

WORKSHOP ON PENETRATION TESTING AND OTHER GEOMECHANICAL ISSUES

Pisa 14 June 2016 – ROOM F8

MINI-CPTU ON COMPACTED SILTY SOILS IN A CALIBRATION CHAMBER

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**UNIVERSITA' DI PISA – PAGANI GEOTECHNICAL
EQUIPMENT**

LECTURE OUTLINE

- **OBJECTIVES**
- **CHARACTERISTICS OF THE CC AND SOIL MODEL PREPARATION**
- **SOIL CHARACTERIZATION**
- **PRELIMINARY TEST RESULTS**



OBJECTIVES

- USE OF DIFFERENT PENETRATION RATES TO ASSESS THE BEHAVIOUR OF INTERMEDIATE SOILS (RANDOLPH, BALIGH, WHITTLE, ETC.)
- CORE OF THE PH. D. THESIS OF I. GIUSTI
- 1g TESTS ON SILTY SOILS (ONLY AVAILABLE CENTRIFUGE TESTS ON KAOLIN)



CHARACTERISTICS OF THE CC

- CC SQUARE SECTION: 1.5x1.5 m
- CC HEIGHT: 1.5 m
- REALIZED IN STEEL (A WALL IS DONE OF A TRIPLE LAYER HARDENED GLASS)
- THE CC WAS ORIGINALLY REALISED TO CHECK THE POSSIBILITY OF SPREADING BACTERIA IN THE SEA FLOOR (HYDROCARBON REDUCTION)
- DURING THIS FIRST STAGE A FISSURE IN THE INTERNAL GLASS WAS CAUSED BY ACCIDENT



CC: FRONTAL VIEW, SIDE DRAINS AND BOTTOM



BASE

STEEL WALL

GEOTEXTILE

IRRIGATION PIPE



CC DETAILS



IRRIGATION PIPE

STEEL WALL

GEOTEXTILE (Edilfloor)
Geodren PPST 150 g/m²



BASE



CONSTRUCTION SEQUENCE



20 CM LAYER; $\gamma = 1.6 \text{ t/m}^2$: RIGHT SIDE

$W \cong 12 \%$

10 CM LAYER; $\gamma = 2.0 \text{ t/m}^2$: LEFT SIDE



L'ORDINE DEGLI INGEGNERI
DELLA PROVINCIA DI PISA

Ordine dei
Geologi della Toscana

AGI
Associazione
Geotecnica Italiana

CONSTRUCTION SEQUENCE DETAILS



- 1) SIEVING
- 2) WEIGHTING
- 3) POURING
- 4) COMPACTING



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CONSTRUCTION STEPS



VOLUME WEIGHT OF LAYERS

Layer	Left Side (242/10cm) Target	Right Side (388kg/20cm) Target
1	184 kg (14.6 kN/m ³)	364 kg (14.4 kN/m ³)
2	242 kg (19.2 kN/m ³)	373 kg (14.8 kN/m ³)
3	242 kg (19.2 kN/m ³)	388 kg (15.4 kN/m ³)
4	242 kg (19.2 kN/m ³)	388 kg (15.4 kN/m ³)
5	207 kg (16.4 kN/m ³)	388 kg (15.4 kN/m ³)
6	233 kg (18.5 kN/m ³)	388 kg (15.4 kN/m ³)
7	229 kg (18.2 kN/m ³)	
8	242 kg (19.2 kN/m ³)	
9	242 kg (19.2 kN/m ³)	
10	236 kg (18.7 kN/m ³)	
11	239 kg (19.0 kN/m ³)	
12	242 kg (19.2 kN/m ³)	



TOP LAYER



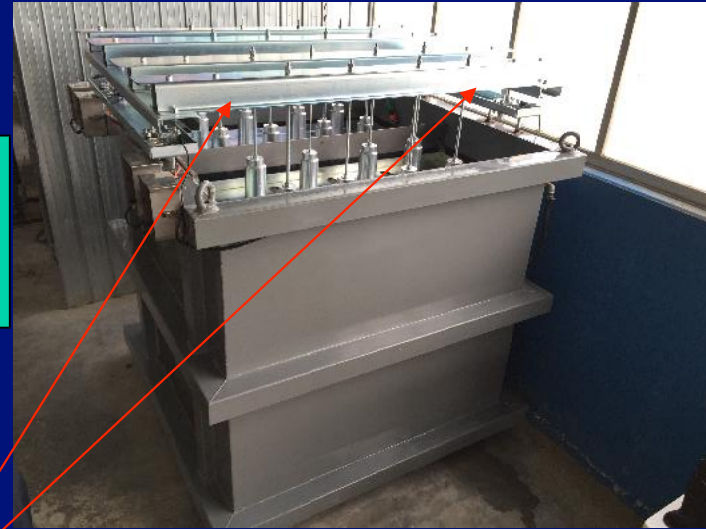
**WATERTIGHT
GUM + SILICON**



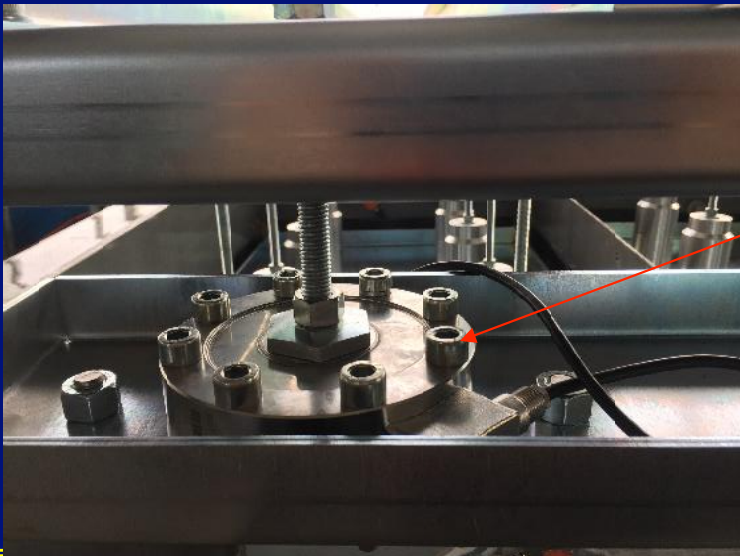
REACTION FRAME



$\cong 2.3 \text{ t}$
 $\cong 10 \text{ kPa}$

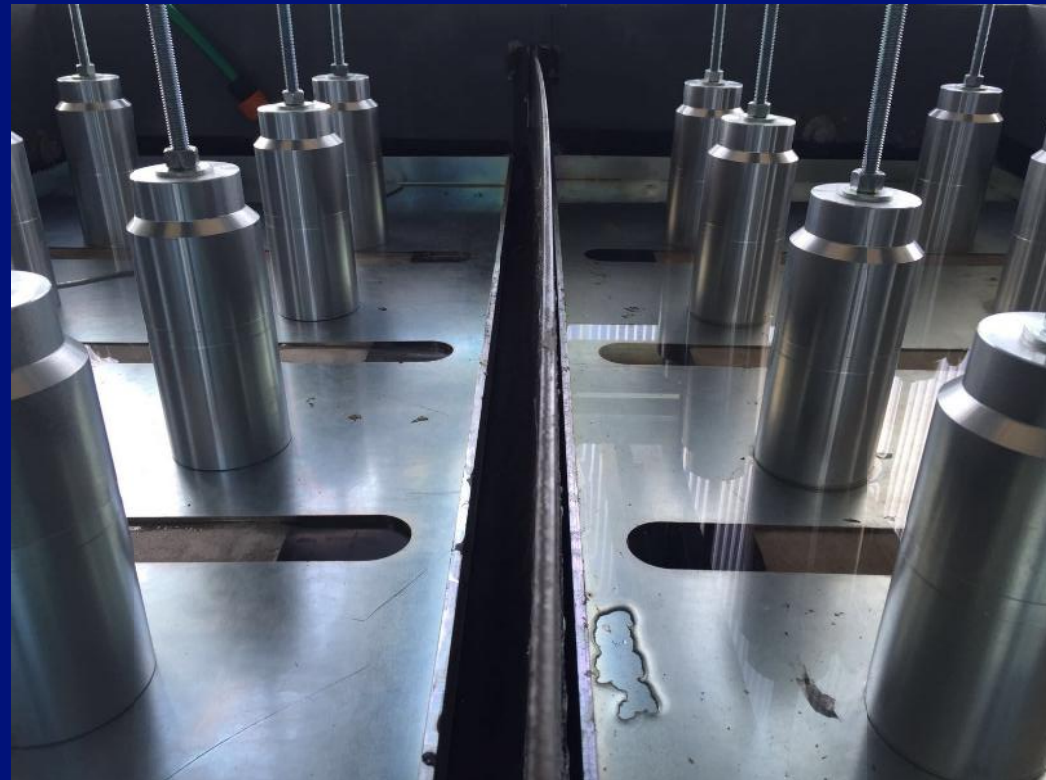


**4 LOAD
CELLS**



SATURATION PROCESS

- STARTED ON APRIL 29th 2016:

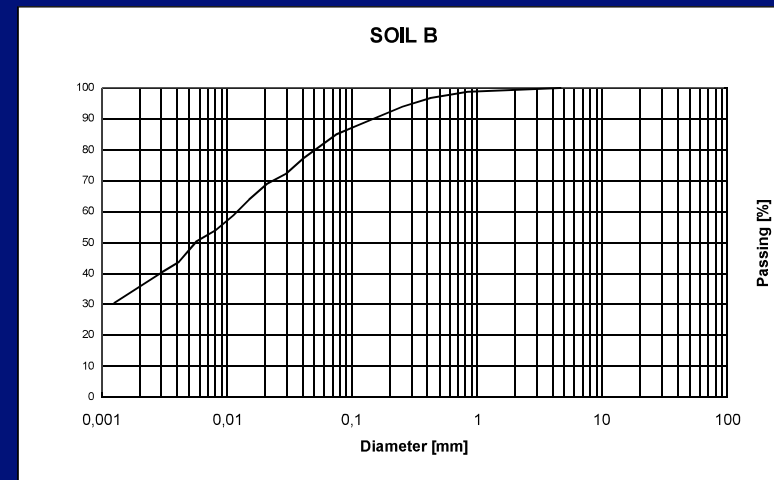
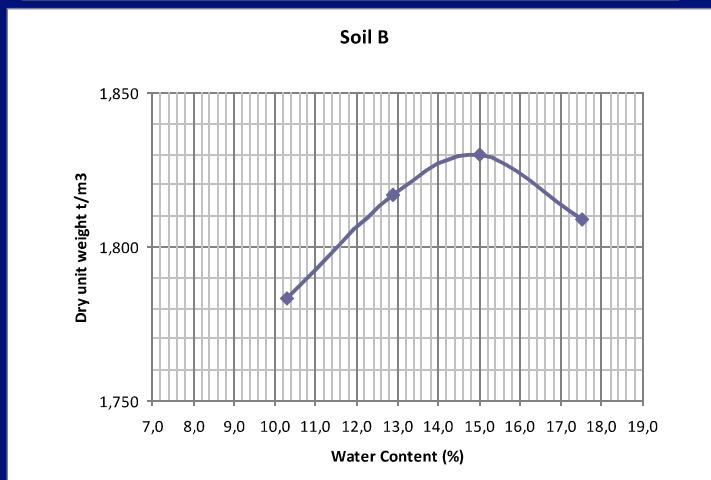
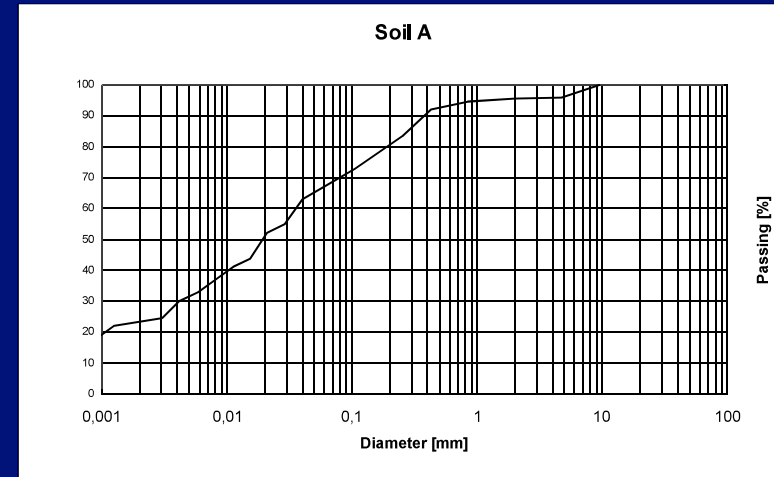
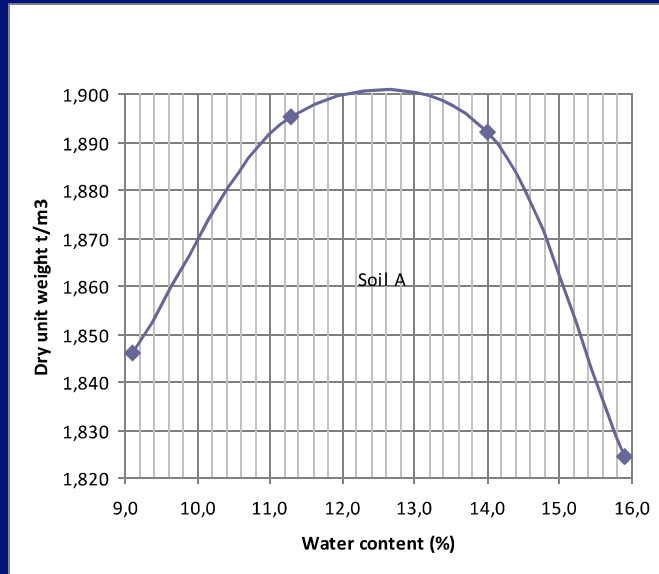


SOIL CHARACTERIZATION

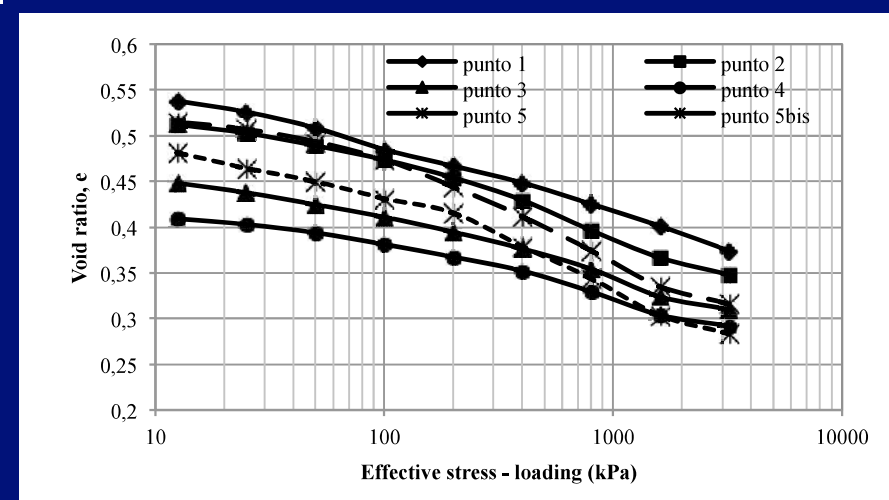
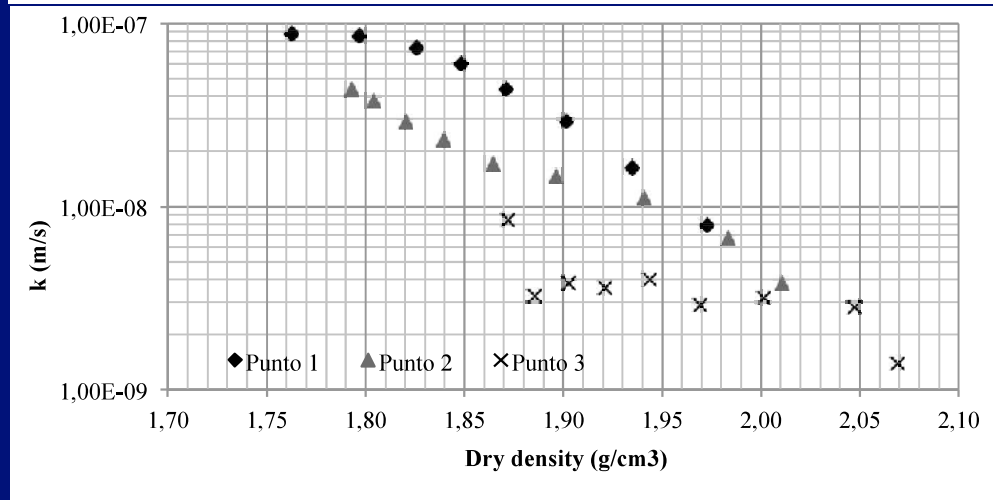
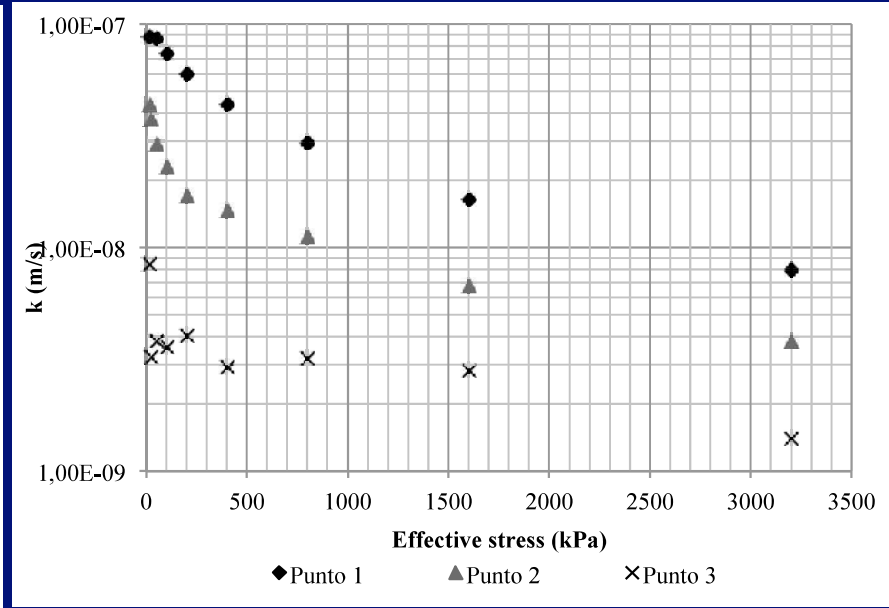
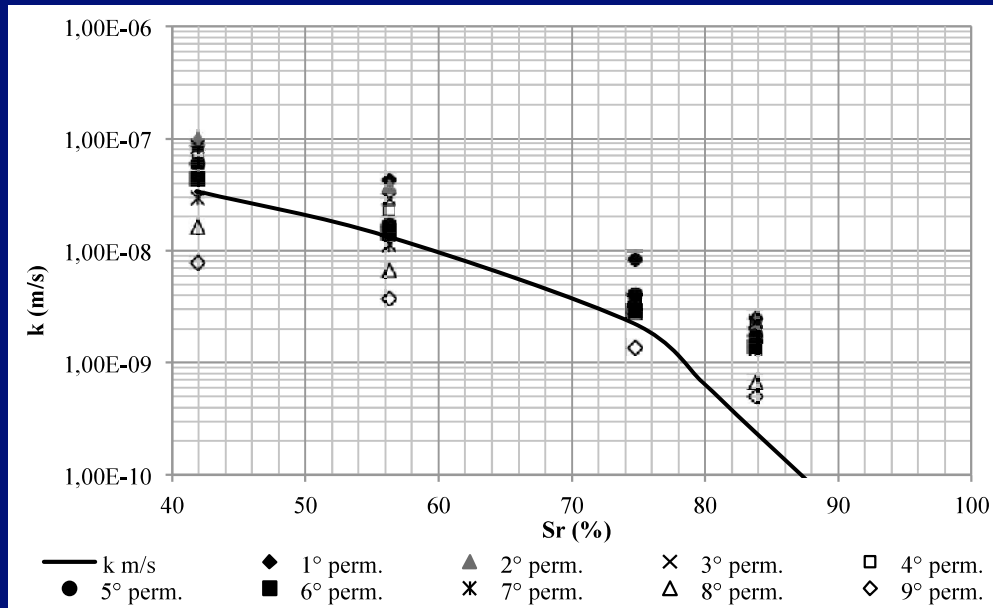
- TWO SIMILAR BUT DIFFERENT SOILS
 - SOIL A (0 – 700 mm)
 - SOIL B (700 – 1200 mm)
- SIMILAR CHARACTERISTICS



MODIFIED PROCTOR AND GRANULOMETRIC CURVES

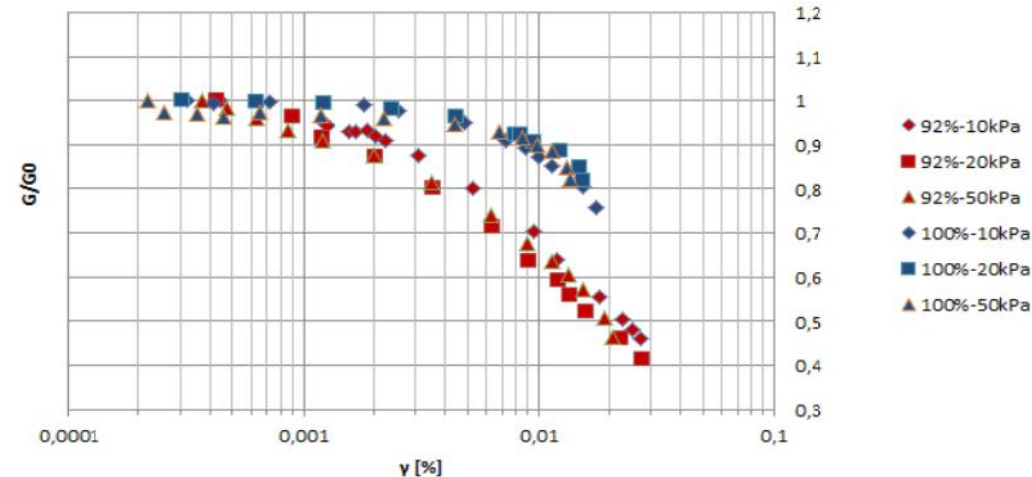
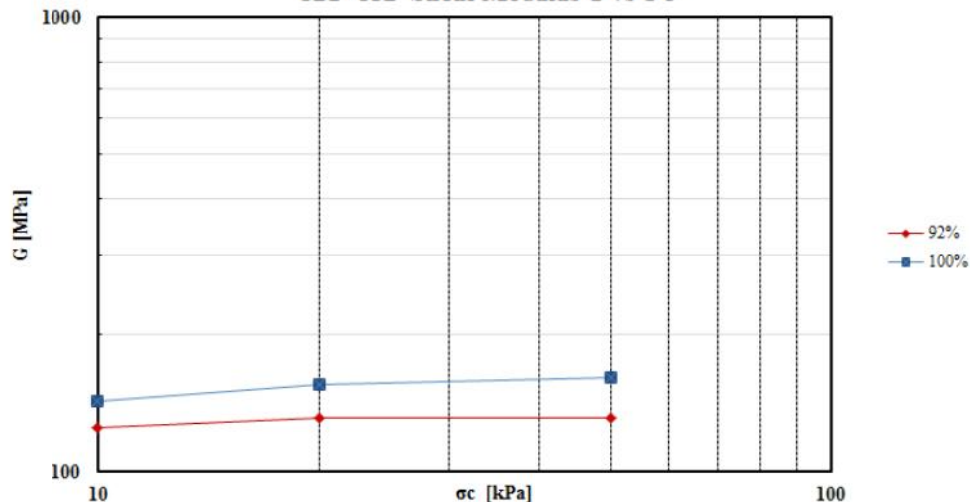


PERMEABILITY AND OEDOMETER TESTS

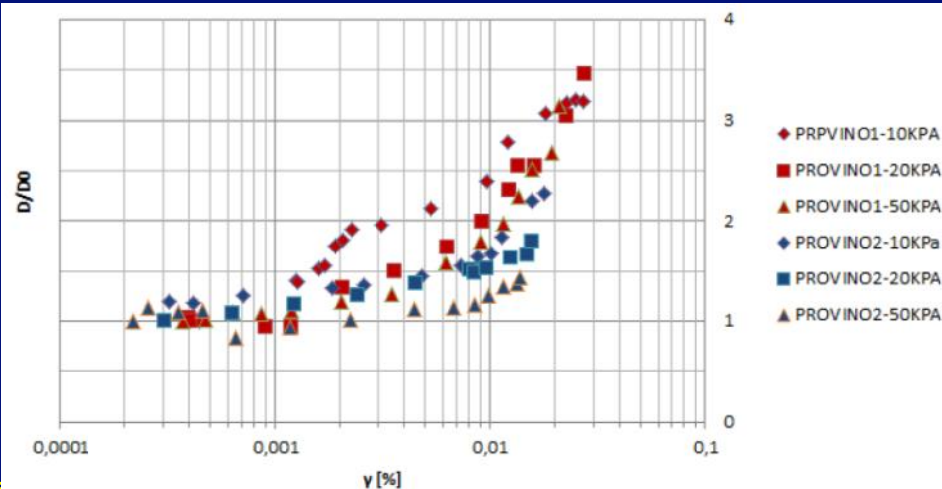


SOIL A – SMALL STRAIN PARAMETERS FROM RCT RESULTS

821+832- Shear Modulus G vs σ_c



Provino 1 = 92% opt
Provino 2 = 100% opt



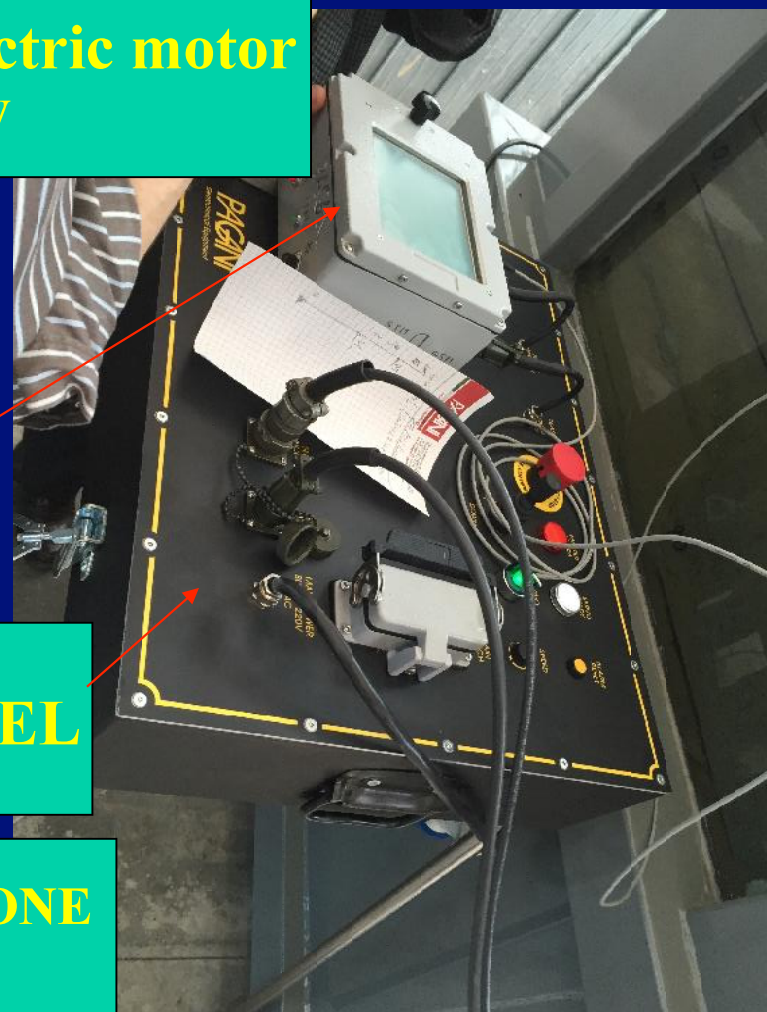
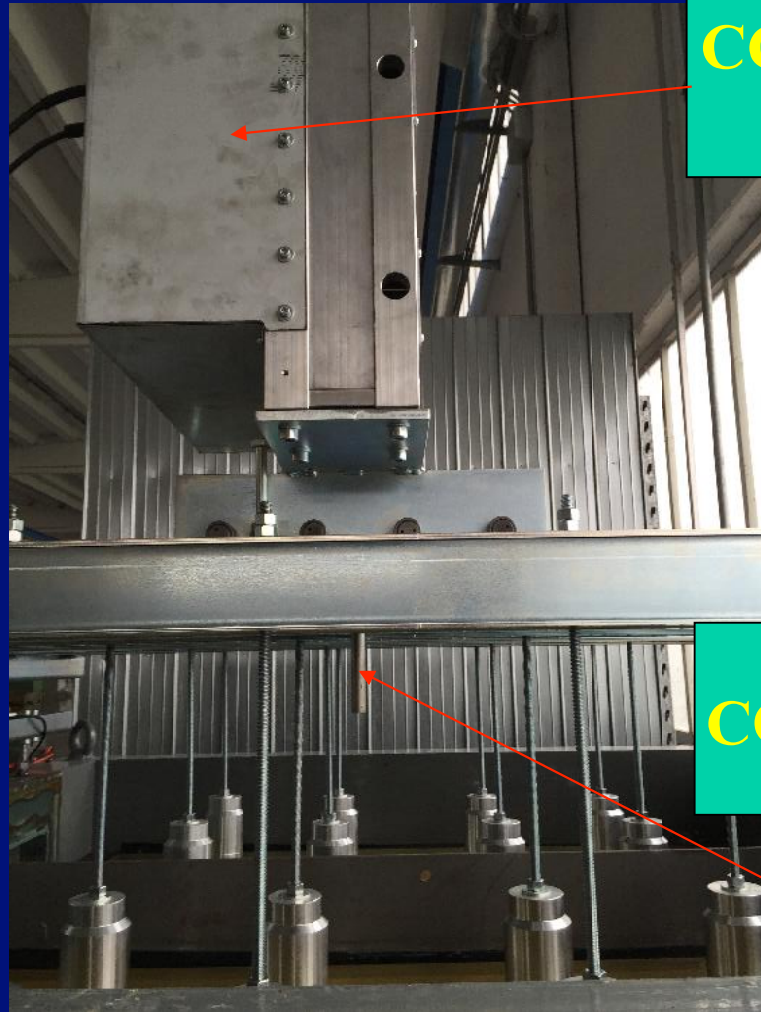
PRELIMINARY TESTS: MAY 11th 2016

CC Brushless electric motor
1.0 kW

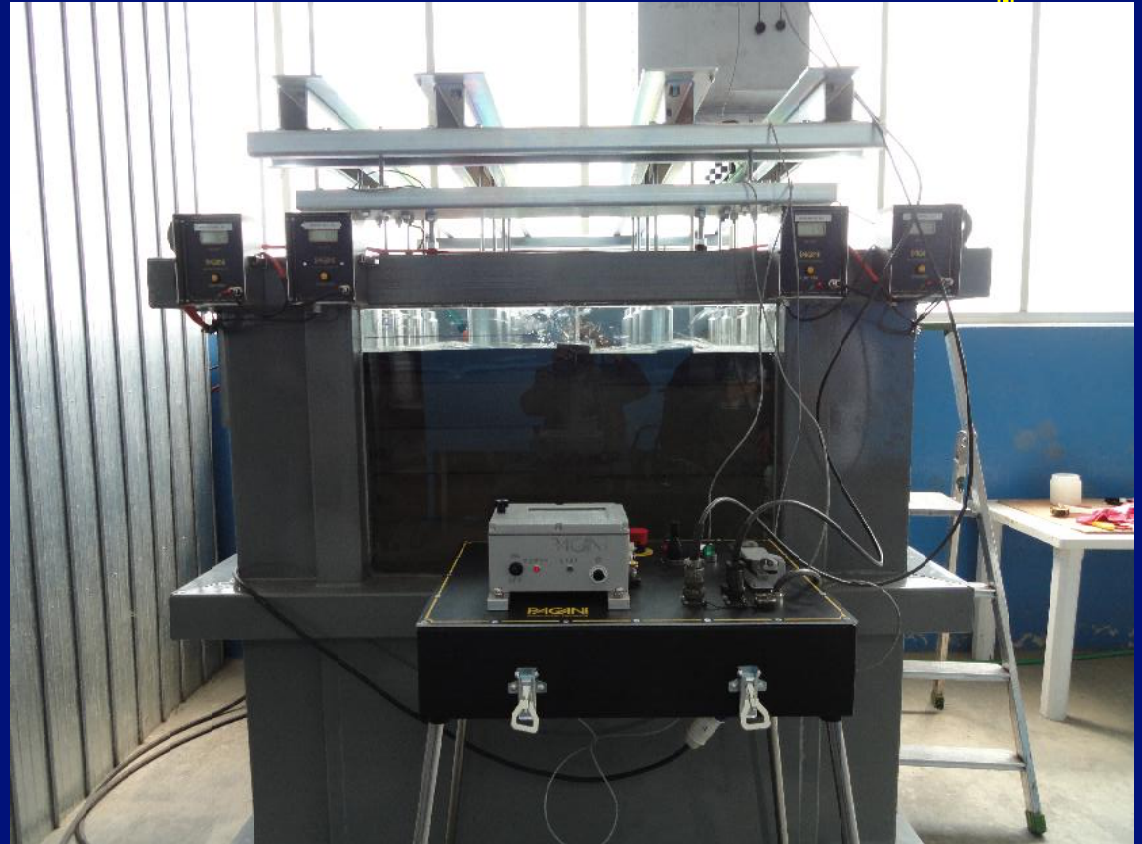
DAS

CONTROL PANEL

MINI PIEZOCONE
d=16 mm

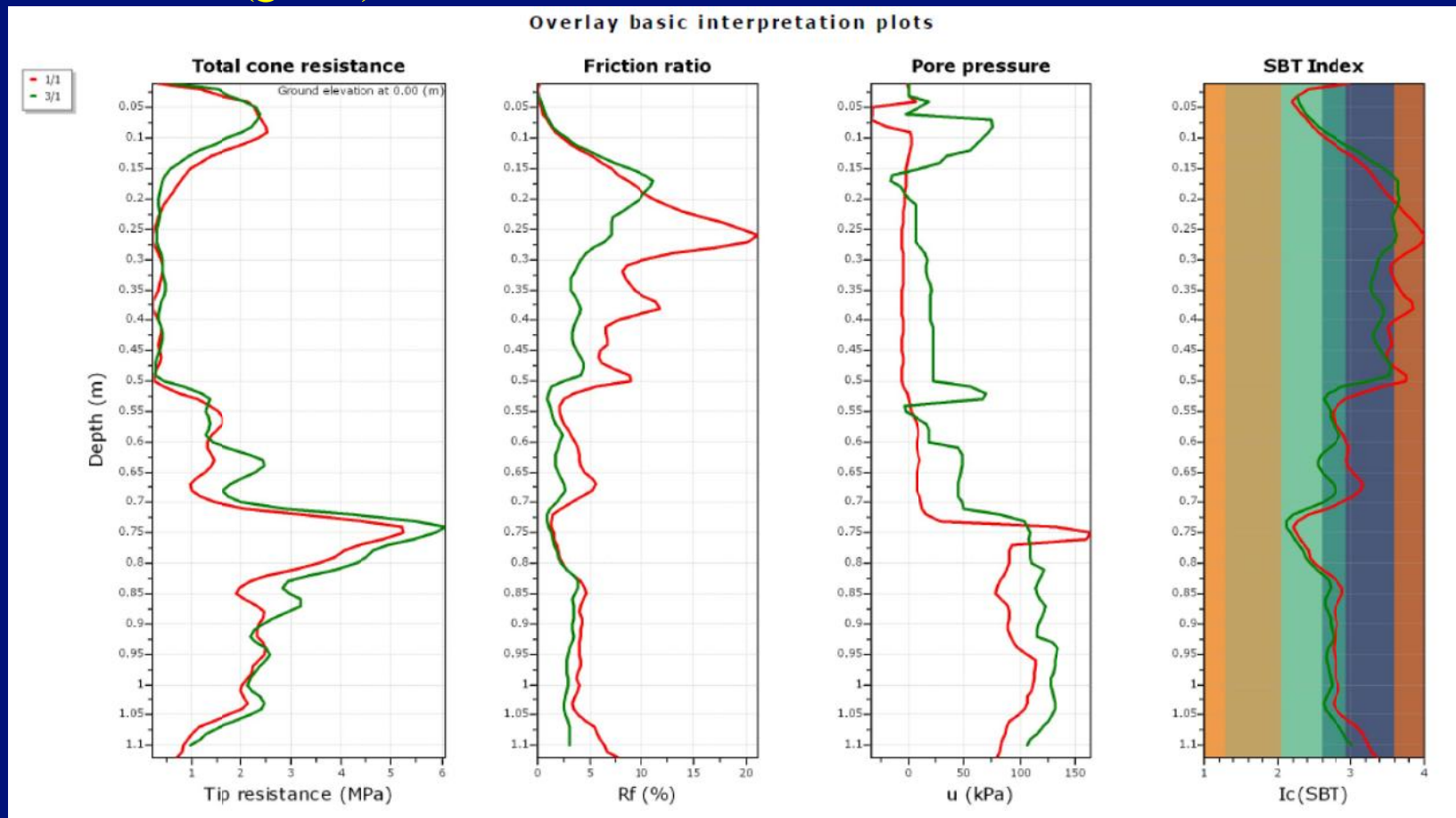


CPT_u DETAILS



PRELIMINARY TEST RESULTS

- Test n.1 (red): 2 cm/s
- Test n.2 (green): 0.2 cm/s



ACKNOWLEDGEMENTS

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