

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

**South Asia Division 1, South Asia Department**

**Japan International Cooperation Agency**

**1. Name of the Project**

Country: India

Project: Mumbai Trans-Harbour Link Project (II)

Loan Agreement: March 27, 2020

**2. Background and Necessity of the Project**

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

In recent years, in India, while urbanization has progressed rapidly, public transport infrastructure has not been fully developed, and therefore, traffic congestion has become increasingly serious in urban areas, hindering economic development. In India, roads are responsible for 85.2% of passenger transport and 62.9% of freight transport, and the Three-Year National Action Plan (April 2017 to March 2020) formulated by the National Institution for Transforming India (NITI Aayog) cites transport as the top priority for achieving economic development, stating that the government will work to develop transport infrastructure, including roads.

Mumbai and its vicinities constitute India's largest urban area with a population of some 18.4 million (as of 2011), and Mumbai, its center, is one of the world's most densely populated cities (population density: 20,694 persons/km<sup>2</sup>). In addition, with the rapid urbanization in recent years, the number of cars registered in the City increased sharply from 1.39 million in 2006 to 2.82 million in 2016 (source: Ministry of Road Transport and Highways' Road Transport Year Book (2015-16)). Taking into consideration that there was little room for further development in Mumbai as it is located at the tip of a peninsula, the state government of Maharashtra has transferred industries located in Mumbai to Navi Mumbai, which is situated on the other side of Mumbai Bay, and attracted new industries there in an effort to promote wider economic development in the urban area. At the same time, it has worked to expand the Jawaharlal Nehru Port, which handles one of the largest amounts of freight in India (4.83 million TEU (2017-18); source: Jawaharlal Nehru Port Trust's website) and advanced urban development projects, including the development of economic special districts and the construction of a new Navi Mumbai airport. However, the only means of transport between Mumbai and Navi Mumbai consists of one road and one

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railway, both of which go around the bay, and the low connectivity between the two cities is becoming an issue to be addressed, and this problem is expected to become even more serious in the future.

For this reason, the Comprehensive Transport Study for the Mumbai Metropolitan Region (2008), which presented a vision for transport plans in the Mumbai metropolitan area, states that the Mumbai Trans-Harbour Link Project (hereinafter referred to as "the Project"), which links Mumbai and Navi Mumbai via a marine road, should be implemented early to solve the problem described above, viewing the Project as one that is essential for promoting economic growth in the Mumbai metropolitan area.

### (2) Japan and JICA's Policy and Operations in the Road Sector

The Country Assistance Policy for India (March 2016), which considered establishment of closer connectivity as a priority area, stated that JICA would support development of transport infrastructure that provides hubs and networks of transport to establish closer connectivity between major industrial cities, between economic zones, and between regions. It also considered enhancement of competitive industrial power as a priority area, stating that JICA would help developing important infrastructure such as high-standard roads. In its Country Analysis Paper (March 2018), JICA viewed development of high-productivity industries as a major development task, emphasizing that establishment of better connectivity was required in order to improve logistics and the movement of people, and the Project is in accordance with these policies and analysis. Furthermore, the Project aims at establishing better connectivity with Navi Mumbai where urban development is progressing and other areas by building a marine road to link central Mumbai on the peninsula to Navi Mumbai on the other side of Mumbai Bay in order to promote economic development in Maharashtra's Mumbai metropolitan area. Therefore, it is also anticipated to contribute to SDG Goal 9 "Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation."

Records of Japanese ODA loans for India indicate that by the end of February 2020, a total of 66 projects worth ¥2,584.5 billion had been approved in the transport sector. This includes 17 projects worth ¥506.9 billion in the road and bridge sector.

### (3) Other Donors' Activity

The World Bank carried out the Mumbai Urban Transport Project to Develop

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State Roads and Suburban Railways in Mumbai City (Approved in 2002; US\$542 million) and Phase 2 of the Project (approved in 2010; US\$430 million). The Asian Development Bank has supported state road construction in other states, including the State Road Development Project in the state of Karnataka (approved in 2010: US\$305 million) and the State Road Development Project in the state of Rajasthan (approved in 2017: US\$500 million).

### 3. Project Description

#### (1) Project objectives

The objective of the Project is to improve connectivity in Mumbai Metropolitan Region by constructing the Mumbai Trans Harbour Link connecting Mumbai with Navi Mumbai, thereby contributing to mitigation of traffic congestion and promoting regional economic development.

#### (2) Project Site/Target Area

Mumbai Metropolitan Region, State of Maharashtra

#### (3) Project Components

1) Road on the sea: three lanes on each side, about 22 km in length, superstructure work (including a 4 km extension of the bridge consisting of a PC girder bridge and steel composite deck slab bridge), substructure and foundation work (pile bent and cast in place), approach roads, connectors to the major highways, related facilities (toll gates, management facilities, etc.), road safety facilities and intelligent transport systems (ITSs), such as an electronic toll collection system (ETC) and control center

2) Consulting services: outline design, bidding assistance, and supervision for construction work

#### (4) Estimated Project Cost (Loan Amount)

\317,501 million (including the loan amount: \66,909 million)

#### (5) Schedule

March 2017 to September 2024 (91 months)

The commencement of facilities being put into use (September 2022) is considered as the completion of the Project.

#### (6) Project Implementation Structure

1) Borrower: Mumbai Metropolitan Region Development Authority (MMRDA)

2) Guarantor: President of India

3) Executing Agency: MMRDA

4) Operation and Maintenance System: After the completion of the Project,

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operation and maintenance will be outsourced to private business operators under the supervision of MMRDA, and it is expected that highly experienced operators will be assigned. MMRDA will take full responsibility for these processes.

### (7) Collaboration with Other Donors

- 1) Aid activities in Japan: N/A
- 2) Aid activities of other aid agencies, etc.: N/A

### (8) Environmental and Social Consideration/Cross-Sectoral Issues/Gender

#### Category

#### 1) Environmental and Social Consideration

- ① Category: A
- ② Reason for Categorization

The Project falls into the road and bridge sector, and has the characteristics of a project that easily affects the environment and society in the JICA Guidelines for Environmental and Social Considerations (“JICA Guidelines”; promulgated in April 2010).

#### ③ Environmental Permit

Indian domestic laws do not require the compilation of reports on environmental impact assessments (EIA) and their approval, but the reports compiled by MMRDA were approved by the Agency in November 2015. Clearance for the Coastal Regulation Zone (CRZ) was obtained from the Ministry of Environment, Forest, and Climate Change in January 2016.

#### ④ Anti-Pollution Measures

During construction work, the contractors will take measures to reduce effects on the air, noise, vibration, etc. mainly by spraying water and using low-noise construction equipment. After the road starts to be put into use, MMRDA will work with the environmental authorities of the Maharashtra state government to take measures to reduce air pollution, noise, and vibration, mainly by controlling land use along the road and installing noise-blocking walls, and thus, air pollution, noise, and vibration will be kept within the range that meets the Indian environmental standards.

#### ⑤ Natural Environment

Part of the road constructed by the Project runs through Mahul-Sewri Creek, which is within the important bird areas designated by BirdLife International, but ever since the road built in Phase 1 started to be put into

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use, there has been no particular change in the population size of birds, and it has been confirmed that birds were continuously pecking at food around the construction site. Judging from this, the Project does not have significant effects on the habitat for lesser flamingoes and other birds, and effects on the natural environment can be reduced by adopting the type of bridge that takes the needs of birds into consideration and taking conciliatory approaches such as sound-insulating walls. A total of 12.77 ha of mangrove forests will be felled in the areas where bridge piers are to be installed and ground approach roads are to be built, but plantation by the state forest bureau of mangroves in about 105 ha of substitute areas, eight times the above-mentioned area of cutovers, is currently under way.

### ⑥ Social Environment

The Project involves resettlement of 1,088 residents in 231 households and the economic resettlement of 66 households, and they are being relocated in accordance with the plan worked out so that it is based on Indian domestic laws and the Maharashtra state government's resident relocation policy and is approved by the executing agency and meets the JICA Guidelines. It also involves the acquisition of 108 ha of land, and 98.7 ha of land owned by the City & Industrial Development Corporation of Maharashtra (CIDCO) has been transferred from the Corporation to MMRDA with the acquisition by CIDCO of the remaining 9.3 ha of land under way. Compensation will be given for the acquired land based on the amounts equivalent to replacement costs in accordance with the agreement with landowners. In the consultations with residents, they expressed opinions about the places and distance of resettlement, and a basic agreement was obtained from them mainly through explanations by MMRDA about the provision of relocation sites, and residents have not expressed particular objections to the Project. Moreover, since project implementation is expected to have some effects on the livelihoods of some fishermen in Mumbai Bay, MMRDA worked out a compensation policy and explained it to them. They did not raise strong objections against it.

### ⑦ Other/Monitoring

During construction work in the Project, MMRDA plans to monitor anti-pollution measures (such as air quality, noise, and vibration) through contractors. After the road starts to be put into use, MMRDA will also

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monitor air quality, noise, and vibration as well as the post-resettlement lives of people, and in addition, during construction work and when the road is put into use, MMRDA will monitor the lives of birds such as lesser flamingoes and the growth of newly planted mangroves.

2) Cross-Sectoral Issues: N/A

3) Gender Category: GI (S) (gender activity integration project)

<Details of Activities/Reason for Categorization> As the result of consultation with the executing agency, it has been agreed that HIV measures that contribute to gender consideration will be implemented in the Project. Therefore, the Project is classified as a gender activity integration project.

(9) Other Important Issues: N/A

### 4. Targeted Outcomes

(1) Quantitative Effects

1) Outcomes(Operation and Effect Indicators)

Indicator	Baseline (Actual value in 2015)	Target (2024) [Expected value two years after project completion]
Average annual traffic volume (PCU/day)	-	47,400
Travel time (minutes) Sewri-Chirle sector (using ordinary roads via the Vashi bridge)	61 (Note 3)	16
Number of passengers (1,000 persons/year) (Note 1)	0	46,078
Freight volume (1,000 tons/year) (Note 2)	0	13,512

(Note 1) The number is calculated based on the average number of passengers by vehicle type (Based on the cooperative preliminary survey conducted in January 2017, the number is set at 2.6 persons for standard cars and 37.2 persons for buses, and it is assumed that it is one person for trucks).

(Note 2) (Since no similar survey has been carried out) The freight volume is

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calculated based on maximum loads by truck type (1 ton for small trucks and 15 tons for large or multi-axis trucks)

(Note 3) Actual value

### (2) Qualitative Effects

Expected qualitative effects include improved traffic congestion in the Mumbai metropolitan area, greater convenience provided by ensuring that people and vehicles can travel within an expected standard time, and economic development in the Mumbai metropolitan area and Navi Mumbai

### (3) Internal Rate of Return

Based on the assumptions listed below, the economic internal rate of return (EIRR) for the Project is 15.4%, and the financial internal rate of return (FIRR) is 1.5%.

#### 【EIRR】

Costs: Project (price-escalated, excluding administrative expenses), operation and maintenance, and land acquisition costs (all costs do not include taxes)

Benefits: Driving cost reduction effects and travel time reduction effects

Project life: 32 years

#### 【FIRR】

Costs: Project, operation and maintenance, and land acquisition costs

Benefits: Fare revenue

Project life: 32 years

## 5. External Factors and Risk Control

(1) Preconditions: N/A

(2) External factors

- The political and economic situation in India and the project target area shall not become worse, and massive natural disasters shall not occur.
- The policy of the government of India and the organizational structure and operations of the project executing agency shall not change.
- The situation of land and facility use in the project target area shall not change rapidly.

## 6. Lessons Learned from Past Projects

(1) Result of Evaluation of Similar Past Projects

One lesson learned mainly from the ex-post evaluation of the Rehabilitation

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and Maintenance of Bridges along Arterial Roads Project, a Japanese ODA loan for the Republic of the Philippines, is that by confirming the appropriateness of the construction period while taking rainy and dry seasons into account, the executing agency and consultants can complete construction work during an appropriate construction period and minimize the effects of natural disasters on the Project.

### (2) Lessons for the Project

In the Project, based on the lesson cite above, an agreement has been reached with the executing agency so that the construction schedule is set taking into consideration the rainy season in Mumbai when the precipitation rises sharply. The Project will be implemented according to the schedule.

## 7. Evaluation Results

The Project contributes to promotion of regional economic development in the Mumbai metropolitan area where many Japanese businesses operate. In addition, improved connectivity between Mumbai and Navi Mumbai is expected to indirectly benefit Japanese businesses whose bases are located in Navi Mumbai. The necessity of supporting in carrying out the Project is high because the Project is in accordance with the Indian government's tasks and development policy as well as the aid policy of Japan and JICA and is expected to contribute to SDG 9.

## 8. Plan for Future Evaluation

### (1) Indicators to be Used

As described in Section 4 (1) to (3)

### (2) Timing

Ex-post evaluation is scheduled for two years after project completion.