

Ex-Ante Evaluation (for Japanese ODA Loan)

1. Name of the Project

Country: Republic of India

Project: Chennai Metro Project (V)

Loan Agreement: March 31, 2017

Loan Amount: 33,321 million yen

Borrower: The President of India

2. Background and Necessity of the Project

(1) Current State and Problems with the Urban Transportation Sector in India

With the recent rapid urbanization, the number of registered automobiles and scooters in India has risen dramatically over the years since FY 2002 with an average increase rate of about 8%. On the other hand, the improvement of public transportation infrastructures has not seen much progress, and its rate of use decreased from 69% in 1991 to 55% in 2001 and is expected to drop to 50% by 2021. In large cities such as Chennai, in particular, traffic congestion has become a serious problem as the result of increasing road transportation needs, causing economic loss and serious health damage due to air pollution, noise, and other pollution generated by automobiles. Thus, improvement of the public transportation system is necessary for reducing traffic congestion and improving the urban environment.

The Chennai Metropolitan Region in the state of Tamil Nadu is the largest urban region in South India with the fourth largest population in the country. The population of the region rapidly grew from 4.5 million in 1981 to 7.06 million in 2001 and reached 8.7 million in 2011. The population density of the city of Chennai, the center of the region, is 25,000 people/km², making it one of the most densely populated cities in the world. The number of registered automobiles, which has been on a marked rise as the population has grown, more than doubled between 2001 and 2011. Thus, the average speed of vehicles on major roads in the city is only about 17 km/h, causing serious traffic congestion.

(2) India's Development Policies for the Urban Transportation Sector and the Role of The Project

The Government of India is focusing on the improvement of the public transportation system from the perspectives of safety, energy efficiency, and social environment conservation, in addition to dealing with the above problems by meeting the growing transportation needs resulting from the recent economic growth, and estimates that its investment in the metro project over the period from 2012-2017 will be 1.3 trillion Indian rupees.

In the Chennai Metropolitan Region, given the difficult circumstances for enhancing the transport capacity of the existing public transit system (bus and railway) and

improving road networks, the improvement of a mass rapid transit system has become a large pillar of the urban transportation policy and the measures for urban environment issues faced by the state of Tamil Nadu in order to reduce traffic congestion and respond to automobile pollution. Its importance is also stipulated in the Chennai Comprehensive Transportation Study (August 2010), prepared by the Chennai Metropolitan Development Authority, and the Chennai Metro Project (hereinafter referred to as “the Project”) is one of the major components of this policy.

(3) Japan and JICA’s Assistance Policies and Operations in the Urban Transportation Sector in India

Japan’s Country Assistance Policy for India (March 2016) sets “enhancement of regional connectivity” as one of its priority areas and states that with a view to removing the bottlenecks in the infrastructure constraining investment and growth, it is necessary to support development work in the area of railways (including high speed railways and metro lines) to strengthen connectivity among major industrial cities and economic zones, as well as regional connectivity, throughout the country. In addition, JICA’s Country Analysis Paper for India (March 2012) indicates the necessity of providing assistance for the development and improvement of infrastructure contributing to the acceleration of regional economic development, streamlining of logistics and expansion of foreign investment, including highways, urban railways, roads and ports, mainly in the six major urban centers of the country, as well as in other industrial clusters, such as the special economic zones in the Delhi-Mumbai Industrial Corridor (DMIC) and other economic corridors, to resolve bottlenecks in economic growth. The Project is consistent with the Policy and Analysis. As of February 2017, JICA received authorization to provide ODA loans to India in the amount of 1.3944 trillion yen for 32 projects in the railway sector (which accounts for 71.9% of the transportation sector in India).

(4) Other Donors’ Activities

In the urban transport sector, the World Bank provides assistance through the Mumbai Urban Transport Project (improvement of roads and suburban railways) and for the improvement of the Eastern corridor in building freight-only railway lines. The Asian Development Bank has assisted the railway sector, especially through organizational reform of Indian Railway and other tangible support, while providing its support to the urban railway sector; 250 million dollars to Bangalore Metro in March 2012 and 176 million dollars to Jaipur Metro in May 2014.

(5) Necessity of the Project

JICA has provided its support to metro projects not only in Chennai, but also in other metropolitan regions in the country (Delhi, Bengaluru, Kolkata and Mumbai). Continuing with the Project into the next phase while taking advantage of the experience and knowledge already gained from the activities of Phases I to IV, is required as a measure for serious traffic congestion in Chennai and is in line with the

issues and development policy of India, as well as the assistance policy of Japan and JICA. Furthermore, given the potential contribution the Project can make to Sustainable Development Goal (SDG) 9, it can be deemed as highly necessary and relevant for JICA to support it.

3. Project Description

(1) Project Objective

By constructing a mass rapid transit system in the Chennai Metropolitan Region, which is located in the south Indian state of Tamil Nadu, and the densely populated areas surrounding it, the project is to address the increasing need for transportation, thereby developing the regional economy and improving the urban environment with increased urban mobility, reduced traffic congestion and mitigated traffic pollution, such as air pollution and noise.

(2) Project Site/Target Area

Chennai Metropolitan Region, the state of Tamil Nadu

(3) Project Components

1) Civil and construction work, track construction

- Line 1: approx. 31.9km/25 stations (elevated section: approx. 14.8km/12 stations, underground section: approx. 17.1km/13 stations)

Including an extended section of approx. 9.0km/9 stations (elevated section: approx. 6.0km/ 6 stations, underground section: approx. 3.0km/3 stations)

- Line 2: approx. 21.4km/17 stations (elevated section: approx. 10.6km/8 stations, underground section: approx. 10.8km/9 stations)

* Two of the above stations are at the intersection of Line 1 and Line 2. Thus, the total number of stations on Line 1 and Line 2 is 40 stations.

- Rail yard construction

2) Electrical and mechanical work, signal and telecommunication work, automatic charge collection system, etc.

3) Procurement of train cars (192 cars: 48 trains, 4 cars per train)

4) Consulting services (Design review, bidding support, construction supervision, etc.) Procurement method: 1 to 3 by international competitive bidding and 4 by the short-list method

(4) Project Cost

385,646 million yen (Loan amount: 183,595 million yen)

(5) Project Implementation Schedule/Cooperation Period

September 2008 – March 2020 (139 months in total). Project completion is defined as the commencement of service (March 2020).

(6) Project Implementation Structure

1) Borrower: The President of India

2) Guarantor: none

3) Executing Agency: Chennai Metro Rail Limited (CMRL)

4) Operation and Maintenance System: same as (3) above. However, outsourcing of the operation and maintenance of trains and system maintenance is now under review at the CMRL.

(7) Environmental and Social Considerations / Poverty Reduction / Social Development

1) Environmental and Social Considerations

① Category: A

② Reason for Categorization:

The Project is classified as Category A because it has the potential to exert significant negative impact by being classified into the railway sector under the “Japan Bank for International Cooperation Guidelines for Environmental and Social Considerations” (dated April 2002).

③ Environmental Permit:

Preparation of an Environmental Impact Assessment (EIA) report for the Project is not required under Indian law. However, an EIA report was completed in May 2008. Another EIA report was created on the extended section in June 2016 and was approved by the CMRL.

④ Anti-Pollution Measures:

The Project takes measures during construction to adequately control pollutants, construction vehicles, and heavy machines based on environment management plans. Measures will be taken to mitigate noise by installing noise reduction walls and pads after starting service. So far, no significant problems have occurred during construction in terms of air quality, noise, and vibration.

⑤ Natural Environment:

The Project sites are located in an urban area and the planned track mostly passes along existing roads. Therefore, it is likely to have a minimal adverse impact on the natural environment, as these sites are not considered places particularly susceptible to natural environmental changes, like national parks, or areas surrounding such places.

⑥ Social Environment:

The Project involves land acquisition of 77.62 ha (of which 13.87 ha is private land) and resettlement of 550 households (including 522 illegally settled families), and 215 shops. The process of acquiring this land was carried out according to the compensation policy, resettlement plan, and laws for acquiring land stipulated by the CMRL, upon discussion with those involved in land acquisition and resettlement. By August 2014, all land acquisition and resettlement of residents had been completed. According to monitoring of the living conditions after resettlement and success of the income restoration program, no significant problems have been reported so far. The extension work involves land acquisition of approx. 6.8 ha (including 2.8 ha of private

land) and resettlement of 21 households (including 15 shops and 6 houses that double as shops).

⑦ Other/Monitoring:

Air quality, water quality, noise, vibration and waste disposal will be monitored by the contractor of each part of the construction work during construction and by the CMRL after the commencement of service. Furthermore, the CMRL will also monitor the resettlement of residents and progress in the income restoration program.

2) Poverty Reduction: N/A

3) Social Development (e.g., Gender Perspective, Measures to Prevent Infectious Diseases Including AIDS, Participatory Development, Considerations for the Handicapped, etc.):

The Project makes efforts to ensure that female passengers can use the metro safely and comfortably, for example, by introducing women-only coaches, marking priority seats for passengers who need assistance, including women, installing CCTV cameras in stations and coaches, and setting strap hangers at a lower position. This is the reason that the Project is classified as a Gender Integrated Project.

In this country which has a risk of AIDS infection, the Project implements large-scale construction work with a significant portion of the labor force concentrated in the site. Thus, the high risk of transmission is considered. The Project has established a special plan for HIV prevention and requires each contractor to take measures in accordance with the plan.

Special needs of the elderly and the physically challenged are taken into consideration when designing stations and coaches (e.g., universally designed elevators and escalators, announcements at stations, signs in Braille, and space for wheelchairs) by learning from precedents such as accessibility considerations adopted by Delhi Metro, in accordance with the accessibility-related laws and policies of India.

(8) Collaboration with Other Donors: N/A

(9) Other Important Issues: N/A

4. Targeted Outcomes

(1) Quantitative Effects

1) Operation and Effect Indicators

Indicator	Baseline (recorded in 2008)	Target (2021) [2 years after project completion]
Operation rate (%/year)	—	92.0
Car traveling distance (1,000km/day)	—	84.0
Number of Running Trains (No. of trains/day, one direction)	—	400
Volume of Transportation (million man-km/day)	—	10.4
Passenger Revenue (million Rupees/day)	—	42.1

2) Internal Rate of Return

Based on the conditions indicated below, the economic internal rate of return (EIRR) of the Project will be 6.1% and the financial internal rate of return (FIRR) will be 13.6%.

【EIRR】

Cost: Project cost (excluding tax), and operation and maintenance costs

Benefit: Effects of reducing the operation and maintenance costs of the existing transportation system and roads, travel time of users of this line and other transportation users, operation and maintenance costs of buses and other transit systems by mitigating traffic congestion, and the number of traffic accidents and pollution.

Project Life: 30 years

【FIRR】

Cost: Project cost, and operation and maintenance costs

Benefit: Fare revenue, advertisement revenue, and revenue from real-estate development

Project Life: 30 years

(2) Qualitative Effects

The qualitative effects of the Project include the improvement of traffic conditions, mitigation of traffic pollution, reduction of green gas emission by promoting modal shift, increase of convenience by securing punctuality of travel, and economic development in the Chennai Metropolitan Region.

5. External Factors and Risk Control

- (1) Precondition: N/A
- (2) External Factors: N/A

6. Evaluation Results and Lessons Learned from Past Projects

(1) Results of Evaluation of a Similar Past Project

A lesson has been learned from the ex-post evaluation of the Delhi Mass Rapid Transport System Project (Phases I to VI) in India as one example, that public transportation carriers should cooperate with each other to form a larger system of urban transportation and promote efficient operation of the whole system, rather than competing. Another lesson is that it is desirable to encourage preconditions of securing profitability when they are evaluated as insufficient after monitoring.

(2) Lessons for the Project

In the Project, the CMRL developed a feeder bus plan with a view to further increasing the rate of use and raising fares, and submitted it to Metropolitan Transport Corporation (Chennai) (MTC), which manages public bus services in Chennai. MTC has been implementing this plan.

The CMRL has also signed contracts with private-sector contractors to add to the revenue and improve profitability, for the installation of vending machines, kiosks and ATMs in stations, management of parking lots near stations, and so on.

7. Plans for Future Evaluation

(1) Indicators for Future Evaluation

- 1) Operation rate (%/year)
- 2) Car traveling distance (1,000 km/day)
- 3) Number of Running Trains (No. of trains/day, one direction)
- 4) Volume of Transportation (million man-km/day)
- 5) Passenger Revenue (million Rupee/day)

(2) Timing

Two years after project completion

-END-