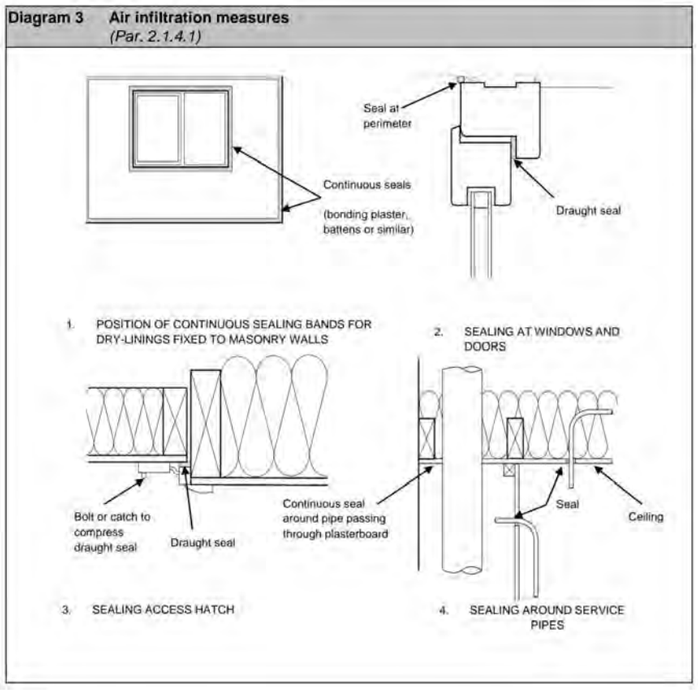
TGD L

2.1 Building Fabric

TGD Regulation	Current Compliance	Response Proposal
2.1.3.1 To avoid excessive heat losses and local condensation problems, reasonable care should be taken to ensure continuity of insulation and to limit local thermal bridging, e.g. around windows, doors and other wall openings, at junctions between elements and other locations. Any thermal bridge should not pose a risk of surface or interstitial condensation. See Appendix D for further information in relation to thermal bridging and it's effect on building heat loss.	The building fabric is currently uninsulated which is causing a high amount of heat loss throughout the building.	Insulating the building is necessary to comply with this regulation. There are 2 options to achieve this: 1) Externally insulate and clad/render over the insulation. 2) Internally insulate the building. The esquisse explores how these 2 options could be carried out with the implications of each.
2.1.4.2 For material alterations or material change of use, infiltration of cold outside air should be limited by reducing unintentional air paths as far as is practicable. Measures to ensure this include: - (a) sealing the void between dry-lining and masonry walls at the edges of openings such as windows and doors, and at the junctions with walls, floors and ceilings (e.g. by the use of certified air tightness tapes and/or membranes); (b) sealing vapour control membranes in timber-frame constructions; (c) fitting draught-stripping in the frames of openable elements of windows, doors and rooflights; (d) sealing around loft hatches; (e) ensuring boxing for concealed services is sealed at floor and ceiling levels and sealing piped services where they penetrate or project into hollow	Much of the external windows and doors cause a significant amount of heat loss.	

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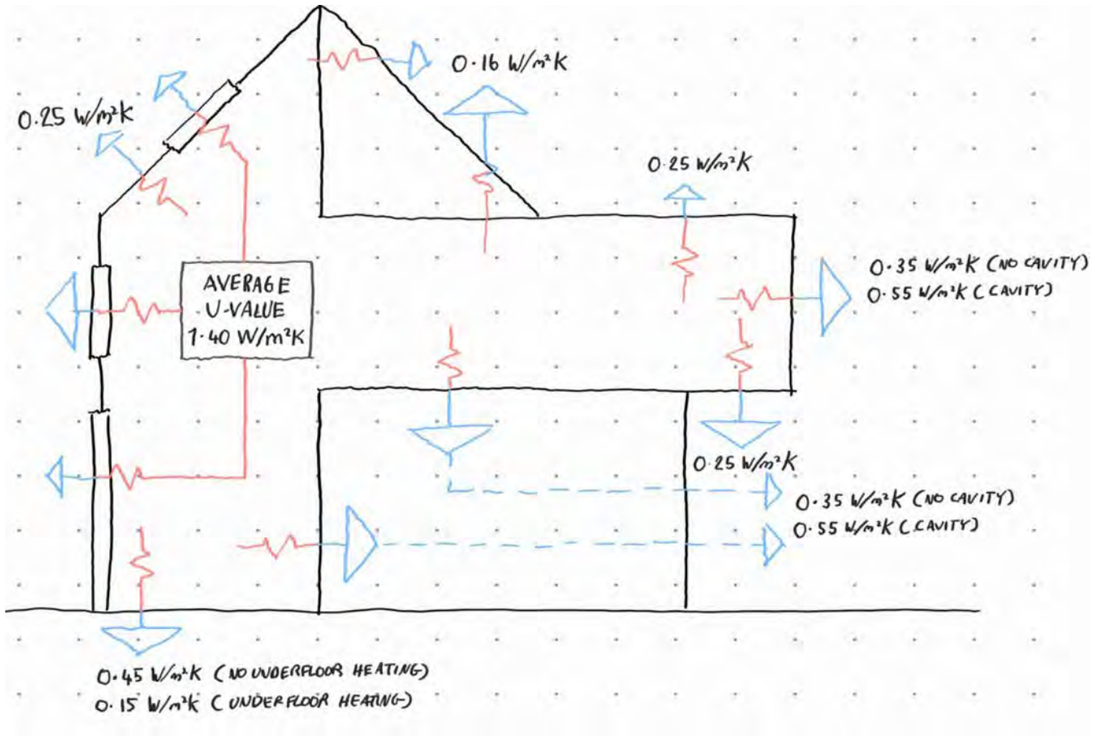
2.1 Building Fabric

Table 10 Maximum elemental U value (W/m²K)[1,2] for Material Alterations		
Column 1 Fabric Elements	**Column 2 Area-weighted Average Elemental U-Value (Um)**	**Column 3 Average Elemental U-value – individual element or section of element**
Roofs Pitched roof - Insulation at ceiling - Insulation on slope Flat roof	 0.16 0.25 0.25	 0.35
Walls Cavity Walls[3] Other Walls	 0.55 0.35	0.60
Curtain Walls	1.8	0.60
Ground Floors	0.45[4,5]	
Other Exposed Floors[5]	0.25	0.60
External doors, windows and rooflights	1.60	3.0

Notes:
1. The U-value includes the effect of unheated voids or other spaces.
2. For material alterations, the U-values relate to the new works.
3. This only applies in the case of a wall suitable for the installation of cavity insulation. Where this is not the case it should be treated as for "other walls".
4. This U value only applies where floors are being replaced.
5. For insulation of ground floors and exposed floors where the source of space heating is underfloor heating, a floor U-value of 0.15 W/m²K should generally be satisfactory where floors are being replaced.



Minimum U-Value Building Envelope Diagram

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2.2 Building Services

TGD Regulation	Current Compliance	Response Proposal
2.2.4.2 Natural ventilation strategies should be considered appropriate for the building geometry. Particular attention should be paid to limiting solar gains by ensuring that areas of the external building fabric which are susceptible to solar gain have appropriate areas of solar shading	The lack of insulation ensures that overheating is not an issue. Most large windows in studios have internal blinds to combat solar shading.	The large area of glazing on the foundry building may cause overheating post insulating the building. Angled pre-cast concrete fins could be placed in front of all vertical mullions to provide solar shading.

Example project with a fibre cement clad box on a glazed box, shaded by columns.

Foundry building 3D sketch

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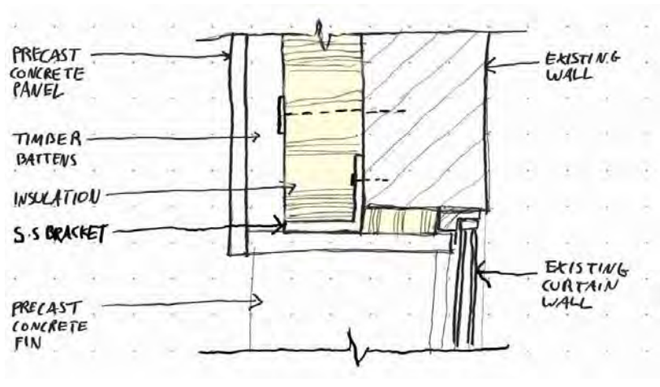
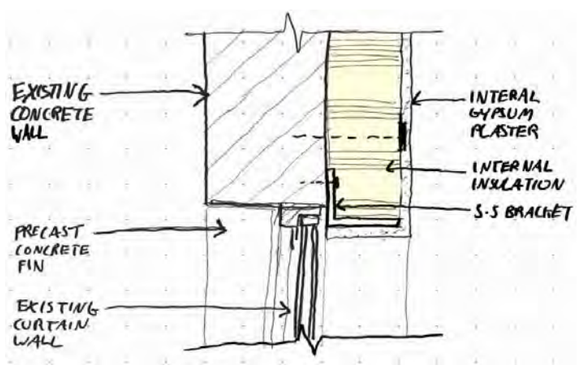
2.3 Major Renovation

TGD Regulation	Current Compliance	Response Proposal
2.3.3 When undertaking on or in connection with a building that is of architectural or historical interest the aim should be to improve the building as far as is reasonably practical. The work should not prejudice the character of the building or increase the risk of long term deterioration of the building fabric or fittings. Refer to Par 0.5	Linenhall is not a protected structure however it may be listed as one in the future. We must protect the character of the building.	The foundry buildings concrete facade bears ugly streaks of staining that completely distract you from the beauty of the brutalist architecture of the building. I propose 2 options to renovate the facade. 1) Externally insulate and clad the building with fibre cement panels to maintain the character of the building whilst giving it a modern aesthetic by covering the stained concrete. This may not be allowed due the historical nature of the building. 2) Internally insulate the building and cleaning the existing stains. This will require specialist advice from a conservation architect.

Staining on concrete facade



Foundry building curtain wall head detail - Externally Insulated



Foundry building curtain wall head detail - Internally Insulated

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Material investigations

Existing Materials

Pebble-dash Render

The main building is finished in an off-white pebble dash render.

Concrete

The foundry building has a cast-in-situ concrete facade.

Asphalt Roof

The existing main building has an asphalt flat roof finish.

Green Roof Park

A roof park similar to The Highline, New York on the roof of Studio 4 will have paving and green roofing.

Proposed Materials

White Render

Re rendering the main building is necessary due to the staining of the existing render It is proposed to externally insulate the building with a smooth white render finish for a fresh, modernist aesthetic.

Fibre Cement Panels

Cladding over the foundry buildings stained concrete facade will cover up the staining and add a modern aesthetic to the brutalist architecture of the building.

Zinc Roof

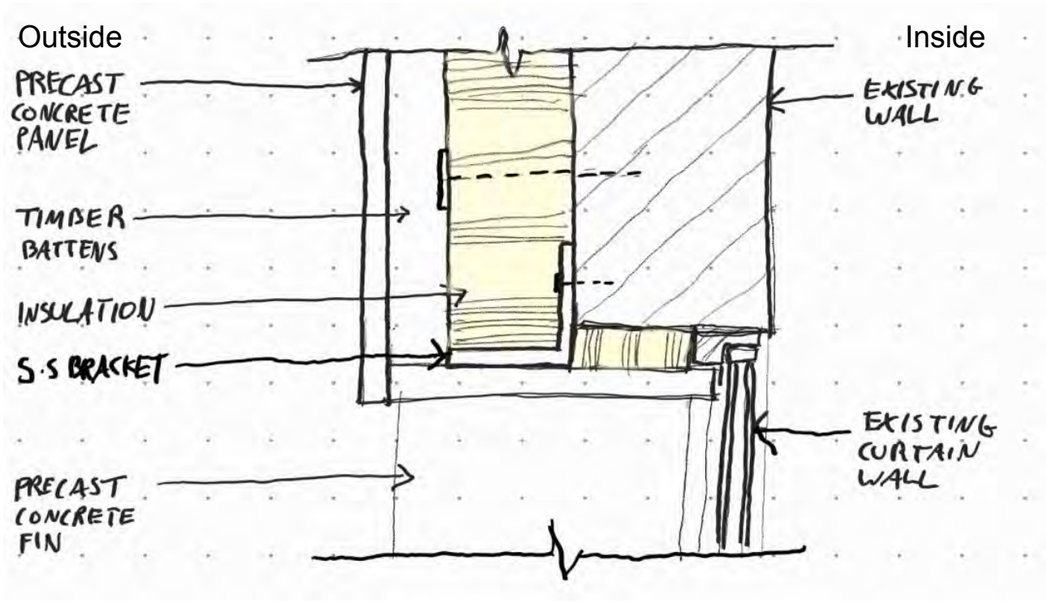
The proposed pavillion parallel to the roof park will be covered by a zinc roof.

Glulam Timber

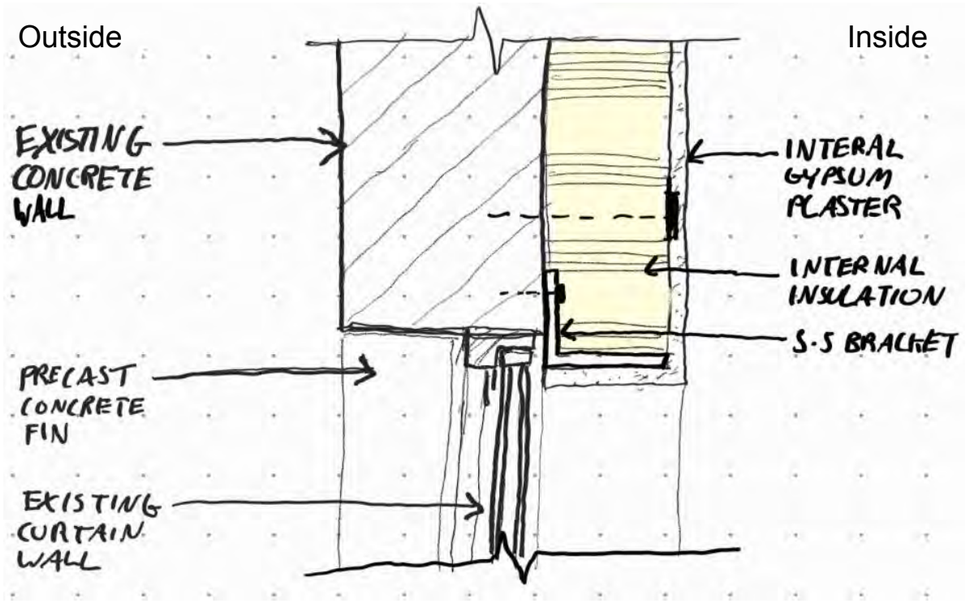
The proposed pavillion along the roof park will have an expressive glulam structure.

Preliminary Detail Design

Foundry Building Curtain Wall Head Detail



External Insulation Method
NTS



External Insulation Method
NTS

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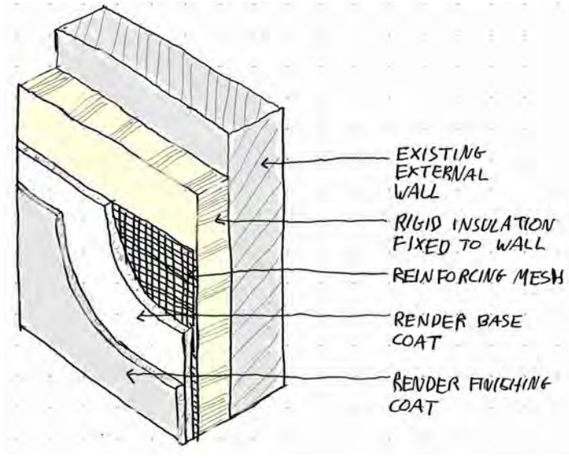
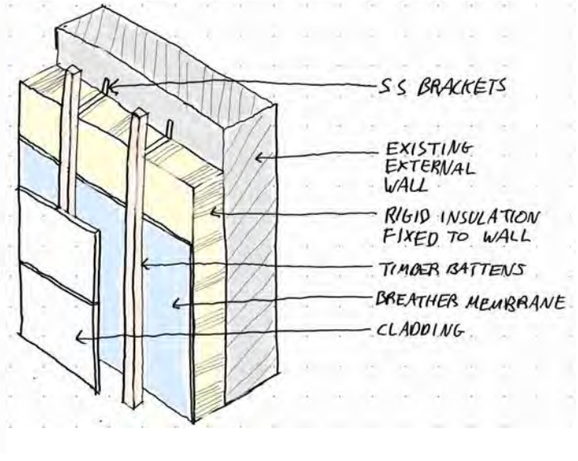
2.1 Building Fabric

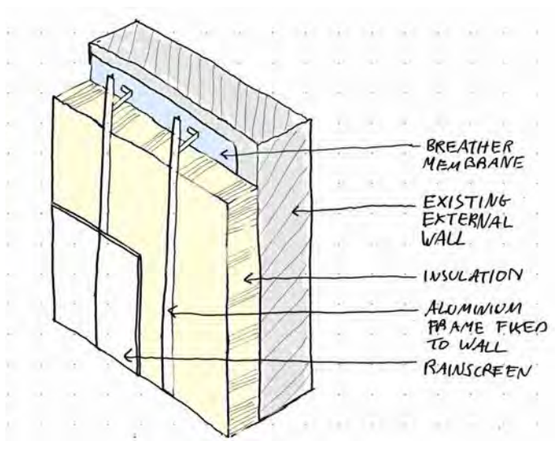
Foundry and Main Building Walls

External Insulation vs Internal Insulation

External insulation options		
Insulated render	**Timber, tile and slate cladding**	**Rainscreen cladding**
Insulated render is the most cost-effective form of external insulation, though the system might be prone to damage and the selection of the render must be carefully considered in respect of a potential need for the existing wall to 'breath'.	Cladding offers the best performance characteristics by separating the thermal insulation from the weatherproof layers. It also offers the designer a wide flexibility in the specification of cladding material and façade design. On the other hand, it is likely to be expensive, require a higher degree of design input and present the greater depth of construction.	Rainscreen cladding is a common choice for buildings of over 3 stories. It is usually applied to high-rise post-war apartments.







Pros	Cons
Applying insulation externally will change the appearance of the building. This might be an intended benefit, or it might be considered detrimental to valued historical building.	It might need planning permission.
External insulation usually provides the designer with a greater flexibility in the choice of insulation materials and insulation thicknesses to obtain optimum u-values.	Living spaces will continue to be relatively slow to warm-up.
The majority of thermal bridges can be eliminated.	Junctions between the added insulation and other elements (eaves, verges, openings etc) will need redesigning.
External insulation will preserve the existing internal thermal mass. The thermal mass might be considered important in regulating the internal room temperatures.	Replacing windows at a later date is difficult.
The works will not unduly inconvenience the occupants.	Adjoining properties may cause thermal bridging issues.

Ref: https://www.greenspec.co.uk/building-design/developing-retrofit-strategy/

Design Development Esquisse

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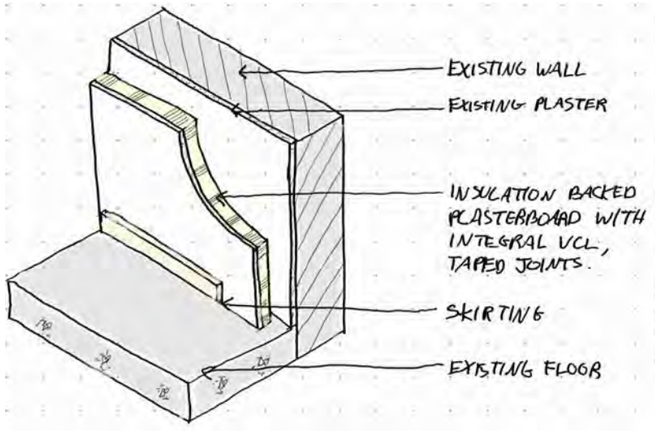
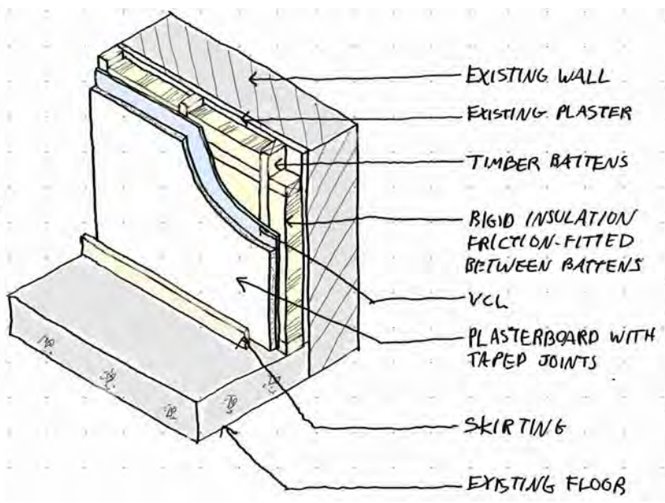
2.1 Building Fabric

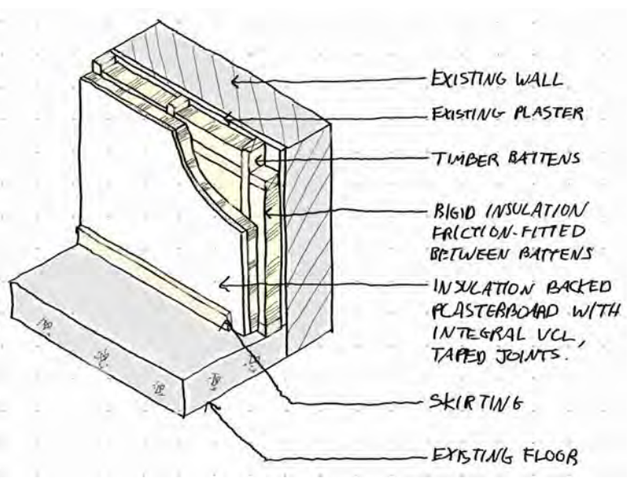
Foundry and Main Building Walls

External Insulation vs Internal Insulation

External insulation options		
Insulation applied directly to the wall	**Insulation fitted between battens**	**Improving the u-value and reducing thermal bridging**
The relatively small depth of the build up makes this solution particularly suitable for applications where internal floor area is at a premium.	Where space permits, the combination of battens and rigid / semi-rigid insulation can provide optimum thicknesses of insulation.	Battens with plasterboard thermal laminate fixed to the face of the battens. This has the effect of reducing thermal bridging through the timber whilst offering the potential to increase the thickness of insulation.







Pros	Cons
Maintains the external appearance of the building	The adding of insulation reduces internal space, and, in historical buildings, will likely compromise decorative features
Spaces are quick to warm-up	The necessity to minimise encroachment on space will restrict the designer's choice of materials and possibly restrict achievable u-values
	The occupants will probably have to relocate during the period of the works

Ref: https://www.greenspec.co.uk/building-design/developing-retrofit-strategy/

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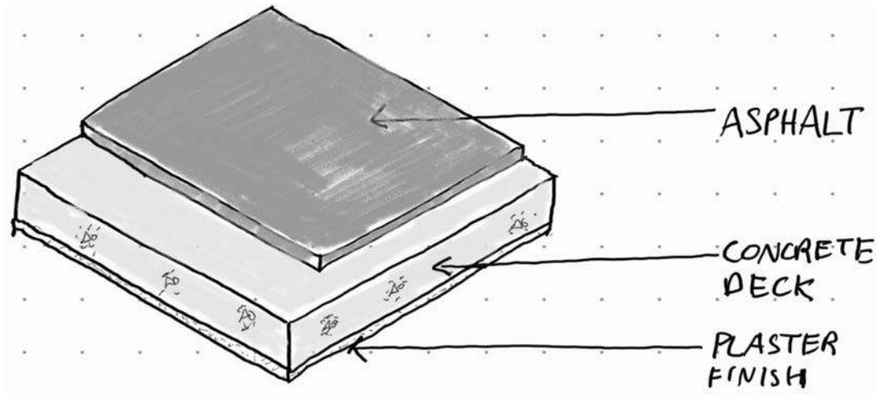
2.1 Building Fabric

Foundry Building Roof Insulation

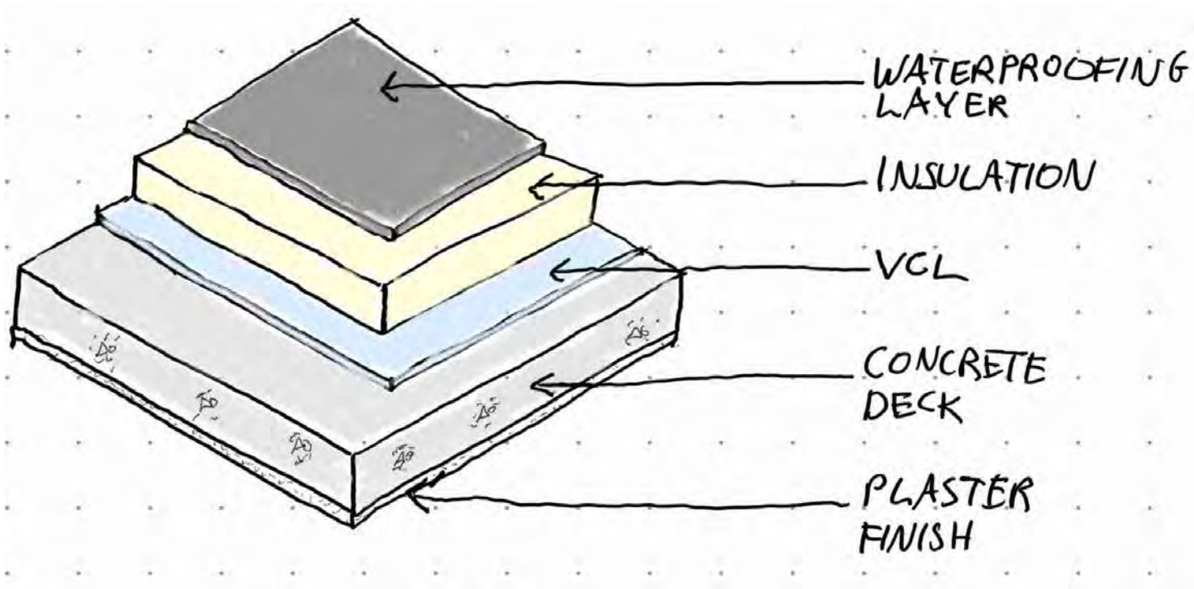
Existing roof build-up



Design considerations
Following a detailed inspection of the existing roof, the following design factors should be established:
The required u-value of the roof.
The extra loading to the existing roof structure from additional insulation / ballast / traffic / equipment both during and after construction.
The required compressive strength of the insulation where permanent plant or equipment is located upon the roof surface.
The required fire resistance.
Check condensation risk (see BS 6229:1982 and BS 5250: 2002 for guidance)
Determine method of adhesion / fixing / ballasting
Fall requirements
Any particular acoustic requirements

Roof Insulation options	
Overlay	**Total Renewal**
Appropriate where the existing deck is sound and where the waterproof membrane is aged. Either a new membrane is placed over the existing complete with insulation and ballast (inverted warm) OR the existing membrane is prepared as a vapour check and insulation is added complete with a waterproof membrane over (warm).	Appropriate where the existing deck and roofing system has failed. The deck and waterproof membrane is stripped and replaced new decking and roofing system (warm or inverted warm as shown below)

Proposed roof build-up



Ref: https://www.greenspec.co.uk/building-design/developing-retrofit-strategy/

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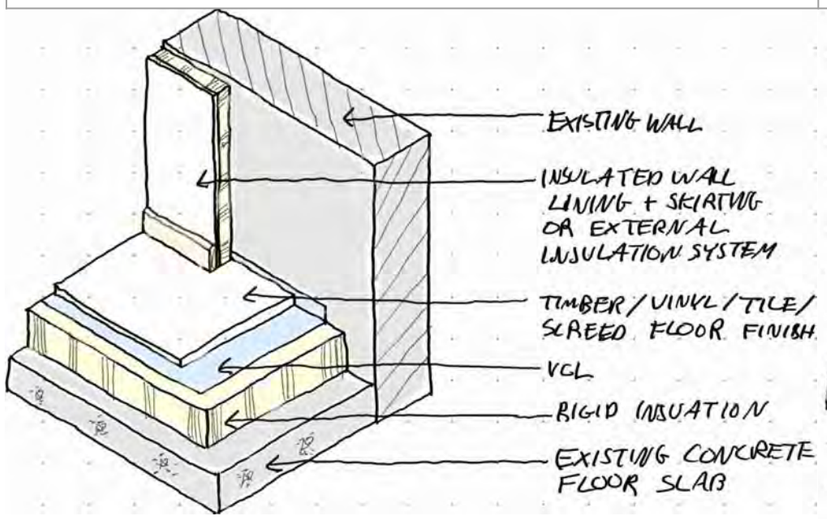
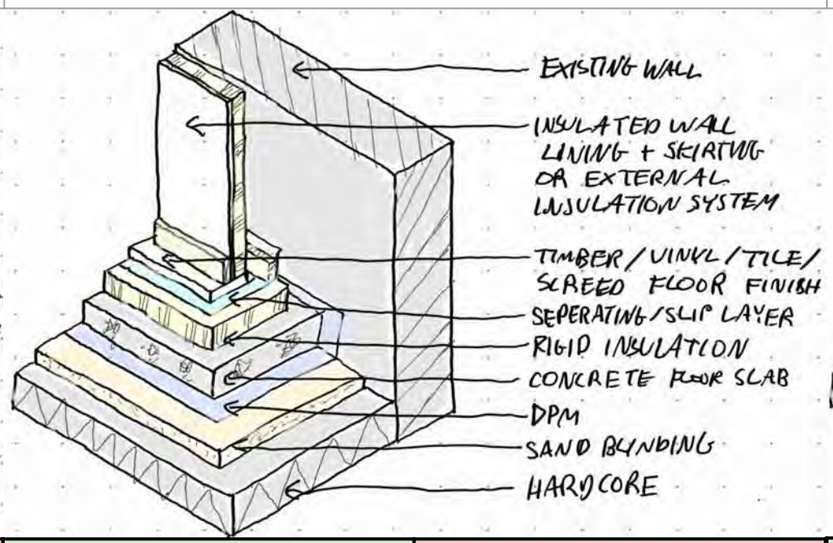
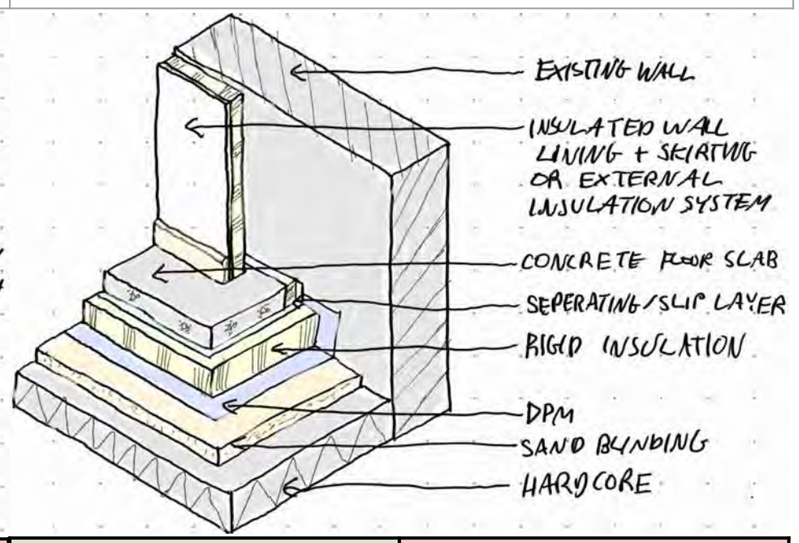
2.1 Building Fabric

Foundry Building Floor Insulation

Floor insulation options		
Upgrading an existing slab	New slab – insulation above slab	New slab – insulation below slab







Pros	Cons	Pros	Cons	Pros	Cons
Easiest way of improving thermal performance	Raising the floor level through added insulation will usually require skirtings and radiators to be removed and re-fixed and doors to be reduced in height	Insulation above the slab increases the heating response time. Temperatures will increase more quickly when the heating system is switched on in comparison with below slab insulation	Point loading requires careful specification of the floor finish where it bears on a smaller area of insulation beneath	Provides thermal mass, particularly useful in southward facing rooms and helps maintain steady temperatures	Rooms are slower to heat in comparison with an above-slab condition
	unequal step heights at staircases and the raising of step heights at external doors.	The insulation zone can be used to run services and underfloor heating	When in conjunction with timber-based flooring it is not advisable for use in ‘wet’ rooms such as kitchens and bathrooms	Thickness of insulation is less restricted than for an above-slab condition	
			The effect of temperature regulation by thermal mass is unavailable	Point loading is less of an issue where the load is spread over the slab	

Ref: https://www.greenspec.co.uk/building-design/developing-retrofit-strategy/

Design Development Esquisse

All bad condition items highlighted in the survey waste harvesting inventory must have a recycling strategy.
The following report details the recycling strategy for the first and second floor of the main linenhall building as well as the foundry buildings first floor:

Linenhall Waste Harvesting Inventory							
Number	Item	Photo	Quantity	Condition	Notes	Material Category	Recycling Strategy
25	Tiled Concrete Stairs		34m²	Bad	Most tiles cracked/broken on concrete stairs.	Ceramic	Tiles to be removed from stairs and broken into pieces to form a mosaic on a section of the proposed roof park.
2	Light Switches		26 switches	Bad	Located on walls of corridors. Some switches are cracked.	Electronic	Broken switches to be replaced and disposed of in the recycling waste.
29	Timber Floor		672m²	Bad	Floor finish in studios, corridors and stairs. Visible deterioration in high foot traffic areas.	Wood	Timber floor to be replaced and any boards in good condition to be reused in converting the basement gym into an indoor basketball court.
31	Tile Floor		34m²	Bad	Most tiles are cracked/broken.	Ceramic	Tiles to be removed and broken into pieces to form a mosaic on a section of the proposed roof park.
33	Wall Paint Finish		NA	Bad	Many walls displaying peeled and cracked painted plaster.	Chemical	Walls may be internally insulated over the existing plaster. If external insulation is the proposed method, plaster will be striped and dispoed of in the recycling waste.
35	Ceiling Paint Finish		732m²	Bad	All ceilings are painted plasterboard. Some ceilings are cracked.	Chemical	Cracked ceilings to be replaced, plaster will be striped and dispoed of in the recycling waste.
39	Intercom Speaker		5	Bad	Showing visible deterioration.	Electronic	Intercom speakers to be replaced. Any functioning speakers to be repurposed as a sound system installed under benches in the roof park playing tranquil music.
41	External Precast Concrete Finish		NA	Bad	Visible staining of concrete visible.	Concrete	The foundry building walls may be externally insulated over. If conservation acts restricts the building to internal insulation a conservation specialist must be employed to clean the staining on the walls.
42	Studio 4 Roof		166m³	Bad	Showing visible deterioration.	Concrete	The roof may be replaced to accommodate the proposed roof park. Concrete may be crushed into hardcore for use in the new foundry buildings insulated ground floor.