

APPROVED:

BY THE FIRST DEPUTY GOVERNOR OF THE
CAPITAL CITY
IN CHARGE OF ECONOMY AND
INFRASTRUCTURE

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TERMS OF REFERENCE
ENGINEERING, PROCUREMENT AND CONSTRUCTION OF THE HIGH-CAPACITY PUBLIC
TRANSPORTATION PROJECT "METRO" IN ULAANBAATAR
(FIRST STAGE)

Ulaanbaatar city

The year 2024

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LIST OF ABBREVIATIONS

BNR	Building norms and rules
GDP	Gross domestic product
CCM	Meeting of Citizens' Representatives of the Capital city
OCCG	Office of the Capital city Governor
FS	Feasibility Study
Ltd	Limited Liability Company
SBE	State Budget Entity
TOD	Transport Oriented Development
SCADA	Supervisory Control and Data Acquisition
EPC	Engineering, Procurement and Construction
RAMS	Reliability, Availability, Maintenance and Security Systems

1. PROJECT BACKGROUND

1.1 GENERAL UNDERSTANDING

Rapid population growth of Ulaanbaatar: The population density of Ulaanbaatar, the capital city of Mongolia, has been increasing rapidly since 1990. The population of Ulaanbaatar, which had a population of 560,600 in 1990, tripled to 1.7 million in 2023, and will increase to 2.2 million by 2040. expected. 48.5% of Mongolia's population lives in Ulaanbaatar, but it occupies 0.3% of the total territory, and 58.2% of all vehicles registered in the country are registered in the city¹. Traffic congestion in Ulaanbaatar has been increasing significantly in recent years due to the growth of the city's population, urbanization, the number of vehicles accompanying it, and unplanned expansion.

1.2 PROJECT VIEW

Based on the "Vision-2050" long-term development policy document of Mongolia and other relevant policy documents, as well as Resolution No. 411 of the Government of Mongolia dated November 22, 2023, it has been decided to implement the "Project to construct a High-Capacity Public Transportation System 'Metro' in Ulaanbaatar city," which will be built in line with the national characteristics, customs, and fundamental interests of the citizens while fully meeting international standards and requirements. The Ulaanbaatar City Governor's Office, by order A/234 of March 5, 2024, has assigned the responsibility to oversee the project and activities outlined in Clause 7 of Appendix 5 to the Ulaanbaatar Traffic Congestion Reduction Unit. These policy measures are intended to ensure sustainable urban development for the growing population of Ulaanbaatar, reduce air pollution and unnecessary costs caused by traffic congestion, and promote the development of a public transport-based city through the introduction of a new public transportation system.

1.3 PROJECT IMPLEMENTATION PROCESS

Based on studies conducted for the public transportation project in Ulaanbaatar, the Japan International Cooperation Agency (JICA) carried out a feasibility study for the Ulaanbaatar Metro project between 2011 and 2013. The study's results recommended the implementation of a "High-Capacity Public Transportation Metro Project," the introduction of a new type of public transport in the capital, and the modernization of transport infrastructure. Following these recommendations, under Ulaanbaatar City Governor's Order A/754 of 2024, a joint venture comprising Dohwa Engineering Co.,Ltd., Korea Railroad Corporation (KORAIL), Korea National Railway (KNR), and Soosung Engineering Co., Ltd. has been engaged to provide consultancy services for the Metro project. The joint venture is currently revising the feasibility study previously completed by JICA. This joint venture signed contract (No.: NXAAG20240103208) on July 5, 2024 with the Ulaanbaatar City Governor's Office to oversee the management of the Metro project and ensure effective monitoring of its implementation.

¹National statistics office of Mongolia

2. OBJECTIVES OF THE PROJECT

The primary objective of the high-capacity public transportation "Metro" project, approved by the Government of Mongolia, is to develop an advanced and integrated public transport system that caters to the growing needs of Ulaanbaatar's expanding population. This project is designed to improve the city's infrastructure by focusing on public transportation while setting multiple goals aimed at ensuring sustainable urban development. These goals include:

- **Environmental sustainability:** Reduce environmental pollution (air, soil, etc.) by introducing new types of transportation systems that meet international standards , and support the creation of a sustainable city with the ability to adapt to climate change;
- **Development of urban infrastructure based on public transport :** Development of new high-capacity vehicles with advanced technology will develop the urban transport infrastructure.
- **Development of an integrated public transport network:** Development of a fast, accessible and safe integrated transport network based on public transport.
- **Increase economic activity:** Develop an active economic zone around the metro line and improve the business environment;
- **Transportation oriented development:** Development of active economic zones and improvement of the business environment by developing transportation-based infrastructure in areas around the station;
- **Reduce traffic congestion:** Reduce Road congestion by shifting car-based traffic to public transport-based passenger traffic;
- **Promoting Social Interdependence:** Increasing community participation and working with businesses along metro lines;
- **Paying attention to people with special needs:** improving transportation options and systems for people with limited mobility and special needs ;

These are the main objectives of the project. In addition to supporting economic growth, the project aims to create long-term benefits for social and environmental sustainability.

3. GENERAL INFORMATION

3.1. ABOUT MONGOLIA

As of 2023, Mongolia's population has grown to 3.5 million, and the per capita GDP has reached USD 6,008. According to the Asian Development Bank's "Mongolia's Economic Outlook" report, the country's geographical location and abundant natural resources are key factors shaping its development outcomes. Due to its low population density one of the lowest in the world Mongolia has a relative advantage in capitalizing on resource-based activities. The report further describes Mongolia's economy as uniquely structured, with a significant concentration in the capital city and the mining sector, which together account for 65% and 20% of the nation's GDP, respectively. This makes Mongolia one of the countries with the highest export concentration globally (in terms of both products and destination markets), second only to some Middle Eastern nations.

In the first half of 2024, the economy of Mongolia will increase by 15.4 percent in the mining sector, the increase in mining export transportation, import of goods, and transit transportation will increase by 27.4 percent, the industry and construction sector increased by 7.9 percent, and the trade and service sectors (except transportation) increased by 7.8 percent. have expanded by percent respectively².

3.2. THE CAPITAL ULAANBAATAR CITY

Population growth trend: As of 2023, 1.7 million people are permanently living in Ulaanbaatar, which is 48.5% of the total population of Mongolia.³ Due to the rapid economic growth of Ulaanbaatar, the population of the city has increased three times since 1990 and is expected to reach 2.2 million in 2040⁴.

Urban development and trends: According to the revision of the fourth general development plan, approved by Parliament's Resolution No. 23 in 2013, Ulaanbaatar covers a total area of 35,206 hectares. This document identifies the city as a single-centered linear urban system, divided into two main development models: built-up areas and ger districts (traditional residential zones without access to engineering infrastructure). The duality of this structure is cited as a key factor contributing to the city's challenges. In response to issues arising from rapid population growth driven by economic expansion such as urban agglomeration, traffic congestion, environmental pollution, and disaster risk. A new concept has been developed to transform Ulaanbaatar from a single-centered city into a multi-centered urban system⁵. This concept, which remains integral to the fifth general development plan, focuses on improving the road and public transportation networks by connecting sub-centers based on the "20-minute city" principle. The city's spatial structure will be reorganized and redeveloped to better manage the urban territory and support sustainable growth.

²The Ministry of Economy and Development of Mongolia website.

³1212.mn, National Statistics Office.

⁴Concept of Ulaanbaatar City's General Development Plan until 2040

⁵Amendment to Ulaanbaatar City's General Development Plan until 2020, Development Trend until 2030.

Economic status: As of 2023, Ulaanbaatar’s Gross Domestic Product (GDP) reached MNT 46.877 trillion, accounting for 66.5% of Mongolia’s total GDP, marking a threefold increase from 2013, when the figure stood at MNT 12.253 trillion⁶. The city’s economy is driven predominantly by the services sector, which comprises 58.2%, followed by industry at 41.1%, and agriculture at a mere 0.5%. This economic composition is expected to remain stable through 2040⁷.

To support Ulaanbaatar’s sustainable development and foster a healthier, more comfortable living environment, the city is focusing on securing stable financial resources for its construction projects and development programs. This effort includes attracting international investments and creating a supportive legal framework. In line with this, the Government of Mongolia amended and passed the “Law on the Legal Status of Ulaanbaatar City” in 2021, granting the city the authority to issue bonds, a financing mechanism widely used internationally. In June 2024, with approval from the Financial Regulatory Commission, Ulaanbaatar city successfully issued bonds worth MNT 500 billion (approximately USD 144 million) in the domestic financial market.

Additionally, on September 19, 2024, Fitch Ratings agency upgraded Mongolia’s sovereign credit rating from “B” to “B+,” which also led to an upgrade in the ratings of several key domestic banks. This upgrade—the first in a decade demonstrates Mongolia’s improving economic indicators and reflects stronger fiscal management.

Key factors of positive situation:

- Consistent measures are being taken to reduce the debt burden: Mongolia is successfully implementing the foreign debt reduction policy and strengthening its financial stability;
- Foreign currency reserves are growing: Mongolia's foreign currency reserves are constantly increasing, which strengthens the confidence of investors⁸;
- Political Stability and Policy Continuity: The fact that Mongolia established a coalition government in July 2024 to solve development problems quickly and jointly implement the agenda put forward in the regular elections of the Parliament indicates that it focuses on improving policy succession and governance stability;

Significance of mega projects: The Government of Mongolia has identified 14 mega projects of social and economic importance for implementation. Some of these projects are planned to be carried out under Ulaanbaatar city's development policy and through additional financing (such as bonds, securities, etc.)⁹.

Ulaanbaatar aims to use bond financing to mitigate urban concentration and improve the accessibility of engineering infrastructure and overall quality of life. These efforts will focus on funding both ongoing and planned projects and programs that address these objectives.

⁶1212.mn, National Financial Committee

⁷Concept of Ulaanbaatar City's General Development Plan until 2040

⁸<https://med.gov.mn/post/151624>

⁹<https://cabinet.gov.mn/10950.html>

Road network: As of 2023, there are a total of 1.1 million registered vehicles in Mongolia, with 697,000 (58.2%) of these registered in Ulaanbaatar. The total length of the city's road network is 1,213 km, with 75% located in built-up areas and 25% in ger districts. Compared to 2020, the road network has increased by 433.8 km, representing a 35.8% growth¹⁰.

Modeling the current traffic conditions in Ulaanbaatar reveals that, in 2023, the length of the road network experiencing congestion throughout the day is 97.3 km, with peak hour speeds ranging from 7 to 13 km/h. Public transport accounts for 39.8% of the city's overall traffic volume. If no specific measures are taken to alleviate traffic congestion, projections indicate that by 2030, the length of the road network experiencing daily congestion could reach 200 km, with peak hour speeds dropping to 5 km/h and public transport's share of total traffic decreasing to 25%. This scenario would pose a significant risk of the "Ulaanbaatar Road Network Stalling"¹¹. In response to these challenges, Ulaanbaatar is implementing long- and medium-term policies aimed at improving the structure of the road network and enhancing public transportation, thereby fostering transport-oriented development.

Environmental status: Ulaanbaatar, the capital of Mongolia, is known as one of the coldest capital cities in the world. The city experiences four distinct seasons, with an average annual temperature fluctuating between 0°C and 2°C. In January, temperatures range from -17°C to -27°C, while in July, they vary between +19°C and +23°C. The absolute extremes range from +40.1°C to -46.7°C, resulting in a temperature variation of approximately 80°C. Annual precipitation is between 300 and 400 mm, with 70-80% occurring during the warmer months. Winds predominantly come from the west and northwest, averaging 4-6 m/s.

Ulaanbaatar's developed and developing areas are situated at an elevation of 1,260 to 1,350 meters above sea level, characterized by a sloping terrain that descends from the northern mountains toward the Tuul River basin. The absolute elevation of the area ranges from 1,200 to 1,500 meters. The surface types within the city exhibit a relatively gradual transition, with slopes generally not exceeding 8%¹².

¹⁰National Statistics Office

¹¹JICA Research

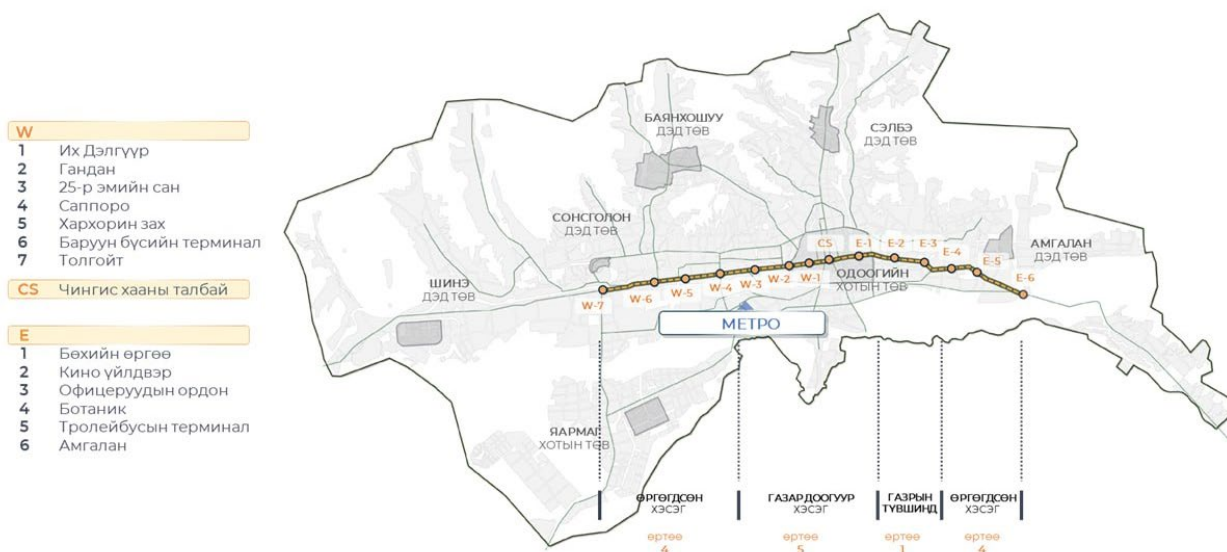
¹²Baseline Study for Ulaanbaatar City's General Development Plan until 2040, 2020

4. PROJECT LOCATION AND CAPACITY

4.1. LOCATION

The planned route will be approximately 17.7 km long from Amgalang, located in the 10th khoroo of Bayanzurkh District, along Peace Avenue to the west, to Songolon Street, near Tolgoi Station, located in the 20th khoroo of Songino Khaikhan District. Proposals and solutions will be developed according to the updated feasibility study, taking into account the possible solutions for the further implementation of the project and the conditions such as the establishment of a depot¹³.

Зургаг 1. Scope of high-capacity public transport "Metro" project



¹³JICA "Feasibility Study of Ulaanbaatar Metro Project," 2013.

4.2 PROJECT REQUIREMENTS

The station will be a complex building that will provide a variety of services and will meet the following requirements.

Passenger Comfort: Optimize the design of waiting areas, ensuring sufficient seating, accessible restrooms, and convenient entry and exit points for passengers.

Infrastructure: Implement a unified solution for the infrastructure of the station's above and below-ground facilities, including the installation of safety equipment to ensure security.

Passenger Flow: Carefully plan the movement schemes, signage, and management systems to effectively regulate passenger flow within the station.

Work Environment: Design workspaces and facilities for station staff in accordance with Mongolian Building Standards (BNR) and international standards to ensure a safe and comfortable working environment.

Public Services: Plan public service facilities such as shopping centers, stores, cafes, information centers, and offices to enhance the overall passenger experience.

Station: The location and number of stations will be updated after thorough analysis of the feasibility study and site assessments. Currently, there are plans to construct five underground stations, one at ground level, and eight elevated stations, with potential changes during the tender phase.

The metro allows to create a comfortable and convenient space that integrates urban and transportation space, and the underground space meets the following requirements. It includes:

- Development of underground space: To create a new space for convenient use of citizens regardless of climatic conditions by combining underground transport traffic with trade and services;
 - Support for business activities: By aligning station planning with the activities of individuals and businesses running businesses along the metro line, create new jobs and additional funding, and develop solutions that ensure the long-term sustainability of the metro system;
 - Footpath: Development of a pedestrian space, network supporting safe movement, building a system connecting the exits of adjacent buildings;
 - Underground parking: Development of underground parking spaces and systems for automobiles and non-motorized vehicles;
 - Development of underground engineering network: Development of engineering infrastructure network in coordination with the planned metro line;
- Security measures: Calculate the disaster risk of underground facilities and comprehensively solve the risk management;

In order to improve the social and economic situation and the smooth travel of citizens by developing the land around the station for various purposes, the "Public Transport Oriented Development" (TOD) has met the following requirements. It includes:

- Alignment with roads and other transportation networks: Alignment of metro lines with road traffic intensity and public transport passenger flow;

- Improvement of boarding system in other types of public transport: Reducing the use of cars by improving the operation system of public transport passenger traffic;
- Improving traffic management near the station: Improving the traffic organization of the street network around the station and ensuring safety;
- Connection of stations and buildings: Alignment of stations with existing and planned buildings;
- Large-capacity parking lot: Plan large-capacity parking lots near stations far from the city center in order to reduce car traffic and increase subway access; (*Park&Ride, P&R*)
- Station and its accompanying facilities: Designing a complex space for the station facilities in accordance with international requirements and local characteristics;

The location of the depot will be determined based on technical and economic considerations. Depot planning meets the following requirements:

- Location determination: The location of the planned rolling stock maintenance depot will be determined based on a detailed site survey in conjunction with the overall route, passenger traffic flow, and nearby infrastructure facilities.
- Infrastructural requirements: Comprehensive planning of the infrastructure required for the depot, i.e. heating, ventilation, water supply, electricity supply, roads and communication systems;
- Equipment: List of equipment needed for rolling stock maintenance, supply plan, entrances and exits, traffic flow, and storage capacity must be calculated;
- Capacity: Determining the space, equipment and human resources required for maintenance of rolling stock;
- Safety: Comply with the relevant international standard requirements that fully ensure the safety of personnel and labor;

Based on the demographic projections and analysis of movement demand, the technical specifications and quantity of rolling stock will be determined. Preliminary estimates suggest that approximately 90 units of car will be supplied as part of the project¹⁴.

¹⁴Clarification: Please note that the number of car will be more specified in the second stage of the tender.

4.3 GENERAL PROJECT REQUIREMENTS /¹⁵/

As the technical and economic basis of the project is updated again, the general requirements defined in this document are not limited to this.

Table 1. General project requirements

Gauge (mm)	1435
Pull system	DC1.5KV 50Hz by overhead power line
Direction	Tolgoit - Amgalan
Line length (km)	17.7
Minimum turning radius (m)	200
Driving force (‰)	30
Number of stations	14 (Elevated-8, underground-5, ground level-1)
Transport demand	
Year	2030
Passengers in the most congested direction during peak hours, /hour /one way	17767 – 26650
The number of cars in the train	6
Passenger Occupancy (180%)	1428
Output (peak hour) (sec)	150 - 300
Average speed (km/h)	39.2
Duration (min)	27
Top speed (km/h)	100 (80 in the underground)
Required series	13
Backup series for inspection	1
Emergency repair backup series	1
Total required series	15

¹⁵Based on the feasibility study conducted by JICA in 2013, Dohwa Engineering Co., Ltd. which was involved by the Ulaanbaatar City Administration from July 2024, is currently carrying out comprehensive monitoring and updates. This updated feasibility study includes current conditions and data, which will serve as a solid foundation for advancing the project. The updated feasibility study will provide the basis for developing detailed engineering designs for the Ulaanbaatar metro.

5. PROJECT SCOPE OF WORK

The Client will notify participants regarding the characteristics of the work to be performed under a single package contract, which will encompass engineering, procurement, and construction activities under an EPC (Engineering, Procurement, and Construction)/turnkey contract. The specific requirements for the work are detailed in Section 4.

5.1. DESIGN PROJECT

(a) Complete design of the following constructions, engineering networks and infrastructure:

- Tunnel Structures
- Bridges and Bridge Structures
- Depot Buildings
- Station Buildings
- Engineering Networks and Preparatory Measures: This includes accompanying structures and equipment for new planning, expansion, relocation, or removal.
- Connections to External Engineering Networks: These must be designed according to approvals from relevant authorities (technical condition).
- Internal Engineering Networks, Equipment, and Lifting Facilities within the construction buildings.
- Infrastructure Affected by the Project: This includes roads, road structures, public land areas, green spaces, relocations, new constructions, and demolitions along the planned route.
- Temporary Structures: Engineering networks, roads, road structures, and preparatory measures for construction activities.

(b) Complete designs of the railway system include:

- Rolling stock
- SCADA control system / train traffic control and management system /
- Operation control center / train traffic control center/
- Alarm and communication system /radio station, etc./
- Billing system
- Train power supply system
- Platform glass sliding door /full length, full height closed/
- Track works (Track works design)
- Depot equipment (including equipment for complete repair of all types of mobile units)

(c) Additional studies:

If complex conditions arise during the construction of bridge foundations and tunnels that are not addressed in the previous studies, additional and necessary research will be conducted.

In addition to the aforementioned scope of work, the contractor will be responsible for completing any necessary design work related to the implementation of the project. Tender participants are also

permitted to propose alternative design solutions that offer superior quality and cost savings compared to the model designs provided.

5.2. PROCUREMENT

- (a) The contractor is responsible for procuring all materials, equipment, machinery, and resources required to execute the project work.
- (b) The contractor is also required to acquire and transfer the rolling stock, equipment, and machinery necessary to initiate, accelerate, and operate the Metro or high-capacity public transport system.

This includes inspecting and evaluating the technical condition of the main railway parameters, track rails, signaling systems, and electrical lines along the entire length of the route.

-Rolling Stock: The rolling stock must be robust and capable of withstanding extreme weather conditions, with an axle load of 13.5 tons or more. It should comply with the RAMS (Reliability, Availability, Maintainability, Safety) management plan, and the entire train must be equipped with a computer that allows control and management from the operator's cabin. It should be capable of transporting passengers both with and without an operator.

5.3. CONSTRUCTION

5.3.1. Construction work

- (a) Implement all works related to underground structures for the Metro project, including tunneling, track installation, tunnel construction, and all associated tasks.
- (b) Execute the construction of surface-level and elevated bridges and bridge structures, along with all earthworks and associated tasks.
- (c) Plan and construct the depot facilities, including a maintenance depot and the connecting railway from the mainline to the depot.
- (d) Construct station facilities, which include underground, surface-level, and elevated stations, and carry out all building works associated with them.
- (e) Execute the works for both internal and external engineering networks, including new planning, expansion, relocation, and removal of networks affected by the route, as well as the construction of access tunnels, ducts, and reinforced concrete channels.
- (f) Implement environmental protection measures to comply with the relevant norms, standards, and requirements.
- (g) Conduct both exterior and interior finishing works, including design, landscaping, and other auxiliary quality works related to the project implementation.
- (h) Perform tasks related to the renewal, relocation, new planning, and expansion of roads and road facilities.

- (i) The contractor must also consider safety, accident management, transport logistics coordination, labor management, financial planning, and technical oversight as part of the planning and execution tasks.

5.3.2. Electrical, signaling and communication works

- (a) The power facilities must consist of a high-quality energy system that includes reliable connections between the electrical transmission and substation facilities, overhead lines, and power plants. These facilities should be designed to minimize energy losses, facilitate maintenance, and allow for future expansion.
- (b) The signaling equipment must utilize the latest train control methods and implement "fault-tolerant" strategies to ensure safety in the event of hardware or software failures. Additionally, the system should be configured with common and standardized signaling equipment capable of maintaining safety operations.
- (c) The communication facilities should be equipped with an optimized system to ensure reliability, safety, and economic efficiency. This includes communication lines and station facilities, train radio communication systems, and automated ticket collection systems as part of the overall communication infrastructure.

5.3.3. Other work

- (a) The term "Other Works" refers to additional requirements, improvements, and tasks that may not be included in the project plan but may arise during the course of the project. These tasks should aim to fully ensure project performance, enhance quality, and optimize safety. Additional works will be implemented after being agreed upon with the project stakeholders, and the necessary resources for their execution will be planned in advance and incorporated into the project¹⁶.

¹⁶Clarification: It is important to note that the proposed organization of the metro line, its length, location, the number of stations, and the location of depots may change depending on the feasibility of the route and corridor, as well as other factors. Updated information will be provided to the participants included in the shortlist.

6. PROJECT PERIOD

Table 2. Project plan

Name	Explanation
Project name	Engineering, Procurement And Construction Of The High-Capacity Public Transportation Project "Metro" In Ulaanbaatar (First Stage)
Project location information	It is planned to be approximately 17.7 km from Amgalan in the 10 th district of Bayanzurkh District to Tolgoit Station in the territory of Songinohairkhan District 20 th along Peace Avenue and Songolon Street (JICA 2013).
Station	Metro line stations will be designed with multiple service buildings, and the number and location of stations will be determined based on a baseline study.
Depot	The specific location and layout of the planned rolling stock repair and service depot may be revised by the consultant.
Time	July 2024 - September 2030, a total of 6 years (75 months)
Type of contract	EPC contract
Implementing organization	City Council will be established.
Administrative Jurisdiction	Ulaanbaatar City, 17-100, Artsat Am, Naadamchid road 1200, 23rd District, Khan-Uul District, Office of the Governor of the Capital City.
Selection of a project management consultant	February - June 2024 (Commence a Project Management Consulting Service: July 5, 2024)

Table 3. Project phase

Phase	Name	Period	Estimated date
Start of Project Management Consulting Services		07.05.2024	
Initial stage	Start working as a project management consultant	1 month	2024.07. 05 ~ 2024. 08 04
Phase 01	Drafting of basic research sketches and Tender documents	2-7 months (6 months)	08.05.2024 - 02.04.2025
	Receive Technical proposals from EPC contract participants		
Phase 02	Selection of EPC Contractor approved by the Government of Mongolia and the Office of the Capital Governor	8-14 th month (7 months)	02.05.2025 - 09.04.2025
Start construction		15 th month (1 month)	09.05.2025 - 10.04.2025
Phase 03	Implementation of construction works	16 - 63 rd month (48 months)	05.10.2025 - 04.09.2029 (48 months)
Stage 04	Operation and maintenance training	Months 51-75 (24 months)	05.10.2028 - 04.09.2030 (24 months)
Metro operations transfer for use		75 th month	October 5, 2030

7. OUTCOMES OF THE PROJECT

Urban Transport Infrastructure Based on Public Transport: The introduction of a new type of public transport vehicle, specifically a Metro system, will create opportunities to develop urban transport infrastructure based on public transport.

Integrated Public Transport Network: The implementation of the Metro will establish a fast, reliable, and accessible public transport network, encouraging the shift from private vehicles to public transport. This will create conditions for 60% of the total urban travel to be conducted via public transport, thereby promoting the development of public transport-based mobility.

Transport-Oriented Development: By planning transport-oriented development along the Metro network, it will connect various types of transport systems and establish a transportation system that links the city center with its outskirts via the public transport network. This will create the essential conditions for comfortable, rapid, and safe travel. Building on transport-oriented development, the establishment of public service, trade, and business facilities around stations will support social and economic growth.

Impact on the Environment: The reduction in traffic congestion and the decrease in vehicle usage will lead to a decrease in air pollution caused by automobiles, positively affecting the air quality and environmental conditions in the city.

Impact on Social and Economic Development: The development of the Metro system will reduce the costs and time associated with travel, mitigate the adverse effects of traffic congestion on social and economic factors as well as public health, and serve as a vital infrastructure for invigorating the city's economy and social development.

Creating Comfortable Living Conditions for Citizens: With optimal planning of the Metro system, travel costs and times will decrease, establishing a comfortable and efficient public transport system, which will significantly enhance the quality of life for all residents. Additionally, construction around Metro stations will create transport hubs tailored to the specific characteristics of the planned areas.

Reducing Traffic Congestion: The proposed Metro system is designed to intersect with high-traffic road networks characterized by high population density, significant public transport passenger flow, and heavy road loads. By transferring a portion of urban transport traffic to the Metro system, it will help reduce road congestion.

Unity and Interconnection: The Metro will connect various parts of the city, linking residential, commercial, and industrial areas, and creating opportunities for residents and business owners to interact.

Impact on Long-Term Urban Planning: The implementation of the Metro system will influence future urban planning, enabling more efficient land use, reducing unplanned expansion, and serving as a lever for the development of transport-based centers.

Social Inclusion: Proper planning and accessible organization of the Metro system can enhance social inclusion by providing transportation options for everyone, particularly for individuals with special needs or limited mobility.

Tourism and Urban Aesthetics: The construction of the Metro will enhance the city's attractiveness and give it a more modern appearance, capturing the attention of tourists and potential investors, thereby promoting the city on a global scale.

8. SPECIAL CONDITIONS

8.1. WEATHER CONDITIONS

Ulaanbaatar is situated at an altitude of 1950 to 2265 meters above sea level, surrounded by the Bogd Khan, Songinokhairkhan, Chingeltei, and Bayanzurkh mountains, and located in the Tuul River basin valley. Ulaanbaatar lies in a region characterized by dry, cool summers and harsh, severe winters. The average annual air temperature fluctuates between 0 to 2 degrees Celsius. In the first month of the year, temperatures range from -17 to -27 degrees Celsius, while in July, they range from +19 to +23 degrees Celsius. The absolute maximum and minimum temperatures are +40.1°C and -46.7°C, respectively, with a temperature variation of approximately 80°C. Annual precipitation is between 300-400 mm, with 70-80% occurring in the warmer months. Winds predominantly come from the west and northwest, averaging between 4-6 m/s, with occasional intensification.

8.2 GEOGRAPHICAL CONDITIONS OF PLANNED ROUTE

Approximately 40% of the city's residents live in the pedestrian-accessible areas along Peace Avenue.

The central part of the city includes Sukhbaatar Square, governmental and public institutions, as well as commercial and residential buildings, forming the urban core. In the western part of the city, the III Thermal Power Plant for energy and heating is located. The underground infrastructure supplies residential areas with clean and wastewater, heating, and other public utilities. Ulaanbaatar is spatially organized in an elongated form stretching from east to west, surrounded by mountains to the north and south, with the main crossroad being only Peace Avenue. As a result, urban activities and transportation demand concentrate along Peace Avenue. According to research findings, out of approximately 2 million trips made within the city daily, 700,000 (about 35%) trips occur along Peace Avenue. Additionally, 21 of the 58 main bus routes (36%) pass through Peace Avenue. Thus, Peace Avenue serves as the main artery of Ulaanbaatar, playing a crucial role in urban and road traffic capacity and functioning as the main axis of the public transportation network. From the perspective of urban development strategy, it is the most significant central route with high potential for growth.

8.3 CURRENT TRANSPORTATION SYSTEM OF ULAANBAATAR CITY

Ulaanbaatar's public transport system serves citizens with over 1,200 buses operated by a total of 21 enterprises. Currently, the city's road network consists of 1,213 kilometers of paved roads, indicating that the structural grid of the network is insufficient. Peace Avenue, which runs along the metro line, is a major thoroughfare connecting the Asian Highway AH-3 route and serves as a central road for the population and service organizations of Ulaanbaatar. Mongolia's transport system consists of three main components: railways, roads, and airways. The Ulaanbaatar Railway is part of the Trans-Siberian Railway, connecting the Russian city of Ulan-Ude with the Chinese city of Ereen. In terms of roads, there is a need for further planning of facilities to ensure the organization of road traffic and traffic safety in Ulaanbaatar.

9. PROJECT CLIENT AND ITS PARTICIPATION

Administrative Jurisdiction:

- Ulaanbaatar City, 17-100, Artsat Am, Naadamchid road 1200, 23rd District, Khan-Uul District, Office of the Governor of the Capital City.
- The comprehensive design and oversight of the project will be carried out by the Office of the Governor of the Capital City and its appointed decision-making and oversight authority.
- The appointed decision-making and oversight authority of the Office of the Governor of the Capital City (OGCC) is responsible for completing the project on time within the approved budget, ensuring the implementation of the project, directing and organizing it, and providing oversight.
- The "Unified Project Implementation Unit for Reducing Traffic Congestion in Ulaanbaatar City" under the OGCC is designated as the organization responsible for implementing the metro construction project, tasked with providing operational guidance, developing and implementing a management plan, and preparing and delivering process reports.
- The OGCC has signed a contract with an international consulting/contracting company specialized in overseeing the metro construction project and urban transport infrastructure. This company will provide professional support for the necessary technical and construction work during the project and participate in the development of advanced solutions to address issues in the public transport sector.