

5.4 COASTAL STRUCTURES

The main and prime reason to construct coastal protection structures is to protect harbor and other infrastructures from sea wave effects such as erosion. Not only are they useful for changing current and sand movements but also to redirect rivers and streams.

Types of Coastal Protection Structures

There are various structures that considered or used as coastal protection structures for example groins, seawalls, bulkheads, breakwaters, and jetties.

1. Seawalls

This large coastal protection structures can be built using different types of construction materials such as rubble mound, granite masonry, or reinforced concrete. Seawalls are commonly built and run along shoreline to prevent coastal structures and areas from the detrimental influence of ocean wave actions and flooding which are driven by storms. There are various arrangements or configurations that might be employed includes curved face seawall, stepped face seawall, rubble mound seawall.

a. Curved face seawall

Curved face seawall is designed to withstand high wave action effects. Foundation materials loss, which might be caused by scouring waves and leaching from over topping water or storm drainage underneath the wall, is avoided by employing sheet pile cut off wall. Moreover, the toe of the curved face seawall is built from large stones to decrease scouring.

b. Stepped face seawall

Stepped face seawall is used to oppose or resist moderate wave actions. Reinforced concrete sheet piles with tongue and groove joints are employed to construction this type of seawall. The spaces which is created between piles is either filled with grout in order make sand proof cut off wall or install geotextile fiber at the back of the sheet pile to form sand tight barrier. Applying geotextile

is beneficial because it allows seeping water through and consequently prevents accumulating hydrostatic pressure.

c. Rubble Mound Seawalls

Design and construction this type of seawall configuration might be easier and cheaper. It can resist substantially strong wave actions. Despite scouring of the front beach, quarry stone comprising the seawall could be readjusted and settled without causing structural failure.

2. Bulkheads

Bulkheads can be constructed by concrete, steel, or timber. There two major types which are gravity structures and anchored sheet pile walls. The bulkheads might not have exposed to sustainability strong wave actions and its main purpose is to retain earth but scouring at the base of the structure should be considered by the designer. Cellular sheet pile bulkheads are employed for situations where rock is close to the surface and enough penetration cannot be achieved for the anchored bulkhead type. Moreover, sheet pile should be sufficiently reinforced for bending moment, soil conditions, hydrostatic pressures and support points.

3. Groins

Groins are shore protection structures that decrease erosion effects to the shoreline by changing offshore current and wave patterns. Groins can be built by materials such as concrete, stone, steel, or timber and are categorized depend on length, height, and permeability. Furthermore, groins are commonly constructed vertically to the shoreline and it can either impermeable or permeable.

4. Jetties

Jetties are usually built of materials such as concrete, steel, stone, timber, and occasionally asphalt used as binder. This structure is constructed at river estuary or harbour entrance and extended into deeper water to oppose forming of sandbars and limit currents.

5. Breakwaters

There are three major types of breakwaters namely: offshore, shore-connected, and rubble mound. Not only are they used to protect shore area, anchorage, harbor from wave actions but also to create secure environment for mooring, operating, and handling ships.

