

The construction of the double-deck system consisted of new railway deck and existing Shinkansen viaduct in urban area

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Summary

We have implemented the project which connects the radiate railway lines existing individually with new line “Tohoku-Jukan line”. This line is now under construction just above the in-service Shinkansen line, because it is very difficult to obtain the space for new line in urban area of Japan. The construction is realized by applying the viaduct structure with double-deck system, which consists of the existing viaduct for Shinkansen and new deck and new pier for the new line added on the steel rigid-frame pier of the existing viaduct.

For this renewed structure, we had studied on the seismic performance by carrying out the analysis and the experiment. The study gave us the result that the base of the piers had not enough capacity against the large-scale earthquake, which we have experienced up to now in Japan. From this result, we also developed the reinforcement method, which was ascertained by horizontal cyclic loading test, for the base from the inside of the hollow steel pier, and conducted it. The reason why the reinforcement had to be conducted from the inside of pier was that the space underneath the viaduct is normally used for various building and it is impossible to construct something from the outside of the pier.

Keywords: double-deck viaducts; ductility capacity; steel rigid-frame; spiral rebar.

1. Introduction

The Tohoku-Jukan line project is the construction of a new double track line from Tokyo Station to Ueno Station (Fig. 1). The Purpose of this project is through a direct train between the Tokaido Line (southbound from Tokyo station) and the Tohoku, Takasaki, Joban Line (Northbound from Ueno station).

Shown in the following several effects by building the Tohoku-Jukan line are expected. One is, the train congestion between Ueno station and Tokyo station is alleviated. Another is, the travel time is shortened by the transfer of train becomes unnecessary. In addition, Transportation network will be strengthened in the Tokyo metropolitan area.

In this paper, we describe the design and construction of steel rigid-frame pier and abutment added on the existing viaduct for building the Tohoku-Jukan line.

2. Layered structure using the existing viaduct

The Tohoku-Jukan line project is building a new line for 3.8km between Tokyo station from Ueno station. Section of the new line construction space, side of Tokyo station and Ueno station,

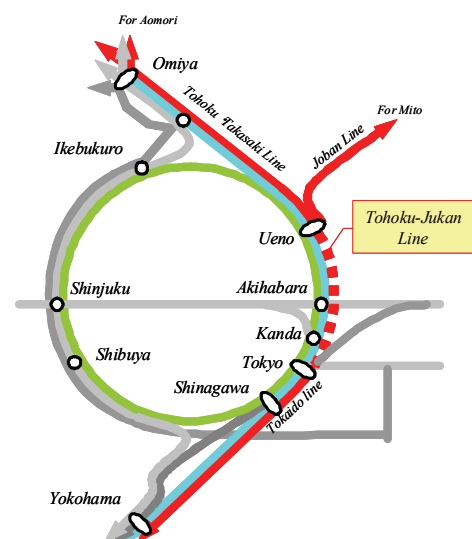


Fig.1: Location of Tohoku-Jukan line