

INTRODUCTION.

The following pages have been brought together for the assistance of a Committee summoned by His Excellency the Minister of Education to discuss the system of building best adapted to withstand Earthquakes. Certain portions of the material are more or less original, being founded upon observations or experiments made by me during the last 13 or 14 years while resident in Japan. Amongst this material I may draw special attention to the remarks upon Earthquake motion, about which more investigations have been made in Japan than in any other country. I deeply regret that this portion of the subject has not been rendered more complete by carrying out the experiments suggested in the letter preceding the Report upon Earthquake Motion. The carrying out of these experiments was intrusted by Mr. Hiromoto Watanabe, the President of the Buildings Committee to several sub-committees, but, so far as I am aware, little or nothing, has yet been done. The information relating, to the Building Regulations of Manila I obtained through the kindness of my friend Mr. Fred. Wilson, C.E., the head of the engineering firm of Barlow and Wilson, in Manila, he having obtaining the same from General Cerero Father Faura and other persons interested in these matters. The Italian laws regulating construction in earthquake districts were obtained through my friends Professor Giglioli and Father Bertelli in Florence. Much of the information relating to South America was obtained for me by Mr. T. B. Clarke Thornhill, H.B. Majesty's Secretary of Legation in Tokio. The remaining notes I obtained by correspondence with gentlemen residing in various

parts of the world. To all who have so kindly assisted in gathering together information for the Buildings Committee of Japan I now tender my sincere thanks. The translations of the various reports have been made by Mr. Nembrini Gonzaga, and the expense attending the same has been defrayed by the Buildings Committee. For assistance in the correction of proofs, assistance in obtaining the English equivalents of technical terms, and for many valuable suggestions, I thank my friend and colleague Mr. Josiah Conder, M.I.B.A., who has personally had much experience in building in one of the most frequently shaken districts in Japan.

In reading these various reports it will be observed that there is considerable repetition, especially in connection with the various building laws which have been adopted in earthquake countries. Without any great difficulty these repetitions might have been avoided, but as the following papers are only written as a guide to a committee which will draw up its own report for the consideration of the Central Government, I have thought it better to lay the whole of the information that I have collected before them. The fact that similar rules have in many instances been adopted by independent committees in different countries ought in many instances to carry great weight when framing regulations for Japan. One set of interesting repetitions, and, I must add, the want of repetitions, is furnished by a comparison of the suggestions of committees and the laws which have been based upon these suggestions. In some instances Governments have not adopted in their entirety the whole of the suggestions which have been placed before them. Although suggestions are usually accompanied by the reasons which led to them, we are unfortunately left to form our own conclusions as to why many of them were not accepted. Generally speaking the laws which have been formed refer to public buildings, private buildings, temporary buildings, buildings which are not habitations, the repairing and demolition of buildings, and to walls and fences.

A small portion of the matter which has no direct connection either with the Seismological Society or the Committee yet sitting in Tokio, are rules relating to the appointment, functions, and *modus operandi* of committees, and the reasons given by governments for the promulgation of laws, and penalties for their infringement. Matter of this nature has been retained as it has been considered that it may possibly be of guidance, should action be taken respecting the final report drawn up by the Building Committee to those whose duty it may be to formulate regulations for this country.

I have concluded my compilation with an epitome of the various suggestions which have been made in order to secure the safety of structures in earthquake countries, here and there adding a few criticisms and suggestions of my own, a perusal of which will give a general idea of the matters touched upon in the present volume.

With these preliminary remarks I respectfully offer the following pages to the Members of the Seismological Society of Japan, the President and Members of the Buildings Committee summoned by His Excellency Arinori Mori, Minister of Education, and to all who are interested in building in earthquake shaken countries.

JOHN MILNE.

Tokio, January 24th, 1889.