Chapter 5
Bulkheads

5-1. General

Bulkheads are retaining walls whose primary purpose is to hold or prevent the backfill from sliding while providing protection against light-to-moderate wave action. They are used to protect eroding bluffs by retaining soil at the toe, thereby increasing stability, or by protecting the toe from erosion and undercutting. They are also used for reclamation projects, where a fill is needed seaward of the existing shore, and for marinas and other structures where deep water is needed directly at the shore.

5-2. Structural Forms

Bulkheads are either cantilevered or anchored sheetpiling or gravity structures such as rock-filled timber cribbing. Cantilevers require adequate embedment for stability and are usually suitable where wall heights are low. Toe scour reduces their effective embedment and can lead to failure. Anchored bulkheads are usually used where greater heights are necessary. Such bulkheads also require adequate embedment for stability but are less susceptible to failure due to toe scour. Gravity structures eliminate the expense of pile driving and can often be used where subsurface conditions hinder pile driving. These structures require strong foundation soils to adequately support their weight, and they normally do not sufficiently penetrate the soil to develop reliable passive resisting forces on the offshore side. Therefore, gravity structures depend primarily on shearing resistance along the base of the structure to support the applied loads. Gravity bulkheads also cannot prevent rotational slides in materials where the failure surface passes beneath the structure. Details of typical bulkheads are presented in Appendix D and are summarized in Figure 5-1.

5-3. Design Procedure Checklist

The bulkhead design procedure is similar to that presented for seawalls in paragraph 4-4, except that Appendix D is used for examples of typical bulkheads. In addition, toe protection should be designed using geotechnical and hydraulic conditions, including wave action and current scour.

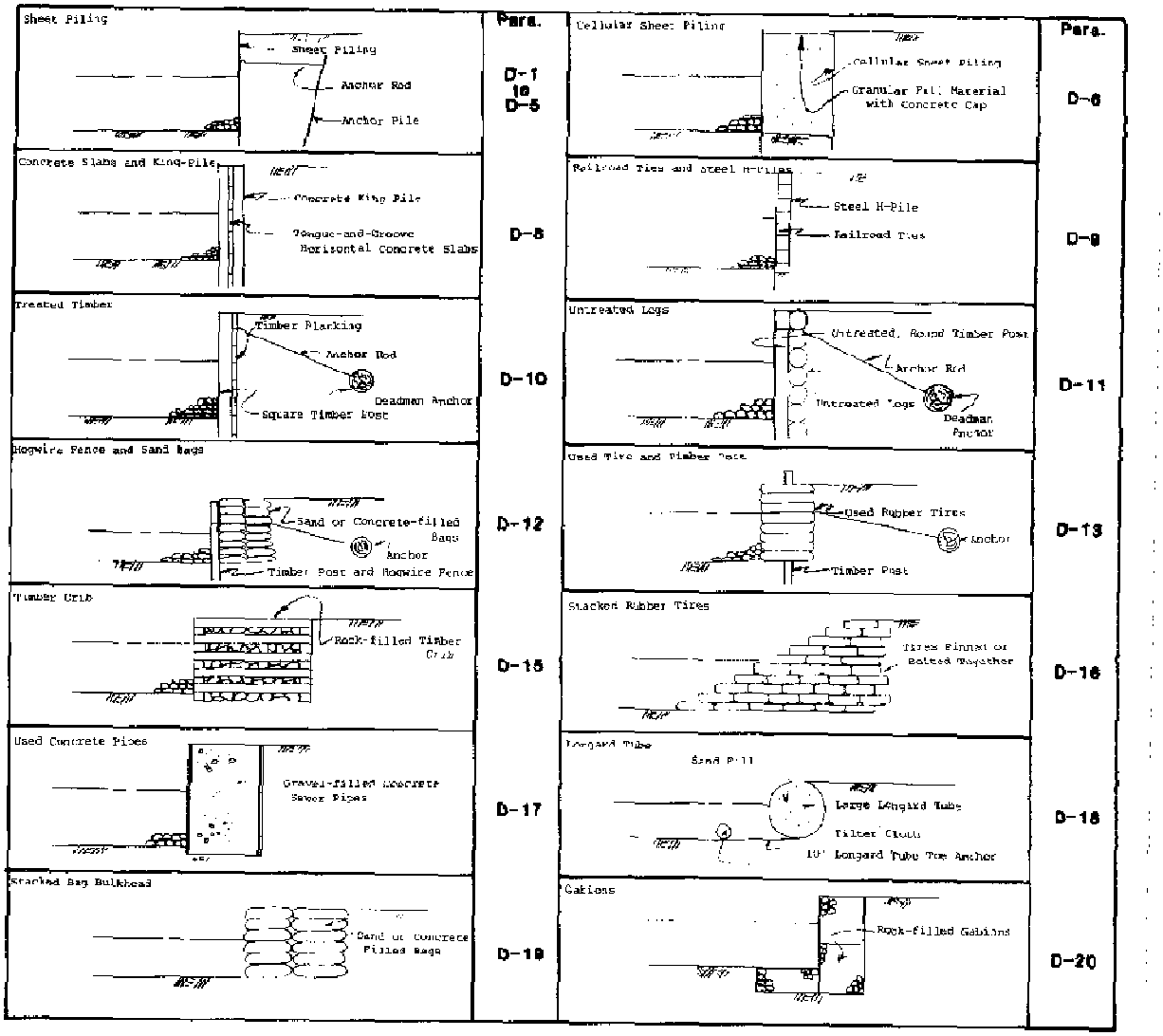

Figure 5-1. Summary of bulkhead alternatives