Ex-ante Evaluation

1. Name of the Project
Country: India Project: Delhi Mass Rapid Transport System Project Phase 2 (II) (Loan Agreement: 03/30/2007; Loan Amount: 13,583 million yen; Borrower: The President of India)
2. Necessity and Relevance of JBIC's Assistance
In large cities like Delhi and Bangalore, traffic congestion accompanying the increase in road traffic demand has become a serious problem. Since this causes economic loss and damage to health due to air, noise and other forms of pollution, there is an urgent need to introduce a mass transportation system to relieve traffic congestion and to cope with vehicle emissions. In response to these issues, in addition to meeting the demand for transportation brought about by recent economic growth, in the Tenth Five-Year Plan (April 2002-March 2007), the Government of India promotes the development of a public transportation system from the perspective of safety, energy efficiency, and environmental conservation. In the current administration's Common Minimum Programme (May 2004) as well as in the budget speech by the Indian Finance Minister for FY2007, the importance of installing urban transportation system is emphasized. In JBIC's current Medium-Term Strategy for Overseas Economic Cooperation Operations, priority areas for assistance to India are "Economic Infrastructure Development" and "Environmental Improvement." The assistance provided by this project is consistent with this strategy. The population of Delhi increased from 6.2 million in 1981 to 13.7 million in 2001 (population density: 9,340 people/km^2). Because the number of buses and private vehicles have also increased, the average speed of vehicles on urban roads reduced to 13km/h, resulting in economic loss due to traffic congestion and health damage due to vehicle emissions including air and noise pollution. Because it is difficult to significantly expand the road network and the capacity of existing public transportation (buses and railroads), extending the mass rapid transit system built in the first phase of this project (JBIC's previous loan, "Delhi Mass Rapid Transport System Project") is a linchpin of the Delhi government's urban transportation policy and its measures against urban environmental problems. Thus, given the need to introduce a mass rapid transportation system for alleviation of traffic congestion and measures to relieve vehicle emissions, JBIC's assistance in this project is highly necessary and highly relevant.
3. Project Objectives
The objective of this project is to cope with the increase of traffic demand in Delhi, the capital city of India, by extending the mass rapid transport system with a total length of 54km in Delhi, thereby promoting regional economic development and improving urban environment through the alleviation of traffic congestion and reduction of pollution caused by motor vehicles.
4. Project Description

(1) Target Area
National Capital Territory of Delhi

(2) Project Outline
The following 6 segments of 5 lines will be built in Delhi as Phase 2 of the urban rapid tranport plan in Delhi (total length approximately 245 km).

(a) Civil works
Line 1: Shahdara – Dilshad Garden (above ground: 3.09km)
Line 2: Central Secretariat – Qutb Minar (underground: 11.76km)
Vishwa Vidalaya－Jahangirpuri (above ground: 5.42km, underground: 0.94km)
Line 3: Indraprastha – New Ashok Nagar (8.07km)
Line 4: Yamuna Bank – Anand Behal (above ground: 6.16km)
Line 5: Kirti Nagar – Mundaka, Ashok Park – Inderlok (above ground: 18.47km)
Construction of an at grade station, 32 elevated stations, 10 underground stations
(b) Electrical, telecommunication, and signaling systems
(c) Procurement of rolling stocks
(d) Construction of depots
(e) Consulting services
The parts targeted for ODA loans are civil works (underground parts including subway stations, track sections along the entire line), electricity and communications related construction along the entire line, procurement of railroad cars, and consulting services.

(3) Total Project Cost/Loan Amount:
213,238 million yen (Yen Loan Amount: 118,187 million yen)

(4) Schedule
January 2006 – October 2010 (58 months)

(5) Implementation Structure
(a) Borrower: The President of India
(b) Executing Agency: Delhi Metro Rail Corporation Limited
(c) Operation and Maintenance System: Same as (b)

(6) Environmental and Social Consideration
(a) Environmental Effects/Land Acquisition and Resident Relocation
(i) Category: A
(ii) Reason for Categorization
This project falls into a 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 Consideration” (established in April 2002). Thus this project is classified as Category A.
(iii) Environmental Permit

The EIA report, though not obligatory under the domestic laws of India, was completed in August 2005.

(iv) Anti-Pollution Measures

Noise reduction measures including the installation of soundproof walls and pads will be adopted.

(v) Natural Environment

Given that the target area of this projects is an urban area, there are no natural forests. Thus no particular adverse impact on the natural environment is expected.

(vi) Social Environment

The project needs to acquire 112.78 ha of land. It is estimated that 1,089 dwellings and structures will have to be moved. The executing agency is holding meetings with those who will be targeted in the land acquision and relocation process. The resident relocation proceedings are scheduled to be completed pursuant to the Land Acquisition Law and the Delhi government's relocation and rehabilitation policy. In addition, with regard to residents of slum areas, the executing agency will provide for value the right to use land in a relocation site in a suburb of Delhi and hire an NGO at its own expense to monitor the living conditons of the residents after they have been relocated.

(vii) Others/Monitoring

In this project, the executing agency will monitor a wide range of matters including noise, air quality, water quality, groundwater levels, land acquisition and resident relocation.

(b) Promotion of Poverty Reduction

None

(c) Promotion of Social Development (e.g. Gender Perspective)

Most of the itinerant laborers who will be engaged in this project live alone and are believed to be at high risk of contracting HIV. Consequently, drawing upon the measures taken in Phase 1, the executing agency will, as part of its social contribution activity, hire an NGO to carry out HIV prevention activities. Additionally, continuing from Phase I, the station houses and coaches will be built by taking into consideration the needs of the elderly and the disabled (e.g., in the design of elevators and restrooms and the provision of in-train announcements, signs in braille and space for wheelchairs).

(7) Other Important Issues

Because of the unexpectedly expeditious progress made in the procurement proceedings and the changes in the alignment of some of the lines, an additional 13,583 million yen in assistance will be needed by the end of FY2007.

5. Outcome Targets

(1) Evaluation Indicators (Operation and Effect Indicator)

Indicator	Target (2012, 2 years after completion)
Operating rate (%/year)	92
Running distance (thousand km/day)	91.93

Line 1 (Shahdara – Dilshad Garden)	5.64
Line 2 (Central Secretariat – Qutb Minar)	22.20
Line 2 (Vishwa Vidalaya – Jahangirpuri)	11.60
Line 3 (Indraprastha – New Ashok Nagar)	13.56
Line 4 (Yamuna Bank – Anand Vihar)	7.90
Line 5 (Kirti Nagar – Mundaka) (Ashok Park – Inderlok)	31.03
Number of running trains (trains/day-1 direction)	1272
Line 1 (Shahdara – Dilshad Garden)	228 (X=6)
Line 2 (Central Secretariat – Qutb Minar)	236 (X=3)
Line 2 (Vishwa Vidalaya – Jahangirpuri)	228 (X=6)
Line 3 (Indraprastha – New Ashok Nagar)	210 (X=4)
Line 4 (Yamuna Bank – Anand Vihar)	160 (X=12)
Line 5 (Kirti Nagar – Mundaka) (Ashok Park – Inderlok)	210 (X=4)
Volume of transportation (million persons-km/ day)	37.63
Passenger traffic receipts (million rupees/day)	37.63

(Running every X minutes during peak hours)

(2) Internal Rate of Return

Financial Internal Rate of Return: 9.4%

(a) Cost: Project costs, operation and maintenance expenses
(b) Benefit: Fare income, income from advertisements, income from real estate development
(c) Project Life: 30 years

Economic Internal Rate of Return: 21.7%

(a) Cost: Project costs (excluding tax), operation and maintenance expenses
(b) Benefit: Cost savings on conventional means of transportation and roads, reduction in travel time for users of these lines and other means of transportation, savings on the operation expenses of transportation systems such as buses reduced road congestion, and effect of reducing accidents and pollution
(c) Project life: 30 years

6. External Risk Factors

Economic stagnation/deterioration and natural disasters in India and the surrounding area of the project

7. Lessons Learned from Findings of Similar Projects Undertaken in the Past

In the ex-post evaluations of previous railway and underground rail projects, it has been learned that establishment of a financially independent project implementation structure is important from the standpoint of ensuring proper operation and maintenance. In this project, it is desirable to adjust this project's routes so as not to compete with bus routes in order to boost the usage rate. The Delhi government is already conducting this adjustment, and Delhi Transport Corporation has agreed 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, etc.

8. Plans for Future Evaluation

(1) Indicators for Future Evaluation

(a) Operating rate (operating train cars/procured train cars) (%/year)
(b) Running distance (thousand km/day)
(c) Number of running trains (trains/day-1 direction)
(d) Volume of transportation (million persons-km/ day)
(e) Passenger traffic receipts (million rupees/day)
(f) Internal rate of return: FIRR (%), EIRR (%)

(2) Timing of Next Evaluation

After project completion