AD-A183 802 NCEL (NAVAL CIVIL ENGINEERING LABORATORY) QUARTERLY ABSTRACTS OF TECHNICAL DOCUMENTS 1 APRIL TO 30 JUNE 1987(U) NAVAL CIVIL ENGINEERING LAB PORT HUENEME CA 30 JUN 87 F/G 13/2 1/1 NL

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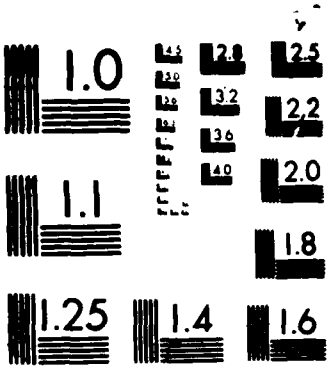

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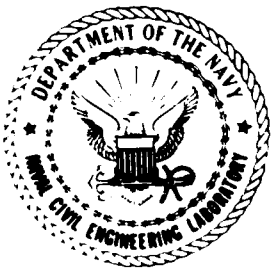

NCEL QUARTERLY ABSTRACTS

of technical documents

1 Apr 1987 to 30 Jun 1987

Naval Civil Engineering Laboratory
Port Hueneme, California 93043-5003

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TECHNICAL NOTES

N-1764
Validation of Nitronic 33 in Reinforced and Prestressed Concrete, Apr 1987, James F. Jenkins (public release)

Nitronic 33 stainless steel (Trademark of Armco Steel Corporation) has a unique combination of high strength and nonmagnetic properties which make it an excellent candidate for use as prestressing strand for concrete waterfront structures where the magnetic properties of the carbon steel commonly used for prestressing strand are not acceptable. Before Nitronic 33 stainless steel prestressed concrete waterfront structures were constructed, it was necessary to establish the corrosion performance of the Nitronic 33 stainless steel in marine concrete. A test plan was developed where a series of tests which compared the performance of carbon steel to the Nitronic 33 stainless steel were to be performed. The time to initiation of attack was established as the critical parameter for the evaluation of the test results. In each test, corrosion of the carbon steel initiated prior to the initiation of the corrosion of the Nitronic 33 stainless steel. In addition, previously emplaced full-scale pier pilings with both carbon steel and Nitronic 33 stainless steel prestressing were inspected. The corrosion activity of the Nitronic 33 stainless steel prestressed piling was less than that of the companion carbon steel prestressed pilings.

It was concluded that prestressed concrete waterfront structures using Nitronic 33 as prestressing strand should perform at least as well as similar structures using carbon steel prestressing. Recommendations for additional work to evaluate possible differences in inspection, maintenance, and repair techniques required for Nitronic 33 stainless steel prestressed concrete waterfront structures are presented.

N-1765
Performance of Recycled Asphalt Concrete Airfield Pavement Surfaces, Apr 1987, G.D. Cline and M.C. Hironaka (public release)

The objective of this research was to make an assessment of the relative performance of recycled versus new asphalt concrete pavement surfaces constructed for airport facilities. To make this assessment, pavement condition index (PCI) surveys and tests on core samples from the hot-mix recycled pavements located on the airports at Needles, California and Valley City, North Dakota were conducted. Both pavements have a condition rating of very good. The survey and test data were compared with those for recycled highway and virgin material Navy airfield pavements. The recycled pavement at Valley City has a higher deterioration rate than the Navy pavements but this could be attributed to the harsh climate found in North Dakota. The results of this study

show that hot-mix recycling was successful at these airports but additional studies are required to determine the applicability of Asphalt Concrete (AC) recycling for reconstruction at all airports.

N-1767
Security of Arms, Ammunition, and Explosives in QUADCONS, May 1987, B. Leek (limited release)

This report describes the quadruple QUADCON container designed for shipping and storage of Government property. The proposal to use the container for protection of arms, ammunition and explosives (AA&E) is explored. The QUADCON is not considered appropriate for protecting AA&E. A recommendation to develop a container specifically designed for AA&E shipments is made.

N-1768
Computational Methods in Ocean Structural Engineering - A Review, May 1987, Theodore A. Shugar, NCEL and Jean-Louis Armand, UCSB (public release)

This report is a description of the state-of-the-art in computational methods for ocean structural engineering related to Navy shore and off-shore facilities. It is divided into three main parts: wave loads, structural response, and reliability methods.

The basics of fluid mechanics that relate to wave load hydrodynamics are presented so that the technical problems faced by engineers as they seek tractability in the solution of problems governed by the highly nonlinear Navier-Stokes equation are appreciated. The concept of added mass is shown to be a mathematical artifice, but nonetheless remains indispensable to tractability in computing wave loads. Emphasis is given to the derivation and numerical solution of the diffraction boundary value problem for hydrodynamic wave loads on partially or fully submerged, large structures. The Morison equation approach for determining wave loads on small, cylindrically shaped structural members is discussed. Boundary element methods play a large role in numerical situations for wave forces.

The structural mechanics of ocean cable systems in the context of finite element technology is discussed. The emphasis is on solution methods for the discrete nonlinear finite element equations. The extraordinarily high degree of geometric nonlinearity inherent in ocean-based cable systems is the principal reason for difficulty in engineering analysis. Robust solution methods are needed. The safe towing of marine vehicles (such as ships, barges, and ocean structures in general) by another vessel providing propulsion and steering through a flexible cable is an extremely complex and important problem refined over the past 20 years. Modeling is complex, as it involves a blend of hydrodynamics, dynamics, and mechanics of materials. More research is still needed. The general problem of the dynamic behavior of a floating structure under the combined action of waves, wind, and current is examined next. Nonlinearities arising from wave and current loading terms, large amplitude motion, and influence of moorings, in particular, should be accounted for in the model. The concept of stability has to

be further examined, with the aim of rationalizing the present stability criteria. Insight into the problem of the analysis and prediction of potentially dangerous response may be provided by application of the general and now well-established theory of dynamical systems and non-linear oscillations.

N-1769
Characteristics and Size Reduction of Navy and Municipal Solid Wastes, May 1987, Bruce E. Bond, Waste Energy Technology Corporation, Bingham Y.K. Pan and R.M. Roberts, NCEL (public release)

Characteristics of Navy Solid Wastes (NSW) and Municipal Solid Wastes (MSW) were compared. The former contained more organic compounds and less than one weight percent of flammable or explosive materials. The performances of shear shredder and hammermill shredder on size reduction were examined. The shear shredder processed a larger quantity and variety of solid wastes with a greater rate and availability. The shear shredder also had a significant economical advantage over the hammermill; however, the hammermill produced a finer solid size with a better maintainability.

N-1770
Basis of Design for NAVFAC Type II Missile Test Cell, May 1987, W. Keenan and R. Murtha (NCEL) and Catesby P. Jones (Safety Systems Consultants), Alexandria, VA (limited - release by Naval Facilities Engineering Command)

This document is issued to guide the development of construction drawings and specifications for a NAVFAC Type II missile test cell that meets the technical operational requirements of the Naval Air Systems Command and Naval Sea Systems Command (NAVSEA), explosives safety requirements of NAVSEA OP-5, and ordnance criteria of the Naval Facilities Engineering Command (NAVFAC). This document will be used to support MCON Projects 151 (NWS Seal Beach) and 419 and 440 (NWS Yorktown).

N-1771
A Summary of the SEACON Mooring Validation Experiment, June 1987, Paul A. Palo, Therese McAllister, and Steve Karnoski, (public release)

This report presents full-scale data collected in a comprehensive mooring test of a 2,300-ldt construction barge, moored with wire rope in 50 feet of water. Wind, current, and wave excitations and all mooring system responses were measured. Measurements included static, slowly varying, and dynamic responses in slack and taut four-point moorings. Additional tests were conducted to determine single-point mooring behavior and vessel loads due to steady wind and current only. The results are summarized in the form of autospectra, probability density functions, frequency response functions, and associated uncertainty levels.

N-1772
Development of the Arms Ammunition and Explosives (AA&E) Penetration Resistance Rating System (PRRS) Calculator Program in a Notebook Computer, June 1987, Steven J. Gunderson (limited - release by Naval Sea Systems Command)

Development of a calculator program to compute Penetration Resistance Ratings (PRR) is discussed. The PRR is used to determine the equivalency of building and security components. The calculator program was developed for NEC PC8201A and Radio Shack Model 100 portable computers. The systems were field tested and the results are discussed. Recommendations for future work are discussed.

N-1773
Timber Piling Barrier and Chemical Preservation Annual Costs Comparison, June 1987, D. Pendleton and T. O'Neill (public release)

The currently recommended means of controlling marine borer damage of timber piling by chemical preservative systems are compared with pile barrier systems. Annual costs of untreated, creosoted, arsenical-treated, and dual-treated timber piling are estimated for fender and bearing systems in various geographical regions. Included in these estimates are the maintenance options of pile replacement and barrier system installation. Annual costs are also estimated for chemically-treated or untreated timber prewrapped with polyvinylchloride (PVC), polyethylene (PE), or precoated with polyurethane (PU). It is concluded that the most cost-effective, proven system for timber bearing piles in all regions is creosoted piling (in tropical and subtropical areas also arsenical-treated piling) protected by wrapping with PVC. The most cost-effective system for timber bearing piles, not yet proven by long-term testing, is untreated piling wrapped with PVC or PE or coated with PU before driving. The most cost-effective proven system for fender piling in all areas is arsenical-treated piling (in polar regions also creosoted piling) protected by PVC wrap. The most cost-effective experimental system for fender piling is untreated piling wrapped with PVC. Implications of this analysis on common timber piling usage practices at Naval shore facilities are discussed along with specific recommendations to improve those practices.

CONTRACT REPORTS

CR 87.009
Planning and Design Criteria for Deployable Port Facilities Pier, May 1987, Giannotti & Associates, Inc, Ventura, CA, N00123-84-D-0235-ZZ11, (limited release)

Planning and design criteria have been developed for the Navy Deployable Port Facility (DPF). The DPF is is envisioned as a heavy lift ship transportable, modular port which can function as an advance base in support of a Marine Amphibious Force, a prepositioned material

base, and as a conventional ship berthing facility both at home and overseas. Planning and design criteria described include: utilities for Naval ship berthing support; deck design live loads; port configuration and dimensions; and space requirements for port support functions.

CR 87.010
The Solution of Large Time-Dependent Problems Using Reduced Coordinates, Jun 1987, Department of Civil Engineering, University of California at Davis, N68305-5345-3995 (public release)

This research is concerned with the idea of reducing a large time-dependent problem, such as one obtained from a Finite-Element discretization, down to a more manageable size while preserving the most important physical behavior of the solution. This reduction process is motivated by the concept of a projection operator on a Hilbert Space, and leads to the Lanczos Algorithm for generation of approximate eigenvectors of a large symmetric matrix. The proposed reduced coordinate algorithm is developed, compared to related methods, and applied to some representative problems in mechanics. Conclusions are then drawn, and suggestions made for related future research.

CR 87.011
Explosibility and Ignitability of Plastic Abrasive Media, Jun 1987, Pittsburgh Research Center, Pittsburgh, PA, N68305-86-WR-60196 (public release)

At the request of the US Navy, the Bureau of Mines has investigated the explosibility hazards of plastic abrasive media used for removing paint from the surfaces of aircraft and aircraft sections. The tests included both original and recycled media. Four types of plastic media were tested and compared with Pittsburgh bituminous coal and polyethylene. The tests were performed in a 20-L explosibility test chamber and a 1.2-L ignitability furnace.

The original coarse media used for abrasive blasting of aircraft components could not be ignited when dispersed as a dust cloud, but the fines generated during the blasting process were capable of generating strong explosions.

1987 TECHDATA SHEETS

No.	Title	NCEL Contact	Ext
87-01	Security Enclosures for Low-Security Structures (limited release)	E. Elkins	5927
87-02	Security Padlocks and Exterior Ordnance Lock (limited release)	B. Leek	5927/ 4284
87-03	Single Building Energy Controllers Can Save Energy $$ (public release)	K. Canfield	4188
87-04	Security Hasps, Anti-Intrusion Bar, and Universal Security System for Naval Environments (limited release)	B. Leek	5927/ 4284
87-05	The NAVMOOR Anchor (public release)	R. Taylor	5419
83-08R	Drag Embedment Anchors for Navy Moorings (public release)	R. Taylor	5419

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