BOOK REVIEW

Title: **"Siting in Earthquake Zones"**

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Destructive earthquakes cause considerable damage to both nature and the built-environment as we have been reminded in recent years. As well, they cause considerable social and economic impact whenever they occur near populated areas as evidenced by the Northridge and Hyogo-ken Nanbu earthquakes, among others. While it is not possible to completely eliminate such impact, the intensity and extent can be reduced by proper site selection and adequate structural design. It is to the first of these aspects that the authors direct this book. Based on a balance between theoretical treatment and practical application, this short book of 115 pages is intended to emphasise tested technology that can be readily used by practising engineers.

The stated aim of the book is to provide guidance for conducting systematical assessments of the potential earthquake hazard of a site. The method outlined is essentially a systematic estimation of the seismic effects that are likely to occur within and around a site and the nature of possible damage, using earthquake and geotechnical engineering practice and any known seismicity of the site. The book is said to supplement existing Chinese, United States and Canadian codes regarding methodology based on recent advances in the field with special emphasis on their practical application.

The book is divided into three main components: fundamental concepts, checklists for site investigation, and detailed methods of site evaluation. The first chapter on fundamental concepts deals with the nature and applicability of the book, along with definitions of some of the technical terms used. The second chapter describes step by step site investigation procedures expressed in the form of checklists. It also describes what is meant by a "design" earthquake for a particular area and how knowledge of any historical earthquakes and their known effect on the site should be taken into account.

Earthquake ground motion is discussed in some detail, taking into account intensity, frequency characteristics (response spectrum), and duration. This is followed by a discussion of the various factors that influence the ground motion parameters including the effects of soft and hard ground.

A chapter on seismic hazard analysis looks at methods for analysis together with how to analyze seismicity. The Poisson process is used to carry out the earthquake hazard analysis and an outline is given of the theory required for the analysis allowing for the various probabilities and factors of uncertainty.

Two short chapters discuss the evaluation of the seismic parameters of a site and the seismic effects of faults. The first covers the classification of the site and the determination of a design earthquake having a suitable acceleration time-history for use in seismic design. Causative faults and their influence on seismic hazard zoning are discussed in the second, along with the effects of surface faulting and ground rupture.

Chapter seven, dealing with the subject of soil liquefaction is the longest chapter in the book. After defining a number of terms, the authors discuss the factors that influence seismic liquefaction before going on to describe methods that can be used to evaluate liquefaction potential. The methods of macroscopic and microscopic assessment are illustrated by means of block diagrams while laboratory and in-situ testing methods are summarised in the text. The use and application of an energy method of evaluation is illustrated by reference to Canadian research.

Landslides and slope stability are dealt with briefly. This chapter outlines some of the situations where stability assessments could be required. The steps required for this are outlined but not described in detail.

The final chapter deals with ground waving and the damaging effect that this can have. A few case histories are presented to illustrate the problems that can arise, followed by a very brief review of relevant research and knowledge.

The book contains a large number of references, though these are mainly to Chinese, United States and Canadian research. Since much of the experience outlined in the book comes from China, many of the references are only available in Chinese and these are listed separately.

One drawback of the book is that it is largely based on Chinese and Canadian research and makes no reference to the large body of research that has and is taking place in the rest of the world. This is particularly true with regard to the chapter on liquefaction where no reference is made to the large amount of research taking place around the world and especially in New Zealand. The fact that the energy approach has been under investigation in New Zealand since the early 1980's is overlooked in preference to referencing much later work by one of the authors. An early paper on this New Zealand work is included among the references but this reviewer could not find a citation to it in the text. Since the Chinese work has not previously been well known outside that country, the book does serve a useful purpose in giving an outline of it.

The book is well presented with a large number of illustrations. The authors claim their book is based on a balance between theoretical treatment and practical application. However, this reviewer considers that the examples and case studies that are

included to illustrate the practical application require considerably more detail in order to achieve this. In addition, the theoretical background is presented more in summary form and could stand further amplification and illustration. As a result, the book is more a monograph outlining what to do about siting in earthquake zones rather than a textbook explaining not only what to do, but why to do it. Nevertheless, the authors do achieve their aim of providing guidance for systematical assessment of the potential earthquake hazard of a site and the book can be recommended for this reason. Engineering practitioners and others involved in evaluating siting in earthquake regions should find this book to be a useful summary of how to go about the task, though at a rather high price in New Zealand dollar terms.

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