

Lecture in CSM:

Foundation for a Caisson structure near an Island in Indian Ocean

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ABSTRACT

Technical solution for foundation of a caisson structure near an island in Indian Ocean will be discussed. The Caisson structure is used for Low Temperature Thermal Desalination plant. The Caisson is circular in shape with outer diameter of 8.15 m and inner diameter of 7.5 m and with overall height of about 10.65m (9.1m above seabed +1.55m below seabed). The Caisson has to be placed 250 m into the sea from the shoreline. The soil below the caisson is assumed to be weak coral sediments with cavities. It has to resist a lateral force of about 500 T. When wave force (lateral force) is applied to the caisson, it lacks stability against sliding and overturning.

Various options are considered: Conventional Gravity type structure of suitable diameter caisson with wind turbine to increase the self-weight is considered as Option-1. Increasing the self-weight of the caisson by filling concrete inside the caisson up to seabed level and reducing the diameter of caisson is considered as the Option-2. In Option 3, rock anchors are provided at bottom raft and additional 1m thick concrete above the raft. The gravity structure is then buried 1m below seabed to mobilise the lateral resistance and increase the self-weight. The rock anchors are designed for adequate anchor depth, such that anchors can provide adequate lateral resistance required.

In Option-1 overall cost of the project is high, but the return benefits from using a wind turbine has also to be considered. Hence this option is considered for one island.

The self-weight for Option 3 is lower considering all the options and hence is preferred for five islands, since lower self weight required lower draft and can easily be prefabricated and towed to the site from the lagoon where water depth is very low.