DESIGN RIGHT

Thermal envelope basics

BY TREVOR PRINGLE,
ANZIA, BRANZ PRINCIPAL WRITER

What areas of a dwelling should be contained within a thermal envelope and what areas shouldn't? Let's review.

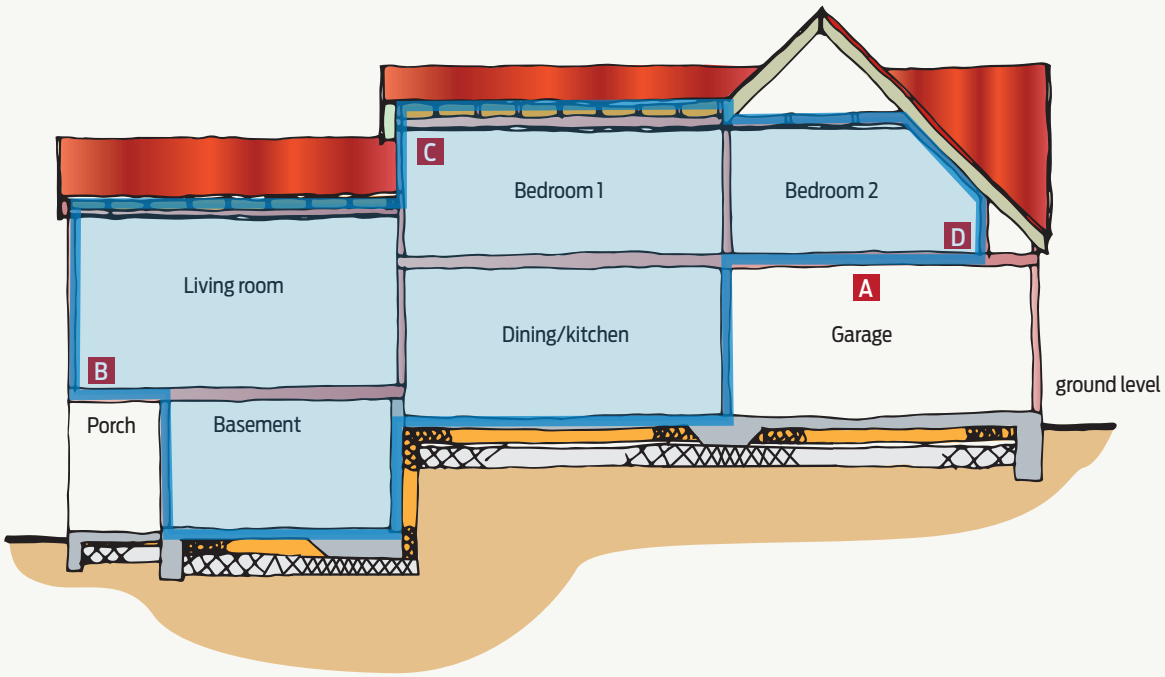

Figure 1 **Cross-section showing the thermal envelope marked in blue.**

WHEN WE ARE COLD, we add more clothes, or put on a hat. On colder nights, we sleep under a duvet or extra blanket. Each of these items insulates us from the cold and creates the thermal envelope around us.

Buildings are no different in that we need to create an effective thermal envelope around the habitable spaces to help keep those spaces warm.

Line between conditioned and non-conditioned spaces

The question is, where does the thermal envelope need to be located?

First, let's look at the requirements. NZS 4218:2009 *Thermal insulation – Housing and small buildings* defines the thermal envelope as the border – a wall, floor or ceiling/roof – between a conditioned space and a non-conditioned external space.

Conditioned space

The standard NZS 4218:2009 defines a conditioned space as 'that part of the building within the building thermal envelope, including habitable spaces, that may be directly or indirectly heated or cooled for occupant comfort'.

Conditioned spaces are habitable spaces such as living rooms, bedrooms, bathrooms, kitchens and other rooms in the building likely to require heating or cooling.

Non-conditioned space

Typically, non-conditioned spaces outside the thermal envelope are:

- garages, unless the garage is fitted with an airtight insulated garage door
- attic roof spaces where the insulation is located above the ceiling
- porches
- conservatories.

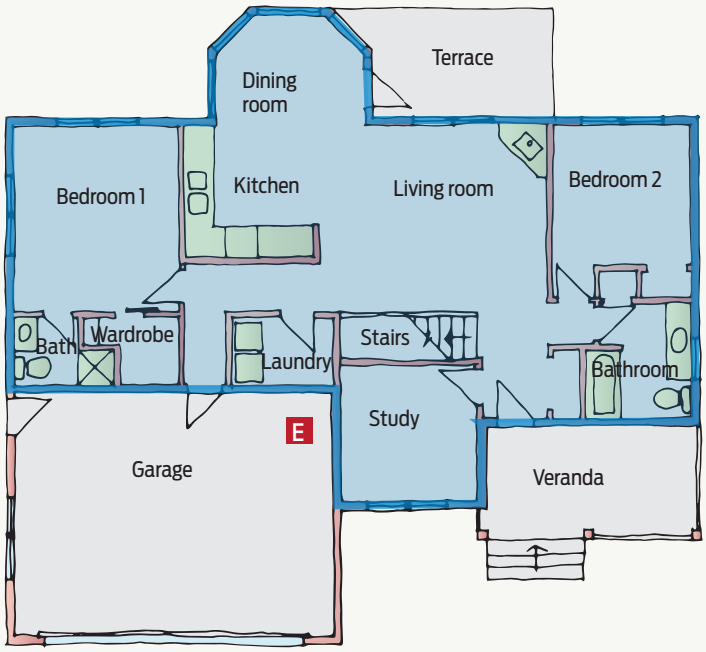

Figure 2 **Floor plan showing thermal envelope marked in blue.**

Placement of thermal envelope critical

Borders that often form the thermal envelope include:

- garage ceilings where there is a habitable space over an uninsulated garage or a garage with a standard door (see A in Figure 1)
- a floor to a conditioned space that is cantilevered past an external wall (see B in Figure 1)
- walls that separate a conditioned space with a roof from an adjacent unconditioned attic space (see C in Figure 1)
- walls that separate a conditioned space from a roof space (see D in Figure 1)
- walls between a conditioned space and a garage with a standard garage door (see E in Figure 2).