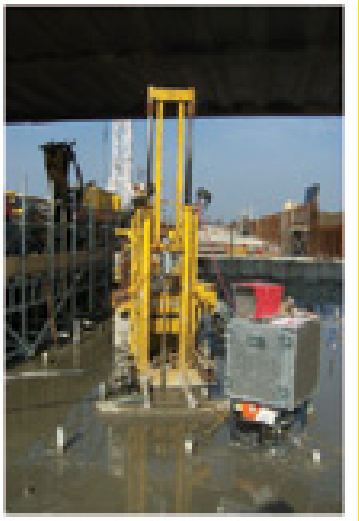
SUMMER NEWSLETTER 2003

CPT's IN LIMITED SPACES

Under The Bridge

Recently, Lankelma was approached to come up with a method of testing the ground beneath a railway bridge on the CTRL. The ground had been capped with concrete and grout pipes which were sticking out of the surface and couldn't be damaged. The underlying soils needed to be tested before it was treated with ground improvement methods, and then tested afterwards to verify that the ground improvement had worked.

Because of the access problems posed by the sites location, Lankelma sent its 3.5 tonne Minicrawler along to do the job. It was craned down onto the site using an onsite crawler crane. Once the rig had landed, it had to move carefully through the maze of pipes that covered the floor. Due to the rig only weighing 3,5 tonnes, extra reaction force was gained by bolting the rig down to the concrete floor. Tests down to 9,5 metres with tip resistances up to 35 mpA were achieved.



In the cellar

This job was carried out in the basement of an important building in central London. The basement had been extended beneath the road that passed outside the building. This extension had recently started to subside and cracks had formed in the walls and floor.

1896

LANKELMA

CONE PENETRATION TESTING LTD.

A ground investigation was needed as a step to prevent any further subsidence. There was a height restriction of less than 2.2m, with pipes and air-conditioning shafts that reduced the working height in even more places. Access to the basement was by foot only down a series of stairs. Due to the restricted access, a drilling rig and a conventional CPT rig was ruled out. Lankelma's basement rig was the best choice for the job. It can work in areas with only 1 metre of headroom. It is hand portable, so can therefore be carried to locations. It can get its reaction from either bolting down to a concrete floor, adding kentledge or pushing from the roof. For this project, the rig was bolted to the floor. The CPT reached a depth of 18.3m penetrating through the Terrace Gravels and into the London Clay. The requirement was for only one CPT, but generally, for basement work, 2 to 3 tests can be carried out in a day. This was just another example of how versatile CPT's are. For more information contact Darren Ward on 01797 280050.

LINK UP SCHEME

Lankelma is now a rail approved supplier under the LINK UP Scheme. Lankelma is certified under number: 19749.

Link-up

LANKELMA RESEARCH

T-Bar Cone for Soft Soils: Lankelma research with University College Dublin and Norwegian Geotechnical Institute

Lankelma CPT Limited has recently completed a programme of field works in Ireland with Dr. Mike Long at the Department of Civil Engineering, University College Dublin(UCD), to assess the performance of a novel cone penetrometer to measure the undrained shear strength of soft soils. Three 'high' plasticity soft clay sites were selected for investigation. This data will augment the data of the NGI sites and which has predominantly been obtained from sites comprising soils of 'low' plasticity.

The T- Bar consists of a short cylindrical bar measuring 250mm in length and 40mm in diameter that replaces the conventional 60 degree cone, and is attached at right angles to the penetrometer rods just below the calibrated load cell. Also included in the shaft is an inclinometer to indicate any deviation from the vertical during penetration. The device can also have incorporated pore water pressure transducers. The T- Bar cone has two major advantages over the conventional electric cone. First, the load cell measures what is essentially a differential force (or net pressure) on the bar, so that no corrections need be made for the overburden stress and ambient pressure.

Second, the correlation between net pressure on the bar and the shear strength of the soil is by an exact plasticity solution, with a potential range of bar factor of less than 10% (due to different roughness of the bar surface), compared with cone factors that range from as low as 7 for sensitive soils to over 15, that is a range of 35%.

An additional use of the T-Bar is to assess the remoulded strength of the soil, by monitoring the bearing resistance during extraction along the same path as insertion. Hopefully, the combined UCD and NGI data will provide a reliable correlation between the undrained shear strength and T-Bar penetration resistance for soft soils that range from low to high plasticity. The results of this work are to be published in the near future. For further information contact Brian Georgious at our Chester office o 01244 289 356

Soil Moisture Probe (SMP)

The soil Moisture Probe (SMP) is installed directly behind the electric cone and permits the simultaneous acquisition of resistivity, soil moisture and geotechnical data. The SMP comprises two ring shaped and carefully isolated electrodes and an Application-Specific Integrated Circuit (ASIC). The ASIC uses synchronous detection for accurate measurements, free from electric interference

Dielectric soil properties, capacitance and electrical conductivity, are governed mainly by the water content of the soil mass. By measuring these parameters between two electrodes, with the soil dielectric in between, the soil moisture can thus be determined.

Special cones and probes:

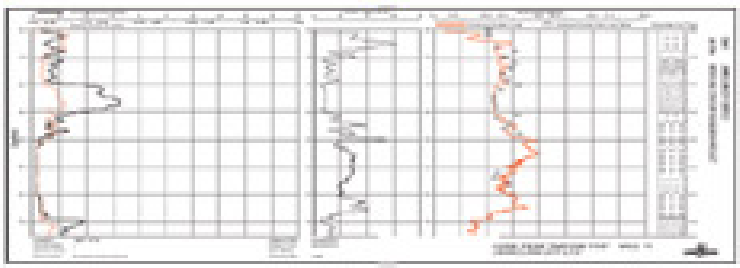
Penetrometers:
Cone for bomb testing
Cone pressuremeter
Core cone
Electric conductivity cone
Environmental cone
Gamma cone
Hydraulical conductivity cone
Hydrocarbon cone
Lubricating cone
Marchetti dilatometer
Nuclear density probe
Push-in vane
Seismic cone

Soil moisture probe
T-bar cone
Video cone

Groundwater Sampling Probes:
WASTAP
DELFT multi-level sampling probe

Soil Sampling Probes:
MOSTAP
DELFT continuous soil sampler

Instrumentation:
Piezometer standpipes
Vibrating wireless piezocone



The capacitance of dry soil is determined by its dielectric constant. For dry soil this constant is of the order of 3 to 6 and for water the constant is 80, that is, the capacitance between the two electrodes is dominated by the volume fraction of water.

In polluted soils non-aquas phase liquids (NAPL's), such as oil or chlorinated solvents, will replace part of the water in the soil matrix. As they do not dissolve easily in groundwater they will occur as a film of pure product, often just above the groundwater table. Dense NAPL's such as chlorinated hydrocarbons, which are denser than water, will penetrate the groundwater table and are typically found on top of impermeable layers. These pollutants affect the dielectric properties of the soil significantly and are detectable using the Soil Moisture Probe. Picture above of water content v. dielectric constant

Summer Seminar

Lankelma CPT Ltd and Pennine Vibropiling will have a joint seminar on Thursday 10th of July 2003. The breakfast seminar will be held in the Clifton suite at Bristol zoo. In the seminar, Pennine will present ground improvement techniques. Lankelma's presentation will be on cone penetration techniques, in particular the control of compaction and ground improvement using the CPT. If you would like more details please e-mail charmaineevans@lankelma.co.uk.

To find out more about how you can benefit from involving Lankelma into your projects log onto www.lankelma.com. Alternatively you could write to us at info@lankelma.co.uk or call us on 01797 280050. Address: The Old Dairy, Iden, East Sussex, TN31 7UY. 'and' Jaguar House, Deeside Industrial Estate, Welsh Road, Deeside, CH5 2LR.