

BIA Report

29 May, 2003

Hon. Lianne Dalziel
Minister of Commerce
Parliament Buildings
Wellington

Re: Update on progress re John Scarry Open Letter

Introduction

A thorough and considered approach has been taken in response to the issues raised by engineer John Scarry about the practices and outcomes of design, Territorial Authority (TA) approval and construction of structures in NZ.

Mr Scarry's paper, circulated widely last year, placed in the public arena a number of issues relating to the structural engineering profession, including concerns regarding design and construction practices relating to building safety. These issues related mainly to commercial buildings, rather than housing, and applied mostly to earthquake resistance.

The Building Industry Authority (BIA) is examining all aspects of Mr Scarry's paper that impact on building safety and compliance with the building code. The BIA will ensure that these matters are addressed appropriately and, as a consequence, further work is to be undertaken on many of the points raised by Mr Scarry.

The Institution of Professional Engineers New Zealand (IPENZ) and the BIA have each undertaken complementary reviews of the issues raised by Mr Scarry.

IPENZ's review focuses on engineering practice issues. They established a Structural Task Force to address the engineering practice concerns identified in the Scarry paper. (A separate report from IPENZ is attached).

The BIA's review, as the regulator, focuses on technical issues relating to building safety and compliance and was undertaken by independent engineering consultancy Sinclair Knight Merz (SKM).

In formulating proposed actions to address concerns raised by Mr Scarry, the BIA has taken account of the IPENZ recommendations and noted that the government intends

amending the Building Act which will address many of the fundamental concerns he raised.

This report:

- summarises the concerns raised by Mr Scarry
- outlines the IPENZ recommendations
- provides preliminary results of the SKM Report
- notes the proposed changes to the Building Act that relate to Mr Scarry's concerns
- lists proposed actions by BIA in relation to the issues raised by Mr Scarry

Summary of Mr Scarry's Concerns

These may be grouped as follows:

1. *Professional Practice*: including such issues as the level of fees and resources, realistic timeframes for design, respect for the value of structural engineering, standards of professionalism and maintenance of technical standards, effective technical training of structural engineers and the balance between technical aspects and business practice issues.
2. *Certification and Consent Processes*: including the high level of technical skill needed, professional approach by designers and certifiers, adequate arrangements for supervision/monitoring of construction phase.
3. *NZ Standards for Structural Design*: need to address adequacy of coverage and details, require tests before systems approved.
4. *Compliance with NZ Standards*: consider improved consistency of interpretation and compliance.
5. *Competence of structural engineers*: including improved certification/registration of structural engineers, the need for a technical body for oversight of structural engineering practice, improvements needed in respect of conceptual understanding of structural principles, the standard of detailing of structural elements and connections, the standard of documentation, internal checking by design firms, identifying and addressing concerns during construction.
6. *Construction practices*: the need for registration of contractors, the requirement for current practicing certificates, the need for improved compliance with drawings and specification and improved attitudes to compliance.
7. *Specific Concerns*: including performance of some pre-cast concrete floors, use of cold worked reinforcing mesh, slender walls, performance of floors as diaphragms

IPENZ Structural Task Force Review

The IPENZ Structural Task Force made the following interim recommendations, which are in line with its submission to the Building Act Review:

1. Revise Standards and Codes of Practice.
2. Ensure on-going professional involvement in the construction process to achieve effective sign-off of work post-construction by a competent structural engineer.
3. Ensure competent structural designers capable of both simple and complex structural design are unambiguously recognised through appropriate registration.
4. Expand technical leadership role for government's central regulator.
5. Improve consent and audit processes.
6. Make it the responsibility of building owners to engage suitably qualified people.
7. Institute formal process to evaluate new materials before they are released for use.
8. Engineers reminded they have an obligation to advise the building owner of any building they consider unsafe.

SKM Report for BIA

The BIA commissioned engineering consultancy, Sinclair Knight Merz (SKM), to examine a range of technical issues raised by Mr Scarry, to assess the validity of his points, and to identify any actions that should be taken in response.

The draft SKM report has identified some issues related to the performance of buildings in a major earthquake that it considers to be of significant concern. These include:

- The performance of some pre-cast flooring systems
- The use of cold worked reinforcing mesh in situations where it is required to deform in a ductile manner
- The performance of very slender concrete walls
- Structural performance of floors in some instances when required to transfer earthquake loads

Recent laboratory research has raised concerns about the performance of these elements when subject to strong earthquake motions. The draft SKM Report has not identified any significant concerns about the performance of these elements under normal conditions.

It should be noted that earthquake design is an evolving technology and that new ideas and approaches to design are constantly emerging. Current design philosophy is that buildings may sustain localised damage in a major earthquake but should remain intact to enable inhabitants to exit safely.

Many existing buildings, particularly those built before 1976 have features that do not conform to current earthquake requirements for new buildings. The intended changes to the Building Act specifically address this situation and are likely to be aimed at dealing with the worst cases.

The issues of particular concern noted above may be considered to fall into the same category of risk as existing buildings that may not perform well in an earthquake.

Ongoing research and investigations will provide more detail on the nature and extent of the concerns.

The initial draft SKM report is currently being peer-reviewed and, given its broad reach and technical nature, this is expected to take several weeks to complete.

Building Act Review

It should be noted that intended changes to the Building Act address many of the fundamental concerns expressed by Mr Scarry.

The proposed amendments to the Building Act will:

- Give direction to the BIA as the regulator to take a more pro-active role to monitor the issues around building safety, including the monitoring of trends and designs
- Ensure that the BIA will be in a stronger position, with better quality information, to provide guidance documentation to both building professionals and the TAs.
- Give the BIA power to issue warnings or bans on products or practices where compliance or risk of failure is an issue
- Specifically address ways of improving the capability and competence of both the TAs and building professionals.

The amendments to the Building Act will bring about a significant change of approach to dangerous and earthquake-prone buildings, in that:

- Significant steps are taken by the proposed legislation to ensure skilled and competent professionals are controlling the building processes. Competent building practitioners, including chartered professional engineers, will be licensed.
- All critical work will have to be undertaken or supervised by licensed practitioners who will also have to certify their work as complying with the building consent.
- The proposed changes to the Building Act will strengthen the TAs' powers and responsibilities with respect to dangerous buildings.
- TAs will be required to make it clear how they will use their powers to require remedial work to earthquake-prone buildings and will require such buildings to be upgraded to comply as closely as possible with the building code.
- The earthquake-prone provisions will apply to all buildings, irrespective of building material.
- The Act will provide stiffer powers of enforcement, by way of fines and action by the regulator, and building owners will be obliged to upgrade a building in respect of all code requirements when changing the use.

- The amended Act will also require the regulator to monitor trends in emerging design, techniques and practices and, where risks emerge, it will have a new power to issue warnings or impose bans on methods, products or systems.

BIA Proposed Actions

General

The information received so far reinforces the BIA's view that it should take the following general actions:

- **Advising TAs on any required changes in practice for new buildings**
- **Notifying the industry and TAs of any actions needed to address significant issues identified by the SKM report**
- **Continuing investigation of these issues, which may include additional research and the establishment of an advisory group**
- **Special technical audits of TA procedures, aimed at improving design, certification and construction practice, as well as compliance levels.**

Mr Scarry's Concerns

In relation to Mr Scarry's concerns the following is a summary of action intended by the BIA:

Professional Practice

- **IPENZ Structural Task Force has examined these issues and is recommending actions to address concerns. The intended changes to the Building Act address most of the concerns.**
- **BIA will monitor progress on these efforts and is considering forming an ongoing advisory group for this purpose.**

Certification and Consent Processes

- **BIA is looking to institute a programme of technical audits of the certification process. This will focus on the standards of structural design and construction supervision, as distinct from processes and timetables. This was a recommendation of the IPENZ Structural Task Force and is a specific provision in the intended changes to the Building Act.**

NZ Standards for Structural Design

- **BIA will support and promote the need for consideration of Mr Scarry's concerns in relevant NZ Standards.**
- **A Standards Committee is currently working to update the Concrete Design Standard, NZS 3101. The BIA will monitor the outcome.**

Compliance with NZ Standards

- **BIA technical audits will be designed to bring about consistent levels of compliance.**
- **BIA will encourage improved training of design, certification and construction personnel where appropriate.**

Competence of Structural Engineers

- **BIA will actively support IPENZ Structural Task Force recommendation of a registration system to clearly identify competent structural designers.**
- **BIA will support the development and promulgation of Guidelines for good practice.**
- **BIA will encourage IPENZ in facilitating training in technical issues where this is shown to be needed.**

Construction Practices

- **BIA Technical Audits of the Consent process will include examination of proposals for construction supervision. This will be aimed at achieving more consistent compliance with drawings and specifications.**
- **BIA will support IPENZ moves to see that suitably qualified people are employed in construction.**

Specific Concerns (as reinforced by the draft SKM Report)

- **BIA will issue advisory notes to industry alerting them of recent concerns and giving guidance on means to address them.**
- **BIA is considering conducting a survey to establish the nature and extent of pre-cast concrete floor installations since introduction of hollow core flooring, noting use of cold worked steel in inappropriate situations.**
- **BIA will actively support investigations and research into the performance of pre-cast concrete floors, thin tilt-up walls, use of cold worked steel, performance of diaphragms and any other significant issue emerging from the SKM Report and subsequent reviews.**
- **BIA will monitor and participate in the deliberations of a specially formed Technical Advisory Group on Pre-cast Flooring Systems that is examining the implications of recent tests on pre-cast floors at the University of Canterbury.**

Mr Scarry has been informed as to how his concerns are being addressed and he is satisfied with the direction being followed by the government and the BIA. He has been assured that his concerns have been taken as a constructive contribution to the current efforts being made to raise standards across the wider building industry.

Richard Martin
Acting Chief Executive Building Industry Authority.
Encl. Structural Engineering Practice Review – Interim Report