

## Ex-ante Evaluation (for Japanese ODA Loan)

### 1. Name of the Project

Country: India

Project: Delhi Mass Rapid Transport System Project Phase 2 (IV)

Loan Agreement: March 31, 2009

Loan Amount: 77,753 million Yen

Borrower: The President of India

### 2. Background and Necessity of the Project

#### (1) Current State and Issues of the Urban Transport Sectors in India

In recent years in India, urbanization continues to progress and the number of registered cars and motorcycles increase dramatically. As a result, the traffic congestion in urban areas has become a serious problem. In large cities like Delhi and Chennai, the traffic congestion accompanying the increase in road traffic demands has become a serious issue, accelerating economic loss and health hazards caused by environment contamination, noise and other forms of vehicle-related pollution. Consequently, there is a need to develop a most suited public transportation system for alleviating traffic congestion and reducing vehicle pollution.

#### (2) Development Policies for the Urban Transport Sectors in India and the Priority of the Project

In its Eleventh Five Year Plan (April 2007 – March 2012) the Government of India has placed emphasis on development in the urban transport sector to meet the issues faced by urban transport. In particular, construction of mass transit systems is being recommended for cities with a population over 4 million.

#### (3) Japan and JICA's Policy and Operations in the Urban Transport Sector in India

In the "Japan's Country Assistance Program for India" prepared by the Government of Japan, "promotion of economic growth" has been set down as a priority area. Accordingly, JICA has set down "support of sustainable growth through development of economic infrastructure" as a major aid area. This project is positioned in the "Transport network development / maintenance management" area that is one of the issues that JICA should tackle in the major aid area given above. Note, in Japanese ODA loans given to India, 31 projects with a total of 506 billion Yen have been granted in the transport sector, and within this, 14 projects with a total of 371.8 billion Yen have been granted in the urban transport sector. Further, in technical cooperation and grants, experts in the rolling stock maintenance management and safety management fields have been dispatched as part

of the Delhi Mass Rapid Transport System Project (FY2008).

(4) Other Donors' Activity

The World Bank has focused its assistance on increasing transport capacity through road infrastructure and organization reforms to increase efficiency of the agencies in-charge of road projects. The Asian Development Bank has provided assistance in (i) capital investment for increasing road transport capacity through infrastructure development of national and state roads, and (ii) capacity development and organization reform. Note, as of 2007, the World Bank has provided assistance of \$16,201 million and the ADB \$4,983 million.

(5) Necessity of the Project

The population of the Delhi metropolitan area increased from 6.2 million in 1981 to 16.3 million in 2006, and the accompanying surge in the number of buses and private vehicles has reduced the average vehicle speed to approx. 15 km/h in the city, resulting in serious traffic congestion and vehicle pollution. Given the difficulty in significantly expanding the road network and the capacity of existing public transportation (buses and railroads), a major component of the Delhi government's urban transportation policy and measures for urban environmental problems is extension of the rapid transport system constructed in Phase 1 (previous project, "Delhi Mass Rapid Transport System Project"). Thus support for this project (phase 2) is highly necessary and relevant.

### **3. Project Description**

(1) Project Objective(s)

The objective of this project is to cope with the surge in traffic demand in the Delhi metropolitan area, the capital city of India, by extending the mass rapid transportation system with a total length of approximately 83 km, and thereby promoting regional economic development and improving urban environment, through mitigation of traffic jams and decrease of pollution caused by the increasing number of motor vehicles.

(2) Project Site / Target Area

National Capital Territory of Delhi

(3) Project Component(s)

This is a project to install the 7 segments (total length: approximately 83km) of 6 lines listed below, as Phase 2 of the urban rapid transport system plan in Delhi (total length of the system in all four phases up to year 2021 : approximately 414 km)

- 1) Civil works: Underground portion including the underground station, track part for full length
- 2) Electrical, signaling, and telecommunication system

- 3) Procurement of rolling stocks
- 4) Consulting services: Design review, construction monitoring
- (4) Estimated Project Costs (Loan Amount)  
391,987 million yen (ODA Loan Amount: 77,753 million yen)
- (5) Schedule  
January 2006–December 2010 (60 months). Project completion is defined as when operation starts on the whole line.
- (6) Project Implementation Structure
  - 1) Borrower: The President of India
  - 2) Executing Agency: Delhi Metro Rail Corporation Limited (DMRC)
  - 3) Operation and Maintenance System: Same as 2) above.
- (7) Environmental and Social Consideration / Poverty Reduction / Social Development
  - 1) Environmental and Social Consideration
    - a) Category: A
    - b) Reasons for categorization: This project falls into the railroad sector project which is likely to have significant adverse impact on the environment under the “Japan Bank for International Cooperation Guidelines for Confirmation of Environmental and Social Considerations” (established in April 2002). Thus this project is classified as Category A.
    - c) Environmental Permit: The Environment Impact Assessment (EIA) report for this project has been prepared in August 2005, although it is not mandatory for such projects in India. (for some of the lines, in May 2007).
    - d) Anti-Pollution Measures: With regard to noise pollution, noise reduction measures including soundproof walls and sound insulating pads will be adopted. Further, by using the shield tunneling method, ground loosening and water inflow can be prevented, and it is expected that there will be no major impacts on the ground subsidence.
    - e) Natural Environment: The project’s site is located in an urban area, and the planned route generally runs along existing roads, so it is likely to have minimum adverse impact on the natural environment.
    - f) Social Environment: This project requires land acquisition of 181.22 ha. A total of 1,489 residences / buildings are expected to be relocated. DMRC has started discussions with those affected by land acquisition and relocation. The land acquisition, resident’s relocation and compensation procedures pursuant to the Land Acquisition Law and the rehabilitation plan prepared by the Government of

National Capital Territory of Delhi (GNCTD) are expected to complete by June 2009. Further, as regards to illegal residents, the land use permits will be provided at a cost for a relocation site in the Delhi suburbs. DMRC will use its own funds to employ a NGO to monitor residents living conditions in the relocated sites.

g) Other/Monitoring: As a part of this project, the DMRC will monitor noise/vibration pollution, air quality, water quality, soil contamination, land acquisition and resident relocation, etc.

2) Promotion of Poverty Reduction: None.

3) Promotion of Social Development (e.g. Gender Perspective, Measure for Infectious Diseases Including HIV/AIDS, Participatory Development, Consideration for Persons with Disabilities, etc.): Many of the migrant workers employed by this project live alone, and the risk of HIV infection is considered high. For this reason, DMRC in cooperation with local NGOs, is implementing HIV prevention activities using its own funds as a form of social contribution. At the same time, as a work place policy, HIV/AIDS prevention clauses have been inserted in larger civil tender documents, and the contractor is expected to cooperate with efforts to prevent HIV/AIDS infection. Besides, the stations and coaches will be built taking into consideration the needs of the elderly and the physically challenged (e.g., in the design of elevators and restrooms and the provision of in-train announcements, signs in Braille and space for wheelchairs). At the same time, the executing agency plans to offer training in customer care for all frontline staff including station attendants and crew members.

(8) Collaboration with Other Donors: None.

(9) Other Important Issues: None.

#### 4. Targeted Outcomes

(1) Performance Indicators (Operation and Effect Indicator)

Indicator	Target (2012) [Expected value 2 years after completion]
Operating rate (%/year)	92
Running distance (1000km / day)	103.01
Number of running trains (trains/day- 1 direction)	1,110
Volume of transportation (million people-km / day)	18.38
Passenger traffic receipts (million Rupees / day)	23.00

(2) Internal Rate of Return

Based on the conditions indicated below, the economic internal rate of return (EIRR) of

this project is 16.34%; the financial internal rate of return (FIRR) is 2.59%.

[EIRR]

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

Benefit: Cost savings on operation and maintenance of roads for conventional transportation means, reduction in travel time for users of these train lines and for users of other means of transportation, savings on the operation expenses of buses and other transit systems due to alleviation of road congestion, reduction in the number of accidents and pollution.

Project Life: 30 years

[FIRR]

Cost: Project cost, operation and maintenance expenses

Benefit: Fare income, advertising revenue, real estate development income

Project Life: 30years

## **5. External Factors and Risk Control**

Changes in transport demand.

## **6. Lessons Learned from Past Projects**

From the ex-post evaluation of previous railroad and underground rail projects, it has been learnt that the establishment of a financially independent project implementation structure is important from the standpoint of ensuring proper operation and maintenance. Improving the utilization rate is essential to strengthening the finances, and in this project adjusting this project's routes so that they will not compete with bus routes is desirable for boosting the utilization rate. GNCTD is already making this adjustment, and an agreement has been made between DMRC and Delhi Transport Corporation that bus lines will play the role of feeder lines for this project. Moreover, to further improve the project's financial status, the executing agency is studying related businesses such as advertising and real estate development.

## **7. Plans for Future Evaluation**

(1) Indicators to be Used

- 1) Operating rate (available vehicles/procured vehicles) (%/year)
- 2) Running distance (1000 km/day)
- 3) Number of running train (trains/day-one direction)
- 4) Volume of transportation (million people-km/day)
- 5) Passenger traffic receipts (million rupees/day)

6) Internal rate of return FIRR (%), EIRR (%)

(2) Timing

2 years after project completion

End