



STRUCTURAL ENGINEERING SOCIETY
NEW ZEALAND

Roles and Responsibilities

Submission to Canterbury Earthquakes Royal Commission

15 August 2012

Introduction

This submission has been prepared by members of the SESOC Management Committee. It is intended to reflect the views of the wider membership of the Society, although only limited consultation has been possible over the timeframe.

SESOC is a collaborating technical society of IPENZ, with a membership of approximately 1400, most of whom are practising structural engineers. Many of our members have participated in the review of buildings after earthquake, some as volunteers in the immediate safety evaluation phase, many more since in the detailed evaluations as the recovery begins.

The CERC discussion paper has raised a series of questions on roles and responsibilities within the overall construction industry with consideration, in accordance with its terms of references, of:

the adequacy of legal and best-practice requirements for building design, construction, and maintenance insofar as those requirements apply to managing risks of building failure caused by earthquakes.

These are discussed below in detail and a series of recommendations is made.

Overview

The CERC paper discusses roles and responsibilities specifically around the building regulatory framework, development of Standards, approval process and quality assurance. Many organisations have important roles to play within the New Zealand building industry. As a leaned society SESOC has concentrated on aspects of building design and construction supervision.

In SESOC's opinion the current system does not exhibit systematic problems; rather better building outcomes can be expected with a more consistent application of the current system. Standards could further be improved in both design and construction by minor modifications to the current system. Our main findings are:

- Funding and time constraints of technical specialists is the biggest impediment to Standards and Guidance development
- Consistent application of the current system has yet to be achieved and should lead to more robust design and construction practices.
- New Zealand Standards have been underfunded to the detriment of the country for too long and a new business model based on proper funding is required.
- Better communication between government, the industry and the public is required.

Responses to the Royal Commission Questions

Efficacy of building regulatory framework:

1. Are there problems with the existing building regulatory framework, identified through the experience of the Canterbury earthquakes? If so, what is the effect of these problems and are they sufficiently significant to require regulatory action?
2. What potential solutions might address the issues (e.g a 'national policy statement') and how might these work in practice? What would the benefits be? What might the disadvantages be?
3. What are your views on the model proposed by IPENZ?
4. Has the Building Amendment Act 2012 gone far enough? If not, what changes are still needed and why?
5. What problems are there, if any, with the level of understanding of the building regulatory framework held by participants in the building sector?
6. What would help improve understanding of the building regulatory framework (if needed), and how should this be done? How would any costs be funded?
7. Do the Building Act and the Resource Management Act work effectively together to ensure an efficient consenting process, while balancing any appropriate competing objectives? If not, how can this be improved?

Q1: In considering the outcomes of the earthquake, there has been a range of building performance from poor to excellent. The question remains as to how much of this may be attributed to the regulatory environment, at either end. There are several aspects to consider:

- Firstly, the existing regulatory environment has only been in place for a short time, relative to the age of the building stock. Therefore it is important (but difficult) to isolate areas in which there may be systemic failure.
- Secondly, as has been stated by many observers, buildings that were well conceived, well designed, well detailed and well constructed, have performed well. Therefore, to the extent that other buildings have failed to achieve acceptable levels of performance, it is necessary to consider to what extent it is possible that this has been because of the regulatory environment.

The building regulatory framework is complex, as has been noted in the discussion paper. However, it is not clear that this in itself results in reduced quality of structures. It has been noted that this may be a barrier to innovation, but this is not necessarily a significant problem. In fact, where innovative solutions have been adopted too quickly, these may become the poor performers of the future.

Of more concern is the lack of consistency of design review and construction review, which allows unsatisfactory designs to be consented (noting that the design should be appropriate in the first place), and poor construction practices to persist.

As codes become more sophisticated and judgement is actively discouraged compliance with the regulatory framework quickly becomes about satisfying the verification method documentation. Removal of judgement and reliance on clause conformance is also problematic for BCAs. Given that BCAs must legally issue a building consent if conformance with the verification method documentation can be demonstrated it leaves them little discretionary control. Another issue with reliance of conformance is that code writers can be very prescriptive on those aspects that lend themselves to equations such as loads ie the science of engineering. However issues around redundancy, symmetry and load paths ie the art of engineering are much more difficult to codify.

A further consideration is whether the addition of more process would improve the situation.

Q2: It is unclear how a National Policy would add value to the process, although it may add clarification at a high level. But it is suggested that the issues that have emerged are generally at a considerably lower level than this.

Q3: The IPENZ model adds support to the technical societies and others in the production of guidance documents. Again however, it is not clear what the significant benefit of this will be. Although the societies would benefit from a level of endorsement, the major issue limiting the production of such guidance is a lack of time, given that they are generally reliant on large amounts of voluntary support. SESOC fully supports the proper funding of New Zealand Standards.

Q4: The Building Act 2012 amendment, as noted in the paper, seeks to clarify responsibilities and to enable risk-based consenting. Neither of these has any direct contribution towards improving the quality of design and construction. The former could be seen as simply enabling the responsibility for poor work to be sheeted home, whereas the latter could be seen as in fact enabling an environment in which projects seen as being less risky could be given less attention. However, those that are prepared to take unreasonable risk are unlikely to be deterred by clarification of responsibility. Moreover, without the introduction of proportional liability, the impact of this may still not be on the responsible parties, in the event of problems.

Q5: It is not clear that there are critical problems in the industry caused by lack of understanding, although there is undoubtedly need for further education of the participants, at the appropriate level.

Q6: Further education of the participants as noted above, may be of benefit. Primary responsibility for this must begin with MBIE, presumably with the participation of the relevant industry bodies. The cost of this may be something that is paid for by industry levy or other means.

Q7: There is currently little relationship between the RMA and the Building Act. The two processes are generally processed separately by different sections of the BCAs. The obligations of the TAs to identify hazards may sometimes inform the design process, although hazard identification is generally covered adequately within the normal design process, apart from abnormal hazards which might be identified under the RMA processes and are not covered in the Building Code.

Recommendations:

- It is concluded that the major issue with the regulatory framework is more with its consistent application than with its complexity or scope. Put simply, if we use the

systems we have consistently and well, we should have reasonable confidence in the outcomes.

- Therefore, any changes in the framework should be focused on ensuring that there are more robust processes for design and construction review.

Standard development:-

1. What, if any, are the weaknesses, (e.g omissions, failures, impediments) in the current building regulatory framework in relation to the process for developing requirements for design and performance of buildings for or in earthquakes?
2. What is the best way to provide compliance guidance (for example, should New Zealand Standards be the main or only method of compliance)? Why?
3. What guidance could or should be given on the compliance methods so that these methods are efficiently and effectively incorporated into the Building Code? Who would or should undertake this work?

Q1: There are several important issues that should be addressed:

- When Standards are cited for use under the Building Code, they are often not cited in whole, or are considerably amended in the compliance document under which they are cited. This is unsatisfactory, leading to confusion and the potential for ambiguity. If there are issues with the Standards, given their purpose, they should be amended. More critically, if there are objectives of purposes not being satisfied by the Standards, this should be communicated between MBIE and SANZ so that this will not happen.
- Standards development has suffered significantly from lack of funding. This has resulted in lack of financial support for the right people to be involved in the writing of the Standards, and in the potential for their being 'captured' by vested interest groups.
- The amount of time that is taken to develop standards (or complete revisions) is excessive, probably at least in part as a response to the lack of funding.
- Although the NZBC is ostensibly a performance-based code, it would benefit from being more explicitly stated, presumably at high level in the Building Code, rather than in 1170, which is where a large part of this currently resides.
- Sufficient funding for Standards New Zealand to write, update and maintain standards of practice. This funding should also allow appropriate representation on international standard panels so as New Zealand can adopt what it believes is world best practice.
- Standards should have to be reviewed routinely for completeness rather than the current model of the industry telling Standards NZ that it is time to do so.
- Design and construction certification such as the producer statement system should be mandatory for some projects.

Q2: It is appropriate for Standards New Zealand to continue to have the role that they do, as an independent body. However, it is recommended that consideration is given to an extension to the model, ie whether the development of standards for use in NZ should continue to be based on stand-alone documents developed specifically for use in NZ, or whether other standards (beyond joint AS/NZS documents) may be adapted. For example ASCE or ACI documents. This may allow standards of wider scope to be developed for less overall expense, incorporating research from overseas as well as within New Zealand.

It is important that there remains sufficient flexibility in the Building Code that new systems may

be introduced, provided that they can clearly demonstrate achievement of the performance objectives required under a performance based code. Clearer consenting paths may be required to achieve this, but this must be balanced by ensuring adequate proof of concepts, which has not always happened.

Q3: Guidance may be provided by a number of bodies, including MBIE, and the technical societies, as currently happens. If the guidance is required by the industry for compliance with the Act then it should be endorsed by MBIE.

Responsibilities:

1. In the context of building performance in an earthquake, who should the key players in the development of the building regulatory framework be and why, and what should their roles and responsibilities be? What impediments currently exist to achieving this?
2. If a work programme is needed for the development of building related Standards to ensure performance in an earthquake, (as discussed above in section 3), who should lead this, what are the priority areas, and how should this be funded?

Q1: Whilst overall responsibility should remain with MBIE the technical expertise often lies elsewhere. There are many organisations that have a role in this, but the most important aspect is to have appropriately skilled people in roles that use their expertise, as opposed to appointments based on availability and minimising cost. The main impediments to this are time availability and the cost of appropriately skilled expertise. MBIE must be prepared to pay for the expertise that it requires, either as staff with the required technical expertise or more likely, by engagement with suitably skilled industry groups or individuals.

Q2: Any work programme should be led by New Zealand Standards with appropriate industry help. There are a number of priority areas in the existing standards, particularly timber and concrete masonry. In addition, there are a number of important research areas highlighted by the earthquakes that need to be considered for updating of the key standards. A range of alternatives should be considered for funding, including building levies, but as there is a public good aspect to this, direct government funding could be considered.

Capability:

1. What examples or evidence are there of issues of competency within BCAs? What options are there to address these competency issues, if there are any? Give consideration to the difference size and scope of territorial authorities across the country, and different mechanisms for acquiring expertise.
2. What skills are needed in the private building sector to ensure seismically resistant buildings?
3. MBIE has a Chief Engineer on its staff. What is or should be the purpose of this position? Should MBIE also have a Chief Architect and/or Chief Designer? Why or why not?

Q1: Without offering specific examples, almost all consulting engineers can attest to competency issues in BCA reviewers (much as the reverse may also be stated – more in reference to completion of documentation than competence). This is not easily reversed – over a number of years, the BCAs have lost expertise, but it is hard to attract engineers to design review work, as most would rather design new structures than review others' designs. This is further exacerbated by a lack of capable in-house training and mentoring. Although it may be possible to rebuild this expertise over time, it is considered more achievable in the short-term to out-source from industry.

Q2: The skills required are generally available, albeit that they may be spread too thinly in some cases. Refer also to our Education and Training paper.

Q3: The role of the Chief engineer should be to support, enable and encourage good engineering across the industry. In practice this encompasses a range of roles. It is assumed that this should be primarily a facilitation role, unless MBIE was to employ vastly more engineers than it currently does.

SESOC does not have expert knowledge on the requirement for a Chief Architect; however it seems that the industry liaison and facilitation functions could only improve the relationship between MBIE and the architectural profession. It is however understood that there is such a role in MBIE currently.

Resourcing Standards development:

1. What should the role of Standards New Zealand be and how should it be funded?
2. What are the advantages, disadvantages and risks of relying on Standards for the majority of building and construction methodologies?
3. Should primary reliance continue to be made on volunteers?
4. In the event that Standards New Zealand is unable to source volunteers, what other means of funding might be available?
5. Should there be more use or less use of mechanisms other than Standards to develop and provide methodologies for compliance; why or why not? Who would or should do this work and how should it be funded?

Q1: Refer Q1 & Q2 of Standard Development above.

Q2: Refer Q2 of Standard Development above.

Q3: No. Refer Q2 of Responsibilities above.

Q4: Refer Q2 of Responsibilities above.

Q5: Refer Q2 of Standard Development above.

Obtaining regulatory approval for building work:

1. How well do you think the current consenting system works and why?
2. Are there any issues with the intersection of roles between territorial authorities and building consent authorities; why or why not?
3. Do you consider the status quo (local control by BCAs), a national model as described above, or an alternate option, would provide the most effective and efficient consenting process for complex building work?
4. Where do you think the focus should be within the consenting system in terms of risk? Are there any changes needed, taking into account those already introduced in the Building Amendment Act 2012? Why or why not?

Q1: The current system can work well however it is inconsistency of application that is the issue. Well designed and documented, straight-forward buildings that have had appropriate engineering involvement have very few issues in the current system. It is only when projects become complex and there appear to be some deficiencies, the documentation is incomplete or

inappropriate engineering advice has been given, that the current system struggles with determining code compliance.

Whilst review of projects is vital and can add real value to a project; once a building consent application is lodged many people don't see the role of the BCA as adding any value to the process.

Most engineering practices have QA procedures of their own which should ensure that the Building Consent application is complete, but in reality, some errors and omissions can still creep through. Also, there are frequently time pressures which can lead to incomplete information. Staged consents can offer a good path to resolve this, but the cost and complexity of this process will often deter people from following it, and hence pressure to submit incomplete designs. In some cases, cynicism over the value of the BCA review may lead submitters to consider that their own internal processes will resolve any issues of completion before construction. Therefore, the construction drawings may not always match the design as consented.

There are also issues around BCA inspections and the current desire to shift risk rather than confirm compliance.

Q2: SESOC is not aware of any issues between TAs and BCAs. In fact most, if not all, TAs have had to become accredited BCAs in order to issue building consents. Whilst the Act allows for private BCAs, SESOC does not know of any.

Q3: A national model has some appeal, particularly for larger projects, for which the required expertise is probably not available in most local BCAs.

Q4: A problem with a risk-based consenting process is that it assumes low consequence, but in practice, this is all relative. For the owner, the consequence of failure is severe. Another problem is that a low risk project may also be seen as a low consequence of being subject to review by the BCA and therefore less pressure to achieve an appropriate level of documentation. SESOC submitted against this process under the Building Act review, and note that this appears to recreate an environment under which poor practice may become in effect institutionalised, not unlike the leaky building situation.

Quality assurance:

1. Comment on the proposed model for regulatory approval by NZCIC – what aspects of this model should or should not be adopted and why?
2. When might producer statements be used and why; what benefits do they provide? What, if any, standard should such statements be required to meet?
3. What standing, if any, should producer statements have?
4. When should a mandatory peer review take place (ie. type of building, complexity level)? Who should the costs of a peer review fall upon?
5. What guidance (and level of guidance) should there be on the use of peer review (for example, a matrix guiding peer review requirements) and who would or should be responsible for developing and providing and enforcing (if reviews are mandatory) this?
6. Who should conduct peer reviews? Should there be any specific requirements (for example, independence) and why or why not?
7. Do peer reviews need to be audited and if so by whom?

Q1: The NZCIC model is generally acceptable however caution needs to be exercised around the use of alternative designs without consultation and approval of the original designer.

Q2: Producer Statements could and should be used only in the manner they were designed to. For example PS4 construction review should not be issued without being accompanied by a PS3 construction. The construction review is periodic and the statement only covers those aspects witnessed. It is important that under periodic inspections appropriate construction quality systems are in place. See also our training and education submission.

There are examples where the PS2 review has apparently been seen to be ineffective - more of a 'rubber-stamping' exercise than a rigorous review. There have also been allegations of mutual design and review arrangements that undermine the credibility of this system. There are two questions that may be considered. Firstly, what level of liability should fall to the reviewer, which must also include consideration of the risk and reward to the reviewer? And secondly, whether the reviewer should be completely independent, ie appointed by the BCA, not the owner?

Q3: When issued, Producer Statements should have full legal weight of a self-certification process that can be relied upon for all items covered by it. However the question of liability as noted above should be considered.

Q4: All design of buildings, as defined in the Act, that are occupied or accessible to the public should be peer reviewed. The extent and level of review could be dictated by a matrix type system similar to the one we have now for construction monitoring. The costs of this review should be considered part of the building development cost.

Q5: MBIE should have ultimate responsibility for any matrix dictating review complexity. The development of any such matrix should be done in consultation with all affected stakeholders to gain maximum industry acceptance.

Q6: All peer reviews must be independent and they must be by people competent to design the building properly themselves. It is preferable that the reviewer is more experienced than the designer. This does not mean that the reviewer needs to personally conduct the review; they may have staff working under their direct supervision do so.

Q7: Any self-regulating system needs random auditing. As MBIE is the government agency that has responsibility for the regulatory framework then they should be responsible for insuring random, independent auditing for system conformance.

Information about building performance:

1. Comment on whether there are any gaps, weaknesses or omissions in the information available on the performance of buildings in an earthquake such that affected parties can make informed decisions. How might these be addressed?
2. What benefits might the implementation of a building warrant of fitness, to check for building deterioration, provide? What costs or disadvantages might this lead to?

Q1: The weakness is in communication between all parties and the terminology used. The Building Act, Regulations, Codes and Standards are largely concerned with life safety and neighbouring property. This has not been communicated to the general public. We use language such as “the building is designed to withstand an earthquake” rather than “the building is designed not to totally collapse in an earthquake”. These gaps can only be overcome by education and communication.

Should the industry move towards performance based design then these issues will need to be formally communicated as part of the design brief. SESOC also has knowledge of a system currently called “quakestar” that is currently being developed, once implemented this may be a useful way to communicate expected building performance.

Q2: Given that the structure is hidden in most buildings it is difficult to see what benefit such a system would achieve. Mortar quality of URM buildings is an issue in their performance however it is expected that this would fall under the earthquake prone building policy when assessing these buildings. As with all buildings on-going maintenance is imperative to get the most value out of the asset and to get the performance assumed during the design. Cost must be considered also. Currently, the building wof review is generally concerned with compliance schedule items that can be reviewed by technicians. Apart from maintenance matters, building structure can only be effectively reviewed by competent professional engineers. As the building structure is not generally subject to the same rate of change, it should not need such frequent review. However, the need for specific maintenance schedules should be considered, and how to ensure that maintenance is actually carried out as needed.