5.4 COASTAL PROTECTION STRUCTURES

Coastal erosion is a ceaseless operation by sea waves and tides. India has a coastal boundary of about 7000km long, which has to be protected from the attack of sea waves and tides, since areas close to the sea shore are always subject to continual action of sea waves.

Protection of the coast and the shore against the erosive forces of waves, currents and storm surge can be performed in many ways, and protection of coast areas against flooding too.

Coastal protection works are under taken for

i) Stabilization of existing beach
ii) Restoring eroded beach
iii) Creation of artificial beaches and for their stabilization
iv) Protecting the shore line.

Generally two types of coastal protection measures are undertaken. They are studied under the following headings.

1. Structural
2. Non structural

Structural measures:

The following structures fall under this category

i. Sea walls & Bull heads
ii. Groynes
iii. Break waters

i) Sea walls & Bulk heads

Sea walls

- A seawall is defined as a structure separating land and water.

- It is designed to prevent coastal damage due to wave action and storm surge, such as flooding.
- Sea walls are normally very massive structures because they are designed to resist the full force of wave and storm surge.

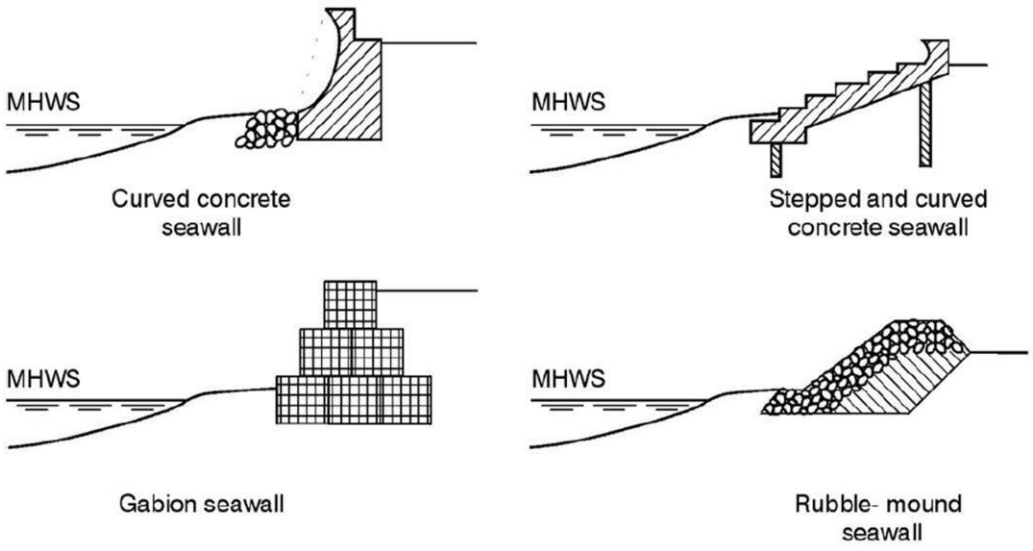


Figure Examples of seawall structures.

- A sea wall protects the coast against erosion and flooding.
- Seawalls are often used at location of exposed city fronts, where good protection was needed.

Figure Seawall/revetment in front of Corniche in Alexandria.

Figure Rubble mound seawall protecting the coastal road at Madampagama, SW coast of Sri Lanka.

Bulk heads

- A bulk head is a structure or partition used to retain or prevent sliding of the land.
- A secondary purpose is to protect the coast against damage from wave action

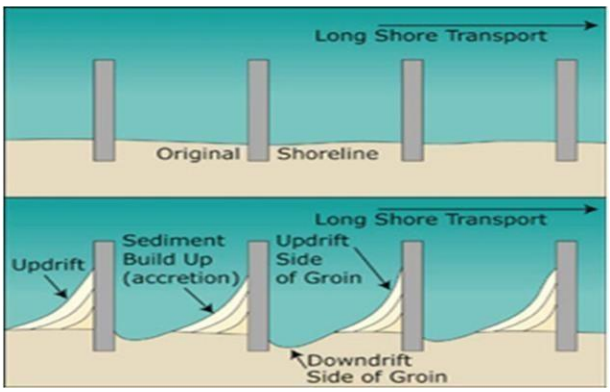
- Bulkhead area normally smaller than seawalls, as their primary function is to retain fill at locations with only limited wave action and not to resist coastal erosion.

Bulkhead structure constructed by Gabion mesh boxes

- These are used along natural shorelines and along filled area, where a well defined separation between land and sea is required.
- These can be used against sea level rise if adjusted in height and if the area is still protected against wave despite the sea level rise.
- These are not used to protect against erosion.

ii) Groynes:

- These are normally straight structures perpendicular (could be slightly oblique) to the shoreline.
- They are build a rubble mound structures but they can be constructed in other materials such as concrete, timber, geo-tube etc.
- These are generally applicable against chronic erosion as groynes are active when there is a net long shore transport. Groynes are not applicable against acute erosion.



iii) Break waters

- It is structure parallel or close to parallel, to the coast, build inside or outside the surf-zone.
- Breakwater are able to protect sections of shoreline in a less harmful way than groynes
- The applicability of breakwater to different types of needs to be studied before choosing a particular design.

Non structural measures:

The following methods are adopted under non structural category to reduce sea erosion.

i. Grass dykes
ii. Beach nourishment
iii. Sand dune rebuilt
iv. Planting vegetation

i) Grass dykes

- Grass dykes of sufficient width and height are orderly arranged along the shore line to withstand the wave action.
- They are densely placed so as to stay with standing for a month time or so.

ii) Beach nourishment

- Eroded beaches are filled with beach materials with suitable dimensions to protect the uplands.
- It is a low cost beach nourishment method by providing natural sand supply periodically to ensure shore protection.

iii) Sand dune rebuilt

- The demolished sand dunes are reconstructed, by bringing beach materials from other unaffected areas, to safe guard the coast line from sea waves and tidal action.

iv) Planting vegetation

- Plantation development, like growing ‘mangrove’ trees will effectively protect the shore line from the sea erosion.
- Further, sand dunes will be stabilized by this vegetation.