

Project Location:

Patras, Greece

Main Contractor:

European Technical S.A.

Client:

Ministry of Public Works of the
Greek Republic

Project period

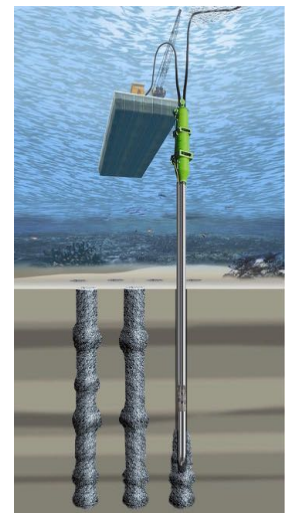
Nov 2000 - Oct 2002

Method Applied:

Offshore Dry Bottom Feed
Stone Columns

Technical Requirements:

1.0 m avg. diameter Stone Columns in given grid spacing.



Barge with Double Lock Gravel Pump Vibro Rig (right)

Quality Control Testing:

Digital Ampere-Depth Recorder.

Recording of exact gravel volume per depth interval by patented double lock mechanism.

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PORT OF PATRAS LIQUEFACTION MITIGATION

Liquefaction mitigation

In the 1990ies soil liquefaction caused by an earthquake destroyed parts of the Port of Patras. It needed therefore no convincing to install stone columns for liquefaction mitigation on this project.

Below: Aerial photo shows the completed project with the wave breaker seawalls and the new berth structures.



QUANTITIES:

Breakwater:

4'830 No. stone columns, 16 m average length, 77'280 lm, 60'665 m3 (1 m dia-meter), square spacing 2.7 m.

Quaywall:

3'073 No. stone columns, 10 m average length, 30'730 lm, 24'123 m3 (1m diameter), square spacing 3.3 m.



Barge setup

The barge of approx. 55 m x 35 m carried the 150 to main crane that hoisted the vibroprobe.

The photo on the bottom left shows that the gravel supply was organized via silos and two conveyor belts that filled the gravel pump's hopper. The silos were refilled using a small auxiliary crane that unloaded the gravel barges into the silos on the main barge.



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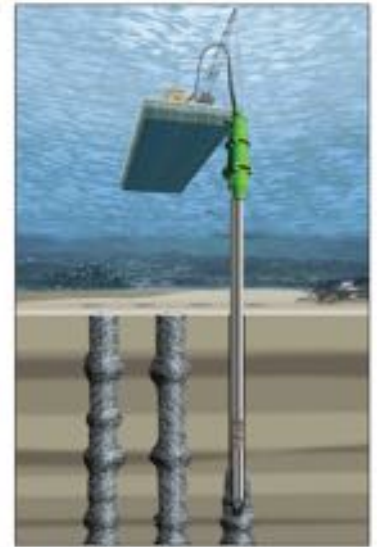
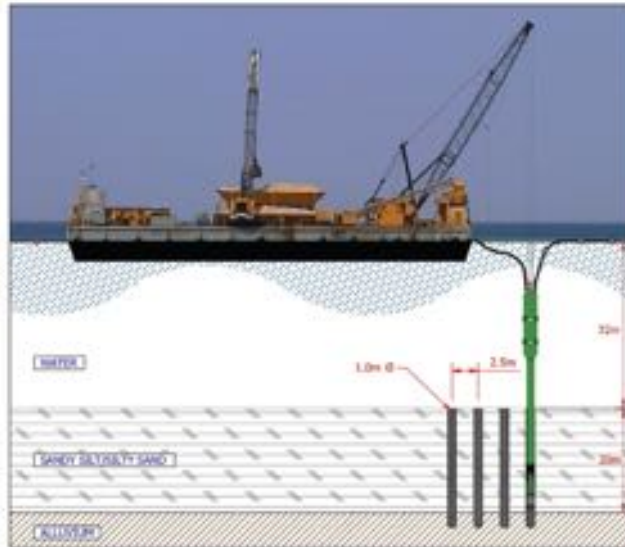
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SEAWALL CROSS SECTION WITH STONE COLUMNS



Submerged receiver with air discharge to the surface
The underwater receiver tank with "schnorchel hose" for the pressure discharge of excess stone transport air to the surface was invented in 2000 by Alexander and Wilhelm Degen. The patent is valid in some countries and today held by others.

For sites in deep waters in relation to the soil treatment depth, this system allows the classic double lock gravel pump to pneumatically transport the stones into an underwater receiver without counteracting water pressure while a receiver above water traditionally simply releases the excess air via a short tube or a venting cover on top of the receiver.

Current new developments like water transport of the stones can avoid the relatively expensive pneumatic stone transport. The patented air discharge hose is nowadays obsolete.



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