Ex-ante Evaluation Paper (for Japanese ODA Loan)

South Asia Division 1, South Asia Department, JICA

1. Name of the Project

Country: India

Project: Mumbai Metro Line 3 Project (II)

Loan Agreement: March 29, 2018

2. Background and Necessity of the Project

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

Rapid urbanization has progressed in India in recent years, and while the number of registered automobiles and motorcycles has increased dramatically, there has been little progress in terms of improving the public transportation infrastructure. In major cities like Delhi and Mumbai, traffic congestion from ever-growing traffic demand has become a serious problem, especially the economic losses and health problems caused by air and noise pollution from vehicles have become a grave issue. For this reason, it has become necessary to establish a public transportation system to alleviate traffic congestion and improve the urban environment.

As a response to the above-mentioned issues, the government of India has been implementing measures to cope with the recent surge in transportation demand brought about by economic growth, and has attached strong importance to improving the public transportation system from the viewpoint of safety, energy efficiency, and preserving the social environment.

The Mumbai metropolitan area, one of the India's largest metropolitan areas, reached a population of 20.7 million people in 2016. The population density of Mumbai city at the center of the area is 20,482 people/km², making it one of the most densely populated cities in the world. The number of registered automobiles in all of India has risen dramatically from 1.03 million in 2000 to 3.06 million in 2011. As a result, the average vehicle speed on major city roadways is just 15 km/h, and traffic congestion has become a severe problem. Besides, expanding the existing road network is also difficult due to lack of land available for construction.

To resolve these urgent issues, the government of Maharashtra has developed an urban transportation plan for introducing a mass rapid transportation system, which was aimed at alleviating congestion in the existing public transportation system, improving traffic conditions, and reducing air pollution. The Mumbai Metro Master Plan was formulated in January 2004, including an Urban Railway development plan that divided the city into 9 routes with a total distance of 146.5 km. As a part of this plan the Mumbai Metro Line 3 Project (hereinafter, “the

Project"), which connects the southern tip of Mumbai to the Mumbai International Airport through the city center and extends to the northern suburbs of the city, was regarded as a project to be implemented as soon as possible to resolve the problems discussed above, and positioned as vital to promoting economic growth of the Mumbai metropolitan area.

(2) Japan and JICA's Urban Transport Sector Policy and the Positioning of this Project

Japan's Country Assistance Policy for India (March 2016) indicates "strengthening connectivity" as a priority issue, including improvement to transportation infrastructure. It also states that with a view to de-bottlenecking the infrastructure based constraints to investment and growth, improving rail systems (including high-speed and urban railways) is vital to strengthening connectivity within major industrial cities as well as connectivity between various economic zones and regions in India.

In addition, the JICA Country Analysis Paper for India (March 2012) concluded the need to support infrastructure with the development of trunk-line railways, urban railways, roads, and harbors—which promote regional economic development, improve goods distribution efficiency, and encourage increased foreign investment—with a focus on industrial clusters such as the Special Economic Zones and Economic Corridors of India's 6 major urban centers and the Delhi-Mumbai Industrial Corridor. Therefore, the Project is consistent with these policies and plans.

As of end of January 2018, there have been 56 ODA Loans to India totaling 1,972.4 billion yen for use in the overall transportation sector. Out of these, urban railway transportation sector, including the Delhi Metro and other metro projects, comprised 35 ODA loans totaling of 1,541.6 billion yen (also at the end of January 2018). It should be noted that the loan for the first phase of the Project has already been provided (L/A signed in 2013 with an amount of 71 billion yen).

(3) Other Donors' Activity

World Bank has been supporting development of the Mumbai Urban Transport Project (developing roads and suburban railways) as well as a freight railway construction plan to upgrade the east corridor. As of the end of January 2018, it has approved 80 loans totaling $17.774 billion.

Meanwhile, Asian Development Bank has provided 60 loans totaling $13.606 billion as of the end of January 2018, $176 million for the Jaipur Metro.

Agence Française de Développement has approved 180 million euro for the Kochi Metro in February 2014 as well as 310 million euro for the Bengaluru Metro in January 2016.

3. Project Description

(1) Project Objective

The objective of the Project is to cope with the increase of traffic demand in Mumbai by expanding the mass rapid transportation system, thereby promoting regional economic

development and improving urban environment, through mitigation of traffic jams and decrease of pollution caused by increasing motor vehicles.

(2) Project Site/Target Area

Mumbai metropolitan area, Maharashtra state

(3) Project Components

1) Civil and construction work (all lines are underground: Approx. 33.7 km, 26 stations)
2) Procurement of depot maintenance equipment
3) Track work (rail laying and related work over 33.7 km)
4) Electrical and mechanical work (outfitting of overhead lines, substations, etc.)
5) Signaling and telecommunication work (outfitting of signaling and communication systems)
6) Procurement of an automated fare collection system
7) Installation of tunnel ventilation system
8) Installation of automatic lifting equipment
9) Procurement of rolling stocks (248 railcars, comprising 8 railcars per line x 31 lines)
10) Other (construction of depot, procurement of passenger station security equipment)
11) Consulting services (bidding assistance, construction supervision, etc.)

ODA loan will cover all the above except for item 'x'. (As for rolling stocks, ODA loan covers procurement of 210 rail cars)

(4) Estimated Project Cost

621.374 billion yen (of which, the ODA Loan amount is 314.367 billion yen)

(5) Schedule

Scheduled from June 2013 to December 2021 (103 months total). The project completion is defined as the commencement of the service (December 2021).

(6) Project Implementation Structure

1) Borrower: President of India
2) Guarantor: None
3) Executing agency: Mumbai Metro Rail Corporation Limited (MMRCL)
4) Operation and Maintenance Agency: O&M after project completion is to be carried out directly by MMRCL.

(7) Collaboration with Other Schemes and Donors

1) Related aid activities by Japan: None in particular.
2) Aid activities of other aid organizations: World Bank is developing roads and suburban railways in the Mumbai Urban Transportation Project.

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

1) Environmental and Social Considerations

① Category: A

② Categorization Rationale: The Project deemed Category A due to its high potential to exert negative impact on the environment as defined by the 'JICA Guidelines for Environmental and Social Considerations' (promulgated in April 2010).

③ Environmental Permit: Although not required under Indian law, an Environmental Impact Assessment (EIA) report for the Project was created in September 2012. Implementing the Project requires tree cutting permission, forest clearance, and coastal regulation zone clearance, all of which are expected to be approved by April 2018.

④ Anti-Pollution Measures: During construction, measures will be taken to adequately manage pollutants, construction vehicles, heavy machinery, etc. No significant negative impact on the ground from subsidence is expected during construction due to adopting a shielded construction method that prevents soil loosening and groundwater inflow. Measures to address noise, vibration, air contamination after the railway goes into service include the following: a sound barrier will be constructed to mitigate noise; a layer of pliable rubber will be installed under the track to mitigate vibration; and a wastewater treatment facility will be installed at the railyard to prevent water contamination.

Also, in light of concerns over noise/air pollution, disposal of construction waste soil, and limits on overnight work, which were raised in discussions with residents during the Project EIA Report, the executing agency has committed to implementing and monitoring measures to address each area of concern. No particular opposition to the project implementation has been found through consultation with residents affected by the Project.

⑤ Natural Environment: The negative impact on the environment from the Project is expected to be minimum as the target area is not situated in or around any vulnerable areas such as national parks. Note that some residents objected against tree logging for the planned Cuffe Parade Station in Colaba district, and filed a lawsuit at Mumbai High Court on February 9, 2017, calling for a project injunction. However, the objection was rejected by the Supreme Court on May 18, 2017. During the lawsuit, MMRCL suspended tree clearing in the litigation area while continuing to clear trees in districts where permits were granted, and resumed tree clearing in the litigation area once the objection was rejected.

⑥ Social Environment: Land acquisition area of the Project is about 76.9 ha (of which, 2.52 ha is private land), and estimated that 2,802 households will be affected (6,941 people), out of which 2,744 households (6,867 people) will be relocated. MMRCL held consultations with residents affected by land acquisition/resettlement and planned to complete the land acquisition/resettlement process by January 2018, following the Resettlement Action Plan prepared to meet the requirements of JICA

Guidelines (based on the New Land Acquisition Act and the Maharashtra state government's resident resettlement policy, etc.). Illegally settled residents are provided with the ownership rights and resettlement expenses to a parcel of public housing provided near Mumbai.

⑦ Other/Monitoring: During construction in the Project, MMRCL is responsible for monitoring land acquisition and resettlement. Construction contractors, under the supervision of MMRCL, are responsible for monitoring noise, vibration, soil, air quality, water quality, waste, etc. Once in service, MMRCL will monitor noise, vibration, air quality, water quality, etc. MMRCL shall also use its own capital to employ an external consultant to monitor land acquisition, resettlement, and living conditions after resettlement.

2) Cross-cutting Items: Many workers engaged in the Project live alone and are considered to be at high risk of HIV infection. Therefore, using measures taken in the Delhi Metro project as a point of reference, MMRCL is coordinating with NGOs in the Project to carry out HIV/AIDS prevention activities with their own funds as a social contribution activity. At the same time, they are requesting contractors to cooperate with HIV/AIDS measures for workers, including by incorporating HIV/AIDS prevention clauses into tender documents.In accordance with domestic law, stations and railcars make allowances for use by elderly and disabled persons (i.e. accessible elevators, restrooms, station announcements, textured paving blocks to guide the blind, wheelchair spaces, etc.). There are also plans to provide customer care training to front line staff including station staff and railway crew.

3) Gender Classification: GI (S) Gender Integrated Project

<Activities/Classification Rationale> In order to ensure that women can enjoy the use of the subway in safety and comfort, the Project includes a number of efforts that include priority seating, installation of CCTV cameras in the station and railcars, and low-hanging handgrip straps. For these reasons, the Project is classified as a "gender integrated project."

(9) Other Important Issues

None in particular

4. Targeted Outcomes

(1) Quantitative Effects

1)Outcomes (Operational and Effect Indicators)

Indicator	Baseline (Actual value in 2014)	Target (2023) [2 Years after Completion]
Operating rate (%)	―	87

Running distance (1000 km)	—	73
Number of running trains per day	—	676
Volume of transportation per day (million man・km)	—	13.8
Income from Passenger per day (million rupees)	—	24.2

2) Impacts

Decrease of road vehicle volume (vehicles/year)

(2) Qualitative Effects

Improvement of traffic conditions in the Mumbai metropolitan area; alleviation of traffic congestion; production of pollution; mitigation of climate change; improved convenience by establishing reliable travel time; and economic development of the Mumbai metropolitan area.

(3) Internal Rate of Return

Based on the assumptions below, the Economic Internal Rate of Return (EIRR) of the Project is 10.1% and the Financial Internal Rate of Return (FIRR) is 2.7%.

[EIRR]

Cost: Project cost (excluding taxes), operation and maintenance cost

Benefits: Reduced operation and maintenance costs for transit means and roadways (including reduced traffic congestion and bus transportation); shorter travel time for users of main routes and other means of transportation; reduced occurrence of traffic accidents and pollution (including reduced production of greenhouse gases).

Project life: 30 years

[FIRR]

Cost: Project cost, operation and maintenance cost

Benefits: Passenger revenue, advertisement revenue, real estate development revenue

Project life: 30 years

5. External Factors and Risk Control

(1) Preconditions: None in particular

(2) External Factors: None in particular

6. Lessons Learned from Past Projects and Applications to the Project

The following lessons were learned from ex-post evaluation results etc. of the 'Delhi Mass Rapid Transport System Project' in India.

Firstly, it is preferable that public transportation bodies to cooperate with each other and establish a systematic urban transport system to achieve efficient operation of the public transport as a whole.

Secondly, to ensure that proper operation and maintenance is carried out, it is important to establish an implementation system that is financially independent from the project.

In the Project, coordination of connections between the bus lines operated by Brihanmumbai Electric Supply and Transport and Mumbai Metro monorail lines (Lines No.1 & 2) operated by MMRDA is being considered. MMRCL is also planning a commercial and real estate development related project and making efforts to strengthen its financial position.

7. Evaluation Results

JICA has been providing support for the greater metropolitan area metro project, and as the Project contributes to promoting equally distributed economic growth by alleviating traffic congestion and reducing traffic pollution in the Mumbai metropolitan area, it is judged to be consistent with Japan and JICA's policy on assistance. Moreover, given that the project is deemed to contribute to Goal 9 of the Sustainable Development Goals, the need for JICA to support the implementation of the Project is judged to be high.

8. Plan for Future Evaluation

(1) Indicators to be Used

As indicated in sections 4. (1) - (3)

(2) Timing of the Next Evaluation

Ex-post evaluation: Two years after project completion