

# Preservation and Restoration of Tokyo Station Marunouchi Building

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## Introduction

Tokyo Station is a key transportation hub in the centre of the Otemachi/Marunouchi/Yurakucho business district of Tokyo. Meanwhile, the space from the station along Gyoko-dori to the Imperial Palace is important as a symbolic gateway to Japan and the capital.

JR East is renovating Tokyo Station and the surrounding area with the cooperation of the national and Tokyo metropolitan governments and other stakeholders, working to form an urban space befitting the face of the capital, and Japan as a whole.

## History of Tokyo Station Marunouchi Building

Tokyo Station Marunouchi Building was designed by Kingo Tatsuno (1854—1919), the father of modern Japanese architecture. It opened in 1914 and remains as a historical building, representing the style of western buildings in the Meiji (1868—1912) and Taisho (1912—26) periods.

## Events up to station opening

Railways rapidly expanded in Japan after the first line opened between Shimbashi and Yokohama in 1872. Services stretched towards the north from Ueno and the southwest

from Shimbashi. Tokyo was also at the centre of rapid change and expansion, and the need for a railway linking the north and southwest was escalating. In this situation, the Tokyo Prefecture government announced an ordinance on urban planning of the capital in 1888. It included a plan to construct an elevated railway line linking Shimbashi and Ueno stations with a central station between them.

## First design for station

The first design was by Franz Balzer, a German railway engineer who was technical advisor to the Railway Bureau of the Ministry of Communications. The proposed exterior announced in 1903 was a mixture of Japanese and western styles, with western brick architecture topped by a clay tile roof and Chinese style gables over the entrances. However, the Meiji Emperor remarked that stations and similar structures were best rendered in a foreign style, effectively rejecting the proposal.

Kingo Tatsuno (of Tatsuno Kasai Architecture Design Office) then came to take charge of the design. At that time, Tatsuno had already established a firm reputation as one of the best architects in Japan for his work on the main office of the Bank of Japan and many other prominent Meiji buildings.

Tatsuno submitted his first proposal in 1904, but it was of meagre proportions because the allotted budget was



Exterior of Tokyo Station Building at original construction

(JR East)

just ¥420,000 (amount in 1904). Japan subsequently embarked on a campaign to improve national prestige after victory in the Russo-Japanese War in 1905, with Railway Agency President Shinpei Goto requesting a station that would amaze the world as befitting the nation that defeated the great power of Russia. The budget was thus increased to ¥2.8 million (amount in 1904), and a third and final proposal in 1910 was for a large station building of three storeys.

Construction of the then so-called 'Central Station' started in March 1908, and was completed in December 1914. The station was a long structure facing the Imperial Palace to the west, spanning approximately 335 m north to south with a central section and domes at symmetrical locations to the north and south. It had a floor area of 23,900 m<sup>2</sup> with three floors aboveground and one floor underground in one part. The south dome was for boarding passengers, the north dome was for disembarking passengers, and the central part had an entrance exclusively for use of the Imperial Family. The first floor housed the stationmaster's office, resting and waiting rooms for the Imperial Family, first to third class waiting rooms, restaurants, luggage delivery rooms, and more. The second and third floors had hotel guest rooms and a restaurant in the southern half as well as the Railway Agency offices in the northern half.

There were four platforms for eight tracks, with two platforms (four tracks) each for steam-locomotive-hauled long-distance trains and another two for electric suburban trains. There was no entrance on the Yaesu side at this time.

The 'Central Station' was officially named Tokyo Station at its opening.

### Damage from 1923 Great Kanto Earthquake and WWII

The Great Kanto Earthquake in 1923, caused a tremendous fire and other damage to surrounding buildings, but Tokyo Station stood practically unscathed. While it withstood the earthquake, most of the roof and interior was burned out by air raids in May 1945.

In the postwar restoration work, the structure was modified from the original three floors and round domed roofs to two floors with most of the third floor removed for safety. The domed roofs were changed to an octagonal shape, differing



Damage from bombing in World War II

(JR East)

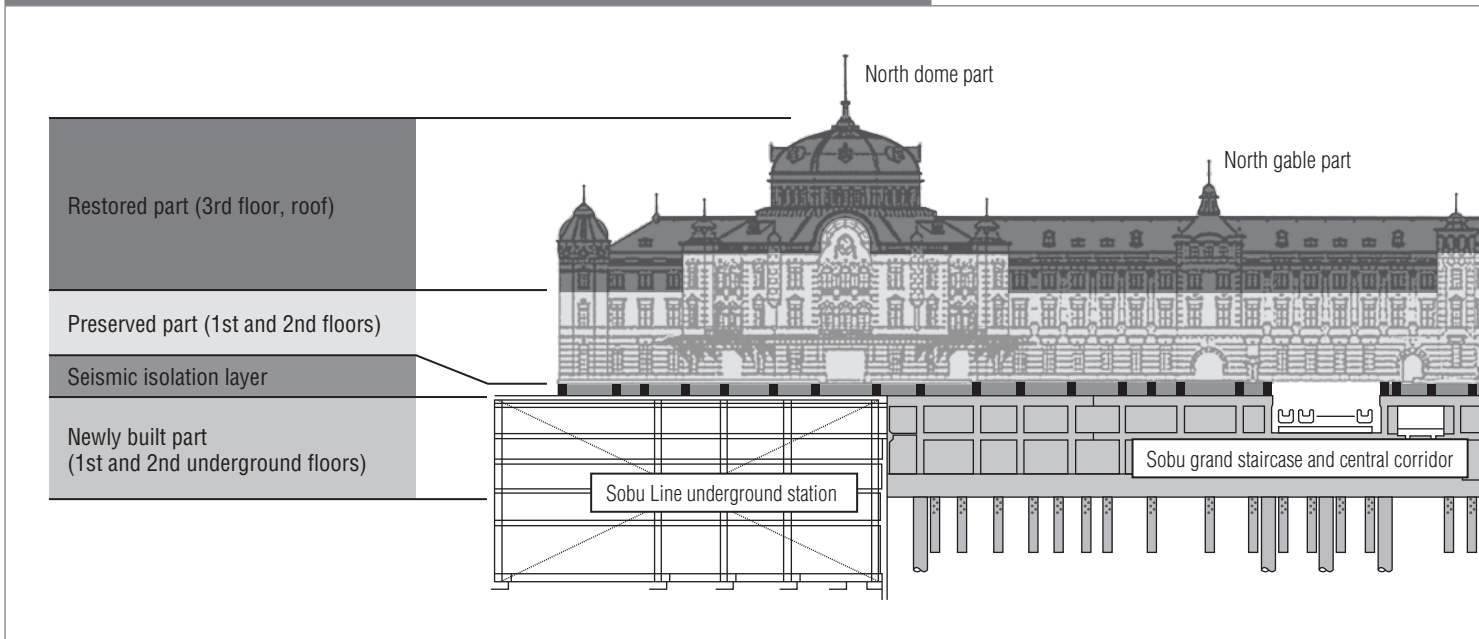
greatly from the original form. Even so, the 'red brick station' was still a familiar site to many and was heavily used.

### Events Leading to Basic Policy for Preservation and Restoration of Tokyo Station

Many plans were proposed from 1955 to renovate the station building, including complete reconstruction as a high-rise building. However, discussions were held in 2001 on preserving and restoring the main building as part of the revitalization of the area around Tokyo Station at the centre of the capital. The committee discussions were sponsored by Tokyo Metropolitan Government and chaired by Waseda University Professor Shigeru Ito. The main points included technical studies on the increase in weight to the existing building frame caused by restoring the structure to its original three storeys without undermining the value of the original building, as well as on structural reinforcement for long-term preservation. Studies were also implemented to address issues, such as improvements to the current functions of the station, hotel, and station gallery for the future.

A basic policy for preservation and restoration was proposed, covering items such as formation of a dignified urban scenery, passing the historical structure on to posterity, and permanent preservation and utilization of the

**Figure 1 Scope of Tokyo Station Marunouchi Building Preservation and Restoration**



red-brick building. The historical and cultural value of the station building was appraised highly once again and it was designated an important cultural property on 30 May 2003.

Following the committee's conclusions, JR East sought the advice of scholars in accordance with the aforementioned basic policy. Studies focused primarily on items such as securing aseismic performance for long-term preservation and use of the internal space, achieving harmony between the restored and current parts, and taking measures to prevent deterioration and flaking of the exterior cladding (Fig. 1).

The original building materials and construction methods were identified and selected by gathering remaining documents and interviewing those with knowledge of the station construction. Technical studies were also made on functions and performance to be maintained into the future and how to achieve them. Other issues were how to preserve and record parts removed or repaired at restoration in the postwar period. Specifications were still being decided after construction started in April 2007 as disassembly surveys and various tests were made.

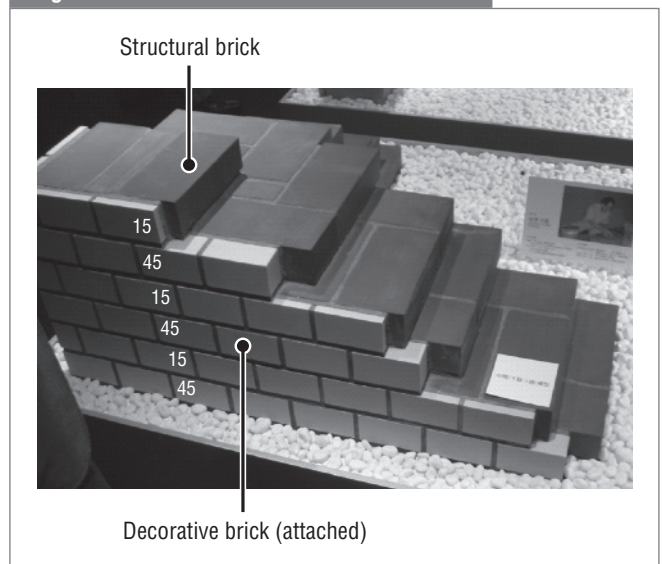
## Overview of Preservation and Restoration Plan

### External walls

The existing station building is a steel-reinforced brick structure. Its outer walls are structural brick overlaid alternately with two types of decorative brick, 45-mm and 15-mm thick (Fig. 2).

In the reconstruction and restoration work, the outer walls of the first and second floors on the station-front plaza side were preserved with the third floor restored.

**Figure 2 Structural and Decorative Brick**



To achieve harmony in texture with the preserved part, features of the decorative brick such as smoothness and sharpness needed to be re-created along with colour in restoration of the decorative brick overlay. Test firings and exposure tests were carried out repeatedly. Extremely high-level techniques such as special joints incorporated in the original construction were also recreated.

The frame of the restored third floor is steel-reinforced concrete (SRC), so all the new decorative bricks are 15-mm thick. Moreover, granite and artificial stone accents on the pilasters and window frames have been restored to their original form (Fig. 3).

The outer walls on the track side (east side) were originally covered with the same decorative brick as on

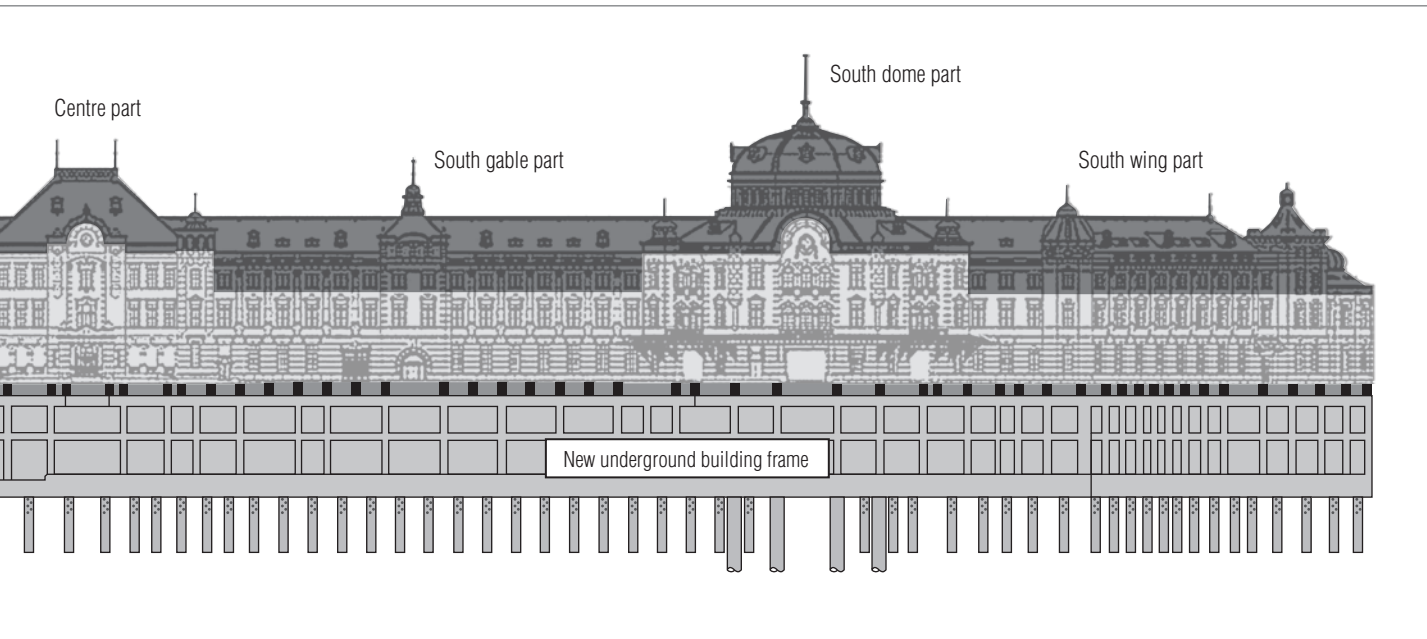
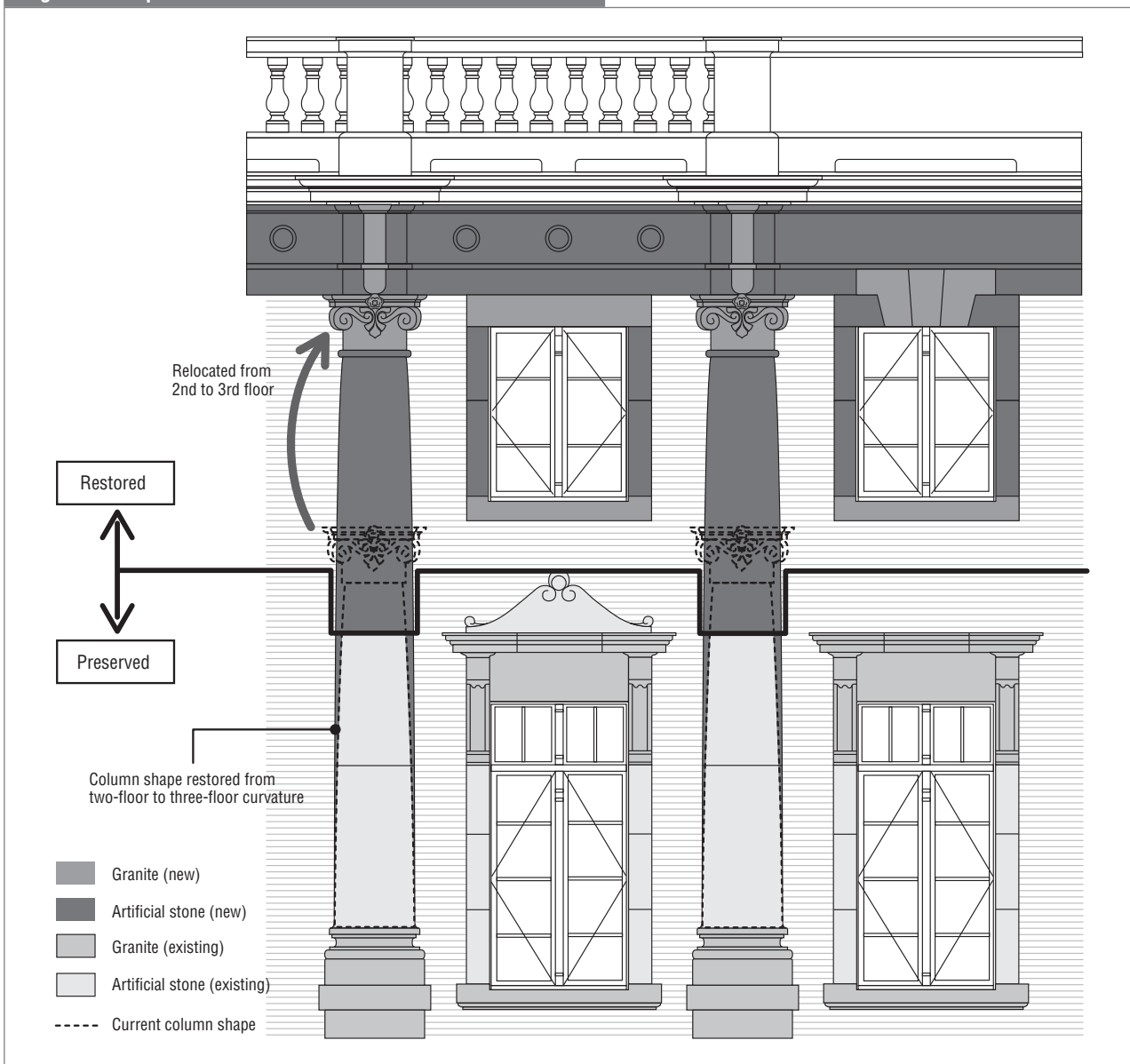


Figure 3 Scope of Outer Wall Preservation and Restoration



the plaza side with granite and artificial stone accents. These were lost in the war, but the walls were all repaired with mortar and painted in brick colour. The lost decorative bricks, pilasters, etc., were all restored on the track side in this reconstruction work.

### Roofs

The north and south domes that were changed to octagonal, hipped roofs at the postwar reconstruction were originally round. The central dome also had cornered towers

with octagonal towers at both ends along with spirelets in the corners. Plans called for the roof natural slate to be restored with the *ichimonji buki*-style shingle roofing used originally, and existing domestic slate was re-used as much as possible on the north and south domes and central part of the station building.

Originally, each tower top, ridge, and eave moulding was copper sheathed. They were restored with copper in the reconstruction, and artificial green aging was not applied, leaving the copper to age naturally over time.

### Dome interiors

The interiors of the north and south domes were the only restored interior parts. The original specifications were estimated from extant photographs, documents, and other literature. The restoration method was studied while surveying the existing conditions, such as part of the original relief still remaining under the duralumin ceiling installed in the postwar reconstruction.

From photographs and surveys, it was discovered that Japanese motifs such as helmets, swords, and zodiac signs were used for the plaster reliefs on the third and fourth floor



Dome roof

(JR East)



View under dome in 1914 (left) and after postwar reconstruction (right)



(JR East)

walls and ceilings. Wooden blocks were also installed on the frames for large reliefs and firmly secured with annealing wire. Documents state that the coloured plaster ceilings

were yellowish and that bright colours were used overall. Such information was gathered and designs identified to restore the interior of the domes lost in the war.



View under dome after 2012 restoration

(JR East)



Hotel guest lounge

(JR East)



Gallery second floor exhibition room

(JR East)



Interior of Travel Service Center

(JR East)

It is worth noting that the remaining original reliefs were very brittle and discoloured due to the effects of fire in the war. However, those that could be preserved were reinforced with chemical agents and refitted.

## Facilities Plan

The post-restoration station building will retain its original functions as a station and hotel as well as the later role as a gallery to make effective use of its historical value and pass these functions on to the future. However, appropriate designs, functions, and equipment have been added to meet modern demands. The underground section has a new two-level building frame supporting parking, machinery rooms, station operation facilities, and more. In planning these facilities, the layout was adjusted to retain the existing interior brick walls as far as possible.

In terms of the station operation, plans called for facilities such as exits, ticket gates, and counters to be kept at their current three locations under the north and south domes and at the centre. The functions of the stationmaster's office and similar facilities were secured at their previous locations. The station business division is located on the new first underground floor.

The Tokyo Station Hotel run by Nippon Hotel Co., Ltd. uses the second and third floors for guest rooms with

the entrance hall and front desk on the first floor near the centre. The second floor is the location for restaurants, and previously unused space under the central dome has become the hotel's guest lounge, bathed in natural light.

The Tokyo Station Gallery run by the East Japan Railway Culture Foundation has its entrance hall on the first floor of the north dome. It has exhibition rooms on the second floor where 'history can be felt' by making use of the original brick walls as well as on the new third floor with modern walls. As part of the plan to ensure a smooth flow of visitors past exhibits, an open gallery is situated on the exhibit route where one can view people coming and going in the station and see the restored dome walls.

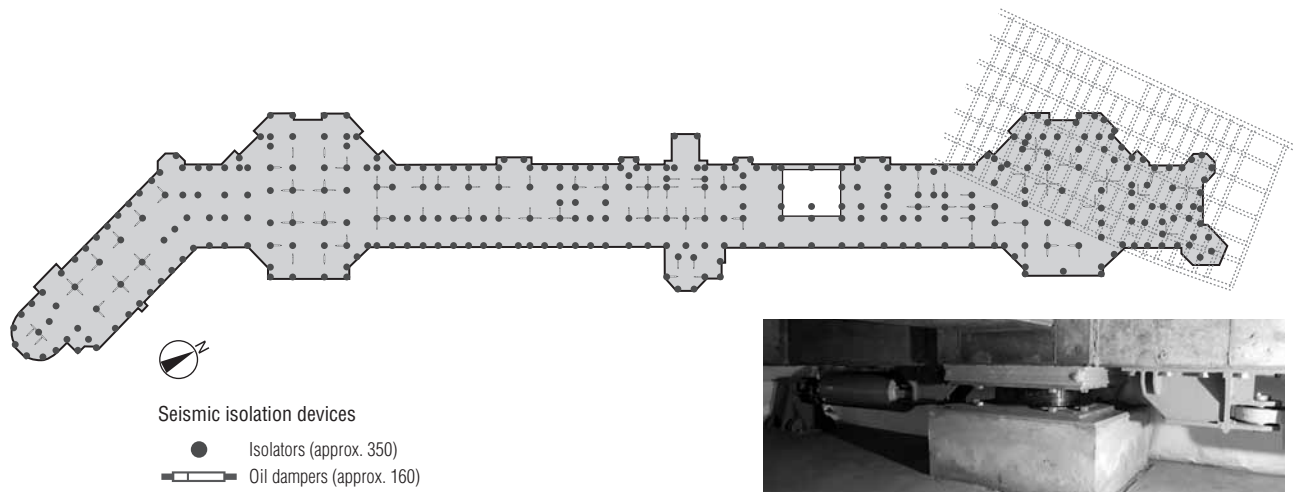
A JR East Travel Service Center was also established to provide services for visitors from abroad.

## Structural Plan

Construction involved aseismic retrofitting on a scale amongst the largest in Japan and unparalleled anywhere else in the world to seismically isolate the existing reinforced-brick station and assure that the station, hotel, and gallery are permanently preserved and utilized while at the same time improving safety and functionality. Seismic isolation was achieved by placing the existing upper structure on temporary supports (underpinning), adding an underground



**Figure 4 Placement of Seismic Rubber Isolators and Oil Dampers**



Seismic isolation devices

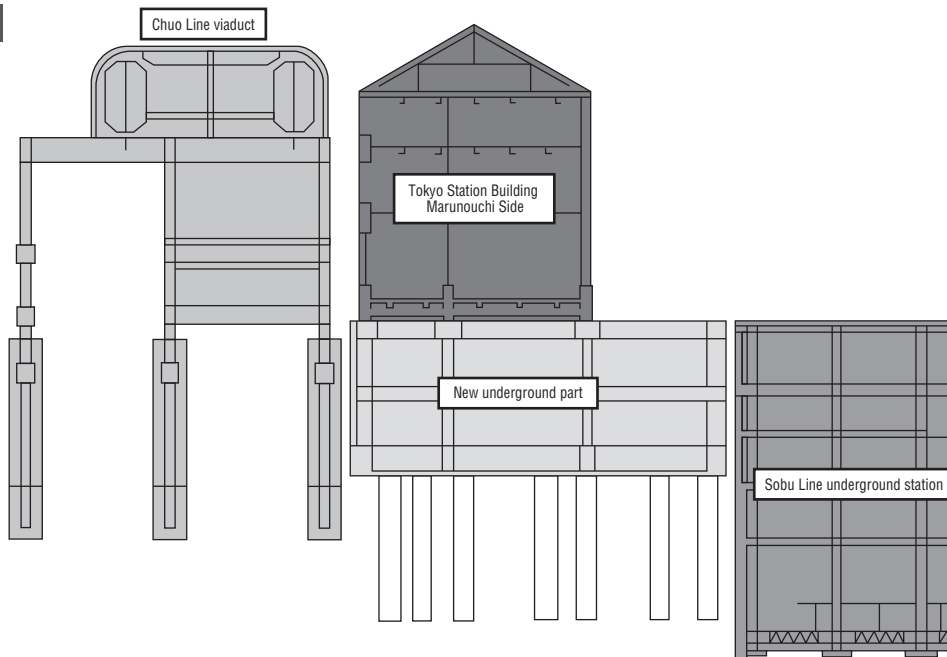
- Isolators (approx. 350)
- Oil dampers (approx. 160)



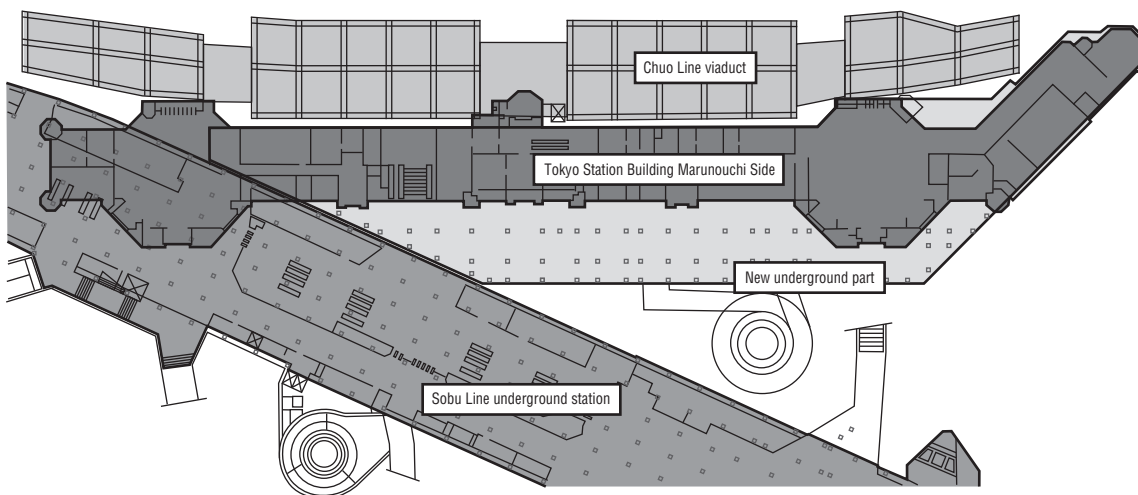
Seismic rubber isolators and oil dampers (JR East)

**Figure 5 Facilities around Tokyo Station Marunouchi Building**

**Cross section**



**Plan view**





View of restored Tokyo Station Building Marunouchi Side (late August 2012)

(JR East)

part by inverted construction, adding a seismic isolation layer between the underground and aboveground sections, and transferring the load of the upper structure onto seismic isolation devices (Fig. 4).

As shown in Figure 5, the building has a complex relation to nearby structures, such as the viaduct of the Chuo Line located next to the east side, and the building frame of the Sobu Line Tokyo underground platforms directly underneath the north dome. Also, since the seismic isolators span 330 m, many analyses were conducted to verify the aseismic design safety.

In seismically isolating the building, approximately 350 seismic rubber isolators and 160 oil dampers were positioned to hold the seismic isolation layer deformation to about 12 cm relative to the design clearance of 20 cm even in extremely rare massive earthquakes. This performance is high compared to the 30 to 50 cm of general seismically isolated buildings.

## Conclusion

The preservation and restoration of Tokyo Station building started in April 2007 has achieved its goal of keeping the station a safe and familiar sight to everyone in Japan. It reopened on 1 October 2012 after about 5 years and 6 months of work. We hope it will continue to be loved by people today—100 years after its original construction—and for the next 100 years as the face of Japan's capital, Tokyo. ■

### Architectural Overview

Address:	1-9-1 Marunouchi, Chiyoda-ku, Tokyo
Owner:	East Japan Railway Company
Main uses:	Railway station, hotel, art museum, parking garage
Zoning district:	Commercial district, fire prevention district, exceptional floor area ratio district

Building-to-land ratio: 47.94%

Floor area ratio: 277.40%

Design: East Japan Railway Company Tokyo Construction Office  
Tokyo Electrical Construction and System Integration Office  
Joint venture of Tokyo Station Building Preservation and Restoration design  
(JR East Design Corporation and JR East Consultants Company)

Construction: Joint venture of Tokyo Station Building Preservation and Restoration design (Kajima-Shimizu-Tekken joint venture)

Property area: 117,324.04 m<sup>2</sup> (pending certification of multiple buildings as single facility)  
20,482.04 m<sup>2</sup> (virtual site area)

Building area: 9819.45 m<sup>2</sup>

Total floor space: 43,084.25 m<sup>2</sup>

Number of floors: 2 underground and 5 aboveground

Existing upper structure: Masonry (steel-reinforced brick)

Added part: SRC

New lower part structure: RC, SRC



**Masahiko Nakai**

Mr Nakai is an Executive Officer in charge of the Construction Department and Shinanogawa Power Station Improvement Department. He joined Japanese National Railways in April 1979, and entered JR East following the privatization in 1987.