



مرکز ملی پژوهش‌ها و نوآوری‌های دریایی

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سازمان بنادر و دریانوردی



AGE OLD RECLAMATION ENCLOSURE AT COCHIN

CHANDRAMOHAN, P.V.

Project Director,
Goshree Islands Development Authority,
Park Avenue,
Cochin - 682 011
Kerala, India

P.V.Chandramohan, born in 1946, received his degree in civil engineering from the University of Kerala in 1967. He was awarded master's degree in Hydraulic Engineering by IHE, Delft, The Netherlands in 1989. Secured his Ph.D. from Indian Institute of Technology, Bombay, India.

Kerala is located on the west coast of southern India. Backwaters are a special hydrographic feature of Kerala. They are long and narrow water bodies lying parallel to the coast but separated from it by an equally narrow stretch of land. They are open to the sea only at a few locations. The port city of Cochin is spread over the mouth of a large backwater system. Major port infrastructure is put up on an island in the backwaters. Willingdon Island was reclaimed from the backwaters using dredged material.

The backwaters are subjected to tidal oscillations from the Arabian Sea through the opening at Cochin. The tide at Cochin is semidiurnal with a marked diurnal inequality. Maximum range of the spring tide is 0.9 m while that of the neap tide does not exceed 0.5m. Tidal currents in the channels have a maximum value of 1.5 m/s but they are confined to the deeper reaches in the middle. The backwater basin is absolutely tranquil without any wave action. The subsoil at Cochin consists of soft cohesive material. The bed, upto a depth of 5 m is made up of settled flocculated cohesive sediments and is amenable to large settlements.

The first requirement for making a reclamation is to have an enclosure to contain the fill to be placed hydraulically. Any sort of shallow rigid retaining structures like the counter fort, cantilever or gravity type would exert high base pressures that could not be passed on to this soft soil. This would have necessitated expensive piled foundations. Another alternative would be deep seated anchored bulkheads, which would have been equally costly.

An ingenious method of putting up a reclamation enclosure is the solution. A section of the wall is given in fig 1. The top portion of the wall from the ground level to the lowest water level is called the head structure and has fixed dimensions as shown in the figure. This is founded on trunk structure which has a side slope of 45° and is below water level. The structure rests on a facine mattress made up of twigs and branches of cashew trees.

Once the bed level of the site is known, the width of the facine mattress can be arrived at using fig. 1. The branches of cashew are tied together in bundles of 30 cm diameter, their length being equal to the width of the mattress. These bundles are placed in water, side by side and tied together to form a mattress of 16 metre length. The floating mattress is then towed to the particular spot in the alignment of the wall. The alignment is marked by driving wooden stakes on both sides of the position of the mattress. The mattress is pushed in position between them. Please see fig 2. Rubble stones weighing upto 50 kg are brought in country canoes called "Valloms". These Valloms are pulled on top of the facine mattress. The stones are then discharged on to the mattress manually. When sufficient quantity of stones are discharged, the mattress would sink down to the bed with the stones. The dumping

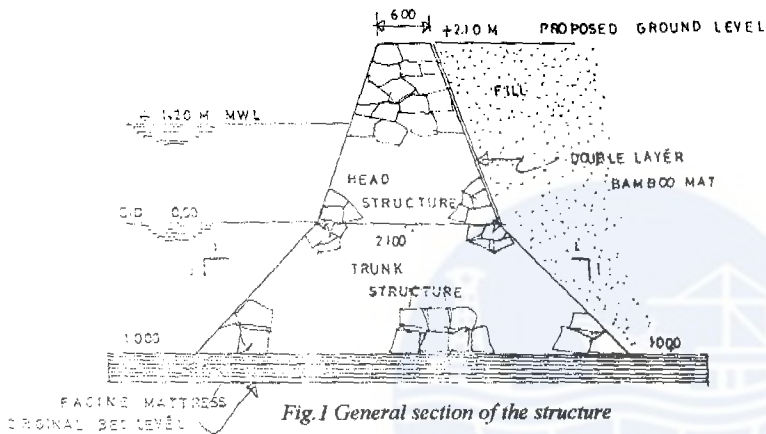


Fig.1 General section of the structure

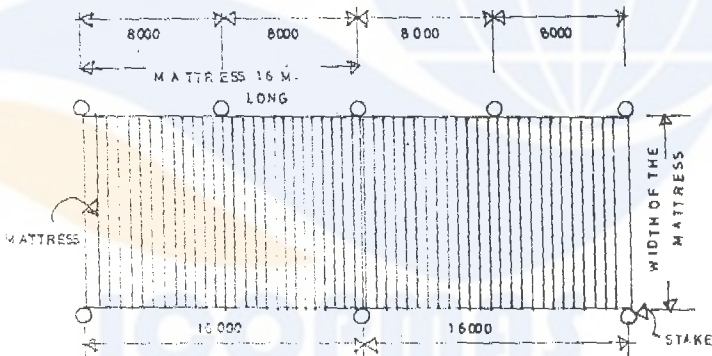


Fig.2 Facine mattress in alignment

of stones is continued till the trunk structure is formed as in the figure. The head structure is made up of dry packing the rubble manually. The reclamation enclosure is now ready for filling in. A bamboo mat in double layer to act as filter is placed inside the head structure and the filling is placed hydraulically by a cutter suction dredger.

This is basically a flexible wall and can accommodate movements both vertically due to sinkage and horizontally from lateral earth pressure. Only locally available material is utilised for its construction. It does not require skilled personnel to build. Mobilisation of any kind of machinery is not required. Kilometres of such structure have been constructed at Cochin and are performing without any distress.