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論 文 要 旨 (英 文)

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(Summary)

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(要 旨) The aim of the study was to characterize a variety of microstructure development-levels and geotechnical properties of the late Pleistocene-Holocene deposits in the Mekong River delta (MRD). The thesis furthermore studies the influences of sedimentary environment and conditions on the geotechnical properties and the influences of delta formation mechanisms on the geotechnical property sequences of the successions of the sedimentary facies and relationship between the sedimentary geology and geotechnical properties. The survey is associated the geotechnical engineering and the sedimentary geology of the late Pleistocene-Holocene deposits at five sites and also undifferentiated Pleistocene sediments. A cross-section rebuilt in the delta progradation-direction between the Mekong and Bassac rivers represents the complicated stratigraphy. The microstructure development-level of the argillaceous soil in each facies is interpreted by a combination of the formation mechanism, consolidated properties, ^{14}C age, and analysis on the thin soil section (TSS) and Scanning electron micrograph (SEM) images. The MRD late Pleistocene-Holocene sediments can be divided into three main broad cases, namely the surface sediment facies and the deep sediment facies with microstructure development-levels being very high to high, the shallow sediment facies with microstructure development-levels being medium to low. The microstructure development-levels indicate how to choose a coefficient “K-value” for estimating yield stress ratio, OCR, using the normalized resistance obtained from the piezocone penetration tests (CPTU). The OCR of the all sediments facies change with depth but not less than 1. The postdepositional processes significantly influenced the microstructure development, particularly the dehydrating and oxidizing processes, affecting K-value. In general, the contents of clay minerals decrease in order from the illite, kaolinite, chlorite, to smectite by the characteristic of material source from the Mekong River. The illite content tends to decrease in the delta progradation-direction, while the smectite content tends to increase. The characteristics of the clay minerals produced the high microstructure development and plasticity, which slightly increase with the reduction of illite content. The cross-sections sufficiently represented by ten successive sedimentary facies of the area were identified based upon the sedimentary properties. Characteristics of the unit showed development of sedimentary facies. Each sedimentary facies was formed under a different environment and revealed typical geotechnical properties. Estuarine channel, estuarine marine, delta front, and sub- to inter-tidal flat				

facies were formed under strong hydrodynamic conditions. The sediments are from clay to coarse sand and even pebbles, and the sedimentary structures are plentiful. Strengths of these sedimentary facies vary significantly, which can be captured by CPTU, but not by standard penetration test (SPT). The normalized values obtained from CPTU in these facies show saw-tooth graphs with large variations. The soil-behavior-types determined from the normalized values are plentiful from cohesionless to cohesive soils. On the other hand, marsh, open bay, pro-delta and march/flood plain facies, which formed under relatively low hydrodynamic conditions, have simple and homogenous sedimentary properties. The sediments are commonly silt and clay. Strengths of these sedimentary facies increase linearly with depth, the normalized values are all rather constant with depth and their soil behavior-types are only clays derived from CPTU results. It could be said that these particular sedimentary conditions in the MRD late Pleistocene-Holocene deposits can be reasonably estimated by CPTU test. The cross-section displays the successions of the sedimentary facies which were created in the all delta formation mechanisms including the tide-dominated delta with significant fluvial activity and material source, the tide-dominated delta, the tide and wave-dominated delta, and the tide and wave-dominated delta with strongly dominated by the waves (coast). Each succession of sedimentary facies was formed under a different delta formation mechanism and revealed a typical geotechnical property sequence. The particular tendency of the mechanical behavior of the sedimentary succession can be reasonably inferred from the delta formation mechanism.

Six typical soil structure types were established based on the thickness and arrangement of the soil layers of the surface, shallow, and deep sediment facies. Considering the typical geotechnical properties of the dominant sediment facies of each structure type, potential or critical geotechnical problems are identified. Furthermore taking the current practice of geotechnical investigation in Vietnam into account, rational investigation procedures are proposed, including critical geotechnical conditions, which should be obtained with reasonable accuracy by the investigation to avoid the potential geotechnical problem in the infrastructure construction in MRD.

備考：論文要旨は、和文2000字と英文300語を1部ずつ提出するか、もしくは英文800語を1部提出してください。

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