

**DESCRIPTION**

The level green was to carry out a full energy saving retrofit of Dublin City Council's existing residential housing apartment complex with new external walling, glazing and internal fit-outs. The project was to be completed in three phases, the first phase being the external envelope, the second phase being the internal fit-outs and the third phase being the landscaping and external works.

The required outcome was that the building would achieve compliance with Irish Building Regulations Part L 2011 and Part M 2012 and achieve an overall A2 BER rating.

The approach taken to achieve this result includes the following:

- The existing front and back walls will be entirely removed, and the existing balconies and access walkways will be incorporated into the new structure, which has the effect of giving a larger living area, and, generally, a number of environmental, thermal bridge junctions between floors and ceilings and external walkways.
- A new highly insulated steel framed front and back wall system will be added using Rockwool Rockshield system, with Master Jentry Eco Glass triple glazed windows and doors. The existing garden walls will have blown mineral wool insulation pumped into the cavity, and an additional layer of Rockwool insulation added externally to the front and back walls.
- New Steel Framed balconies and access walkways will be added externally and fixed through to the existing structure with Stick-It Type 6 bolts through wall bearings.
- Heating and hot water is supplied by Ochsner Universal Combi Individual Heat Pumps to each unit. These will be controlled by the October OTE 2 in-house climate control manager system.
- Each unit will have either one or two PV panels on the roof in line with local planning requirements.
- The existing site will be reworked with grass covers to reduce surface water runoff.
- A new play area will be added in a grassed and planted lawn garden area.
- Recycling bins are being provided adjacent to this shed. The site will be landscaped with walls and retaining structures and vehicle access will be restricted to one entrance only with electric gates.
- Pedestrian access will be via gates with key pad, adjacent to both vehicle entrance and rear of site.
- There are 4 fully accessible one bed apartments on left hand side of the building, these apartments comply with the requirements of the Building Regulations Part M 2012.
- The provision of five, three bedroom apartments caters for target families.

**Environmental Credentials of Building Green Roof**

Growing substrate - these products include a high proportion of recycled green waste and aggregate which is mixed with controlled green waste to provide an ecological solution.

**Drainage Layer** - BAUER PLT 10, CD 20 (Drilled) are manufactured from recycled materials. They are one of the most versatile and easily recycled materials available.

**Protection, Filtration and Retention Layer** - These products have important role within a green roof building. They are manufactured from recycled materials. They have high UV resistance, and are resistant to acids and alkalis. They are also resistant to root penetration and other vermin.

**Thermal Properties**

ROCKWOOL ROCKSHIELD DR dual density insulation slab has a thermal conductivity (k) value of 0.029W/mK.

**Fire Properties**

When tested to the European Fire Classification, the ROCKWOOL ROCKSHIELD system achieves a Euro Class A2 for reaction to fire. The core mineral wool of ROCKWOOL insulation will achieve a rating of A1.

**Plasticisation and Prolongation**

The ROCKWOOL ROCKSHIELD system is stable and will ensure continuing high performance. ROCKWOOL slabs have been proven in service for over 50 years in all types of exposure. ROCKWOOL ROCKSHIELD has undergone successful accelerated ageing tests simulating 25 years of exposure.

**Compressive Strength**

The ROCKWOOL system will support loads with a spreading board used for normal maintenance work, without being damaged.

**Water Repellent**

ROCKWOOL mineral wool is water repellent, which means that the stone wool of the slab is not wetted and remains dry.

**Climate Degrading Potential**

When tested to the European Fire Classification, the ROCKWOOL ROCKSHIELD system does not contain (and has never contained) any of the substances listed in the Commission Decision (ODP).

**Global Warming Potential**

When tested to the European Fire Classification, the ROCKWOOL ROCKSHIELD system does not contain (and has never contained) any of the substances listed in the Commission Decision (GWP).

A design stage BREEM Domestic Refurbishment assessment was carried out on the development, and an 81.8% score was achieved under this assessment. This should be carried out again by a registered BREEM assessor for accurate results.

**Breem Assessment**

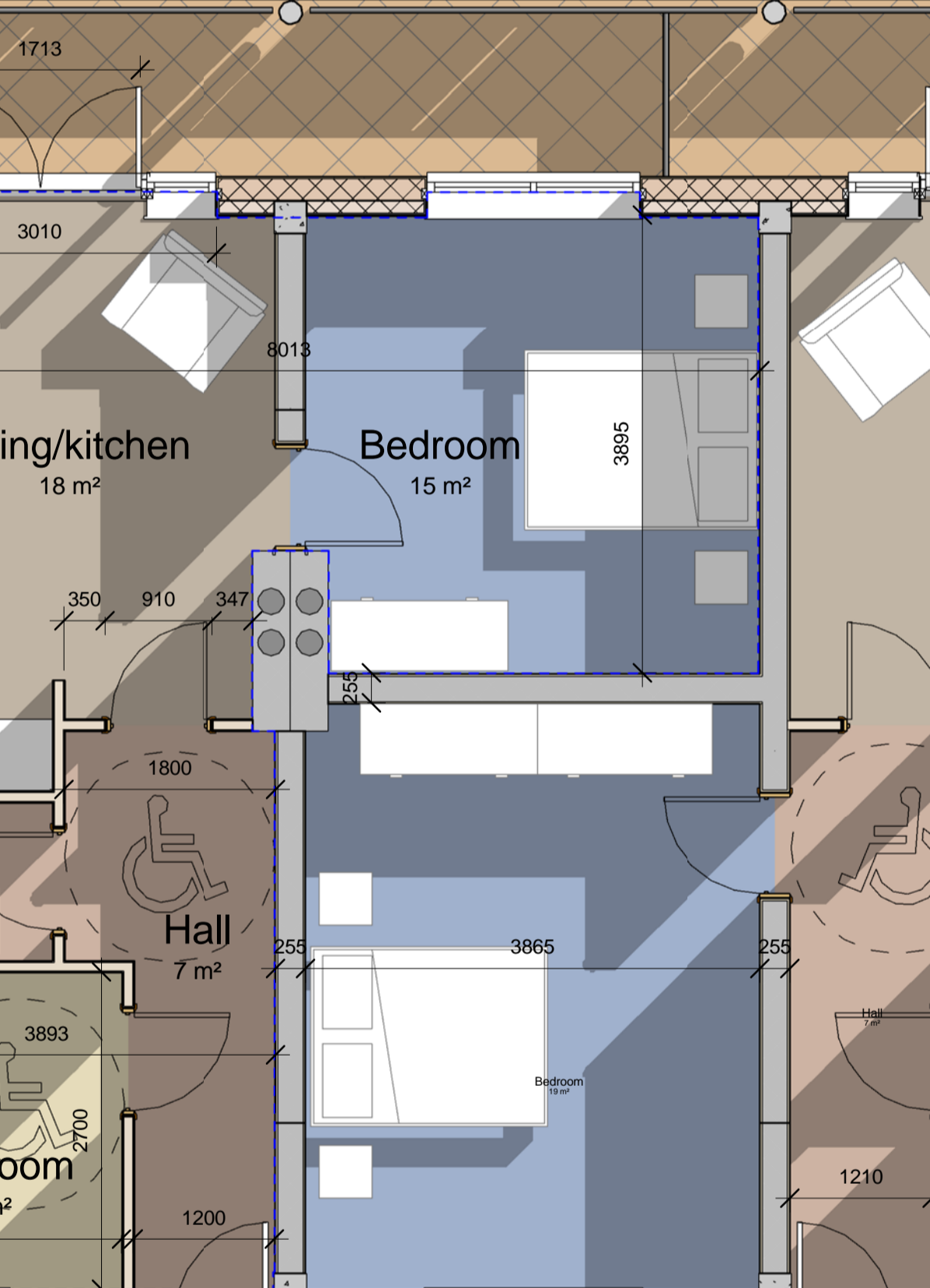
The Flat Top Refurbishment Complete Code has a BREEM Rating of EXCELLENT.

**Building Energy Rating (BER)**

Each apartment will achieve an A2 BER rating under DEAP Part M 2012.

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Each apartment will achieve an A2 BER rating under DEAP Part M 2012.



**DEMAND CONTROL VENTILATION SCHEMATIC**

Air is drawn into the dwelling is provided by a centralised fan which, as is attached (green arrow) via the extract units located in the main bedroom, utility room, bathroom and toilet. Connected to the fan (red arrow) the extract units drive the removal air volume for the whole dwelling.

It is the demand controlled ventilation, the fan and air intake, which is controlled by the fan, which is connected to the building's energy management system. The fan is controlled by the energy management system. The fan is controlled by the energy management system. The fan is controlled by the energy management system.



**SOLAR PV**

Each apartment is provided with either one in the case of end units or two for all other ground and fourth floor apartments.

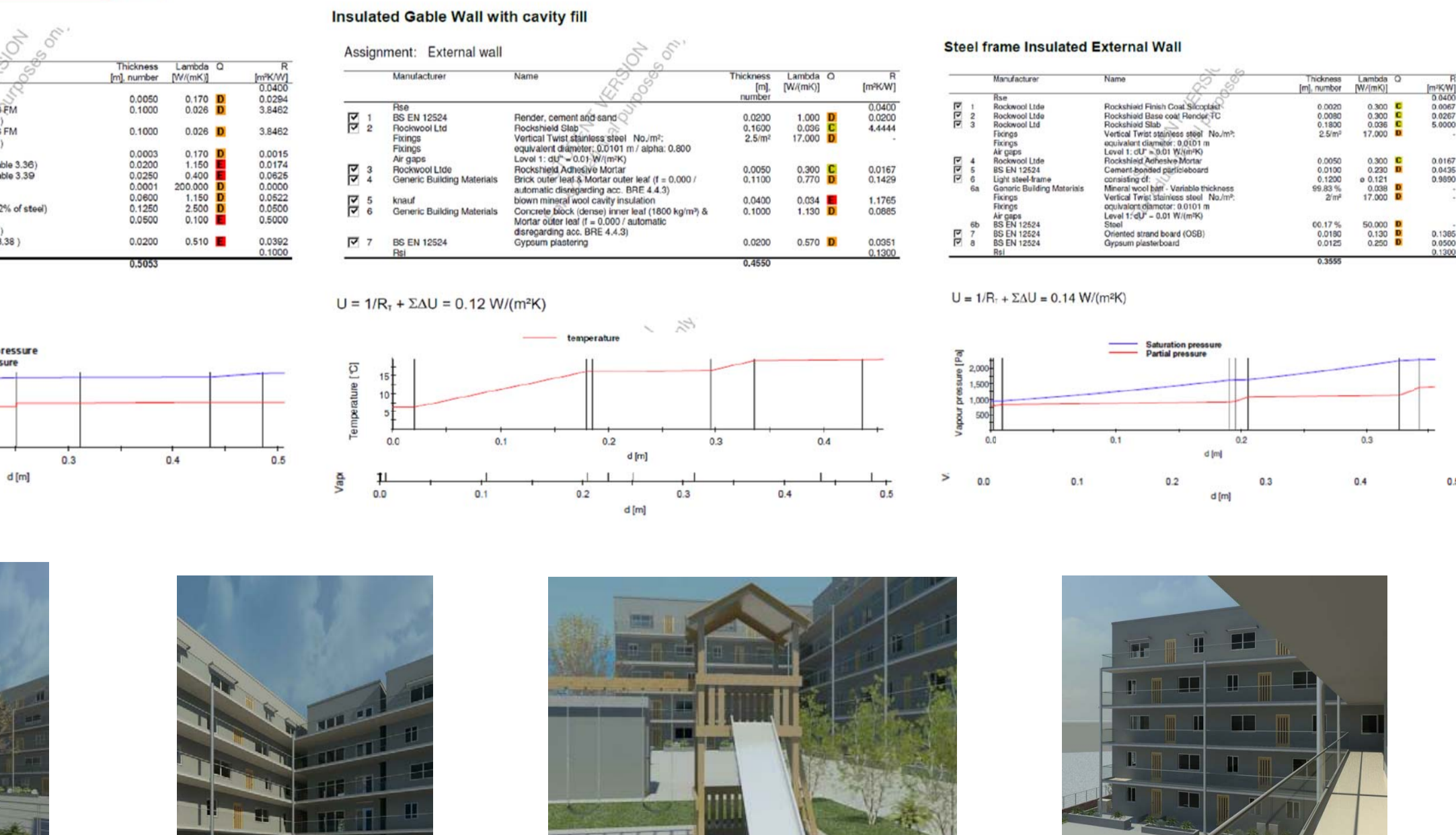
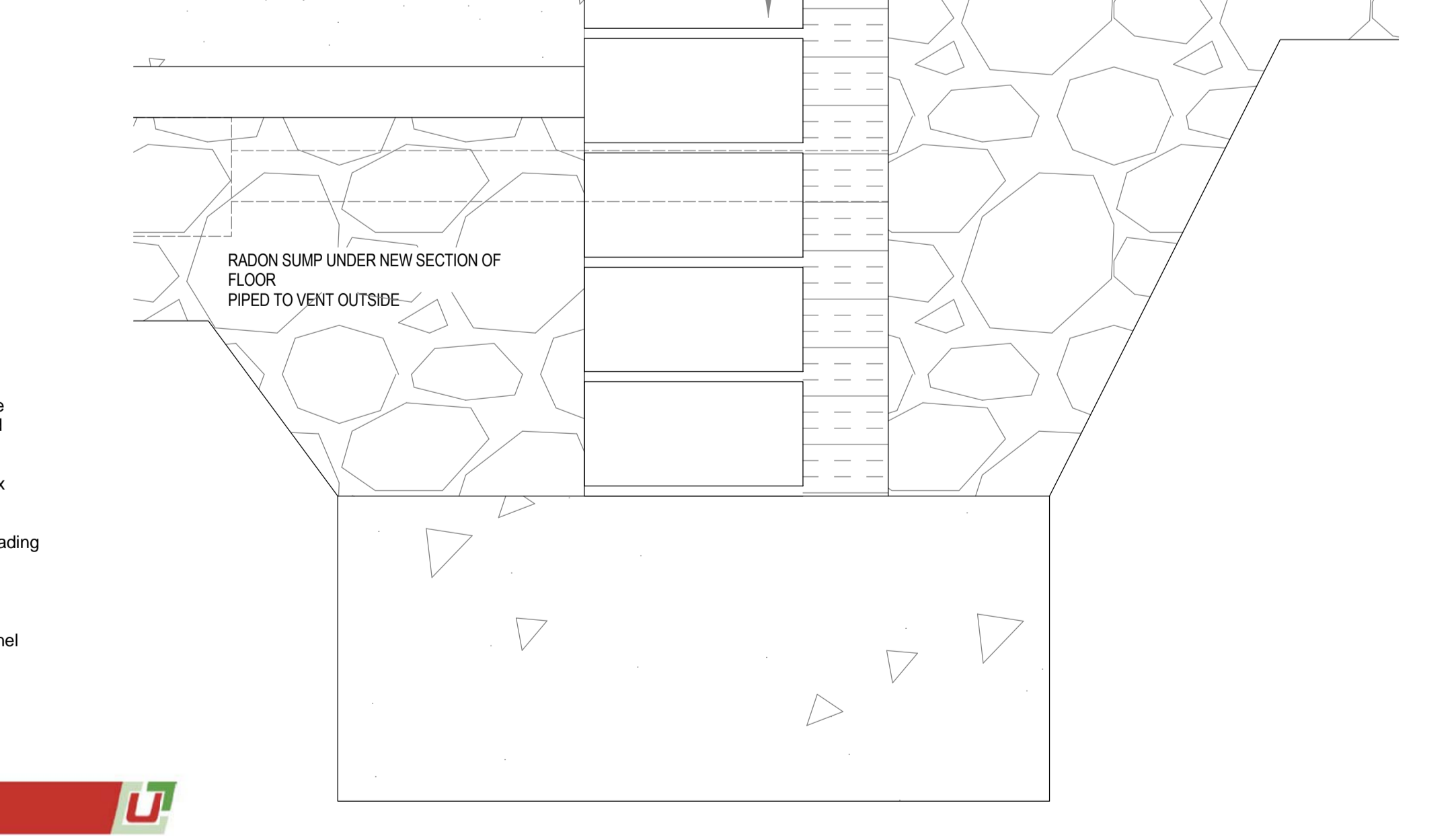
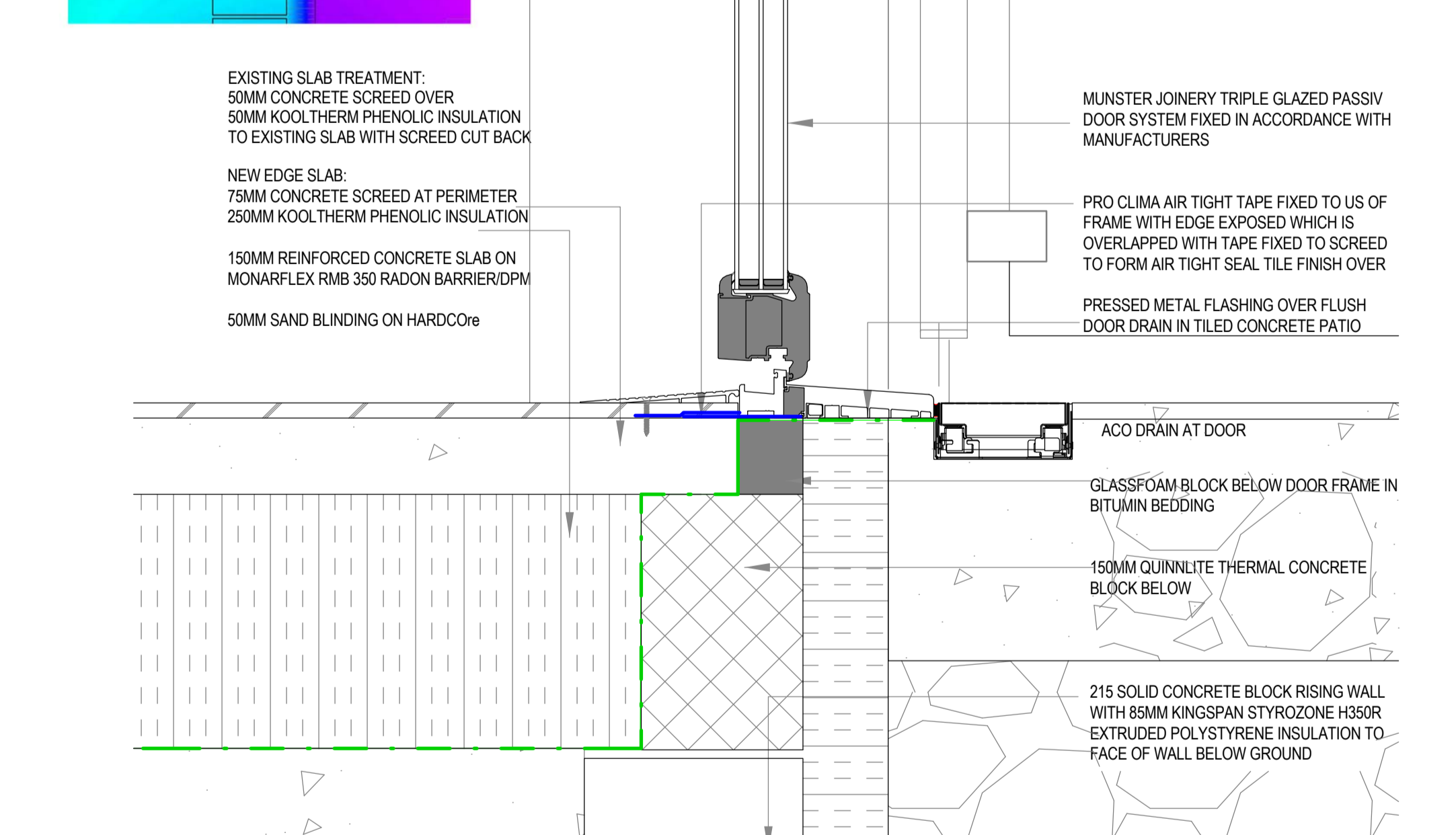
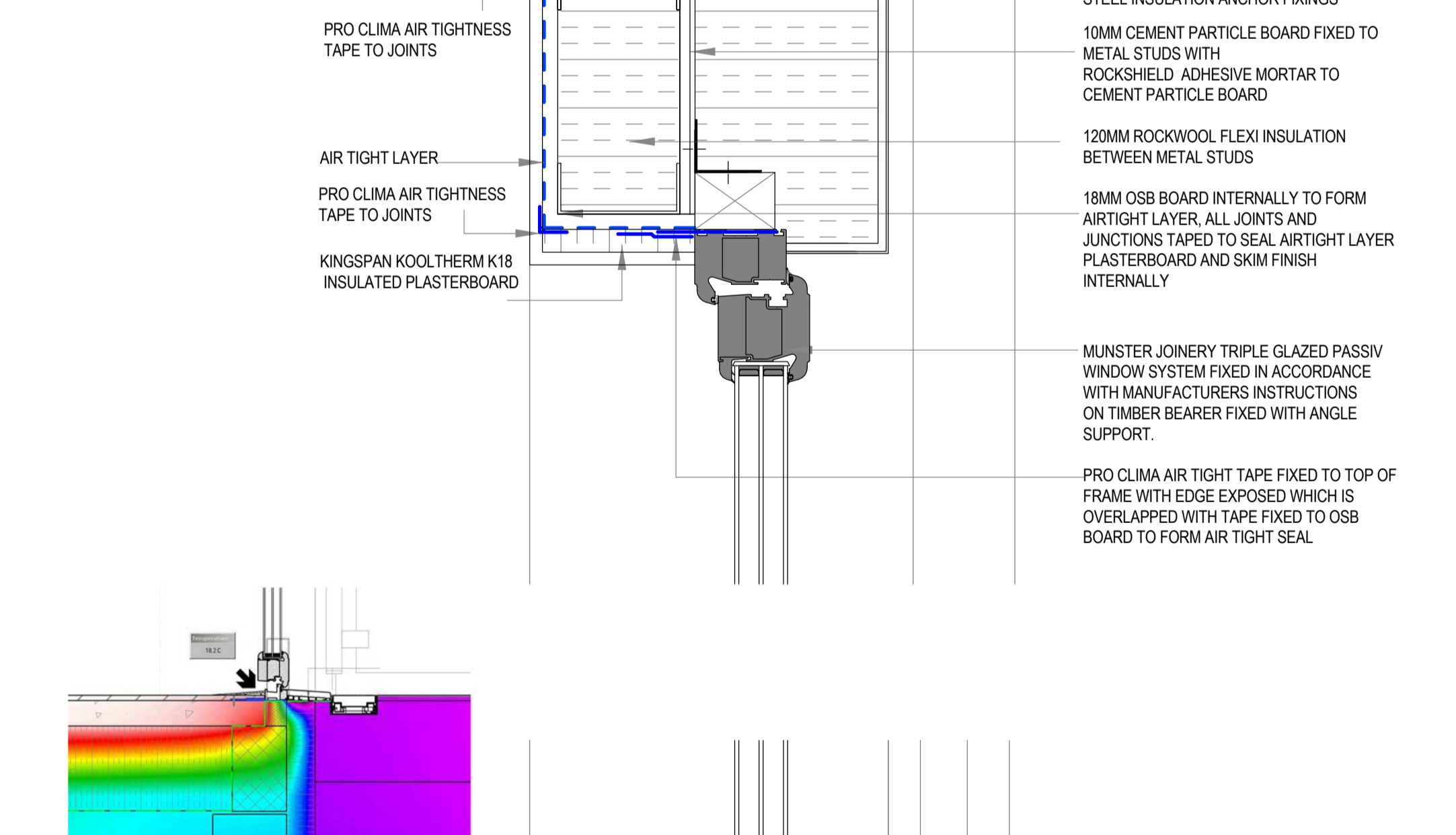
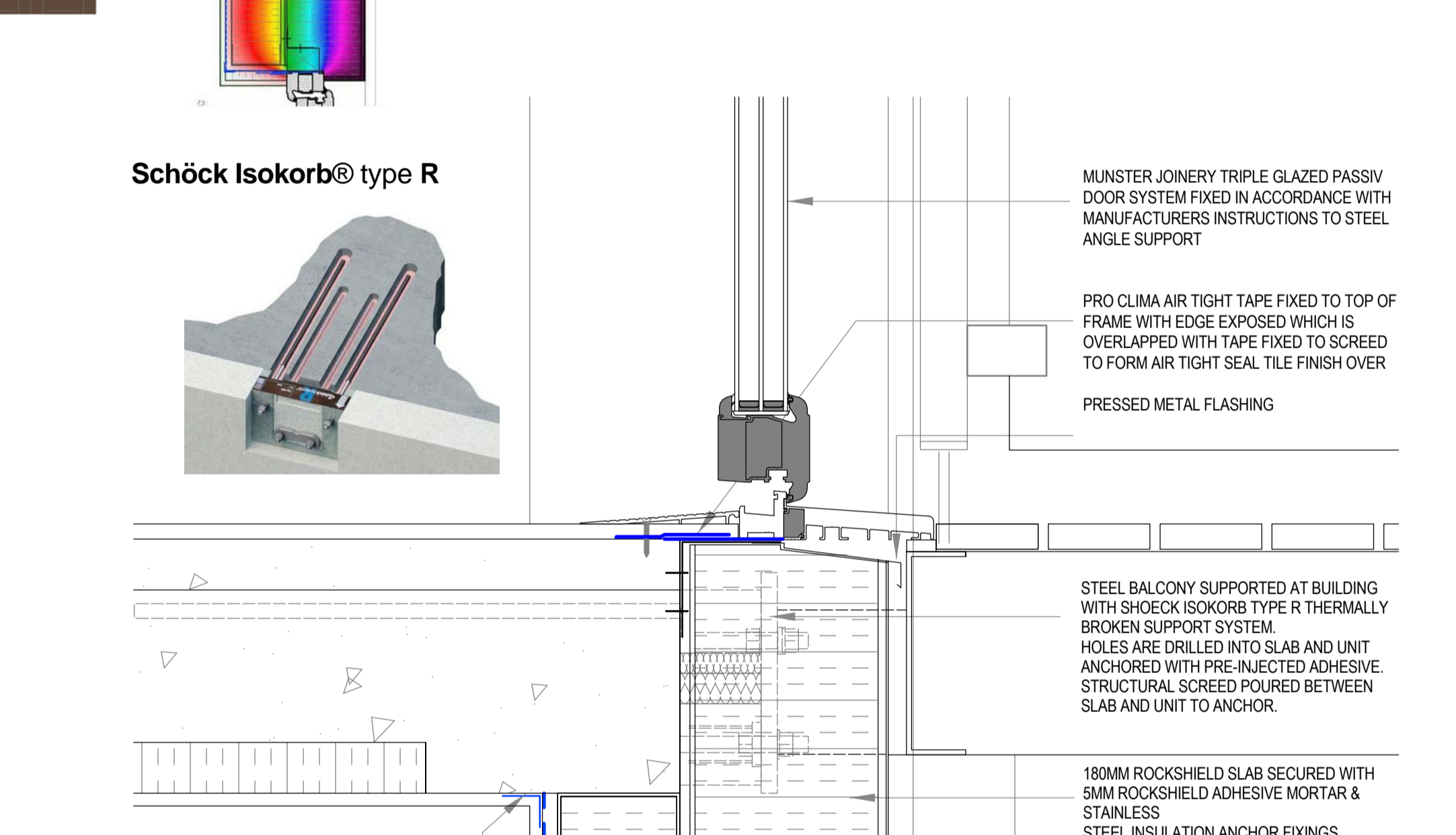
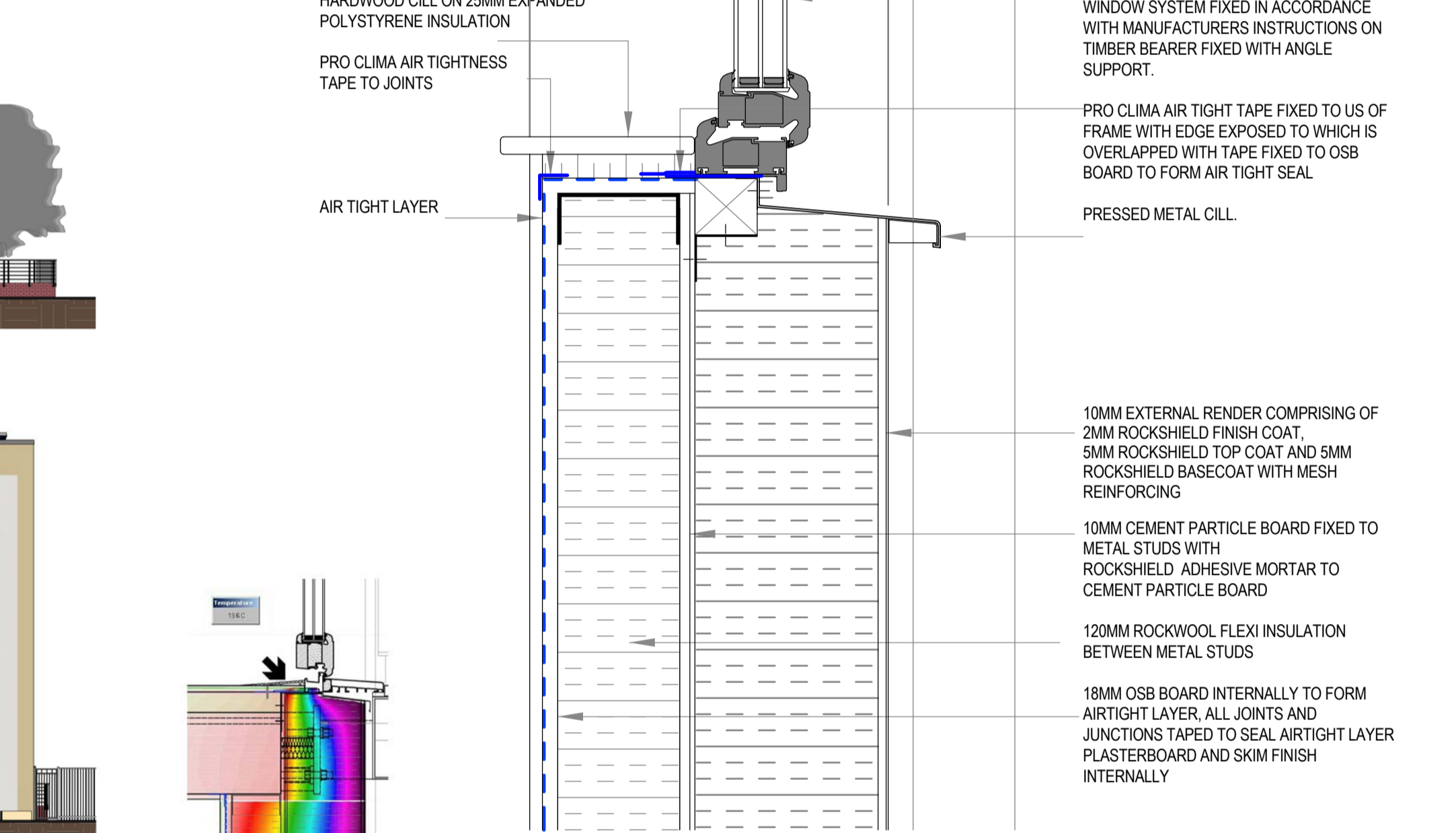
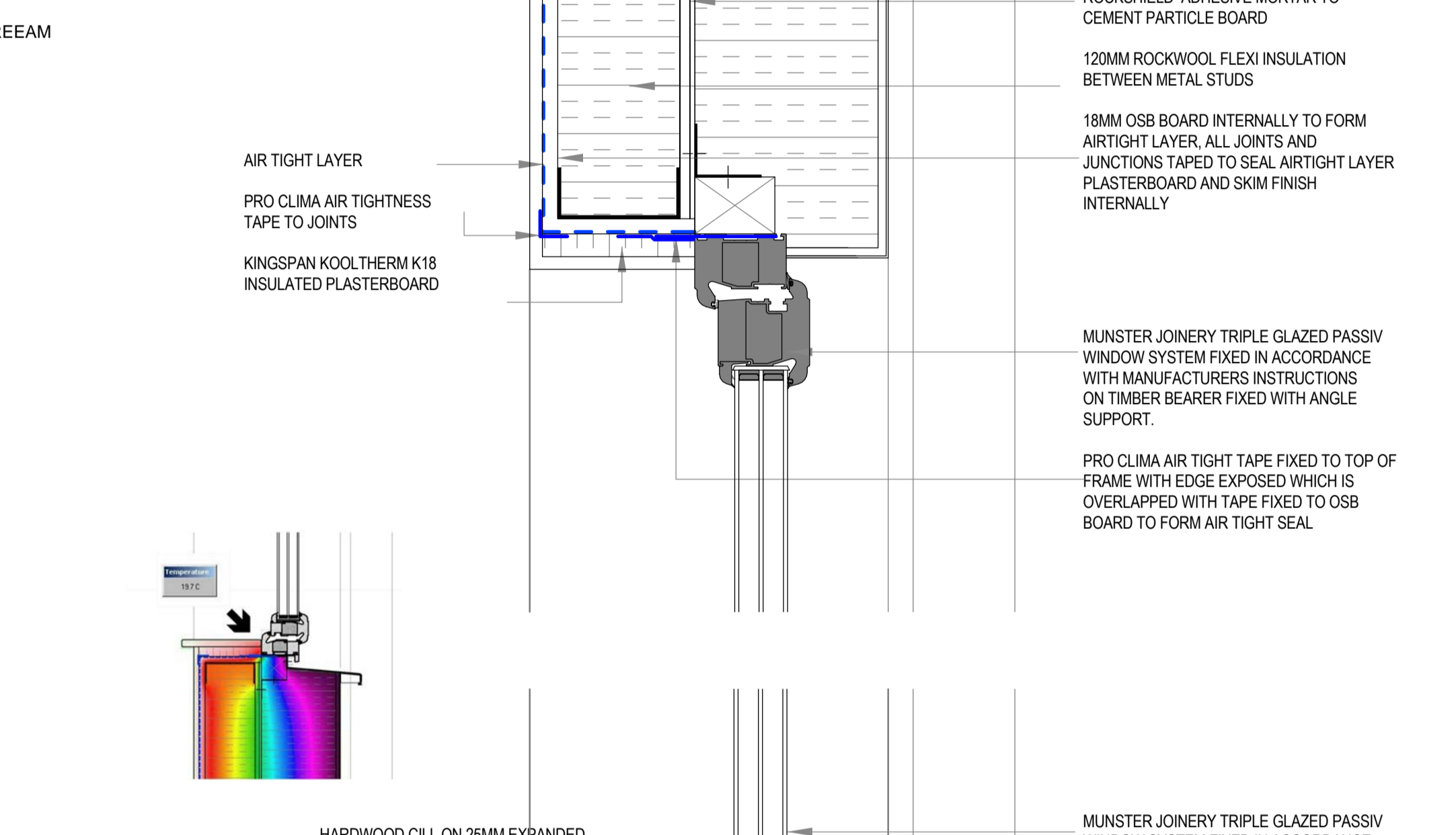
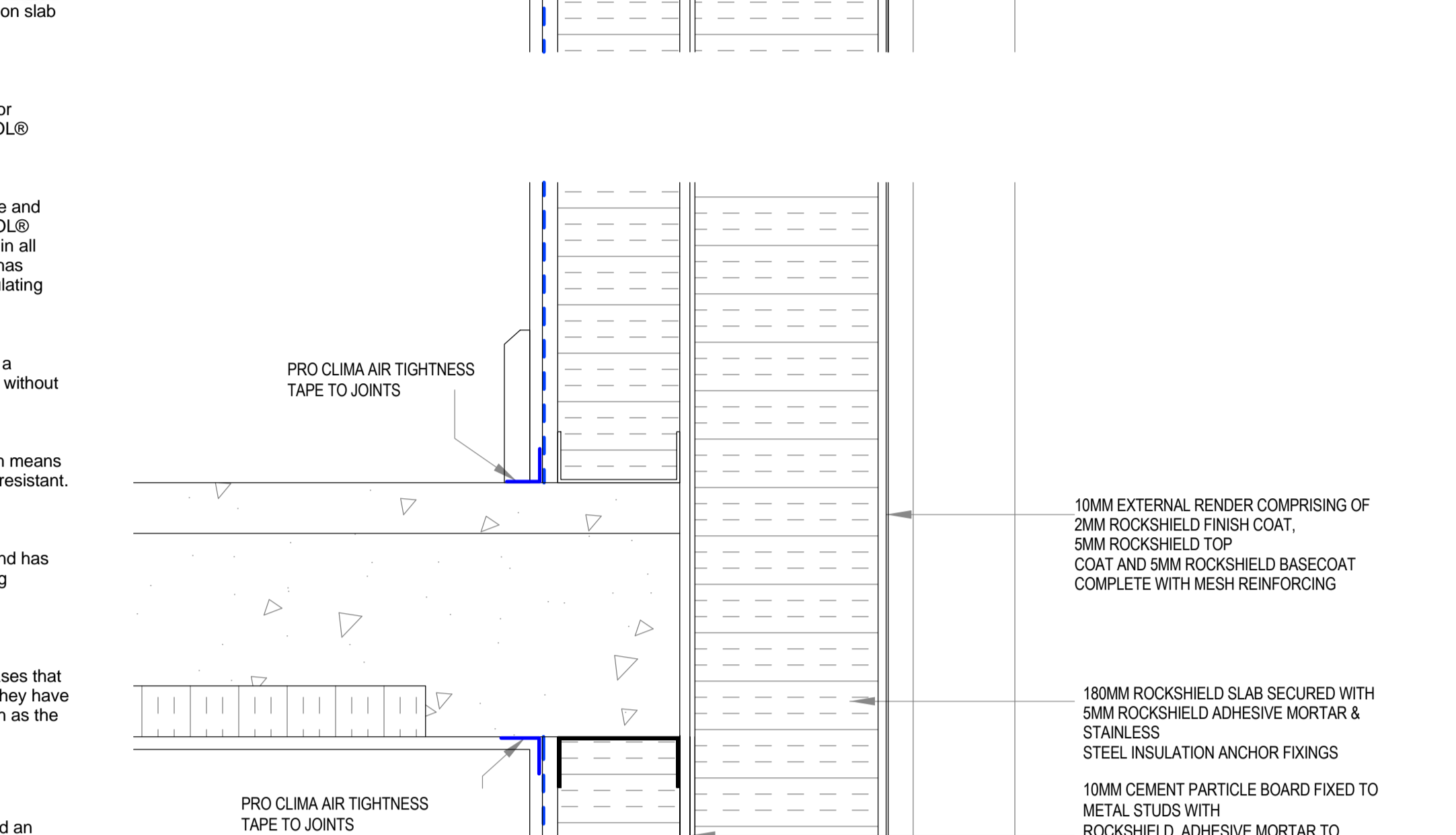
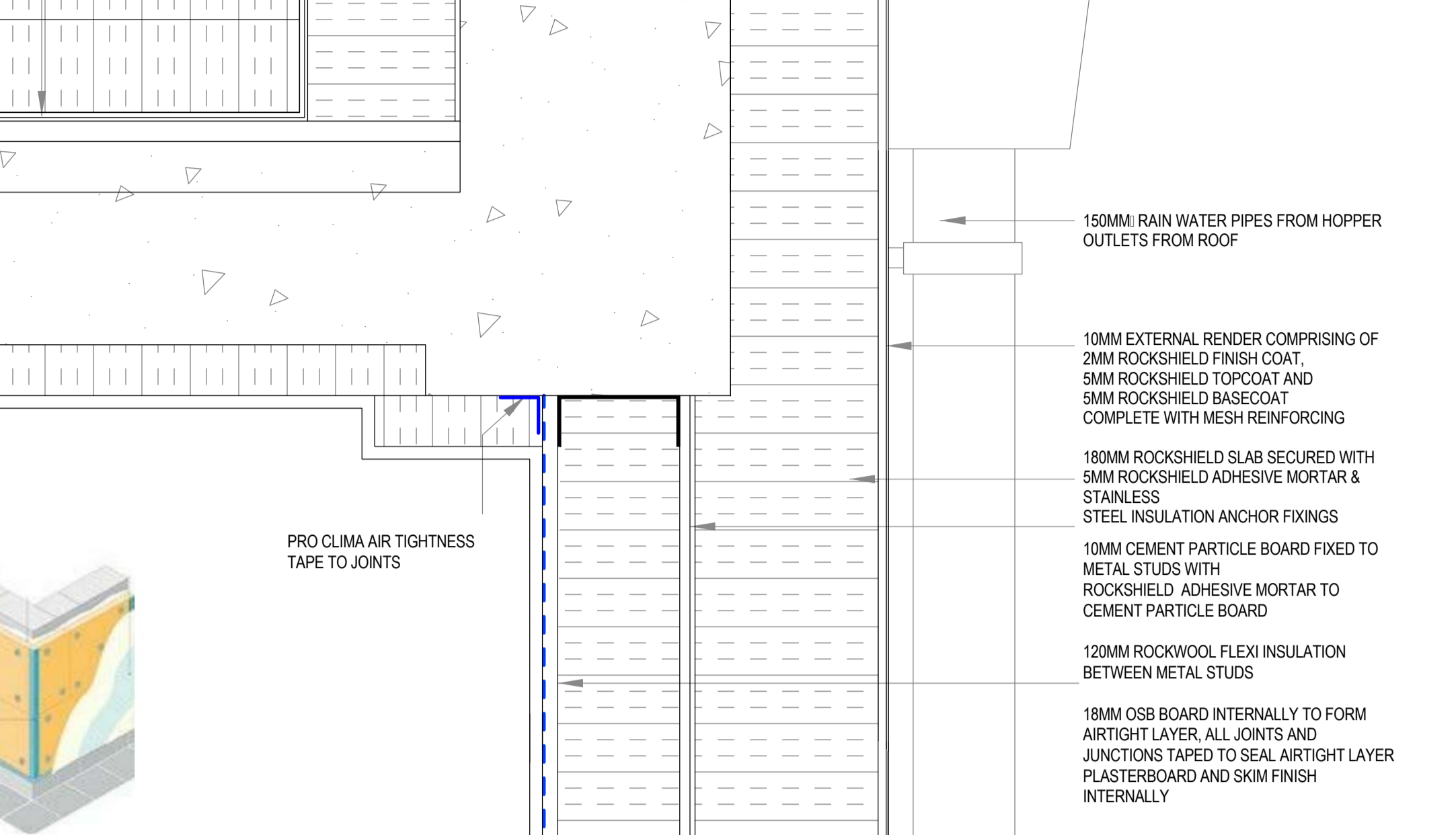
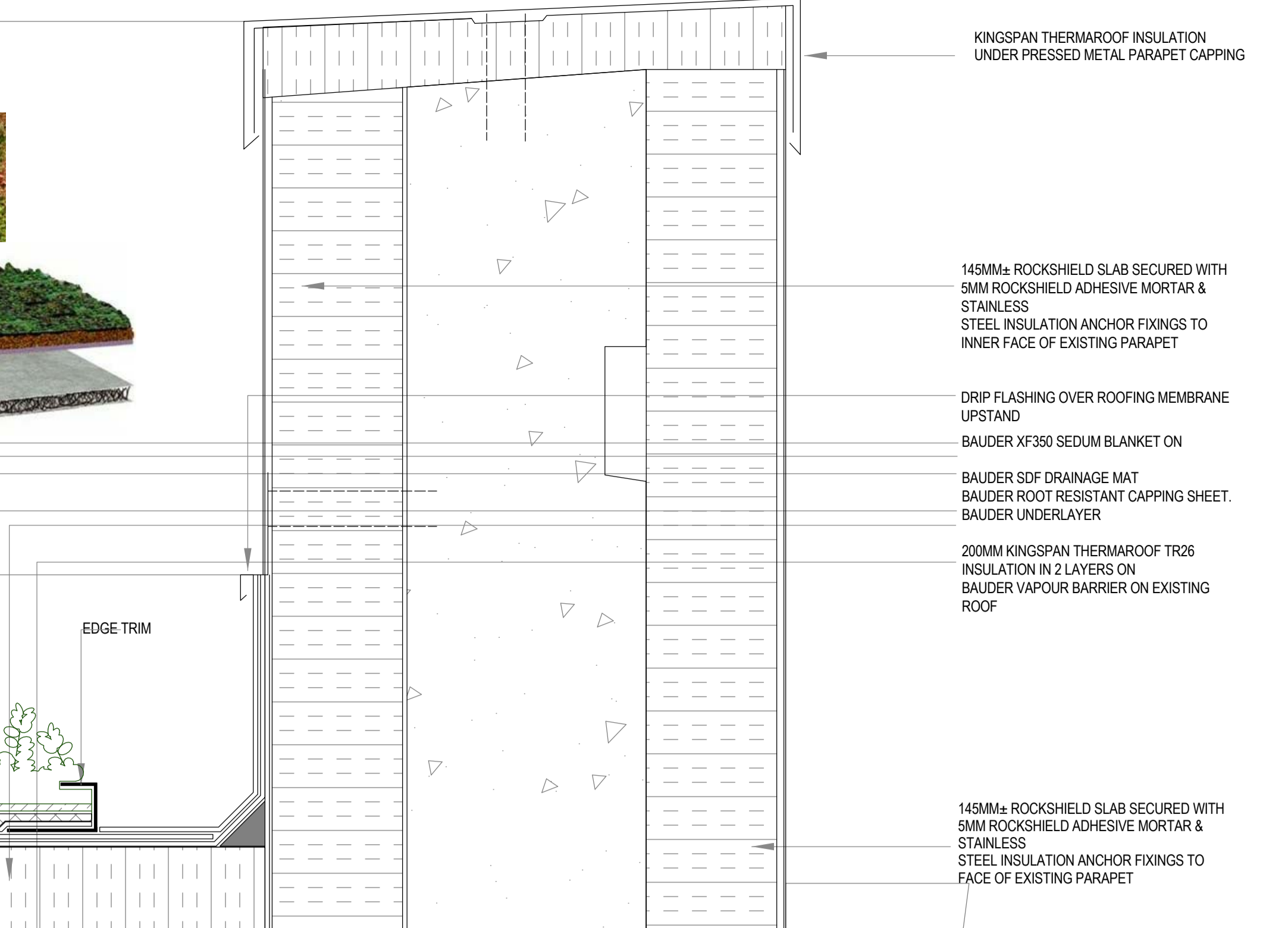
Ecologists SR-P060246 PV panel with 249W Max power output.

Panel size: 1637mm x 920mm x 20mm.

45 degree gable being due south with an overhanging 2.0 x 2.45 x 0.49.

0.48 x 0.61 x 1.025 x 1 = 420W/ky for two panels.

0.240 x 0.8 x 1.025 x 1 = 210W/ky for single panel.



**Assignment:** Flat roof

| Material               | Thickness (mm) | Thermal Conductivity (W/mK) | U-value (W/m²K) |
|------------------------|----------------|-----------------------------|-----------------|
| Concrete               | 100            | 1.75                        | 0.0175          |
| Rockwool Rockshield DR | 150            | 0.029                       | 0.0018          |
| OSB board              | 15             | 0.16                        | 0.0009          |
| Air layer              | 20             | 0.18                        | 0.0001          |
| Steel beam             | 100            | 45                          | 0.0022          |
| Concrete               | 100            | 1.75                        | 0.0175          |
| <b>Total</b>           |                |                             | <b>0.0400</b>   |

**Slab Frame Insulated External Wall**

| Material               | Thickness (mm) | Thermal Conductivity (W/mK) | U-value (W/m²K) |
|------------------------|----------------|-----------------------------|-----------------|
| Concrete               | 100            | 1.75                        | 0.0175          |
| Rockwool Rockshield DR | 100            | 0.029                       | 0.0029          |
| OSB board              | 15             | 0.16                        | 0.0009          |
| Plasterboard           | 12.5           | 0.16                        | 0.0008          |
| Brick                  | 100            | 0.15                        | 0.0015          |
| Plasterboard           | 12.5           | 0.16                        | 0.0008          |
| Rockwool Rockshield DR | 100            | 0.029                       | 0.0029          |
| OSB board              | 15             | 0.16                        | 0.0009          |
| Concrete               | 100            | 1.75                        | 0.0175          |
| <b>Total</b>           |                |                             | <b>0.0330</b>   |