Chapter 10: Introduction to Volume II

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Introduction to Volume II

10.1 Purpose and Organization

Volume II of this *Coastal Construction Manual* provides information on determining site-specific loads and designing, constructing, and maintaining a residential building in a coastal area. This volume builds on the background information contained in Volume I and provides detailed guidance for constructing buildings that will resist the damaging effects of natural hazards.

As stated in Chapter I, Volume I, this manual is intended to address new residential buildings—principally detached single-family, attached single-family (townhouses), and low-rise (three-story or less) multi-family buildings. Detailed discussions and example problems are provided for buildings located in or near coastal flood hazard areas, in a variety of coastal environments and subject to flooding, erosion, high winds, seismic activity, and other hazards.

This manual will be of assistance to all persons involved in the design and construction of one- to three-story residential buildings in coastal areas of the United States. Contractors, designers, architects, engineers, and building officials can apply the information presented in this manual as they strive to site, construct, and maintain disaster-resistant housing.

Volume I of this *Coastal Construction Manual* presents a history of coastal disasters in the United States, an overview of the U.S. coastal environment, and fundamental considerations for constructing a building in a coastal region, including hazard identification, risk assessment, and the financial and insurance implications of siting, design, and construction.

Volume II contains information on the following:

- determining site-specific loads at a building site
- evaluating design and construction techniques to reduce the damage potential of hazards and to accommodate loads from these hazards
- maintaining the completed building so that it will continue to resist damage from natural hazard events

Remember: this manual, at times, will recommend and advocate techniques that exceed the minimum requirements of model building codes, design and construction standards, or Federal, state, and local regulations. However, the authors of the manual are aware of the implications of such recommendations and make them on the basis of careful review of building practices and building performance.

Several chapters of this manual include example problems that help demonstrate decisions and calculations designers must make to reduce the potential for damage from natural hazard events. The manual also presents numerous examples of siting, design, and construction practices—both good and bad—to illustrate the results and ramifications of those practices. The intent is twofold: (1) to highlight the benefits of practices that have been employed successfully by communities, designers, or contractors and (2) to warn against practices that have resulted in unnecessary damage or loss of coastal residential buildings.

Because of its size, this manual is divided into three volumes, with 14 chapters and appendixes, divided as follows:

Volume I

Chapter 1 – Introduction. This chapter describes the purpose of the manual, provides an overview of the manual's contents and organization, and explains how icons and summary tables are used throughout the manual to guide and advise the reader.

Chapter 2 – Historical Perspective. This chapter provides short summaries of selected coastal flood events, including findings of post-event evaluations, and it documents the causes and types of damage associated with storms and tsunamis ranging from the 1900 hurricane that struck Galveston, Texas, to Hurricane Georges, which struck Puerto Rico and the U.S. Gulf coast in September 1998.

Chapter 3 – Coastal Environment. This chapter provides an introduction to coastal processes, coastal geomorphology, and coastal hazards. Regional variations for the Great Lakes, north Atlantic, mid-Atlantic, south Atlantic, Gulf, Pacific, Alaska, Hawaii, and U.S. territories are discussed.

Chapter 4 – Fundamentals. This chapter provides an overview of acceptable levels of risk; tradeoffs in decisions concerning siting, design, construction, and maintenance; and cost and insurance implications that need to be considered in coastal construction.

Chapter 5 – Identifying and Evaluating Site Alternatives. Detailed discussions of the coastal construction process begin in this chapter, which presents information on which to base the selection of a site for a coastal residential building.

Chapter 6 – Investigating Regulatory Requirements. This chapter discusses Federal, state, and local regulations, including the National Flood Insurance Program (NFIP), Coastal Barrier Resources Act, and Coastal Zone Management programs, which may affect construction on a building site.

Chapter 7 – Identifying Hazards. This chapter provides information on hazards that will influence construction of a coastal building, including coastal storms, erosion, tsunamis, and earthquakes, and their effects.

Chapter 8 – Siting. This chapter describes factors that should be considered in the selection of building sites, including small parcels within already developed areas, large parcels of undeveloped land, and redevelopment sites. Also provided is guidance that will assist designers and contractors in determining how a building should be placed on a site. The topics covered include site conditions, the location and orientation of the building in relation to hazards at the site, and the effects of adjacent buildings, topography, and erosion control structures.

Chapter 9 – Financial and Insurance Implications. This chapter includes explanations of short-term and lifecycle costs associated with alternative decisions regarding siting, design, and construction. Included is a discussion of different types of hazard insurance and the effects that decisions regarding where and how to build have on insurance purchase requirements and rates, including premium discounts. This chapter lays the foundation for sound design and construction decisions.

Volume II

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Chapter 11 – Determining Site-Specific Loads. This chapter provides information on calculating site-specific loads, including loads from high winds, flooding, seismic events, and tsunamis, as well as combinations of more than one load.

Chapter 12 – Designing the Building. This chapter provides designers and builders with information needed to design each part of a building to withstand the expected loads. Topics covered include structural failure modes, load paths, building systems, application of loads, structural connections, the building envelope, utilities, and appurtenant structures.

Chapter 13 – Constructing the Building. This chapter provides information needed to properly construct a building in a coastal area. Information is provided on ways to avoid common construction mistakes that may lessen the ability of a building to withstand a natural disaster.

Chapter 14 – Maintaining the Building. This chapter explains special maintenance concerns for new and existing buildings in coastal areas. Methods to reduce damage from corrosion, rot, fatigue, and weathering are provided along with descriptions of building elements that require frequent maintenance.

Volume III

Volume III contains the appendixes referred to in Volumes I and II.

10.2 Important Reminders

There has been an explosion in coastal development, leading to greater numbers of structures at risk. Many of the residential buildings being constructed today are larger and more valuable than those of the past, leading to the potential for larger economic losses when disasters strike. The increase in coastal development has also brought about greater use of sites in areas where the risk is higher, such as lots closer to the ocean, lots on high bluffs subject to erosion, or lots artificially created on fill deposits.

Regulatory requirements have expanded over the past decade. More communities require compliance with model building codes. More states and communities, in implementing the Coastal Zone Management Act, have instituted construction setbacks and coastal resource protection programs. More jurisdictions require geotechnical studies and certifications from design professionals for construction along the coastline. Finally, more communities participate in the NFIP, which requires that plans for new homes constructed in coastal high hazard areas be certified by a design professional.

Investigations conducted by FEMA and other organizations after major coastal disasters have consistently shown that properly sited, well-designed, and well-constructed coastal residential buildings generally perform well. This *Coastal Construction Manual* is intended to aid the designer, contractor, and community official with the identification and evaluation of practices that will improve the quality of construction and reduce the economic losses associated with coastal disasters.