

Engineering in Design

Design Intelligence.

Ideas for consideration when designing and building your new home

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The 2008 Building Design of the Year. 'Kew Project'.

Engineering forms an integral part of the design process and influences the aesthetics of a dwelling from the ground up.

Firstly, a geotechnical engineer provides a report detailing soil conditions. This testing involves a series of bores in the vicinity of the proposed building, providing details of the soil content at varying depths. In some circumstances, a more extensive report will be required where the subject site is near a fault line, contains fill or is prone to slippage. The structural engineer will rely heavily upon this information for the design of the footing and slab systems.

The involvement of a structural engineer is paramount to the design process where longer spans, cantilevers or other innovative design solutions are beyond the scope of standard industry tables. Throughout the design process, a designer must give due consideration to the possible location of structural members and give the structural engineer sufficient scope to introduce an appropriately sized beam, column or the like.

The cost of steel is not directly proportionate to its size or strength; it is based on its weight. For example, a beam that is smaller in height can be heavier and more costly than a taller beam of comparable strength. Where a designer has not made suitable provision for an engineered member, the structural engineer will have no option than to resort to heavier member to maintain the design aesthetic, which may result in an increase to the overall construction cost.

An important role undertaken by the structural engineer is bracing. Contemporary styled homes often feature large expanses of glass; open living spaces and generous cantilevers, leaving limited wall space for standard bracing methods. In such cases, the engineer will generate a 3D model of the building and simulate the design wind gust to confirm the building's bracing capability is within allowable tolerances. Some of our designs incorporate an expansive solid fireplace or feature wall, which not only contributes to the aesthetics of the building, but also offers an anchor for the structure to be

braced from. Generally speaking, the engineer will usually be able to accommodate suitable bracing solutions without alteration to the design.

The relationship between a designer and structural engineer is important on any project, but particularly on those that require an innovative and new approach. In 2008 we were awarded 'Designer of the Year' by the BDAV for a residence in Kew. This home featured a striking cantilevered copper clad box, which protruded a staggering 5m from the façade of the building. We worked closely with the engineer to devise a steel wall-truss system that incorporated the generous cantilever on what would be considered a relatively limited backspan. Rod-bracing was introduced in both the floor and roof spaces and afforded rigidity and minimal deflection.

In coastal environments, it is imperative that any steel members specified by the structural engineer be galvanised if they are to be in contact with the ground or exposed to the elements. In such circumstances, it is preferable to use bolted connections, as any site welding will compromise the galvanising and promote rust.

Engineering is an extremely valuable part of design and offers designers the freedom to express new and exciting solutions, whilst ensuring their buildings maintain their structural integrity.

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