POLICIES AND PROJECTS IN THE BRITISH COLUMBIA MINISTRY OF EDUCATION

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ABSTRACT

The entire 900 km long western seaboard of British Columbia plus large areas in the northeast are defined as zones of high seismic risk. The development of earthquake-preparedness programs, however, was not begun until 1986. This paper describes the difficulties experienced in starting such programs, the developments to date and plans for the future. The intention of this paper is to share experiences with other education authorities and perhaps initiate future dialogue to mutual benefit.

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INTRODUCTION

School-based earthquake preparedness programs only began in British Columbia in early 1986. This paper records out experiences since that date so that those who are more advanced can advise us while others perhaps can learn from our successes and failures. It is hoped that a regular exchange of information can be continued in the future to mutual benefit.

BACKGROUND

The Province of British Columbia is approximately 1,400 kms long north/south and 600 - 800 kms east/west. It contains 75 school districts with almost half a million students in 1600 schools.

Along its 900 km western seaboard are a series of mountain ranges and offshore in the Pacific Ocean there are major geophysical faults where earthquakes occur regularly.

The population is concentrated mainly in the southwest corner. On the mainland is Greater Vancouver with 800,000 population, while nearby is Vancouver Island where the provincial capital Victoria has a population of 300,000.

In 1988, the Association of Professional Engineers of British Columbia presented a brief to the Provincial Government in which they pointed out that our west coast is one of the most seismically active areas in the world; also that several M7 to M8 earthquakes have occurred in the past and certainly will again.

In 1946 on Vancouver Island, an earthquake of 7.3 magnitude seriously damaged 30 schools around the town of Courtenay; fortunately it occurred on a Sunday when the buildings were empty. Nearby, across the U.S. boarder, Seattle in 1965 experienced a 6.5 magnitude earthquake which caused damage to eight schools and death to seven people in the community.

PROGRAM DEVELOPMENT

One of the major restraints on the development of earthquake programs in B.C. has been the low level of public awareness.

In 1985, one of the benefits of television was demonstrated vividly when the results of the Mexico City earthquake were brought into the homes of our local population. Public awareness of our own exposed position was heightened as never before by that disaster. Scientists and Emergency Planning personnel who had been trying for years to sound an alarm suddenly became headline news. As a result, a few government people took up the cause and began to initiate programs which received political support.

The lead in our school system was taken at first by the Greater Victoria School Board. In 1986, they established an ad-hoc committee to investigate their situation and make recommendations

for action. Included on that committee were representatives from other sectors of the community including the Facilities Branch of the Ministry of Education.

The primary purpose of our Facilities Branch is to allocate and monitor funding for school construction. We also set standards and provide guidelines. The actual design and construction of schools is undertaken by the 75 school districts and their consultants.

In 1986, it was decided that the Ministry should develop school, earthquake preparedness programs for school districts. Implementation of that decision however has often been surprisingly difficult. At first, there seemed to be no shortage of useful guideline material, but as we began to develop programs, we realized that very little of that material addressed some critical realities.

Firstly, the cost implications of earthquake preparedness programs are huge. Senior decision-makers are hesitant in committing themselves to this potentially major demand on resources, particularly during a period of financial restraint.

To that problem must be added the uncertainty of earthquakes. As we know, nobody can forecast how large they will be or when, where, and how often they will occur. Procrastination, therefore, tends to occur at every level from the senior policy maker to the junior staff person, both of whom have many other calls on their time.

Pressure for action seems to have come from the "grass roots." Without that, it is difficult for the few dedicated realists to gain political support and acquire sufficient resources.

We began our programs by establishing an advisory committee and in that we were fortunate in having representatives from both the Federal and Provincial Emergency Planning programs, both of whom had offices in Victoria. We also obtained the services of a geophysicist from the nearby Pacific Geoscience Centre, a base for several of Canada's most knowledgeable scientists on the subject. The committee recommended that we address earthquake preparedness on two fronts, EDUCATION and PROTECTION. The following is a description of what has been accomplished to date under those headings.

Education

One of the most useful documents we were given when we began to develop Ministry programs was the Guidebook for Developing a School Earthquake Safety Program, published by the U.S. Federal Emergency Management Agency (FEMA). At first, our committee proposed to issue that Guidebook complete to all schools in British Columbia. However, it was eventually decided that for ready acceptance, we needed a shorter document that was easier to use and more specifically addressed the B.C. situation.

Our document was entitled School Earthquake Safety Guidebook and it amalgamated the best material available from several sources into 24 pages and five sections.

1) How to set up an Earthquake Safety Program.
2) Recommended earthquake drill procedures.
3) How to identify and eliminate non-structural hazards in schools.
4) A typical Response Plan.
5) Checklists for students, teachers, parents and others on what to do before, during and after an earthquake.

Four hundred copies of the Guidebook were printed and copies were sent to every school district. A loose-leaf version was included and permission granted to duplicate as many copies as required.

We have since been swamped with additional requests for copies. It is therefore planned to reprint 4 - 5000 and give it wider distribution.

A demand on our resources that we did not anticipate was the time required simply to respond to requests for the guidebook. We have now arranged for the Ministry Information Services Branch to handle that task for the reprinted issue. That is an example of how demands on time can come from unexpected sources.

It is Ministry policy that earthquake preparedness programs are a school district responsibility. One problem with that policy is that some districts act and others do not. There has been some pressure for the Ministry to make the preparation of an earthquake preparedness plan mandatory, a step that so far has not been taken. In B.C. there is a tradition of local autonomy that the Ministry will depart from only with reluctance. Government policy tends to follow and not lead popular opinion; therefore when trying to start something new, public education is a vital facet. At present in B.C. there is probably insufficient popular support for a mandatory, government-directed program for earthquake preparedness.

Another facet of education concerns the actual school curriculum. Our branch has been encouraging the Ministry Curriculum Branch to introduce disaster-planning material into regular programs. The reaction so far has not been encouraging, possibly because nobody in Curriculum has the necessary commitment. However, education must be undertaken on the broadest possible front; not only the student curriculum but teachers, parents, community leaders and - most effectively - the politicians and senior bureaucrats who make the decisions that allow us to do what seems to be needed.

Protection

The second front on which we addressed earthquake preparedness concerned protection. Though protection of the occupants was primarily addressed, we also addressed protection of the structural and non-structural elements of school buildings.

One program we have introduced which allows school districts to deal with non-structural hazards such as ceilings, windows, parapets and chimneys is termed a "Shareable Capital Allowance." This is a formula-generated fund provided for minor capital works.

Funding for non-structural hazard correction can also be provided within an overall facility-upgrading project.

The Ministry has also commenced a province-wide structural upgrading program. Because the cost implications of such a program are huge, it was decided that to obtain some credible cost estimates, we needed more information on the scale of the problem. To obtain this, we issued a survey questionnaire to 27 school districts in the zones of highest seismic risk. Twenty-two districts completed and returned the questionnaires for all their schools. This gave us a data base of information about the age, size and type of construction of just under half of the schools in B.C.

Many schools comprise several segments built at different times and of different structures. Our data provides separate information for each segment.

From information obtained from elsewhere, notably California State and the Seattle School District, it seems clear that unreinforced masonry buildings are more vulnerable to earthquake damage than most other structural types. Seismic requirements were not introduced into the Canadian National Building Code until 1953 and have been made more stringent at regular intervals since then. From our survey, we ascertained that there are 109 masonry buildings in the 22 districts built prior to 1960 and therefore likely to be poorly reinforced or not at all.

Our consultant engineer estimated the 1988 cost of rebuilding those schools as $307 million or alternatively $58 million to upgrade. Those figures are so large that before making policy recommendations, we decided to obtain some supporting information on actual projects. Five different districts were asked to obtain upgrading recommendations and cost estimates.

Fees for the actual studies were only $5 - 10,000 each. We asked the districts to pay, which in retrospect, was a mistake. Two districts objected and at first were not cooperative. As a result, completion of the studies was delayed.

The past six months has been a particularly active period in the Ministry for a variety of reasons, and unfortunately earthquake programs have tended to become a low priority in the demands on time. This points out the need for staff people whose specific responsibility is for earthquake programs rather than relying on personnel with other major responsibilities.

Two encouraging events have occurred recently. One of the pilot project engineers has introduced us to a new system for evaluating and upgrading the seismic resistance of buildings, developed recently in the U.S. and termed ATC 14. It provides an approach to seismic upgrading that focuses primarily on life-safety but also on limiting damage in a way that post-quake repairs are feasible.

Until recently, we had been uncertain what approach to take with the numerous old buildings that are either impossible or very expensive to upgrade to full code standards. To either carry out full upgrading or to demolish and rebuild them all would take decades and cost billions of dollars. It did not seem at first that reduced levels of seismic resistance are an acceptable alternative. We were concerned about the question of liability if a building is upgraded to reduced standards but is subsequently damaged and causes injury. By focusing on life safety, ATC 14 seems to provide a practical answer on which to base a funding program.

The second encouraging event is this present workshop. We hope to be able to learn from and exchange ideas with many of those present and then go home with sufficient knowledge to move into our next phase. That phase is currently planned to be a program in which each school district is allocated an amount of seismic upgrading funding calculated from a formula based on the age, type, and size of the district's existing school buildings. This decentralized approach seems the only practical answer in our present administrative organization.

It will also be necessary to publish structural guidelines for which we think ATC 14 will probably be the basis. In addition, some monitoring will be necessary, and we hope initially that this can be accomplished with our present staff.

CONCLUSION

We are intrigued and challenged by the unique task of preparing against a hazard that might happen today but perhaps not for decades; a hazard that may strike the centre of Greater Vancouver in the middle of a busy winter's day or (let us hope) hundreds of miles from any community.

It seems to be a natural human defense mechanism that people tend to believe nothing bad can happen to them personally until it is imminent. Earthquakes, of course, happen usually without warning. Perhaps we need a few minor ones to literally shake the populace out of its apathy but let us hope not. We must accept that it will be many years before all our schools are made reasonably safe from seismic shock. But that is only one aspect of earthquake preparedness. Perhaps ultimately the single most important task we face is described in the title of this conference. Educate well - in the broadest sense - and the rest will follow.