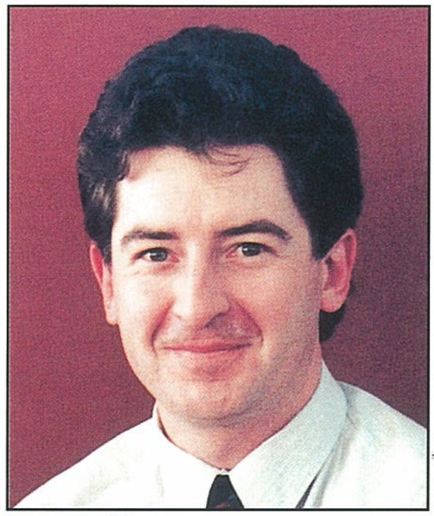
Gang-Nail Guide Lines No.19

WIND LOAD FOR HOUSING



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One of the most critical loads to consider when designing a building is the wind load.

Great care is usually taken to ensure the building elements, in particular the roof trusses, are designed for precise dead loads.

For example, a house with a concrete tile roof will have larger timber sizes than a house with a steel deck roof.

However, the design wind velocity, which can be just as critical to the design, is generally assumed conservatively, based on the normal value adopted in a particular suburb.

If the building location is taken into account, the wind load can often be significantly reduced.

WHY IS IT CRITICAL?

You may be interested to know that a design wind velocity of 33m/s produces a load on the roof approximately equal to the weight of concrete tiles.

Similarly, 28m/s is approximately equal to 0.7 times the weight of concrete tiles, 41m/s is 1.5 times and 50m/s is 2.3 times.

Wind affects many components in a building. Designing for wind speeds higher than necessary can result in larger members, and hence a more expensive building. Some of the more critical components include:

- Holddown (of trusses to the top plate, top plate to studs, etc). Depending on the wind speed adopted, the roof truss tie down requirements may change from a single Trip-L-Grip to two Cyclone ties or worse.
- Glazing
- Bracing (of both the roof and walls). The 1992 release of AS1684 'National Timber Framing Code' sets out the required wall bracing for different design gust wind speeds and areas of elevation. Over 4 times as much bracing may be required on a house designed for a design Wind Velocity of 41m/s, compared to one designed at 28m/s.
- Roof trusses

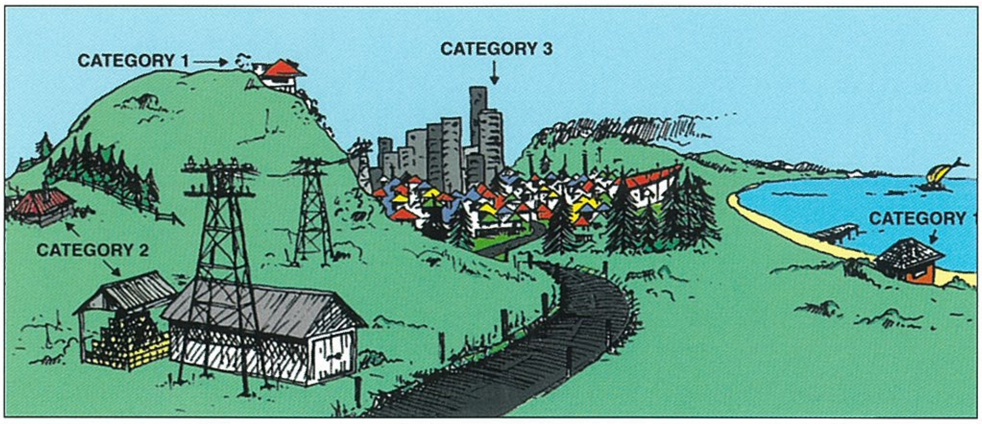
Of course, designing a building for a wind speed less than required can be catastrophic. Everyone is aware of the tragedy caused in Darwin by Cyclone Tracey.

HOW TO OBTAIN THE D.W.V.?

There are three main methods used to obtain a Design Wind Velocity.

The most common would be through the local council, which will generally have zoned areas designating the required design wind speed unless otherwise justified.

Engineers generally use AS1170.2-1989 "Wind Loads" which is suitable for any type of structure.



It is fairly complex, but has the advantage of producing the most accurate answer.

For builders and truss fabricators, my recommended method of obtaining the relevant design wind velocity is through the use of AS4055-1989 "Wind Loads for Housing".

AS 4055-1992

This code is a simplified version of AS1170.2, specifically targeted to the domestic building market.

It covers Class 1 or 10 buildings as defined by the Building Code of Australia (ie detached house, row houses, terrace houses, town houses, small boarding houses or the like), providing they comply with the geometric limitations that follow:

a) The distance from ground level to the underside of the eaves must not exceed 6.0m; from ground level to the highest point of the roof, neglecting chimneys, must not exceed 8.5m; and the height of each storey at external walls must not exceed 2.7m.

b) The width, including roofed verandahs but excluding eaves, must not exceed 16.0m, and the length must not exceed five times the width.

c) The roof pitch must not exceed 35 degrees

DESIGN WIND VELOCITY

The Design Wind Velocity for a building is dependent on the following factors:

Geographic region (1)

This gives your basic wind speed, which is modified by factors (described in points 2 to 4 below), to give the design wind velocity. Cyclonic regions such as far North Queensland will be subject to a lot higher basic wind speed than will ever be encountered in Melbourne or Sydney.

Terrain Category (2)

Areas exposed to the sea front or in the desert will experience higher wind speeds than houses located in the suburbs, where there are numerous objects around that will break up the wind flow.

Shielding (3)

Houses that have similar size buildings in the vicinity will be protected from the direct wind force.

Topographic location (4)

The topographic classification determines the effect of wind on a house because of its location on a hill, escarpment or ridge. Houses at the top of a hill will be exposed to higher wind speeds than those at the bottom.

By gathering this easily obtained information about the building site, you will often be able to reduce the Design Wind Velocity, and construct a more economical building. When every effort is made to reduce costs in other areas, why not use this information to obtain substantial savings.