Ex-Ante Evaluation (for Japanese ODA Loan)

1. Name of the Project

Country: The People's Republic of Bangladesh

Project: The Kanchpur, Meghna and Gumti 2nd Bridges Construction and Existing Bridges Rehabilitation Project (II)

Loan Agreement: June 29, 2017

Loan Amount: 52,730 million Yen

Borrower: The Government of the People's Republic of Bangladesh

2. Background and Necessity of the Project

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

In the People's Republic of Bangladesh, where the annual growth rate of the gross domestic product (GDP) has been maintained at 6% strong for over ten years, the volume of cargo and passenger transport handled increased 1.48-fold in the four years from 2005 to 2009. This volume is expected to continue increasing by 6-7% every year until 2030. The major transport modes in the country are inland transport by water, railway and road. Among these, road accounts for the largest share at more than 70% for both passenger and cargo transport (2016). However, the development of new roads is not keeping up with the increase in transport volume and conditions of existing roads and bridges are deteriorating due to lack of maintenance, which adversely affects passenger and cargo transport.

In particular, the economic corridor on National Highway No. 1 between the Dhaka Metropolitan Area and Chittagong, the country's second largest city, accounts for 30% of the population of the country and 50% of the GDP, driving the country's economic development. The vehicle traffic volume on Kanchpur, Meghna and Gumti Bridges on this national highway has exceeded the planned capacity by up to about 60% (2012), and is expected to increase to three-fold the planned capacity in 2025. Therefore, in 2008, the Government of Bangladesh started to increase the number of lanes on the entire length of National Highway No. 1 to four or eight in accordance with the traffic volume and other factors. For Kanchpur, Meghna and Gumti Bridges, there is also an urgent need to increase the number of lanes (through construction of second bridges) to enhance the traffic capacity. Having long supported passenger and cargo transport between Dhaka and Chittagong, the road surface of these existing bridges is severely damaged, posing a problem for traffic. Moreover, there are concerns about the safety of these bridges because they do not meet the new domestic earthquake resistance standards that were tightened after the completion of the bridges and they are suffering from bridge pier scouring, so rehabilitation and reinforcement of these existing bridges is another urgent issue.

(2) Development Policies for the Road Sector in Bangladesh and the Priority of the Project

The 7th Five-Year Plan (FY2016/17–FY2020/21) states, in line with the 6th Five-Year

Plan, that a modern and efficient road transport system will play an important role in achieving the plan and Vision 2021 (2009), a midterm vision of the country. It also lists the development of six lanes for all roads on National Highway No. 1 between Dhaka and Chittagong as one of the major objectives. The Road Master Plan (2009) states that the improvement of National Highway No. 1 is essential to responding to the increase of transport demand in the next 20 years.

This project, which enhances National Highway No. 1 through constructing new bridges and rehabilitating the existing bridges to address the sharply increasing transport demand, is highly prioritized in the development policy of this country.

(3) Japan and JICA's Policy and Operation in the Road Sector

The Country Assistance Policy for Bangladesh (June 2012) sets the acceleration of economic growth as a priority area and aims to contribute to the development of transport and traffic infrastructure including bridges and arterial roads such as Dhaka-Chittagong Economic Corridor for promoting the efficient transport of passengers and goods, as well as for mitigation of regional disparities. Moreover, the JICA Country Analysis Paper for Bangladesh (April 2013) also identifies the "development of a national transport network" as a priority issue. The Project is in line with these policies and the analysis.

The major support activities in the road sector in the past include the following:

- Grant Aid: Meghna Bridge Construction Project (FY1986), Meghna and Gumti Bridge Construction Project (FY1991), Project for Reconstruction of Small and Medium Bridges on Dhaka-Chittagong Highway (FY1997–FY1998), Project for Improvement of Steel Bridges for Roads in Rural Areas (FY2001–FY2002), etc.
- Loan: Eastern Bangladesh Bridge Improvement Project (FY2008), Chittagong City Outer Ring Road Project (FY2009), Western Bangladesh Bridge Improvement Project (FY2015), Cross-Border Road Network Improvement Project (Bangladesh) (FY2016), etc.
- Technical Cooperation: Dispatch of Road and Bridge Maintenance Advisors (FY1998–present), etc.

(4) Other Donors' Activity

The major donors in the road sector in Bangladesh are JICA, the Asian Development Bank (ADB), and the World Bank. The ADB has supported the widening of roads and the reform of the transport sector (including the institutional capacity building in the Highways Department of the Ministry of Road Transport and Bridges) through South Asian Subregional Economic Cooperation. The World Bank assisted the Highways Department with the restoration and maintenance of roads from the 1990s to 2006. China supported the construction of all eight China-Bangladesh Friendship Bridges from 1986 to 2016, as well as held a meeting of the Joint Working Group for the Bangladesh, China, India and Myanmar Economic Corridor in 2013 to promote the concept of economic

corridor.

(5) Necessity of the Project

As discussed above, the Project is in line with the assistance policies and the analysis of the Government of Japan and JICA. In addition, the policies of the Government of Bangladesh identify the urgent need of improving the National Highway No. 1, which is one of the key routes. The Project will improve the safety and enhance the transport capacity of National Highway No. 1 through the rehabilitation of the existing bridges and construction of second bridges adjacent to the existing bridges, thereby contributing to achieving the ninth goal of the Sustainable Development Goals (SDGs). Therefore, the necessity for JICA to support the Project is substantial.

3. Project Description

(1) Project Objective

The objectives of the Project are to strengthen the capacity and the efficiency of transport and to improve the safety of bridges in Bangladesh by rehabilitating existing Kanchpur, Meghna and Gumti bridges, and constructing 2nd new Kanchpur, Meghna and Gumti bridges adjacent to their existing bridges on Dhaka-Chittagong National Highway No. 1, thereby contributing to sustainable economic development of Bangladesh.

(2) Project Site / Target Area

Narayanganj District, Munshiganj District and Comilla District, Bangladesh

(3)Project Components

1) Repair of Kanchpur Bridge (overall length 0.4 km, 4 lanes), Meghna Bridge (0.9 km, 4 lanes) and Gumti Bridge (1.4 km, 4 lanes)
2) Construction of 2nd Kanchpur Bridge (overall length 0.4 km, 4 lanes), 2nd Meghna Bridge (0.9 km, 4 lanes), 2nd Gumti Bridge (1.4 km, 4 lanes), their approach roads, Development of Kanchpur Intersection (Chittagong side) and Widening of 2 lanes connection roads at the end of 2nd Meghna Bridge and 2nd Gumti Bridge to 4 lanes (1.85km)
3) Installation of overloading control equipment: axle load scales (2 for each bridge), deck scales (1 for each bridge) and an inspection vehicle (1 for all bridges)
4) Consulting Services (e.g., detailed design, bidding assistance and construction supervision)

(4) Estimated Project Cost (Loan Amount)

103,288 million Yen (Loan Amount: 52,730 million Yen

(5) Schedule

March 2013 – April 2022 (110 months in total). The Project will be completed when the facilities are put in place (April 2020).

(6) Project Implementation Structure

1) Borrower: The Government of the People's Republic of Bangladesh
2) Executing Agency: Roads and Highways Department, Ministry of Road Transport and Bridges (RHD)
3) Operation and Maintenance System: The operation and maintenance of the Project is provided by RHD

(7) Environmental and Social Consideration / Poverty Reduction / Social Development

1) Environmental and Social Consideration

① Category: A

② Reason for the Categorization: The project falls into the roads and bridges sector (located in a sensitive area and is likely to have significant adverse impact due to its characteristic) under the JICA Guidelines for Environmental and Social Considerations (April, 2010).

③ Environmental Permit:

The Environmental Impact Assessment (EIA) Report for the Project was approved by the Department of Environment, Ministry of Environment and Forest of Bangladesh in October 2012.

④ Anti-Pollution Measures:

As it is expected that operation of construction machinery will generate coarse particles and noise during construction, the following measures will be taken: water sprinkling, covers on load-carrying platforms of vehicles, installation of sound-proof sheets near houses and use of low-noise heavy machinery. As for water pollution, water-shielding steel-pipe sheet-pile foundation and steel sheet piles will prevent muddy water from flowing into rivers, and muddy water will be treated in detritus tanks before being discharged so that the environmental criteria of the country will be satisfied. All excavated soil (about 14,000 m^3) will be used for the construction of approach roads in the project. The result of the bottom sediment survey conducted as part of EIA confirms that the soil does not contain heavy metal or any other harmful substance exceeding the criteria.

⑤ Natural Environment:

The target area does not apply to a vulnerable area, such as national park, or its surrounding. The Meghna and Gumti Rivers may have rare species of river dolphins, which may be affected by the underwater noise and vibration from pile driving and nighttime lighting. If any river dolphin is spotted, pile driving and the operation of construction vessels will be suspended and nighttime lighting will be limited to the

construction sites. Therefore, no serious adverse impact on the natural environment is expected.

⑥ Social Environment:

Although the Project is carried out within the land owned by the executing agency and does not require land acquisition, it required the involuntary relocation of a total of 294 residents for the construction of the three bridges. The relocation was carried out according to the regulations of the country and the Resettlement Action Plan (RAP). There was a meeting with residents during the development of the RAP, where the project outline, compensation through payment of the replacement costs, support measures, monitoring plan, complaint handling mechanism, etc., were explained. Meeting participants made requests for a construction planning that will minimize relocation, the provision of appropriate compensation and measures to support livelihood recovery, and asked questions about relocation schedule. No special opposition against the project was identified throughout the meeting.

⑦ Other / Monitoring:

Concerning the resident relocation, the executing agency will conduct internal monitoring and external experts will also monitor the status of relocation and the status of livelihood recovery after relocation. As for the environment, the executing agency will monitor air quality, noise, vibration, water quality, etc., during the construction and after the commencement of service.

2) Promotion of Poverty Reduction: Measures to support livelihood recovery has been taken for poor illegal residents who were relocated.

3) Promotion of Social Development: Educational activities for construction workers concerning HIV/AIDS prevention will be carried out with support from consultants.

(8) Collaboration with Other Donors: In collaboration with ADB, JICA will support RHD in strengthening its organization system.

(9) Other Important Issues: The Project adopts the steel-pipe sheet-pile foundation work, a high-quality technology at which Japanese firms excel.

4. Targeted Outcomes

(1) Quantitative Effects

1) Performance Indicators (Operation and Effect Indicators)

Indicator	Baseline (Actual Value in 2012)	Target（2022） 【Expected value 2 years after project completion】
Annual average traffic volume (no. of vehicles/day) (*1)	76,732 (Kanchpur Bridge) 65,008 (Meghna Bridge) 65,008 (Gumti Bridge)	155,100 (Kanchpur Bridge) 108,900 (Meghna Bridge) 101,000 (Gumti Bridge)
Reduction of travel time (min) (*2)	23	5
Improvement of average driving speed (km/h) (*3)	14	60
Indicator	Baseline (Actual Value in 2015)	Target（2022） 【Expected value 2 years after project completion】
Volume of Transportation (Passengers) (person per year)(*4)	206,586 (Kanchpur Bridge) 103,955 (Meghna Bridge) 106,602 (Gumti Bridge)	256,835 (Kanchpur Bridge) 130,700 (Meghna Bridge) 133,786 (Gumti Bridge)
Volume of Transportation (Cargo) (ton per year)(*5)	51,460 (Kanchpur Bridge) 51,796 (Meghna Bridge) 47,203 (Gumti Bridge)	78,491 (Kanchpur Bridge) 79,011 (Meghna Bridge) 71,994 (Gumti Bridge)

*1 Number of vehicles is the value converted by passenger car unit (PCU) based on 24 hour traffic volume measurement.

*2 The value is the average time passing the total length of 5.3 km, including the three bridges and their approach roads.

*3 The value is for the length about 47 km from Jatrabari crossing, the starting point of the National Highway No. 1, to Shahidnagar crossing, the end point of the Gumti Bridge.

*4 The value is provided by annual average traffic volume times average number of passengers per vehicle, common in all bridges.

*5 The value is provided by annual average traffic volume times volume of average cargo (ton per vehicle), common in all bridges

2) Internal Rate of Return

According to the following preconditions, this project's Economic Internal Rate of Return (EIRR) will be 23.2%. The Financial Internal Rate of Return (FIRR) of Kalna Bridge will be 4.0%.

【EIRR】

Cost: Project Cost (excluding tax), operation/maintenance costs

Benefit: Reduction in vehicle operation cost and travel time, and others.

Project Life: 25 years

【FIRR】

Cost: Project costs, operation/maintenance costs

Benefit: Toll revenue

Project Life: 25 years

(2) Qualitative Effects

Improved safety of existing bridges by strengthening earthquake resistance, revitalization of the economy of the whole country of Bangladesh through revitalization of the economy between Dhaka-Chittagong economic corridor.

5. External Factors and Risk Control

Delay in civil engineering works caused by natural disasters such as a flood

6. Lessons Learned from Past Projects

(1) Lessons Learned from Past Projects

The result of the ex-post evaluation of the Rupsha Bridge Construction Project in Bangladesh highlights the necessity to strengthen the maintenance capabilities of the executing agency for large-size bridges, strengthen the mid- and long-term financial planning capabilities including toll setting, and tighten overload control.

(2) Application of Lessons Learned to the Project

As the Project is for the rehabilitation and construction of large bridges, based on the above-described lesson, the bridge maintenance capabilities of the executing agency will be strengthened through consulting services and technical cooperation. It has been confirmed that the maintenance cost can be covered with the current toll level. As for overload, the Ministry of Road Transport and Bridges, the regulatory agency, has agreed that axle load scales, etc., should be included in the project components to tighten control.

7. Plan for Future Evaluation

(1) Indicators to be Used

1) Annual average traffic volume (no. of vehicles/day), Reduction of travel time (min), Improvement of average driving speed (km/h), Volume of Transportation (Passengers) (person per year), Volume of Transportation (Cargo) (ton per year)
2) Economic Internal Rate of Return (EIRR) (%), Financial Internal Rate of Return (FIRR) (%)

(2) Timing: Two years after the project completion