

# Managing Geological and Geotechnical Risks Through Urban Geological Characterization Using Borehole Database and Sedimentary Environment Analysis

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Ground-related problems that are prone to occur because of geotechnical characteristics, namely, high-risk ground conditions—are often controlled by factors such as depositional environments, constituent minerals, and geological structures from a geological perspective. Consequently, geological characteristics of the ground play a critical role in determining countermeasure strategies during construction as well as design policies.

In the Kansai region, where extensive ground information has been accumulated, such data are frequently used in studies conducted during infrastructure development. This paper introduces representative case studies based on the use of accumulated ground information and presents approaches to the management of geological and geotechnical risks.

In the Osaka Plain, marine clay layers were widely deposited during interglacial periods in association with sea-level fluctuations. More than 15 marine clay layers, ranging from the Holocene to the Pleistocene, are distributed in the area. These layers are generally characterized by nearly horizontal deposition and wide lateral continuity. However, they are occasionally eroded by fluvial deposits such as gravel and sand, resulting in a significant reduction in layer thickness.

Such erosional valleys cannot be sufficiently inferred from the present-day topography alone; therefore, careful examination through correlation of borehole data is essential. When constructing linear infrastructure in urban areas, such as roads and railways, as well as large-scale industrial foundation structures, borehole investigations should be conducted at regular intervals. Alternatively, previous investigation records should be carefully reviewed and compared in advance.

Furthermore, attention must be paid to flexural deformation structures caused by active faults underlying the Osaka plain. In areas where fault movement has produced significant flexural deformation, adjacent marine clay layers occurring at the same depth are not necessarily contemporaneous deposits. Therefore, geological investigations of depositional environments are required to correlate individual strata accurately and to construct reliable geological cross-sections.

Keywords: borehole database, urban geology, Sedimentary Environment, risk management