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UNDERGROUND NETWORK IN TOKYO TORCH PROJECT

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Abstract: TOKYO TORCH Project (Tokiwa-bashi Project) is a large-scale mixed-use redevelopment project located in front of Tokyo station, where more than one million people use the station each day. As the first phase of the project, two buildings were constructed and operational in 2021 and 2022. Currently, a 390-meter skyscraper, which will be the tallest building in Japan when completed, is under construction. A large-scale underground pedestrian network linking Tokyo station, subway stations, and many buildings is already in place around Tokyo station. The underground space to be developed in the project will complete an underground pedestrian network with a total length of approximately 15 km, which is unparalleled globally. This paper introduces our efforts to create a bustling underground network where everyone can enjoy moving around.

Keywords: Studying session, First basement level network, 15km underground network

1. INTRODUCTION

Mitsubishi Estate Group is promoting urban development in Otemachi, Marunouchi, and Yurakucho areas, where people and businesses gather and interact to generate innovative value. By viewing the entire area as a platform, the group aims to create a town where people want to work, have offices, and visit, by offering initiatives throughout the area that would be difficult for individual tenants to realize on their own.

This paper introduces the TOKYO TORCH Project (hereinafter referred to as "**TTP**"), the latest project of the group, from the perspective of how the underground space should be utilized.

2. OUTLINE OF TTP

TTP is a large-scale urban development project located in front of Tokyo station, where more than 1 million passengers get on and off every day. The main uses of **TTP** include offices, stores, a hotel, a hall, an observation deck, rental housing, an electrical substation, a sewage pumping station, and a parking lot, with a total floor area of approximately 740,000 m2. (Fig. 1).

The **TTP** site is located in front of National Route 1, which lies between the site and Tokyo station, and is connected to Otemachi station (Fig. 2). Otemachi station, with approximately 240,000 passengers in 2021, has many subway lines including Tozai line, Marunouchi line, Chiyoda line, Hanzomon line, and Mita line. In the planning process of **TTP**, connecting **TTP** with Tokyo station and Otemachi station was recognized as a critical priority for creating a comfortable and bustling underground pedestrian network.

Figure 1. *Perspective view of TTP*

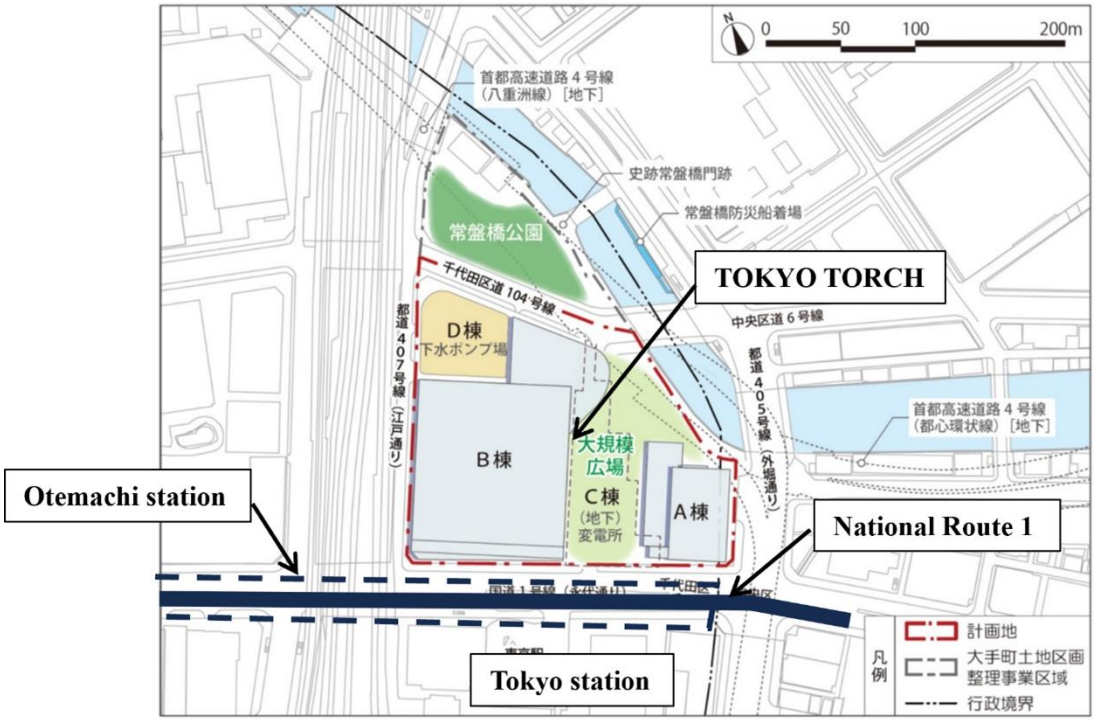

Figure 2. *TTP site location*

3. STUDYING SESSION ON UTILIZING UNDERGROUND SPACE

3.1. Background of the Studying Session

In **TTP** project, reducing the impact of automobile and pedestrian traffic on Tokyo station, Otemachi station, and surrounding streets was recognized as an important issue from the early stages of the project. One of the key issues was how to utilize the underground space of National Route 1 to solve this problem. Based on the awareness of the issue, a study session was held in 2013, during the initial phase of the project, to discuss how to utilize the underground space of National Route 1 adjacent to **TTP** site and Tokyo station from a transportation perspective. The session aimed to enhance pedestrian circulation from Tokyo station to the surrounding area and to strengthen the linkage and liveliness of the surrounding area. The session was chaired by Professor Masaharu Oosawa, including members from both the public and private sectors such as Ministry of Land, Infrastructure, Transport and Tourism; Tokyo Metropolitan Government; Chiyoda Ward; Chuo Ward; East Japan Railway Company; Tokyo Metro; The Council for Area Development and Management of Otemachi, Marunouchi, and Yurakucho; and representatives from **TTP** landowners. There was a strong sense of urgency among the members that missing the development timing of **TTP** would result in losing the best opportunity to utilize the underground space of National Route 1.

3.2. Strategy of Underground Space Utilization

The underground space of National Route 1 was planned as an underpass road for vehicles in the 1960s, and the structure was constructed in advance in some sections. At that time, the amount of automobile traffic in Japan was expected to increase continuously, and the main purpose was to mitigate congestion caused by the increase in vehicular traffic. The study session examined whether the underground space of National Route 1 should be used for automobiles, as originally envisioned, or for pedestrians. As a result, the session concluded that the increase in pedestrian traffic caused by **TTP** and the surrounding development would have a higher traffic impact than vehicular traffic. The final strategy was to construct a pedestrian-only underpass (Fig. 3).

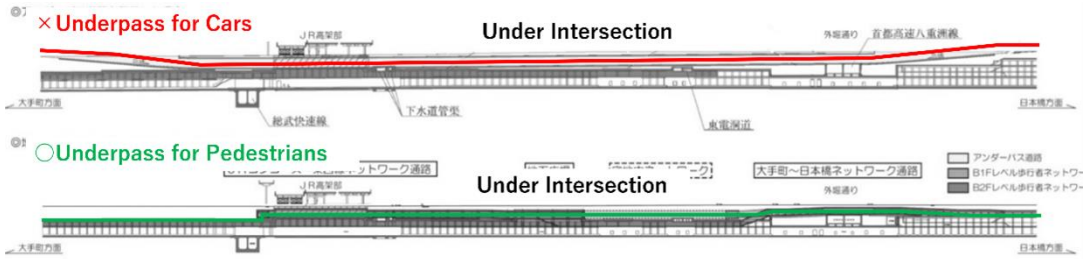

Figure 3. *Comparing two options of utilizing the underground space*

3.3. Basement Level of Underground Passages

When studying the network of underground passageways, it is important to consider not only the horizontal but also the vertical flow lines. In the next step of the study session, a discussion was held on the depth at which the underground passageways should be developed. The alternatives were to connect at the second basement level or at the first basement level. A survey of the surrounding underground structures revealed that connecting at the second basement level was difficult due to the presence of highway structures, railroad equipment rooms, parking lots, and other structures at the level. As for the first basement level, infrastructure pipes such as sewage pipes, water pipes, gas pipes, and communication pipes are often buried at the depth of the level, and in many cases, the possibility of relocating these buried objects is critical. Thanks to the underpass plan developed in 1960s, there were few buried objects at the first basement level. In addition, by selecting the first basement level for the pedestrian passageway, the session confirmed the following benefits: strengthening the connection with the first basement level network formed around Tokyo Station, creating a bustling atmosphere in cooperation with the commercial facilities located on the first basement level of the building, and easing traffic congestion on the ground level by promptly guiding pedestrians on the ground level to the first basement level. Thus, the policy of forming a network at the first basement level was settled.

There were some legal restrictions on the use of underground passageways at the first basement level. In Japan, the law requires that the distance between the top of an underground passageway and the road surface (hereinafter referred to as "earth coverage") exceed 3.5 meters. Under unavoidable circumstances, the restriction was to be loosened to 2.5 meters. However, if the underground passageway is at the first basement level, the minimum earth coverage is around 1.6 meters, which does not satisfy the restriction. Through the study sessions, both the public and private sectors recognized the high public benefit of this passageways. This led to a revision of the law in 2022, allowing a lower earth coverage than 2.5 meters provided the circumstances are unavoidable.

4. FUTURE OF THE UNDERGROUND NETWORK

The underground passage network proposed in the study session is divided into four areas: west side, center, east side, and under the intersection (Fig. 4). The west and east areas were proposed to be located on the first and second basement levels, the central area on the second basement level, and the area under the intersection on the first basement level, creating a seamless network connecting **TTP** to the train station. Based on the study session's proposal, the team conducted quantitative analysis to study the width and ceiling height of the corridors, which greatly affect pedestrian safety and comfort.

The current status of **TTP** is as follows: the east side area was completed in 2022, the west side and center area are under construction for completion in 2028, and the area below the intersection is to begin construction in 2025. When all these areas are completed, Nihonbashi Station on Tozai line will be connected to Otemachi, Marunouchi, and Yurakucho area via underground passage, forming a vast 15-kilometer underground network around Tokyo Station (Fig. 5).

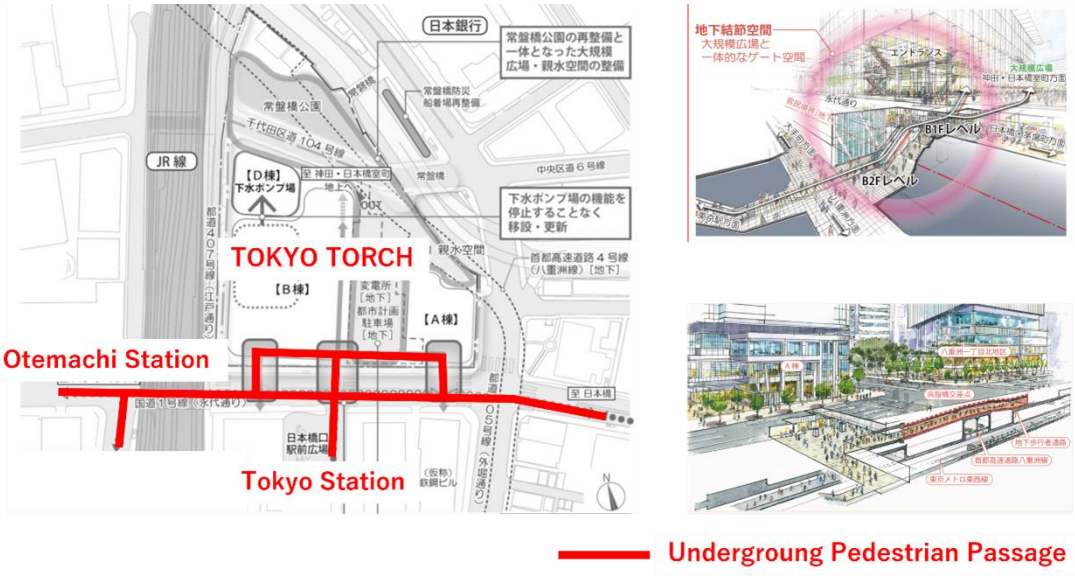

Figure 4. *Underground network plan of TTP*

Figure 5. *Underground network around Tokyo station*

5. SUMMARY

By utilizing underground space for pedestrians, an attractive pedestrian network can be formed, ensuring safety through the separation of pedestrians and cars, comfort regardless of weather conditions, and liveliness ensured by the integration of underground commercial facilities. In order to realize such initiatives, it is essential that road administrators, developers, and railroad operators work together to develop underground facilities for roads, private land, and railroads in an integrated manner.

Mitsubishi Estate Group will continue to promote urban development that provides new value to the entire area through the development of attractive underground spaces.

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