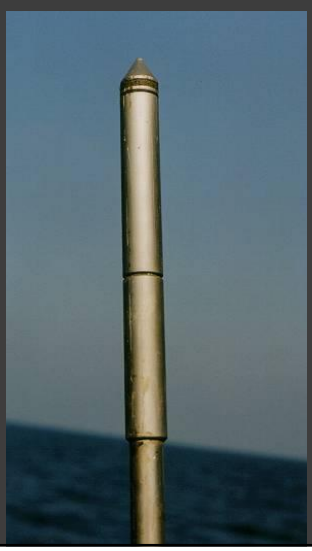
PROFILING Size effects

Mini Cone



2 cm^2 cone with pore pressure sensor and friction sleeve

Effects of cone size

- Investigations have shown that tests with cone diameters in range 5 cm^2 to 15 cm^2 gives very similar results
- Smaller cones should be checked for scale effects, especially in layered soils; ref. recent investigation in Louisiana soils (Titi et al.,1999.):
  - $q_{c,2cm^2} = 1.11 * q_{c,15cm^2}$
  - $f_{s,2cm^2} = 0.91 * f_{cs15cm^2}$

But others have shown different factors (CEN standard says calibrate in new soil types!

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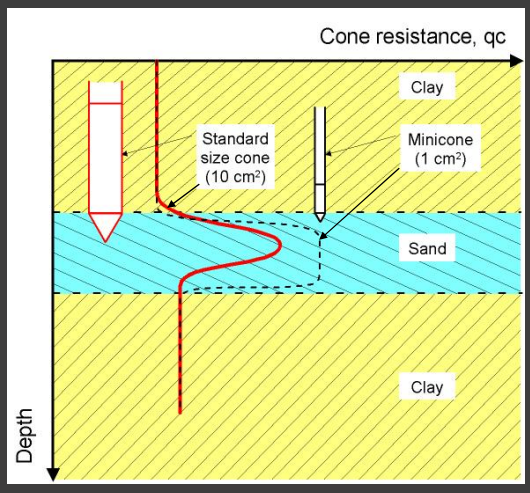
Effect of cone size in layered soils



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Aspects of using minicones

- Can use lighter rigs and reduce cost, increase accessibility
- Can have better definition of thin layers
- Will have quicker dissipation in dissipation tests

- More easily damaged
- Have to consider any scale effects

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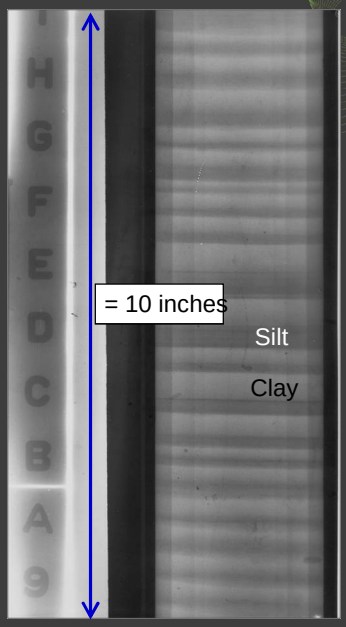
Example CPTU in Connecticut Valley Varved Clay (CVVC), Western MA

X-ray of fixed piston sample of Connecticut Valley Varved Clay (CVVC) – Amherst, MA

Silt = "summer" deposit
Clay = "winter" deposit



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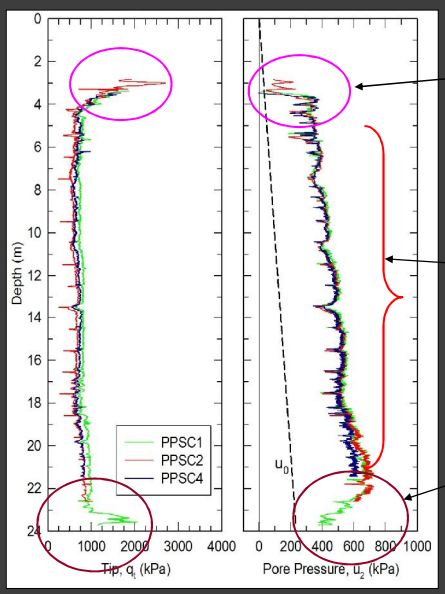
Example CPTU in CVVC, Amherst, MA



Stiff desiccated CVVC crust

Lightly overconsolidated CVVC = soft, moderately sensitive "clay"

Increasing silt content and thickness of silt layers

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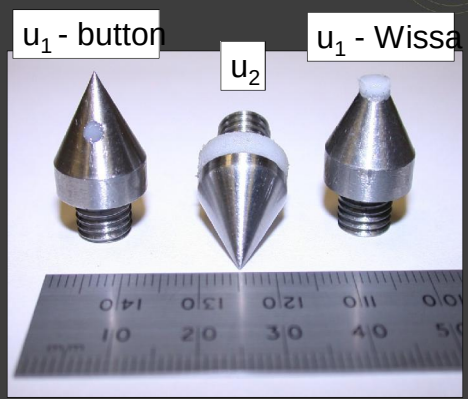
Miniature Piezoprobe for high resolution profiling of thin soil layers



Projected tip area = 1.25 cm^2

u_1(face), u_2, u_1(tip)

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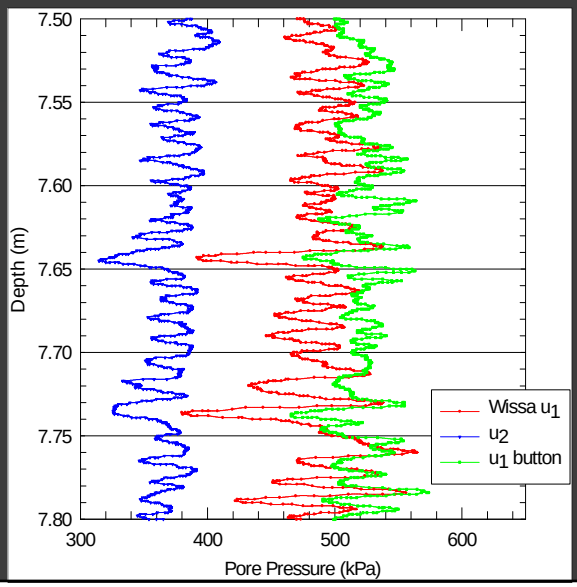
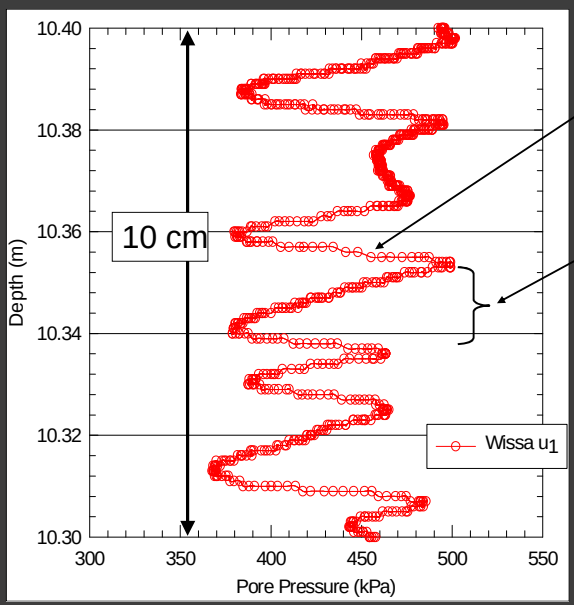
Example Miniature Piezoprobe – CVVC Amherst, MA



- push at 2 cm/s
- sample at 64 Hz

Example Miniature Piezoprobe – CVVC Amherst, MA



Clay-Silt Interface = spring thaw

Increasing clay content (going upwards) = deposit of finer grained particles in calm waters of ice covered lake

u_1 (tip) at 0.5 cm/