3.4 External building materials

As the building and plot areas take shape, it is important that the appropriate materials are selected for external structures and facade. There are several requirements to consider when specifying these materials.

U- values

The materials that comprise the structure and facade of the building will form its thermal envelope – the main barrier to external heat and solar energy. Keeping the occupied space cool and comfortable is an easier task with a high performance envelope.

The U-value is a measure of how much heat passes through a given material (i.e. how much insulation the material provides). The project team should specify and build the building envelope to achieve the lowest possible U values and in any case achieve the minimum U-value requirements outlined in RE-R1 which are defined by ASHRAE Standard 90.1-2007, Section 5. For the UAE the relevant climate zone is zone 1.

The following practices can be used to achieve the required values:

- Provide insulation between the earth and concrete floor slab to reduce heat from the ground warming the rooms.
- Insulate above the roof slab and apply an external finish in a light color to reflect solar heat.
- Include sufficient insulation in the building walls.

In addition to the basic U-value heat transfer reduction the following factors can also benefit the energy and internal environment:

Thermal mass

Place concrete elements adjacent to the occupied spaces, to buffer thermal energy and provide a cool surface feel for the occupant.

Vapor barrier

Provide a barrier to restrict ingress of moisture through the building walls, floor and roof. This is a critical protective consideration given the high humidity in the coastal area of the UAE.

Exterior Surface finishes

Use light colors to reflect sunlight and reduce absorption of solar energy. This will reduce heat build up and gain through the walls and roof.

Glazing design

Glazing design is important for overall building energy usage, because windows bring light and heat into occupied spaces. Credit RE-R1 details the requirements for both windows insulation, e.g. U values, and radiative heat gain, e.g. solar heat gain coefficient (SHGC). The U value requirements will generally require double glazing coatings while the SHGC requirements can be achieved with tinted glass or reflective factory applied coatings.

These factors can be specified to the glazing manufacturers; a wide range of suitable, compliant products are available within the UAE.