LABOR MARKET INTELLIGENCE REPORT | 2024

METRO MANILA SUBWAY PROJECT: Unearthing Skills Needs, Unleashing Opportunities

TABLE OF CONTENTS

I. BACKGROUND

Transport in the Philippines is vital for connecting the population to economic centers across the archipelago. The country has a comprehensive network of approximately 215,000 kilometers of roads, over 1,300 ports, and 215 airports. Road transport is predominant, handling 98% of passenger traffic and 58% of cargo traffic. Urban transport, especially in Metro Manila, relies heavily on road-based vehicles like jeepneys, taxis, and motorcycles, which contribute to congestion and traffic accidents. The city's public transport is largely operated by the private sector, including 433 bus companies and various jeepney operators.

Metro Manila's urban transport infrastructure includes roads and railways, with private operators managing most public transport services. The city's rail system consists of light and heavy rail lines, with ongoing expansion projects aimed at alleviating traffic congestion. The Build Better More infrastructure program of the Marcos administration involves the advancing several railway projects under the. These include the LRT-1 Cavite Extension, which will boost capacity and reduce travel time between Baclaran and Bacoor; the MRT-7, connecting Metro Manila to Bulacan; the Metro Manila Subway Project, aimed at easing the capital's main thoroughfare congestion; the 163-kilometer North-South Commuter Railway (NSCR) enhancing connectivity between Central and Southern Luzon; and the MRT 3 and MRT 4, which will improve transit within Metro Manila and to nearby provinces.

II. OBJECTIVES

The consultation intends to collect information on the current situation of the Metro Manila Subway Project construction to determine the necessary training-related support and programs for the sector. Specifically, it intends to:

- Determine the challenges and opportunities;
- Present and validate the skills map;
- Discuss the relevance of the existing Training Regulations; and
- Determine the priority skill requirements for the sector.

III. ATTENDEES

The TESDA Planning Office invited the following organizations/agencies to the industry consultations:

- The Technical Education and Skills Development Authority (TESDA)
    - Planning Office (PO)
    - Qualifications and Standards Office (QSO)
    - Partnerships and Linkages Office (PLO)
    - TESDA National Capital Region (NCR)
    - TESDA Region III
    - TESDA Region IV-A
- The Department of Transportation (DOTr)
    - Metro Manila Subway Project
- The Department of Public Works and Highways (DPWH)
- Philippine Constructors Association (PCA), Inc.
- Construction Manpower Development Foundation (CMDF)

- Sumitomo Mitsui Construction
- EEI Corporation
- First Balfour
- Megawide Corporation
- DMCI
- Oriental Consultants Global Co. Ltd. (OCG)
- DATEM

As part of the contract packages (CP) of the MMSP, the following companies/joint ventures (JV) were asked to respond to Question 2 of the survey:

- CP101: Shimizu-Fujita-Takenaka-EEI Joint Venture (SFTE-JV)
- CP102: Nishimatsu-DMCI Joint Venture (NDJV)
- CP103: Sumitomo Mitsui Construction Corp. (SMCC)
- CP104: Tokyu-Tobishima-Megawide Joint Venture (TTM-JV)
- CP106: Mitsubishi Corp. (MC)
- CP107: Japan Transport Engineering Company (J-TREC) and Sumitomo Corporation Joint Venture (JSJV)

IV. THE HIGHLIGHTS OF THE RESULTS

A. Industry Situationer

The Metro Manila Subway Project is a $7-billion subway project financed by the Japanese Government through the Japan International Cooperation Agency (JICA), which aims to “accommodate increasing transportation demand of Mega Manila, as well as to alleviate serious traffic congestion in Metro Manila by constructing an urban railway line including a subway section” (JICA, n.d.).

According to the Preparatory Survey for Metro Manila Subway Project in the Philippines by JICA, the MMSP will be implemented in two (2) phases: the Initial Phase, which covers the Central Zone in the National Capital Region (NCR), and the Future Phase, which covers both North and South Zones. The Central Zone originally consisted of 15 stations, from Mindanao Avenue in Quezon City to the Ninoy Aquino International Airport in Pasay City (Rappler.com, 2019) (see Table 1).

Table 1. Construction Phases of the MMSP

	Location	Stations	Length of Route
Initial Phase	Central Zone in the NCR, i.e., between Valenzuela and Parañaque	- East Valenzuela (depot site) - Quirino Highway - Tandang Sora - North Avenue - Quezon Avenue - East Avenue - Anonas - Katipunan - Ortigas (previously	Approx. 33 km

		Ortigas North) - Shaw (previously Ortigas South) - Kalayaan Avenue - NAIA Terminal 3 - Bonifacio Global City - Lawton - Senate - FTI - Bicutan	
Future Phase	North Zone and South Zone	Additional stations in - North Caloocan or Meycauayan, Bulacan - Dasmariñas, Cavite	

Currently, the MMSP is planning to have 17 stations, a Depot, and the Philippine Railways Institute located in Valenzuela. The stations will connect East Valenzuela Station to Bicutan, with an expected traveling time of 45 minutes. The table below lists the 17 stations and their approximate locations:

Table 2. List of Metro Manila Subway Stations and their Location

Station	Location	City
East Valenzuela	Beside the Northbound side of Mindanao Avenue near P. Dela Cruz Street	Valenzuela City
Quirino Highway	Corner of Mindanao Avenue and Quirino Highway	Quezon City
Tandang Sora	Along Mindanao Avenue, near the intersection of Mindanao Avenue and Tandang Sora Avenue	Quezon City
North Avenue	Within the property of Veterans Memorial Medical Center (DND property), on the corner of Mindanao Avenue and North Avenue	Quezon City
Quezon Avenue	Corner of EDSA and Quezon Avenue, at the Manila Seedlings (NHA	Quezon City

	property)	
East Avenue	Along V. Luna Street, near East Avenue and Kalayaan Avenue	Quezon City
Anonas	On the property of LBL Prime, near the LRT2 Anonas Station	Quezon City
Camp Aguinaldo	Within the property of E. Camp Aguinaldo, near the corner of Col. Boni Serrano and Katipunan Avenue	Quezon City
Ortigas	Within Metrowalk, near Meralco Avenue and Unimart (PCGG, Blemp property)	Pasig City
Shaw Boulevard	Along Meralco Avenue, in front of Estancia Mall (OCLP property)	Pasig City
Kalayaan Avenue	Along the intersection of 11th Avenue and 38th Street of BGC Area	Taguig City
BGC	Along the rotunda, between the Market! Market! and Serendra buildings	Taguig City
Lawton Avenue	Within NAMRIA property and Megaworld Property in McKinley	Taguig City
Senate-DepEd	Within the DepEd property near Chino Roces Road, and NSCR Nichols Station	Taguig City
NAIA Terminal 3	Within the parking area of NAIA Terminal 3	Pasay City
FTI/Arca South	Integrated with NSCR FTI Station	Parañaque City
Bicutan	Common Station with NSCR Extension	Parañaque City

There are 240 cars (8 cars/train sets). The subway is also expected to cater to approximately 519,000 passengers per day.

A joint venture (JV) between Japanese and Filipino construction companies was conducted for the implementation of this project. There are nine (9) contract packages (CP) overseen by different JVs. The stations and tunnels are Packages 1-5 and 8-9, while Package 6 is for signaling and 7 is for rolling stack. To date, the following are the contract packages with their respective JVs:

- CP101: Shimizu-Fujita-Takenaka-EEI Joint Venture (SFTE-JV)
- CP102: Nishimatsu-DMCI Joint Venture (NDJV)
- CP103: Sumitomo Mitsui Construction Corp. (SMCC)
- CP104: Tokyu-Tobishima-Megawide Joint Venture (TTM-JV)
- CP106: Mitsubishi Corp. (MC)
- CP107: Japan Transport Engineering Company (J-TREC) and Sumitomo Corporation Joint Venture (JSJV)

The remaining packages, namely CP105, CP108, and CP109, are still being procured.

In terms of the overall project and its various activities, the Environmental Impact Statement (EIS) for Metro Manila Subway Project (MMSP) (Phase 1) by the Department of Transformation (DOTr) and JICA stated that the MMSP has four stages: the (1) Pre-Construction, and (2) Construction, which discuss the methodologies of acquisition and construction, and (3) Operation, which provides plans for train operation, travel time, source of power supply, and water supply and demand, and (4) Abandonment, which centers on the plans and activities when the subway becomes nonoperational. Since this report is angled toward the construction sector, we shall only focus on the pre-construction and construction phases. Table 3 summarizes the activities conducted in those two phases.

1. Pre-Construction - During this phase, the acquisition of ROW at the proposed depot, stations, and subterranean land covered by a 50-meter distance from the surface to the proposed structures will be conducted. Site preparation activities will include the clearing of existing vegetation, as well as the removal and demolition of existing structures on the proposed depot and stations.
2. Construction - The stations, tunnels, and depot will have different construction methodologies.
    a. Stations - To construct the stations, large construction machines are used for tasks like building the RC diaphragm wall, installing road decking, excavating, and constructing the structure frame. To maintain traffic flow, measures such as creating a temporary road on acquired private land and placing shield machine bases off the road are considered. The cut-and-cover method is used for the box tunnel construction at the stations. Diaphragm walls are recommended as retaining walls, constructed by excavating the ground with slurry and pouring concrete. The top-down excavation method is employed, with base slabs built parallel to the excavation, serving as supportive struts for the retaining walls.
    b. Tunnels - The shielded tunneling method is initially chosen for the sections between stations, but it may be changed to the New Austrian tunneling method (NATM) based on a detailed geological survey in the DED phase. The

shielding method involves using a tunnel boring machine (TBM) with a shield, cutting wheel, and soil removal systems. The TBM excavates the soil, while precast segments are placed to form the tunnel. The TBM entry point is at the cut and cover sections of the stations, and the excavated soil is removed from the same section. Adequate space is required for the TBM, including material stock, equipment, and a slurry plant. The shield machine base will have an area of around 3,500m² for two TBMs per site. The number of TBMs operating simultaneously will be determined in the DED phase, considering cost and construction time. Further considerations in the detailed design phase include shortening the construction period, reducing costs, and exploring the possibility of using the NATM alternative.

c. Depot - The depot for the project line will be situated at a higher position than the current ground through embankment construction. Retaining structures will be prepared around the embankment to maximize the depot size within the limited site. The reinforced retaining wall (RRR) is initially chosen as the most suitable type, considering cost, feasibility, height requirements, and foundation conditions. The RRR consists of reinforced materials in the backfill, forming a wall at a right angle to the ground. It is cost-effective, has high structural capacity, and is applicable for heights up to 10 meters. Retaining wall construction will occur during intervals between embankment works.

Table 3. Activities Under the Pre-Construction and Construction Phases

Phase	Activities
Pre-Construction	- Land clearing ● Clearing of existing vegetation ● Removal and demolition of existing structures on the proposed depot and stations
Construction	**Stations** - Construction of: ● Reinforced Concrete (RC) diaphragm wall ● Road decking ● Structure frame ● Temporary road - Excavation - Preparation of a shield machine base around the station - Ensure lane closures for land without temporary road - Cut and cover method to build box tunnel ● form a diaphragm wall using bentonite slurry or polymer slurry for ground stabilization, place rebar cages at excavated holes, then pour concrete ● Top-down method of excavation - base slabs of the structure are constructed from top down in parallel with excavation - Finishing **Tunnel** - Shielded tunneling method for the construction in between stations (can be changed to the NATM if proven more favorable)

	● Shield: excavate the ground using a shield machine and construct a tunnel by assembling concrete or steel blocks in a circular shape ● NATM: excavate the ground transversally using an excavation machine, construct a tunnel while retaining earth pressure by falsework - Use of the tunnel boring machine (TBM) for the specific shielded tunneling method ● Use of an erector (a rotating system which picks up precast concrete segments and places them in the desired position) to build a new tunnel ring ● Excavated soil removal ● Use of slurry pipelines, if applicable - Construction of: ● Control rooms - Use of rails for transport of the precast segments, etc. **Depot** - Construction of: ● Embankment structure ● Reinforced retaining wall (RRR) to prepare any retaining structures

For the construction methodology of the MMSP, the stations use the cut-and-cover: top-down construction method. Diaphragm walls are recommended as retaining walls, constructed by excavating the ground with slurry and pouring concrete. The top-down excavation method is employed, with base slabs built parallel to the excavation, serving as supportive struts for the retaining walls. On the other hand, the tunnels use the New Austrian Tunneling Method (NATM) using Tunnel Boring Machines (TBM). The TBM excavates the soil, while precast segments are placed to form the tunnel. The TBM entry point is at the cut and cover sections of the stations, and the excavated soil is removed from the same section. Adequate space is required for the TBM, including material stock, equipment, and a slurry plant. The shield machine base will have an area of around 3,500m² for two TBMs per site.

The magnitude of the construction of the project, particularly on the tunnel alignment, inevitably affects numerous establishments. To minimize this, the DOTr conducts monitoring during the TBM tunneling, which includes monitoring of the settlement point, dilapidation survey within the influence zone of the station, which must have a 20-m distance each from the left and right sides of the station, and 15-m distance each from the left and right sides of the tunnel alignments. Here, the infrastructures within the influence zone will be checked based on their actual condition. During the excavation, these will be monitored by the contractors. If there is a crack, the tunneling activity will be immediately stopped and the Japanese experts will investigate the crack and its cause. If the investigation reveals that the tunneling activity did not cause the crack, DOTr will continue the activity. Otherwise, they will pay for the damages.

In terms of the manpower requirements, it was initially reported that the pre-construction and construction phases of the MMSP involve approximately 5,000 skilled and non-skilled

laborers. As of the third quarter of 2023, the DOTr updated that there were now 5,346 jobs across various contract packages of the MMSP. However, the number fluctuates based on the construction phases. Given that Japanese technology is expected to be utilized for the subway project, a portion of the technical personnel will be supplied by Japanese consultants. The majority of technical personnel are supplied by the Japanese consulting company, while local construction companies hire the manpower specifically for the construction works.

B. Challenges and Opportunities

Based on the discussions made during the Focused Group Discussion (FGD) on the skills requirements in the construction of the MMSP, presented below are the current challenges and opportunities identified and discussed by the industry representatives. These were divided into several aspects, such as (1) Economic, (2) Employment, and (3) Education.

Although there are challenges in different aspects listed here, TESDA can only address the challenges under its mandate, specifically, the development and/or review of TVET programs for skills needed in the construction of the MMSP.

Table 4. Summary of Challenges and Opportunities Based on the Focus Group Discussion

Areas	Challenges	Opportunities
ECONOMIC	● Budget constraints that lead to family separation as a result of recruitment ● High wages and pay expectations for locally trained workers	● Promotion of employment opportunities in provinces like CDO, Bukidnon, and Lanao
EMPLOYMENT	● Shortage of skilled workers, particularly Tunnel Boring Machine (TBM) operators, and other specialized roles ● High turnover rates and labor retention issues ● Competition from overseas opportunities ● Difficulty finding skilled workers despite proximity to the project ● Issues with the certification process of the workers ● Challenges in recruitment due to the perception and attractiveness of construction jobs ● Project complexity and the need for specialized skills not available locally	● Potential to leverage subcontractors' expertise for training programs ● Utilization of TESDA services to instill values and independence in workers ● Collaboration with TESDA for certification and training programs to ensure job placements ● Retention strategies to keep trained workers within the country ● Continuous monitoring of candidates post-training to ensure effective placement ● Providing information on job opportunities post-training to enhance recruitment efforts

		● Involving the Department of Transportation (DOTr) to negotiate training resource sharing and program adoption
EDUCATION	● Skills gap requiring extensive training and knowledge sharing ● Lack of training providers for specific skills like ring builders and PLC operators ● Necessity for TESDA certification, which can be a barrier for those without high school diplomas ● Stigma attached to construction as a career path for students	● Development of inclusive programs to address language barriers ● Incorporating construction skills into Senior High School curriculums to change perceptions and attract young talent

During the FGD, the participants noted that the specialized skills required in some areas are not available locally. This shortage includes critical roles such as Tunnel Boring Machine (TBM) operators, necessitating extensive training and knowledge sharing. According to the FGD participants, there is a lack of workers in highligh technical skills and critical roles since they opt to work abroad due to more opportunities and higher pay as compared here in the Philippines. In turn, there will be a lack of trainers, facilities and equipment to support such training, especially given the higher cost for the delivery of these programs. Also, despite efforts to promote employment opportunities in various provinces, challenges such as labor shortages, skills gaps, project complexity, budget constraints, and wage issues persist. Efforts are also complicated by competition from overseas opportunities and the necessity to address family separation concerns.

The FGD also highlighted the recruitment difficulties faced by companies like EEI Corp. and First Balfour, particularly in securing skilled workers for highly specialized roles. Both companies emphasized the importance of TESDA certification for workers and the need for more training providers for specific skills like ring building and programmable logic controllers (PLC). Despite some clients not requiring TESDA certification, EEI mandates it and provides necessary training. The fluctuating number of jobs, based on project phases and the involvement of subcontractors, further complicates hiring efforts. Initiatives to change the perception of construction as a career path and address language barriers are ongoing, with a focus on embedding construction appreciation in Senior High School and promoting the dignity and diversity of construction work.

C. Technical Skills Requirements

The list of requirements identified by the FGD participants and CPs is presented in Table 5. The participants agreed during the FGD to focus only on the Direct Workers and Equipment (Operators and Maintenance) components of the value chain since the construction of the MMSP is already ongoing. The Emerging Skills or Highly Specialized Skills were also noted by the respondents.

Table 5. List of Requirements for the Metro Manila Subway Project Construction

Value Chain (Construction Industry)	Technical Requirements (Job/Skill/Qualification)
Direct Workers	● Rough Carpenters ● Welders ● Pipefitters ● Plumbers ● Painters ● Electricians ● Tile Setters ● TIG/SMAW/GTAW Welder ● Scaffolders ● Certified Scaffolders ● Erection Crew/Erectors ● Formworks Crew ● Tinsmiths ● Foreman ● Leadmen ● Finishing Carpenters ● General Foreman ● Master Electrician ● Semi Skilled Workers (no specialized skills or advanced training) ● Unskilled Workers (Laborers/Helpers) ● Millwright ● Pre Cast Masons/Skilled ● Finishing Masons ● Sandblasting Crew ● Water Well Drilling ● Elevator Installation Technician ● Roofing ● Heat-retention and cool-retention ● Formwork construction ● Plastering ● Construction machinery and construction ● Interior finishing ● Concrete pumping ● Reinforcement construction ● Telecommunications ● Spray urethane insulation ● Tunnel and micro-tunneling ● Railway Technicians ● Senior Engineer Segment Yard ● Engineer for Segment Yard ● Foreman for Segment Yard ● Foreman for TBM ● Engineer for TBM ● Surveyor ● Chain man ● Fuel /Storage Keeper ● Engineer (Plant & Electrical) ● Foreman (Plant & Electrical) ● Foreman for Civil

	• Foreman for Arch • Cost Control • Quantity Surveyor • QC Engineer • Engineer (E&M System) • Foreman for E&M • Station Manager • Safety officer • Safety Supervisor • Occupational Health Officer • Environmental Supervisor • Design Engineer • Geotechnical Engineer • Planning Engineer • Administrator • HR Assistance • Site Clerk • Reception • Office lady • Accountant Manager • Accounting Assistant • Purchaser • Commercial Manager • Cost Control • Site Physician
Equipment (Operators and Maintenance)	• Backhoe Operators • Crane Operators (Tower Cranes) • Compactors • Grader Operators • Dump Truck Drivers • Transit Mixer Truck Drivers • Service Vehicle Drivers • Equipment Technicians • Riggers • Crane Operators (Mobile) • Alimak Operators • Gondola Tenders • Generator Set Tenders • Tower Light Tenders • Skid Loader Operators • Stamping Machine Operators • Drilling Rig Operators • Boom Truck Drivers • Building sheet metal work • Heavy Equipment Mechanic (Advance) • Equipment Machine Supervisors • Equipment Tool Keepers • Spotters
Emerging Skills (Highly Specialized Skills)	• Ring Builder • Programmable Logic Controllers (PLC) • Tunnel Boring Machine Operator • TBM Guiding System Operator

	● Advanced analytics ● Construction software ● Pay Loader Operator ● Bulldozer Operator ● Dumptruck Operator ● Forklift Operator ● Gantry Crane Operator ● Trailer Truck Driver ● Telecommunication Engineers ● Network IT Engineers ● Security Guard ● Steelman ● Cladding Installer ● Locomotive Operator

The initial list of skills requirements that was presented during the FGD was obtained from the Labor Market Information (LMI) on Future Proofing the Construction Sector by the Technical Education and Skills Development Authority (TESDA), which indicated the construction section value chain and their corresponding jobs/skills requirements. However, the list was narrowed down since the study now only focuses on the Direct Workers and Equipment (Operators and Maintenance) value chain components. During the FGD, the participants added that aside from the list presented, there is a need to include the following specialized skills/jobs:

- Ring Builder
- Programmable Logic Controllers (PLC)
- Tunnel Boring Machine Operator
- TBM Guiding System Operator
- Advanced Analytics
- Construction Software

Meanwhile, the respondents from the Contract Packages (CPs) also added the following skills requirements:

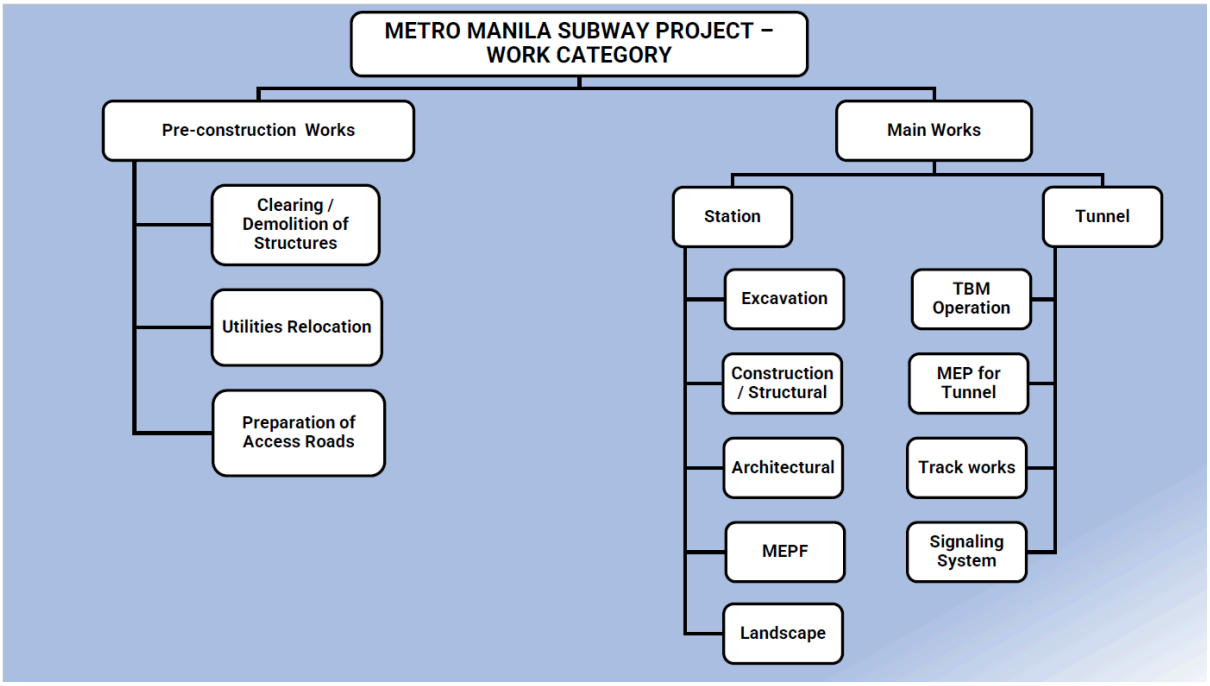
- Senior Engineer Segment Yard
- Engineer for Segment Yard
- Foreman for Segment Yard
- Foreman for TBM
- Engineer for TBM
- Surveyor
- Chain man
- Fuel /Storage Keeper
- Engineer (Plant & Electrical)
- Foreman (Plant & Electrical)
- Foreman for Civil
- Foreman for Arch
- Cost Control
- Quantity Surveyor
- QC Engineer
- Engineer (E&M System)
- Foreman for E&M
- Station Manager
- Safety officer
- Safety Supervisor
- Occupational Health Officer
- Environmental Supervisor
- Design Engineer
- Geotechnical Engineer
- Planning Engineer
- Administrator
- HR Assistance
- Site Clerk
- Reception
- Office lady
- Accountant Manager
- Accounting Assistant

- Purchaser
- Commercial Manager
- Cost Control
- Site Physician
- Pay Loader Operator
- Bulldozer Operator
- Dump Truck Operator
- Forklift Operator
- Gantry Crane Operator
- Trailer Truck Driver
- Telecommunication Engineers
- Network IT Engineers

The list of jobs/skills/priorities was considered in Questions 2a and 2b of the industry consultation questionnaire, where the respondents were asked to review and identify each listed skill as needed by the industry.

The Metro Manila Subway Project Management Office of the DOTr also identified additional jobs/skills requirements for the MMSP, which they categorized according to the construction phase and the activities under each phase (Figure 1). These were then matched with the jobs/skills included in the skills map which were validated by the respondents (Table 6).

Figure 1. Metro Manila Subway Project Work Category



Source: Department of Transportation

Table 6. Jobs/Skills Requirements of the MMSP by Construction Phase and Activity, According to DOTr, Matched with Equivalent Jobs/Skill Requirements Indicated from the Skills Map

From DOTr			From Skills Map	
Construction Phase	**Activity**	**Jobs/Skills Requirements**	**Value Chain Segment**	**Jobs/Skills/ Qualifications**
Pre-Construction	Clearing/ Demolition	Heavy Equipment Operator	Equipment (Operators and Maintenance)	Backhoe Operators
		Heavy Equipment Operator	Equipment (Operators	Crane Operators

			and Maintenance)	(Tower Cranes)
		Heavy Equipment Operator	Equipment (Operators and Maintenance)	Compactors
		Heavy Equipment Operator	Equipment (Operators and Maintenance)	Grader Operators
		Heavy Equipment Operator	Equipment (Operators and Maintenance)	Dump Truck Drivers
		Heavy Equipment Operator	Equipment (Operators and Maintenance)	Transit Mixer Truck Drivers
		Heavy Equipment Operator	Equipment (Operators and Maintenance)	Service Vehicle Drivers
		Heavy Equipment Operator	Equipment (Operators and Maintenance)	Crane Operators (Mobile)
		Heavy Equipment Operator	Equipment (Operators and Maintenance)	Alimak Operators
		Heavy Equipment Operator	Equipment (Operators and Maintenance)	Gondola Tenders
		Heavy Equipment Operator	Equipment (Operators and Maintenance)	Generator Set Tenders
		Heavy Equipment Operator	Equipment (Operators and Maintenance)	Tower Light Tenders
		Heavy Equipment Operator	Equipment (Operators and Maintenance)	Skid Loader Operators
		Heavy Equipment Operator	Equipment (Operators and Maintenance)	Stamping Machine Operators
		Heavy Equipment Operator	Equipment (Operators and Maintenance)	Drilling Rig Operators
		Heavy Equipment Operator	Equipment (Operators and Maintenance)	Boom Truck Drivers
		Heavy Equipment Operator	Equipment (Operators and Maintenance)	Building sheet metal work
		Heavy Equipment Operator	Emerging Skill	Gantry Crane Operator
		Flagman/Riggers	Equipment (Operators and Maintenance)	Riggers
		Carpenter	Direct Workers	Rough Carpenters
		Carpenter	Direct Workers	Finishing Carpenters
		Mason	Direct Workers	Pre Cast Masons/Skilled
		Mason	Direct Workers	Finishing Masons
		Electricians	Direct Workers	Electricians
		Electricians	Direct Workers	Master Electrician
		Plumbers	Direct Workers	Plumbers
		Welders/Gas	Direct Workers	Welders

		Welders/Gas	Direct Workers	TIG/SMAW/GTAW Welder
		Security Guard	**Not in the Skills Map**	
	Utilities Relocation	Electricians	Direct Workers	Electricians
		Electricians	Direct Workers	Master Electrician
		Plumbers	Direct Workers	Plumbers
		Welders	Direct Workers	Welders
		Welders	Direct Workers	TIG/SMAW/GTAW Welder
		Heavy Equipment Operators	Equipment (Operators and Maintenance)	Backhoe Operators
		Heavy Equipment Operators	Equipment (Operators and Maintenance)	Crane Operators (Tower Cranes)
		Heavy Equipment Operators	Equipment (Operators and Maintenance)	Compactors
		Heavy Equipment Operators	Equipment (Operators and Maintenance)	Grader Operators
		Heavy Equipment Operators	Equipment (Operators and Maintenance)	Dump Truck Drivers
		Heavy Equipment Operators	Equipment (Operators and Maintenance)	Transit Mixer Truck Drivers
		Heavy Equipment Operators	Equipment (Operators and Maintenance)	Service Vehicle Drivers
		Heavy Equipment Operators	Equipment (Operators and Maintenance)	Crane Operators (Mobile)
		Heavy Equipment Operators	Equipment (Operators and Maintenance)	Crane Operators (Mobile)
		Heavy Equipment Operators	Equipment (Operators and Maintenance)	Alimak Operators
		Heavy Equipment Operators	Equipment (Operators and Maintenance)	Gondola Tenders
		Heavy Equipment Operators	Equipment (Operators and Maintenance)	Generator Set Tenders
		Heavy Equipment Operators	Equipment (Operators and Maintenance)	Tower Light Tenders
		Heavy Equipment Operators	Equipment (Operators and Maintenance)	Skid Loader Operators
		Heavy Equipment Operators	Equipment (Operators and Maintenance)	Stamping Machine Operators
		Heavy Equipment Operators	Equipment (Operators and Maintenance)	Drilling Rig Operators
		Heavy Equipment Operators	Equipment (Operators and Maintenance)	Boom Truck Drivers
		Heavy Equipment	Equipment (Operators	Building sheet metal

		Operators	and Maintenance)	work
		Heavy Equipment Operator	Emerging Skill	Gantry Crane Operator
		Flagman/Riggers	Equipment (Operators and Maintenance)	Riggers
	Preparatory Access	Heavy Equipment Operator	Equipment (Operators and Maintenance)	Backhoe Operators
		Heavy Equipment Operator	Equipment (Operators and Maintenance)	Crane Operators (Tower Cranes)
		Heavy Equipment Operator	Equipment (Operators and Maintenance)	Compactors
		Heavy Equipment Operator	Equipment (Operators and Maintenance)	Grader Operators
		Heavy Equipment Operator	Equipment (Operators and Maintenance)	Dump Truck Drivers
		Heavy Equipment Operator	Equipment (Operators and Maintenance)	Transit Mixer Truck Drivers
		Heavy Equipment Operator	Equipment (Operators and Maintenance)	Service Vehicle Drivers
		Heavy Equipment Operator	Equipment (Operators and Maintenance)	Crane Operators (Mobile)
		Heavy Equipment Operator	Equipment (Operators and Maintenance)	Alimak Operators
		Heavy Equipment Operator	Equipment (Operators and Maintenance)	Gondola Tenders
		Heavy Equipment Operator	Equipment (Operators and Maintenance)	Generator Set Tenders
		Heavy Equipment Operator	Equipment (Operators and Maintenance)	Tower Light Tenders
		Heavy Equipment Operator	Equipment (Operators and Maintenance)	Skid Loader Operators
		Heavy Equipment Operator	Equipment (Operators and Maintenance)	Stamping Machine Operators
		Heavy Equipment Operator	Equipment (Operators and Maintenance)	Drilling Rig Operators
		Heavy Equipment Operator	Equipment (Operators and Maintenance)	Boom Truck Drivers
		Heavy Equipment Operator	Equipment (Operators and Maintenance)	Building sheet metal work
		Heavy Equipment Operator	Emerging Skill	Gantry Crane Operator
		Flagman/Riggers	Equipment (Operators and Maintenance)	Riggers
		Carpenter	Direct Workers	Rough Carpenters
		Carpenter	Direct Workers	Finishing Carpenters

		Mason	Direct Workers	Pre Cast Masons/Skilled
		Mason	Direct Workers	Finishing Masons
		Electricians	Direct Workers	Electricians
		Electricians	Direct Workers	Master Electrician
		Plumbers	Direct Workers	Plumbers
		Welders/Gas	Direct Workers	Welders
		Welders/Gas	Direct Workers	TIG/SMAW/GTAW Welder
		Security Guard	**Not in the Skills Map**	
Main Works	Station	Heavy Equipment Operators	Equipment (Operators and Maintenance)	Backhoe Operators
		Heavy Equipment Operators	Equipment (Operators and Maintenance)	Crane Operators (Tower Cranes)
		Heavy Equipment Operators	Equipment (Operators and Maintenance)	Compactors
		Heavy Equipment Operators	Equipment (Operators and Maintenance)	Grader Operators
		Heavy Equipment Operators	Equipment (Operators and Maintenance)	Dump Truck Drivers
		Heavy Equipment Operators	Equipment (Operators and Maintenance)	Transit Mixer Truck Drivers
		Heavy Equipment Operators	Equipment (Operators and Maintenance)	Service Vehicle Drivers
		Heavy Equipment Operators	Equipment (Operators and Maintenance)	Crane Operators (Mobile)
		Heavy Equipment Operators	Equipment (Operators and Maintenance)	Alimak Operators
		Heavy Equipment Operators	Equipment (Operators and Maintenance)	Gondola Tenders
		Heavy Equipment Operators	Equipment (Operators and Maintenance)	Generator Set Tenders
		Heavy Equipment Operators	Equipment (Operators and Maintenance)	Tower Light Tenders
		Heavy Equipment Operators	Equipment (Operators and Maintenance)	Skid Loader Operators
		Heavy Equipment Operators	Equipment (Operators and Maintenance)	Stamping Machine Operators
		Heavy Equipment Operators	Equipment (Operators and Maintenance)	Drilling Rig Operators
		Heavy Equipment Operators	Equipment (Operators and Maintenance)	Boom Truck Drivers
		Heavy Equipment Operators	Equipment (Operators and Maintenance)	Building sheet metal work

		Heavy Equipment Operator	Emerging Skill	Gantry Crane Operator
		Flagman/Riggers	Equipment (Operators and Maintenance)	Riggers
		Carpenter	Direct Workers	Rough Carpenters
		Carpenter	Direct Workers	Finishing Carpenters
		Mason	Direct Workers	Pre Cast Masons/Skilled
		Mason	Direct Workers	Finishing Masons
		Electricians	Direct Workers	Electricians
		Electricians	Direct Workers	Master Electrician
		Plumbers	Direct Workers	Plumbers
		Welders/Gas	Direct Workers	Welders
		Welders/Gas	Direct Workers	TIG/SMAW/GTAW Welder
		Steelman	**Not in the Skills Map**	
		Finishing Carpenter	Direct Workers	Finishing Carpenters
		Finishing Mason	Direct Workers	Finishing Masons
		Cladding Installer	**Not in the Skills Map**	
		Scaffolder	Direct Workers	Scaffolders
		Scaffolder	Direct Workers	Certified Scaffolders
		Tile Setter	Direct Workers	Tile Setters
		Painter	Direct Workers	Painters
		Technicians	Direct Workers	Elevator Installation Technician
		Technicians	Direct Workers	Railway Technicians
		Technicians	Equipment (Operators and Maintenance)	Equipment Technicians
	Tunnel	Mechanic	Equipment (Operators and Maintenance)	Heavy Equipment Mechanic (Advance)
		Flagman/Riggers	Equipment (Operators and Maintenance)	Riggers
		Carpenter	Direct Workers	Rough Carpenters
		Carpenter	Direct Workers	Finishing Carpenters
		Mason	Direct Workers	Pre Cast Masons/Skilled
		Mason	Direct Workers	Finishing Masons

		Electricians	Direct Workers	Electricians
		Electricians	Direct Workers	Master Electrician
		Welders/Gas	Direct Workers	Welders
		Welders/Gas	Direct Workers	TIG/SMAW/GTAW Welder
		Steelman	**Not in the Skills Map**	
		Lift/Alimak Operator	Equipment (Operators and Maintenance)	Alimak Operators
		Locomotive Operator	**Not in the Skills Map**	
		Safety/Environmental Officer	Direct Workers	Environmental Supervisor
		Man-hoist (Elevator) Operator	**Not in the Skills Map**	
		Tunnel Attendant Training	**Not in the Skills Map**	
		Work Environment Measurement (WEM) (Specific for Tunnel)	**Not in the Skills Map**	

Among these skills, the following have no equivalent skill/job from the initial skills map sent to the survey respondents:

- Security Guard
- Steelman
- Cladding Installer
- Locomotive Operator
- Man-hoist (Elevator) Operator
- Tunnel Attendant Training
- Work Environment Measurement (WEM) (Specific for Tunnel)

The MMSPMO-DOTr also emphasized the need for training for safety that focuses on tunnels and confined spaces.

D. Identified Priority

To identify the project's priorities, the submitted responses were then processed using the formula based on TESDA Circular No. 001 S. 2023. The skills that were identified as priorities by only one respondent were omitted from the list. Table 7 shows the summary results of the survey. The complete survey results can be found in the annex.

Table 7. Summary of the Identified Priorities by the MMSP Contract Packages

VALUE CHAIN	JOBS/ SKILLS/ QUALIFICATIONS	JOBS/SKILLS IMMEDIATELY NEEDED *(multiple response is allowed)*		ASSESS THE SHORTAGE OF WORKERS IN FILLING-UP THE SKILLS REQUIREMENTS *(choose only one from the three choices)*			REASONS/CONSTRAINTS IN FILLING-UP THE SKILLS REQUIREMENTS (e.g. no qualified applicants, prefer to work abroad, seek higher pay, work schedule)	RECOMMENDED ACTION (e.g. need for conduct of training, standardization, certification)
		In the next 1-3 years	In the next 3-5 years	Low (below 100)	Medium (100-500)	High (above 500)		
Direct Workers	Rough Carpenters	50.00%	33.33%	16.67%	16.67%	16.67%	lack of skilled manpower / insufficient manpower supply	Include safety and working in confined spaces training Need to conduct training
	Welders	66.67%	50.00%	33.33%	16.67%	16.67%	lack of skilled manpower / insufficient manpower supply Running rail welders	Need to conduct training Certification Required
	Pipefitters	33.33%	33.33%	16.67%	16.67%	16.67%	lack of skilled manpower / insufficient manpower supply	Include safety and working in confined spaces training Need to conduct training
	Plumbers	50.00%	33.33%	16.67%	16.67%	33.33%	lack of skilled manpower / insufficient manpower supply	Include safety and working in confined spaces training Need for certification
	Painters	50.00%	33.33%	33.33%	0.00%	16.67%	lack of skilled manpower / insufficient manpower supply	Include safety and working in confined spaces training Need to conduct training

	Electricians	50.00%	50.00%	33.33%	16.67%	16.67%	lack of skilled manpower / insufficient manpower supply	Include safety and working in confined spaces training Need to conduct certification
	Tile Setters	50.00%	33.33%	16.67%	0.00%	33.33%	seek higher pay and lack of manpower supply	Need to conduct certification
	TIG/SMAW/GTAW Welder	50.00%	33.33%	16.67%	16.67%	16.67%	lack of skilled manpower / insufficient manpower supply	Include safety and working in confined spaces training Need to conduct certification
	Scaffolders	50.00%	50.00%	33.33%	16.67%	16.67%	lack of skilled manpower / insufficient manpower supply	Include safety and working in confined spaces training Need to conduct training
	Certified Scaffolders	66.67%	50.00%	33.33%	16.67%	16.67%	lack of skilled manpower / insufficient manpower supply	Include safety and working in confined spaces training Need to conduct certification
	Erection Crew/Erectors	50.00%	33.33%	16.67%	16.67%	16.67%	lack of skilled manpower / insufficient manpower supply	Need to conduct training
	Formworks Crew	66.67%	50.00%	33.33%	16.67%	16.67%	lack of skilled manpower / insufficient manpower supply	Need to conduct training
	Foreman	66.67%	50.00%	33.33%	16.67%	16.67%	Seek higher pay	Include safety and working in confined spaces training Need to conduct

								certification
	Leadmen	50.00%	33.33%	16.67%	16.67%	16.67%	Seek higher pay	Need to conduct certification
	Finishing Carpenters	66.67%	50.00%	33.33%	16.67%	16.67%	lack of skilled manpower / insufficient manpower supply	Need to conduct training
	General Foreman	66.67%	50.00%	33.33%	16.67%	16.67%	Seek higher pay	Need to conduct training
	Master Electrician	50.00%	50.00%	33.33%	16.67%	16.67%	Seek higher pay	Include safety and working in confined spaces training; Enhance knowledge in understanding plan drawings/diagrams Need to conduct certification
	Semi Skilled Workers (no specialized skills or advanced training)	66.67%	50.00%	50.00%	0.00%	16.67%	lack of skilled manpower / insufficient manpower supply Prefers to work abroad	Include safety and working in confined spaces training Need to conduct training Training for update of candidates
	Unskilled Workers (Laborers/Helpers)	66.67%	50.00%	50.00%	0.00%	16.67%	lack of manpower supply	Include safety and working in confined spaces training Need to conduct training
	Millwright	33.33%	16.67%	16.67%	16.67%	0.00%		
	Pre Cast Masons/Skilled	33.33%	16.67%	16.67%	16.67%	0.00%		
	Finishing Masons	50.00%	33.33%	16.67%	0.00%	33.33%	lack of skilled manpower /	Need to conduct training

							insufficient manpower supply	
	Water Well Drilling	33.33%	0.00%	0.00%	33.33%	0.00%	lack of skilled manpower / insufficient manpower supply	Need to conduct certification
	Elevator Installation Technician	33.33%	33.33%	33.33%	16.67%	0.00%	lack of skilled manpower / insufficient manpower supply	Need to conduct certification
	Roofing	33.33%	33.33%	33.33%	16.67%	0.00%	lack of skilled manpower / insufficient manpower supply	Need to conduct training
	Heat-retention and cool-retention	33.33%	16.67%	33.33%	0.00%	0.00%		
	Formwork construction	50.00%	33.33%	16.67%	16.67%	16.67%	lack of skilled manpower / insufficient manpower supply	Need to conduct training
	Plastering	33.33%	33.33%	16.67%	33.33%	0.00%	lack of skilled manpower / insufficient manpower supply	Need to conduct standardization
	Construction machinery and construction	33.33%	33.33%	16.67%	0.00%	16.67%	lack of skilled manpower / insufficient manpower supply	Need to conduct training
	Interior finishing	50.00%	33.33%	16.67%	16.67%	16.67%	lack of skilled manpower / insufficient manpower supply	Need to conduct training
	Plumbing	50.00%	33.33%	16.67%	0.00%	33.33%	lack of skilled manpower / insufficient	Need to conduct certification

							manpower supply	
	Concrete pumping	66.67%	50.00%	33.33%	33.33%	0.00%	lack of skilled manpower / insufficient manpower supply	Need to conduct certification
	Reinforcement construction	50.00%	33.33%	16.67%	16.67%	16.67%	lack of skilled manpower / insufficient manpower supply	Need to conduct certification
	Telecommunications	33.33%	33.33%	16.67%	16.67%	16.67%	lack of skilled manpower / insufficient manpower supply	Need to conduct certification
	Spray urethane insulation	16.67%	16.67%	16.67%	16.67%	0.00%	lack of skilled manpower / insufficient manpower supply	Need to conduct certification
	Tunnel and microtunneling	50.00%	33.33%	33.33%	0.00%	16.67%	Lack of qualified applicants	Need to conduct certification
	Railway Technicians	16.67%	33.33%	16.67%	16.67%	0.00%	Lack of qualified applicants	Need to conduct certification
	Environmental Supervisor	16.67%	16.67%	16.67%	0.00%	0.00%		
Equipment (Operators and Maintenance)	Backhoe Operators	50.00%	33.33%	16.67%	16.67%	16.67%	lack of skilled manpower / insufficient manpower supply	Need to conduct certification
	Crane Operators (Tower Cranes)	50.00%	33.33%	16.67%	16.67%	16.67%	lack of skilled manpower / insufficient manpower supply	Need to conduct certification
	Compactors	50.00%	33.33%	16.67%	33.33%	0.00%	lack of skilled manpower / insufficient	Need to conduct certification

							manpower supply	
	Grader Operators	33.33%	33.33%	16.67%	33.33%	0.00%	lack of skilled manpower / insufficient manpower supply	Need to conduct certification
	Dump Truck Drivers	50.00%	33.33%	16.67%	16.67%	16.67%	lack of qualified applicants	Need to conduct certification
	Transit Mixer Truck Drivers	50.00%	33.33%	16.67%	16.67%	16.67%	lack of qualified applicants	Need to conduct certification
	Service Vehicle Drivers	66.67%	50.00%	33.33%	16.67%	16.67%	lack of qualified applicants	Need to conduct certification
	Equipment Technicians	66.67%	50.00%	33.33%	16.67%	16.67%	lack of qualified applicants	Update the current skills by adding more equipments or keeping up with latest equipments available at construction industry Need to conduct certification
	Riggers	66.67%	66.67%	50.00%	16.67%	16.67%	lack of qualified applicants	Conduct or add safety skills Need to conduct certification
	Crane Operators (Mobile)	66.67%	50.00%	33.33%	16.67%	16.67%	lack of qualified applicants	Need to conduct certification
	Gondola Tenders	33.33%	0.00%	0.00%	16.67%	0.00%		
	Generator Set Tenders	50.00%	33.33%	16.67%	16.67%	16.67%	lack of qualified applicants	Need to conduct certification
	Tower Light Tenders	33.33%	16.67%	0.00%	16.67%	16.67%	lack of qualified applicants	Need to conduct certification
	Skid Loader Operators	33.33%	16.67%	0.00%	33.33%	0.00%	lack of qualified applicants	Need to conduct certification
	Stamping Machine	33.33%	16.67%	16.67%	16.67%	0.00%		Need to conduct

	Operators							certification
	Drilling Rig Operators	50.00%	33.33%	16.67%	16.67%	16.67%	lack of qualified applicants	Need to conduct certification
	Boom Truck Drivers	66.67%	50.00%	33.33%	16.67%	16.67%	lack of qualified applicants	Need to conduct certification
	Building sheet metal work	16.67%	33.33%	16.67%	33.33%	0.00%	lack of qualified applicants	Need to conduct certification
	Heavy Equipment Mechanic (Advance)	50.00%	33.33%	16.67%	16.67%	16.67%	lack of qualified applicants	Need to conduct certification
	Equipment Machine Supervisors	50.00%	33.33%	16.67%	16.67%	16.67%	lack of qualified applicants	Need for conduct of training
	Equipment Tool Keepers	50.00%	33.33%	16.67%	16.67%	16.67%	lack of qualified applicants	Need for conduct of training
	Spotters	50.00%	33.33%	16.67%	16.67%	16.67%	lack of qualified applicants	Need for conduct of training
Emerging Skills (Highly Specialized Skills)	Ring Builder	0.00%	16.67%	0.00%	16.67%	0.00%		
	Programmable Logic Controllers (PLC)	0.00%	33.33%	16.67%	16.67%	0.00%		
	Tunnel Boring Machine Operator	50.00%	33.33%	33.33%	16.67%	16.67%	new in the industry No applicable certification yet; Seek Higher pay lack of qualified applicants	to be check by DOTR Applicable operators and trainers are currently working overseas Need to conduct certification
	TBM Guiding System Operator	50.00%	33.33%	33.33%	0.00%	16.67%	new in the industry lack of qualified applicants	to be check by DOTR Need to conduct certification
	Advanced	33.33%	0.00%	16.67%	16.67%	0.00%	lack of qualified	to be check by

	analytics						applicants	DOTR need for conduct of training
	Construction software	50.00%	33.33%	33.33%	16.67%	0.00%	To be identify lack of qualified applicants	to be checked by DOTR need for conduct of training
	Pay Loader Operator	16.67%	16.67%	16.67%	0.00%	0.00%		
	Bulldozer Operator	16.67%	16.67%	16.67%	0.00%	0.00%		
	Dumptruck Operator	16.67%	16.67%	16.67%	0.00%	0.00%		Identify in coordination with LTO license restriction codes
	Forklift Operator	16.67%	16.67%	16.67%	0.00%	0.00%		
	Gantry Crane Operator	16.67%	16.67%	16.67%	0.00%	0.00%		
	Trailer Truck Driver	16.67%	16.67%	16.67%	0.00%	0.00%		Identify in coordination with LTO license restriction codes
	Telecommunicatio n Engineers	0.00%	16.67%	16.67%	0.00%	0.00%	Prefer to work abroad	Search freshers and OJT. Preparation, during the installation, for the Operation and Maintenance activities
	Network IT Engineers	0.00%	16.67%	16.67%	0.00%	0.00%	Prefer to work abroad	Update training for new technologies

Based on the survey results with only six (6) respondents, there are numerous skills/jobs that need skilled workers and thus need the development of Training Regulations (TRs) and Competency Standards (CS). The list is summarized in Table 5 below. It is also worth noting that some of these skills/jobs already have existing equivalent TVET programs, which will be identified in the next section. As gleaned from the survey results, immediate needs span from rough carpenters to advanced roles like Tunnel Boring Machine Operators, reflecting both basic and specialized skills deficits. The need for general construction skills was emphasized by the DOTr further as they have noted that these are the skills that they need more urgently, compared to highly technical skills. According to them, the highly technical skills such as the TBM Operators are supplied by the Japanese partners. Meanwhile, the severity of the shortage varies, with several roles facing high immediate needs, notably for welders and semi-skilled workers, which can be due to the nature of their tasks in the project which would need more sets of workers. This can be compared to the low to moderate shortage of workers with highly specialized skills. Based on these results, it can be assumed that the more specialized the skills are, the less manpower they need.

In addition, the respondents noted that the constraints include preferences for higher pay and working abroad, indicating an underlying issue with local job attractiveness and compensation. Recommended actions focus extensively on conducting targeted training and certification programs, particularly emphasizing safety, working in confined spaces, and updating candidates' skills to meet current industry demands.

Table 8. Skill/Job for Development of Training Regulations

Value Chain Segment	Skill/Job	Priority Level
Direct Workers	● Rough Carpenters ● Welders ● Pipefitters ● Plumbers ● Painters ● Electricians ● TIG/SMAW/GTAW Welder ● Scaffolders ● Certified Scaffolders ● Erection Crew/Erectors ● Formworks Crew ● Foreman ● Finishing Carpenters ● General Foreman ● Master Electrician ● Semi Skilled Workers (no specialized skills or advanced training) ● Unskilled Workers (Laborers/Helpers) ● Millwright ● PreCast Masons/Skilled ● Elevator Installation Technician ● Roofing ● Formwork construction ● Construction machinery and construction	1

	• Interior finishing • Concrete pumping • Reinforcement construction • Telecommunications • Spray urethane insulation • Tunnel and microtunneling • Environmental Supervisor	
	• Railway Technicians	2
Equipment (Operators and Maintenance)	• Backhoe Operators • Crane Operators (Tower Cranes) • Dump Truck Drivers • Transit Mixer Truck Drivers • Service Vehicle Drivers • Equipment Technicians • Riggers • Crane Operators (Mobile) • Generator Set Tenders • Stamping Machine Operators • Drilling Rig Operators • Boom Truck Drivers • Heavy Equipment Mechanic (Advance) • Equipment Machine Supervisors • Equipment Tool Keepers • Spotters	1
Emerging Skills (Highly Specialized Skills)	• Tunnel Boring Machine Operator • TBM Guiding System Operator • Advanced analytics • Construction software	1
	• Programmable Logic Controllers (PLC)	2

Table 9. Skill/Job for Development of Competency Standards

Value Chain Segment	Skill/Job	Priority Level
Direct Workers	• Water Well Drilling • Plastering	1
	• Tile Setters • Finishing Masons	2
Equipment (Operators and Maintenance)	• Compactors • Grader Operators • Gondola Tenders • Tower Light Tenders • Skid Loader Operators	1
	• Building sheet metal work	2

Moreover, the additional jobs/skills requirements identified by the MMSPMO-DOTr, as listed below, that were not included in the survey of the skills map and its processing are for CS development as well:

- Security Guard
- Steelman
- Cladding Installer
- Locomotive Operator
- Man-hoist (Elevator) Operator
- Tunnel Attendant Training
- WEM Training (Specific for Tunnel)

To address the skills gaps and prepare for the emerging skills requirements, the FGD participants shared their plans on starting overseas training initiatives and researching the latest in construction advancements, including software tools, despite their high cost, conducting leadership training for successors to boost productivity, acquisition of new equipment, including the Tunnel Boring Machines from Japan and Computerized Heavy Equipment for trade tests.

E. Soft Skills and Skills Related to the 4IR

In addition to technical skills, the participants recognized the critical importance of soft skills for employees. Based on the FGD, the following soft/essential skills have been identified as necessary for the construction of the MMSP:

- Open-mindedness
- Adaptability
- Life skills
- Appreciation for the value of the construction sector
- Teamwork
- Communication skills
- Leadership skills

F. Possible Training Providers

The FGD also resulted in a list of potential training providers identified by the participants.

- Construction Manpower Development Foundation (CMDF)
- EEI Corporation
- First Balfour
- Megawide Corporation
- DMCI
- TESDA

G. Other Sectors/Sub-Industries That Will Be Affected

The FGD participants also identified potential sectors and sub-industries where the developed skills could be applied. These sectors and sub-industries include the following:

- Tourism
- Railway
- Logistics

- Land Transportation

V. Mapping of the Skills Requirements vis-a-vis Existing TR

The table below shows the mapping of the identified skills requirements for the construction of the MMSP vis-a-vis the existing TVET programs (Training Regulations or Competency Standards).

Table 10. Mapping of the Skills Requirements in the MMSP Construction vis-a-vis Existing TVET Programs

For TR Development (Priority 1)		
Value Chain Segment	Skills/Job	Equivalent TVET Program
Direct Workers	Rough Carpenters	Carpentry NC II (Amended)
	Welders	**Gas Metal Arc Welding (GMAW) NC I**
		Gas Metal Arc Welding (GMAW) NC II
		Gas Metal Arc Welding (GMAW) NC III
		Flux Cored Arc Welding (FCAW) NC I
		Flux Cored Arc Welding (FCAW) NC II
		Flux Cored Arc Welding (FCAW) NC III
		Submerged Arc Welding (SAW) NC I
		Submerged Arc Welding (SAW) NC II
		Gas Welding NC I
		Gas Welding NC II
	Pipefitters	Pipefitting (Metallic) NC II
	Plumbers	Plumbing NC I
		Plumbing NC II
		Plumbing NC III
	Painters	Construction Painting NC II
		Construction Painting NC III
	Electricians	Electrical Installation and

		Maintenance NC II
	TIG/SMAW/GTAW Welder	Gas Tungsten Arc Welding (GTAW) NC II
		Gas Tungsten Arc Welding (GTAW) NC IV
		Shielded Metal Arc Welding (SMAW) NC I
		Shielded Metal Arc Welding (SMAW) NC II
		Shielded Metal Arc Welding (SMAW) NC III
		Shielded Metal Arc Welding (SMAW) NC IV
	Scaffolders	Scaffolding Works NC II (Supported Type Scaffold)
	Certified Scaffolders	Scaffolding Works NC II (Supported Type Scaffold)
	Erection Crew/Erectors	Structural Erection NC II
	Formworks Crew	System Formworks Installation NC II
	Foreman	Construction Trade Supervision Level IV
		Construction Site Supervision Level IV
	Finishing Carpenters	Carpentry NC II
		Carpentry NC III
	General Foreman	Construction Trade Supervision Level IV
		Construction Site Supervision Level IV
	Master Electrician	Electrical Installation and Maintenance NC II
		Electrical Installation and Maintenance NC III
		Electrical Installation and Maintenance NC IV
	Semi Skilled Workers (no specialized skills or advanced training)	No Equivalent TVET Program

	Unskilled Workers (Laborers/Helpers)	Masonry NC I
	Millwright	No Equivalent TVET Program
	Pre Cast Masons/Skilled	No Equivalent TVET Program
	Elevator Installation Technician	Elevator Installation Level II
	Roofing	No Equivalent TVET Program
	Formwork construction	System Formworks Installation NC II
	Construction machinery and construction	No Equivalent TVET Program
	Interior finishing	Carpentry NC III
	Concrete pumping	HEO (Concrete Pump) NC II
	Reinforcement construction	Reinforcing Steel Works NC II
	Telecommunications	Telecom OSP and Subscriber Line Installation (Copper Cable/POTS and DSL) NC II
		Telecom OSP Installation (Fiber Optic Cable) NC II
	Spray urethane insulation	No Equivalent TVET Program
	Tunnel and microtunneling	No Equivalent TVET Program
	Environmental Supervisor	No Equivalent TVET Program
Equipment (Operators and Maintenance)	**Backhoe Operators**	**HEO (Hydraulic Excavator) NC II**
	Crane Operators (Tower Cranes)	**HEO (Tower Crane) NC III**
	Dump Truck Drivers	HEO (Articulated Off-Highway Dump Truck) NC II
		HEO (Rigid Off-Highway Dump Truck) NC II
		HEO (Rigid On-Highway Dump Truck) NC II
	Transit Mixer Truck Drivers	HEO (Transit Mixer) NC II
	Service Vehicle Drivers	Driving NC II
		Driving (Passenger Bus/Straight Truck) NC III

	Equipment Technicians	Heavy Equipment Servicing (Mechanical) NC II
	Riggers	Rigging NC I
	Crane Operators (Mobile)	HEO (Crawler Crane) NC III
		HEO (Rough Terrain Crane) NC III
		HEO (Overhead and Gantry Crane) NC III
		HEO (Truck Mounted Crane) NC III
	Generator Set Tenders	No Equivalent TVET Program
	Stamping Machine Operators	No Equivalent TVET Program
	Drilling Rig Operators	No Equivalent TVET Program
	Boom Truck Drivers	No Equivalent TVET Program
	Heavy Equipment Mechanic (Advance)	No Equivalent TVET Program
	Equipment Machine Supervisors	No Equivalent TVET Program
	Equipment Tool Keepers	No Equivalent TVET Program
	Spotters	No Equivalent TVET Program
Emerging Skills (Highly Specialized Skills)	Tunnel Boring Machine Operator	No Equivalent TVET Program
	TBM Guiding System Operator	No Equivalent TVET Program
	Advanced analytics	No Equivalent TVET Program
	Construction software	Basic 3D Building Information Modelling Level III
For TR Development (Priority 2)		
Direct Workers	Railway Technicians	No Equivalent TVET Program
Emerging Skills (Highly Specialized Skills)	Programmable Logic Controllers (PLC)	Electrical Installation and Maintenance NC IV
		Mechatronics Servicing NC III
		Mechatronics Servicing NC IV
For CS Development (Priority 1)		
Direct Workers	Water Well Drilling	Water Well Drilling Level II

	Plastering	Masonry NC II
Equipment (Operators and Maintenance)	**Compactors**	**HEO (Road Roller) NC II**
	Grader Operators	HEO (Motor Grader) NC II
	Gondola Tenders	No Equivalent TVET Program
	Tower Light Tenders	No Equivalent TVET Program
	Skid Loader Operators	No Equivalent TVET Program
For CS Development (Priority 2)		
Direct Workers	Tile Setters	Tile Setting NC II
	Finishing Masons	Masonry NC III
Equipment (Operators and Maintenance)	Building sheet metal work	No Equivalent TVET Program
For CS Development (Identified by MMSPMO-DOTr)		
[redacted]	Security Guard	Security Services NC I
		Security Services NC II
	Steelman	Reinforcing Steel Works NC II
	Cladding Installer	No Equivalent TVET Program
	Locomotive Operator	No Equivalent TVET Program
	Man-hoist (Elevator) Operator	Construction Lift Passenger/Material Elevator Operator
	Tunnel Attendant Training	No Equivalent TVET Program
	Work Environment Measurement (WEM) (Specific for Tunnel)	No Equivalent TVET Program

It should be noted that the TRs on HEO (Tower Crane) NC III, HEO (Crawler Crane) NC III, HEO (Rough Terrain Crane) NC III, HEO (Overhead and Gantry Crane) NC III, HEO (Truck Mounted Crane) NC III are currently being reviewed.

VI. TVET CAPACITY

Listed below are the data on the TVET Capacity at the national level based on the jobs/skills/occupations listed in the previous section.

Table 11. Total Number of Enrolled, Graduated, Assessed, and Certified, 2021-2023

Training Regulations/Competency Standards	2021				2022				2023			
	Enrolled	Graduates	Assessed	Certified	Enrolled	Graduates	Assessed	Certified	Enrolled	Graduates	Assessed	Certified
Training Regulations												
Carpentry NC II	8,786	7,792	7,812	7,520	8,859	9,776	11,977	11,462	8,429	8,035	12,802	12,467
Carpentry NC III	70	44	71	70	26	48	134	128	106	103	163	148
Construction Painting NC II	2,285	1,807	1,511	1,480	2,096	2,383	2,571	2,490	1,364	1,237	1,619	1,604
Construction Painting NC III	0	0	0	0	0	0	0	0	0	0	0	0
Driving (Passenger Bus/Straight Truck) NC III	711	518	3,950	3,716	951	1,028	5,990	5,679	1,133	1,026	6,282	6,049
Driving NC II	43,433	40,939	54,414	50,707	52,223	54,850	67,981	64,258	50,403	45,299	61,734	58,399
Electrical Installation and Maintenance NC II	23,926	23,275	30,742	28,039	25,830	26,958	42,191	39,054	27,406	24,022	55,588	51,920
Electrical Installation and Maintenance NC III	1,414	1,213	1,286	1,160	956	1,278	1,974	1,816	903	857	1,974	1,816
Electrical Installation and Maintenance NC IV	0	0	3	3	0	0	10	10	0	0	10	10
Flux Cored Arc	75	24	0	0	6	47	0	0	0	24	0	0

Welding (FCAW) NC I												
Flux Cored Arc Welding (FCAW) NC II	73	25	103	100	168	166	413	412	105	125	816	792
Flux Cored Arc Welding (FCAW) NC III	0	0	0	0	0	0	0	0	0	0	0	0
Gas Metal Arc Welding (GMAW) NC I	125	46	30	30	52	74	121	98	125	115	260	253
Gas Metal Arc Welding (GMAW) NC II	956	970	1,122	1,114	1,076	1,249	1,594	1,545	1,062	1,048	1,758	1,721
Gas Metal Arc Welding (GMAW) NC III	23	23	23	23	0	0	1	1	25	24	0	0
Gas Tungsten Arc Welding (GTAW) NC II	1,472	1,570	1,737	1,717	891	1,076	1,784	1,738	1,038	1,031	1,616	1,588
Gas Tungsten Arc Welding (GTAW) NC IV	0	0	0	0	0	0	0	0	0	0	0	0
Gas Welding NC I	25	25	0	0	25	24	37	37	0	0	13	13
Gas Welding NC II	2	2	0	0	11	16	0	0	6	1	0	0
Heavy Equipment Servicing (Mechanical) NC II	145	46	136	127	168	24	335	321	57	1	578	557

HEO (Articulated Off-Highway Dump Truck) NC II	0	0	0	0	0	0	0	0	0	0	0	0
HEO (Concrete Pump) NC II	0	0	0	0	0	0	0	0	0	0	0	0
HEO (Crawler Crane) NC III	0	0	14	9	0	0	20	20	0	0	253	224
HEO (Hydraulic Excavator) NC II	3,601	3,454	5,027	4,880	3,683	4,133	7,095	6,851	3,001	2,816	6,770	6,537
HEO (Motor Grader) NC II	515	416	527	509	276	348	569	534	309	262	496	471
HEO (Overhead and Gantry Crane) NC III	0	0	9	9	0	0	62	62	0	0	332	312
HEO (Rigid Off-Highway Dump Truck) NC II	101	101	83	81	22	22	243	237	21	21	544	543
HEO (Rigid On-Highway Dump Truck) NC II	1,645	1,548	3,341	3,141	509	854	3,277	3,013	149	123	3,460	3,348
HEO (Road Roller) NC II	79	79	430	379	65	105	484	434	537	519	805	738
HEO (Rough Terrain Crane) NC III	0	0	40	20	0	0	144	113	0	0	458	409
HEO (Tower Crane) NC III	0	0	6	6	0	0	27	27	0	0	267	237

HEO (Transit Mixer) NC II	0	0	164	154	0	0	600	556	0	0	580	568
HEO (Truck Mounted Crane) NC III	0	0	24	5	69	0	1,040	1,000	0	0	662	531
Masonry NC I	3,542	3,179	2,017	1,956	5,145	5,189	4,674	4,600	3,448	2,892	2,640	2,617
Masonry NC II	6,027	5,390	5,208	5,079	5,915	6,141	7,968	7,618	5,180	4,949	8,224	8,089
Masonry NC III	0	0	0	0	0	0	61	52	0	0	46	34
Pipefitting (Metallic) NC II	959	860	794	789	397	483	1,773	1,672	657	635	1,986	1,972
Plumbing NC I	1,242	1,175	924	895	1,654	1,697	1,445	1,420	2,413	2,032	1,362	1,343
Plumbing NC II	2,231	1,935	2,157	1,933	1,934	2,101	3,400	3,099	1,647	1,618	2,921	2,765
Plumbing NC III	50	49	40	40	0	0	0	0	0	0	0	0
Reinforcing Steel Works NC II	0	0	44	39	61	33	813	781	35	47	592	576
Rigging NC I	142	159	1,519	1,439	167	130	2,172	2,075	77	69	2,205	2,163
Scaffolding Works NC II (Supported Type Scaffold)	1,057	970	4,511	4,397	1,102	1,190	8,051	7,747	2,932	2,623	9,841	9,521
Shielded Metal Arc Welding (SMAW) NC I	25,330	24,870	24,578	23,288	22,957	26,820	28,034	26,588	27,350	25,350	29,538	27,839
Shielded Metal Arc Welding (SMAW) NC II	29,163	29,581	34,716	32,625	25,453	30,315	42,289	39,896	25,922	23,567	42,927	40,746
Shielded Metal Arc Welding (SMAW) NC III	1,905	1,950	1,850	1,791	785	1,059	1,150	1,120	1,562	1,561	1,258	1,227

Shielded Metal Arc Welding (SMAW) NC IV	141	140	172	169	0	0	49	41	180	180	183	178
Structural Erection NC II	0	0	0	0	0		0	0	0	0	0	0
Submerged Arc Welding (SAW) NC I	0	0	0	0	0	0	0	0	0	0	0	0
Submerged Arc Welding (SAW) NC II	0	0	0	0	0	0	0	0	0	0	0	0
System Formworks Installation NC II	0	0	20	20	37	0	22	22	21	0	145	142
Telecom OSP and Subscriber Line Installation (Copper Cable/POTS and DSL) NC II	0	0	0	0					0	0	0	0
Telecom OSP Installation (Fiber Optic Cable) NC II	59	59	20	20	35	54	103	103	132	104	147	147
Tile Setting NC II	5,850	5,322	4,256	4,069	6,219	6,702	5,410	5,297	7,961	7,390	5,611	5,456
Mechatronics Servicing NC III	98	92	0	0	153	161	0	0	242	112	0	0
Mechatronics Servicing NC IV	0	0	0	0	0	0	0	0	0	0	0	0
Security Services	124	75	29	29	134	115	112	112	110	159	99	98

NC I												
Security Services NC II	776	616	1,155	1,152	661	769	2,083	2,044	643	631	1,205	1,200
Reinforcing Steel Works NC II	0	0	44	39	61	33	813	781	35	47	592	576
Training Regulations, Total	**168,158**	**160,339**	**196,659**	**184,768**	**170,832**	**187,451**	**261,096**	**246,964**	**176,726**	**160,655**	**271,362**	**257,944**
Competency Standards												
Elevator Installation Level II	0	0			0	0			0	0		
Water Well Drilling Level II	0	0			0	0			0	0		
Construction Trade Supervision Level IV	0	0			27	25			18	16		
Construction Site Supervision Level IV	201	206			141	196			111	95		
Basic 3D Building Information Modelling Level III	0	0			0	0			0	0		
Competency Standards, Total	**201**	**206**			**168**	**221**			**129**	**111**		
Total	**168,359**	**160,545**	**196,659**	**184,768**	**171,000**	**187,672**	**261,096**	**246,964**	**176,855**	**160,766**	**271,362**	**257,944**

Table 12. Number of Assessment Centers, Competency Assessors, Registered Programs, and National TVET Trainers Certification Holders as of March 2024

Training Regulations/Competency Standards	Registered Programs	NTTC Holders	Assessment Centers	Competency Assessors
Carpentry NC II	256	687	129	225
Carpentry NC III	6	64	10	24
Construction Painting NC II	50	134	34	43
Construction Painting NC III	0	1	0	0
Driving (Passenger Bus/Straight Truck) NC III	54	272	91	144
Driving NC II	765	2,462	417	729
Electrical Installation and Maintenance NC II	518	1,580	296	511
Electrical Installation and Maintenance NC III	58	317	50	84
Electrical Installation and Maintenance NC IV	2	20	5	3
Flux Cored Arc Welding (FCAW) NC I	5	0	3	0
Flux Cored Arc Welding (FCAW) NC II	15	135	23	15
Flux Cored Arc Welding (FCAW) NC III	0	1	1	0
Gas Metal Arc Welding (GMAW) NC I	14	0	13	10

Gas Metal Arc Welding (GMAW) NC II	57	319	41	55
Gas Metal Arc Welding (GMAW) NC III	3	13	3	5
Gas Tungsten Arc Welding (GTAW) NC II	70	319	51	73
Gas Tungsten Arc Welding (GTAW) NC IV	0	0	0	0
Gas Welding NC I	1	0	2	2
Gas Welding NC II	3	3	3	2
Heavy Equipment Servicing (Mechanical) NC II	2	21	6	14
HEO (Articulated Off-Highway Dump Truck) NC II	0	2	3	2
HEO (Concrete Pump) NC II	0	0	0	4
HEO (Crawler Crane) NC III	0	1	9	5
HEO (Hydraulic Excavator) NC II	76	263	89	121
HEO (Motor Grader) NC II	20	85	27	32
HEO (Overhead and Gantry Crane) NC III	0	2	6	5
HEO (Rigid Off-Highway Dump Truck) NC II	1	5	5	6
HEO (Rigid On-Highway Dump Truck) NC II	30	124	63	86
HEO (Road Roller) NC II	14	45	29	17

HEO (Rough Terrain Crane) NC III	0	4	10	6
HEO (Tower Crane) NC III	0	1	6	3
HEO (Transit Mixer) NC II	3	16	16	16
HEO (Truck Mounted Crane) NC III	0	5	11	7
Masonry NC I	81	1	57	97
Masonry NC II	221	646	125	207
Masonry NC III	2	54	6	14
Pipefitting (Metallic) NC II	16	60	11	32
Plumbing NC I	44	0	34	27
Plumbing NC II	95	237	61	72
Plumbing NC III	1	9	2	3
Reinforcing Steel Works NC II	6	16	8	9
Rigging NC I	7	18	17	22
Scaffolding Works NC II (Supported Type Scaffold)	61	195	65	98
Shielded Metal Arc Welding (SMAW) NC I	641	8	368	379
Shielded Metal Arc Welding (SMAW) NC II	806	2,393	426	547
Shielded Metal Arc Welding (SMAW) NC III	67	362	54	60
Shielded Metal Arc Welding (SMAW) NC IV	5	52	8	7
Structural Erection NC II	0	0	0	0

Submerged Arc Welding (SAW) NC I	0	0	0	0
Submerged Arc Welding (SAW) NC II	0	0	0	0
System Formworks Installation NC II	3	5	2	6
Telecom OSP and Subscriber Line Installation (Copper Cable/POTS and DSL) NC II	0	0	0	0
Telecom OSP Installation (Fiber Optic Cable) NC II	1	5	2	6
Tile Setting NC II	146	332	87	117
Mechatronics Servicing NC III	6	24	7	8
Mechatronics Servicing NC IV	2	4	1	3
Security Services NC I	25		6	8
Security Services NC II	41	84	18	33
Reinforcing Steel Works NC II	6	19	9	10
Competency Standards National Infrastructure (as of 2023)				
Elevator Installation Level II	0	0		
Water Well Drilling Level II	0	0		
Construction Trade Supervision Level IV	9	0		
Construction Site Supervision Level IV	10	0		
Basic 3D Building Information Modelling Level III	1	0		
Total	**4,326**	**11,425**	**2,826**	**4,014**

Based on the provided data, a significant number of enrollments and certifications is observed across several TVET programs throughout 2021-2023, such as Carpentry NC II, Driving NC II, and EIM NC II, indicating a high demand for skilled workers in these areas. Also, lower level qualifications, particularly those at the NC II level, have higher outputs than NC III and NC IV programs. It is also worth noting that the two (2) CS programs in Elevator Installation Level II and Water Well Drilling Level II have no outputs at all. This can be attributed to the absence of TVET infrastructure for these programs. This instance happens also to other programs with no outputs at all, such as GTAW NC IV, Structural Erection NC II, SAW NC I and SAW NC II, since it has a correlation to the TVET infrastructure. By correlating these figures with the data on registered programs, NTTC holders, assessment centers, and competency assessors, it becomes evident that areas with high enrollment and certification rates often coincide with a greater presence of registered programs, NTTC holders, assessment centers, and competency assessors.

VII. WAYS FORWARD

Based on the information presented, TESDA will be able to support the MMSP construction by supplying the industry with capable workers certified in the construction process of the subway system.

With this, TESDA is recommended to take the following actions:

- Enhancement of the TVET Infrastructure for the MMSP Construction-Relevant Programs

  TESDA Regional and Provincial/District Offices are recommended to enhance the TVET infrastructure, such as registered programs, trainers, assessors, and assessment centers, of the existing TVET programs that are relevant to the construction of the MMSP, since it has been emphasized that the MMSP project requires more workers in the more general construction skills rather than the emerging skills. All ROPOs are encouraged to do this as construction workers for big projects in the metro are still being hired from all over the Philippines. Establishing or enhancing TVET infrastructure for these programs could significantly contribute to bridging skill gaps and meeting the demands of the project. Moreover, they are recommended to foster partnerships with relevant stakeholders, including industry players, educational institutions, and government agencies, to facilitate the development and implementation of targeted training programs, ensuring the availability of skilled professionals to support key sectors of the economy.

- Prioritization of Skills Requirements for the Construction of the MMSP

  As a result of the industry consultation, it is evident that addressing skills gaps in the construction of the MMSP is essential to ensure the successful completion of the project.

  Based on the processed skills mapping survey results, the following skills/jobs are recommended for the development of comprehensive Training Regulation (TR)**:**

Table 13. Identified Skills/Jobs for the development of full-blown Training Regulations (TR)

For TR Development (Priority 1)	
Value Chain Segment	Skills/Job
Direct Workers	Semi Skilled Workers
	Millwright
	Pre Cast Masons/Skilled
	Elevator Installation Technician*
	Roofing

	Construction machinery and construction
	Spray urethane insulation
	Tunnel and micro-tunneling
	Environmental Supervisor
Equipment (Operators and Maintenance)	Generator Set Tenders
	Stamping Machine Operators
	Drilling Rig Operators
	Boom Truck Drivers
	Heavy Equipment Mechanic (Advance)
	Equipment Machine Supervisors
	Equipment Tool Keepers
	Spotters
Emerging Skills (Highly Specialized Skills)	Tunnel Boring Machine Operator
	TBM Guiding System Operator
	Advanced analytics
For TR Development (Priority 2)	
Direct Workers	Railway Technicians

Elevator Installation Technician already has an existing equivalent CS, which is Elevator Installation Level II. Since it is identified for the development of TR, it is recommended to review the CS for upgrading to TR. Moreover, the following skills have already been prioritized and proposed for TESDA Board Presentation:

- Semi Skilled Workers
- Millwright
- Heavy Equipment Mechanic (Advance)

Meanwhile, the below-listed skills were already identified for CS development:

- Drilling Rig Operators
- Boom Truck Drivers
- Equipment Machine Supervisors
- Equipment Tool Keepers

The survey results also yielded skills that are recommended for the development of Competency Standards (CS). These are listed in the table below.

Table 14. Identified Skills/Jobs for the development of Competency Standards (CS)

For CS Development (Priority 1)

Equipment (Operators and Maintenance)	Gondola Tenders
	Tower Light Tenders
	Skid Loader Operators
For CS Development (Priority 2)	
Equipment (Operators and Maintenance)	Building sheet metal work

It should be noted that the skills map was further reviewed by the MMSPMO-DOTr to identify the most urgent skills requirements. Based on the mapping of these skills provided by MMSPMO-DOTr and the skills in the skills map, the following skills are recommended for the development of TR or CS by the Qualifications and Standards Office (QSO):

Table 15. Narrowed Down List of Prioritized Skills/Jobs for TR/CS Development

For TR Development (Priority 1)	
Value Chain Segment	Skills/Job
Direct Workers	Pre Cast Masons/Skilled
	Elevator Installation Technician*
	Environmental Supervisor
Equipment (Operators and Maintenance)	Generator Set Tenders
	Stamping Machine Operators
	Drilling Rig Operators
	Boom Truck Drivers
	Heavy Equipment Mechanic (Advance)
For TR Development (Priority 2)	
Direct Workers	Railway Technicians
For CS Development (Priority 1)	
Direct Workers	Skid Loader Operators
For CS Development (Identified by MMSPMO-DOTr)	
[redacted]	Cladding Installer
	Locomotive Operator
	Tunnel Attendant Training
	Work Environment Measurement (WEM) (Specific for Tunnel)

In line with the identified skills for TR development, and as part of the prioritization process, the **Planning Office** will assist the designated industry champion designated by the industry in preparing for the presentation to the TESDA Board - Direction Setting Committee (TB-DSC).

Meanwhile, while awaiting the presentation to the TB-DSC and its approval, the development of Competency Standards can be undertaken as a parallel activity to meet industry demand. Additionally, once the program is prioritized, its development will be facilitated by the **QSO**.

- Embedment of Specific Competencies in the Training Regulations and Competency Standards in the Construction Sector

    A. Competencies for Occupational Health and Safety in the Construction Sector focusing on Tunneling and Confined Spaces

    Given the location of the construction of the MMSP, the **Qualifications and Standards Office** is recommended to review the embedment or integration competencies for Occupational Health and Safety that focus on tunneling and confined spaces in the existing TRs and CS in the construction sector. This will ensure that workers are adequately trained to handle the unique risks associated with these environments, thereby enhancing safety and compliance with industry standards. Additionally, incorporating these competencies can lead to a more skilled and versatile workforce, capable of meeting the demands of complex construction projects.

    B. Green Competencies for the Construction Sector

    While the Environmental Supervisor has been identified as a job requirement for TR development, it is still recommended that the **Qualifications Standards Office** and the **Green Technology Center of the National Institute for Technical Education and Skills Development** look into the incorporation of green competencies into the TRs and CS to ensure that all workers are equipped with the knowledge and skills to implement sustainable practices. This integration will promote environmentally responsible construction methods and contribute to the industry's overall goal of reducing its ecological footprint.

- Establishment/Strengthening of Partnerships with Construction Sector Representatives

    To enhance the workforce development for the Metro Manila Subway Project (MMSP), it is recommended that the **Partnerships and Linkages Office** establish and strengthen collaborations with the construction companies and joint ventures involved in the project, such as EEI Corporation, DM Consunji Inc., Sumitomo Mitsui Construction Corp., Megawide Construction Corp., Mitsubishi Corp., and others. These partnerships should focus on implementing enterprise-based training programs that equip trainees with the necessary skills to meet the project’s demands. To strengthen these partnerships, the **Certification Office** and the **TESDA Provincial/District Offices** are also recommended to provide close assistance to these companies in the training delivery, and the assessment and certification of the graduates.

    By fostering these relationships, we can ensure a steady supply of qualified workers for the MMSP and facilitate the employment of graduates both during and after the project’s completion. Additionally, these partnerships can help address skill gaps and improve the overall competency of the local workforce, contributing to the long-term development of the construction industry in the Philippines.

- Establishment of Infrastructure of Skills Requirements Identified for TR Development

  To address the high physical and capital costs of specific and highly technical skill requirements, such as Tunnel Boring Machine Operator, it is recommended to first establish the necessary infrastructure (e.g., acquisition of equipment and facilities) before developing their corresponding TVET programs. It is advisable for the **Industry TVET Board for the Construction Sector** and the Philippine Constructors Association (PCA), Inc. to oversee this initiative. Additionally, they are recommended to assess the need for establishing specialized training institutions that can offer such programs, considering the complexity and significant costs involved in the implementation of such training programs. This stems from PCA noting that they want to pursue highly technical constructions skills for the Philippines to keep up with the technological advancements in the global scene.

  Moreover, the **Planning Office** is recommended to explore the possibility of having the training programs for highly technical skills be delivered by foreign institutions since it has been mentioned during the consultation meetings that delivering training for such skills is a challenge as there is a lack of subject matter experts and facilities. As stipulated in Executive Order No. 65 “Promulgating the Eleventh Regular Foreign Investment Negative List,” foreign entities can establish educational institutions with up to 40% foreign equity for short-term high-level skills development. Thus, to address the lack of availability of trainers, facilities and equipment for highly technical skills training, TESDA can partner with foreign institutions and organizations who can provide them.

  Aside from foreign partners, TESDA, through the **Planning Office and the PLO**, can explore a partnership with the Philippine Railway Institute especially on the development and delivery of training programs for skills intended specifically for the railway industry. This not only benefits the MMSP, but also current and future projects included in the Build Better More Infrastructure project of the Marcos Administration.

- Provision of Scholarship Allocations for Training Programs Relevant to the MMSP Construction

  To encourage more people to receive training in the construction sector and contribute significantly to the construction of the MMSP, it is also recommended that the **Planning Office with the Regional Operations Management Office** study the possibility of establishing a scholarship program for trainees who will work for the MMSP construction. TESDA can tap the involved companies, as well as JICA, DOTr, and NEDA, in pooling the funds for the said scholarship.

- Further Research on the Skills Requirements for the Operation and Management of the Metro Manila Subway, Other Build Better More Projects, and Other Upcoming Big-Ticket Infrastructure Projects in the Country

  To complement the already identified skills requirements for the construction of the Metro Manila Subway Project, the **Planning Office** is recommended to develop

Labor Market Intelligence Reports on the operation and management of the Metro Manila Subway itself, and other upcoming big-ticket projects in the construction sector, especially those under the Build Better More project.

By examining both the operational and management phases of the subway and comparing them with the construction phase, TESDA can develop a comprehensive understanding of the skills required throughout the project lifecycle. This holistic approach ensures that workforce development initiatives align with the evolving needs of the infrastructure sector, facilitating seamless transitions from construction to operation. Moreover, research on other Build Better More Projects can help TESDA gain valuable insights into the evolving skill sets needed within the construction sector, allowing for the development of targeted training programs, competency standards, and workforce development initiatives closely aligned with project requirements. Ultimately, such research contributes to the strategic planning process, ensuring that the workforce remains adequately equipped to support the successful implementation and operation of vital infrastructure projects.

VIII. ANNEXES

VALUE CHAIN	JOBS/SKILLS/ QUALIFICATIONS	JOBS/SKILLS IMMEDIATELY NEEDED *(multiple response is allowed)*		ASSESS THE SHORTAGE OF WORKERS IN FILLING-UP THE SKILLS REQUIREMENTS *(choose only one from the three choices)*			REASONS/CONSTRAINTS IN FILLING-UP THE SKILLS REQUIREMENTS (e.g. no qualified applicants, prefer to work abroad, seek higher pay, work schedule)	RECOMMENDED ACTION (e.g. need for conduct of training, standardization, certification)
		In the next 1-3 years	In the next 3-5 years	Low (below 100)	Medium (100-500)	High (above 500)		
Direct Workers	Rough Carpenters	50.00%	33.33%	16.67%	16.67%	16.67%	lack of skilled manpower / insufficient manpower supply	Include safety and working in confined spaces training Need to conduct training
	Welders	66.67%	50.00%	33.33%	16.67%	16.67%	lack of skilled manpower / insufficient manpower supply Running rail welders	Need to conduct training Certification Required
	Pipefitters	33.33%	33.33%	16.67%	16.67%	16.67%	lack of skilled manpower /	Include safety and working in

							insufficient manpower supply	confined spaces training Need to conduct training
	Plumbers	50.00%	33.33%	16.67%	16.67%	33.33%	lack of skilled manpower / insufficient manpower supply	Include safety and working in confined spaces training Need for certification
	Painters	50.00%	33.33%	33.33%	0.00%	16.67%	lack of skilled manpower / insufficient manpower supply	Include safety and working in confined spaces training Need to conduct training
	Electricians	50.00%	50.00%	33.33%	16.67%	16.67%	lack of skilled manpower / insufficient manpower supply	Include safety and working in confined spaces training Need to conduct certification
	Tile Setters	50.00%	33.33%	16.67%	0.00%	33.33%	seek higher pay and lack of manpower supply	Need to conduct certification
	TIG/SMAW/GTAW Welder	50.00%	33.33%	16.67%	16.67%	16.67%	lack of skilled manpower /	Include safety and working in

							insufficient manpower supply	confined spaces training Need to conduct certification
	Scaffolders	50.00%	50.00%	33.33%	16.67%	16.67%	lack of skilled manpower / insufficient manpower supply	Include safety and working in confined spaces training Need to conduct training
	Certified Scaffolders	66.67%	50.00%	33.33%	16.67%	16.67%	lack of skilled manpower / insufficient manpower supply	Include safety and working in confined spaces training Need to conduct certification
	Erection Crew/Erectors	50.00%	33.33%	16.67%	16.67%	16.67%	lack of skilled manpower / insufficient manpower supply	Need to conduct training
	Formworks Crew	66.67%	50.00%	33.33%	16.67%	16.67%	lack of skilled manpower / insufficient manpower supply	Need to conduct training
	Tinsmiths	16.67%	0.00%	0.00%	0.00%	16.67%		
	Foreman	66.67%	50.00%	33.33%	16.67%	16.67%	Seek higher pay	Include safety and working in

								confined spaces training Need to conduct certification
	Leadmen	50.00%	33.33%	16.67%	16.67%	16.67%	Seek higher pay	Need to conduct certification
	Finishing Carpenters	66.67%	50.00%	33.33%	16.67%	16.67%	lack of skilled manpower / insufficient manpower supply	Need to conduct training
	General Foreman	66.67%	50.00%	33.33%	16.67%	16.67%	Seek higher pay	Need to conduct training
	Master Electrician	50.00%	50.00%	33.33%	16.67%	16.67%	Seek higher pay	Include safety and working in confined spaces training; Enhance knowledge in understanding plan drawings/diagrams Need to conduct certification
	Semi Skilled Workers (no specialized skills or	66.67%	50.00%	50.00%	0.00%	16.67%	lack of skilled manpower / insufficient manpower	Include safety and working in confined spaces

	advanced training)						supply Prefers to work abroad	training Need to conduct training Training for update of candidates
	Unskilled Workers (Laborers/Helpers)	66.67%	50.00%	50.00%	0.00%	16.67%	lack of manpower supply	Include safety and working in confined spaces training Need to conduct training
	Millwright	33.33%	16.67%	16.67%	16.67%	0.00%		
	Pre Cast Masons/Skilled	33.33%	16.67%	16.67%	16.67%	0.00%		
	Finishing Masons	50.00%	33.33%	16.67%	0.00%	33.33%	lack of skilled manpower / insufficient manpower supply	Need to conduct training
	Sandblasting Crew	16.67%	0.00%	0.00%	16.67%	0.00%		
	Water Well Drilling	33.33%	0.00%	0.00%	33.33%	0.00%	lack of skilled manpower / insufficient manpower supply	Need to conduct certification
	Elevator Installation Technician	33.33%	33.33%	33.33%	16.67%	0.00%	lack of skilled manpower / insufficient manpower	Need to conduct certification

							supply	
	Roofing	33.33%	33.33%	33.33%	16.67%	0.00%	lack of skilled manpower / insufficient manpower supply	Need to conduct training
	Heat-retention and cool-retention	33.33%	16.67%	33.33%	0.00%	0.00%		
	Formwork construction	50.00%	33.33%	16.67%	16.67%	16.67%	lack of skilled manpower / insufficient manpower supply	Need to conduct training
	Plastering	33.33%	33.33%	16.67%	33.33%	0.00%	lack of skilled manpower / insufficient manpower supply	Need to conduct standardizatio n
	Construction machinery and construction	33.33%	33.33%	16.67%	0.00%	16.67%	lack of skilled manpower / insufficient manpower supply	Need to conduct training
	Interior finishing	50.00%	33.33%	16.67%	16.67%	16.67%	lack of skilled manpower / insufficient manpower supply	Need to conduct training
	Concrete pumping	66.67%	50.00%	33.33%	33.33%	0.00%	lack of skilled manpower / insufficient manpower supply	Need to conduct certification
	Reinforcement	50.00%	33.33%	16.67%	16.67%	16.67%	lack of skilled	Need to

	construction						manpower / insufficient manpower supply	conduct certification
	Telecommunications	33.33%	33.33%	16.67%	16.67%	16.67%	lack of skilled manpower / insufficient manpower supply	Need to conduct certification
	Spray urethane insulation	16.67%	16.67%	16.67%	16.67%	0.00%	lack of skilled manpower / insufficient manpower supply	Need to conduct certification
	Tunnel and micro-tunneling	50.00%	33.33%	33.33%	0.00%	16.67%	Lack of qualified applicants	Need to conduct certification
	Railway Technicians	16.67%	33.33%	16.67%	16.67%	0.00%	Lack of qualified applicants	Need to conduct certification
	Senior Engineer Segment Yard	16.67%	16.67%	16.67%	0.00%	0.00%	Seek higher pay	conduct training and certification
	Engineer for Segment Yard	16.67%	16.67%	16.67%	0.00%	0.00%	Seek higher pay	conduct training and certification
	Forman for Segment Yard	16.67%	16.67%	16.67%	0.00%	0.00%	Seek higher pay	conduct training and certification
	Forman for TBM	16.67%	16.67%	16.67%	0.00%	0.00%	Experience not in-line	conduct training and certification
	Engineer for TBM	16.67%	16.67%	16.67%	0.00%	0.00%	Experience not in-line	conduct training and certification

	Surveyor	16.67%	16.67%	16.67%	0.00%	0.00%		
	Chain man	16.67%	16.67%	16.67%	0.00%	0.00%		
	Fuel /Storage Keeper	16.67%	16.67%	16.67%	0.00%	0.00%		
	Engineer (Plant&Electrical)	16.67%	16.67%	16.67%	0.00%	0.00%	Seek higher pay	conduct training and certification
	Forman (Plant&Electrical)	16.67%	16.67%	16.67%	0.00%	0.00%	Seek higher pay	conduct training and certification
	Forman for Civil	16.67%	16.67%	16.67%	0.00%	0.00%	Seek higher pay	conduct training and certification
	Forman for Arch	16.67%	16.67%	16.67%	0.00%	0.00%	Seek higher pay	conduct training and certification
	Cost Control	16.67%	16.67%	16.67%	0.00%	0.00%		
	Quantity Surveyor	16.67%	16.67%	16.67%	0.00%	0.00%		
	QC Engineer	16.67%	16.67%	16.67%	0.00%	0.00%		
	Engineer (E&M System)	16.67%	16.67%	16.67%	0.00%	0.00%		
	Forman for E&M	16.67%	16.67%	16.67%	0.00%	0.00%		
	Station Manager	16.67%	16.67%	16.67%	0.00%	0.00%		
	Safety officer	16.67%	16.67%	16.67%	0.00%	0.00%		
	Safety Supervisor	16.67%	16.67%	16.67%	0.00%	0.00%		
	Ocupational Health Officer	16.67%	16.67%	16.67%	0.00%	0.00%		
	Environmental Supervisor	16.67%	16.67%	16.67%	0.00%	0.00%		
	Design	16.67%	16.67%	16.67%	0.00%	0.00%		

	Engineer							
	Geotechnical Engineer	16.67%	16.67%	16.67%	0.00%	0.00%		
	Planning Engineer	16.67%	16.67%	16.67%	0.00%	0.00%		
	Administrator	16.67%	16.67%	16.67%	0.00%	0.00%		
	HR Assistance	16.67%	16.67%	16.67%	0.00%	0.00%		
	Site Clerk	16.67%	16.67%	16.67%	0.00%	0.00%		
	Reception	16.67%	16.67%	16.67%	0.00%	0.00%		
	Office lady	16.67%	16.67%	16.67%	0.00%	0.00%		
	Accountant Manager	16.67%	16.67%	16.67%	0.00%	0.00%		
	Accounting Assistant	16.67%	16.67%	16.67%	0.00%	0.00%		
	Purchaser	16.67%	16.67%	16.67%	0.00%	0.00%		
	Commercial Manager	16.67%	16.67%	16.67%	0.00%	0.00%		
	Cost Control	16.67%	16.67%	16.67%	0.00%	0.00%		
	Site Physician	16.67%	16.67%	16.67%	0.00%	0.00%		
Equipment (Operators and Maintenance)	Backhoe Operators	50.00%	33.33%	16.67%	16.67%	16.67%	lack of skilled manpower / insufficient manpower supply	Need to conduct certification
	Crane Operators (Tower Cranes)	50.00%	33.33%	16.67%	16.67%	16.67%	lack of skilled manpower / insufficient manpower supply	Need to conduct certification
	Compactors	50.00%	33.33%	16.67%	33.33%	0.00%	lack of skilled manpower / insufficient manpower supply	Need to conduct certification

	Grader Operators	33.33%	33.33%	16.67%	33.33%	0.00%	lack of skilled manpower / insufficient manpower supply	Need to conduct certification
	Dump Truck Drivers	50.00%	33.33%	16.67%	16.67%	16.67%	lack of qualified applicants	Need to conduct certification
	Transit Mixer Truck Drivers	50.00%	33.33%	16.67%	16.67%	16.67%	lack of qualified applicants	Need to conduct certification
	Service Vehicle Drivers	66.67%	50.00%	33.33%	16.67%	16.67%	lack of qualified applicants	Need to conduct certification
	Equipment Technicians	66.67%	50.00%	33.33%	16.67%	16.67%	lack of qualified applicants	Update the current skills by adding more equipments or keeping up with latest equipments available at construction industry Need to conduct certification
	Riggers	66.67%	66.67%	50.00%	16.67%	16.67%	lack of qualified applicants	Conduct or add safety skills Need to conduct certification
	Crane	66.67%	50.00%	33.33%	16.67%	16.67%	lack of	Need to

	Operators (Mobile)						qualified applicants	conduct certification
	Alimak Operators	16.67%	0.00%	0.00%	16.67%	0.00%		
	Gondola Tenders	33.33%	0.00%	0.00%	16.67%	0.00%		
	Generator Set Tenders	50.00%	33.33%	16.67%	16.67%	16.67%	lack of qualified applicants	Need to conduct certification
	Tower Light Tenders	33.33%	16.67%	0.00%	16.67%	16.67%	lack of qualified applicants	Need to conduct certification
	Skid Loader Operators	33.33%	16.67%	0.00%	33.33%	0.00%	lack of qualified applicants	Need to conduct certification
	Stamping Machine Operators	33.33%	16.67%	16.67%	16.67%	0.00%		Need to conduct certification
	Drilling Rig Operators	50.00%	33.33%	16.67%	16.67%	16.67%	lack of qualified applicants	Need to conduct certification
	Boom Truck Drivers	66.67%	50.00%	33.33%	16.67%	16.67%	lack of qualified applicants	Need to conduct certification
	Building sheet metal work	16.67%	33.33%	16.67%	33.33%	0.00%	lack of qualified applicants	Need to conduct certification
	Heavy Equipment Mechanic (Advance)	50.00%	33.33%	16.67%	16.67%	16.67%	lack of qualified applicants	Need to conduct certification
	Equipment Machine Supervisors	50.00%	33.33%	16.67%	16.67%	16.67%	lack of qualified applicants	Need for conduct of training

	Equipment Tool Keepers	50.00%	33.33%	16.67%	16.67%	16.67%	lack of qualified applicants	Need for conduct of training
	Spotters	50.00%	33.33%	16.67%	16.67%	16.67%	lack of qualified applicants	Need for conduct of training
Emerging Skills (Highly Specialized Skills)	Ring Builder	0.00%	16.67%	0.00%	16.67%	0.00%		
	Programmable Logic Controllers (PLC)	0.00%	33.33%	16.67%	16.67%	0.00%		
	Tunnel Boring Machine Operator	50.00%	33.33%	33.33%	16.67%	16.67%	new in the industry No applicable certification yet; Seek Higher pay lack of qualified applicants	to be check by DOTR Applicable operators and trainors are currently working overseas Need to conduct certification
	TBM Guiding System Operator	50.00%	33.33%	33.33%	0.00%	16.67%	new in the industry lack of qualified applicants	to be check by DOTR Need to conduct certification
	Advanced analytics	33.33%	0.00%	16.67%	16.67%	0.00%	lack of qualified applicants	to be check by DOTR need for conduct of training

	Construction software	50.00%	33.33%	33.33%	16.67%	0.00%	To be identify lack of qualified applicants	to be check by DOTR need for conduct of training
	Pay Loader Operator	16.67%	16.67%	16.67%	0.00%	0.00%		
	Bulldozer Operator	16.67%	16.67%	16.67%	0.00%	0.00%		
	Dumptruck Operator	16.67%	16.67%	16.67%	0.00%	0.00%		Identify in coordination with LTO license restriction codes
	Forklift Operator	16.67%	16.67%	16.67%	0.00%	0.00%		
	Gantry Crane Operator	16.67%	16.67%	16.67%	0.00%	0.00%		
	Trailer Truck Driver	16.67%	16.67%	16.67%	0.00%	0.00%		Identify in coordination with LTO license restriction codes
	Telecommunication Engineers	0.00%	16.67%	16.67%	0.00%	0.00%	Prefer to work abroad	Search freshers and OJT. Preparation, during the installation, for the Operation and Maintenance activities

	Network IT Engineers	0.00%	16.67%	16.67%	0.00%	0.00%	Prefer to work abroad	Update training for new technologies

IX. REFERENCES

A. (2022, November 29). *Differences Between Specified Skilled Worker (SSW) and Technical Intern Training Program (TITP) - Akal Japanese Academy - Blog*. Akal Japanese Academy - Blog. https://www.japan-academy.in/blog/differences-between-specified-skilled-worker-ssw-and-technical-intern-training-program-titp/

Asian Development Bank. (2012). *Philippines Transport Sector Assessment, Strategy, and Road Map*. Asian Development Bank. https://www.adb.org/sites/default/files/institutional-document/33700/files/philippines-transport-assessment.pdf

Bangko Sentral ng Pilipinas. (2023, January). *Build Better More: A Glimpse into the Philippines' Infrastructure Program*. Bangko Sentral ng Pilipinas. https://www.bsp.gov.ph/Pages/iro-macro-pres/Build%20Better%20More_Jan%202023.pdf

C. Piad, T. J. (2022, May 5). *Megawide wins contract to build 2 Metro Manila Subway stations*. INQUIRER.net. https://business.inquirer.net/347140/megawide-wins-contract-to-build-2-metro-manila-subway-stations

Camus, M. R. (2019, October 16). *P393-B Metro Manila subway is 'project of the century' for PH*. INQUIRER.net. https://business.inquirer.net/281164/p393-b-metro-manila-subway-is-project-of-the-century-for-ph

Constro Facilitator. (2020, September 23). *Different types of tunnel construction equipment*. ConstroFacilitator. https://constrofacilitator.com/different-types-of-tunnel-construction-equipment/

Construction dictionary. (n.d.). Construction Dictionary. https://www.diccionariodelaconstruccion.com

Construction Project Management: Definition, Processes, and More | EcoSys. (n.d.). EcoSys. https://www.ecosys.net/knowledge/construction-project-management/

Dela Cruz, R.C. (2022, October 3). *Metro Manila Subway construction to generate 18K jobs: DOTr*. Philippine News Agency. https://www.pna.gov.ph/articles/1185207

Dela Cruz, R. C. (2022, September 21). *Metro Manila Subway project nominated for int'l digital awards*. Philippine News Agency. https://www.pna.gov.ph/index.php/articles/1184237

Department of Transportation (DOTr). (2017, September). *Environmental Impact Statement (EIS) for Metro Manila Subway Project (MMSP) (Phase 1)*. Japan International Cooperation Agency. https://www.jica.go.jp/Resource/english/our_work/social_environmental/id/asia/southeast/philippines/c8h0vm00009pabyg-att/c8h0vm0000boxc4z.pdf

DOTr Awards 2 Subway Contracts to Nishimatsu-DMCI JV and Sumitomo Mitsui Construction. (n.d.). Ministry of Foreign Affairs of Japan. https://www.ph.emb-japan.go.jp/itpr_en/11_000001_01019.html

DOTr signs deal for Metro Manila Subway's first 3 stations. (2019, February 24). RAPPLER. https://www.rappler.com/business/224251-dotr-signs-deal-metro-manila-subway-stations/

Efficient rail system, a solution to NCR's traffic woes. (2021, August 20). PIA. https://pia.gov.ph/features/2021/08/20/efficient-rail-system-a-solution-to-ncrs-traffic-woes

'Efficient rail system crucial to solving Manila traffic' | *PPP Center*. (2016, May 5). 'Efficient Rail System Crucial to Solving Manila Traffic' | PPP Center. https://ppp.gov.ph/in_the_news/efficient-rail-system-crucial-to-solving-manila-traffic/

Embassy of Japan in the Philippines. (n.d.). *Japan's Development Cooperation in the Philippines*. Embassy of Japan in the Philippines. https://www.ph.emb-japan.go.jp/files/100340222.pdf

Information Disclosure under JICA Guidelines for Environment and Social Considerations (April, 2010) and the Guidelines revised thereafter. (n.d.). Japan International Cooperation Agency. Retrieved July 6, 2023 from https://www.jica.go.jp/Resource/english/our_work/social_environmental/id/asia/southeast/philippines/c8h0vm00009pabyg.html

International Resource Panel. (2010, December 10). *Analysis of the Construction Value Chain*. One Planet Network. https://www.oneplanetnetwork.org/sites/default/files/value_chain_analysis_construction_-_draft_201210_-_for_inputs.pdf

Japan consortium wins bid to build P11-billion Metro subway. (n.d.). Philstar.com. https://www.philstar.com/business/2018/11/22/1870557/japan-consortium-wins-bid-build-p11-billion-metro-subway

JICA. (2020). *Co-Creating a Better Future for All Annual Report 2020*. Japan International Cooperation Agency. https://www.jica.go.jp/Resource/philippine/english/office/others/c8h0vm0000d3hsdw-att/report_2020.pdf

Manila Subway kicks off construction of Quezon Avenue, East Avenue stations. (n.d.). Ministry of Foreign Affairs of Japan. https://www.ph.emb-japan.go.jp/itpr_en/11_000001_01162.html

Metro Manila Subway Project | *Our Work* | *JICA*. (n.d.). Metro Manila Subway Project | Our Work | JICA. https://www.jica.go.jp/Resource/english/our_work/social_environmental/id/asia/southeast/philippines/c8h0vm00009pabyg.html

Metro Manila Subway. (2019, March 14). Railway Technology. https://www.railway-technology.com/projects/metro-manila-subway/

N. (2020, June 1). *Gov't adds more stations to Metro Manila subway - BusinessWorld Online*. BusinessWorld Online. https://www.bworldonline.com/editors-picks/2020/06/02/297426/govt-adds-more-stations-to-metro-manila-subway/

Outline of the Specified Skilled Worker Program | JAC | The Japan Association for Construction Human Resources (JAC). (n.d.). Outline of the Specified Skilled Worker Program | JAC | the Japan Association for Construction Human Resources (JAC). https://jac-skill.or.jp/en/system/

Preston, R. (2022, October 5). *Work starts on Metro Manila Subway*. International Railway Journal. https://www.railjournal.com/passenger/metros/work-starts-on-metro-manila-subway/

Rappler.com. (2019, February 24). DOTr signs deal for Metro Manila Subway's first 3 stations. Rappler. https://www.rappler.com/business/224251-dotr-signs-deal-metro-manila-subway-stations/

Regidor, J. R. F. (n.d.). *Current State of Transportation Data and Statistics in the Philippines and Opportunities for Improvement Towards Usability*. Philippine Statistics Authority. https://psa.gov.ph/sites/default/files/7.5.1%20Current%20State%20of%20Transportation%20Data%20and%20Statistics%20in%20the%20Philippines%20and%20Opportunities%20for%20Improvement%20Towards%20Usability%20_0.pdf

Royandoyan, R. (n.d.). DMCI, Japanese partner bag subway station project. Philstar.com. https://www.philstar.com/business/2022/10/04/2214232/dmci-japanese-partner-bag-subway-station-project

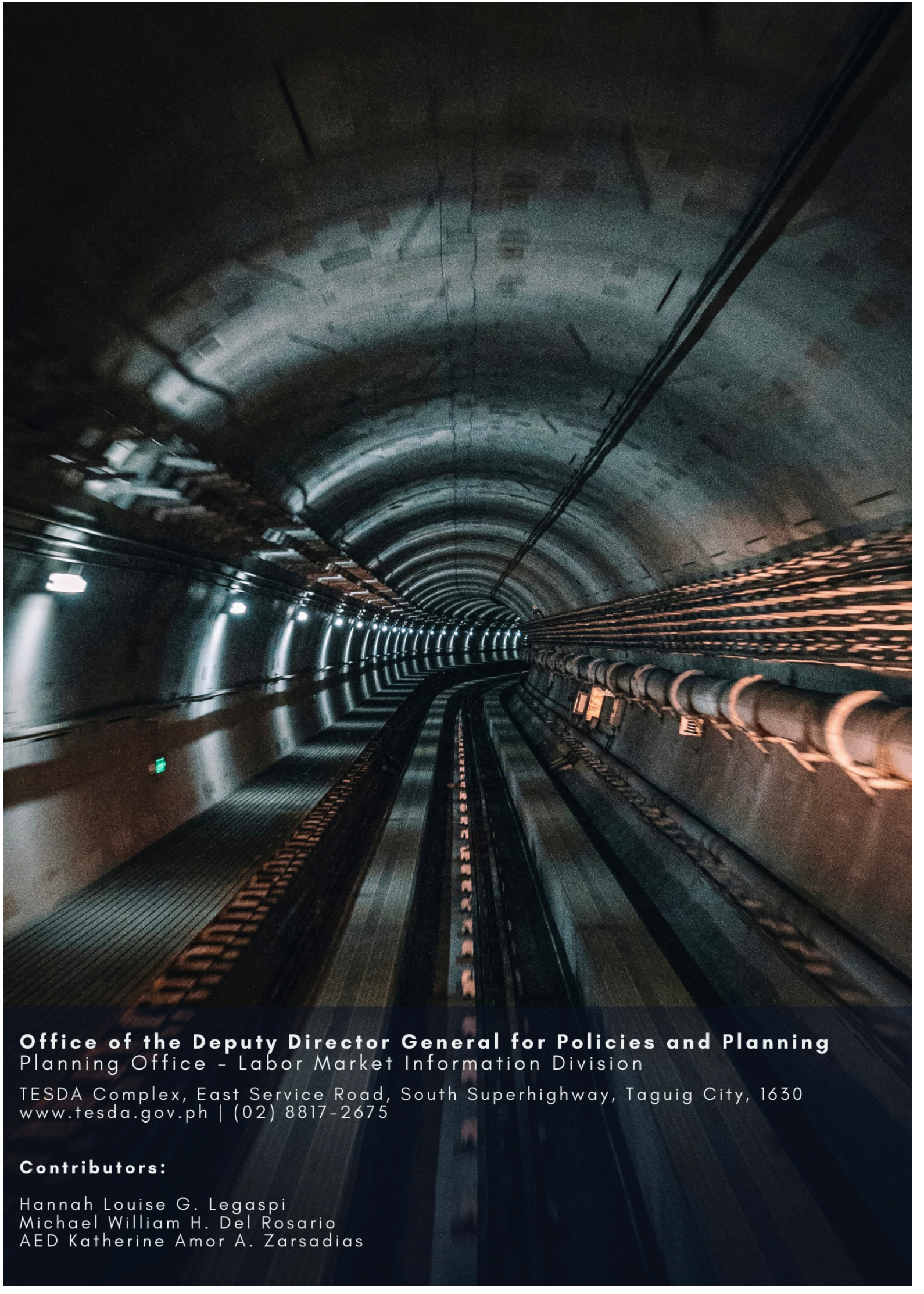
Story behind Metro Manila Subway and the 45 years since its first proposal. (2018, December 28). Interaksyon. https://interaksyon.philstar.com/trends-spotlights/2018/12/28/141316/story-behind-metro-manila-subway-and-the-45-years-since-its-first-proposal/

TBM launching, Philippines' first subway construction | Shimizu Corporation. (2023, January 17). Shimizu Corporation: News Release. https://www.shimz.co.jp/en/company/about/news-release/2023/2022062.html

Transport. (n.d.). NICCDIES. https://niccdies.climate.gov.ph/mitigation/transport

Vergel, K. N. & Yai, T. (n.d.). *Analysis of Road Traffic Flow and Traffic Environment in Metro Manila*. National Center for Transformation Studies. https://ncts.upd.edu.ph/tssp/wp-content/uploads/2018/08/Vergel00.pdf

Yu, L.S. (2024, Mar 8). *MAP: Metro Manila Subway stations*. Rappler. https://www.rappler.com/business/map-metro-manila-subway-stations/



Office of the Deputy Director General for Policies and Planning
Planning Office - Labor Market Information Division

TESDA Complex, East Service Road, South Superhighway, Taguig City, 1630
www.tesda.gov.ph | (02) 8817-2675

Contributors:

Hannah Louise G. Legaspi
Michael William H. Del Rosario
AED Katherine Amor A. Zarsadias