

EVALUATION OF PRESSURE CELLS USED FOR FIELD MEASUREMENTS OF LATERAL EARTH PRESSURES ON RETAINING WALLS

Technical drawing of a wall cross-section. The wall is 19" wide at the top. The total height of the wall above the foundation is 18'-6". The wall is composed of several sections: a top section of 8'-0" containing 'MACHINED METAL PADS FOR MEASUREMENT OF WALL MOVEMENT WITH INCLINOMETER.', a middle section of 3'-0" containing an 'EARTH CELL PRESSURE CELL', and a bottom section of 2'-3" containing a '"WEEP" HOLE'. The wall is supported by a foundation of 12 BP 53 PILING. The foundation is 2'-6" wide at the base. The wall is backfilled with 'BACKFILL'. The wall is shown with a 'WEEP' HOLE and an 'EARTH CELL PRESSURE CELL'.

Cooperative Research Program of the
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Evaluation of Pressure Cells Used for Field Measurements of Lateral Earth Pressures on Retaining Walls

by

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Research Report 169-1 presents the results of an investigation which was conducted to evaluate several types of commercially available total earth pressure cells for the measurement of lateral earth pressure on a retaining wall. This work was accomplished during the first year of a five-year study.

The principles of operation are described for nine commercially available pressure cells, and the manufacturer's stated specifications are summarized. Four types of pressure cells were purchased for evaluation during this preliminary study, and the results of calibration tests which were conducted over a typical range of operating temperatures to determine the performance characteristics of the cells are summarized. Specifically, the cells which were obtained for evaluation included the Geonor vibrating wire, Carlson unbonded strain gage, Terra-Tec pneumatic, and Gloetzl hydraulic type units, plus associated read-out equipment.

Following completion of the calibration tests, the cells were installed in a cantilever concrete retaining wall in Houston, Texas. The nominal height of the wall was 18 feet. Installation procedures for the pressure cells and the thermocouples which were utilized for temperature determinations are described. Engineering properties of the backfill material are reported. The precautions which were observed to insure proper placement of the backfill are described.

The deflections of the retaining wall both during and after backfilling were monitored by transit and inclinometer observations. Graphs which depict the recorded earth pressures and wall deflections as a function of time are presented.

The Rankine and Coulomb theories of lateral earth pressure are briefly discussed with emphasis being placed on the assumptions and deficiencies of the theories. These theories are then used to calculate the theoretical earth pressures on the wall and a comparison is made with the actual pressures observed in the field.

The relative merits of each of the four types of pressure cells are summarized. The cells are compared on the basis of (a) magnitude and consistency of measured earth pressures, (b) reliability and durability, (c) ease of installation and operation, and (d) cost. The major problems which were encountered during calibration, installation, and observation of earth pressures are summarized.

The results of the first year's study are considered preliminary. The data which were obtained will be used to select the type (or types) of pressure cell to be used for subsequent research. Hence, no conclusions are made regarding the findings of this preliminary study.

The published version of this report may be obtained by addressing your request as follows:

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