

**Zeitschrift:** IABSE structures = Constructions AIPC = IVBH Bauwerke  
**Band:** 3 (1979)  
**Heft:** C-8: The structures of new railway line in Japan  
  
**Artikel:** Underground structures  
**Autor:** Structure Design Office, Japanese National Railways  
**DOI:** <https://doi.org/10.5169/seals-15798>

### **Nutzungsbedingungen**

Die ETH-Bibliothek ist die Anbieterin der digitalisierten Zeitschriften auf E-Periodica. Sie besitzt keine Urheberrechte an den Zeitschriften und ist nicht verantwortlich für deren Inhalte. Die Rechte liegen in der Regel bei den Herausgebern beziehungsweise den externen Rechteinhabern. Das Veröffentlichen von Bildern in Print- und Online-Publikationen sowie auf Social Media-Kanälen oder Webseiten ist nur mit vorheriger Genehmigung der Rechteinhaber erlaubt. [Mehr erfahren](#)

### **Conditions d'utilisation**

L'ETH Library est le fournisseur des revues numérisées. Elle ne détient aucun droit d'auteur sur les revues et n'est pas responsable de leur contenu. En règle générale, les droits sont détenus par les éditeurs ou les détenteurs de droits externes. La reproduction d'images dans des publications imprimées ou en ligne ainsi que sur des canaux de médias sociaux ou des sites web n'est autorisée qu'avec l'accord préalable des détenteurs des droits. [En savoir plus](#)

### **Terms of use**

The ETH Library is the provider of the digitised journals. It does not own any copyrights to the journals and is not responsible for their content. The rights usually lie with the publishers or the external rights holders. Publishing images in print and online publications, as well as on social media channels or websites, is only permitted with the prior consent of the rights holders. [Find out more](#)

**Download PDF:** 16.12.2025

**ETH-Bibliothek Zürich, E-Periodica, <https://www.e-periodica.ch>**

## 6. Underground Structures

In the construction of the Tohoku Shinkansen, Ueno underground station of 800 m in total length will be constructed at a distance of about 4 km from Tokyo Station and it will be followed by circular double track shield-driven tunnels of about 13 m in diameter and 1700 m in total length (see Fig. 2)

### Ueno Underground Station

The station structure is as long as 800 m in total, 50 m wide at maximum and 30 m deep as shown in Fig. 3. It consists of four underground storeys, two platforms for four tracks of the Shinkansen being situated at the lowest storey.

The structure is planned to be constructed by the method of reverse construction sequence, in which the construction of the upper stories precedes that of the lower stories. It is mainly composed of side walls and slabs of reinforced concrete and columns of centrifugally cast steel pipes. The walls consist of inner and outer ones, the latter being cast in situ to serve as the retaining walls during excavation and to remain as permanent elements of the station structure.

Near the construction area there exist many kinds of structures such as railway tracks, a box-type subway station, the existing JNR station building, overhead pedestrian bridges and highway bridges. One of the most important and complicated tasks is therefore that of providing protection for the existing structures from damage due to the excavation works.

Many structures in the area are to be underpinned before the excavation works for the new Ueno station begin (see Fig. 4 and Fig. 5).

### Shield Tunnel

The tunnel with a maximum covering depth of 20 m is to be constructed by the circular shield-driving tunnel method, instead of the open-cutting method. Because it is very difficult to obtain the right-of-way on the surface of the ground, the shield-driving tunnel method is considered favorable, as it minimizes the area influenced by the excavation of the ground. Fig. 6 shows the cross-section of the circular shield tunnel.

As the shield is driven through water-bearing sand deposit, it will be necessary to stabilize it by means of chemical grouting, compressed air and so on.

Application of the shield-driving method of hand excavation is planned to facilitate the works concerning the cut and removal of many structural foundations.

The main tunnel lining consists of 60 cm thick precast segments of slab-type reinforced concrete, while the 30 cm thick concrete for the auxiliary lining, which prevents the ground water from entering the tunnel, is cast in place.

Eight buildings will have to be underpinned in the shield-driving lots and this will involve the cutting and removal of about 100 foundation piles.

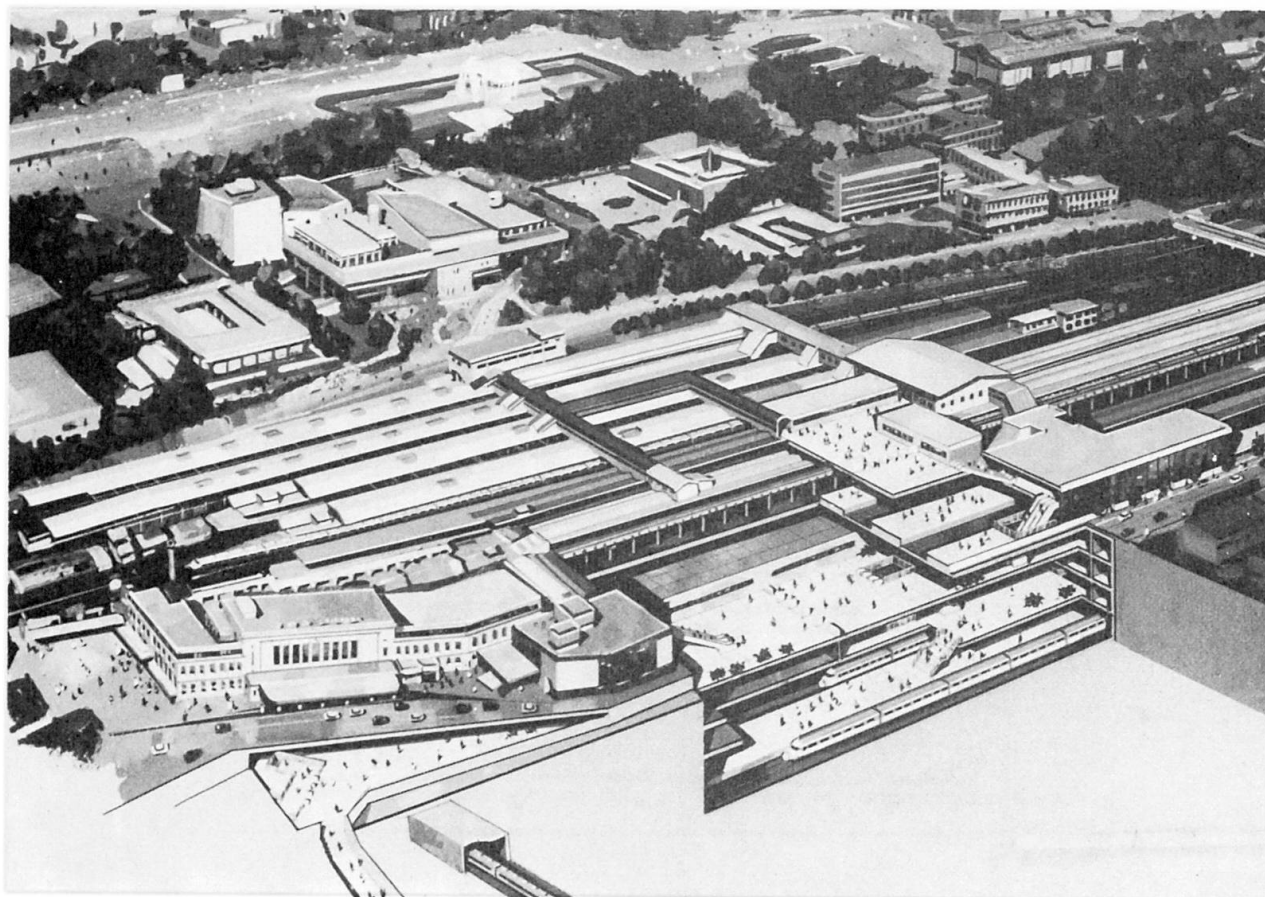


Fig. 1 General view of Ueno station

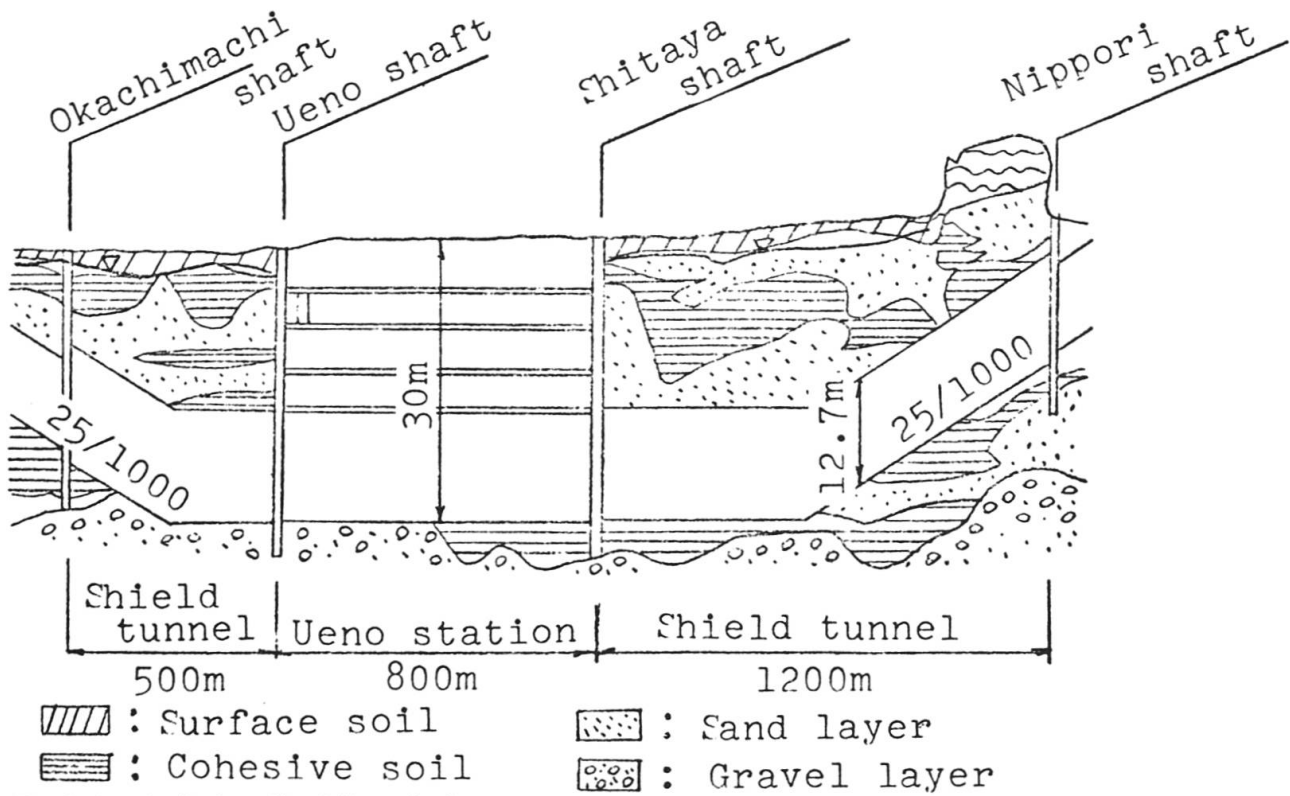


Fig. 2 Longitudinal profile of Ueno district

Platforms for conventional lines

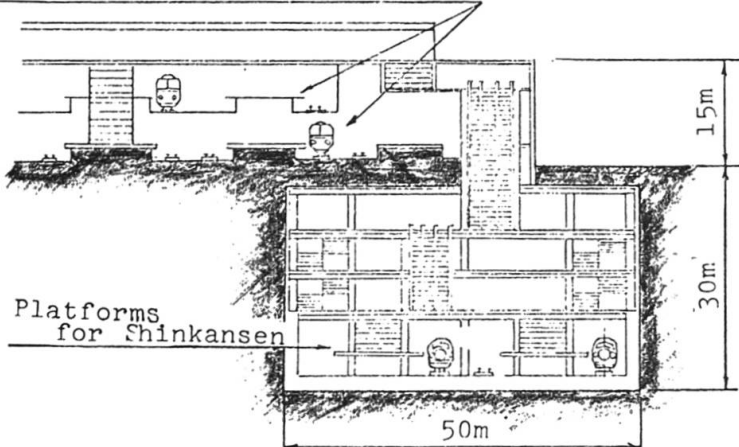


Fig. 3 Cross section of Ueno station

Highway bridge

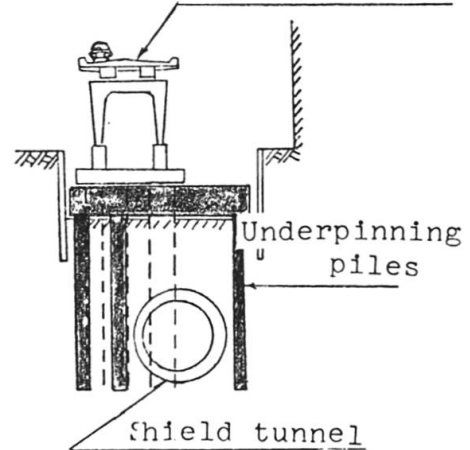


Fig. 4 Underpinning for highway bridge

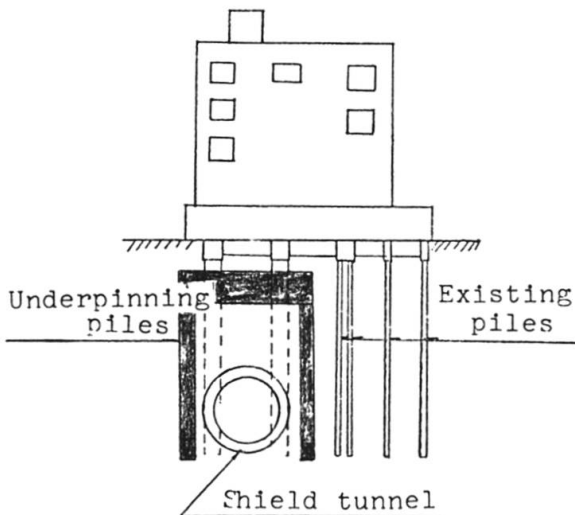


Fig. 5 Underpinning for building

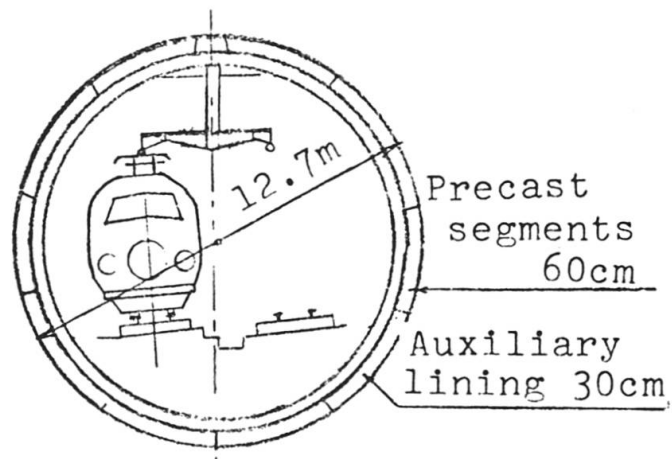


Fig. 6 Cross section of shield tunnel