The Octagon

A Sustainable Community Arts and Cultural Hub

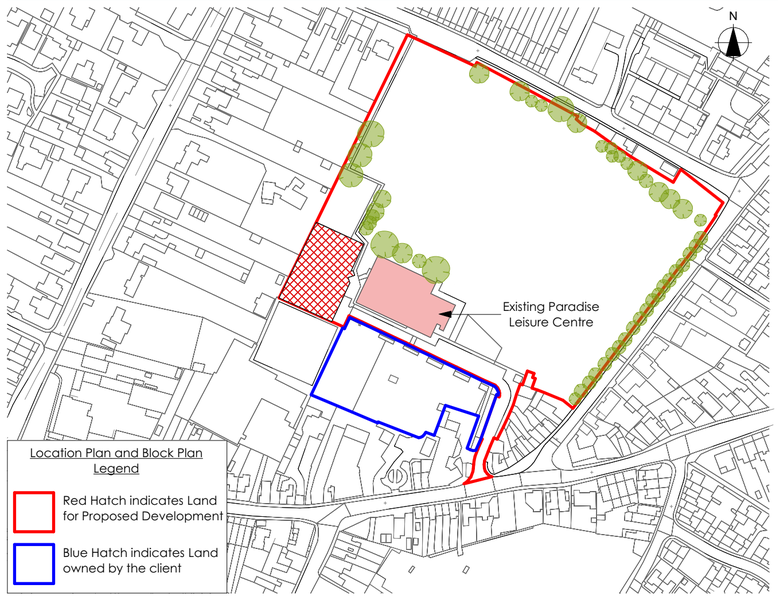
Project Vision

The Octagon is to become a new **arts and cultural hub** situated in the city centre of historic Ely to showcase and support, sustainable enterprises with a strong communty focus. This project is to set a precendent for community hubs in the East Cambridgeshire District **designed with local needs** at the heart of the scheme. The scheme is to promote sustainable and resilient construction methods, and to celebrate local character and distinctiveness through its design.

Client Objectives

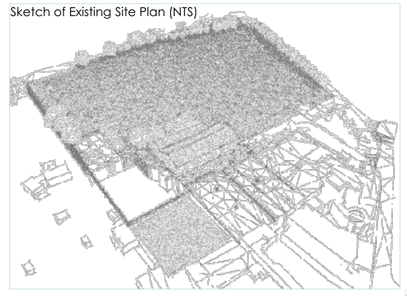
- To provide **high quality, creative spaces** for the community to attract future business opportunities.
- To enhance tourism facilities that that are in keeping with Ely's quality of place and distinctiveness.
- To provide an **inspiring outdoor venue** for major tourism events that will set a precedent for venues within the district.
- Create a scheme that will provide Ely with an '**evening economy**'
- The proposed scheme must recognise the role culture, music and the arts have in forming a community and placemaking.
- To **improve permeability** through the City and **priorities pedestrians and cyclists**.

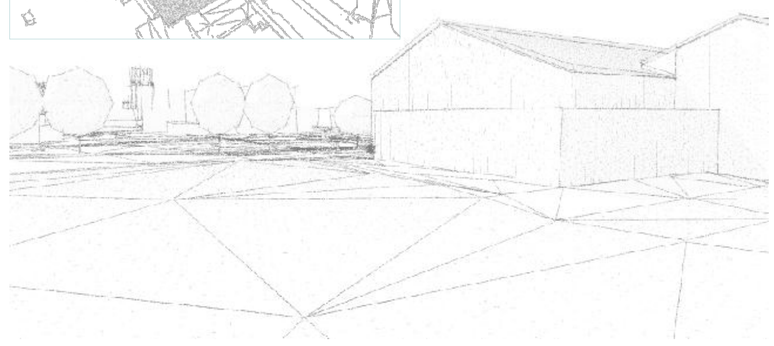
Existing Site



Site Location/Block Plan 1:2500

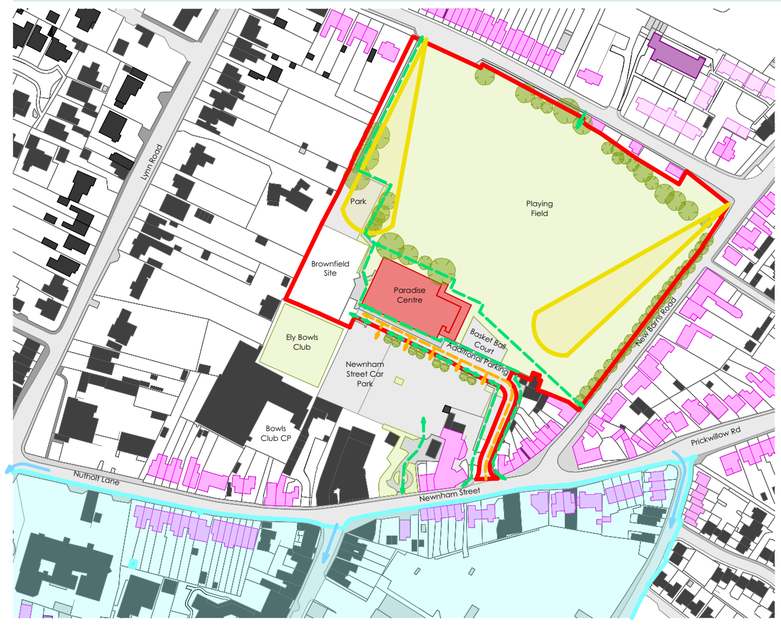
Sketch of Existing Site Plan (NTS)





Sketch of Existing Paradise Leisure centre with Ely Cathedral in the Background (NTS)

Site Analysis



Site Analysis of Proposed Development Site 1:2500

Site Analysis Legend

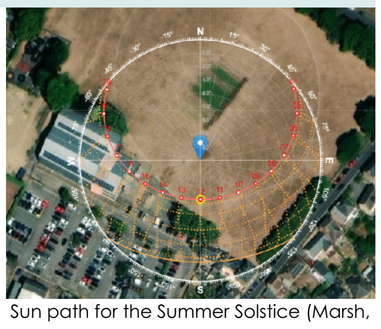
- Existing Paradise Centre
- Building Massing Analysis Single Storey Buildings
- Building Massing Analysis Two Storey Buildings
- Building Massing Analysis Three Storey Buildings
- Green Areas
- Views of Ely Cathedral through the Site
- Footpaths around Proposed Development Site
- Main Roads around Proposed Development Site
- Proposed Site Boundary
- Vehicle Access to Proposed Development Site
- Pedestrian Access to & Through Proposed Development Site
- Ely City Centre

Challenges to Consider of Summer Sunlight

- Excessive solar heat gain without proper mitigation resulting in occupant discomfort and their productivity levels and an increased need for cooling
- Increased demand for cooling will increase the building's energy consumption and running costs

Challenges to Consider of Winter Sunlight

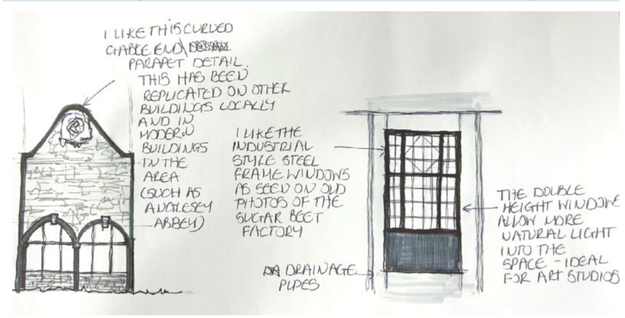
- Lower sun angles can result in increased glare. The occupants of each studio can manage the glare to their preferred levels through the use of shades and blinds whilst still allowing natural light into the space
- Proper specification of insulated windows should mitigate against heat loss at night. The insulation of the walls and ensuring thermal bridging is designed out where possible.

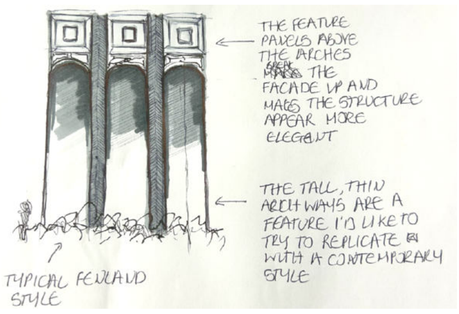


Sun path for the Summer Solstice (Marsh, 2023)

Sun path for the Winter Solstice (Marsh, 2023)

Analysis of Local Historic Context of Ely



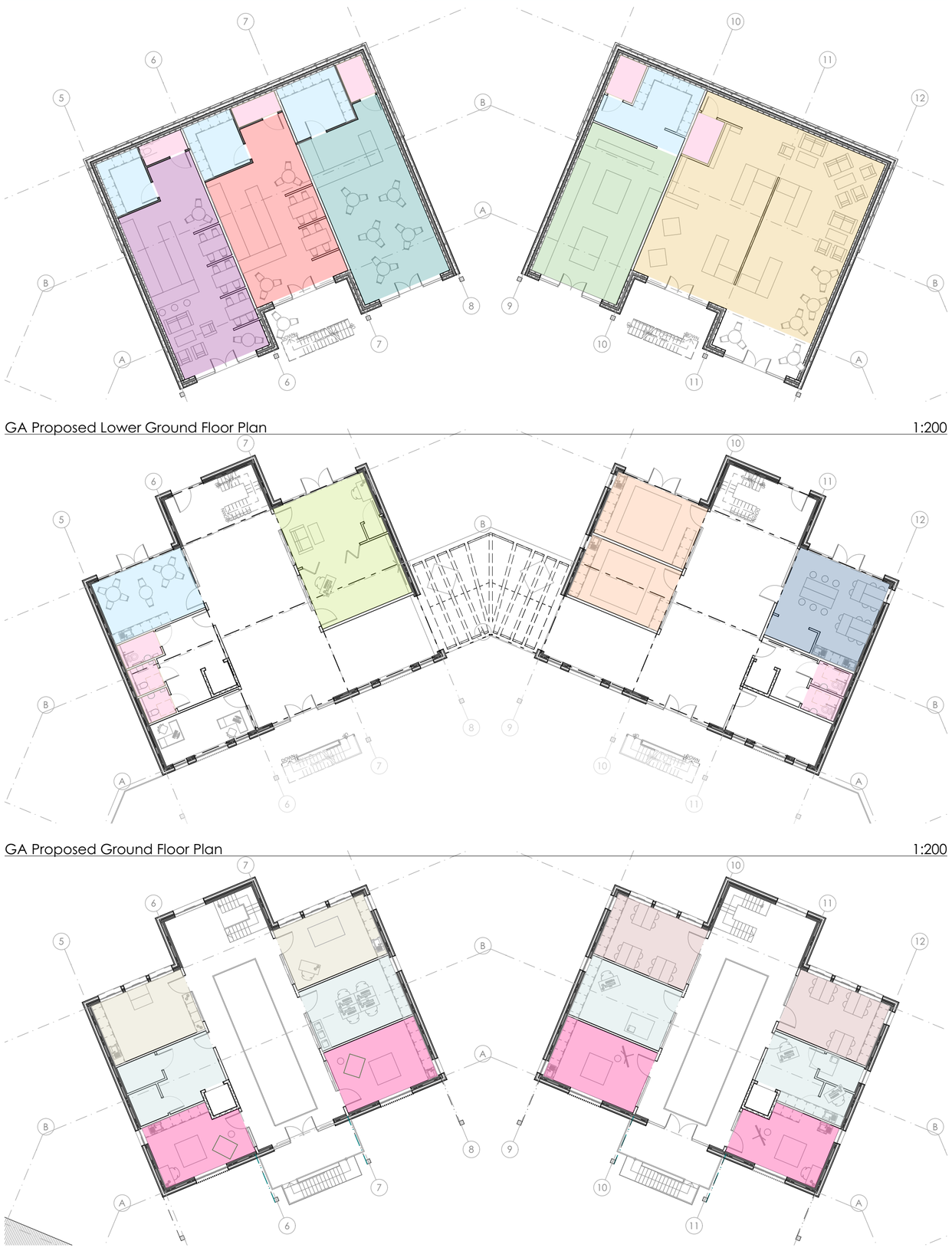


Proposed Site Plan

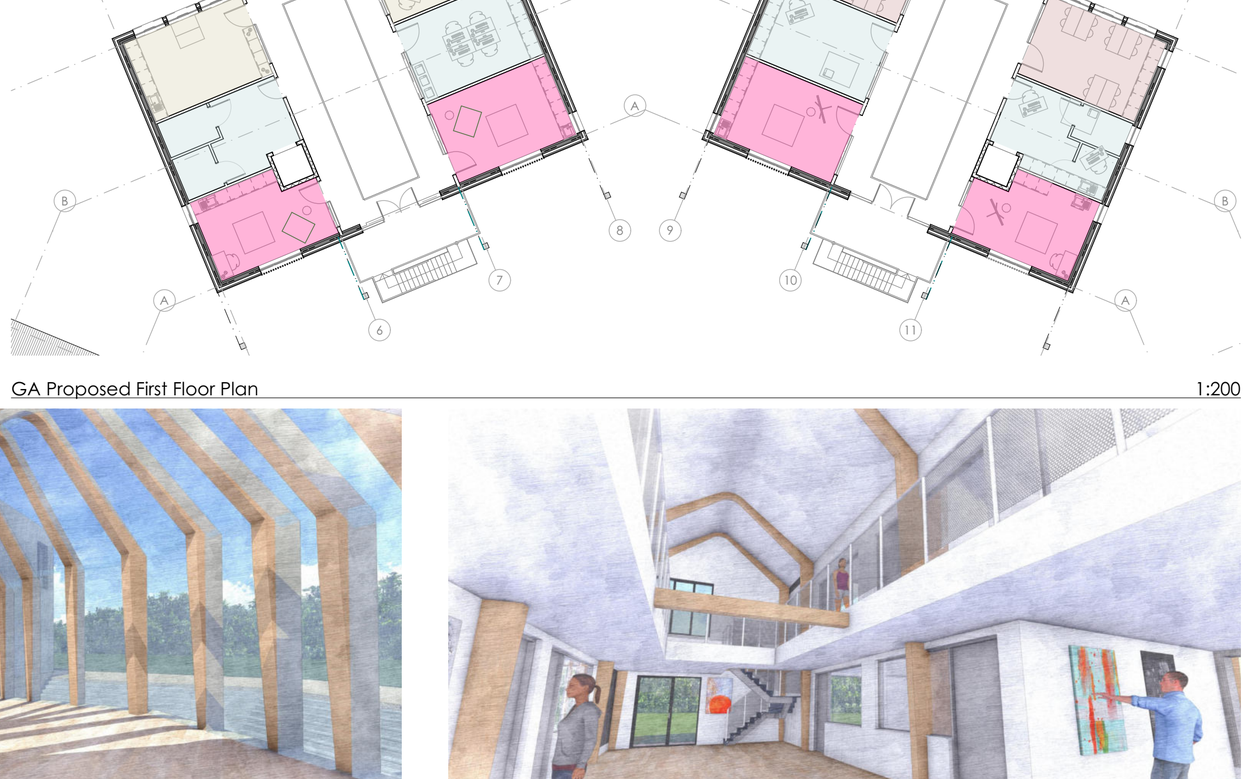
- Coffee Shop
- Bar
- Deli/restaurant
- Farm Shop
- Pop up shops
- Photography Studio
- Sculpure Making Workshop
- Pottery Studio
- Print Making Workshop
- Graphic Art Studio
- Painting/Drawing Studio
- Stain Glass Workshop
- Kitchen Areas
- W/Cs

Proposed Site Plan 1:1250

Proposed Floor Plans



GA Proposed Lower Ground Floor Plan 1:200



GA Proposed Ground Floor Plan 1:200

GA Proposed First Floor Plan 1:200

External Balcony looking out to Ely Cathedral.

Central Walkway taking precedent from Ely Cathedral.

Central Atrium looking up from the ground floor.

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Proposed Elevations

E-01 Proposed Elevation 01 (South) 1:100

Roof overhang on south elevation to mitigate against overheating during the summer.

Vertical feature thermally modified timber cladding.

Windows triple glazed to achieve U value of 1.2. Windows cill heights of 900mm. As a result critical glazing is not required in these locations as it is above the 800mm (above FFL) threshold.

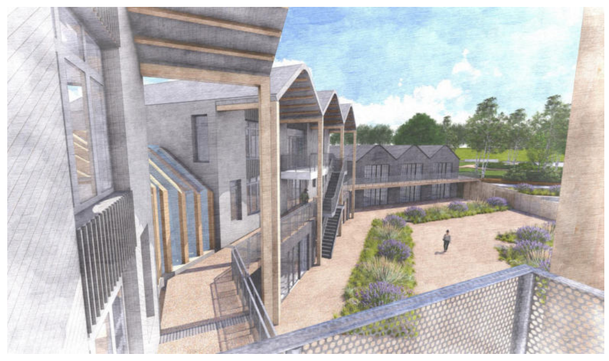
Guarding to walkway and staircase is 1100mm in height, satisfying Approved Document: Part K. Slip resistant handrails to be no more than 1000 from FFL/external ground level.

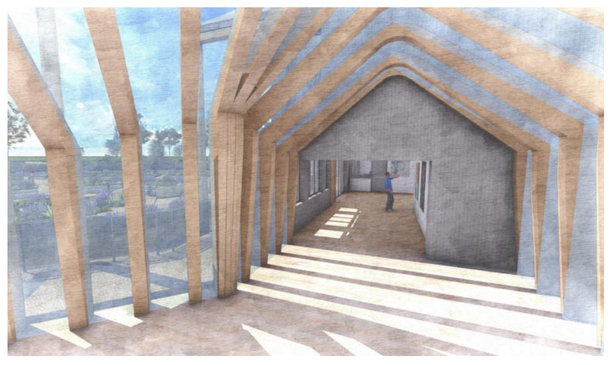
Greencoat Steel Clading by SSAB.

E-02 Proposed Elevation 02 (North) 1:100

Vertical thermally modified timber cladding with Factory applied SiOO:X treatment.

External doors triple glazed to achieve U value o 1.2. All glazing within critical locations shall be certified to BS EN 12600 and BS:6206 standards. Critical locations include: between finish floor level and 1500mm above finish floor level in all glazed doors, and sidelight panels within 300mm of either edge of the door.





External Materials

Timber External Wall Cladding - The scheme proposes the majority of the building's façade to be clad in a **decorative, contemporary timber rainscreen cladding** to reflect the timber-first structural approach on the outside. Whilst there are alternative cladding options the replicate the look of timber boarding, such as fibre cement boards, it was felt this did not represent the environmentally conscience approach taken for other elements of the building. Whilst there are some elements where it is unavoidable to use masonry and cement based products, it can be avoided for the external walls above ground level. Scottish (European) Larch Factory Coated with Russwood's SiOO:X (in Mid Grey)is specied due to it being **sourced from 'FSC® or PEFC-certified and well-managed forests'** within the UK resulting in a lower embodied carbon due to the reduced travel distance (Ross, 2018).

Roof Finish - The proposed roof finish is a colour-coated steel standing seam roof system chosen for its sustainability credentials. Steel is **100% recyclable**, meaning it can be melted time after time without affecting its properties or performance. The manufacturer, SSAB who are ISO 14001 certified **have revolutionised the steel industry by replacing the use of fossil fuels** in the production of iron and have replace '*carbon and coke with* ***green hydrogen'*** in the oxygen removal process (Vetter, 2021). SSAB use a bio-based coating to eliminate a substantial portion of petroleum-based chemicals by using Swedish rapeseed (SSAB, n.d). Whilst reducing the products carbon footprint, the rapeseed oil based coating also minimises 'the release of harmful substances into the air' (SSAB, n.d).

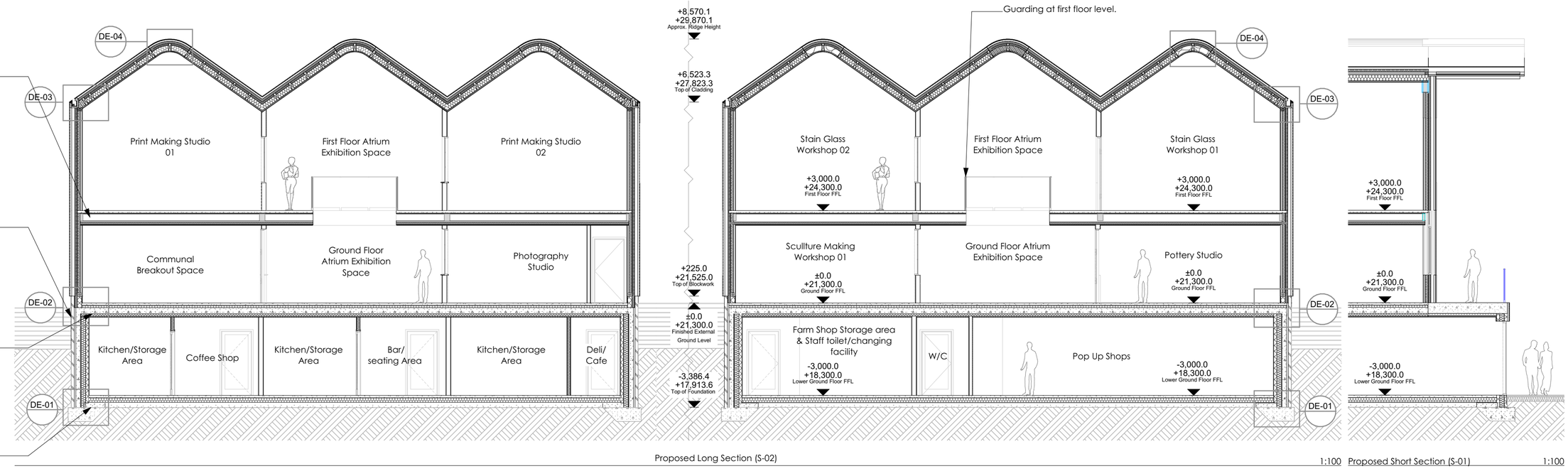
Proposed Sections

Approved Document Part E: the proposed internal floors fall under category C; this consists of a timber or metal floor joists covered in a wood based board to achieve a minimum mass per unit area of 15kg/m^2 . An **acoustic absorbing** mineral layer of 100mm thick sits between the joists with a single layer of 10kg/m^2 plasterboard to be fixed to the underside of the joists.

Typical Basement Construction - a poured, reinforced concrete basement wall construction with a **type B and C waterproofing** system. Combining integral structural water proofing and a cavity drain to mitigate against minor water ingress results in a more durable basement structure.

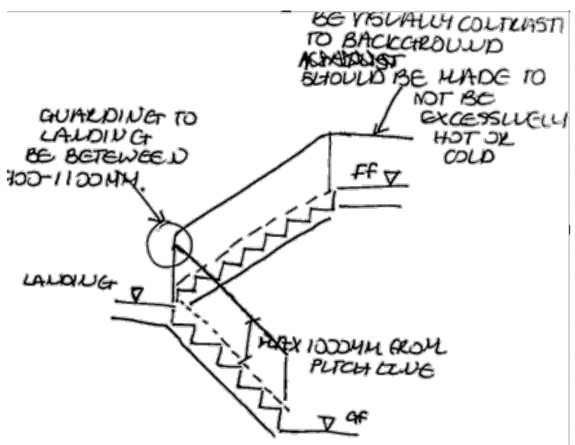
Hollow Core Ground Floor Slab - manufactured offsite can **save construction time on site**, allows for services to be ducted through should it be required.

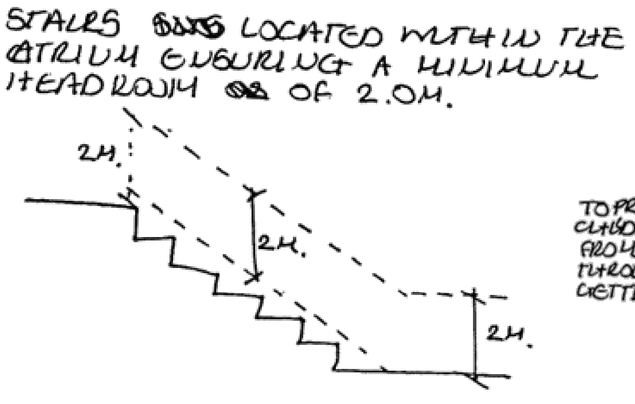
(Lower) **Ground floor bearing slab** poured on site

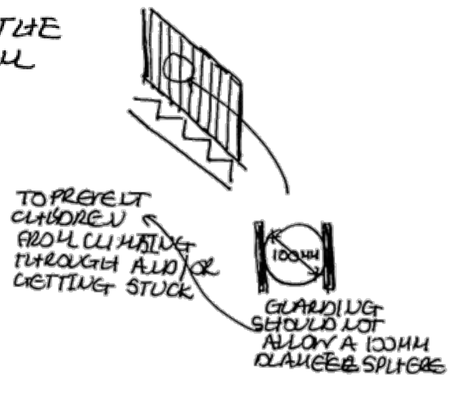


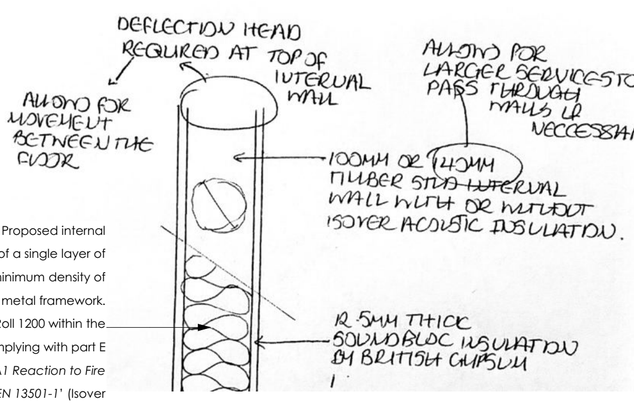
Proposed Long Section (S-02) 1:100

Proposed Short Section (S-01) 1:100









Approved Document Part E: Proposed internal walls (Type B) consisting of a single layer of plasterboard with a minimum density of 10kg/m^2 to line timber or metal framework. Isover Acoustic Partition Roll 1200 within the studword in addition to complying with part E also '*achieves a Euroclass A1 Reaction to Fire classification, according to EN 13501-1*' (Isover Acoustic Partition Roll (APR 1200), n.d).

Structural Elements

Primary Structural Elements

The Glulam post and beam arrangement provides the desired aesthetic internally with the aim to show the structure within the central atrium. The frame is a combination of **a three-pin truss with steel ties and a three pin frame** with finger jointed haunches and has the advantage of achieving a large, **unobstructed volume**; ideal for an exhibition space.

Secondary Structural Elements

The main factors in determining where best to place the purlin were the aesthetics and how it interfaced with the insulation. The design intent was to only have the **primary structure exposed internally t**o provide a blank space for the exhibition area. To achieve this with the insulation going between and over, it was determined that sitting the purlin on top of the primary beam was going to be more successful. This gave more space for insulation and the purlins could be hidden by plasterboard.

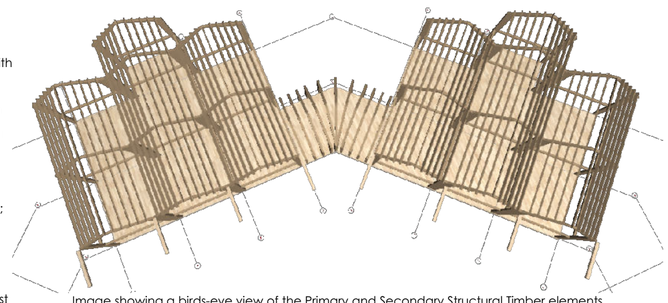


Image showing a birds-eye view of the Primary and Secondary Structural Timber elements

Image showing a elevation view of the Primary and Secondary Structural Timber elements

Internal Visual showing exposed primary structure.

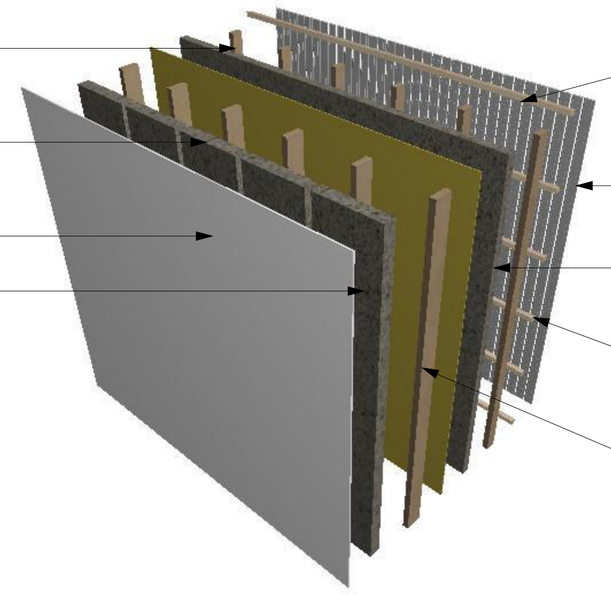
Proposed External Wall Construction (at Ground and First floor)

100x50mm vertical thermally modified cladding battens installed to manufacturers instruction.

100mm Thick rockwool insualtion batts, friction fitted between timber studs to acheive a combined U value of 0.2 W/m^{2}K or better. Insulation to be installed to manufacturers instructions.

1 No. Layers 12.5mm Thick SoundBloc Plasterboard, by British Gypsum.

50mm Wide service void betwen timber studwork.



Cladding to be factory coated in SiOO:X Wood Potection in the colour 'light grey' to **eliminate differential weathering** and provides a consistently weathered tone.

Vertical Scottish Larch Rainscreen cladding by 'Russwood' sourced from **sustainably managed forests,** within 100 miles of Russwood's Highland sawmill.

75mm Thick Rockwool insulation with staggered horizontal joints.

EPDM tape fixed on the upper edge of the horizontal batten to ensure that a water trap is not created, **enhances ventilation** and **improves durability** by creating a gap between the timber elements.

150mm wide **thermally modified** timber studwork infill external wall. Vertical Studwork at maximum 400mm centres.

Refer to Detail DE-01 and DE-02 for full wall specification.

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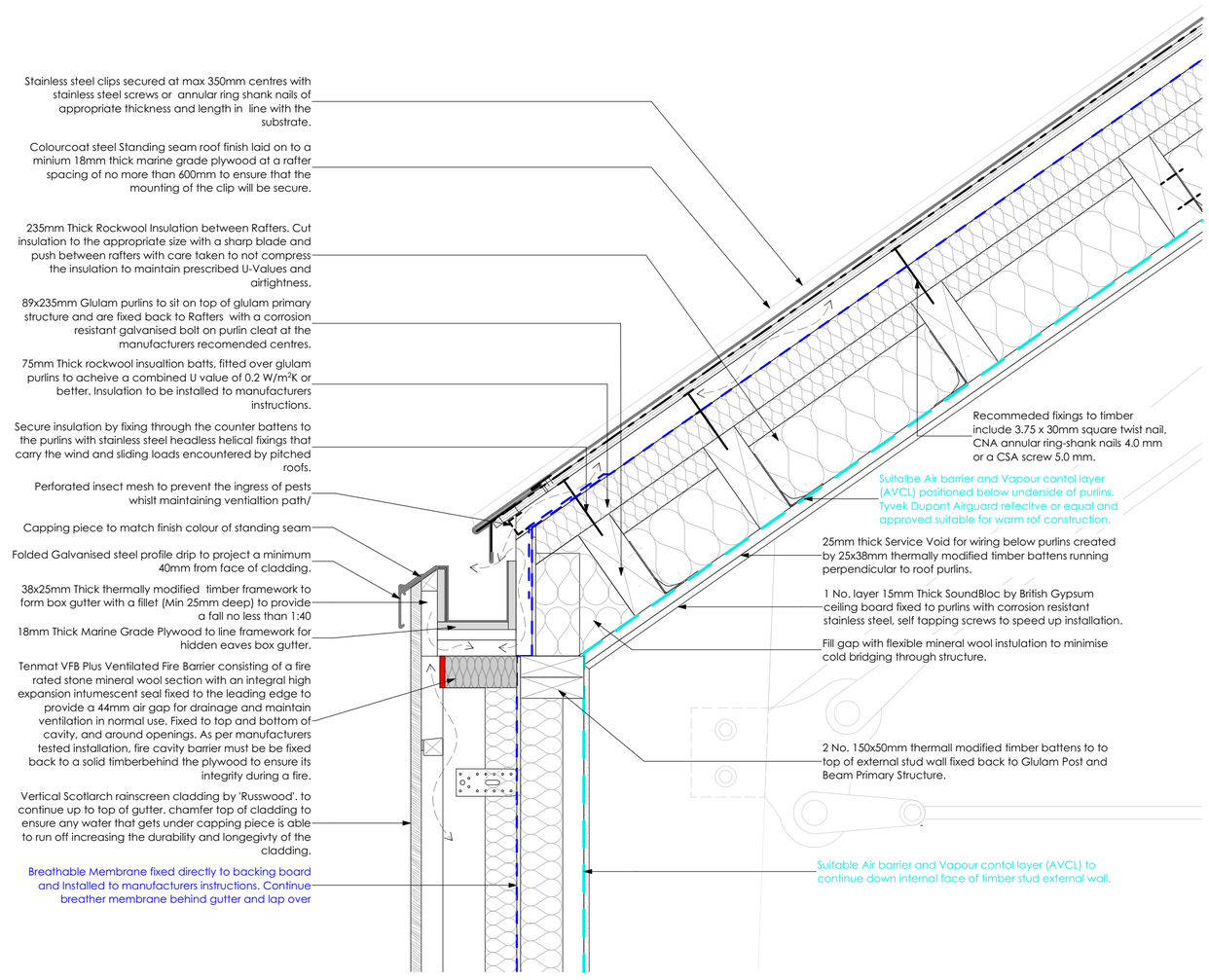
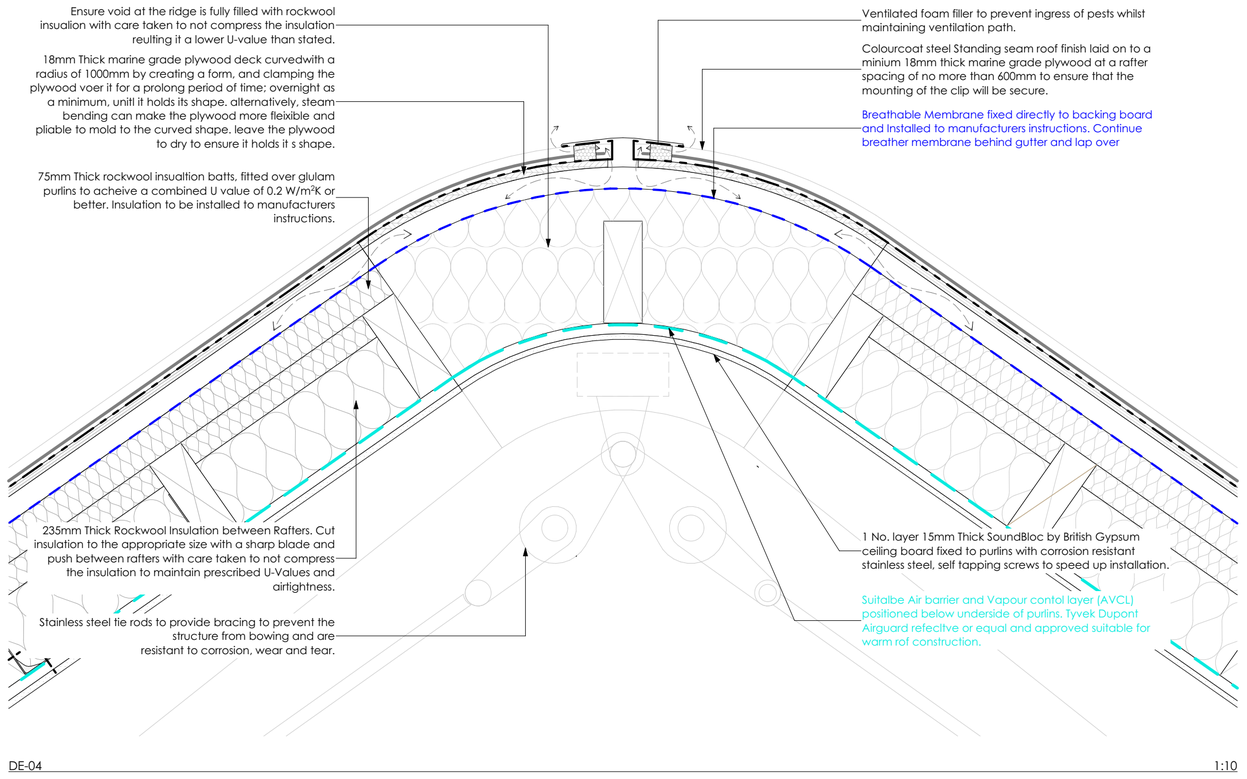
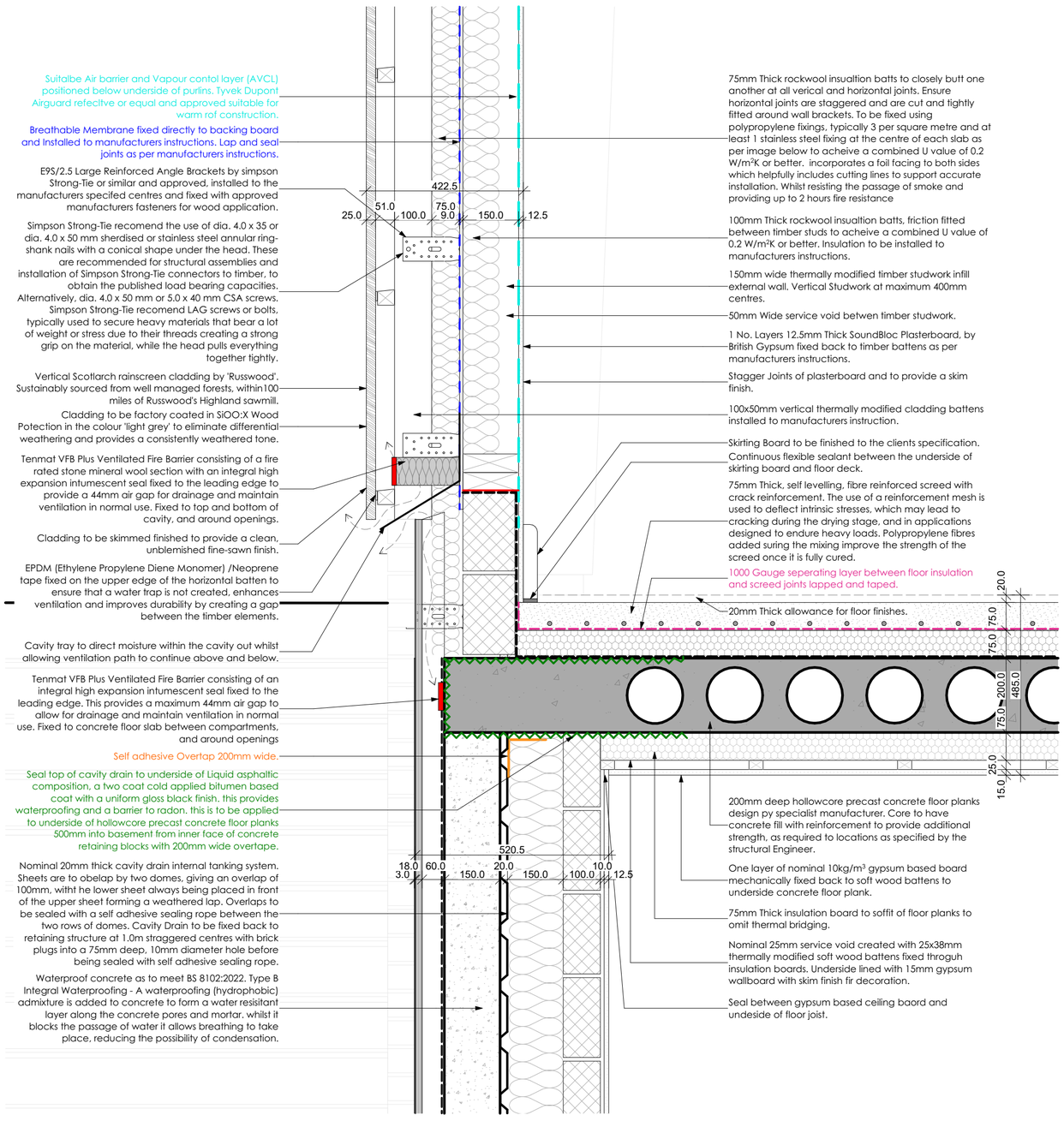


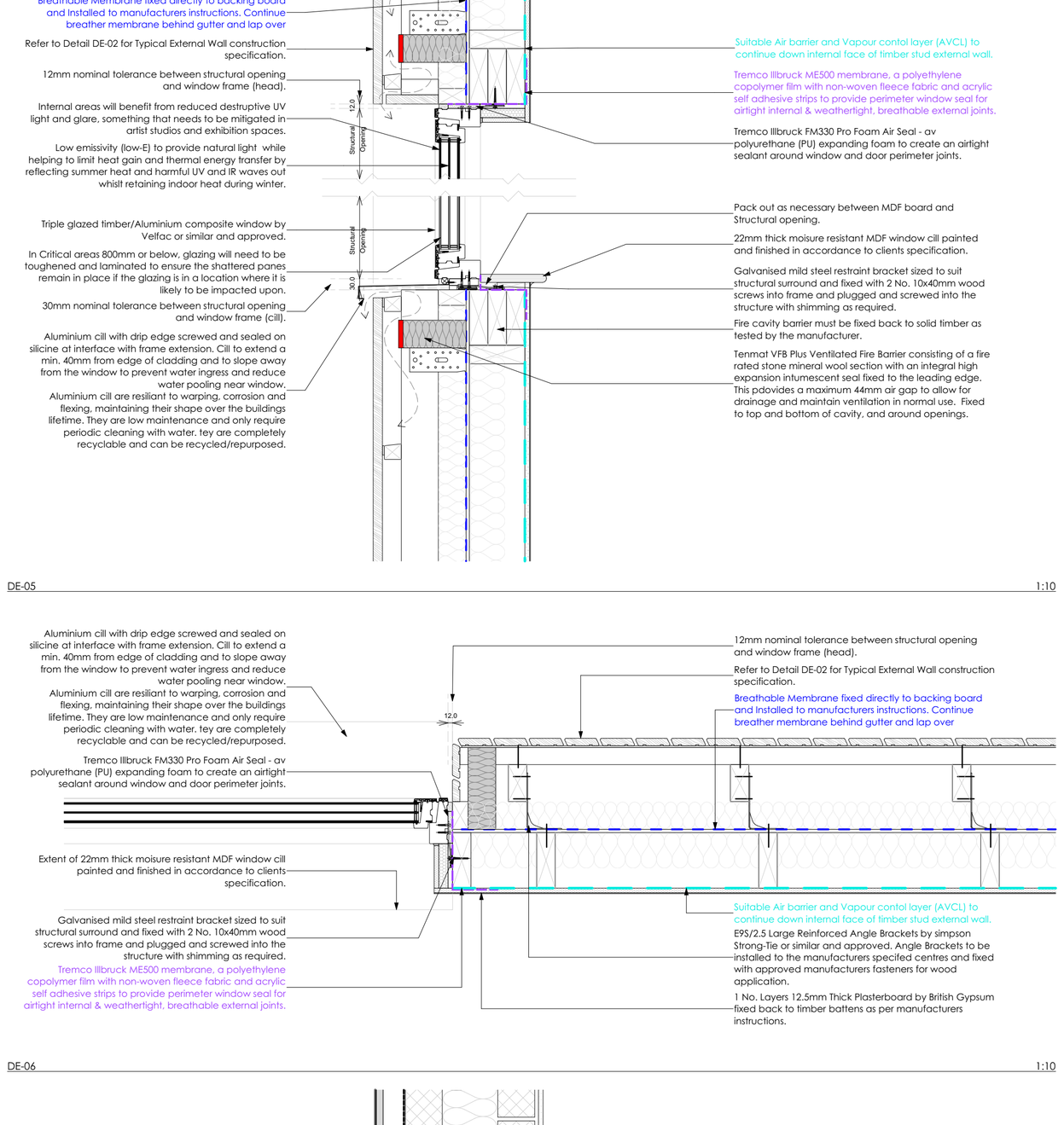
DE-03 1:10



DE-04 1:10

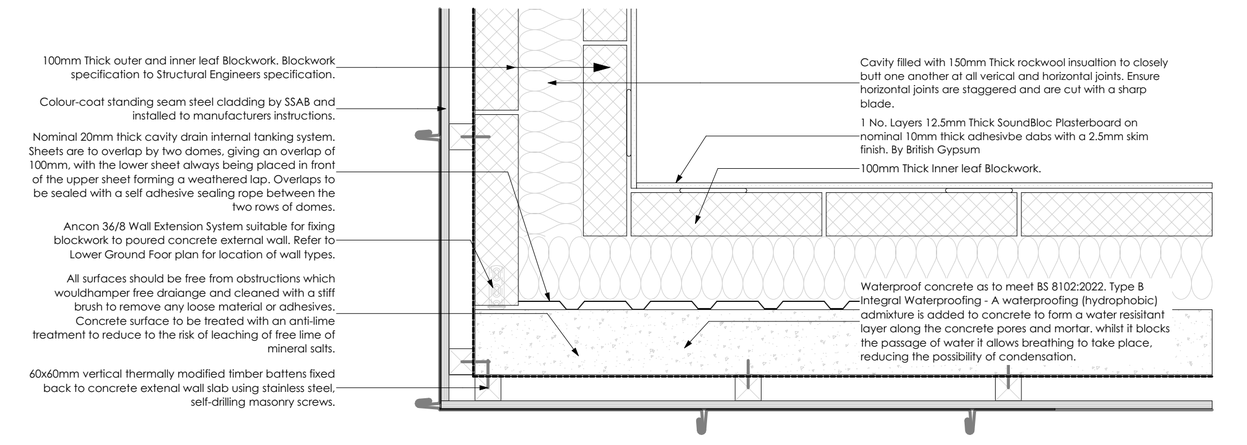


DE-02 1:10

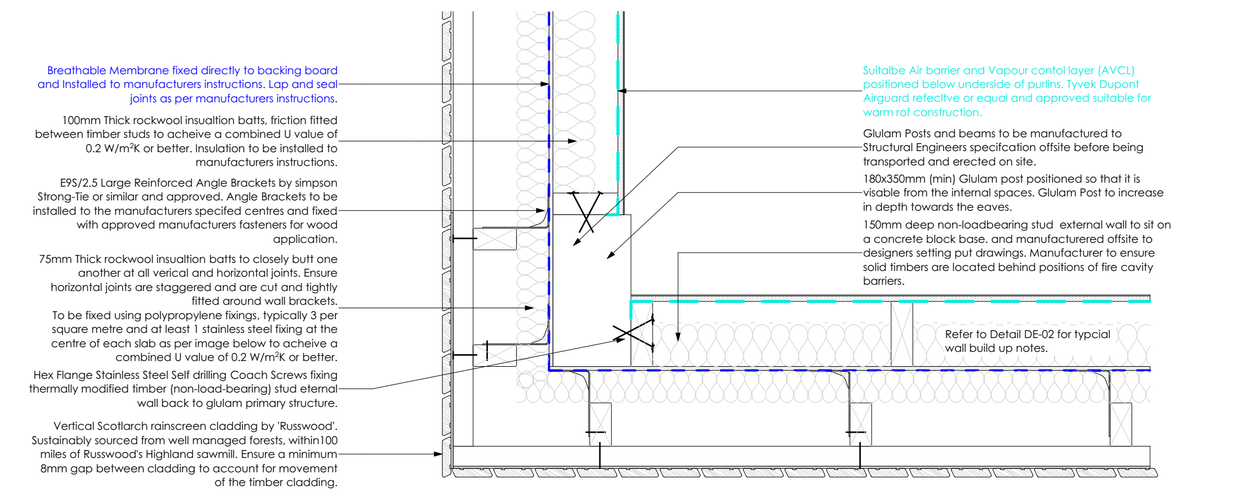


DE-05 1:10

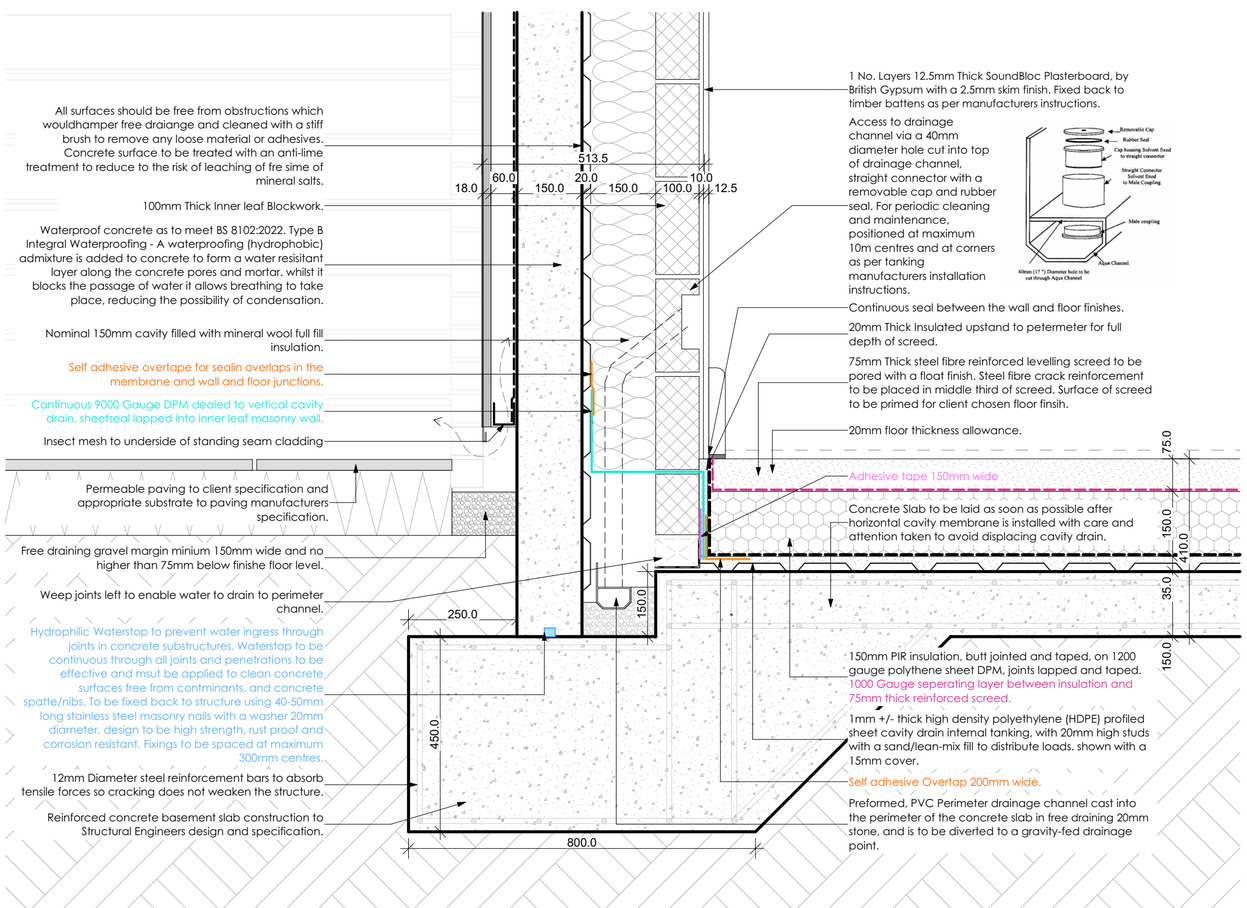
DE-06 1:10



DE-07 1:10



DE-08 1:10



DE-01 1:10

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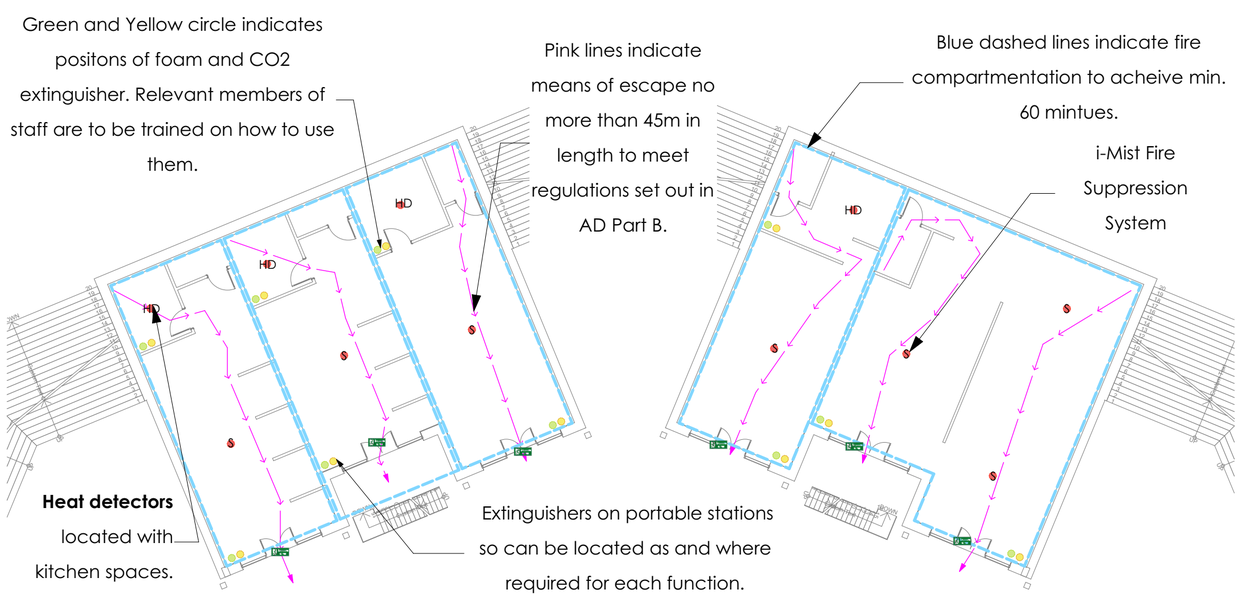
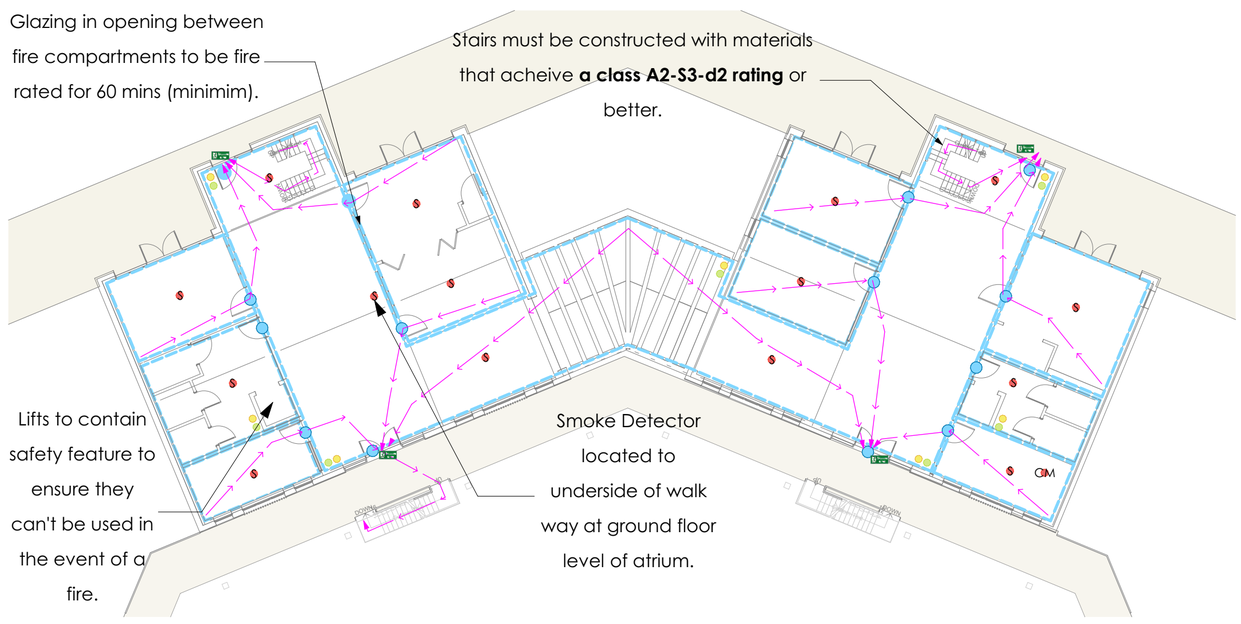
Fire Strategy



Fire Strategy Lower Ground Floor Plan 1:200



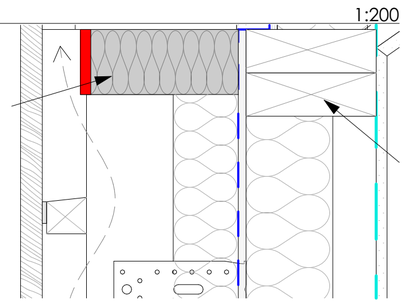
Fire Strategy - Ground Floor Plan 1:200

Fire Stopping

- The use of fire barriers such as **fire retardant sealant, fireproofing tape, fireproof collars/wraps, intumescent sleeves, panels and dampers** that have **testing data** demonstrating the that the products have been tested within the timber construction they are intended to be used with. (Gustafsson et al., 2019, p. 43).
- Ensuring that connections between various building elements achieve the same 'fire resistance, resist the applied forces and, prevent the passage of heat and flames' that the building elements achieve (Gustafsson et al., 2019, p. 43).

Cavity Barriers

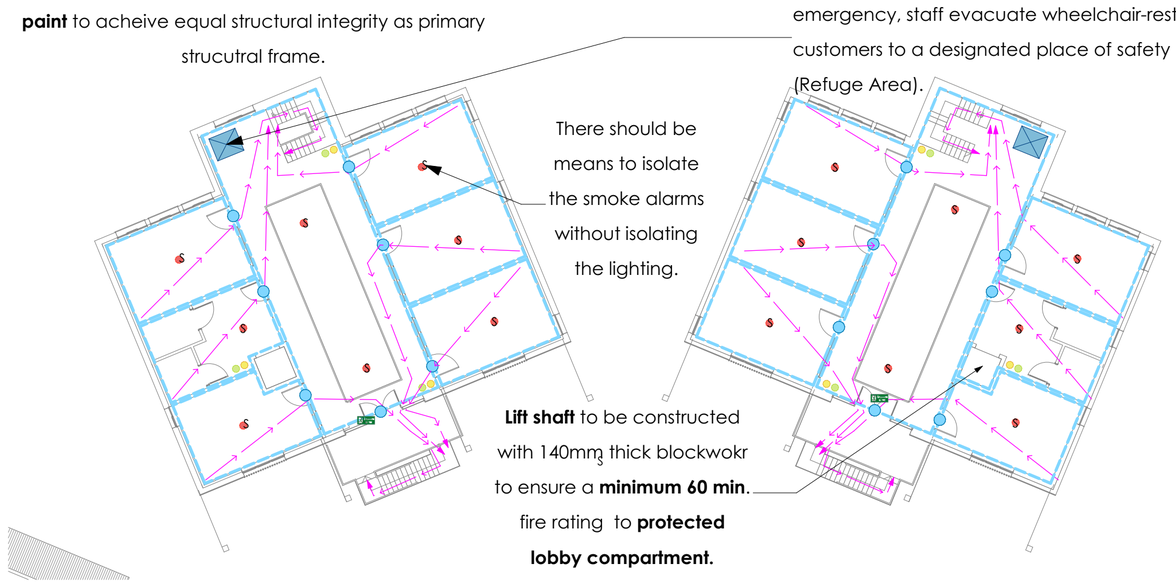
To avoid '*rapid fire spread bypassing compartment floors or walls*' (LABC Warranty, n.d) the scheme proposes installing **horizontal and vertical cavity barriers** to the edges of cavities, including around openings , and at compartment wall or floor junctions (LABC Warranty, n.d). Horizontal cavity barriers with an i**ntumescent strip facilitate drainage and ventilation of the cavity**, though their specification should ensure that in the event of a fire, the intumescent products seal the entire width of the cavity (LABC Warranty, n.d).



Tenmat VFB Plus Ventilated Fire Barrier consisting of a fire rated stone mineral wool section with an integral high expansion intumescent seal fixed to the leading edge to provide a 44mm air gap for drainage and maintain ventilation in normal use.

Exposed Structural Glulam elements to b design with a charring layer to provide **minimum 30 minimum integrity** to allow enoguh time for people to escape the building.

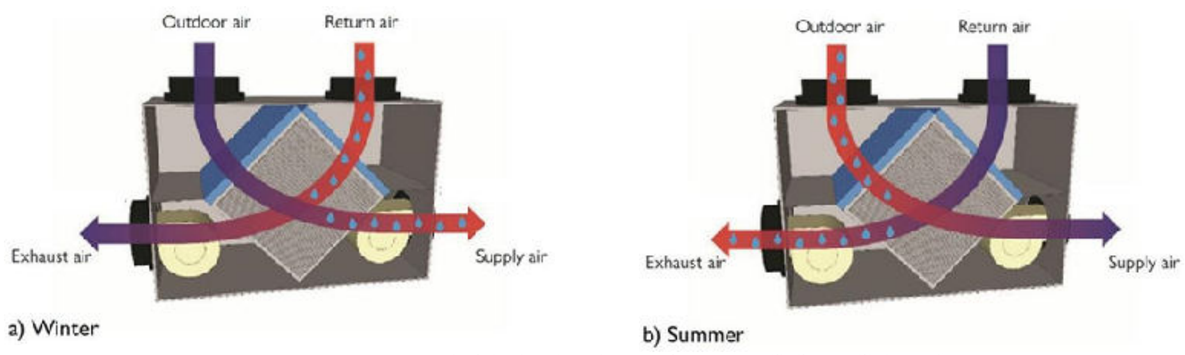
Exposed Stainless steel ties to be coating in **intumscent paint** to acheive equal structural integrity as primary strucutral frame.



Refuge area. In the event of a fire, or other emergency, staff evacuate wheelchair-restricted customers to a designated place of safety (Refuge Area).

Fire Strategy - First Floor Plan 1:200

Ventilation Strategy



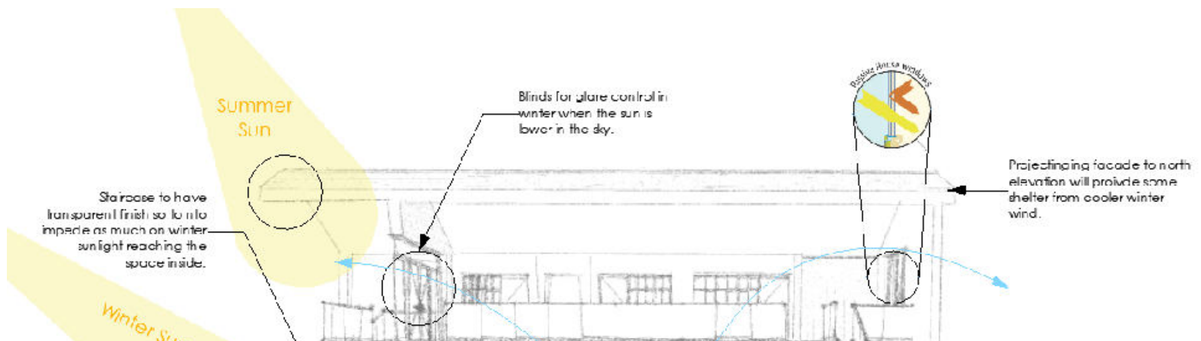
MVHR summer and winter heat exchange (Home Ventilating Institute, n.d)

Passive Stack was not a suitable ventilation strategy due to how the internal spaces are to be used.

- It was not ideal to have windows and doors remaining opening for long periods of time to ensure an adequate supply of fresh air for stack ventilation.
- The building use also requires careful control of the indoor climate; passive stack ventilation is harder to control and maintain consistent temperatures.

For these reasons a mechanical ventilation heat recovery system is proposed to '*provide a controlled way of ventilating [the space} while minimizing energy loss' (Home Ventilating Institute*, n.d).

Heating, Cooling and Ventilation Strategy



Materials with high thermal capacity - absorb heat 'when the temperature is higher than the thermal mass material' (Branz Ltd, 2018) thus reducing ambient indoor temperature. A night, when the temperature drops, the heat energy is release, passively heating the room. In winter 'south facing windows, will allow low level winter sun to penetrate into the building and absorb into the thermal mass (walls, floor ceiling)' before being released overnight when the temperature drops (First in Architecture, 2019). Additional heating is likely to be required in the day until when the sun is at the correct angle and the building begins to heat up from the days activities (First in Architecture, 2019).

Sustainability and Environmental Considerations

Planting an area dedicated as a wildflower meadows will support insects, is a natural alternative to a labour intensive lawn.

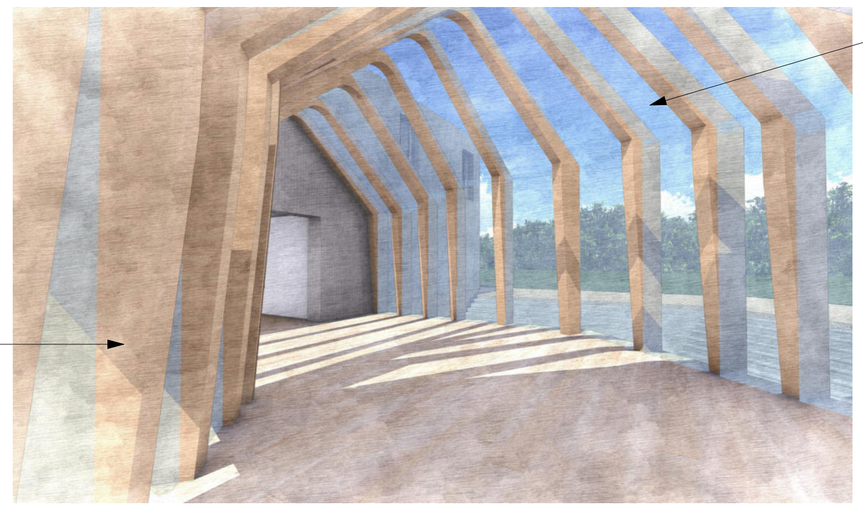
Wildflower Meadow (Country Life, 2023)

Plant a range of trees, shrubs and climbers, that are able to provide food in the form of flowers, fruits and seeds as well as providing cover

Rainwater harvesting where water from catchment areas, such as roofs, are diverted to a storage tank until it is needed for domestic or irrigation purposes. Great for using in applications that don't require drinking water e.g flushing toilets and can reduce waterbill.

Installing PV panels onthe south and west facing roofs generate '*free, renewable, low carbon electricity*' (Energy Saving Trust, 2022).

PV Solar Cells within glazing.
This '*solar harvesting system uses small organic molecules developed ...to absorb specific nonvisible wavelengths of sunlight*' and convert this energy to electricity using thin strips of PV solar cells. The materials look transparent to the human eye making them suitable for applying to windows.



Sourcing of sustainable materials: Glulam is a material and the timber for manufacturing is sourced from sustainable Scandinavian forests where forestry legislation limits the amount of timber that is harvested. Woodlot owners are obligated '*to carry out regeneration after felling'* under this legislation (Boreal Forest, 2022). There has been an increase focus on retaining and providing suitable habitats for endangered species.

Luminescent Solar Concentrator Technology (Zhao, 2021).