

POST-EARTHQUAKE CO-ORDINATION OF TECHNICAL RESOURCES: THE NEED FOR A UNIFIED APPROACH

D R Brunsdon¹, A W Charleson², A B King³,
D A Middleton⁴, R D Sharpe⁵,
R B Shephard⁶, E G C Smith⁷

ABSTRACT

During 1996, the Management Committee of the Society considered where emphasis should be placed in the future in terms of its study group activities. This strategic review highlighted the important role that the Society and its members will be asked to play following a major earthquake in New Zealand. However the effective response of Society members, many of whom have gained valuable "real" post-earthquake experience from the Society's reconnaissance visits, would be severely limited by the current absence of an effective co-ordination framework.

The *Post-earthquake Response of Structural Engineers* Study Group has made a significant contribution in this area, culminating in its recent draft building safety evaluation procedures for territorial authorities. However a wide range of additional procedures and frameworks have also been identified as being required, many of which are outside the customary scope of study group activities.

This paper outlines the formation of a *Working Party on Integrated Planning for Earthquake Preparedness* by the Society, and backgrounds the critical issues associated with the post-earthquake co-ordination of scarce technical resources. Proposals for participation by the Society in a concerted approach to addressing these problems are presented. The body of this paper has been circulated to a wide range of involved agencies, including all territorial authorities in New Zealand and central government representatives.

1. INTRODUCTION

1.1 Background

The implications of a major earthquake in any urban area are clearly significant; equally clear is the need for an organised and well-planned response. The New Zealand National Society for Earthquake Engineering has become increasingly aware of the problems that will exist in co-ordinating the post-earthquake response process between the many organisations involved. Of particular concern is the scarcity of technical personnel, including (but not limited to) engineers.

Society members returning from reconnaissance visits following major overseas earthquakes (nine in the past decade) have universally commented on the difficulties experienced in co-ordinating technical resources. Recommendations have been made regarding the need to generate more comprehensive

response plans for key activities such as building safety evaluations. However these lessons have not been absorbed with any particular urgency.

It is ironic that the extent of this co-ordination problem is only becoming apparent as a consequence of the current general emphasis on planning for disaster response. While the limited number of plans produced to date represent a significant advance, the gaps between the plans are becoming apparent.

A number of current activities, including the development of a proposed new emergency management framework as part of the Emergency Services Review, make it timely to address the issue of the post-earthquake co-ordination of technical resources.

1.2 The Scope of the Problem

Presentations made at the March 1995 *Wellington After the Quake* conference organised by the Earthquake Commission and the Insurance Council gave rise to concerns regarding response co-ordination at a national level. The recent seminar held in Wellington by the Earthquake Commission, *Natural Disaster: Finding, Managing and Sharing People and Information*, has also highlighted many of the needs with respect to technical personnel.

A presentation at this seminar [1] estimated the expected technical personnel resources to respond and assess damage

1 *Brunsdon Cathie Ltd, Wellington (Fellow)*
2 *School of Architecture, Victoria University (Member)*
3 *BRANZ (Member)*
4 *Earthquake Commission (Member)*
5 *Beca Carter Hollings & Ferner Ltd, Wellington (Fellow)*
6 *Works Consultancy Services, Wellington (Fellow)*
7 *Institute of Geophysics, Wellington (Fellow)*

levels in the region from Wanganui to Nelson following the Wellington Fault earthquake scenario to be:

Building Safety Inspectors	Insurance Claim Assessors	Engineers
700	700	1,100

These figures broadly allow for a 60 day duration, rest periods, and continuation of other core activities.

A presentation at the *Wellington After the Quake* conference [2] identified personnel hours required to manage and carry out design and construction administration for repair and recovery works for the immediate Wellington region (Wellington, Hutt, Porirua) under the same scenario at 8,396,000 hours. Given a reconstruction period of four years, a peak demand of 1.5 times the average and 2500 hours worked per year, this results in a requirement of some 1260 personnel to be taken out of 'normal' national requirements.

1.3 The NZNSEE Working Party

As a large proportion of the Society's members will be asked to play important roles in the response process, it has a close interest in ensuring that the post-earthquake response is as integrated as possible. As a result, the Society has established a *Working Party on Integrated Planning for Earthquake Preparedness* to achieve the following objectives:

- Promote awareness at Central and Local Government level of the need to have co-ordinated plans for mobilising and co-ordinating technical personnel
- Promote awareness of the need to compile standard procedures for key post-earthquake technical and regulatory activities; *and*
- Contribute to the compilation of these procedures.

This report outlines the post-earthquake activities that require co-ordination, and highlights the issues that are currently seen as being critical. The role that the Society intends to take in this area is described, including a proposal for working in partnership with territorial authorities.

2. THE CO-ORDINATION OF POST-EARTHQUAKE BUILDING SAFETY EVALUATIONS AND DAMAGE ASSESSMENTS

2.1 Post-earthquake Activities

In addition to rescue operations, the key activity in the days following a major earthquake will be the initial assessment of building safety. The initial emphasis will be on critical facilities such as hospitals, ambulance and medical centres, police and fire stations and the operations centres of utility organisations and emergency management agencies. The damage assessment and initial repair for key infrastructure facilities is an equally vital area which will require considerable input from technical personnel.

The focus is then likely to move to residential accommodation, as there will be only limited temporary accommodation in the affected area. Commercial concerns will quickly follow as

people and businesses strive to minimise loss and get back to normal. The interests of this sector may also influence the direction of technical and physical resources unless some prior arrangements have been made.

Assessing damage in detail and compiling repair specifications along with other reconstruction documentation will continue to demand an increasing number of building industry professionals as the recovery phase commences.

2.2 Key Parties Involved

The principal responsibility for co-ordinating disaster response lies initially with Emergency Management (civil defence) agencies at appropriate levels. The building inspectorate of each affected territorial authority will have responsibility for the co-ordination of safety assessments. The various arms of the insurance industry will also become involved at a relatively early stage.

Agencies and organisations with defined roles include:

- Territorial Authorities
 - *Emergency Management Offices*
 - *Building Inspectorate/Engineering Division*
- Central Government
 - *Ministry of Civil Defence*
 - *Domestic and External Security Committee*
- Earthquake Commission and the Insurance Industry

Due to the downsizing of local authority technical arms in recent times, private consultants will play a key role in the assessment of most public structures. There are also a number of technical and advisory bodies who have an interest in this process, but do not have defined roles.

3. THE CRITICAL ISSUES

From consideration of the post-earthquake activities outlined in the previous section, three critical issues are apparent:

Issue 1: *The Scarcity of Qualified Local Technical Personnel*

The judgement of whether buildings are safe for occupancy or not will require suitably qualified and experienced technical personnel. Whilst in the main it is anticipated that professional engineers will be filling this role, architects and building inspectors will also be required to assist in an organised team approach. For example, building inspectors should be encouraged to take a greater role in initial residential safety assessments, provided appropriate prior training can be given.

Input from seismologists and geotechnical engineers will also be keenly sought at this point.

The demand on technical personnel will only increase as the emphasis shifts towards damage assessment and repair specification. These demands will come from a widening range of sectors. A major earthquake in any location in New Zealand will require many times the number of local technical personnel. This problem intensifies in the major metropolitan centres.

A plan is therefore required for bringing in additional resources, and more importantly, the briefing, deployment and co-ordination of them. While this plan needs to be driven by territorial authority agencies, acknowledgment and support from Central Government is also required.

Issue 2: *The Lack of Pre-determined Frameworks Within Which Technical Personnel Are to Operate*

Very few New Zealand engineers, architects and emergency management personnel have direct operational experience following a major earthquake. There is however sufficient knowledge available from those who have this experience to map a framework of the technical response process to a certain level.

This framework mapping process requires considered input from a range of sectors. Establishing the different roles that technical personnel will be asked to undertake represents a fundamental first step in this process.

In addition to the need for an overall response framework, there are a number of associated processes that are either common across all territorial authorities (*eg rapid processing of Building Consents for repairs*) or repetitive (*eg reporting on damage*). The overall efficiency of the response of building professionals would be raised considerably if they were applying pre-established and streamlined procedures that have acceptance throughout the country.

The recently released draft report *Post-earthquake Building Safety Evaluation Procedures: Preparedness Checklist and Response Plan for Territorial Authorities* [3] by a Study Group of the Society is an example of the common framework approach envisaged. This document however only provides a generic framework model, and it is up to the individual territorial authorities to develop working response plans from this model.

Two copies of this document have been forwarded to each territorial authority for their comment, and copies have also been sent to other relevant agencies.

A research report on temporary shoring and building stabilisation [4] has been published on behalf of the Earthquake Commission, and is another example of a specific reference document. Awareness of its existence however needs promoting. Mechanisms for keeping documents or plans of this nature "live" need to be created.

Examples of other post-earthquake activities that would benefit from standardised procedures or frameworks include:

- Reporting on earthquake damage to owners, insurers or other parties
- Storage and retrieval of building damage reports via a database system that different organisations could have access to
- The processing of Building Consents
- The rapid approval of post-event Resource Management Act issues.

Examples of specific subject areas that would benefit from having pre-event reference documents include:

- Defining structural standards for the repairs of damaged structures to be designed to
- Specifying repair methods for common non-structural damage

It should be noted that a number of the above activities relate to any natural disaster irrespective of nature or scale.

Table 1 following lists the procedures and reference documents associated with these activities. Those groups who would benefit by the existence of these procedures are indicated, along with the groups who would be expected to take a lead role in the development of these products. Local Government New Zealand (LGNZ) is identified in this table as the umbrella organisation acting on behalf of all territorial authorities. The term "engineers" used in Table 1 represents the broad grouping of Professional Engineers.

It is the Society's belief that all of the four main parties involved in the recovery phase (ie. TLAs, the insurance industry, building owners, engineers and other technical personnel) would benefit from the development of each of these procedures and reference documents.

Issue 3: *The Lack of Physical Resources*

Consideration of physical resources has two aspects: firstly *plant and equipment for rescue and reconstruction*, and secondly, *materials for reconstruction*.

With regard to the former, the virtual elimination of "works" operations from national and local government agencies over the past decade means that heavy plant is now thinly spread amongst contractors. More importantly, at any one time plant is dispersed amongst construction sites, and so may not be able to be of assistance following a disaster, or may only be available after procurement and access delays. The vastly diminished holdings of stores and equipment kept by the defence forces is also significant.

New Zealand's relative isolation gives cause for concern in the vital early stages of the recovery phase. While a reasonable variety of construction materials is sourced from within New Zealand, key components will need to be obtained from off-shore. Planning is required to get organisations to consider such items ahead of time.

4. PROPOSED ACTION

There is a growing awareness of risk management at territorial authority level, and the need to have workable response and recovery plans. The seminar organised by the EQC and the Insurance Council in November 1996 represented an important platform at which the issues and current problems associated with the post-earthquake co-ordination of technical resources were highlighted.

The recent announcement of Cabinet approval to move toward a new emergency management framework following on from the Emergency Services Review also creates a specific and unique opportunity to promote the needs in this area.

This environment represents a significant opportunity to achieve a greater level of post-earthquake co-ordination by prior planning than is currently apparent.

Table 1: Required Standardised Procedures for Post-earthquake Response

Standardised Procedures/Reference Documents		Responsible Parties (Post-Earthquake)	Benefiting Parties	Parties to Lead Development
1.	Guidelines for reporting on earthquake damage	-	TLAs Insurance industry Building owners Engineers/Technical Personnel	Insurers and NZNSEE
2.	The storage and retrieval of reports on building damage via a common database system	TLAs	TLAs Insurance industry Building Owners Engineers/Technical Personnel	LGNZ and NZNSEE
3.	Streamlined procedures for Building Consents	TLAs	TLAs Insurance industry Building owners Engineers/Technical Personnel	LGNZ
4.	Streamlined procedures for Resource Consents	Regional Councils	TLAs Insurance industry Building owners Engineers	LGNZ
5.	Define structural standards for the repair of damaged buildings	Building Industry Authority	TLAs Insurance industry Building owners Engineers	BIA and NZNSEE
6.	Standard repair methods for common non-structural damage	Engineers	TLAs Insurance industry Building owners Engineers/Technical Personnel	NZNSEE

The New Zealand National Society for Earthquake Engineering is to draw the attention of all territorial authorities to the need to develop the standardised frameworks and procedures outlined above. It is intended that this report be circulated widely amongst territorial authorities and other related agencies.

While the Society is not funded to address issues and projects of the scale raised in this paper, it is willing to assist with the further development of national standardised procedures on a partnership basis, given the experience and concern of its members in this area.

Accordingly, an approach will be made to Local Government New Zealand to undertake work in this area under a joint arrangement. The attention of Central Government will also be drawn to this issue, and its support sought for this initiative.

Work in this area represents a medium-term strategy for the Society to follow in parallel with its current study group activities.

5. REFERENCES

- 1 Shephard, R.B. 1995. *Theme Scenario for the Natural Disaster: Finding, Managing and Sharing People and Information Seminar*, Earthquake Commission and the Insurance Council, November.
- 2 *Wellington After the 'Quake - The Challenge of Rebuilding Cities*, 1995. Earthquake Commission, Wellington, July.
- 3 *Draft Post-earthquake Building Safety Evaluation Procedures - Preparedness Checklist and Response Plan for Territorial Authorities*, 1996. New Zealand National Society for Earthquake Engineering, October.
- 4 *Guidelines for Initial Shoring or Securing of Damaged Buildings Following Earthquake*, 1996. Ian Smith and Partners, Consulting Engineers Ltd, April.