



## PROFESSIONAL PRACTICE:

### Earthquake Strengthening of Existing Buildings

**50 years ago, on the 28 February 1954, buildings in Adelaide suffered extensive damage from an earthquake of 5.6 Richter magnitude.**

The frequency of damaging earthquakes in Australia is fortunately very low largely because most of the big earthquakes occur in Australia's more remote areas. However, SA has a history of seismic activity and the 1954 earthquake was the most significant to date in terms of its impact on the metropolitan area.

It was about 1969 that our scientific knowledge had developed to the extent that earthquake risk in Australia could be quantified and it was recognised that Adelaide and its surrounding areas had been identified as having a significant earthquake risk within the Australian context.

In 1973 the State Government introduced provisions (in what were then the new Building Regulations under the Building Act 1971), which required a building located in an area of seismic activity to be built in accordance with any requirements of the local council for that activity. By this provision South Australia was the first State to have requirements for the design of buildings for earthquakes.

This provision was superseded in 1983 when a new Australian Standard made it possible for new buildings to be structurally designed for such events. South Australia was the first (and was for many years the only) State to adopt this standard. This means that South Australian engineers have now had some twenty to thirty years of designing new buildings for earthquakes.

In the late 1980's, the Adelaide City Council started looking at upgrading existing buildings for earthquake resistance. The Government recognized this work and developed it further to provide criteria and typical details for the strengthening of older buildings. This work was later incorporated into development of an Australian Standard dealing with strengthening of existing buildings for earthquakes.

The Newcastle earthquake on 28 December 1989 reminded everyone of the vulnerability of Australian cities to earthquake. In particular the damage to existing buildings was notable. Newcastle had had a previous earthquake in 1923 some 66 years earlier but the passage of time can lead to complacency. It is therefore appropriate that we remind ourselves of the risk of damage to buildings we could face in Adelaide if another earthquake should occur, such as:

- Older buildings may have developed weaknesses that were not evident in 1954
- Building fabric may have weathered and decayed from lack of maintenance
- Building alterations may have introduced unintended weaknesses into buildings
- A significant stock of older buildings still have no provisions for earthquake resistance

Building owners need to plan for the earthquake upgrading of these buildings.

### **Applying the *Development Act***

This is also an appropriate time for building surveyors to reflect on their responsibilities under Section 53 A of the *Development Act*, which has provisions for requiring the upgrading of safety in buildings.

The provisions specifically refer to buildings considered to be 'unsafe' and/or 'structurally unsound', therefore requirements for earthquake strengthening should be considered when assessing an application for alterations or additions to an existing building.

Some solutions may be as simple as tying a wall to a roof, or bracing to a parapet (a prevalent failure point in Newcastle). However, for more extensive situations (such as for a hospital) it may be appropriate for the building owner to commission a risk assessment to identify safety risks and any upgrading work needed to address or reduce those risks. In some cases, work identified through a risk assessment may be incorporated into a Building Upgrade Plan, which proposes that only the most urgent work will be undertaken immediately and less urgent work will be undertaken over a number of years.

Any risk assessment undertaken to address structural safety risks should preferably be done in conjunction with an assessment of all other building risks such as health, fire safety and access, so that upgrading work can be prioritised appropriately.

*AS 3826 Strengthening of Existing Buildings for Earthquake* provides good guidance on the extent of strengthening that is reasonable in an existing building. The typical details are especially useful and building surveyors in South Australia should be familiar with their application.

### **Useful information**

A useful information sheet (No M12, July 2002) is available from the Office of Minerals and Energy Resources South Australia, entitled 'Faults, Earthquakes and House Damage'.

This information sheet can be obtained from Mineral Resources, 101 Grenfell Street, Adelaide, by writing to Mineral Resources, GPO Box 1671, Adelaide, SA 5001, or by Email to [pirsa.minerals@saugov.sa.gov.au](mailto:pirsa.minerals@saugov.sa.gov.au).

Further information about earthquakes can be obtained from the Department of Primary Industries and Resources website at [www.minerals.pir.sa.gov.au](http://www.minerals.pir.sa.gov.au), and Emergency Management Australia's website at [www.ema.gov.au](http://www.ema.gov.au).

### **Further information**

Department of Transport and Urban Planning

**Planning SA**

136 North Terrace Adelaide  
GPO Box 1815 Adelaide SA 5001  
Telephone: 8303 0600  
[www.planning.sa.gov.au/building\\_policy/](http://www.planning.sa.gov.au/building_policy/)

Contact:

Don Freeman, Manager  
Building Policy Branch  
Level 3, 136 North Terrace Adelaide SA  
Telephone: 8303 0602  
**ISSN: 1443-8038**

