

The Good City.

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Tokyo: The 100 year old TOD

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Tokyo is a city based almost entirely on public transport. The Head of Urbanism in NK-Urban Tokyo Studio', Eiji Okada talks with planning expert Mr. Takayuki Kishii about how this came to be and what other cities might learn from the Tokyo model.



Left: Eiji Okada is a Chief Planner, Tokyo Head Office, Nippon Koei Urban Space, Co., Ltd.

Right: Takayuki Kishii, President of The Institute of Behavioural Sciences, former Professor of Civil Engineering at Nihon University, and former President of the City Planning Institute of Japan.

How is it that Tokyo, the world's largest city, with a population of 38 million people, has very little traffic congestion? While similar cities like Beijing and Jakarta are clogged with cars, Tokyo is a city based on public transport. It is a city where 80% trips are by rail, an order of magnitude higher than most comparable cities.

In London, for example, the target for all sustainable transport modes (public transport and active travel) is 80% but the current rate is just 60%. Both cities have comprehensive public transport systems and London now has congestion charging.

The difference is that Tokyo has practiced Transit Oriented Development (TOD) for more than a century, long before the term was coined. In doing so, it has created a low-carbon, compact, walkable, public transport-based urban structure that most other cities would envy. This is the story of how it was achieved.

Trains before cars

Japan's first railway, built in 1872 using British technology, ran between Shin-bashi and Yokohama. It opened just four years after the collapse of the feudal system (the Edo Period), an era that marked the emergence of modern Japan. As the government took power from the landlords (Samurai) one of the first things they did was to build railways.

As the three maps in Figure 1 illustrate, by the 1930s a comprehensive network of lines had been built to serve Tokyo. The same was true of many western cities, but the difference in Tokyo is that this network still exists. Unlike the US and Europe, Japan never scaled back its railways in order to invest in roads. Apart from a brief period of road building leading up to the 1964 Tokyo Olympics, Japan's cities and indeed its whole economy has been built around railways. As Mr. Takayuki Kishii explains, there is a clear link between this reliance on rail and the urban form of Tokyo. During the early modern period, Tokyo was a dense city, much of which was destroyed in the Great Kanto Earthquake and the fire that followed in 1923. If the destruction had happened a decade or so later, and certainly if it had taken place in the US, it would have been an opportunity to rebuild a city based on roads. But in Tokyo it provided the opportunity to complete the rail system.

This included the missing rail link between Ueno and Kanda Stations, which had defeated the rail planners because before the earthquake the land along the route was so clogged with shops and other buildings that land assembly was impossible. The link allowed the Yamate Loop Line to begin operation as a circular route in 1925. As Mr. Kishii says, "While the disaster was heartbreaking, it ironically contributed to the development of the rail network."

The network continued to grow until the 1950's. It is now based upon main lines formerly operated by JNR (Japan National Railways) including the Yamate Loop, Sobu-Chuo and Keihin-Tohoku lines. These main lines are then fed by a network of private suburban lines that radiate from the terminus stations on the Yamate Loop such as Shinjuku, Ikebukuro and Shibuya.



Shinbashi Station



Ueno Station



Tokyo Station

Within the loop

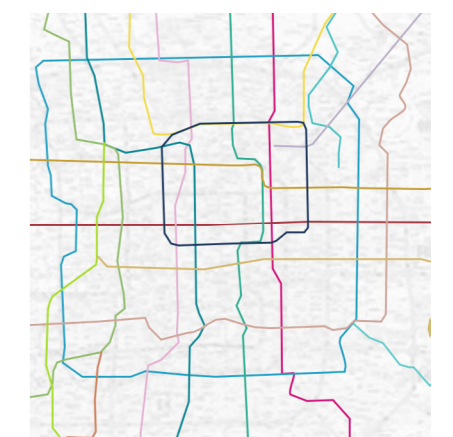
The Yamate Loop is the equivalent of London's Circle Line. The area outside the loop is served by railways while the area within the loop used to be served by trams. At their peak in 1955 there were 40 tram lines and 213km of track. All but one line was closed in 1971. They were replaced by an underground network with nine lines operated by the Tokyo Metro Company plus another four lines operated by the Tokyo Metropolitan Bureau of Transportation. Together these create an underground network of just over 300km. This may only be the seventh largest underground system in the world, but within the Yamate Loop the density of stops is unprecedented. As Mr. Kishii tells us, when Janet Sadiq Khan, then director of the New York Transportation Bureau, came to Tokyo in 2019, she said "I used to think that the New York underground was the best in the world, but the Tokyo underground is much more convenient!"

One of the innovative features of system is the way that the suburban lines and underground system are linked via an 'interactive direct service system'. Trains are able to run between the two systems despite them being operated by different companies thus avoiding the capacity constraints caused by trains turning back at terminus stations. It also extends the reach of Tokyo's underground network to almost 1,000km which would make it the largest in the world.



Fig 2 Tokyo Underground

Fig. 1 Railway development in the Tokyo Metropolitan Area (source: Tokyo Metropolitan Urban Development Bureau website)



Beijing Metro at the same scale

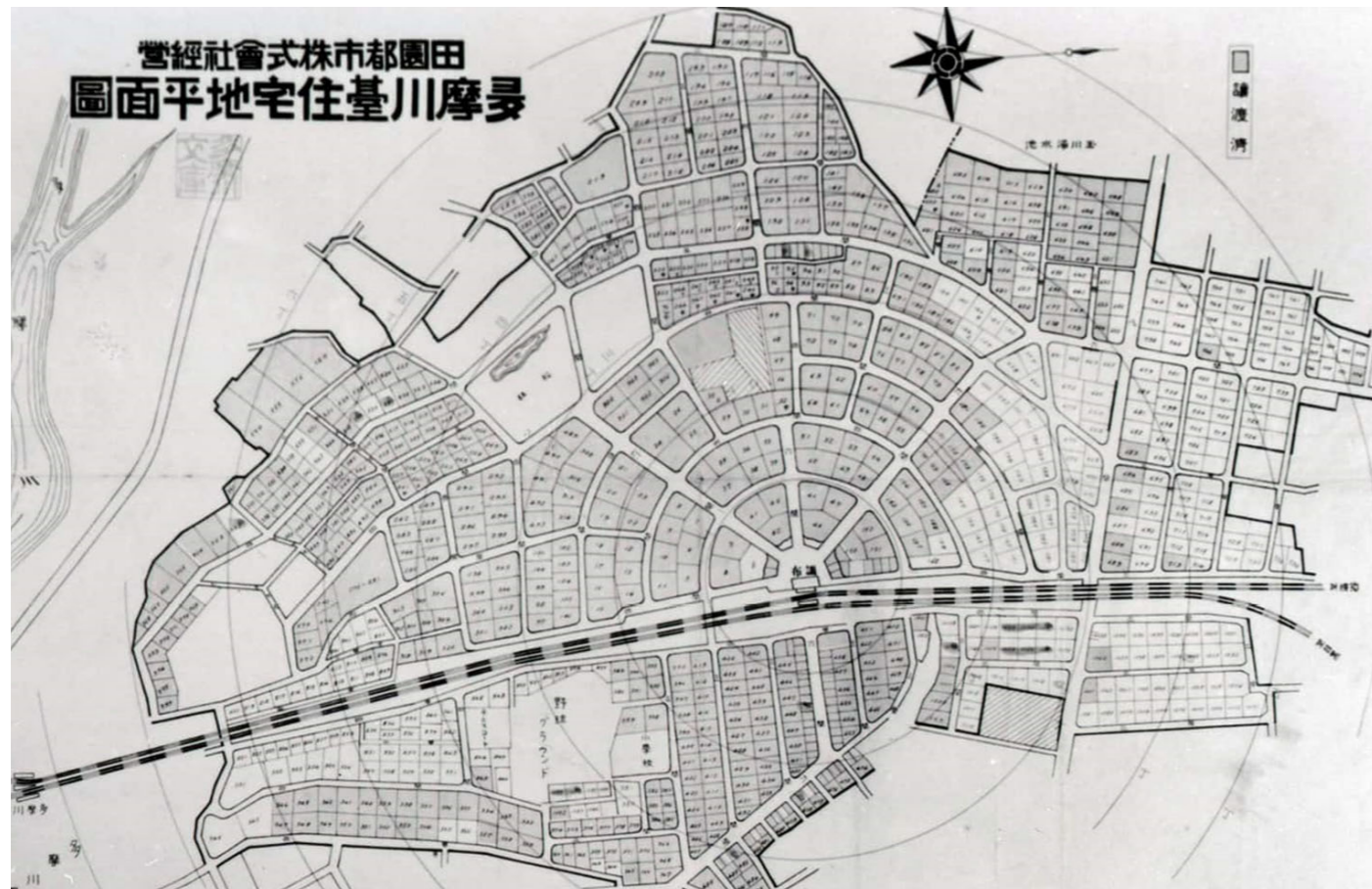
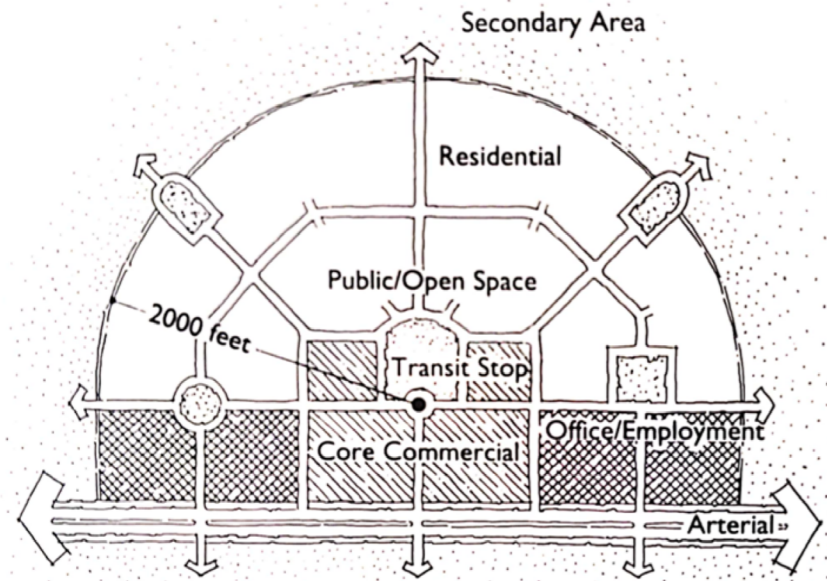
“Passengers are created by trains.”

Private suburban lines

Most of the Japanese rail network was nationalised under the Railway Nationalisation Act of 1906. However this excluded private suburban lines. Mr. Kishii takes up the story: “One of the key players was Mr. Ichizo Kobayashi who set up the Hankyu Corporation and developed the business model for private suburban lines in the Osaka, Kobe area. His motto was “passengers are created by trains” and his idea was to develop residential schemes along his railway line for commuters and their families.

He also built commercial facilities such as department stores at terminal stations within the city, and leisure facilities such as amusement parks and theatres at the suburban end of the line, thus creating a two-way, seven-day-a-week ridership. The model was hugely successful and was copied by the other private railway companies established in Tokyo in the 1910s and 1920s (who became known as the ‘Major Eight’).”

Fig. 3 Proposed plan of Den-en-Chofu (below) compared to TOD diagram in Peter Calthorpe’s book *The Next American Metropolis* (left). Source: Website of Tokyu Corporation.



Garden cities

One of these companies, a predecessor of Tokyu Corporation, was founded by the businessman Eiichi Shibusawa. He was influenced by Ebenezer Howard’s Garden City model, and in 1918 he established Den-en-toshi Co (Garden City Co) with the aim of developing suburban residential areas around new stations.

One of the first was Den-en-Chofu. Started in 1923 and built around a new station on the line between Meguro and Kamata, it was operated by one of Shibusawa’s companies. The plan of the new settlement resembles the TOD diagram in Peter Calthorpe’s book *The Next American Metropolis*, even though this would not be published for another 70 years. The Tokyu Corporation is seen as the originator of the garden city in Japan.

The financial model

Once it had recovered from the war, Japan entered a period of rapid economic growth. Between 1955 and 1973 GDP grew by an average of 9.25% a year and the population of Tokyo (together with its three neighbouring prefectures Kanagawa, Chiba, and Saitama) doubled to 24 million. Population growth of nearly 300,000 a year led to severe housing shortages creating a strong market for new settlements along railway lines.

One of the most successful of these settlements was the ‘Tama Garden City’ developed by Tokyu

“The new settlement closely resembles the TOD diagram in Peter Calthorpe’s book *The Next American Metropolis*.”

from 1953. Built in a hilly area along the Tokyu Denentoshi Line in the Kanagawa prefecture, the low-rise neighbourhood with abundant greenery now extends to 5,000 hectares with a population of 620,000.

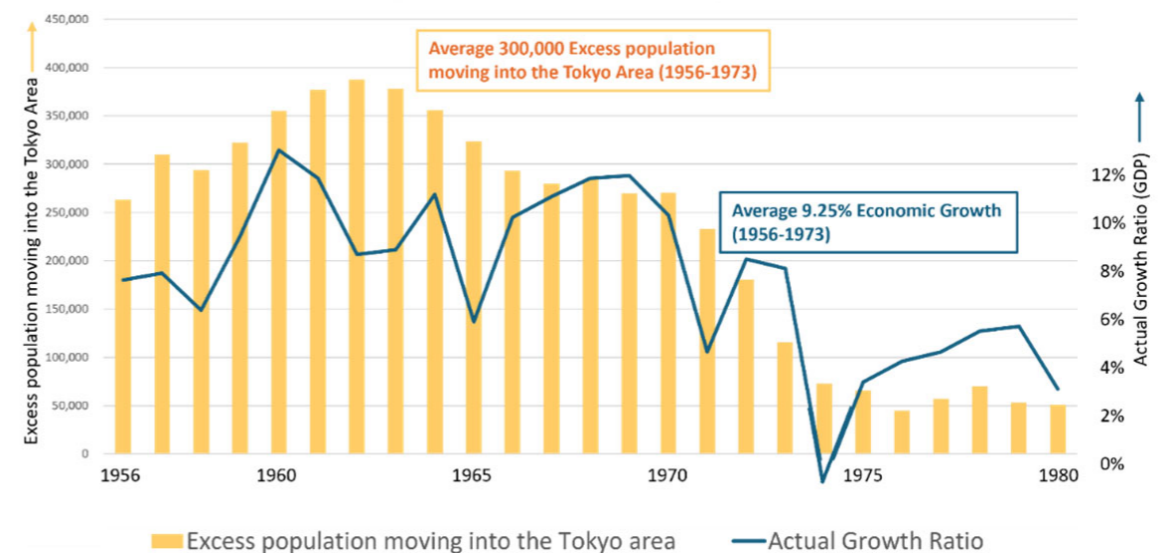
Key to its success was the ‘Land Readjustment Process’ as Mr. Kishii explains: “Tokyu would buy land along the lines from owners willing to sell. This land was swapped for the land needed for the line and also for development around stations. Outside the station Tokyu would build a transit square together with supermarkets and facilities for residents. They would establish feeder bus services into the station and up land for housing development by themselves and others. In total Land Readjustments were undertaken in 58 districts”

Many of the private railway companies followed Tokyu’s model allowing them to capture the land value uplift generated by the railway line. This value has been used to develop new settlements, but is also an important income stream for the railway.

As Mr. Kishii explains: “This was vital in allowing private railway companies to overcome Covid-19 because they weren’t solely reliant on fare revenue but could also generate profits from real estate and service businesses. This is even true of JR East, one of the privatised arms of Japanese National Railways that has become profitable through the development and management of commercial facilities next to its stations. Is there any other city where so many private railway companies continue to operate in good health?”

The same Land Readjustment mechanism has been used by the state on public sector new towns including schemes by the Japan Housing Development Corporation and prefectural governments. The largest of these are Tama NT (population 220,000), Chiba NT (120,000), and Kohoku NT (220,000) See Fig 6 on the following page. In these cases an agreement was reached with a railway company so that, as the population and therefore passenger demand, increased railway service was provided allowing growth to accelerate.

Fig. 4 Economic growth and population growth in Tokyo



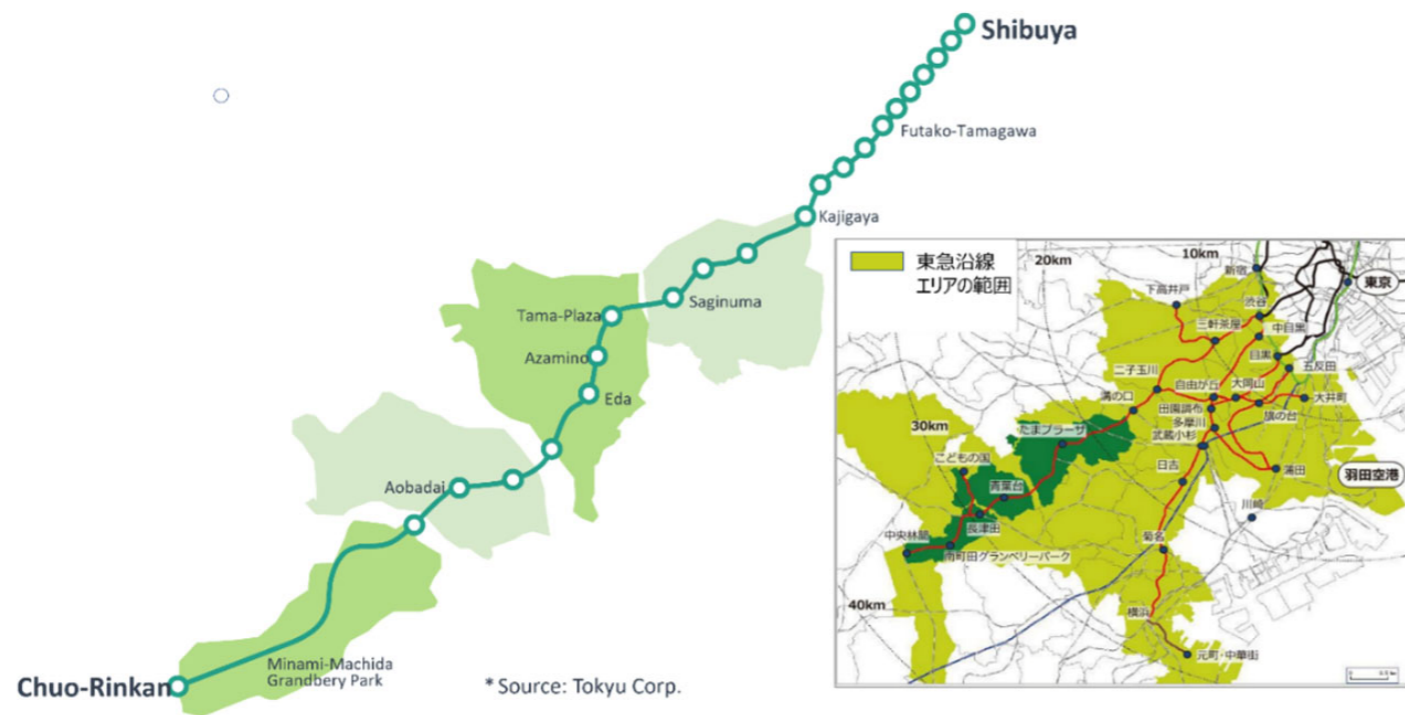


Fig. 5 The area of Tama Garden City
Total Area 5,000ha, population 620,000
(Source: Website of Tokyu Corporation)

	Tama New Town	Chiba New Town	Kohoku New Town
Placement			
Project Approval	1966	1969	1969
Area	2,884ha	1,930ha	2,530ha
Planned population	342,000	143,000	220,000
Current Population	224,000 (2021)	106,000 (2022)	215,000 (2022)
Development Entities	Urban Renaissance Agency Tokyo Metropolitan Gov't Tokyo Metropolitan Housing Corporation Land Readjustment Association	Chiba Prefecture and Urban Renaissance Agency (Jointly operated)	Urban Renaissance Agency
Development Methodology	New Residential Urban Development Project Land readjustment project (in front of the main station, along the main road)	New Residential Urban Development Project	Land readjustment project (application of a system that allows the right holder to choose the destination of the land transfer)
Railway (Year of full opening)	Keio Erubium Sagami Original Line (1974) Thallium Tama Line (1975) Tama City Monorail (2000)	Hokuso Line Phase 1 (1979) Hokuso Line Phase 2(1984) [by Urban Renaissance Agency. Later transferred to a new company, "Chiba New Town Railway"]	Yokohama Municipal Underground Blue Line (1993) Yokohama Municipal Underground Green Line (2008)

Fig. 6 The main public sector new towns around Tokyo

Habit forming

These railway developments established strong commuting patterns in Tokyo with households living in railway suburbs and commuting to the city centre by train/underground every morning. As the city expanded, people moved outwards in search of affordable housing so that commuting times increased, and the costs of transport started to become a major burden.

So, in order to secure the best people, companies started to cover the cost of commuting by public transport. This system is so entrenched that it is now part of the tax system much as the company car is in the UK. The tradition of commuting has become as engrained in Japanese society as car use has in the west.

A walkable city centre

The convenience of Tokyo's rail network is only the start. The TOD model only works when the area around the station is walkable. Almost all of Tokyo's office employment is within 10 minutes' walk of a station

“This tradition of commuting has become engrained in Japanese society.”

and most of it is within a 5 minutes. The walkability of the area around many stations has been improved by widening sidewalks, staircases and lifts.

For example, Dai-Maru-Yu, Tokyo's largest business district covering 120 hectares to the west of Tokyo Station, has seven underground lines and five stations. Apart from the wide walkways above ground, there is an 18km network of underground walkways connecting the stations to most of the buildings.

Mr. Kishii, who is also chairman of the Area Management Association for Dai-Maru-Yu District, says “It used to

be a ghost town on weekends, but in 1988 local building owners set up a council to draw up guidelines, and the area was transformed into a pleasant strolling town with cafés and food trucks along the cozy street – Nakadori. The area also hosts music festivals and illuminations at Christmas, and in the future we would like to try to further update the district using technology and data.”

Value of station areas

The spaces around stations have become important places where people travelling to work and school gather every morning and evening. They have become walkable community hubs and magnets for shops and services.

Mr. Kishii explains “The Japanese government has consistently placed emphasis on public transport in urban planning. The Tokyo Metropolitan Government's land use zoning system sets maximum Floor Area Ratio (FAR) limits based on national standards linked to public transport ensuring that high-density commercial areas are located in areas with good access to public transport.”

Commercial FAR ranges from 2.0 to 13.0 depending on the connectivity of the location. To designate a FAR of 10.0 or higher the area must be ‘surrounded by a network of four or more broad roads and have extremely good public facilities, and multiple railway networks.’ Figure 7 shows the area around Shin-bashi Station is collectively designated as the FAR limit of 10.0, and the area contiguous to it is from 7.0 to 8.0. This is the main reason why land near stations is so valuable.

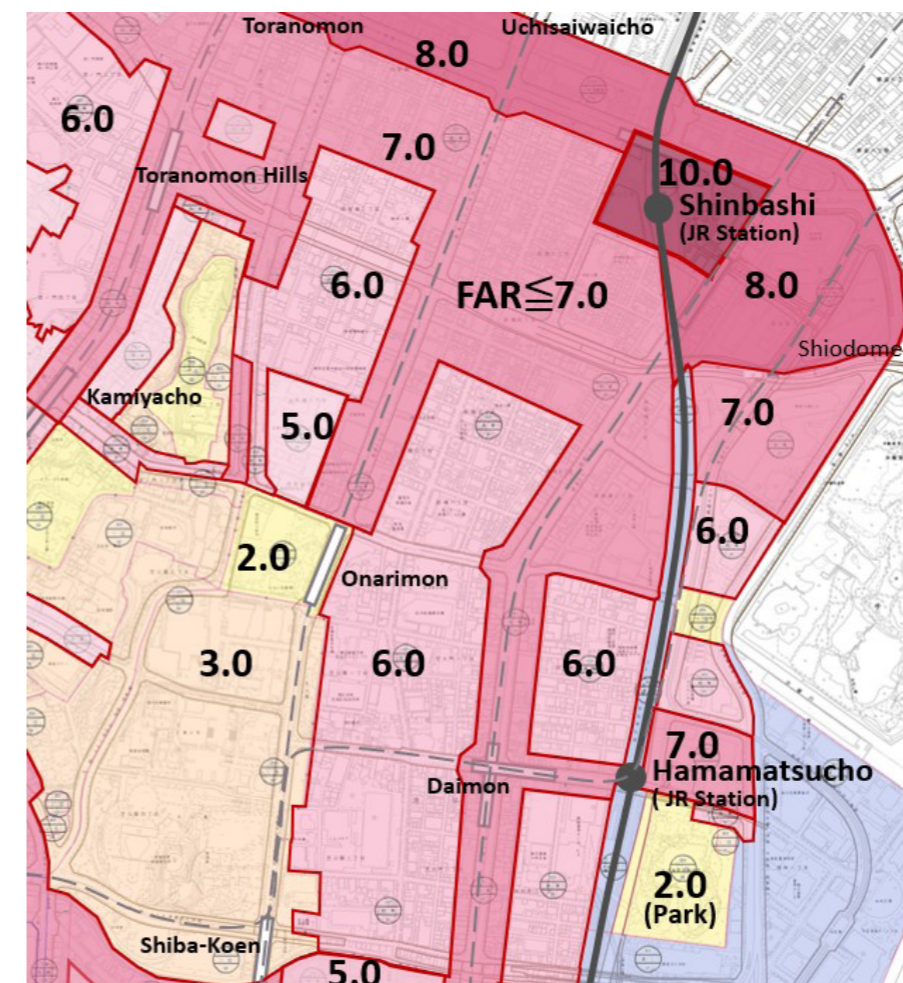


Fig. 7 Maximum floor area ratio limit in the area around Shimbashi Station
(Source: website of Minato Ward office)

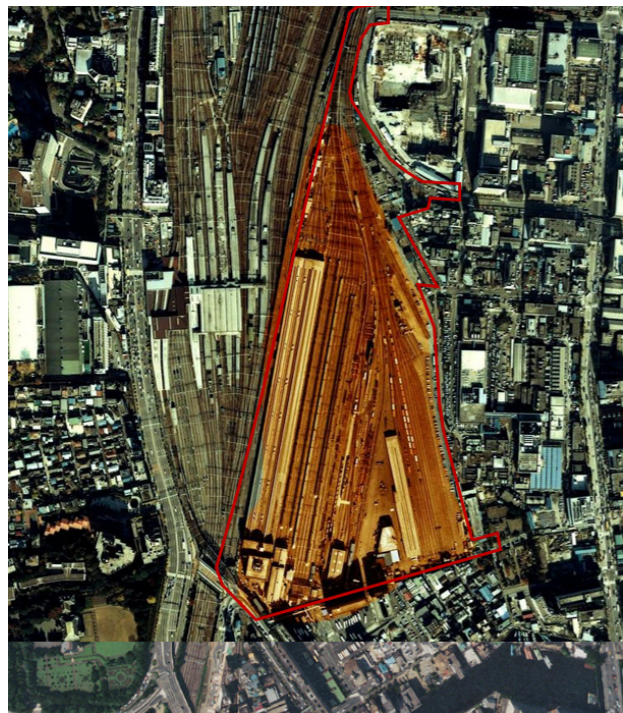
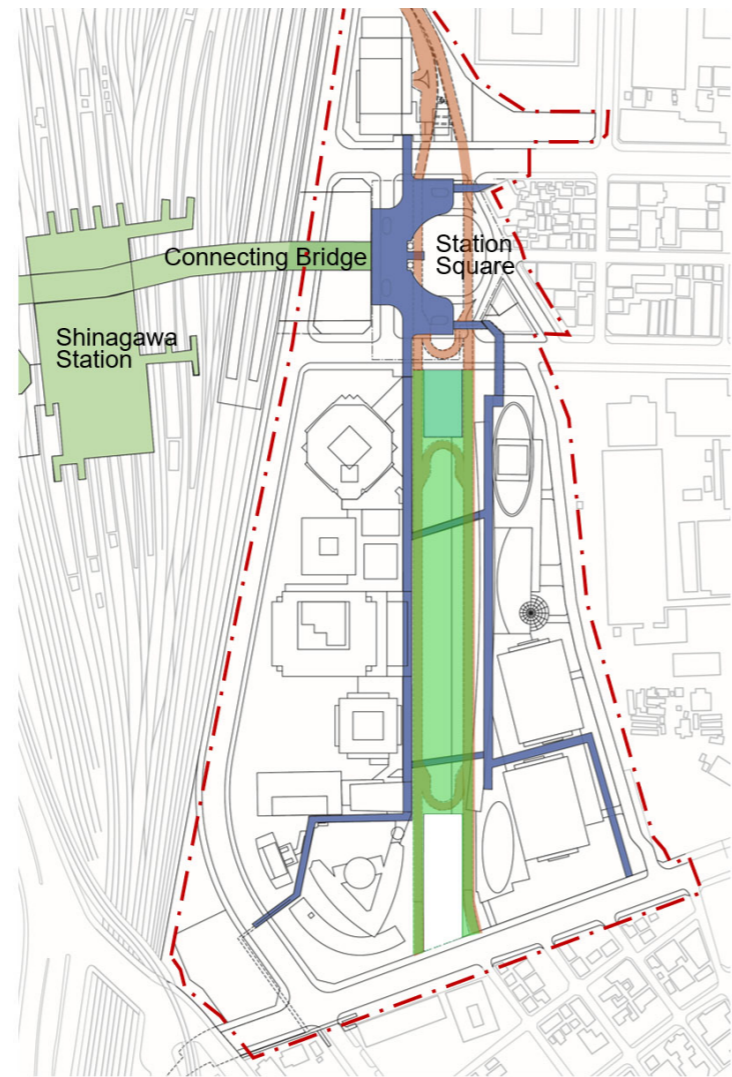
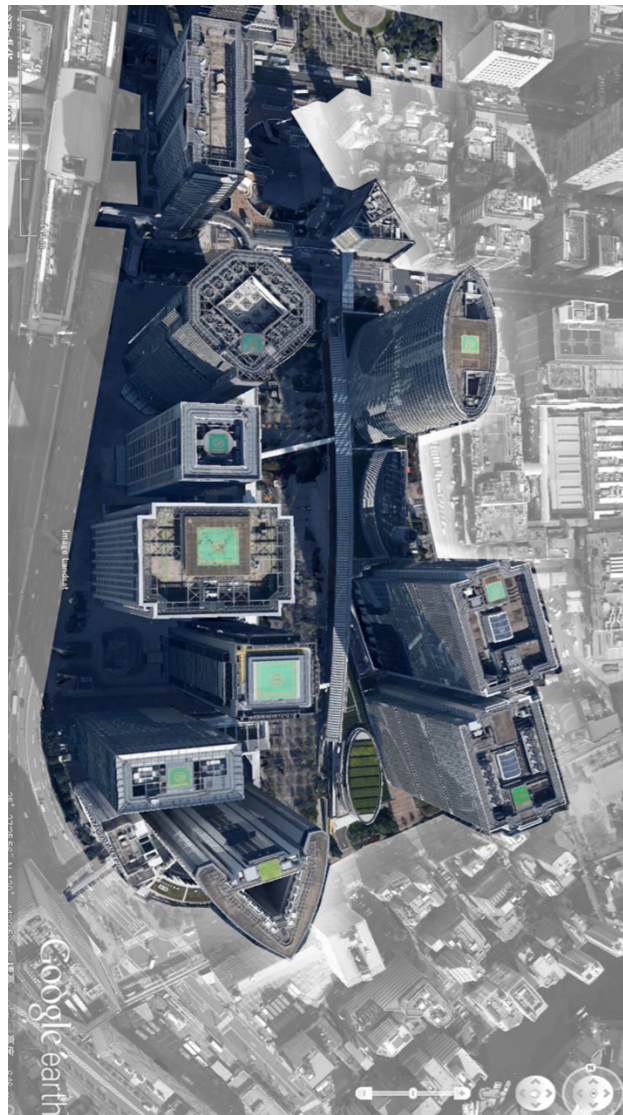


Fig. 8 Shinagawa Station East project, which became a model for high-density TOD in front of the station. The scheme was able to increase its FAR by 2.1 by building a pedestrian deck network, public green spaces, and an underground vehicular network (next page).

“There are still many stations, even in the heart of Tokyo, where the surrounding land is not well used.”

Station squares

The transit squares are vital to this system. They provide the link between the neighbourhood and the station while facilitating the movement of large numbers of people and the transfer between different transport modes.

As Mr. Kishii tells me, the first was built in front of Tokyo Station and they now exist outside all main stations and many of the smaller stations, particularly the terminus stations on the Yamate Loop. Initially, the railway operators were responsible for the squares but since 1946 the responsibility for squares has been partially shared by the local government. Design criteria have been established along with formulae for calculating the area.

Urban redevelopment

There are still many stations, even in the heart of Tokyo, where the surrounding land is not well used. This might be because of the lack of a station square, narrow streets or complicated land plots and property rights. In these areas an Urban Redevelopment Project mechanism has been established to enable the creation of a transit square. Through this mechanism, different land and rights holders can be rationalised. The system allows them to remain in the area if they wish, although the form of their assets may change into shared ownership of floors.



Fig. 9 The Transit Square in front of the East Exit of Shinagawa Station

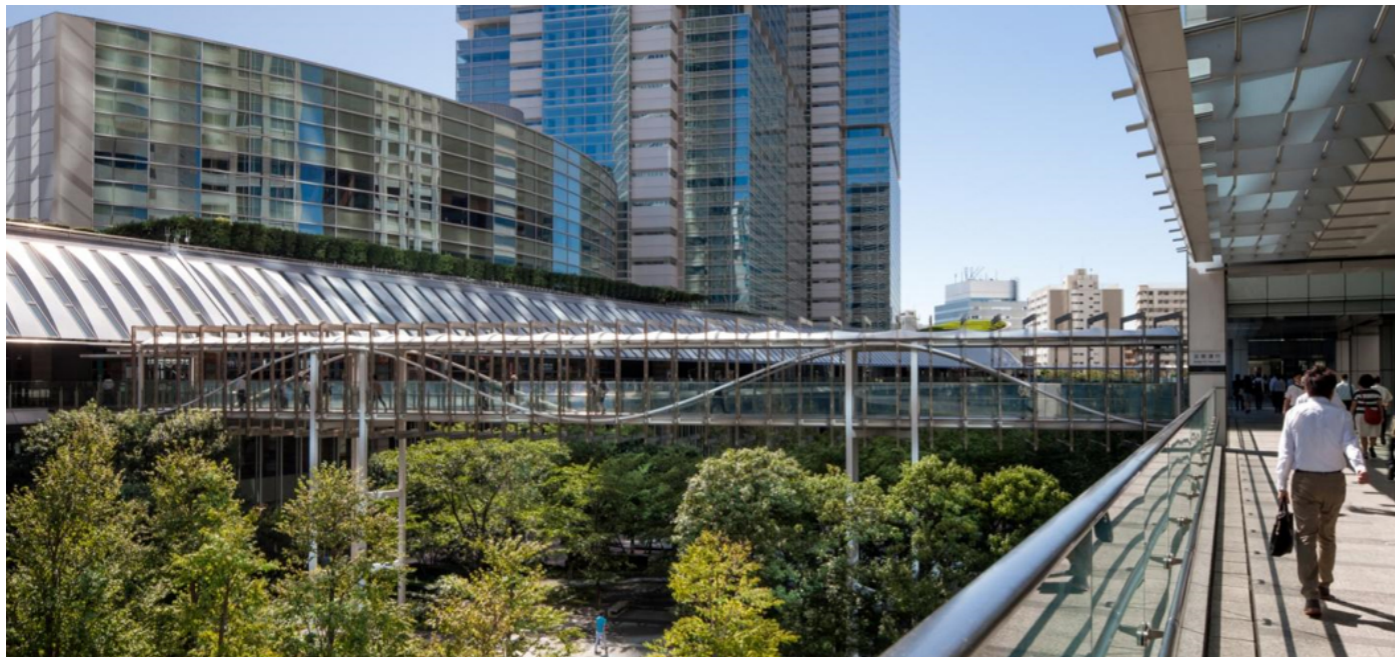


Fig. 10 Pedestrian deck at the east exit of Shinagawa Station. Covered by a huge canopy, each office can be accessed comfortably even on rainy days or hot summer days. There are no ups and downs.

Urban Redevelopment Projects for station squares were originally applied around suburban stations. But more recently a number of Urban Regeneration Projects have been promoted around under-exploited urban stations. Sometimes this is done through local 'rights-holders associations' that are authorised by government and who work with developers and the railway operators. This process is incentivised by the Floor Area Ratio (FAR) rules.

From a developer's perspective, the development of large profitable office and residential buildings with great views is the top priority. With land suitable for large-scale development increasingly scarce, land consolidation, FAR incentives and good connectivity to railway stations are essential factors for development

New Urban TODs

The same process has been applied to the development of new TODs in the city centre aimed at transforming low density areas around stations into high density office districts. This started in the late 1980s when an initiative was developed for Japanese National Railways to sell its former depots and other lands to reduce its deficit. The Government created the 'District Planning System with FAR Incentives' to facilitate this. This allowed developers to increase their FAR in exchange for contribution to infrastructure and a good urban environment.

A good example is the Shinagawa Station East Development, completed in 2003 that is a model for high-density TOD development around a station. The scheme was able to increase its FAR by 2.1 by making a pedestrian deck network connecting all the building to the station, creating a common green space in the middle and by providing underground vehicular network to reduce surface traffic. Further schemes were developed as part of national strategy to increase Tokyo's international competitiveness. These allowed developers to trade FAR uplifts for investment in transport infrastructure.

An example is the Toranomon Hills Station Tower project completed in 2023. This stood on the Tokyo Metro Hibiya Line but had no station. It was promoted by a land- owners association led by a developer, who built a new underground station and underground transit square at their own expense, trading these improvements for an increased FAR.

The extra floor area allowed the scheme to compete with Marunouchi and other business area in Tokyo. It also has a pedestrian deck system linking the 4 towers and an extensive underground network of walkways to improve walkability. The area was subsequently upgraded to become a part of the city centre.

Conclusion

The Tokyo system brings together central and local government along with the railway companies railway operators, private developers and public development entities to integrate transport infrastructure and development. It is a system based on cooperation with profits being shared and benefits given back to society. It has been made possible by the government's consistent commitment to public transport. Tokyo has thus opted for a society where people do not have to waste more than an hour each way commuting and the city is largely free of the congestion and associated air pollution that plagues other mega cities.

As Mr. Kishii says "In the Tokyo Metropolitan Area, the government created a vision and system that considers land use and transportation systems at the same time, and then realised it through the interdependence of private railway operators, private developers, and public development entities. Tokyo has been practicing TOD for more than 100 years, rather than creating a city that fills the suburbs with large parking lots as happens in Europe and the US. For the Tokyo Metropolitan Area, TOD is a matter of course, and with TOD+M (TOD management), which is one step ahead, it will continue to evolve toward a low-carbon, compact, and walkable urban structure premised on the use of public transportation.



Fig. 11 Toranomon Hills Station Tower Project promoted by a landowners' association led by a developer, who built a new underground station and an underground transit square.

The Good City

BDP believes that cities are good for us, at least they can and should be. They have the potential to be good for economic growth, for our quality of life and wellbeing, for arts and culture and for the environment. However too often, around the world, cities fail to live up to this potential.

The Good City is an initiative launched together with BDP's parent company Nippon Koei to help cities across the world become better. It brings together our designers, urbanists, engineers, environmental scientists, and technologists to provide a package of services targeted at cities and municipal authorities.

As part of this the City Observatory is a research programme and think tank in association with the Academy of Urbanism that draws on expertise from across the world to better understand the issues facing cities.

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