EXPANSION PROJECT OF EMARAT TERMINAL

FUJAIRAH-UAE

DYNAMIC COMPACTION / DYNAMIC REPLACEMENT

Category:	**Oil & Gas / Tanks**
Developer:	**EMARAT**
Engineer:	**PENSPEN**
Contractor:	**CB&I EASTERN ANSTALT**
Area / Quantity:	**10 Miscellaneous Tanks**

menard VIBRO MIDDLE EAST

PROJECT DESCRIPTION

EMARAT planned to expand its Tank Farm by building ten (10) 34m diameter, 25m high Oil and Gas tanks in the immediate vicinity its three (3) existing Tanks. The site is located at the Port of Fujairah, UAE.

The following table summarizes the criteria to be achieved at hydro-test under 265kPa load:

Max edge settlement before piping	Max dishing settlement
75 mm	375 mm
Max Edge settlement after piping	Differential Settlement along the shell
25 mm	10mm/10m

SOIL CONDITION / GEOTECHNICAL PROBLEM

The following soil profile is extracted from the Soil Investigation Report

Soil profile

Layer #	Description	Elevation of top (m RAK)		Thickness
		from	to	(m)
1	silty fine grained SAND	5.1	3.6	1.5
2	SILT/CLAY*	3.6	3.1	0.5
3	silty fine, sometimes gravelly SAND	3.1	2	1.1
4	dense to v. dense SAND to SANDTONE/Gravel	2	-8	10
5	Substratum	-8		N/A

Due to the presence of 0.5m of CLAY at 1.5m from EGL, Tanks could not be safely supported by the existing soil.

Main concern of the client was vibration effects on existing structures due to their proximity (18m) from the area to be compacted.

For this purpose, Vibration monitoring associated with cut-off trenches have been implemented to ensure no damage to the structure shall be generated by soil improvement.

Ring trench DC at Tank TK-10

MENARD SOLUTION

A combination of Dynamic Compaction / Dynamic Replacement was implemented.

DR pillars inside the pad tanks were pre-excavated in order to reduce impact of vibrations.

Ring Trench excavation combined with Dynamic Compaction was performed to ensure homogenous settlement along the ring of the future tanks.

In order to reduce vibrations, cut-off trenches were dug and vibration monitoring was performed along the duration of the work.

Cut-Off Trenches / Pre-Excavated Pillars

QUALITY CONTROL

A Pre Design has been performed using Finite Element Calculations.

Soil profile and parameters were extracted from Soil Investigation Report.

Achievement of the criteria was confirmed through execution of 3 Post PMT tests per tank and Finite Element Calculations based on soil characteristics extracted from Post PMT tests.