III－B 235 QUICK LIME STABLIZED ARIAKE CLAY-EVALUATION OF FIELD AND LABORATORY VALUES

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1. INTRODUCTION

Ariake coastal region is located in north western part of Kyushu Island . Soil in this region is clay which possesses some special characteristics like high sensitivity ,high plasticity but low swelling. It has been found that this clay has different compressive strengths at different locations. Keeping in view its properties it has been found that stabilization of this clay with lime is most effective. In this study Ariake clay of near Saga city has been tested. An attempt has been made to study the lime stabilized properties in field and laboratory conditions and to see how the properties change.

2. MATERIALS AND EXPERIMENTAL PROCEDURES

2.1. *Field tests:*

Soft clay of Hattac river bed was put in stacks of 5.5×3.5×0.5 m size. Quick lime was spread on the top of the stack in proportion of 20, 40, 60 and 80 kg/m^3 of soil. Mixing was done by back-hoe for 30-40 minutes. Stacks were divided in different strips by marking to make rolling 2, 5 and 10 times. The experiment was done in the month of January-February at atmospheric temperature of 5 - 12 °C. Curing periods for field are 3, 7, 28 and 56 days. After sampling from the field unconfined compression test was performed in laboratory.

2.2. *Laboratory tests:*

In laboratory samples of same mix proportions were made under similar conditions of water contents and kept for curing in temperature controlled room.
Geotechnical properties of Ariake clay have been determined in laboratory which are given in table-1.

Table-1 Engineering properties of Ariake clay.

Properties	Values
Field water content %	124.08
Liquid limit %	116.50
Plastic limit %	54.42
Plasticity index %	62.08
Liquidity index	1.12
Specific gravity	2.607
Dry density	0.62
Group index	78 > 20
Soil classification subgroup	A-7-5
pH value	7.4
Particle size (passing 75μm) %	96

3. RESULTS AND DISCUSSION

3.1. *Unconfined compressive strength*

The results of unconfined compression tests with various lime proportions in field and laboratory for different curing days have been depicted in Fig.1(a), (b) and Fig.2(a), (b). In the case of field for 20 kg/m^3 mix, increase in strength is very slow with curing days. whereas for higher lime contents it increases with rapid rate. Even on the same day, strength for higher mix are high. In laboratory conditions, the gain in strength for 20 kg/m^3 mix is almost similar to field for the total period but for higher lime content initial strength is high as well as gain in strength is very high after 7 days in comparison to field but onto 7 days it is slow. The reasons behind these are pozzolonic reactions with time and controlled conditions in laboratory, e.g. mixing and temperature.

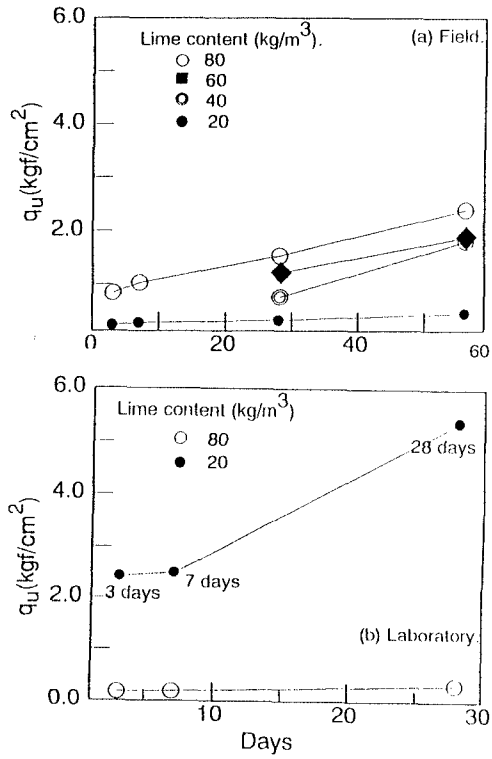

Fig. 1 Unconfined compressive strength with curing days for different lime contents, (a) field and (b) laboratory.

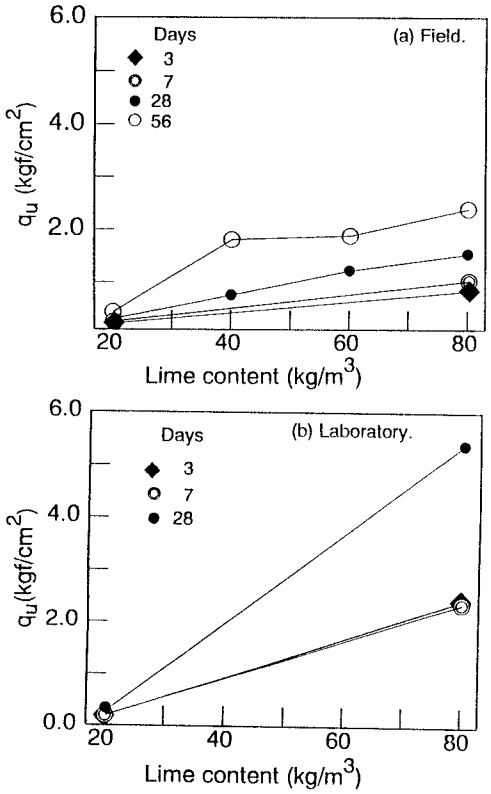

Fig. 2 Unconfined compressive strength with lime contents for different curing days, (a) field and (b)

3.2. *Effect of compaction*

The effect of number of rolling (compaction) for 20 and 80 kg/m^3 lime mix and for different days of curing has been summarized in fig.3 (a) and (b). From these figures it is evident that there is no dependency of unconfined compressive strength on the number of compaction.

3.3. *Field and laboratory test results*

From fig.4 , it is clear that for lower % of lime mix clay the strength is almost same in laboratory and field conditions for the same curing time. Strength is higher for higher mix in laboratory conditions.

4. SUMMARY AND CONCLUSIONS

The following conclusions can be drawn on the basis of the test results.

1. For lower % of lime content difference in strength between field and laboratory values is very low and for higher lime content high in field and much more high in laboratory.
2. The unconfined compressive strength of the mix is independent of compaction value of 2 – 10 times if a light-weight roller (0.6 tonne), is used.

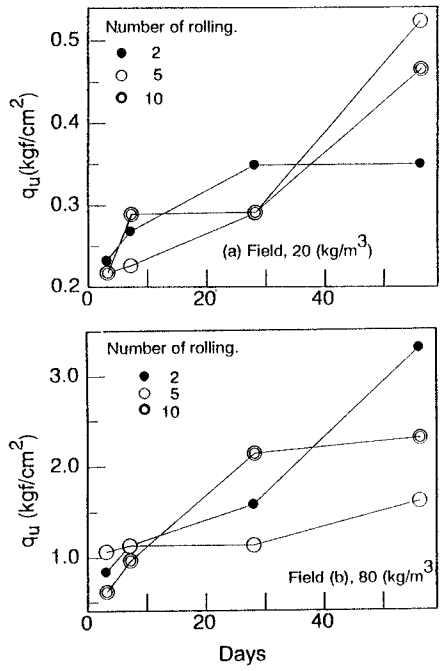

Fig.3 Unconfined compressive strength in field with curing days for different compaction numbers, (a) 20 kg/m^3 and (b) 80 kg/m^3.

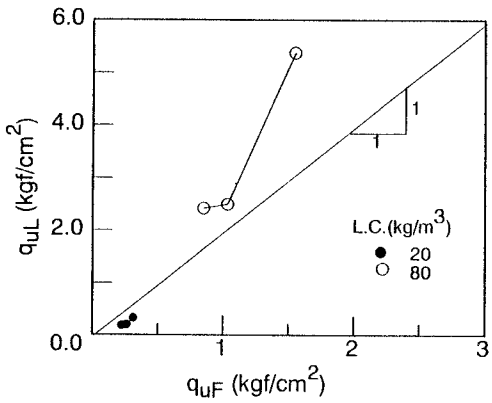

Fig.4 Comparison of laboratory and field values of unconfined compressive strength. Lime content for 3,7 and 28 days.

REFERENCE: Onitsuka, K. (1988). Mechanical properties of the very sensitive Ariake clay. Proceedings of the International Symposium on Shallow Sea and Low Land, saga, October.