

CECW-CE

Manual  
No. 1110-2-1613

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Engineering and Design  
HYDRAULIC DESIGN OF DEEP DRAFT NAVIGATION PROJECTS

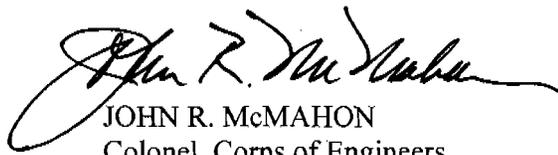
1. Purpose. This manual provides design guidance for improving deep-draft navigation projects. The design goal applicable to project development is to provide a safe, efficient, environmentally sound, and cost-effective waterway for ships and other vessels. An economic objective is to provide for these goals while minimizing and balancing the initial construction costs and future maintenance costs. The general guidance presented in this manual is based on *average* navigation conditions and situations. The design engineer will adapt these guidelines to the local, site-specific conditions of the project. Usually, the final project design will be developed by application of a ship navigation study, incorporating real-time ship simulation tests with local professional pilots. Deviations from this guidance are acceptable if properly substantiated and approved by Headquarters, U.S. Army Corps of Engineers.

2. Applicability. This manual applies to all USACE commands having civil works responsibilities. The manual will be used in project planning, design, construction, operation, and maintenance as applicable.

3. Distribution Statement. This publication is approved for public release; distribution is unlimited.

FOR THE COMMANDER:

5 Appendices  
Appendix A – References  
Appendix B – Conversion Factors and Constants  
Appendix C – Ship Simulator Applications to  
Waterways Design—Lessons Learned  
Appendix D – Ship Simulator Scope of Work  
Appendix E – Sample Wave-Induced Ship Motion  
Calculation for Tankers Using the Kimon Method (1982)  
Glossary

  
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This manual supersedes EM 1110-2-1613, 8 April 1983.