

**CODE OF PRACTICE FOR THE  
CONSTRUCTION OF HOUSES: AN  
INSTRUCTION MANUAL FOR FOREMEN  
AND EXPERIENCED ARTISANS**

**PART 1: TRAINER'S MANUAL**



Agence canadienne de  
développement international  
Canadian International  
Development Agency



Organization of  
American States

# **Code of Practice for the Construction of Houses: An Instruction Manual for Foremen and Experienced Artisans**

## **Part 1: Trainer's Manual**

**CARIBBEAN DISASTER EMERGENCY RESPONSE AGENCY  
(CDERA)**

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## Foreword

The Code of Practice for the Construction of Houses: An Instruction Manual for Foremen and Experienced Artisans was prepared by the CARICOM Regional Organisation for Standards and Quality (CROSQ) through its Technical Management Committee. The Code of Practice is based upon previous initiatives in the Caribbean to address Safe Building in the informal and formal sector. The Trainer's and Student's Manual were developed by the Caribbean Disaster Emergency Response Agency (CDERA) with the assistance of the Organisation of American States (OAS) and funding support from the Canadian International Development Agency (CIDA) under the Caribbean Hazard Mitigation Capacity Building Programme (CHAMP).

Through CHAMP there has been an assessment of the quality of existing building practices in the informal sector, the opportunities for training, the capacity of local technical institutes, the level of existing building standards and the framework for development control and review. This assessment has established a baseline of existing training activities in the informal sector which has informed the development of a Safer Building curriculum for training.

The curriculum has been based upon the contents of the Organisation of Eastern Caribbean States (OECS) Building Guidelines and has been tested at the regional level through a regional train-the-trainers workshop in Grenada and a national train-the-trainers workshop in Belize in April 2005. Subsequently, the curriculum has been refined and has been used to deliver national training in the CHAMP pilot states of Belize, Grenada and St. Lucia; and the British Virgin Islands. A technical working group consisting of regional trade schools who would ultimately teach the curriculum, as well as lending institutions which offer residential mortgages around the Caribbean was established by CDERA to elaborate upon the Safer Building course curriculum. The course was approved by the CDERA Thematic Cooperating Group on Safer Building. Further technical support was provided by the Organisation of American States (OAS) and the membership of the CDERA Thematic Cooperating Group on Safer Building, who assisted in review of the document.

In August, 2005 CDERA initiated discussions with the CARICOM Regional Organisation for Standards and Quality (CROSQ) Technical Management Committee regarding acceptance of its Safer Building Course. In November, 2005 a special CROSQ Technical Management Committee meeting was convened to review the curriculum, student's manual and trainer's manual of the Safer Building Course. CDERA revised the document to reflect recommendations of the Technical Management Committee and the documents were re-circulated to stakeholders for further comments. On February 15, 2006 the CROSQ Editorial Committee was convened to edit the document now renamed Code of Practice for the Construction of Houses: An Instruction Manual for Foremen and Experienced Artisans – Part 1: Trainer's Manual and has been referred to the CROSQ Council March 9-10, 2006 for endorsement.

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This document has been drafted in accordance with the ISO/IEC Directives, Part 2: Rules for the structure and drafting of International Standards. This document is Part 1 in the two part series- Code of Practice for the Construction of Houses: An Instruction Manual for Foremen and Experienced Artisans and should be read in conjunction with the Code of Practice for the Construction of Houses: An Instruction Manual for Foremen and Experienced Artisans - Part 2: Student's Manual. The next maintenance date for this document is April, 2009.

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**Acknowledgements**

The Caribbean Disaster Emergency Response Agency (CDERA) wishes to convey its sincere appreciation and profound gratitude to its many partners who contributed to the successful development of the first Code of Practice for the Construction of Houses: An Instruction Manual for Foremen and Experienced Artisans in the Caribbean.

A technical working group was established by CDERA through Consulting Engineers Partnership Ltd. (CEP) to elaborate upon the Code of Practice for the Construction of Houses course curriculum and training materials. Participants included the Samuel Jackman Prescod Polytechnic; Barbados, Technical & Vocational Education & Training Council; Barbados, Centre for Employment Training; Belize, T A Marryshow Community College; Grenada, St Patrick's Multi Purpose Centre; Grenada, H. Lavity Stoutt Community College; British Virgin Islands, Sir Arthur Lewis Community College; St Lucia, University of Technology, Jamaica; Insurance Association of the Caribbean; the Caribbean Association of Indigenous Banks; and the CARICOM Regional Organisation for Standards and Quality (CROSQ). Further technical support was provided by the Organisation of American States (OAS) and the membership of the CDERA Thematic Cooperating Group on Safer Building, who assisted in the review of the document.

In addition the CARICOM Regional Organisation for Standards and Quality (CROSQ) through its Technical Management Committee and Editorial Committee facilitated finalisation of the document.

The production of this document has been made possible by the financial support of the Canadian International Development Agency (CIDA).

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## Introduction

The geographic location of the Caribbean region, which has been the source of its appeal for its residents and visitors alike, is also the basis of its vulnerability to natural hazards such as tropical storms, hurricanes, flooding, volcanic eruptions, fires and land slippages. Within the region, direct and indirect damages from natural hazards over the past thirty years have been estimated at between US\$700 million and \$3.3 billion annually.

A large portion of the wealth of any nation is invested in its built environment: housing, infrastructure, industrial and commercial facilities. Statistics indicate that in recent times there has been an increase in damage due to inappropriate building practices (both construction methods and materials) and improper siting which have been primarily driven by commerce. The development of a building regulatory system (building codes, land use and development plans, and an inspection mechanism) plays an important role in ensuring the quality of the built environment.

A large percentage of houses in the Caribbean are constructed by the informal building sector which operates outside the formal construction industry which is regulated by the standards of building and planning authorities. This sector is dominated by small contractors and builders with little regard for building standards and codes. Moreover, many practitioners within the sector, in most instances, have never received formal skills training or certification. Training for individuals in all parts of the construction industry in appropriate building techniques is an important counterpart to codes and regulations and can significantly enhance the quality of this very vulnerable sector of the housing market.

Building upon the foundation created by previous Caribbean initiatives such as the Organisation of American States (OAS) led Caribbean Disaster Mitigation Project (CDMP) and the Post Georges Disaster Mitigation Project (PGDM) in both the formal and informal building sectors, the Caribbean Hazard Mitigation Capacity Building Programme (CHAMP) was developed in 2001 as a mechanism through which many of the lessons learnt and gains of past initiatives could be consolidated and advanced. The three year Canadian International Development Agency (CIDA) funded CHAMP program recognized the gaps in these various interventions and sought to produce a cadre of regional building professionals who are certified in safer building techniques within the informal sector, as well as materials suppliers who stock safer building materials.

To be successful, recognition of the certification process must be achieved at the level of CARICOM for the movement of skills within the Caribbean Single Market and Economy (CSME) and so as a first step CDERA initiated discussions with the CARICOM Regional Organisation for Standards and Quality (CROSQ) to obtain their support for a common accredited Caribbean residential construction curriculum that would be the basis of the artisan's regional certification. Based on recommendations from the CROSQ Technical Management Committee the Safer Building Curriculum

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has been revised to a Code of Practice for the Construction of Houses: An Instruction  
Manual for Foremen and Experienced Artisans.

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## 1 Scope

The Code of Practice for the Construction of Houses Course is designed to certify residential contractors so that they can construct homes in the Caribbean that are less vulnerable to natural hazards. This requires that they be familiar with high standards of construction planning, construction materials and construction methods. This Trainer's Manual provides information on training and evaluation principles for adult learners, and should be read in conjunction with the Code of Practice for the Construction of Houses: An Instruction Manual for Foremen and Experienced Artisans - Part 2: Student's Manual. All of the self-explanatory adult learning principals should be addressed in the formal training sessions in order to maximize the effectiveness of the course.

Part 2 of the Code will be available on CDERA's web site ([www.cdera.org](http://www.cdera.org)) in a downloadable Adobe PDF format. Students can download and print the document, or the training institution can print copies and provide them to the students, or the document can be projected from a computer to a screen in the classroom.

The Code does not include plumbing or electrical requirements.

## 2 Normative references

The following documents were used in the preparation of the Code.

- Barbados National Standards Institute, Barbados National Building Code, 1993
- Organisation of Eastern Caribbean States, Grenada Building Guidelines, 1999
- Virgin Islands, Building Regulations, 1999
- Belize Chamber of Commerce and Industry, Belize Residential Construction Standards, 1999

## 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

### 3.1

Adult-learning principles  
principles that facilitate learning by adults.

### 3.2

Module  
section of the course that may be linked to other sections.

## **4 General Principles**

### **4.1 Objective**

The objective of the Code is to provide sufficient relevant information to residential construction foremen, to allow them to properly direct construction methods and select construction materials, in order to construct homes in the Caribbean that are less vulnerable to natural hazards.

### **4.2 Training principles**

The class participants are adults with at least 2 years of construction experience, and who may be working while taking the course. The trainer should incorporate the following relevant adult-learning principles in the training process:

- a) allowing participants to share practical experiences to add value to the training processes;
- b) the accessing of information which has direct application to the immediate needs of the participants in order to improve performance and to solve problems;
- c) allowing participants to challenge and question information to support acceptance of that information;
- d) respecting the opinions of participants;
- e) allowing participants adequate time to think about new information in order to critically analyse it;
- f) encouraging participants to integrate new ideas and information with existing ones and to continually use that new information;
- g) focusing training on one subject at a time, with emphasis on applications to problems.

This Code has been written to accommodate adult learners and it partially addresses principles b, f, and g.

### **4.3 Training Methods**

The following format should be applied.

- a) The participants should be encouraged to share their experiences at the beginning of each training session. Areas recommended for discussion are construction planning, materials, and methods relevant to the module being discussed.
- b) The information in the module under consideration should then be presented, with opportunities for the students to ask questions at the end of each training session.

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- c) Participants should describe the construction methods that they employ before the specified Construction Method is introduced in order to understand the gaps in their current practice.
- d) No more than one module should be presented during a classroom session.
- e) Participants should visit active construction sites in order to identify the ideas presented in the last module.

#### **4.4 Responses to questions from participants**

The Trainer should not be intimidated by the participants' questions or comments, especially when their experience of construction standards exceeds that described in the Code. It must be noted that the Code contains minimum standards, and it is acceptable if participants propose higher standards. In discussing the issue of higher standards, the building construction costs should be considered.

Questions from participants on information not covered in Part 2 of the Code should be referred to the publisher by the trainer<sup>1</sup>. The trainer should respond to the participants' questions during the following class.

### **5 Evaluation principles**

Cognitive, psychomotor, and affective learning components should be tested in order to examine knowledge, the development of psychomotor skills, and attitudes and values respectively.

#### **5.1 Evaluation Methods**

5.1.1 Cognitive learning can be tested through oral or written examination in the classroom. Participants should demonstrate their ability to:

- a) understand and recall the construction planning information;
- b) identify and select good quality construction materials;
- c) understand and recall construction methods.

5.1.2 Affective learning can be tested in the classroom and on the construction site. The participants' attitudes to the course are measured by their willingness to implement appropriate construction standards as described in Part 2 of the Code.

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<sup>1</sup> Trainers are encouraged to advise the publisher of any gaps in Part 2 of the Code. Comments or questions should be directed to the Safer Building Course's, web site address [www.crosq.org](http://www.crosq.org), E-mail address: [saferbuildingcourse@crosq.org](mailto:saferbuildingcourse@crosq.org) or by fax [number], for an appropriate and timely response.  
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5.1.3 Psychomotor learning is tested at the construction site. The Trainer should visit the construction sites at which the participants are working and evaluate their work methods in accordance with Part 2 of the Code.

The participants' performance may be assessed at the end of the course in order to eliminate the stresses associated with continuous assessment.

**6 Quality assurance examinations**

The final examination will be managed by an appropriate regional agency.

End.

**Annex A**  
(normative)  
**Course curriculum**

**A.1 Introduction**

This course curriculum outlines the aims, content and objectives of the course on safer building which is intended to improve the technical knowledge of participants who wish to direct residential construction activities.

**A.2 Skills and Abilities to be Assessed**

The curriculum is designed to test the skills and abilities of the participants in relation to two cognitive levels:

- a) procedural knowledge – that is the ability to recall, select, and use a particular construction activity within the context of its correct position in the sequence of relevant construction activities;
- b) consequential knowledge – that is the ability to recall, select and use a construction activity to avoid or reduce the risk of damage.

**A.3 Prerequisites of the Course**

The following are pre-requisites of this course:

- a) a certificate in masonry or carpentry followed by employment in the construction industry as an artisan or a foreman for a cumulative period of not less than two years; or
- b) employment in the construction industry as an artisan or a foreman for a cumulative period of not less than four years.

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#### A.4 Structure of the Course

The Code of Practice for the Construction of Houses Course is organised in eight modules as shown in Table A.1

**Table A.1 – Proposed course structure**

<b>Module</b>	<b>Number of contact hours (h)</b>	<b>Number of site visits (SV)</b>
1. Course introduction/orientation	1	0
2. Pre-construction planning	3	1
3. Site preparation	3	1
4. Foundations	4	1
5. Floors	3	1
6. Walls	3	1
7. Roofs	5	1
8. Post construction maintenance	3	1
<b>Total</b>	<b>25</b>	<b>7</b>

Each module should be at least 3 hours of classroom instruction and should include at least one site visit. The total time for the completion of the course should be not less than 25 contact hours and seven site visits. Since the participants will most likely be employed during the day, the classes may be offered in the evening, with no more than one module per week, resulting in an eight week course.

Certification should be provided to those participants who can demonstrate an understanding of at least 80 % of the subject matter in each of the modules.

#### A.5 Objectives of the Course

By the end of this course students should be able to:

- Recall, select and use a particular construction activity within the context of its correct position in the sequence of relevant construction activities;
- Recall, select and use a construction activity to avoid or reduce the risk of damage
- Outline safer construction methods which, when used can enable structures to withstand natural hazards
- Identify and select good quality construction materials for use in ensuring that buildings are constructed using safer building methods
- Design and implement construction plans to be applied to real life situations

### **A.5.1 Module 1: Course introduction**

The course introduction is an orientation to the course where the participant's expectations are received and the responsibilities and benefits of the course are explained.

#### **A.5.1.1 Aims**

This module aims to provide participants with sufficient information to allow them to:

- a) develop enough interest in the course so that they would commit to attending every class;
- b) appreciate the importance of all residential construction activities.

### **A.5.2 Module 2: Pre-construction planning**

Proper attention to pre-construction planning can facilitate the timely and cost effective completion of a well-constructed building. The converse is also true. This section will explore the pre-construction planning activities that are relevant to builders, and will provide the participant with sufficient knowledge to effectively plan the building project.

#### **A.5.2.1 Aims**

This section aims to provide participants with sufficient information to allow them to, *inter alia*:

- a) effectively manage the building project;
- b) utilize good quality building materials;
- c) construct structurally sound building elements;
- d) effectively connect the building elements together;
- e) construct a house with a low vulnerability to natural hazards.

#### **A.5.2.2 Topics**

The following topics are contained within this module.

- a) Planning approval process
- b) Contract with the client
- c) Safe construction
- d) Quality of materials
- e) Quality of joints
- f) Structural Stability

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**A.5.2.3 Objectives**

Participants should be able to:

- a) explain the possible consequences of starting construction without Government planning approval;
- b) complete a construction contract with a client;
- c) explain how to deal with variations to the construction contract;
- d) explain how to specify quality materials;
- e) explain how to protect structural members;
- f) explain how to connect structural elements together.

**A.5.3 Site preparation**

**A.5.3.1 Aims**

This section aims to provide participants with sufficient information to allow them to, *inter alia*:

- a) identify vulnerable building areas;
- b) identify how to reduce the vulnerability of a proposed building;
- c) properly lay out a building;
- d) properly store materials;
- e) properly construct an access road.

**A.5.3.2 Topics**

The following topics are contained within this module.

- a) Site condition
- b) Clearing the site
- c) Setting out
- d) Storing materials
- e) Access Roads

**A.5.3.3 Objectives**

Participants should be able to explain:

- a) vulnerable areas and how to mitigate the risk;
- b) potential consequences of inaccurately setting out;
- c) the consequences of improperly storing construction materials;
- d) the access road construction procedure.

#### **A.5.4 Module 4: Foundations**

##### **A.5.4.1 Aims**

This section aims to provide participants with sufficient information to allow them to, *inter alia*:

- a) select an adequate foundation type;
- b) understand how each foundation type is constructed;
- c) understand reinforcement laps;
- d) understand when to seek engineering advice.

##### **A.5.4.2 Topics**

The following topics are contained within this module.

- a) Excavations
- b) Timber post foundations
- c) Pad Footings
- d) Strip Footings
- e) Raft Foundation

##### **A.5.4.3 Objectives**

Participants should be able to explain the suitability and construction procedure for each foundation type.

#### **A.5.5 Module 5: Floors**

##### **A.5.5.1 Aims**

This module aims to provide participants with sufficient information to allow them to, *inter alia*:

- a) Select an adequate floor type;
- b) Understand how each floor type is constructed.

##### **A.5.5.2 Topics**

The following topics are contained within this module.

- a) Raft foundation with ground floor slab
- b) Reinforced concrete ground floor slab supported on strip footings
- c) Suspended reinforced concrete floor slab on reinforced concrete pad footings
- d) Suspended timber floor supported on reinforced concrete beams (on strip footings)
- e) Suspended timber floor supported on reinforced concrete columns (on pad footings)

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**A.5.5.3 Objectives**

Participants should be able to explain the suitability and construction procedure for each floor type.

**A.5.6 Module 6: Walls**

**A.5.6.1 Aims**

This module aims to provide participants with sufficient information to allow them to, *inter alia*:

- a) Select an adequate wall type;
- b) Understand how each wall type is constructed.

**A.5.6.2 Topics**

The following topics are contained within this module.

- a) Concrete block walls
- b) Timber walls

**A.5.6.3 Objectives**

Participants should be able to explain the suitability and construction procedure for each wall type.

**A.5.7 Module 7: Roofs**

**A.5.7.1 Aims**

This module aims to provide participants with sufficient information to allow them to, *inter alia*:

- a) Select an adequate roof type;
- b) Understand how each roof type is constructed;
- c) Repair a roof lost to high winds.

**A.5.7.2 Topics**

The following topics are contained within this module.

- a) Timber structure on new concrete block wall
- b) Timber structure on existing concrete block wall
- c) Timber structure on timber wall
- d) Repairing a roof lost to high winds

**A.5.7.3 Objectives**

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Participants should be able to: explain the suitability and construction procedure for each roof type, describe the method of installing a new roof on an existing reinforced concrete beam, and to describe the construction procedure for reinstalling a roof.

**A.5.8 Module 8: Post-construction maintenance**

**A.5.8.1 Aims**

This module aims to provide participants with sufficient information to allow them to, *inter alia*, understand that maintenance is but one part of the construction cycle.

**A.5.8.2 Topics**

The following topic is contained within this module.

- a) Maintenance inspections

**A.5.8.3 Objectives**

Participants should be able to explain the types of maintenance inspections and associated remedial actions.

End.