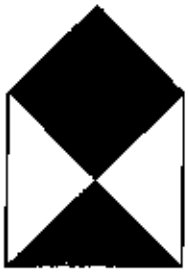

DISASTER SALVAGE TEAM

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NEWS LETTER

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EARTHQUAKE ISSUE

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"STANDING ON SHAKY GROUND"

"Despite the very limited history of earthquake damage in Canterbury, the geological record provides compelling evidence that a substantial hazard exists, particularly for urban and industrial development. Recent studies have shown that Christchurch is vulnerable to both the exposure to significant earthquake events, and adverse ground conditions which potentially enhance their effects . . ." [1]

This extract from a Canterbury Regional Council paper emphasises the potential for damage that earthquakes have in Canterbury and reminds us that, although we prefer not to think about it, the chances of a "significant earthquake event" occurring sometime in the not too distant future are quite high.

Preparation for an earthquake and for dealing with its aftermath should be included in every institution's disaster plan, and all reasonable precautions should be taken to ensure that the collections suffer minimal damage. An assessment of your region, its proximity to active earthquake faults and its seismic history, will provide an indication of what frequency and intensity of earthquakes are likely, although we know of course, that earthquake prediction is notoriously difficult.

WHAT TO EXPECT? - ASSESSING THE RISKS

Canterbury's history of earthquakes of various magnitudes can be looked at and calculations made as to the probability of return events. A 1991 report (The Earthquake Hazard in Christchurch - A Detailed Evaluation, by Elder, McCahon and Yetton) states that during the first 80 years of European settlement of Christchurch (between 1840 and 1920) four major earthquakes struck the city, causing considerable damage. However, since 1930, although there have been numerous smaller shakes, there have been none with a felt intensity of more than VII on the Modified Mercalli Scale. The authors go on to state:

"Analysis indicates that potential exists for relatively rare but very large earthquakes (magnitude approximately 8) along the Alpine Fault, which essentially marks the western edge of the Southern Alps. More frequent moderate to large earthquakes (magnitude around 6 - 7.5) can be expected in the Canterbury Plains foothills and North Canterbury area, and less frequent moderate earthquakes under the Canterbury Plains and Christchurch itself." [2]

and:

"Christchurch will at some time in the future almost certainly experience shaking of an intensity that has not been experienced in the period since European settlement." [3]

As well as damaging buildings, a major earthquake can also be expected to disrupt water supplies, sewerage reticulation, transport routes and energy supplies, all of which can cause serious problems for your institution. These possibilities should also be considered in your disaster plan.

The extent of damage will vary from area to area, even within the city, depending on local ground conditions and types of building structure.

Local Site Conditions

The effects of earthquakes are modified, either amplified or lessened, by the nature and characteristics of the soil or rock underlying an area.

Much of Christchurch is underlaid by deep, relatively soft, sediments which are vulnerable to liquefaction - an effect which occurs when water saturated fine sands or silts lose their supporting capacity when subject to earthquake vibration. The high water table throughout much of Christchurch (generally around two metres below the ground surface), combined with the general soil profile, means that liquefaction is likely to be a real hazard in a major earthquake. This will magnify its destructive effects and means that buildings sited on such soil types will suffer more damage.

Other geological effects of an earthquake could include landslides, rockfalls and subsidence. These risks can be reduced by building retaining walls, injecting grout into unstable soils, draining water and strengthening the building.

Building Design

Certain types of buildings are less vulnerable to earthquake damage than others. For example, wooden frame buildings are quite flexible and do not usually break apart, while brick buildings are considered the least safe. Concrete block walls often collapse during an earthquake.

An assessment of your building by a structural engineer will provide a good indication of its weak points. It may be necessary to brace or

strengthen certain elements of the structure, especially chimneys and parapets on older buildings. More modern buildings are usually designed so that they will flex during earthquakes, and will sway considerably without collapsing.

If you cannot actually afford to make any structural changes to your building, at least identify the strongest parts of the building and move your most valuable and vulnerable collections there.

COLLECTIONS

Even if a museum building is able to withstand an earthquake without collapsing, the collections within it are likely to suffer. Objects on shelves or in display cases will topple, glass may break and pictures could fall off walls. The 1989 San Francisco earthquakes left 300,000 books on the floors of the Los Angeles Public Library and about 75% of Stanford University Library's stock.

As part of the disaster planning process, all the collections in a museum or library should be classified in order of importance i.e. national treasures or irreplaceable objects, objects of great importance or cultural value and specialised equipment, and objects of lesser importance or cultural value. The material should be labelled according to its classification so that it is easy to identify. Registers of the material in each category should be prepared and lodged with another institution. Such a system will ensure that priority can be given to the salvage of the most important parts of the collection.

Although we cannot predict when an earthquake will strike, and have no control over its destructive forces, careful planning of storage areas can considerably reduce the risk to collections. The following tips could prove helpful:

- Store small fragile objects in carved blocks of expanded polyethylene that have been custom cut to the shape of the object.
- Use garden netting to keep light-weight objects from tumbling off shelves.
- Line shelves and bins with inert light-weight foam sheeting to minimise sliding and vibration damage.
- Fit restraining bars or elastic straps along the edges of shelves.
- Store heavy items on lower, rather than upper, shelves.
- Use tie-downs and archival padding for larger three-dimensional objects.
- Secure all storage racks and units to the walls and floors by brackets and footings which have been bolted directly into the surrounding architecture (it may be necessary to consult a structural engineer).
- Store works on paper out of frames, in Solander boxes, to prevent damage from broken glass.
- Display three-dimensional objects on exhibition on secure pedestals bolted to walls or floor.
- Keep in mind earthquake hazards while objects are in transit or in use on tables, e.g. Stabilise with foam or lash down to table with twine etc.

STAFF SAFETY

In the event of an earthquake, human safety is the most important consideration. Stay inside and keep away from windows or other glass. Get underneath a strong desk or table, or stand in a doorway. If you are in a storage area at the time, move as far away from cabinets and shelves as possible.

After the quake, check for injuries (your own and others). If your building is badly damaged, it should be evacuated as aftershocks could bring it down. Remember that people are more important than collections, and human safety must take priority.

When you receive confirmation from emergency services that it is safe to return to your building to check collections, you will need to proceed carefully. Open doors cautiously when you check closed cupboards and cabinets, watching for falling objects. Clean up any spilled solvents appropriately.

A disaster plan should incorporate arrangements for providing shelters for both people and collections if evacuation from the building becomes necessary. If valuable collections are involved, security will need to be considered as well. Evacuation routes from the damaged building and the storage facility to which the material is being moved must be safe. Check this BEFORE beginning to move material.

DISASTER SALVAGE TEAM

Ensure that key members of your staff are trained in disaster preparedness and each member knows exactly what to do in the event of a disaster. The majority of damage after a disaster has occurred is due to ignorance and mishandling of delicate objects. This should not occur.

PAYING FOR THE DAMAGE - THE EARTHQUAKE AND WAR DAMAGE COMMISSION

Insurance cover for damage incurred as a direct result of war, earthquake or landslip has been provided by the New Zealand government since 1944. The Earthquake and War Damage bill, enacted in that year, established a commission to collect funds in anticipation, and award compensation in the event of, damage by natural or military causes.

The Earthquake and War Damage Commission's principle funding comes through a levy on all private fire and damage insurance. While the commission's reserves are being built up ($93m added in 1991-2), insufficient funds exist to compensate the damage caused by a major disaster. It is predicted that an earthquake of magnitude 7.5 on the Richter scale and centred on Wellington, would result in claims to the EQC of $2-3 billion. Research indicates a 50% probability of such an earthquake in the next 250 years. (The new Museum of New Zealand is being strategically placed so as to be able to fully experience the historic event when it occurs!).

The EQC takes out insurance itself on the international reinsurance market. However, the price of this cover has risen in recent years due to the rise in natural disasters in Europe and the USA. The bulk of the commission's funds are invested in government stock and treasury bills. Research into earthquake and geomechanical engineering is funded by the commission, as is the development of disaster recovery planning.

Claims to the commission for compensation occur regularly. In the 1991-2 year over $2m was paid out, made up of $1,600,000 or earthquake and $390,000 for land and landslip claims.

The EQC provides cover for both buildings and contents up to their indemnity value. The gap between indemnity and replacement value must be met by the owner. In the commission's own words, "to cover the difference between indemnity and replacement value you should approach your own insurance company in respect of earthquake damage". Although there have been recent changes to the coverage provided for commercial and residential property, public buildings will continue to be covered in the same manner as previously.

Enquiries about the EQC and its work should be made directly to the commission in Wellington by phone ((04) 5699-771), or by writing to P.O. Box 31-342, Lower Hutt. Your own insurance broker should also be able to provide information about the workings of the commission and advise the recent changes to the earthquake coverage.

Footnotes:

1. p 10, "Managing Natural Hazards in Canterbury - Positioning Paper 2" Strategic Policy Unit, July 1992
2. Executive Summary, "The Earthquake Hazard in Christchurch - A Detailed Evaluation, Elder, McCahon and Yetton, Soils and Foundations Ltd, March 1991
3. p 74, ibid

Sources:

"Safeguarding Museum Collections from the Effects of Earthquakes" by John R. Hensley, Curator 30/3 1987, publ. by the American Museum of Natural History

"Preservation in Australian and New Zealand Libraries: Principles, Strategies and Practices for Librarians" by Ross Harvey, 1990, publ. by Centre for Information Studies, Charles Sturt University, Wagga Wagga, NSW, Australia

"Earthquake Hazard in Christchurch - A Detailed Evaluation" by Elder, McCahon and Yetton, Soils and Foundations Ltd, March 1991, with assistance from University of Canterbury

"Managing Natural Hazards in Canterbury - Positioning Paper 2" Strategic Policy Unit, Canterbury Regional Council, July 1992