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Coastal Engineering Guide, Longshore Precipitation, Coastal Diversity, Meteorology and Wave Climate, Surf Area Hydrodynamics, Water Levels and Long Wave, Coastal Projection Projects, Tidal Bays, Storm Schematics, Coastal Waves, Appendix A. GLOSSARY FROM THE FROM TERMINOLOGY Cem Coastal Engineering Guide

Part_III-Chap_1 Chapter 1. COASTAL PROPERTIES Part_III Chap_2 Chapter 2. LONG SEDIMENTSHORE TRANSPORT Part-I-Chap-1 'Chapter I-1. Introduction Part-I-Chap-2 'Chapter I-2. Coastal Diversity Part-I-Chap-3 Chapter 1-3. History of Coastal Engineering Part-I-Chap-4 'Chapter I-4. Coastal Engineering Guide Part-II-Chap1. Chapter II-1. Mechanics of the Water Wave Part-II-Chap2 Chapter II-2. Meteorology and Wave Climate Part-II-Chap3 Chapter II-3. Assessment of coastal waves Part-II-Chap4 Chapter II-4. Hydrodynamics of the surfing zone Part-II-Chap5 Chapter II-5. Water levels and long waves Part-II-Chap6 Chapter II-6. Hydrodynamics of tidal inputs Part-II-Chap7 Chapter II-7. Harbour Hydrodynamics Part-II-Chap8 Chapter II-8. Hydrodynamic analysis and design conditions partV-Chap3 Chapter V-3. Partv-Chap4 Coastal Protection Projects Figure V-4-1. The schematic scheme of storm surge attacks on the beach, dune and super-land structures coastal engineering manual technology Guide to Coastal Engineering (CEM) is the U.S. Army Corps of Engineers (USACE) Comprehensive Coastal Engineering Guide. It includes the basic principles of coastal processes, methods for calculating coastal planning and design parameters, as well as recommendations on how to formulate coastal flood research, coastal protection and navigation projects. Problem Over the past five decades, coastal engineering practices in the USACE and around the world have been based on the Coastal Protection Guide (1974, 1984) and its predecessor, the Technical Report #4 (1954, 1957, 1961, 1966), which are now out of print. These guides no longer reflect the most advanced technologies and knowledge of coastal processes and engineering. The U.S. government erosion along the Morgan Peninsula, Alabama, coast ment, through the coastal illustrated coastal diversity around the United States (CHL), initiated the training of CEM in the mid-1990s, bringing both in-house technicians and outside consultants who are all recognized experts in specific fields. The expected cost of the Official CEM is the USACE Engineering Guide. It is available on the Corps web page for implementation as a .pdf document that users can download and print on their computers. This version, like other engineering guides, is available for free to the public. The same .pdf files are also available on the KHL website. The interactive version was developed by private company Veri-Tech, Inc. a commercial product based on CEM and includes interactive features, formulas and and connections with other analytical tools. Benefits /CEM Savings provides a standard for the formulation, design and expected performance of a wide range of coastal projects. This extended replacement document provides a much broader area of guidance and is designed to be updated as needed to reflect the current state of coastal science and technology. Status Parts I-IV and Appendix A were officially released as USACE guidelines in 2002, and Part V was released in 2003. Part VI is expected to be completed in 2005. U.S. Army Engineer Research Center April 2004 www.erd.c.usace.army.mil Print this page Design Coastal Elements Project by Jim Newton, P.E., DEE Course Outline This 30-hour course provides valuable information for those individuals who design, manage and maintain coastal structures. Completion of this course will provide the student with the necessary information and testing to meet the requirements of continuing education in order to renew their licenses. It was developed by an instructor who developed and implemented numerous similar training courses. This course requires completing a multi-choice quiz when it is completed to obtain the required certification. Learning Purpose At the end of this course, the student will be able to: Understand the different types of coastal structures; Understanding different layouts and cross-sectional types of structures; Understand the main types of concrete armor blocks; Understanding the underlying failure modes for structure types; Understanding basic and geotechnical requirements; Understanding ice problems; Understanding environmental considerations in relation to design; Understanding building design considerations; Understanding other related design issues; Understanding building materials requirements; Understand the use of land and sand; Understand the use of stone; Understand specific uses and problems; Understand the use of steel; Understand the use of wood; Understanding geotextile and plastic use; Understand the structure of hydraulic response; Understand loading and responding to the rubble-mound; Understanding the vertical front loading and response structure; Understanding the foundation load structure; Understand to scour and scour protections; Understand the forces of the wave on thin cylindrical sills; Understanding the failure mode and failure functions; Understand the probability analysis of one failure mode; Understand the uncertainty of parameters when determining the reliability of designs; Understand a partial system of safety factors to introduce reliability in design; Understand the content of coastal projects; Understand, inspection of coastal structures; Understand the monitoring of coastal structures; Understand the repair of coastal structures; and understand the restoration of coastal structures. Intended Audience Intended Audience for This Course a professional who is involved in design, operation and management of coastal facilities. The benefits for the participants of this course will understand the basic concepts of coastal engineering and how to implement them. Introduction With the advent of numerical models, robust field instrumentation techniques and improved understanding of physical relationships that affect coastal processes that lead to more complex approaches in coastal defense design, the U.S. Army Corps of Engineers issued the Coastal Engineering Manual (CEM) in 2002 (EM-1110-2-1100). The guide of more than 2,650 pages was divided into six parts, each covering several chapters. Parts defined as Part I - Introduction Part II - Coastal Hydrodynamics Part III - Coastal Sediment Processes Part IV - Coastal Geology Part V - Coastal Project Planning and Design Part VI - Design Coastal Elements Project PDH has developed a series of courses that cover all Part II through the VI Guide and offer 108 hours of professional development to complete the entire guide. This course will look at Part VI - Design Coastal Elements Project. This course will cover the types and functions of coastal structures, specific design conditions, materials and building aspects, design fundamentals, and lead an example of the problem. Content Course In this course, you should study the U.S. Army Corps of Engineers Publishing Coastal Engineering Guide, Part VI, Chapters 1-8, EM 1110-2-1100. Part VI - Chapter 1 Part VI - Chapter 2 Part VI - Chapter 3 Part VI - Chapter 4 Part VI - Chapter 5 Part VI - Chapter 6 Part VI - Chapter 7 Part VI - Chapter 8 Please click on the aforementioned stressed hypertext to view, download or print a document for your study. Because of the large file size, we recommend that you first save the file to your computer by clicking on the mouse and selecting Save the Target as ..., and then open the file in Adobe Acrobat Reader. Course Summary This course discusses the basics of designing the coastal elements of the project. Related links For more information related to this topic, please visit the following websites or web pages: U.S. Army Corps of Engineers quiz Once you finish studying the aforementioned course content, you need to take a quiz to get PDH credits. DISCLAIMER: The materials contained in the online course are not intended as a submission or guarantee by the PDH Center or any other person/organization named in the present. Materials for general information only. They do not replace competent professional advice. The application of this information to a particular project should be considered by a registered architect and/or professional engineer/surveyor. Anyone who uses the information presented in the present does so at their own risk and takes on resulting in the responsibility arising from this. CONDITIONS OF THE ARMY ARMY DIVISION Washington Army Corps of Engineers, D.C. 20314-1000 CECW-EH Guide No. 1110-2-1100 EM 1110-2-1100 Change 1 July 31, 2003 Engineering and Design ENGINEERING 1. Goal. The purpose of the Coastal Engineering Manual (CEM) is to provide comprehensive technical coastal engineering documentation. It includes the basic principles of coastal processes, methods for calculating coastal planning and design parameters, as well as recommendations on how to formulate coastal flood research, coastal protection and navigation projects. This change 1 to EM 1110-2-1100, April 30, 2003, includes the following changes and updates: Part 1-4. Includes new chapter titles. Part II-1. The formulas have been corrected. Part II-2. Numerous changes in formulas, coefficients and numbers. Part II-4. New findings on the subject have been added. Part III-1. The table and the figure have improved. Part III-2. Links have been corrected. Appendix A. Additional terms have been added and some definitions have been changed. 2. Applicability. This guide applies to all elements of HUSACE and all USACE teams with civilian and military design responsibilities. 3. Discussion. CEM is divided into six parts in two main divisions: science, technology and engineering. The first four parts of CEM and the app were published on April 30, 2002. These include: Part I, Introduction Part II, Coastal Hydrodynamics Part III, Coastal Sediment Processes Part IV, Coastal Geology Appendix A, Glossary Engineering Unit Focused on Project Type Approach, Part V, Coastal Project Planning and Design. The distribution statement. Approved for public release. distribution is unlimited. Note to users. The revised chapters are dated April 1, 2008. Readers need to download all new chapters and opt out of earlier versions at their disposal. FOR COMMANDER: MICHAEL J. WALSH Colonel, Corps of Engineers Chief of Staff DEPARTMENT OF THE ARMY U.S. Army Corps of Engineers Washington, D.C. 20314-1000 CECW-CE Guide No. 1110-2-1100 EM 1110-2-1100 (Change 2) April 1, 2008 Engineering-Design Purpose Company. The purpose of the Coastal Engineering Manual (CEM) is to provide comprehensive technical coastal engineering documentation. It includes the basic principles of coastal processes, methods of calculating coastal planning and design parameters, as well as recommendations on how to formulate and conduct research in support of coastal flooding, protection and navigation projects. This change 2 em 1110-2-1100, April 1, 2008, includes the following changes and updates: Part 1-1. Links have been checked and some removed Guides that are no longer in the USACE inventory). Part 1-4. Minor changes have been made to the text to better reflect the contents of the subsequent parts of the CME. Part II-1. Revised figure II.1.9, Equations II-1-128, II-1-160 and II-1-161 have been corrected. Part II-2. Equations II-2-4, II-2-5 and II-2-32 were corrected along with other bugs reported by various users. Part II-5. Links have been verified and some have been removed (Engineering manuals that are no longer in USACE inventory). Part II-6. The e used in Eq. II-6-28, has been corrected. Part II-7. The content table has been corrected. At the end of the chapter was added a new section, II-7-11. Note to Users, Floating Ships. Part III-3. Adjustments have been made to the format and spelling. Various sections were added to the figures III.3.24 and III.3.26. Part IV-1. References have been amended. Part V-1. The citation of the engineering regulations has been corrected. Part V-2. Links have been changed, web pages with wind and wave data sources have been added. Some minor changes to the text have also been made. Part V-3. Citations from unpublished reports or personal messages have been removed, and references to other figures or parts of the CME have been verified and corrected. Part V-4. Minor text changes, link fixes, and V.4.1 drawings. Part V-5. Links to other parts of CEM that were planned but were never written have been removed. 2. Applicability. This guide applies to all elements of HUSACE and all USACE teams with civilian and military design responsibilities. 3. Discussion. CEM is divided into five parts in two main divisions: science, technology and engineering. The first four parts of CEM and Annex A comprise a scientific unit: Part I, Introduction Part II, Coastal Hydrodynamics Part III, Coastal Sediment Processes Part IV, Coastal Geology Appendix A, Glossary Engineering Unit Focused on Project Type Approach, Part V, Coastal Project Planning and Design. The distribution statement. Approved for public release. distribution is unlimited. Note to users. The revised chapters are dated April 1, 2008. Readers need to download all new chapters and opt out of earlier versions at their disposal. FOR COMMANDER: STEPHEN L. HILL Colonel, Corps of Engineers Chief of Staff Chapter 1 AD EM 1110-2-1100 (Part I) August 1, 2008 (Change 2) Table Content I-1-1. Target and area I-1-2. Applicability I-1-3. Definitions a. Coastal b. Coastal Engineering c. Coastal Science I-1-4. I-1-5 bibliography, Links I-1-6. Confessions of I-1-1. The Purpose and Sphere Coastal Engineering Guide (CEM) gathers in one source the current contemporary in coastal engineering to provide appropriate guidance for methods and techniques to address most coastal engineering engineering CEM provides the standard for the design, design and expected efficiency of a wide range of coastal projects. These projects are designed to provide or improve shipping in commercial harbours, port operations for commercial fish processing and maintenance facilities, and recreational boat facilities. In addition to improving navigation, coastal protection projects are often required to mitigate the impact of navigation projects. Projects to combat beach erosion and hurricanes or coastal storms reduce wave damage and protect against flooding for valuable coastal commercial, urban and tourist communities. Environmental restoration projects provide a sound plan and a proven approach to the restoration of coastal and tidal areas where such actions may be justified, or necessary as mitigation of the coastal project, or as mitigation of some previous coastal activities, incidents or neglect. As a very advanced replacement document for the Coastal Protection Manual (1984) and several other U.S. Army Corps of Engineers (USACE) manuals, CEM provides a much broader area of guidance and is designed for frequent updates. I-1-2. The Applicability of This Guide is applicable to the U.S. Army Corps of Engineers (USACE) Teams with civil liability works. It is anticipated that the comprehensive coverage and instructions of this guide will justify its use by a wide range of coastal engineers and scientists outside USACE. Although this was widely used throughout the development of CME, some sections are specific to the mission, authority and operation of USACE. I-1-3. Definitions are listed in the manual when the terms are first introduced. In addition, the annex provides a glossary of terms, and table IV.1.1 lists definitions of the general geological features of coastal areas. However, a few key definitions will help the newcomer better understand and understand the purpose and scope of CEM. Part IV, Chapter 2 identifies the types of coastal structures. a. Coastal. Referring to the area where the earth meets the sea, an area of uncertain width that extends inland from the sea to the first major change in topography. In this guide, coastal areas will refer to shores that are influenced by wave processes (oscillator flow dynamics). Bays, lakes and estuary are included, but rivers, mostly influenced by usually unidirectional currents, tend to go beyond this guide. Estuaries, including some of the rivers that are prone to tides, are covered by this guide. Coastal Engineering. One of several specialized engineering disciplines that fall under the umbrella of civil engineering. It's a composite of physical sciences and engineering disciplines that have applications in the coastal zone. This requires a rational rational knowledge from a number of technical disciplines to develop solutions to problems related to natural and human-induced changes in the coastal zone, structural and non-structural mitigation of these changes, and the positive and negative consequences of possible solutions to problem areas on the coast. Coastal engineers can use contributions in geology, meteorology, environmental sciences, hydrology, physics, mathematics, statistics, oceanography, marine science, hydraulics, structural dynamics, marine architecture and others in developing understanding of the problem and possible solution. The coastal engineer must take into account the processes present in the field of interest, such as: Environmental processes (chemical, environmental). Hydrodynamics processes (winds, waves, fluctuations in water level and current). Seasonal weather trends (hurricane season, winter storms). Sediment processes (sources, transport routes, sinks and characteristics). Geological processes (soil and layer characteristics, stable and migratory sub-air and subaqueal features, recovering or calming surfaces). Long-term environmental trends (sea level rise, climate change). Social and political conditions (land use, development trends, regulations, social trends, public security, economy). Harbour work, improved navigational channels, coastal protection, flood damage reduction, and conservation and restoration of the environment are the main areas of activity. c. Coastal science. This field is a set of interdisciplinary technologies used to understand the processes, environment and characteristics of the coastal zone. Coastal engineers use these insights to develop physical adaptation to solve problems and improve human interaction with the coast. I-1-4. The bibliography of Technical and Scientific Literature is cited in each chapter listed in the chapter references. I-1-5. Links Following Official USACE Engineering Rules (ER), Engineer Manual (EM), Engineer Brochures (EP), and Technical Manuals (TM) found in the bibliography after each chapter. They are highlighted here for the simple use of USACE. TM 5-850-1 Designing and Designing Military Ports ER 1105-2-100 Planning Guide Laptop EP 1165-2-1 Digest Water Policy and Em 1110-1 Geophysical Research for Engineering and Environmental Research EM 1110-1-1804 Geotechnical Research EM 1110-2-2302 Environmental Engineering for Coast Guard EM 1110-2-1415 Hydrological Frequency Analysis EM 1110-2-1613 Hydraulic Design of Deep-Sea Navigation Projects EM 1110-2-1615 Hydraulic Design of Small Harbors Em Boat 1110-2-1906 Laboratory Soil Testing EM 1110-2-2301 Test Careers and Test Fills EM 1110-2-2302 Construction with Stone EM 1110-2-5025 Dredging work EM 1110-8-1 (FR) Winter navigation on inland waterways I-1-6. Confessions of the Authors of Chapter I-1: Joan Pope, U.S. Army Engineer Research Center, Vicksburg, Mississippi. John H. Lockhart Jr., Headquarters, U.S. Army Corps of Engineers, Washington, D.C., (retired). Reviewer: Andrew Morang, Ph.D., CHAPTER KHL 2 COASTAL DIVERSITY EM 1110-2-1100 (Part I) April 30, 2002 (Change 2) Content Table I-2-1. Introduction I-2-2. Coastal areas a. Atlantic north: Glaciated coast b. Atlantic Central and Southern: Barrier and sunk shores of the valley c. Atlantic Ocean and Gulf of Mexico: Coral and mangrove coasts d. Gulf of Mexico East: wetlands mangroves, and coast barrier e. Gulf West: Barrier Coast f. Pacific: Sea cliffs and terraced coasts g. Bering and Chukchi Sea: Arctic coastal : Delta Coast i. Pacific: Volcanic Islands j. Great Lakes of North America I-2-3. I-2-4 stability.

