



WELCOME

**TO THE
MODEL BUILDING CODES
FOR EARTHQUAKES AND WIND LOADS
ON CD-ROM**

PROJECT SUMMARY

INTRODUCTION

Over the last two decades, the Greater Caribbean Region has experienced a dramatic upsurge in the frequency of natural hazards, such as earthquakes, hurricanes and flooding. These events have caused significant social and economic disruption and environmental damage, destroying years of development efforts and investments, and shifting development priorities away from long-term goals in order to meet immediate needs of reconstruction and rehabilitation. Many disasters are inevitable but their damage can be reduced significantly. It is indeed recognised that a large percentage of losses results from inadequate design and siting of housing and other infrastructures. With proper-engineered construction much of the risk can be reduced.

Recognising the need for each country susceptible to disasters to have appropriate construction standards, the Association of Caribbean States (ACS), with financial assistance from the Government of Italy, through its Trust Fund managed by the Inter-American Development Bank (IDB), and from STIRANA (Foundation for Disaster Preparedness of the Netherlands Antilles), has embarked on a project aimed at “*Updating Building Codes of the Greater Caribbean for Winds and Earthquakes*” and thereby reducing the vulnerability to natural disasters. This initiative is consistent with the goal of the ACS Special Committee on Natural Disasters to reduce risks and losses caused by natural disasters in ACS Members Countries.

The objective of the first phase of the project was to produce and disseminate state-of-the-art model codes for earthquakes and wind loads as well as recommendations for the updating of existing codes, so that ACS Member Countries be able to endow themselves with new

appropriate codes or improve the existing ones, in order to develop better construction practices and techniques for the building of safe and reliable buildings.

The second phase of the project (sensitisation phase) aims at promoting the development, maintenance and application of appropriate construction standards and codes to enhance significantly the resilience of buildings to the effects of natural hazards. It covers therefore important aspects related to enforcement and inspection mechanisms, incentives and training.

Enforcement comes from the political will to fully implement adequate building codes and standards. Combined with inspection mechanisms it has the strongest effect on strengthening building practices and represents therefore a crucial step towards reducing vulnerability. To reinforce these building regulations, governments should work with private-sector financial and insurance companies to encourage the development of financial incentives, such as premium reductions or reduced-rate loans, for properly constructed buildings using established standards and regulations. Finally, with the adoption of state-of-the-art building codes throughout the region, building inspectors, designers, engineers, builders and construction workers have to be trained on the new codes. Control measures for the training and qualification of those actors should also be put in place.

EVALUATION OF EXISTING BUILDING CODES IN THE GREATER CARIBBEAN

The first part of the project was devoted to a thorough analysis of the situation of present codes for earthquake and wind loads resistant design in ACS Spanish- and English-speaking Member Countries. To accomplish this task, ad-hoc Evaluation Forms were prepared, the entries of which included all the main items that should be found in a state-of-the-art code. Subsequently, the existing earthquake codes of ACS Spanish- and English-speaking Member Countries were thoroughly reviewed and evaluated, and the Forms were completed. At the end of each Evaluation Form, salient recommendations for code improvement were formulated.

For the English-speaking countries of the Caribbean, only CUBiC, OECS and the second draft of the proposed Trinidad and Tobago Small Building Code were reviewed because most of these countries which have developed or are in the process of developing their national building codes such as Jamaica and St. Lucia have all made reference to the wind and earthquake provisions of CUBiC. In the case of the OECS countries, the OECS model code also makes reference to the wind and earthquake provisions of CUBiC and the St. Lucia Building Code was evaluated as being representative of all the OECS countries. In respect of the proposed Trinidad and Tobago Small Building Code, this was reviewed as it incorporated and updated both the OECS Building Guidelines and appropriate provisions from the International Residential Code.

The Evaluation Forms form part of the present CD-ROM, so that ACS Member Countries can observe which section of their codes is missing or needs updating, and then can use the model codes to update their codes accordingly.

PREPARATION OF A MODEL CODE

In the second part of the project Model Codes for Earthquakes and Wind Loads were drafted, to be used by each State in updating/preparing actual Codes of Practice, inspired by common concepts.

Given the diversity of the situations in each country, the project team decided to prepare conceptual model codes that would not only be complete in their scope, but also capable of allowing the development of actual codes of practice at different levels of complexity.

This step required a clear distinction between principles, to be adopted as the basis of design and safety rules, and recommendations to implement these principles into practical rules.

The conceptual choice of the model codes implied that no reference to specific construction materials and structural systems should be made, since these should be treated at a national or regional level.

Due to their conceptual basis, the Model Codes are intended for use by code makers and authorities, not by single professionals.

RECOMMENDATIONS FOR ENSURING SAFER BUILDING

SEISMIC ZONATION AND WIND SPEED MAPS

The seismic zonation and wind speed maps referred to in the Model Codes should be enforced at the State level, and be possibly based on global comprehensive and consistent scientific studies for the entire Greater Caribbean Region, to avoid inconsistency at the borders between different states. **It is therefore recommended that a “model seismic zonation map” and a “model wind speed map” be developed for the Greater Caribbean Region.**

Seismic zonation and wind speed maps shall be developed using internationally accepted methods, up-to-date data and transparent and repeatable procedures. Periodic revisions should be foreseen.

ENFORCING AND MONITORING THE USE OF A CODE

Countries of the Greater Caribbean Region should **give priority to the strengthening of existing building codes or the development of new codes.**

However, the development or updating of relatively advanced national codes based on the present model codes will not automatically produce a reduction of seismic and wind risks.

Such reduction requires side measures to enforce the use of the code, to monitor its performance, to increase the level of understanding and the specific preparation of professionals and consultants.

Enforcing the use of a code requires making its application mandatory, implying therefore some sort of control of the application of the code in designing, assessment and strengthening, through the **creation of enforcement and inspection mechanisms**. This objective may be pursued by defining strategies and creating special offices in charge of collecting design data, responding to technical questions, and checking the actual and appropriate use of the code in given fractions of the designed and constructed cases. Such fractions of the designed building stock to be checked may be defined for different building importance categories (e.g.: 5 % for importance class IV, 10 % for importance class III, 50 % for importance class II, 100% for importance class I).

To reinforce these building regulations, governments should work with private-sector financial and insurance companies to **encourage the development of financial incentives**, such as premium reductions or reduced-rate loans, for properly constructed buildings using established standards and regulations.

EDUCATION AND DISSEMINATION

The importance of **assuring a high level of competence of the designers** cannot be overemphasized. With the adoption of state-of-the-art building codes throughout the region, building inspectors, designers, engineers, builders and construction workers have to be trained on the new codes. Control measures for the training and the qualification of those actors should also be put in place. It is therefore recommended that all means of increasing the understanding of concepts and rules defined in the codes be exploited. Appropriate measures may include organization of short courses, possibly using e-learning tools, preparation of manuals and on-line helping tools, periodical verification of the effective competence of professionals.

PERIODICAL REVISIONS

It is recommended that a procedure be established for the **periodic updating of the model and national codes**, which should be based on scientific progress and on the results of the monitoring process. These revisions should be considered at time intervals in the range of 5 years with a maximum of 10 years.