



BALUSTRADE

The carbon steel pipes are connected with stainless steel elements.

A nice cap covers the piles' tops.

A navigational aid is fixed on the last pile to guide boats away from the balustrade.

Sacrificial anodes are fixed to the pipes to ensure cathodic protection and to mitigate corrosion.



RIG AFLOAT

The steel casings are placed in position guided and held by a metal frame.

The temporary access ramp is installed with the rig sitting on it.

The permanent pile is inserted and held in final position before grouting takes place.



TEMPORARY RAMP

A 150 T crane is lifting elements of the steel temporary access ramp on which the drilling rig would position itself in order to carry out its activities.

WORKING IN TANDEM

A rig and a crane are seen working in tandem; the rig carries out the pre-drilling through the bedrock and the crane follows with the temporary casing and the permanent pile. Grouting of the pile follows on. A similar team worked in parallel on the other beach barrier in order to complete the project on time.



STEEL PILING

A drilling rig is driving steel piles into the ground using a vibro hammer.

These piles will carry the pre-cast concrete elements that form the removable ramp.

BEACH BARRIERS

The Royal Court Affairs (RCA) launched a tender for the construction of two beach barriers in order to restrict access of intruders onto a private beach in Salalah, together with a removable onshore pre-cast concrete ramp to be used by coastguards.

The design called for driving carbon steel pipes straight into the ground.

However, two test piles proved that, despite the "shoe" and the use of a large vibro hammer, the bedrock resisted and the piles buckled.

Sarooj suggested to pre-drill, insert a sleeve, and then fix the pipe in position and grout it in whilst removing the temporary casing.

The method succeeded.

Stainless steel pipes were used as horizontal elements.

The ramp had to rest on steel piles connected with capping beams and completed with removable pre-cast concrete slabs.

A cathodic protection system was provided and controlled from a panel board fixed in a discrete electrical room.

