IN-LB	Inch-Pound Units
SI	International System of Units

Design and Construction of Waterfront and Coastal Concrete Marine Structures—Guide

Reported by ACI Committee 357

ACI PRC-357.3-25

American Concrete Institute
Always advancing

First Printing: September 2025
ISBN: 978-1-64195-331-3

Design and Construction of Waterfront and Coastal Concrete Marine Structures—Guide

© 2025 American Concrete Institute. All rights reserved.

This material may not be reproduced or copied, in whole or in part, in any form or by any means, including making copies by any photo process, or by electronic or mechanical device, printed, written, graphic, or oral, or recording for sound or visual reproduction for use in any knowledge or retrieval system or device, without the written consent of ACI. This material may not be used by data mining, robots, screen scraping, or similar data gathering and extraction tools such as artificial intelligence ("AI") for purposes of developing or training a machine learning or AI model, conducting computer analysis or creating derivatives of this material, without the written consent of ACI.

The technical committees responsible for ACI committee reports and standards strive to avoid ambiguities, omissions, and errors in these documents. Despite these efforts, the users of ACI documents occasionally find information or requirements that may be subject to more than one interpretation or may be incomplete or incorrect. Users who have suggestions for the improvement of ACI documents are requested to contact ACI via the errata website at http://concrete.org/Publications/DocumentErrata.aspx. Proper use of this document includes periodically checking for errata for the most up-to-date revisions.

ACI committee documents are intended for the use of individuals who are competent to evaluate the significance and limitations of its content and recommendations and who will accept responsibility for the application of the material it contains. Individuals who use this publication in any way assume all risk and accept total responsibility for the application and use of this information.

All information in this publication is provided "as is" without warranty of any kind, either express or implied, including but not limited to, the implied warranties of merchantability, fitness for a particular purpose or non-infringement.

ACI and its members disclaim liability for damages of any kind, including any special, indirect, incidental, or consequential damages, including without limitation, lost revenues or lost profits, which may result from the use of this publication.

It is the responsibility of the user of this document to establish health and safety practices appropriate to the specific circumstances involved with its use. ACI does not make any representations regarding health and safety issues and the use of this document. The user must determine the applicability of all regulatory limitations before applying the document and must comply with all applicable laws and regulations, including but not limited to, United States Occupational Safety and Health Administration (OSHA) health and safety standards.

Participation by governmental representatives in the work of the American Concrete Institute and in the development of Institute standards does not constitute governmental endorsement of ACI or the standards that it develops.

ACI documents are written via a consensus-based process. The characteristics of ACI technical committee operations include:
(a) Open committee membership
(b) Balance/lack of dominance
(c) Coordination and harmonization of information
(d) Transparency of committee activities to public
(e) Consideration of views and objections
(f) Resolution through consensus process

The technical committee documents of the American Concrete Institute represent the consensus of the committee and ACI. Technical committee members are individuals who volunteer their services to ACI and specific technical committees.

American Concrete Institute®, ACI®, and Always Advancing® are registered trademarks of American Concrete Institute.

American Concrete Institute, 3880 Country Club Drive, Farmington Hills, Michigan 48331.
Telephone: +1.248.848.3700. Facsimile: +1.248.848.3701
www.concrete.org

ACI PRC-357.3-25

Design and Construction of Waterfront and Coastal Concrete Marine Structures—Guide

Reported by ACI Committee 357

Jeremiah D. Fasl, Chair

Widianto, Secretary

Erik Åldstedt
Domenic D'Argenzio
Raymond R. Foltz
Kjell Tore Fosså
Michael J. Garlich
Anton Magne Gjorven
Kare Hjorteset
Jonathan Hurff
Mohammad S. Khan
Jonah C. Kurth
Abbas Mokhtar-zadeh
Robert Moser
Jose Pacheco*
Barry J. Pecho
Jorge L. Quiros, Jr.
Felipe Saavedra
Watsamon Sahasakkul
Joar Tistel
Samuel X. Yao

*Chair of the Task Group that prepared this guide.

Waterfront and coastal concrete marine structures are exposed to severe environmental conditions for which concrete is ideally suited. These conditions include wind; waves, including seiches and tsunamis; ice and ship impact; abrasion and impact from floating debris; passing vessel effects; and seismic events. As many of these structures are pile-supported, the seismic loading can be critical and, therefore, a discussion of piles and their installation is included in this guide. Also provided are the measures that can be taken to minimize the undesirable effects of these environmental factors and reduce the potential for serious problems.

This guide also defines waterfront and coastal concrete marine structures, discusses materials that can be used to construct them, describes potential durability issues and how to mitigate them, and presents sustainability and serviceability requirements. Design loads, analysis techniques, design methodology, and construction considerations are also presented. Other topics include quality control (QC), above-water and below-water inspection of these structures, and repair of damaged structures. The materials, processes, QC measures, and inspections described in this guide should be tested, monitored, or performed as applicable only by qualified individuals holding the appropriate ACI certifications or equivalent.

Keywords: construction procedures; durability; inspection; marine structures; materials; quality control; serviceability; structural analysis; structural design; sustainability.

ACI Committee Reports and Guides are intended for guidance in planning, designing, executing, and inspecting construction. This document is intended for the use of individuals who are competent to evaluate the significance and limitations of its content and recommendations and who will accept responsibility for the application of the information it contains. ACI disclaims any and all responsibility for the stated principles. The Institute shall not be liable for any loss or damage arising therefrom. Reference to this document shall not be made in contract documents. If items found in this document are desired by the Architect/Engineer to be a part of the contract documents, they shall be restated in mandatory language for incorporation by the Architect/Engineer.

CONTENTS

CHAPTER 1—GENERAL, p. 2
1.1—Introduction, p. 2
1.2—Scope, p. 2

CHAPTER 2—NOTATION AND DEFINITIONS, p. 3
2.1—Notation, p. 3
2.2—Definitions, p. 3

CHAPTER 3—GENERAL TYPES AND STRUCTURAL CONFIGURATIONS OF CONCRETE MARINE STRUCTURES, p. 3
3.1—General definition, p. 3
3.2—Functional classification, p. 4
3.3—Layout and operational terminology, p. 4
3.4—Structural configurations, p. 4
3.5—Application of concrete in marine structures, p. 5
3.6—Concrete marine structures in contemporary design practice, p. 6

CHAPTER 4—MATERIALS, p. 6
4.1—General, p. 6
4.2—Cementitious materials, p. 6
4.3—Aggregates, p. 7
4.4—Water, p. 7
4.5—Chemical admixtures, p. 8

ACI PRC-357.3-25 supersedes ACI 357.3R-14 and was published September 2025. This guide was first published in 2014 and revised in 2025.

Copyright © 2025, American Concrete Institute.

This material may not be reproduced or copied, in whole or in part, in any form or by any means, including making copies by any photo process, or by electronic or mechanical device, printed, written, graphic, or oral, or recording for sound or visual reproduction for use in any knowledge or retrieval system or device, without the written consent of ACI. This material may not be used by data mining, robots, screen scraping, or similar data gathering and extraction tools such as artificial intelligence ("AI") for purposes of developing or training a machine learning or AI model, conducting computer analysis or creating derivatives of this material, without the written consent of ACI.