**Japanese ODA Loan**

**Ex-Ante Evaluation (for Japanese ODA Loan)**

## 1. Name of the Project

Country: India
Project: Chennai Metro Project (III)
Loan Agreement: March 28, 2013
Loan amount: 48,691 million yen
Borrower: The President of India

## 2. Background and Necessity of the Project

(1) Present State of Development and Problems of the Urban Transportation Sector in India

Rapidly expanding urbanization has taken place in India over recent years. The number of registered automobiles and motorcycles registered is increasing dramatically, despite of lack of a sophisticated public transportation infrastructure. In metropolitan areas—Delhi and Mumbai in particular—traffic congestion gets more severe every day. The situation poses serious threats in terms of vehicle-related pollution, economic loss and deterioration due to pollution-related health issues, noise, and the like. Therefore, improving the public transportation system to ease traffic jams and improve urban conditions is a pressing issue.

(2) Positioning of Development Policy of Urban Transportation Sector and the Project in India

To cope with these problems, the Indian government has emphasized the development of the urban transportation sector during an urban transportation working group formed under the Twelfth Five-Year Plan (April 2012 through March 2017) following the Eleventh Five-Year Plan. The working group formulated metro construction plans for cities with a population of over two million and recommended that construction plans be launched in cities with a population upwards of three million. These recommendations were made from the perspective of safety, energy efficiency, and socio-environmental conservation. The Project supports the above plans.

(3) Japan and JICA's Aid Policy/Actual Performance for Urban Transportation Sector of India

Under the country assistance plan for India, "promotion of economic growth" is defined as a priority goal. In response to this, JICA lays out a goal of "supporting sustainable economic growth through improving economic infrastructure". This project is defined as "improvement and maintenance of the transportation network", which JICA pointed out as an issue to be addressed under priority goals and thereby considered relevant to the policies. So far, Japan had approved 778.0 billion yen in support (23% of the entire approved amount) for 22 projects aimed at the country's urban transportation sector under the yen loan scheme.

(4) Response from other donors

The World Bank (WB) is currently providing assistance to Mumbai urban transportation projects (improvement of roads and suburban railways) in the urban transportation sector. The WB also supports construction of the Eastern Dedicated Freight Corridor along the Delhi – Kolkata route being implemented by the Dedicated Freight Corridor Corporation of India (DFCCIL). The Asian Development Bank (ADB) is currently providing assistance to the railway sector, focusing on non-material activities such as organizational reform in Indian Railways.

(5) Necessity of the Project

The Chennai metropolitan area of Tamil Nadu state is the largest urban area in southern India and fourth-largest city in terms of population. Population in Chennai went up from 4.5 million people in 1981 to 7.06 million in 2001 and 8.70 million in 2011. It is one of the most densely populated urban areas in the world, with a population density is 26,000 people per square km. There has also been a tremendous increase in number of registered automobiles in the state capital due to the growing population, more than doubling in

the decade between 2001 and 2011. This rapid increase in vehicles hinders normal traffic in the major roads of the city, where the average speed of the automobiles is as low as 15 km per hour, causing severe traffic congestion. On the contrary, there is limited scope for enhancing the capacity of existing public transportation network (buses and railways) and road networks. In response to the situation, the state government of Tamil Nadu defined the establishment of rapid mass transportation as a core component of their urban transportation policy and an urban environmental measure to mitigate traffic congestion and vehicle-related pollution. Therefore, the aim of the project satisfies development policies of the Indian government as well as the support policies of the Japanese government and JICA. Consequently, JICA's support for this project is highly necessary and relevant.

## 3. Project Description

(1) Project Objectives

This project aims to respond to ever-increasing transportation demand by constructing a rapid mass transportation system in the Chennai metropolitan area of Tamil Nadu, in the southern part of India, thereby contributing to local economic development and an improved urban environment by mitigating transportation congestion and reducing traffic pollution.

(2) Target Area

Chennai metropolitan area, state of Tamil Nadu

(3) Project Overview

Construct a mass rapid transportation system (about 43.6 km) in the Chennai metropolitan area.

1) Construction works (civil engineering, architecture, and track construction for approximately 43.6 km (elevated section: approximately 18.4 km, underground section: 25.2 km))
2) Procurement of train cars
3) Consulting services (e.g. design review, assistance for bidding, supervision of works, and planning for operation/maintenance)

(4) Total Project Cost

276,985 million yen (Yen Loan Amount: 48,691 million yen)

(5) Project Implementation Schedule

Planned between November 2008 and August 2015 (total of 82 months). The project should be considered completed on the day of starting operation of facilities (August 2015).

(6) Project Implementation Structure

1) Borrower: the President of India
2) Executing Agency: Chennai Metro Rail Limited (CMRL)
3) Operation and Maintenance System: same as 2)

(7) Environmental and Social Consideration, Poverty Reduction, and Social Development

1) Environmental and Social Consideration

i. Category: A
ii. Reason for Categorization: This project is classified as Category A because it has the potential to exert significant negative impact by being classified into railway sector under the "Japan Bank for International Cooperation Guidelines for Environmental and Social Considerations" (dated April 2002).
iii. Environmental Permit: Preparation of an Environmental Impact Assessment (EIA) report for this project is not required under Indian law. However, an EIA report was completed in May 2008.
iv. Anti-Pollution Measures: This 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.

v. Natural Environment: The project sites are located in an urban area and the planned track passes along existing roads. Therefore, it is likely to have a minimal adverse impact on the natural environment.

vi. Social Environment: The project involves land acquisition of 14.05 hectare (ha) and resettlement of 525 families (including 522 illegally settled families), and 227 shops. The process of acquiring this land is in process according to the compensation policy, resettlement plan, and laws for acquiring land stipulated by the Chennai Metro Rail Limited (CMRL), upon discussion with those involved in land acquisition and resettlement. As of February 2013, acquisition of private land and the resettlement of 522 families have been completed. The CMRL and NGOs work together to monitor living conditions after resettlement and the success of the income restoration program. So far, no significant problems have been reported.

vii. Other/Monitoring: The executing agency monitors undesired noise, vibration, air quality, water quality, soil contamination, land acquisition, and resettlement.

2) Promotion of Poverty Reduction: N/A

3) Promotion of Social Development (e.g. Gender Perspective, Measures to Prevent Infectious Diseases Including AIDS, Participatory Development, Consideration for the Handicapped, etc.): A significant portion of the labor force involved in this project are living away from home, so the risk of transmitting HIV/AIDS is considered high and measures to prevent the spread of the disease have been taken. Station buildings and passenger coaches are also being constructed to be more accessible to the aged and disabled (installing elevators, escalators, PA systems, studded paving blocks to aid the blind, extra space for wheelchair users, and so on).

(8) Linkage with other schemes or donors: N/A

(9) Other Important Issues: N/A

**4. Targeted Outcomes**

(1) Quantitative benefits

1) Evaluation Indicators (Operation and Effect Indicator)

| Indicators | Baseline (2008 actual) | Target (2017) two years after completion |
|---|---|---|
| Operation rate (%/year) | - | 92 |
| Car traveling distance (1,000 km/day) | - | 45.4 |
| Number of times the trains runs per day in each direction | - | 260 |
| Millions of passengers transported per day | - | 6.1 |
| Passenger service revenue (millions of Rupees/day) | - | 9.8 |

2) Internal Rate of Return (IRR)

Based on the conditions below, the Economic Internal Rate of Return (EIRR) of this project was calculated as 12.1%, while Financial Internal Rate of Return (FIRR) was 0.1%.

EIRR:

Cost: Project cost, operation and maintenance expenses

Benefits: cutting operation/maintenance costs of existing transportation and roads, shortening travel time of users of the target line and other transportation, cutting operation/maintenance costs of

transportation systems such as buses by mitigating road congestion, reducing traffic accidents, and mitigating environmental pollution.

Project Life: 30 years

FIRR:

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

Benefits: Revenues from fares, advertisement, and real-estate development

Project Life: 30 years

(2) Qualitative benefits

Improvement of traffic conditions in Chennai metropolitan area, mitigation of traffic pollution, reduction in GHG emission through a modal shift, more convenience through more reliable travel times, and economic development of Chennai urban area.

**5. External Factors and Risk Control**

Economic stagnation and deterioration in political situation in India and the surrounding area of the project as well as natural disasters

**6. Lessons Learned from Past Projects**

(1) Assessment results of similar projects

The past Ex-post evaluations carried out for India's urban railway projects pointed out the significance of establishing a financially independent project implementation system. Past Ex-post evaluations for projects involving massive resettlement also indicated the necessity of taking measures such as income improvement programs to secure living conditions and livelihood for the people subject to resettlement.

(2) Lessons to be applied to the project

Based on the lessons learned from past projects, the Project plans to implement relevant projects (e.g. advertising and real estate development) to enhance the financial condition of the executing agency. For people subjected to resettlement, a series of steps for acquiring land and resettlement are being carried out after taking the necessary measures, including holding meetings to explain the situation to local residents. JICA is also scheduled to to receive reports from Chennai Metro Rail Limited (CMRL) on a regular basis to monitor the post-resettlement living conditions of those who previously lived in slum areas.

**7. Plans for Future Evaluation**

(1) Indicators to be Used:

1) Operation rate (%/year)
2) Car traveling distance (1,000 km/day)
3) Number of times the train runs per day in each direction
4) Millions of passengers transported per day
5) Passenger service revenue (millions of rupees/day)
6) Economic Internal Rate of Return (EIRR) (%)
7) Financial Internal Rate of Return (FIRR) (%)

(2) Timing of Next Evaluation:

Two years after plan completion