

FUNDAMENTALS OF CONSTRUCTION TECHNOLOGY ASSIGNMENT

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Fundamentals of Construction Technology

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SECTION 1: OFF-SITE CONSTRUCTION

The term 'offsite construction' describes the process of completing parts or components of a building project at a different location from where they will be installed. The process involves designing, planning, fabricating and assembling the components in a dedicated facility off-site. When the components are completed, they are transported to the main site and assembled at a high level of speed, precision and finish.

The off-site facilities can be permanent factories or temporary setups known as 'flying factories'. They are established for a specific project and then relocated elsewhere to support other construction projects (Designing Buildings , 2022).

1.1 VOLUMETRIC MODULAR CONSTRUCTION

The volumetric modular construction includes modules such as walls, floors, ceilings and furnishings being constructed under controlled conditions in a factory to allow precise manufacturing, less waste and control of quality. The modules are transported after completion to the construction site to be positioned and connected to create the final structure (Zeeshan, 2024). This application can be integrated into Miss A Client's proposed house by prefabricating fully insulated modules off-site using timber twin frame or SIPS, then cladding on-site with stack-bonded brick and rendered blockwork to meet her requirements. This method will accelerate the build time and enhance quality control.

1.2 PANELISED CONSTRUCTION

Panelised construction involves manufacturing wall, floor and roof panels in a factory, and then transporting and assembling them on-site using a crane. The panels are connected to form a sealed, weather-tight structure, and they typically include structural framing, sheathing, insulation and moisture and air control layers. Some packages may also feature windows, flashing and rainscreen elements. The panels can be made from various materials such as concrete, wood or steel. Panelised construction can be incorporated into the proposed house by delivering pre-insulated wall, floor and roof panels such as SIPS or twin timber frame to be assembled on site (OCRC, 2024). These panels will accommodate service zones and insulation layers,

while the brick and render can be applied on-site. This will improve efficiency and build precision.

1.3 HYBRID MODULAR CONSTRUCTION

Hybrid modular construction combines flexible 2D panels with efficient 3D modules, allowing diverse room configurations and designs. This approach allows creative freedom with 2D panels while streamlining the process with 3D modules. This system meets the needs of various projects, such as simple spaces and complex designs, while limiting challenges in logistics (The Offsite Guide, 2025). Hybrid modular construction can be applied to the Miss A Client's proposition by combining volumetric modules for areas like kitchens and bathrooms with panelised systems for walls and roof. This will allow efficient off-site manufacturing while enabling off-site installation of the required brick and block skin, insulation layers and traditional floor and roof systems to meet design requirements.

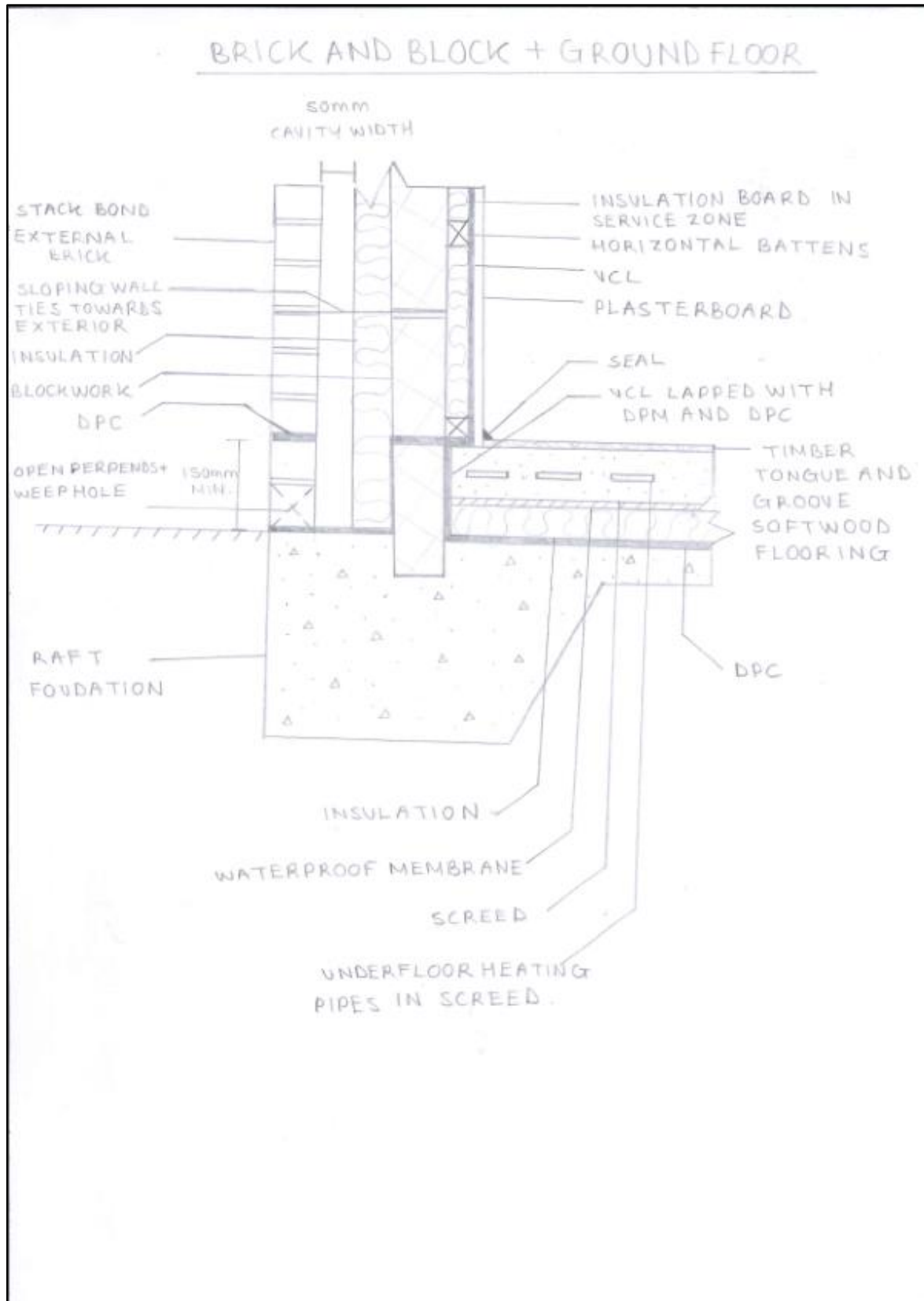
1.4 COMPONENT (SUB-ASSEMBLY) CONSTRUCTION

This system describes separate building components like bathroom pods, stairs, and mechanical and electrical assemblies that are manufactured off-site, transported and placed on the main structure on-site (OCRC, 2024). This system can be integrated by manufacturing elements like roof trusses, wall panels, floors and service zones off-site, then assembling them on-site. This will allow flexibility for applying the required brick and render while improving construction speed, thermal performance, and build quality using timber frame or SIPS systems.

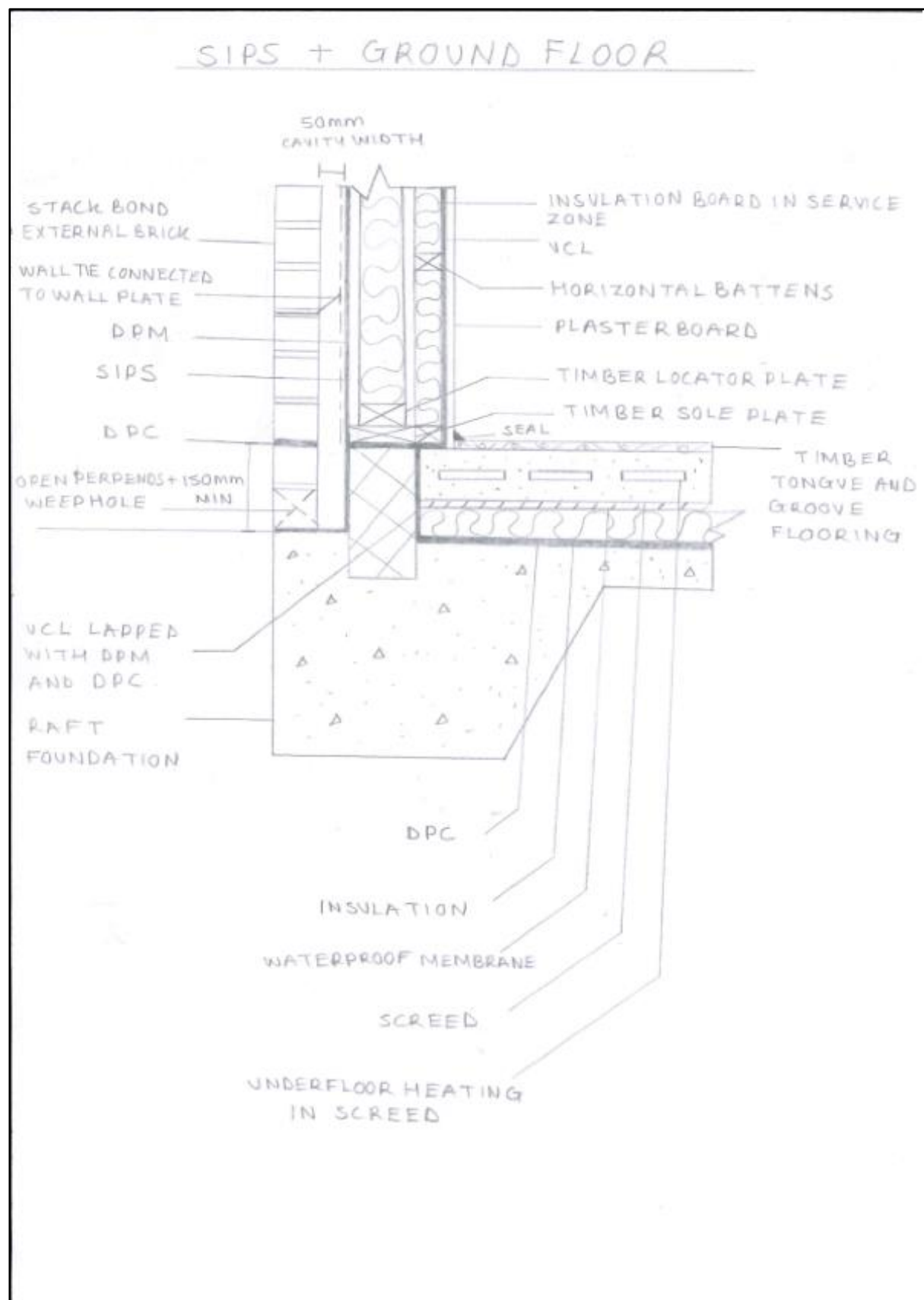
SECTION 2: SKETCHES

2.1 GROUND FLOOR CONSTRUCTION

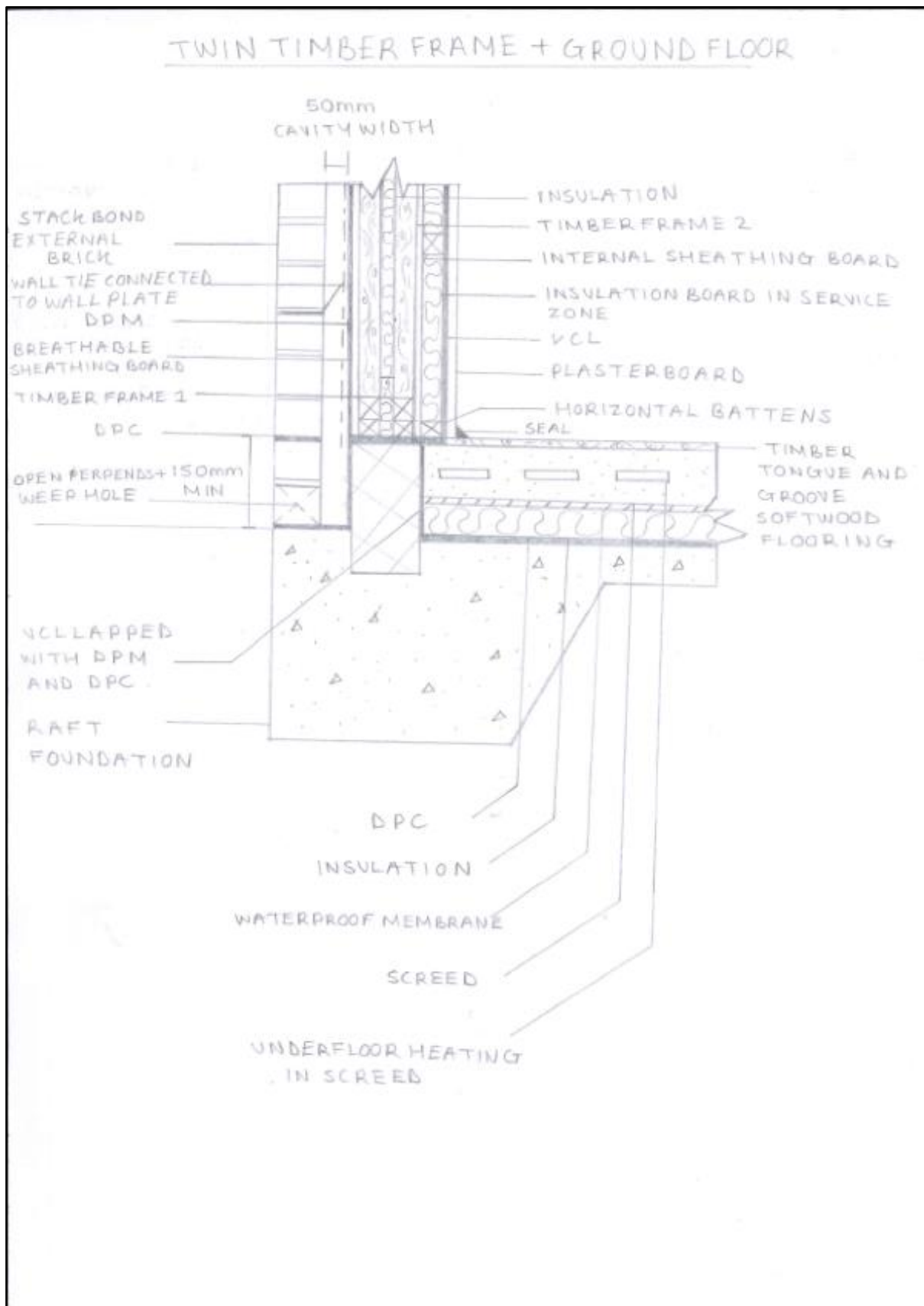
BRICK AND BLOCK



SIPS

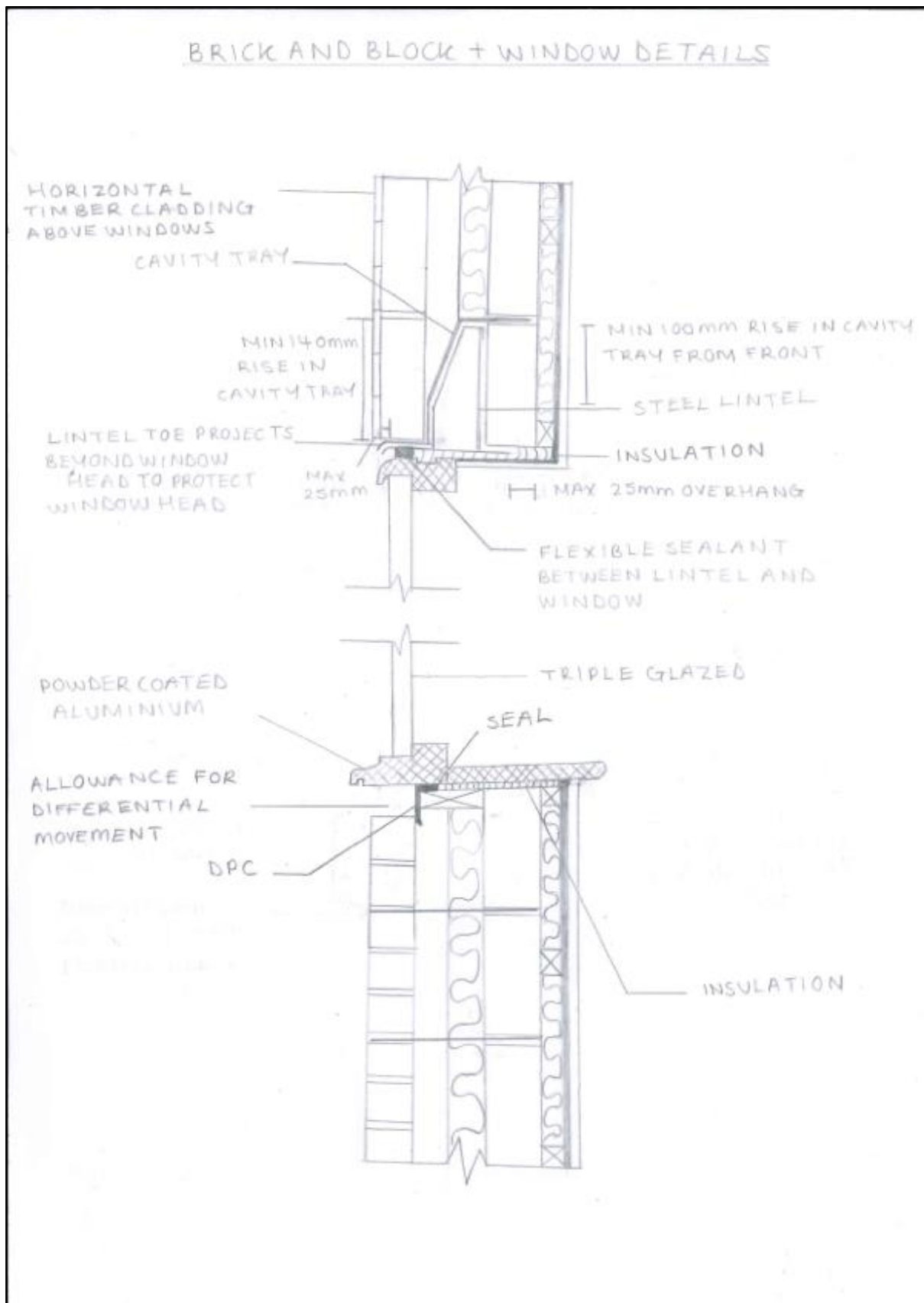


TWIN TIMBER FRAME

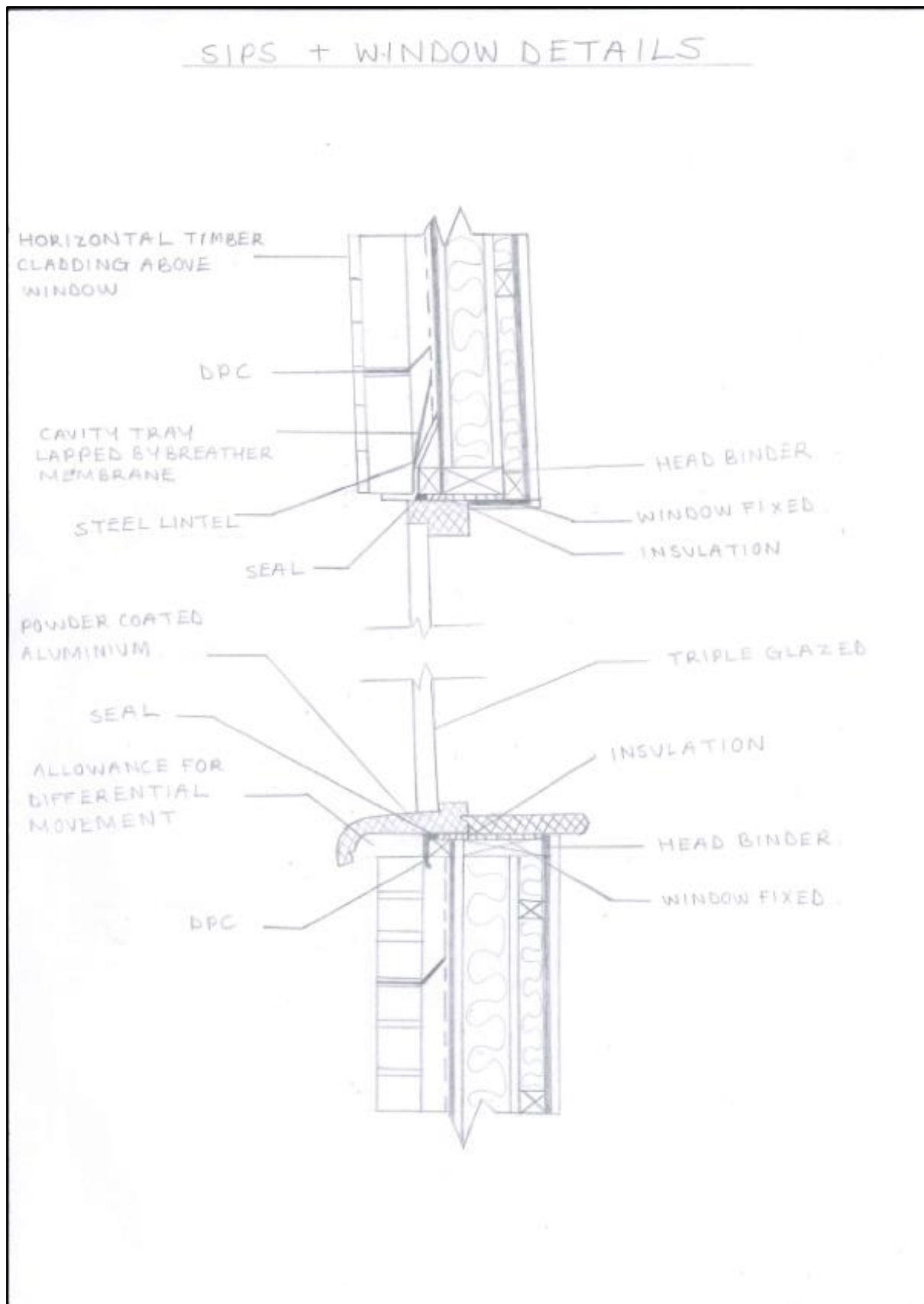


2.2 WINDOW OPENING SECTION DETAIL

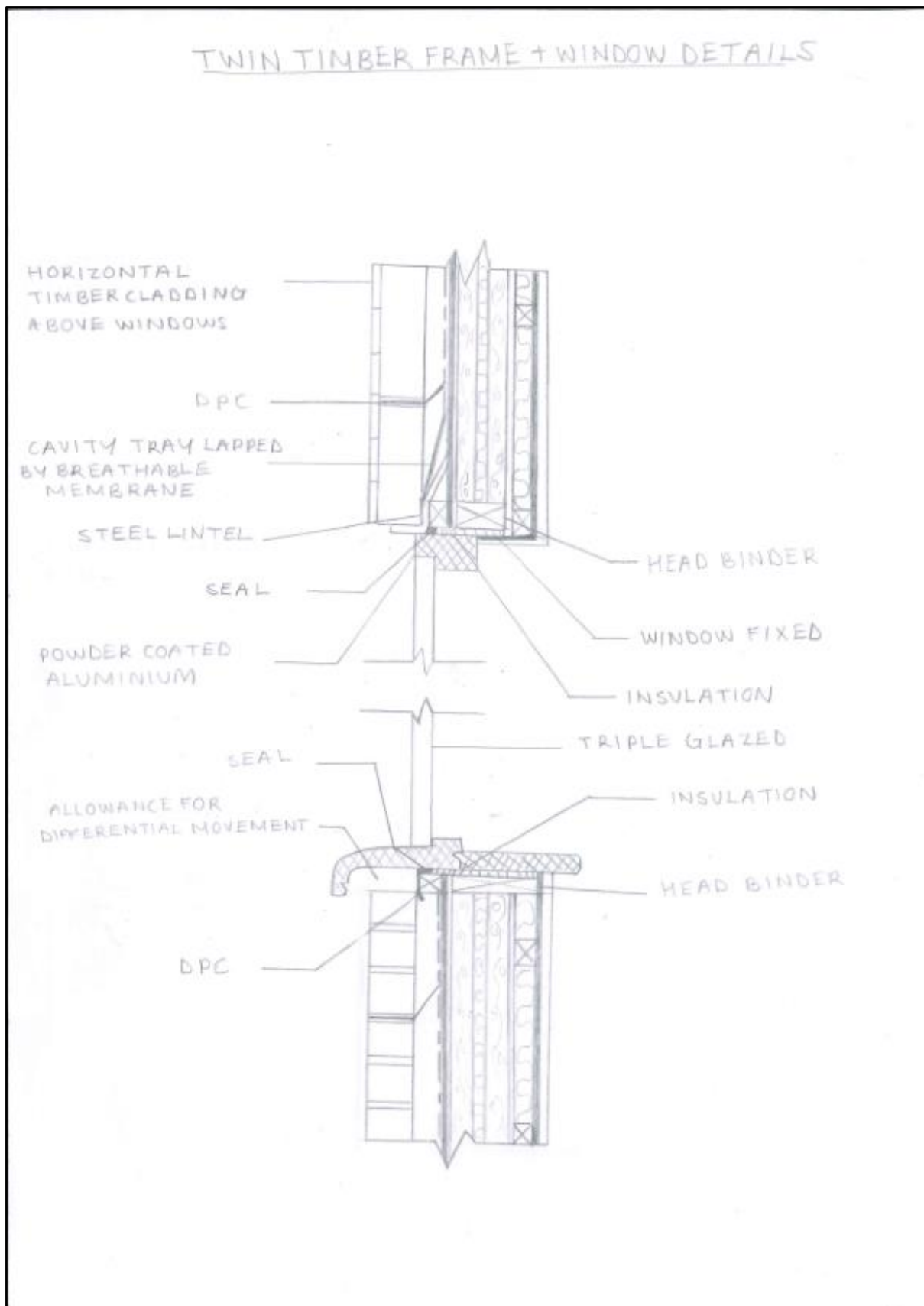
BRICK AND BLOCK



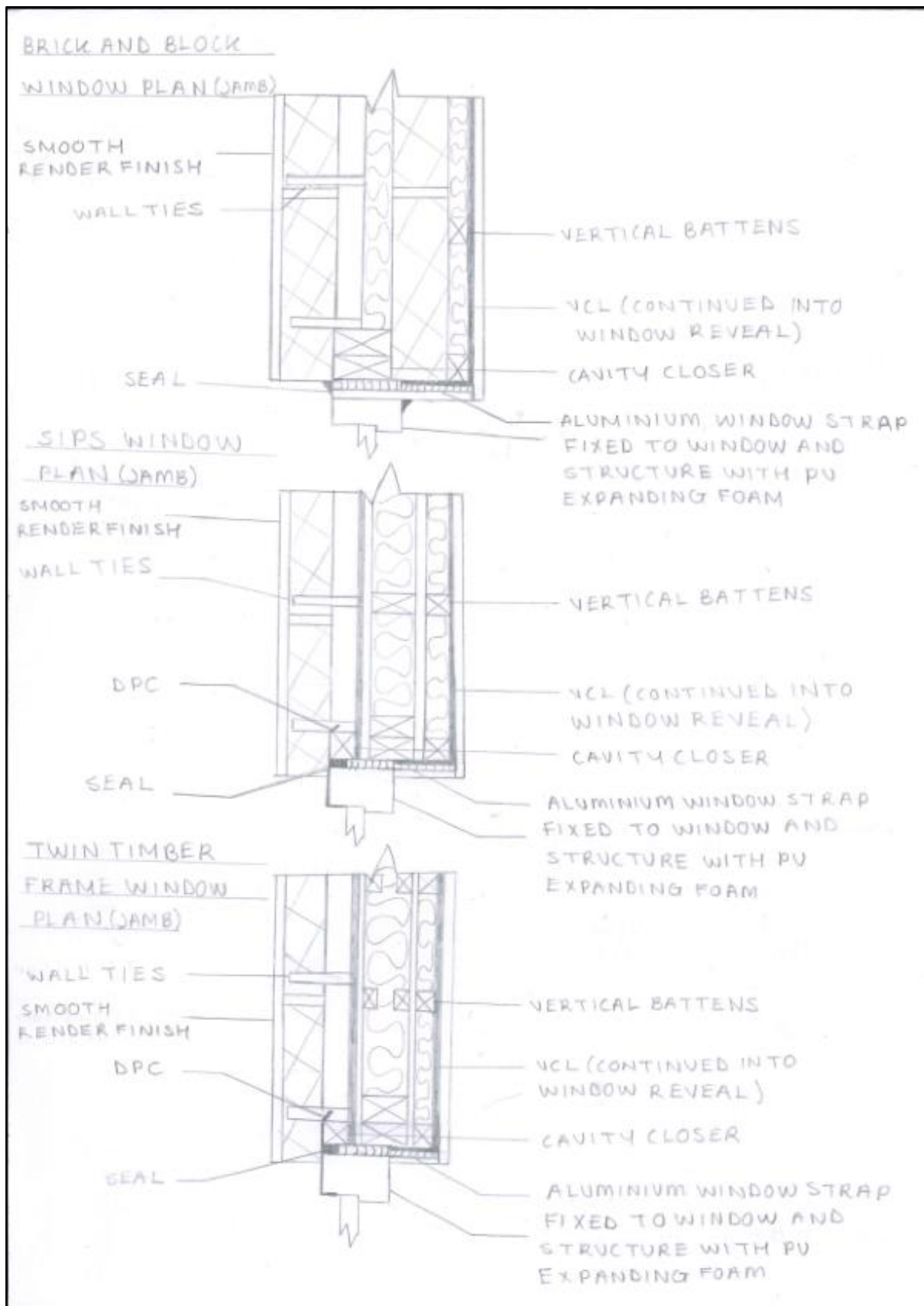
SIPS



TWIN TIMBER FRAME

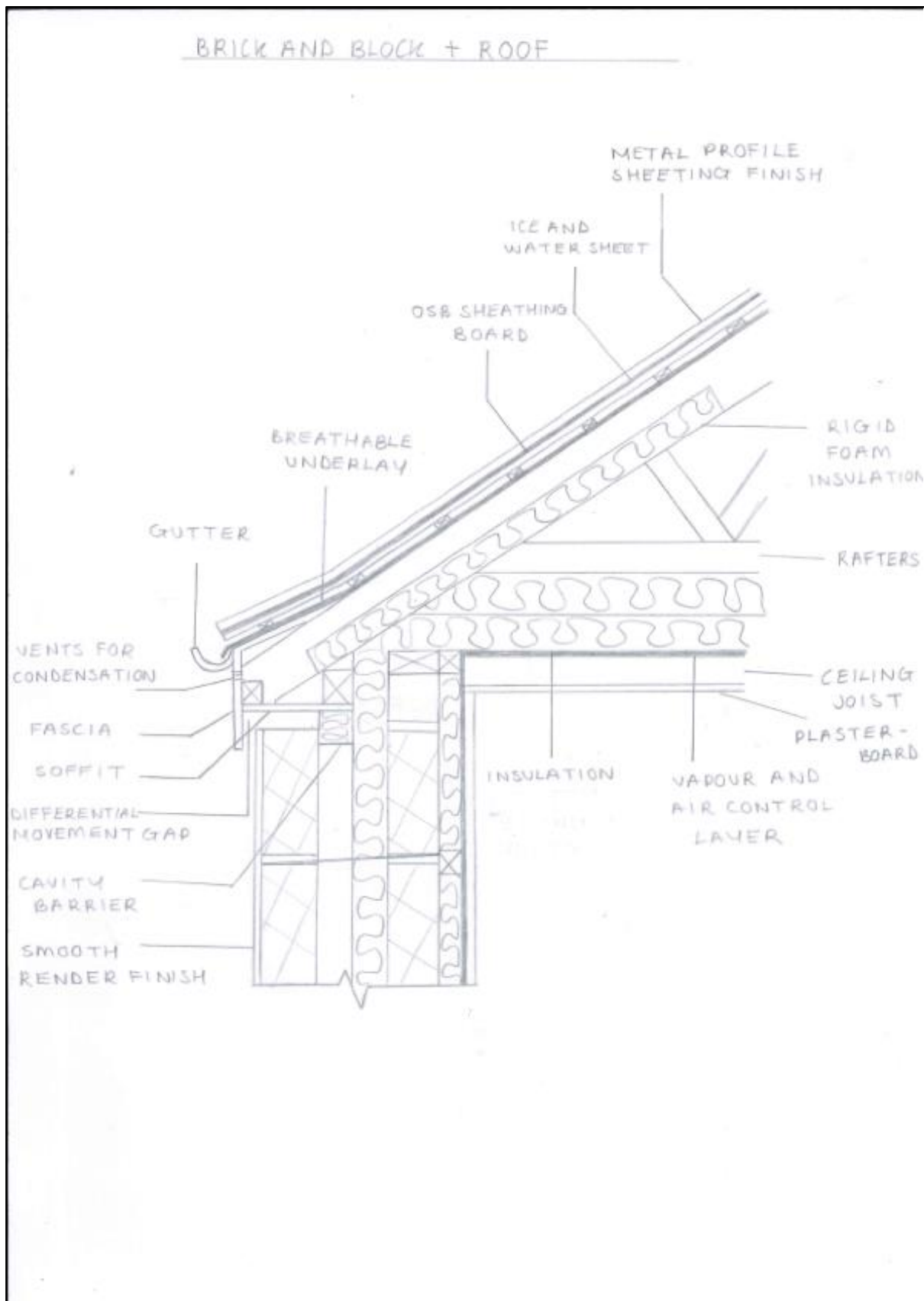


WINDOW OPENING PLAN (JAMBS) DETAIL

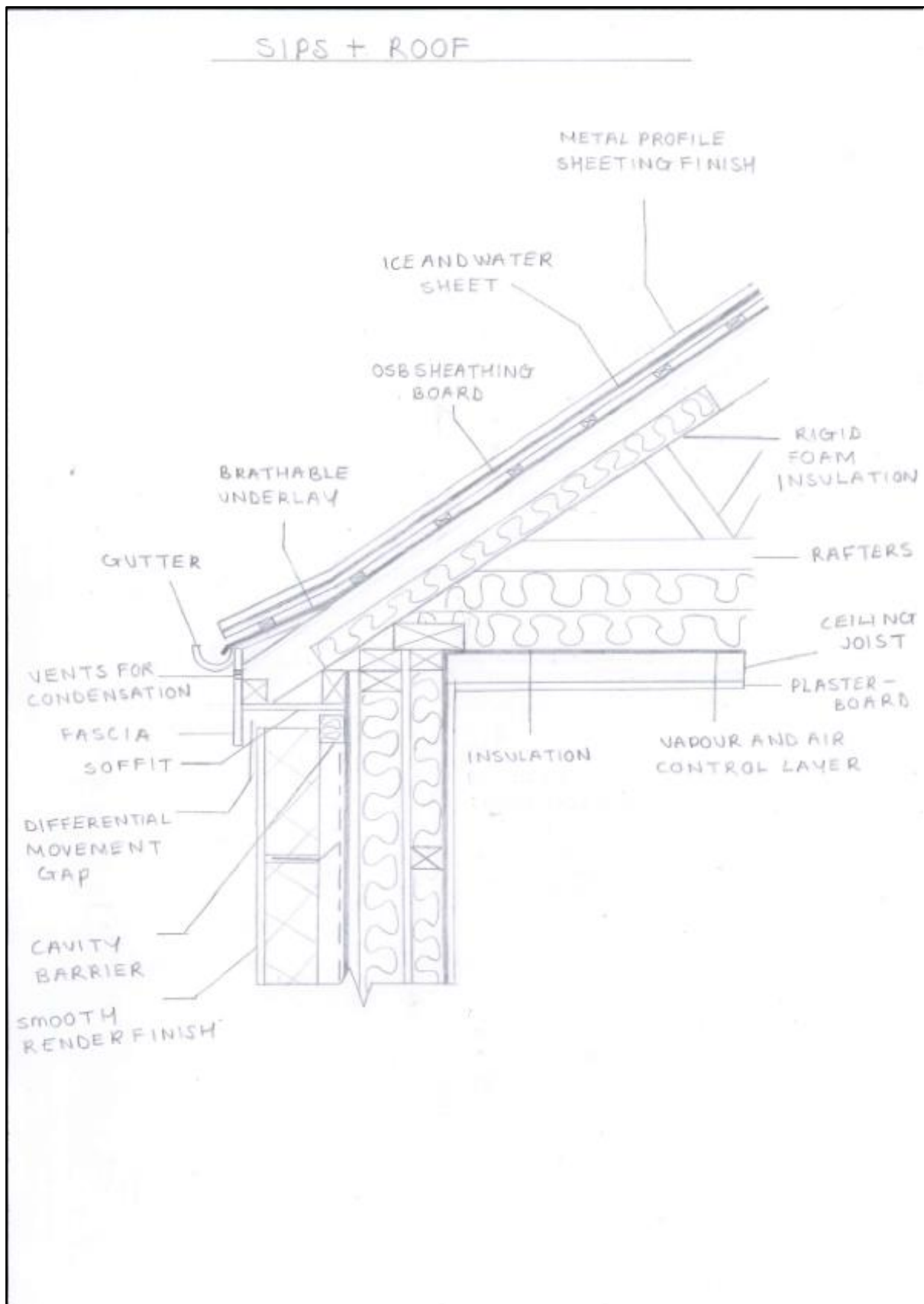


2.4 ROOF STRUCTURE AND EAVES DETAIL

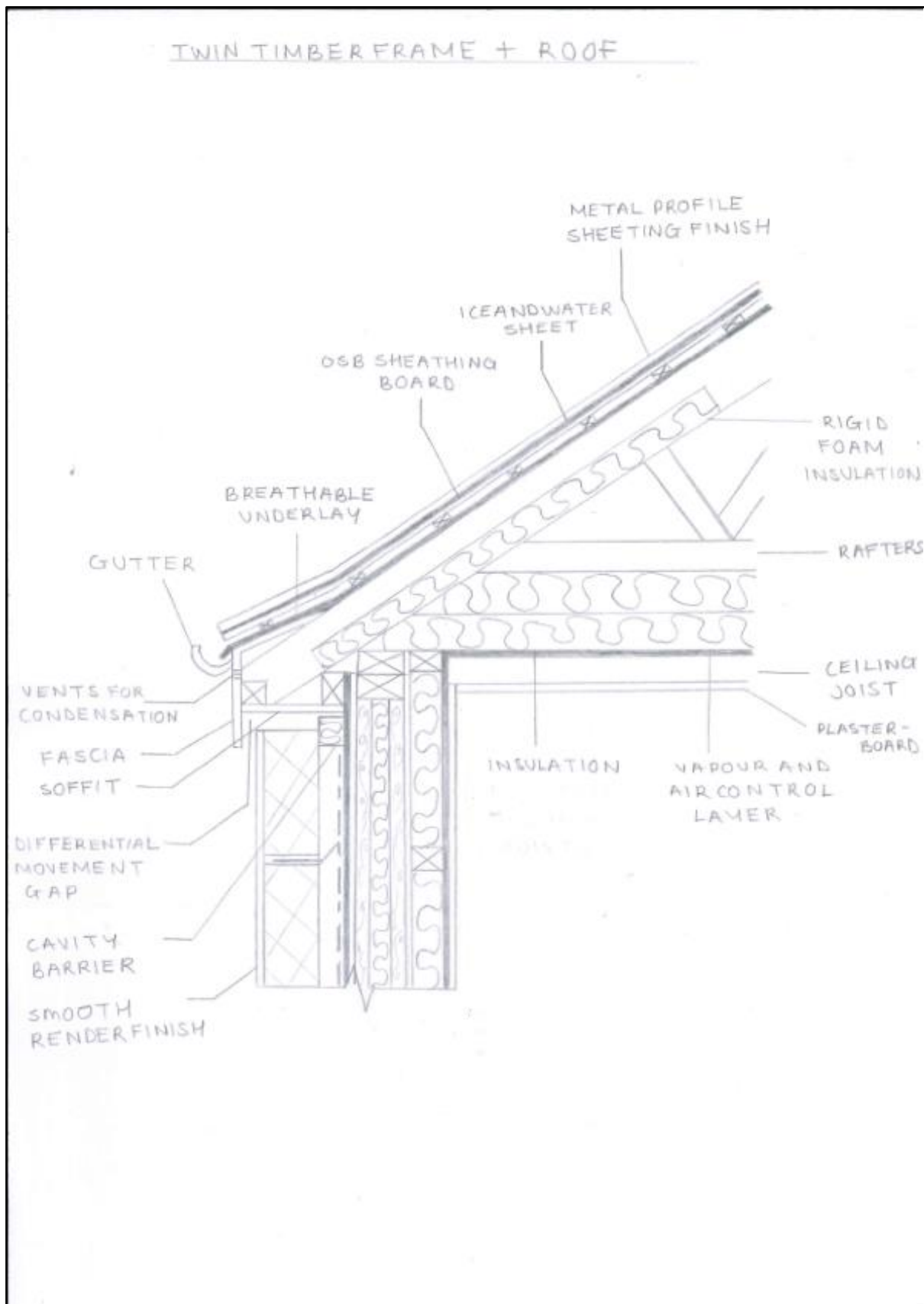
BRICK AND BLOCK



SIPS



TWIN TIMBER FRAME



2.5 RECOMMENDATION

Despite the twin timber frames' flexibility and ease of on-site work, the recommendation for Miss A Client's proposed house would be SIPS. SIPS are mostly used in self-build and new build homes. It is a type of off-site construction due to being prefabricated off-site or manufactured in controlled factory settings. They will combine both structure and insulation components, then transport and assemble them on-site. As previously mentioned in Section 1, being an off-site construction process means they will be installed quicker, reduce waste, and improve overall project efficiency.

SIPS offer excellent insulation and environmental benefits to homes, such as Miss A Client's, because of their minimal construction waste and low-energy manufacturing. They will create a strong, airtight, and quiet structure while improving energy efficiency, therefore lowering her bills and cutting CO2 emissions (Sips Eco, 2021).

SIPS are manufactured to precise dimensions, so components will arrive ready to install, saving construction time on-site. The process will get streamlined because of the reduced labour needs, allowing a shorter construction timeline and lower project costs.

As they are designed for quick and simple assembly, they will significantly speed up the construction of the house, where tasks such as the walls will be completed in hours instead of days. Despite this, they don't compromise on strength as they offer excellent durability and the ability to withstand harsh UK weather.

SIPS are very versatile because of the ability to increase the thickness of the insulation based on the requirements of the house, and they can be easily combined with other materials used in the project, such as wood, brick and blocks (Sips Eco, 2021).

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