pressure. This condition is shown by Fig. 6. The maximum past value of intergranular major principal stress may be estimated with reasonable accuracy from the compression curves that are obtained in consolidation tests, by a method proposed by A. Casagrande 5). This method, which is shown in Fig. 7, may be used for cases of both level and sloping ground surface.

There are more direct methods for determining the shearing strength of precompressed clays, the commonest being by cylindrical compression tests, either confined or unconfined, on undisturbed samples at their natural water content and by tests on samples reconsolidated to their natural overburden pressure. x) Such tests, however, give strengths that usually do not bear a constant ratio to the overburden pressure. Possible further research will lead to a more general method of type similar to that presented in this paper for determining the strengths of precompressed clays. Such a method quite possibly can be based on the use of curves of the type appearing in Fig. 8, which represents a compressed clay, but which has the same plots as used in Figs. 1 to 3.

FINAL COMMENTS

Study of pore pressure data shows that shearing strengths, for cases in which no drainage occurs, depend on the ratio of the principal stresses under which the soil is consolidated before the shear occurs; therefore, for rational predictions of shearing strengths for this case, data on pore pressures are essential.

The method presented in this paper is as general as can possibly be obtained for soils that have not been precompressed. For precompressed soils, the method gives upper and lower limiting values that, at least, are of value as checks on strengths obtained by other methods.

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x) Outlined in detail in 6).

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A STUDY ON PLASTIC CLAY OF THE PARIS REGION

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SUMMARY OF THE FRENCH REPORT

1) Origin of the samples

Carrières des Etablissements Etienne Henry, PROVINS.

2) Characteristics of the Clay

Natural Water Content	27.2 %
Specific Weight	2.69
Liquid Limit	117.5 %
Plastic Limit	32.7 %
Plasticity Index	84.8 %

3) Nature of the Study

Determination of strength by means of the triaxial compression device. In our device the vertical pressures are exerted through a piston with weights or tanks filled with water. The lateral grasp is exerted by means of glycerine under pressure. This device allows the measurement of vertical and horizontal deformations by means of comparators.

4) Tests on undisturbed samples

These tests yielded unconclusive results even for samples of close-by origin in the pit, i.e. $\varphi = 22^0$; C = 3,90 kg/cm2 (55.5 psi) and $\varphi = 20^0 30'$; C = 1,85 kg/cm2 (26.4 psi). These characteristics are obtained from the intrinsic curves.

The angles of internal friction which may be deduced from the gradient of the shearing surfaces, are very irregular.

Seen through a magnifying glass, the undisturbed clay is traversed by a network of fine cracks. These cracks cause the shear resistance to vary. The angle of internal friction φ and the cohesion C, which may be derived from the intrinsic curves do not correspond to the facts.

5) Tests on remolded and similar samples

Consolidation through compression of saturated homogeneous samples did not permit to obtain samples of the same water-content throughout their entire height, because of the friction on the sides.

The variation of water-content observed on a length of 10 or 12 cm (4" to 5") could reach 20% of the average value.

Remoulded homogeneous samples were obtained from dry pulverized clay.

The dry powder is compressed with 2 pistons in a permeable cylinder. This compressed sample is brought into contact with water. The water is absorbed and one awaits consolidation.

The samples thus obtained presented no stratification, their water-content was constant throughout their height, their apparent specific gravity agreed with their water-content.

6) Results obtained

The water-contents in terms of consolidation pressures are:

34.5 %	for	4 kg/cm2	(57 psi)
32.2 %	"	6 kg/cm2	(85,7 psi)
31 %	"	8 kg/cm2	(115.7 psi)
29.5 %	"	10 kg/cm2	(143.8 psi)

For all the consolidation pressures the intrinsic curves, obtained with the triaxial device, show an inclination of 10°. This value corresponds to that which may be derived from the slope of the shearing planes or from shearing due to torsion.

Cohesion which may be derived from the intrinsic curves is of 1.5 kg/cm2 (21.4 psi) and 2 kg/cm2 (28.5 psi), the consolidation pressures being respectively 6 kg/cm2 (85.7 psi)and 10 kg/cm2 (153.8 psi).

Series of tests are now being carried out with a view to measuring the variations of water-content and cohesion.

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SETTLEMENTS DEDUCTED FROM OEDOMETER TESTS COMPUTATION HYPOTHESIS AND TRIAXIAL TESTS

II d 15

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SUMMARY OF THE FRENCH REPORT

When computing from oedometer tests, the figures obtained for settlements are in most cases larger than when such settlements are directly obtained from existing buildings.

These differences must proceed from a definite cause which we are, now, to work out.

After systematical tests, we should think these differences related to the wrong value given to Poisson's number in such computations.

In oedometer test calculations, the value assumed for the said Poisson's number is "nil". In fact, we don't know the real value, but,as the "nil" value is certainly wrong the calculations must be, and are, widely away from the true figures.

In practice, the estimated settlements are always in excess to the recorded ones, moreover, when the computer adds to the calculated figure the settlements which must take place just when the soil is loaded, although no volumetric change has to occur in the latter process.

An experimental determination of the exact value of Poisson's number is a shear necessity and it must be as true as possible, relating to the prevailing conditions in loaded soils.

In a tentative way, experiments have been performed on cubic samples, full of water but being drained on every side. Each sample side had applied to it, a given and measured pressure, and the correlative deformations were recorded.

This "triaxial" apparatus may be used when testing various samples of underground soils, the particles of which may be much large than when using the usual oedometer apparatus.

The actual process includes two specific main tests, i.e. :

1) Compressive tests, in which lateral sides of the sample are maintained in a fixed position, and
2) Crushing tests, in which a fixed and constant pressure is applied to such lateral sides.

In both tests, and first of all, the swelling pressure has to be measured.

From obtained data, may be deducted :

3) the figures for compression modulus and Poisson's number which may be accounted for, when precise calculations are to be made refering to settlements in same soils as samples.
4) The crushing stresses in relation with given horizontal stresses, from which, in using Mohr's circles envelope line, one may deduct an internal friction angle and a cohesion value.

The formulas here after given, may enable any designer to get from such tests results, the corresponding values for the compression modulus and Poisson's number when using this "triaxial" apparatus in various ways.

The recorded test results are not yet sufficient in number to get a definite opinion as to the exactitude of a similar test method. Any way, up to know, it has given interesting data for the actual behavior in loaded soils.

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