

Coastal Dune Protection Using ACETube® in Mexico



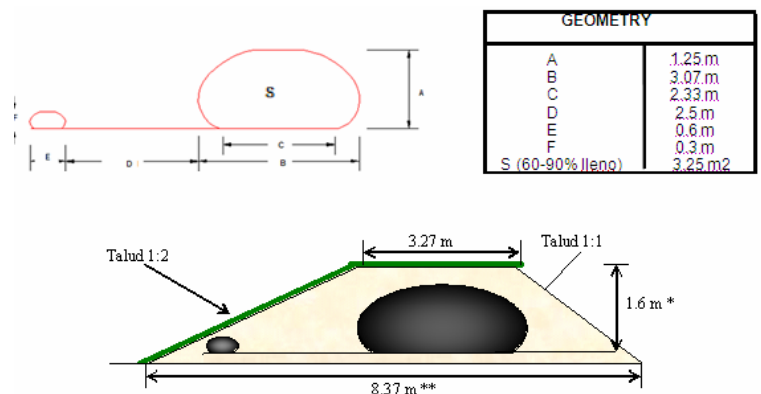
Introduction

ACE Geosynthetics has done an ACETube® application in cooperation with Axis Ingenieria and ML Ingenieria for Industria Salinera de Yucatan in Mexico to protect beaches and coastal dunes at Las Coloradas from further damage caused by Hurricanes. The lagoons are used to produce salt and they are major income source for that region. Since the lagoons have an important economical benefit, protecting the region while offering an environmental and economical solution is vital.

The Design

According to local sea meteorology data analysis shows that for an average year, 73% of the offshore waves approaching Yucatan's coast are not higher than 0.5 m. But in winter season, occurrence of waves higher than 1 m and the frequency of long wave ($T_p \Rightarrow 6$ s) increase. Based on these criteria, dune height is designed to reach 2.5 m above low water level.

Shore protection adopts beach dune reinforcement using 30m long and 1.2 m height ACETube® filled with sand. Reinforced dune uses ACETube® as a base core then covered with sand reaches 2.5 meter of designed height from the low water level. Reinforced dune has worked as coast line regression limit, avoiding dune failures and preventing sea water from entering salt production lagoons during extreme events. Covering tubes with sand not only protected them from UV light but also helped re-vegetation. The construction firstly took place in year 2006 along the coast for 2.5km in length. In September 2007, the length is increased to 3.9km. This project used 97 units of ACETube® of 70x105 kN/m tensile strength, 0.5mm AOS and 0.3 sec⁻¹ permeability.





Construction

7.4m circumference and 30 meter long ACETube® is used in the project. ACETube® is filled from a hopper to the filling ports with the pumping seawater and dumping sand from an excavator producing slurry as filling materials. Once ACETube® is filled; they would be covered with sand to reach designed height.



Filling ACETube® with Hopper



During Construction

Performance

Right after the construction is completed, dunes start natural vegetation's growth. Periodically the conditions of the tubes are checked and after the 2006 storm season from October through December, some parts need attention but do not influence the safety of whole structure. In conclusion, the whole structure provided the well performance in the salt production lagoons protection without affecting coastal process and natural evolution of surrounding beaches. In terms of environmental impact which is a priority concern in every coastal project, the flexibility of ACETube® represents a great alternative for coast-protection solutions.



Open Sea side



Lagoon Side

Specification:

- **Main Tube: circumference 7.4m**
- **Anchor Tube: circumference 1.33m**
- **Apron: 2.5m in width**
- **Length: 30m**

Quantity: 97 pieces

