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III-146 CONSOLIDATED DRAINED BEHAVIOR OF UNDISTURBED STIFF SAND IN TRIAXIAL COMPRESSION

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INTRODUCTION

In order to evaluate the strength and deformation characteristics of field stiff sand/silt layers of Pleistoncene Era, consolidation drain triaxial compression tests on undisturbed samples of small size (7.2 cm in diameter) taken from a construction site for a high-rise building in Tokyo was performed at different over consolidation ratios. The results were compared with the results of large triaxial compression tests on large samples (125 cm × 25 cm in cross section). Reported herein are the method and results.

TEST PROGRAM

The deposit consists of alternating layers of uncemented fine sand and cemented silt. Two small specimens, 7.2 cm in diameter and 15 cm in height, were trimmed from undisturbed blocks from sand layers with great care so as not to disturb them. After set in a conventional triaxial cell, they were isotropically consolidated to a common maximum confining pressure $\sigma_{c'}$ of 2.0 kgf/cm^2 (the field over burden pressure). One specimen was rebounded to $\sigma_{c'} = 1.0$ kgf/cm^2 at OCR = 2. Table 1 summarizes the testing conditions and results for the small and large specimens. The detailed data of the large specimens are given in the companion paper for this conference (Kimura et al, 1992).

Great care was taken in measuring strain and other parameters as follows,

1. The axial strain free from the effect of bedding error were measured by means of Linear Local Deformation Transducer (LLDT) fixed to the lateral surface of the specimen (Hameed et al, 1992). The external strain was also measured by means of an External Deformation Transducer (EDT).
2. The ends were lubricated with a 0.05 mm Dow silicone grease layer together with a 0.2 mm thick latex rubber sheet to minimize the end friction.
3. The change of the water level in a burette due to the volume change of the specimen was directly measured by means of a Low Capacity Differential Pressure Transducer (LCDPT).
4. The difference between the cell water pressure and the back pressure (1 kgf/cm^2), which was equal to the effective confining pressure, was measured directly by means of a High Capacity Differential Pressure Transducer (HCDPT).
5. The axial stress was measured by means of a load cell placed inside the triaxial cell.

TEST RESULTS

1. It may be seen from Figs. 1 and 2 that the difference between externally and locally measured axial strains is significant, particularly at small strains. This was because of the effect of Bedding Error (BE).
2. E_{max} and q_{max} of the two small specimens are more prone to the change in the value of $\sigma_{c'}$ during triaxial compression (TC). This tendency is not clear for the large specimens. This would be due partly to that the large specimen consisted to sand layers and silty layers, the latter being very insensitive to the change in $\sigma_{c'}$.
3. The small sample No. 1, which seems to be less disturbed than the sample No. 2, exhibited very brittle behavior with a very small strain at the peak, less than 1.5%

CONCLUSIONS

It was found that LLDT is a powerful tool to obtain accurate deformation properties of " undisturbed " sand specimen. While the effect of sample disturbance should be evaluated on one hand, the test result suggests that the field sand/silt layer has a brittle deformation characteristics.

Table. 1 Comparison of large and small tests results.

Specimn No		Max consolidation pressure kgf/cm^2	Confining pressure at TC kgf/cm^2	γ_d gf/cm^3		q_{max} kgf/cm^2		E_{max} kgf/cm^2	
Large	small			Large	small	Large	small	Large	small
No.4	No.1	2.0	2.0	1.428	1.477	4.260	3.526	2210	2205
No.2	No.2	2.0	1.0	1.431	1.503	5.208	2.04	3370	1120

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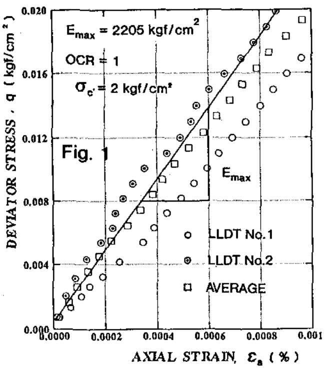
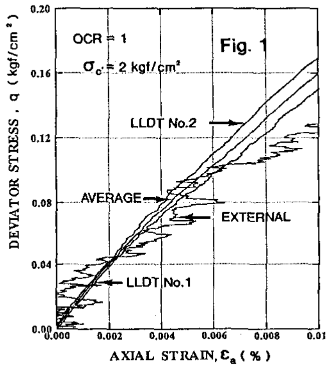
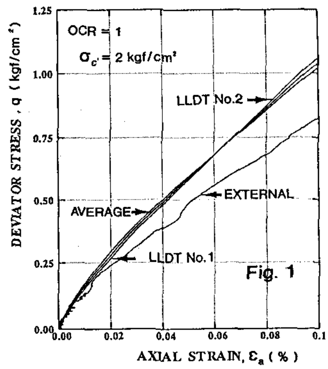
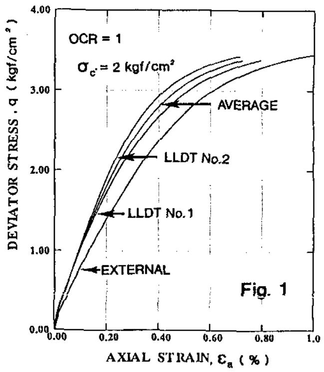
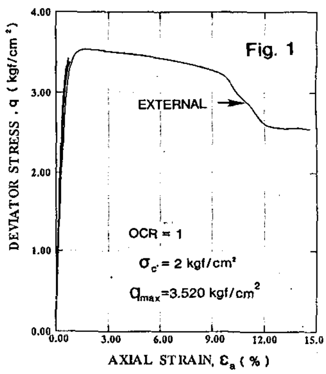










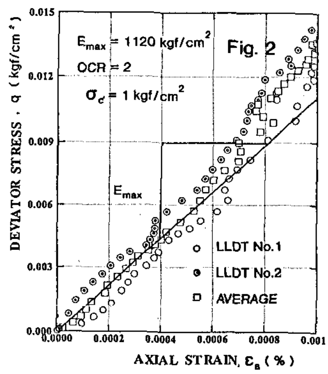
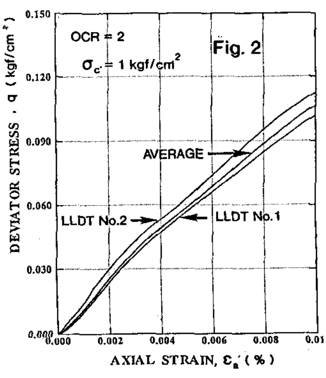
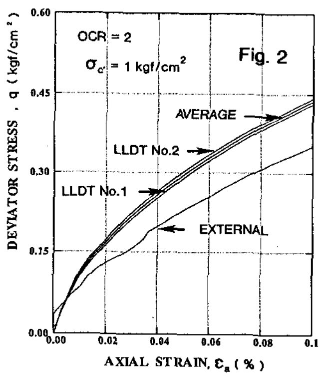
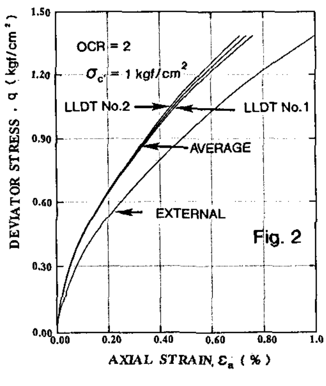


Fig. 1 Stress strain relations of No.1 specimen for different scales.







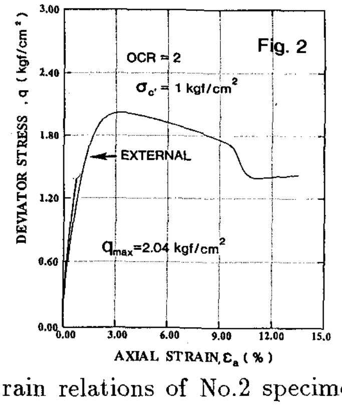


Fig. 2 Stress strain relations of No.2 specimen for different scales.

REFERENCES

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