THE USE OF THE TROEMNER BALANCE FOR MEASURING THE UPPER PLASTIC LIMIT OF SOILS

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Perhaps the greatest criticism of the use of the Atterburg constants for characterizing soil consistency has been due to the personal factor in making the determinations. This has been especially true of values for the upper plastic limit. The upper plastic limit is defined as that moisture content at which the soil will just barely flow under an applied force. The force used in the usual method is produced by the arm of the investigator as he strikes a dish containing the plastic soil against the palm of the hand or a rubber stopper. If the small groove which was cut into the plastic mass just barely flows together as a result of this impact the correct moisture content of the upper plastic limit has been obtained.

It has been shown that each investigator can duplicate his own results but that different investigators vary considerably in the data they obtain. This should be expected if one considers the difficulties involved in trying to standardize the amount of force in the swinging arm of different observers. The moisture content of the upper plastic limit would be expected to vary with the number of impacts, the force applied in the impact, the amount of soil in the dish, and the width of the groove. All of these factors are naturally influenced by the personal element. It is obvious, therefore, that a standardization of the technic of determining the upper plastic limit to eliminate the personal element is highly essential in order to strengthen the value of the determination.

Roberts has suggested the use of small glass cups for making these measurements. These cups are made from ordinary 100-cc graduate cylinders which have been cut off at the 5 cc mark. A V-shaped groove, 4 mm deep and 4 mm wide at the top, is cut into the top of the cylinder. This standardizes the size of the groove which is cut into the soil. Roberts used the weights of iron cylinders of various sizes to provide the desired force for making the soil flow together. The data in this paper were obtained by a modification of

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