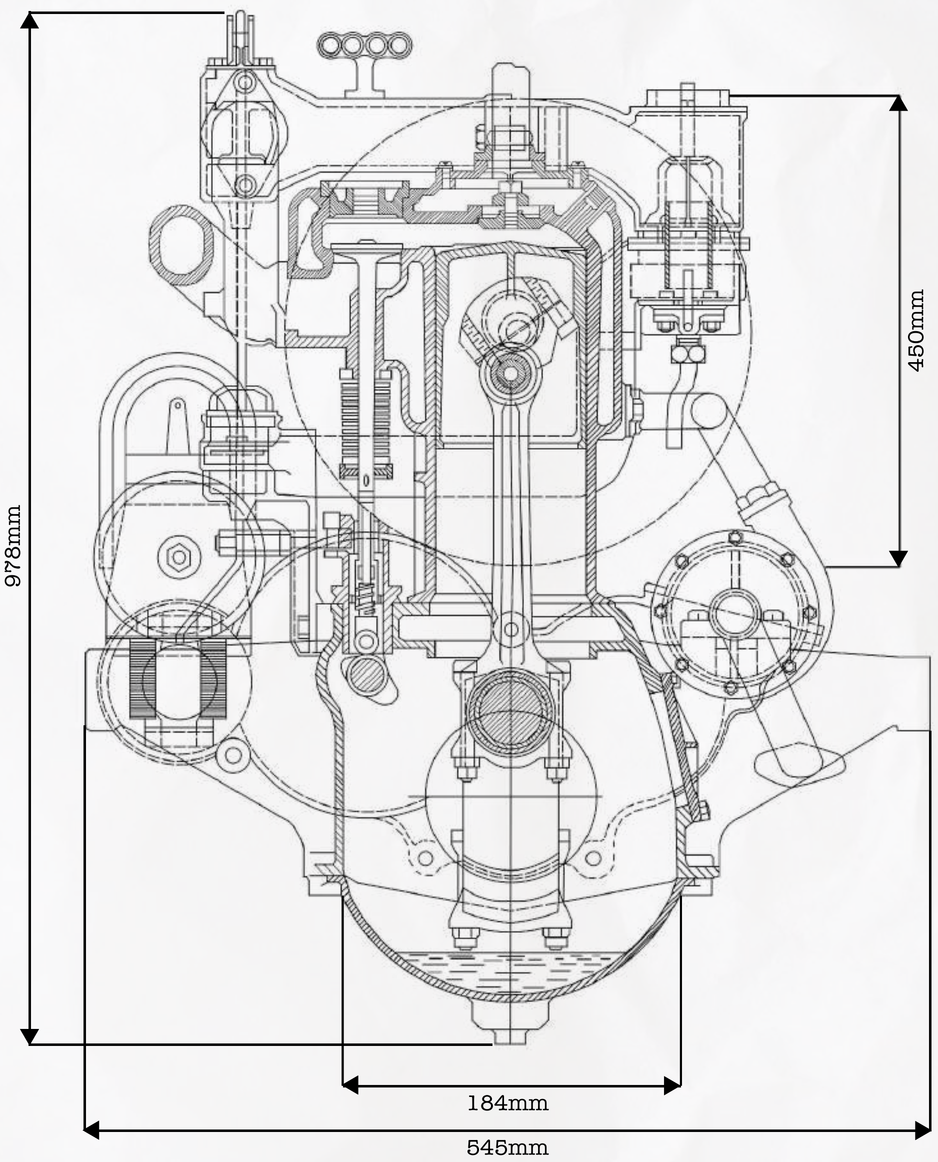
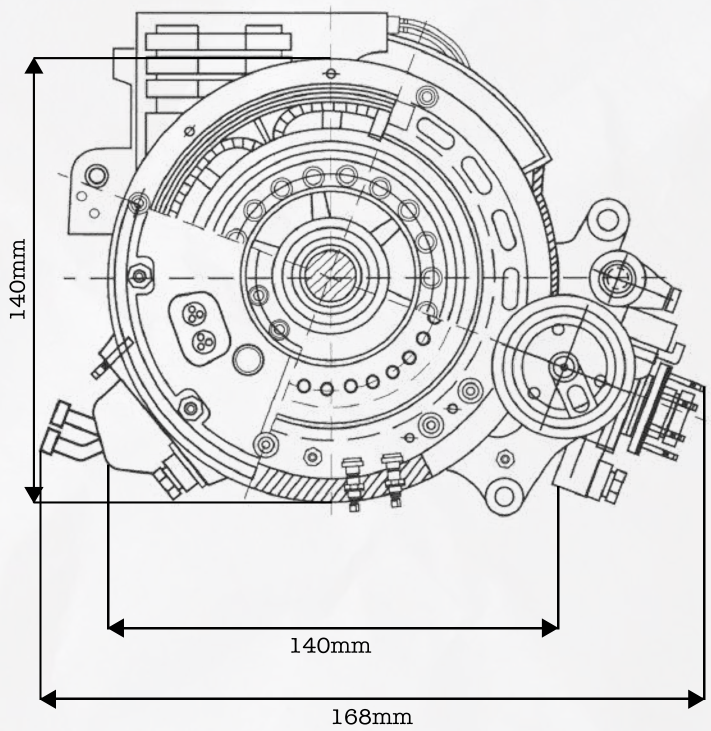
Architecture Portfolio





CleanSwap

Jan Ilukpitiya

25 TONNES

of CO2 Emitted in the Production of One (400mile range) Electric Car.

5 TONNES

of CO2 Emitted in the Production of One (400mile range) Combustion Car.

Global Warming is Still Increasing as Electric Vehicles, are Powered Through an Energy Grid That is Not Largely Made Up of Renewable Energy. Therefore Not (Zero Carbon Vehicles)

200,000 MILES

is Required to be Driven Over the Lit
a 400Mile Range Electric Vehicle to
the Same Amount of Emissions as a
400Mile Range Combustion Car Ove
Same Distance.

90,000 MILES

is Required to Have Been Driven to
the Emissions of an Electric Car w
Range in Comparison to a 500mile
Conventional Car. (With the Averag
Over a Cars Lifetime Being 200,00

EMISSIONS VS PRODUCTION

fetime of
Produce
a
er the

o Offset
vith a 125
e Range
ge Range
0 Miles.

%41

of the U.K. Grid is Renewable as of 2020

%28

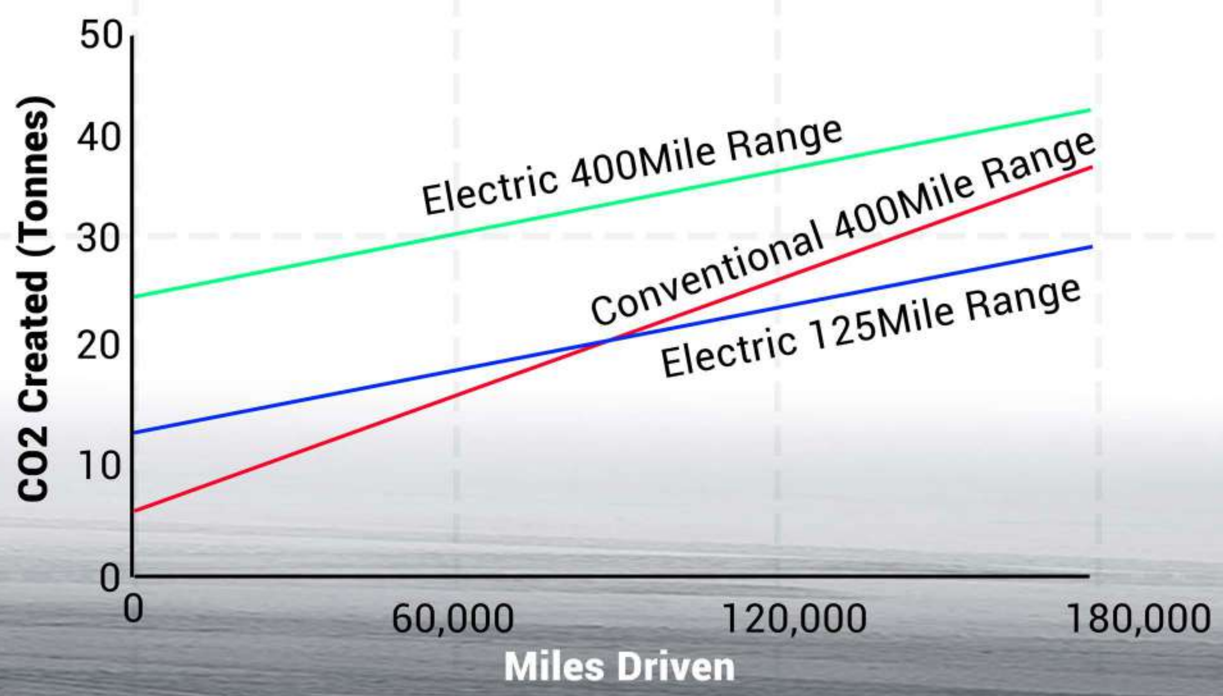
of the Worlds Energy Grid is Renewable as of 2020

The world needs to stop pushing for a Fully Electric Future Before it has Sufficient Infrastructure or it will Worsten the Global Warming Crisis.

Convert Your Current Cars Instead!

%60

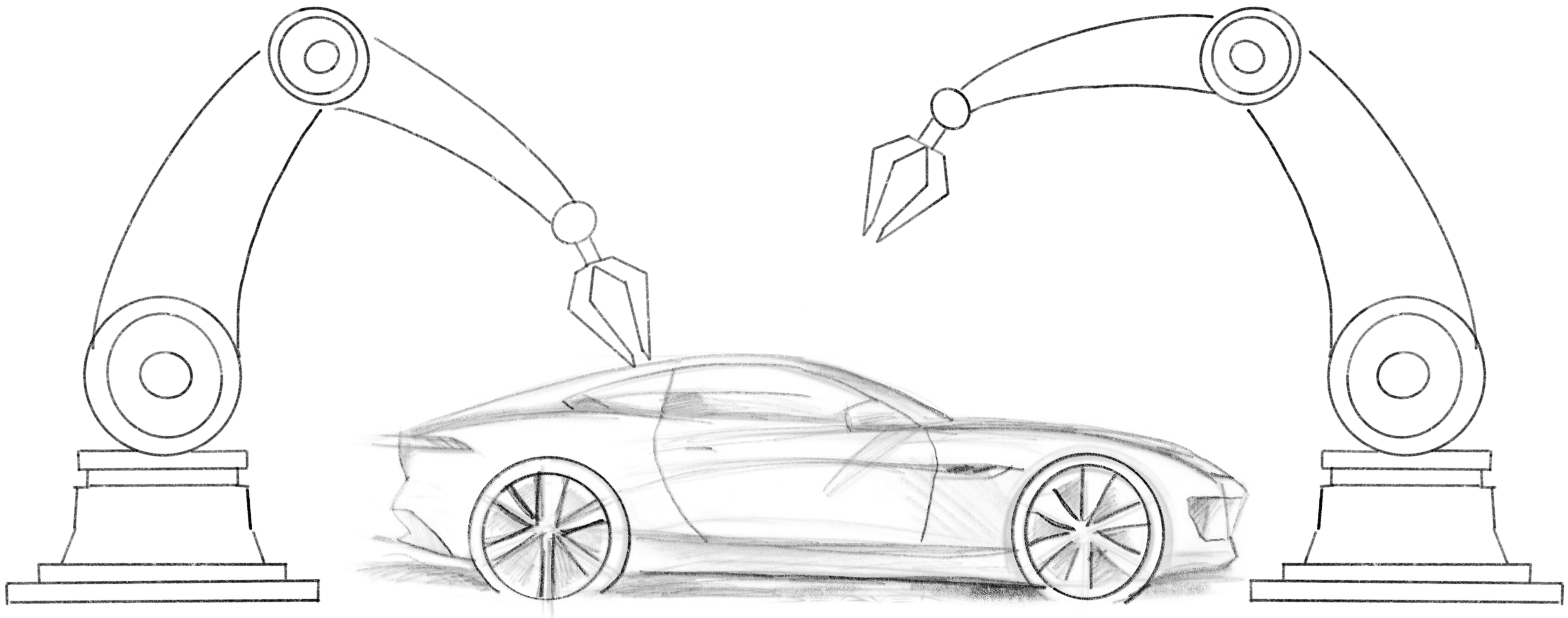
of the Worlds Energy Production is still Coal and Gas.
Mining Coal and Oil and Burning it is Adding CO2 into the Atmosphere That was Not Once There, Which is the Same for the Production of Hazardous Lithium Batteries

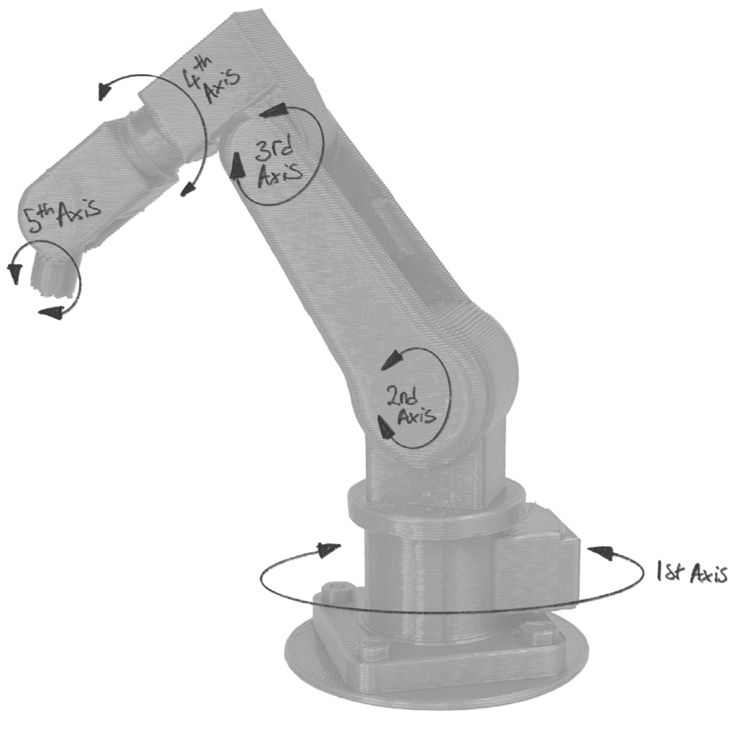


Left /IV

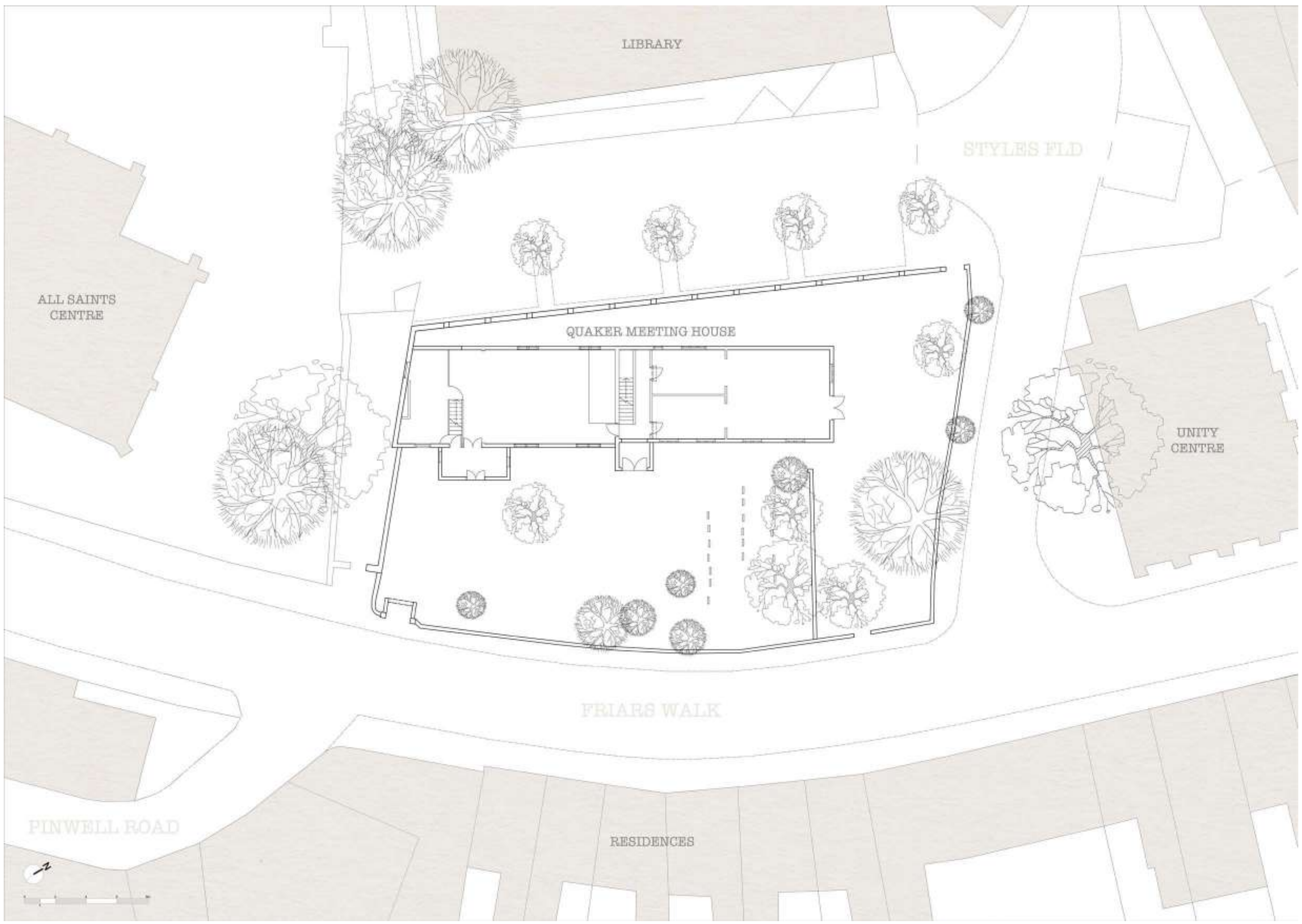
Lewes Quaker Meeting House
North Elevation
Scale 1:100 @A1

Contents





Lewes Quakers Meeting House



The proposed site, is the Quaker Meeting House in Lewes, East Sussex. It is a grade II listed building, and has had several extensions added to it across 1784-1978. The building is still used for its intended purpose, for the local Quakers to meet together and host activities.

Project Status : Completed
Project Year : 1784-1978
Site Area : Quakers Meeting House
Location : Lewes

Site Survey Split Into Generational Developments

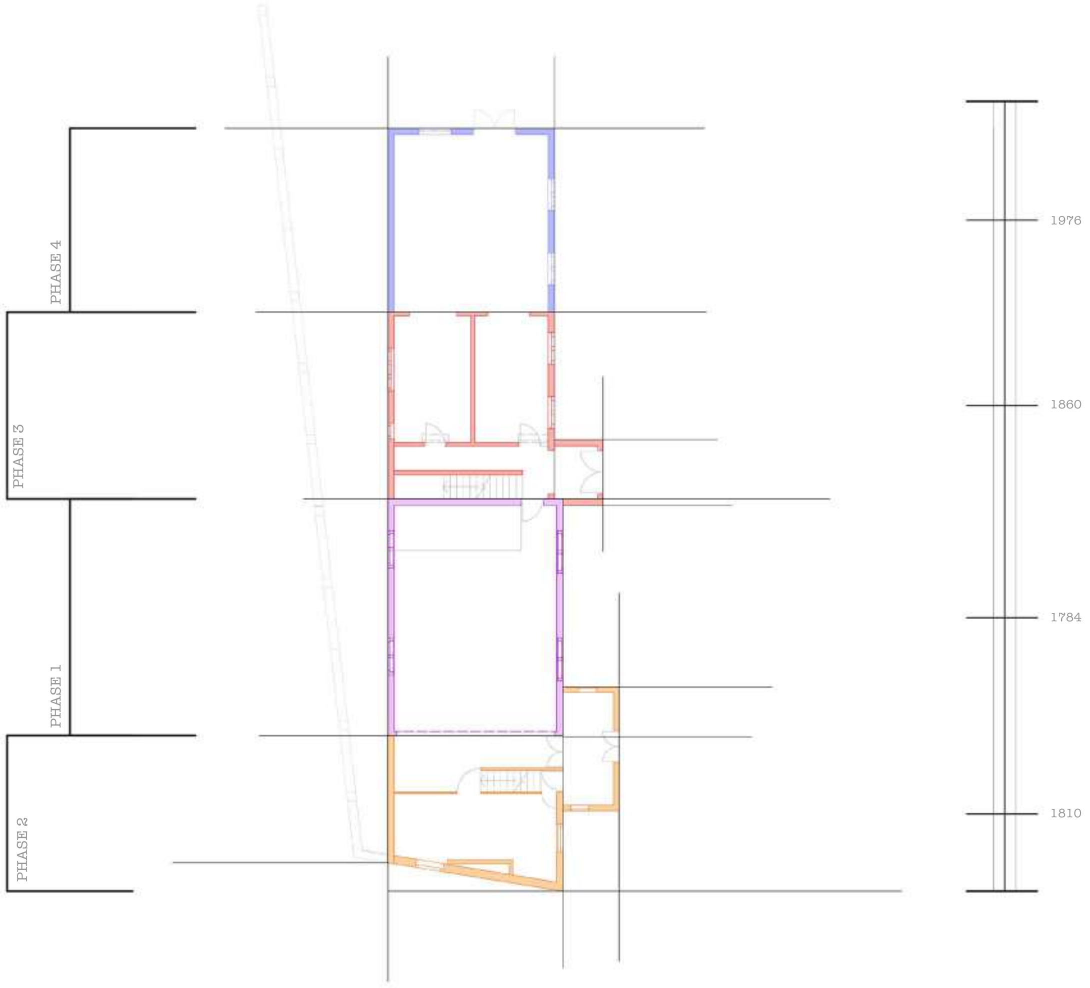
Directional Access Points

Directional Access Points


North East to South View Impression of Wider Context

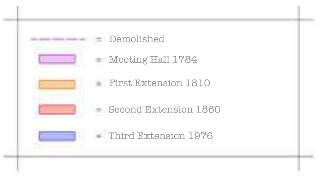
Site Survey and Photographs

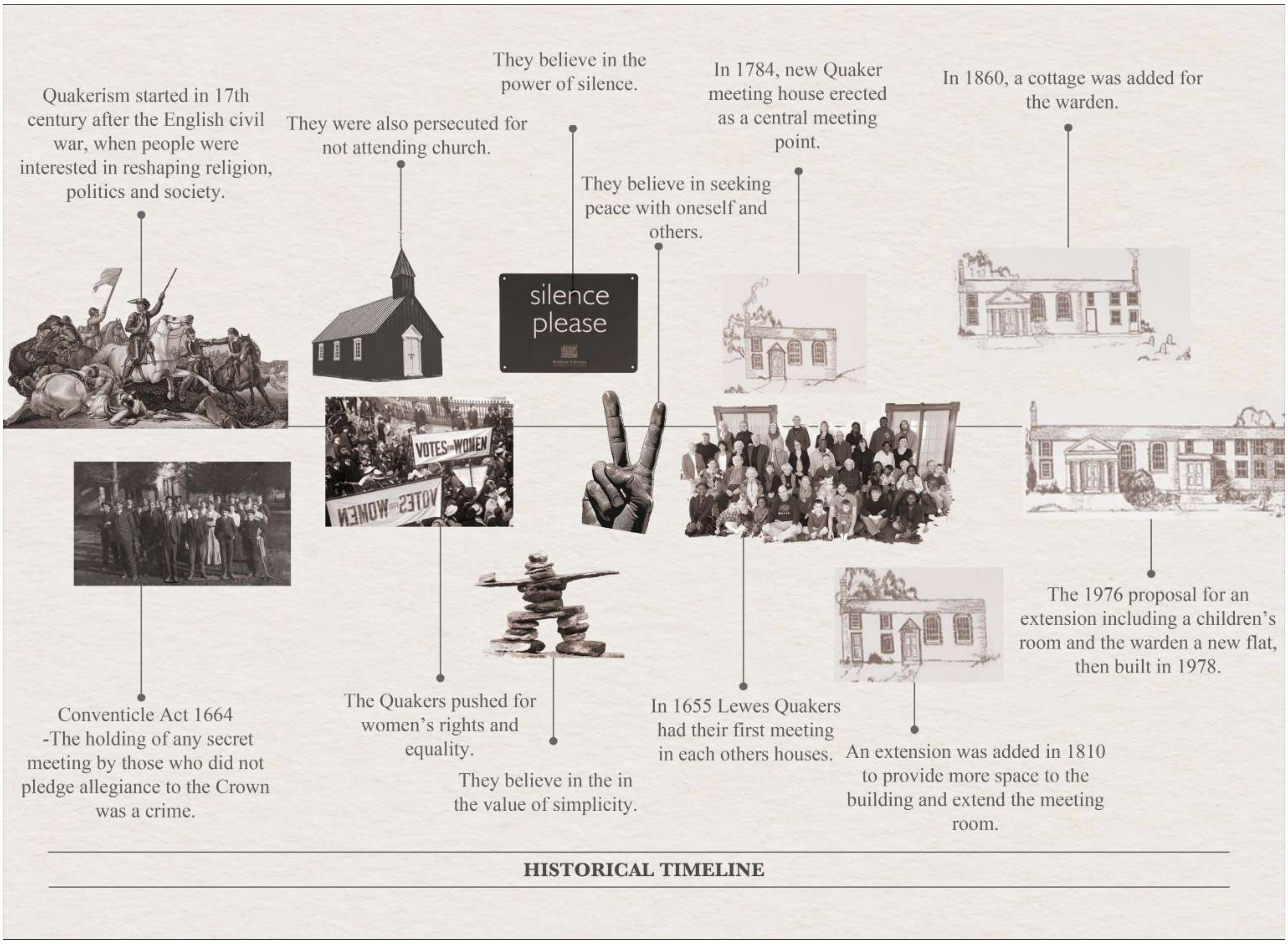
Historical Timeline & Floor Plan Over Generational Expansions

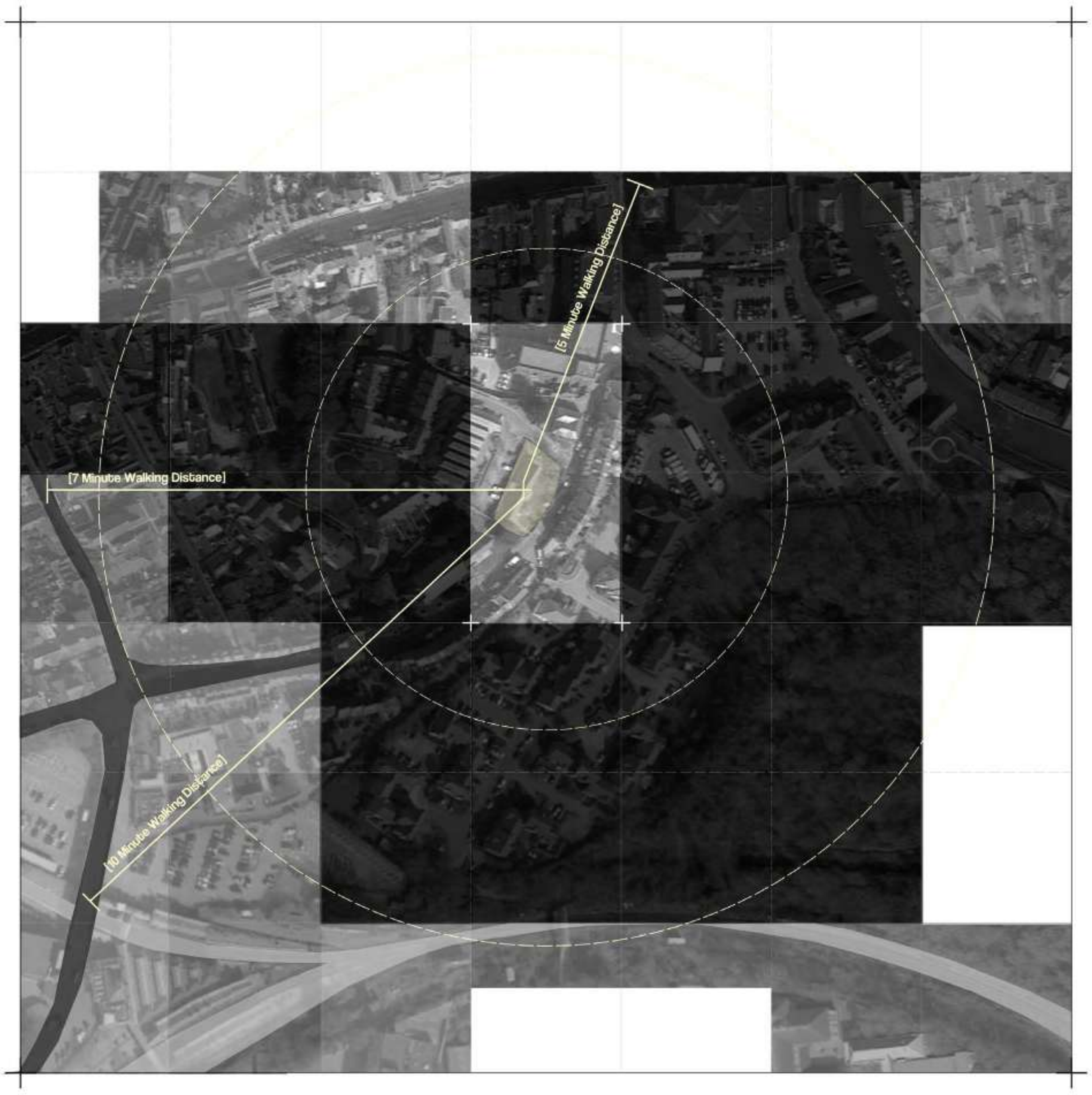


The Quakers has an extensive history in England embedding themselves from the 17th Century to the modern day. They believe in the power of silence, simplicity and meeting together. Due to laws against hosting secret meetings, the Quakers became known for rebelling against normal conventions and now have meeting houses all across the U.K.

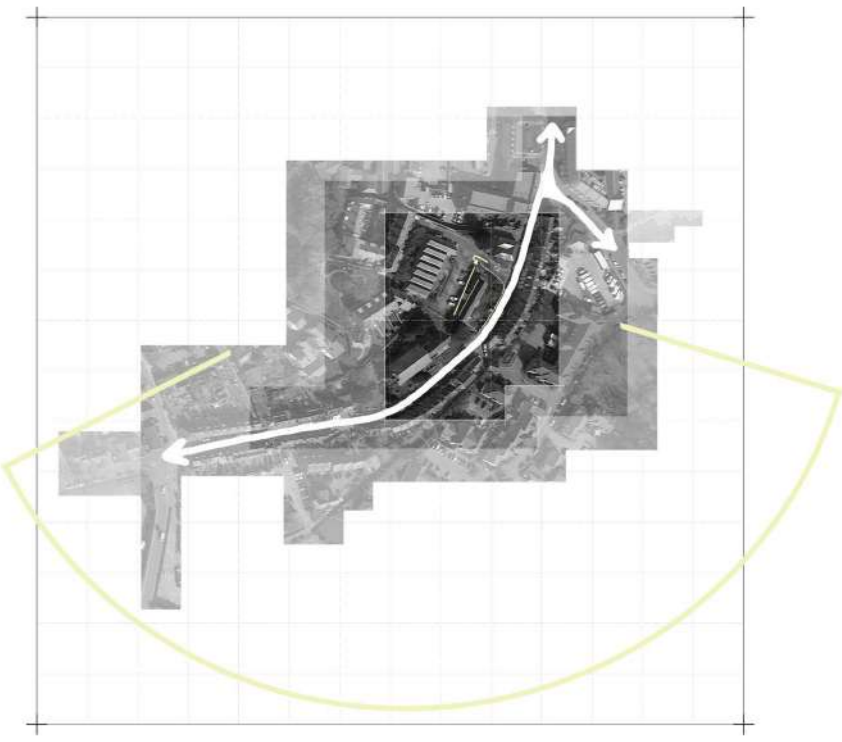
This Quaker Meeting House in Lewes is 239 years old, therefore several renovations have been added throughout the generations as their groups have grown and trends have changed. Subsequently, building techniques have changed and has led this building to be challenging when tackling for a design proposal due to many different materials being used, a lack of technical drawings and several building imperfections.



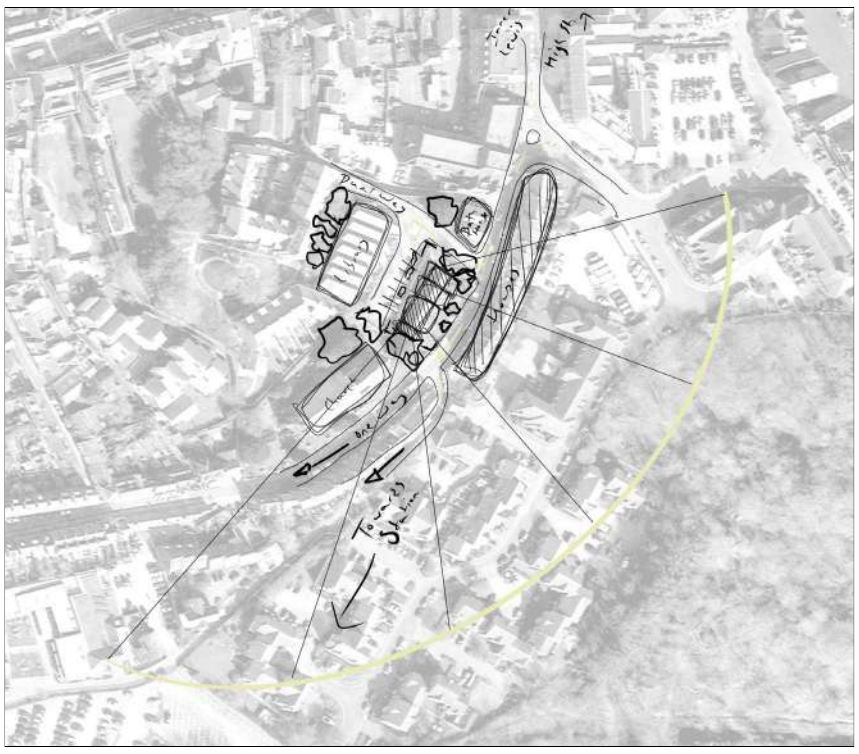




Walking Distance Between Site and Immediate Surroundings



Vehicular Access Points & Sun Path

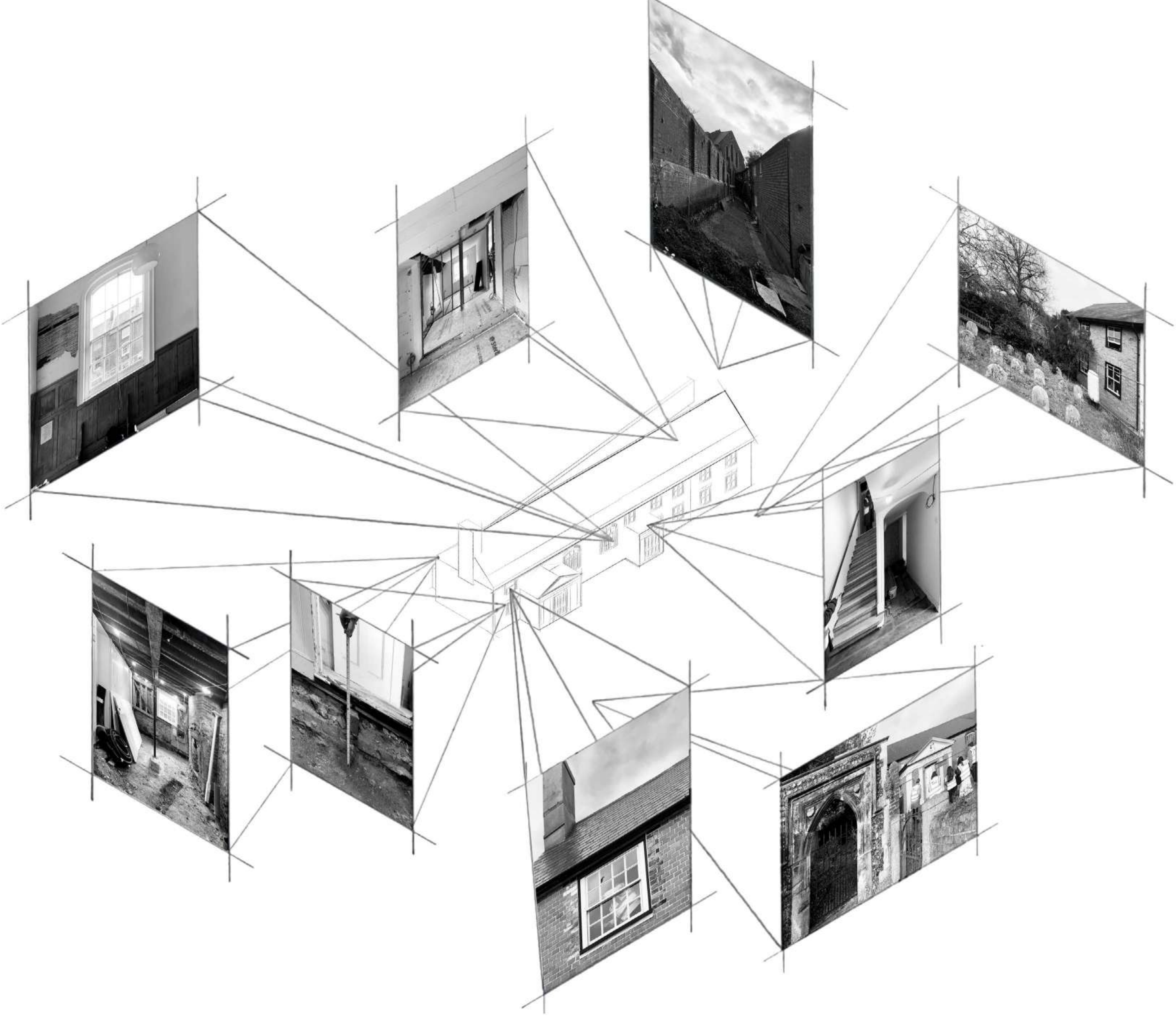


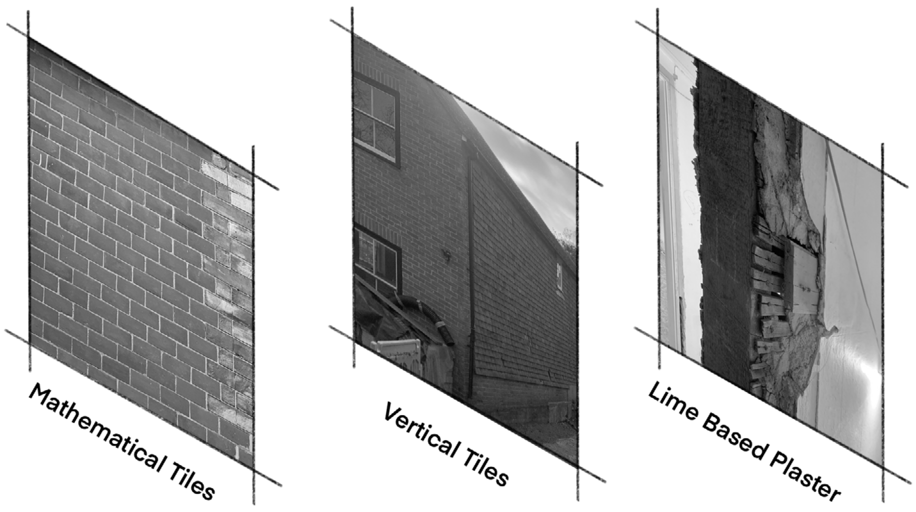
Pre-Site Survey Analysis

The site is in close proximity to Lewes High Street and Lewes Train Station. It has immediate surroundings of residential buildings, an old Church, Yoga Studio and Library. It is accessible via two streets, one of which is a one way road, which has a medium to low traffic flow. The front Elevation is North East Facing with a large front garden.

Visual Data Diagrams & Analysis

Material and Site Survey Analysis

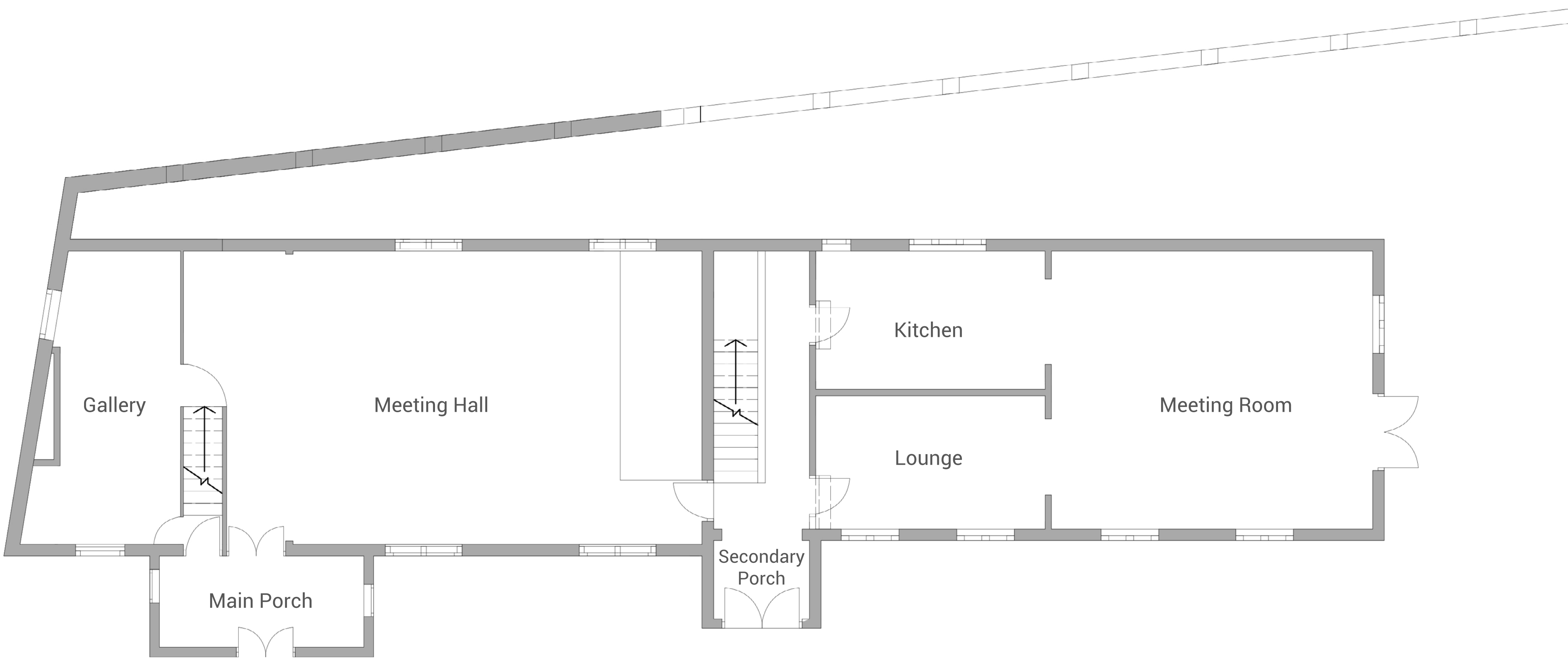




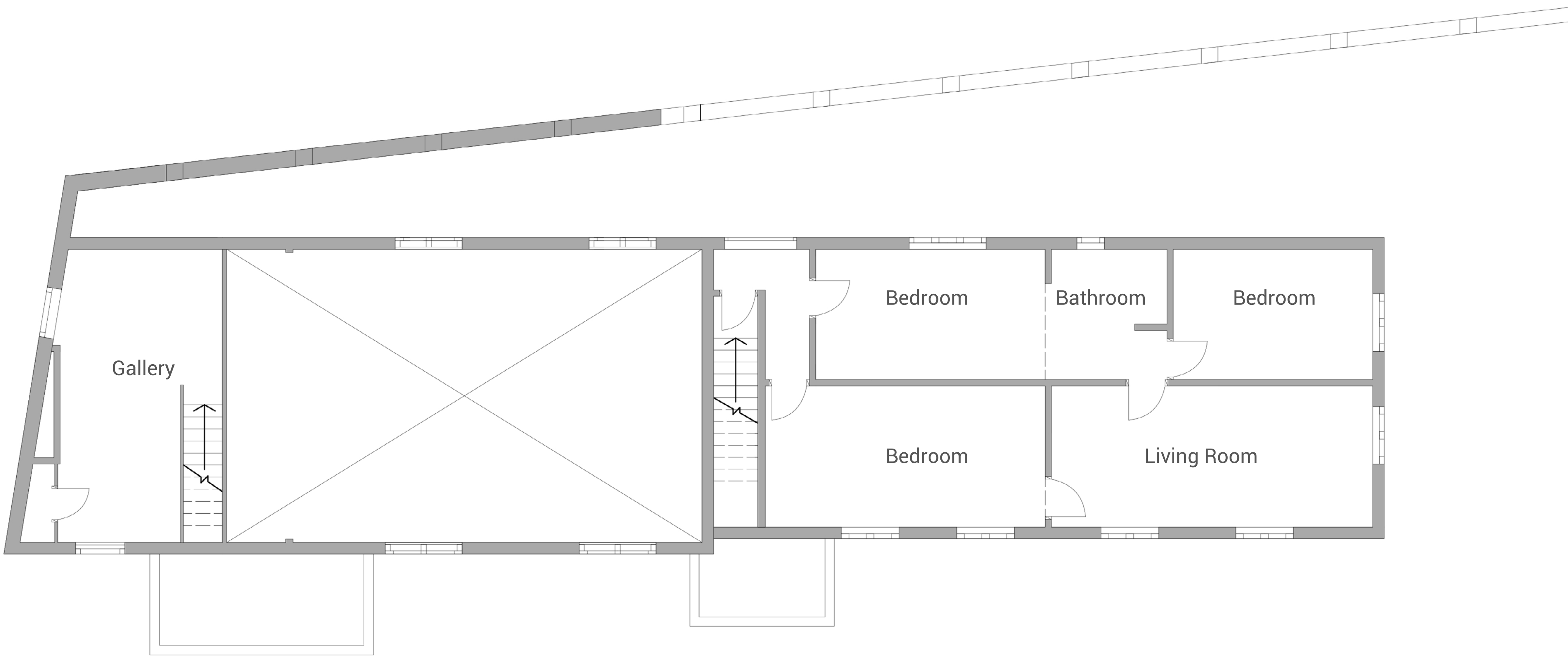
Locally Sourced & Produced Materials

The Site Survey findings were that the materials across the several extensions differentiated to the period in which they were built. From lathes and plaster, a lack of insulation in the main meeting hall and a structurally weak external wall. The newer extension was of modern building techniques and materials including the use of cavity walls and sufficient insulation. The first floor had two seperate levels due to different building techniques meeting eachother between extensions. The main meeting hall and first extension also utilised mathematical and vertical tiles to mimic brickwork, thus leading to challenging repairs as once one fell, the rest followed.

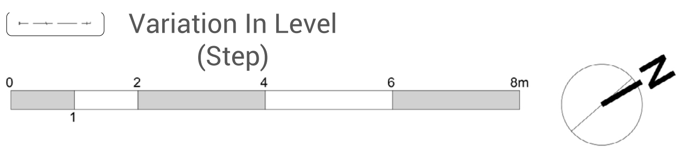
Due to a lack of insulation, poor maintenance of exterior tiling, large repairs will have to be made if not replaced completely. Thus suggesting new cladding may be appropriate, and recycling or upcycling of existing tiles.



Ground Floor



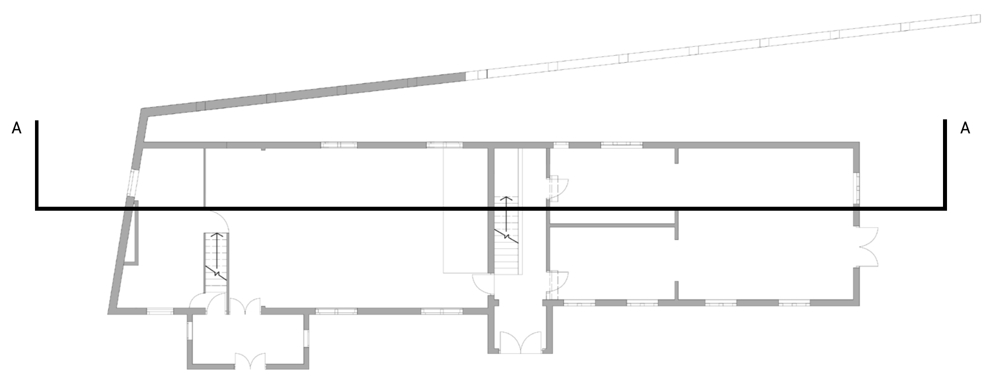
1st Floor



Floor Plans
1:100 @A3

Left /7

Front Elevation (East) &
Long Section AA
1:100 @A1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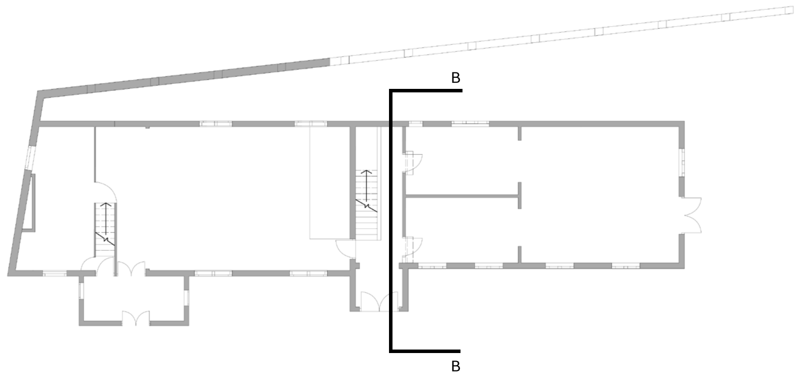
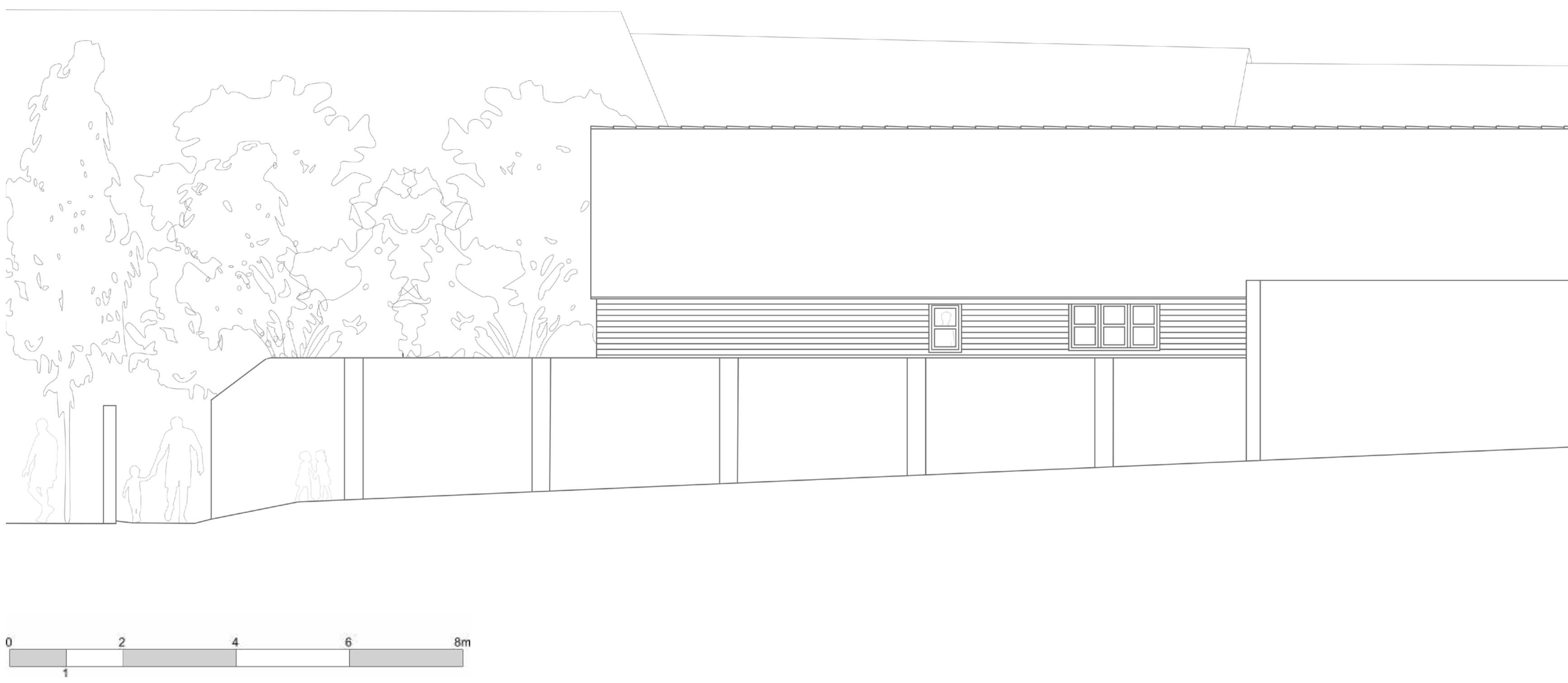
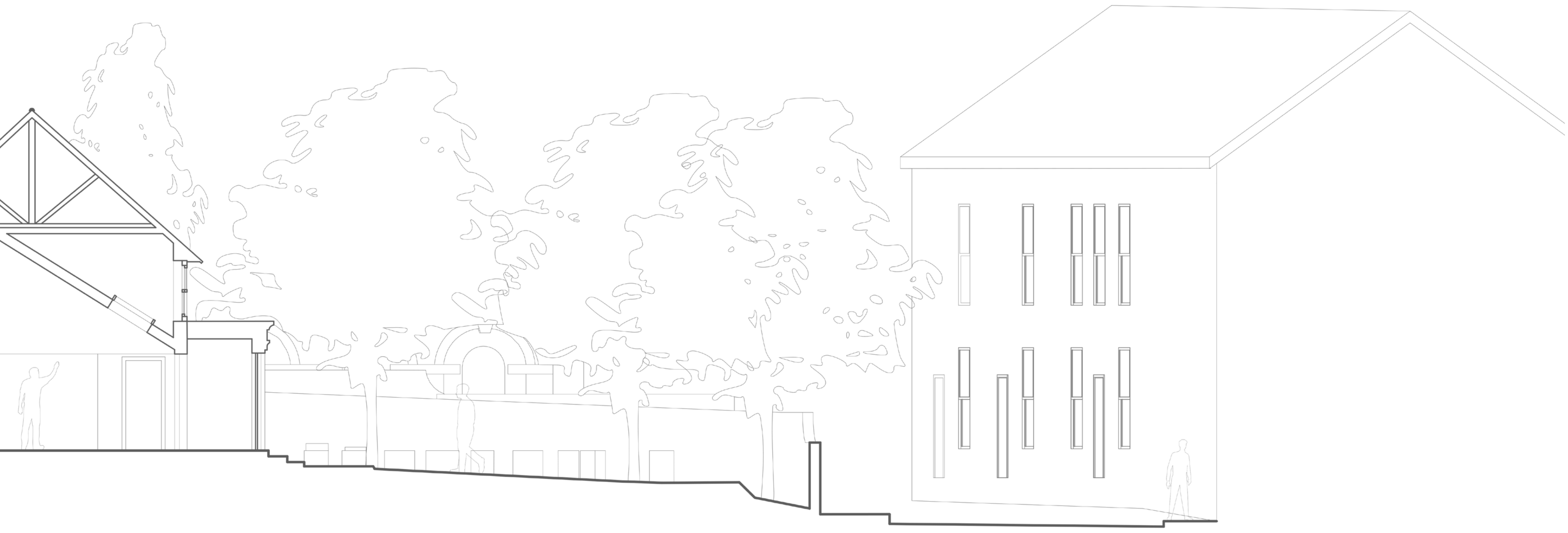
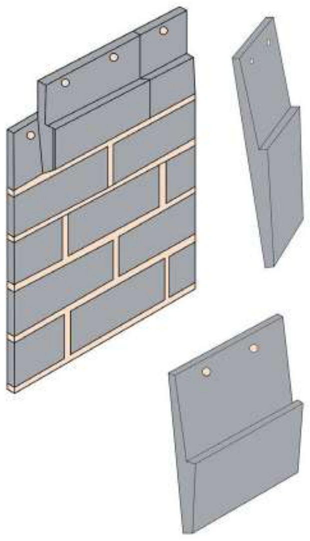




Short Section BB &
Back Elevation (West)
1:100 @ A1

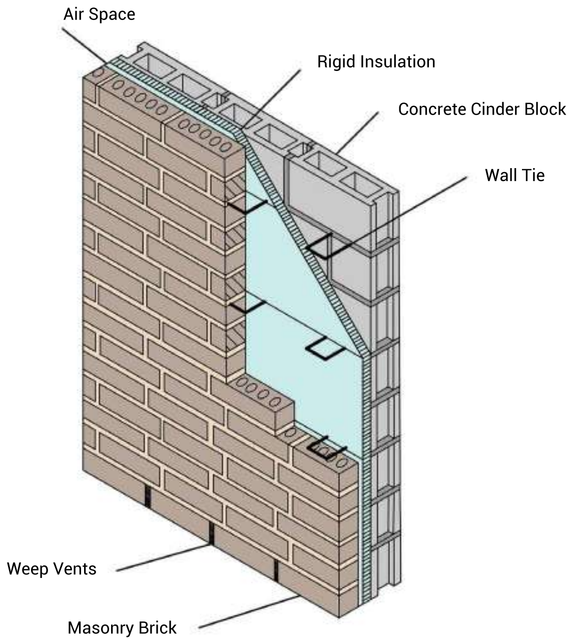


Existing Material Analysis



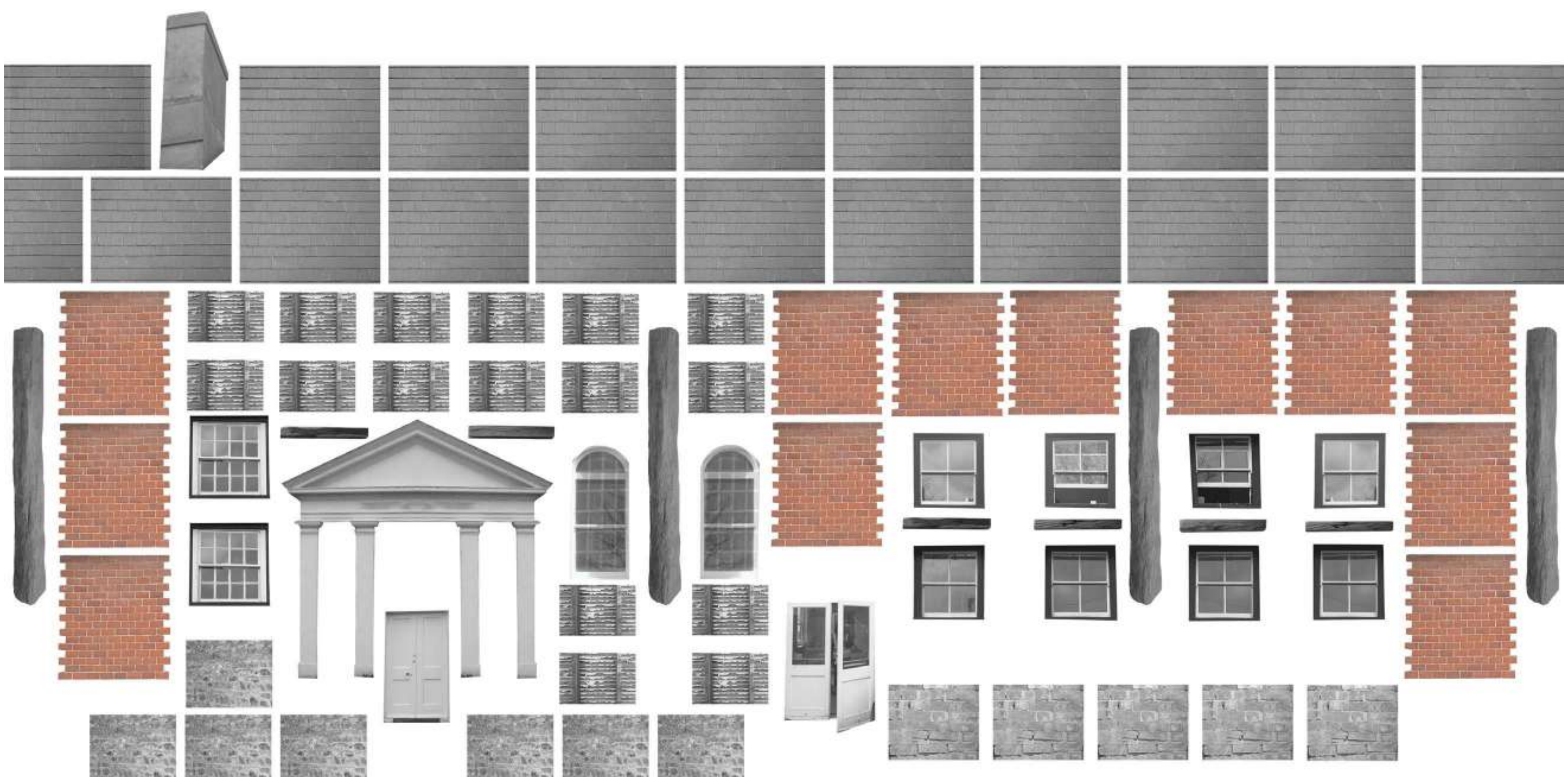
Mathematical Tiling

Experimentation of Site's Lathes and Plaster

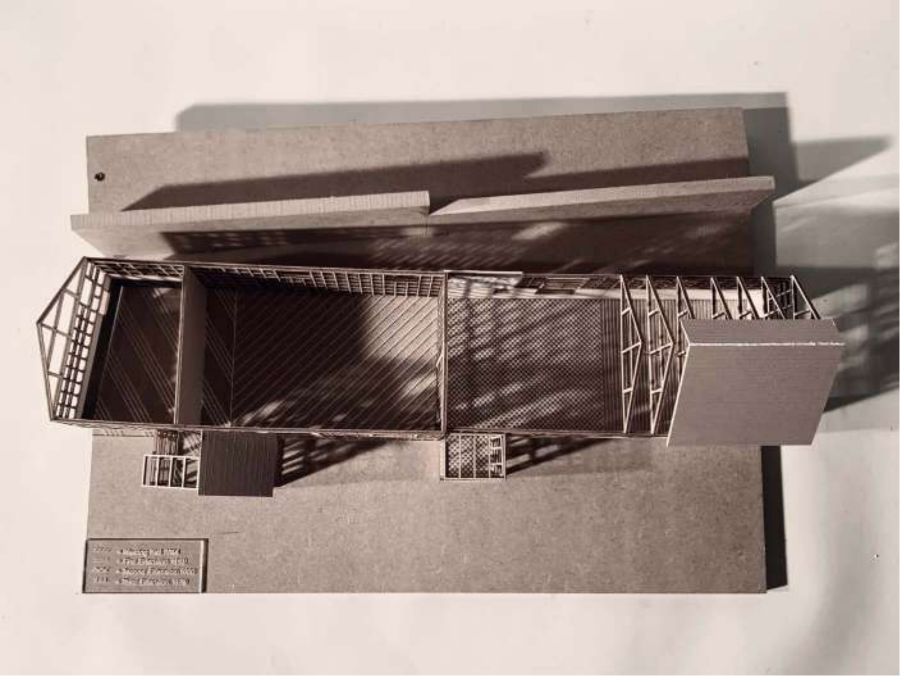


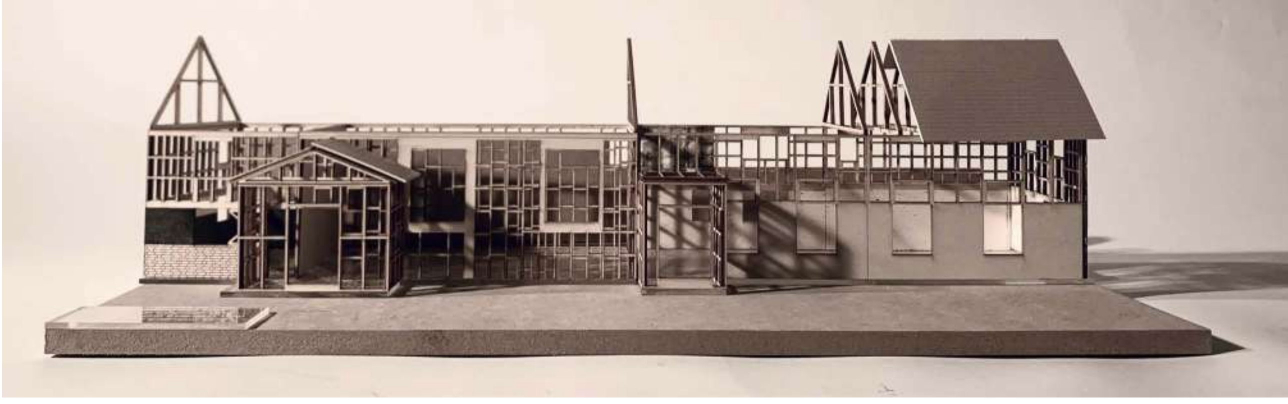
Modern Cavity Wall

Before determining a design proposal, several tests were coordinated to ensure the effectiveness of existing materials. Lathes and Plaster were recreated to assess whether the plaster would be reusable.
The experiment concluded the plaster would be able to be reused as it was lime based and used horse hair to bind it together, therefore leading the design proposal to consider the use of replastering a mixture of existing plaster to be sustainable. It was also found that the lime plaster absorbed CO2 in the drying process.
The mathematical, vertical and slate roof tiles were all determined they could be reused to refloor the space as they would have to be taken off to repair. This led to an investigation for a new cladding to support the building, which would be resistant to several properties as well as sustainable, renewable and a good thermal efficiency.



Flat Lay of the Quaker Meeting Houses Materials

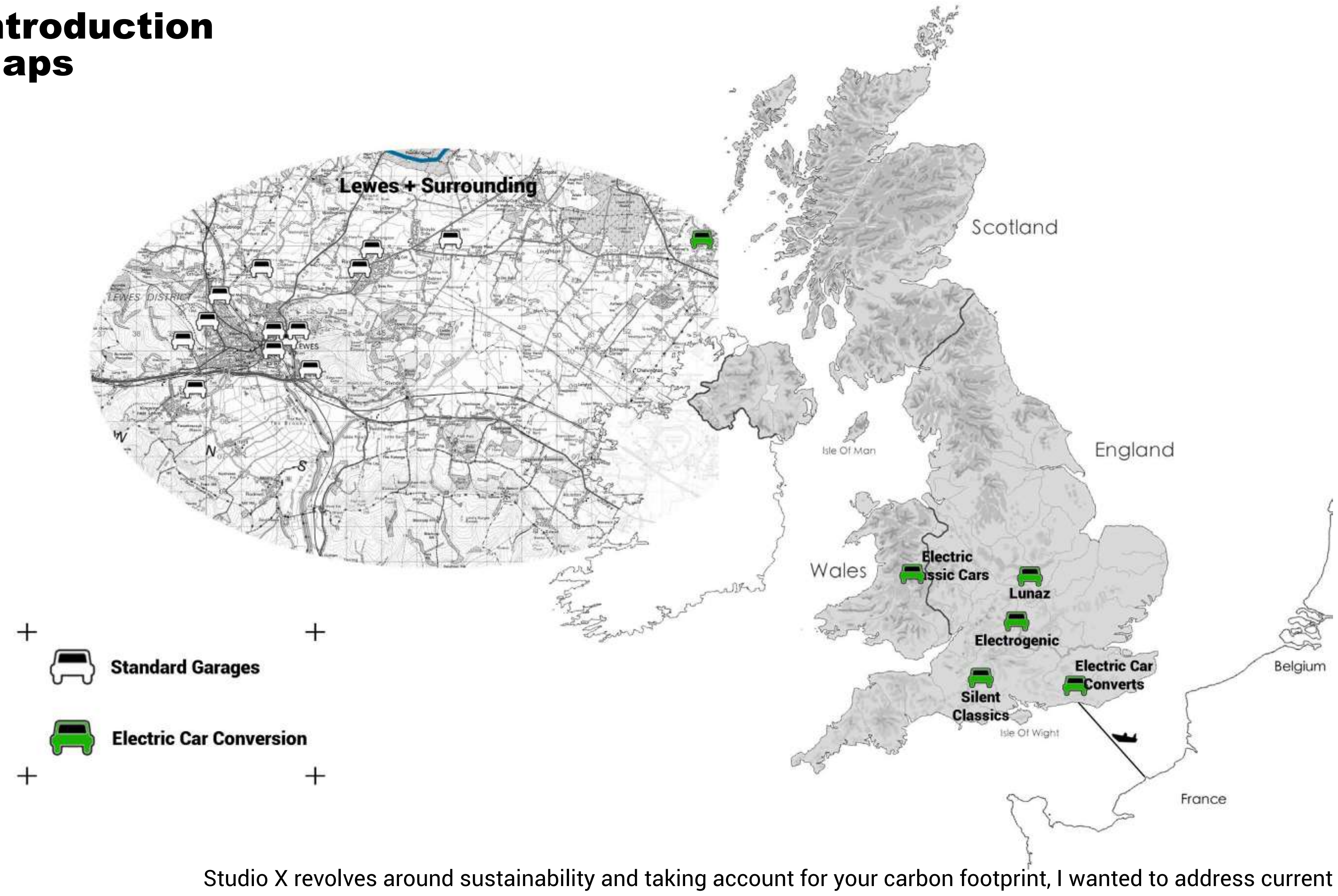




A structural model was created in order to further analyse the materials and structural elements across the building. This was the most efficient way to investigate as several different generational techniques worked together to connect the extensions, it proved challenging to analyse due to no standard way of combining the two methods.

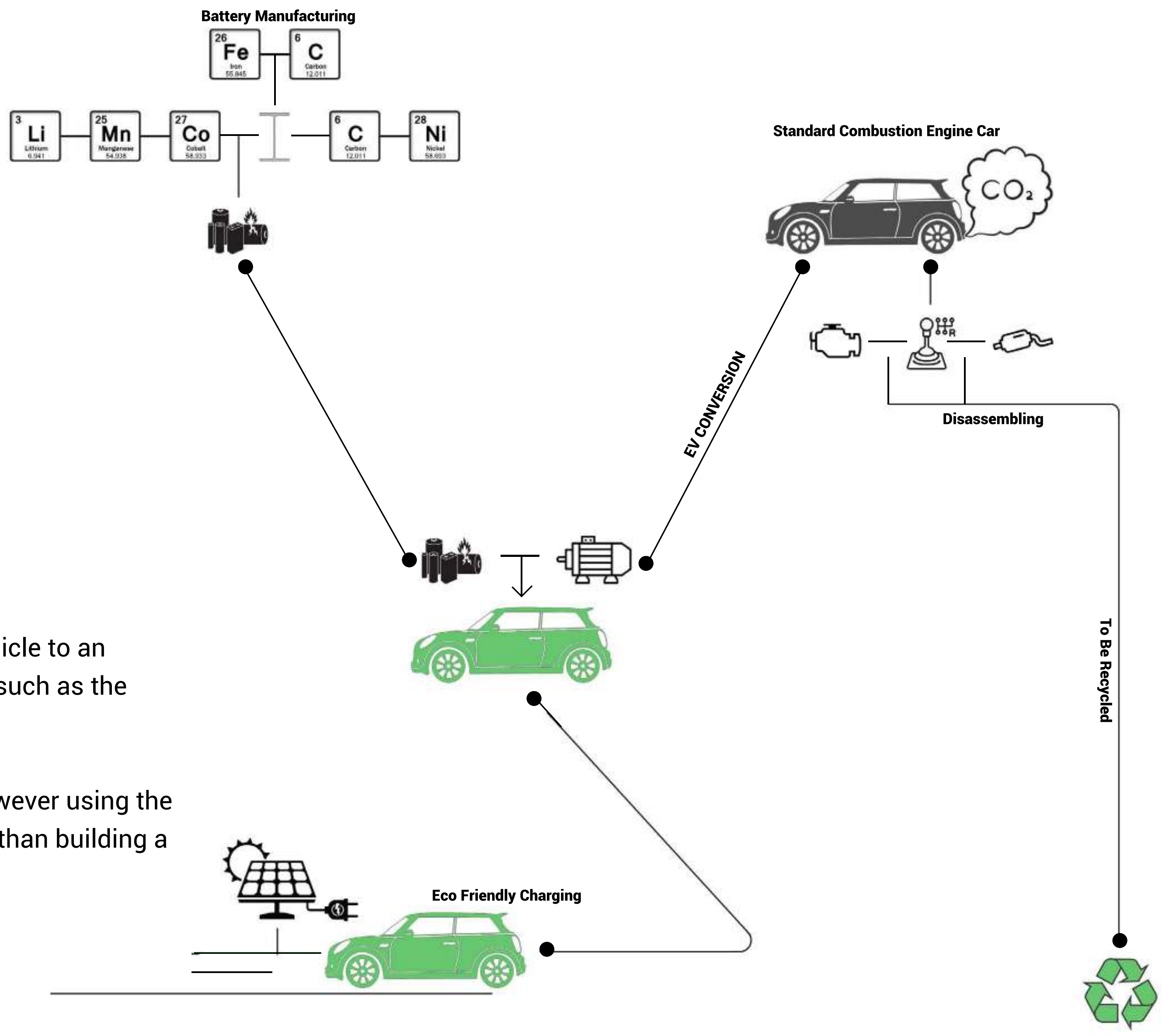
Structural Analysis Representation Model

Programme Introduction & Research Maps



Studio X revolves around sustainability and taking account for your carbon footprint, I wanted to address current world politics in my proposal such as the tension between the automotive industry and sustainability.
It is a widespread misconception that upgrading to an electric vehicle is the answer to tackle global warming. Due to misinformation, large quantities of the public are under the impression that electric vehicles are zero emissions, which is not in fact the reality of it.
The creation and farming of the materials to build an electric vehicle from scratch has a huge CO2 emission penalty (See Page II) in addition to a consistent CO2 emission throughout its life due to a lack of renewable energy infrastructure.
The average mileage needed to see the benefits of an electric vehicle is 200,000. Far beyond the mileage the average person would keep their car for.

This is why I looked at whether, **Is it more sustainable to convert existing cars?**

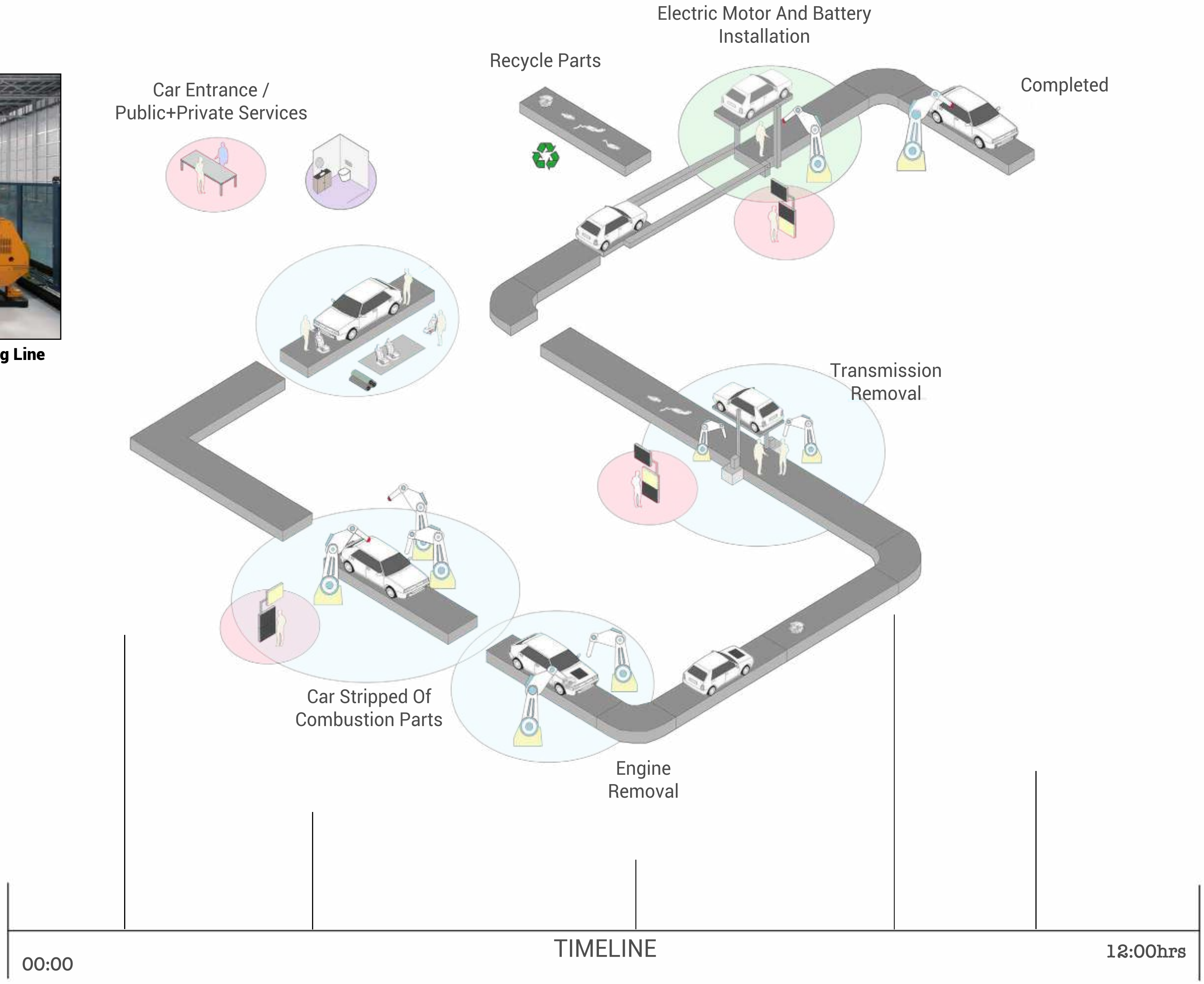


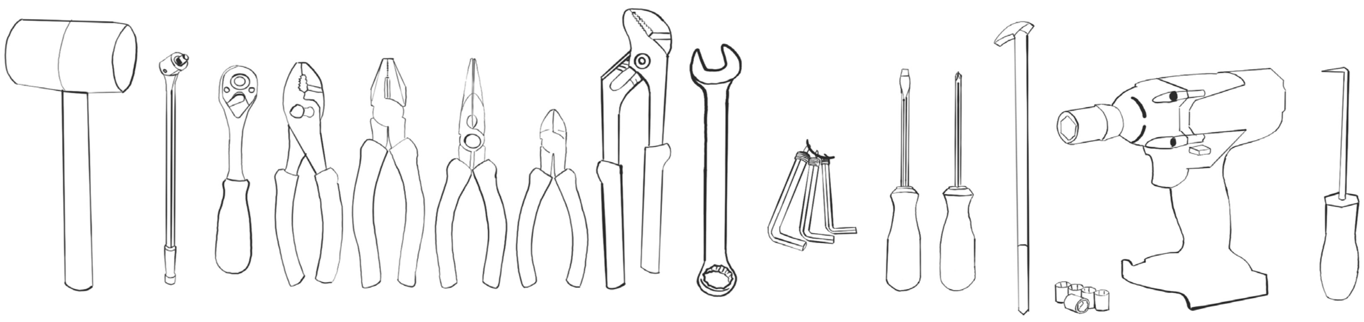
I narrowed down the process of converting a conventional vehicle to an electric vehicle by analysing what would need to be removed, such as the transmission, engine, exhaust system, gearbox etc.

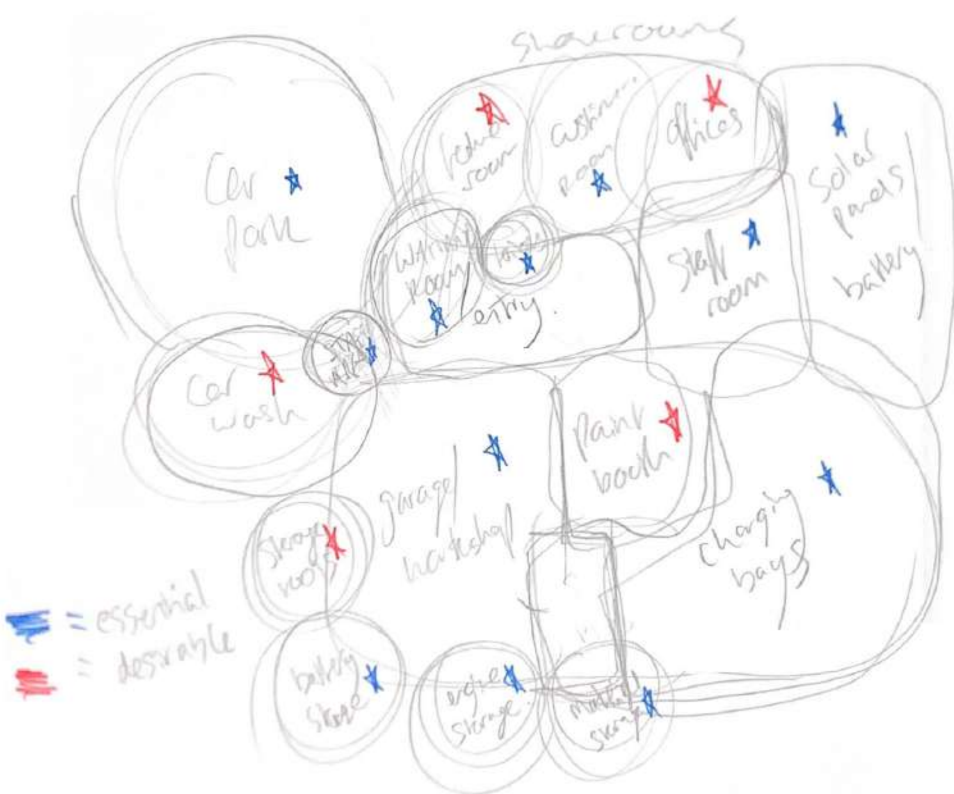
The creation of batteries are still a huge polluting industry, however using the existing chasis and car can be used to offset against it rather than building a new car from scratch.

3D Programme Spatial Analysis & Research

Vantage Corporation Automotive Manufacturing Line



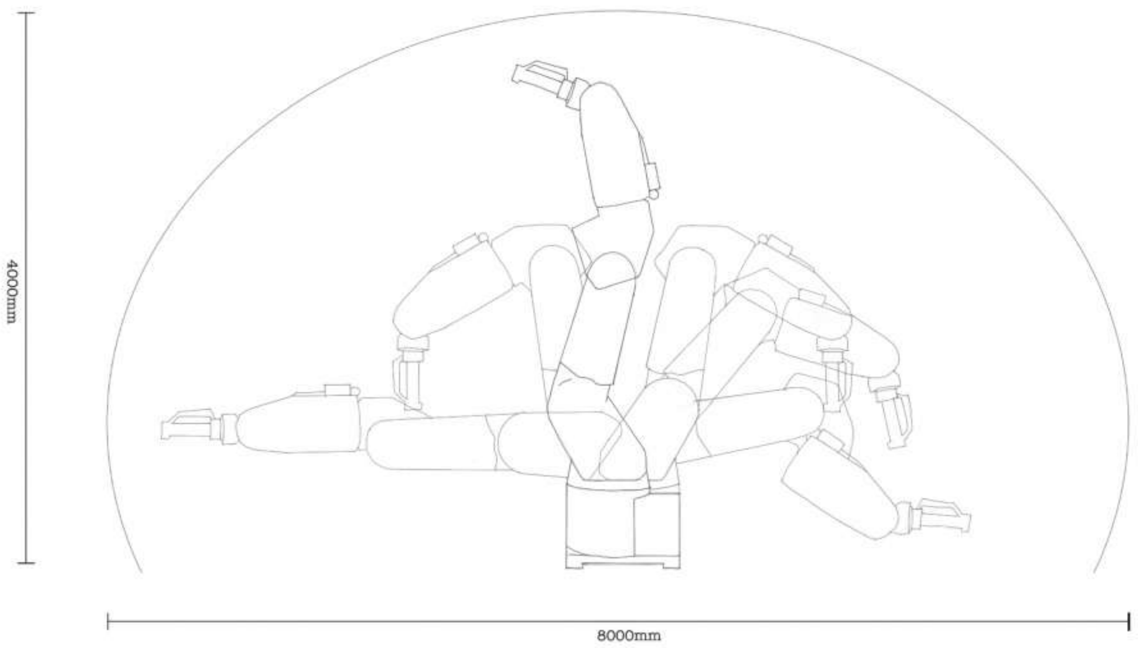




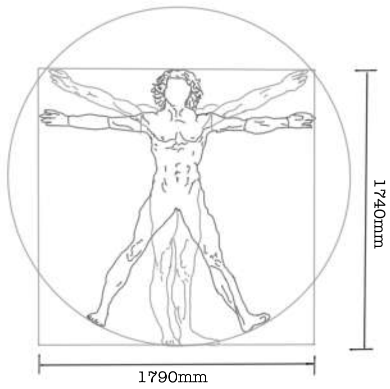
In the primary phases of my design development, I analysed essential, desirable spaces and equipment.

The primary spaces I identified were, staff quarters, charging bays, solar panels, waiting room, toilets, engine storage, battery storage, materials storage and sufficient car parking.



Measure of Robot vs Measure of Man

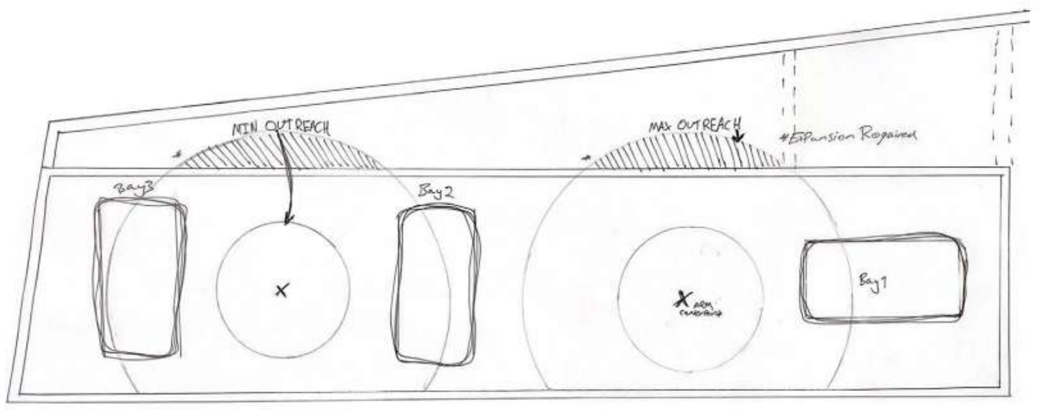


During my investigation of automotive production lines, I was quick to realise that most of it is completely automated, and it is in a clinical, zero human environment in comparison to a busy, dirty, messy mechanics garage.

3D Printed Parts to Develop Moving Model

I developed a mechanical arm from some simple 3D printed shapes to hold a pencil on a pivot (similar to a compass). This helped me understand spatially how a production line could flow through the site. I tested to see the maximum outreach and minimum outreach on the floor plans, identifying where I would be able to place them and where I would have to transform the building.I learnt from these phases that I would have to expand the space inside, as well as determine a new roof structure to allow for spatious, obstacle free environment for the mechanical arms.

This led me to create a further development of the mechanical arms and use stopmotion animation to further analyse the movement within the existing bulding.

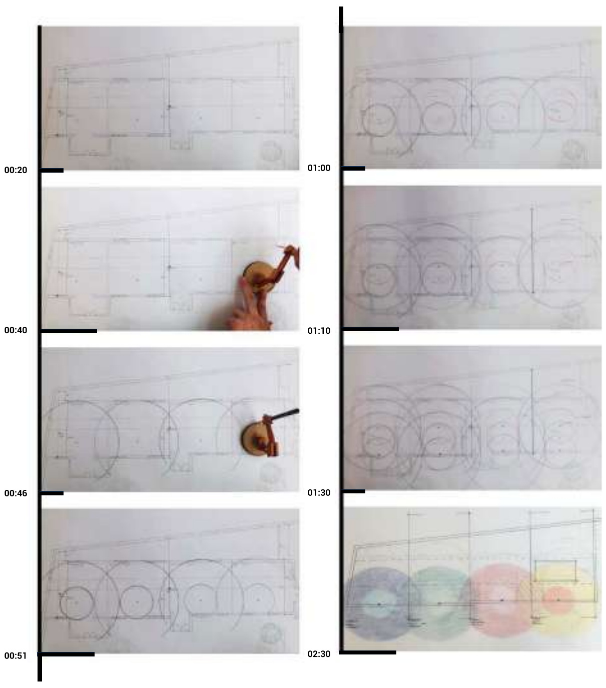


First Attempt at Determining Maxmimum Outreach

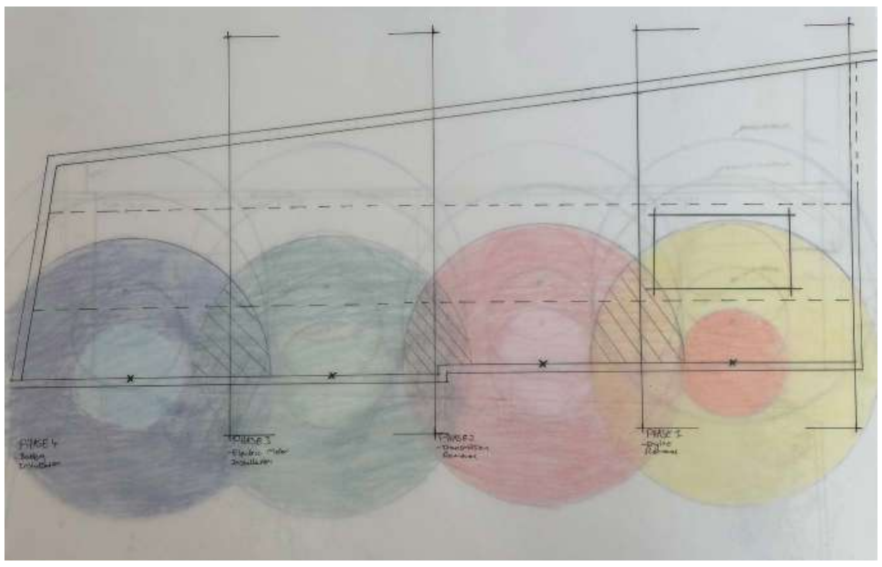
Creation of Moving Mechanical Model

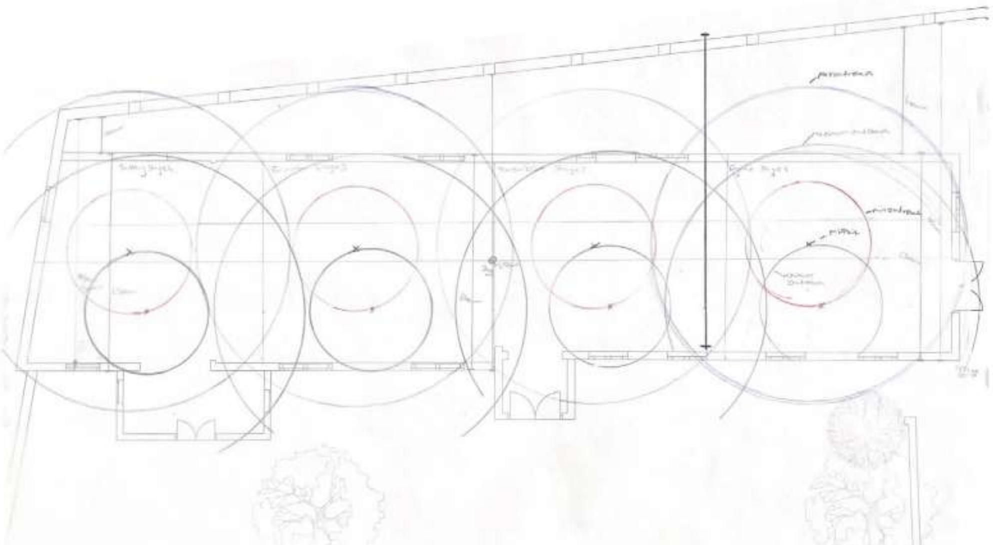
Design Development

Stage 1 - Robotic Arm

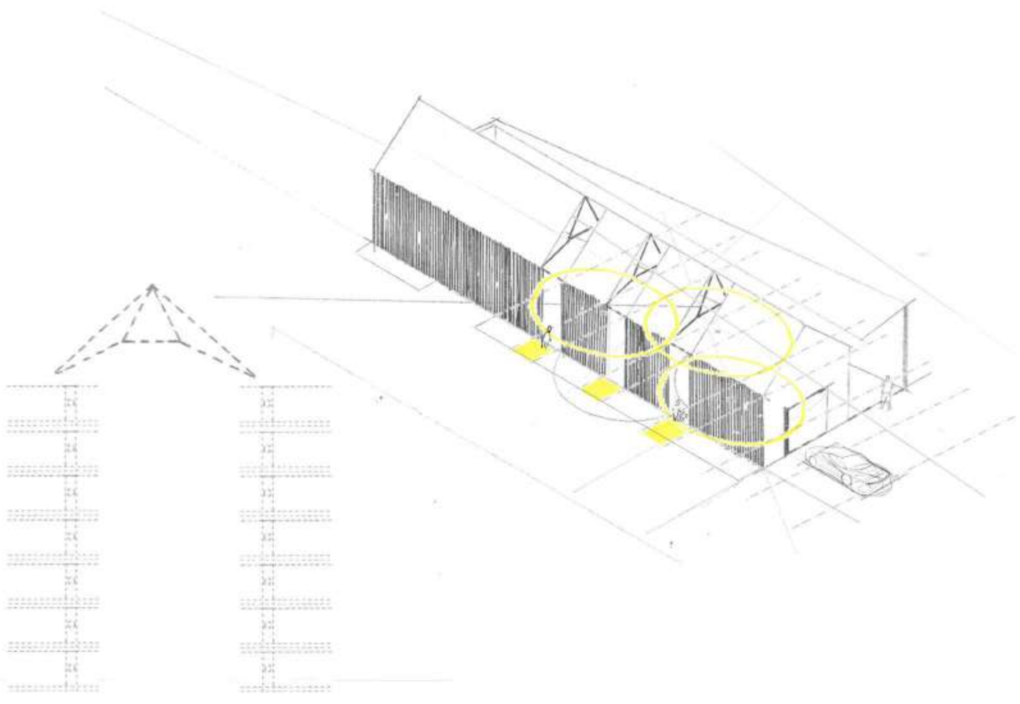


Timelapse Drawing of Mechanical Arm on Site

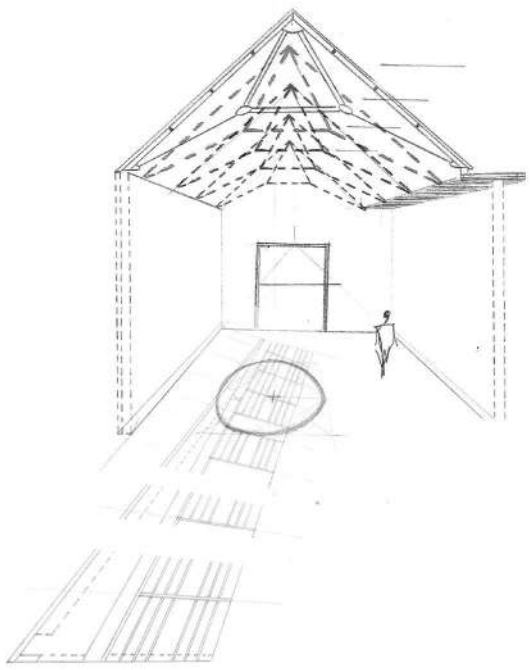


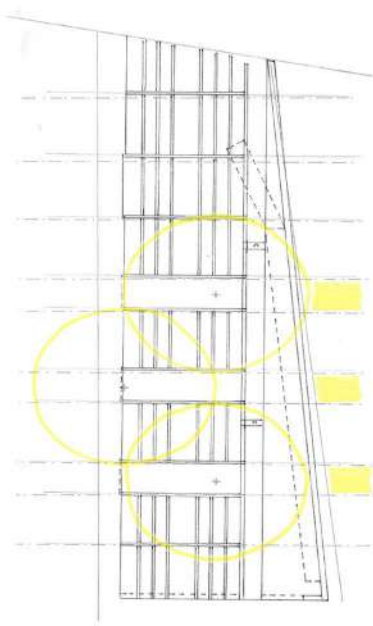


I started to experiment with the positioning of the mechanical arms, as well as how many are needed for the process and whether or not they should overlap.



Along with this experimentation, I started analysing where people would move around in the space, where the different desirable and essential spaces would be placed and how the public & workers would communicate through the space without disturbing the process.

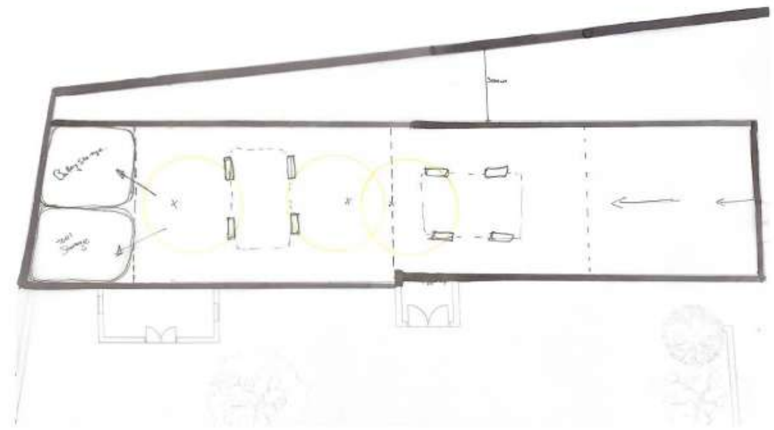




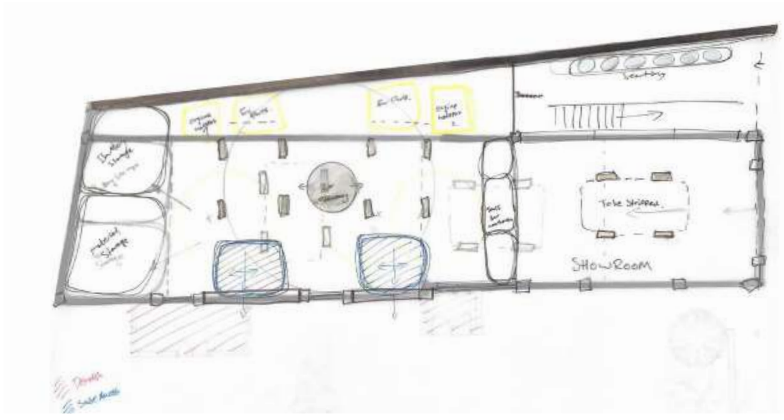
Design Development

-Stage 3 Transforming the Site to the Essential Programme Spaces

Stopmotion of Standard Car Size on Site



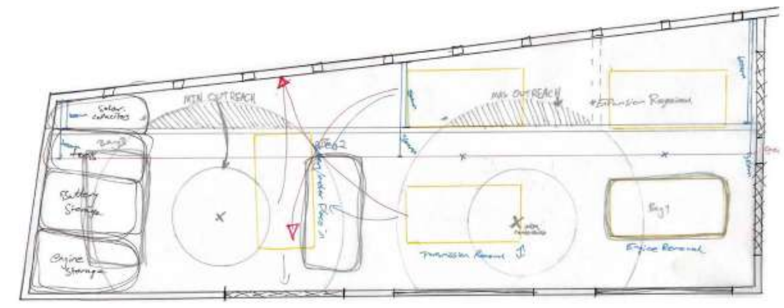
Secondary Attempt at Positioning of Arms



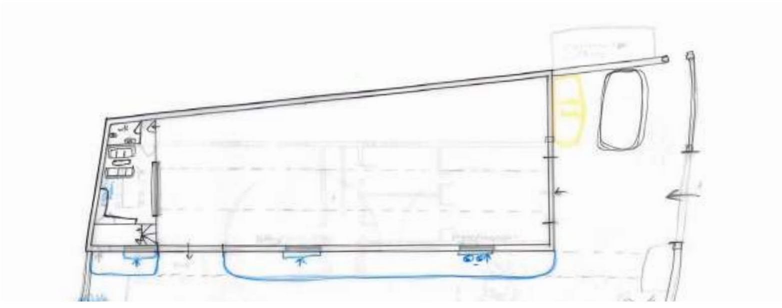
Adding "Essential" Facilities

Through iterative testing through floor plans, I identified that most of the essential spaces I was looking to add were out of date and unnecessary for the future of the streamlined automotive production line. I also identified that if you overlapped the arms reach radius, the need for humans also reduced, therefore leading to minimal spaces needing to be added and minimal human interaction in the process.

After streamlining the process, I experimented through the placement of the robotic arms on the plan to allow a natural flow for a car to travel through the space.

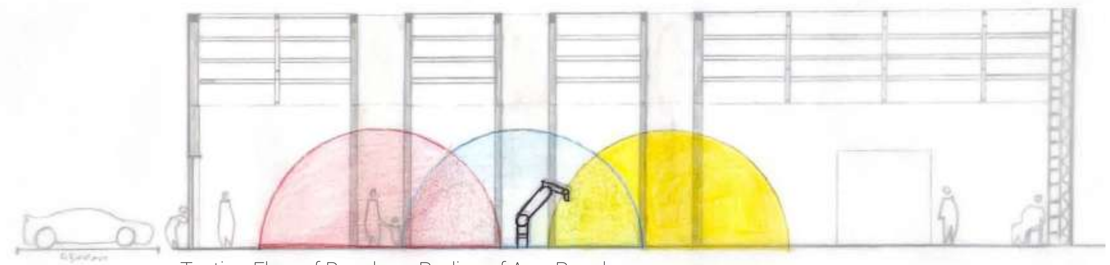


Trying to Maximise Efficiency

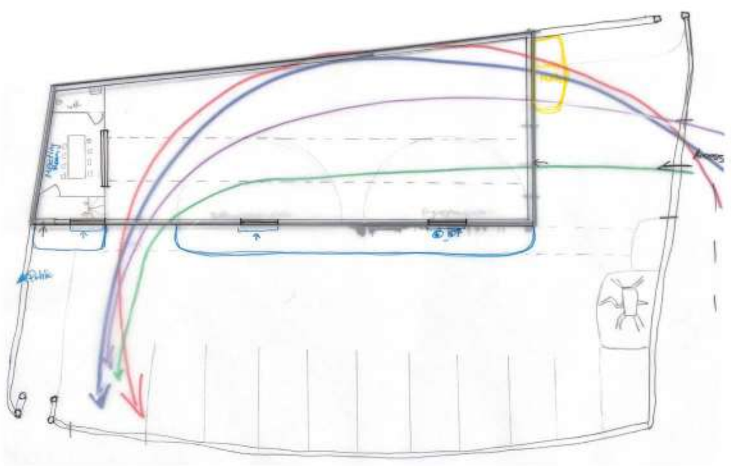


Adding View Points for Public to Watch

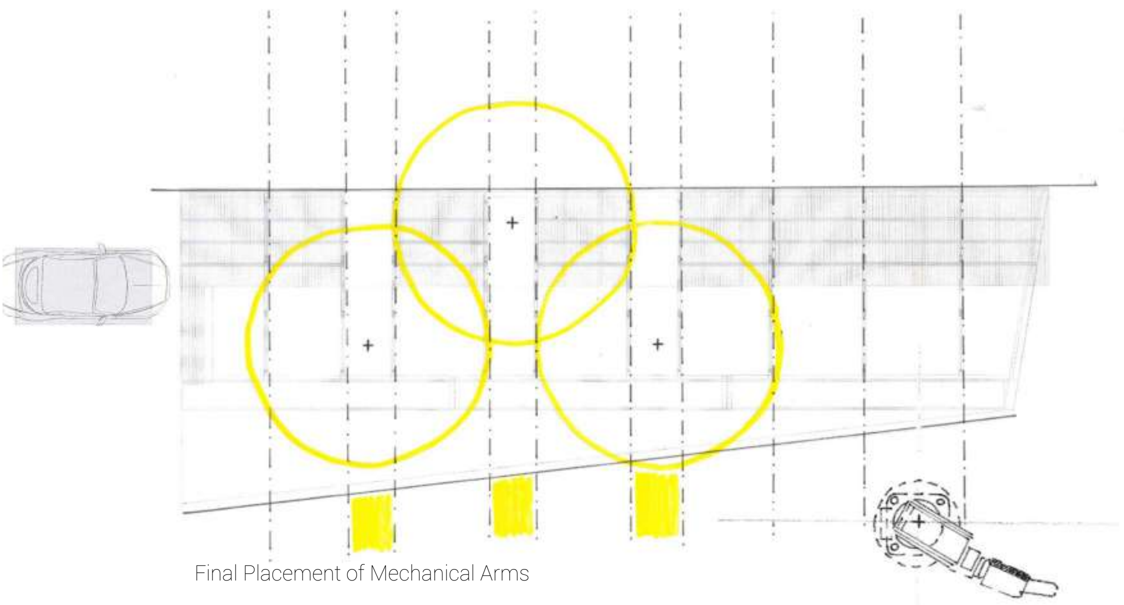
Testing Flow of People Through Sectional Perspective



Testing Flow of People vs Radius of Arm Reach

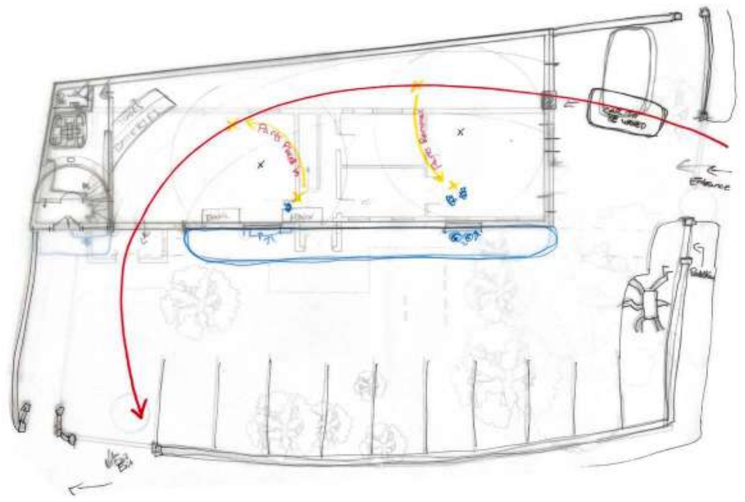


Testing of Car Flow Through Space



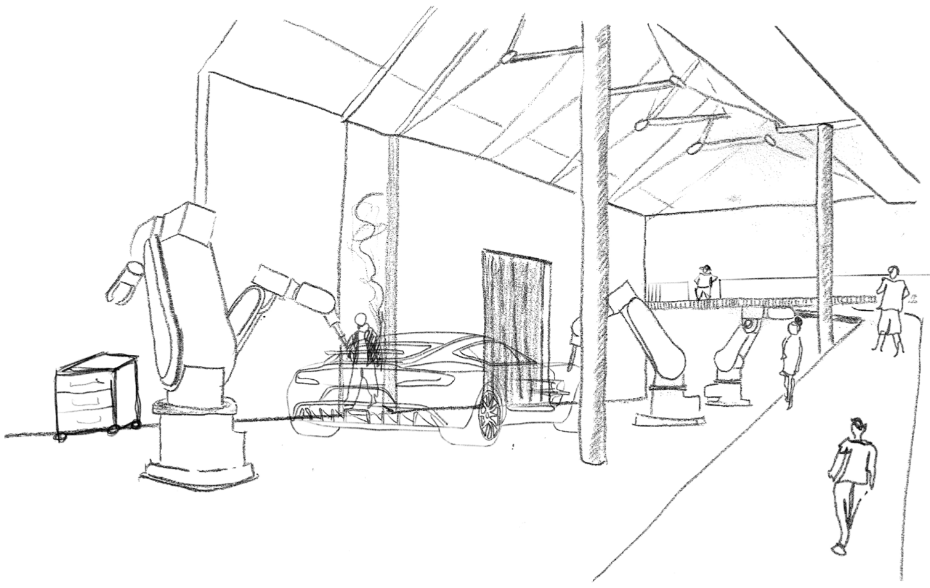
Final Placement of Mechanical Arms

I reached the final placement of the mechanical arms by using the streamlined new process, as well as the known radius and flow of customers to determine each stakeholders positioning.

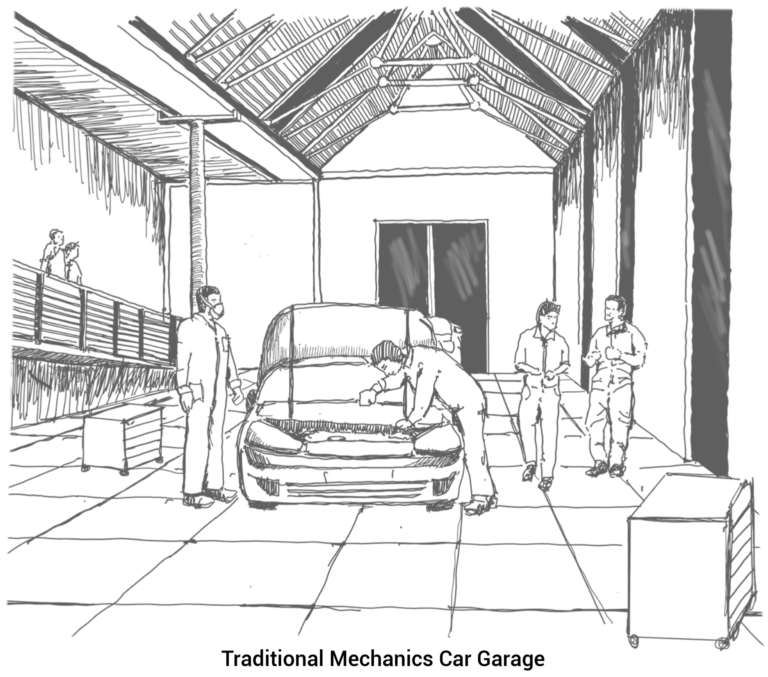


Testing of Car Flow Through Space with Arm Placement

Stage 4 Streamlining Programme and Catering to Inhabitants

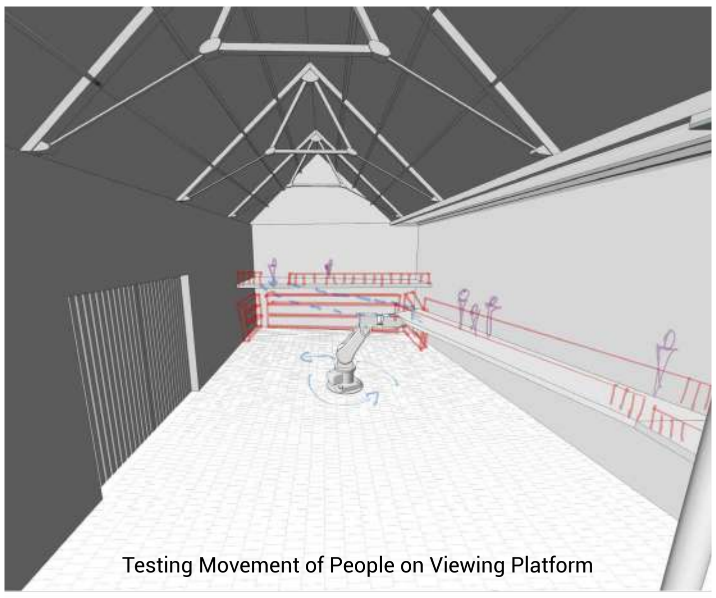


Futuristic Clinical Car Garage

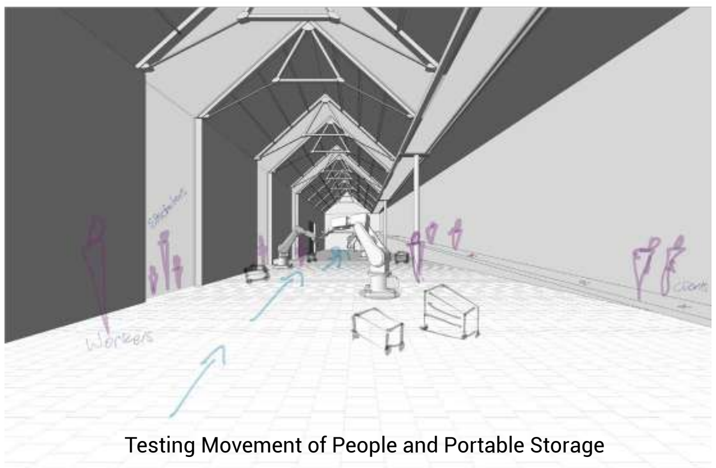


Traditional Mechanics Car Garage

As cars self-diagnose, and self order parts, traditional garages in the future are a part of a failing system, where automation is taking over jobs, it won't be long until the same is done in the automotive repair industry, as it did for the automotive creation industry.

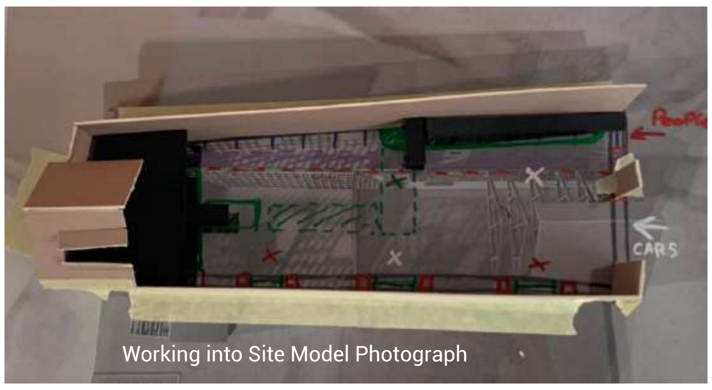


Testing Movement of People on Viewing Platform

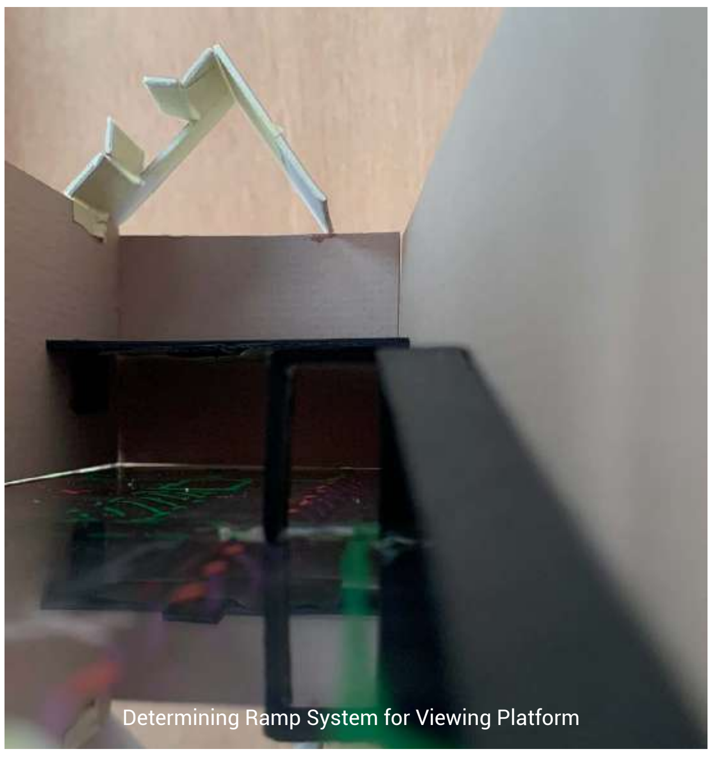


Testing Movement of People and Portable Storage

Through collaging and creating an iterative model on site plans, I determined various ways for people to travel through the space in a ramp system. The ramp system creates a secondary form of travelling through the building without imposing on the space required for the manufacuturing line. The iterative model and collages concluded that there were several ways to reach the viewing platform at the back of the garage, however one was most apparent which would be the most efficient, thus influencing the final route of the ramp system. This allowed people to view the whole process whilst walking up the ramp, as if they were the car, going through the transformation process themselves (ideal for customers to view the process before they decide to convert their own cars, a futuristic take on a modern showroom). At the end of the ramp, a mechanical arm lifts the last ramp along to the platform, to embed the technology into the design proposal.

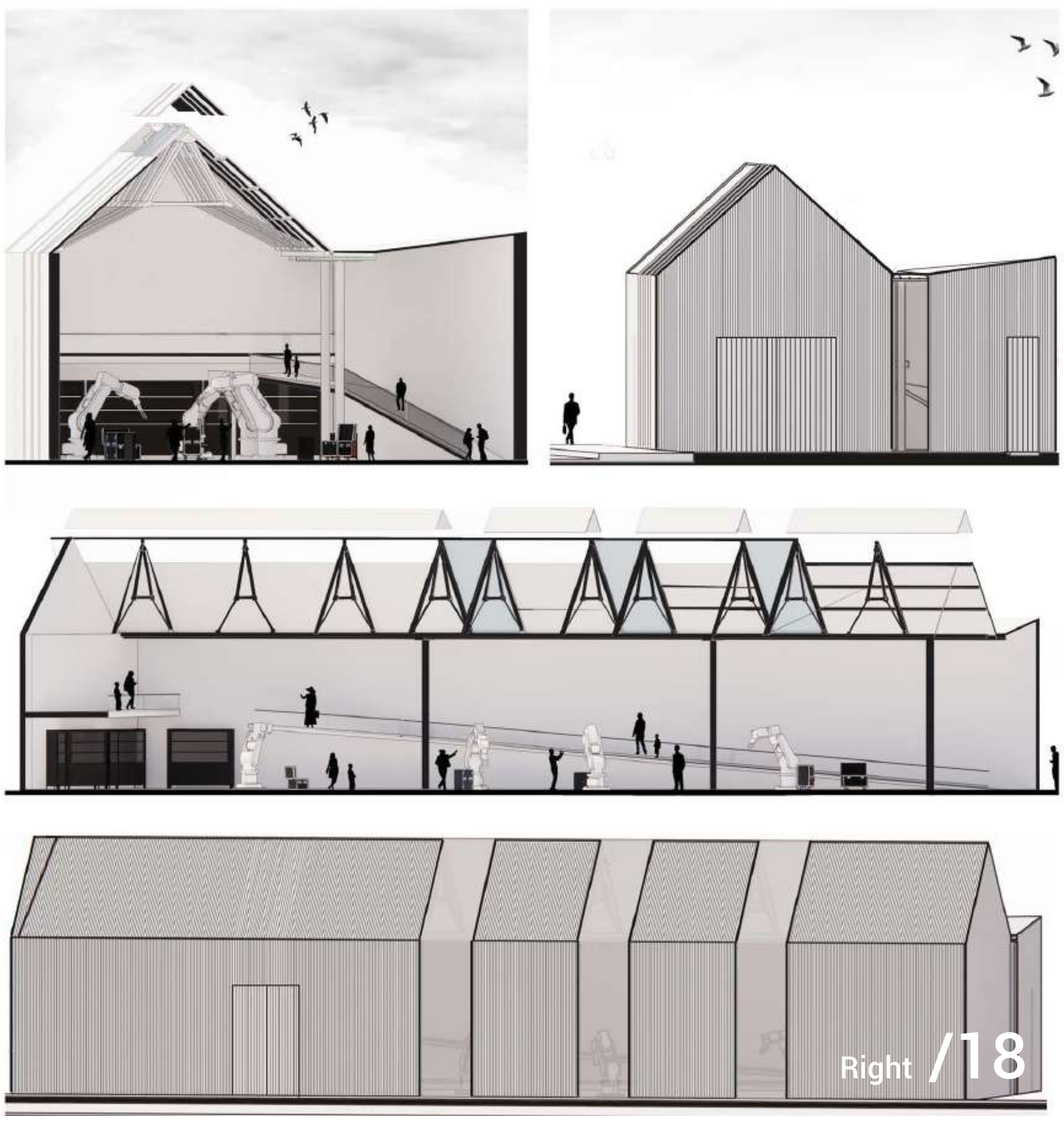


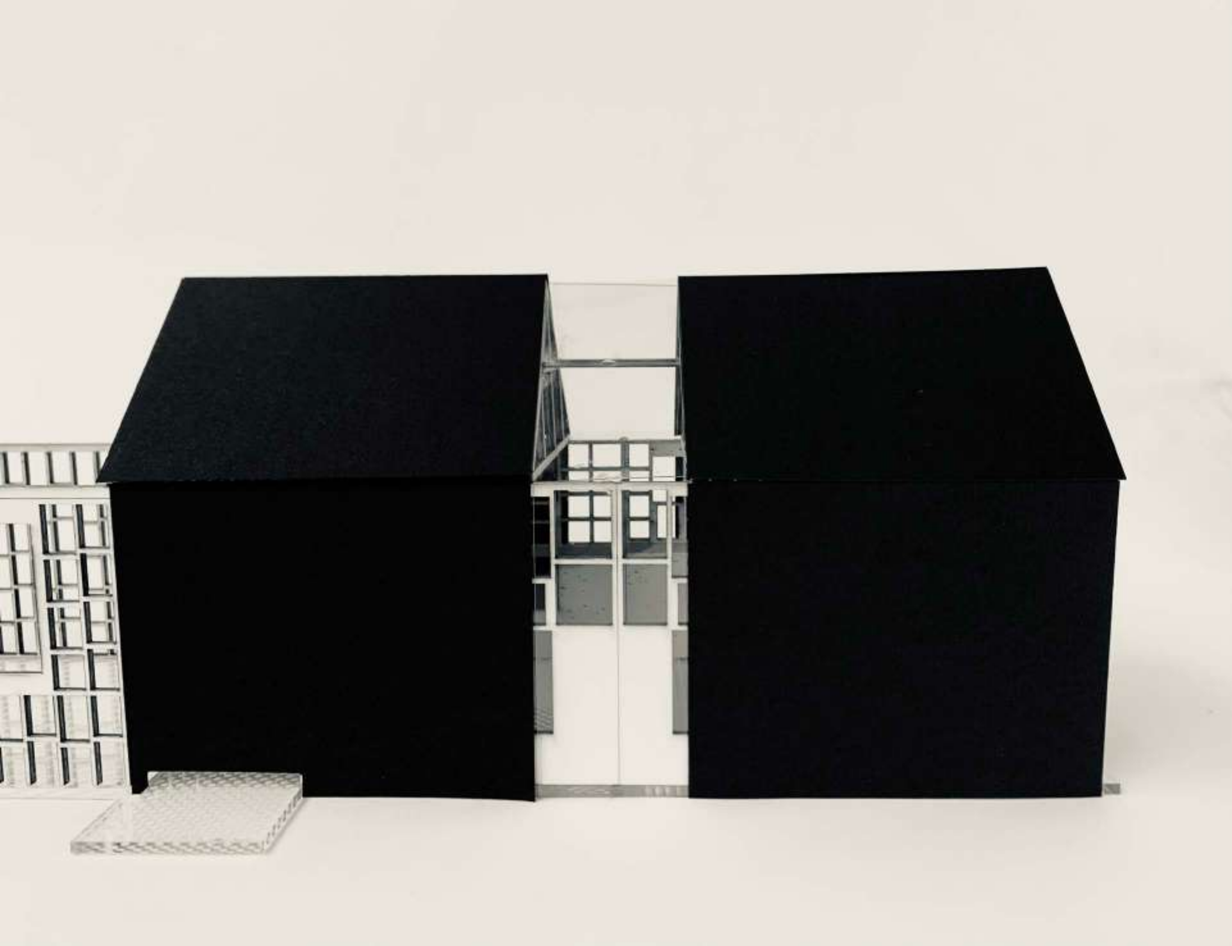
Working into Site Model Photograph



Determining Ramp System for Viewing Platform

Collaging to Determine Ramp System

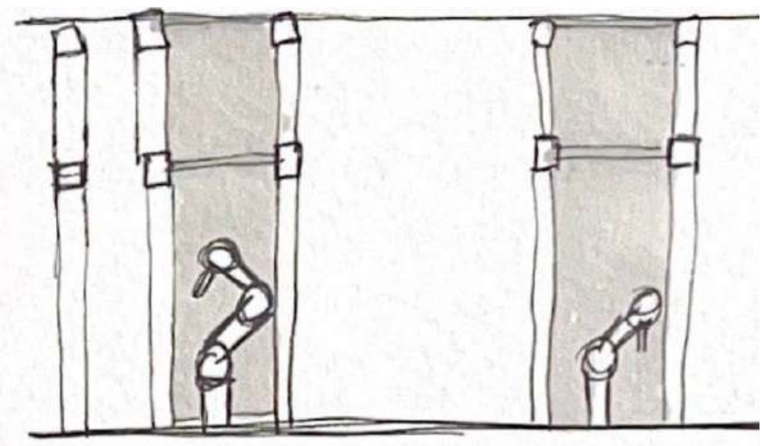


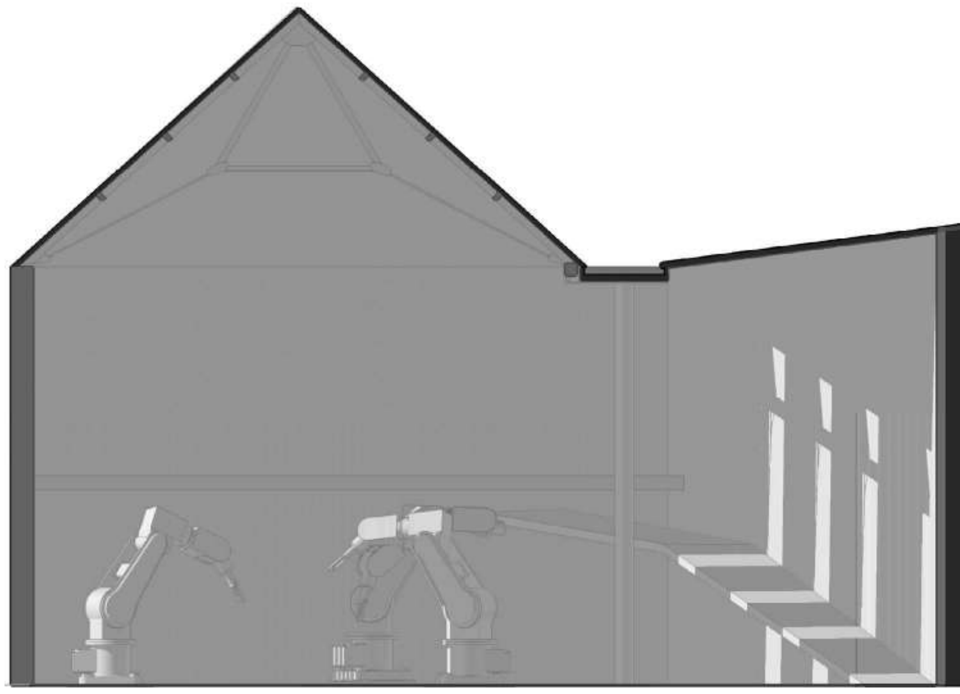


Sliding House - dRMM Architects

Having analysed the Sliding House, I liked how they had a glass facade covered by an exterior shell that allowed it to move, determining however much sunlight they wanted to let in.

I needed a form to encourage the public to view the different moments in the assembly process. I developed a form which had strips of triple glazing panes, hugging the building, inspired by the splitting up of the different generational extensions the Quaker Meeting House consisted of. This design element also solved part of the insulation issue as well as harvested sunlight to travel inside the production line.



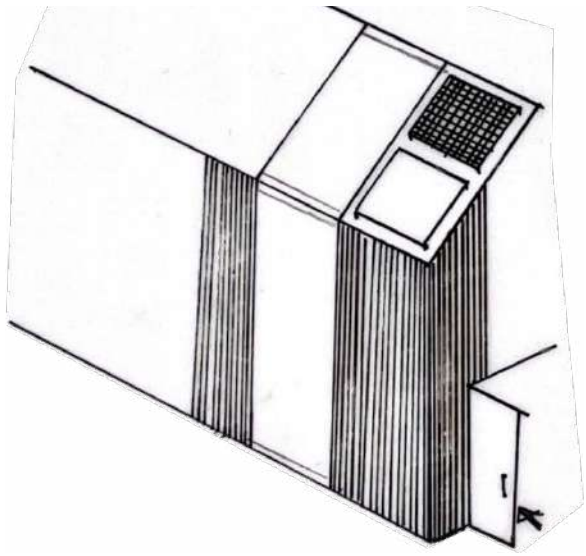


Testing Sunlight Through 3D Model

Precedent Analysis & Iterative Model

Stage 5 Determining Structural Design to Complement Process

Locally Growing Trees at a Radius of 30 Miles
-Larch
-Douglas Fir
-Ash
-Yellow Pine
-Pitch Pine
-Sitka Spruce



I tested several alternative construction materials to determine which would be the most sustainable and effective for my design proposal.

I tested the different wood by charring them to identify if they were all suitable to the same theoretical properties that charred larch holds. Ash was also effective and the result concluded it would last without further treatment for around 30 years, as well as pest, rot and fire resistant.

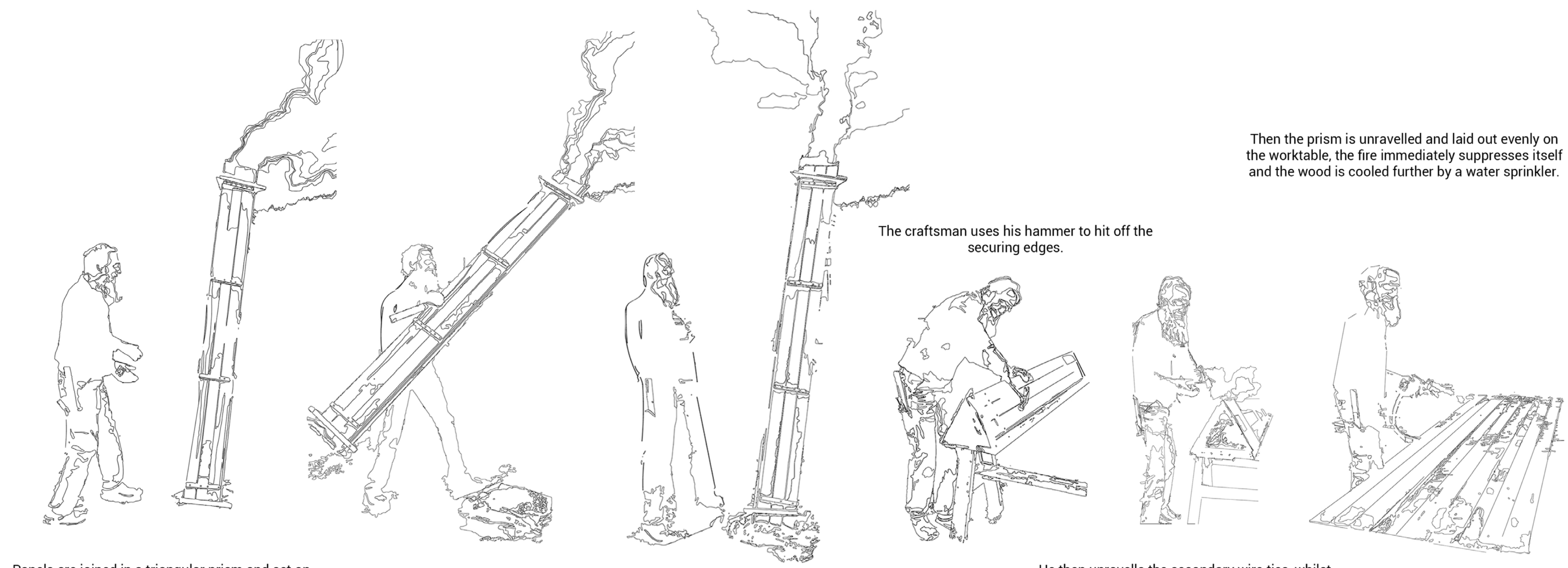
My investigation led me to the conclusion that Ash Dieback was the most sustainable as it was a locally grown product with a current disease infestation. Burning the planks would erradicate the disease from developing whilst also utilising the material which would have been discarded and burnt in the process of trying to stop the outbreak.

Testing / Charring Wood Types

The craftsman then uses his hamer to pry the sides loose to allow the fire to burn the edges.

Then the prism is unravelled and laid out evenly on the worktable, the fire immediately suppresses itself and the wood is cooled further by a water sprinkler.

The craftsman uses his hammer to hit off the securing edges.



Panels are joined in a triangular prism and set on fire internally.
This process draws in oxygen from the bottom and accelerates the burning through a chimney like structure, burning what would be the exterior of the panels once taken apart.

The prism has been flipped around to allow for an even burn across the panels.

He then unravells the secondary wire ties, whilst allowing the prism to continue burning horizontally.

Proposal Material Analysis, Sourcing & Testing

Material Research & Comparison

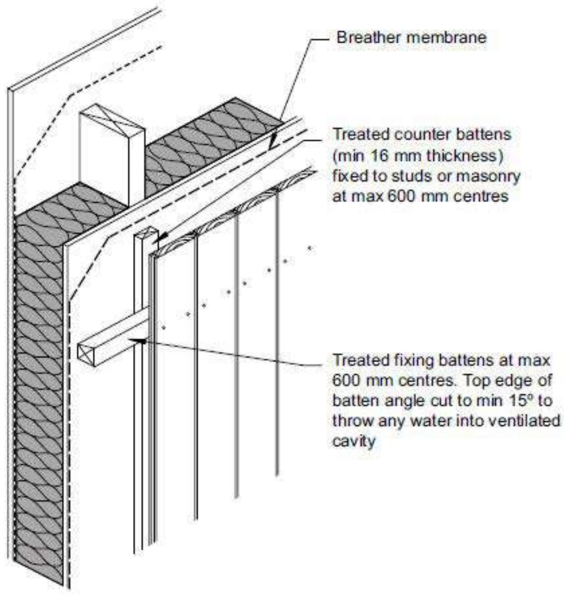
Image of Burnt Ash Closeup

Burnt Ash was selected for this proposal as it can be locally sourced, sustainable and has several positive properties that support the narrative.

The proposal concentrates on carbon emissions due to the production of new electric vehicles, burnt Ash cladding embraces this narrative through locally sourced ash dieback from Lewes, burnt on site instead of using harmful protective chemicals. Ash dieback is also the most sustainable material in comparison to other softwoods as ash dieback is currently tackling a disease, and being cut down to prevent the disease from spreading, thus providing an unlimited, free material to use.

The cladding compliments the minimalism of the process as well as works with the narrative, to provide an insight on the future of sustainable building and car production lines.
The cladding is attached to the timber studwork of the existing Quaker Meeting House.

It supports the poetic aim of the proposal by giving the local community a focal point of the mechanical arms working with the customers cars, whilst also blending into the nighttime darkness.



Burnt Ash Cladding- In Use Section

Image of Burnt Ash Cladding

SKIN /ENVELOPE

The material is used a lot in Japan, across Europe and Scandanavia, predominantly to contrast against the local area, as well as using natural elements to be weather resistant. It's external expression is burnt however the backside of the cladding is unburnt.

The skin is connected onto studs, on a breather membrane, on further insulation. It compliments the buildings thermal performance by drawing in heat from the sun rays, to heat the building by harvesting natural elements.

APPLICATIONS

Burnt larch panels are usually used as cladding, however the panels can be used for cladding (with coatings) and woodwork in construction.

It is usually used to adapt existing buildings as the material is sustainable and easy to source, relatively cheap, as well as they last for a long period of time.

DESIGN IMPLICATIONS

Softwood panels come in all various sizes and shapes and can be cut to the users desire.

Ash cladding weathers over time, however it has a natural layer of sap protecting the front for around 40 years before needing maintenance.

The panels are fire resistant, pest resistant, water resistant, rot resistant and acts as a sun shield.

SUSTAINABILITY

The material originates from Ash Dieback trees, it is usually produced by timber companies, cut into standard stud sizes and sold.

The process of burning Ash is by setting it on fire in a triangular prism shape, forming a chimney and forcing oxygen to feed the fire and travel up, at a fast pace. This creates high temperatures and allows the worksman to burn several pieces at once, at a fast turnaround time on site.

The Panels can be further burnt and used as a fuel, or ground down into ash and using the lye from the ash to create soap.
The embodied carbon (kgCO2e/m2) in Timber Cladding (unburnt) has been independently calculated at 9.15 kgCO2e/m2.

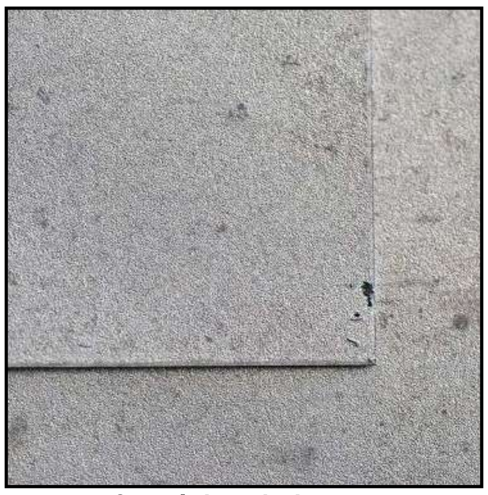


Image of Reclaimed Zinc

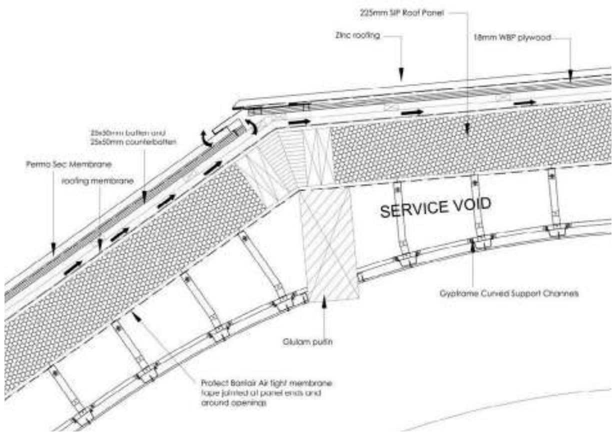
Reclaimed Zinc Sheets were selected as an alternative for the proposal as Zinc provides a waterproof membrane as well as compliments the dark tones of the burnt larch cladding.

The zinc is reclaimed from the local, Lewes Recycling Centre, and is utilised for the roof membrane due to its weather repellant nature, as well as being lightweight and easy to reuse due to its versatility in sheet form.

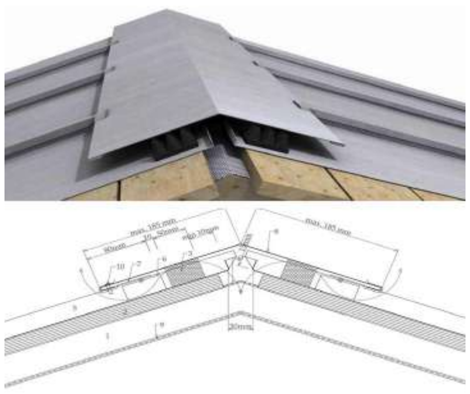
It supports the poetic aim of the proposal, as it is reclaimed and recycled into a new usage without having to repurpose it through the typical recycling channels. It also provides a better sustainability and less of a carbon impact than to mine for new zinc.

It attaches to the roof as a membrane "skin" form due to its sheet and flexible nature.

It thrives on carbon dioxide rich atmosphere, which relates to the poetic aim of the proposal, reducing the automobile industries carbon footprint.



Reclaimed Zinc Sheet Cladding- In Use Section



Reclaimed Zinc Sheet Cladding- In Use Section

Image of Reclaimed Zinc Sheet Cladding

SKIN /ENVELOPE

Reclaimed Zinc Sheets are dark grey, malleable, lightweight and weatherproof.

It's skin is a single layer, and is screwed into a secondary skin of a plywood panel underneath.

It has poor acoustics and is cool to the touch. It is generally used as a skin on buildings as well as underneath solar panels as they have a good UV resistance.

APPLICATIONS

It can come in any sizes as it is reclaimed as well as standard sheets of rolled zinc. It can be shaped easily as well as mould on any suface or angle.
It has a natural patina and ages very well, across time and weathering.

DESIGN IMPLICATIONS

Reclaimed Zinc Sheets are often used for roofing however they can also be used for rainwater systems.
If it is alloyed with copper and titanium, it maximises its tensile strength and can be used for load bearing capability.

SUSTAINABILITY

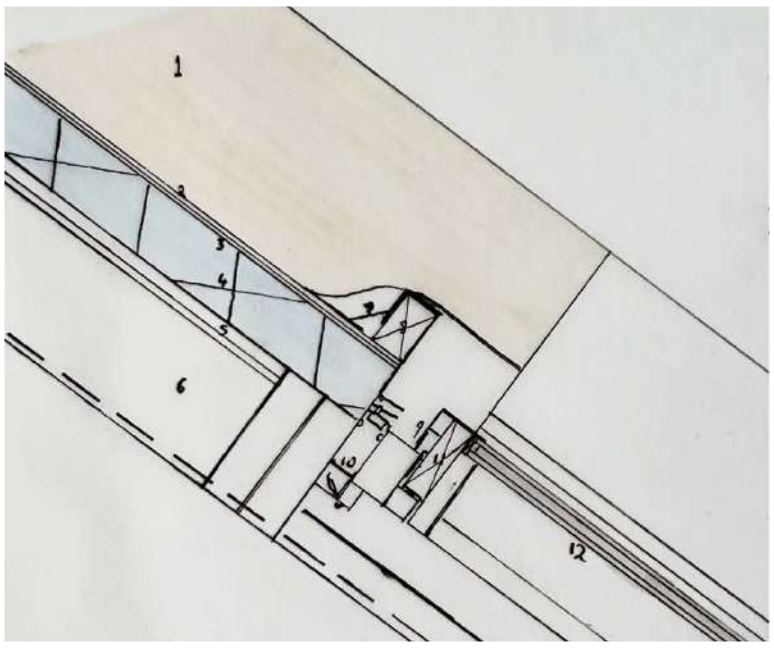
Zinc originally has to be mined, it is usually combined with different elements to increase it's strength.

It is easily reusable and recyclable due to it being in sheet form and its strength, it is usually recycled in large quantities, therefore generally 80% is usually reused.

Embodied energy in zinc (production) is, on average, between 49-55 MJ/kg, this puts the total annual energy required to produce zinc between 637-715 petajoules (1015 joules) therefore minimising the demand for new zinc is crucial.

Precedent Analysis & Testing

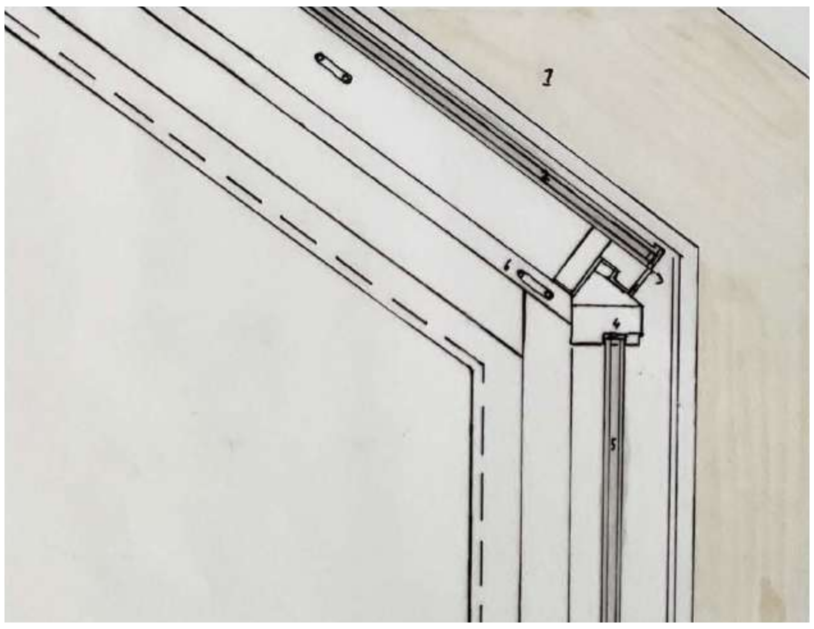
Stage 6 Developing Structural Design

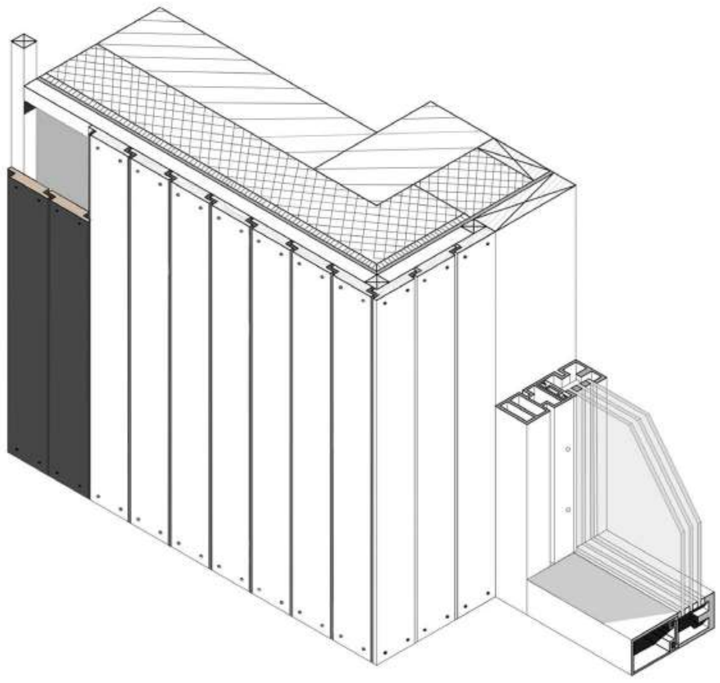


1) 350mm Chinese Straw Hatch
2) Waterproof Plywood Substrate
3) Waterproof Membrane
4) 122mm Rigid Insulation
5) Plasterboard Ceiling Panel
6) 246mm Steel Joist
7) Waterproof Membrane
8) Timber Framing
9) Aluminium Profile
10) Trickle Vent
11) Timber Window Frame
12) Double Glazing

Living On The Edge House - Arjen Reas Architects

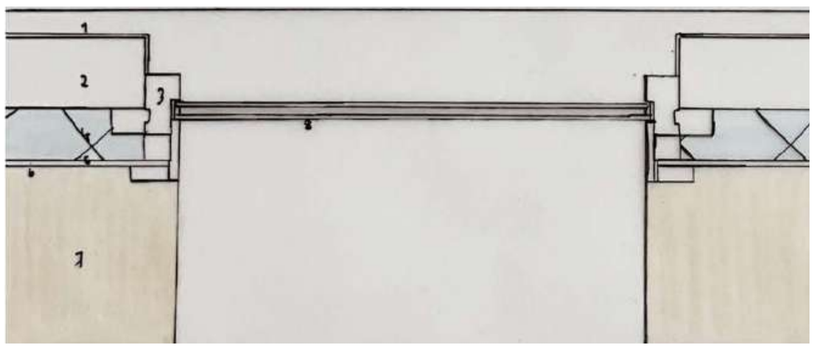
1) 350mm Chinese Straw Hatch
2) Double Glazing
3) Aluminium Profile
4) Timber Window Frame
5) Double Glazing
6) Spring Mechanism To Open Window





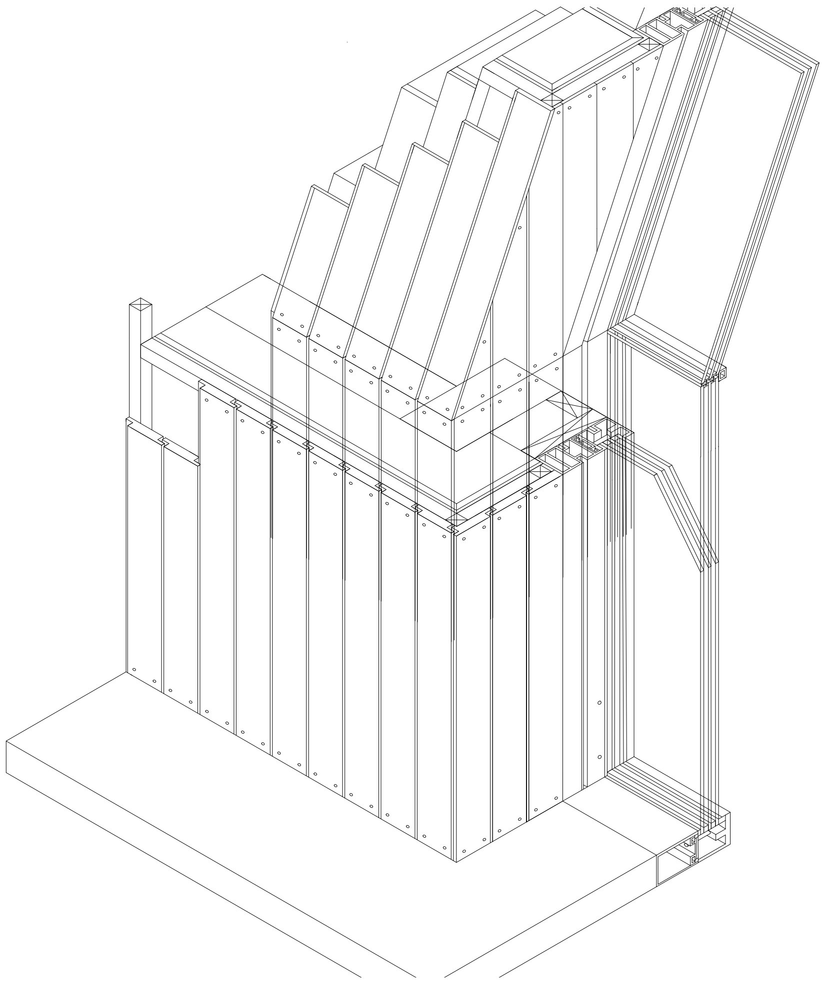
Testing of Wood Clad and all Glass Facade.

1) Plasterboard Wall Panel
2) 140mm Timber Framing
3) Timber Window Frame
4) 100mm Rigid Insulation
5) Waterproof Membrane
6) Waterproof Plywood
7) 350mm Chinese Straw Hatch
8) Double Glazing

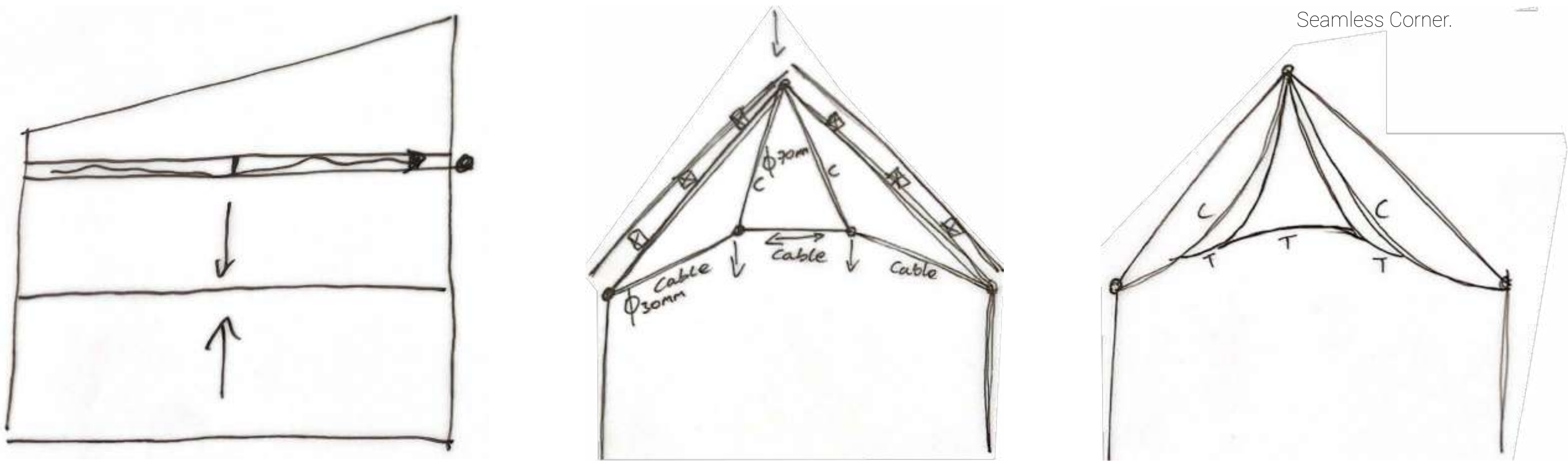


Throughout my analysis of the Living on the Edge House, I investigated into several structural elements of how they created glass panels hugging the building with a seamless corner edge. I came to the conclusion that structural silicone and glass would be able to work hand in hand with load bearing side aluminium profiles to give an all glass exterior profile look.

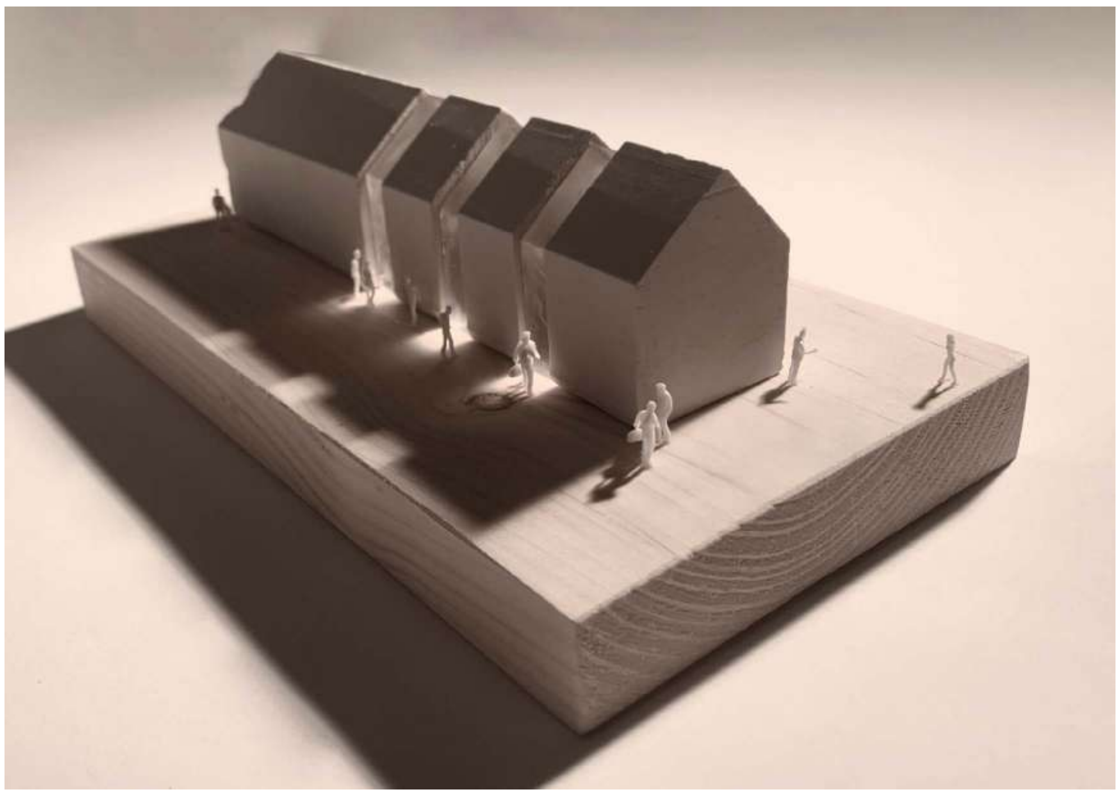
Throughout further analysis and experimentation I worked on creating a wood clad, all glass exterior look, this led me to understand the materials and structural integrity behind it, which I further developed to create a seamless inset glass design.

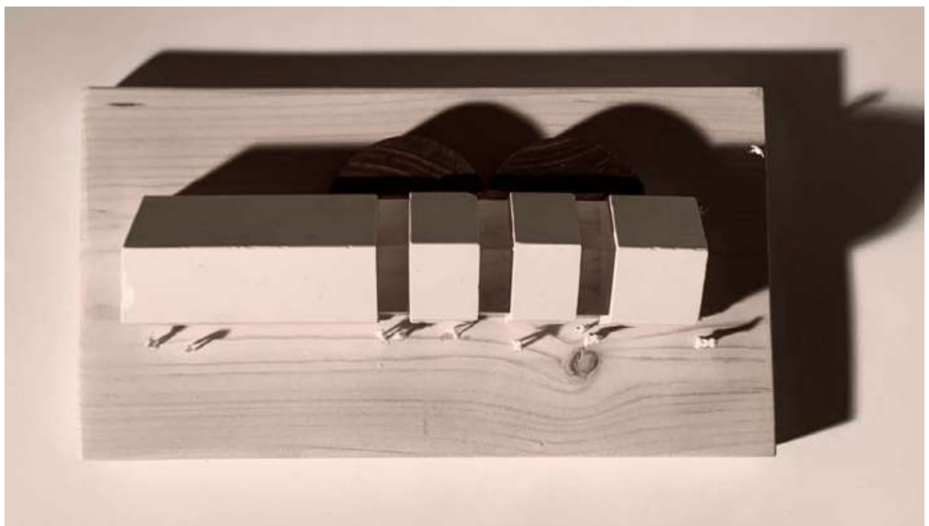


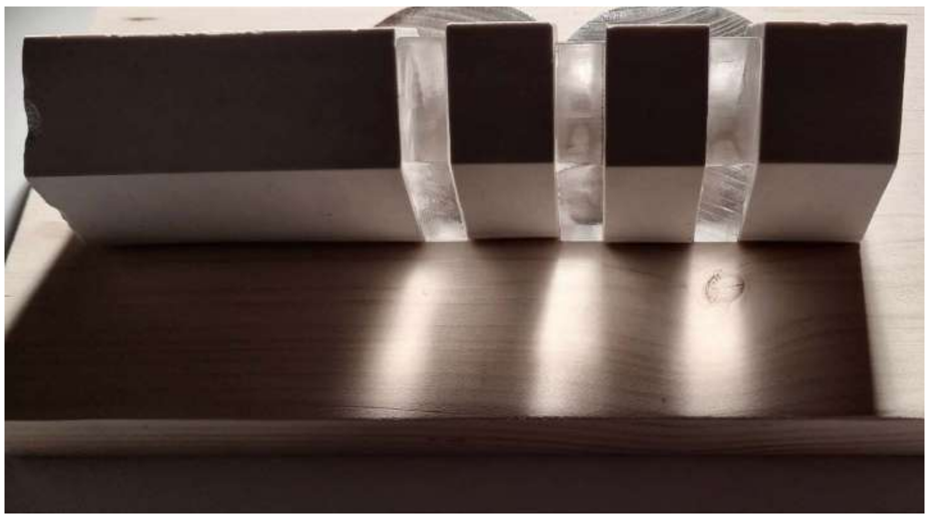
Testing of Wood Clad and Inset Glass Facade with Seamless Corner.

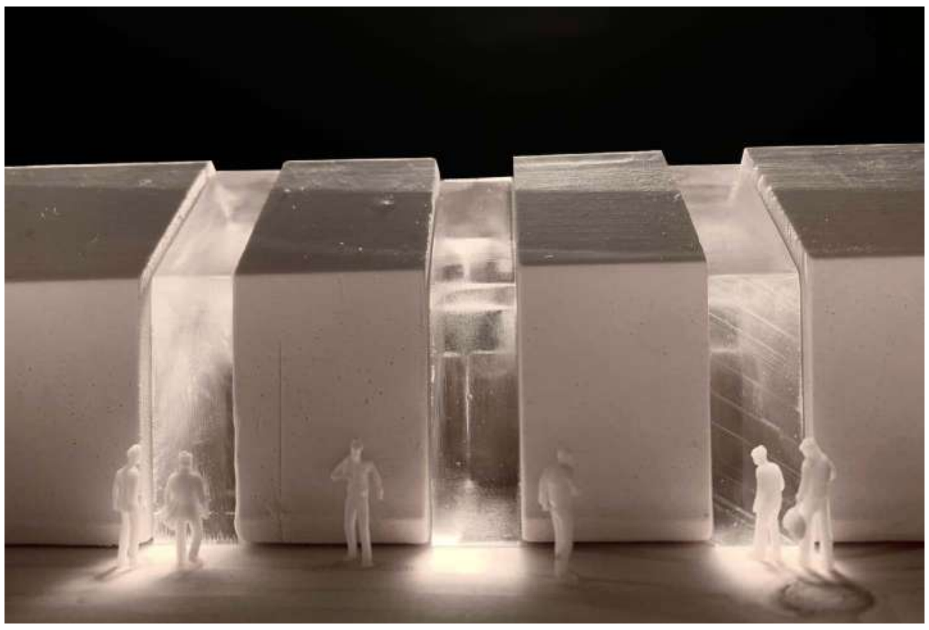


Experimentation Designing a Spatious Roof Structure Whilst also Supporting the Glass Facades





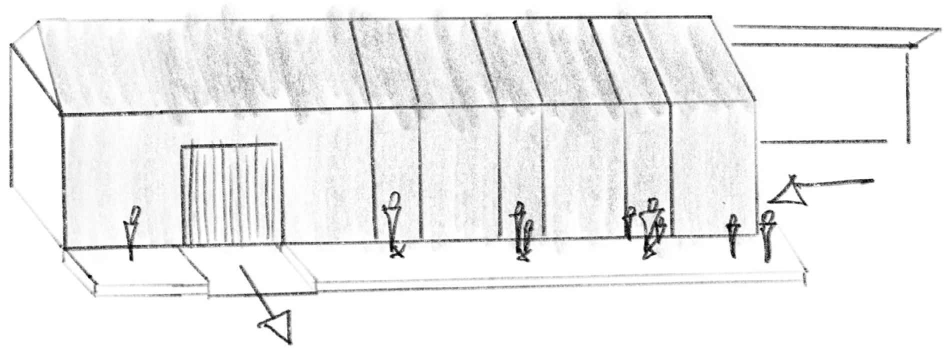




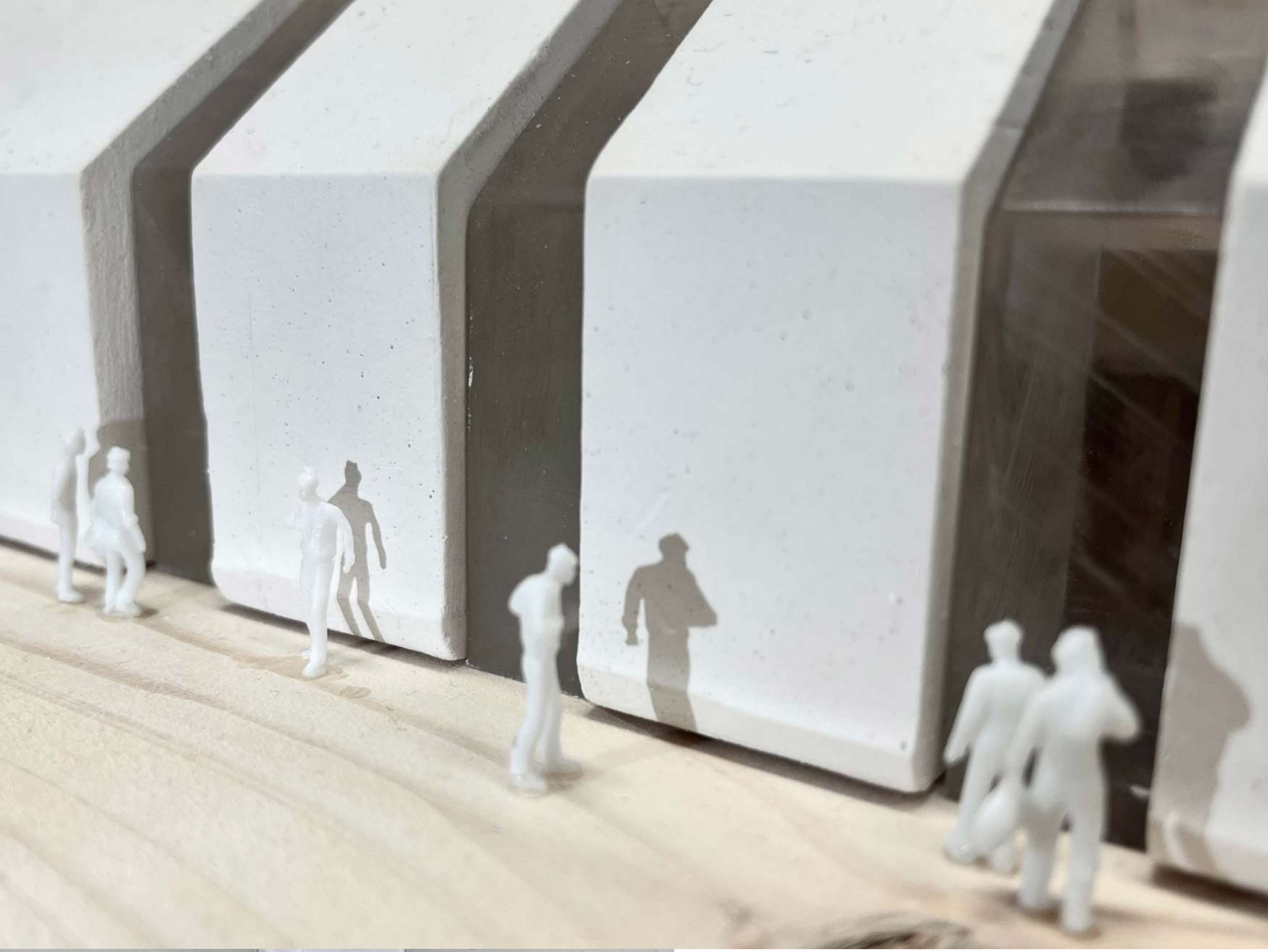
Sun Analysis

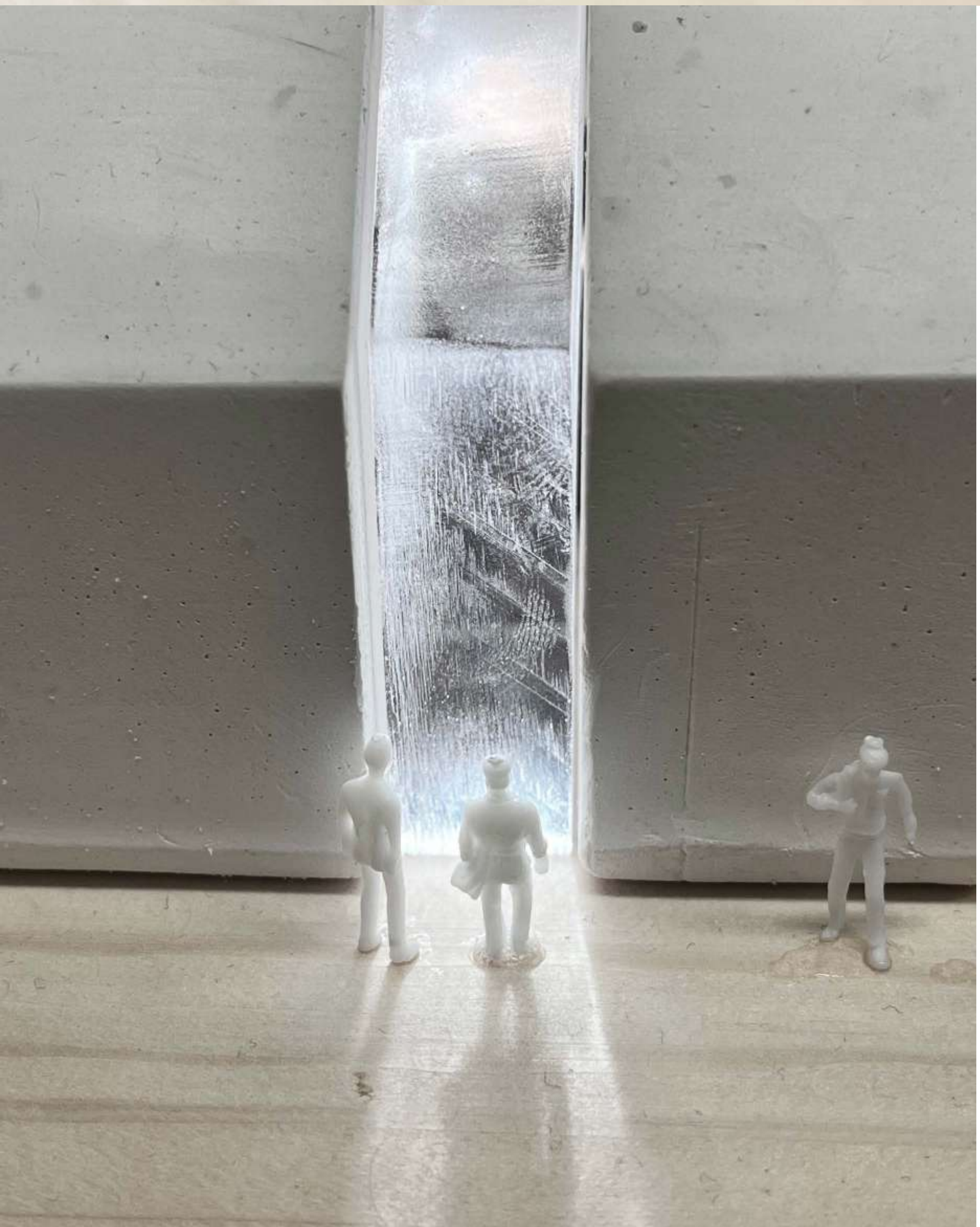
Through testing of light through the iterative model, I analysed how much light travelled into the space as well as how much light passed through and its effect on the nearby surroundings.

The placement of robotic arms determined the placement of glass panels so that there could be a public vs private threshold where they could use it as a viewing point.
This influenced my final design as through the analysis of robotic arm and process efficiency, as well as how much sunlight it took to light the interior, I came to the conclusion that three different viewing points were most efficient.



x = Public vs Priv Threshold view.



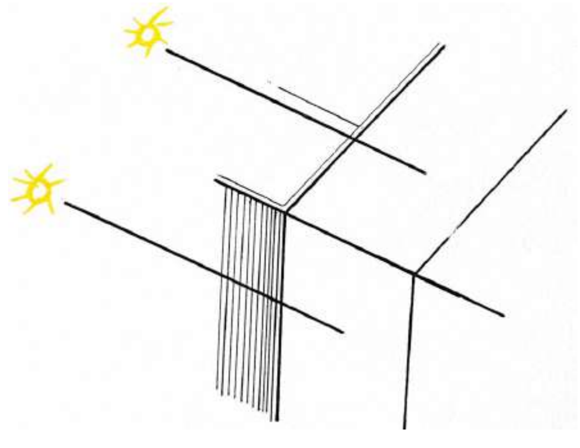


Model Testing

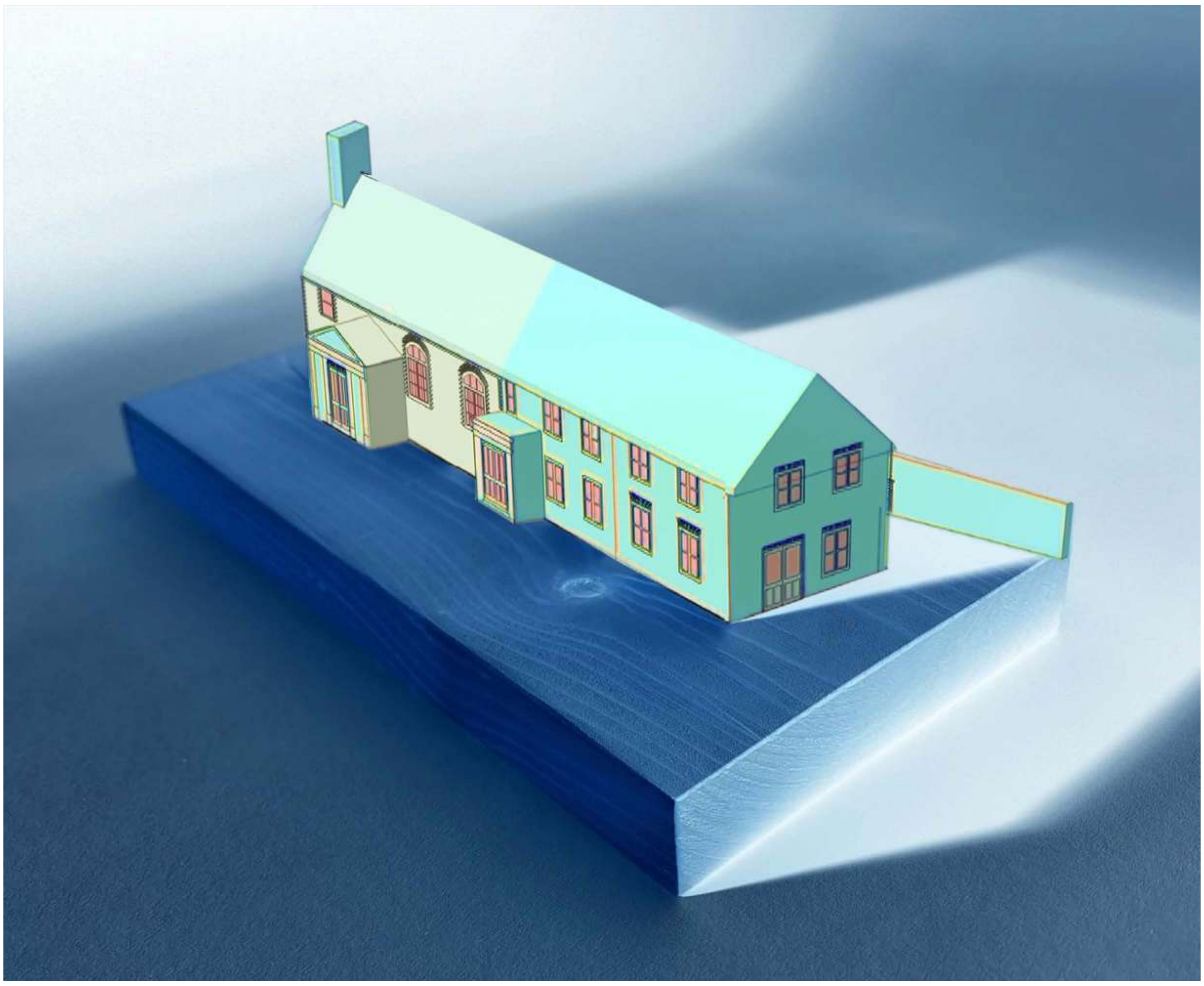
The glass strips were effective as it drew light in as well as created a threshold viewing point.

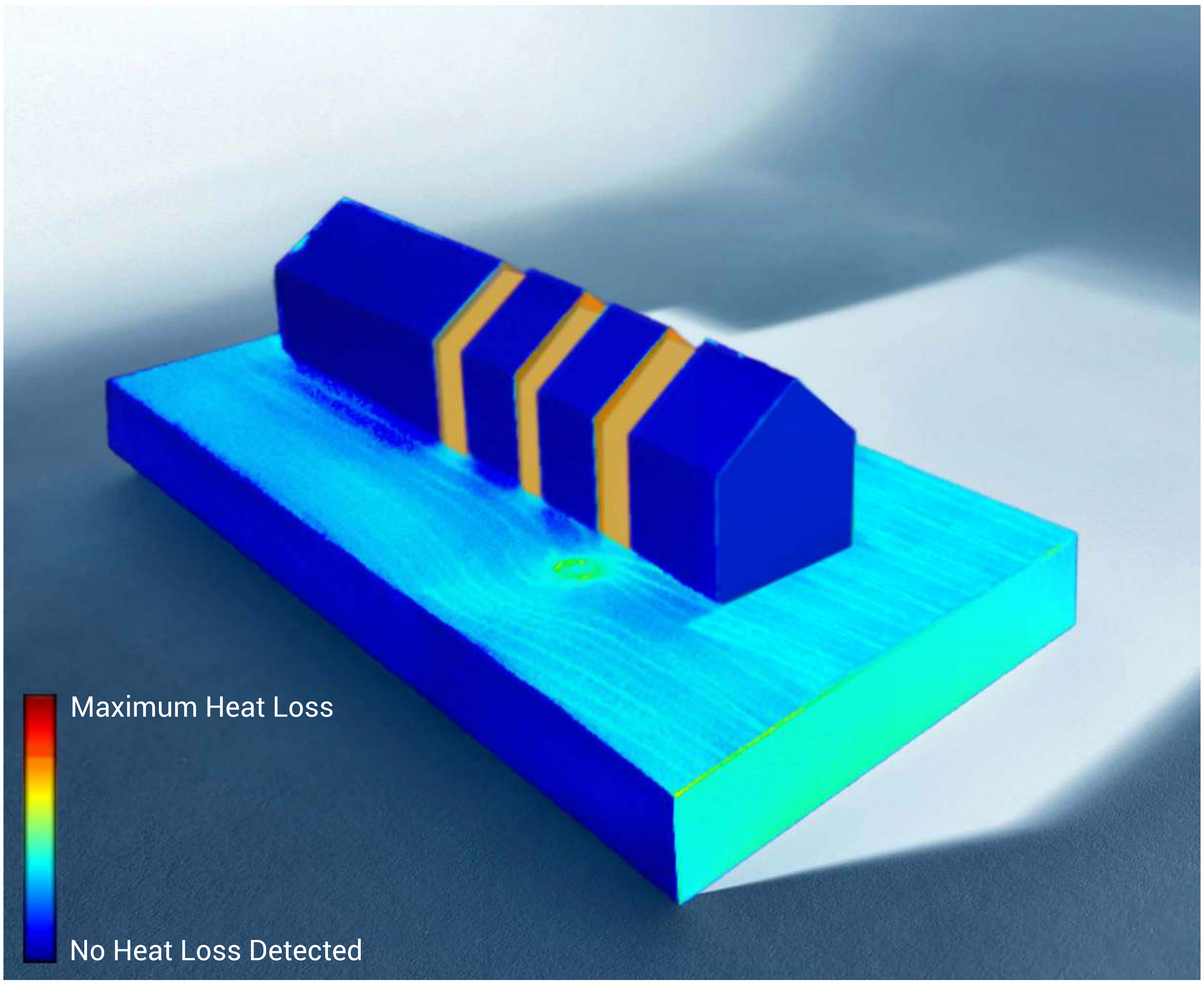
It was efficient to keep it at three as any more would significantly add to the embodied carbon of the design as triple glazed panes were not as sustainable as double glazing and more so in comparison to wood cladding with a negative carbon value.

I further analysed whether it was necessary to have the panes hug all the way around the building, however due to the positioning of the building and the front elevation facing North East, it was essential to have it hug all the way around to draw in the most sunlight throughout daylight hours.



Thermal Imaging of Existing Build vs Proposal

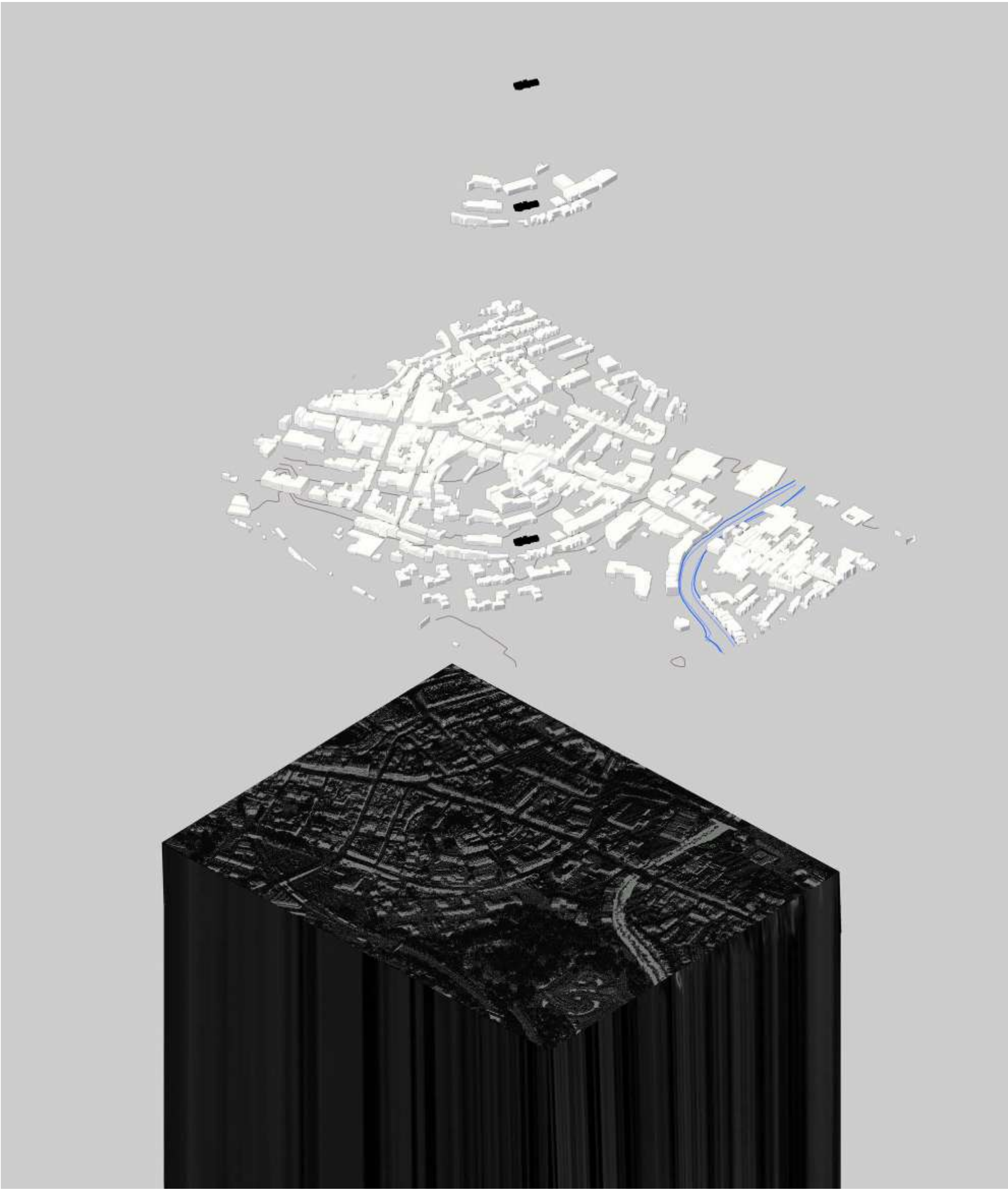




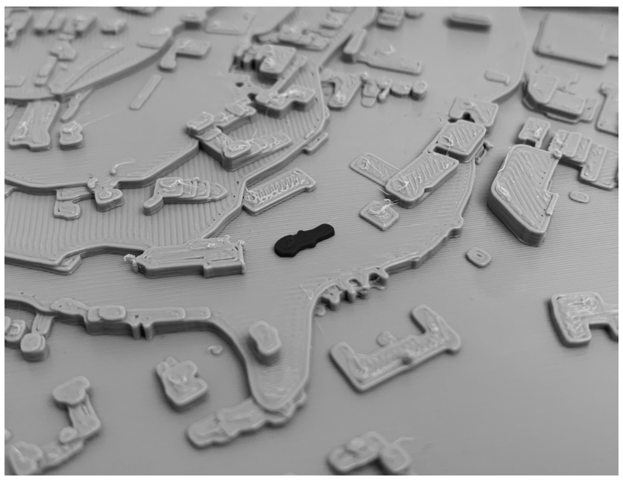
The charred Ash cladding provides a sustainable and renewable solution to insulate through a high thermal mass, covering the entirety of the building. The material absorbes heat from the sun and funnels it through into the building, thus providing heat and providing inertia against temperature fluctuations.

Terrain Analysis & Water Collection Development

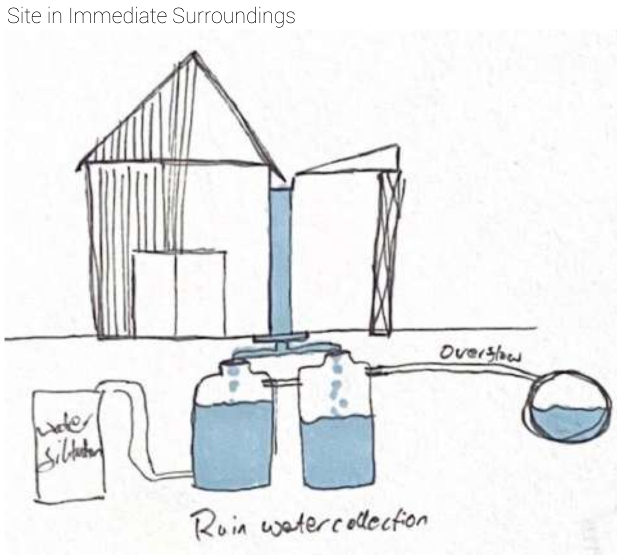
Stage 7 Determining Structure to Facilitate Water Collection

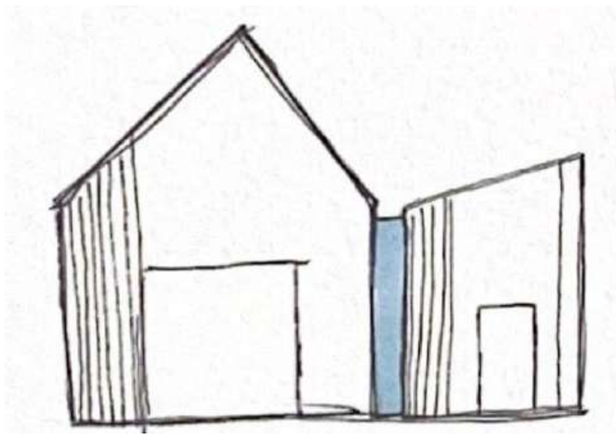


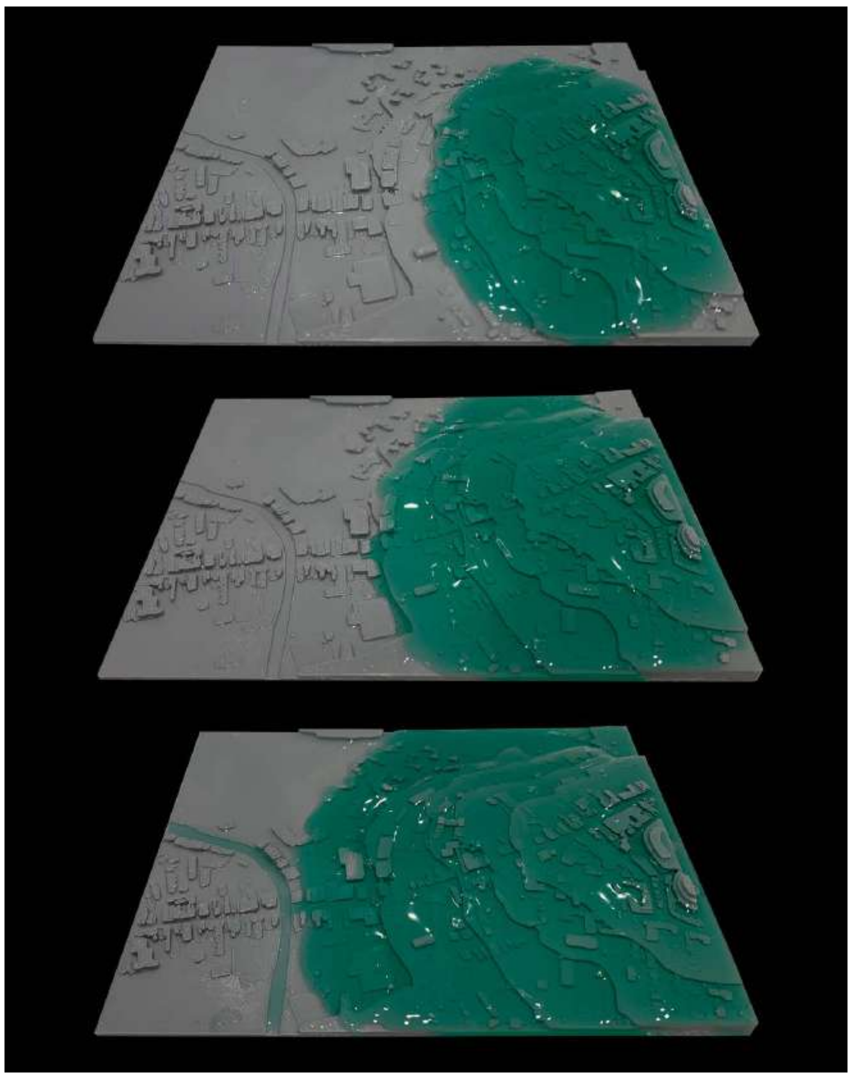
Breakdown of Site and Terrain Composition



Site in Immediate Surroundings







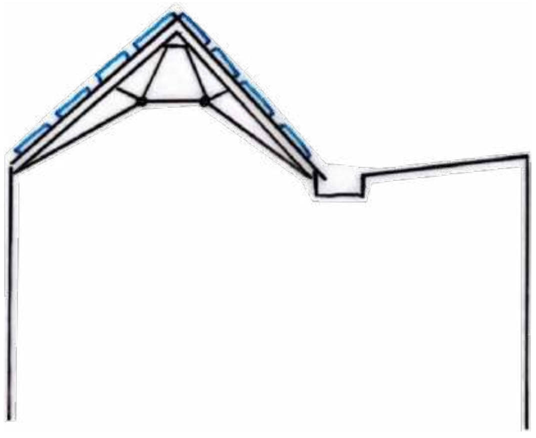
3D Printed Site Terrain Testing

Through site analysis, I calculated the data for average precipitation in the area, as well as analysed the flow of water through terrain topography.

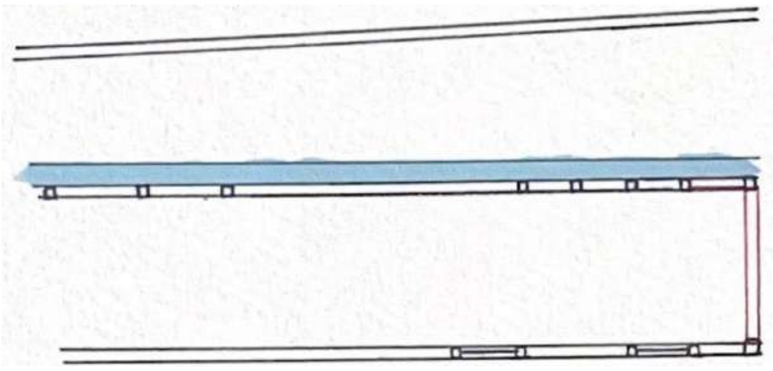
I tested 3D printed lidar data of the region to determine how much water flows through the local terrain and how it would affect collection of rainwater.

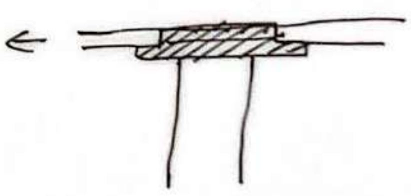
Average Precipitation

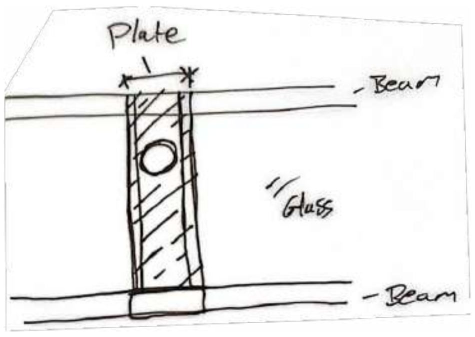
Glass Gutter Structural Development

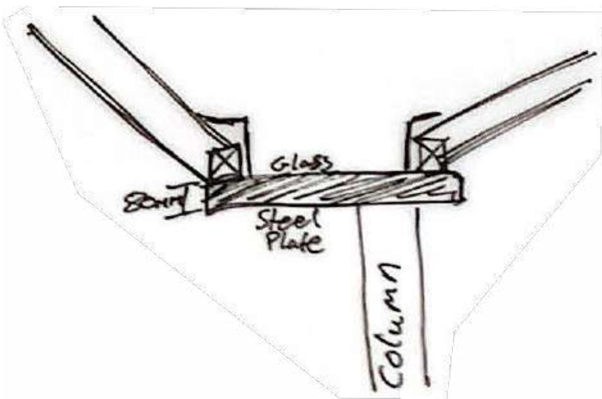


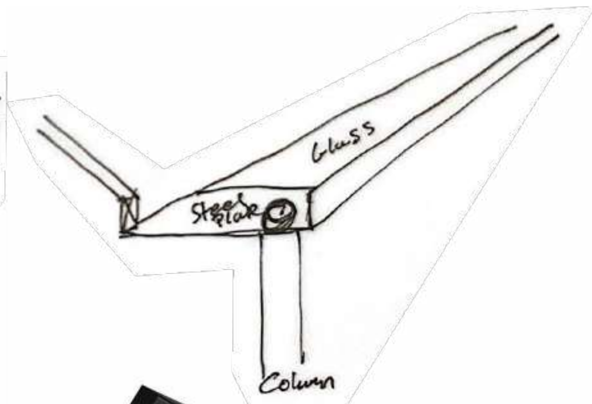
The Waterfall House Glass Gutter - Simon Modra

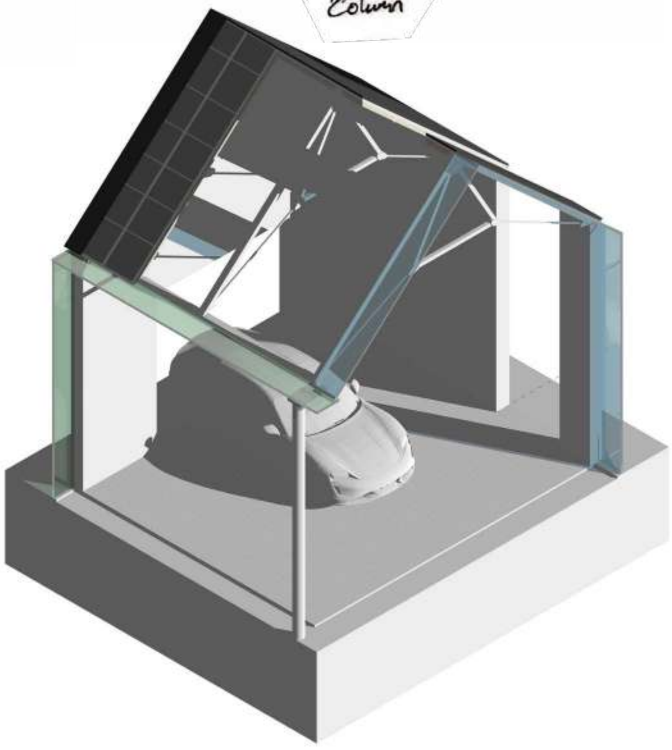








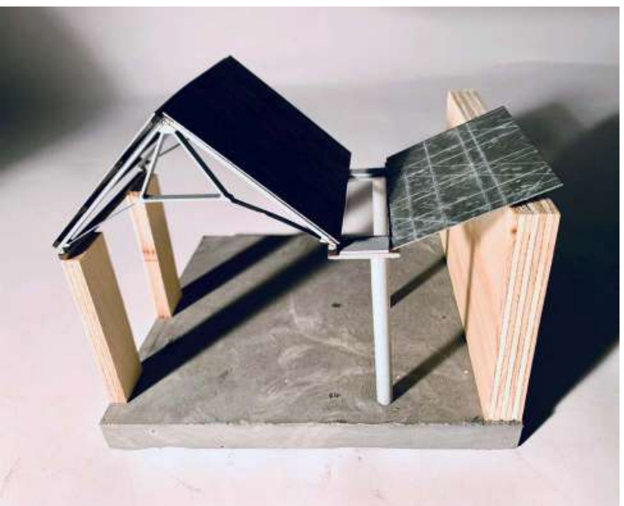




Through iterative experimentation and testing, I determined several possible ways to create a glass gutter which was structurally stable.

I learnt from several iterations that, it was possible to streamline the design through hidden steel detailing within the concrete column, as well as the steel plate to create a flow of glass all the way down. This would prevent the creation of multiple unnecessary seams which would be further liable to water leakage.



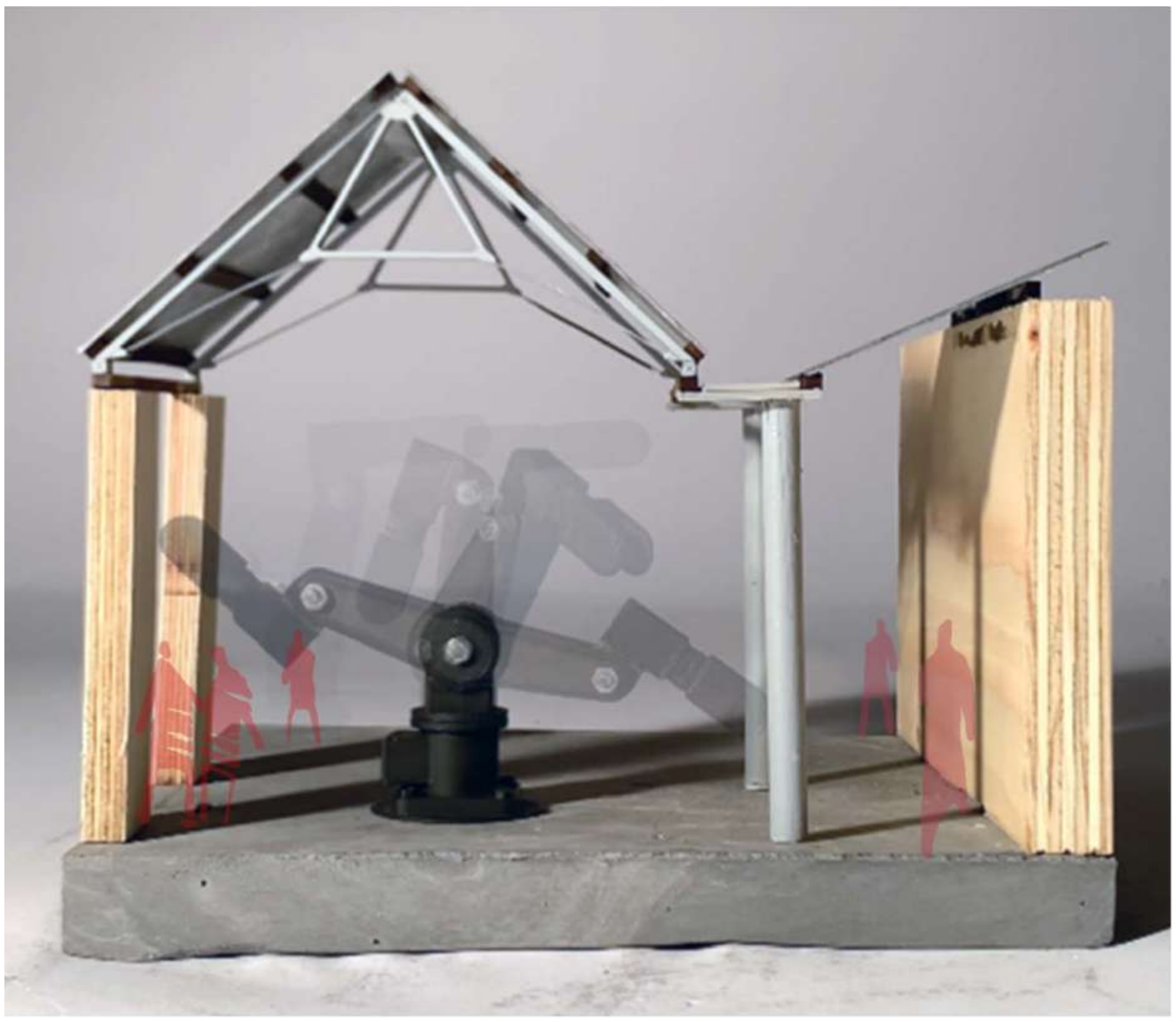





Through iterative structural experimentation, I analysed and developed a roof system to allow free, unobstructed movement for the mechanical arms as well as load bearing the glass facades and extra cladding weight.

In addition I also developed an all glass water gutter system integrated into the structural capabilities of the building, to collect and recycle water into the washing of the cars.

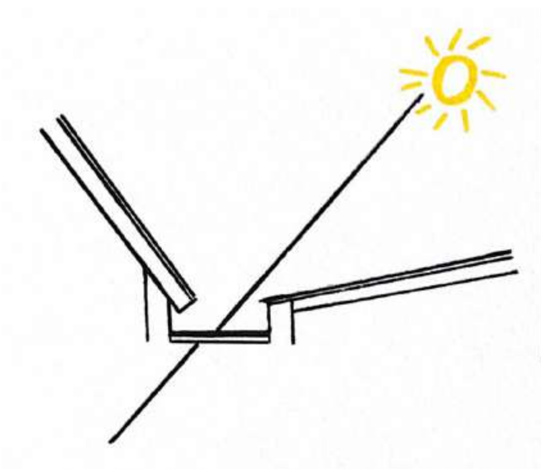
This experiment tested the roof cladding as reclaimed zinc, however the investigation found, the cladding could also be used for the roofing.



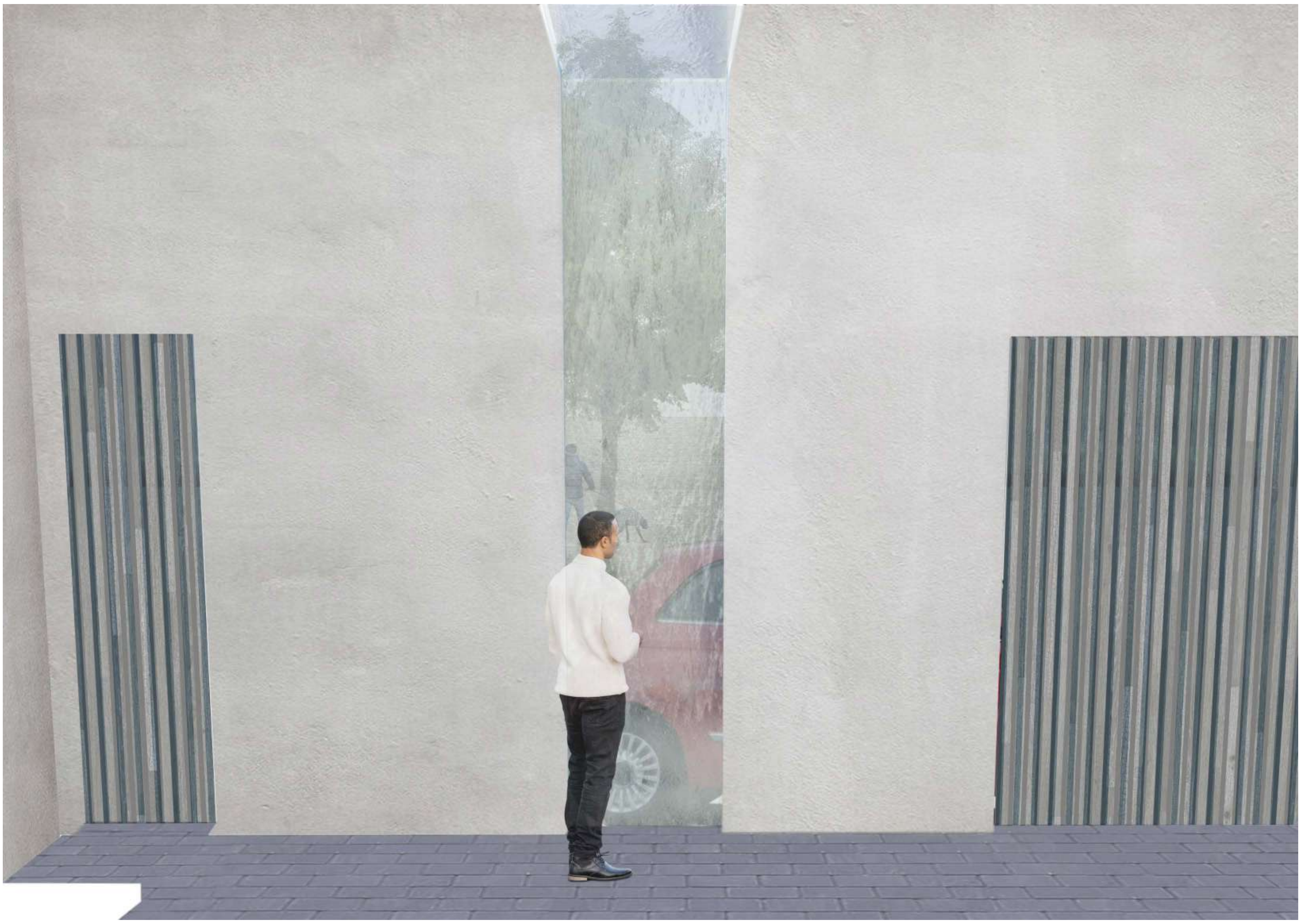
Design Development & Iterative Structural Experimentation

Glass Gutter Model Testing

The glass gutter funnels water during a rainstorm from half of the main meeting houses roof and the new extension, collecting in a drainage sytem for later use on the north side. It also allows for more sunlight to enter the building, directing onto the access ramp for a nicer atmosphere.

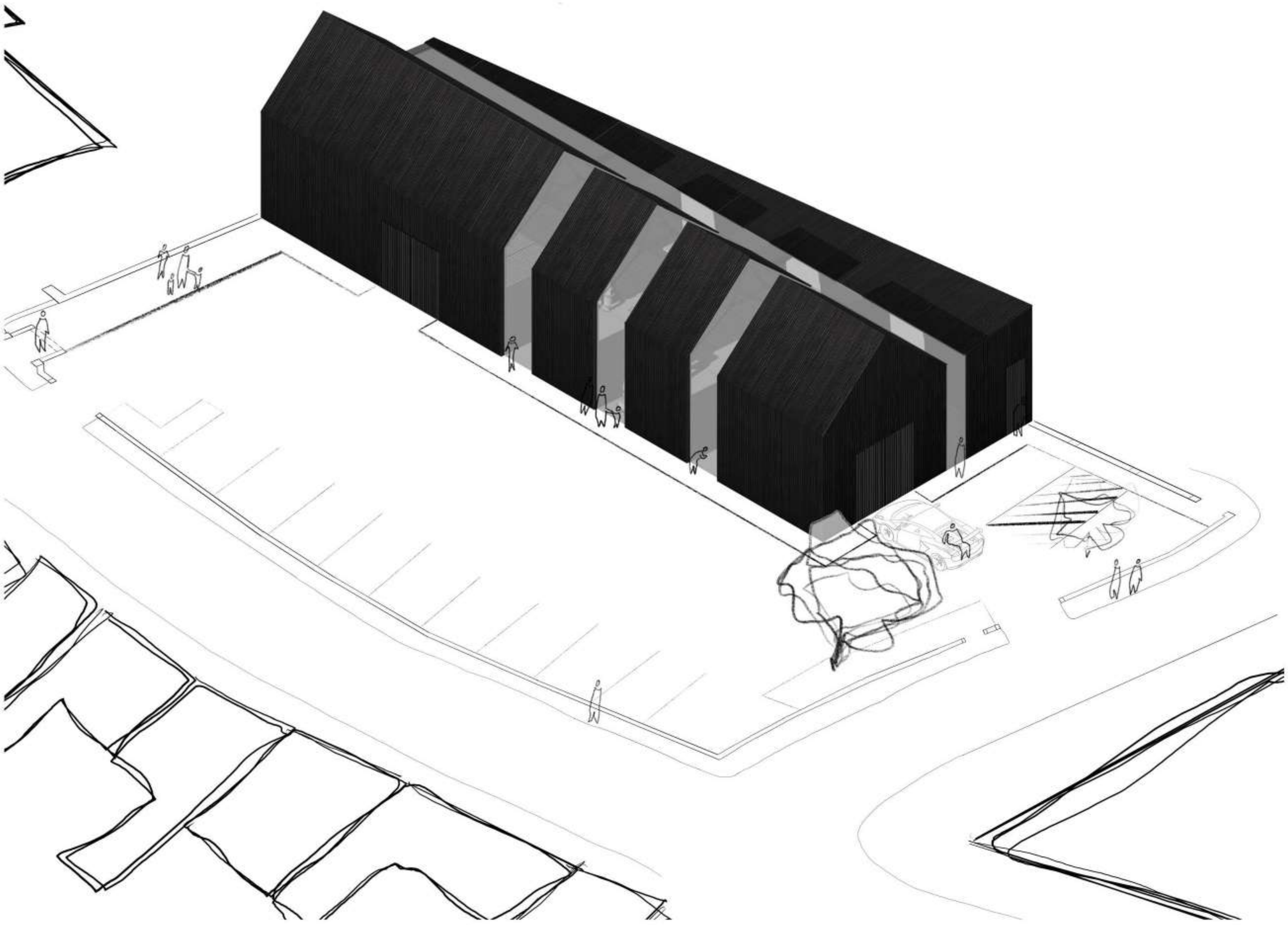


Glass Gutter Render In Action



The glass gutter provides a solution for the collection of rainwater to be recycled to wash cars on demand. The gutter also provides a physical barrier between the extension and the Quaker Meeting House, paying respects to the heritage of what the building once was.

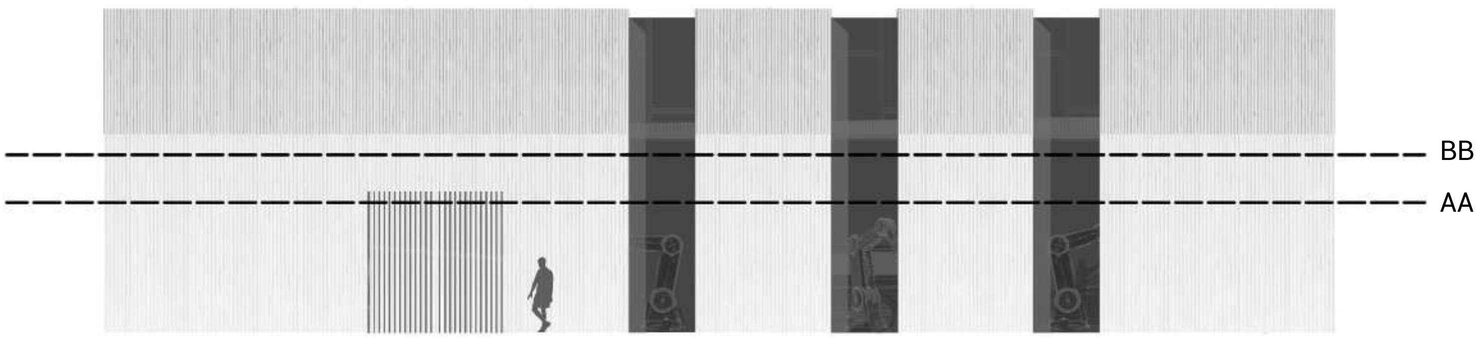
CleanSwap
Proposed Concept

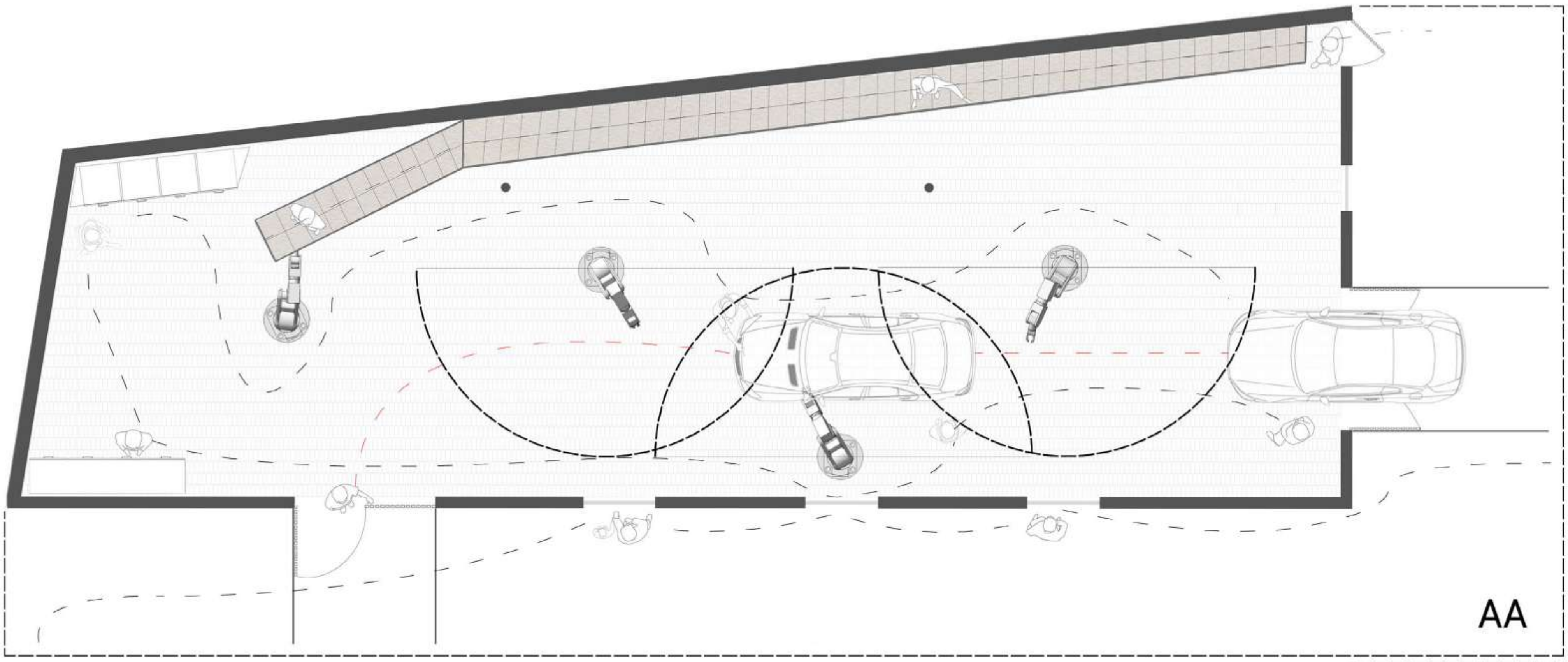


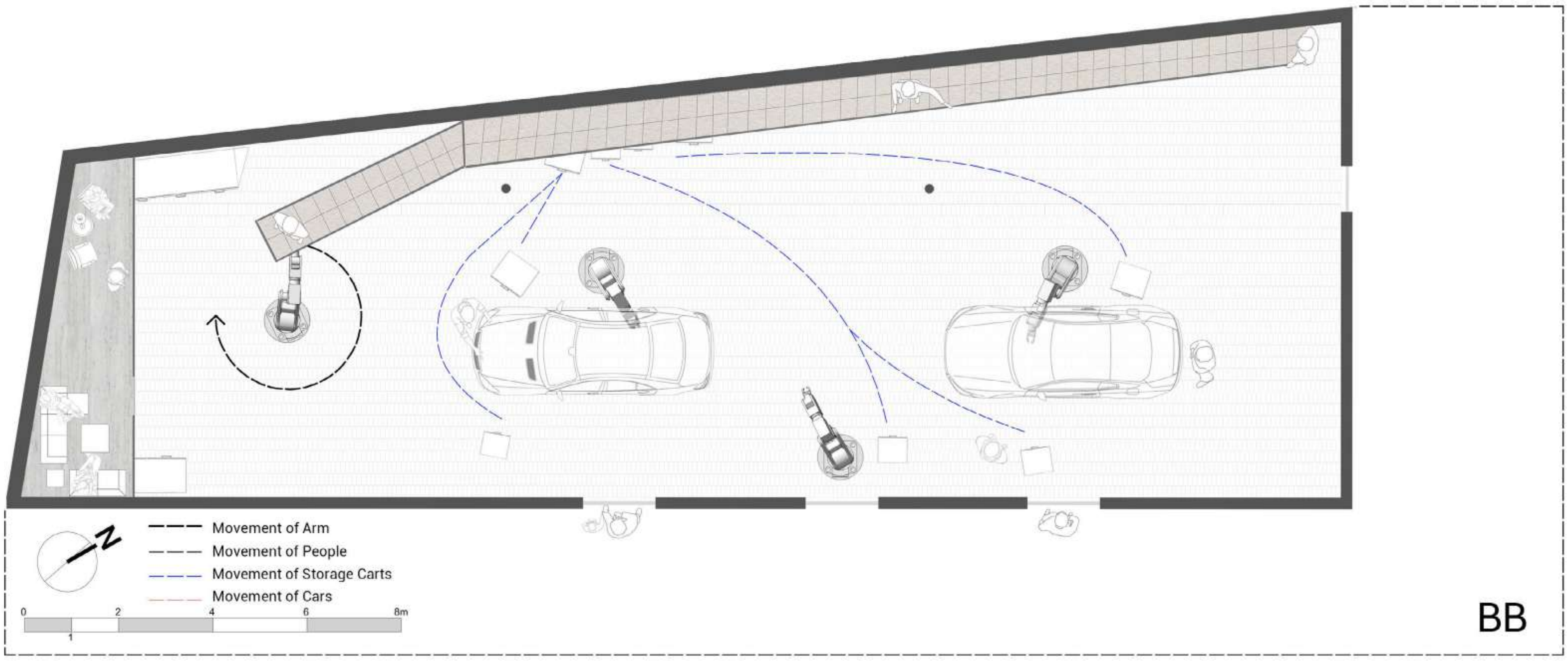
CleanSwap is a concept to address the tension between global warming and the automotive industry. This is done by analysing the emissions of the creation of a conventional vehicle versus an electric car with the equal amount of range. Currently if you wanted to swap to an electric vehicle, you would be adding to the demand of production of new electric cars, thus polluting the world further. We must consider the circular lifecycle of our vehicles, such as the giving up of their current vehicle, to swap to an E-V (which holds its own emissions from creation).
Using the cars existing chasis, parts and body, it reduces the need to build a car from scratch, therefore reducing the emissions of buying an E-V.

Project Status : Proposed
Project Year : 2030
Site Area : Quakers Meeting House
Location : Lewes

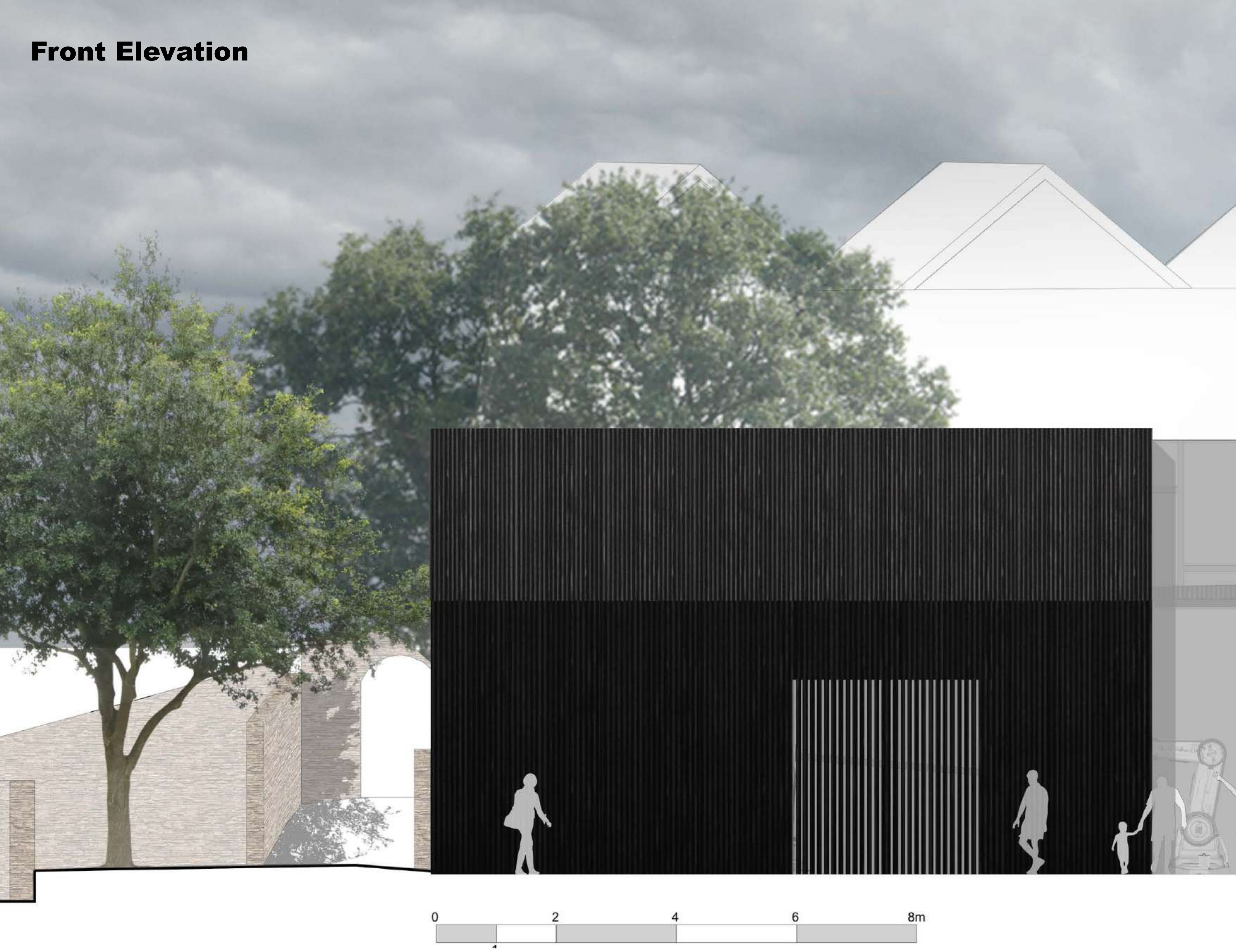
Proposal in Plan View



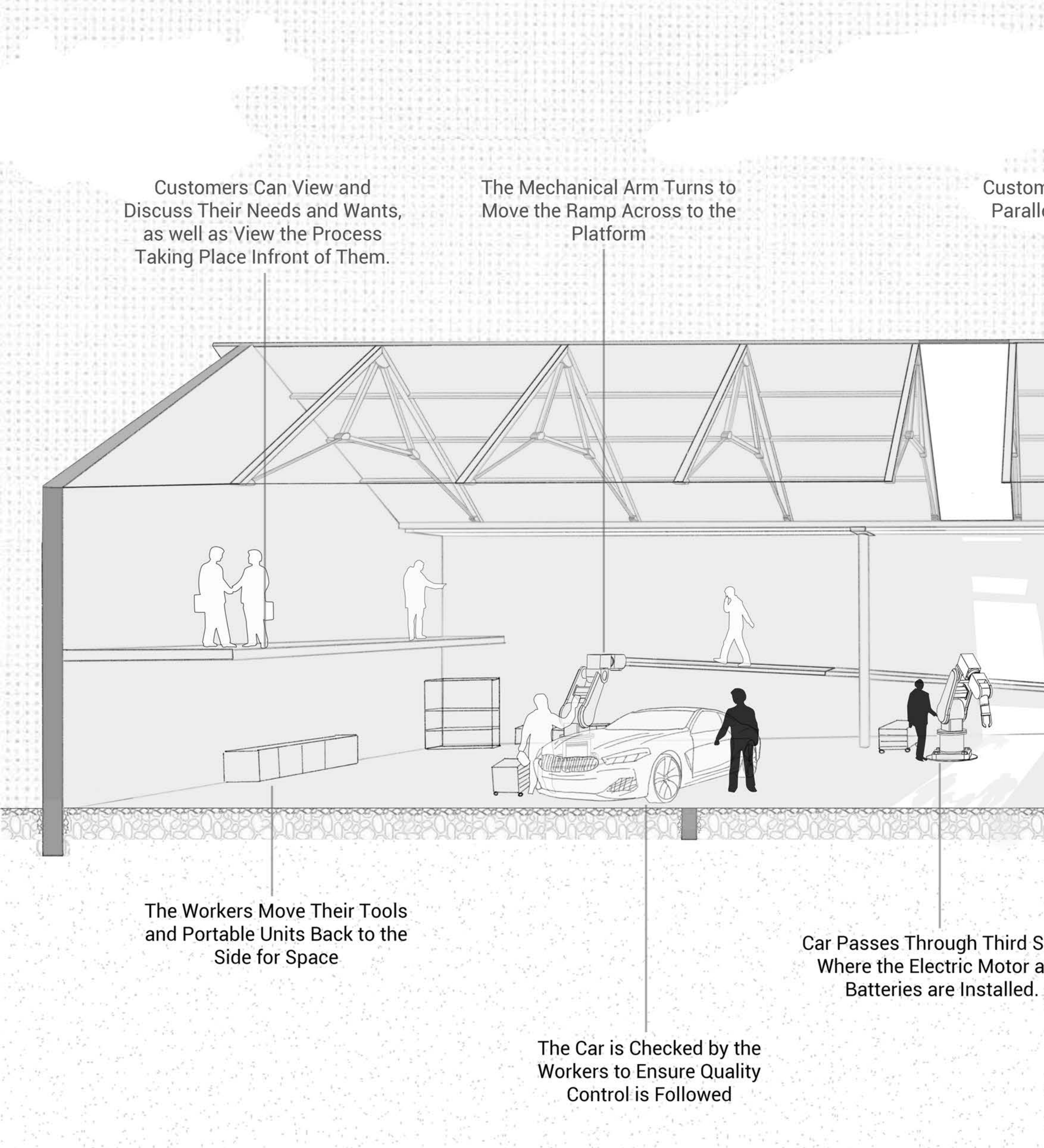


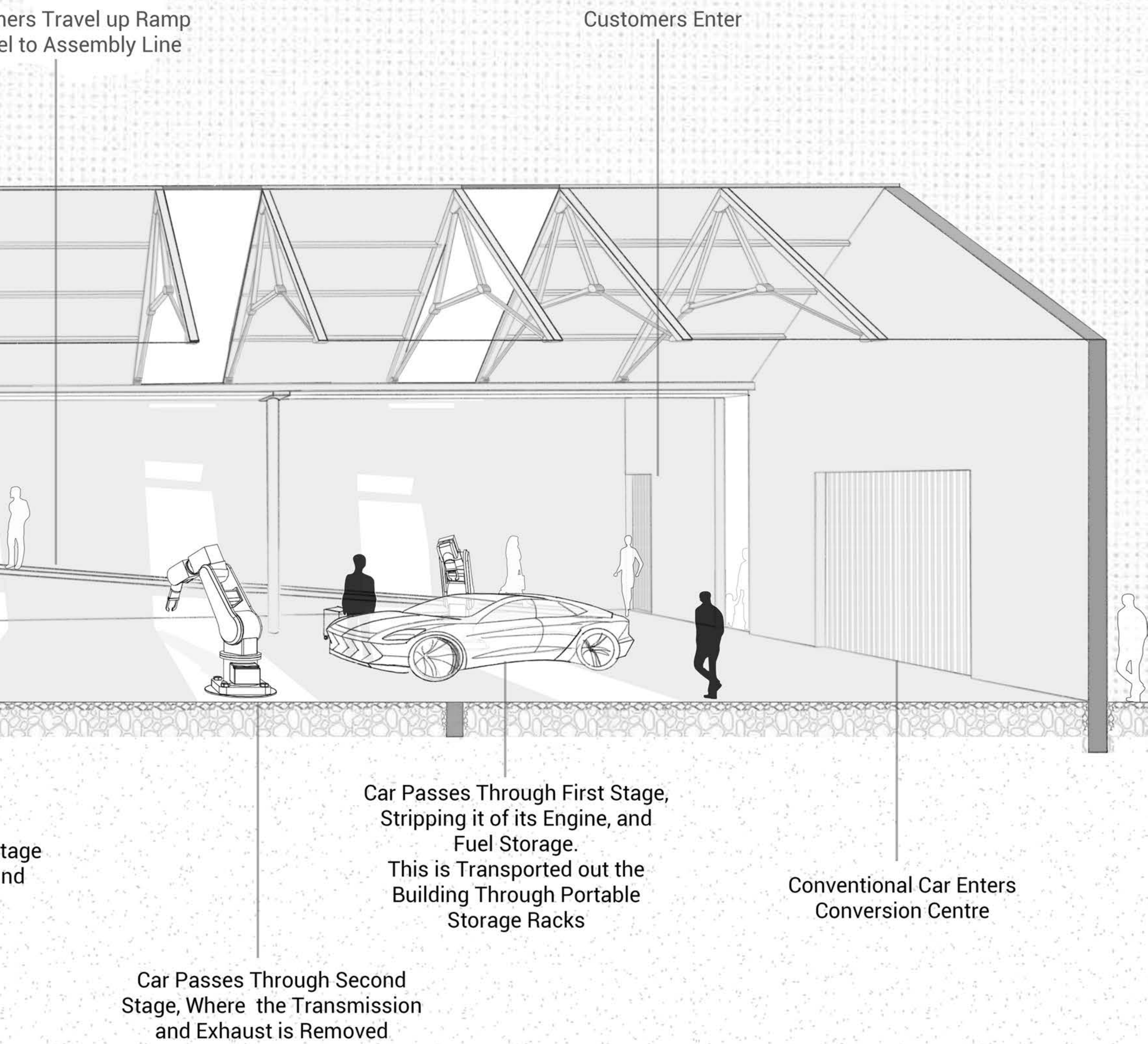


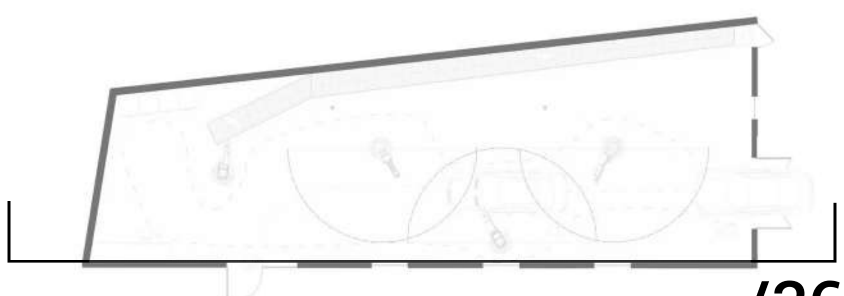
Front Elevation

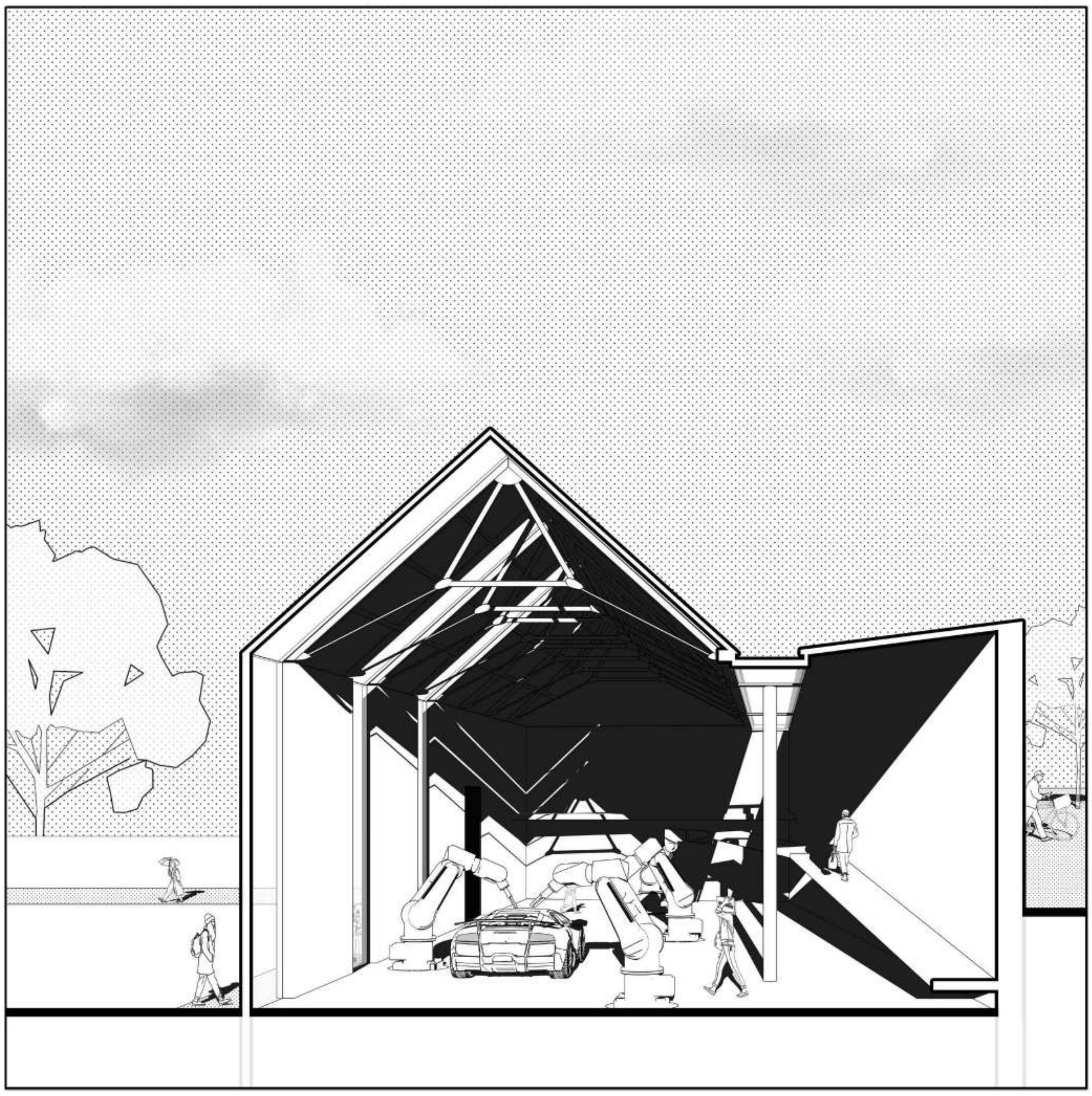


Long Section

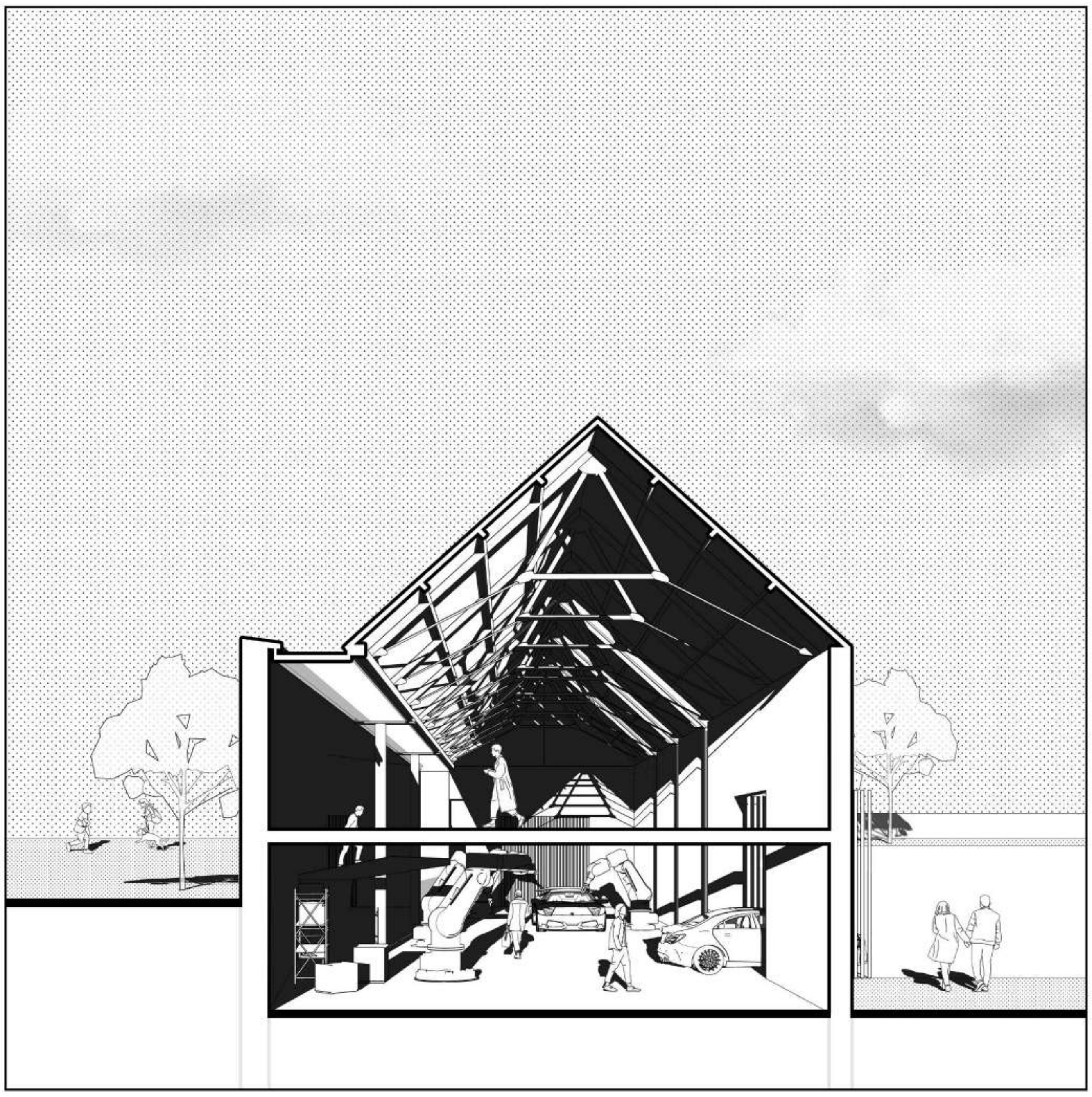



ners Travel up Ramp
el to Assembly Line
Customers Enter
Car Passes Through First Stage, Stripping it of its Engine, and Fuel Storage.
This is Transported out the Building Through Portable Storage Racks
Conventional Car Enters Conversion Centre
tage
nd
Car Passes Through Second Stage, Where the Transmission and Exhaust is Removed



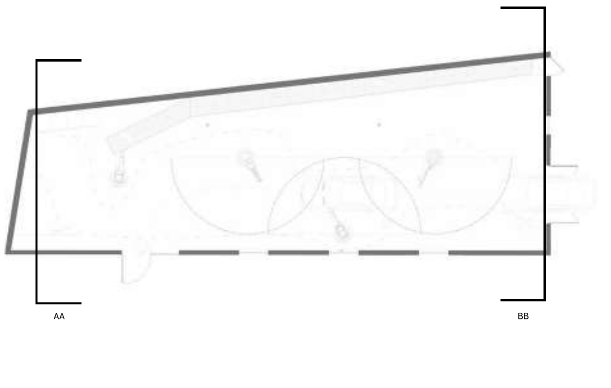


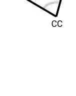
North Experiential Elevation AA



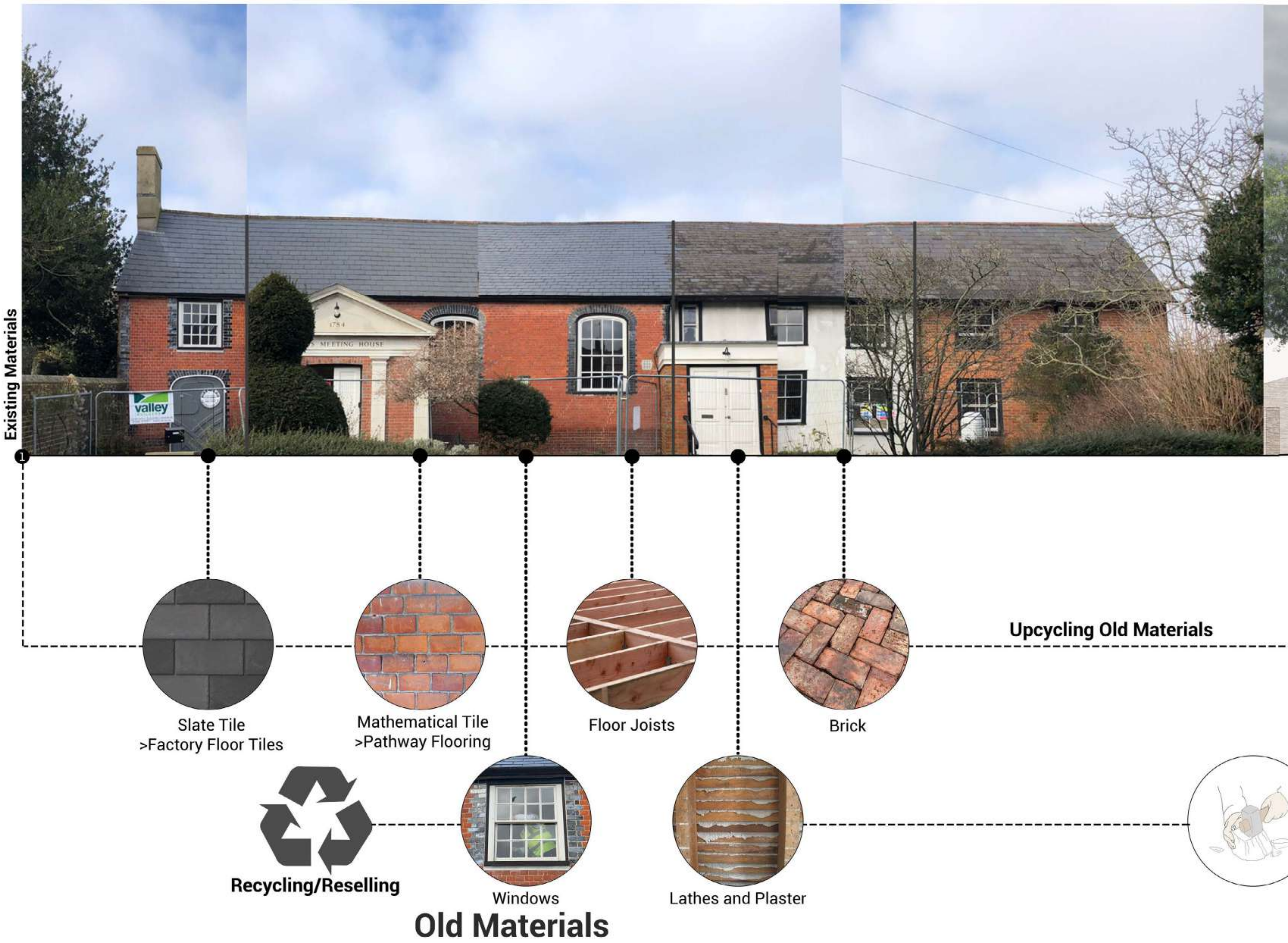
South Experiential Elevation BB

Front Experiential Elevation CC





New Vs Existing Materiality



New Sustainable Materials & Alternatives

Less Sustainable Alternatives=

+Locally Sourced Tree
+Dying Out Locally Due to Disease Therefore There is Plenty in Abundance
+Easy to Burn on Site
+Sustainable
+Low Environmental Impact Due to Trees Being Cut Down to Stop Disease Spread

Larch Cladding

+Locally Sourced Tree
+Easy to Burn on Site
+Renewable
-Not Dying Out Locally

1m3 =415.6 kg CO2 eq

+High Thermal Efficiency Leading to Less Emissions Post Creation
+Long Lasting
+Sound Resistant
+Manufactured in Large Sizes

1m3 =266.1 kg CO2 eq

Double Glazing

+Less Emissions in the Creation Compared to Triple Glazing
+Can be Locally Sourced
-Thermal Efficiency is Worse Than Triple Glazing
-Not as Great Sound Resistance

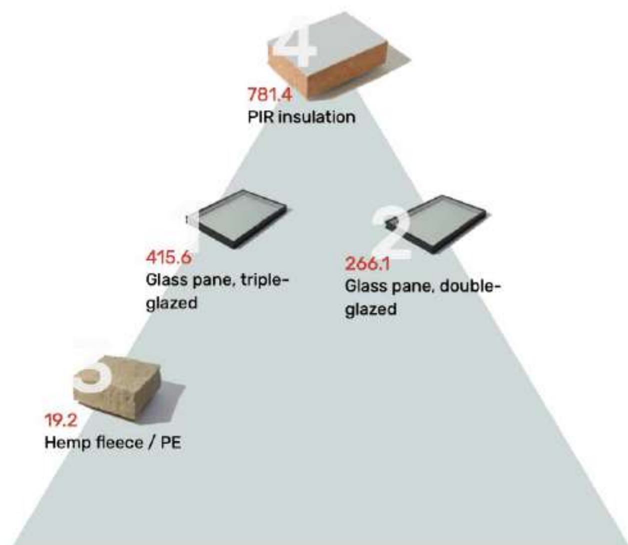
1m3 =19.2 kg CO2 eq

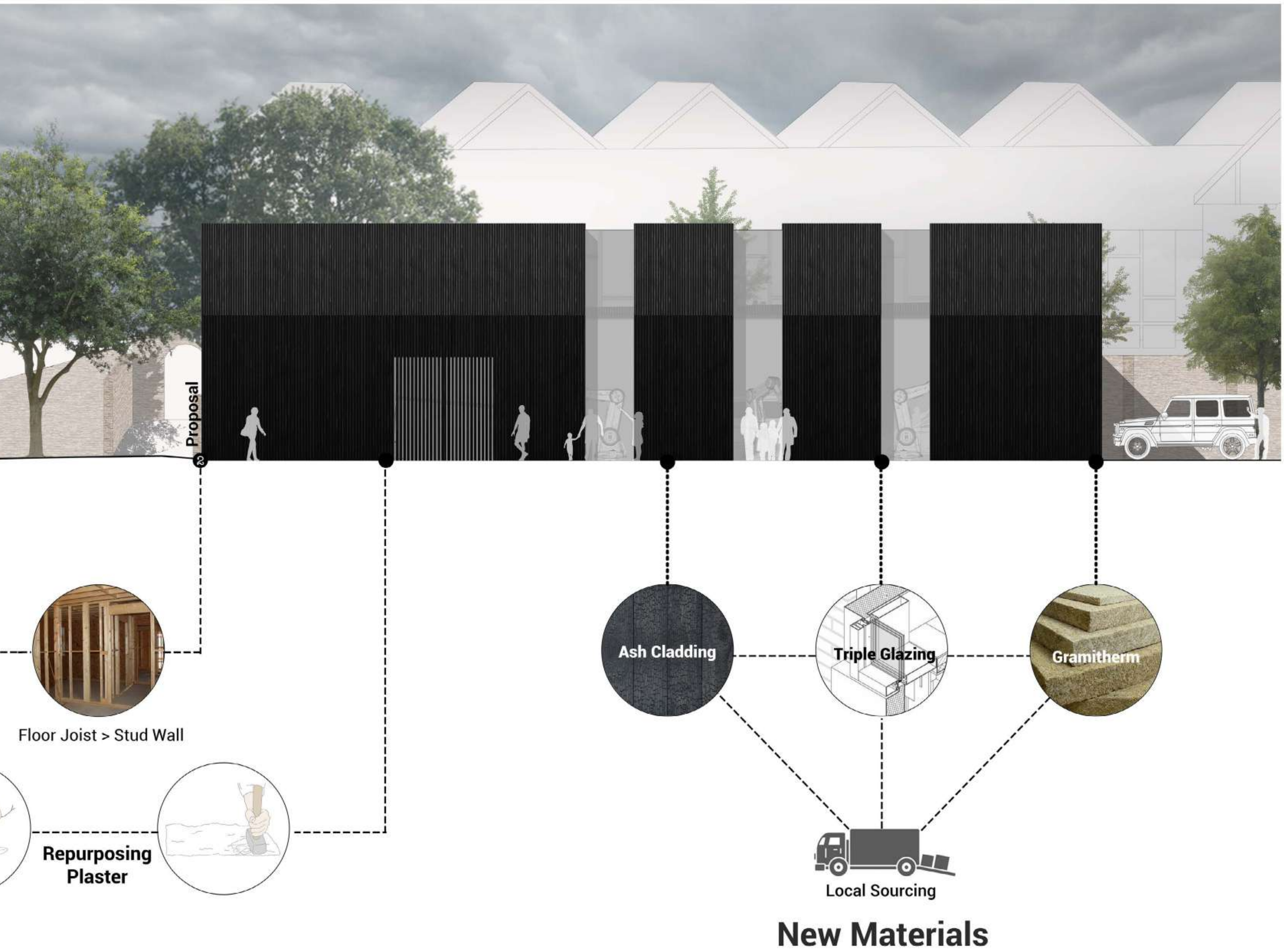
+Created From Meadow Grass Fibres
+High thermal efficiency
+Sustainable (1 Acre = 200m3 Insulate)
+Good Fire Rating

1m3 =781.4 kg CO2 eq

Standard Rigid PIR Insulation

-High Carbon Emissions in Creation
-Hard to Recycle
-Long Lifespan
-Toxic to Wildlife if Broken Down Incorrectly





| kg $CO_{2\ eq}$
| module A1-A3

Your pyramid:
1,482.3 kg $CO_{2\ eq}$

I selected these materials for the proposal as the ash cladding is giving a use to the wood that is currently being discarded due to a disease, as well as providing a negative value when calculating the embodied carbon of the proposal. The material draws in heat due to a high thermal mass, thus heating the building through a renewable energy source. The building runs 24 hours a day, therefore the black cladding helps the building camoflage into the night, and not burdening the neighbors.

I also selected triple glazing as, although the carbon penalty is higher than double glazing, it will outweigh the impact in the future due to having to heat the facility less as it uses argon gas as a thermal insulator. The triple glazing also provides better sound insulations, therefore protecting the immediate neighbors from the loud mechanical sounds, and therefore complying with Studio X building regulations.

As a less sustainable alternative, I could have chosen larch cladding, which would have resulted in more trees being cut down for the sole purpose of cladding the proposal. Secondly using recycled zinc could have taken away more zinc that could be used elsewhere as it is a valuable resource as it is a large polluter to mine new zinc.

Double glazing would also have had a better carbon emission during manufacture, however during the lifecycle of the building, the carbon emitted whilst heating the building due to heat loss would have been larger, therefore being less effective.

Lastly, inspiration taken from local-works and Stonecycle (concentrating on the creation of bricks and tiles through recycled materials), Led to the upcycling of the slate, vertical and mathematical tiles for the flooring.

Material & Building Lifecycle

Lewes Quakers Meeting House (Present)

Stage 1 - Timber Framing and Water Resistant Membrane Coverage

show result in pyramid ↑ | reset calculation | Upcycling Existing Materials | m²

	material	group	impact / m3	volume [m3]	area [m2]	thickness [mm]	result
2	Construction timber	trae	-680.0 kg CO2eq/m3	18 m3	m2	mm	-12,240.0 kg $CO_{2\ eq}$/m3
3	Glass wool	mineralsk	12.8 kg CO2eq/m3	6.9 m3	m2	mm	88.3 kg $CO_{2\ eq}$/m3
4	PIR insulation	kunststof	781.4 kg CO2eq/m3	3.4 m3	m2	mm	2,656.8 kg $CO_{2\ eq}$/m3
5	Slate	natursten	1367.3 kg CO2eq/m3	0.74 m3	m2	mm	1,011.8 kg $CO_{2\ eq}$/m3
1	Reused brick	mineralsk	4.9 kg CO2eq/m3	8.85 m3	m2	mm	43.4 kg $CO_{2\ eq}$/m3
							-8,439.8 kg $CO_{2\ eq}$/m3

The CO2 emissions in the creation of the existing materials that are being upcycled are at an estimated -8,439.8kg CO2 eq/m3

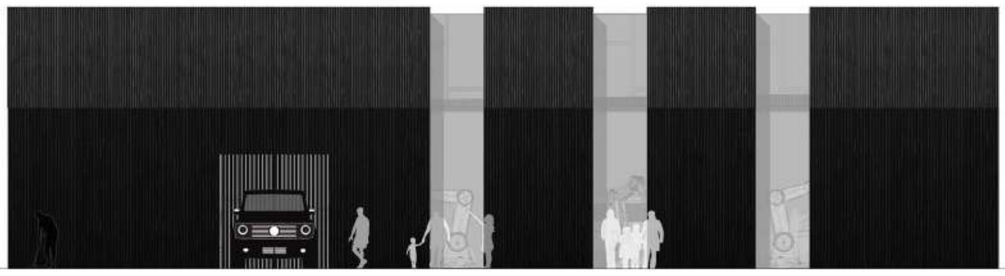
This therefore contributes into the calculation of the embodied carbon for the proposed design.

show result in pyramid ↑ | reset calculation | New Materials | m²

	material	group	impact / m3	volume [m3]	area [m2]	thickness [mm]	result
1	Glulam	trae	-610.0 kg CO2eq/m3	0.40 m3	20 m2	20 mm	-244.0 kg $CO_{2\ eq}$
2	Plywood	trae	-649.0 kg CO2eq/m3	7.94 m3	467 m2	17 mm	-5,152.4 kg $CO_{2\ eq}$
3	Hemp fleece / PE	biobaseret	19.2 kg CO2eq/m3	35.20 m3	352 m2	100 mm	675.8 kg $CO_{2\ eq}$
4	Aerated concrete blocks	mineralsk	180.0 kg CO2eq/m3	18.10 m3	181 m2	100 mm	3,258.0 kg $CO_{2\ eq}$
5	Paint, matte	andet	2851.0 kg CO2eq/m3	0.03 m3	460 m2	0.076 mm	99.7 kg $CO_{2\ eq}$
6	Structural steel	metal	8831.2 kg CO2eq/m3	0.13 m3	2.5 m2	50 mm	1,103.9 kg $CO_{2\ eq}$
7	Aluminium frame window	komponenter	1172.7 kg CO2eq/m3	0.14 m3	13.9 m2	10 mm	163.0 kg $CO_{2\ eq}$
8	Glass pane, double-glazed	komponenter	266.1 kg CO2eq/m3	0.79 m3	31.5 m2	25 mm	209.6 kg $CO_{2\ eq}$
9	Glass pane, triple-glazed	komponenter	415.6 kg CO2eq/m3	3.04 m3	69 m2	44 mm	1,261.8 kg $CO_{2\ eq}$
10	PP roofing membrane	kunststof	271.5 kg CO2eq/m3	0.26 m3	171 m2	1.5 mm	69.6 kg $CO_{2\ eq}$
11	Gypsum board	mineralsk	169.6 kg CO2eq/m3	4.67 m3	467 m2	10 mm	792.0 kg $CO_{2\ eq}$
12	Concrete C30/37	mineralsk	288.0 kg CO2eq/m3	6.77 m3	m2	mm	1,949.8 kg $CO_{2\ eq}$
							4,186.7 kg $CO_{2\ eq}$/m3

Charred timber cladding is renewable, thus a sustainable option to clad a building with, whilst also bringing several properties such as rot, pest and water resistant. It can last around 30 years without needing further treatment, as well as it can be recycled after, or growned down into wood chip. It is easily repaired by burning more cladding on site and adding it back where it is needed to be replaced. Galvanised steel screws would also be most efficient in comparison to nails to allow for ease of securing and removing the cladding.

Glass is also important to consider in the proposal, it can be recycled and or reused in a different building. The difficulties that come along, is that these glass panes are manufactured into bespoke sizes, therefore making it more difficult to find someone who would need the same size.



Stage 2 - Combustion to Electric Car Conversion Centre

Stage 3 - 30 Years Time + Repairs

Through investigation and analysis of existing materials, the vertical, mathematical and roof slate tiles will be upcycled to the flooring of the proposal.

The Plaster will be repurposed and used to replaster the inner walls, in addition to the reclaimed timber, bricks and insulation, during construction of load bearing elements.

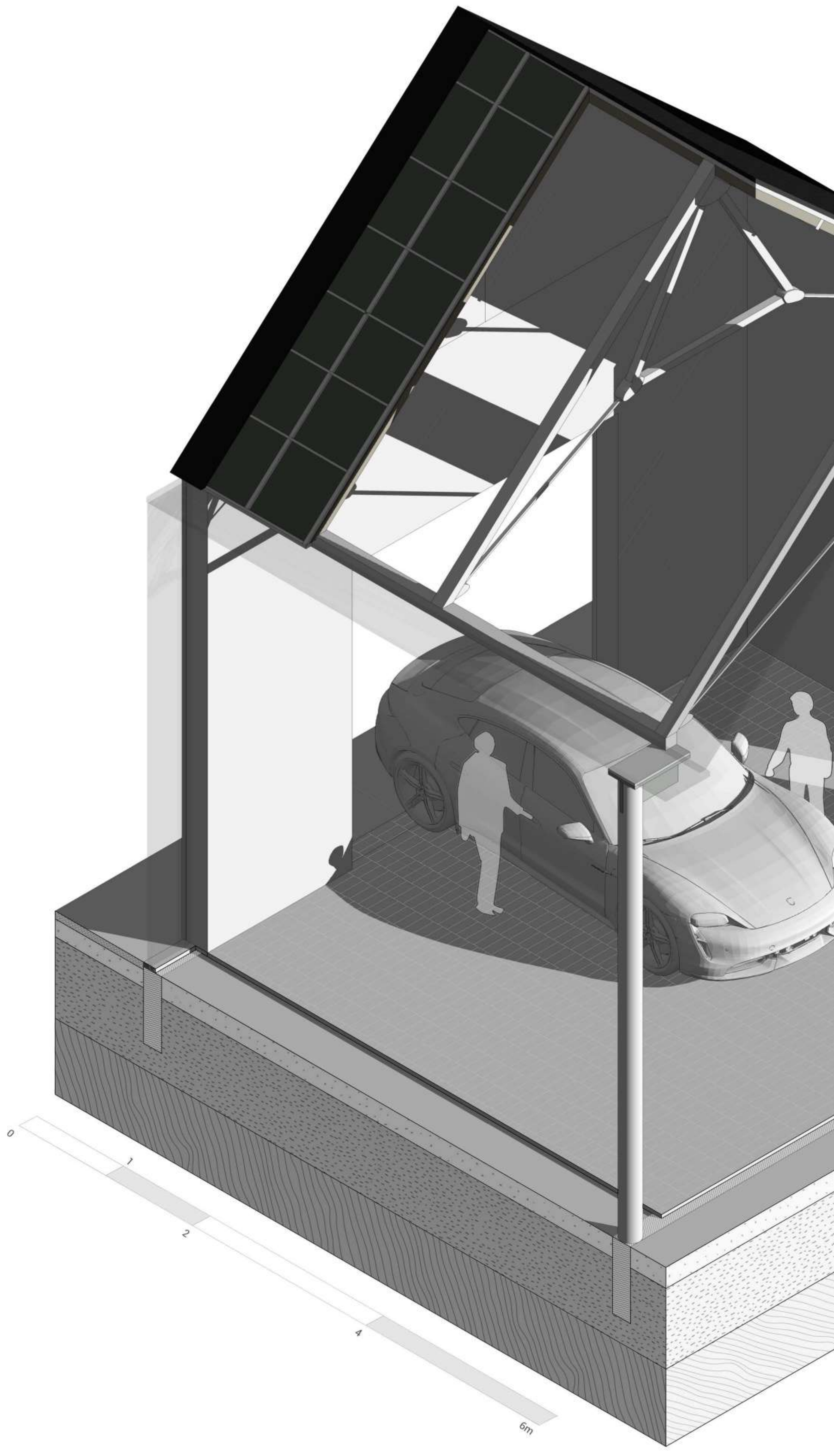
The CO_2 emissions in the creation of the proposed materials are at an estimated 4,186.7kg CO_2 eq/m3

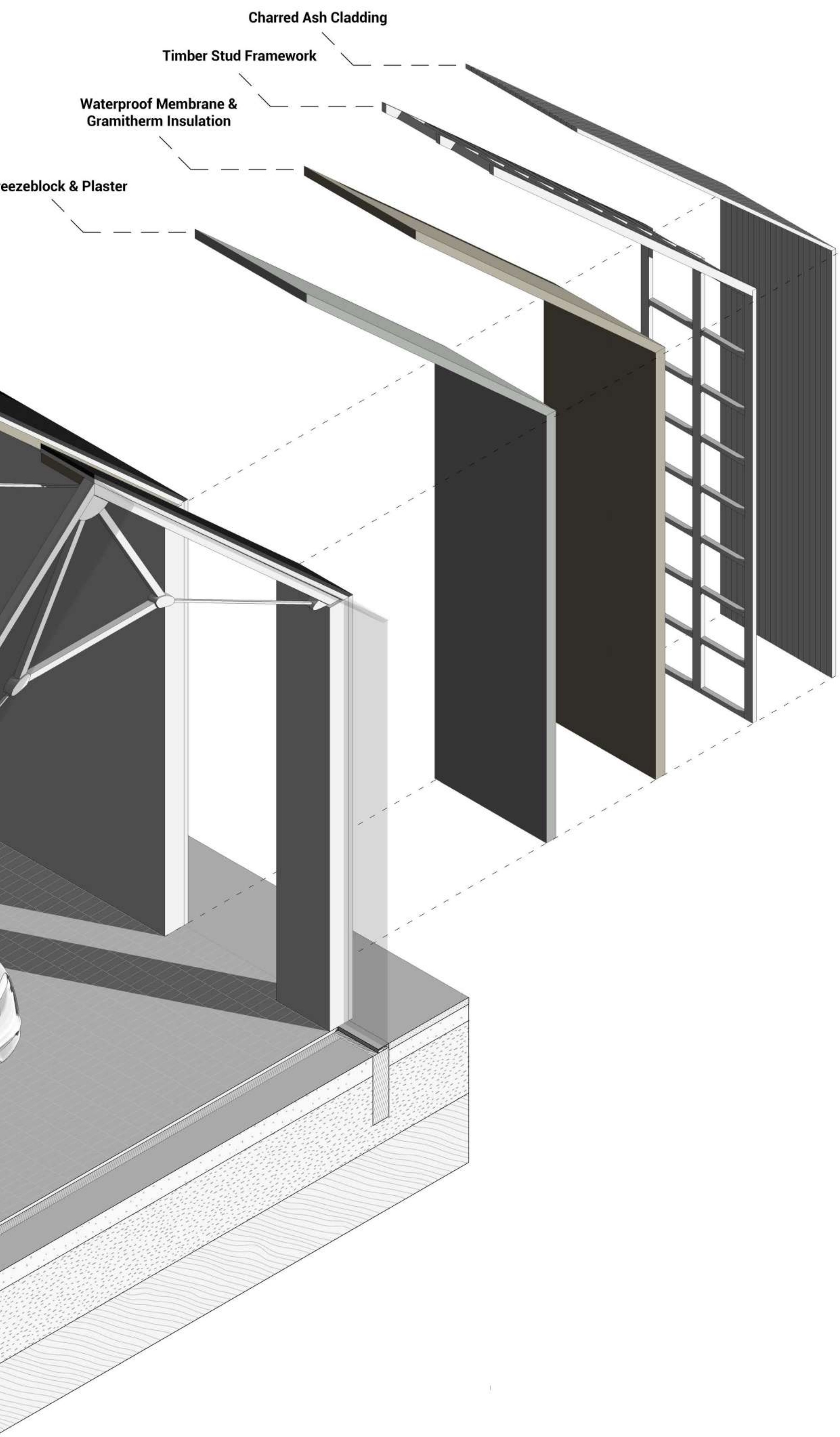
With the negative carbon value of the upcycled materials subtracted, the embodied carbon value for the design proposal is at a total of -4,253.1kg CO_2 eq/m3 from cradle to gate.

The utilisation of renewable materials in the proposal such as wood cladding and timber, gave a negative carbon emission value, as well as the upcycling of old materials, offsets the emissions of the new required materials in the creation of the proposal.

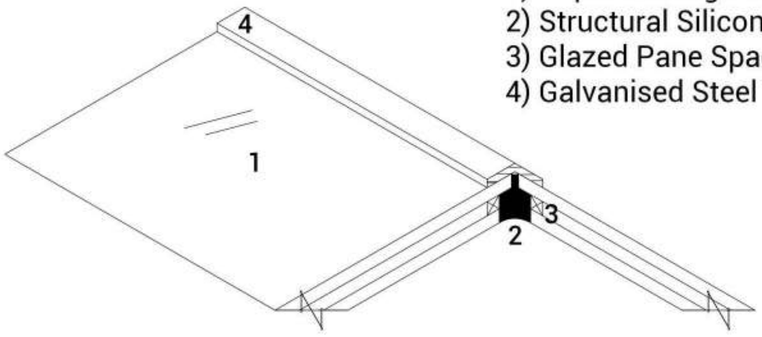
1:20 Sysmat Isometric Drawing

Br



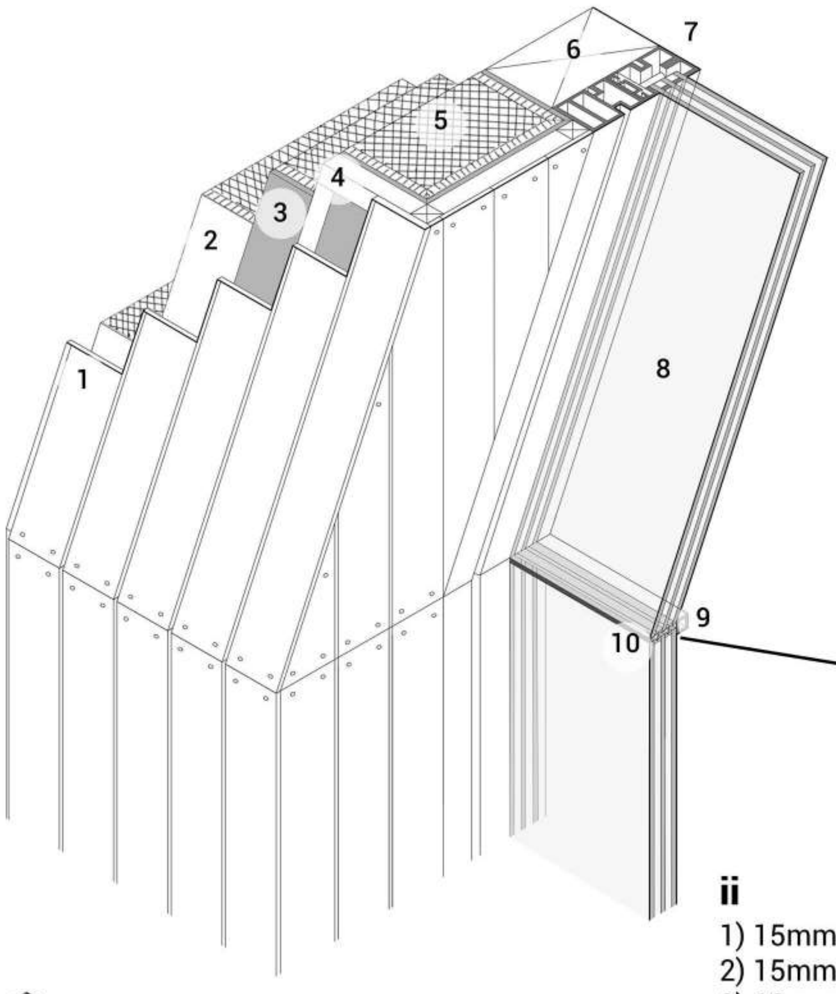

Charred Ash Cladding
Timber Stud Framework
Waterproof Membrane &
Gramitherm Insulation
eezeblock & Plaster

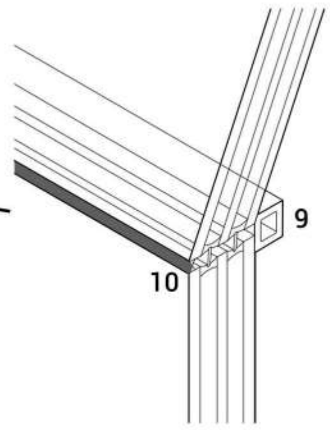
1:10 Detail Composition Analysis



iii

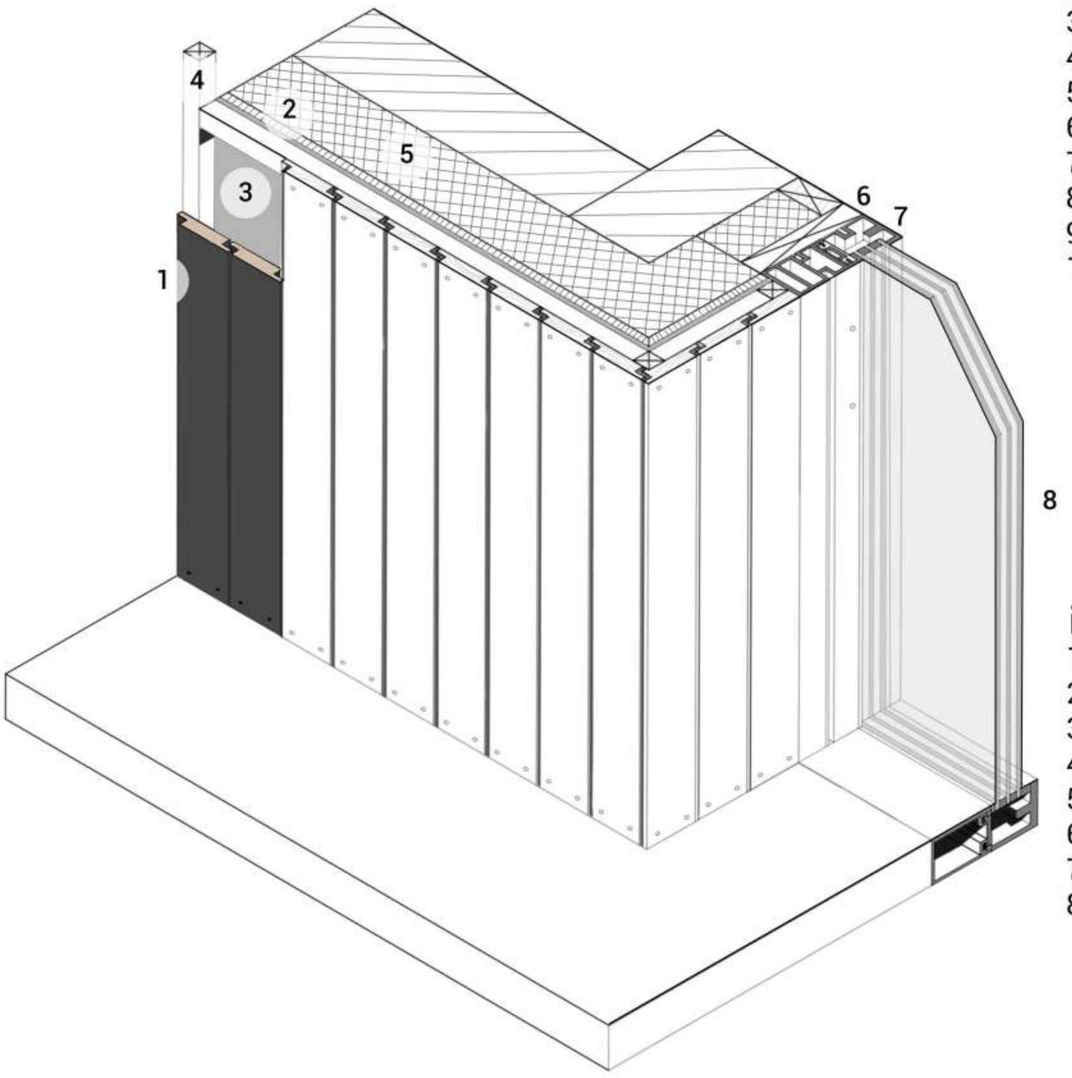
1) Triple Glazing Pane
2) Structural Silicone
3) Glazed Pane Spacer
4) Galvanised Steel Topper





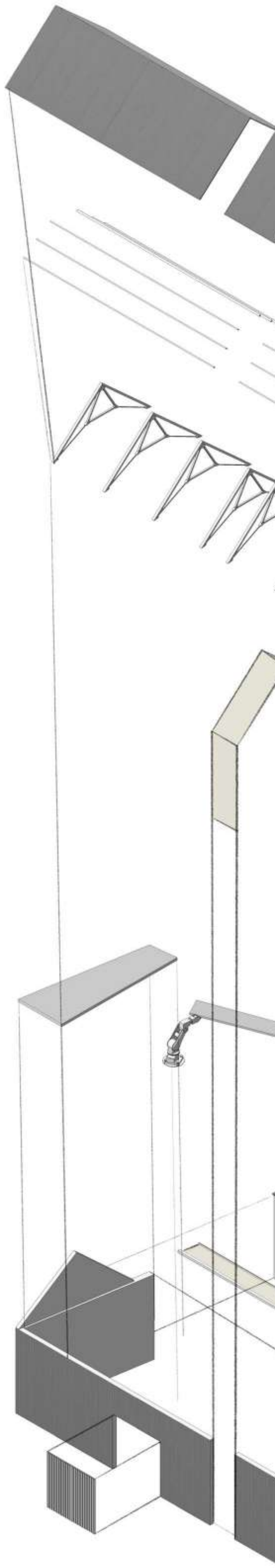
ii

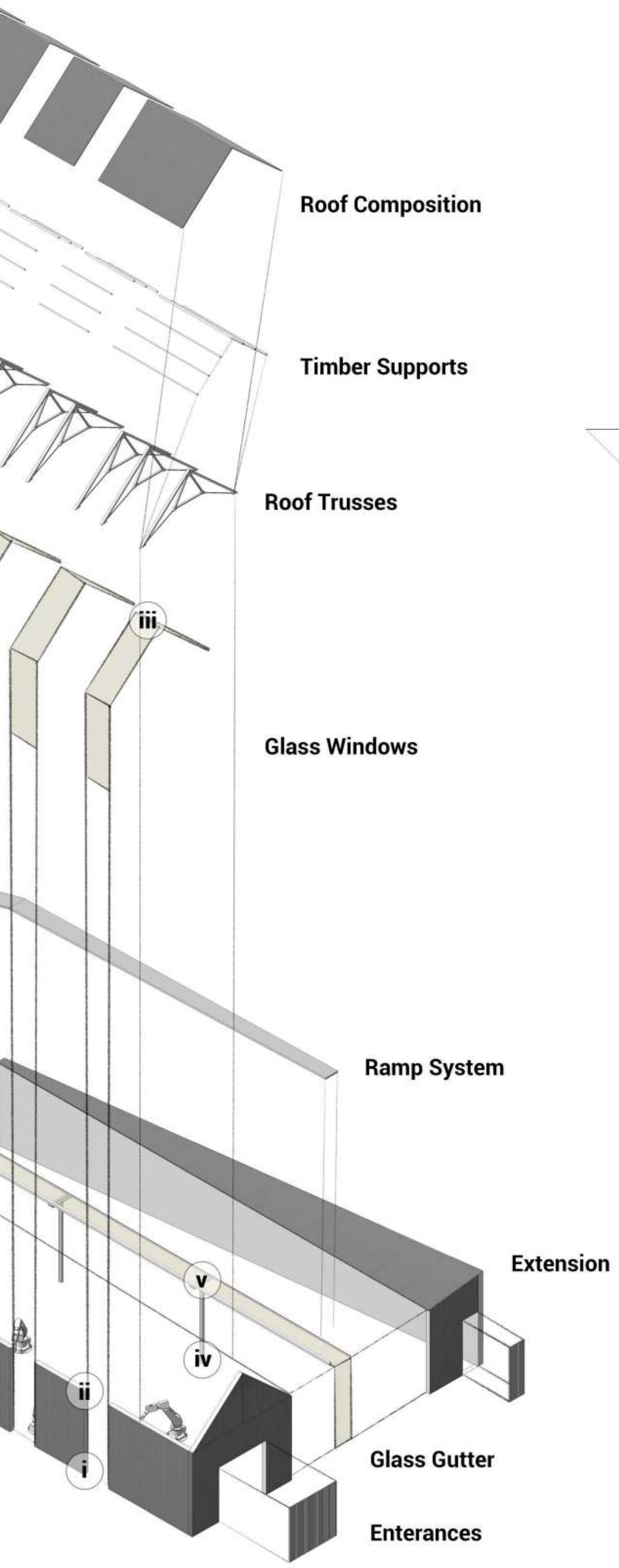
1) 15mm Charred Ash Cladding
2) 15mm Waterproof Ply membrane
3) 10mm Waterproof Membrane
4) 20mm Timber Stud Framing
5) 110mm Rigid Insulation
6) 180mm Timber Truss
7) Aluminium Side Supported DGU Unit
8) Triple Glazing Pane
9) Aluminium Square Corner Profile
10) 10mm Structural Silicone

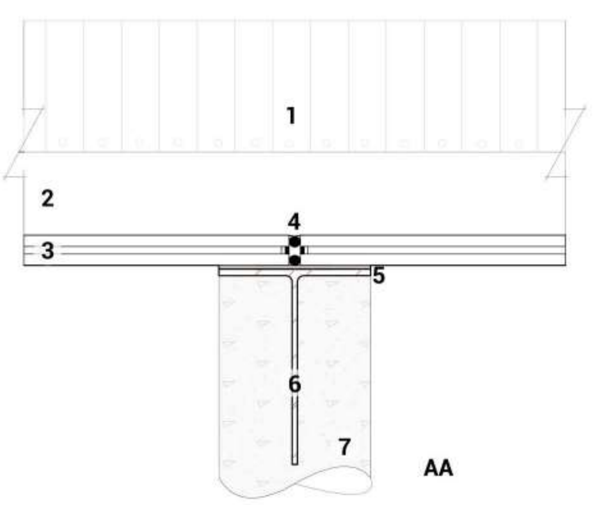


i

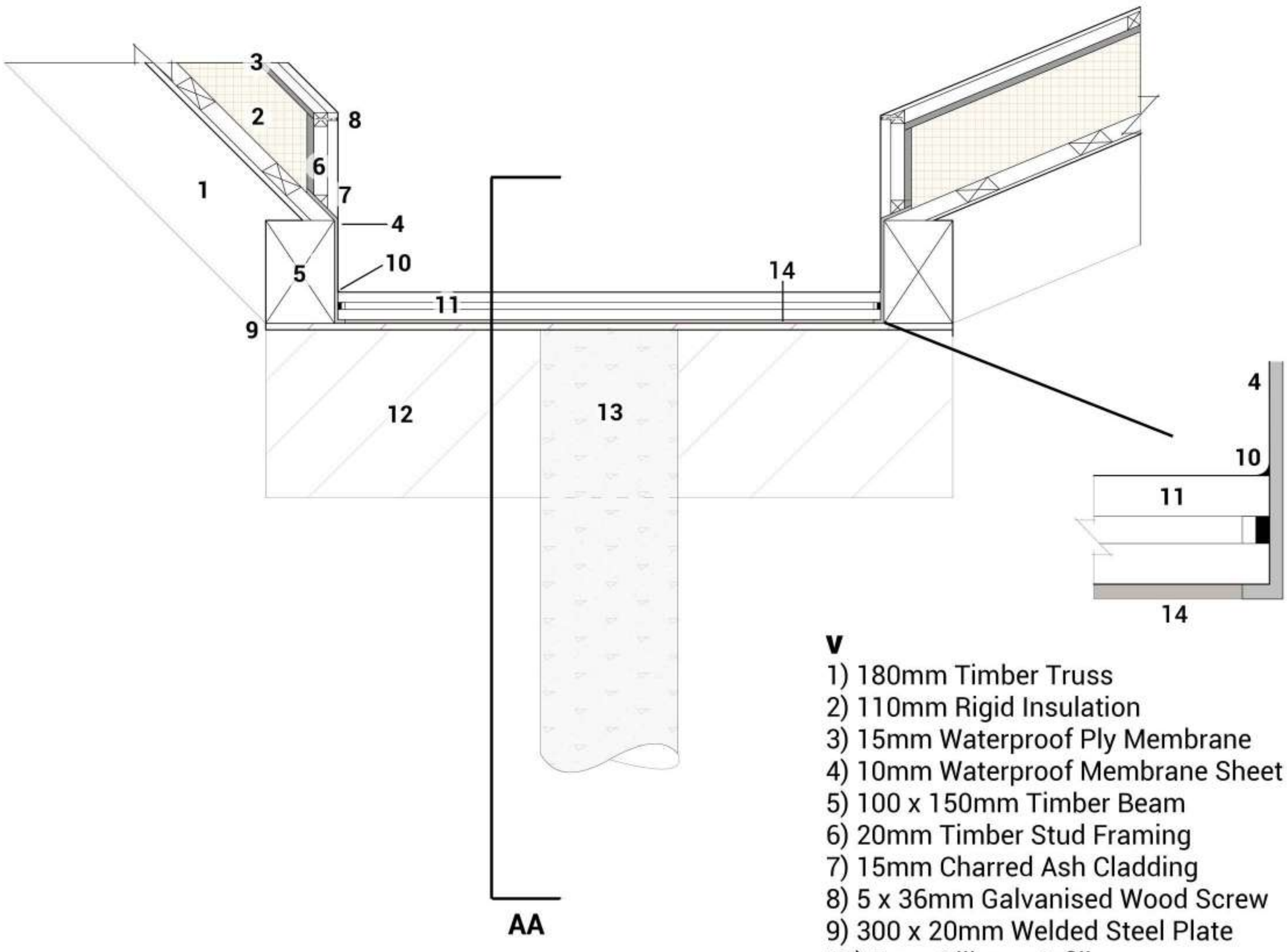
1) 15mm Charred Ash Cladding
2) 15mm Waterproof Ply membrane
3) 10mm Waterproof Membrane Sheet
4) 20mm Timber Stud Framing
5) 110mm Rigid Insulation
6)Timber Stud
7) Aluminium Side Supported DGU Unit
8) Triple Glazing Pane



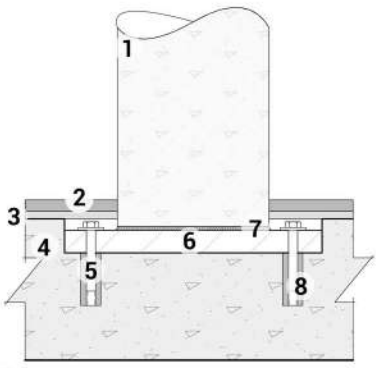




AA
1) 180mm Timber Truss
2) 100 x 150mm Timber Beam
3) Double Glazing Panel
4) 5mm Silicone Infill
5) 10mm Rubber Bed
6) 300 x 150mm T Steel
7) 200mm Concrete Column

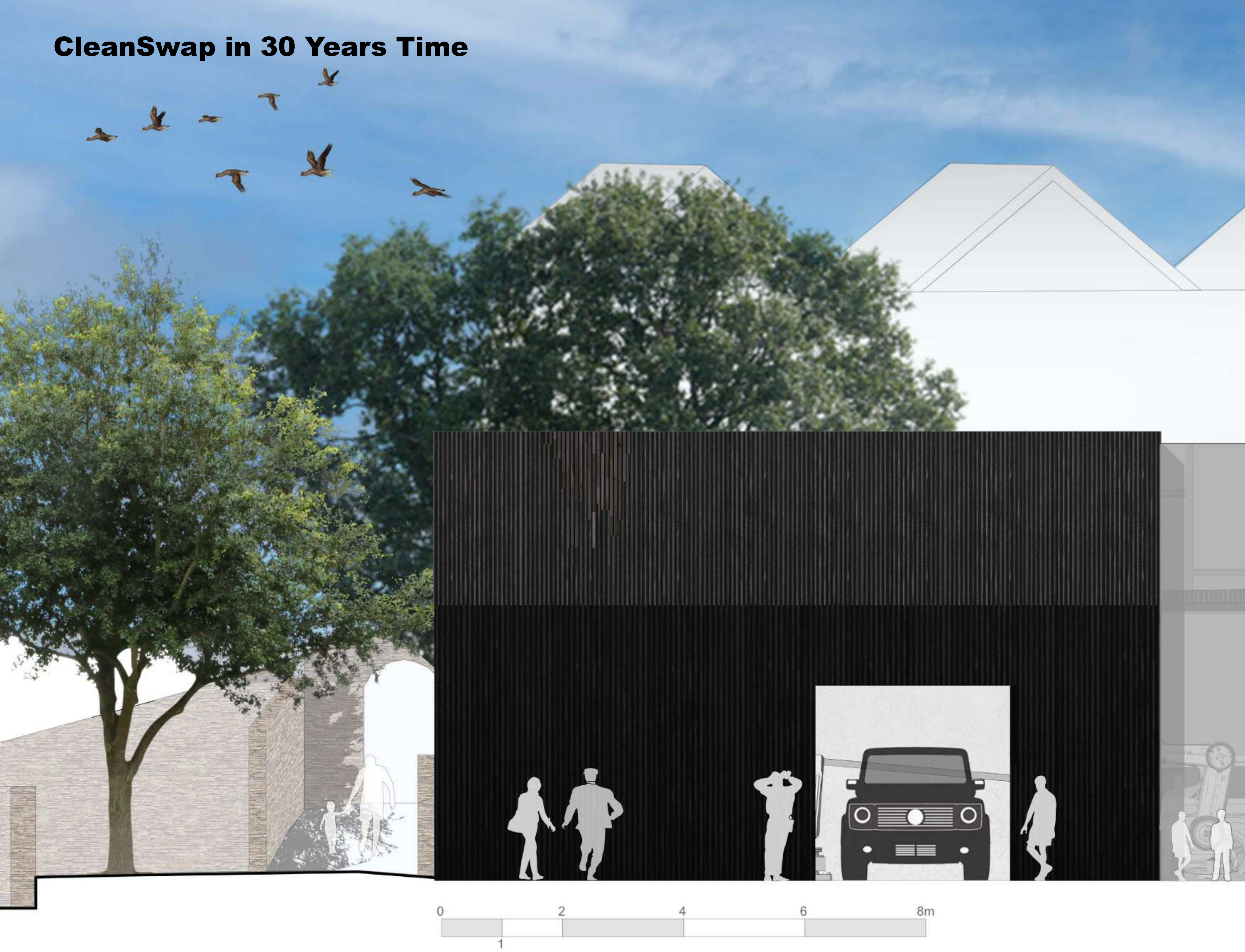


v
1) 180mm Timber Truss
2) 110mm Rigid Insulation
3) 15mm Waterproof Ply Membrane
4) 10mm Waterproof Membrane Sheet
5) 100 x 150mm Timber Beam
6) 20mm Timber Stud Framing
7) 15mm Charred Ash Cladding
8) 5 x 36mm Galvanised Wood Screw
9) 300 x 20mm Welded Steel Plate
10) 5mm Silicone Infill
11) Double Glazing Panel
12) 300 x 150mm T Steel
13) 200mm Concrete Column
14) 10mm Rubber Setting



iv
1) 200mm Concrete Column
2) 15mm Slate Tiles
3) 10mm Tile Adhesive
4) 150mm Concrete Setting
5) 100mm M12 Bolt
6) 300m Steel Plate
7) Plate to Column Welding
8) Epoxy (Metal to Concrete)

CleanSwap in 30 Years Time



With the success of CleanSwap, the industry changed to slow the production of E-V's down and focus on encouraging renewable infrastructure first. This led to less CO_2 emissions, as well as encouraging people to see that there are other ways of reducing global warming such as converting their existing cars. This front elevation highlights, the effects of the industry shift such as: less polluted skies, wildlife returning, as well as a busier garage with more people coming to convert and watch the process.