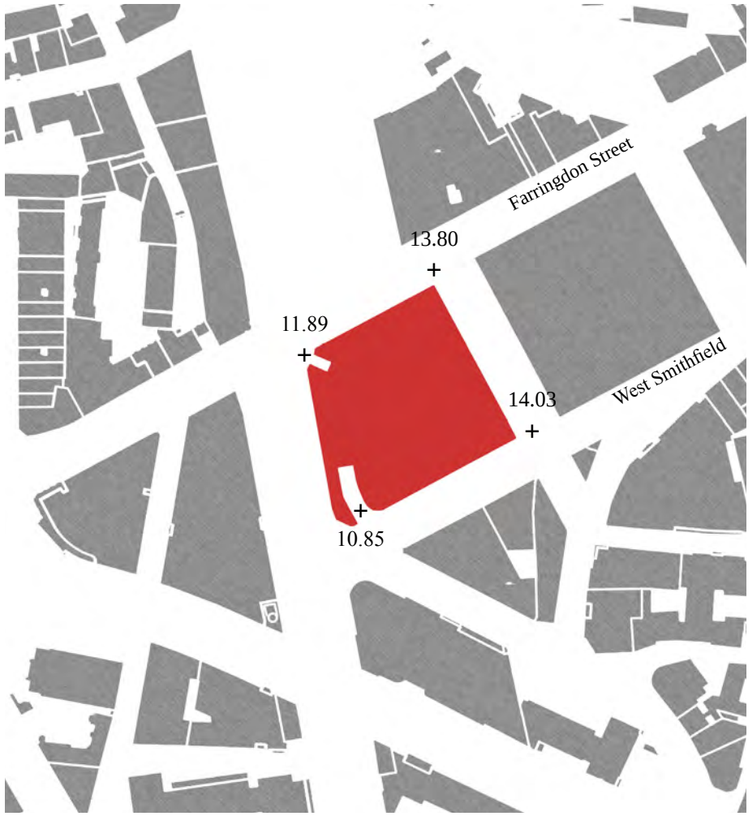
Briefly, in terms of the structure this project aims at:

1) retaining and repairing the existing fabric,
2) strengthening its weaknesses
3) proposing a sound structure the provides a uniform finish to the additional elements and serves the needs of the particular typology.

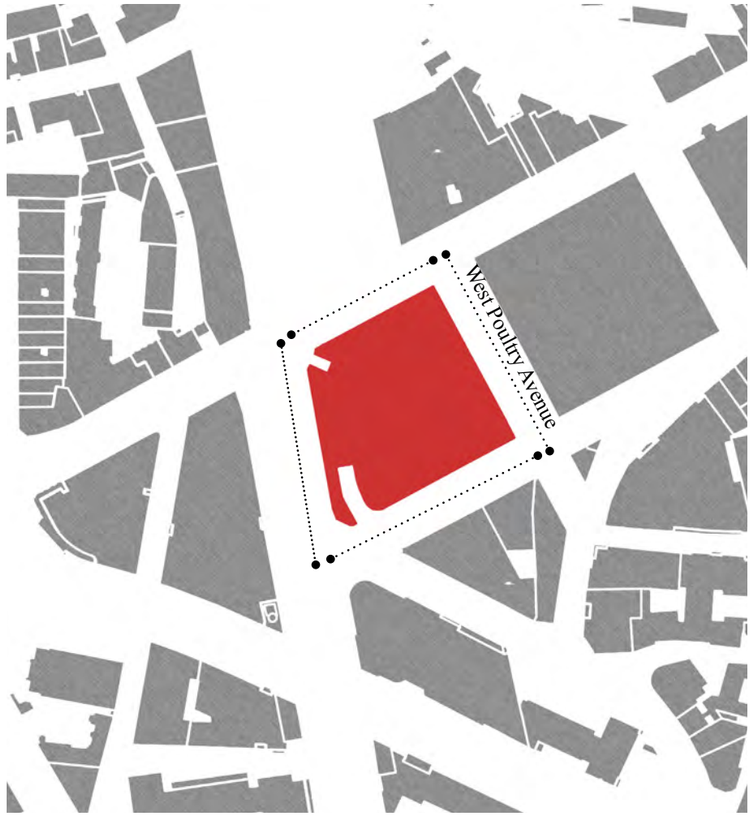
Evidently, this chapter is divided into two section, the alteration of the existing structure and the new structure.



3.1 SITE CONSIDARATIONS



The perimeter of the General Market steps down along the edge of the site in relation to a change in level toward Farringdon Street. The floor in the centre of the building is set out on a continuous level relating to the upper level of West Smithfield. Consequently the new structure will be along those lines.



It is also evident that the site is very easily accessible therefore loading and off loading of materials can happen without important implications to the surrounding area. Particularly through the West Poultry Avenue where the surrounding buildings are not used that people will not be significantly affected by noise.

The most important limitation of the site in terms of the proposing structure is the fact that underneath the building, in the basement level, pass train lines. As a result, careful consideration should be given to the location of the main primary structure. Lightweight structures should be a priority.

3.2 UNDERSTANDING EXISTING STRUCTURE

Slated Mansard Roof

Masonry wall structure - Flemish bond

Lath and Plaster Ceilings

Masonry wall structure - Flemish bond

Masonry wall structure - Flemish bond

Timber roof trusses

Basement Arched walls

Concrete Dome

Masonry wall structure - Flemish bond

Cast iron Doric Columns

Masonry wall structure - Flemish bond

Ground Floor

Basement Floor

Barrier Wall between building and train tunnels

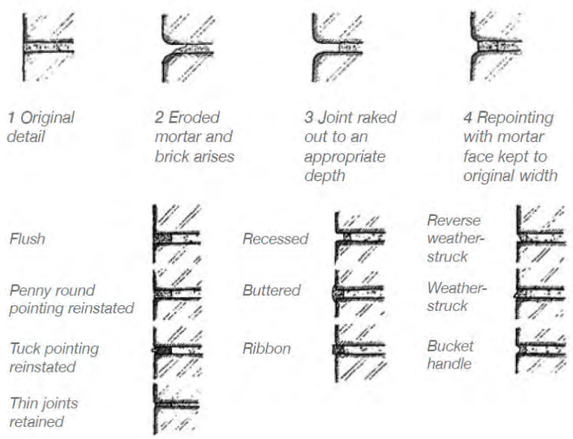
EXISTING STRUCTURE OPPORTUNITIES AND LIMITATIONS

In terms of the existing structure, the elements that are going to be retained and repaired are the existing perimeter, the basement, the roof structure as well as Horace Jones' cast iron phoenix columns.

PERIMETER STRUCTURE

The perimeter of the General Market is comprised of masonry frame with the use of deep red brick with Portland stone dressings, decorative dormer windows and classical detailing. Yet, slates are missing, much of the timber boarding of the roof is rotten, the lead flashings have been replaced with concrete as well lead cladding on dormers has been replaced with felt.

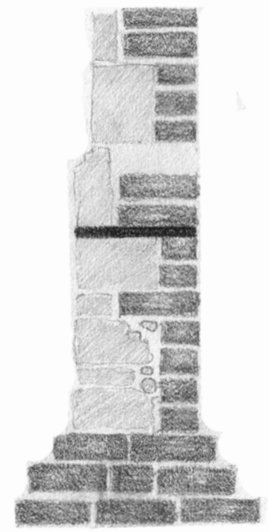
RETAIN



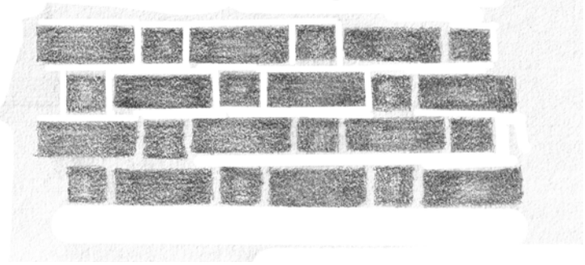
REPLACE

If it becomes necessary to replace bricks it should be conducted with great care in order not to damage existing bricks in good condition in the process. The minimum amount of work necessary must be undertaken to help preserve the integrity of the wall. The choice of repair method will depend on the ease that the damage bricks can be re-used, and thus on the bond type and the strength of the mortar.

Flemish Bond



This style has stretchers and headers alternating within each course.



CLEAN

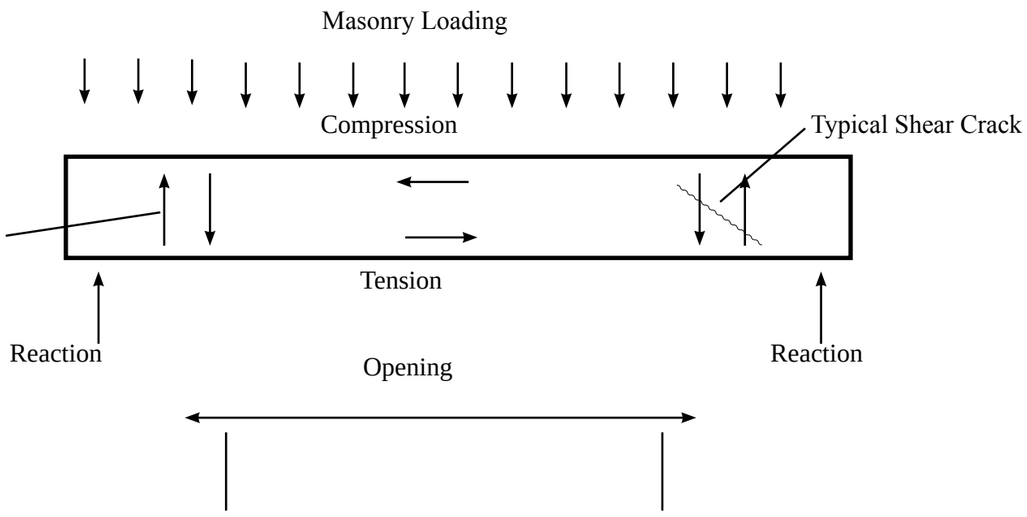
When considering cleaning historic brickwork it is important to be gentle. Over-abrasive forms of cleaning, such as sand blasting or high pressure water jets, can damage the valuable surface of the brick, leaving it open to further problems. This principle also applies to Chemical Cleaners, which are just too strong for old brickwork. Any Chemical applications are best undertaken by a specialist conservation contractor.

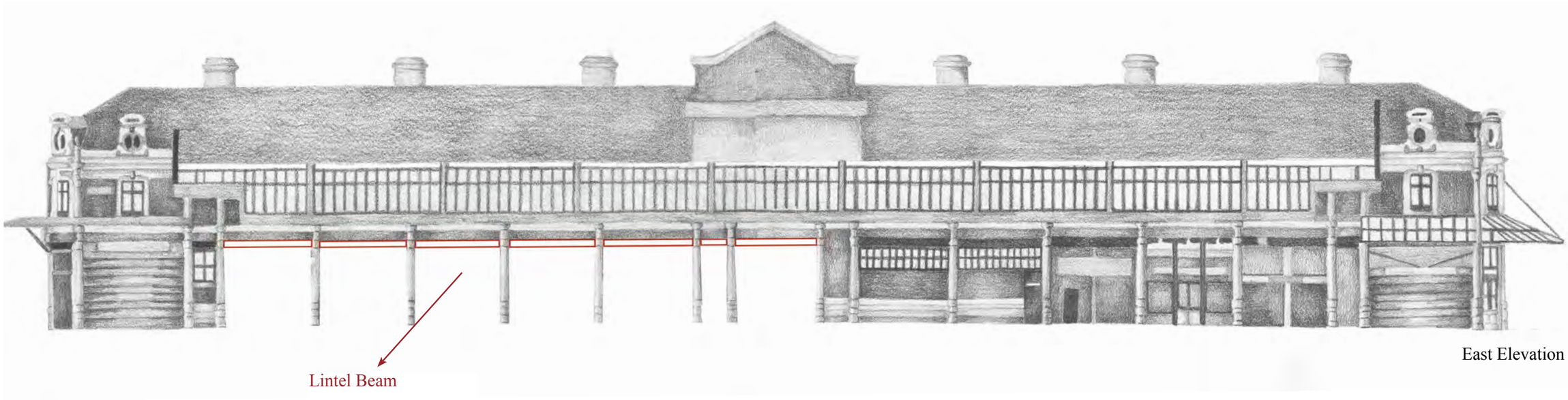
Throughout the perimeter in the north,west and south elevation the existing building has already openings for the retail units that I want to place in my design. However in the east facade most of the spaces have solid brick walls with Portland stone decorations therefore in order to create openings for the retail units careful treatments should be employed.

Since the proposed wall for the openings is a load bearing wall that supports the structures above it in order to provide an opening in it is necessary to transfer the weight of the load above this new opening to the sections of wall either side using a lintel beam.

The lintel on its own will take some of the weight therefore it is crucial that the proper size is chosen for the specific load requirements.

Lintels can be from a variety of materials like concrete, steel, stone therefore a decision will be made according to the existing facade and the desired window frame for those openings.

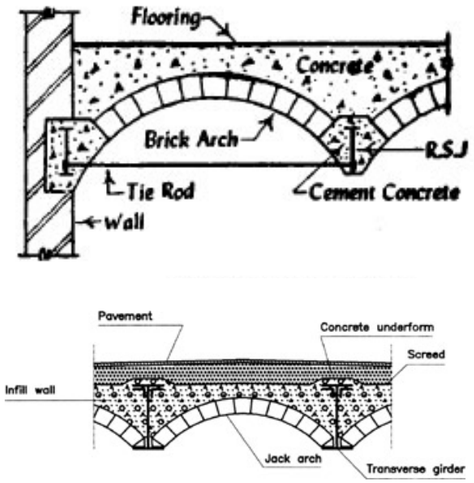




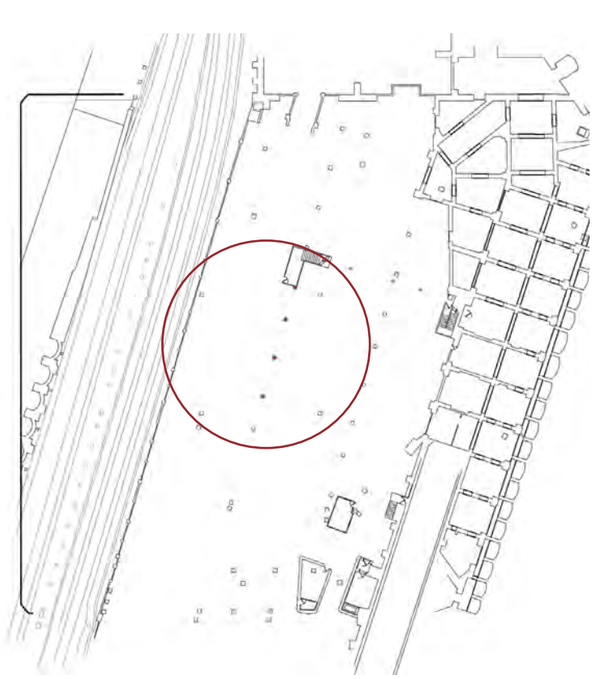
East Elevation

GROUND LEVEL FLOOR

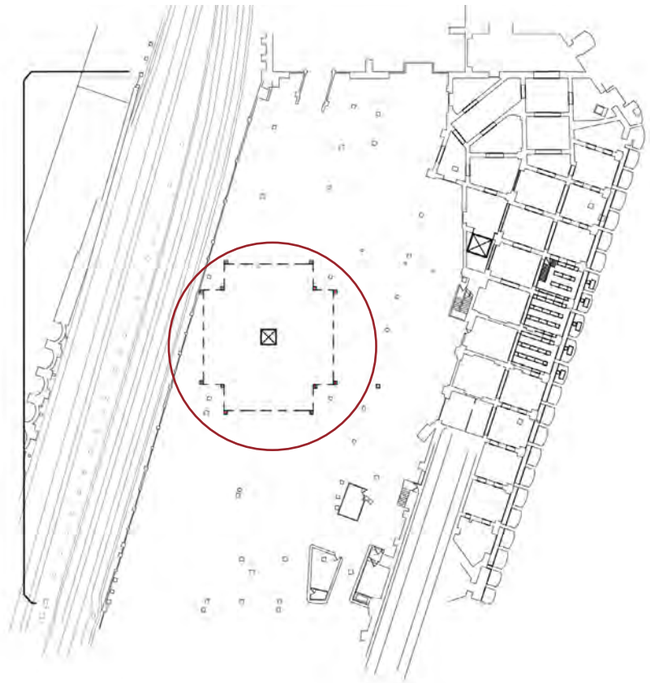
As it was shown in the initial axonometric drawing the main floor at the ground level is a concrete floor supported on masonry columns on the basement level. One of my design intentions is to create a void underneath the dome in the floor in order to enable light coming from the roof to penetrate in the core of the basement level. In order to do that in the existing floor we need to take into account the weight of the concrete per m^3 and thus the support it requires in order to replace the existing columns with new ones.
Generally, the number of columns is inversely proportional with the thickness of the columns. In order to serve the design intention which is to keep the core of the basement permeable it is preferable to use less and thicker columns at the edges of the void and to create a more directional path. Furthermore, by cutting the Jack arches underneath the concrete layer additional steel frame support through beams or reinforced concrete need to be added in order to maintain the floors structural strength.



Due to lack of access into the basement level of the site there the images above illustrate possible scenarios based on limited verbal information.



Before



After

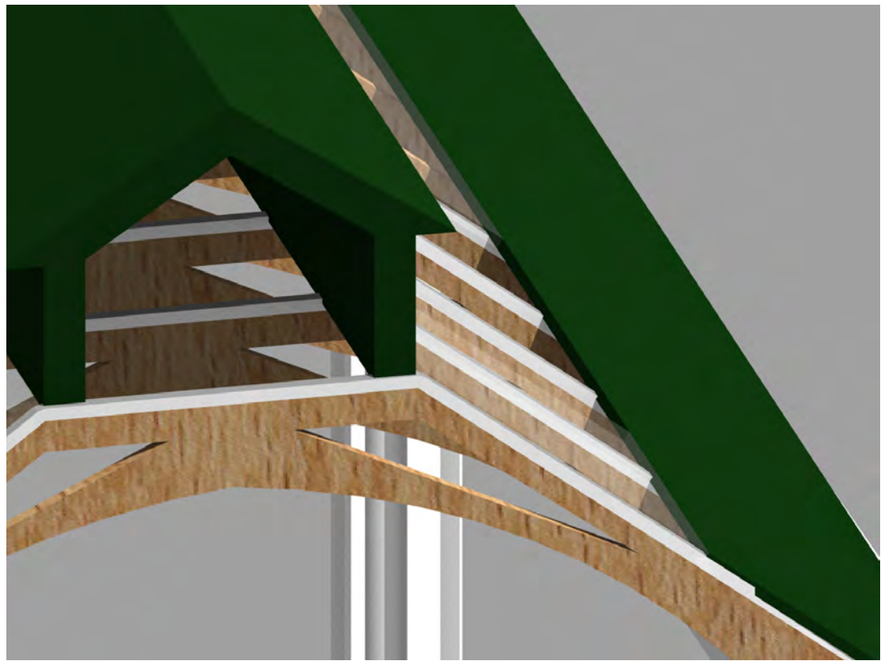
TIMBER FRAME VAULTED ROOF

Roof Current State

Design Intention

Similarly to the existing masonry wall, repairing and cleaning treatments will be performed to the existing roof structure. Missing slates or rotten boarding will be replaced in the perimeter. Temporary concrete flashings and cladding on dormer windows will be replaced by lead flashings and cladding, same as to the initial structure.

Moreover, in terms of the core of the roof, window opening will replace the existing material therefore steel reinforcement is required in order to hold the load of the window-window frame since the timber arched structure is old and it may have lost its strength.



3.3 NEW STRUCTURE

There are a variety of things that need to be considered while deciding the best option available for the structure of the buildings. The design seeks for a structure that takes into account both materiality, spanning strength (particularly for the core of the design) as well as though for sustainability, thermal properties since the existing structure is lacking insulation and acoustic performances due to the nature of the spaces (debating chambers).

MATERIAL ANALYSIS

01. STEEL

Most steel constructions use mild steel.

Advantages

+ Immensely Strong
+ Flexibility: it bends without cracking
+ Ductility
+ Fast construction process on site using a wide range of ready made structural sections such as I,C and angle sections.
+ Wide range of joining methods such as bolting, welding and riveting
+ Best spanning potential
+ 100% recyclable material

Disadvantages

- Corrosion
- No fire protection (requires various methods such as spray on in order to be protected.)
- Heavyweight building material
- High Cost

02. REINFORCED CONCRETE FRAME

Advantages

+ Strong
+ Low Cost
+ High strength in compression
+ Can be used as finish material
+ Reused

Disadvantages

- Low strength in tension requires reinforcement
- Not sustainable, high emissions of CO_2 emmisions
- Weaker than steel

03. TIMBER FRAME

Advantages

+ Lightweight
+ Fast construction
+ Adapts itself on any geometric shape
+ Economically feasible
+ Sustainable, renewable, lowest CO_2 footprint
+ Tensile Strength
+ Thermal Properties (resistance to high temperatures)
+ Good acoustics properties
+ Prefabricated members
+ No heavy tools or equipment required in construction

Disadvantages

- Low spanning strength
- No fire protection
- Risk of condensation

04. CROSS LAMINATED TIMBER

Advantages

+ Lightweight (15-2 time the strength to weight ration of steel)
+ Fast construction
+ Prefabricated components
+ Sustainable, renewable, lowest CO_2 footprint
+ Good Spanning strength
+ Thermal Properties (resistance to high temperatures)
+ Great acoustics properties
+ Strong Aesthetic value, it can be used as internal finish, comfortable environments

Disadvantages

- High Cost
- No fire protection unless treated

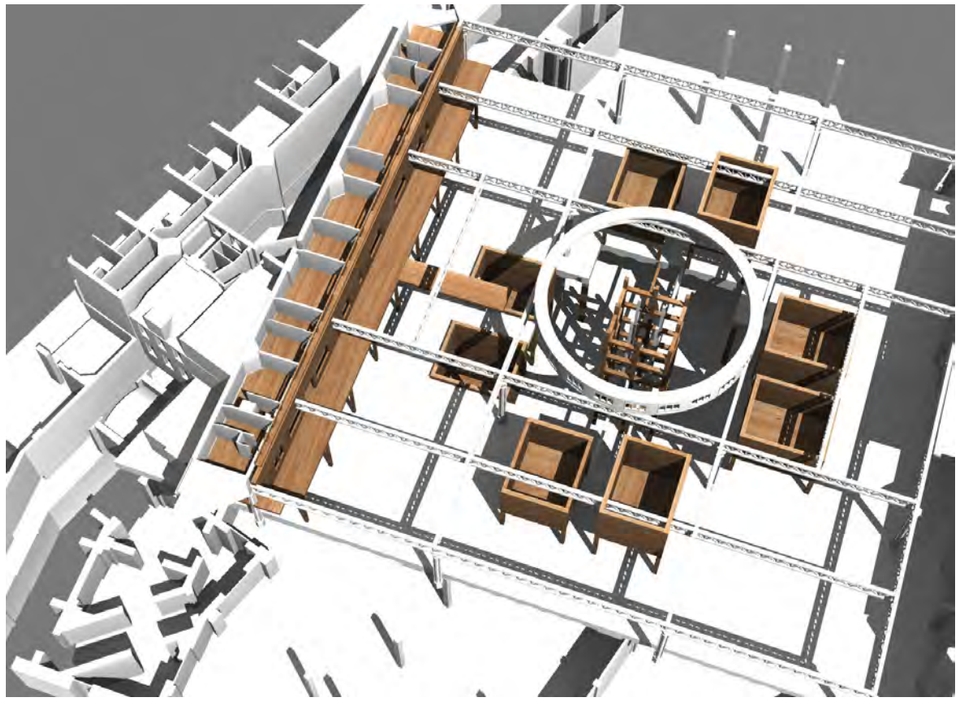
Based on the previous exploration of the properties of the different structural materials it is evident that a combination of Timber and Cross Laminated Timber Frame combines most if not all the characteristics that are essential in terms of the design intension. Perhaps an important issue that may arise is the big spanning platforms where still frame reinforcement may be used along with the CLT flooring in order to reduce the number of columns in the cantilever corridors. Examples of connections of this type of structure will be further explored. It is also important to note, that the CLT used as an internal finish will create a strong contrast with the existing masonry structure making distinct the difference between new and old. Furthermore, existing flooring in the upper levles of the perimeter structure which is in bad conditions will be replaced and by new similar to the new structure unifying the two parts.

Comprising Elements

Lamellas: a maximum length of 6m and a maximum section of 40x200mm.
Board: can reach up to 16m long.
Cross beam: 60mm wide and 80, 100, 140, 180, 200, 240 or 280mm deep.

Maximum length: 14,000mm.
Maximum width: 3,800mm.
Typical thicknesses: wall 60mm to 225mm, flooring 190 to 330mm.

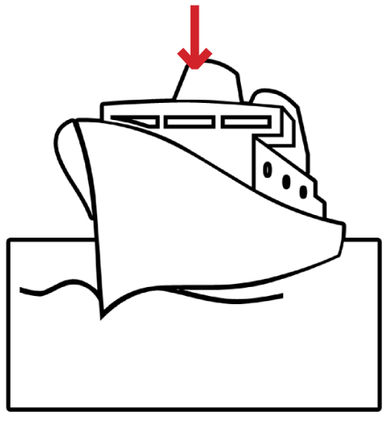
Internal Wall thickness: 65- 165 mm



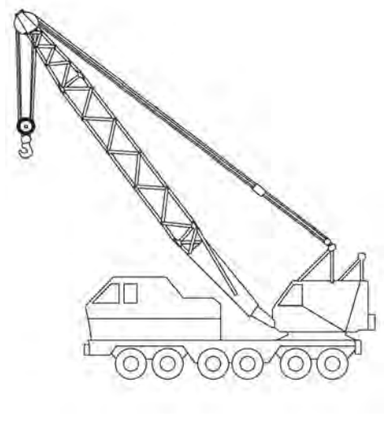
Aerial view of the interior structure

FABRICATION AND CONSTRUCTION PROCESS

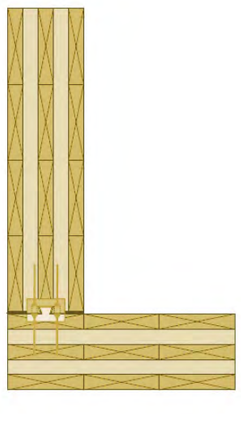
1. Selection and cutting of lamellas.
2. Panel fabrication: gluing and pressing.
3.CNC panel cutting and panel finishing.



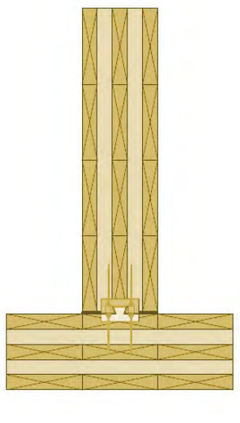
CLT components need to be imported for Europe (lack of manufacturers)

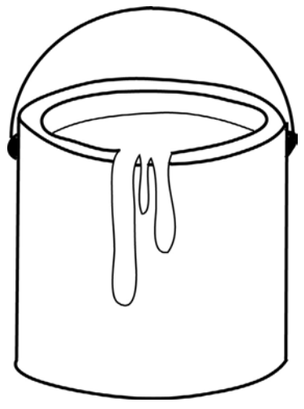


Components placed quickly with the use of cranes

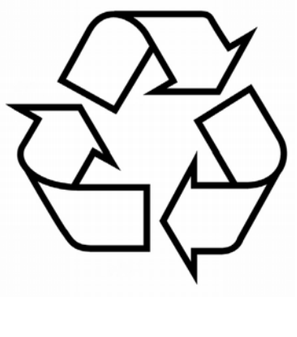


Components assembly

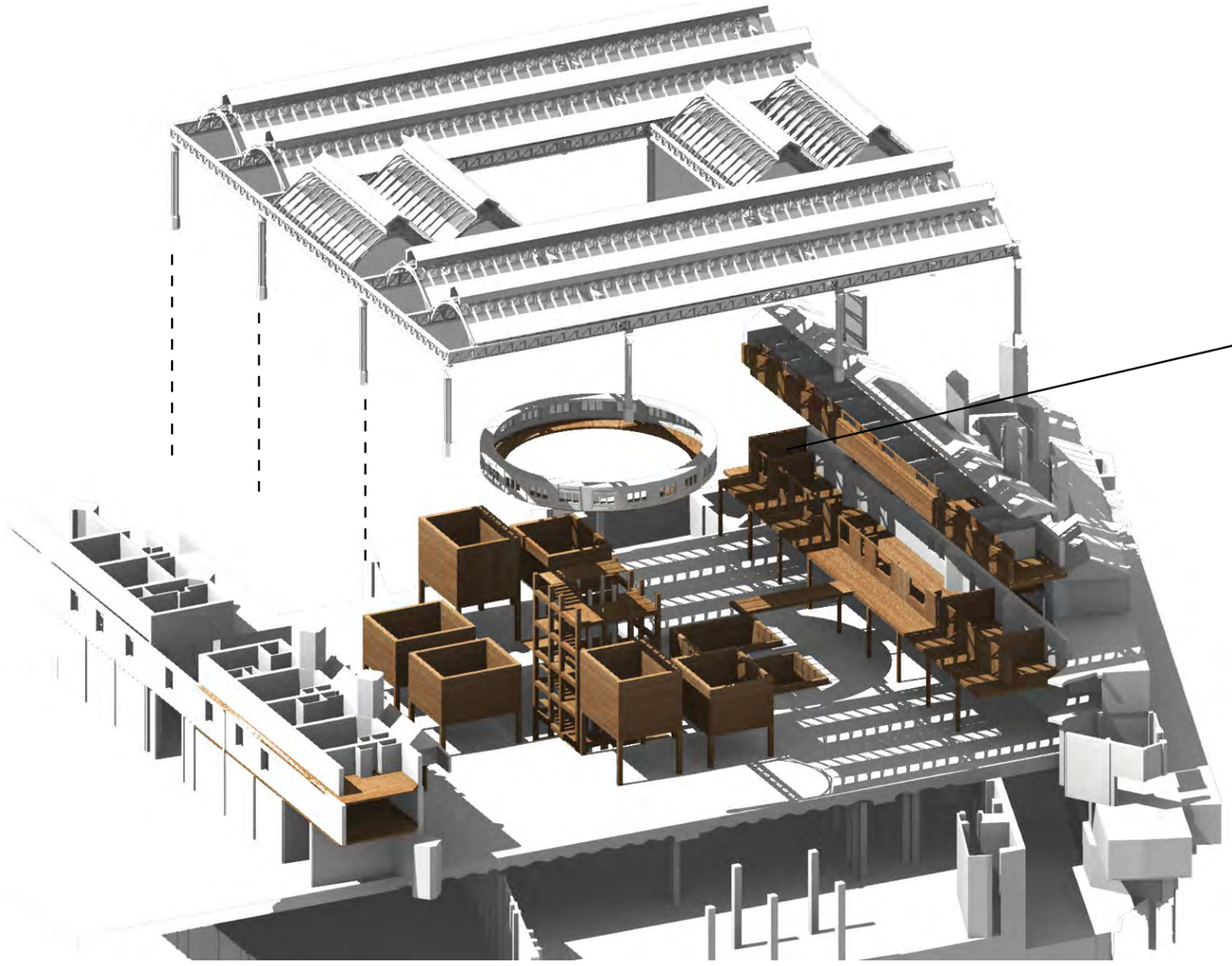


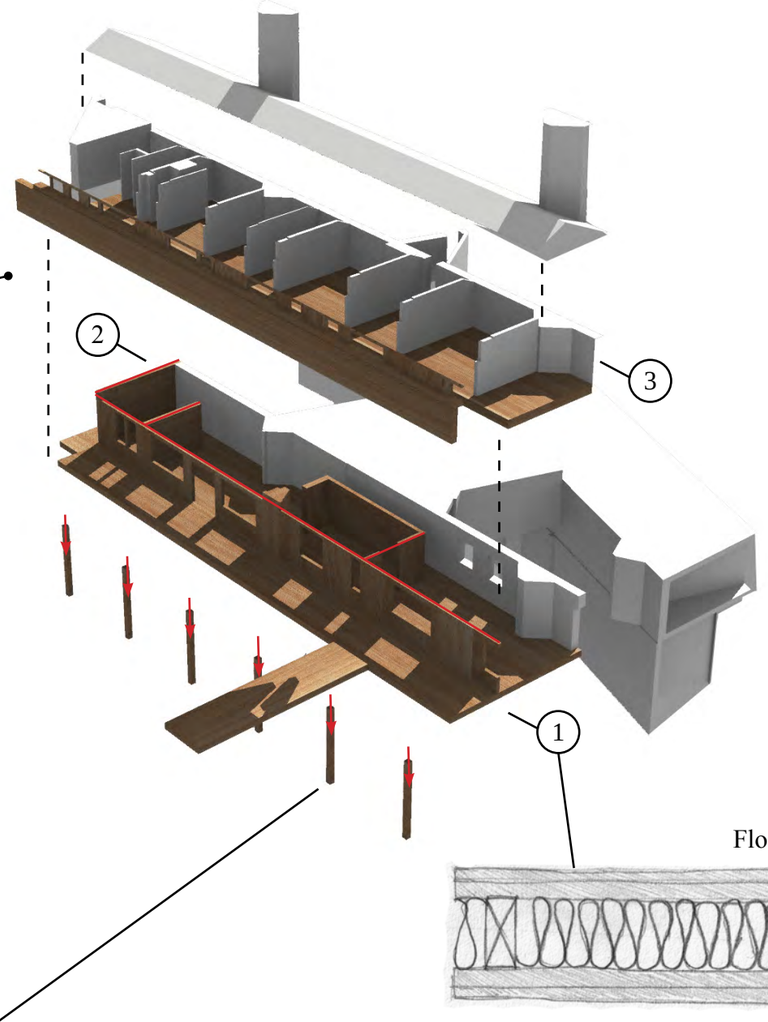


Apply finish material



Recycle & Reuse





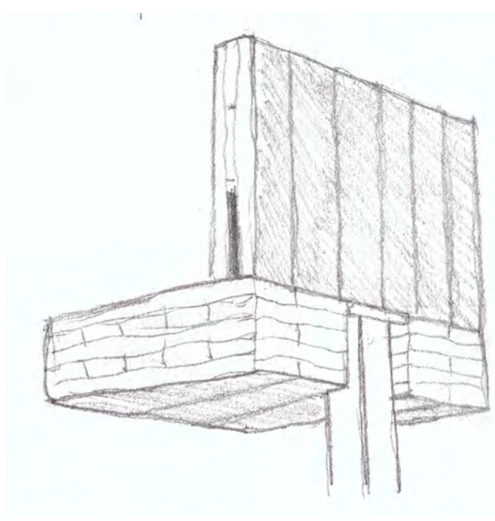
First and Second floor Exploded Axonometric

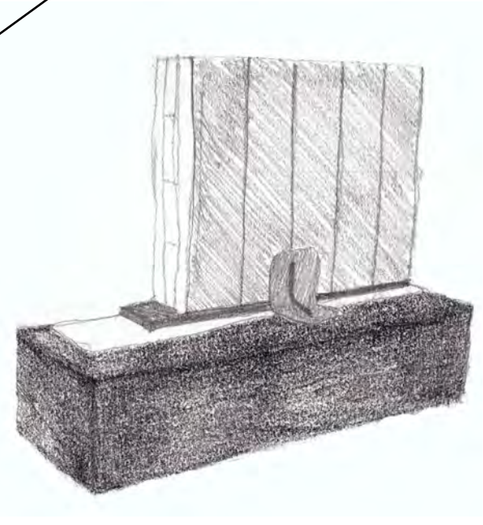
1. Given the previously stated maximum dimensions of CLT it is evident that several types of connection will be needed for the construction of both the vertical (walls) and horizontal elements of the buildings. Smaller components will be provided as solid pieces.

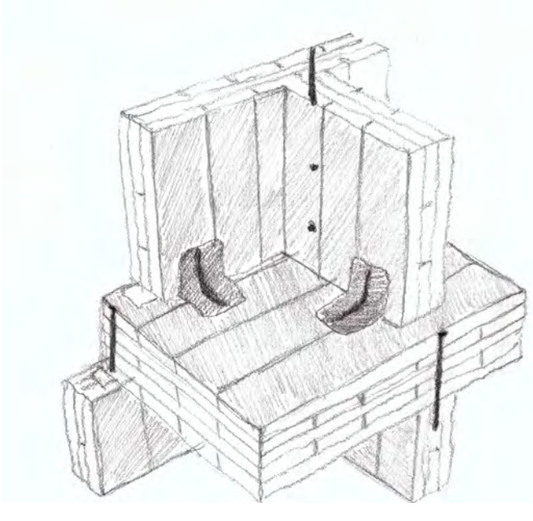
2. The red lines indicate walls that need to be thicker in order to cope with the load of second floor and roof. Additionally, columns need to be positioned below first floor in order to cope with the stress of the cantilever floor.

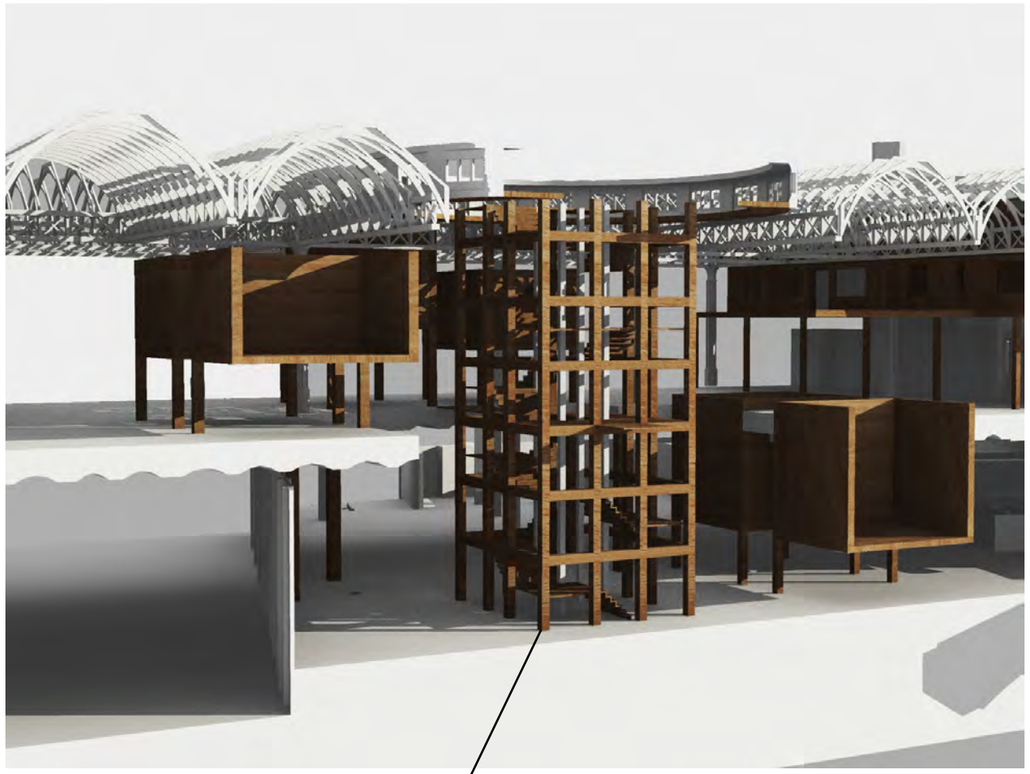
3. CLT is used internally and forms connections with the old Victorian masonry walls in many cases. As such, attention should be given in order to change the load distribution in those walls when placing new elements. This will thus influence then thickness of those components as well.

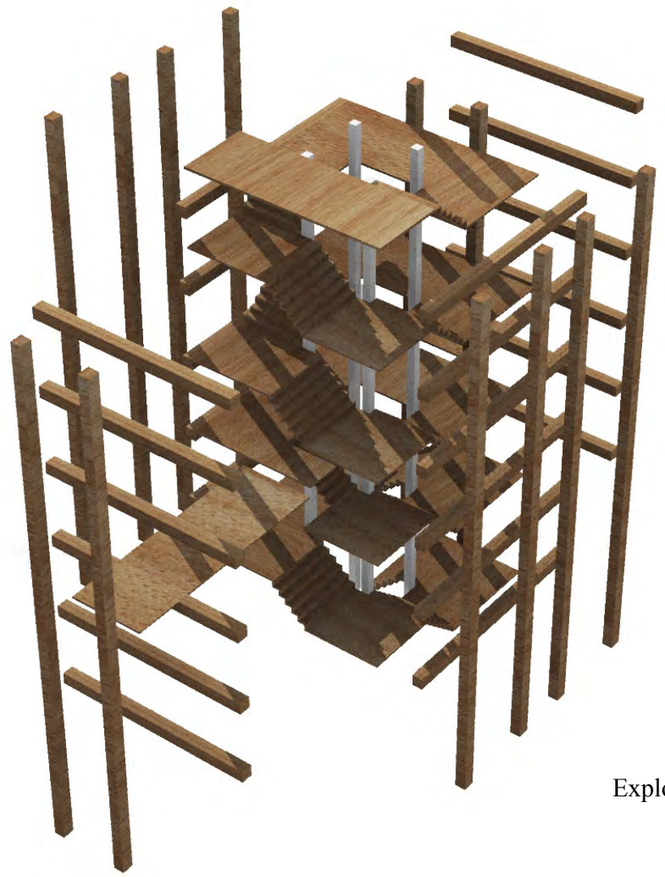
Wall/ Floor/ Column Connection detail





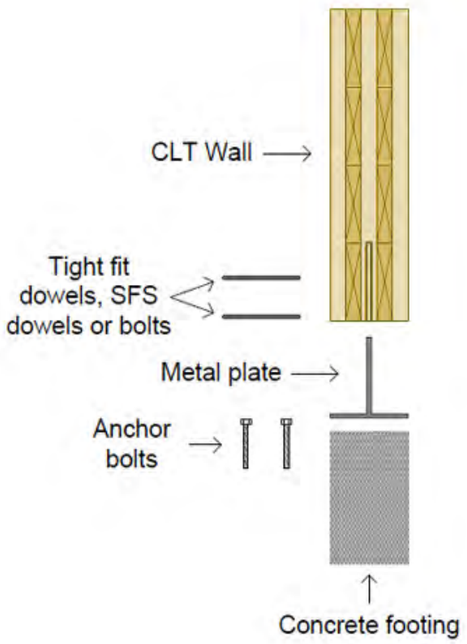


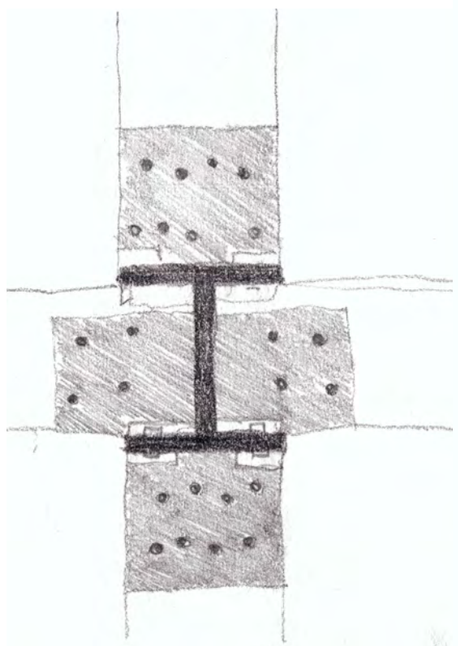


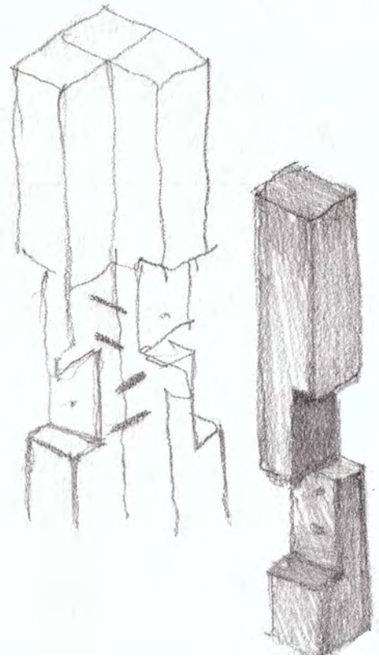


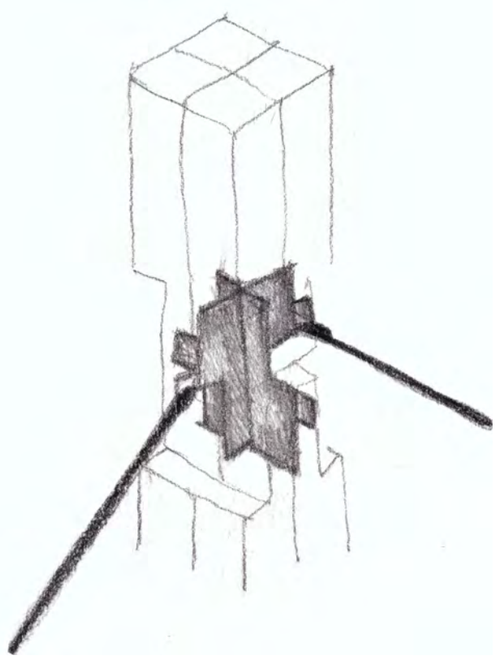
Exploded construction of tower

Collumns and Beams assembly

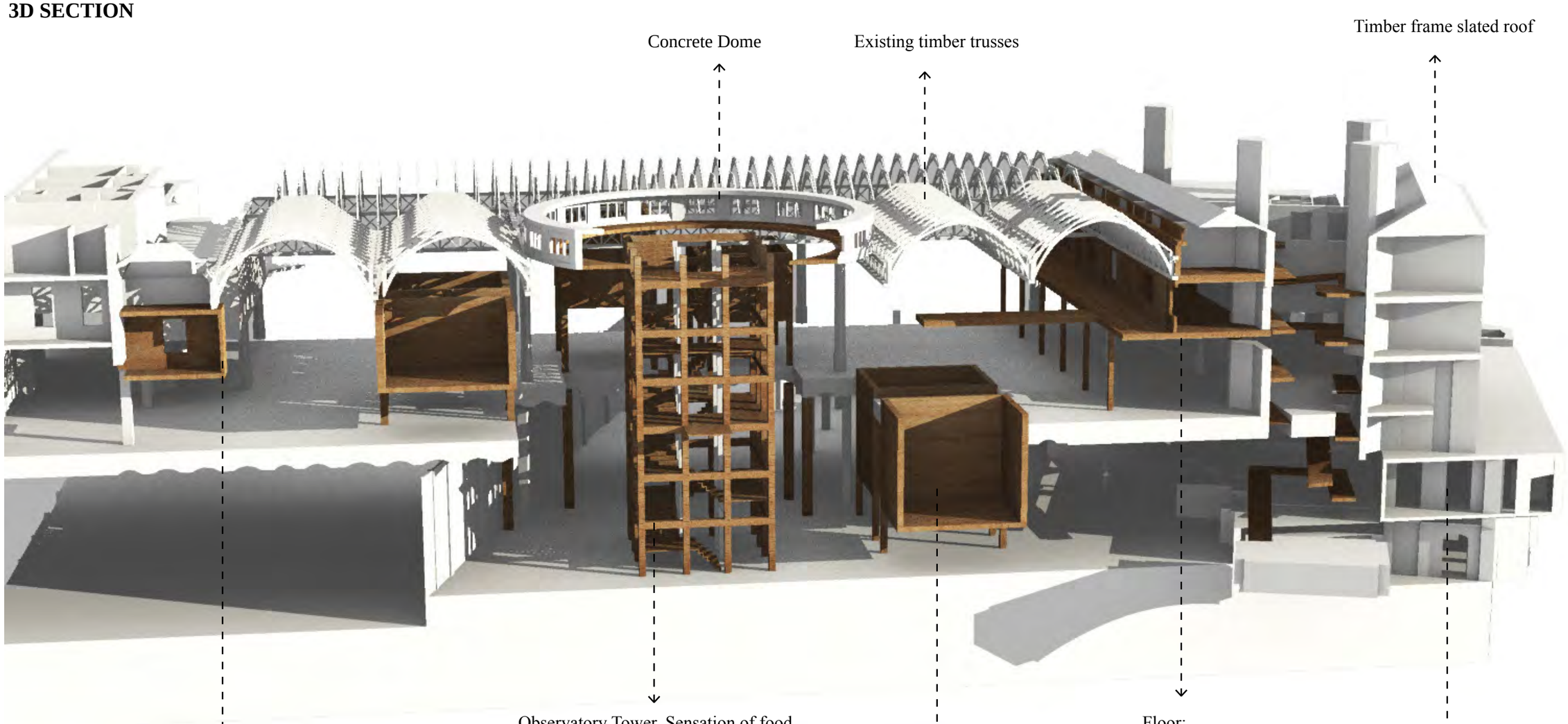








3D SECTION


Concrete Dome
Existing timber trusses
Timber frame slated roof
Wall:
160 mm lamella
Observatory Tower, Sensation of food
Timber beams/ columns 320 x 360 mm
Dining Chambers. CLT structure
(Further explored and developed in Chapter 5)
Floor:
2.5 mm linoleum render
20 x 140 mm. lamella
30 x140 mm. lamella
Insulation 140 mm. wood fi-
bre including beams
60 x 140 mm. beam
20 x 140 mm. lamella
30 x140 mm. lamella
Existing External Masonry Structure

Nest We Grow / College of Environmental Design UC Berkeley + Kengo Kuma & Associates

Regal Homes, London’s Skyline, Hawkins Brown

Regal Homes constitutes the tallest construction using CLT frame.

04 **FACADE & ASSEMBLAGE**

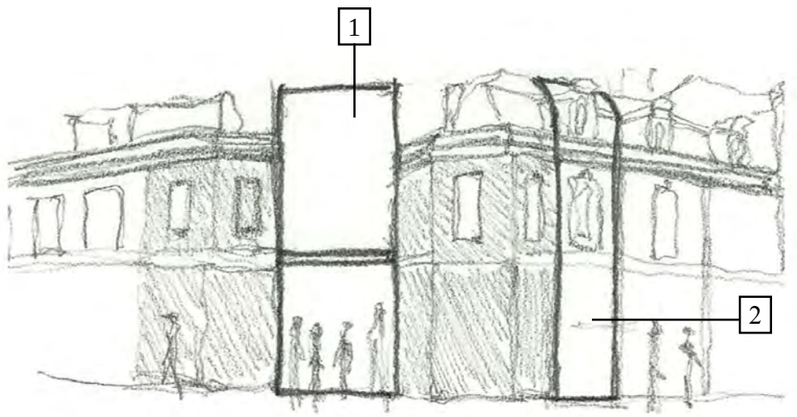
Given the typology of the building (Ministry/Governmental department) the way that people/occupants enter is crucial. It also imposes security requirements that need to be undertaken but based on the philosophy and democratic attitude of the project is pushed at the edges, creating an indirect route towards the main space both for visitors as well as workers. Consequently, the current entrance becomes a threshold which aims at giving people an initial interaction with the interior space but does not allow direct access. It needs therefore to be transparent and have the form of a screen and not of a solid wall.

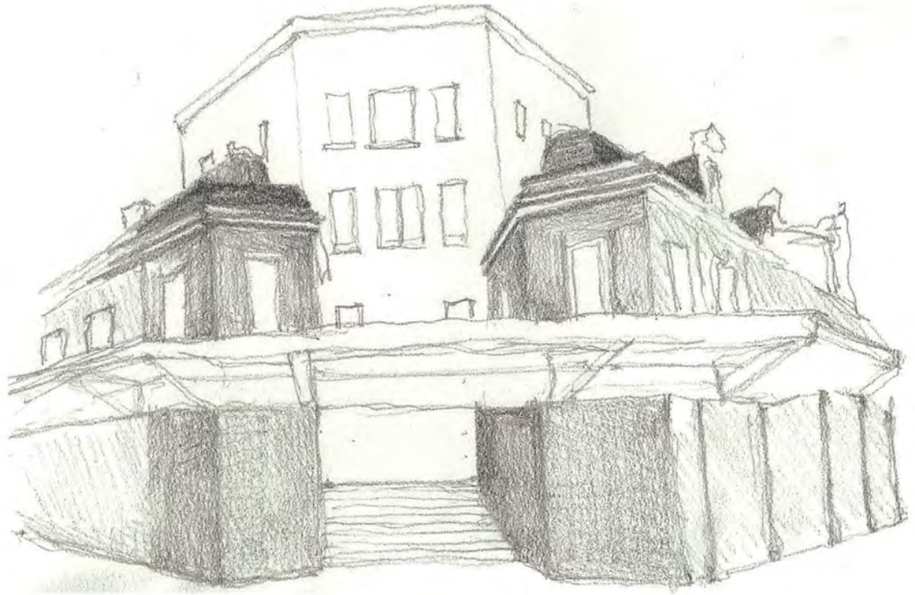
At this point therefore, it poses the question of how you alter the existing, historical facades with such an element that is determined by the design intention and thus the redefined use of the building without compromising the appeal, the aesthetic qualities and the feeling that old fabric generates to the area.

Elements to be removed

Part of the design of the new facade includes the removal of the main Tower as well as the canopy and the brick wall between the flanking ashlar stone elements and the main flemish bond Victorian brick facade.

Location of Screen Facade

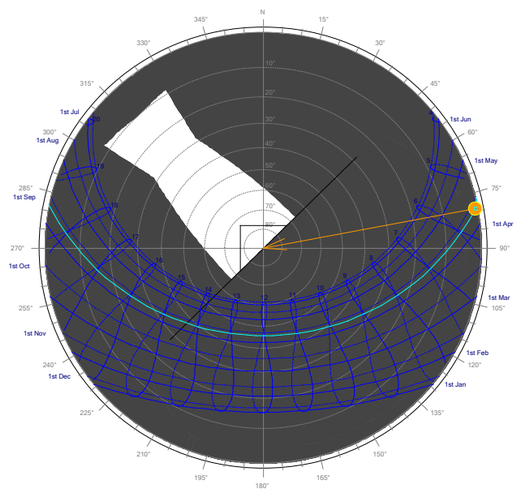




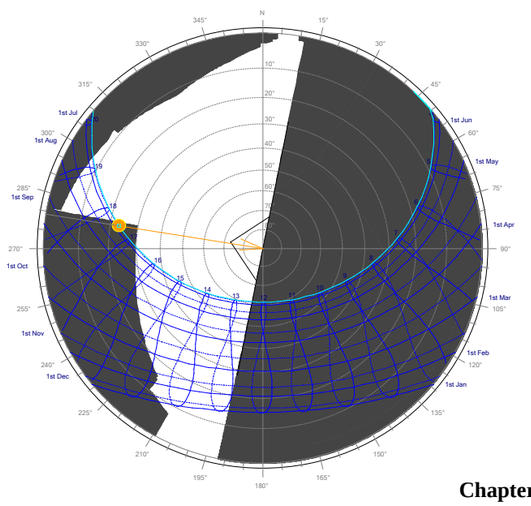
North West Facade - Hart's Corner

During the second world, this part of the building was hit by a bomb and as a result this new complex of the three ashlar stone elements where put in place making a critical distinction between the old and new by that time. As a result my alteration of the facade will aim at reflecting that change throughout the history and bringing the balance between those different elements.

Part 1. Shadow Analysis



Part 2. Shadow Analysis



MATERIALS & DETAILS OF EXISTING FACADE

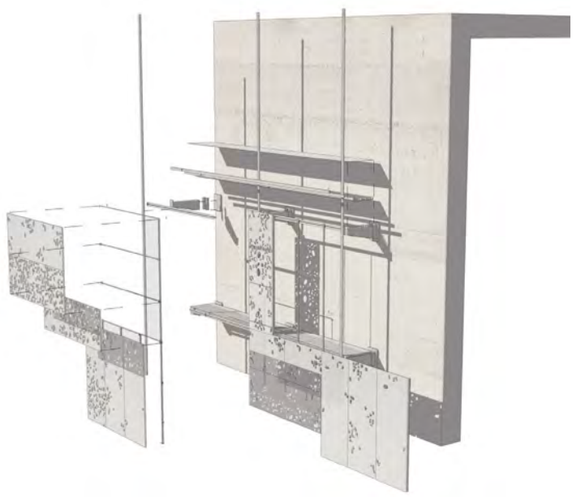
FILIGREE FACADE TYPES UNDER CONSIDERATION

1. Metal Cladding
2. Ultra High Performance Concrete Facade
3. Cor-ten steel Mesh
4. Robot Laid Bricks

Different cladding materials will be thus assessed in elevation in terms of the existing structure and their particular properties.

4.1 MATERIALITY

OPTION 1. CAST ALUMINIUM



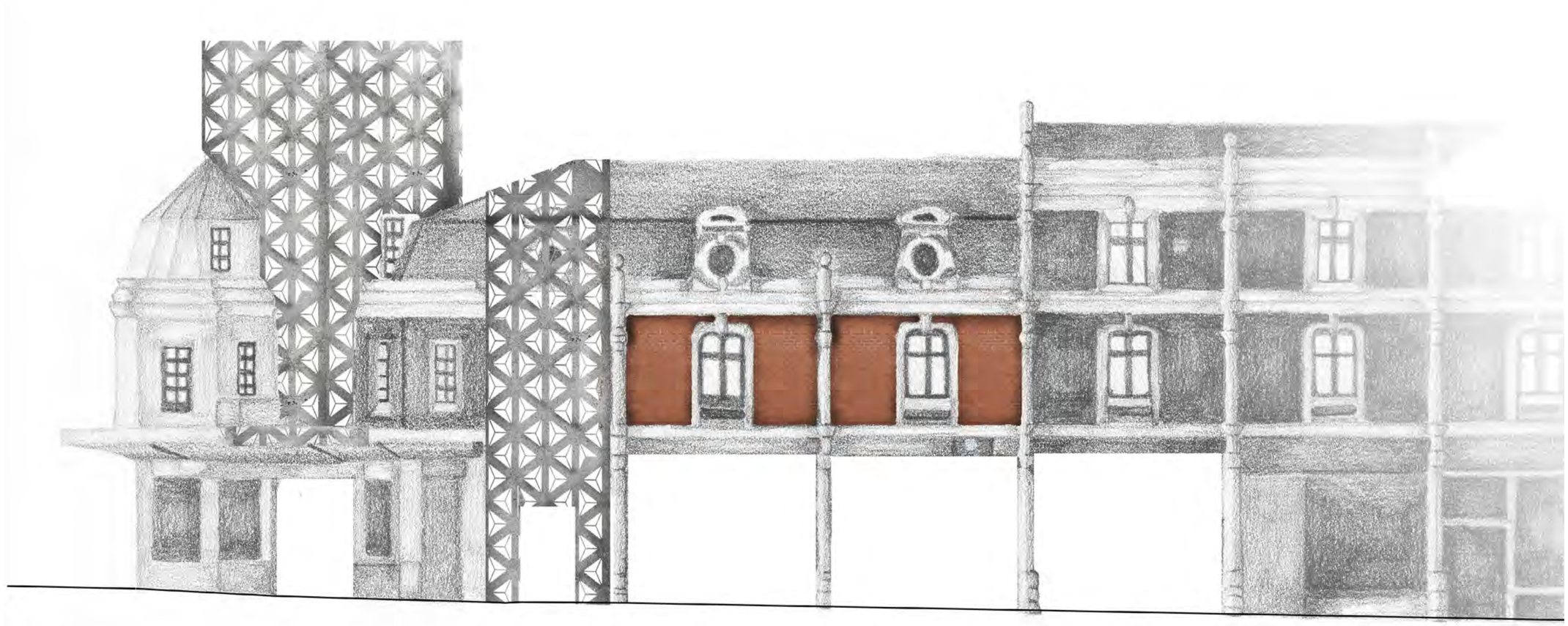
Facade Investigation Assessment - Field Trip, San Sebastian 2015

SAN TELMO MUSEUM - SAN SEBASTIAN

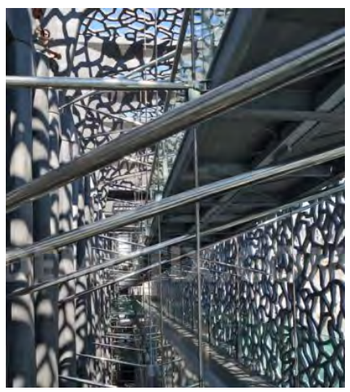
Properties

+ Light weight, strong, long lasting (wight 27g/cm^4)
+ Highly Corrosion Resistant (useful for protection & conservation)
+ Good reflective properties
+ Very ductile
+ Impermeable
+ Recyclable - up to 95% energy save from reprocessing
+ Rapid secure fastening
- Excellent heat and electricity conductor. Shifts due to change in temperature thus implications for fixing, sheets etc. and thermal loss during winter and excessive thermal gains during summer.
- Clean silver/white colour

OPTION 2. ULTRA HIGH PERFORMANCE CONCRETE



MUCEM - MARSEILLE



Properties

+Great strength
+Ductility
+ Durability
+ Design Flexibility can take various shapes
+ No corrosive
+ Speed of construction
+ Stability
+ Better thermal and acoustic properties
+ Recyclable
+ Interesting light and shadow patterns

- For long span requires bigger/stronger connections for support thus unsuitable for the street face part of the facade.
- Grey colour, texture very similar to the ashlar stone towers.

OPTION 3. COR-TEN STEEL

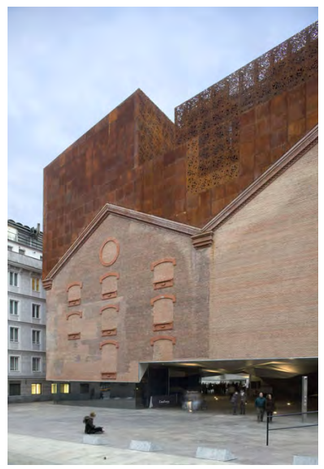
CAIXA FORUM - MADRID

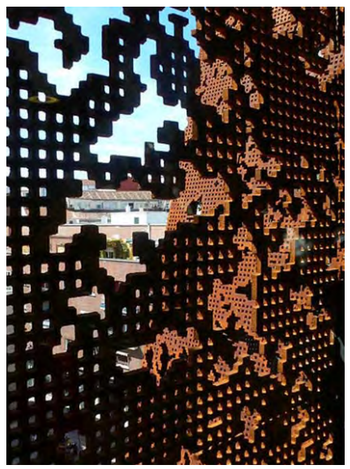
Properties

+ Oxidized and creates a dense/shallow passive barrier against further corrosion
+ Low maintenance costs
+ Does not stain other materials
+ No painting
+ Reddish Brown colour

Thickness (dependend on assembly method) 0.8 -3.0 mm
Length/Width: ± 2,0 m

+ Affordable
+ High strength
+ High elasticity
+ Visibility
+ Light and Shadow pattern





OPTION 4. ROBOT LAID BRICK

Properties

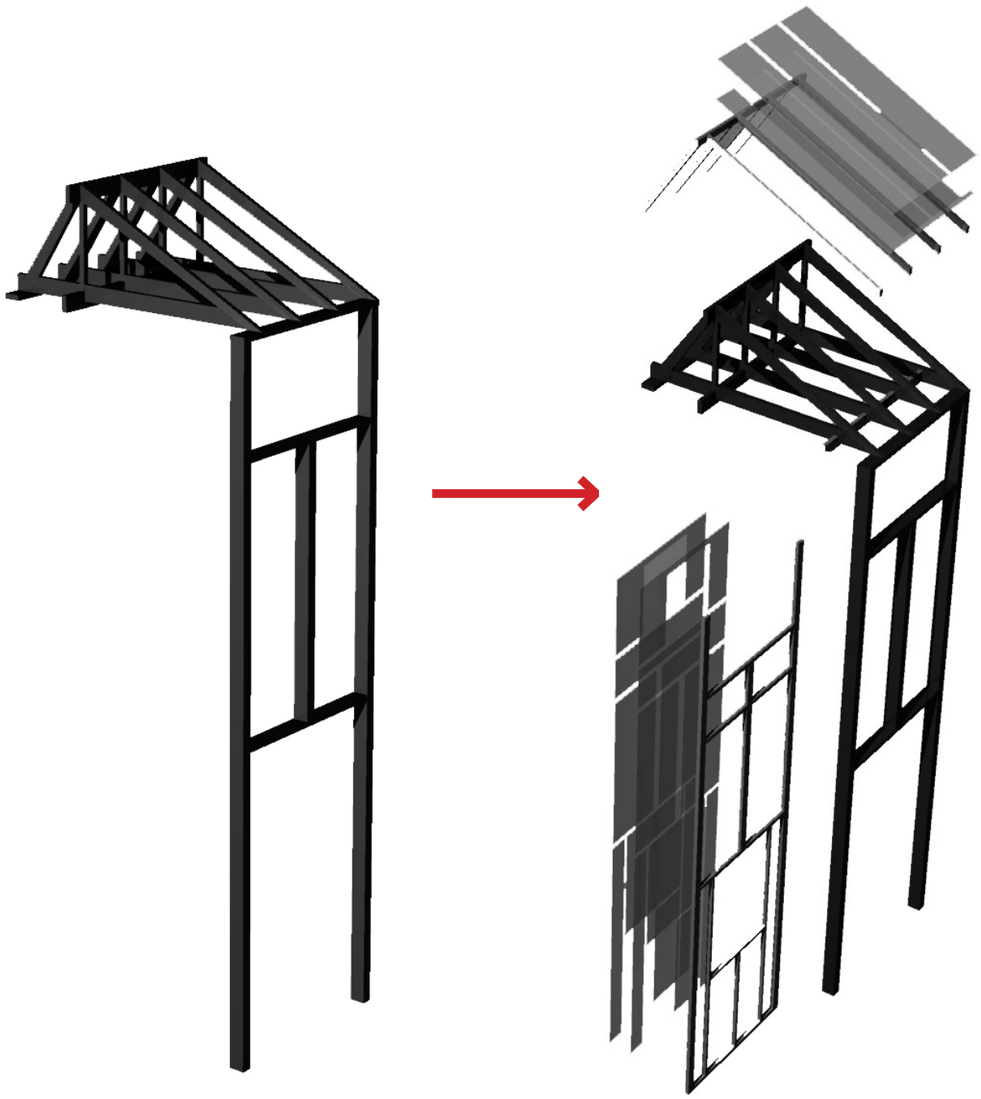
+ Better thermal insulating properties than the rest of the the materials
+ Waterproof
+ Fireproof
+ Acoustic Insulation
+ Fasilitates and Makes quicker the construction process
+ Recyclable
+ Sustainable
+ Regionally sourced
+ Textural
+ Various Colour

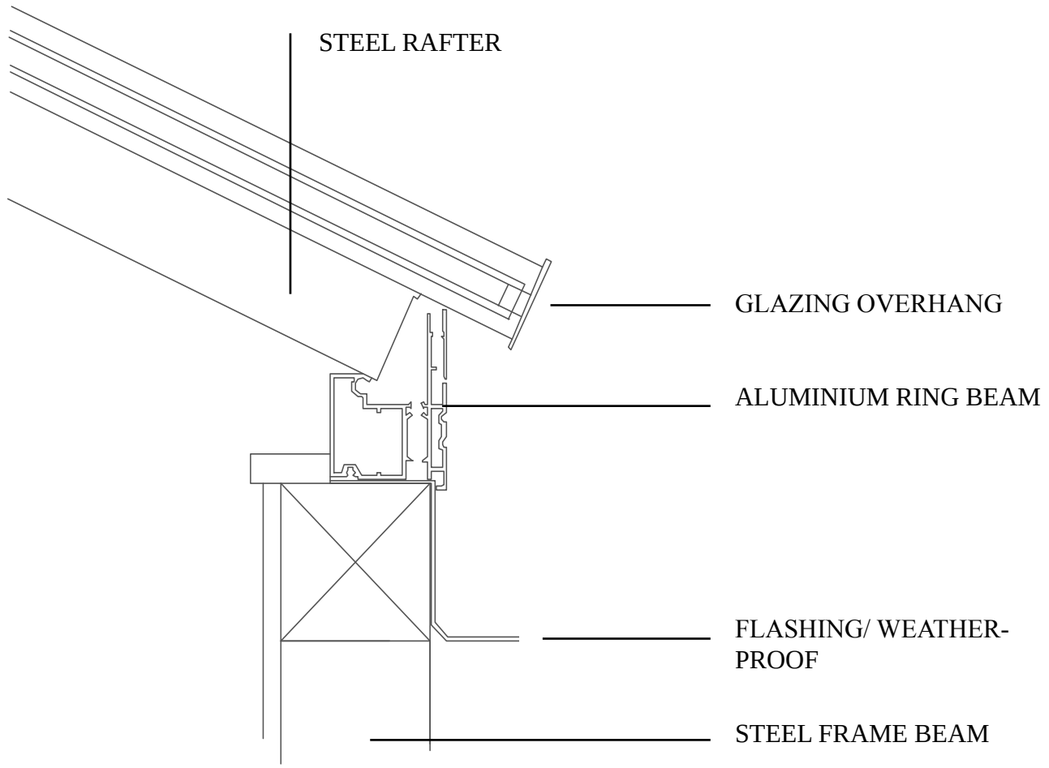
- However it needs to be treated very carefully in terms of shape and colour next to the old victorian brick and possible aesthetically the result is not the one required for such an element in the design.

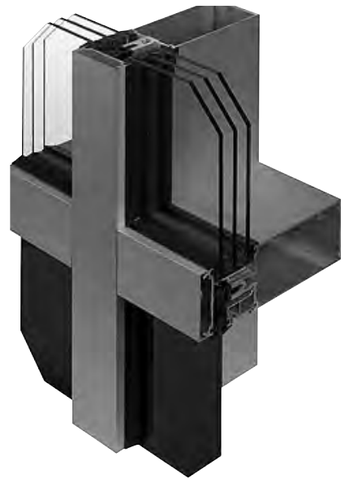
- It creates interesting and atmospheric patterns with light diffusion from the interior looking at the exterior however it does not serve the needs of the facade in a asence that it does not allow people to get glimpes towards the interior from outside. (entrance point)

Extension of Vineyard Estate Buildings in Fläsch by Bearth & Deplazes Architekten

STRUCTURAL ASSEMBLY







Steel frame will be used to replace the masonry structure of the existing facade. The primary steel columns will be UB 254 x 146 x 43 mm columns with a weight ration of 43 kg/m.

Then a triple glazed window frame will be fastened/bolted onto the steel frame both in the case of the wall and roof.

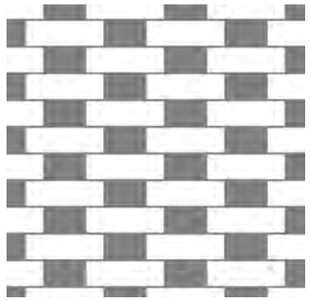
Apart from the exterior cladding the frame needs to be shaped that way that it will support the existing window in first floor and dormer window in second floor.

FACADE FORM

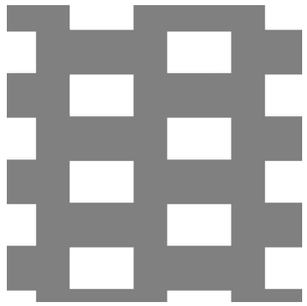
As it was stated in the beginning this facade system will expanded into two walls, the first one is a new wall created as part of the new structure while the second part constitutes an iteration of an existing wall therefore this entails greater limitations and thus it will be analysed in this Chapter. Yet, it is most likely that changes will be done to both of the as the design progresses towards a more final stage.

Based on the types of facades that were mentioned previously, I started looking at the possible patterns that my screen may take as well as reflecting on the geometry of the surrounding area. The two buildings opposite to General markets are typical office buildings with enormous height and minimum architectural significance therefore I thought of using the elements that already exist in the facade.

First of all, I decided to maintain the current window for the first and second floor with the stone detailing and remove the bricks. As a result the new facade will have to incorporate those elements and provide a structural framework.

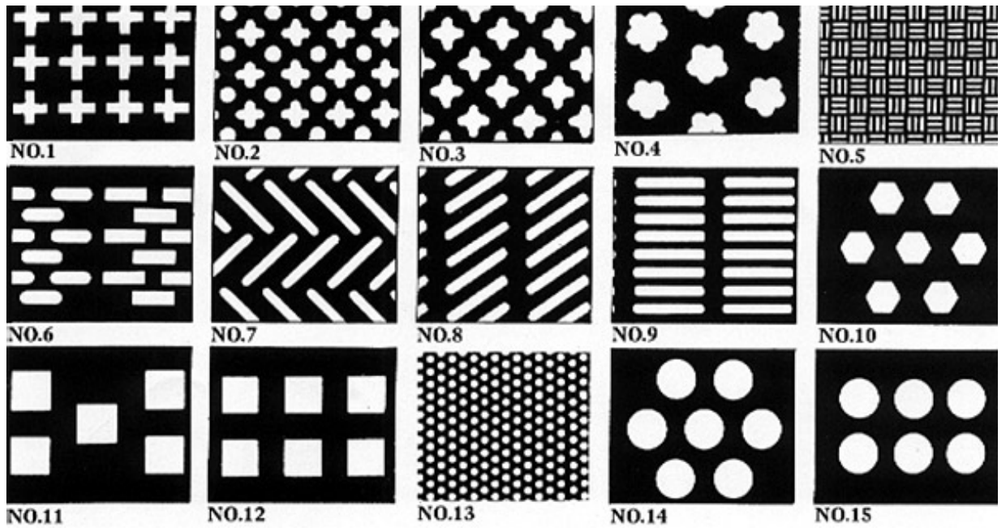


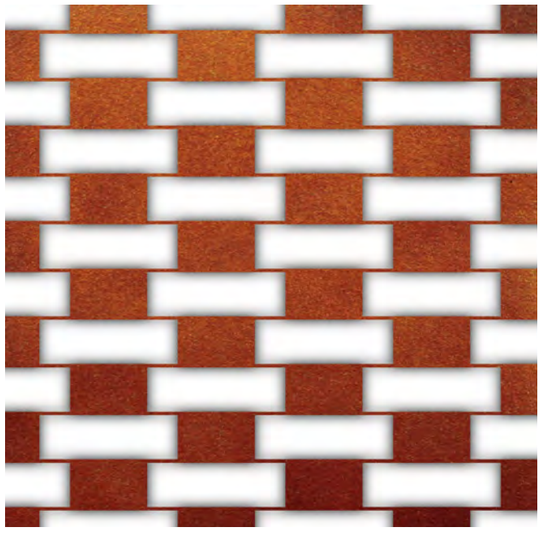
OPTION 1



OPTION 2

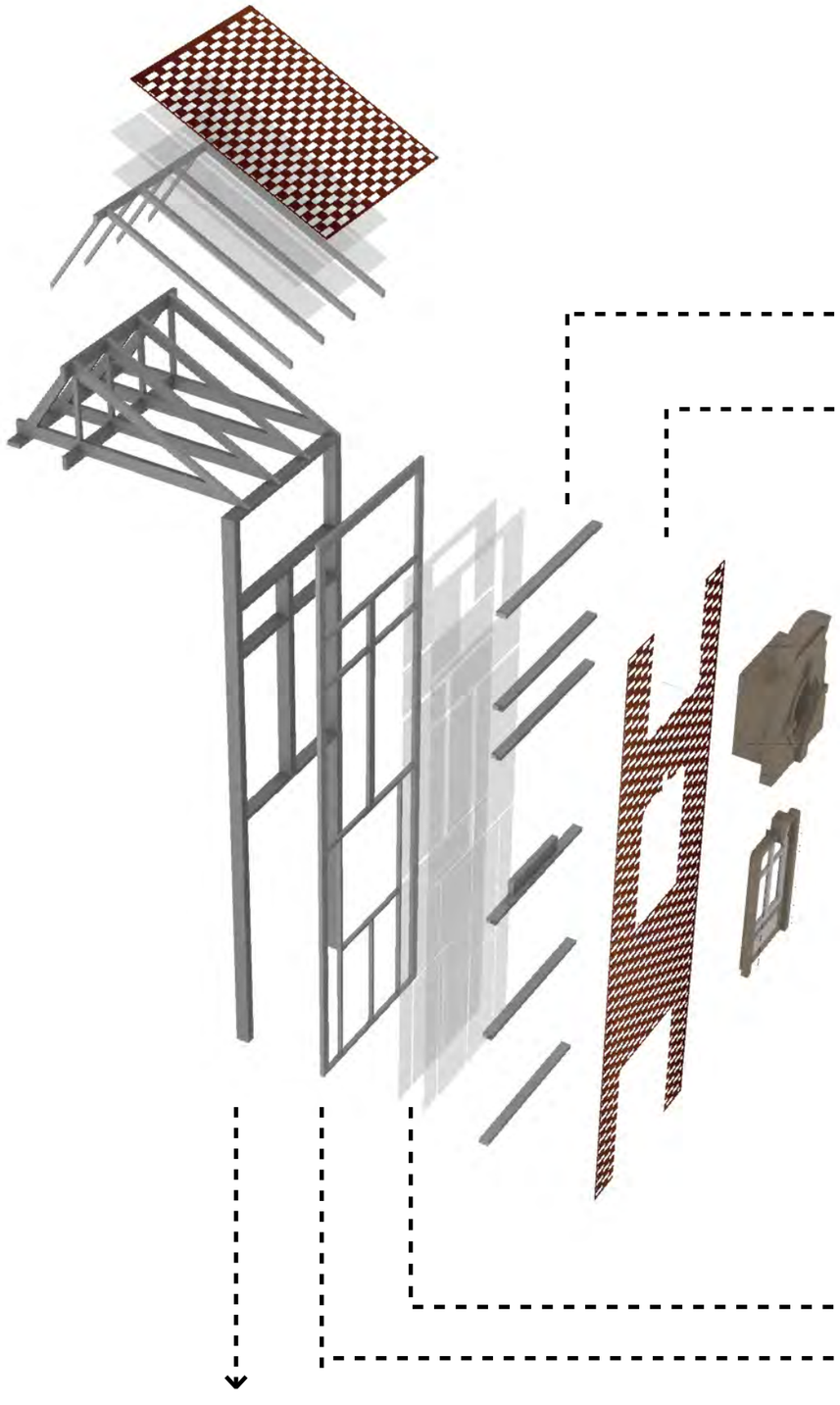
I started therefore looking at possible patterns that could be created using the Flemish bond style as well as the dimensions of the existing brick facade. Such a pattern would create immediately a connection with the rest of the building but in a more contemporary version. Additionally, this also came to define the materiality of that screen. UHPC and aluminium did no constitute an interesting version any more since concrete would compromise the light weight aspect of the facade and instead would create a solidity that would contrast the rest of the brick/stone facade of Smithfield market. In addition suddenly too many different hues of grey material would be incorporated in a very small surface area creating an aesthetically unpleasant result.





OPTION 1 USING WEATHERING STEEL

- Imitating the existing brick facade but at the same time separating itself
- Colour harmony with the rest of the materials (close to the red brick colour but not exactly the same)
- Visibility both from the inside and outside
- During the night where light comes from inside the building it would create a dynamic contract with the solidity of the rest of the facade.



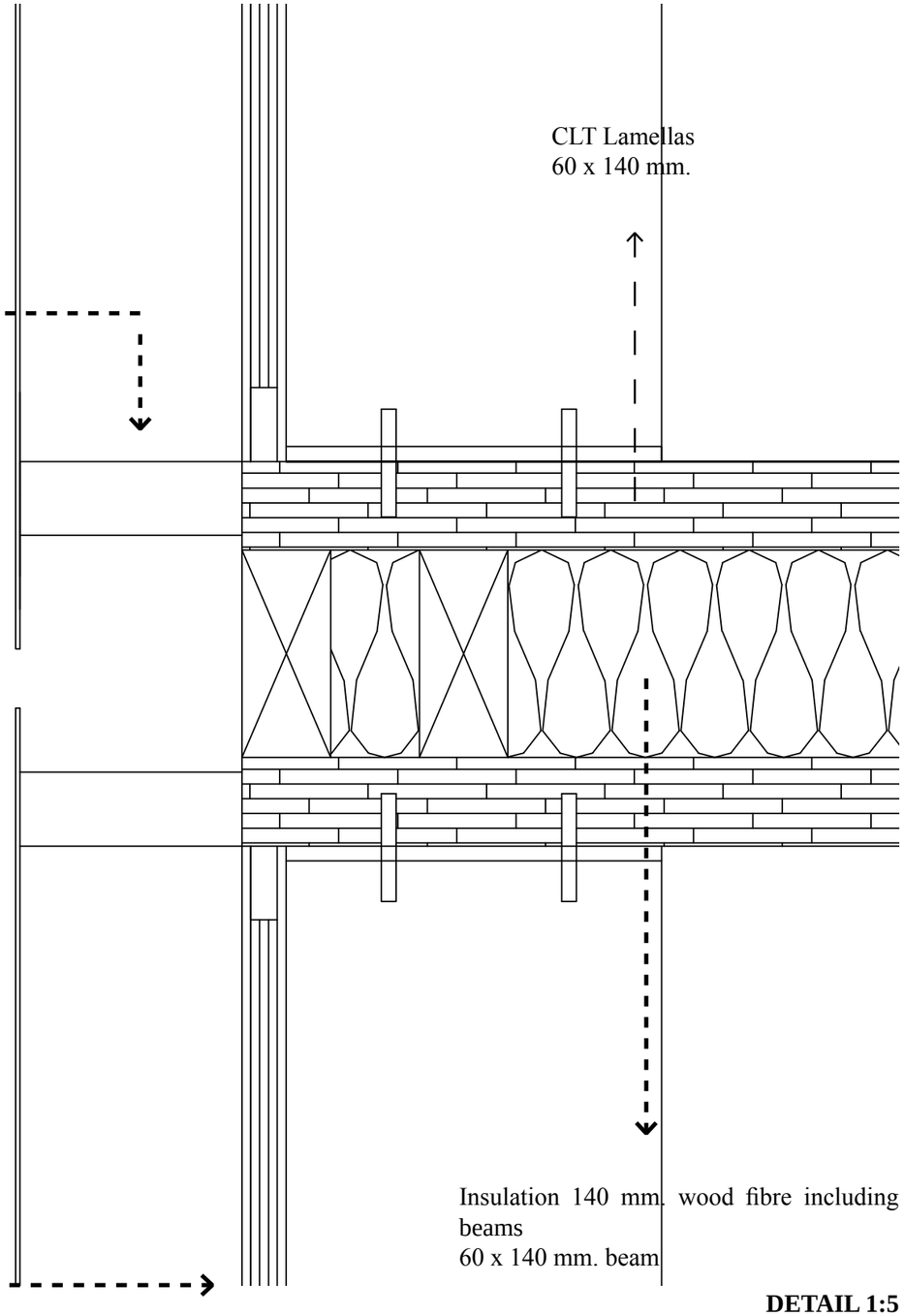
Steel Battens Bolted on Window Frame
150 x 50 mm

Cor-ten Steel Cladding
Panels 3 mm

Triple Glazed Window

Aluminium Window Frame

Steel Frame



DETAIL 1:5

U- VALUE CALCULATIONS

MATERIAL	THICKNESS L (m)	THERMAL CONDUCTIVITY K (W/mK)	RESISTANCE (m^2K/W)
Outside Surface	-	-	0.060
Cor-ten steel panels	0.003	16	0.000187
Air gap	0.160	0.16	1.000
Triple glazing	0.028	0.80	0.035
Steel Frame	0.254	16	0.015875
Inside Surface	-	-	0.12

U - value of Screen Facade = 0.812 W/ m^2 K

As it can be observed from the above calculations the U- value of my facade is way higher than the targeted 0.28 according to Building Regulations Document Part L due to the externsive use of windows. There is a number of ways that this value could be decrease, by retaining some of the existing brick facade and placing the cladding panels on top of that or by reducing the glazing area and instead additing a solid layer in the wall preferably CLT with a layer of insulation. This however would compromise the design intention of the facade and since it constitutes only a small proportion of the total surface area of the facade it could be balanced by other elements of the building envelope. Last but no least, since the whole wall of the facade could be seen as a window wall it should be noted that according again to Building Regulations Document Part L the targeted U-value for windows is 2.0 W/ m^2 K therefore the particular facade performs better than could be expected.

At this point it would be beneficial to see the performance of the retained brick wall (Chapter 2) with the additional layer that were placed in order to improve its energy efficiency.

Path 1.

MATERIAL	THICKNESS L (m)	THERMAL CONDUCTIVITY K (W/mK)	RESISTANCE (m^2K/W)
Outside Surface	-	-	0.060
Old Brick	0.225	0.84	0.302
Lime Plaster	0.01	0.137	0.073
Wood Fiber	0.100	0.046	2.174
Lime Plaster	0.01	0.137	0.073
Inside Surface	-	-	0.12

U - value of Retained Brick Wall = 0.33 W/ m^2 K which is very close to the targeted 0.30 according to Building Regulations Document Part L.

Path 2.

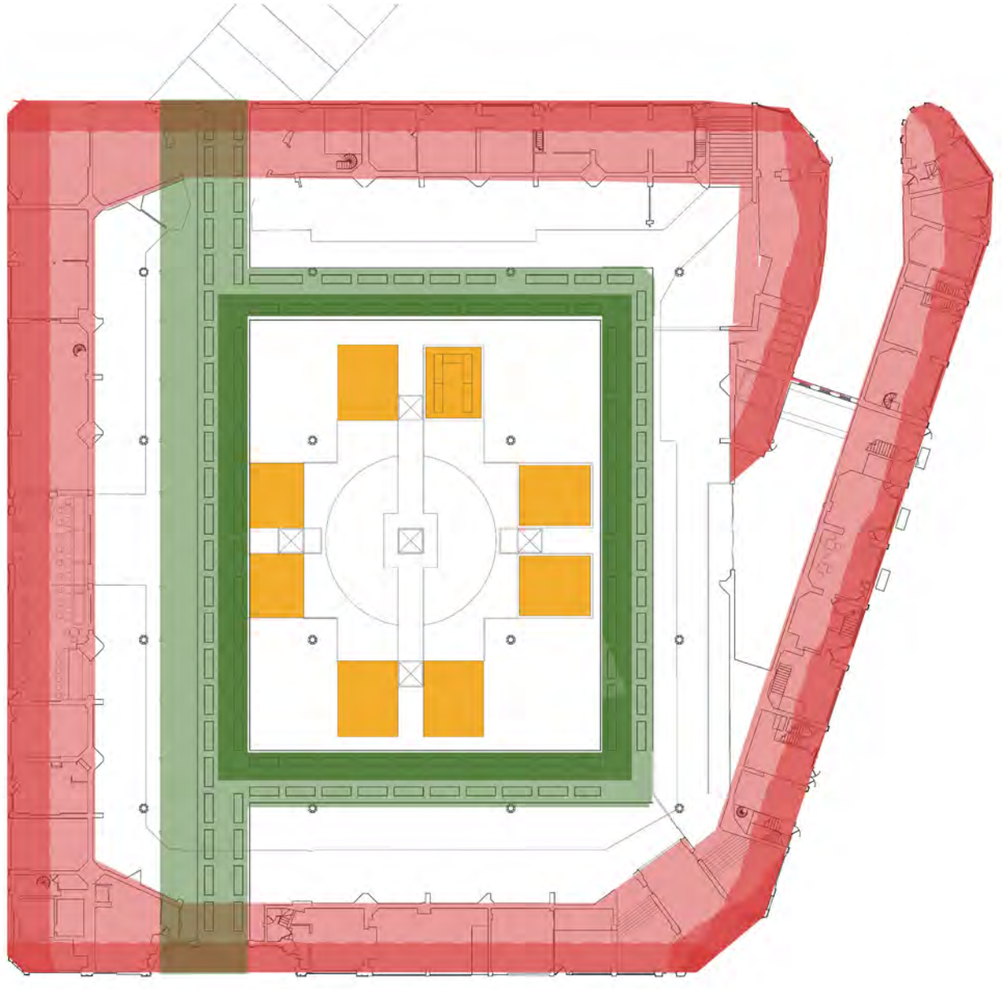
MATERIAL	THICKNESS (L/m)	THERMAL CONDUCTIVITY (K/ w/mK)	RESISTANCE (m^2K/W)
Outside Surface	-	-	0.060
Lime mortar	0.010	0.80	0.0125
Lime Plaster	0.010	0.137	0.073
W	0.100	0.046	2.174
Lime Plaster	0.010	0.137	0.073
Inside Surface	-	-	0.12

05 THEMATIC INTEGRATION : Integrated Design in Architectural Process

In this chapter my aim is to develop the design of the key space of my proposal by analysing and investigating various aspects such as acoustic properties, light and ventilation. The key spaces are the dining/debating chambers, which were on purpose left out in the previous chapters. The design intent is to place those elements in the core of the building and while creating an acoustically insulated environment where people can actually discuss and debate, it will be transparent and exposed for everyone to observe. At the same time it will create to those that are inside the feeling that they re being observed so as to take their role more seriously and be constantly reminded what they are doing inside that room. In addition, their location inside the main area of the market needs that way were food can be transferred inside from the first floor perimeter where the various kitchens will be located.

5.1 ACOUSTICS

Choosing to locate the box shaped dining/debating chambers in the core of the building on one hand proves to be beneficial since existing perimeter will act as an acoustic buffer zone therefore external noise from the surrounding streets will not cause a problem to those spaces. (It was also mentioned in the Chapter 2 p, 12 that it is part of the proposal to make those streets pedestrian routes that would serve the retail units along the perimeter. On the other hand though, they are exposed to loud noise levels coming from the open market located around them (green zone) therefore acoustic treatment still constitutes a need for those spaces.



Without any exception acoustic properties of governmental buildings are always one of the main design driver however my project has one critical difference with those project which will affect radically the way that the acoustic properties will be treated. Instead of having a lot of people in one area, I am dividing them to different rooms around different topics. Thus having to take into account reverberation time is not a critical point any more. Fewer people in a more informal atmosphere entail different demands. Instead of being interested thus in the interior performance of the space i am interested in each exterior form and how it can be constructed so as to absorb noise before entering into space. Thus materials with absorbent qualities like timber were the focus of my attention, as it was originally mentioned in Chapter 03

PRECEDENTS

Scottish Parliament - Enric Mirales

Parliament of the German speaking community in Eupen - Atelier Kempe Thill

Welsh Assembly - Richard Rogers

EXPERIMENTING WITH ACOUSTICS

In order to understand better the principles, issues and solutions that acoustics may entail I did a very quick demonstration of various alternative ways of assembling the debating chambers in order to provide the required acoustic properties. It is important to note here that all the figures mentioned in the following two pages are only a way of ranking the different systems and by no means they do not reflect the actual performance of the materials. The whole process of testing was used as an observations' tool.

During the experiment a particular, point source was used with a sound outcome at a particular frequency in order no to increase the degree of uncertainty in the measurements. Given the fact that sound in decibels was calculated using an I-phone App called Decibel 10th already implied a variety of things that could go wrong. Despite all the difficulties however, the outcome seems to be rather accurate and insightful.

Test no. 1 using 20 mm balsa wood.

Test no. 2 adding extra sheet of 20 mm balsa wood. (40 mm)

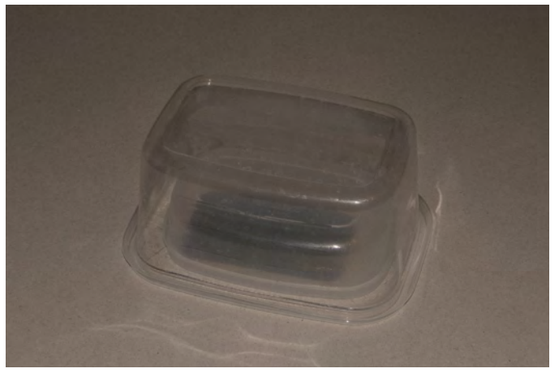
Phase 1 Altering Thickness - Recorded Results

Finish Used	Range of Sound in dB Measured
No shell	69 - 70
20 mm Balsa wood	69 - 70
40 mm Balsa wood	67
100 mm Balsa wood	63 - 65

Test no. 3 adding extra sheet of 60 mm balsa wood at the sides towards the noise source. (100 mm)

Test no. 4 40 mm balsa wood & fabric sheets

Test no. 5 40 mm balsa wood within 10 m plastic box



Test no. 6 20 mm plastic box within 10 mm plastic box

Phase 2 Altering Materials - Recorded Results

Finish Used	Range of Sound in dB Measured
40 mm Balsa wood & fabric sheets	67 - 69
40 mm Balsa wood & 10 mm plastic	64 - 65
20 mm Plastic & 10 mm Plastic	61 - 63
20 mm plastic & 20 mm cardboard	58 - 59

Test no. 6 20 mm plastic box within 20 mm cardboard

CALCULATING ACOUSTIC PROPERTIES REQUIRED

In order to begin the investigation therefore I started by performing the traditional calculations in order to get a first idea about the sound insulation requirements of the dining chambers.

Specification of Acoustic Performance

Type of room	Activity noise (source room)	Noise Tolerance (Receiving room)	$L_{Aeq,30min}$ (dB)
Assembly Hall	High	Low	35
Dining room	High	High	45
Dining Chambers	High	Medium	40
Atrium/ Market space	High	High	50

Based on the above principles and using the "Performance standards for airborne sound insulation between spaces - minimum weighted BB93 standardized level difference", $D_{nT(Tmf,max)},w$ was estimated:

From Market to Dining Chambers: 50 dB
From Dining Chambers to Market place: 45 dB

Therefore there should be at least 50 dB sound insulation between the two and since circulation spaces like corridors or staircases are all exposed to the same degree as the dining chambers the solution should come from the structure and material finishes of the dining chambers.

Moving onwards, the performed more calculations in order to find out R_w (Sound insulation Index) and $L_{n,w}$ (sound pressure Level) consequently calculate the proper layering of the walls and floors of the dining chambers.

$$R_{w,est} = D_{nT(Tmf,max)}w + 10\lg \frac{(ST_{mf,max})}{V} + 8 \text{ dB}$$

$$R_{w,est} = 50 + 10\lg \frac{(19.5 \times 0.5)}{107.25} + 8 \text{ dB}$$

$$R_{w,est} = 50 \text{ dB}$$

$$R_w = 55 \text{ dB}$$

$$L_{n,w,est} = L'_{nT(Tmf,max)w} + 10\lg \frac{(V)}{T_{mf,max}} - 18 \text{ dB}$$

$$L_{n,w,est} = 65 + 10\lg \frac{(107.25)}{0.9} - 18 \text{ dB}$$

$$L_{n,w,est} = 67.7$$

$$L_{n,w} = 62.7 \text{ dB}$$

PROPOSED FORMS OF CONSTRUCTION ACCORDING TO REQUIRED SPECIFICATIONS

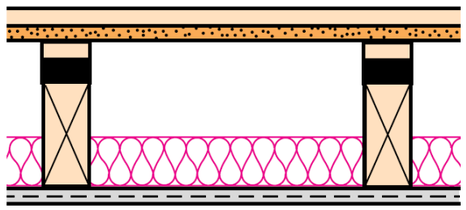
GLAZING OPTION FOR R_W = 45 dB :

6 mm laminated glass/ 200 mm air gap/ 10 mm + absorptive reveals

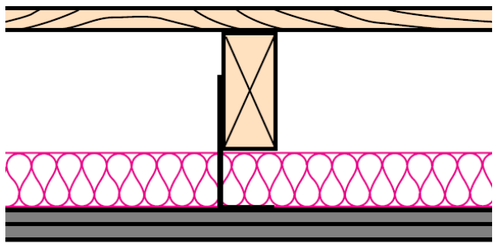
17 mm laminated glass/ 12 mm air gap/ 10 mm glass

TIMBER FLOORING FOR R_W = 55 dB

Lightweight floating floor using resilient pads or strips
Thickness (mm): 270-320



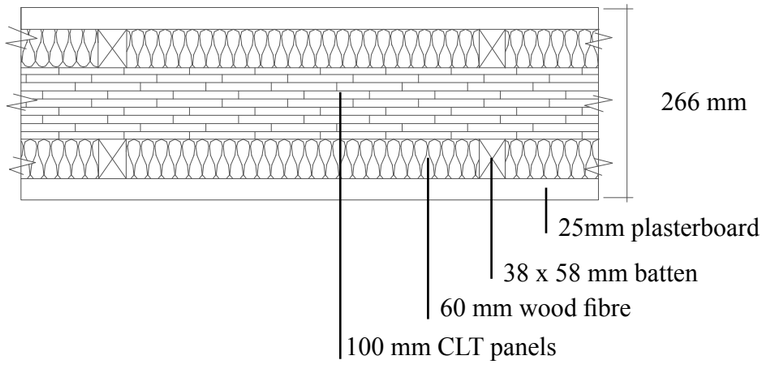
Suspended Ceiling
Thickness (mm) 450-500



*Derived from BB93 Document

STRUCTURE

Since as I mentioned at the beginning on of the main drivers of the design is transparency and openness therefore having solid cross laminated timber components for walls would compromise that, even though it could provide great acoustic insulation and thus the proper environment for the discussions of the dining chambers.



Thermal protection

U[W/m²K]	0,25
Transmission	adequate
$m_{w.e.a}$[kg/m²]	15,7

Calculated by HFA

Sound insulation

$R_w(C;C_{tr})$	58 (-)
$L_{n,w}(C_I)$	-

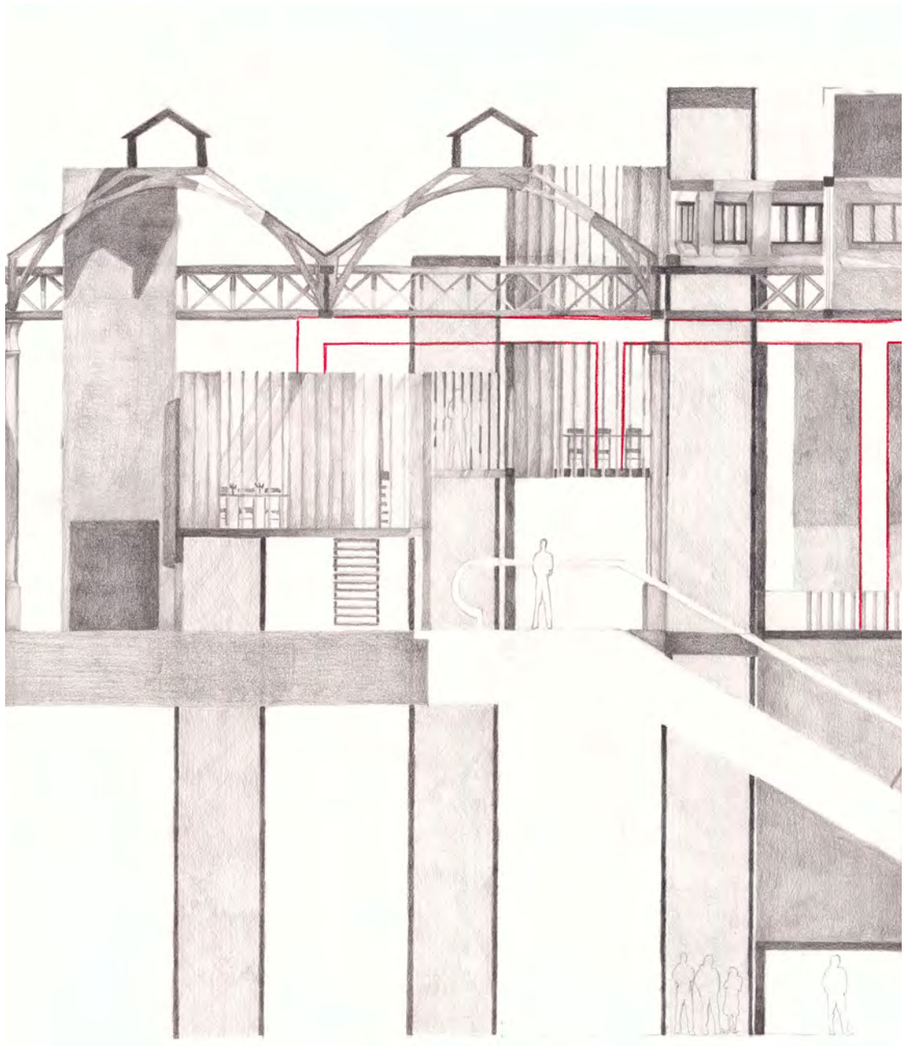
Assessed by TU-GRAZ

Ecological value*

013_{Kon}	-11,1

Calculated by IBO

Part Section - Interim review

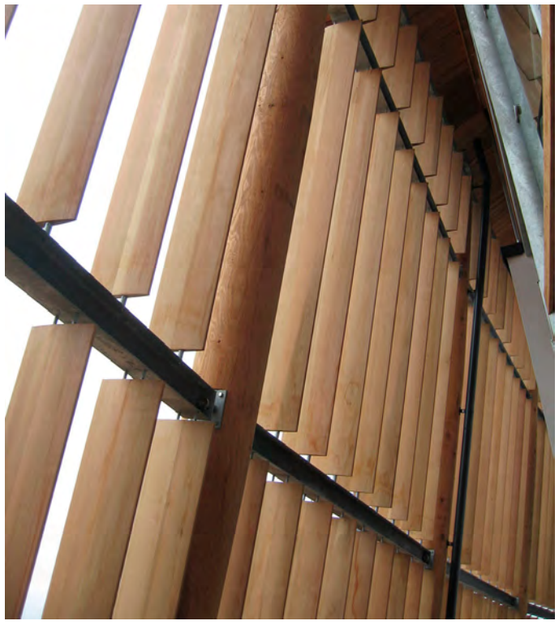


Perspective view of Dining Chamber

Louvres detail

As a result I started exploring the possibility of using timber louvres outside a steel frame glazed construction in order to provide the required insulation and at the same time enhance visibility and openness. By doing that I could also protect the spaces from excessive solar gains from the “atrium” roof since they could be moderated it according to the occupants needs.

Timber Louvers



Moving on from that and based on the result of my initial quick experiment I started looking at the possibility of creating a box within a box glazed structure that will allow full transparency and at the same time provide the required buffer zone by giving between the two glazed a cavity space. Consequently insulation would be required in the floor level only.

Implications

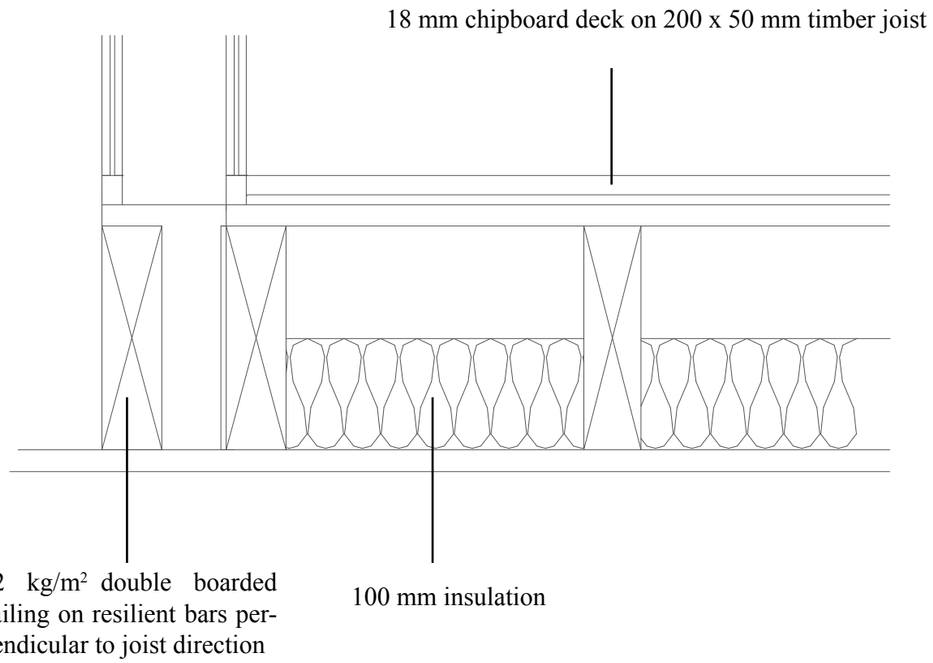
The timber frame, CLT structure that was initially proposed in the Chapter 2 is no longer suitable for this new component of the design therefore a combination of the two seems to be a wiser option. This will be beneficial for all the big spans which initially would have to incorporate timber beams for support whereas now with the use of the steel floor plates can be reinforced. This will also maintain the structural character of the existing building which is already combines the two structural methods for different components.

Acoustic louvres can be still incorporated to prevent the dinning chambers from excessive solar gains from the open atrium roof.

In addition such a move imposes implications to the way people enter such as space which ideally could incorporate double glazed doors to each skin and how you ventilate the space particularly when it involves food meals etc. This will be further explored in this Chapter.

Floating acoustic floor system

$L'_{nT,w}$: 49dB



Historic Spanish chapel by Adam Bresnick Architects, 2014

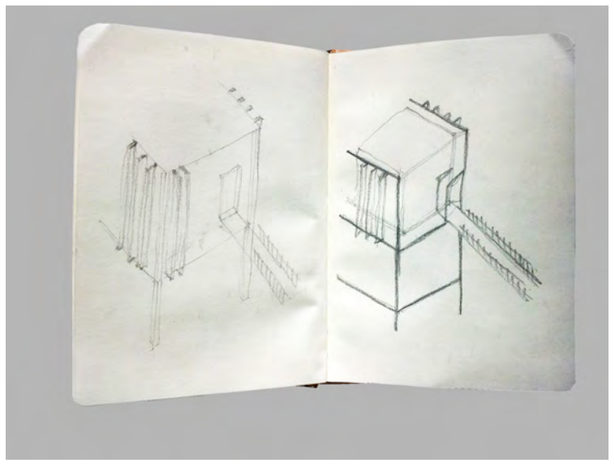
Zamora Offices by Alberto Campo Baeza, 2012

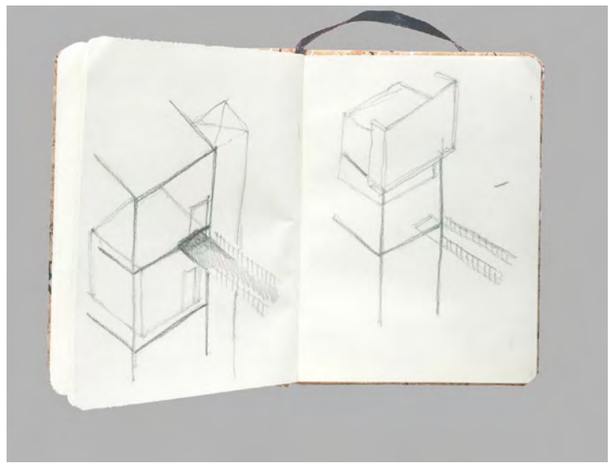
PROJECT AMBIOTION : VERTICALLY MOVING, ACOUSTICALLY INSULATED DINING CHAMBERS

Important aspect of the project is that vertical movement between the different floor levels and mezzanines. Currently, those dinning chambers are stable and connect to the concrete floor of the main ground level surrounded by various lifts and circulation spaces to allow and reflect that movement. Making the actual dining spaces part of the movement will allow me to resolve issues such as privacy, shading, acoustics, access etc. and it will make that element of the design more dynamic. In order to reflect on the options this may include for future investigations as the design further developed, i was interested in the New York Gallery by Norman Foster.

The dining halls could incorporate such a hydraulic mechanism that would enable them to move and stop at different levels within the main space and thus people using the rooms even though exposed to the public could alter the height and thus visibility, privacy and noise levels since it would still encompass the idea of the double skin skeleton that asks as a acoustic buffer zone.

Sperone Westwater gallery by Foster + Partners, 2010





LIGHT & VENTILATION

As it was mentioned previously the dinning chambers receive direct sun light through the roof only since both east, south and west light can only penetrate up to the perimeter of the building. Consequently, depending on the season and particular location of the space within the central core shading may be required in order to maintain the appropriate location and direction. In addition, in terms of ventilation, windows that can be opened can not be placed near the ground floor surface since they would compromise the acoustic insulation thus ventilation needs to be done in the vertical axis (stack effect) or through window openings near the top (ceiling).

Historic Spanish chapel by Adam Bresnick Architects, 2014

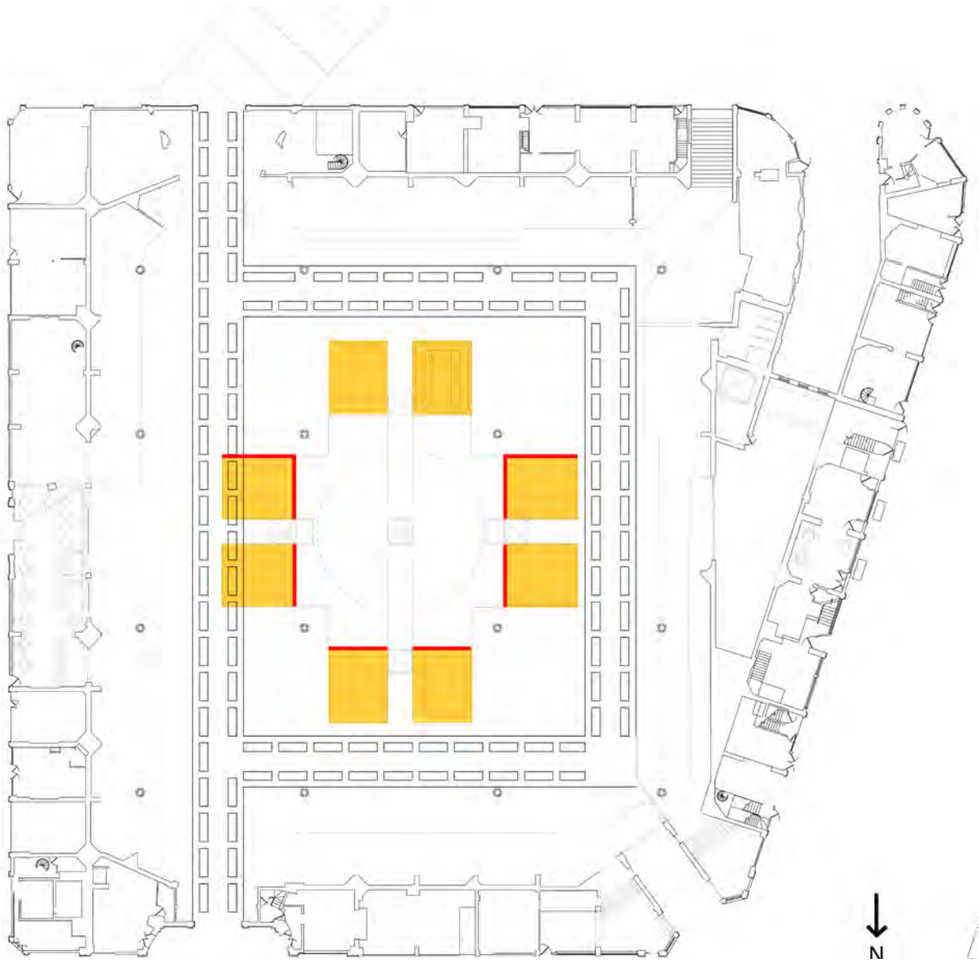
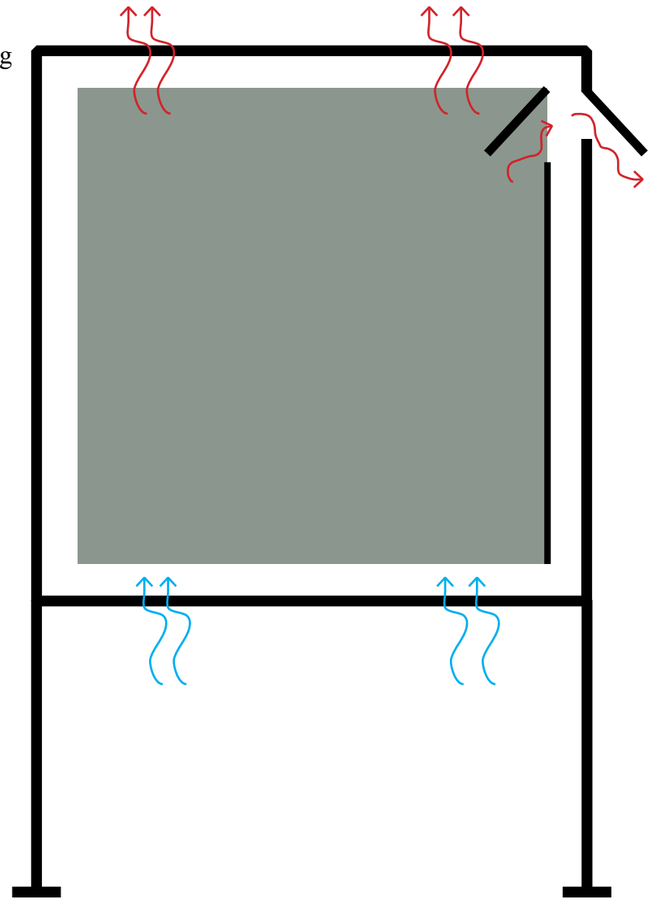


Diagram illustrating possible sides where louvres for shading may be required.

Diagram illustrating ventilation strategy



06 REFLECTION

Designing this Ministry of Food inside an existing Victorian building was even from the beginning a great challenge. Before even starting the consideration of any design intention apart from the initial concept explored in the Design Briefing Documents every part of the building had to be understood, assessed and evaluated which was in certain cases an impossible task. We visited multiple times the site area however we were allowed to access the particular building only once in the beginning of the year and due to its bad condition we could not even access all floors. As a result, a great amount of the information stated in this report is based on assumptions according to other facts, online resources, general conclusions based on Victorian constructions and the architecture of that era as well as previous planning applications. Evidently, this report illustrates an attempt to resolve as many issues as possible but in certain cases the lack of information and in certain areas lack of knowledge implies a more conceptual and theoretical resolution of the problem.

ENVIRONEMENT

Enhancing the efficiency of an old building and thus reducing its environmental impact is really challenging. On one hand, regenerating an existing fabric and thus in a way recycling as much as possible is a sustainable move on its own, however, in order for that building to come to terms with the needs and comfort conditions of the 21st century requires the implementation of many different strategies. Every decision had to be considered multiple times since by altering one thing to boost the buildings energy efficiency could compromise certain structural elements. As a result a combination of things was proposed in order to meet the required conditions and more importantly a more sustainable environment. In terms of daylight and ventilation, a combination of natural and mechanical strategies is the only way to bring the balance that it is required for the tasks undertaken inside the building. It was inevitable not to alter the historic fabric at all in order to resolve those issues. Atria and changes in the roof scape needed to be considered as for instance with the main concrete dome to voids in the existing concrete floor in order to allow light to penetrate deeper into other levels of structure. It is evident that with so many restrictions imposed by the importance of the existing fabric the result and the combination of different solutions such as increase in vegetation, pedestrianizing streets and reducing CO_2 emissions to heat recovery mechanisms from the kitchens and laundry areas throughout the building is quite satisfying. One particular aspect that could have been explored under this chapter and could be perhaps implemented later on in the design is waste management. In a building where retail units are all over the perimeter and food is the key the will be a great amount of waste at the end of the day. Currently, such issues, bins and waste storage are part of a more general masterplanning of the basement floor yet alternative solutions could be explored.

STRUCTURE

The challenge in structure was the ultimate challenge of understanding the existing structure and thus the actual possibilities and limitations of the new design. It was even form the beginning but certainly still is, since the design is still under process, challenging to assess the components of the existing fabric and consequently develop specific arguments on whether you keep or remove an element but also in case that you remove something what do you put in its place? The general strategy is to maintain as much as possible or repair the and retain the existing perimeter and alter in a vertical axis the core parts of the building. Yet, even elements that have been removed like the box-cells in the core of the building under the dome, have been reintroduced and developed through the new proposed structures, like the dinning/debating chambers. Similarly, to the environmental chapter various structural strategies needed to be incorporated in order to make the most out of the design intention. A replacement of the masonry units by CLT components will maintain the structural strength and increase the acoustic and thermal performance of the building, while steel reinforcements and additional steel structures will preserve the more industrial character of the building and at the same time support the more intriguing parts of the design like the movable spaces. Further investigation in terms of this chapter needs to be done for the circulations spaces and multiple spanning ramps above the debating chambers as well as the possibility or not of using the hydraulic mechanism to lift the dinning halls. Last but not least, further investigation needs to be done in terms of the structure of the basements levels where the design is currently very conceptual.

FACADE ASSEMBLY

It is clear that the chapter that is currently lacking more at the moment is that of the facade assembly. A thorough investigation of materials and processes has been undertaken yet the final form, shape and workings of the facade are to be further explored. The skin of the facade is greatly affected by the surrounding spaces therefore by resolving those areas in greater detail, it will allow me to develop and improved the facade. It is also the most complicated part of the design in terms of the existing fabric. It is crucial for the facade to generate the same appeal and aesthetic qualities with the existing ones and at the same time not to comprise them. It poses questions as to how far do you interfere with the existing, what determines the form and colour of it. How exposed or not exposed the structural components will be, the impact it will have to the interior, the change in the load distribution of the existing wall etc. At the same time, as it was previously stated, it is crucial also for the particular typology of my proposal and thus equal consideration needs to be given to that part of the facade and the way it engages with a human scale apart of the greater building scale or city scale. The facade thus needs to combine those elements and attract people in such a way to explore the interior that they will willingly pass through the security which is something that can not be missing from the design due to the nature of the building even if it has been compromised in certain cases since people can access the may core where the public market is located yet they can enter to any other area without passing through security. In addition, it needs to be developed in such a way that could adapt in both cases that were stated. It should be suitable both for the entrance facade as well as the other part along the street where different conditions apply. Consequently, the current proposed facade was used as an initial exploration and for the purposes of this report and thus it will be re introduced along with the final scheme proposal.

THEMATIC INTEGRATION

This chapter constitutes a combination of the three previously explored. With a central focus in acoustics it is and has greatly affected environmental issues such as ventilation and lighting as well as structural with the need of implementing steel frame components to the initial CLT, timber frame proposal. It is the element of the design that links the two driving forces of the project, the concept around the politics of food and the preservation of the existing building . It holds the greater essence and ambition of the project and provided the greater source of inspiration for the development and masterplanning of the whole project.

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