

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

### 1. Name of the Project

Country: The Republic of the Union of Myanmar

Project: Yangon-Mandalay Railway Improvement Project Phase I (II)

Loan Agreement: March 1, 2017

Loan Amount: 25,000 million yen

Borrower: The Government of the Republic of the Union of Myanmar

### 2. Background and Necessity of the Project

#### (1) Current State and Issues of the Railway Sector in Myanmar

The overall length of the railway network in Myanmar is 6,106 km (2014), and all lines are managed and operated by Myanmar Railways (MR). Nearly all trunk lines were constructed during the British colonial period, thereafter MR worked to build new lines and double-track existing lines. Between 1988 and 2010, MR built new lines that today comprise nearly half of its railway network. MR has appropriated the majority of its annual investments to the construction of new lines; as a result, renovating existing transport facilities and equipment has become a major issue to address. Among all MR lines, the approx. 620-km-long, double-tracked Yangon-Mandalay line is an important one that connects Yangon, Myanmar's largest commercial city; Nay Pyi Taw, the capital city; and Mandalay, the country's second largest commercial city. The Yangon-Mandalay section belongs to the Central North-South Corridor, the main artery of Myanmar's economy; if all modes of transport are combined, it has both the largest passenger and cargo traffic in Myanmar, accounting for approximately 50% of passenger traffic and 45% of cargo traffic in the country (2013). A total of 19.55 million people, 37% of the population, live in the Yangon, Bago, and Mandalay areas through which the Yangon-Mandalay line runs (2014). In the future, the population in these areas is expected to further increase as Myanmar's economy develops. Against this backdrop, the number of passengers in the Central North-South Corridor is anticipated to increase from 42.8 million/km in 2014 to 230.8 million/km in 2030. The amount of cargo is projected to increase from 41.3 million t/km in 2014 to 216.9 million t/km in 2030. As described above, as overall transport demands increase, it is necessary to increase the efficiency of all modes of transport, including railways, for the Yangon-Mandalay region. However, while demands for passenger and cargo transport through the Yangon-Mandalay line have increased, events such as reductions in train speed, delays, and derailments continue to occur, and declines in transport services are becoming an issue to address. To meet fast-growing demand and improve railway services, replacing and modernizing antiquated transport facilities and equipment have become an urgent issue.

#### (2) Development Policies for the Railway Sector in Myanmar and Priority of the

## Project

Myanmar's government worked out the National Comprehensive Development Plan (NCDP) to present strategic national development goals. It has also drawn up the National Spatial Development Plan to clarify the country's overall development vision, and each sector has formulated specific plans based on the national plan. The transport sector formulated the National Transport Master Plan in collaboration with JICA, and the Master Plan was approved at a cabinet meeting in December 2015. The Master Plan views the Yangon-Mandalay Railway Improvement Project as a priority project that should be implemented with haste, and Myanmar's government views the project as one to which it should give top priority among the Japanese ODA loan projects requested in October 2013. In September 2014, a Japanese ODA Loan Agreement was concluded for the first period of Phase I of the Yangon-Mandalay Railway Improvement Project. The new administration, which came into being in March 2016 and is led by the National League for Democracy (NLD), unveiled its new economic policy in July 2016; in this policy, it emphasized that it would pay particular attention to the swift development of basic economic infrastructures. In the 100-Day Action Plan it launched after the change of administrations, the Ministry of Transport and Communications described the improvement of the Yangon-Mandalay railway as the top priority for the railway sector. Thus, the Project is positioned as one of the new administration's important undertakings.

### (3) Japan and JICA's Policy and Operations in the Railway Sector

The Japanese government's economic cooperation policy for Myanmar (formulated in April 2012) views "Assistance for development of infrastructure and related systems necessary for sustainable economic development" as a priority area, citing improvement and modernization of railway operations as one specific measure. The Project meets this policy goal. The Project, which connects the major cities of Yangon, Nay Pyi Taw, and Mandalay, also satisfies Item IV, "Strengthening of Transport Infrastructure to Connect Urban and Rural Areas," a priority area in the Japan-Myanmar Cooperation Program, which was developed jointly between the governments of Japan and Myanmar. The results of support for Myanmar's railway sector include the following ODA loan cooperation projects: the Kyangin Cement Plant Railway Reinforcement Project (1982), the Railway Modernization Plan (1982 and 1984), and the Vehicle Improvement Project (1984).

### (4) Other Donors' Activities

Germany supported the establishment of the Railways Technical Training Centre in 1981, and provided technical support to maintain railway facilities during the 1990s. While China is currently helping to build rolling stock factories (for locomotives and passenger trains) and to procure rolling stocks (locomotives and passenger trains) through loans, India now supports rolling stock procurement using the same means of funding. South Korea helped to establish the Myitnge passenger train manufacturing

factory in 1969 and concluded a contract to support procuring new passenger trains through its economic development cooperation fund in 2015. These activities do not overlap with the Project.

#### (5) Necessity of the Project

The Project, which plans to improve and modernize part of the existing railway that connects Yangon, Myanmar's largest city, with Mandalay, its second largest, is in accordance with Myanmar's development tasks and Japan's economic cooperation policy. It also contributes to the construction of robust infrastructures by increasing railway transport capabilities and is expected to contribute to the achievement of Sustainable Development Goal 9. For these reasons, it is highly necessary for JICA to implement the Project.

### **3. Project Description**

#### (1) Project Objective:

The objective of the Project is to improve the capacity of railway transportation by rehabilitating and modernizing the existing railway and related facilities from Yangon to Toungoo in part of Yangon-Mandalay Railway, thereby contributing to economic development of Myanmar.

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

The Project covers the approximately 260-km-long Yangon-Taungoo section (excluding the Yangon-Pazundaung section, which is covered by the grant aid cooperation "Central Railway Monitoring Center and Maintenance Equipment Improvement Plan") of the existing railway between Yangon and Mandalay (approximately 620 km). Plans call for the Yangon-Mandalay Railway Improvement Project Phase II to cover the remaining Taungoo-Mandalay section (approximately 360 km).

#### (3) Project Components:

Existing railways and related facilities and equipment along the approx. 260-km-long Yangon-Taungoo section of the existing railway between Yangon and Mandalay (approximately 620 km)

- 1) Construction works (repair and improvement of civil engineering structures, including tracks, as well as new depot and workshop construction)
- 2) Railway systems (renovation of signal communication facilities)
- 3) Rolling stocks (including introduction of new vehicles)
- 4) Electric facilities(including 66kv/6.6kv transformer substations)
- 5) Consulting services (such as bidding assistance and construction supervision)

Major changes from the first period: As a result of detailed design, depot construction has been moved forward from the following phase, and tracks have been changed to high-standard ones based on ASEAN's standards.

(4) Estimated Project Cost: 112,735 million yen (91,291 million yen covered by the Japanese ODA loan, including 25,000 million yen covered by this period)

(5) Schedule:

The Project will last for 125 months from September 2014 to January 2025. The Project will be deemed complete upon completion of construction work in January 2023. (Since construction work will be implemented on a live railway, the railway will be brought into service as soon as construction work is completed for the relevant section.)

(6) Project Implementation Structure

1) Borrower: Government of the Republic of the Union of Myanmar

2) Executing Agency: Myanmar Railways (MR)

3) Operation and Maintenance System:

After completion of the Project, MR will operate and maintain the renovated section.

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

1) Environmental and Social Considerations

① Category: B

② Reason for categorization:

The Project does not fall under large-scale projects in the railway sector as listed in the JICA Guidelines for Environmental and Social Considerations (published in April 2010) because its adverse effects on the environment are not considered to be serious. Its characteristics are not considered to be those that are likely to affect the environment as listed in the Guidelines, nor is its site considered to be one where the environment is likely to be affected.

③ Environmental Permit:

The environmental impact assessment report for the Project was approved by the Environmental Conservation Department of the Ministry of Environmental Conservation and Forestry in October 2014. The new depot and workshop added to the Project do not require additional environmental procedures under Myanmar's environmental laws and ordinances.

④ Anti-Pollution Measures:

It is assumed that the effects of air pollution and water contamination expected during construction work will be minimized by reducing dust by sprinkling water and taking the conciliatory approach of installing spillways and grit chambers as required; moreover, the noise expected to be generated will be controlled by adjusting work processes and maintaining construction equipment so that noise is kept to minimal levels. After the railway comes into service, noise due to train operation and other public nuisances is expected, but it is assumed the railway will not have serious effects because it is located away from residential areas.

⑤ Natural Environment:

The Project site is not a national park or other area where the environment is likely to be affected, and it is assumed that the adverse effects of the Project on the natural environment will be minimal.

⑥ Social Environment:

The Project will affect 32 people from 7 households; of these, 31 from 6 households must be physically relocated, and a total of 80 acres of land are expected to be acquired. The residents will be relocated, and the land will be acquired, in accordance with Myanmar's laws and ordinances and the Abbreviated Resettlement Action Plan formulated based on the JICA Guidelines for Environmental and Social Considerations. No particular objections have been expressed in discussions with the residents.

⑦ Other/Monitoring:

During construction work, MR will monitor water quality, noise levels, and so forth. After the railway comes into service, MR will continue to monitor noise levels and so forth.

2) Promotion of Poverty Reduction: N/A

3) Promotion of Social Development: HIV measures will be taken during construction work.

(8) Collaboration with Other Donors: N/A

**4. Target Outcomes**

(1) Quantitative Effects

1) Performance Indicators (Operation and Effect Indicators)

Indicator	Baseline (Recorded in 2013)	Target (2027) (4 years after completion)
No. of passengers transported (persons/km/day)*	3,317,908	27,524,873
Amount of cargo transported (t/km/day)*	2,789,477	15,815,649
No. of trains operated (trains/day)	27.5	164
Distance traveled by rolling stocks (km/day)	11,112	52,119
Travel time between Yangon and Taungoo (for passengers)	6 hrs. 54 min.	3 hrs. 20 min.

\* The effects of all sections between Yangon and Mandalay will be measured.

(Note) Construction work for Phase I (Yangon-Taungoo section) will be completed in 2023, but the targets have been set for two years after the completion of improvement and modernization work for the Yangon-Mandalay section, which is scheduled for 2025.

(2) Qualitative Effects: Safe train operation, revitalization of the regional economy, and invigoration of logistics

(3) Internal Rate of Return

Based on the following assumptions, the Economic Internal Rate of Return (EIRR) for

the Project is 24.3%, while the Financial Internal Rate of Return (FIRR) is 13.0%.

[EIRR]

Costs: Project costs (excluding tax) and operation/maintenance costs

Benefits: Shorter travel times for railway users, reduced automobile driving costs, reduced automobile driving times, and increased fare revenue

Project life: 30 years

[FIRR]

Costs: Project costs (including tax) and operation/maintenance costs

Benefits: Fare revenue and cargo transport revenue

Project life: 30 years

## **5. External Factors and Risk Control**

- Procuring sleepers and ballasts for track improvement without delay (by MR using its budget)
- Completing embankment at the site where a new depot and workshop will be constructed without delay (by MR using its budget)

## **6. Lessons Learned from Past Projects**

### (1) Lessons Learned from Similar Projects

The lesson learned mainly from the results of an evaluation of the "Depok Depot Construction Project" in the Republic of Indonesia after its completion is that if facilities are designed to mechanize work processes and make operations efficient, it is important to assess the executing agency's technical level, to design facilities that enable appropriate operation and management, and to consider comprehensive technical support, including facility operation and management, because introduced equipment cannot be fully utilized unless corresponding technology is introduced.

### (2) Application of Lessons Learned to the Project

The Project also plans to introduce relatively high-performance machinery and equipment for depots, vehicles, signal systems, and so on. Therefore, it plans to not only transfer technology through consulting services but also to provide necessary technical support through the technical assistance project, "The Project on Improvement of Railway Service and Rolling Stock Maintenance" (to be launched in March 2017) based on the results of the "Data collection Survey on Maintenance on Rolling-Stock in the Republic of the Union of Myanmar" completed in December 2016.

## **7. Plan for Future Evaluation**

### (1) Indicators to Be Used

- 1) No. of passengers transported (persons/km/day)
- 2) Amount of cargo transported (t/km/day)
- 3) No. of trains operated (trains/day)
- 4) Distance traveled by rolling stocks (km/day)
- 5) Travel time between Yangon and Taungoo

### (2) Timing of the Next Evaluation

Four years after the completion of the Project (to be evaluated two years after the completion of the next phase, when sufficient evaluation of the EIRR is expected)