

Care should be taken when providing insulation to avoid thermal bridges. Proper reinforcement (i.e. welded net or wire mesh) should be provided for the external plastering, to avoid any cracks and degradation due to thermal shocks and humidity variations. The building fabric should be constructed such that, there are no readily avoidable thermal bridges in the insulation layers caused by gaps within the various elements at joints between elements and at the edges of elements, e.g. around door and window openings. The building fabric should be constructed to minimise air leakage through the thermal elements.

For villas, thermal bridges can be avoided by increasing the efficiency of building envelope. The average thermal transmittance (U-value) of the wall must not exceed 0.40 W/m²K. Weighted average U-value calculation conforming the average thermal transmittance (U-value) for the building envelope must be submitted. Weighted average U-value allows for trade-off the values between the various wall types. For instance, if the columns and beams are not well insulated, then the remaining portion of the wall must have better U-value to compensate the higher U-value of non-insulated column and beams. Project team can also consider increasing the wall insulation to attain an average wall U-value of 0.4 W/m²K.

Methodology for calculating the average U-value for a sample wall (fig. 501.02(3)) is shown below:

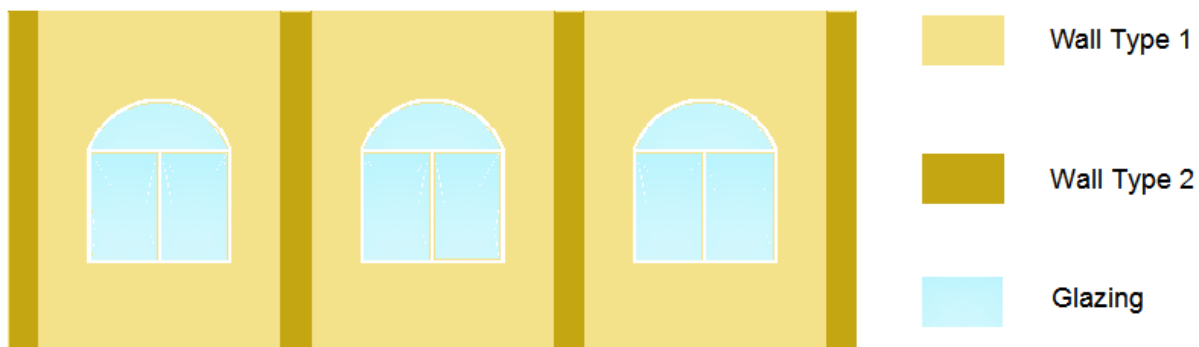


Fig. 501.02(3): Sample Wall Elevation

First, the R-equivalent of each wall type is computed. Based on which the U-value for each wall is calculated, as:

$$U = \frac{1}{R}$$

$$\text{Then, Weighted Average U-value} = \frac{(A_1 U_1) + (A_2 U_2)}{(A_1 + A_2)}$$

Where,

R = Thermal Resistance in m²K/W

A₁ = External surface area of wall type 1 in m²

A₂ = External surface area of wall type 2 in m²

U₁ = U-value of wall type 1 in W/m²K

U₂ = U-value of wall type 2 in W/m²K

The material layers and thickness considered in the U-value calculator must be consistent with the architectural wall sections. The area of each type of external wall must be calculated and multiplied with those wall section U-value to calculate the heat transmittance of each wall type.