**Japanese ODA Loan**

**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: Ahmedabad Metro Project (II)

Loan Agreement: March 27, 2020

## 2. Background and Necessity of the Project

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

In recent years, in India, while demand for road transport has grown with the rapid urbanization, not much progress has been made in the development of public transport infrastructure, and traffic congestion has become a serious problem in large cities such as Delhi, Mumbai, and Ahmedabad, causing economic loss as well as serious health damage due to air pollution, noise, and other public pollution attributed to motor vehicles. For this reason, it is necessary to develop public transport systems to reduce traffic congestion and improve the urban environment.

With the progress of urbanization due to economic growth, the population of Ahmedabad increased from 3.42 million in 1991 to 7.72 million in 2019, making it the seventh largest city in India. The number of cars also increased sharply from 850,000 in 2001 to 3.66 million in 2016, and increasingly serious traffic congestion has caused greater economic loss as well as air pollution and other environmental problems. In order to cope with such population increase and the issues pertaining to it, the city government commenced Ahmedabad Municipal Transport Service (AMTS) and Bus Rapid Transport System (BRTS), and has strived to improve the public transport network in the city. However, the traffic congestion still remains unresolved, requiring the government to enhance transport capabilities to meet further growth in transport demand.

In its Three-Year Action Plan (April 2017 to March 2020), in order to meet growing transport demand resulting from economic growth in recent years, the Government of India places emphasis on public transport system development from the viewpoint of ensuring safety, achieving greater energy efficiency, and protecting society and the environment and expects to increase budgets for urban railway construction projects. The Gujarat state government also worked out a comprehensive transport plan for the Ahmedabad metropolitan area in

2012 and officially decided to build a rapid transit system called “Ahmedabad Metro” to promote utilization of public means of transport, and since then, it has viewed the construction of such a system as one of its top priority projects. Among these projects, the Ahmedabad Metro (“the Project”), which consists of an east-west line, that connects the eastern end of Ahmedabad and its western end through the city center, and a north-south line, that links the northern end of the city and its southern end along the Sabarmati River, is positioned as an indispensable project to stimulate economic growth in the Ahmedabad metropolitan area.

(2) Japan’s and JICA’s Policy and Operations in the Urban Transport Sector/Ahmedabad City

The Country Assistance Policy for India (formulated in March 2016) considers it as a priority assistance area to establish closer connectivity through development of transport infrastructure, and so on. Focusing on the need to solve infrastructural bottlenecks for investments and growth, the Policy states that it is necessary to develop railways (including high-speed and urban railways) from the perspectives of realizing effective and efficient development in urban regions and industrial cluster areas. In order to solve bottlenecks for economic growth, meanwhile, the JICA Country Analysis Paper for India (March 2018) emphasizes that it is necessary to support the country in developing infrastructure, including trunk and urban railways, roads, and ports and harbors, to contribute to promote regional economic development, effective logistic, and further investments by foreign capital in industrial clusters such as special economic zone and economic corridors which are located in the six major urban areas of the country and the Delhi-Mumbai Industrial Corridor. The Project is in accordance with these policies and analyses.

The Project, which aims to reduce traffic congestion and improving the urban environment, helps reduce greenhouse gas (GHG) emissions, and therefore, it contributes to achieving two of the sustainable development goals (SDGs): Goal 11 “Make cities and human settlements inclusive, safe, resilient, and sustainable” and Goal 13 “Take urgent action to combat climate change and its impacts.”

In the railway and urban transport sector, Japanese ODA loans have been provided to support subway projects such as the Delhi Metro, and records indicate that as of the end of February 2020, a total of 41 projects worth \2,041.3 billion had been approved. A Japanese ODA loan has already been granted to

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Phase I of the Project (loan agreement: March 2016; approved loan amount: \82,434 million).

(3) Other Donors' Activity

The World Bank has supported Mumbai urban transport projects (road and suburban railway development) as well as projects such as the development of eastern corridors in the dedicated freight railway construction plan, and in the transport sector, a total of 83 projects worth $18,762 million had been approved as of the end of January 2020. In addition to the loan of $176 million for the Jaipur Metro, the Asian Development Bank worked with the New Development Bank to finance the Mumbai Metro (2A, 2B, and No. 7 lines) in February 2019 (approved amount: $926 million for the former and $260 million for the latter), and a total of 64 projects worth $15,572 million had been approved by the end of January 2020.

## 3. Project Description

(1) Project Objectives

To cope with the increase of traffic demand in Ahmedabad by expanding the mass rapid transportation system, thereby promoting regional economic development and improving urban environment, through mitigation of traffic congestion and decrease of automobile pollution caused by increased traffic.

(2) Project Site/Target Area

Ahmedabad Metropolitan Region, State of Gujarat (northwestern India)

(3) Project Components

1) Civil engineering and construction work

East-west line: 19.8 km (13.2 km elevated and 6.6 km underground tracks; 17 stations, including the station connected to the north-south line)

North-south line: 18.9 km (18.9 km elevated tracks; 15 stations, including the station connected to the east-west line)

2) Track work

3) Electrical and mechanical work

4) Signal and telecommunication work, automatic fare collection system, etc.

5) Procurement of train cars (96 cars for 32 trains each consisting of three cars)

6) Consulting services (such as design review, bidding assistance, and supervision of construction work)

The Japanese ODA loan covers part of the elevated section of the

north-south line as well as the underground section of the east-west line of 1) and 2) to 5).

(4) Estimated Project Cost (Loan Amount)

The total project cost is \238,976 million (amount covered by the Japanese ODA loan: \13,967 million)

(5) Schedule

The Project is scheduled for March 2016 to June 2022 (76 months). The commencement of putting facilities into use (June 2022) is considered the completion of the Project.

(6) Project Implementation Structure

1) Borrower: President of India

2) Guarantor: None

3) Executing Agency: Gujarat Metro Rail Corporation Limited (GMRC)

4) Operation and Maintenance System: GMRC

(7) Collaboration with Other Donors: 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 railway sector and has the characteristics of projects that easily affect the environment and society as cited 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 Project to compile a report on its environmental impact assessments (EIA), but the Project compiled such a report, and the report was approved by the Gandhinagar-Ahmedabad Urban Railway Corporation (current GMRC) in November 2014.

④ Anti-Pollution Measures

During construction work, measures such as water sprinkling, wastewater treatment, disposal of surplus soil, and the installation of sound-insulating walls will be taken mainly to protect air and water quality, manage waste properly, and reduce noise and vibration so that the Project satisfies India's domestic emission and other environmental standards. After the start of the Project, measures such as the installation of noise-blocking

walls and layers of elastic rubber under the tracks will be taken to reduce noise and vibration as required. With respect to the effects of underground construction work on the ground, geological surveys will be conducted, and soil improvement work will be performed as required, and in addition, the shield method will be used to prevent the ground from loosening and underground water from flowing into the construction site. Thanks to these measures, serious effects due to ground subsidence are not expected.

⑤ Natural Environment

The project target area does not fall within national parks and other easily affected areas or their vicinities, and it is assumed that undesirable effects on the natural environment are minimal.

⑥ Social Environment

The Project involves the acquisition of about 95.0 ha of land (including about 9.6 ha of private land) as well as the non-voluntary relocation of 4,802 residents in 1,787 households and the economic relocation of 480 locations. GMRC started consultations with landowners and residents and proceeds with the resettlement process in accordance with the Resettlement Action Plan prepared to comply with the JICA Guidelines, the Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013, and the Gujarat state government's resident relocation policy, and so forth. The relocation is expected to be completed in August 2020. In the consultations with GMRC, residents expressed their opinions, demanding the provision of sufficient compensation and resettlement sites with well-developed infrastructure for relocation, and the Corporation is taking steps for compensation and resident relocation reflecting the requests of affected people. These affected people have not raised particular objections to the implementation of the Project.

⑦ Other/Monitoring

In the Project, GMRC is monitoring the quality of air and water, waste, noise, vibration, land acquisition, non-voluntary resident relocation, and so forth.

2) Cross-Sectoral Issues

① Projects to Combat Climate Change

The Project, which aims at relieving traffic congestion caused by use of

automobiles and other vehicles by constructing a large-volume, high-speed transport system, contributes to reduction in GHG emissions. The effects of climate change mitigated by the Project are equivalent to approximately 57,273 tons of $CO_2$/year.

② Promotion of Poverty Reduction

In the Project, consideration is given to low income earners when fares are set.

③ Measures for Infectious Diseases, Including AIDS/HIV

A large number of migrant workers are employed in the Project. Experiences in similar projects in other cities indicate that they are exposed to HIV infection risks when they are away from their families and engaged in long-term construction work. GMRC is working with NGOs to engage itself at its own expense in activities for preventing AIDS/HIV while referring to the measures taken for Delhi Metro. At the same time, by including AIDS/HIV prevention clauses in bidding documents, it seeks cooperation from contractors in taking measures to prevent workers from contracting AIDS/HIV.

④ Participatory Development and ⑤ Consideration for Persons with Disabilities, etc.

In accordance with India's domestic laws and ordinances, the Project gives consideration to elderly, disabled, and other socially disadvantaged persons when designing station buildings and passenger cars (such as escalators, lavatories, announcements, braille blocks, and wheelchair spaces), and customer care training is being provided to all frontline staff members, including station clerks and crew members.

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

<Details of Activities/Reason for Categorization>

Reason for Categorization: The Project's efforts to ensure that women can use subways in a safe and comfortable way include introducing vehicles exclusively for women, setting priority seats for women and other passengers who require support, installing CCTV cameras in station buildings and trains, providing low hand straps, and employing female guards to be assigned to all stations. For these measures, the Project is classified a gender activity integration projects.

(9) Other Important Issues: N/A

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## 4. Targeted Outcomes

(1) Quantitative Effects

1) Outcomes (Operation and Effect Indicators)

| Indicator | Baseline (Actual value in 2015/16) | Target (2024/25) [Expected value two years after project completion] |
|---|---|---|
| Operating rate (%/year) | — | North-south line: 92<br>East-West line: 92 |
| Running Distance (1,000 km/day) | — | North-south line: 21.316<br>East-West line: 26.902 |
| Number of Running Trains (No. of trains/day, one direction) | — | North-south line: 376<br>East-West line: 452 |
| Volume of Transportation (million persons-km/day) | — | North-south line: 1.1<br>East-West line: 1.4 |
| Passenger revenue (million rupees/day) | — | North-south line: 5.2<br>East-West line: 6.5 |
| Average Travel Time (minutes) | North-south line: 70.0<br>East-West line: 97.5 | North-south line: 40.0<br>East-West line: 42.0 |

(2) Qualitative Effects

Qualitative effects include improving traffic conditions in the Ahmedabad metropolitan area, easing pollution caused by traffic, mitigating climate change, increasing convenience by ensuring that people and vehicles can travel within the range of a standard travel time, and stimulating economic development in the urban city.

(3) Internal Rate of Return

Based on the assumptions listed below, the economic internal rate of return (EIRR) for the Project is 14.56%, and the financial internal rate of return (FIRR) is 2.65%.

【EIRR】

Cost: Project and operation/maintenance costs (all excluding taxes)

Benefits: Operation and maintenance cost reduction effects for means of transport (including bus transport) and roads (eased road congestion); travel time reduction effects for users of Ahmedabad Metro and other means of transport; fuel and vehicle maintenance cost reduction effects; and traffic accident and pollution reduction effects

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Project life: 30 years

【FIRR】

Cost: Project and operation/maintenance costs

Benefits: Passenger revenue, advertising revenue, and revenue from in-station development

Project life: 30 years

## 5. External Factors and Risk Control

(1) Preconditions: N/A

(2) External Factors: Massive natural disasters shall not occur.

## 6. Lessons Learned from Past Projects

One lesson learned mainly from the ex-post evaluation of the Calcutta Metro Railway Construction Project in India is that its executing agency's commitment is indispensable in order to carry out a project efficiently. In particular, consultations with project affected people should be started early on the executing agency's own initiative. Among the metro railway construction projects currently under construction, there are cases of delay of the project due to the residents' lawsuit on land acquisition, which caused different claims of route alignment between the state government responsible for land acquisition and the central government / metro railway corporation. Ambiguity of the role of state government for the project after dissolving its capital tie-up with metro railway corporation is also the factor of the delay.

The state government has taken the initiative in planning and implementing the Project. In carrying out the Project, GMRC and the state government take responsibility for land acquisition. Explanations to residents to be relocated have already begun, and it has been confirmed that details of the Project and compensation policy have been explained through visits to each household.

## 7. Evaluation Results

The Project is in accordance with the development tasks and policy of India as well as the cooperation policies and analyses of Japan and JICA, and contributes to developing regional economy and improving the urban environment by reducing traffic congestion and its pollution. It also contributes to two of the SDGs: Goal 11 "Make cities and human settlements inclusive, safe, resilient, and sustainable" and Goal 13 "Take urgent action to combat climate

change and its impacts.” Therefore, the necessity to support the implementation of the Project is high.

## 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.