

DISCUSSION SECTION

CLASSIFICATION OF HIGH EARTHQUAKE RISK BUILDINGS

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One of the consequences of Section 301A of the M.C. Act will be a confrontation between local Authority Engineers and Consulting Engineers on the adequacy of certain old masonry buildings. There is, therefore, a need for a code which establishes a Classification system, an analysis system, and strengthening procedures for masonry buildings. While the published code does offer a classification system it tends to be a commentary on a code rather than a code.

There are many building owners who honestly believe that their collection of bricks is in fact a sound building. It may, therefore, be more diplomatic as far as such owners are concerned to refer to a "numerical rating" rather than an accumulation of penalty points. Co-operation with owners often means that particular hazards can be removed without recourse to the Act. The "life evaluation" philosophy will have a somewhat numbing effect on the trustees of many superannuation funds and would seem to be of doubtful value in an arbitrary "classification system" designed to assess potential risk. It can also conflict with good social reasons for retaining some historic masonry buildings such as the Normal School in Christchurch - the first State School in the country - which will certainly collapse in a catastrophic earthquake but I am yet to be convinced that buildings such as this can't be strengthened to the extent that they will "not collapse in a moderate earthquake." Some insurance incentive to transfer from one class to another could make a good Classification system a most effective part of a code and for this reason alone some classification system should be retained.

It is agreed that Councils should undertake surveys (8.1) but the requirement of a compiled list available for public inspection is contrary to normal practice. Clause 2.8.1 (ii) of N.Z.S 1900 requires building permit drawings to be available for inspection :-

"By the owner of the building for the time being or any person duly authorised by him in that behalf."

This principle should be retained.

As Engineers interested in seismic problems we must remember that this code involves not only buildings, but people. Someone owns each of these "accumulated penalty points" and at least two Engineers will have to prepare reports on buildings to which the provisions of the Act are applied. Unless we have the humility to admit that our present knowledge of seismic engineering is such that there could be several suitable solutions to any particular structural problem conflicting "expert evidence" could

undermine public confidence in the science of seismic engineering.

To be constructive I feel that the code should be re-written:-

- (a) With a more diplomatic classification system.
- (b) With a section giving a positive guide to the analysis to be used in assessing the strength of old buildings.
- (c) With a section giving a guide to suitable strengthening systems.

A separate commentary could then be prepared which would encourage the designer to develop solutions which are consistent with current seismic engineering knowledge.

While it is admitted that a code would be a most useful document, the most important need is a further amendment to the Act which will explain clearly what the Act requires.

REPLY BY O. A. GLOGAU, CONVENOR, PROJECT COMMITTEE :

Mr. Bluck's comments are appreciated and together with those received from other local bodies were considered by the committee resulting in further useful modifications of the recommendations for the classification of high earthquake risk buildings. As Mr. Bluck correctly states the document is not a code of practice; nor was it intended to be one. It is a recommendation on the subject to local bodies and the large majority of comment received was very favourable. If there is indeed a need for a document in code form this can better be produced by the Standards Association of New Zealand or the local bodies themselves.

The committee is only too well aware that Mr. Bluck's items (b) and (c) have not been dealt with in depth by this report and the reasons for this were given by the writer in the introduction to the document in the previous issue of this publication.

Mr. Bluck's pessimism re confrontation between local authority engineers and consulting engineers has so far fortunately not been borne out in practice. Since the Act came into force no case has even gone to the arbitration stage. As pointed out by the writer it is hoped that economic pressures will be the prime mover in ensuring that hazardous buildings will be replaced or strengthened but this will only be the case if local bodies set a reasonably high standard for the condition "secured to their satisfaction". It should be remembered that the level of tolerable hazard set by the legislation is very low - much lower than the one half current code level it might appear to be on superficial reading of the Act. The reasons are that firstly code level earthquake

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forces must be load factored and material under capacity factors applied before an ultimate strength assessment may be made for new designs. Of even more significance is the fact that code level design is appropriate only for ductile structures whereas the hazardous structure is brittle and has only a little more damping than the modern building on its side. A brittle structure will not withstand a severe earthquake unless designed for four or more times current code loadings. Structures possessing levels of resistance equal to or less than those specified by the Act should therefore not be allowed to remain in existence for indefinite lengths of time given the likely frequency of greater than "moderate" earthquakes in any part of this country.

Any Council that will allow modernisation of these buildings without strengthening significantly in excess of the nominal one half code earthquake level would be very ill-advised and should consider the possible serious consequences.

Mr. Bluck comments on the principle concerned with permit inspections but this need not be infringed. Prospective buyers and tenants once aware that buildings in a city have been classified will demand to become "duly authorised persons by the owner" and again the useful method of economic pressure will apply.

Historic buildings certainly are a problem but in the writer's experience the enthusiasm for their retention is usually dampened considerably when those most vocal in this respect are asked to contribute to the cost of strengthening or to take the responsibility for the consequences of structural failure in an earthquake - and here it must be remembered that adequacy to resist only a moderate earthquake is not sufficient when a considerable further length of life for a building is considered.

Strengthening costs are high and methods that are likely to be reasonably effective as a rule require alterations to the existing architecture to such an extent that the original objective is defeated. Consider the beauty of a stone building encased in gunite, its ornaments and parapets removed and an exterior corsetting of vertical and horizontal members.