



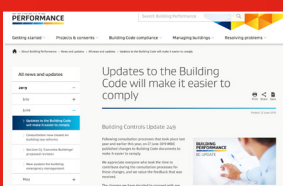
# The Journal



## New techniques for masonry buildings

The advances of structural strengthening

### IN THIS ISSUE



Building code changes  
published



CoA basics: what you  
should know



At the forefront of  
industry knowledge



Waterproofing membrane:  
spoilt for choice



Busy times .....	2
Welcome to the second edition The Journal! .....	3
A successful business requires good debt management.....	4
MBIE'S amendments .....	5
Illegal works – the basics of a Certificate of Acceptance .....	6
Making an informed choice on membrane selection .....	8
Lowest tender – but who wins?.....	10
Keeping the cutting edge sharp .....	12
Masonry buildings: new techniques for seismic structural strengthening .....	14
Seismic and deflection joints – thoughts on design.....	16
Thank you to our sponsors .....	18

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**NZIBS PRESIDENT**  
**Rory Crosbie**

## Busy times

School holidays are coming at us again, fast. The first half of 2019 is behind us and our 25th anniversary conference, in Dunedin, will soon be upon us.

There's lots happening in our industry. Our Government is not on its own in trying to deal with systemic issues in building and construction. All governments in the developed world are working to improve the sector and many within the industry across the world are seeking new ways to improve.

The Ministry of Business, Innovation and Employment (MBIE) released a discussion paper last month on the Government's proposed changes to the Building Act. That paper spells out the risks and liability issues in the construction industry, an industry that now accounts for 13 per cent of GDP. The paper "Building System Legislative Re-form – Discussion Paper" sought to make amendments to the following areas;

1. Building products and methods.
2. Occupational regulation.
3. Risk and liability.
4. Building levy.
5. Offences, penalties and public notification.

In response, Auckland Council has asked the Government to end the use of joint and several liability in construction industry cases, which would prevent it having to carry the

can for another leaky buildings-type crisis.

In a draft submission on proposed changes to the Building Act, Auckland Council is calling for a liability cap of 20 per cent. "The objectives of the proposed changes are to provide protections for homeowners and incentives to builders and designers to produce high-quality building work. The view of staff is that the proposals are unlikely to achieve these objectives because the discussion document recommends retaining joint and several liability for building defects instead of changing to proportional liability. This means that councils as Building Consent Authorities (BCAs) will continue to bear a disproportionate liability burden."

In Australia, there is a call for all involved taking out a "decennial" building insurance where defects are fixed by all contractors at a building regardless of fault. This could be the solution that protects Australian owners of apartments and units, construction experts say. Such a system already operates in many European countries.

MBIE commissioned a review of the building defect disputes between 2008 and 2018 to provide it with an up-to-date picture of the financial risks faced by consent authorities. MBIE's report can be found **here**. Many of our members will have been, and are



currently, involved in many of these cases.

Our industry leaders are working alongside the Government by joining the Construction Sector Accord and Housing taskforces. NZIBS also continues to be part of industry-wide groups in supporting building industry reforms. On that note I recently met with Property Council CEO, Leonie Freeman, to discuss how NZIBS could work with their member groups. The Property Council recently formed a volunteer member working group that provided feedback on MBIE's proposed changes. We look forward to getting involved. We also maintain a presence at Construction Industry Council events.

Last month, I was invited to the annual New Zealand Institute of Quantity Surveyors (NZIQS) conference in Nelson. I, and other industry group leaders, had a meet and great with the NZIQS leadership team. We look forward to continued dialogue on many common points of interest.

2019 was no different to previous years' NZIQS conferences. The main take away comments to pass on are, all present agreed that NZS3910 does need updating; that by 2032 all new buildings will have a net zero carbon target and by 2050 all buildings will achieve this target! Additionally, that drones are good but it's the software that really makes their use worthwhile considering.

At NZIBS we continue to work hard to ensure our members are competent, ethical and reliable. Existing members and their companies continue to grow awareness across the industry of what building surveyors do for the New Zealand economy. We are all getting involved in a variety of building surveying work, some for our industry's key players.

The date for our annual conference has been set, and conference early bird registrations are now open. Come along; it will be educational and fun and will provide a welcome short break before the mad dash towards the end of the year. ■



**EDITOR**  
**Robin Miller**

## Welcome to the second edition **The Journal!**

**Robin Miller** is a Registered and Chartered Building Surveyor with offices in Arrowtown and Dunedin.

Following on from the first edition, it was really good to receive members' feedback from those who completed the Survey Monkey questionnaire. There were some interesting results, including:

- 70 per cent of respondents felt that The Journal should be aimed at a wider audience than purely the NZIBS membership;
- 85 per cent felt that the magazine should include articles written by non-members;
- 90 per cent favoured there being four editions of The Journal per year; and
- Just over 60 per cent said they would be happy to contribute an article.

So, with those responses in mind, I hope the second edition comes up to scratch. It includes the article (missing from the first edition, apologies!) from John Stallard, who gave us a presentation on waterproofing at the March Training Day; and an article from Win Clark, structural engineer in Wellington, who has long experience in the retrofit of seismic-strengthening of unreinforced masonry buildings, both here and abroad. Ben Critchlow of Kaizon has provided his thoughts on the design of seismic and deflection joints and Chris Phayer reminds us about tendering and why it's all likely to go wrong if you do accept the lowest price. Finally, as well as our technical and legal updates, Warren Neville updates us on the NZIBS training programme, and Ed Morris and Darryl August have started a discussion within the profession about CoAs.

Which reminds me, I have been asked if there will be a 'Letter to the Editor' section in the magazine in the future to encourage discussion about important issues that face us. The answer is 'yes', I hope so – for edition three.

Finally, it has been suggested that future editions should be themed, say fire protection or residential pre-purchase inspections. It sounds a good idea, but will need a lot more input from members in that particular area of focus – I think that's an edition or two away yet. In the meantime, this is your E-magazine and its success does depend on the way the membership carves it, so let me know.

The next edition will be due out at the end of October/early November. In the meantime, see you all at the annual conference in Dunedin – it's going to be a great event and a milestone in the profession, so don't miss it. ■

# A successful business requires good debt management

One of the most critical aspects of running a successful business is maintaining cash flow, and debt management plays an important role in business management.

If you are owed money by a company that has not responded to your invoices or requests for payment, you may wish to consider taking formal action to recover the debt. One of the simplest and most effective ways of doing this is to issue a statutory demand under the Companies Act 1993.



The process is commenced by serving a demand in the appropriate form on the company. If the company does not comply with the statutory demand, the creditor can apply to place the company into liquidation.

A statutory demand itself is a court document which provides 15 working days for the debtor to:

- Settle the debt owed to the creditor; or
- If it disputes the debt, apply to the Court to have the statutory demand set aside.

It is essential the debt on which a statutory demand is based is a liquidated debt, meaning the other party does not dispute the debt. The consequence of inappropriately issuing a statutory demand is it may be set aside by the Court and costs awarded against you.

If the debtor company does not settle the debt or apply to the Court to have it set aside, the creditor may rely on the statutory demand as evidence that the company is insolvent and apply to have the company put into liquidation. The Court of Appeal in *Magsons Hardware Ltd v Concepts* recorded that the use of a liquidation proceeding as an enforcement mechanism may be justified in cases where, for example, there is an unreasonable refusal to pay a significant sum which is indisputably owed. Therefore, it is typically open to creditors to use the statutory demand process as a means of debt recovery.

 **If you are having difficulty pursuing a debt from a company and wish to learn more about debt recovery options, we suggest that you seek early advice.** 

The statutory demand and liquidation process place significant pressure on a company debtor to pay its debts. This response is not surprising as the consequences of liquidation proceedings can include negative publicity, payment of legal

costs incurred by the creditor in pursuing the debt and potentially the winding up of the company.

If you are having difficulty pursuing a debt from a company and wish to learn more about debt recovery options, we suggest that you seek early advice. Initial input can ensure the process is run correctly and does not fall short for procedural reasons. Equally, if you have been served with a statutory demand you need to seek legal advice immediately as the timeframe for responding is very short.

## **For more information:**

Our litigation department is experienced with these types of applications and is available to assist with any questions you may have. Feel free to get in touch with Michael Wolff on 04 495 8919.

# MBIE'S amendments

Following on from the last article with regard to proposed changes to the building codes, MBIE have now announced on the 27 June 2019, that changes to the Building Code documents have been published.

Here is the link below advising of the changes made: [www.building.govt.nz/about-building-performance/news-and-updates/all-news-and-updates/updates-to-the-building-code-will-make-it-easier-to-comply](http://www.building.govt.nz/about-building-performance/news-and-updates/all-news-and-updates/updates-to-the-building-code-will-make-it-easier-to-comply)

**Ministry of Business, Employment and Innovation (MBIE) have announced over 120 building standards are now free to download.**

Standards are referenced in many of the building codes and to refer to the relevant standard, the only way this could be obtained was to purchase the document. This could be seen as costly to some users.

It has been discussed for a long time now for these standards to be made readily available free of charge to the industry. As MBIE have noted, improving access to the building standards will remove barriers and the selected standards that are free to download are ones that directly help demonstrate compliance with the Building Code.

To access the free downloads, please check out: [www.standards.govt.nz/sponsored-standards/building-standards](http://www.standards.govt.nz/sponsored-standards/building-standards)

**CertMark International suspended (published MBIE notification)**

As of 10 July 2019, CertMark International Pty Ltd's (CMI) accreditation as a CodeMark Product Certification Body (PCB) under the Building Act 2004 has been suspended by the Joint Accreditation

The screenshot shows the MBIE Building Performance website. The header includes the 'BUILDING PERFORMANCE' logo and a search bar. Navigation links include 'Getting started', 'Projects & consents', 'Building Code compliance', 'Managing buildings', and 'Resolving problems'. The main content area features a breadcrumb trail: 'About Building Performance > News and updates > All news and updates > Updates to the Building Code will make it easier to comply'. A sidebar on the left lists 'All news and updates' with a table showing dates from 2019 (July, June, May, April, March) and a link to 'Updates to the Building Code will make it easier to comply'. The main article is titled 'Updates to the Building Code will make it easier to comply' and is dated 'Posted: 27 June 2019'. The article content includes a section for 'Building Controls Update 249' and a detailed announcement about the changes to the Building Code documents, stating that they will support housing densification, healthier homes, and easier pathways to Building Code compliance.

System of Australia and New Zealand (JAS-ANZ).

The suspension is due to CMI not meeting CodeMark accreditation requirements. The suspension may be lifted by JAS-ANZ if CMI resolves the issues that led to its suspension. CMI has until 1 October 2019 to resolve these issues and demonstrate it meets the accreditation requirements.

While suspended, CMI cannot perform any of the functions of a CodeMark PCB, including accepting or evaluating new certification applications, revising existing certificates, or undertaking surveillance activities for existing certificate holders.

All current CodeMark product certificates issued by CMI remain

valid, and can continue to be relied on by Building Consent Authorities (BCAs) as long as they remain on the MBIE CodeMark New Zealand product certificate register. MBIE recommends BCAs check the register before issuing any new building consents involving certificates issued by CMI.

MBIE will be working with CMI's certificate holders to help ensure any upcoming surveillance is carried out by another accredited PCB.

JAS-ANZ is appointed by MBIE and is responsible for the accreditation and ongoing monitoring of PCBs for the CodeMark scheme.

**To confirm the status of a product certificate, please check MBIE's Product certificate register. ■**

# Illegal works – the basics of a Certificate of Acceptance

In New Zealand there's a significant amount of illegal building works that has been carried out over the years and is still happening presently.

Illegal building works is any building work that falls outside the scope of Schedule 1 – Exempt Works, of the NZ Building Act 2004. The illegal building work that is happening today involve property owners not having obtained the necessary permissions/consents from councils, which inevitably raises its head for a number of reasons. This can range from people wanting to sell their properties, through to a complaint made to council that illegal building work has been carried out.

Subsequently, once council are notified of the illegal works, then a Notice to Fix can be issued by the territorial authority (TA). It is worth noting that a Notice to Fix and a Certificate of Acceptance (CoA) falls under the function of the TA, not the Building Consent Authority (BCA). For the illegal works to be resolved, a CoA will be required. This is where our registered members of the Institute are commonly called on for their expert knowledge and experience, and to provide their services to help people find resolution.

Some of our members may be reluctant to take on these types of surveys due to the perceived risk that

may be involved with obtaining a CoA from council, however the risks of obtaining a CoA can be greatly reduced if you have a robust and systematic way of conducting your survey.

Once understanding the extent of works that has been undertaken, the next proactive step is to approach the respective council to find out

your client. It is also beneficial to discuss with council their specific requirements or expectations they have for a CoA Report so that they can fully assess the works that have been carried out.

Having fully informed your client of the requirements to meet a CoA, then you would proceed with preparing a terms of engagement

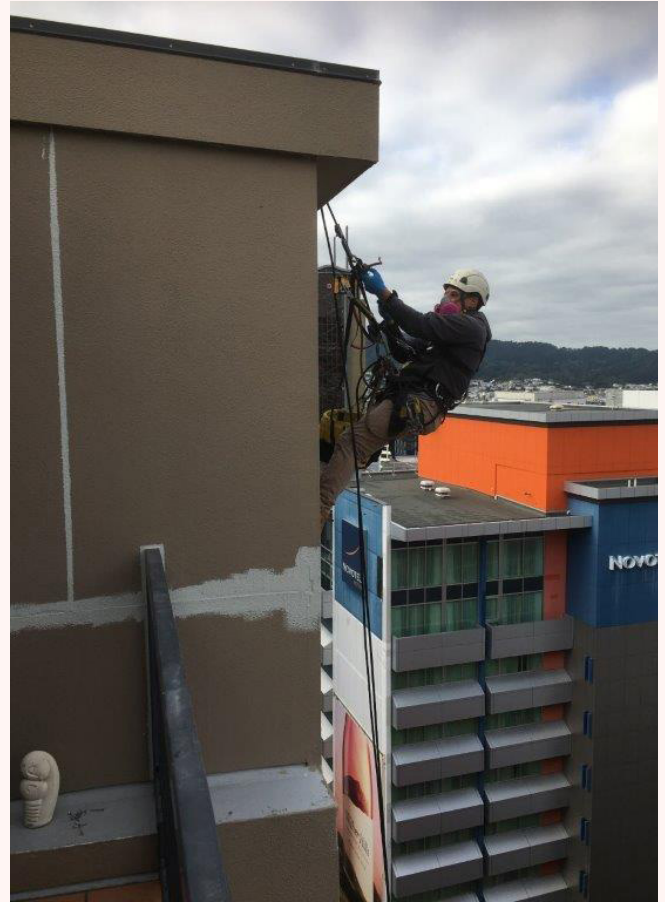
**6** In your building surveyor report, it is sometimes a good idea to list each building code clause, then go through each one and determine which codes are applicable to the work that has been carried out, thereby providing an in-depth description of how the work meets the requirements.

whether an independent building survey report can be provided by you as a registered building surveyor. Many councils willingly accept CoA Reports from NZIBS members, but this aspect needs to be checked first before you proceed with assisting

covering the service you will provide and limitations; what will not be covered in a report, or what is outside the scope of works, etc. These things must be fully discussed with your client and they need to be made aware that there may be



*In a recent investigation, remedial work was carried out (left) while observable issues were communicated to owners of the neighbouring building (right).*



additional costs involved (council fees, remedial works) depending on those further investigative findings. It must be made very clear to the client the potential costs involved and depth of work required. Again, this would be detailed in the terms of engagement. Once you have authority to act for your client, a review of the council property file and obtaining a record of the Notice to Fix, if one has been issued, is required.

The illegal building work must meet current day building code requirements. To prove this on reasonable grounds, the survey could involve invasive and destructive measures if required. Your onsite survey report must be well-detailed, based on fact and have robust evidence to

demonstrate how, or if the works comply with the relevant building codes.

In your building surveyor report, it is sometimes a good idea to list each building code clause, then go through each one and determine which codes are applicable to the work that has been carried out, thereby providing an in-depth description of how the work meets the requirements. This is also a good method to demonstrate to council that you have considered all building code clauses.

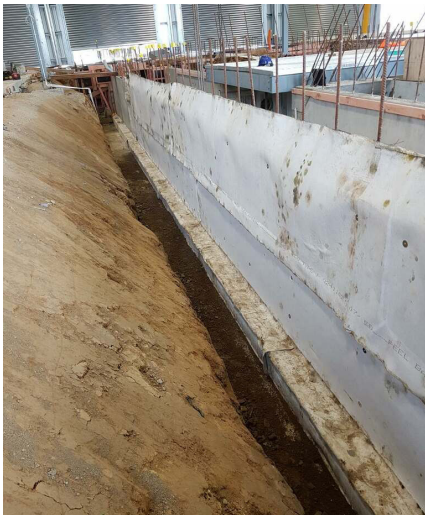
As you progress through the survey, it may become clear that there are a number of things that do not meet building code requirements. If this is the case, then a building consent will be required for the remedial works in order to meet the performance

criteria set out in the building codes. By taking a building consent out for any remedial work, this will reduce risk that may be imposed on you as a surveyor. If a building consent is required, the client may ask you to be involved with this as well.

Once you have completed your survey and your report is ready to be lodged with council, then your client may ask you to look after the lodgement and liaise with council as their appointed agent, which in many cases is the sensible approach as many clients find the whole process daunting. As our members often work closely with council, it is much easier for a building surveyor to follow the process through on their client's behalf, and should any queries be raised by council then you have the opportunity to work with them directly.

# Making an informed choice on membrane selection

Selection of a waterproofing membrane system should involve looking into the reputation and track record of the supplier, and the experience and qualifications of the technical person assisting you in the selection.



Do you trust their integrity, judgement and advice? What is the history of the membrane being specified? Is it fit for purpose in the situation you are specifying it for and has it the compliance documentation to qualify for the consent process?

There is still no singular membrane system fit for all purposes, therefore each project should go through an evaluation process. Additionally, it should be peer reviewed to look at durability, physical properties, data sheets, independent compliance evaluations, the suppliers product manual, detailed drawings and specifications.

There is a history of membrane systems that have started out-performing like champions only to lose their physical properties with age and become part of the leaky home saga. Don't assume all roofing membranes are the same or perform the same. Take time to understand your requirements and the capabilities required of the membrane system.

The membrane product warranty is very important to support the membrane selection. But it's only a piece of paper and it won't stop your clients' roof or deck leaking. The combination of the best membrane selection, with a highly skilled and experienced applicator

knowledgeable in the membrane selection will ensure the very best outcome – making it highly unlikely the product or workmanship warranties will be needed.

## Issues facing the waterproofing industry

One of the issues facing the industry is the shortage of experienced tradesman working in the waterproofing membrane industry. Additionally, it's very important architects, designers, engineers and consultants only accept in, and during, tender acceptance process the best and most experienced waterproofing applicator companies.



6

There is a history of membrane systems where they have started out-performing like champions only to lose their physical properties with age and become part of the leaky home saga. 9



The industry is now facing new issues with previously unknown waterproofing companies coming into the industry and winning tenders by price that do not understand the documentation, and do not follow the specification. This is a very real concern, particularly in the major centres. The construction companies are also not being very helpful; accepting very low quotations without any research into the companies' experience. It may be time to consider having an approved list of waterproofing applicators who are nominated in the Masterspec specification sections to uphold the quality of workmanship?

### Tanking improvements

Waterproofing Systems have been using extruded fillets in place of the standard mortar fillets in our tanking specifications, and recently they showed their worth. A bituFLAME 3mm 2 layer tanking system was partly completed in a remediation, while the uncompleted areas were primed and bituFLAME extruded fillets installed on the foundation wall, column junctions with the concrete substrate.

With three days of inclement weather, the trench ended up holding approximately 300mm of water. The system held its water tightness partly on the water tightness of bitumen extruded fillets. We're moving to using extruded bitumen fillets on the bituFLAME roof membrane systems in place of plywood fillets.





Registered Building Surveyor  
**Chris Phayer**

# Lowest tender – but who wins?

“...you can have good, cheap or quick projects, but you can only ever choose two of these attributes together...”. There is wisdom in these words if we choose to listen.

It seems to me that principals, consultants and main contractors still struggle with this proposition even in 2019. Those best placed to change things are consistently accepting the lowest tender and expect efficient and high quality jobs for bargain basement prices – is that logical?

## How not to win a tender

Arriving in 1994, building surveying was in its infancy in the cities of New Zealand and non-existent in the provinces (still is, some may say?). In Taranaki, I switched to the “darker side” of project management and quantity surveying roles for main contractors and my eyes opened wider!

I soon realised it was easy to win a tender battle; (a) by mistake (ie measuring omissions); or (b) by company directive for workflow i.e. slash margins or overheads, to retain staff); or (c) for prestigious projects that were “wanted” (i.e. Christchurch Justice Precinct scenario). Entry margins were around two to three per cent, so it was a constant battle to finish jobs with a higher exit margin, a pat on the back, or even a smile on your

face. But the work site camaraderie kept many of us sane.

Mass production, in a controlled environment, is sneered at but allows prototypes and full understanding of work activities and production costs to take to market. The Victorians realised this and became champions of affordable housing – granted not luxury, but not too bad for a starter home and maybe KiwiBuild could learn a thing or two. However, when clients and consultants want different jobs, on different sites, then an activity which takes 30 minutes one day, may take 40 minutes the next (a 33 per cent increase); often such nuances are not properly factored. Consultants may argue they similarly use judgements, about time required for tasks, but I’d suggest they are starting with a more rewarding margin. Could this reluctance to accept higher construction margins be part of the reason for building company failures?

A recent news headline stated our industry is a “house of cards”, and despite busy years there are too many contractors that are not running profitable businesses. Industry chatter is around risk transfer and a more equitable approach, which is commendable,

and during an New Zealand Institute of Quantity Surveyors (NZIQS) Panel Discussion, about this “utopian dream”, parties from principals through to subbies agreed there is an imbalance. However, a lawyer for the principal justified the “need” to insert pages and pages of special conditions and consultants empathised with the contractors, but still “need” to have a fixed price for their client. So, another status quo hit is re-released entitled *“lowest tenders may not be accepted (but most probably will be), again, again and again...”*. Those best placed to change things consistently pass the buck to contractors/subbies who are not best suited to carry the risk – so, where is the logic?

## Partnership arrangements

Why not promote partnership arrangements that endeavour to reimburse contractors and consultants for resources they use, plus a reasonable margin for their trouble? After all, we need financially viable and sustainable contractors, so they will still be able to honour those precious “paper” guarantees that we like.

It seems to me the fundamental objection is that a partnership

arrangement will lead to increased costs (or will expose sub-standard contract documentation) – but increased above what? Is it above a “correct” estimate of the final price (I defy anyone to answer that correctly), or perhaps it’s above the “wrong” estimate of what the lowest cost will be? Only the contractor can know the final “cost” price and that is once the project is complete. In my mind, the low tender wins scenario is wanting the best contractor to do the work for the price of the cheapest contractor – again....logic anyone?

My experience of working with contractors has largely been they are just people trying to make a living – like the rest of us. I believe the vast majority want to be proud of their work, above anything else, and want to go home feeling good each day. Yes, there are some rogues out there, as in every walk of life (including consultants and clients, perhaps), and they will take liberties given the chance. But, isn’t that why we advocate for consultants to be involved and manage the issues? We have all heard the stories of disreputable contractors, yet they are still invited to tender and are often appointed.

### Who dares wins, Rodney (Maybe)!

Is there scope for improvement, because “...if we keep doing what we’ve always done then, we’ll always get what we’ve always gotten...”.

There are various Guaranteed Maximum Price and Joint Venture Partnering options that mainly offer advantages over the lowest tender wins scenario and can remove the bulk of financial debates around variations – a separate article is needed for more detail. Further



improvement could be to discard highest and lowest tenders and to accept the tender closest to the mean or median value, meaning contractors can submit a price they are happier with from the start. The focus is then on making the project a smooth and successful operation, unless, of course, we feel the need to keep one foot on the throat of the people we need help from – I for one am not good with hammers and nails!

The perception is that builders will charge more than is the “norm” for a task. Again, if a builder provides quality and efficiency in their work, why should their costs be compared against their lowest competitor? Do building surveying practices all charge the same hourly rate, when the products are (meant to be) of similar quality? I think not. Perhaps if the focus was on efficiency and quality of contractors the marketing slogan “...we deliver projects on time and under budget...” could be

replaced with “...we deliver quality work...”. Done once, done right!

It’s funny that retailers can fund “up to 50 per cent off” sale prices (some outlets each weekend it seems) and yet remain viable? Presumably “normal” retail prices include massive margins and we (consumers) will “normally” pay them, even though products are not unique, or made-to-measure? We may not think so, but construction is also a retail industry; consultants begin by selling their time, which leads to an idea on paper, while contractors are selling their time and the materials needed to create that idea which becomes a product.

Modern life is strewn with calls for transparency and fairness amongst business. Our business is building, so can the construction industry be dragged into a new era of working co-operatively and confidently with everybody that is needed for a successful building project? I’ll leave you to decide.





**Registered Building Surveyor**  
**Warren Nevill**

# Keeping the cutting edge sharp

Ever since the Institute responded to the weathertightness crisis back in 2003 by providing trained building surveyors, we have maintained an educational program, which has been at the forefront of industry knowledge.

At that stage it was generally directed around fulfilling the need for knowledgeable assessors to be able to undertake investigative work within the Weathertight Homes Resolution Service (WHRS) scheme and involved an intensive week of related study and examinations. This was followed by a three-hour entrance examination for those not already Institute members. To say this examination was challenging is an understatement. Shortly after a similarly difficult remediation examination was initiated, and along with a course aimed at that area, the concept of our current modular courses evolved.

Ongoing and frequent amendments to the Building Act, revision of the Acceptable Solution for E2, changes to B2 Durability requirements along with the ongoing amendments to other Code clauses and regular updating of manufacturer's installation requirements kept a

number of these modules in a state of constant updating.

As expected, the retirement of some of the founder members who had been presenting the core of these modules brought in new faces at the chalk face and as the need for additional modules became apparent, so more new faces and more modules were incorporated into the program.

In 2016, it was decided to raise the profile of the Institute and our education program, which by now was catering to wider aspects of the industry than just our own membership. The concept of an Educational Centre of Technical Distinction was promoted and the structure of the modules and associated examination processes further refined in order to obtain our current ISO Accreditation status, which enables the Institute to present our education program at a recognised Diploma level. By then the

emphasis had progressed from that initially driven by the weathertight situation and included modules on Forensic Investigations, Durability, Recording & Reporting, Asset Management/maintenance, Lease Dilapidations, Remediation, Contract Administration, and Technical Commercial Due Diligence. Further whetting of that cutting edge the following year involved the provision to undertake six of these modules to attain a Certificate in Property Inspection.

The Institutes Educational Committee recently accepted a suggestion that the restructuring of the sequence in which the modules were being presented would better enable the concepts of "prior" and "sequential learning" providing a clearer pathway to our diploma. Satisfactory completion of the first six modules will now result in an achievement of the Certificate in Property Inspection. While this

aspect may not appear as important to those intent upon completion of the entire module package as a requirement for Institute membership, it does provide a much more compact undertaking for the those heading down the certificate path, remembering that we cater for a wider educational market than just our own membership.

Another advantage being that the re-sequencing of the modular structure units will compartmentalise them into areas based loosely upon Forensic requirements, Remediation and Contract work and Asset/Maintenance/Dilapidations and Due Diligence. Thus structuring each "area" about similar or related learning concepts with potential for further similar grouped modules as may be required to accommodate our required body of knowledge in the future.

Further options may be considered down the track whereby the introduction of additional modules may possibly lead to the situation requiring a "core" set of modules to be completed along with selected other modules in areas of interest to the particular candidate.

While the concept of restructuring the sequence of our modules will require approval of our accreditation authority in keeping with our diploma status, this is considered (hopefully) only a formality and will be undertaken at the completion of accreditation review currently been undertaken with the expectation that introduction will occur in 2020.

Two overriding considerations were held at the forefront of these changes. Firstly, that there should be no increase in either time or financial involvement for completion of the full diploma module package. And secondly, that we must cater for a wider audience than our own members and that further efforts should be made to tap into this audience for the benefit of the Institute.

It was felt that there is a need to provide wider audience course participants, other than our own transitional students, with a more positive course outcome. Some students, while achieving at a reasonable level of understanding in any particular module, do not manage to attain the stringent level that is required for the pathway

toward Institute membership.

As such, it is considered two levels of pass should be available; an "A" level pass set at 70 per cent, as has always been required to maintain that elite degree of understanding required by an Institute member; along with another "B" level pass of 55 per cent, indicating a general level of understanding (albeit considerably less than that required by the budding surveyor) and certificate of attendance at the module. Providing acknowledgement of such "B" level passes, being more beneficial toward external organisational expectations of course attendance outcomes and professional development.

It has been noted that a number of course participants from other areas who have attended some of our modules via completion of the Certificate in Property Inspection, or just out of an interest perhaps on a professional development basis, have become aware of the values of our educational package and have returned to attempt the full diploma package.

The restructure format proposed to our educational modules being detailed below:

New Module No	Description	Old Module No	Trainer
1	Building Act Regime	3	Rosemary Killip
2	Properties of Moisture	1	Greg Overton
3	Cladding Systems	6	Warren Nevill
4	Condition/Compliance Reporting	7	William Hursthouse
5	Residential Property Inspections	10a	Darin Devanny
6	Forensic Techniques	2	Warren Nevill Frank Weimann
7	Recording/Reporting – name change to Expert Witness	4	Frank Weimann
8	Decay, Fungi and Moulds	5A	Robin Wakeling
9	Durability and Material Performance	5B	Catherine Nicholson
10	Remediation	9A	Philip O'Sullivan
11	Contract Administration	9B	David Clifton
12	Asset and Maintenance Planning	8A	Warren Nevill
13	Dilapidations	8B	Mike Gray
14	Technical Due Diligence – Commercial	10B	Rory Crosbie



**Structural engineer**  
**Win Clark**

# Masonry buildings: new techniques for seismic structural strengthening

Win Clark, who is a structural engineer who has a fascination with the construction and seismic performance of heritage buildings, talks about significant advances have been made in the development of new techniques for the structural strengthening of unreinforced brick and stone masonry buildings over the last 15 years.

The Canterbury Earthquake Sequence of 2010-11 has highlighted in New Zealand the need for a range of strengthening techniques as engineers endeavour to meet the challenges put by owners, regulatory authority and society. These challenges include meeting stringent standards of seismic resistant performance, life safety, economic viability of the retrofit works, and meeting the expectation for the protection of heritage streetscapes and buildings that are valued by society.

As the engineer develops an understand of the building structure, and how it is likely to respond to severe earthquake effects, ideas will start to develop as to possible strengthening options. So it is important that the engineer has an extensive 'tool box' of structural strengthening options that can be drawn on to make up an appropriate strengthening scheme for the particular building.

For the strengthening scheme there are a number of basic objectives to be addressed for any building. The first consideration for any strengthening scheme is the tying of the masonry walls, particularly perimeter walls, into the floor and roof diaphragms. The diaphragm is to take the transverse inertia loading from the masonry wall and transfer it to the walls running parallel to the direction of seismic action. Where the existing floor does not have sufficient strength or stiffness, the timber floor can be overlaid with plywood, nailed down to the existing flooring, to provide the additional capacity. For concrete floors, an overlay of carbon fabric epoxy fixed to the surface of the concrete will enhance the diaphragms seismic capacity.

The next requirement is to fix the perimeter of the diaphragm to the masonry walls. There are a number of techniques to achieve this, such

as fitting pattress (circular) plates to the exterior face of the masonry wall and connecting through to the floor framing with tie-bolts. Where access to the floor framing is difficult, a steel angle can be fitted into the corner between the masonry wall and flooring (original flooring or new plywood). The horizontal leg of the angle is screw fixed down to the floor diaphragm and framing below, and the vertical leg dowel fixed to the masonry wall, thus providing a load path between masonry wall and the floor diaphragm.

The next area of strengthening to be addressed is the capacity of the masonry walls to distribute their transverse inertia load to the floor diaphragm above and below. To take the resultant bending tension at the mid-height of the wall, there are now a number of techniques to strengthen the masonry to achieve the required capacity.



One option is the use of carbon strips or steel reinforcing bars or steel cables epoxy bonded into vertical saw cuts in the masonry. The saw cut and installation of the reinforcing can take place from one side of the wall to give the required bending capacity in either direction. Where the brickwork has an original plaster finish, the saw cut in the plaster can readily be made good to match the surrounding finish.



**Photograph 1:** Vertical Near-surface

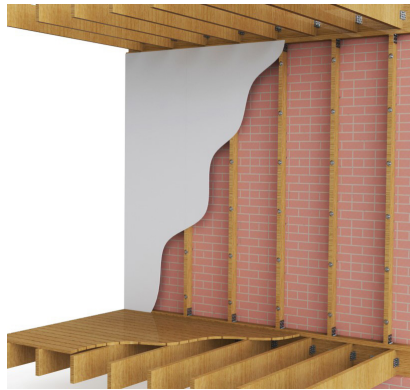


**Photograph 2:** Glass Composite Fabric Reinforcing of Masonry Wall. (Clark) epoxy fixed to Masonry Wall. (Clark)

Where the in-plane resistance of the masonry wall requires additional

capacity, sheets of glass or carbon fabric are saturated with epoxy resin and fixed to the masonry surface with epoxy. With both these techniques, the cost of altering door and window architraves is significantly reduced, as are the finishes required to achieve a desired decorative treatment for the walls.

A further option for strengthening masonry wall against transverse loading is the installation of timber strongbacks to one face of the wall. This again is a very cost effective solution as the timber strongback is fixed to the wall with masonry screws as shown in Photograph 3.



**Photograph 3:** Timber Strongback Reinforcing of Masonry Wall. (Giaretton, Ingham, Dizhur)

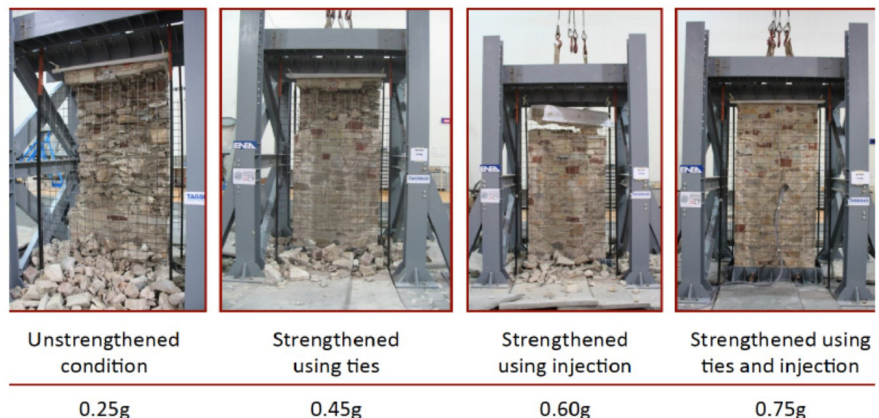
The solutions for structural strengthening noted above are generally appropriate for brick or well-cut stone masonry. For stone rubble masonry, such as where the

original construction is made up of three leaves or 'wythes', further techniques have been developed. These techniques include installing transverse stainless steel rods to tie the inner and outer wythes from spreading apart during an earthquake, and grouting the rubble core to bind the stone rubble together and fill any voids. For thick stonewalls the capacity of the wall to carry transverse and in-plane seismic loading is significantly enhanced.

All the strengthening techniques noted above are based on extensive research here in New Zealand or overseas. However, it is important that the engineer develops a clear understanding of the likely performance of the building in a moderate to major event, and makes appropriate choices as to what are viable strengthening techniques to meet the particular requirements of the building.

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Giaretton, M., Ingham, J. M., Dizhur, D., 'Timber Strong-backs as Cost-effective Seismic Retrofit Methods for URM Buildings' published in the proceedings of the New Zealand Society for Earthquake Engineering 2017 Conference, Wellington, New Zealand, 7 – 29 April 2017. 1-9.



## Reference:

Mazzon N., Valluzzi M. R., Aoki T., Garbin E., De Canio G., Ranieri N., Modena C. (2009). "Shaking table tests on two multi-leaf stone masonry buildings", Proc. of the 11<sup>th</sup> Canadian Masonry Symp., Toronto (Canada), May 31<sup>st</sup> - June 3<sup>rd</sup> 2009.


**Ben Critchlow**

Article by Ben Critchlow, Senior Engineer, Kaizon Engineering Ltd.

**About the Author**

Ben Critchlow is from Kaizon Engineering Limited where we specialise in the design and peer review of new and existing building enclosures, including facades, basements and external decks.

This article describes the fundamental design considerations of seismic drift and structural deflection joints within cladding and glazing systems, and some typical deflection joint systems.

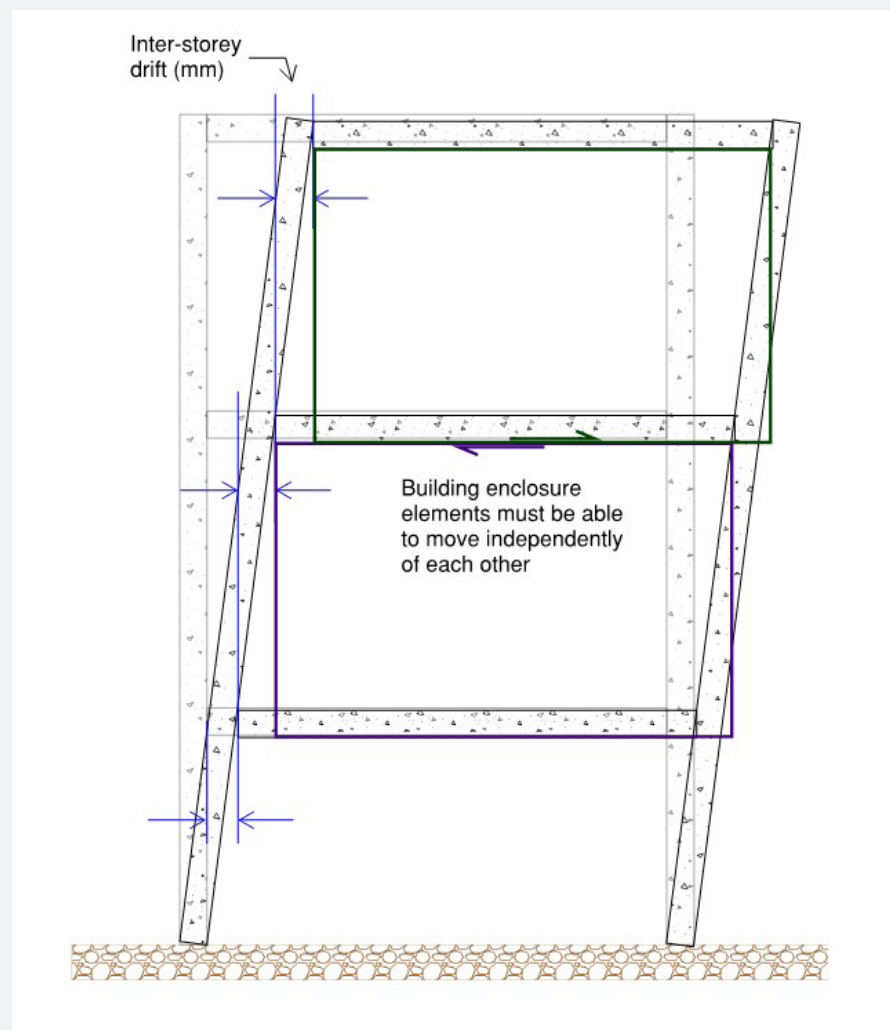
# Seismic and deflection joints – thoughts on design

## Why do we need seismic and deflection joints?

Buildings are less rigid than they appear. They have to withstand forces from gravity loads, wind pressure and seismic activity over their lifespan. The severity and location of the resulting movements can be complex, and depends on the magnitude and direction of force, and the resistance provided by the structure. We accommodate these movements by introducing continuous inter-storey drift joints around the perimeter of the building enclosure; these joints need to be flexible and weathertight to meet NZBC Clause requirements, particularly B2 and E2.

## What is inter-storey drift?

When a building shifts from side to side during earthquake or wind loads, the floor levels move relative to each other. The distance (in mm) a floor moves relative to a floor above or below is known as inter-storey drift (See Figure 1), and is typically dependant on the magnitude of the forces and the stiffness of the structural frame.

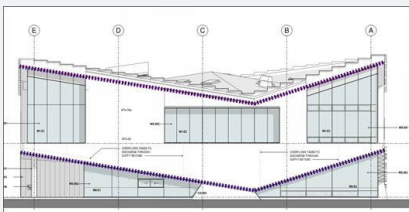


**Figure 1:** Typical inter-storey drift of structural frame



## Where to use seismic and deflection joints

Seismic and deflection joints should be positioned at strategic locations throughout a building facade to allow the building to move naturally, and prevent cracking or interference between building elements that could result in damage or detachment from the building. Joints are placed between components along strategic lines to allow different building enclosure systems to move independently of each other. Ideally, these joints are aligned as they track around the building to prevent areas of conflict or complex detailing.



**Figure 2:** Te Ara Ātea – Inter-storey drift joints track around the perimeter of a building and separate primary building enclosure elements. Drawing courtesy of Warren and Mahoney Architects.



**Figure 3:** Te Ara Ātea – Inter-storey drift joints track around the perimeter of a building and separate primary building enclosure elements. Drawing courtesy of Warren and Mahoney Architects.

## Design criteria - Serviceability Limit State (SLS) and Ultimate Limit State (ULS)

Depending on the building height, location, and design, the maximum movement (mm) will occur under either earthquake or wind loads; in New Zealand earthquake loads typically govern. Deflection joints must perform under two design criteria, Serviceability Limit State (SLS), and Ultimate Limit State (ULS).

SLS criteria establishes the amount of movement a deflection joint must withstand and return to equilibrium while continuing to perform (remaining structurally sound and weathertight) without repair. ULS criteria establishes the amount of movement a deflection joint must withstand without resulting in a risk to life safety, such as a glazing unit detaching from an upper storey. Following a ULS event, building enclosure elements will likely require significant repairs to return them to an acceptable level of performance for the remainder of the building's service life.

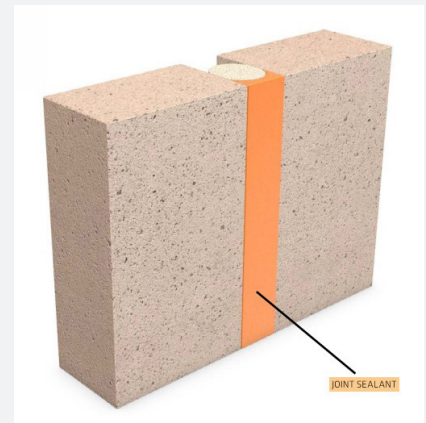
## Types of Deflection Joints

**Cladding Systems – Framing Deflection:** This is a simple channel at the top of a non-load bearing wall to allow for movement in multiple directions. The wall framing is fixed to the lower floor and is allowed to slide, translate, or rack within the channel attached to the structure above. This provides a solution for any wall cladding attached to the outboard side of the wall frame to move unimpeded

**Glazing Systems – Seismic Receptor Frames:** Receptor frames perform in a similar way to a wall framing deflection head, but are specific to glazing units where movement must be independent of the building structure. Seismic receptor frames are attached to the building frame around the opening to allow the glazed panel to move independently, while keeping the junction weatherproof with flexible gaskets. Like the wall framing condition, the clearance between the glazing unit and the seismic channel is determined by required vertical displacement, as well as the clearance needed during racking of the glazing under the ULS design criteria.

**Barrier Wall Sealant Joints:** Sealant joints are designed to bridge two barrier wall cladding assemblies, such as precast or GRC panels, with a strong, flexible material that can compress and stretch while keeping external water on the outside of the building. Most sealants can compress

up to 50 per cent of their width, and expand to between 50 and 100 per cent. For these joints to perform, the joint needs to be sized to twice the amount of expected movement.



**Figure 4:** Typical Sika Sealant Joint – PEF backing rod sealed with a flexible sealant.

**Proprietary Joint Systems:** These are pre-formed elements that are fixed on either side of two separate building elements and are designed to flex without breaking while remaining watertight. They often accommodate more movement than rigid or flexible flashings and require less maintenance than sealants.



**Figure 5:** VaproShield VaproSilicone joint – A flexible preformed silicone tape used to integrate building underlays over seismic joints.

Understanding the fundamentals of facade engineering is an essential part of the design process. The building's structure is designed to move to ensure the safe, long-term use of a building. Seismic and other deflection joints introduce a dynamic that affects durability and weathertightness performance, and if done efficiently, they can blend into the appearance of a building. Intelligent facade design addresses and combines all of these criteria into a coherent and functional building.





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