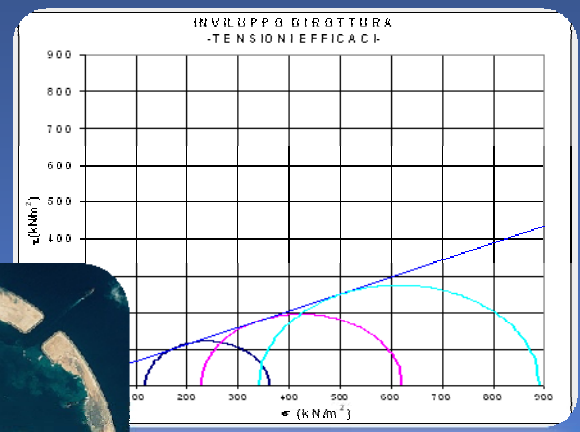
CEMENT STABILIZATION SAND



LABORATORIO ASSOCIATO A.L.G.I.

DIMMS CONTROL

ICMQ

Ministero delle Infrastrutture e dei Trasporti

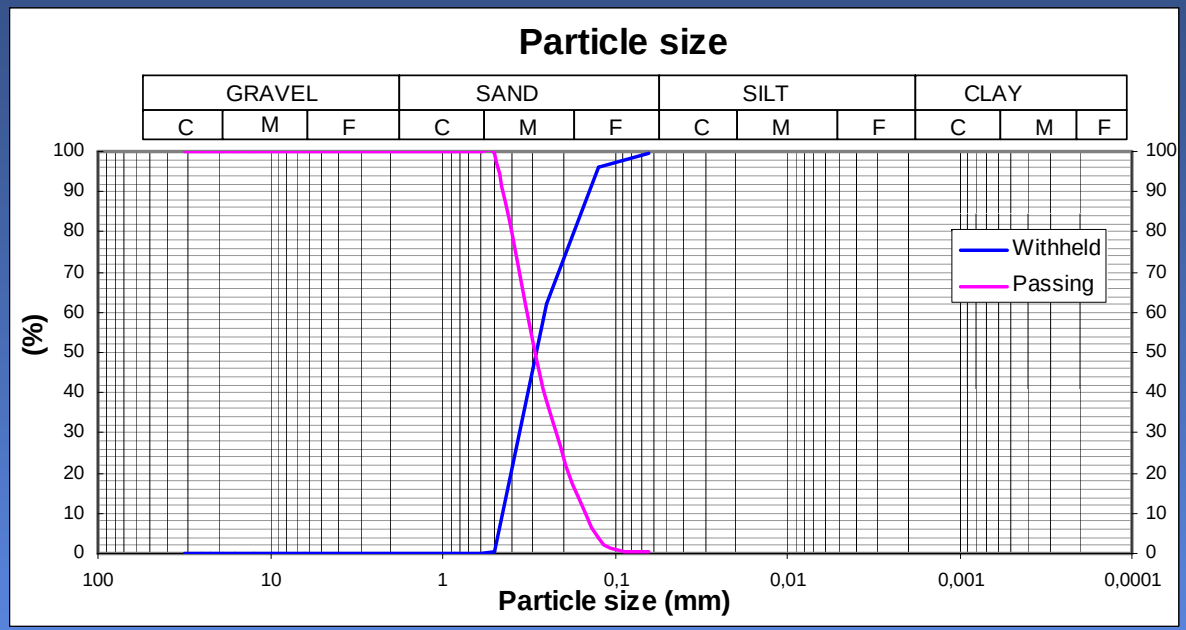
Cement stabilization sand

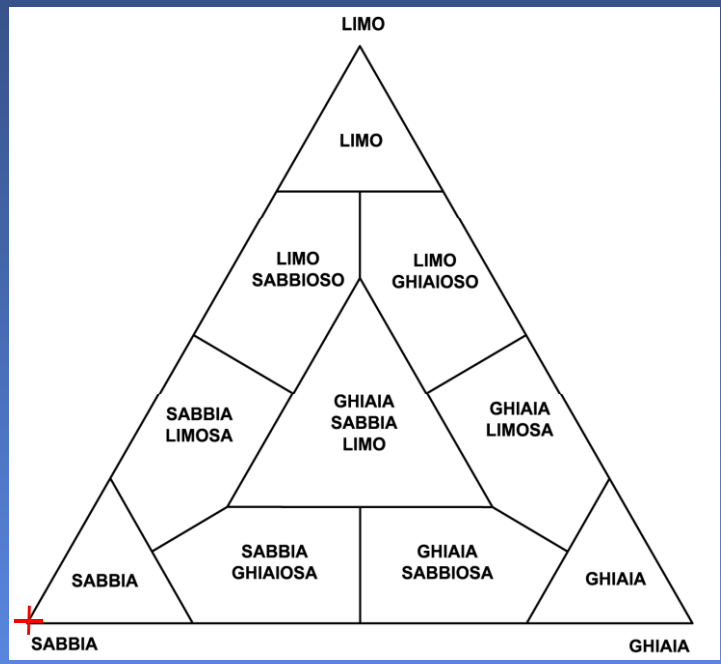
Project steps

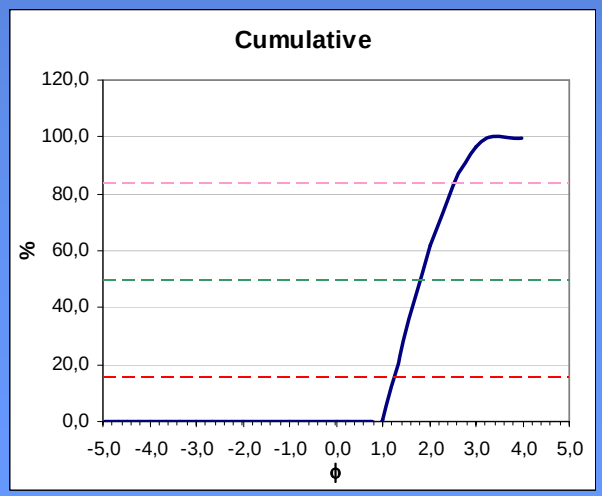
1. Study of natural sand
2. Study of mix design sand + cement
3. Study of mix design sand + cement + fiber

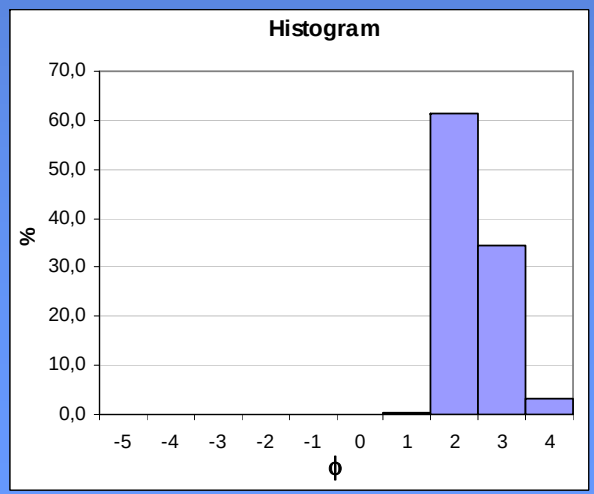
Cement stabilization sand

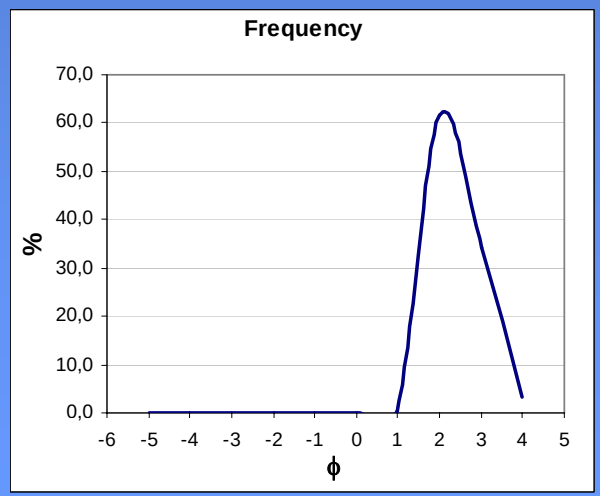
Study of natural sand





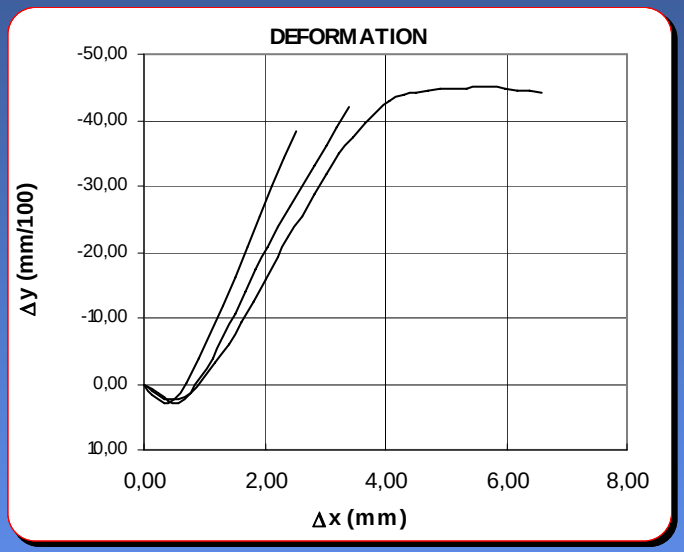


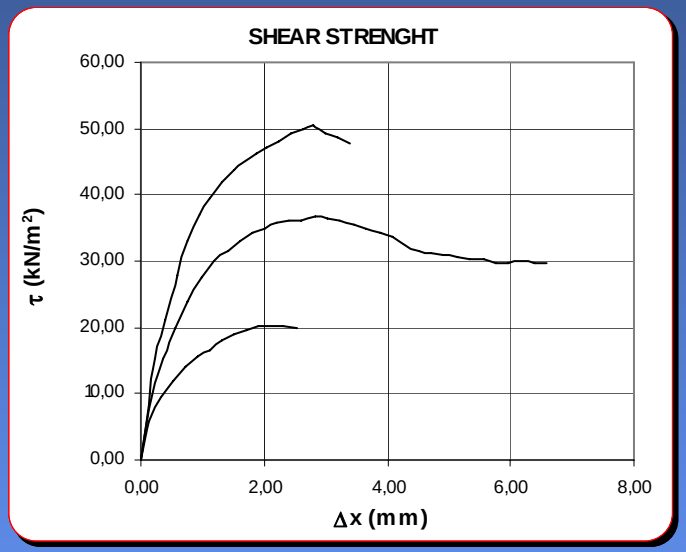


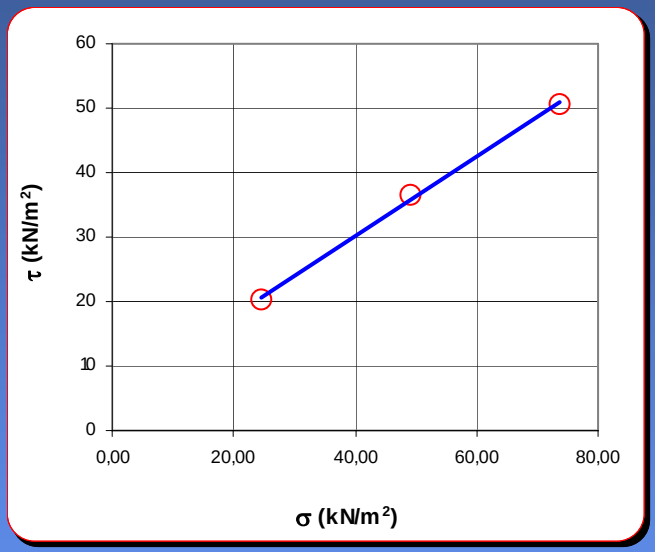


Cement stabilization sand

Study of natural sand







C (kN/m²): ***5.63***

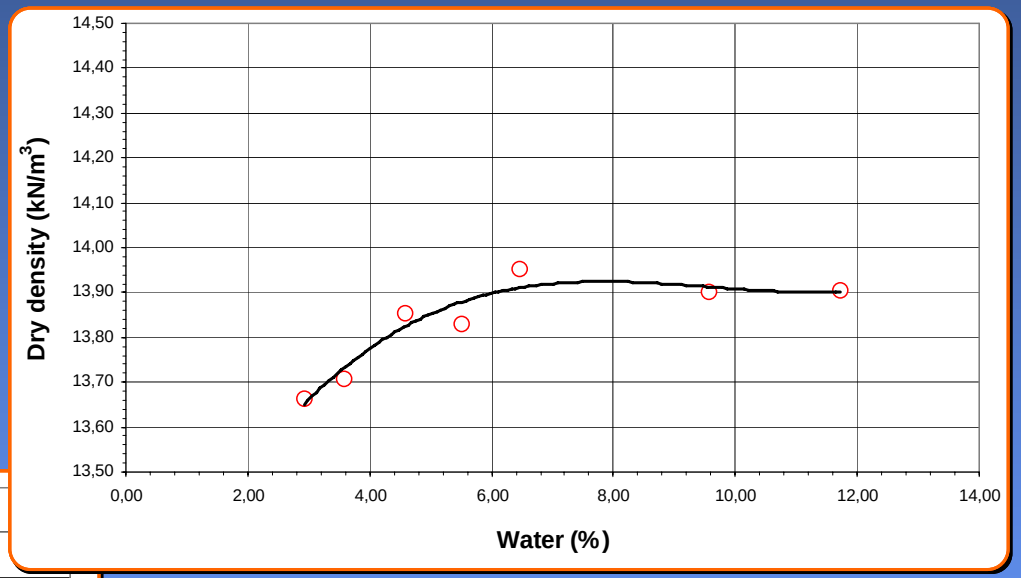
Φ (°): ***31.62***

Cement stabilization sand

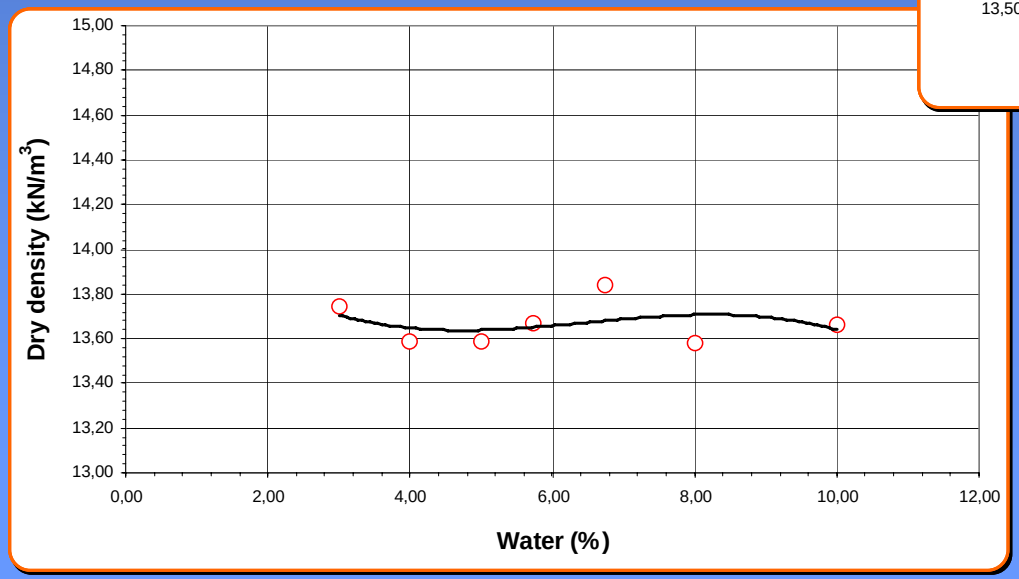
Study of mixture sand + 3-6% cement

Compaction of mixture

Study of mixture sand + 6% cement



Study of mixture sand + 3% cement

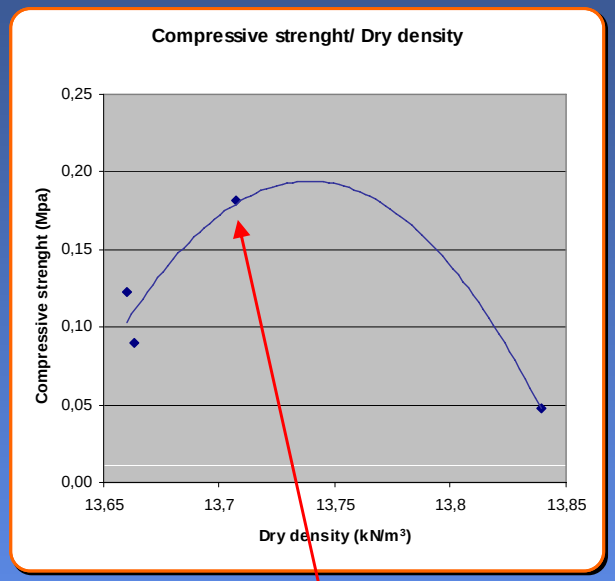


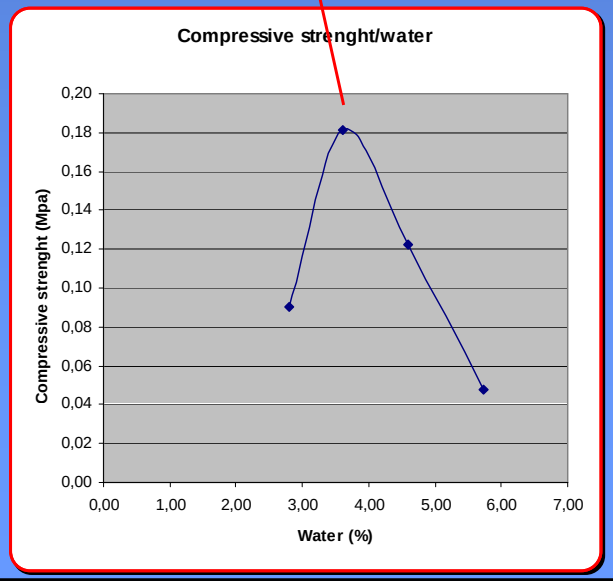
There is no correlation between water content and degree of densification

Cement stabilization sand

Study of mixture sand + 3% cement

Compressive strenght

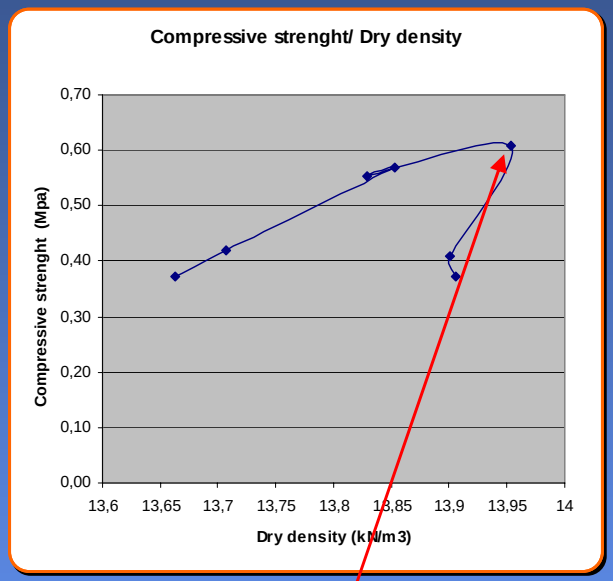


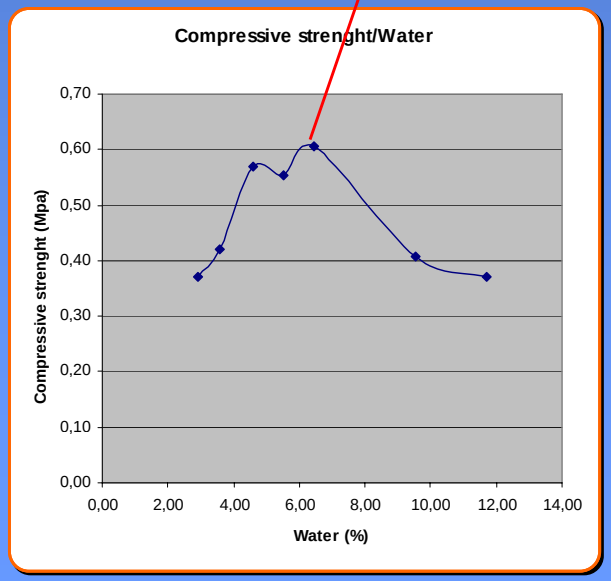


Cement stabilization sand

Study of mixture sand + 3% cement

Compressive strenght





Cement stabilization sand

Study of mixture sand - cement

Consolidated Drained triaxial compression test

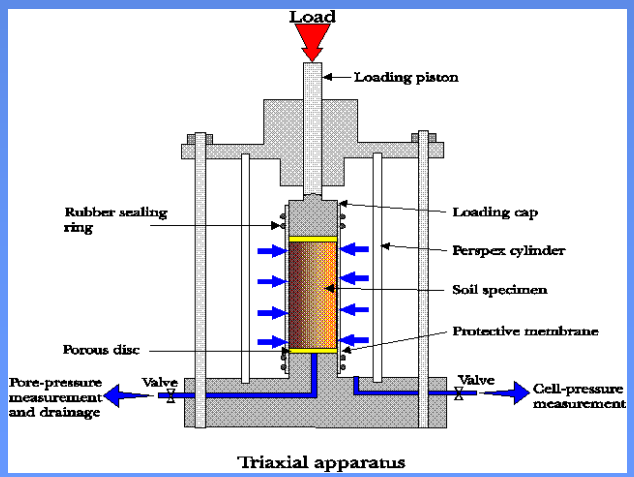
This test is performed on mixtures of sand + cement and sand + cement + fiber. The test was conducted using samples of large diameter (10 cm diameter, height 20 cm)

Standard sample

7.62 cm

3.81 cm

Large diameter Sample

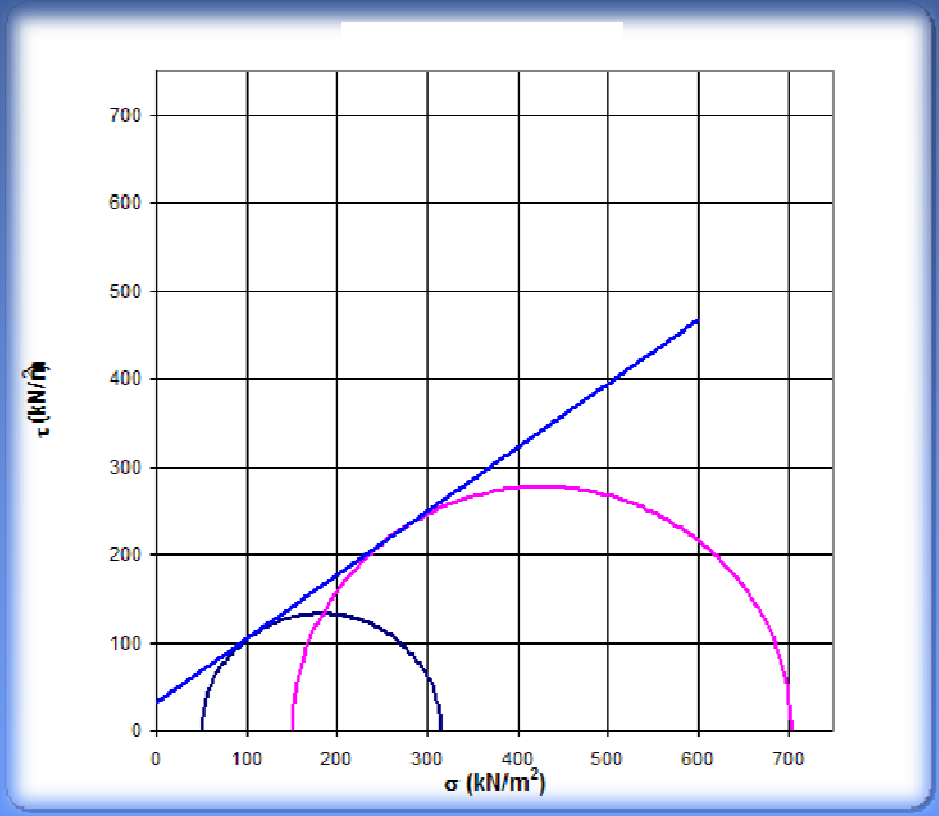


Triaxial apparatus

Cement stabilization sand

Study of mixture sand + 3% cement

Consolidated Drained triaxial compression test



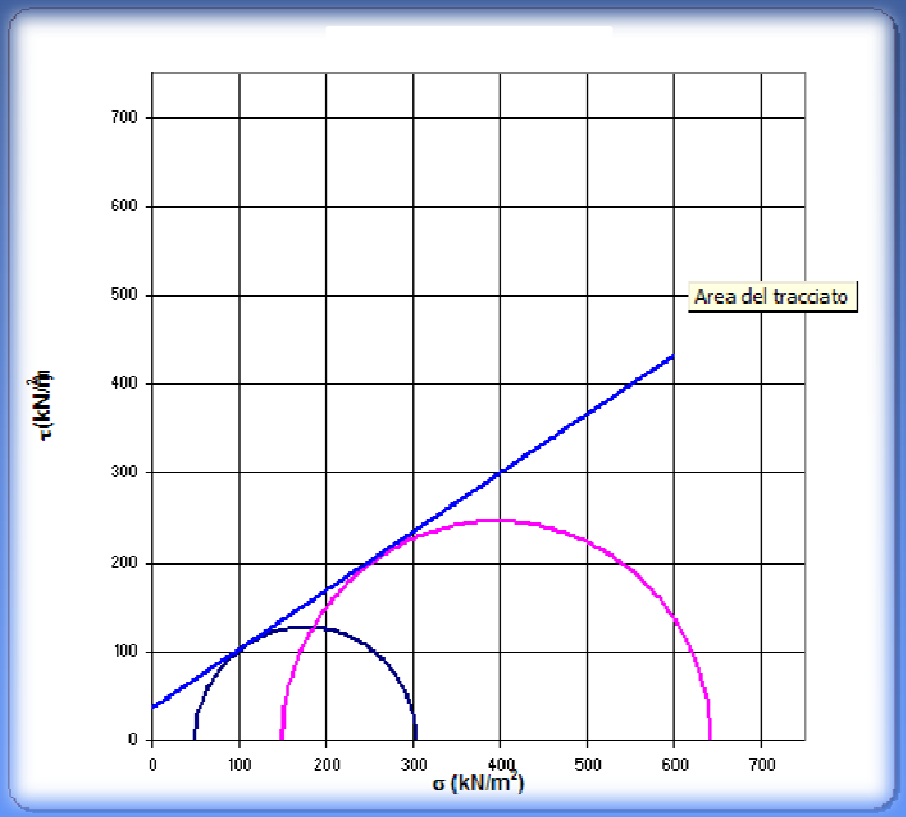
C (kN/m²): 32.00

ϕ (°): 33.42

Cement stabilization sand

Study of mixture sand + 3% cement+ fiber

Consolidated Drained triaxial compression test



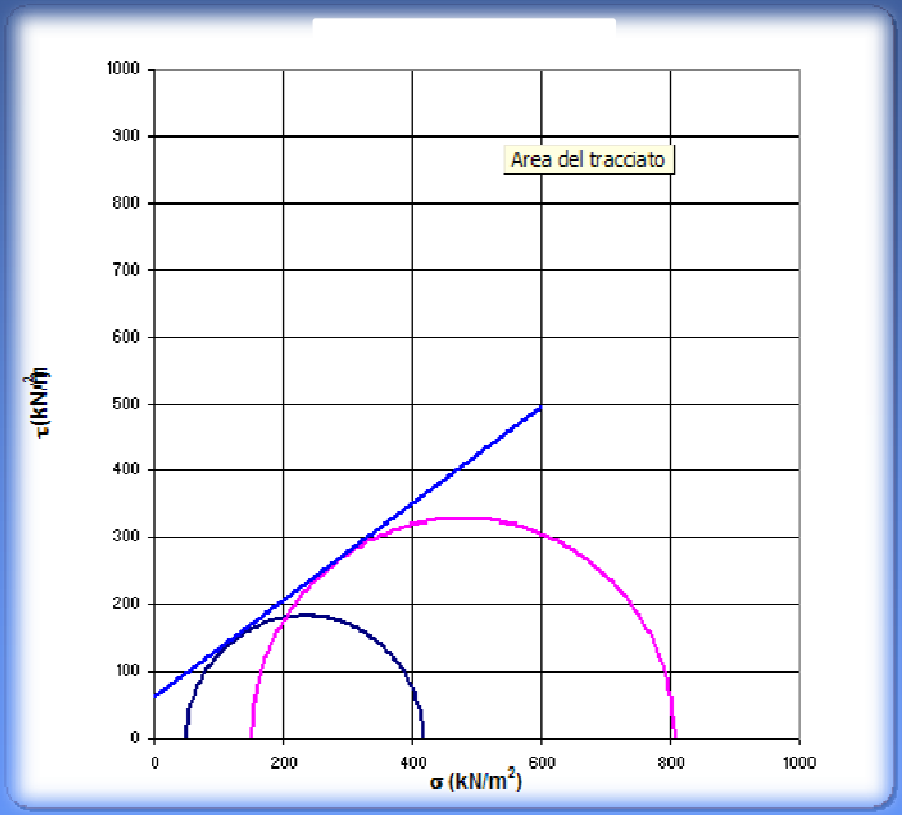
C (kN/m²): 37.00

ϕ (°): 34.10

Cement stabilization sand

Study of mixture sand + 6% cement

Consolidated Drained triaxial compression test



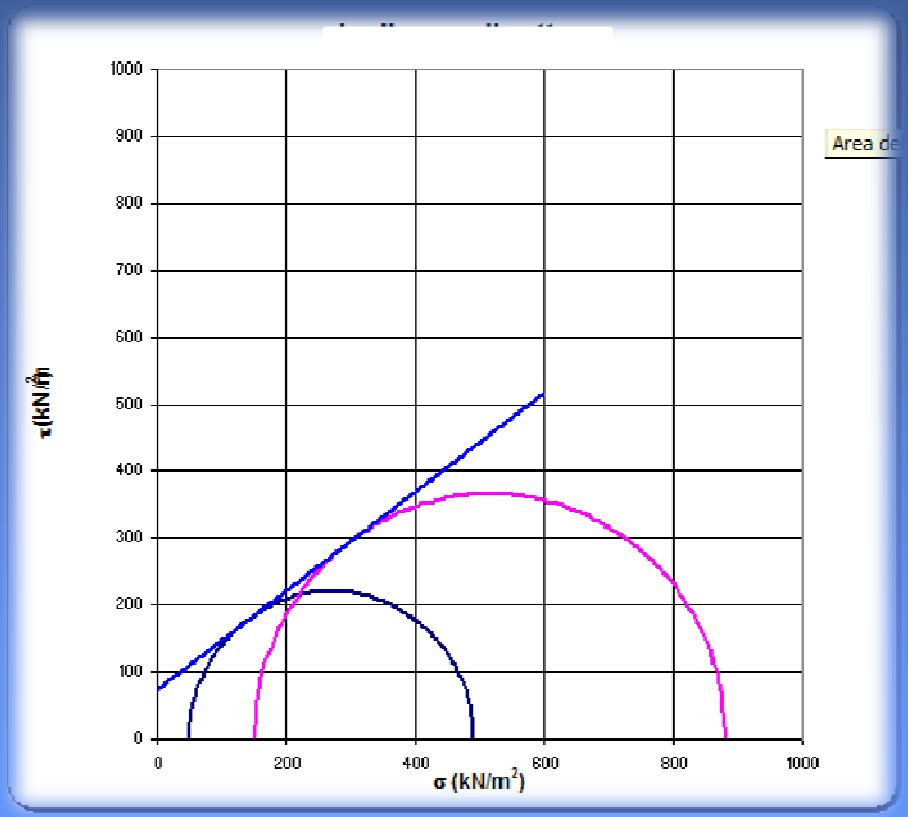
C (kN/m²): 62.00

ϕ (°): 35.80

Cement stabilization sand

Study of mixture sand + 6% cement+ fiber

Consolidated Drained triaxial compression test



C (kN/m²): 72.00

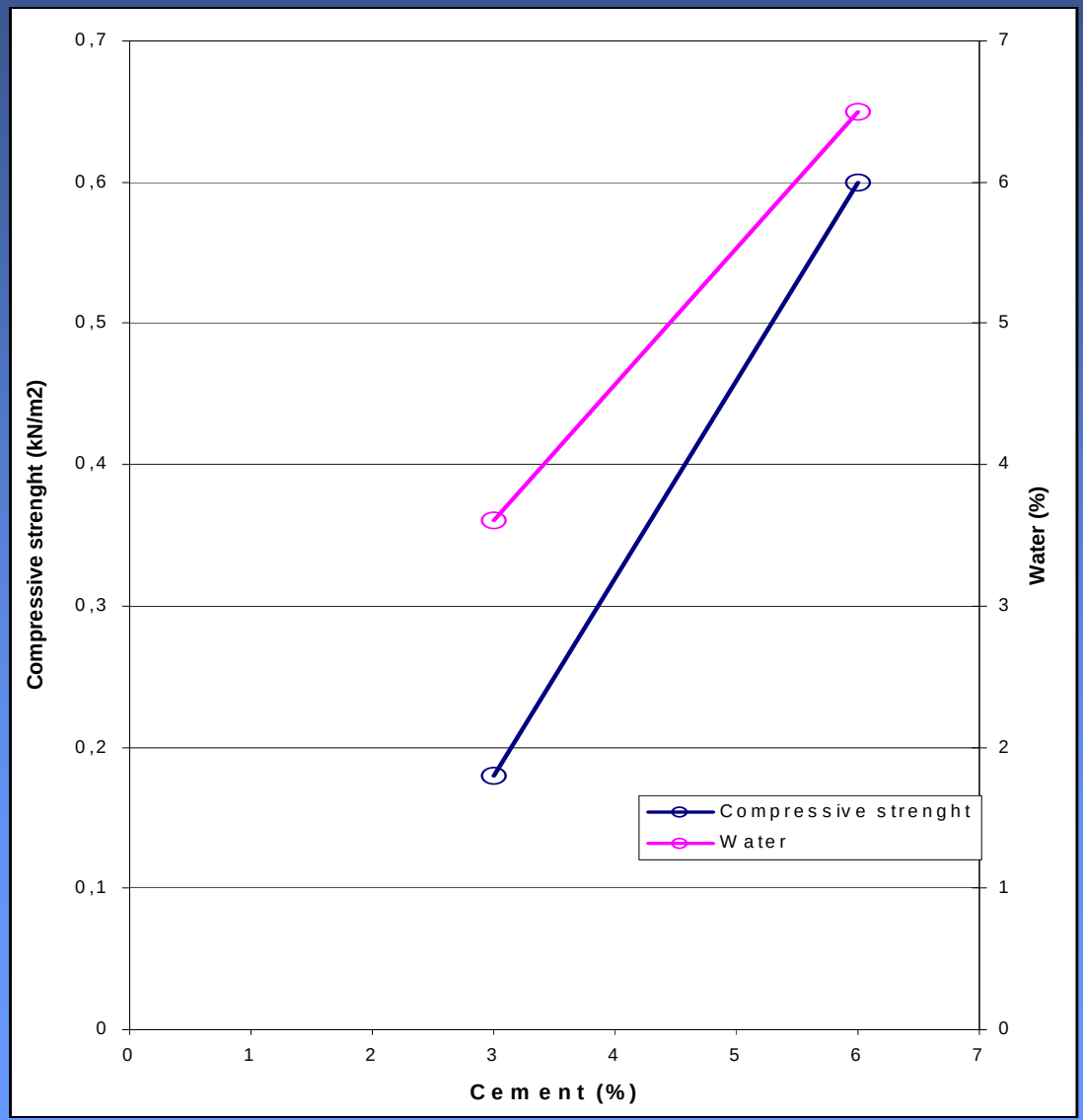
ϕ (°): 36.60

Cement stabilization sand

Comparison of results

Compressive strenght

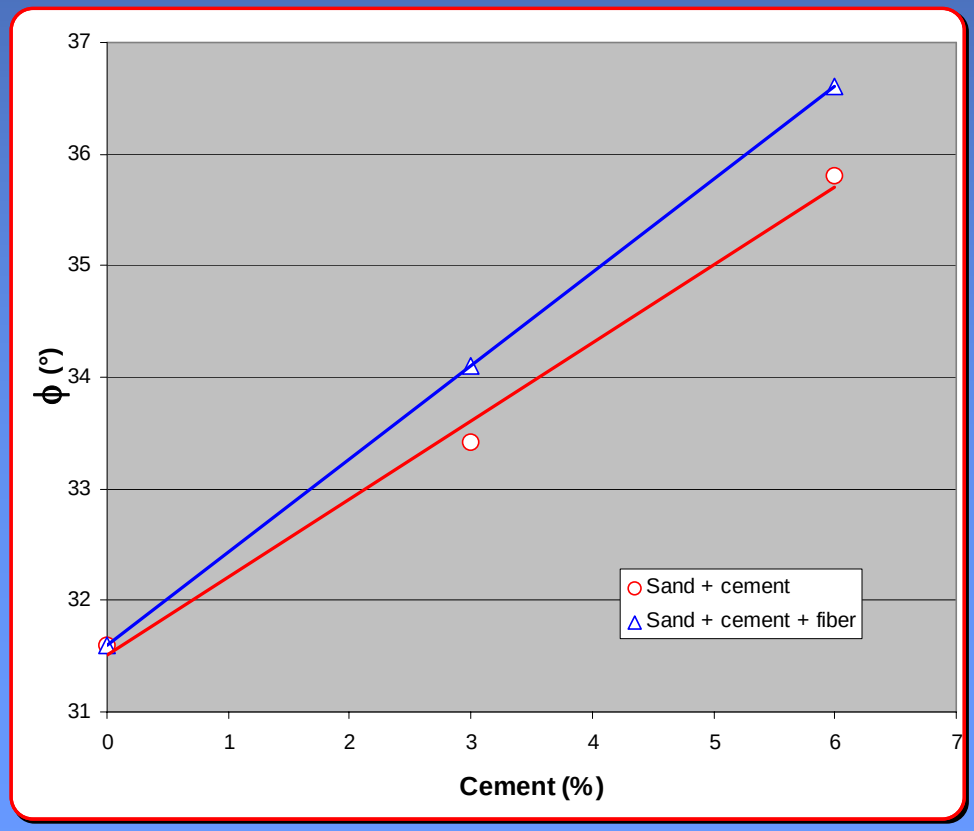
% Cement	Compressive strenght (kN/m^2)	% Water
3	0.18	3.6
6	0.6	6.5

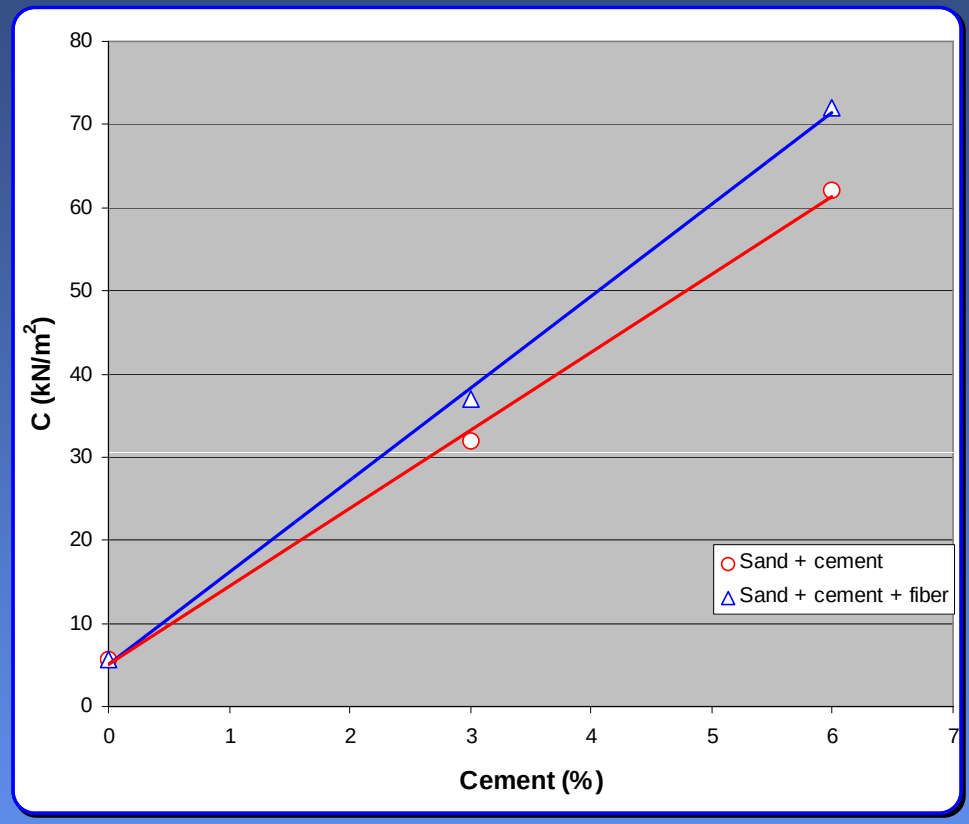


Cement stabilization sand

Comparison of results

Direct Shear test





Mixture	Φ (°)	C' (kN/m^2)
Natural sand	31.62	5.63
Sand + 3% cement	33.42	32.00
Sand + 3% cement + fiber	34.1	37.00
Sand + 6% cement	35.8	62.00
Sand + 6% cement + fiber	36.60	72.00

Cement stabilization sand

Conclusions

- For monogranular sands there is not correlation between degree of densification and water contentII
- The value of ϕ was not significantly influenced both by the addition of only cement and the addition of cement plus fiber
- The value of cohesion has increased considerably with the addition of cement, has also seen a further increase with the addition of fiber