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DISCUSSIONS

EFFECTS OF FRICTION AND THICKNESS ON LONG-TERM CONSOLIDATION BEHAVIOR OF OSAKA BAY CLAYS[i)]

Discussion by GHOLAMREZA MESRI[ii)]

Some of the technical articles that have been published in recent decades in connection with compressibility and consolidation of Osaka Bay clays and settlement of Kansai International Airport (KIA) have been, unfortunately, misleading. These articles, often authored or co-authored by individuals who were connected in one form or another with subsurface investigation or settlement analyses for the first phase of KIA, tend to disparage and dismiss well-established and widely tested empirical concepts of compressibility. A main objective of these articles then appears to be explaining away unsatisfactory settlement predictions by claiming that either well-established empirical concepts are incorrect or not applicable to Osaka Bay clays.

The article by Watabe et al. (2008) is, therefore, a breath of fresh air. The authors have conducted a series of high quality consolidation tests on undisturbed specimens of several Osaka Bay clays from the site of KIA, and more importantly, have attempted an objective evaluation of their measurements. Both the data and interpretation in this article are valuable contributions.

The writer and co-workers have repeatedly explained that compressibility with respect to effective vertical stress at any time, $(\partial e/\partial \sigma'_v)_t$, and compressibility with respect to time at any effective vertical stress, $(\partial e/\partial t)_{\sigma'v}$, both operate simultaneously during primary compression (e.g., Mesri et al., 1995; Mesri, 2001). According to Mesri (2001), ''As soon as primary consolidation begins, both $(\partial e/\partial \sigma'_v)_t$ and $(\partial e/\partial t)_{\sigma'v}$ contribute to compression; however, only $(\partial e/\partial t)_{\sigma'v}$ contributes to compression during secondary consolidation when $d\sigma'_v/dt = 0$''. By computing the values of $(\partial e/\partial t)_{\sigma'v}$ and $(\partial e/\partial \sigma'_v)_t$ during primary compression, we have shown that a combination of the interrelationship between $(\partial e/\partial t)_{\sigma'v}$ and $(\partial e/\partial \sigma'_v)_t$, and relation of both to the rate of increase in effecttive vertical stress, $d\sigma'_v/dt$, and duration of primary consolidation, t_p, lead to an EOP compression independent of duration of primary consolidation and, therefore hypothesis A.

The classic excellent consolidation test data by Aboshi (1973) substantially support hypothesis A. The figure from Aboshi (1973) is reproduced, with one revision, in Fig. 31 of this discussion. The arrows marking ''100% primary consolidation'' have been removed and replaced by EOP consolidation defined by the Casagrande construction. The magnitudes of EOP vertical strain, marked on the figure by closed circles, are listed in Table 5. These data show that EOP compression is practically independent of duration of primary consolidation. Even

Table 5. Measured values of EOP strain of clay layers of different thickness

No.	1	2	3	4	5
H, cm	6.0	14.4	60	120	300
EOP ε_v, %	8.40	8.15	8.05	8.15	8.80

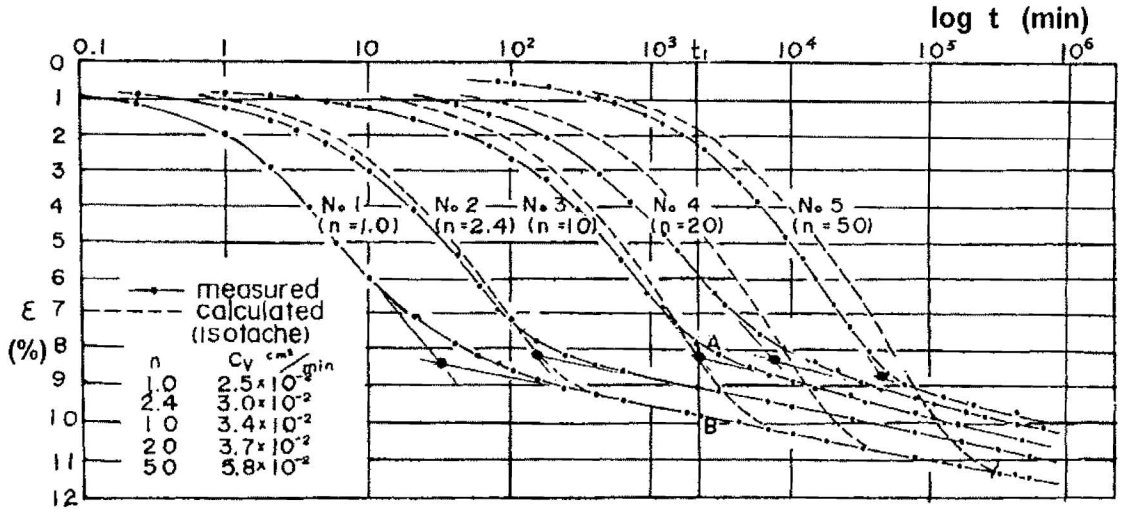

Fig. 31. One-dimensional consolidation test results by Aboshi (1973)

i) By Yoichi WATABE, Kaoru UDAKA, Masaki KOBAYASHI, Takechiho TABATA and Tsuyoshi EMURA, Vol. 48, No. 4, August 2008, pp. 547–561.

ii) Ralph B. Peck Professor of Civil Engineering, University of Illinois at Urbana-Champaign, Illinois, USA 61801 (gmesri@illinois.edu).

without an interpretation of EOP compression, Fig. 31 shows that the Aboshi (1973) data are close to hypothesis A and far from hypothesis B.

Aboshi (1973) also showed, for comparison, a series of calculated isotaches according to hypothesis B, as defined in Fig. 31 of the article by Watabe et al. (2008). The Aboshi (1973) consolidation data in Fig. 31 of present discussion may not be precisely identical to hypothesis A; however, the behavior observed by Aboshi (1973) completely repudiates hypothesis B. Therefore, it is rather unfortunate that hypothesis B is even mentioned in the conclusions of the article by Watabe et al. (2008). The authors' data for some Osaka Bay clays may deviate somewhat from hypothesis A; however, in no way the observed data behave according to hypothesis B as defined in Fig. 31 of the article and by the isotaches calculated by Aboshi (1973) in Fig. 31 of present discussion.

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