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# Article - Overview on Residential and multi-residential housing

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## SINGLE UNIT-RESIDENTIAL

Traditionally, single unit residential buildings are built in timber-framed construction. For many years now, the basic reference for the design of such buildings has been NZS 3604. From the original version comprising about 100 pages, this has grown to a monster of about 500 pages in the 2011 version and its title "Timber framed buildings not requiring specific design" might be regarded as an oxymoron.

This code sets out rules for the selection of the types, materials and sizes of foundations, floors, walls, rafters, lintels, beams, cladding, linings, bracings, and their construction and connections. Members can only be "selected" within certain maximum dimensions.

However, because clients want to have ever-larger houses with ever-larger clear spans in their living spaces or ever-larger view windows these limits are often exceeded and it is necessary to calculate the size of beams, often steel beams rather than timber beams, with their end supports and foundations.

Large living spaces and larger windows mean that there is less length of walls to provide bracing to the house and it is often necessary to design by calculation steel frames to provide this bracing.

It should be noted that buildings designed to this code are limited to two stories plus a partial basement. A three-storey house (two-stories with a full basement) is beyond the scope of this code and requires "specific design". This means (among other things) that the bracing requirements cannot be assessed using the simplified rules in NZS 3604 and must be calculated from the Loadings Code as if the house were a small commercial building.

The standard New Zealand house 30 years ago was a 100 sq metres, a flattish site with perhaps a small garage under. Nowadays, many new houses are two-storied, open-planned and extending to 300 sq metres or more, often built on a steep site with wide windows to take advantage of expansive views. Yet they are planned as if they were just slightly larger versions of the traditional New Zealand timber framed-house. The extensive structure to support such a house is ignored in planning and often must be hidden within wardrobes, pantries and cupboards of a layout already approved by the client. The solutions are neither elegant, logical nor cheap. Beyond a certain size of house, it would be more efficient and equally aesthetic to include a logical and regular structural system in the original planning.

## MULTI-UNIT RESIDENTIAL

More than for single unit residential units, it is desirable for multi-unit developments to have consistency and repetition of detail so that tradesmen gain experience and become more efficient in carrying out similar work.

However, from time to time we encounter multi-unit developments planned as if they were two-storey houses built over third and fourth stories in which some illogical structural system is grudgingly hidden in conventional New Zealand bungalow planning.

Also, while in theory work by various trades should progress unit-by-unit, bottom to top, block-by-block from beginning to end of the project, in practice, trades often need to leap-frog over one another.

For all these reasons, it is desirable for a structural skeleton to be erected first (using a "hard" material such as structural steel) aligned to a control grid system. While using slightly more steel, this defines the limits of the building work, allowing "soft" elements such as timber wall framing or roof framing to be fitted later, and if necessary altered.