

【Philippines】

Overview of Urban Railways and a New Subway Project in Manila

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1. Introduction

In Manila, the capital of the Philippines, urban rail lines have been established, including LRT Line 1 in 1984, MRT Line 3 in 1999, and LRT Line 2 in 2003. Through partial extensions, a metropolitan railway network spanning approximately 50km was established in the early 2000s. Additionally, the Philippine National Railways (PNR) had been gradually developing since the late 19th century during the Spanish colonial period, and currently oversees a total route length of approximately 480km, connecting the northern and southern regions of Luzon Island with Manila.

However, until the mid-2010s, insufficient infrastructure investment in the Philippines hindered the expansion of the railway network, resulting in problems such as reduced operational efficiency in the urban rail systems due to inadequate maintenance. Additionally, in the case of the PNR, numerous sections remained suspended due to the effects of disasters and other factors.

Subsequently, from the mid-2010s onward, there has been a lively promotion of infrastructure

development, as symbolized by policies such as the “Build Build Build” initiative advocated by former President Duterte and the “Build Better More” policy championed by the current President Marcos. Various projects have been undertaken in the field of railways, including the construction of new rail lines and the extension and renovation of existing routes. Some of these projects are of a significant scale, with a total cost exceeding six billion USD for solo projects.

In September 2023, the JTTRI team visited Manila’s operational lines and the ongoing construction site of the Metro Manila Subway Project (MMSB) in Manila. This report provides an overview of Manila’s operational urban railways and the current situation of the MMSB, which is being developed with Japanese support.

2. Overview of Operational Urban Railways

The current operational lines in the Manila Metropolitan Area consist of four routes: LRT Line 1, LRT Line 2, MRT Line 3, and PNR. The route maps and brief descriptions of these lines are provided below.



Source) Website of the Department of Transport, Philippines

Figure-1 LRT and MRT Route Map ^{Note1)}

Table-1 Summary of LRT Line 1


Section	Baclaran to Roosevelt
Open	December 1984
Length	19.65 km
Station	20
Gauge	1,435 mm
Roiling Stocks	

Table- 2 Summary of LRT Line 2



Section	Recto to Antipolo
Open	April 2003
Length	17.8 km
Station	13
Gauge	1,435 mm
Rolling Stocks	

Table-3 Summary of MRT Line 3


Section	North Avenue to Taft
Open	December 1999
Length	16.9 km
Station	13
Gauge	1,435 mm
Rolling Stocks	



Source) Website of PNR

Figure-2 PNR Route Map

Table-4 Summary of PNR (Operational Section)

Section	Gov. Pascual to Tutuban to Alabang
Station	19
Gauge	1,067 mm
Roiling Stocks	

During the visit to these railways, it was evident that train occupancy rates were particularly high during the morning and evening commuting hours. At stations, long lines formed at ticket vending machines and counters for ticket purchases, and queues extended to the ticket gates for baggage inspection. Meanwhile, in terms of road traffic, severe congestion plagued the city during peak commuting hours, resulting in frequent delays in citywide car travel, even during daytime hours. These situations made it clear that the current railway system in Manila alone is insufficient to adequately alleviate urban congestion. There is a pressing need for further expanding the railway network, increasing transport capacity, and enhancing the flow within station premises, among other measures.

It's worth noting that efforts are underway to improve connectivity not only within individual railway projects but also between railways and road transportation at existing stations. For example, at Ayala Station on MRT Line 3, there's a substantial terminal for buses and shared transportation, along with a large commercial facility. These initiatives aim

to enhance the convenience of transferring between various modes of transportation and improve accessibility to commercial facilities, with the railway station at its core.



Picture-1 Congestion at Ayala Station



Picture-2 The Bus Terminal Adjacent to Ayala Station



Picture-3 EV Charging Stations



Picture-4 Scene of the Site Visit

Several railway projects are currently underway in the Manila Metropolitan Area, reflecting

their particular importance, as previously mentioned. These developments are noteworthy to be monitored. In the upcoming chapters, we will focus on MMSP, the first subway system in the Philippines, and delve into its details.

3. Overview of MMSP Phase 1

In 2014, the Philippine government approved the 'Roadmap for Transport Infrastructure Development for Metro Manila and its Surrounding Areas'. As part of the proposed expansion of the mass transportation network, Phase 1 of MMSP received government approval in 2017 and construction commenced in 2019. This marks the Philippines' first subway development project, funded through Japanese ODA loans from the Japan International Cooperation Agency (JICA) with the condition of the Special Terms for Economic Partnership (STEP) utilizing Japanese technology support. Several Japanese companies are participating in this project.

The route summary, route map, and longitudinal profile of MMSP Phase 1 are provided below. Almost all sections are underground, with cut-and-cover stations and shield tunnels excavated by Tunnel Boring Machines (TBM) for the stretches between stations. The underground sections are designed to be constructed at a depth of approximately 20m to 30m from the surface, with relatively stable rock or silt and sand layers confirmed below 5m to 10m deep.

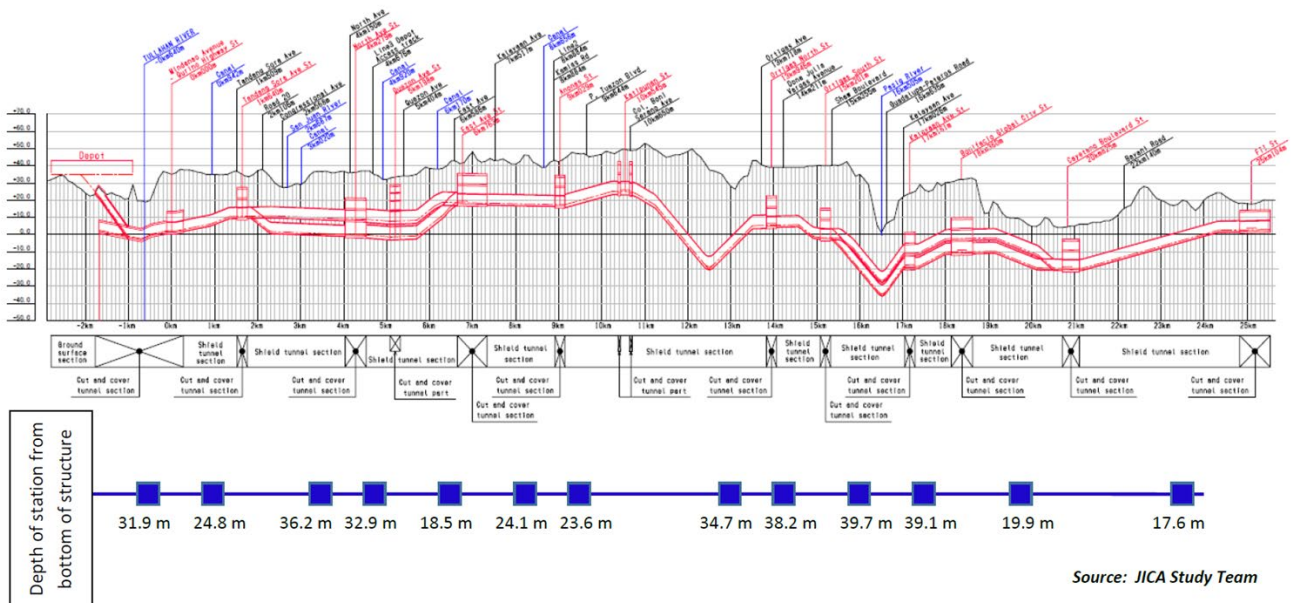
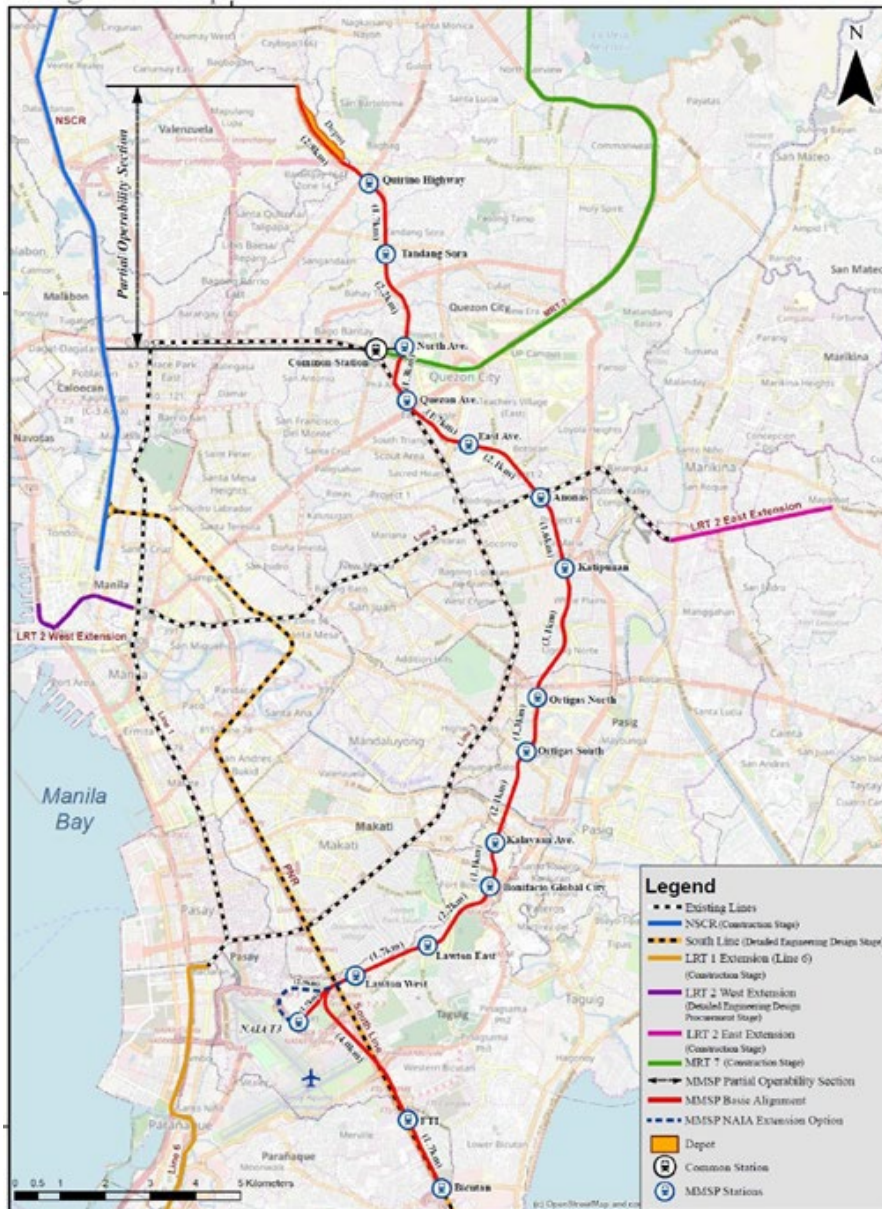
Out of the 7 civil packages, 4 have already been contracted, and 3 are in the bidding process. Both the railway system and rolling stocks procurement packages have also already been contracted.

Table-5 Summary of MMSP Phase 1

Section	East Valenzuela to Bicutan, and to NAIA Terminal 3
Project Cost	Approx. 356,960 million PHP
Length	Approx. 36 km
Station	17
Gauge	1,435 mm
Project Owner	Department of Transport, Philippines

Alignment Map

July 28, 2019



Source: JICA Study Team

Source) Website of the Department of Transport, Philippines

Figure-3 MMSP Phase 1 Route Map and Longitudinal Profile

4. Visit to MMSP Phase 1 Construction Site

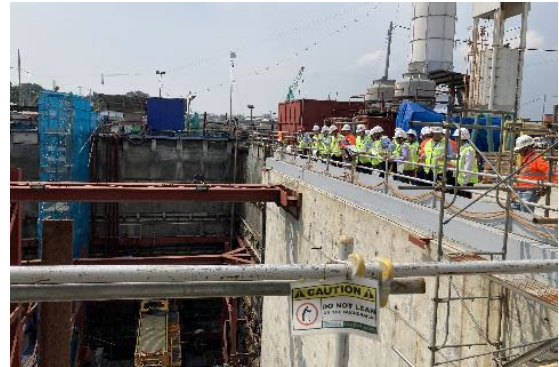
With the support of the project owner, the JTTRI team visited the construction site of CP101, which is the earliest in terms of contract start date and the most advanced in terms of construction progress among the civil packages in MMSP Phase 1. This work section is located at the north end of MMSP Phase 1, with a length of 6.9km, involving the construction of 4 stations and a depot, including the construction of six single-track tunnels with an outer diameter of approximately 7m (three sections in between stations for both up and down lines).

During the visit, we went to the TBM launch shaft between East Valenzuela Station and Quirino Highway Station. The tunnel excavation had progressed to approximately 100m to 200m for each of the up and down lines, and equipment installation, such as subsequent TBM cars and belt conveyors, was underway in the limited shaft space. At the time of the visit, only two TBMs were operational, but plans are in place for up to six TBMs to operate simultaneously as the project continues. Further project expansion is anticipated in the future.

In shield tunneling, direct observation of the excavation face (cutting face) is generally challenging. Therefore, construction supervision requires specialized knowledge and experience, including closely monitoring cutting face pressure, assessing the condition of excavated soil, selecting proper cutter bits based on geological conditions, and adjusting slurry and additives. Work inside the shield tunnel frequently involves specialized machinery, and central control rooms are essential for consolidating and managing extensive measurement data and machinery control information.

For the time being, experienced Japanese tunnel engineers primarily handle construction supervision. However, there are plans to gradually develop local human resources and transfer technology to Filipino engineers, allowing them to assume similar responsibilities as the project advances. The goal is

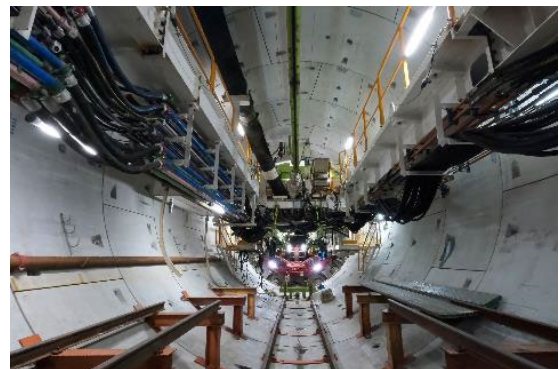
to involve Filipinos in tunnel construction and supervision.



Picture-5 Outside the TBM Launch Shaft



Picture-6 Inside the TBM Launch Shaft



Picture-7 Inside the Shield Tunnel



Picture-8 Central Control Room of TBM



Picture-9 Scene of the Construction Site Visit

5. Conclusion

During this visit, we observed the steady progress of MMSP Phase 1, the Philippines' first subway. Additionally, in the greater Manila area, various railway projects are underway, encompassing the southward extension of MRT Line 1, the establishment of MRT Line 7, the development of a north-south commuter railway connecting Manila and its suburbs, the creation of the Philippines Railway institute to foster talent in the railway sector, and the enhancement of Transit-Oriented Development (TOD) capabilities. These projects span a wide range of activities within the railway sector.

In the Manila metropolitan area, severe congestion has become a common issue. However, the current railway network has limited capacity to meet the demand for mobility. With the advancement of various railway projects, including MMSP, it is anticipated that a more effective transportation network will address this problem.

Note

Note1) LRT Line 2 extended its eastern section (4 kilometers, 2 stations) and began operations in July 2021. However, this expansion is not reflected on the current route map.

References

- 1) Department of Transportation website, <https://dotr.gov.ph/railways-sector/mrt.html>
- 2) National Economic and Development Authority website, <https://neda.gov.ph/>
- 3) Light Rail Transit Authority website, <https://www.lrta.gov.ph/>
- 4) Metro Rail Transit LINE-3 website, <https://www.dotrmrt3.gov.ph/>
- 5) Japan Railway Technical Service, ‘世界の鉄道’
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