

Combined railway and urban development toward the 21st century

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Ongoing New Joban Line Project



Photo 1 Overall view of Akihabara Station under construction

A new approach to integrated urban and railway development is being implemented in the Tokyo metropolitan area. The New Joban Line project is not merely a railway construction project, but rather a huge effort aimed at improving urban functions along a new railway. The project is enormous, with the cost reaching about 1 trillion for railway construction alone; including urban development along the railway corridor, the total is estimated to reach as high as 7 trillion. As the president of a railway company in the rather-distant Kansai area of Japan and with an engineering degree, I made a quick tour of project sites on the New Joban Line to see the status of the project. This report sums up my views on how railway development should proceed in the future.

FROM HIGH-TECH TOWN TO ACADEMIA

The Akihabara district of Tokyo throngs with people visiting its huge electronics stores. Personal computer shops are now more prominent than in the past, so Akihabara seems more high-tech than ever. Akihabara station is a transit point for passengers traveling on three railway lines (the Yamanote line, Keihin Tohoku line, and Sobu line) and one subway line (Hibiya line). Thus the station plays an important role as a railway hub for the metropolitan area.

My visit was the first for a while, and I noticed that a land readjustment project was under way close to the station. This is where the Kanda wholesale market and Akihabara freight depot once stood. I felt a general sense of enthusiasm among local people as their neighborhood redevelops. From a construction base in the readjustment area, diaphragm walls were being built for

the new Akihabara station, terminus of the New Joban Line. (Photo 1)

From this terminus, the 53-km railway will pass through Saitama and Chiba Prefectures before terminating at Tsukuba in Ibaraki Prefecture. Driving north up the Joban Expressway along the route of the new line, I was impressed by the residential and rural land stretching outward to the northern Kanto plain, and I could imagine the fast railway access of the 21st century. (Fig. 1)

The drive to Tsukuba took about an hour. This area has seen extensive development since 1963, when it was designated Tsukuba Science City. It is now home to about 46 public research/education institutions. Together with private ones, it is the densest integration of research institutions anywhere in the world. Against the background of the huge new EPOCAL Tsukuba, an international convention center that opened in June 1999, it is clear that the town is fulfilling its role as a place of international exchange.

OUTLINE OF RAILWAY CONSTRUCTION PROJECT

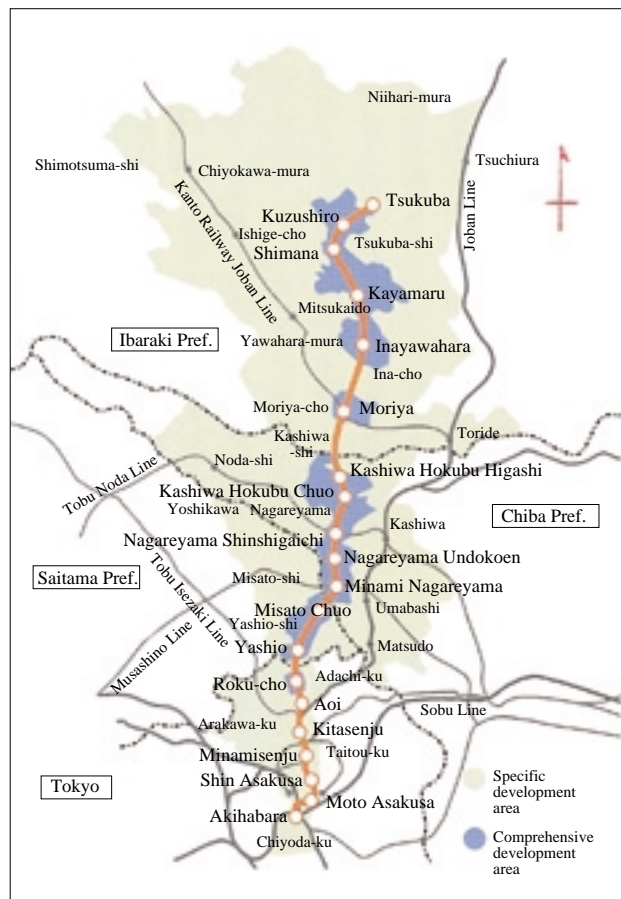
A plan to reduce congestion by building a new line, the Second Joban Line, in addition to the Joban Line was once proposed in the days of the Japanese National Railways (JNR). The enormous construction cost prevented the plan from moving forward. For a while, I myself worked on this Second Joban Line project at the head office of JNR, prior to the privatization.

The plan remained an important part of efforts to develop the northeastern metropolitan area. With strong support from the ministries of Transport, Construction and Home Affairs, a plan to develop the railway as a third-sector project was put into effect by establishing the Metropolitan Railway Co., Ltd., which is primarily made up of municipalities along the route.

Once opened, the New Joban Line will link Akihabara with Tsukuba in 45 minutes, considerably reducing today's access time; Tsukuba Academic New Town is currently 85 minutes away by train on the Joban Line and 65 minutes by bus on the expressway. There are plans for 20 stations along the line in Tokyo, Saitama, Chiba, and Ibaraki Prefectures. Seven stations in Tokyo, including the Akihabara terminus, will be built underground, with the exception being Kitasenju station. In Saitama and northward, the railway will be almost continuously elevated, except near Minami



Fig. 1. Electronic Mobile Unit of New Joban Line (illustrated)



Specific development area : area in which large numbers of residential lots are promised through development of the new railway
Comprehensive development area : part of specific development area in which large numbers of residential lots are planned for areas around new stations

Fig. 2. Route map of the New Joban Line

Nagareyama station at the junction with the JR Musashino Line and Tsukuba station. (Fig. 2)

With a construction cost estimated at about ¥1.05 trillion, financing consists of 40% in non-interest bearing loans from the national government (Corporation for Advanced Transport and Technology), 40% in non-interest bearing loans from the municipalities, and 20% in investment and borrowings from treasury investment

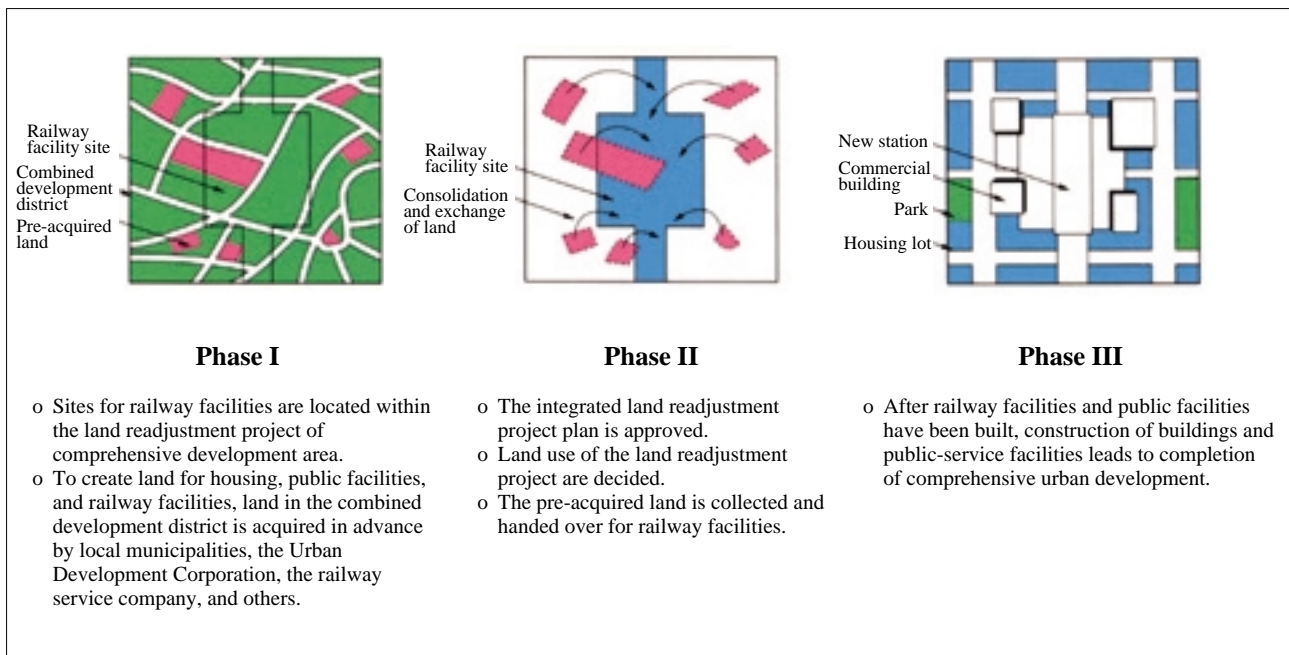


Fig. 3. Development process of integrated land development and railway construction



Photo 2 A viaduct under construction in an area of land readjustment project (near Moriya Station, Ibaraki Prefecture)



Fig. 4. Urban development plan for Moriya Station, Ibaraki Prefecture

and loan. The non-interest bearing loans and treasury investment and loan will be repaid with fare income once the line enters commercial operation. The project is expected to meet its debt obligations with complete reliability.

EPOCH-MAKING APPROACH THROUGH INTEGRATED DEVELOPMENT LAW

In the vicinity of the new stations, land readjustment and railway construction are proceeding in tandem. This is a new approach known as land readjustment for urban railway construction. Based on the Special Measures Law for Integrated Promotion of Land Development and Railway Construction (Integrated Development Law) enacted in 1989, the idea is to set

aside land for the railway by substituting* lands acquired in advance by municipalities in an integrated development area. In a major departure from the conventional approach to land readjustment, pre-acquired lands are being consolidated and exchanged. After exchange with (handing over to) the railway service company, construction of railway facilities can begin. (Fig. 3, Photo 2)

This breakthrough approach not only avoids the risk of difficulties in land acquisition, but also stimulates traffic demand by encouraging simultaneous urban

* Substituting: Exchanging, subdividing, or consolidating plots based on urban development plans in land readjustment projects

development around stations through the systematic preparation of public and housing land. The land needed for railway facilities is already 100% secured in the ownership of the municipalities and others, and the necessary procedures for city planning decision are complete, so the project is now in its implementation phase.

NEW CITY PLANNING

The integrated land readjustment for urban railway construction involves implementing land rearrangements and railway development. On the readjusted land in the vicinity of the line, urban development plans concerning regional characteristics are being formulated. This land readjustment for the line covers about 3,000 ha at 17 sites as the so-called "concentrated development areas" around stations alone, for a total cost of about ¥1.2 trillion. In addition, housing and public facility development projects will cost about ¥4.2 trillion.

When I visited, preparations for areal development were under way around Yashio and Misato Chuo stations in Saitama Prefecture. The Misato area is characterized by many rivers and drainage channels, and the local urban development plan aims to create communities that offer recreation and relaxation to citizens through the provision of "water amenity" parks, commercial, business, and cultural facilities. Although the finished landscape is as yet difficult to imagine, the railway viaducts and bridges that are beginning to take shape and the ongoing project to extend the Tokyo-Gaikan Expressway to Chiba clearly indicate the great changes that will take place in the area.

In Moriya-cho, where the New Joban Line and the Kanto Railway's Joso line intersect, the area is expected to develop as a gateway to Ibaraki Prefecture. The area around the station is the subject of an urban development plan that integrates commercial, business, and cultural facilities since, given the proximity of the Yawahara Interchange on the Joban Expressway, the area is favorable location for transportation. Site preparation for a land readjustment project has already started, and the first step toward development is clearly under way. (Fig. 4)

COST CONTROL FOR RAILWAY CONSTRUCTION PROJECT

The railway company would fail to gain a profit if construction costs, estimated at ¥1.05 trillion, were to overrun. Thus the project must be controlled to



Photo 3 Rigid frame viaduct with arch-slab

ensure that the budget is not exceeded. Further, as I am in charge of third-sector management in the Kansai region, I was particularly interested in efforts to reduce the capital investment burden on the railway service company. I made enquiries of the Japan Railway Construction Public Corporation, a major body involved in the construction of the railway, as to how the challenge of cost reduction was being addressed.

COST REDUCTION FOR ELEVATED SECTIONS

According to officials, railway viaducts have a long history of development based on the "minimum materials" principle because labor cost was cheaper than material cost. There are limits to further cost reduction on this basis. Considering the social and economic conditions of recent years that labor cost is increasing, work should be based on the principle of "minimum labor," they said. With the aim of eliminating the use of complex concrete forms and temporary supports, rigid frame viaducts with arch-slab and U-shaped PC girder viaducts have been developed to save labor. Near Misato, an aesthetically pleasing three-span arch-slab viaduct has already been completed. (Photo 3)

COST REDUCTION FOR UNDERGROUND SECTIONS

Reducing the cost of the underground work that accounts for half of the total construction cost is a major issue in urban railway construction. To cut down the cost of shield tunnels, wider shield segments, i.e. 1.5 m wide (conventional ones are 1.0 to 1.2 m wide) and more rigid joint have been developed. I visited the construction site for the Kodo tunnel close to Aoi Station,



Photo 4 Kodo Tunnel, where wider segments are in use (close to Aoi Station, Tokyo)



Photo 5 Underground station under construction in metropolitan area (New Asakusa Station)

where 500 m of tunneling has already been completed. Where the cut-and-cover method is used, construction costs are being reduced by introducing steel tube columns filled with high-strength concrete, and fitted with compact bearing plates. (Photo 4)

REMAINING HURDLES

As already noted, the New Joban Line project is characterized by concurrent railway construction and areal improvement. According to a project official, the railway construction part of the project is progressing well, with all construction permits and official authorization obtained. Construction starts are presently 30%, with these mostly in locations where land had been purchased for the railway only. On the other hand, progress with the land readjustment part of the project, differs from area to area (although all city planning decisions have already been drawn up) because of different timing of decisions and many project promoters.

The financial feasibility of the railway business depends on, in addition to the construction cost reduction work and the achievement of the planned construction term already mentioned, assumed income from fares, by the assumed number of passengers. The number of passengers in the line's inaugural year (2005) is expected to be 327,000 per day. However, this figure depends greatly on the progress of urban development, and this in turn is heavily dependent on how the land created in readjustment projects is used. It is therefore important to work steadily on the development of distinctive and attractive communities that will be suitable for living in the coming century, and this will depend on the collaborative efforts of the private and government



Photo 6 Construction in a residential area (Aoi Station)

sectors. I hope that those involved in this project will make every effort to this end.

TOWARD THE 21ST CENTURY

In the 21st century, Japan's society will age at a rate almost never experienced. Railway development will increase in importance as it offers infrastructure for a safe and eco-oriented society. Strongly backed by the ministries of Transport, Construction, and Home Affairs, removing interministry boundaries, the New Joban Line project is moving forward by a new and innovative approach. It heralds a coming reorganization of the government ministries, and in this sense it has par-

ticularly great significance. The huge initial investment required for railway development projects means that private-sector financing by the conventional approach has severe limitations, and strong support from the government and municipalities is essential. I am hoping that more effective approaches to development will be established on the basis of experience with this project.

My two days at the project sites allowed me to collect materials for this report, and I hope it provides an overview of the significance of the project. The project sites were hives of activity: underground sections are being constructed in the central built-up area of Tokyo and large-scale bridges, realignment of the existing

Joban Line, and large-scale residential land preparation work are in progress elsewhere. (Photos 5 and 6) Because this is such a big project, reporting on individual areas of progress would take too much space. Still, the project has not yet reached its peak, so I hope that a further report will be published when both railway construction and urban development have made greater progress.

Cooperation in collecting materials for this report by: Japan Railway Construction Public Corporation and Metropolitan Railway Co., Ltd.