

Rapid Transit and Related Urban Development in Tokyo Waterfront Area

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Introduction

The 12.2-km urban Rinkai Line links JR East's Keiyo Line and the Yurakucho Line belonging to the Tokyo Metro; it starts from Shin Kiba Station and runs to Osaki Station via Tokyo's waterfront subcentre.

The Rinkai Line was built to promote track-side urban renewal, starting with the Tokyo waterfront area and also to improve the convenience of railways in metropolitan Tokyo. Construction started in 1992 and the entire line was opened on 1 December 2002. This article details some of the construction and the current status of track-side urban developments.

Rinkai Line Construction

Tokyo waterfront subcentre

Postwar reconstruction soon saw rapid population concentration and business expansion in Tokyo. With continued growth in the economic-boom period,

History of Rinkai Line Project

1983	Abandonment of Keiyo Freight Line belonging to former JNR
1985	Report of Transport Policy Council (using freight lines for passenger transport)
1990	Formalization of position in Third Long-term Plan for Metropolitan Tokyo
1991	Foundation of Tokyo Waterfront Rapid Transit Railway Corporation (TWR) Acquisition of construction licence for first section
1992	Start of construction of first section
1994	Acquisition of construction licence for second section
1996	Start of business between Shin Kiba and Tokyo Teleport stations Start of construction of second section
2000	Decision to name Rinkai Line
2001	Start of business between Tokyo Teleport and Tennozu Isle stations
2002	Start of business between Tennozu Isle and Osaki stations (opening of entire line)

businesses became excessively focussed in the central business district (CBD), resulting in typical urban problems, such as long commuting times between remote suburban bed towns, traffic jams, air pollution, etc.

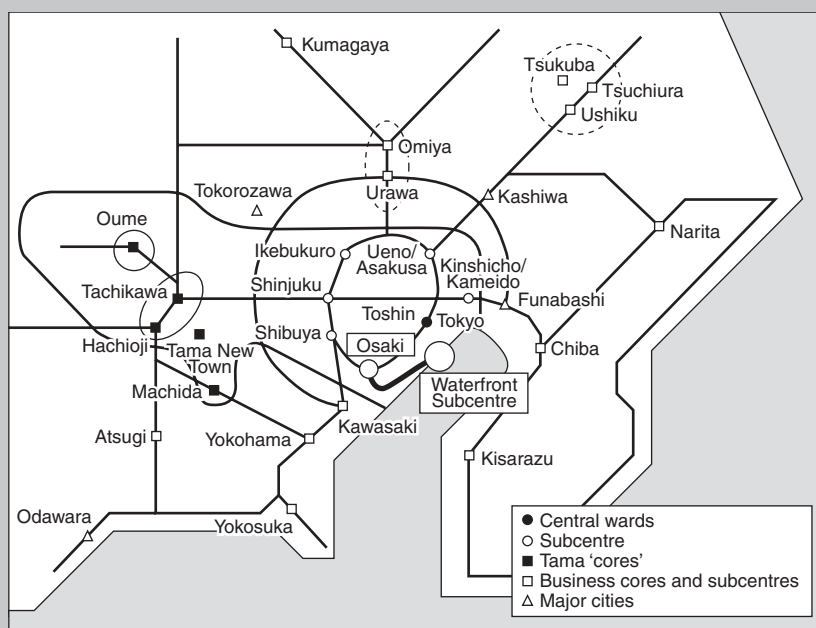
To ameliorate these problems, the Tokyo Metropolitan Government (TMG) developed a city planning policy where the city structure would change from central concentration to a type with many subcentres offering a mixture of jobs and

nearby homes. These subcentres would be linked by a modern transport infrastructure of railways and roads. The 1980s saw remarkable globalization and computerization, boosting planning for the Shinjuku, Shibuya, and Ikebukuro subcentres, which were considered to be 'inland' areas. Additionally, construction of a seventh subcentre on reclaimed land at the edge of Tokyo Bay was planned as the Tokyo waterfront development.

Today's waterfront subcentre covers 442 ha. It has a daytime working population of about 70,000 and a night-time resident population of about 42,000. Its completion as a futuristic city with business, commercial, cultural, residential, etc., functions is planned for 2015, but construction is still very much in progress.

Development of such a large-scale urban subcentre naturally puts great importance on good access to more-inland areas. Metropolitan Expressway No. 12 and the bay side Wangan urban motorway were built to offer good road access to the waterfront area and the *Yurikamome* automated guideway transit (AGT) system was built (see *JRTR* 16, pp. 15–19) to offer railway access. However, it soon became clear that an urban rapid-transit railway was needed to meet heavy and rising transport demand.

Subcentres in Tokyo Metropolitan Area



Re-tasking abandoned Keiyo Freight Line

The infrastructure of the old Keiyo Freight Line soon attracted attention as offering potential for constructing an urban rapid-transit railway to the waterfront subcentre. Although the former Japanese National Railways (JNR) started construction of the Keiyo Freight Line from Kawasaki to Kisarazu, it was interrupted by the drop in rail freight after 1982. Although some sections were re-tasked as passenger sections, most sections, bridges and tunnels in Tokyo remained abandoned. On the other hand, the 1985 report of the Transport Policy Council described the basic policy of converting freight lines into passenger lines as the best way of using facilities in which investment had already been made. Furthermore, the report suggested that the TMG should re-task facilities of the old Keiyo Freight Line. In 1990, the TMG's third long-term plan mentioned promotion of JR East's Saikyo Line extension to Osaki and strengthening traffic access to the waterfront subcentre, giving concrete form to the route plans.

Plan Outline and Work

Route

The 12.2-km route from Shin Kiba Station to Osaki Station via the Shinonome area, waterfront subcentre and Shinagawa coastal area includes eight stations. Although each terminal station connects to other lines as described earlier, there are also connections with the Tokyo Monorail at Tennozu Isle Station, and with JR East's Keihin-Tohoku Line and Tokyu's Oimachi Line at Oimachi Station. Every station is barrier free and fully equipped with elevators and escalators.

Operations

JR East's Saikyo Line runs some through services on the Rinkai Line from Osaki Station. As a result, the time between



TWR's Series 70-000 for Rinkai Line

(TWR)

Operation Plan

Operating km	12.2 km (Shin Kiba to Osaki, 8 stations)
Operation speed	41 km/h
Train sets	10 cars x 5, 6 cars x 5
Number of trains	9/h during morning rush hours, 8/h during day, 9/h during evening rush hours
Through operation on Saikyo Line (both directions)	4/h during morning rush hours, 3/h during day, 2 to 3/h during evening rush hours
Journey times (shortest route)	Shin Kiba–Osaki: 18 minutes Shinjuku–(Osaki)–Tokyo Teleport (Odaiba area): 23 minutes Shinjuku–(Osaki)–Kokusai-tenjijo: 25 minutes Shinjuku–(Osaki)–Shin Kiba: 30 minutes Shinjuku–(Osaki)–Shin Kiba–Maihama (Tokyo Disneyland): 30 minutes

Note: Excluding time for changing trains

Shinjuku Station and Tokyo Teleport Station is greatly reduced to 23 minutes. However, although there are through tracks at Shin Kiba Station to JR East's Keiyo Line, technical and other reasons prevent through services other than occasional special trains.

Construction

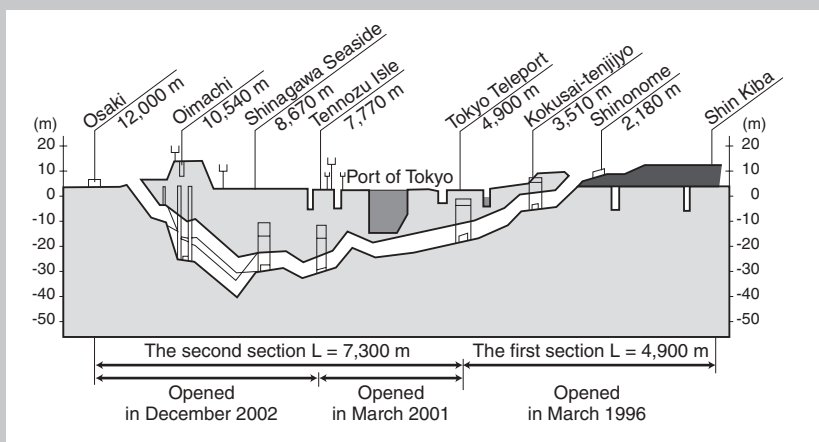
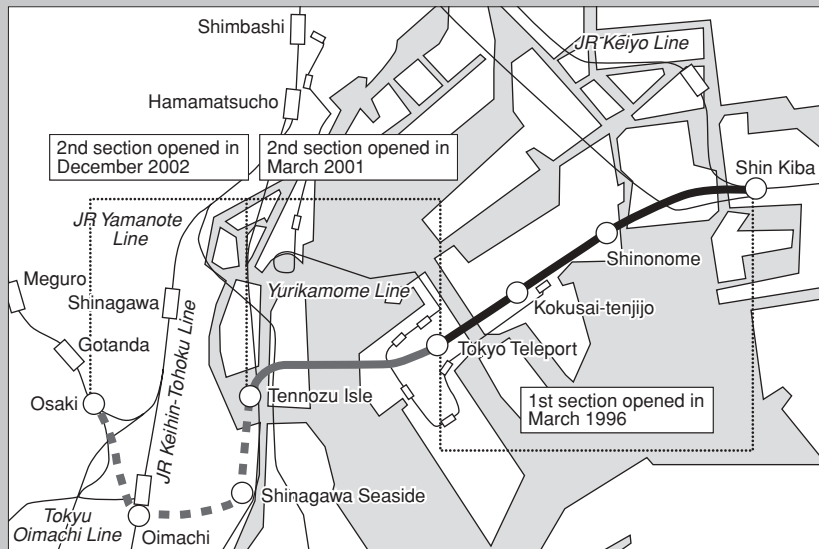
The Tokyo Waterfront Rapid Transit Railway Corporation (TWR) was established as a third-sector company to

raise funds for constructing the Rinkai Line and building it as quickly as possible. Other investors were JR East, Tokyo's Shinagawa Ward, banks, etc. To match progress with the waterfront subcentre development, the line construction was implemented by dividing it into two sections.

First section

The first 4.9-km section from the Shin Kiba to Tokyo Teleport stations was started

Route and Cross Section of Rinkai Line



based on the development situation in the first stages of the waterfront subcentre. A construction licence was obtained in November 1991 and work started in March 1996.

The old Keiyo Freight Line was used throughout the section and the construction cost was about ¥120 billion. In addition to the first capital investments, construction funds were increased by imposing a burden charge on developers carrying out track-side development, as well as by taking out bank loans, etc. The actual construction work was

subcontracted to the Japan Railway Construction Public Corporation (JRCC).

Second section

The second completely new underground 7.3-km section from the Tokyo Teleport to Osaki stations includes a yard next to Oi Freight Terminal. A construction licence was obtained in May 1994 and work began on 1 December 2002. The estimate at the planning stage was about ¥290 billion with construction handled by the JRCC, which also managed funding and handover to TWR after completion.

Returns from track-side development

Railway construction requires enormous capital, especially because purchasing urban land is extremely difficult and very costly. As a result, many new lines are built underground, but underground construction is also very expensive due to the need to build deeper to avoid the many pre-existing underground structures, such as sewers, gas lines, other subways, etc. On the other hand, construction of new lines and stations stimulates business development around stations, causing land prices to jump. There is also a social need to return some of the resultant increasing land value to the railway construction fund.

In the Rinkai Line development, the approach was to compel developers around stations to return some of their windfall profits as a burden charge, which covered the cost of purchasing the old Keiyo Freight Line. Similarly, the burden charge on developers or local governments at the Shinonome, Tennozu Isle, and Shinagawa Seaside stations covered almost 50% of the construction costs.

Urban Development of Second Section

The construction of four stations on the second section and the situation of surrounding urban development are explained in more detail below.

Tennozu Isle

The station at Tennozu Isle is located in an area where large-scale urban development is planned by Mitsubishi Corporation. The station is a three-layer structure constructed under the road. Passenger facilities like the concourse, exit gates, and station offices, etc., are located on the first basement level while the power substation and machine rooms are on the second basement level. Island platforms (205-m long, 8-m wide) are on

the third basement level. Shinagawa Ward built an underground bicycle parking lot in the space excavated above the station during the construction period. A pedestrian skywalk on the second floor of buildings in the developed area offers direct access to the station elevators, ensuring good integration between the station and its surroundings.

Shinagawa Seaside Station

Shinagawa Seaside Station is located in a redeveloped business area on land vacated by a warehouse belonging to Japan Tobacco Inc. The station uses the same underground three-layer structure as at Tennozu Isle Station. The land redevelopment and station construction progressed almost simultaneously from the planning stage through to completion. The structures offering direct access to the redeveloped buildings and underground bicycle parking, and the traffic rotary over the station were developed simultaneously with the station opening. The development plans cover an area of 7.3 ha, and accommodate a daytime working population of 13,000 and a night-time residential population of 3000. Construction started in 1999; two office buildings and one commercial building were completed in October 2002 with the entire work being finished in March 2005. Completion of the Rinkai Line has triggered redevelopment in neighbouring areas today.

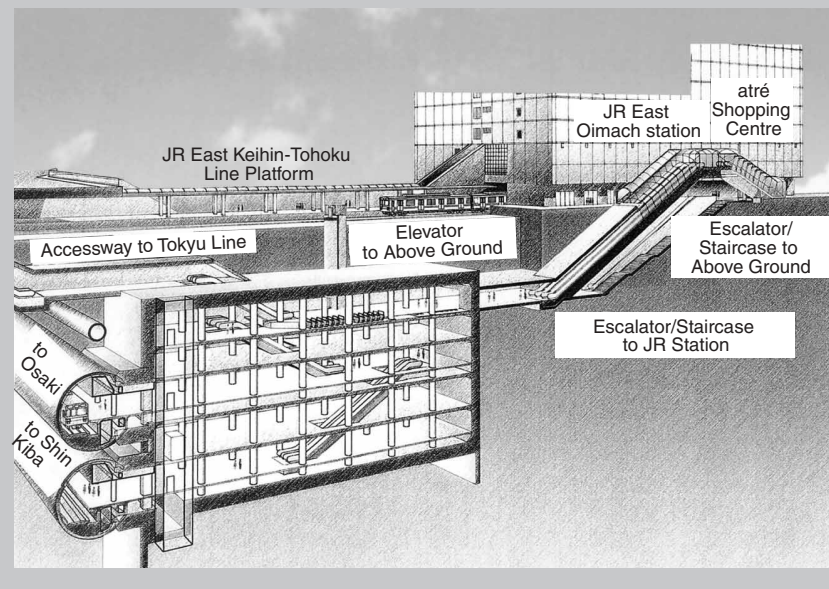
Oimachi Station

The tracks and platforms at Oimachi Station were built in parallel shield tunnels due to restrictions on construction resulting from heavy aboveground traffic. Most parts of the station, such as the concourse, ticket gates, station offices, and machine rooms are in the underground five-layer station building below the road intersecting the tunnel at 90°. This station was built close to stations on JR East's Keihin-Tohoku Line and Tokyu's

Planning Image of New Town in Higashi Shinagawa Area



Oimachi Station Image Plan

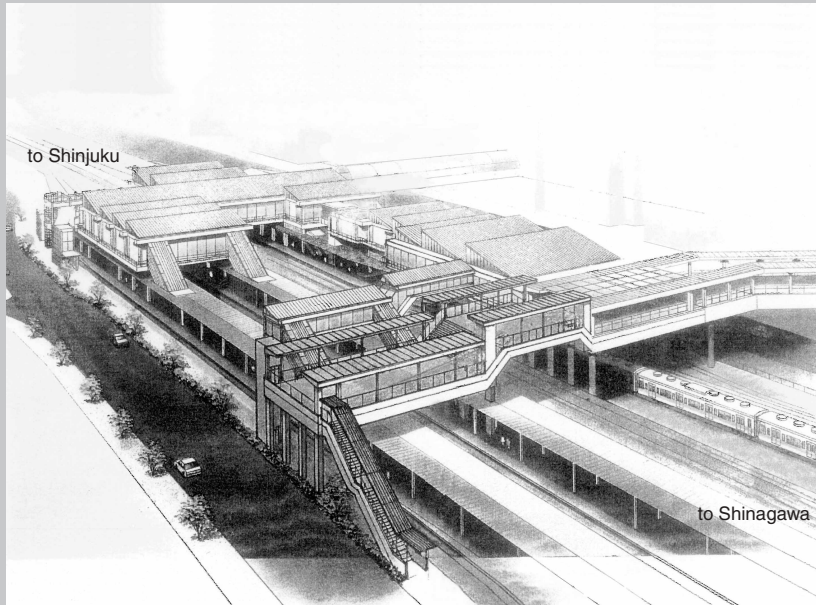


Oimachi Line to facilitate connections with Kawasaki and Yokohama. As a result, most station passengers are transferring and are not local people. To improve transfers, dedicated connections like underground passages are being planned.

Osaki Station

In the early planning stage, some opinions favoured separate construction of the new station from the existing JR East Osaki Station. However, a long-term study of technical matters, such as station wiring, operation patterns, site procurement, and

Osaki Station Image Plan



through operations between the Rinkai Line and JR East's Saikyo Line led gradually to the current design.

The new station shares common platforms with JR East's Shonan Shinjuku Line and the Tokaido Freight Line, offering shuttle services on the Rinkai Line and through services on the Saikyo Line. To secure space, station wiring was changed and substantial changes were made to bridges, station buildings, etc.

The Osaki area is very crowded with many factories manufacturing both electrical goods and machinery. In 1986, TMG gave it the status of a Tokyo subcentre redevelopment progressed rapidly based on expectations for future changes in land use. The first (3.0 ha) and second (5.9 ha) redevelopment sites near the east side of Osaki Station saw the rise of high-rise offices, hotels, and commercial establishments, completely transforming the area's appearance. In addition, when the national government designated it as a renewal area in 2002, development of the third site (2.5 ha) near

the east gate, and a new site near the west gate (3.3 ha) accelerated again. As a result, the new subcentre is expected to have a daytime working population of 35,000 and a night-time residential population of 3000.

Conclusion

Just 3 years after the entire Rinkai Line opened, 140,000 people were using it each day. This was a comparatively good start. Full service on the Rinkai Line and through services over the Saikyo Line now offer improved access to the Tokyo waterfront subcentre and the Chiba

coastline, especially from the Saitama, Tokyo Tama, and Kanagawa districts. The TMG and TWR have established the Rinkai Line Action Plan 21 in cooperation with JR East and are working on through ticketing to help stimulate demand.

On the other hand, at this stage, they are still confronted by problems, such as service timetables, freight revenue and costs, through services on the Keiyo Line, etc.

Moreover, although the planned construction costs were estimated to be more than ¥440 billion, construction difficulties in crowded urban areas, engineering problems with subsurface water, intersections with existing railway lines, etc., caused the project to run far over budget, making debt redemption very difficult. In response, the TMG wants TWR to reduce management and administration overheads and has offered help with management development.

Acknowledgements

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