

A Half Century of Concrete Masonry

In this article David Barnard examines how, with the aid of active representation, the New Zealand concrete masonry industry has responded positively to regulatory change, as well as developed its range of products to enhance performance and meet the demands of more sophisticated consumers.

New Zealand Concrete Masonry Association (NZCMA)

Tracking masonry developments in New Zealand is in many respects a case of following the activities of the New Zealand Concrete Masonry Association (NZCMA). With its beginnings in 1956, the NZCMA still remains active in the promotion and technical support of products geared for today's use.

To successfully keep these products up to date, the NZCMA works closely with the Cement & Concrete Association of New Zealand (CCANZ) and with overseas agencies such as the National Concrete Masonry Association (USA) and the Concrete Masonry Association Australia.

Today the manufacturing requirements for concrete masonry are harmonized in one recently revised joint Standard - AS/NZS 4455: *Masonry units, pavers, flags and segmental retaining wall units*. The NZCMA also had a major hand in the original preparation of the NZS 3116: *Concrete segmental and flagstone paving*, and has just seen the document revised to include flagstone paving.

Fire Resistance

Regular periods of building control adjustment have seen a steady tide of regulatory change for the industry to respond to. In certain instances, these changes can perhaps be seen as lessening the overall performance requirements of building systems. The most obvious changes have been to the fire resistance ratings, which have seen the four-hour fire protection offered by 200-Series concrete masonry required less often.

Regardless, concrete masonry still remains a key wall system in fire regulation areas for various reasons, not least of which is providing a fire barrier that does not contribute to the fire load, and is not damaged by high-pressure fire hoses.

Concrete Masonry: Guide to Weathertightness Construction - download from www.nzcma.org.nz

Sound Insulation

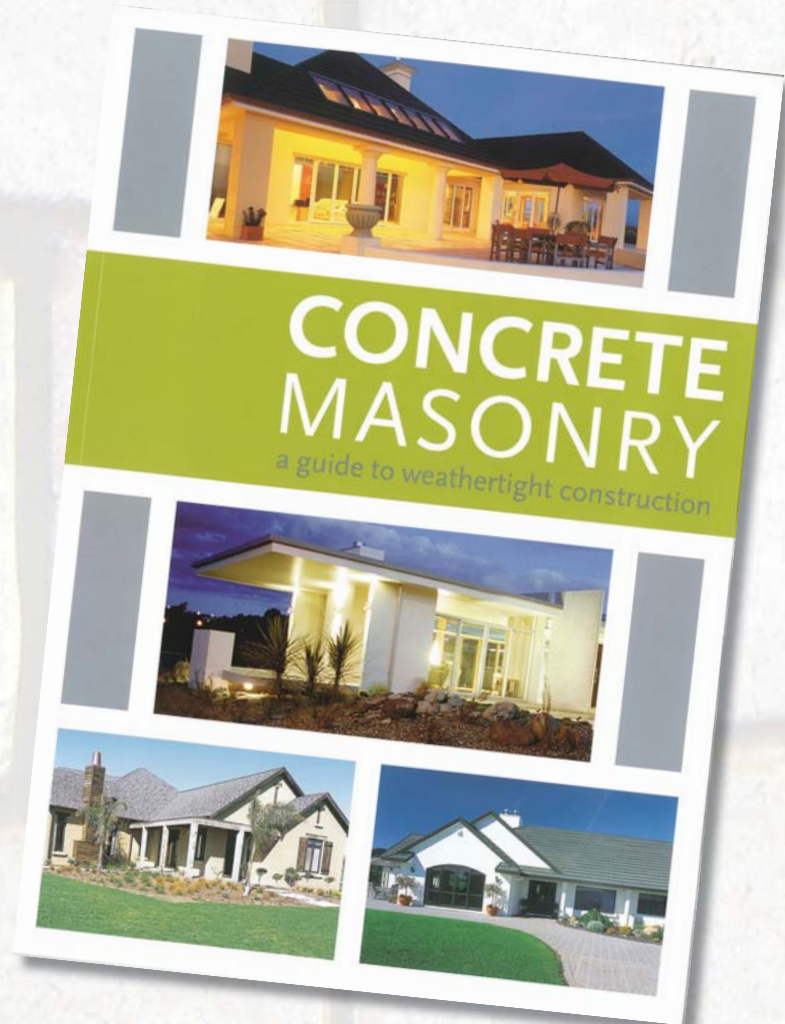
Ironically, the reduction in fire requirements for inter-tenancy walls has led to a growth in sound transmission problems. Despite various competing systems, masonry remains tried and proven, and is not plagued by workmanship issues, which on site, can significantly influence the loss of sound insulation. With masonry you get both fire and sound security.

Weathertightness

Traditionally, the issue of weathertightness as it relates to concrete masonry, has been managed by providing the

appropriate weatherproofing for the application, which itself could range from industrial to residential. However, the residential application clearly needs careful thought to ensure the Building Code requirements of E2 are met. For this reason the NZCMA worked with BRANZ to publish *Concrete Masonry: Guide to Weathertightness Construction*. This publication has enabled designers to access a comprehensive set of instructions that provide weathertightness for all applications of masonry.

Similar to the fire/sound combination, the weathertightness/durability of



concrete masonry is enhanced by the fact that the material does not rot!

Thermal Insulation

Concrete masonry has encountered regulatory obstacles in relation to the requirements for thermal insulation. While certain applications require assistance from other materials, such as polystyrene, to achieve the stipulated R-values, its ability to perform without deterioration over a period of time is unquestioned. However, the situation has become complicated because all heavy weight solid materials, like concrete and concrete masonry, introduce a mass factor that is difficult to accurately include in 'steady state' heat loss/gain calculations.

The NZCMA with CCANZ have been working with the experts in the field to accurately determine the heat loss and gain of a building that uses masonry walls. The work will provide architects with additional information that will enable them to balance the elements of the various regulations.

Structural Masonry

The structural scene for concrete masonry has been one of modification as and when new structural data, particularly relating to seismic actions, has come to the fore. *NZS 4230: Design of reinforced concrete masonry structures* was significantly updated in 2004 and *NZS 4229: Concrete masonry buildings not requiring specific engineering design* was updated in 1999. *NZS 4229* is about to undergo further revision.

Trade Certification

As the engineering demands for seismic structural performance increased so too did the need to have appropriately skilled trades people to execute the work. The Institution of Professional Engineers of New Zealand (IPENZ) and the New Zealand Masonry Trades Federation set up the New Zealand Masonry Trades Registration Board (NZMTRB) in the late 1970's.

In the last 30 years the NZMTRB has certified the practical skills of masons to build walls in concrete masonry. It is not just a case of the actual *blocklaying*, but also fitting reinforcing steel and grouting the walls. Over the past five years the NZMTRB

introduced a further trade recognition for *bricklayers* primarily working in veneer construction.

The two qualifications remain in demand by both practitioner and prospective customer. In fact, when developing their Licensed Building Practitioner Scheme (LBP), the Department of Building and Housing (DBH) identified the NZMTRB qualifications as ideal for inclusion.

Concrete Paving

Masonry's use in paving has seen significant growth since the late 1970's. A single car park through to a commercial office complex will have required minimal if any maintenance for 30 years – a claim not many paving systems can make.

Interlocking concrete block paving has a range of applications from heavy industrial to domestic driveways. Ironically concrete paving on municipal footpaths has provided the greatest challenge, particularly in terms of surface abrasion wear. It quickly became known that this property needed to be specifically designed for. As a result *NZS 3116: Concrete segmental and flagstone paving* was developed, and contains requirements as well as a test method to demonstrate abrasion resistance.

The latest version of *NZS 3116* includes information on the specification and laying of flagstones. All products over 0.08m in area, e.g. 300mm x 300mm, are defined as flagstones. The principal factor in the flagstone paving specification is an instruction that flagstones are essentially a product for pedestrian loading, with limited vehicle access.

During the introduction of interlocking concrete block paving there was considerable debate over the comparative impermeability of the surface compared to asphalt surfaces. In practice, provided the bedding sand was of a permeable material and not subject to degradation under load, block paving has performed well. Some projects did encounter problems, but this led to the modification of the bedding sand specifications, which are contained in *NZS 3116* and should be strictly adhered to.

Permeable Paving

Having gone through this phase of dealing with water that might penetrate the pavement, matters have got to the stage where the pavement can now be deliberately designed to allow water to penetrate, leaving the surface free of standing water.

A permeable pavement system has been developed, using slotted blocks, which allow the water to accumulate in the lower layers of the pavement. The hydrology of the pavement takes into account the storage capacity associated with flood control, water quality/effluent control or water harvesting where the water is reused. The base sand acts as a permeable storage reservoir, and can self drain into the sub-base material over a period of time.

Some Local Authorities are restricting the amount of "hard landscaping" and are also requiring owners not to discharge surface water from driveways into the public surface water drainage system. Accordingly the permeable paving option for concrete driveways will be a solution to this growing requirement.

Moving into the area of landscaping, the industry has developed a range of dry bedded retaining wall units, which once laid, require no maintenance. The walls are permeable allowing water to percolate through the joints avoiding the build up of hydrostatic pressure behind the wall. Once again there are a variety of pigmented concrete colours and textures that can be selected.

In summary, the New Zealand concrete masonry industry, aided by the NZCMA, remains resilient in its efforts to confront the changes in focus demanded by regulators and customers. In today's world of combative advertising, it is entirely appropriate to highlight concrete masonry's fire resistance, durability, sound separation properties and recyclability. Furthermore, the industry accepts the need to keep informing its potential users of how its wall systems will comply with Building Regulations and how its paving systems meet the demands for local authorities, landscape designers and specifiers.