

DEVELOPMENT AND TESTING OF A
COLLISION TOLERANT PILE STRUCTURE

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THESIS

Submitted to the University of New Hampshire
in Partial Fulfillment of
the Requirements for the Degree of

Master of Science
in
Ocean Engineering

May, 1987

ABSTRACT

A 1/4 scale (approximately 12 feet tall) Collision Tolerant Pile Structure (CTPS) was developed to be a navigational aid in shallow water. The CTPS concept consists of the marker/light mounted on a cylindrical pile which is hinged just above the mudline. The pile is required to withstand scaled collisions by barge traffic and recover promptly as well as maintain verticality when subjected to wind, wave, and current forces.

The system uses a peripheral stay, universal joint hinge concept. After preliminary testing, design modifications were made on the spring/cable system to improve the recovery characteristics of the 1/4 scale model after collisions. Testing of the modified 1/4 scale CTPS included dry bench tests, insitu collisions, and insitu measurement of the environmental response. Bench tests showed that recovery was strongly dependent on spring tension. Field experiments demonstrated that the pile sustains negligible damage during barge collisions and that recovery is prompt when the spring is sufficiently tensioned. Environmental testing was performed to determine the CTPS's response to scaled wind, wave and current forces. Several methods were used to obtain data from the

environmental field tests including several unsuccessful attempts with a radio telemetry package. The most useful data was obtained by video recording. The experimental response data was then compared with a two dimensional computer simulation of the pile dynamics.