SHORELINE EROSION
MOBILE COUNTY, ALA.

U.S. ARMY ENGINEER DISTRICT, MOBILE
CORPS OF ENGINEERS
MOBILE, ALABAMA

31 March 1975

INFORMATION SHEET
FOR
WORKSHOP MEETING ON BEACH EROSION CONTROL AND HURRICANE PROTECTION
MOBILE COUNTY, ALABAMA

STUDY DESCRIPTION

Authority. - This study is authorized by a resolution adopted 27 October 1970 by the Senate Public Works Committee, in accordance with Section 110 of the River and Harbor Act of 1962, and at the request of Senator John Sparkman of Alabama. The resolution requests a survey of the shores of Mobile County and such adjacent shores as necessary, including Dauphin Island, in the interest of beach erosion control, hurricane protection, and related purposes. A map defining the study area is attached.

Scope of study. - Surveys will be made in the study area to define the problem areas and emphasis will be placed on solutions for the most acute problem areas. Population projections and beach use studies will be made to determine future requirements for recreational beach areas. Economic data will also be developed on land values, property damages, damages to marine resources, losses to navigation, costs of existing protective structures, and present recreational use of the beaches in the study area. The study will address alternative plans of improvements and related costs. The study will consider artificial restoration using beach fill material; protective structures such as groins, revetments, and breakwaters; combinations of beach fill and protective structures; and nonstructural alternatives. Economic analysis will determine costs, benefits, and environmental impact of the various plans considered, and the extent of Federal interest in any recommended plan. The study findings and recommendations will be presented in a survey report and submitted to Congress for appropriate action.

Study problems. - Generally, the problems we are aware of to date include:

a. Shoreline recession and bluff erosion along most of the western shoreline of Mobile Bay;

b. Erosion of the gulf beach on the eastern end of Dauphin Island;

c. Continued migration of Petit Bois Island to the west causing excessive widening of Petit Bois Pass; and

d. Erosion of protecting islands in Mississippi Sound.

SHORELINE HISTORY OF MOBILE COUNTY

General. - Mobile County shoreline extends south from the City of Mobile along the west coast of Mobile to Cedar Point then west along the north shores of Portersville Bay and Grand Bay to the Alabama-Mississippi State Line. The gulf and Mississippi Sound shorelines of Dauphin Island are also included as county shoreline. Mobile County has about 15 miles of gulf shoreline and about 119 miles of sound and bay shoreline.

No information is available on littoral drift along the western shore of Mobile Bay. However, based on comparison of old and recent coast charts, this reach of shore has a history of erosion. It is estimated that over certain reaches the shoreline has receded about 450 feet since 1892.

Portersville Bay and Grand Bay are major arms of Mississippi Sound. Except at Bayou La Batre, the shorelines of these bays are entirely marsh and have been relatively stable. However, the small islands in the area are eroding. The erosion of these islands may be attributed to the widening of Petit Bois Pass which has exposed these islands to increased wave action.

Available evidence indicates that the predominant direction of gulf littoral drift along Dauphin Island is to the west. However, the volume of littoral drift is not known. Based on coast charts, in 1892 Dauphin Island had a length of about 10½ miles, Petit Bois Pass was about 1¼ miles wide, and Petit Bois Island extended into the State of Alabama about 7 miles. The 1969 coast charts indicate the length of shoreline of Dauphin Island to be about 14¾ miles, Petit Bois Pass to be about 5 miles wide, with Petit Bois Island extending into the State of Alabama only ⅝ mile.

SHORE PROTECTION MEASURES

General. - The lure and enchantment of the sea has eternally drawn man to its shore. Man's encroachment on the sea has often lead him afoul of the dynamic sea conditions and its ever shifting shorelines. In such cases economic reasons have necessitated the establishment of static boundaries with protective structures. Various types of seawalls, bulkheads, and revetments have been used for this purpose. In general, seawalls are considered to be structures designed primarily to resist the full force of the waves, bulkheads are normally structures used to retain fill, and revetments are structures to protect an embankment against erosion by current or wave action. In many cases any of the structures may serve all purposes. Typical examples of these structures are shown on the attached illustrations. Dimensions and cost of the structures given herein are illustrative of typical conditions and may vary greatly depending on the physical conditions existing at a particular location.

Stepped seawall. - The concrete stepped seawall shown is designed for stability against moderate wave conditions. Normally a seawall of this type is not conducive to the accumulation of sand and any beach that might exist at the time of construction would probably be eroded during periods of high waves. This structure would cost about $1,350,000 per mile.

Riprap revetment. - A structure similar to the illustrated riprap revetment could be designed to function as a seawall, i.e., a structure to resist the full force of the waves. A structure of this type constructed with 2,000-lb armor stone would be stable under the influence of waves up to about 7 feet high. Also this type of structure dissipates wave energy more

effectively than the step-type seawall shown. Consequently, if other conditions are favorable, sand will accumulate at the toe of the structure and during periods of high waves the structure will not greatly contribute to erosion of an existing beach. A rubble structure such as this would cost about $1,400,000 per mile.

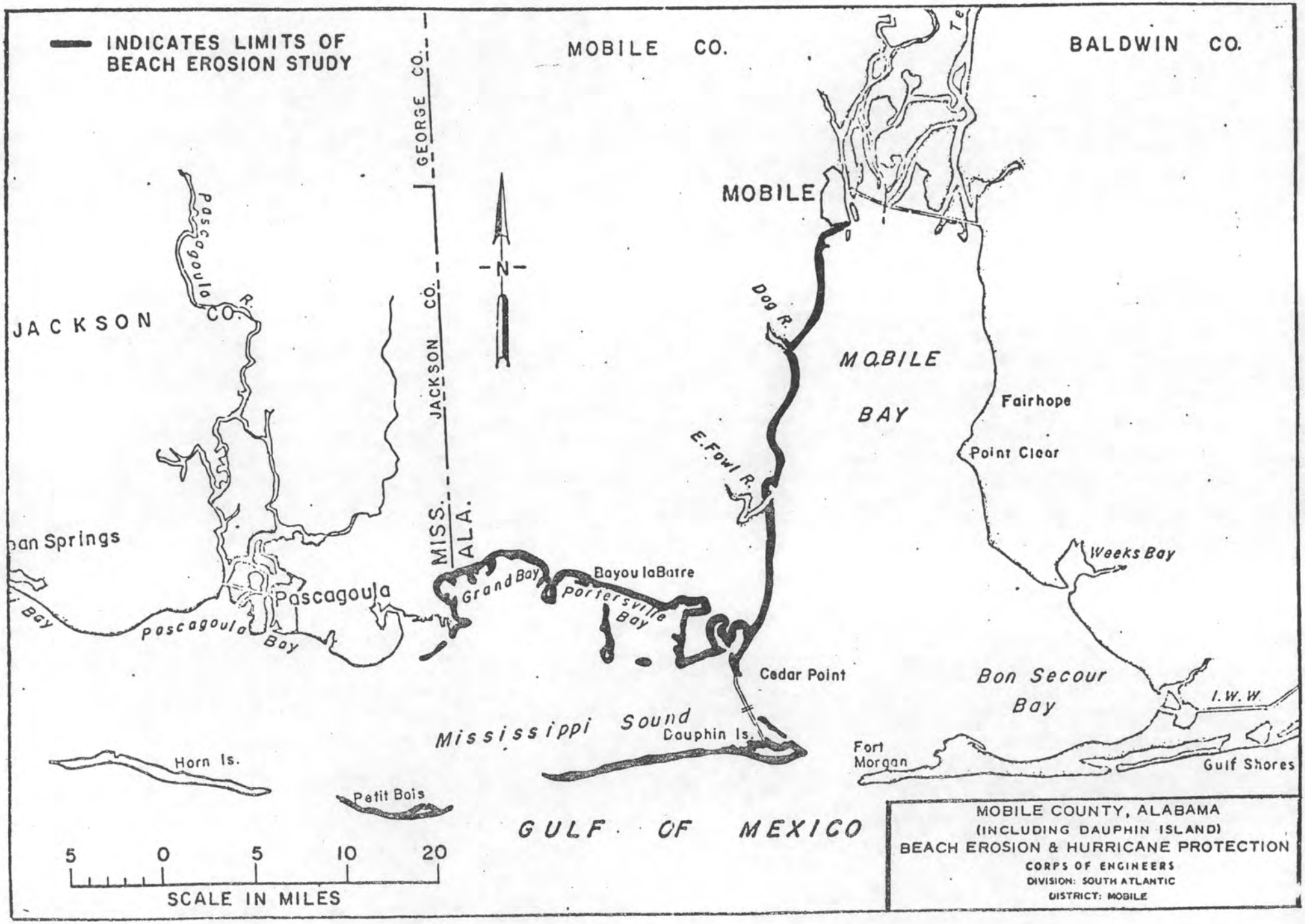
Timber retaining walls and block revetment. - The timber retaining wall and interlocking concrete block revetment shown on the attached illustrations would cost about $597,000 per mile and $2,230,000 per mile, respectively. Neither of these structures would be conducive to the accumulation of sand.

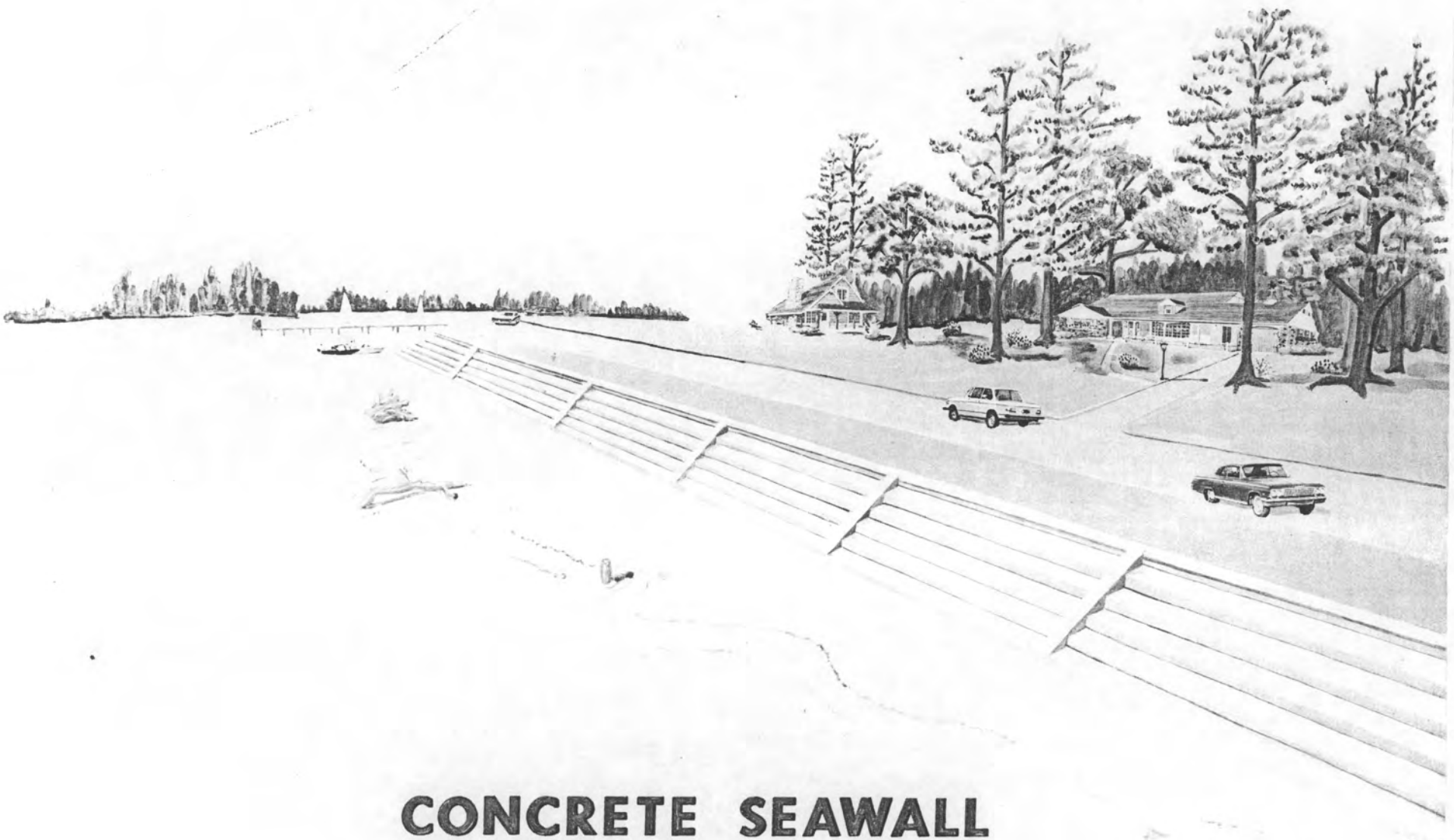
Land reclaiming. - Excluding marsh areas and mouths of streams, there are about 15 miles of shore along West Mobile Bay (between Brookley Field and Cedar Point) where structures such as those illustrated could be used effectively to control erosion. It is estimated that in this reach the shore has eroded as much as 450 feet in certain areas during the period between 1892 and 1969. This eroded land could be reclaimed by placing fill along the shore. The material that will be dredged during the construction of future navigation projects in the area could be a source of fill. About 35,000,000 cubic yards of material will be removed as part of the initial construction of the Theodore Ship Channel project. After completion of the project, maintenance dredging will remove about 2,000,000 cubic yards per year. This project is in an advanced state of planning and means for deposition of the material to be excavated have been planned. However, enlargment of the Mobile Ship Channel, which is under consideration, will require dredging of even larger volumes of material. New work material from such a project could be utilized for shoreline fill. A graph showing the relationship between the volume of fill material and the width of shoreline extension into the bay is attached.

Groins. - In some areas such as Dauphin Island where suitable material is probably available, a protective artificial beach will provide ample protection to the shore. Such beaches can be constructed from dredged material, or when conditions are favorable a groin system will build a beach by trapping littoral drift. The groin system should be designed so that it will trap the required volume of beach material and bypass sufficient material to nourish down drift beaches. Groin systems are the most difficult to design of all shore protection structures. Accordingly, these structures should not be built without detailed study of the littoral processes to which the structures are to be subjected. Groins can be constructed using timber, steel, concrete, or rock and may cost $100 to $350 per foot of shore protection dependent upon such factors as exposure to wave action, range of toe, and accessibility of building materials.

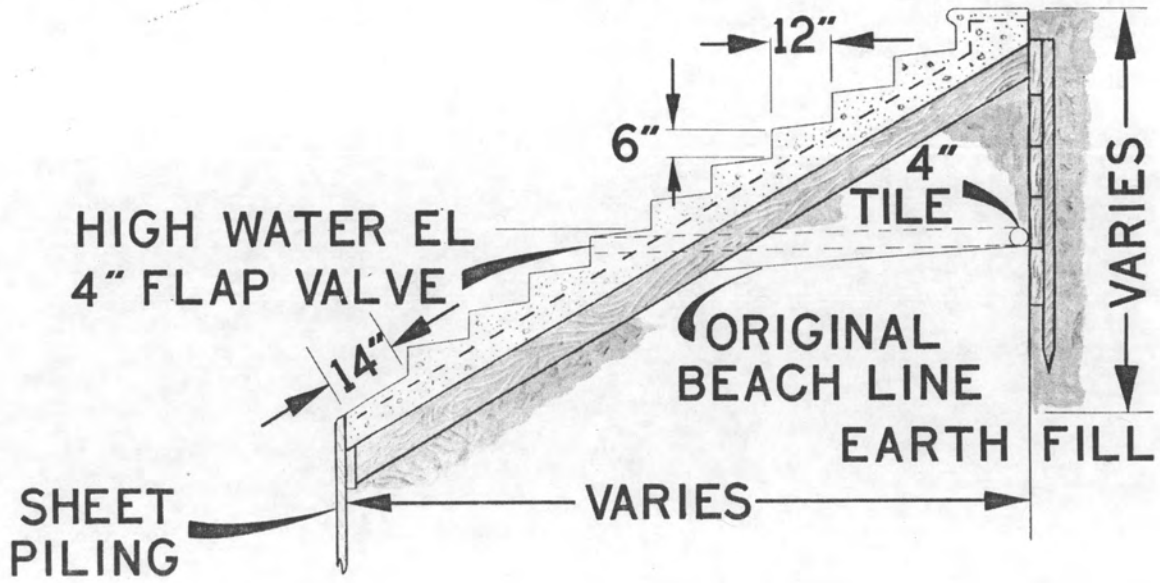
STUDY SCHEDULE

The study for beach erosion control and hurricane protection for Mobile County was initiated in 1973. Preliminary studies were initiated and an initial public meeting was held 31 July 1973; however, the study was not funded in Fiscal 1975. The study is scheduled to be resumed in Fiscal 1976 and completed in 1978.


INDICATES LIMITS OF BEACH EROSION STUDY
MOBILE CO.
BALDWIN CO.
GEORGE CO.
JACKSON CO.
MISS.
ALA.
JACKSON
Pascagoula R.
MOBILE
Dog R.
MOBILE BAY
Fairhope
Point Clear
E. Fowl R.
Weeks Bay
Bayou la Batre
Grand Bay
Portersville Bay
Pascagoula
Pascagoula Bay
Cedar Point
Bon Secour Bay
I.W.W.
Mississippi Sound
Dauphin Is.
Fort Morgan
Gulf Shores
Horn Is.
Petit Bois
GULF OF MEXICO
5 0 5 10 20
SCALE IN MILES
MOBILE COUNTY, ALABAMA
(INCLUDING DAUPHIN ISLAND)
BEACH EROSION & HURRICANE PROTECTION
CORPS OF ENGINEERS
DIVISION: SOUTH ATLANTIC
DISTRICT: MOBILE

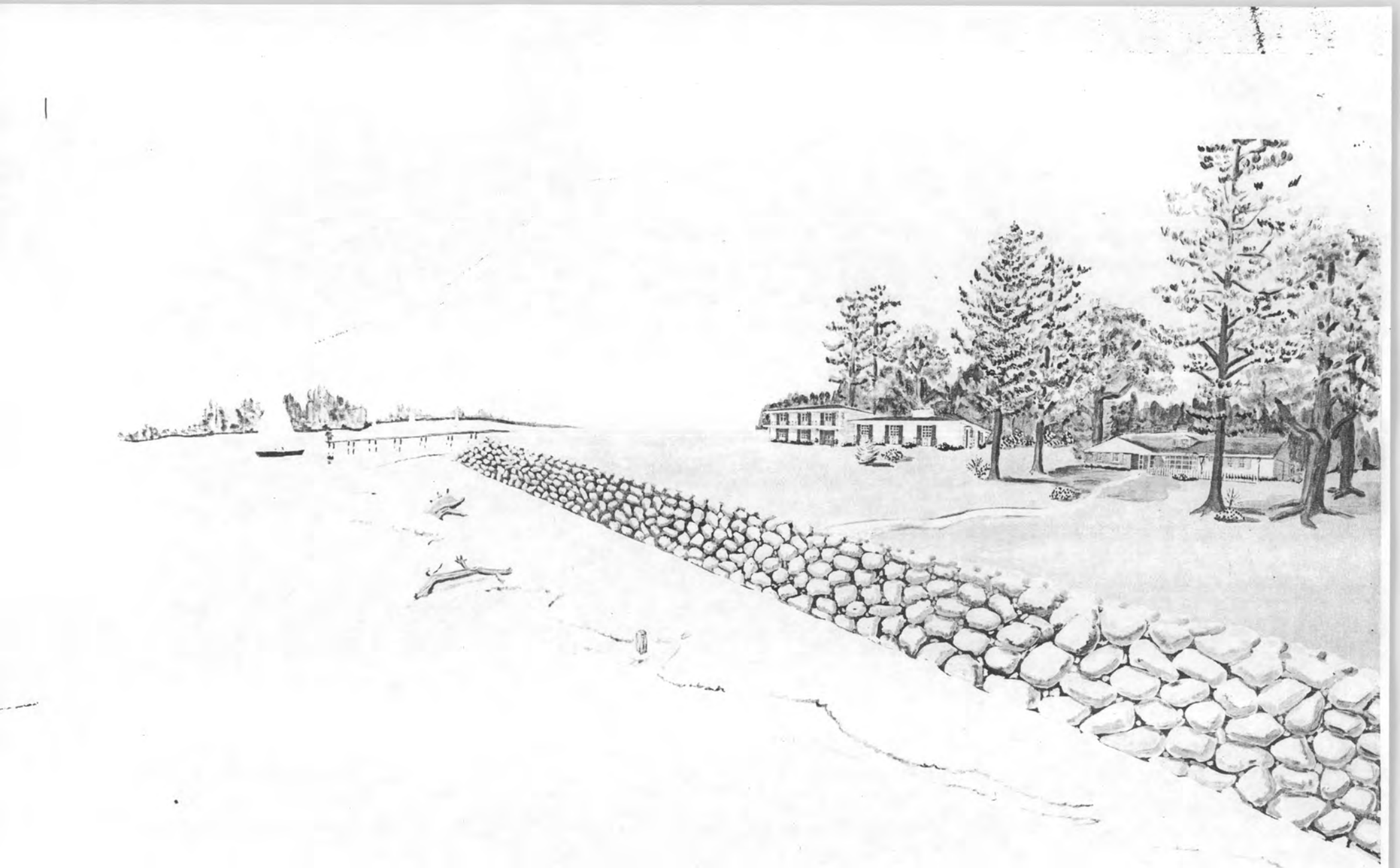


CONCRETE SEAWALL
SHORE PROTECTION

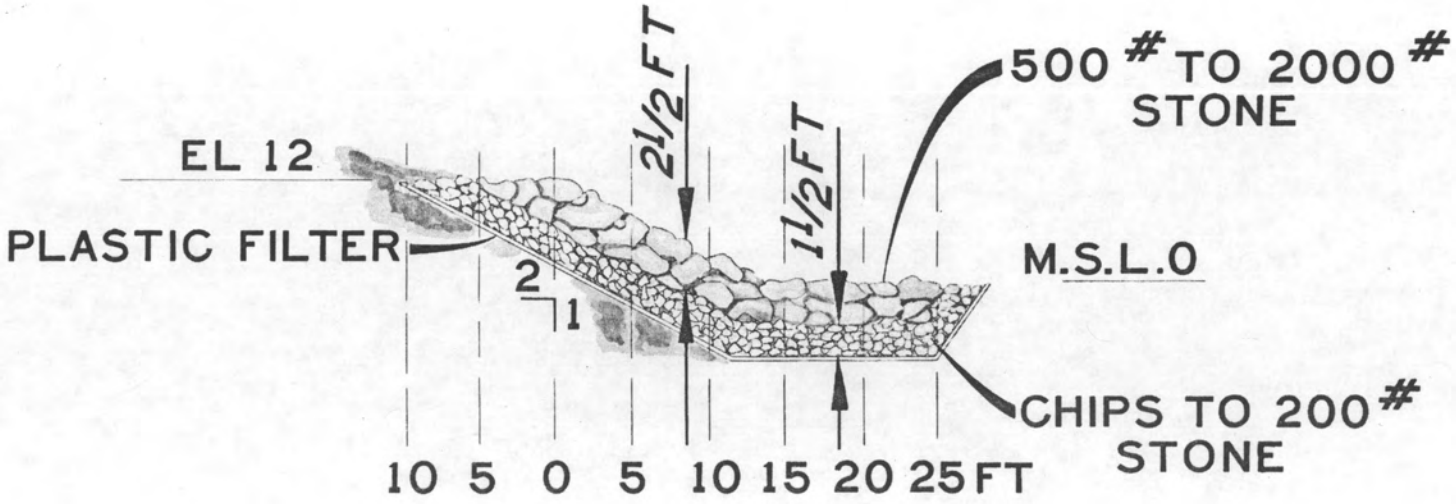


CONCRETE SEAWALL

TYPICAL SECTION

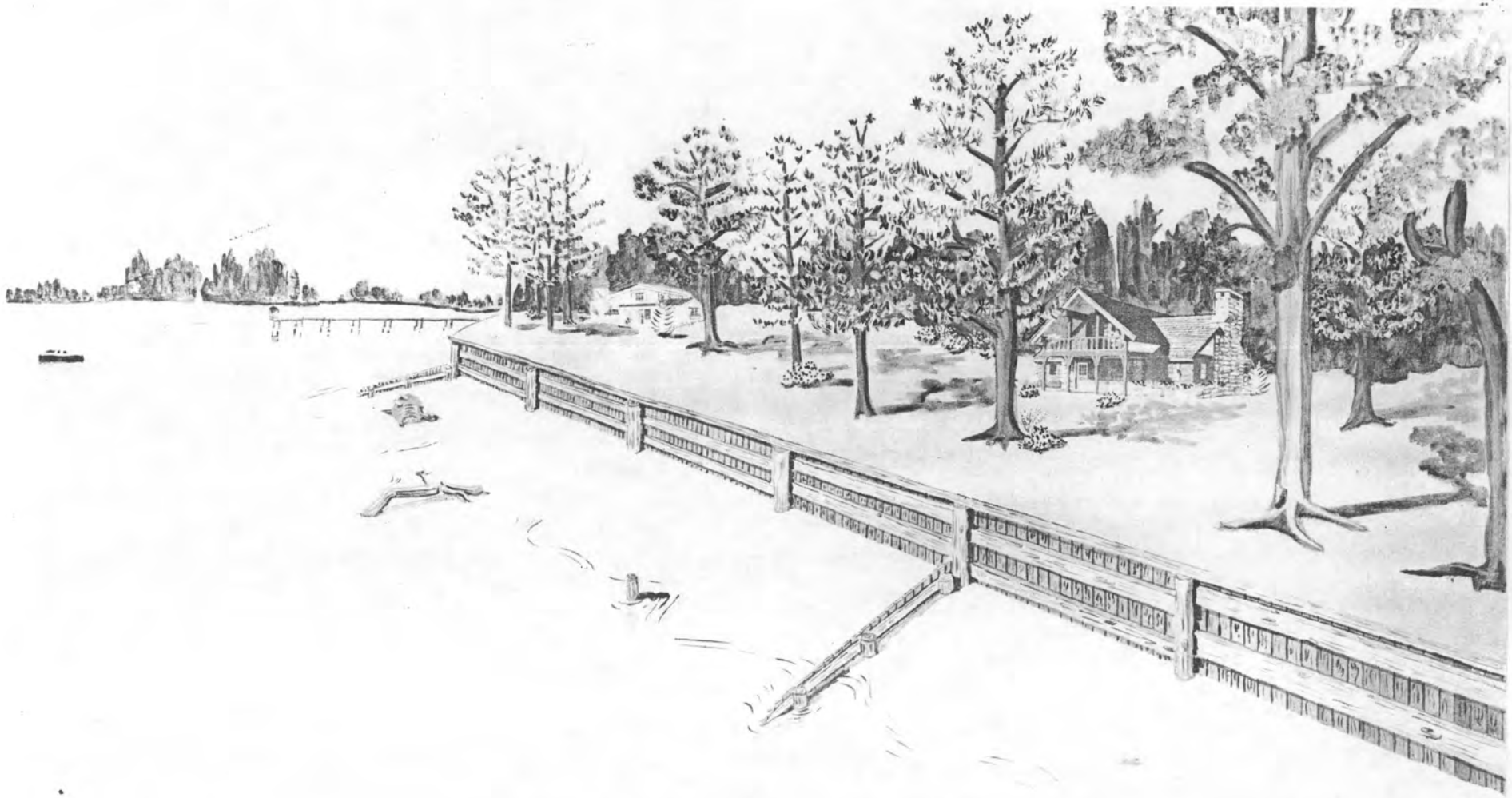


RIPRAP REVETMENT
SHORE PROTECTION



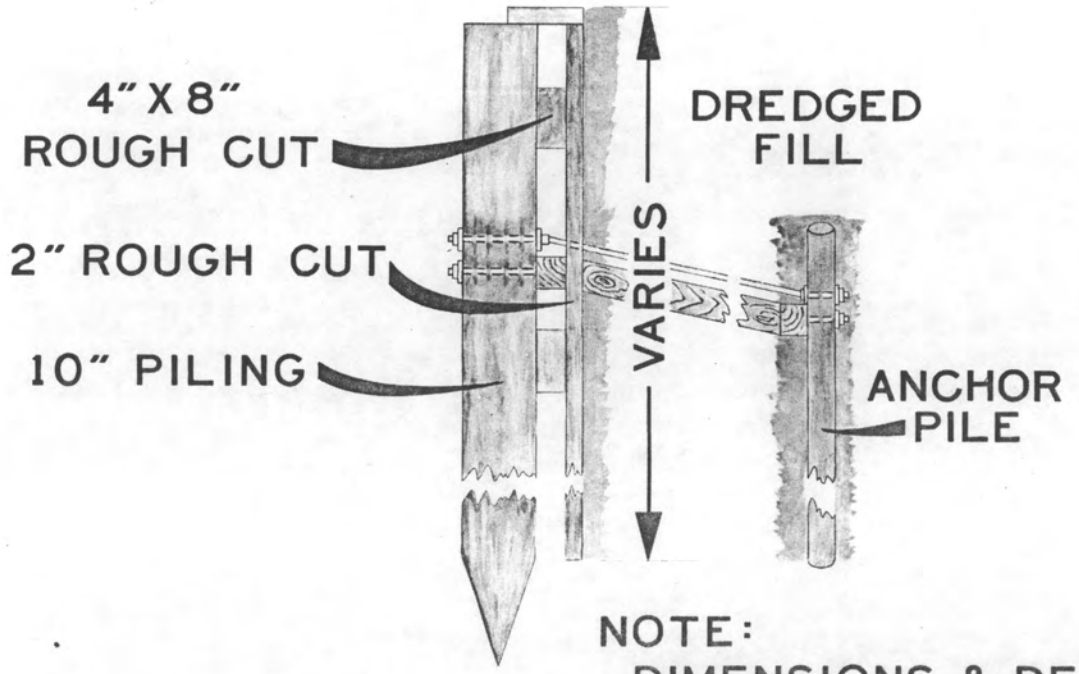
RIPRAP REVETMENT

TYPICAL SECTION



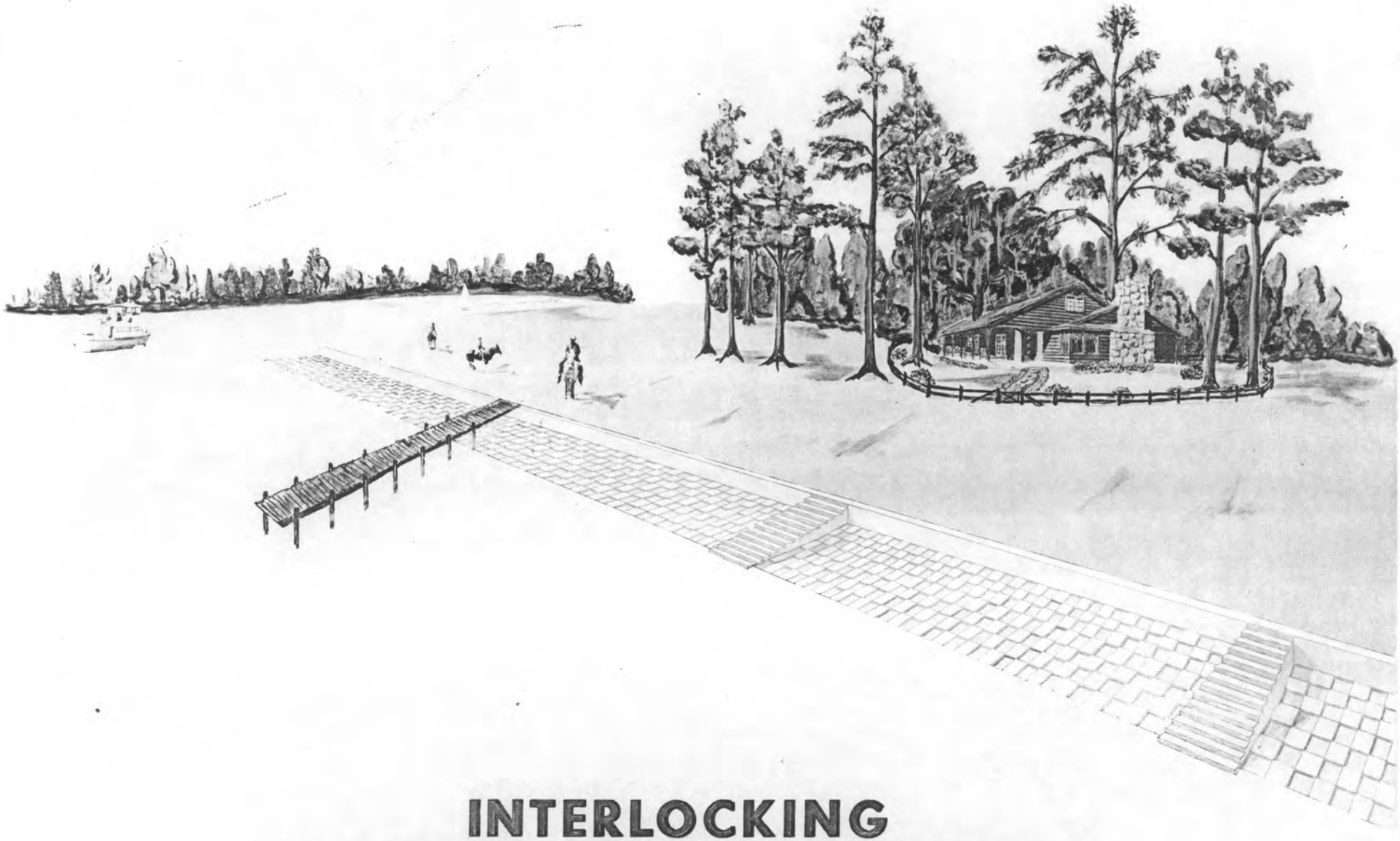
TIMBER RETAINING WALL
SHORE PROTECTION

TYPICAL SECTION



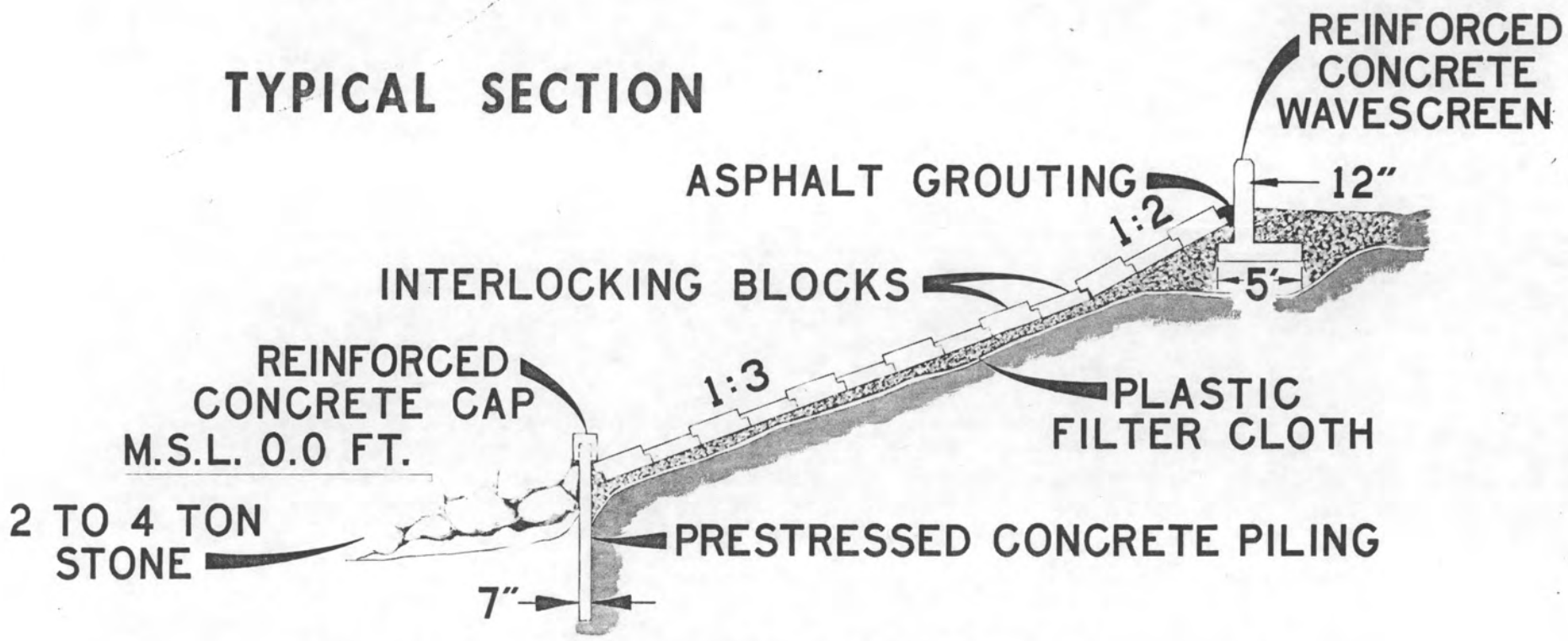
TIMBER RETAINING WALL

NOTE:
DIMENSIONS & DETAILS TO BE DETERMINED BY PARTICULAR SITE CONDITIONS.



INTERLOCKING CONCRETE BLOCK REVETMENT SHORE PROTECTION

TYPICAL SECTION



INTERLOCKING CONCRETE BLOCK REVETMENT