

# The second phase construction of Kansai International Airport considering the large and long-term settlement of the clay deposits

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## ABSTRACT

Kansai International Airport was planned as a fundamental solution to the aircraft noise pollution in the area surrounding the Osaka International Airport (Itami Airport) and to meet the increasing demand for air transportation. As a man-made island, it was constructed 5 km offshore in Osaka bay to minimize noise pollution in residential areas. The airport opened its operations in September 1994. The second phase construction works are now being carried out to build an island further offshore than the island built in the first phase. Since sea water is deep at the Kansai International Airport construction site and the layers below the seabed consist of a very soft layer of Holocene clay (immediately below the seabed surface) followed by alternate layers of Pleistocene clay and sand/gravel, the construction of an airport island upon them is expected to produce a sizeable ground settlement. Thus, consideration of the predicted settlement during and after construction should be reflected in the design of the airport islands, as well as in the details of the land development work. This report outlines the second phase construction work at Kansai International Airport and describes the related geotechnical issues such as settlement.

## 1 INTRODUCTION

Kansai International Airport was planned as a fundamental solution to the aircraft noise pollution in the area surrounding Osaka International Airport (Itami Airport) and to meet the increasing demand for air transportation. It was constructed 5 km offshore in Osaka bay as a man-made island (Figure 1). The airport opened in 1994 as the first twenty-four-hour airport in Japan.

At Kansai International Airport, the number of aircraft take-offs and landings is already close to handling capacity (30 per hour) during peak hours in the morning and in the early evening. Based on pressure from both home and abroad to further increase its capacity as an international hub airport, the second phase of construction was started in 1999. The second phase construction work involves the development of 545ha land, at a site further offshore than the existing island, and the construction of a 4,000m parallel runway and related facilities. Figure 2 shows an image of the airport after completion of the second phase project. In the second phase construction work, as a way to decrease financial burden on Kansai International Airport Co., Ltd. (KIAC), land development and superstructure construction are undertaken by different companies; the land development work for the second airport island is undertaken by Kansai International Airport Land Development Co., Ltd. (KALD) while the construction of airport facilities including a new runway is undertaken by KIAC. KALD has been conducting the land development work toward the scheduled opening of the new run-

way, taking careful consideration to harmony with the local environment and eligibility as an airport island. The new runway, the taxiway connecting the first and second islands, and related facilities are scheduled to open in 2007. Figure 2 shows the areas that will be put to use in 2007.

## 2 THE SECOND PHASE PROJECT OF THE KANSAI INTERNATIONAL AIRPORT

### 2.1 Geotechnical conditions

The water depth of the construction site is in the range between 18m and 20m. Figure 3 outlines the layers below the seabed of the construction site. The layers are generally formed in a similar manner throughout the entire construction site, consisting of a monocline structure with a gentle downward inclination from landside to offshore side. The order and thickness of the layers are generally uniform along a line parallel to the shoreline. Immediately below the seabed, there exists a soft layer of Holocene clay, the thickness of which is roughly between 20m and 25m. The Holocene clay is mostly in normally consolidated condition with natural water content ( $w_n$ ) of 80% to 120% and

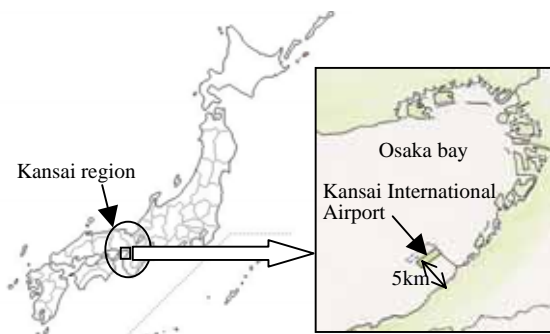


Figure 1. Location of Kansai International Airport

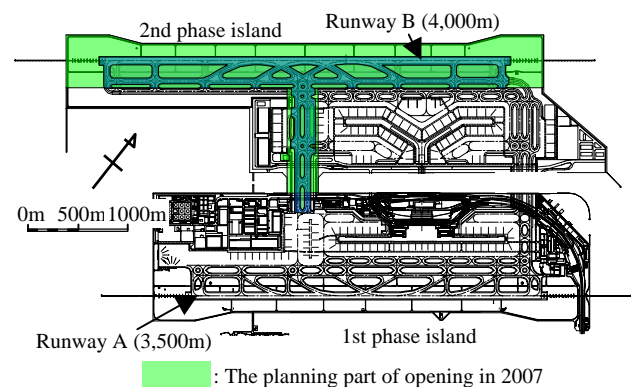


Figure 2. Image of Kansai International Airport after completion of the second phase project)