SEISMIC CODE EVALUATION

ST. LUCIA

Evaluation conducted by Myron W. Chin

NAME OF DOCUMENT: The St. Lucia Building Code [1.01]
This code is also known as the **Organization of Eastern Caribbean States (OECS) Code**. It has been adapted and adopted by each individual island state as its own code.
It is in this context that it is here also described as the St. Lucia Building Code.
Separate legislation is therefore designed to give it legal standing in each territory.

YEAR: October 2001

GENERAL REMARKS: The principal reference Code is the Caribbean Uniform Building Code (CUBiC) [102]. The Code is administered by the Development Control Authority of St. Lucia and shall take precedence over any other building code or standard.

CONTENTS: The details are set out in the following sections:

SPECIFIC ITEMS:

Note: Bracketed numbers refer to Code's specific chapters or articles. [ ]
Parenthesis numbers refer to item of this document. ( )

1. SCOPE

1.1 Explicit concepts and limitations

[102.1] the code shall apply to design and construction of new buildings and alteration, reconstruction, demolition, removal, relocation, maintenance and occupancy of existing buildings or any appurtenances connected or attached to such buildings or structures.

[102.1] the principal reference code is the caribbean uniform building code (cubic).

[102.2] it is not intended to supersede or amend legislation in force in st. lucia. developer must consult other listed legislation.

1.2 Performance Objectives

No Specific Performance Objectives are given.

EARTHQUAKE LOADS [1203]

1203.1 Basis of Design

a) The record of seismic activity within the last 100 years shows that there have been earthquakes which have created significant damage in some of the islands in the Eastern Caribbean. In the past twenty-five years Islands such as Antigua, St. Kitts and Montserrat have experienced earthquakes which have caused damage to buildings and other property.

b) It is necessary therefore that every building and structure and every portion thereof be designed and constructed in accordance with Part 2 Section 3 of the Caribbean Uniform Building Code (CUBiC) or in

accordance with any other Code or Standard approved by the Director.1

c) For the design of small buildings to resist seismic forces see Section 18 of this Code and Section A of the Building Guidelines.

1203.2 Building Response Data from Future Earthquakes

In order to develop earthquake resistant design recommendations more specific to each of the OECS, building response data must be obtained from future earthquakes. The installation of at least three strong motion accelerographs is recommended in all buildings six storeys or more in height. Where provided, accelerographs are to be distributed between ground and roof.

RECOMMENDATIONS FOR CODE DEVELOPMENT

Since the principal Reference Code is CUBiC which is itself being considered for revision, the OECS Building Code can be considered outdated, and it is recommended that the provisions of the proposed updated CUBiC 2000 should be incorporated into the OECS model code.

[1] *The appropriate zonal coefficient for St. Lucia taken from Table 2.305.1of CUBiC is 0.75*

SEISMIC CODE EVALUATION

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NAME OF DOCUMENT: **OECS Building Guidelines**
(Minimum Standards for the Construction of Small Buildings)

YEAR: 2001

GENERAL REMARKS: Guidelines developed for building and construction in keeping with acceptable building practices in the OECS.

These Guidelines are based primarily on the reports of the construction industry workshops held in 1985 and 1986 in Antigua, Anguilla, British Virgin Islands, Dominica, Montserrat, St. Kitts/Nevis and St. Vincent.

Other engineers and architects in the OECS and the Turks and Caicos Islands have contributed to the present document, building on the work previously carried out by the Pan Caribbean Disaster Prevention Preparedness Program (PCDPPP).

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3.2.1 Location of Openings
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3. EARTHQUAKE AND HURRICANE CONSIDERATIONS

3.1 Earthquake Resistant Construction

3.1.1 General

a) It is widely recognised in the building industry, that many of the Caribbean Islands are in an earthquake zone and have suffered varying degrees of damage due to earthquakes.

b) Because of this situation, buildings must be designed and constructed so that they have some resistance to the shaking or lateral forces produced by earthquakes.

3.1.2 Effect of Soil Type

a) The type of soil at the site may have a significant effect upon the resistance of the building to an earthquake. However for buildings within the scope of these Guidelines the effect of the soil type is not so significant provided that the building is not constructed on loose saturated sands, which may liquefy during an earthquake and cause collapse of the building.

b) The earthquake may also, due to shaking of the ground, compact loose sands or fill material, and if a building is constructed on such material, the building will be damaged.

3.1.3 Effect of High Seas

Buildings on coastal areas may suffer due to high waves produced by earthquakes, and therefore the siting of the building in relation to the sea level is very important.

3.1.4 Building Shape

a) The success with which a building survives an earthquake is greatly affected by its shape in plan, the way the building is tied together and the quality of construction.

b) Most buildings with a simple rectangular shape with no projections (or only short projections) perform well under earthquake conditions provided the construction is adequate.

c) Long narrow buildings should be avoided by limiting the length to three time the width. If the building must be longer, then it should be divided into separate blocks with adequate separation. Figure A-1 illustrates desirable and undesirable plan shapes.

d) Rectangular buildings with well inter-connected cross walls are inherently strong and therefore desirable.

3.1.5 Appendages

Where buildings have decorative or functional additions or appendages such as window hoods, parapets and wall panels etc. extreme care must be taken to ensure that they are securely fixed, since many of such items tend to fall easily and may cause damage during an earthquake.

3.2 Rules for the Construction of Earthquake Resistant Buildings

It is recommended that the following rules be followed for the construction of buildings in earthquake prone areas:

3.2.1 Location of Openings

a) The location and size of openings in walls have a significant effect upon the strength of a wall and its ability to resist earthquake forces.

b) Openings are to be located away from a corner by a clear distance to at least 1/4 of the height of the opening. It is recommended that the minimum distance be 15".

c) The total length of the openings should not exceed 1/2 the length of the wall between consecutive cross walls. (See figure A-2).

d) The horizontal distance between two openings should not be less than 1/2 the height of the shorter opening. (See fig. A-2)

For two storey buildings, the vertical distance from an opening to one directly above it should not be less than 2'-0", nor less than one half the width of the smaller opening.

3.2.2 Masonry Buildings

An important factor contributing to the earthquake resistance of concrete masonry buildings is the detailing and placing of steel reinforcement. The design of a reinforced concrete frame building should be undertaken by experienced engineers. The reinforcing guide given in this section therefore must only be used for simple single storey buildings constructed of good quality concrete blocks.

The minimum quantities of reinforcing to be used, have been set out in Section B Subsection 3.4. The following is a checklist which should be used to ensure that all necessary steps have been taken:

a) Vertical reinforced columns should be placed in all masonry walls with a maximum dimension between columns of 16 ft.

b) All exterior walls should be reinforced as shown in 3.4 of Section B. Interior walls also require reinforcement for earthquakes.

c) All vertical wall reinforcement must be securely fixed to the foundation and belt course.

d) Where vertical reinforcement is not a continuous bar, adequate lap lengths are to be provided and securely tied. (See Table B-1). Minimum lap length for a 3/8" bar should be 1'-6".

e) Reinforced block work cores are to be filled after the laying of every three courses with well compacted concrete, or poured grout.

f) In addition to the minimum vertical wall reinforcement, All the corners and junctions of the wall will be reinforced (Figs A-3 and A-4).

g) All vertical reinforcement is to be securely fixed to the ring beam. Horizontal reinforcement must be placed every 3 courses.

h) Window and door jambs should be reinforced and tied into the lintels.

i) Gable walls are to be reinforced by bars fixed to the concrete beam at eaves height and to the sloping ring beam at the top of the gable. (Fig. A-5).

3.2.3 Timber Buildings

Although the foregoing principles apply to concrete block buildings, there are two additional areas of concern with respect to timber buildings:

a) All corners and intersections must be adequately braced.

b) Earthquake forces tend to remove timber buildings from their supports by shaking. Because of this it is important to securely fasten sills to foundations.

3.2.4 Steel Buildings

a) While steel buildings are generally beyond the scope of these Guidelines, it should be noted that the natural ductility of steel protects the frame itself from severe damage.

b) However, in many cases concrete block walls are used and the precautions already listed for these walls will apply. The wall reinforcement must now be anchored by welding to the steel columns and beams, or the steel frame encased in concrete in which case the wall reinforcement can be tied into the concrete cage encasing the steel frame.

RECOMMENDATIONS FOR CODE DEVELOPMENT

Since the Small Buildings Code of Trinidad and Tobago (SBCTT) has included and updated most of the provisions of the OECS Building Guidelines, it is recommended that the provisions of the proposed SBCTT should be incorporated into the OECS Building Guidelines.