IJNRD.ORG ISSN : 2456-4184
INTERNATIONAL JOURNAL OF NOVEL RESEARCH AND DEVELOPMENT (IJNRD) | IJNRD.ORG
An International Open Access, Peer-reviewed, Refereed Journal

Study Project on Impermeable Re-curve Seawalls to Reduce Wave Overtopping.

[1]AVADHOOT KADU, [2]SARVESH R JOSHI,[3]PRATHAMESH MISAL,[4]ROHIT C MISAL,[5]ADITYA M DOIPHODE.

[1]AssistantProfessor,[2345]UGStudent,
[12345]DepartmentofCivilEngineering
[12345]Padmabhooshan Vasant Dada Patil Institute Of Technology(PVPIT),
Pune,India.

***Abstract*- Sea-level rise due to climate change results in deeper water next to existing coastal structures, which in turn enables higher waves to reach these structures. Wave overtopping occurs when wave action discharges water over the crest of a coastal structure. Therefore, the higher waves reaching existing structures will cause higher wave overtopping rates. One possible solution to address increasing overtopping, is to raise the crest level of existing coastal structures. However, raising the crest level of a seawall at the back of a beach, will possibly obstruct the view to the ocean from inland. Alternatively, recurves can be incorporated into the design of both existing and new seawalls. The recurve wall reduces overtopping by deflecting uprushing water seawards as waves impact with the wall.**

***Keywords*: Re-Curved Seawall,CoastalErosion.**

I. INTRODUCTION

Wave overtopping occurs when wave action discharges water over the crest of a coastal structure. Coastal structures protect infrastructure (walkways, roads, buildings and land) as well as humans (especially pedestrians) from the impacts of the coastal environment. The crest height of coastal structures is often determined by the allowable wave overtopping during extreme conditions measured in litres per second per metre (l/s per m).

Apart from waves, water-level is an important parameter when considering overtopping. Due to climate change and its concomitant rise in sea level, deeper water occurs next to existing coastal structures. Consequently, coastal engineers are confronted with higher wave heights, which result in an increase in wave overtopping. The levels of land and infrastructure safety behind coastal structures are thus compromised. Raising the crest height of existing coastal structures is one possible solution to this problem

II. DEFINATION

SeawallDefinition

A Recurve wall is defined as a vertical, impermeable seawall with a curved or straight seaward overhang sited at the top of the seawall .

TypesofSeawall

Therearethreemaintypesofseawalls:Vertical,Curvedand Mound.

VerticalSeawall

Vertical or near vertical shore-parallel structures designed to prevent upland erosion and storm surge flooding. Seawalls are generally massive concrete structures emplaced along a considerable stretch of shoreline at urban beaches.Figure 2showsverticalseawall.

Figure1VerticalSeawall

CurvedSeawall

Curved seawalls are designed to imitate the wave's shape as it moves towards the land and repels it back to the sea. The concave also prevents the wave from overtopping the wall, providing additional protection. Figure 3showscurvedseawall.

Figure2CurvedSeawall

A) Seawall Type :

The first thing you'll have to decide is the type of seawall you want to construct. Each shape has its benefits and is better suited for a unique environment.

- ***Vertical:*** *Vertical seawalls are inexpensive and straightforward to build. They deflect wave energy away from the coast and can absorb energy with their loose rubble. However, they are also the fastest to become damaged and can erode from the bottom.*

- **Curved:** Curved seawalls are much better at spreading wave energy, so they don't erode as easily. The curve at their top prevents waves from overcoming the wall. Their engineering process is relatively complex and is still susceptible to undermining.

- **Natural:** Natural seawalls are one of the best ways to protect against the elements. Things like coral reefs, mangroves, and coastal plants can create a natural defence against erosion that doesn't hurt the environment.

B) Seawall Materials

The material you choose for your seawall will impact its durability. However, some materials might not be necessary (and are too expensive) for low-risk environments.

- **Wood:** Wood isn't usually used for seawalls because it erodes and gets damaged much more quickly than other materials. If you decide to construct a wood seawall for your lakefront it must be for very mild conditions and undergo regular maintenance.

- **Vinyl or Plastic:** Relatively new to the seawall material industry, vinyl or plastic has a longer lifespan than steel, possibly lasting more than 50 years. Unlike the other seawall materials, vinyl/plastic colors can be chosen for an aesthetically pleasing appearance. But, like aluminum, vinyl/plastic has height limitations and cannot be driven into hard surfaces.

3] CALCULATIONS :

- Costal length of Mumbai = 33 km
- Cost of Recurve-wall for 1 km = 12 crore Rs
- Cost of construction of Recurve for 33 Km = 396 crore Rs
- Add 10% inflation charges = 40 crore Rs
- Total construction cost = 436 crore Rs
- Estimated damage in Rs till year 2050 = 5000 crore Rs
- Amount saved by using recurve = 4564 crore Rs
- Percentage of amount saved [%] = 91.28 %

4] LITERATURE REVIEW :

International Journal :

- **J.A. Comfort and M. B. Single**
  {Land and Water Studies International Ltd}

In discussing the question of whether coastal structures cause or accelerate erosion, the authors have analysed seven years of bi-weekly to monthly monitoring of beaches adjacent to and fronting seawalls. The seven years of data was evaluated for any seasonal or long term patterns or effects.

The result of this analysis was that there are some seasonal changes between the summer and winter profiles on both the adjacent and seawalled beaches. However once the summer berm on the adjacent beach had retreated back to or landward of the seawall, there was very little difference between the profile fronting the seawall and that of the adjacent beach. The authors stated that there were no significant long term effects or impacts shown from the seven years of data collection.

National Journal :

- **Design of Coastal Structures for the Protection of Ponnani Coast By :** Parasakthi P B, Neha Mohammed, Gayatri Menon, Dixon Devassykutty

The coastline is the separation of the land from the sea thus protecting or maintaining that borderline plays a very important role in maintaining the natural Eco balance. Hundreds of millions of people are migrating to the beaches in quest of a better living, and the coastal and marine ecosystems provide very important services. If the coastlines are affected due to natural or manmade

reasons immediate measures need to be taken to prevent them, reduce them as well as rebuild those lost coastlines if possible. The coastline of Ponnani was one of the coastlines that was facing the threat of erosion. Design and construction of appropriate coastal structures can not only help to control erosion but would also help to rebuild the lost areas of the beach gradually. Thus for the coast of Ponnani we chose to design two coastal structures. A Seawall to prevent and control erosion and a breakwater to protect port infrastructure from the destructive forces of the waves while also providing calm conditions for the ships berthing.

5] CONCLUSION :

- Higher wave heights resulting from the expected rise in sea-level will cause larger wave overtopping over seawalls at the back of beaches.
- To address this problem, the crest level of existing coastal structures can be raised. However, raising the crest level could obstruct the view of the sea.
- This project investigates the use of recurve walls as a possible solution as the crest level of recurve walls can be lower than that of vertical walls with the same overtopping rate.
- The use of recurve walls is not only a solution mitigating the impact of sea-level rise, but also applies to the design of new seawalls.
- Using rates obtained from physical model tests, the project aims to compare overtopping rates for a vertical seawall without a recurve, with seawalls with recurves
- The second objective of the study is to investigate the influence of the overhang length of the recurve wall on overtopping rates.

6] REFERENCES :

- J.A. Comfort and M. B. Single Land and Water Studies International Ltd

  The effects of seawalls on beaches

  Published by Department of Conservation Head Office, PO Box 10-420 Wellington, New Zealand

- International Journal of Engineering Research & Technology (IJERT)
  Parasakthi P B, Neha Mohammed Sadik, Gayatri Menon, Dixon Devassykutty
  Design of Coastal Structures for the Protection of Ponnani Coast

- International Journal of Scientific Development and Research (IJSDR) www.ijsdr.org

  DESIGN OF SEAWALL

  VIJAYARAGHAVAN R, TEEPAN KARTI, SATHYA Y

- *Status Report on Coastal Protection & Development in India*
  Central Water Commission New Delhi
  December, 2016