PROFESSIONAL DEVELOPMENT PROGRAMME:
COASTAL INFRASTRUCTURE DESIGN, CONSTRUCTION AND MAINTENANCE

A COURSE IN
COASTAL DEFENSE SYSTEMS II

Organized by Department of Civil Engineering, The University of the West Indies, in conjunction with Old Dominion University, Norfolk, VA, USA and Coastal Engineering Research Centre, US Army, Corps of Engineers, Vicksburg, MS, USA.

Dominica, West Indies, July 30 – August 3, 2001
Acknowledgments

The organizing committee for the Coastal Defense Systems I course wishes to acknowledge the following, who have made invaluable contribution toward the staging of this course:

The United States Agency for International Development USAID-Jamaica for providing the funds for hosting this training programme.

The Organization of American States, through its Unit for Sustainable Development, for its invaluable support and advice especially in obtaining personnel for lecture material and presentation for the various lectures. They have also assisted in maintaining the momentum and ensuring that the course objectives were achievable.

The contributors to the notes and the presentation material for their enthusiasm and demonstration of commitment to the development of regional experts for addressing the problems in the Caribbean.

The administrative staff for their tireless work toward the organization of the course, sometimes at major personal sacrifices.
Contributors

DAVE BASCO, PhD, Professor, Department of Civil and Environmental Engineering and Director, the Coastal Engineering Centre at Old Dominion University, Norfolk, VA.

RAYMOND CHARLES, Senior Lecturer, Head of Department, Department of Civil Engineering, The University of the West Indies, St. Augustine Campus, Trinidad, West Indies.

JACK DAVIS, Coastal Hydraulics Laboratory, US Army Corps of Engineers, Vicksburg, MA, USA.

DAVID SMITH, PhD, Smith Warner International Limited, Consulting Engineers, Kingston, Jamaica.
Advisory Board

Mr. Jan Vermeiren, *Organization of American States*

Mr. Mansfield Blackwood, *US-AID*

Mr. Compton Deane, *Consultant*

Mr. Raymond Charles, *The University of the West Indies (UWI)*

Mr. Winston Rajpaulsingh, *UWI*

Dr. Gyan Shrivastava, *UWI.*

Dr. Derek Gay, *UWI*

Mr. Vincent Cooper, *UWI*

Dr. David Smith, *Consultant*

Mr. Norman Allyn, *Consultant*
FOREWORD

This course on coastal defense systems, which is being delivered in two parts in St. Lucia and Dominica respectively, is the second in a series of four short courses in the Coastal Infrastructure Design Construction and Maintenance (CDCM) professional development training programme being offered between June and September 2001. The first part of this course, which took place in St. Lucia, covered the underlying theoretical concepts of Coastal Engineering. The second part of this course, which is being held in Dominica, covers the design, construction and maintenance aspects of coastal defense works and coastal infrastructure. This programme is a first step toward systematically building the capability of the Caribbean region to adequately address its coastal infrastructure. The vulnerability of this infrastructure was realised in the aftermath of Hurricane Lenny in November 1999, which has served to galvanize efforts within the region toward mitigating the impacts from hurricanes and other natural disasters. The training programme aims at providing an understanding of the processes that may trigger failure and the approaches available toward increasing the effective life of the coastal infrastructure. The main focus of this course is towards the engineering design of coastal defense systems and coastal infrastructures. These range from sea walls and breakwaters to marinas, moorings, and piers.

Lecture notes presented in this course have been prepared by eminent international and Caribbean experts; who have taken into account the peculiarities—physical, economic, social and cultural—of the Caribbean environment. The experts, from the United States, the University of the West Indies and a regional consulting engineer, have provided sound approaches which should be adaptable to our Caribbean islands. It is the intention of the course, that with discussion and interaction among the group of experts and the participants, that these approaches can be adapted for providing effective coastal solutions to the Caribbean islands.

These course notes were edited by the course coordinator, Dr. Gyan S. Shrivastava.
PROFESSIONAL DEVELOPMENT PROGRAMME:
COASTAL INFRASTRUCTURE DESIGN, CONSTRUCTION AND MAINTENANCE

A COURSE IN COASTAL DEFENSE SYSTEMS II

Table of Contents

Acknowledgments
Contributors
Advisory Board
Table of Contents
Foreword to Coastal Defense Systems I

1. Life Cycle Design
   Dave Basco 1

2. Design of Coastal Structures
   Jack Davis 2

3. Design of Coastal Roads
   Raymond Charles 3

4. Design of Coastal Defense Works
   David Smith 4