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GROIN DESIGN AS A COASTAL PROTECTION PAGATAN BEACH, TANAH BUMBU REGENCY

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ABSTRAK

Kerusakan pantai yang diakibatkan oleh abrasi di Pantai Pagatan di Kabupaten Tanah Bumbu memerlukan pengamanan pantai yang kuat dan stabil. Selama ini digunakan pengaman pantai jenis groin yang terbuat dari bronjong kawat, yang cepat rusak karena kawat yang digunakan untuk bronjong ini lama kelamaan mengalami korosi. Oleh karena itu, untuk mengantisipasi terjadinya hal itu, perlu dibuat suatu rancangan bangunan pantai tipe groin sebagai pengaman Pantai Pagatan yang kuat dan stabil. Dalam menghitung tinggi dan periode gelombang digunakan metode Severdrup Munk Bretschneider (SMB) yang telah dimodifikasi oleh Shore Protection Manual (US.

Army Corps Engineers, 1984). Perancangan ini mengacu pada Pd T-04-2005-A. Data-data yang diperlukan antara lain, data angin, data gelombang, data pasang surut, data sedimentasi, dan data tanah. Hasil perancangan didapat dimensi bangunan dengan lebar dasar 22 m dan elevasi puncak rencana groin 5.5 m, daya dukung ultimate 400.128t/m^2, stabilitas guling 33.836 dan stabilitas geser 4.198. Angkutan sedimen yang terjadi sepanjang pantai sebesar 30.107,72m^3/hari, tinggi gelombang signifikan (H33) 1,98 m dan Desain Water Level (DWL) 2,77 m. Dalam perancangan ini, material yang digunakan adalah batu pecah.

Kata kunci: perancangan, pengaman pantai, groin, Pantai Pagatan

ABSTRACT

Damage caused by coastal erosion in Pagatan Beach in Tanah Bumbu regency require strong and stable coastal protection. During these days as coastal protection used groins type of protection are made by gabion wire, which is easily damaged because gabion wire used for this more easily corroded. Therefore, to anticipate it, it should be made a design of a safety coastal structures by groin type in Pantai Pagatan that strong and stable. To calculating the wave height and period used Severdrup Munk Bretschneider (SMB) method which has been modified by the Shore Protection Manual (US. Army Corps of Engineers, 1984). This design refers to the Pd T-04-2005-A. These data are required is wind data, wave data, tide data, sediment data, and soil data. The results obtained dimensional design of the building with a base of 22m width and a crest elevation of 5.5m groin plan, ultimate withstand capacity of 400,128t/m^2, overthrown stability 33,836 and shear stability 4,198. Sediment transport that occurs along the coast of 30,107.72m^3/day, significant wave height (H33) is 1.98 m and the Design Water Level (DWL) 2.77 m. In this design, material used is crushed stone.

Keywords: design, coustal protection, groin, Pagatan Beach.

1. INTRODUCTION

Although most of the Pagatan area is near the coast where most of the inhabitants are livelihoods as fishermen, but not a few people grow rice and crops, resulting in a fairly dominant economic value for local revenue.

Pagatan is a coastal area in Tanah Bumbu Regency that is experiencing abrasion that destroys the coast with the erosion process. Pagatan beach is very important to be protected, because it is a residential area and is one of the areas that add to regional income. To protect Pagatan Beach from the danger of damage caused by coastal abrasion, one of them by making a coastal protection.

Coastal protection design that has been done in the form of groynes made with blocks of concrete are arranged stacked and then tied with a cement cast and some are made in the form of square-shaped bronjong wire filled by split stones / stacks are arranged stacked. Both types of groynes are made without a protective layer so as to make the structure quickly damaged by the energy received from the waves. In the type of groyn made of bronjong wire faster damage occurs because the wire used for bronjong this gradually over time and eventually damaged.

Therefore, to anticipate the occurrence of more severe damage, it is necessary to create a design of groynes as a safeguard Pagatan Beach. Which can protect the beach to be able to withstand waves, and reduce the energy of waves that reach the shore so no abrasion occurs.

The issues to be addressed in this review are:

1. Safety type of groyne with protective coating for Pagatan Beach, Tanah Bumbu District, Kalimantan South.
2. Design of coastal type groynes.

The purpose of this design is to design the type of groin with a protective layer that is used as a beach security on Pagatan Beach.

The expected benefit of this design is to obtain a stable, safe, and protective type of groin-type beach safeguard design to protect coastal settlements, and to be an income for the local government.

To limit the issues reviewed so that planning can be directed according to the intended purpose, then used the basic assumptions and limitations of the problem as follows:

1. Analyzing the characteristics and conditions of the Pagatan Beach area, Tanah Bumbu District.
2. Alternative countermeasures of coastal abrasion with Groin Type Building.
3. Wind Data of Tanah Bumbu Regency is not available in BMKG Banjarbaru, instead used Wind Data of Kotabaru Regency which is still close to study location.
4. Not analyzing soil stability, only using secondary land data from Kerasian Island of Kotabaru Regency.
5. Not counting RAB building.

2. THEORITICAL STUDY

Handling of Beach Damage

Problem solving erosion / abrasion and sediment (accretion) in coastal areas are two things that must be looked for problems. Beach erosion can cause enormous losses and damage to residential areas and existing facilities in the area. To overcome coastal erosion, the first step to be done is to find the cause of erosion / coastal abrasion.

Classification of Beach Buildings

In accordance with the function of coastal buildings are grouped into three groups (Triatmodjo, 1999), namely:

a. Construction built on the beach and parallel to the coastline. Included in this group is the beach wall / revetment.

b. Construction built approximately perpendicular to the beach and connect to the beach. Included in this group are groin and jetty.

c. Construction built offshore and approximately parallel to the coastline.

Included in this group are sea walls and breakwaters.

Groin is a coastal protective building that is usually made perpendicular to the coastline and serves to hold or capture transport or sediment transport along the coast to the port or river mouth.

Groin can only withstand sediment transport along the coast. Along the coast there is a sediment transport. Groynes placed on the shore will withstand sedimentary motion, so sediment settles upstream (towards the direction of sediment transport along the coast).

Downstream of the sediment-grown groyne is still occurring, while the upstream supply is blocked by the building, resulting in the downstream groynes suffering from sediment deficits that the coast is eroded. This situation causes a shoreline to change that will continue until a new equilibrium is reached. The new balance is reached when the angle formed by the wave against the new coastline is zero (άb = 0), where there is no sediment transport along the coast.

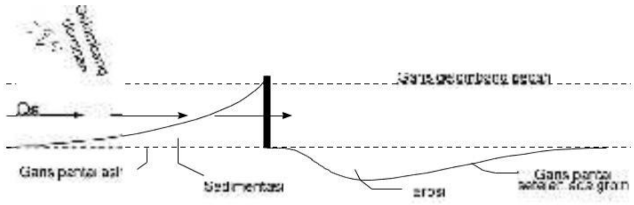

Figure 1. Single groynes and coastal line changes (Triadmojo, 1999)

Because of the above factors, the protection of the beach by using one groyne is not effective. Usually coastal protection is done by making a series of buildings made of several groins that are placed with a certain distance. Using this system, the shoreline changes are not too large (Triatmodjo, 1999).

In general, the length of the groyne is 40% to 60% of the average surf zone width, and the distance between groins 1 to 3 times the length of the groyne (Triatmodjo, 1999). Groin has several types, there are straight type, Type T or type L. Selection of groy types depends on usability and planning needs. Groin type T and type L is often used for sand not to come out of pias. The use of T and L type groynes is based on the following reasons:

1. To reduce the energy of the waves coming by the parallel groin section of the beach.
2. The area behind the groynes parallel to the coast is expected to be quiet so as to prevent the loss of sand towards the sea.
3. The groynes can be used for inspection and tourist.

Figure 2. Groin Types

Calculation of Beach Building Structure

The selected plan wave height is the maximum wave height that may occur at the job site.

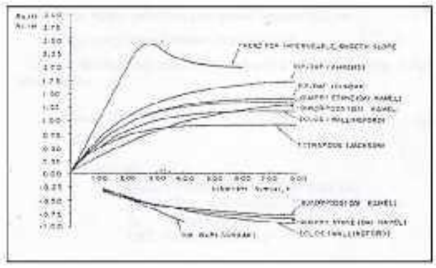

Figure 3. Height of wave invasion on various types of protective layers

3. METHOD

Data needed in designing coastal safety design through the following steps:

a. Primary data obtained from direct survey and from result of interview with resource person in field.

b. Secondary data include bathymetry and water plan data) topography, hydro-oceanography data consisting of wind data, tidal data obtained from BMKG, sediment gradation data, soil mechanics data, and wave data.

4. RESULT AND DISCUSSION

The dominant wind direction is in the southeast direction, with a maximum wind speed of 12 knots or 6.17 m / dt indicated by the windrose below (Figure 4).

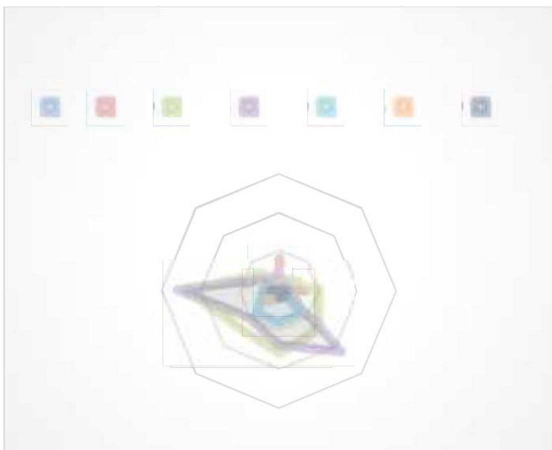

Figure 4. *Windrose*

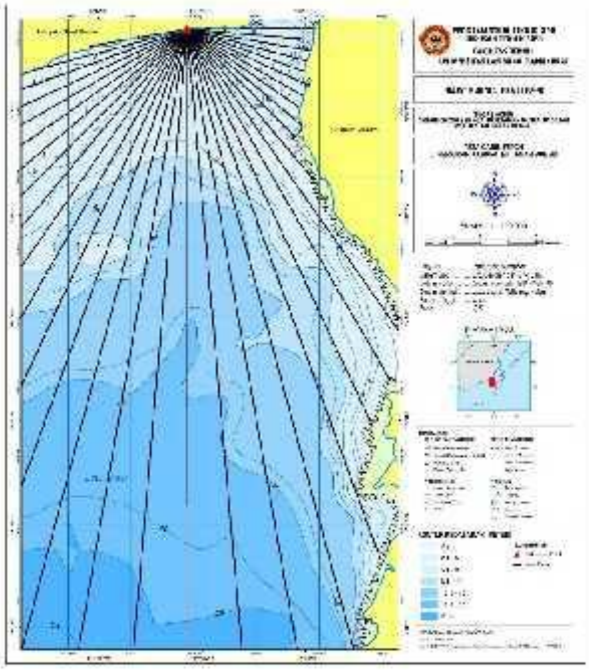

Figure 5. Map fetch effective

The depth of the breaking wave is 2.91m

The determination of water level is obtained as follows:

1. Highest high water face (HHWL) of 270 cm
2. Lowest low water face (LLWL) - 10 cm
3. Average high water face (MHWL) of 227 cm
4. Average low water face (MLWL) of 51 cm
5. Average water face (MSL) of 139 cm

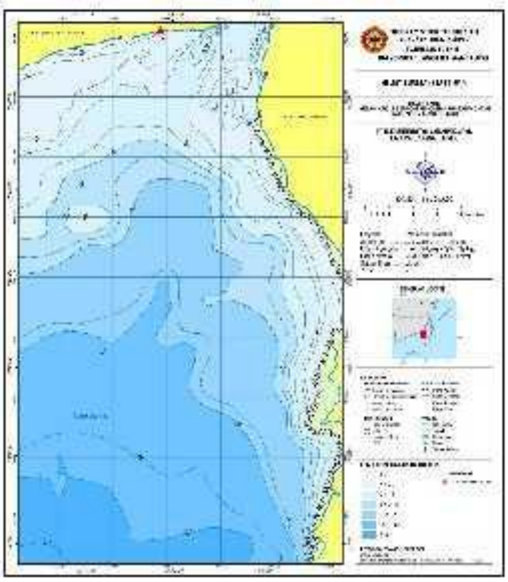

Figure 6. Map of bathymetry and topography of design location

The sediment transport that occurs along the coast is 30107,72 m3 / day.

STRUCTURAL DESIGNING

Calculation of Groin Structure

1. Angle coming wave 30 °
2. High and significant wave period

   H33 = 1.98 m

   T33 = 5.38 seconds
3. The depth of the breaking wave (db) = 2.91 m
4. The basic slope of the beach (m) = 0.01
5. Surfzone width (Ls) = db / m = 2,91 / 0,01 = 291 m
6. Length of groyne (Lg) = (40% - 60%) × Ls = 60% × 291 = 174.6 m

   = Distance between groynes (Xg) = 1 to 3 times Lg = 3 × 174.6 = 523.8 m
7. The length of the beach ± 6 km so that the number of groynes to = 12 pieces.

   Elevation Mercu = DWL + Ru + high guard = 2,77 + 2,256 + 0,50 = 5,526 m ≈ 5,5 m

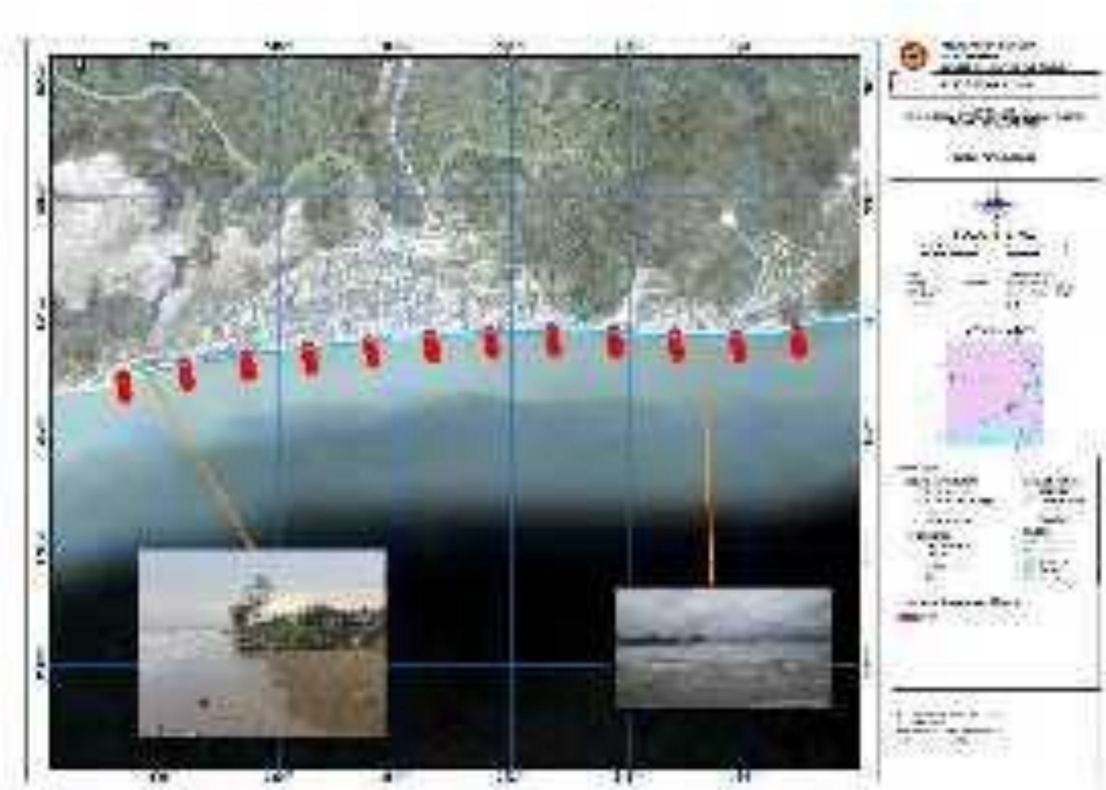

Figure 7. Groin plan layout

5. CONCLUSION

The sediment transport that occurs along the coast is 30107,72m3 / day. Significant wave heights (H33) = 1.98m. Water Level Design (DWL) = 2.77m. Peak elevation of groin plan = 5.5m, groin width = 2m, 22m base width with two layers of protection and foot protection. Two layers of armor and armor layer of the second layer, the material used is broken stone. Weight armor layer = 1789kg with thickness = 2m and weight of second layer stone = 178.9kg with thickness = 1.5m. Width of foot protector = 4.5m, foot protective thickness = 1.5m, and foot protective weight = 895kg. The length of the groyne is 174.6m, as many as 12 pieces of groyne for coastal length ± 6km with each groin distance of 523.8m. The ultimate carrying capacity of the soil is 400.128t / m2, and the security factor 17.812 is greater than 3 (Safe). The result of structural stability analysis, obtained stability 33,836 bolsters more than 2 (Safe) and shear stability 4,198 more than 1,5 (Safe).

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