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Ship Channel Design and Operation



ASCE

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Ship Channel Design and Operation

Task Committee
Bruce L. McCartney, Chair and Editor
Laurie L. Ebner
Lyndell Z. Hales
Eric E. Nelson





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PREFACE

This manual was completed by ASCE's Task Committee for updating Manual 80, *Ship Channel Design*, 1993. Task Committee members were: Bruce L. McCartney, Chairman and Editor; Dr. Laurie L. Ebner, Portland District, Corps of Engineers; Dr. Lyndell Z. Hales, Waterways Experiment Station, Corps of Engineers; and Eric E. Nelson, Seattle District, Corps of Engineers.

Chapter 3, "Ship Characteristics" was authored by Ogden Beeman, Maritime Consultant. Eric Christensen, Commander, U.S. Coast Guard, authored Chapter 20, "Coast Guard Activities that Support Navigation." All other chapters and appendices were assembled by Bruce L. McCartney.

Additional contributions were made by the following: Dr. Cyril Galvin, Coastal Engineer; Andrew M. Tuthill, Cold Regions Research and Engineering Laboratory, Corps of Engineers; R. Anne Sudar, Institute for Water Resources, Corps of Engineers; and Charles C. Calhoun, Jr., President COPRI, 2003–2004.

Waterways Committee Review was performed by the following: Dr. Anatoly B. Hochstein, Director, National Ports and Waterways Institute; Dr. B. K. Lee, Consulting Engineer; and E. Clark McNair, Jr., Consulting Engineer.

Peer review was performed by the following: Dr. James R. Houston, Director, Engineering Research Directorate, Corps of Engineers; Doug Thiessen, Chief Harbor Engineer for Port of Long Beach, California; Dr. William H. McAnally, Research Professor, Mississippi State University; and Dr. Kees d'Angremond, Professor Emeritus, Delft University of Technology, Faculty of Civil Engineering and Geosciences, Department of Hydraulic Engineering.

Chapter 1
INTRODUCTION

1.1 PURPOSE

This manual provides an overview of the design process and operation of deep-draft navigation projects. Information was obtained from many sources with significant contributions from recent U.S. Army Corps of Engineers Manuals, publications of the Permanent International Association of Navigation Congresses (PIANC) and the following web sites:

U.S. Army Corps of Engineers	COE, Digital Visual Library www.images.usace.army.mil
U.S. Coast Guard	U.S. Coast Guard Digital www.equi.uscg.mil
National Oceanic and Atmospheric Association	NOAA Photo Library www.photolib.noaa.gov

It should be noted that web site addresses can be temporary and may disappear in the long term as agencies reformat navigation information.

English measurement units are used for the U.S. navigation system and design guidance, metric is used for guidance reported by PIANC (1 m = 3.3 ft).

Ship Channel Design and Operation (ASCE Manuals and Reports on Engineering Practice No. 107) was prepared by a task committee of the Waterways Committee, which is part of the Coasts, Oceans, Ports, and Rivers Institute.

This manual provides an overview of the design process and operation of deep-draft navigation projects. The reliability of ship channels is not only of immense importance to commerical navigation but is also vital to national defense interests for rapid deployment of Navy, Army, and Coast Guard vessels.

The manual covers channel design practice, dredging and disposal, construction practices, operation activites, environmental considerations, and contributions of the United States Coast Guard and National Oceanic and

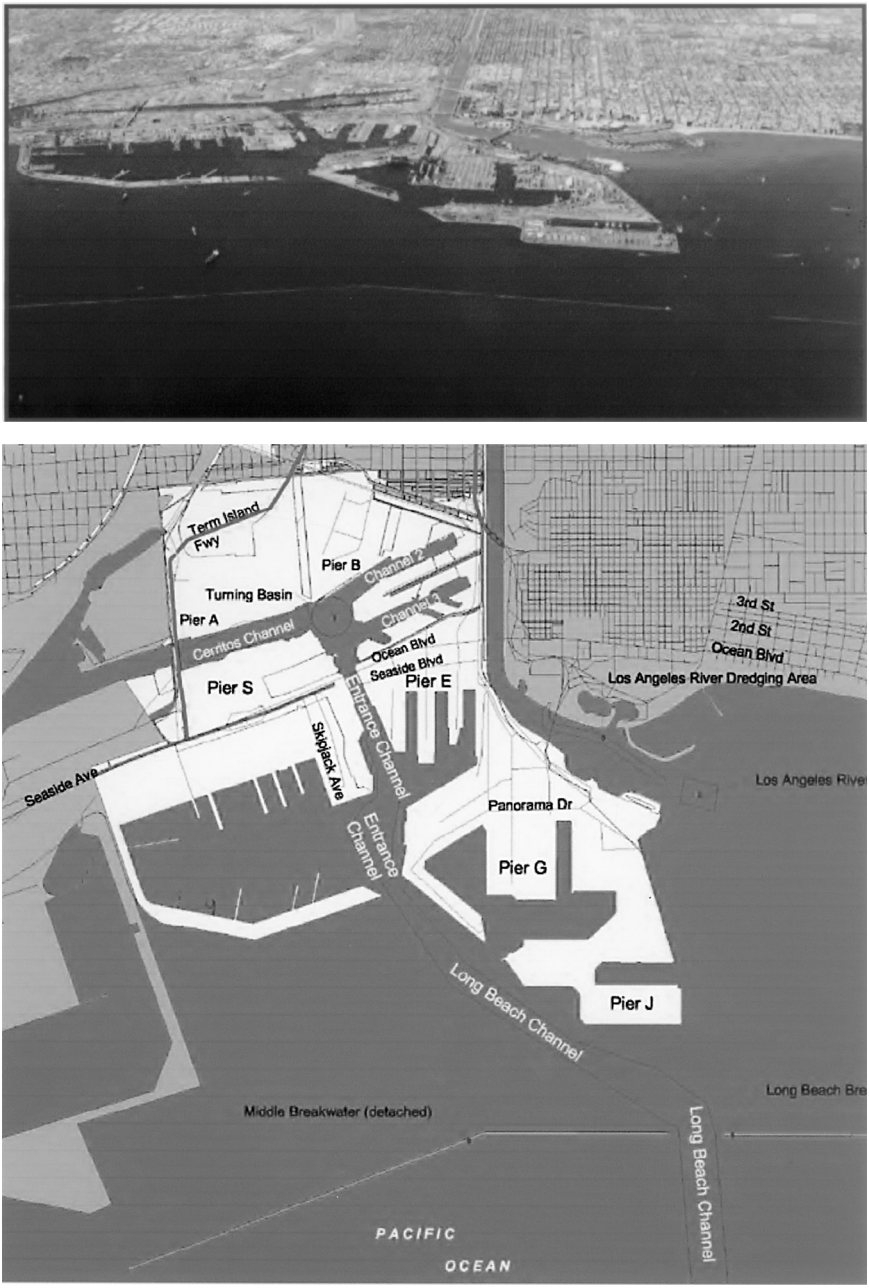


FIGURE 1-1. Long Beach Harbor (spl.usace.army.mil).

Atmospheric Administration (NOAA) to navigation. Channel design practice includes both the United States experience, primarily by the United States Army Corps of Engineers and methods used in other parts of the world as reported by the Permanent International Association of Navigation Congresses (PIANC).

This manual is intended as a design guide for practicing engineers, a reference for government agencies involved with the design and operation of deep draft navigation systems, and a text book for classes or short courses related to navigation engineering.

1.2 BACKGROUND

The reliability of ship channels is not only of immense importance to commercial navigation but is also vital to our national defense interests for rapid deployment of our Navy vessels.

Ship channels are the connecting link between the ocean shipping lanes and coastal or inland deep-water ports. These channels can be very short when the port is immediately behind coastal breakwater, such as in the Port of Long Beach (Figure 1-1).

The ship channel also could wind its way up a major river, like the 106-mi-long Columbia River channel that serves the Port of Portland, Oregon (Figures 1-2 and 1-3).

The 965-ft Evergreen Class container ship (4,200 TEU Capacity) is an example of a commercial vessel that uses ship channels (Figure 1-4).



FIGURE 1-2. Columbia River Ship Channel (COE, Digital Visual Library).