

# **The assessment of degree of cementation in weakly to moderately cemented sands by the static cone penetrometer.**

**Nabil Muhammad Abdallah Al-Joulani**

Civil Engineering

1987

## **Abstract**

In this thesis, the effect of degree of cementation on a selected local dune sand has been studied by using the static cone penetrometer.

Artificially cemented sands were prepared in the laboratory at different relative densities, different cure periods and different amounts of cement. The two cementing agents used were portland cement and calcium carbonate.

The variation of cone resistance and skin resistance versus penetration depth were determined for all test samples. Also, the effect of each variable on the friction ratio defined as the ratio of skin resistance to cone resistance ( $f_s/q_c$ ) were also assessed.

The results have shown that the addition of a cementing agent to a wind blown sand increases penetration resistance. On the other hand the penetration resistance was found to increase with relative density and cure time. The results also show that long time curing is essential for cementation development especially when calcium carbonate is used as a cementing agent.

A limited triaxial test program conducted on cemented sand samples extracted from cemented specimens tested by the penetrometer have shown that peak and residual strengths increase with the increasing relative density, cement content and confining pressure.

Attempts made to estimate cone resistance ( $q_c$ ) from known bearing capacity formulae based on  $O' p$  and  $C' p$  determined from triaxial test program fell considerably below measured cone resistance values at comparable densities and percent cement.