

Development of a Continuous Feed Miniature Electronic Cone Penetrometer System for Transportation Applications

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Duration: 24 months

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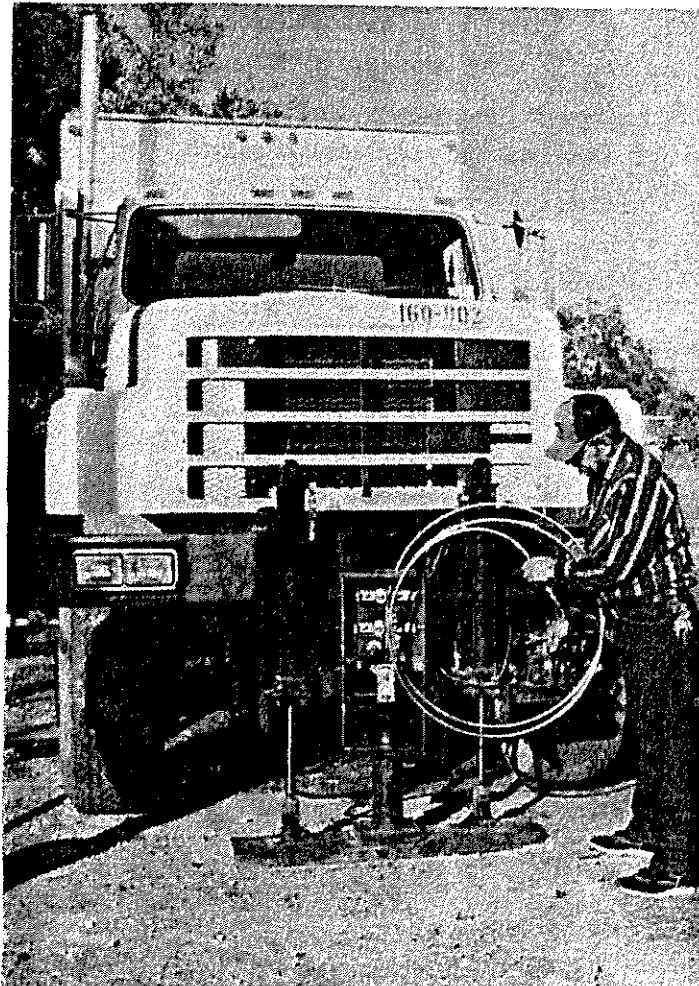
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Problem

Evaluating and improving soil condition before highway construction begins is critical to building a lasting road. Rapid and accurate site characterization for pavement data analysis of the subgrade and base is needed.

The electronic cone penetrometer has become an important in situ investigation tool. This research will develop an improved version of the minicone penetrometer, one which provides continuous advancement of the cone into the soil for ease of operation.



The cone truck operator feeds stainless steel tubing into the minicone penetrometer system for soil testing.



LTRC



Louisiana Transportation
Research Center

Sponsored jointly by the
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Transportation and
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Objectives

- Design and test a continuous advance miniature electronic miniature cone penetrometer.
- Develop an advanced data acquisition hardware system.
- Improve the existing software for data acquisition, processing, and analysis.
- Test and evaluate the continuous advance electronic miniature penetrometer system mounted on an all-terrain vehicle.

Description

The minicone penetrometer, which can penetrate down 30-50 feet, allows the soil it passes through to be classified according to type and strength characteristics. The device

measures resistance at the tip and sleeve friction. The electronic cone collects data using strain gages in the cone and transmits the information to a computer, which analyses the data.

The two-year research project will make improvements to the present minicone penetrometer. Coiled tubing technology will be integrated into the system, providing for a single, jointless push rod assembly. Since the penetrometer is a sealed single-piece system, damage to the system's electronics from movement of segmented rods or infiltration of ground water through rod joints will be minimized.

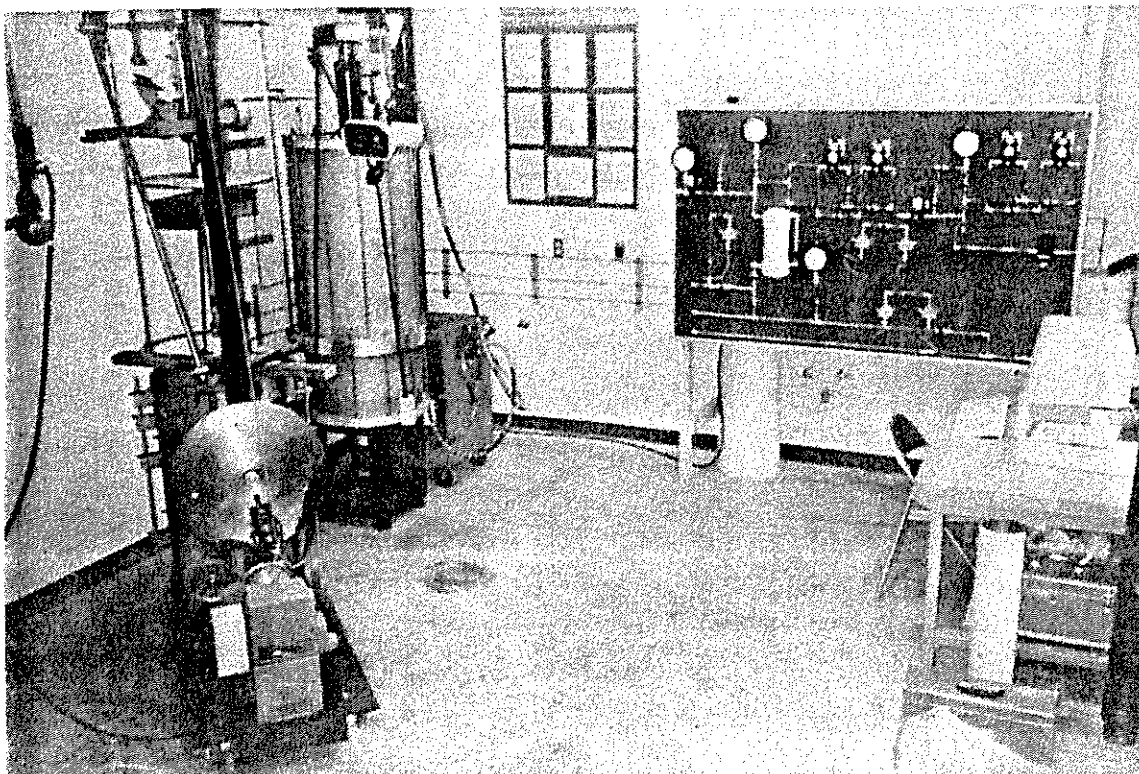
The miniature cone penetrometer system will be more mobile and economical than standard cone systems, and it can be mounted on a smaller all-terrain vehicle. In addition, other uses for the system, such as environmental screening by applying fiber optic sensors, may be explored.

Laboratory testing and field evaluation of the continuous feed electronic miniature cone penetrometer will be done at the LTRC Calibration Chamber System and National Geotechnical Experimentation Sites.

The LTRC Calibration Chamber is used to calibrate geotechnical test instruments and model foundations. The chamber is computer-controlled and can simulate different boundary conditions of stress and strain.

Implementation Potential

The project's results will have practical application in soil condition assessment and will significantly advance transportation design, analysis, and construction practice.



The calibration chamber at LTRC is an integral part of the cone penetrometer system.