19th WORLD CONFERENCE OF THE ASSOCIATED RESEARCH CENTRES FOR THE URBAN UNDERGROUND SPACE
Belgrade, Serbia, November 4-7, 2025.

ACUUS BELGRADE 2025

Paper No: 1.15.128
DOI: 10.46793/ACUUS2025.1.15.128

INTEGRATED URBAN REGENERATION OF SUBWAY STATIONS AND URBAN DEVELOPMENT IN CENTRAL TOKYO

- The Case Study of Toranomon Hills Station Tower –

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Abstract: Tokyo is one of the world's leading subway cities in the world, with approximately 10 million people using the subway each day. New York City has about 5 million subway passengers per day. In central Tokyo, automobiles account for less than 10% of transportation sharing in the city center, while subways and other railroads account for more than 50%. These are the results of urban development linked to public transport (Transit Oriented Development: TOD), which is one of the sustainable urban models.

This paper addresses the significance the case of Toranomon Hills Station and Toranomon Hills Station Tower in Toranomon, Minato-ku, Tokyo, where embassies and offices are concentrated, where transportation operators and urban developers have worked together to integrate subway station construction and urban development.

Subway stations are built underground in the road, and therefore have many spatial constraints. In addition, urban developers and transportation operators are often separate, and project periods do not coincide, making it very difficult to promote urban development in conjunction with transportation infrastructure. In the Toranomon Hills Station project, the transportation operator and urban developer worked together from planning to disaster prevention to solve these problems, and were able to develop a transportation node that will become a landmark in Toranomon, including a large, atrium station plaza from the second basement floor to the first floor that incorporates natural light.

Keywords: Tokyo, subway, urban development, TOD, Toranomon Hills

1. INTRODUCTION

Tokyo is one of the world's leading subway cities, with approximately 10 million people using the subway every day (2018). This number is far greater than New York's 5.6 million people (2014) and Paris' 4.2 million people (2011). In central Tokyo, rail transportation's share is very high at 50%, and in recent years, the importance of subway stations has further increased, with an increase in the number of direct trains. In addition, the Ministry of Land, Infrastructure, Transport and Tourism and the Tokyo Metropolitan Government have set policies such as TOD (Transit Oriented Development) and station-city integration, making urban development linked to transportation infrastructure such as stations and bus terminals increasingly important. However, urban developers and transportation operators are often separate entities, and their development periods do not necessarily coincide, so there are many challenges to promoting urban development linked to transportation infrastructure.

Due to the nature of subways, subway stations are often necessarily developed in road areas, and due to the difficulty of acquiring additional land, there are very few examples of subway stations in central Tokyo having station plazas in front of them.

In this paper, the Toranomon Hills Station and Toranomon Hills Station Tower Urban Redevelopment Project made the most of the opportunity to proceed with the construction of a new station and the redevelopment project at the same time. From the project planning stage, multiple stakeholders, including not only urban developers and

railway operators but also academics and government officials, sought station-city integration and held detailed discussions, ultimately finding a solution that allowed the creation of a plaza space that goes beyond the connection between the station and the city, and is in a real sense, one with the station.

In this paper, written with the cooperation of the Urban Renaissance Agency (hereinafter "UR"), the project owner of the new station, and Tokyo Metro Co., Ltd. (hereinafter "Tokyo Metro"), which is responsible for the design, construction, and management of the new station, the author, from the perspective of the coordinator of this redevelopment project, introduces the overall process by which a railway project and an urban development project were linked to create an integrated space between the subway station and the city, with the hope that the paper will be useful for future urban development projects linked to transportation infrastructure.

2. TORANOMON HILLS INTEGRATED WITH TRANSPORTATION INFRASTRUCTURE

Toranomon was designated as an urban regeneration emergency development area under the Urban Renewal Special Measures Act of 2002 and became a specific urban regeneration emergency development area in 2012. Its development plan stipulates the basic policies of developing an international business and exchange hub with a living environment and strengthening transportation hub functions.

In the Toranomon Hills area (Figures 1 and 2), urban infrastructure development and urban development have been advanced in a step-by-step and integrated manner through several different redevelopment projects, including Loop Road No. 2, Toranomon Hills Station, and a multi-layered pedestrian network at ground, underground, and elevated deck levels.

Mori Tower, completed in 2014, utilizes the multi-level road system that allows buildings to be built above roads to develop both Loop Road No. 2 and the super-high-rise tower in an integrated manner. With the full opening of Loop Road No. 2 in December 2022, access to central Tokyo, the waterfront, and Haneda Airport has been dramatically improved. Business Tower, completed in 2020, has a bus terminal of approximately 1,000 m2 for the airport limousine bus and the Tokyo BRT, which connects the city center and the waterfront via Loop Road No. 2, as well as an underground passage connecting the bus terminal to both Toranomon Station on the Ginza Line and Toranomon Hills Station on the Hibiya Line. In addition to creating the open subway station plaza described in this paper, Station Tower, completed in July 2023, features a large-scale 20 m wide pedestrian deck (T-deck) above Sakurada-dori Ave. that connects to the surrounding blocks.

In addition, the reconstruction of Toranomon Hospital and Hotel Okura in the vicinity of Toranomon Hills, and various urban functions and transportation infrastructure such as subway stations and bus terminals are connected by underground passages, pedestrian decks, and lush walkways, and there is a clear focus on urban regeneration centered on public transportation.

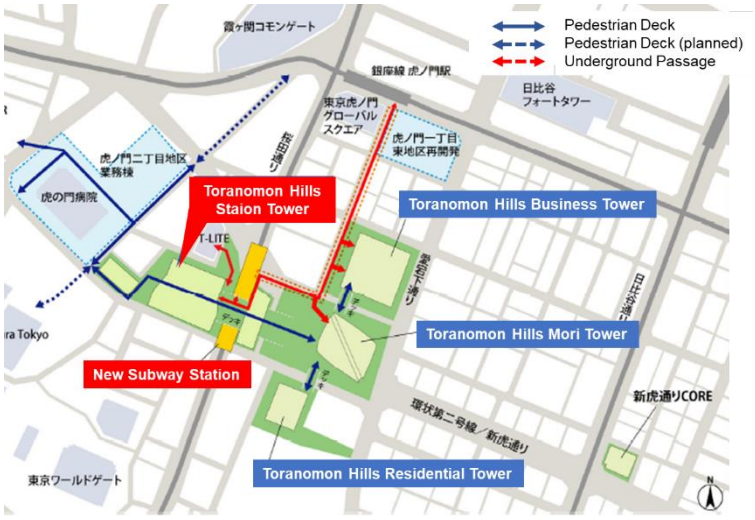

Figure 1. *Location map*

Figure 2. *Panoramic view of Toranomon Hills*

3. PROJECT IMPLEMENTATION STRUCTURE

This project was made possible through close cooperation between two different business entities: the construction of Toranomon Hills Station (hereafter "the new station") and Toranomon Hills Station Tower Urban Redevelopment Project (hereafter "the redevelopment project").

UR was the project owner for the new station, with Tokyo Metro responsible for design, construction and operation and management of the new station after opening, and a joint venture between Kajima Corporation and Obayashi Corporation in charge of construction.

The construction of Toranomon Hills Station Tower, including the underground station plaza, was carried out as a redevelopment project by the Toranomon 1-2-chome District Urban Redevelopment Association (hereafter "the redevelopment association"), which is composed of approximately 30 landowners including Mori Building Co., Ltd(hereinafter “Company M”), who acted as a participating member, designated builder, secretariat manager, coordinator, and design and construction supervision, while Kajima Corporation was responsible for construction.

4. TORANOMON HILLS STATION TOWER URBAN REDEVELOPMENT PROJECT

This redevelopment project was carried out by approximately 30 landowners, including Company M, and involved the construction of Toranomon Hills Station Tower, Edomizaka Terrace, and Glass Rock (hereinafter referred to as "redeveloped buildings"), as well as public facilities such as Minato Ward parks, roads, and pedestrian decks.

Figure 3. *Panoramic view of Toranomon Hills Station Tower*

In 2014, a study group was started by landowners, including Company M. At the same time, the urban planning for the new station was decided, and discussions were held from the beginning with the aim of creating a development integrated with the new station. A preparatory association was established in February 2016, and construction of the new station began at the same time. With the possibility of creating a more convenient and rich space increasing, discussions and considerations in the preparatory association also accelerated with the aim of creating a development integrated with the new station. A development planning proposal was formulated based on the following: 1) Development of a subway station plaza that would contribute to strengthening the transport hub function; 2) Development of a wide pedestrian deck on Sakurada-dori Ave. (National Route 1) that would be the key to forming a pedestrian network connecting Shimbashi and Akasaka; and 3) Development of the Akasaka-Toranomon Greenway on the southern side of the district along Ward Road 1014 in conjunction with the surrounding redevelopment. The development plan was approved in March 2018, the redevelopment association was established in November 2018, the rights conversion plan was approved in March 2019, and new construction began in November of the same year. Toranomon Hills Station Tower (Block A-1) and Toranomon Hills Edomizaka Terrace (Block A-3) were completed in July 2023. Glass Rock (Block A-2) and Minato Ward Park (Block A-4) were completed in August 2024. Although there were various difficulties in carrying out the new station construction and redevelopment project in this area as a whole, thanks to the focused efforts of the association members to promote the local development and the cooperation of all concerned parties, construction was completed in the exceptionally short period of about 10 years since the study sessions began and about 7 and a half years since the preparatory association was established.

5. TORANOMON HILLS STATION DEVELOPMENT

5.1. Committee Recommendations

Since 2000, with the enactment of the Urban Renewal Special Measures Act (2002), large-scale redevelopment buildings have been built one after another in central Tokyo, and congestion inside some train stations has become

a major problem. On the other hand, it has been pointed out that there may be areas in central Tokyo that are unable to realize their potential growth potential due to poor access to train stations. Therefore, in 2010, UR commissioned the Japan Transport Policy Research Institute to conduct a survey, and the Research Committee on Public Transportation Service Levels for Promoting Urban Renewal in Central Tokyo (hereinafter referred to as the "Committee") was formed, consisting of academics with knowledge of urban and railway development, railway operators, related local governments, related organizations, and the Ministry of Land, Infrastructure, Transport and Tourism, and conducted the survey.

The Committee conducted the following activities: 1) Survey of urban development trends and actual use of public transportation, 2) Evaluation of public transportation and identification of key issues, 3) Consideration of improvement measures and case studies, and 4) Consideration of systems for strengthening cooperation between urban development and railway development.

During the study, it was found that there are urban railway inconvenient areas (such as around Harumi and along Loop Road No. 2 around Shimbashi and Toranomon) in specific urban regeneration emergency development areas with poor access to the nearest station and main terminals. It was found that it is important to improve railway station congestion and inconvenient areas in urban areas where the railway share is high in central Tokyo, and that it is important to consider improving railway services in parallel with the promotion of urban regeneration.

Regarding financial resources, it was found that since the effects of railway facility development spread widely among many parties, it is necessary to consider the beneficiary burden, which requires a proportionate burden for the benefits enjoyed, taking into account the ability to bear (ability-based burden). It was found that it is desirable for the national and local governments to continue supporting urban development and railway development in the future, since railway development increases the attractiveness of cities and absorbs development profits in the form of increased tax revenues such as property taxes, and therefore they are one of the beneficiaries and are in a position to be responsible for city development.

As a result of this study, it was determined that the area around Toranomon faced issues related to both congestion within stations and the distance from train stations (an urban area that is inconvenient for railways), and it was recommended that effective improvement measures include constructing new entrances and exits at existing stations, establishing a new Hibiya Line station, developing underground passageways, and developing new access services such as LRT/BRT.

5.2. Positioning in administrative plans

In March 2014, the Tokyo Governor announced the proposal for the National Strategic Special Zone, proposing strengthening Toranomon's transport hub function and indicated the policy of developing a new Hibiya Line station and bus terminal, improving Toranomon Station on the Ginza Line, developing a pedestrian network connecting them, and promoting the development of the surrounding area in an integrated manner. In October of the same year, the Development Plan for the Tokyo Metropolitan Center and Waterfront Area (Loop Road No. 2 Shimbashi/Toranomon District) was formulated as a specific urban regeneration urgent development area, and UR was positioned as the developer of 14 urban development projects necessary to improve the city's international competitiveness, public facilities such as development of a new station, improvement of Toranomon Station and Kamiyacho Station, and development of underground passages to strengthen transport hubs, and the new station. In the Tokyo Metropolitan Long-Term Vision announced in December of the same year, the target year for the development of new stations, bus terminals, and underground passages was set as 2020.

After that, the area was designated as a National Strategic Special Zone by the Prime Minister in June 2015, construction began in February 2016, the name of the station was decided as Toranomon Hills Station in December 2018, and it opened in June 2020. In July 2023, it was connected to the adjacent redeveloped building, creating an integrated station-town space. In this paper, the state in July 2023 will be referred to as the official opening of the new station.

6. SPACE DEVELOPMENT OF STATION AND THE DEVELOPMENT

6.1. Development classification, property classification, and maintenance classification

The development classification of this project is as shown in Figures 4 . The new station was developed within the road area of National Route 1 after widening it as part of this redevelopment project, and the redevelopment project implementation area were developed by this redevelopment project. The property classification and maintenance classification are also the same.

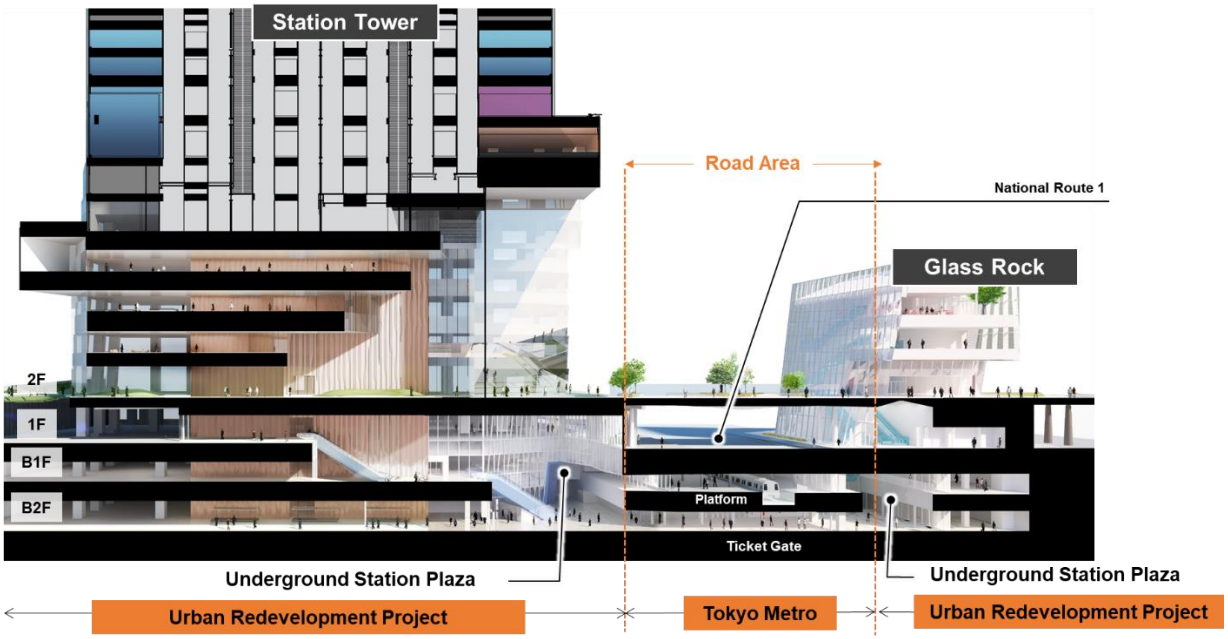

Figure 4. *Cross-section of the new station and subway station plaza (construction division, property division, maintenance division)*

6.2. Process toward realization

UR, promoted the new station development, Tokyo Metro, the redevelopment association, and M Company, promoted urban development, conducted study sessions and coordination meetings from the project concept stage to planning, design, construction, and management, respectively, and promoted this project by linking the intention of the planning stage to design, construction, and management.

6.2.1. Planning and design stage

In order to make the most of the opportunity to simultaneously proceed with the new station construction and redevelopment projects on both sides, and to coordinate urban development and railway construction as one of the committee's recommendations, we held a series of study sessions with academic experts to realize a project that integrated subway stations and urban development, and which could not be realized with subway construction alone.

In addition to the participants mentioned above, administrative officials and consultants with specialized knowledge also participated in this study session, and lively discussions were held on multiple fronts, such as understanding each other's projects, including not only the construction plan but also the methods and systems for railway and urban development projects. It was because of the discussions at that time that we were able to proceed with this project with the same feeling, even in the midst of various difficulties, to make it an unprecedented project that integrated the station and the town.

During the study session, it was recognized that while subway stations are becoming increasingly important, due to their nature as underground stations and the conditions of occupying road areas, there are several issues: 1) it is difficult to know where the station is; 2) it is difficult to develop barrier-free facilities such as station plazas and elevators; and 3) it is difficult to understand the flow of people. Therefore, in order to solve these issues, the new station is not only be located within the road area but was developed in an integrated manner with the redevelopment projects being carried out on both sides of the road area. In both the new station and this

redevelopment project, the basic concept for the low-rise areas was set as creating a space that will be the face of the development, connecting the station and the development in an easy-to-understand way without relying on signs, etc., and connecting the development on a broad scale, and the design of the station and redevelopment buildings was thus advanced.

From the perspective of business feasibility, this redevelopment project sought to develop floors that generate as much revenue as possible, but based on the discussions at the study group, an underground station plaza that is integrated with the station was developed on the site of this redevelopment adjacent to the station (Figure 5), with a three-story atrium from the ticket gate floor on the second basement floor to the first floor above ground, allowing natural light to pour into the underground space, and escalators and elevators were installed. This allows for intuitive movement from underground to above ground.

At the platform level on the first basement floor, the platform wall is made of glass screens (Figures 6 and 7), visually connecting the platform and the station plaza, allowing rail users and people moving throughout the development to feel each other's presence.

Figure 5. *Underground Station Plaza*

Figure 6. *Station concourse (second basement floor) and platform (first basement floor) as seen from the underground station plaza*

Stores have been placed around the underground station plaza to better integrate the station with the development. Normally, this space serves as a symbolic plaza that connects the station and the development, but in emergencies it also serves as a temporary shelter (for approximately 340 people) for people unable to return home in an emergency who gather at the station. This underground station plaza has been designated a major public facility in urban planning (district planning that defines redevelopment promotion zones), and will be maintained as a highly public space into the future.

Figure 7. *View of the underground station plaza from the platform*

6.2.2. Construction stage

The construction of the new station and this redevelopment project were carried out at the same time while National Route 1 and the Hibiya Line were in service, and the construction site area was limited, so the schedule and construction site area adjustments were posed some problems.

The construction of the new station was set to begin service before the 2020 Tokyo Olympics under the extremely difficult construction conditions of widening and excavating both sides and the underside of the Hibiya Line structure (Figure 8) while National Route 1 and the Hibiya Subway Line were in service. The new station was planned to open in 2023 when the redevelopment buildings were completed, but when it began service in 2020, it was decided to strictly adhere to the June 2020 start of service date by providing the minimum necessary facilities for the station and establishing an entrance and exit for materials and waste soil within the redevelopment project site, as well as an entrance and exit for the start of service in June 2020 (hereinafter the "provisional entrance and exit") . The temporary entrance was relocated in accordance with the progress of the construction of the redeveloped building and was removed when the new station opened in July 2023. After that, the redeveloped building and the ward park were developed as part of this redevelopment project.

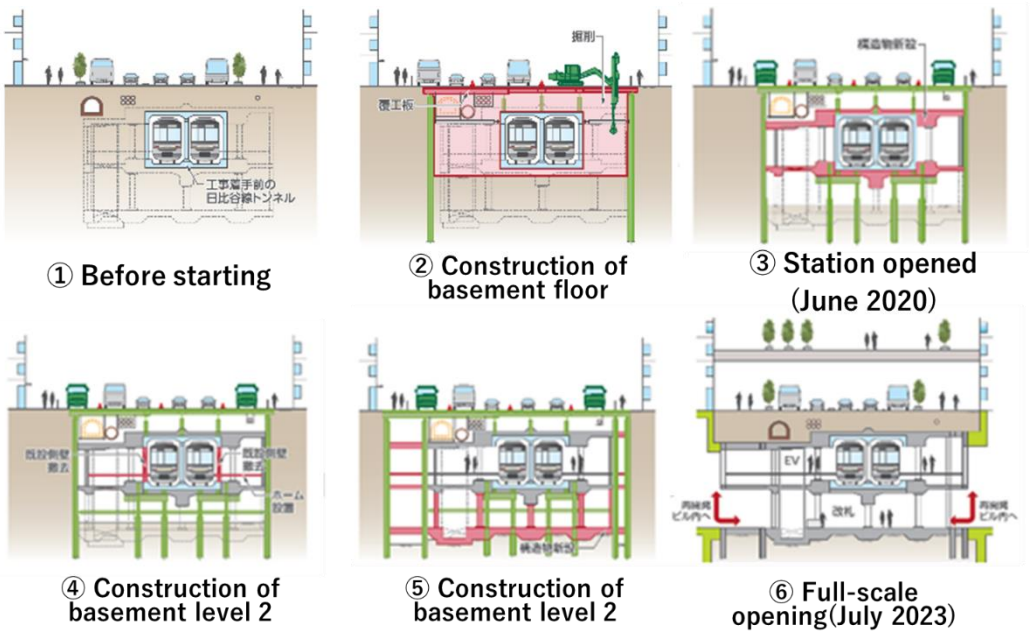

Figure 8. *New station construction steps*

The scope of the redevelopment work and the new station construction overlapped, such as the construction of a 20m-wide deck above National Route 1 during the construction of the new station, and the construction period

was limited. Therefore, the Tokyo Metropolitan Government Bureau of Urban Development acted as the secretariat, and a regular liaison and coordination meeting was established as a place for information sharing and cooperation between related parties such as road managers, traffic managers, buried construction companies, UR, Tokyo Metro, and the redevelopment association. This liaison and coordination meeting was very helpful in smoothly coordnating the project.

In addition to the liaison and coordination meeting, coordination meetings between the businesses and construction companies and monthly meetings were held to closely coordinate the two projects. In particular, establishing loading/unloading entrances and temporary entrances within the redevelopment project site had a significant impact on the redevelopment work, and in this way, the schedule was carefully coordinated. Additionally, for construction at the borders of construction zones, an agreement was signed between the projects and the use of retaining walls and temporary structures was shared to reduce costs and construction time. Nevertheless, many unforeseen situations occurred, and adjustments were made between the businesses on each occasion. Road restoration work on National Route 1 is still ongoing.

6.2.3. Maintenance and operation

This redevelopment project and the new station are classified as assets and under maintenance management as shown in Figure 7. For the redevelopment buildings, including the part designated as a redevelopment project in the property and maintenance classifications, a management association was formed by the landowners, and a manager based on Article 25 of the Condominium Act (hereinafter the "Article 25 Manager"). Company M was selected as the Article 25 Manager. The Article 25 Manager's duties include not only building management, but also town management, branding the redeveloped buildings, creating a lively atmosphere, and area management in cooperation with surrounding buildings. The subway station plaza is a common area of the redeveloped buildings and is managed and operated by the Article 25 Manager, who holds concerts (Figure 9) and events linked to the information center (TOKYO NODE) at the top of Station Tower (Figure 10). Income from the event is used to cover the operating costs of the event, as well as part of the town management costs of the Article 25 Administrator.

Figure 9. *Event at the subway station plaza ①*

Figure 10. *Event at the subway station plaza ②*

The new station will be the first for Tokyo Metro to not have a dedicated passenger entrance/exit for Tokyo Metro but will instead pass through the underground station plaza that will be developed as part of this redevelopment project, with the entrance to the redeveloped building serving as the subway entrance/exit. The passenger flow from the new station within the redeveloped building to ground level is entirely common to the redeveloped building, and no sectional surface rights have been established for Tokyo Metro. A management agreement has been concluded between Tokyo Metro and the redevelopment building management association, satisfying the requirements of both parties. Furthermore, the necessary evacuation routes (also used for subway work) have been developed within the redeveloped building and are for the exclusive use of Tokyo Metro.

6.2.4. Disaster prevention plan

The redeveloped building and the new station were treated as a single fire prevention object (hereinafter "this fire prevention object"), because it would have been difficult to create a space that integrated the subway station and the development by dividing each facility into sections according to Article 8 of the Fire Service Act Enforcement Order, and using buffer zones, etc.

The Fire Service Act does not allow multiple managers for a single fire prevention object, so either the building manager or the station manager must be responsible for overall management. However, in this project, the redeveloped building and the new station, which have different management and operation formats, are able to cooperate with each other while separately installing, maintaining, managing, and operating firefighting equipment. An advanced fire and disaster prevention system, including the integrated control panel described below, was built based on the special firefighting equipment, etc. stipulated in Article 17, Paragraph 3 of the Fire Service Act, and has been certified by the Minister of Internal Affairs and Communications.

In addition to organizing a self-defense fire brigade for each of the redeveloped buildings and the new station, the redeveloped buildings and the new station created an overall fire prevention plan, appointed a general fire and disaster prevention manager, and work together to manage daily fire prevention, maintain firefighting equipment, and hold regular meetings. In addition, there are plans to conduct comprehensive fire drills so that initial firefighting activities and evacuation guidance can be carried out quickly and accurately in the event of a fire. The underground station square will also serve as a temporary shelter for approximately 340 people who are unable to return home in the event of a disaster.

7. IN CONCLUSION

A station-development integration project cannot proceed without the cooperation of many stakeholders, including the high technical skills and coordination abilities of urban development companies, railway operators, designers and constructors, as well as the government, buried utility companies for communications, electricity and water, and local residents. Coordination between the station and the development was complicated from the planning and design stages, but at the construction stage, the process and costs become intertwined, making the coordination even more complicated. I once again felt that while systems such as conferences are important for carefully unraveling these issues one by one, the human relationships and trust between the stakeholders played a major role. I believe that an unprecedented space was realized by the strong desire of the stakeholders to realize an unprecedented project that integrates the station and the development, by understanding each other's circumstances and cultures of the railway business and the urban development business, and by considering the optimal solution for station-development integration.

It is extremely difficult to proceed with the development and renewal of transportation infrastructure on its own, due to factors such as the surrounding environment and the difficulty of acquiring land. I feel that in the future, it will be important to advance urban development and the development of transportation infrastructure in an integrated manner in order to advance the renewal of urban functions in the region. Furthermore, I believe that the role of redevelopment coordinator will be expected to go beyond the redevelopment area and coordinate the entire region, including transportation infrastructure, more than ever before.

This project was made possible thanks to the guidance and cooperation of many people involved, including local residents. I would like to express my sincere respect and gratitude here to all involved.