



World Bank Group Archives Exhibit Series

The Bank and Japan's Bullet Trains

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These exhibits, authored by World Bank archivists, highlight key events, personalities, and publications in the history of the World Bank. They also bring attention to some of the more fascinating archival records contained in the Archives' holdings.

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The Bank and Japan's Bullet Trains

In 1961 a loan from the World Bank to the Japanese National Railways helped finance one of the most technically advanced railway projects in the world—the New Tokaido Line (the Shinkansen Project) between Tokyo and Osaka that carried the famous Bullet Trains.

But this landmark event cannot be fully appreciated without knowing more about Japan's experience with trains to that date. The first railway in Japan was constructed by the government in 1872 from Tokyo to Yokohama, a distance of 29 kilometers. By 1881, government lines totaled 135 kilometers. Thereafter, for financial reasons, private enterprise was called upon to assist in railway construction. Nine years later, there were 885 kilometers of government and 2,124 kilometers of private railways.

Expansion by public and private means continued to 1906, when the multiplicity of short-line disconnected private carriers led to government action. In order to promote long distance through transportation, the Railway Nationalization Law was enacted whereby the government purchased all privately-operated railways, except those serving local areas.

At the end of 1907, the government owned and operated 6,407 kilometers of lines, compared with 717 kilometers of privately-owned short lines. Construction of new railway lines continued to 1937 at an average annual rate of 470 kilometers, for a total at that time of about 20,000 kilometers. From 1938, emphasis was on improvement to existing lines rather than on new construction.



Signing of the loan to the Japanese National Railways. From left to right, His Excellency Koichiro Asakai, Ambassador of Japan in the United States; Sir William Iliff, Vice President of the World Bank; and Mr. Shinji Sogo, President of the Japanese National Railways. Standing, left to right: Mr. Gengo Suzuki, Executive Director of the World Bank for Japan; and Mr. Manabu Kanematsu, Managing Director of the Japanese National Railways



Loan 0281 for \$80 million was approved on May 1, 1961. The purpose of the loan was to assist the financing of the new \$548 million New Tokaido Line, a 311-mile express railway serving the cities of Tokyo, Yokohama, Nagoya, Kyoto and Osaka, providing what was at the time the fastest train service in the world. The project was in addition to a much larger continuing railway development program.



The new bullet train in Torikai station on the new Tokaido Line in Japan

The Tokaido area is the industrial heart of Japan. For some time the development in the Tokaido area of adequate transport facilities was becoming an obstacle to the general economic development of the region. Highways in the area were continually congested and the existing narrow gauge railway was operating at maximum capacity with as many as 186 passenger trains and 124 freight trains using it each day.

Japanese National railways set up a team to begin the feasibility study for the project on May 10, 1956. The project was authorized on December 19, 1958, with the first portion of the construction beginning on April 20, 1959. By October 1961 the route between Tokyo and Osaka was finalized. Service on the line began October 1, 1961.

The New Tokaido Line was designed as an electrified system with standard gauge double track throughout. The track was composed of long welded rails, each measuring about a mile in length and linked together by expansion joints with double elastic fastenings on pre-stressed concrete ties. The curves of the track were designed to be gentle, permitting the maintenance of higher speeds.

The project envisaged the construction of 80 tunnels for a total length of 62 kms, and of these tunnels 18 would be more than 1 km long, of which the Tanna Tunnel, 7.9 kms, would be the longest. The total length of bridges is 18.1 kms. A subway 2.2 kms long was to be built in the Tokyo area. These and other structures including elevated tracks are



The new train depot and fitting out station at Torikai rail station, between Osaka and Kyoto



required by the undulating and hilly terrain, and represent a total length of 226 kms or 45 percent of the length of the Project, which was approximately 500 kms overall.



Here, President Ishida is seen cutting a tape at the grand ceremony marking the opening of the New Tokaido line in Tokyo

As originally designed the new line carried passenger trains during the day and freight at night. Even the freight trains traveled at speeds approaching 100 miles per hour. The trains were designed to be controlled at the Centralized Traffic Control in Tokyo, which also maintained communication with the train engineers by train radio telephone communication. The rolling stock on the new line consisted of multiple unit electric rail cars of lightweight construction and equipped with a motor on each axle. To ensure safety and riding comfort, the cars were provided with devices to eliminate

vibration, noise and heat transfer. The cars were air tight to protect the passengers from unpleasant effects when entering tunnels at high speeds or passing another train going in the opposite direction.

The passenger trains could be made up to a maximum of sixteen units with a seating capacity of 1,250. For the initial service, the trains traveled between Tokyo and Osaka every thirty minutes beginning at 6:00AM. Half of the trains were Super Expresses named *Hikari* with stops at Nagoya and Kyoto. The other trains stop at all the larger stations between Osaka and Tokyo.

To ensure maximum safety, a considerable amount of testing and research was employed before the New Tokaido Line began operation. Several different prototypes of rail cars were designed and tested and considerable time was spent in researching the best possible design of track.



A view of an embankment on the Tokaido Line

Mieko Nishimizu, SAR Vice President, reflects on the significance of this loan in an August 1994 interview with Bank's World:



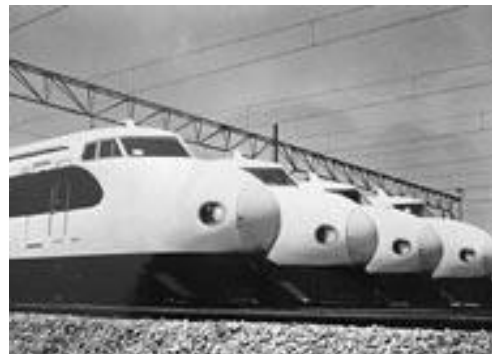
"I decided to give this old World Bank a try for a few years, without knowing much about the Bank really. That proposal caused my father great distress. After my being a professor, this was certainly something he couldn't stomach. He called a family conference to discuss what to do.



The new double track wide-gauge line runs parallel with the old narrow-gauge line from Tokyo to Osaka. The new line will be used only for express passenger and express freight trains, reaching speeds of 125 miles an hour

"Unknown to me, I had an ally in the family, one of my uncles on my mother's side. He was with the Japan National Railways Company, and when he was a young, dashing engineer, a few decades back, he was assigned to the Shinkansen project engineering team—the Bullet Train, which was a World Bank-supported project. So my uncle had known something about the Bank, and when he came to this family conference, he said to my relatives: 'You are very crazy if you think that the World Bank is a money lender. Don't you know that the World Bank was a great teacher to our country?'

"Of course, engineering we knew everything about and we didn't have to learn from the World Bank engineers. But they taught us how to think about the project, they taught us about rational project analysis, they taught us cost-benefit analysis, they taught us how to think about pricing train tickets in the context of the Shinkansen Project, and they taught us how to think, most of all, about a railway line project, not just in the context of the railway system of our country, but in the context of the entire transport system of Japan.



The photo shows regular service railcars for the New Line standing in readiness for operation, in Tokyo

"And so these are the things I would learn from the great teacher called the World Bank and, in fact, we have been applying what we learned to every single project that we executed and to every single marginal extension of the Bullet Train system."



Bank lending to Japan ended in 1966. There was a total of 31 loans from 1953 through 1966 for \$862 million.