

נספח א' – תכולת העבודה

Scope of Services

1. Objectives

- 1.1. The main objective of the services (hereinafter: the “**Services**”) is to conduct a feasibility study, including initial designs and proposals for alternative alignments, for the purposes of refining the preferred route and station locations, as well as system characteristics for the Metro Rail system as proposed in the Jerusalem Metropolitan Mass Transit Strategic Plan (the “**Strategic Plan**”).
- 1.2. The initial designs and proposals will be prepared in relation to four main areas: (1) the route alignment; (2) underground stations location; (3) location of street level station entrances (4) defining systems characteristics.
- 1.3. The principal goal of the Services will be to develop alternatives for each of the above-mentioned areas and produce initial designs for these alternatives in order to analyse them and recommend a preferred alternative. The Services therefore will include the preparation of certain design details (as more fully elaborated below), as well as drawings and plans related thereto, together with related professional consulting services, which will include:
 - 1.3.1. Determining possible routes and alignments for proposed metro lines, as well as station and entrance locations; and
 - 1.3.2. Preparing cost estimates based on the initial designs for the proposed alternatives; and
 - 1.3.3. Examining the integration of the proposed metro lines within the existing and planned mass transit system (LRT lines & ISR heavy rail line), including, where necessary, proposing changes to the current system; and
 - 1.3.4. Proposing implementation phases for the mass transit network in general, and specifically for the metro lines, all based on transportation, urban and economic parameters; and
 - 1.3.5. Defining the system characteristics – including technical requirements, rolling stock, depots, operation and control centre needs, and integration of the system with other transportation modes.
- 1.4. The end-result of these Services will be the initial designs and recommendation of an alternative for future development (beyond the scope of the Services).
- 1.5. In this Scope of Services document, a ‘**Line**’ shall refer to an alignment from terminus to terminus; a ‘**Branch**’ shall refer to the rail alignment between the central common station(s) and the terminus of that Branch. The configuration of Lines as approved in the Strategic Plan will include at least four (4) Branches;

2. Performance of the Services

- 2.1. Commencing on the date of signing of the Agreement with JTMT, (hereinafter: the “**Signature Date**”) the Services will be performed in the five stages of work set out in section 3 below and in accordance with the timeframe and Milestones set forth in section 4 below and **Appendix 2** attached hereto (hereinafter: the “**Project**”).
- 2.2. Each stage of work shall be coordinated with all relevant authorities, including, but not limited to: the Ministry of Transportation, local municipalities, the planning authorities, the Israeli Electric Company, Israel Railways. There will be a stakeholders committee comprised of representatives from the above-mentioned bodies and any other relevant authority/body that will accompany this Project.

- 2.3. The Consultant will be responsible for preparing material and participating in public interest meetings throughout the duration of the Project.
- 2.4. Throughout the duration of the Project, the Consultant team will be expected to hold weekly meetings with JTMT. These meetings will be conducted online with no need for the physical presence of the foreign consultants. As part of the weekly meetings the Consultant will present the status and progress of the various deliverables, as well as the changes resulting from the comments received from JTMT and relevant stakeholders. The goal of the weekly meetings will be to maximise the coordination between JTMT and the Consultant and facilitate the approval of the deliverables without delays. Notwithstanding the foregoing, JTMT reserves the right to request the physical presence of the foreign consultants in Jerusalem up to five (5) times during the duration of this Project.
- 2.5. The commencement of each stage of work will follow the written notice to proceed (“NTP”) of JTMT and/or anyone appointed on JTMT’s behalf. The completion of each stage shall be dependent upon the written approval of JTMT.
- 2.6. JTMT will retain all rights to and in any and all design documents and materials of any kind whatsoever to be produced during the course of the Project. Such rights shall include, without limitation, the right to use such documents and materials in any manner it deems appropriate, and at its sole discretion, including transferring such documents and materials for the use of other designers on the Jerusalem Metro project and/or any other project, all at JTMT’s sole discretion.
- 2.7. The design deliverables for each of the areas outlined in section 1 above shall comply with the planning and design guidelines and criteria as set out on the JTMT website at jet.gov.il. Any requests for clarification of such guidelines and criteria shall be addressed to JTMT.
- 2.8. The Consultant shall be responsible to ensure that all deliverables meet all the requirements set out in this SOW and that they are of a suitable quality and standard conforming to best industrial practice. In this regard the Consultant shall also ensure that all deliverables conform with the JTMT guidelines for preparation of deliverables <https://jet.gov.il/supplier/>. Where the Consultant wishes to deviate in any way from such guidelines it shall do so only with the prior approval of JTMT.

3. The Stages of Work

- 3.1. The stages of work for the performance of the Services in this Project are as follows:
 - 3.1.1. **Stage 1 – Preparation** – leading division in JTMT – Planning & Engineering;
 - 3.1.2. **Stage 2 – Urban Analysis** – leading division in JTMT – Planning;
 - 3.1.3. **Stage 3 – Proposal of alternatives for the route alignment and station location and feasibility studies for each** – leading division in JTMT: Engineering;
 - 3.1.4. **Stage 4 – Evaluation of alternatives and selection of preferred alternative**– leading division in JTMT: Planning & Engineering;
 - 3.1.5. **Stage 5 – Initial design and complimentary components for the preferred alternative**– leading division in JTMT: Planning & Engineering
- 3.2. The above five (5) stages of work are described more fully in the following sections.

4. Timeframe

4.1. The Consultant shall complete the work of this Tender, in accordance with the timeframe provisions, Milestones and Gantt as set forth in **Appendix 2** attached hereto. The overall timeframe for the completion of the Services shall not exceed **twenty-five (25) months** following the Signature Date (the “**Term of the Agreement**”).

5. Process for review and approval of deliverables

- 5.1. All deliverables and all documentation prepared by the Consultant related to or associated with the performance of the Services shall be (i) prepared, updated, maintained and completed according to the requirements set forth in this SOW and (ii) uploaded to and submitted to JTMT through the EDMS only. The current EDMS is the Mezzoteam.
- 5.2. The Consultant shall be responsible to coordinate the preparation of its deliverables with representatives of JTMT throughout the course of the Project. Without derogating from the foregoing, the coordination with JTMT as set forth above shall include coordination and updates during weekly meetings with JTMT, as well as meetings with the stakeholders’ committee as set forth in section 2.2 above.
- 5.3. In addition, there shall be two (2) additional coordination points during the Project, upon the submission of draft deliverables at Stage 2 and Stage 4, where the Consultant shall be required to participate in coordination meetings for the review of deliverables with professional representatives from the Jerusalem Municipality, as well as representatives from the Ministry of Transport, in addition to JTMT.
- 5.4. Following the submission by the Consultant of any of the deliverables listed herein, JTMT shall commence the review of such deliverable and shall deliver any comments to the Consultant within twenty (20) working days (approximately one (1) calendar month). Following receipt of JTMT’s comments on any deliverable, the Consultant shall correct and resubmit such deliverable within twenty (20) working days (approximately one (1) calendar month).
- 5.5. The foregoing procedure will be repeated in the event of additional comments by JTMT on any deliverable. The satisfactory implementation of any comments by the Consultant and the final approval by JTMT of any deliverable shall be a precondition for receiving the relevant Milestone payment.
- 5.6. It shall be the sole responsibility of the Consultant to ensure that it submits drafts of all submissions within sufficient time so as to ensure that the entire process of review, comments, corrections, resubmissions and approvals shall not result in the Consultant exceeding the timeframe for the completion of Milestones as set forth in **Appendix 2**.

6. Stage 1 – Preparation

6.1. Data collection

6.1.1. The Consultant shall research and procure any information that may be needed and that might have a bearing on the performance of the Services, including but not limited to data relating to:

- major transportation projects and other infrastructure projects; and
- utilities – in this regard, the consultant shall gather relevant information on utilities from the large utility companies (HaGihon, Bezek, the IEC, etc); and
- existing and approved land-use information; and

- relevant national, regional and local land-use forecasts and master plans; and
- soil conditions – based on existing information collected from the relevant authorities and other projects; and
- environmental information, including with respect to sensitive environmental areas (schools, hospitals, etc), government sites, urban nature sites, and areas with historical or archaeological sensitivity; and
- existing and planned projects.

6.1.2. The Consultant shall, in addition, make use of relevant data held by JTMT, including plans, designs, GIS data, model data, etc. JTMT will provide such information to the Consultant, and the Consultant shall, at its sole risk and expense, verify the accuracy of all pertinent information and data received from JTMT and, potentially, other agencies. Some of the information available includes:

- The 2050 Mass Transit Strategic Plan containing the proposed conceptual Metro rail routes;
- JTMT’s transport model for the Jerusalem metropolitan area; as well as other related demand forecasts and analysis (e.g. GIS network analysis);
- Available reports of previous studies and plans concerning mass transit transportation in the Jerusalem metropolitan area;
- An up-to-date photogrammetric survey, on a scale of 1:5,000.

6.1.3. Deliverables for Data Collection:

Based on the above, the Consultant shall provide the following deliverables:

- 6.1.3.1. The Consultant shall analyse all survey information and other background materials necessary for the completion of the Services. The Consultant shall prepare, based on the above collected data, a compilation of approved land uses for a minimum of 500 metres from *each side* of the horizontal alignment (i.e. a strip of 1,000 metres in total) to a scale of 1:5000 (the “Strip”). The Strip may be extended at later stages of the Project; and
- 6.1.3.2. A summary of collected data, presented as a written report which includes GIS layers; and
- 6.1.3.3. Any relevant data tables, land use layers, or design files shall be included as digital files.

6.2. Detailing of technical parameters

6.2.1. The Consultant shall develop the details of the technical parameters for each proposed Metro line, which shall include:

- **Track structure and configuration** (including whether elevated or underground); and
- **Alternatives for typical tunnel sections** (single or twin tunnels), tunnel dimensions and tunnel construction method (TBM, NATM or Cut & Cover) for the various segments. In this regard the unique characteristics of Jerusalem, including with regard to archaeological sites, sites of religious/historical importance, and burial sites shall be

taken into consideration, as well as constraints relating to work on the Sabbath and Holidays. The alternatives shall be analysed with respect to soil conditions among other factors; and

- **Interoperability and inter-modality** of the different mass transit systems in the Jerusalem metropolitan area, providing design criteria for transfers from one system to another; and
- **Typical cross-sections** with all relevant utilities and systems on a scale of 1:100; and
- **Power supply and traction systems**, including capacity, potential locations of substations, power feeders to the trains, connections to main power supplies, auxiliary supply arrangements and energy saving, regeneration, and efficiency improvement measures. The Consultant shall be responsible for coordinating the procurement of all data relating to power supply needs with the Israel Electric Company; and
- **Rolling stock**, including capacity, speed, length, width and mode of operation, noise and vibration levels, EMF, ecoefficiency of materials for use, energy efficiency, driving modes and level of automation; and
- **Systems Characteristics** – the special characteristics for a metro railway relating to each of the relevant systems, including railway signalling, AVLS, SCADA etc.; and
- **Operational scheme**, including necessary frequencies, design speed, initial required locations of switches, stabling configuration;
- **Depots** – the sizing and functional programme, as well as identifying potential locations for the Metro depots.

6.2.2. Deliverable for Technical Parameters: A written report for each of the above technical parameters of the metro rail system, together with drawings where relevant.

6.3. Preparation of Design Guidelines for the Design of Metro Lines

6.3.1. Based on the above data collection work and technical parameters, the Consultant shall prepare, for the use of JTMT, design guidelines for the Jerusalem area Metro rail network as part of the Jerusalem Metropolitan mass transit system. The design guidelines shall be based on the most up to date international design guidelines with adaptation to be in compliance with Israeli codes and standards.

6.3.2. The preparation of design guidelines as aforesaid shall present all the design guidelines and standards upon which the Consultant proposes the design work will be based in each discipline.

6.3.3. All design guidelines and standards proposed should be relevant for the future use and application of all parties that may be involved in the planning and design of the Metro rail system.

6.3.4. For the track alignment discipline, the design guidelines should be defined considering the specific characteristics of the city of Jerusalem and the Project including the topography and distances between stations. The track alignment guidelines will be submitted to JTMT engineering division for monitoring and approval, in addition to a report summarising justifications for the main design parameter limits.

6.3.5. Deliverables for the preparation of design guidelines:

6.3.5.1. Compilation of all design guidelines and standards that will be relevant throughout the planning and design of the Metro rail system, in accordance with international and local design guidelines and to be in compliance with Israeli codes and standards.

6.3.5.2. Preparation of specific written design guidelines for the track alignment together with a report summarising justifications for the main parameter limits.

6.4. Typical Stations – Initial Design

6.4.1. In this part of Stage 1 (the “Preparation Stage”), the goal will be to define the dimensions and depth of a typical station. To this end the Consultant shall develop an initial design for such typical station. The preparation of this initial design will be the responsibility of the architect who will take into account the systems and utilities as defined by the respective consultants.

6.4.2. The Consultant shall prepare an initial design for two typical stations: one with side platforms and one with a central platform.

6.4.3. The initial design for the typical station shall take into consideration the level of use at the particular station (high use, low use, and others, as required.). The initial design shall incorporate all facilities, utilities, services, and amenities needed to operate the station within the proposed Metro line and shall address, *inter alia*, the following key elements:

6.4.3.1. Station facilities, including utilities, services and amenities required on each level; and

6.4.3.2. Required electromechanical and plumbing systems; and

6.4.3.3. Elevators, escalators, length and width of platforms and all other facilities necessary or required for a properly functioning station.

6.4.4. In its development of an initial design, the Consultant shall incorporate ‘green’ building—standards, international best-practices, and experience in eco-design, using an LCA (life cycle assessment) approach for similar design activities.

6.4.5. The initial design shall be based, *inter alia*, on demand forecasts that will be supplied to the Consultant by JTMT.

6.4.6. The level of detail in the design drawings shall be sufficient to enable and support the estimation of the cost of, and statutory requirements for a typical station – all in accordance with the JTMT design guidelines as referred to in section 2.7 above.

6.4.7. The Consultant shall take into account the possibility of the stations being used as public passages and locate the card validation machines in such a way as to allow the public to cross through the stations when possible.

6.4.8. The initial design shall include an analysis of the number and size of elevators and escalators needed to enter/ exit the station, all in accordance with the expected demand at such stations, as well as an estimation of the time it takes to enter/ leave the station.

6.4.9. The Consultant shall analyse the impact of potentially using the stations as public shelters.

6.4.10. The initial designs for the typical stations as set out in this section shall form the basis for the design of the individual stations at later stages of the Project.

6.4.11. Deliverables (for the initial design of typical stations):

The deliverables for this section shall comprise the following:

- 6.4.11.1. General architectural arrangement drawings for each level of the typical station at a scale of 1:200 including all necessary systems and utilities details.**
- 6.4.11.2. Longitudinal and cross-sectional drawings for the typical station at a scale of 1:200 including all necessary systems and utilities.**
- 6.4.11.3. A typical station 3D imaging, at appropriate scale and angles, to provide a visual understanding of the style, passenger movement, usability, accessibility, and layout of the station.**

7. Stage 2 – Urban analysis

7.1. Essential elements of this Stage 2

- 7.1.1. The urban planner will be the lead designer for this Stage 2 with the assistance of the transportation planner and the architect.
- 7.1.2. The Consultant will take each initial station location, as defined in the Strategic Plan, and analyse the surrounding neighbourhood, within a 500m radius. The purpose of this will be to optimise the positioning of station entrances, and also to recommend the preferred positioning of station platforms, from an urban perspective.
- 7.1.3. The Consultant will map out the local land uses, topography, attractions, transfer points, available plots of land, understand the various design stages of the surrounding plots and present a detailed map for the neighbourhood surrounding each station.
- 7.1.4. The Consultant shall analyse the potential coverage of possible station entrance locations, including a walkability and accessibility analysis of the surrounding area and suggest new walkability and accessibility projects as needed to increase the catchment area for, and accessibility of, each station. Based on this, the Consultant will suggest various possibilities for the station entrance locations. In addition, based on the neighbourhood analysis, the Consultant will suggest possible locations for construction preparation sites.
- 7.1.5. With regard to walkability and accessibility it should be noted that key elements are the walkability and accessibility aspects both outside on the street network and in underground tunnels connecting the station entrances. As such, the Consultant will perform a coverage analysis of each station to identify how many households are within walking distance of each station, taking into account the topography, street network, and underground connections that the Metro system will create. The walking time and accessibility analysis should be separated into the walking/accessibility time outside the station and the time within the station.
- 7.1.6. The Consultant will develop at least four (4) viable alternatives for entrances to each of the stations. Each entrance could either be on an available private plot of land, on a public plot of land, or on the site of an existing building which could be wholly or partially expropriated and redesigned to include the station.
- 7.1.7. The Consultant will prepare and provide 3D models at appropriate scale, to provide a visual understanding of the urban environment surrounding the proposed station locations.

7.2. Deliverables for Stage 2 – Urban Analysis:

The deliverables for this Stage 2 – urban analysis comprise the following:

- 7.2.1. Plans (to a scale of 1:1000) together with a report defining and analysing at least four (4) viable alternatives for entrances to each of the stations as well as a recommendation as to the ideal locations for each station platform.
- 7.2.2. A minimum of four (4) viable alternatives for preparation and construction sites for each Metro line shall also be identified (in separate plans to a scale of 1:1000).
- 7.2.3. A coverage analysis of each station identifying how many households are within walking/accessibility distance from each of the station entrances (and the entire station), and supplementary projects to increase the number of households within walking/accessibility distance therefrom.

8. Stage 3 – Proposal of alternatives for the route alignment and station location and feasibility studies for each

8.1. Essential elements of Stage 3

8.1.1. In this Stage 3, the Consultant shall conduct feasibility studies and propose plans for, and examine between 4 and 6 alternatives for the route alignment and station location for each segment of the Metro lines.

8.1.2. The selection of feasible alignments will be based on a thorough investigation of the nature, location and extent of all main utilities, structures and properties that may be affected in each case, details of which shall be obtained by the Consultant from the relevant utility owners, authorities and Municipality.

8.1.3. The Consultant's plan for each of the proposed alternatives shall be based on the proposed corridors as included in the 2050 Jerusalem Metropolitan Mass Transit Plan included in **Appendix 1**.

(The corridors detailed in **Appendix 1** were selected based on a multitude of parameters including land uses and demographics (population, employment, commercial centres, education facilities, etc.), and based on a multi-criteria analysis that evaluated many different parameters to achieve the predetermined goals set out in the 2050 Jerusalem Metropolitan Mass Transit Plan).

8.1.4. The goal of this Stage 3 is to **Appendix 1** propose the alternatives for the alignment as well as station and entrance locations, all based on the urban analysis to be performed as part of Stage 2, and the basic configuration set out in the Strategic Plan. This will include various sub alternatives as outlined in the map.

8.1.5. A minimum of 3 and a maximum of 6 alignment alternatives will be examined (in accordance with the directions of JTMT). Of these:

- 8.1.5.1. One alternative will include the common station at the city entrance;
- 8.1.5.2. One alternative will include the common station at the government centre; and
- 8.1.5.3. One alternative will include more than one common station.

- 8.1.6. The difference between each alternative shall be reflected in each of the Branches of that alternative. In its analysis of each alternative, the Consultant shall investigate a number of sub-alternatives for the inter-connections between Branches, Lines, common stations, and depot(s).
- 8.1.7. In its preparation of the plans for each of its proposed alternatives the Consultant shall:
- 8.1.7.1. Ensure conformity with respect to geometric design, including horizontal and vertical alignments, design speed, turning radius, terrain and gradients, superstructures, platforms, and all other elements of geometric design.
 - 8.1.7.2. Prepare single-line layouts and profiles (scale 1:5,000,) along with cross sections and right-of-way (ROW).
- 8.1.8. Provide cross sections at characteristic points of the alignment (scale 1:100) for each alternative, and no less than one cross section for every 1,000 meters of alignment. The level of detail shall be sufficient to enable and support the comprehensive evaluation (at Stage 4) of each alternative's design and JTMT's decision-making process with respect to each of the elements of the particular proposed preferred alternative.
- 8.1.9. Prepare and provide 3D models at appropriate scale to provide a visual understanding of the various alternatives.

8.2. Deliverables for Stage 3:

The deliverables for this Stage 3 (proposal of alternatives and feasibility study) comprise the following:

- 8.2.1. A minimum of 4 and a maximum of 6 viable alternatives for each section of the Metro lines. A vertical and horizontal alignment plan together with typical sections will be presented for each alternative to the scales outlined above.**
- 8.2.2. With regard to each of the proposed alternatives, the Consultant shall conduct a feasibility study and shall produce a detailed report relating to the advantages and disadvantages of that alternative, including with respect to parameters such as: track alignment, accessibility (including depth of stations), maximising ridership, level of service for users of the mass transit network, economic and environmental impact, and so on. A list of such parameters is also set out in section 9.1.4 below.**

It should be noted that this **Stage 3** may form part of an iterative process with **Stage 4**, as during the design process new information may be accumulated, leading to further alternative proposals.

9. Stage 4: Evaluation of alternatives and selection of preferred alternative(s)

9.1. Essential elements of Stage 4

- 9.1.1. In this **Stage 4** the Consultant will present and evaluate its proposed alternatives, including for each station, following which JTMT shall determine which alternative(s) to take forward to **Stage 5**.

9.1.2. The Consultant will evaluate the alternatives chosen in **Stage 3** and, based on the results of the feasibility studies conducted for each, recommend an optimal alternative.

9.1.3. In arriving at its proposed recommended alternative, the Consultant will use a multicriteria analysis (MCA) of all relevant parameters.

9.1.4. A partial list of the criteria to be considered for each alternative is set out below:

- I. Coverage;
- II. Speed and travel times, taking into account the slopes of the various alternatives and distances between the proposed stations;
- III. Cost – a detailed cost estimate for each of the proposed alternatives to a sufficient level of detail, which may be taken into account for the comparative evaluation thereof. The Consultant shall prepare detailed cost estimates of capital, operational and maintenance costs, in terms of, inter alia:
 - All construction, maintenance and operation work, including, among others, the following: civil engineering (tunnels, stations etc.), depots, traction and power supply, signalling and telecommunication works, automatic fare collection, rolling stock, environmental protection, general charges and contingencies.
 - Relocation of utilities and services.
 - Land acquisition
 - Design and project management costs
 - Operation and maintenance costs for over a twenty (20) year period, taking into account the specific physical characteristics of the alternative
- IV. Ridership;
- V. Station depths;
- VI. Impact on neighbouring businesses;
- VII. Opportunities for urban development and promotion of TOD;
- VIII. Opportunities for urban nature, parks, and public open space;
- IX. Intermodal integration;
- X. Statutory and land acquisition aspects – identifying land acquisition requirements along the transit alignment routes, at stations and interchanges, at P&R zones, at depots and operation and control centres;
- XI. Impact on existing utilities;
- XII. Environmental impacts – including sustainability elements, contaminated land, sensitive areas (such as schools and hospitals), government sites, sites of important natural beauty/interest, sites with historical or archaeological importance;
- XIII. Operational elements;

- XIV. Impact on private and public transportation in the influenced area, including an analysis of the impact on road geometry, parking availability, necessary changes in traffic plans, taking into account pedestrian movements as well;
- XV. Impacts on utilities and services;
- XVI. Maintenance;
- XVII. Social impacts;
- XVIII. Potential construction sites;
- XIX. Risk management;
- XX. Legal and planning constraints;
- XXI. Public safety and accessibility;
- XXII. Ability to meet the strategic goals and objectives as outlined in the Strategic Plan for mass transport stage 5;
- XXIII. Ability to service the main attractions of the neighbourhood as outlined in Stage 2.

9.2. Deliverables for Stage 4:

The deliverables for this Stage 4 shall comprise the following:

- 9.2.1. Report, presentation and excel table outlining the decision-making process of analysing the 3-6 alternatives and recommending (a) preferred alternative(s).**
- 9.2.2. The report shall refer to all relevant parameters and disciplines as outlined above (section 9.1.4).**

10. Stage 5 – Initial design and complimentary components for preferred alternative(s)

In its initial design (of the preferred alternative(s) chosen at the completion of Stage 4) to be provided as part of Stage 5, the Consultant will address and prepare the following:

10.1. Multimodal facility design and programmatic design for each station

- 10.1.1. For each of the facility types listed below, the Consultant will prepare general design guidelines and will also define which station entrances should include which facilities, in order to prepare the necessary "programme" for each individual station entrance:
 - 10.1.1.1. Park and ride facilities – identify which stations should have park and ride facilities and identify potential plots of land which could be used as park and ride facilities, indicating the required amounts of parking spots in each facility, the size of each facility, an estimate of the number of floors of each facility;
 - 10.1.1.2. Bicycle facilities at stations – recommend the desired amount of bicycle parking at each metro station entrance, identify possible locations for bicycle parking, and recommend which additional bicycle facilities should be provided at which stations. This could either be within the station itself or outside;

- 10.1.1.3. Bus facilities at stations – identify which Metro stations will have a significant bus interface and identify potential land that can be used as bus termini/large bus stops at these stations;
 - 10.1.1.4. Kiss and ride facilities and taxi stands at stations – identify which Metro stations should have kiss and ride facilities, and how many “places” should be dedicated to kiss and ride facilities at each Metro station. Present suitable locations for kiss and ride facilities and taxi stands at the relevant stations;
 - 10.1.1.5. Walking access paths leading to the station entrances, including location for potential public escalators/elevators if relevant within an aerial radius of 500m from each station entrance as well as planning the underground paths which connect each station entrance to the station itself;
 - 10.1.1.6. Accessibility facilities, including for persons with mobility impairment and disabilities;
 - 10.1.1.7. Transfer facilities with light rail and heavy rail at relevant stations. At all stations where one of the planned Metro lines meets another mass transit mode (heavy rail, light rail, BRT line, future metropolitan rail connection, major bus facility), the Consultant will plan the path the passengers will take between the Metro and the other transit mode in order for the transfer to take place as seamlessly as possible. For each transfer station, the Consultant will provide a plan which demonstrates the length the passengers must travel and estimate the amount of elevators/stairs/escalators needed to transfer between modes, as well as an estimation of the time the transfer will take;
 - 10.1.1.8. Toilets, storage facilities, commercial areas within the stations – a recommendation of which stations should have storage facilities, which stations should have toilets, which stations should have commercial areas, either within the stations themselves or within the tunnels connecting the entrances to the platforms.
- 10.1.2. **Three types of maps/diagrams** will be prepared and presented by the Consultant:
- 10.1.2.1. An overall map of the Metro system will be presented, outlining which Metro stations will have which facilities; and
 - 10.1.2.2. In addition, a zoom-in of each station will be presented with a polygon outlining the areas for the different facility types; and
 - 10.1.2.3. An architectural plan will be prepared for each station showing the different uses surrounding the station at a resolution of 1:1000 or higher.
 - 10.1.2.4. The consultant shall prepare visual views, 3D images and simulations, as needed, to present the various elements of the Project to the stakeholders
- 10.2. **Overall functioning and level of service of the system** – given the potential high gradients, slopes, radiuses, station depths, bridges crossing over sensitive ecological area, it is important to understand the overall level of service of the system and if the Metro lines succeed in meeting the strategic goals in terms of level of service (travel times, coverage, cost, etc) set by the Strategic Plan
- 10.3. **Depots** – location, sizing, functional programme. In this regard the Consultant shall also consider the flexibility of the depot in terms of adding additional Metro lines in the future. **A**

layout plan at a scale 1:1000 of with all functions will be prepared and presented (see Deliverables for Stage 5 below).

10.4. Operation and control centres functions and locations

10.5. The Consultant shall prepare an operational report. The operational report shall include, without limitation, the following:

- 10.5.1. An operational scheme, including locations of switches, stabling, platforms, and interchange station(s).
- 10.5.2. Demand profiles (boardings, alighting, continuing passengers, estimated dwell times) for each station along the line; and
- 10.5.3. A diagrammatic track plan; and
- 10.5.4. A description of the required capacity for the lines, recommended frequencies for each line throughout the day, vehicle type and length, and include options for the capacity (seated and standing) of each vehicle;
- 10.5.5. The estimated trip time for each line shall be included, as well as estimated time between each station.
- 10.5.6.** The number of vehicles required for operation.

10.6. Risk Management

- 10.6.1. The Consultant will prepare and submit to JTMT **a risk assessment survey**, in accordance with the instructions and procedures provided by JTMT. The Consultant will point out in the risk assessment survey all potential risks and complications in the execution of the Metro Project, which are known or foreseen at every stage during the Agreement Period.
- 10.6.2. Without derogating from the generality of the foregoing, the risk assessment survey will specify, in detail, each of the matters and issues which may potentially cause: {1} delays in the expected schedule for the execution of the Metro Project; (2) increase in the Metro Project's estimated costs; (3) any compromise in the quality standards of the Metro Project; and (4) any other setbacks, claims, losses and damages of any kind in relation to the Metro Project.
- 10.6.3. The findings and conclusions of the risk assessment survey will be integrated in the preliminary schedule for the design of the Metro Project, which shall reflect, *inter alia*, the potential impacts on the Metro Project's feasibility and estimated costs.
- 10.6.4. It is hereby clarified that, together with the process for identifying all potential risks and complications to the Metro Project, JTMT ascribes great importance to the proper implementation of the risk assessment survey's conclusions to reduce such risks and complications to their absolute minimum. Risk management constitutes a fundamental aspect within the Scope of Services and a key element for the process of preparing the preliminary design for the next stages of design and the implementation of the Metro Project in general. Each potential risk shall undergo an assessment process to select the required and optimal actions for the minimizing thereof.
- 10.6.5. The Consultant will submit to JTMT a preliminary copy of the risk assessment survey as part of **Stage 1 (Data Collection)** and **thereafter will continue to submit updated copies of the risk assessment survey**, as necessary to keep JTMT's copy of the risk assessment survey up to date at all times throughout the Project.

10.7. Implementation phases

10.7.1. The Consultant shall propose an **implementation plan** for the mass transit network, including for the implementation of the integration of the selected Metro lines within the currently existing mass transit system in the Jerusalem Metropolitan Area.

10.7.2. The **implementation plan** shall take into account all relevant considerations, including the following:

- Benefit impact on transportation;
- Level of feasibility (including but not limited to statutory plan availability, land acquisition, utilities and services, major risks, etc.);
- Construction costs;
- Possible schedule for operation and construction alternatives, including recommending construction preparation sites;
- Potential depot locations.

10.8. Tunnelling & Structures

10.8.1. **An initial tunnelling & structures report** shall be prepared which shall include the following:

10.8.1.1. The Consultant shall propose solutions for the construction of the Project for each of the chosen routes including all stations and tunnels;

10.8.1.2. As part of the analysis for the preparation of the tunnelling and structures report the Consultant shall take into account all common construction methods for tunnelling, stations and other structures;

10.8.1.3. In addition, the analysis shall be based on the specific conditions in Jerusalem, including soil conditions, width of roads, population, etc.

10.9. Track alignment

10.9.1. **A track alignment report** shall be prepared which shall include full design data for the track alignment (horizontal & vertical) of all chosen routes.

10.9.2. The track alignment report shall highlight the main issues in the track alignment, such as design values which are close to the criteria limitations and their impacts, a description of designed track elements including unique switches, and so on.

10.9.3. Together with the track alignment report, horizontal & vertical alignment plans along all chosen routes (1:2500) shall be submitted.

10.10. Architecture

10.10.1. **An initial architecture report** shall be prepared taking into account all chosen routes and incorporating the following:

10.10.1.1. The initial design, prepared by the Consultant's architect, of all stations and other structures along the chosen routes.

10.10.1.2. Architectural layouts (1:500 scale or higher) and sections (1:200) for each station and main structure.

10.10.2. The Consultant's architect shall coordinate the architectural design with all other **disciplines** including structure and utilities and integrate them in the design.

10.11. Landscape

10.11.1. **An initial landscape report** shall be prepared taking into account all chosen routes.

10.11.2. The Consultant's landscape designer shall be responsible for the initial landscape design around all main stations and structures in the project and for coordinating such design with the Consultant's architect, physical designer and urban designer.

10.12. Environment

10.12.1. **An initial environmental report** shall be prepared taking into account all chosen routes.

10.12.2. The environmental report shall cover such environmental aspects as noise, vibration, infections and all other relevant environmental aspects.

10.12.3. The environmental report shall cover all stages of the Metro Project (including construction & operation stages).

10.13. Geology

An initial geological report shall be prepared taking into account all chosen routes.

10.14. Soil and pavement structure

10.14.1. **An initial soil and pavements report** shall be prepared considering all chosen routes.

10.14.2. As part of the initial soil and pavements report, the Consultant's designer shall prepare a drilling program to be used in the next stages of the project (stages that are not part of this SOW).

10.15. Safety

10.15.1. **An initial safety report** shall be prepared taking into account also the construction and operational stages of the Metro Project.

10.16. Accessibility

10.16.1. **An accessibility report** shall be prepared taking into account the design of all stations along the chosen routes;

10.16.2. The Consultant's accessibility consultant shall prepare instructions for the typical stations design and coordinate this with the Consultant's architect.

10.17. Drainage

10.17.1. **An initial drainage report** shall be prepared taking into account all chosen routes.

- 10.17.2. The Consultant's drainage designer shall analyse the alignment of the chosen routes and proposed drainage solutions for the tunnels and for major construction sites including depots.
- 10.17.3. The Consultant's drainage designer shall obtain the relevant data regarding the main existing and designed drainage lines from the water and drainage authorities as well as from other projects.
- 10.17.4. The Consultant's drainage designer shall propose initial solutions for main drainage utilities in case of a clash with the design of the Metro Project and to coordinate it with the utilities coordination designer.

10.18. Air-conditioning

- 10.18.1. The Consultant shall be responsible for **the initial air-conditioning design** in typical main metro stations and structures and for coordinating such design with the architect for the Project.

10.19. Statutory

- 10.19.1. **A final statutory report** shall be prepared taking into account all chosen routes.

10.20. Traffic

- 10.20.1. **An initial traffic report** shall be prepared taking into account all chosen routes.
- 10.20.2. The Consultant's traffic designer shall be responsible for the initial traffic design in the Project and for coordinating this with the architect, the physical designer, the urban designer and the transportation planner.

10.21. Rolling stock

- 10.21.1. **An initial rolling stock report** shall be prepared outlining the details of the recommended rolling stock for the Metro Project.

10.22. Rail systems

- 10.22.1. An initial rail systems report shall be prepared considering all rail systems including all relevant rail electricity systems and signalling.

10.23. Physical design

- 10.23.1. The Consultant's physical designer shall be responsible for the initial design of all routes, roads and transportation elements in the project.
- 10.23.2. Layouts along all chosen routes (1:2500) shall be prepared and should include all tracks, tunnels, structures, roads, etc.

10.24. Existing & Designed utilities coordination

- 10.24.1. Each specific utilities designer shall be responsible for the coordination of such utilities design with the relevant utilities authority, together with the utilities coordination designer, for the purposes of collecting all relevant existing data relating to the relevant utility.
- 10.24.2. The Consultant's utilities coordination designer shall be responsible for coordinating all existing and designed utilities and for providing initial coordination utilities layouts for all the chosen routes (1:2500).

10.25. Bezeq Utilities

- 10.25.1. The Consultant's designer shall obtain all the relevant data regarding main existing and deigned Bezeq lines from the relevant authority (Bezeq) and from other projects.
- 10.25.2. The Consultant shall propose initial solutions for dealing with main Bezeq utilities in the event of such utilities interfering with the design of the Metro Project and shall coordinate such solutions with the utilities coordination designer.

10.25.3. Water design

- 10.25.4. The Consultant's designer shall obtain all relevant data relating to main existing and designed water lines from the water authorities (Hagihon, Mekorot) and from other projects.
- 10.25.5. The Consultant shall propose initial solutions for main water utilities in the event of its proposals for the design of the Metro Project interfering with such existing functioning water utilities and shall coordinate such design and solutions with the utilities coordination designer.

- 10.25.6. The Consultant shall be responsible for the initial water design in typical metro stations and for coordinating such design with the architectural design of the Project.

10.25.7. Electricity & lighting

- 10.25.8. The Consultant shall obtain all relevant data relating to the main existing and designed electricity lines from the Israel Electricity Company (IEC) and from other projects.
- 10.25.9. The Consultant shall propose initial solutions for dealing with main electricity utilities in case of these interfering with the design of the Metro project and shall coordinate such solutions with the utilities coordination designer.
- 10.25.10. The Consultant shall be responsible for the initial electricity and lighting design in typical metro stations and for coordinating such design with the architectural design of the Project.

10.26. Sewage

- 10.26.1. The Consultant shall obtain all relevant data relating to the main existing and designed sewage lines from the water and sewage authority (Hagihon) and from other projects.
- 10.26.2. The Consultant shall propose initial solutions for dealing with main sewage utilities in case of these interfering with the design of the Metro Project and for coordinating such solutions with the utilities coordination designer.
- 10.26.3. The Consultant shall be responsible for the initial sewage design in typical metro stations and for coordinating such design with the architectural design of the project.

10.27. Deliverables for Stage 5:

As part of **Stage 5**, the Consultant will produce a **report and presentation outlining each component and discipline of the design for each of the alternatives selected in Stage 4.**

Without derogating from the foregoing, the deliverables for **Stage 5** will include *all* of the deliverables outlined in sections 10.1 to 10.26 above, and shall include the following:

- 10.27.1. Multimodal facility report & maps as defined above including the various urban planning elements and layouts (1:1000) for each station outlining connections to other transportation systems;
- 10.27.2. Transportation report (including level of service and demands analysis);
- 10.27.3. Depot report and depots layout plans (1:1000) including all required functions;
- 10.27.4. Operation and control centre functions and layouts;
- 10.27.5. Operational report;
- 10.27.6. Risk assessment survey report;
- 10.27.7. Implementation plan report;
- 10.27.8. Tunnelling & structures report;
- 10.27.9. Track alignment report and track alignment (horizontal & vertical) plans (1:2500);
- 10.27.10. Architectural report and architectural layouts (1:500) and sections (1:200) for each station;
- 10.27.11. Landscape report and landscaping plans
- 10.27.12. Environmental report
- 10.27.13. Sewage report
- 10.27.14. Geology report
- 10.27.15. Soil & pavement structure report
- 10.27.16. Safety report
- 10.27.17. Accessibility report
- 10.27.18. Drainage report
- 10.27.19. Air-conditioning report
- 10.27.20. Statutory report
- 10.27.21. Traffic report
- 10.27.22. Rolling Stock report
- 10.27.23. Rail systems report
- 10.27.24. Physical design layouts (1:2500)
- 10.27.25. Utilities coordination report (including all relevant utilities) and utilities coordination layouts (1:2500) which shall include:
 - 10.27.26. Bezeq utilities (report and layout)
 - 10.27.27. Water utilities (report and layout)
 - 10.27.28. Electric utilities (report and layout)

11. Approval of final report

- 11.1. Following JTMT's assessment of the deliverables to be submitted at the end of Stage 5, the Consultant will produce a final report. This final report will include all information and deliverables submitted in the previous phases after they have been updated according to the comments of JTMT.

12. Professional consulting services (optional)

- 12.1. The design in the stages following the completion of the work as a result of this Tender will form part of a separate tender. The final report of the feasibility study will be published and available for all those who will work on the following design stages.
- 12.2. Following the end of the term of the Agreement with the Consultant (Volume __ of this Tender), JTMT reserves the right to request additional particular professional consulting services from the Consultant (including, without limitation, and as necessary, in relation to the implementation of the final report), as these shall be determined by JTMT on an ad hoc basis during the execution of the Metro project. Such additional services will be priced on an hourly basis.

Appendix1

Summary of the Jerusalem Metropolitan Mass Transit Strategic Plan for 2050 (including description of Jerusalem Area Mass Transit Network)

The existing mass transit network plan is based on mostly at-grade LRT lines.

The strategic plan for mass transit in the Jerusalem metropolitan area for 2050 shows the need for 2 metro lines within the urban context.

Line 1: From South East Jerusalem to Pisgat Zeev

Line 2: From South West Jerusalem to the old city, with two alternatives for branches to East Jerusalem.

The map below shows two alternatives which must be examined in this project. Before the start of this project, the consultant will be given the full strategic plan report.



Appendix 2

Time-frame, Milestones and Gantt for Performance of Services

1. Timeframe for Performance of Services

- 1.1. Subject to the provisions of section **Error! Reference source not found.** of this SOW, the overall period for the performance of the Services shall be twenty-five (25) consecutive months from the Signature Date. During this period, the Stages as itemised in section 3 of this SOW may run concurrently in whole or in part;
- 1.2. Without derogating from the foregoing: a) Stage 1 shall run from month 1 to month 8 of the Project; b) Stage 2 shall run from month 2 to month 8 of the Project; c) Stage 3 shall run from month 6 to month 11 of the Project; d) Stage 4 shall run from month 11 to month 18 of the Project; and e) Stage 5 shall run from month 16 to month 25 of the Project.
- 1.3. The Milestones listed hereunder for the performance of the Services may include deliverables from more than one of the Stages itemised in section 3 of this SOW;
- 1.4. The Consultant shall provide a detailed **schedule and management plan** for implementing the Services, which shall be provided to JTMT within four (4) weeks of the Signature Date. The schedule and management plan shall lay out the timeframe for each of the deliverables set out in this SOW, taking into account the Milestones to which each deliverable belongs, all as set out below.

2. The Milestones

- 2.1. **Milestone 1**, comprising the following deliverables shall be completed by no later than **the end of month 6** of the Project:
 - i) The deliverables for Stage 1, set out in section 6.1.3 of this SOW (Stage 1);
- 2.2. **Milestone 2** comprising the following deliverables, shall be completed **by no later than the end of month 8** of the Project:
 - i) The analysis of all neighbourhoods (Stage 2).
- 2.3. **Milestone 3**, comprising the following deliverables, shall be completed **by no later than the end of month 12** of the Project:
 - i) The deliverables set out in section 8.2 of this SOW (Stage 3) - Proposal of alternatives for the route alignment and station location and feasibility studies for each.
 - ii) The aforesaid deliverables shall be provided in the following order: a) Proposal of two (2) initial alternatives; and b) Proposal of additional alternatives in coordination with JTMT for a total of 4-6 alternatives.

2.4. Milestone 4, comprising the following deliverables, shall be completed by no later than the end of month 17 of the Project:

- i) The deliverables set out in section 9.2 of this SOW (Stage 4) – evaluation of alternatives and selection of preferred alternative, including the following:
- ii) Analysis of speeds and travel times for each alternative;
- iii) Analysis of coverage and ridership for each alternative;
- iv) Analysis of statutory and environmental aspects for each alternative;
- v) Analysis of costs for each alternative;
- vi) Analysis of all additional relevant criteria for each alternative;
- vii) Report outlining the analysis of each discipline and the decision-making process, recommendation of (a) preferred alternative(s).

2.5. Milestone 5, comprising *all* the deliverables set out in **section 10** of this SOW, shall be completed by the end of month 23 of the Project:

2.6. Milestone 6, comprising the Final Report – in accordance with section 11.1 of this SOW. A draft of the final report which will include all information and deliverables as set forth in this SOW shall be completed and submitted to JTMT **within 23 months** of the start of the Project. The final report after it has been updated according to comments received from JTMT and any other members of the steering committee shall be submitted to JTMT for approval no later than 25 months from the start of the Project.

3. The Milestones detailed above are as set out in the following Gantt:

Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Stage 1: Preparation																									
Data collection, with the deliverables set out in section 6.1.3			draft		Final																				
Detailing of technical parameters, with the deliverables set out in section 6.2.2				draft	Final																				
Preparation of design guidelines, with the deliverables set out in section 6.3.5				draft	Final																				
Typical Stations – Initial Design, with the deliverables as mentioned in section 6.4.11				draft	Final																				
Stage 2: Urban analysis, with the deliverables as mentioned in section 7.2																									
Analysis of two initial neighbourhoods, to be chosen in coordination with JTMT		draft		Final																					
Analysis of all additional neighbourhoods					draft		Final																		
Stage 3: Proposal of alternatives for the route alignment and station location and feasibility studies for each, with the deliverables as mentioned in section 8.2																									
Stage 4: Evaluation of alternatives and selection of preferred alternative with the deliverables as mentioned in section 9.2																									
Stage 5 – Initial design and complimentary components for preferred alternative(s), with the deliverables as mentioned in section 10.																									
Final Report																									