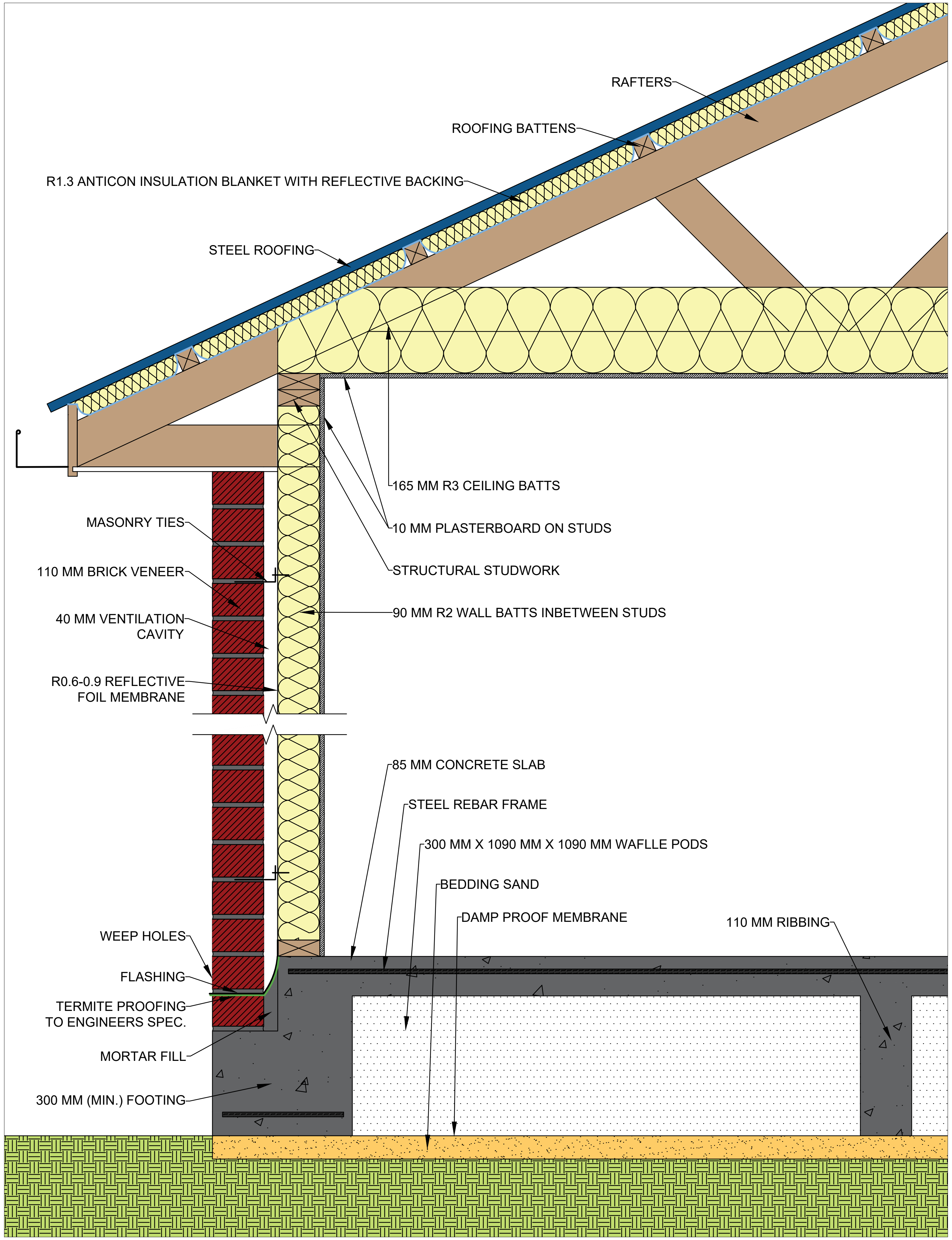
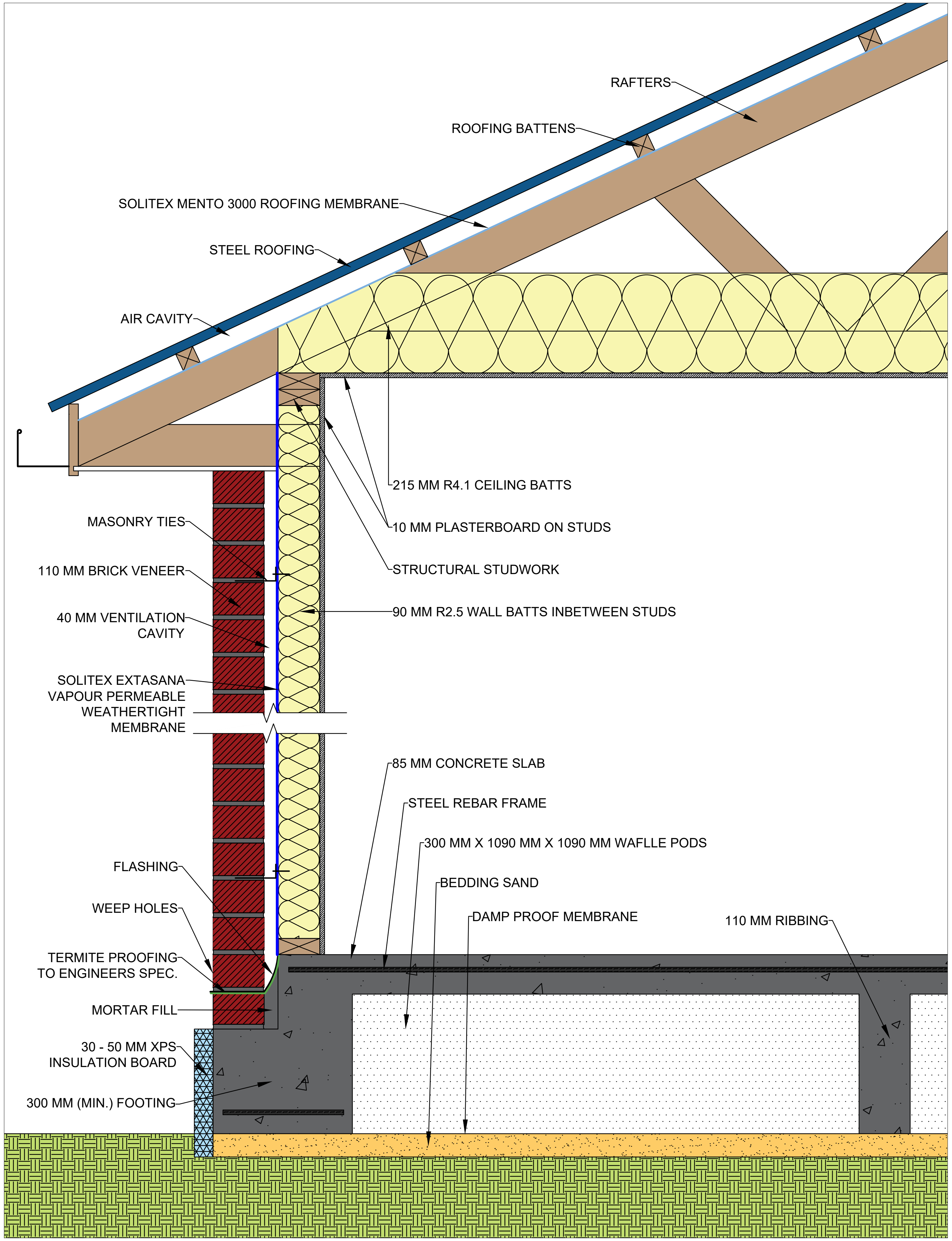
1. STANDARD SINGLE BRICK VENEER ON WAFFLE POD SLAB WITH TRUSS ROOF



2. SINGLE BRICK VENEER WITH EDGE INSULATED SLAB AND VAPOUR PERMEABLE WALL MEMBRANE



	DATE:	10/07/2018	DATE:	30/05/2019	LAROS TECHNOLOGIES
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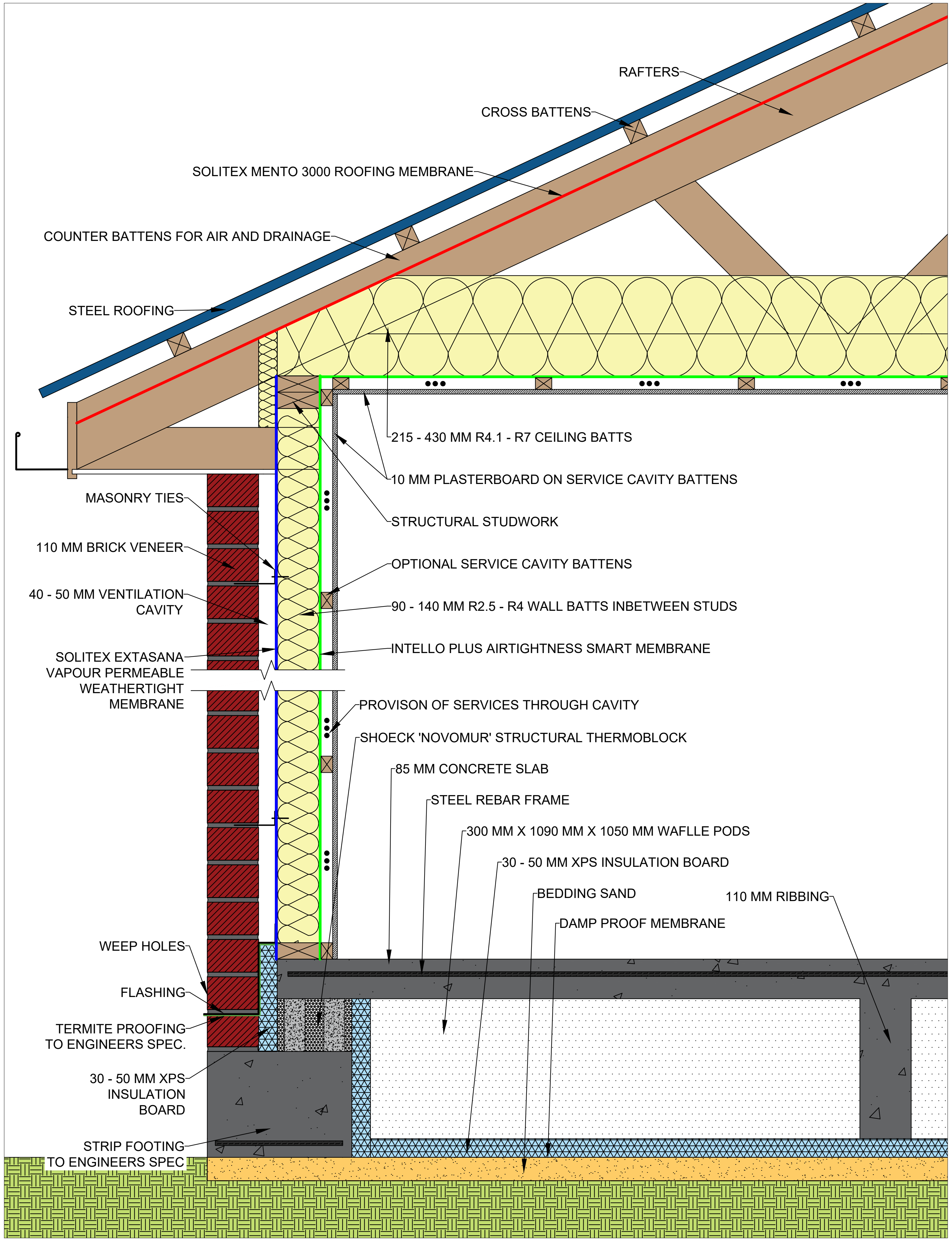
3. HIGH PERFORMANCE INSULATED SLAB AND WALLS WITH AIRTIGHTNESS MEMBRANE



CALCULATED TOTAL R-VALUES OF ASSEMBLIES

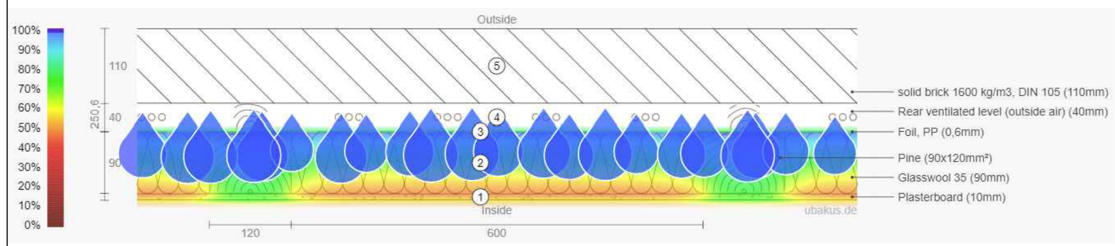
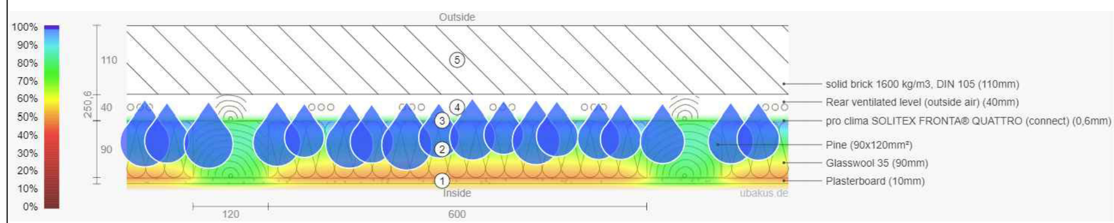
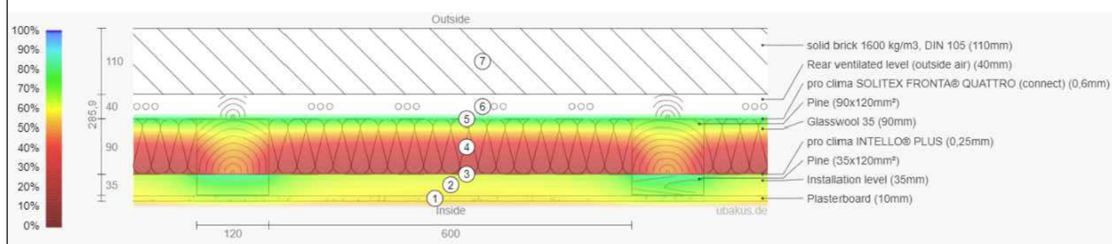
ASSEMBLY	1 STANDARD BRICK VENEER (B.V.)	2 VAPOUR PERMEABLE B.V.	3 HIGH PERFORMANCE B.V.
WALLS	R2.84 [1], R2.02 [2]	R2.95 [1], R2.18 [2]	R2.43 (90 mm), R3.43 (140 mm) [2]
ROOF	R4.36 [2]	R6.38 [2]	R6.55 (215 mm), R12.69 (430 mm) [2]
SLAB*	R1.95 [2]	R1.95 [2]	R5.26 [2]

NOTE ON CALCULATIONS: The R-values referenced as [1] use the online Knauf thermal calculator. This type of calculator is popular among home owners and builders. However, it uses a simplified method which does not account for airflow through cavities or heat transfer through structural elements such as studwork. The R-values calculated using [1] are always best possible values that are unlikely to be reached in real conditions and fail to model complex structures such as a waffle pod slab. The calculation method referenced as [2] uses a specialised software; U-Wert. U-Wert takes into account cavity ventilation as well heat transfer due to studwork. It can also be used on complex structures and is able to identify any potential to form condensation in the assembly.

*The Slab calculations are all performed in U-Wert which is able to model the waffle pod and ribbed slab structure, but cannot take into account the slab edge insulation. As such the real total R-value of the slab might be slightly larger than what is indicated here.

References: [1] www.knaufcalculators.com.au/KnaufWallThermalCalculator.html. [2] www.ubakus.de/u-wert-rechner/

CALCULATED EXTERNAL WALL CONDENSATION POTENTIAL OF ASSEMBLIES

	CONDENSATION PROFILE THROUGH WALL	INSIGHT SUMMARY
1	MOULD & ROT RISK 	Total condensate formed over a 90 day winter period in the assembly is 3.7 kg/m². Here the affected layers are the foil sarking and the insulation batts and studwork, which is indicated in the diagram as the blue 100% relative humidity region and the water droplets. This is caused by the warm inside air diffusing through the insulation batts, and then meeting the cold foil sarking layer. At the interface any moisture in the warmer air condenses onto the colder foil layer. As the foil does not allow vapour to easily pass through, the condensation slowly builds up during winter when the inside is warmer than the outside. During summer months this condensation then has the opportunity to dry. However, as the amount of condensation is so large and ideal drying conditions are not always met (for example consider shaded southern walls), condensation may never totally dry and could build up over a number of years leading to rot and mould.
2	MOULD & ROT RISK 	Total condensate formed over a 90 day winter period in the assembly is 1.3 kg/m². Here the affected layers are the SOLITEX EXTASANA (named FRONTA QUATRO in the diagram) and the insulation batts and studwork. In this assembly the process of condensation formation is the same as that of the foil sarking. However, as the SOLITEX membrane is vapour permeable, some of the moisture content is able to more easily evaporate into the ventilation cavity which reduces the condensation build up over winter. The vapour permeability also enables the wall assembly to dry out faster during summer. Although an improvement on assembly 1, this assembly still has the potential for mould and rot to form as there is still significant winter condensation within the cavity.
3	NO RISK OF MOULD OR ROT 	No condensate forms in this assembly over a 90 day winter period. The reason for the large improvement in this assembly is solely due to the internal INTELLO PLUS smart airtight membrane. The INTELLO keeps moisture on the warm side of the insulation and prevents it from diffusing into the insulation batts. This, combined with the vapour permeable EXTASANA keeps the air moisture content throughout the assembly low enough that it never condenses. Under the conditions modeled, this completely removes the potential for mould and rot due to dampness.

NOTE ON CALCULATIONS: The calculations of the moisture content shown here are based on the German standard DIN 4108-3, which stipulates requirements and calculation methods for climate-related moisture protection in buildings. There is no equivalent Australian standard, and so a modified version of DIN 4108-3 to better suit local Canberra conditions has been used in its stead. The modeling done this way specifies a 90 day winter period under constant conditions of externally 3 °C and 90% relative humidity, and internally 20 °C and 50% relative humidity. This is done to represent a standard heated home during a particularly cold Canberra winter, with 3 °C and 90% relative humidity an average accounting for consistent drops below 0 °C at night. The DIN 4108-3 standard requires that during the winter period, no more than 1.0 kg/m² of condensate accumulates in any wall assembly. Of the above assemblies only number 3, incorporating both the internal INTELLO PLUS and external EXTASANA membrane meets this requirement.

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