Ref. Ares(2024)4220492 - 12/06/2024

ANNEX II + III: TECHNICAL SPECIFICATIONS + TECHNICAL OFFER

Contract title: Supply of Equipment for İstanbul SUMP Stage II

Publication reference: EC-NEAR/ANK/2024/EA-OP/0086

Columns 1-2 should be completed by the contracting authority
Columns 3-4 should be completed by the tenderer
Column 5 is reserved for the evaluation committee

Annex III - the contractor's technical offer

The tenderers are requested to complete the template on the next pages:

- Column 2 is completed by the contracting authority shows the required specifications (not to be modified by the tenderer),
- Column 3 is to be filled in by the tenderer and must detail what is offered (for example the words ‘compliant’ or ‘yes’ are not sufficient)
- Column 4 allows the tenderer to make comments on its proposed supply and to make eventual references to the documentation

The eventual documentation supplied should clearly indicate (highlight, mark) the models offered and the options included, if any, so that the evaluators can see the exact configuration. Offers that do not permit to identify precisely the models and the specifications may be rejected by the evaluation committee.

The offer must be clear enough to allow the evaluators to make an easy comparison between the requested specifications and the offered specifications.

The Tenderer should avoid copying the specifications required from Column 2 to specifications offered in Column 3. Column 3 shall be filled by the Tenderer with the exact/real specification for the offered supplies.

Each offered supplies must be stated with brand / product name, product version and product/part number. The tenderer shall identify model and manufacturer of each individual item in their technical offer. Offers that do not permit to identify clearly and precisely the existence of the items with all the proof documents and/or certifications requested through this annex may be rejected by the evaluation committee.

1. General Requirements

1.1. Offered supplies must be provided complete with necessary accessories and/or parts to ensure that the supplied items are capable of operating to required technical and quality specifications.

1.2. The contractor is fully responsible for proper connections of supplied items to existing infrastructure for smooth installation and operation.

1.3. The type of voltage in Türkiye is 220 V (mono phase) and 380 V (tri phase + neutral). All hardware must be suitable or adapted for direct connection to the standard power outlets in Türkiye. The type of electrical outlets generally installed in Türkiye is the type with 2 side mounted earthing poles (EUROPLUG). All plugs of all goods will have to fit exactly. The contractor shall evaluate the supplied current, the quality of the current and the fluctuations of the current and take the necessary precautions to avoid damages to the equipment.

1.4. The supplies must be compliant with CE standards. Wherever reference is made in the technical specifications to specific standards and codes to be met, provisions of the latest edition or revision of the relevant standards in effect, shall apply, unless otherwise stated in this technical specification.

1.5. The supplies should comply with the regulations concerning safe operation, energy saving and environmental safety, in line with the policies or the practical measures in use within the EU and Türkiye. Evaluation Committee may further request additional information/confirmation for the standards.

1.6. During the installation of supplied items, the contractor will be responsible for providing measures for any Health & Safety risks associated with supplies provided.

1.7. System components and whole system must be compatible with each other “as a whole.” Any compatibility problems between software and hardware must be resolved by the contractor at no additional cost to İstanbul Metropolitan Municipality and the Contracting Authority.

1.8. All offered supplies must be suitable for operation in the climatic conditions in place of delivery (please refer to “Draft Contract and Special Conditions, including annexes”).

1.9. For warranty, the contractor shall comply with the special and general conditions Article 32 and 33, Warranty Regulation of Turkish Law as published on Official Gazette no.29029 dated 13.06.2014.

2. Technical documents to be provided by the tenderer:

2.1. The obligatory documents for the provisional acceptance:

- Original certificate of origin;
- Operation and maintenance manuals - all supplies must be offered with original set of operation and maintenance manuals in English and in Turkish language (if commercially available). If manuals are not in Turkish language, a “Quick Guide” in Turkish shall be supplied;
- Warranty document of the manufacturer and/or authorized dealer/distributor of manufacturer.

3. Installation and commissioning requirements

3.1. For Lot 1and Lot 2; full installation and commissioning shall be borne by the contractor.

3.2. Consumptions on site during the installation and commissioning shall be borne by the contractor.

3.3. The contractor shall make available to himself all tools, materials and equipment required for transport, assembling, installation and commissioning.

3.4. The contractor shall provide all tools and equipment needed for testing of supplies.

3.5. The contractor shall perform starting-up, installation and commissioning of the supplies by trained and authorized personnel including unloading, furnishing to designated location, unpacking, assembling and connection to main supply and removal of packing materials from site in accordance with Article 29 of Special Conditions.

3.6. Subscription for all utility connections such as internet, electricity, water, etc. to relevant authorities shall be under a responsibility of the İstanbul Metropolitan Municipality.

3.7. All software must be delivered and installed in electronic version. All software must be licensed to the İstanbul Metropolitan Municipality.

4. Health and Safety

4.1. The contractor shall be fully responsible for applying the Health and Safety procedures in accordance with the legislation published by Republic of Türkiye, Ministry of Labor and Social Security during the manufacturing, delivering, assembling, installation, commissioning, and testing. Moreover, the contractor shall be responsible for advising İstanbul Metropolitan Municipality and the Contracting Authority of any Health and Safety risks associated with supplies provided and suitable protective measures.

4.2. Supplies shall be designed to operate safely taking into account the characteristics of the terrain and its surroundings, atmospheric and meteorological conditions, any possible structures and obstacles located in the vicinity either on the ground or in the air in such a way as to cause no nuisance or pose no danger under operation or servicing conditions or in the event of an operation to rescue persons.

5. Trainings

5.1. Following installation and commissioning of supplies, the contractor shall provide trainings for İstanbul Metropolitan Municipality staff.

5.2. The tenderers shall include in their offer a training plan according to requirements in this Technical Specifications (duration, topics provided in tables hereunder are requested as minimum). The contractor (if required) may extend training durations and topics covered.

5.3. Trainings will be realized in Turkish or English with simultaneous translation when necessary.

5.4. Trainings shall be provided by qualified instructors.

5.5. All necessary accessories, materials and documentation for the trainings shall be provided by the contractor.

5.6. Unless otherwise required, trainings shall be realized in İstanbul Metropolitan Municipality facilities in Türkiye.

5.7. The trainings shall be recorded by the contractor and provided as a separate media to the İstanbul Metropolitan Municipality for future use.

Lot	Item	Content of the Trainings	Min Number of Training days	Max Number of Participants
1	1.1. Multimodal transport modelling software; 1.2. Multimodal traffic simulation software.	The training shall include theoretical training and applied training. The trainings shall cover topics including but not limited to: • Overview and terminology, • Full usage training, • Maintenance and troubleshooting, • User interface and software, • Health and safety requirements.	**15 days per trainee**	**15**
2	2.1. Desktop; 2.2. Monitor; 2.3. Laptop; 2.4. Keyboard; 2.5. Wireless optical mouse; 2.6. Printer;	The training shall include theoretical training and applied training. The trainings shall cover topics including but not limited to: • Overview and terminology, • Full usage training, • Maintenance and troubleshooting, • User interface and software,	**2 hours per trainee**	**15**

Lot	Item	Content of the Trainings	Min Number of Training days	Max Number of Participants
	2.7. Plotter; 2.8. Monitor for meeting room; 2.9. Mini projector; 2.10 Tablet; 2.11 Hard drive; 2.12 Video conference camera; 2.13 Presentation remote.	• Health and safety requirements.		

6. Warranty requirements

6.1. Please refer to Article 32 of Special and General Conditions of the Contract and Warranty Regulation of Turkish Law as published on Official Gazette no.29029 dated 13.06.2014.

6.2. Only original or approved by the manufacturer(s) spare parts should be used in any repair service.

6.3. The contractor shall provide available software updates during the warranty period.

6.4. For all Lots the tenderer shall provide a list of spare parts for informative purposes only.

7. Visibility

7.1. All projects /contract implemented under this programme shall comply with the latest Visibility Guidelines for European Commission Projects in Türkiye published by the EU Delegation to Türkiye. Please refer to Article 9 of Special and General Conditions of the Contract.

7.2. Proper material and size compatible with specifications and dimensions of supplies shall be offered by contractor and approved by Contracting Authority after the commencement of the Contract.

7.3. Label shall be designed in accordance with the Article 9 of Special and General Conditions of the Contract.

7.4. Label shall be coloured, readable, visible and durable.

7.5. The contractor shall take the necessary measures to ensure the visibility of the European Union financing or co financing. These measures must comply with the latest Communication and Visibility Requirements for EU-funded external action, laid down and published by the European Commission.

Lot 1 – Transport modelling and simulation software

1. Item number	2. Specifications required	3. Specifications offered	4. Notes, remarks, ref to documentation	5. Evaluation committee's notes
1.1	**Multimodal transport modelling software (the modelling software)**			
	Manufacturer's name; product model/type:			
	Country of origin:			
	Quantity: 11			
	The modelling software shal be used for İstanbul Metropolitan Municipality (IMM) official boundaries.			
1.1.1. General	The modelling software shall: 1. enable analysis of transport networks, including roadways, public transit, cycling lanes, and pedestrian pathways; 2. support data-driven decision-making for urban planning, traffic management, and infrastructure development; 3. facilitate scenario modeling to assess the impact of factors on transportation systems, as a minimum: population growth, changes in land use, new infrastructure projects and costs; 4. provide comprehensive tools for evaluating relevant metrics as a minimum: traffic flow, congestion, travel times, emissions for all transport modes; 5. enable integration with geographic information systems (GIS) and external data sources to enhance data accuracy and usability.			

1. Item number	2. Specifications required	3. Specifications offered	4. Notes, remarks, ref to documentation	5. Evaluation committee's notes
1.1.2 scope	As a minimum, the modelling software shall provide macroscopic modelling of transport networks and multi modal transport. The transport model shall have at least the following features: 1. A demand model (trip generation, trip distribution, modal choice, and time of travel); 2. A road assignment model (road-based public transport, private vehicles, freight and other commercial vehicles); 3. A rail, metro, LRT, bus, dolmuş, sea transport and ferry assignment model (public transport and freight); 4. A bicycle assignment model.			
1.1.3	As a minimum, the modelling software shall provide following functions: • Network representation and management; • Demand modelling; • Traffic flow modelling; • Assignment of traffic flow; • Model validation; • Calculation of performance metrics; • Scenario testing and analysis; • Options and sensitivity analysis; • Visualization and reporting; • Optimization strategies.			
1.1.4	**Network representation and management:** As a minimum, the modelling software shall: • define and represent the transportation networks, including roads, intersections, junctions, public transit routes, and stops;			

1. Item number	2. Specifications required	3. Specifications offered	4. Notes, remarks, ref to documentation	5. Evaluation committee's notes
	• manage network attributes - link lengths, capacities, speed limits, and transit schedules; • manage intersection/junction capacity analysis and calculate junction performance indicators; • include a cycling routes interface with a map-supported bicycle road network and cycling facilities.			
1.1.5	**Demand modelling (input):** As a minimum, the modelling software shall: • input and manage travel demand data, including trip origins, destinations, and volumes for various time periods; • handle different types of demand (e.g., passenger trips, vehicle trips) and capture the spatial and temporal distribution of travel patterns.			
1.1.6	**Demand modelling:** As a minimum, the modelling software shall be 4-step macroscopic demand model able to: • estimate travel demand and traffic flows for all modes of transport; • estimate changes in transportation demand based on various factors, such as population growth, economic development, and changes in land use; • analyse the potential impacts of infrastructure projects, policy changes, and urban planning decisions on transportation patterns and congestion;			

1. Item number	2. Specifications required	3. Specifications offered	4. Notes, remarks, ref to documentation	5. Evaluation committee's notes
	• examine and evaluate impacts of transport policy, investments, and land use changes.			
1.1.7	**Activity Based Demand Modelling (ABM):** As a minimum, the modelling software shall: • model activity-based travel demand and traffic flows for all modes of transport; • model mobility decisions of individuals based on daily activities and travel schedules, time spans, locations, and mode; • have undergone transport analysis using ABM within a densely populated urban area of at least 3.000.000 inhabitants.			
1.1.8	**Traffic flow modelling:** As a minimum, the modelling software shall: • implement macroscopic traffic flow models or algorithms to simulate the movement of vehicles or passengers through the transportation network; • calculate macroscopic traffic flow variables, including density, flow rate, and speed.			
1.1.9	**Assignment algorithms:** As a minimum, the modelling software shall: 1. assign travel demand to the transportation networks, considering factors, as a minimum: shortest paths, travel times, and mode choices; 2. estimate traffic flow and congestion patterns on transport networks, including bicycle demand forecasting and assignment; 3. evaluate the impact of transportation policies and infrastructure changes and account for mode shifts (at least from private			

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	vehicles to public transit) based on user behaviour and preferences; 4. predict traffic flow and congestion patterns on transport networks; 5. evaluate the impact of transportation policies and infrastructure changes; 6. support decision-making for transport network planning and optimization; 7. make restricted traffic area or sub-area assignment.			
1.1.10	**Model validation:** As a minimum, the modelling software shall: • validate the accuracy and reliability of the model by comparing simulated results with real-world data, as a minimum: traffic counts and travel surveys; • refine and adjust model parameters to improve alignment with observed transportation behavior; • calibrate the matrix when previous household surveys are obsolete, allowing for updates without having to conduct a new origin-destination survey. The updates shall be based on census data.			
1.1.11	**Performance metrics calculation:** As a minimum, the modelling software shall: • calculate performance metrics to assess transportation system efficiency, including travel time, delay, queue lengths, and transit ridership;			

1. Item number	2. Specifications required	3. Specifications offered	4. Notes, remarks, ref to documentation	5. Evaluation committee's notes
	• evaluate congestion levels and identify bottlenecks or areas of concern within the network.			
1.1.12	**Scenario testing and analysis:** As a minimum, the modelling software shall: • test different transportation/ land use scenarios, as a minimum: changes in infrastructure, development policies, or transit services, to understand their potential impacts on system performance; • compare and analyse scenario outcomes to make informed decisions about system improvements and investments; • compare scenario options outputs against do-nothing and other modelled scenarios; and the base year conditions.			
1.1.13	**Options and sensitivity analysis:** As a minimum, the modelling software shall: 1. run and test variations of road network options, public transport network options or combinations of both; 2. assess implications of strategies including scaled public and private sector investments, land-use decisions, and transport sector investments, at the metropolitan scale; 3. quantify the effects of land use strategies on transport network performance to identify whether and what interventions may be required; 4. enable refinement and development of transport network options and detailed network design and appraisal;			

1. Item number	2. Specifications required	3. Specifications offered	4. Notes, remarks, ref to documentation	5. Evaluation committee's notes
	5. involve options development and modelling through to appraisal.			
1.1.14	**Sensitivity analysis:** As a minimum, the modelling software shall: • conduct sensitivity analysis to assess how changes in model parameters or inputs impact simulation results and system performance; • understand the robustness and sensitivity of different transportation strategies; • provide sensitivity analysis of options in a consideration through variable input data and model parameters to identify the robustness of the model relations and the associated forecasts.			
1.1.15	**Visualization and reporting:** As a minimum, the modelling software shall: • generate visualizations such as maps, graphs, and charts to display simulation results and provide insights into traffic patterns and congestion; • create reports summarizing model inputs, outputs, and findings for presentation and communication purposes; • perform queries and modifications in graphical environment.			
1.1.16	**Optimization strategies:** As a minimum, the modelling software shall: 1. Offer optimization features to help identify strategies for improving transportation system efficiency, reducing congestion, and enhancing public transit services;			

1. Item number	2. Specifications required	3. Specifications offered	4. Notes, remarks, ref to documentation	5. Evaluation committee's notes
	2. Optimize public transport route assignments.			
1.1.17	The modeling software shall have at least following modules: 1. Public transport module; 2. Price (cost) simulation module; 3. Emission module.			
1.1.18	As a minimum, the **public transport module** shall: 1. simulate and analyze passenger movement in a public transport network; 2. analyze the utilization and performance of public transport networks; 3. evaluate the impact of changes in service frequency, routes, and infrastructure;			
1.1.19	As a minimum, the public transport module shall: 1. facilitate decision-making for public transport planning and optimization; 2. model stops, routes, and attributes (frequency, capacity, travel time, and others) for each public transport mode including rail and sea transport; 3. estimate passenger demand or input into the model, including trip origins, destinations, and volumes; 4. have a graphical user interface for user interaction, data input and results visualization; 5. have a specific algorithm that will assign passenger demand to the public transport network based on flow equations and other factors; 6. identify passenger flow distribution and service utilization including crowding,			

1. Item number	2. Specifications required	3. Specifications offered	4. Notes, remarks, ref to documentation	5. Evaluation committee's notes
	overcapacity used routes, stops and potential areas for improvement.			
1.1.20	The transport modelling software shall implement pricing management scenarios. As a minimum, the software shall be able to: 1. assess cost of transport scenarios in consideration and effects of price changes in public transport lines; 2. assess scenarios to manage traffic congestion, road closures or construction sites and to accurately simulate the interaction of vehicles and pedestrians; 3. identify traffic congestion zones and asses impacts of pricing policies; 4. assess volume/capacity ratios in respect to traffic congestion zones; 5. car park areas pricing policies and their effect to transport demand; 6. test scenarios involving pricing policies - fuel, tolls, parking charges, transport infrastructure provisions and service improvements.			
1.1.21	The transport modelling software shall have an emission module. As a minimum, the emission module shall: 1. assess traffic data according to air pollution parameters; 2. provide emission calculations for cars and trucks based on assignment results and for scheduled public transport busses based on time table data;			

1. Item number	2. Specifications required	3. Specifications offered	4. Notes, remarks, ref to documentation	5. Evaluation committee's notes
	3. identify of sub-areas to assess emission conditions and to suggest decarbonisation strategies; 4. evaluate the effects on modal choice and traffic volumes by specifying restrictions and fares to specific modes of transport; 5. support decision making on definition of Low Emission Zones; 6. assess and compare transport scenarios on emission effects and compare potential de-carbonization benefits; 7. calculate cold start excess emissions based on zone data; 8. make statistical calculations; 9. define and refine demand segments and transport systems to create detailed analysis.			
1.1.22	As a minimum, the modelling software shall model following types of input data: 1. Transport network data - Geographic information system (GIS) data for nodes, links, and attributes; 2. Demand data: -Travel and household survey data; - Big data from data sources; -Travel demand matrices representing trip origins, destinations, and volumes; 3. Traffic flow parameters - free-flow speed, critical density and relevant other. 4. Policy and scenario data - data related to transportation policies, infrastructure changes, or other relevant scenarios.			

1. Item number	2. Specifications required	3. Specifications offered	4. Notes, remarks, ref to documentation	5. Evaluation committee's notes
1.1.23	As a minimum, the modelling software shall process the following data: 1. municipal and or national databases, land-use plans, and other input data; 2. highway and public transport patronage data; **3.** population data and targeted or area-wide travel surveys for at least **5000 traffic analysis zones;** 4. public transport network, types, vehicle capacities, routes, stops, timetables, passenger surveys and smart card data; 5. data from engineering designs (Auto CAD, and other formats), field surveys, GPS data, geographical information system (GIS) files, or aerial photographs; 6. data from spread sheet programs - Access, Excel and other.			
1.1.24	The modelling software shall be able to import data from other transportation modelling software as a minimum Visum, Cube, Aimsun and Transcad or other.			
1.1.25	The modelling software should have been successfully tried at least once in a city of at least 3.000.000 inhabitants.			
1.1.26	The modelling software shall be installable and functionable on a computer with following minimum configurations: **Processor:** Intel Core i7-12700K, i9-12900K, i9-12900KS; Intel Xeon W-1370, W-1370P, W-1390P; AMD Ryzen 9 5900X, Ryzen 9 5950X or better; **Memory:** 32 GB or more;			

1. Item number	2. Specifications required	3. Specifications offered	4. Notes, remarks, ref to documentation	5. Evaluation committee's notes
	Disk space (software): 5 GB free disk or more; **Monitor:** Full HD (1920x1080 pixels) or higher resolutions; **Graphics card:** 3D Graphics OpenGL® 3.0 or DirectX 1,1 or better.			
1.1.27	**User interface and interaction:** As a minimum, the modelling software shall: • provide a user-friendly graphical user interface (GUI) for data input, parameterization, scenario testing, and result interpretation; • ensure ease of use and accessibility for transportation professionals and stakeholders.			
1.1.28	**Documentation and technical support:** As a minimum, the modelling software shall: • provide comprehensive user guides, technical documentation and customer support to assist users in effectively utilizing the software and interpreting results; • provide technical support to troubleshoot and resolve complex technical issues and respond queries; • provide assistance with customization of the software to cater to specific needs of the Istanbul Metropolitan Municipality for at least three years.			
1.1.29	**Updates and subscription**: As a minimum, the modelling software shall provide all version upgrades including new features and improved functionalities for three years.			

1. Item number	2. Specifications required	3. Specifications offered	4. Notes, remarks, ref to documentation	5. Evaluation committee's notes
1.1.30	The modelling software should integrate with and shall provide data exchange with item 1.2. Multimodal traffic simulation software.			

1.2	**Multimodal traffic simulation software (the simulation software)**			
	Manufacturer's name; product model/type:			
	Country of origin:			
	Quantity: 2			
	The simulation software shall be used for İstanbul Metropolitan Municipality (IMM) official boundaries.			
1.2.1.	As a minimum, the simulation software shall: • simulate individual vehicles and pedestrians on microscopic level; • simulate traffic on mesoscopic level to process more efficient simulations for larger regions; • create a simulation that combines both micro- and mesoscopic simulations.			
1.2.2	**Scope:** As a minimum, the simulation software shall: 1. model all transportation modes and behaviours, including pedestrians, bicycles, motorcycles, buses, cars, trucks, and rail vehicles;			

	2. model both 2D and 3D micro-simulations for individual vehicles and public transportation systems; 3. model intelligent transportation system designs; 4. model interactions and conflicts between different transportation modes simultaneously, such as pedestrians and vehicles; 5. model programmable signal control logic and include fixed, updated, and adaptive signal algorithms; 6. allow customization of vehicle characteristics according to specific requirements.			
1.2.3	**Scope:** As a minimum, the simulation software shall: 1. create a digital model of traffic by adding to the simulation private vehicles, freight transport, rail and road-bound public transport, or pedestrians and cyclists are possible; 2. simulate a complex traffic scenario involving at least 20 signalized intersections at the same time; 3. model complex parking situations and related vehicle behaviour, parking price, analysing parking vehicles as well as the interaction of parking structures with public transport and other general traffic; 4. number of pedestrians to be accounted in the simulation model should be at least 50.000.			
1.2.4	**Intersection simulation and design:**			

	As a minimum, the simulation software shall: 1. simulate a single intersection, corridor, or network; 2. create different types of intersections - signalized, unsignalized, signal-controlled with fixed and traffic-responsive signal programs, roundabouts, and intersections with various geometries or infrastructure, signalized intersections with pedestrian islands, intersections with more than four legs.			
1.2.5	**Functions:** As a minimum, simulation software shall: 1. allow customized "what if" scenarios to evaluate operational countermeasures and their impact on the overall traffic flow; 2. prioritize allocation of road capacity between different users, as a minimum: bus priority or pedestrian signal phasing; 3. assist in identifying the effects on delays and queues resulting from changes in transport system variables, as a minimum: signal phasing, lane configurations, ramp metering; 4. provide emission results from the traffic simulations, 5. track and analyse how traffic measures will affect vehicle emissions, as a minimum: adapted signal controls, intelligent transport systems, different vehicles; 6. analyse traffic scenarios, consisting of as traffic engineering solutions, as a minimum: adapted signal timing control, intelligent			

	traffic systems or changing the vehicle types; 7. assess the detailed operational performance of specific transport infrastructure projects and initiatives; at least: ramp metering, land use developments and local area traffic management.			
1.2.6	**Dynamic intersection modules** The simulation software shall have dynamic intersection modules. • As a minimum, the simulation software should map intelligent traffic management systems or advanced traffic management systems to stabilize traffic flow and increase traffic safety.			
1.2.7	**Input Data** As a minimum, the simulation software shall model following types of input data: • road geometry, as a minimum: lengths, lanes, curvature; • traffic control systems as a minimum: signal timing, signs; • demands as a minimum: entry volumes, turning volumes; • traffic counts and performance data; • data on vehicle and driver characteristics (vehicle length, maximum acceleration/deceleration length, driver behaviour.			
1.2.8.	**Input Data:** As a minimum, the simulation software shall:			

	1. share and merge municipal databases, traffic signal timing plans, and other input data; 2. import data from engineering designs (Auto CAD and other formats), field surveys, geographical information system (GIS) files, or aerial photographs; 3. be able to programme in any type of languages (such as C++, Visual Basic, Java, Python, Matlab) which is able to handle Component Object Model (COM) objects; 4. support the import of 3D objects with various file extensions, at least: .skp, .3ds, .dwf; 5. import and process public transportation input data on timetables, routes, vehicle capacities, vehicle structures, shapes of stops, boarding and alighting points for passengers.			
1.2.9.	**Public transport:** As a minimum, the simulation software shall: 1. simulate public transport lines, different vehicle types, timetables, stops, stop types and dwell times; 2. include modelling coordination with signal timing controls to enable simulation of different variants of public transport prioritizations and analyse the effects on public and private transport; 3. monitor public transportation service details, including schedule adherence and passenger information, during simulation at the route, stop, or vehicle level.			
1.2.10.	**Reports:**			

	As a minimum, the simulation software shall: 1. generate reports, maps, and charts for inclusion in reports and presentation slides; 2. define arterial and corridor segments with interactive graphical editing tools to customize segment and corridor level-of-service reports; 3. generate colourful and illustrative trip departure and arrival rate histograms; 4. query trip statistics and measures of effectiveness by origin, destination, path, vehicle type, or any combination of driver, vehicle, and trip attributes when generating reports; 5. graphically display the distributions of calculated parameters, as a minimum: travel time, delay, average speed, and generate reports in text files. 6. generate reports and display the level of service for intersections; 7. provide the necessary data input for public transportation simulations, such as timetables, routes, vehicle capacities, vehicle structures, shapes of stops, boarding and alighting points for passengers, etc.			
1.2.11	**User interface and interaction:** As a minimum, the simulation software shall: • provide a user-friendly graphical user interface at least for data input, parameterization, scenario testing, and result interpretation;			

	• ensure ease of use and accessibility for transportation professionals and stakeholders.			
1.2.12	**Documentation and technical support:** As a minimum, the simulation software shall: • provide comprehensive user guides, technical documentation, and customer support to assist users in effectively utilizing the software and interpreting results; • provide technical support to troubleshoot and resolve complex technical issues and respond queries; • provide assistance with customization of the software to cater to specific needs of the Istanbul Metropolitan Municipality for at least three years.			
1.2.13	**Updates and subscription**: As a minimum, the simulation software shall provide all version upgrades including new features and improved functionalities for three years.			
1.2.14	The simulation software should integrate with and shall provide data exchange with item 1.1. Multimodal transport modelling software.			

LOT 2: IT equipment

1. Item number	2. Specifications required	3. Specifications offered	4. Notes, remarks, ref to documentation	5. Evaluation committee's notes
2.1.	**Desktop**			
	Manufacturer's name; product model/type:			
	Country of origin:			
	Quantity: 2			
2.1.1.	The CPU benchmark shall be min 11000			
2.1.2.	Memory speed min 3200 MHz			
2.1.3	Processor with min 8 cores			
2.1.4	Processor base frequency shall be min 2.3 Ghz			
2.1.5	Cache shall be min 16 MB			
2.1.6	Main memory installed shall be min 16 GB			
2.1.7	Memory type shall be DDR4			
2.1.8	SSD type hard drive with min 1 TB capacity			
2.1.9	Graphic Processing Unit (GPU) shall be min 4GB GDDR5 memory			
2.1.10	Minimum 1 x HDMI output			

1. Item number	2. Specifications required	3. Specifications offered	4. Notes, remarks, ref to documentation	5. Evaluation committee's notes
2.1.11	As a minimum, speakers, wi-fi, Bluetooth, web-camera, 2 x USB 3.0 or latest port, ethernet port			
2.1.12	Licensed latest version of Windows 10 pro or equivalent operating system installed.			
2.2.	**Monitor**			
	Manufacturer's name; product model/type:			
	Country of origin:			
	Quantity: 8			
2.2.1.	The size of the monitor shall be at least 27".			
2.2.2.	The monitor shall have at least following connections: • HDMI • DisplayPort • USB Type-C - 3.5mm.			
2.2.3	The response time of the monitor shall be maximum 5 ms.			
2.2.4	The resolution of the monitor shall be minimum 2560 x 1440 HD.			
2.2.5	The refresh rate of the monitor shall be minimum 60 Hz.			
2.2.6	The monitor shall have P27h, TÜV certificate.			

1. Item number	2. Specifications required	3. Specifications offered	4. Notes, remarks, ref to documentation	5. Evaluation committee's notes
2.2.7	The brightness of the monitor shall be minimum 250 nits.			
2.2.8	Items: 2.1 Desktop, 2.2 Monitor, 2.4 Keyboard, 2.5 Wireless optical mouse should be compatible with each other.			
2.3.	**Laptop**			
	Manufacturer's name; product model/type:			
	Country of origin:			
	Quantity: 14s:			
2.3.1.	The CPU benchmark shall be min 11800.			
2.3.2.	Memory speed shall be min 2666 MHz.			
2.3.3.	Processor with min 8 cores.			
2.3.4.	Processor base frequency shall be min 2.3 Ghz.			
2.3.5.	Cache shall be min 24 MB.			
2.3.6.	Main memory installed shall be min 32 GB.			
2.3.7	Memory type shall be DDR4.			

1. Item number	2. Specifications required	3. Specifications offered	4. Notes, remarks, ref to documentation	5. Evaluation committee's notes
2.3.8.	SSD type hard drive with min 1 TB capacity.			
2.3.9	Laptop Graphic Processing Unit (GPU) shall be min 6 GB GDDR6 memory.			
2.3.10	Minimum 1 x HDMI output.			
2.3.11	As a minimum, laptop shall have; speakers, wi-fi, Bluetooth, web-camera, 2 x USB 3.1 or latest port, ethernet port.			
2.3.12	Min 15.6" size monitor supporting 1920 x 1080 resolution.			
2.3.13	The integrated keyboard of the laptop shall be Turkish-Q and shall have backlit feature.			
2.3.14	Laptops shall have licensed latest version of Windows 10 pro or equivalent operating system installed.			
2.3.15.	Laptop shall have an original min 3 cell, lithium-ion battery. The original power cord shall be included.			
2.3.16.	Laptop shall be provided original manufacturer's carrying case.			
2.3.17	Items: 2.3 Laptop, 2.4 Wireless optical mouse should be compatible with each other.			

1. Item number	2. Specifications required	3. Specifications offered	4. Notes, remarks, ref to documentation	5. Evaluation committee's notes
2.4.	**Keyboard**			
	Manufacturer's name; product model/type:			
	Country of origin:			
	Quantity: 2			
2.4.1	The keyboard shall be Turkish-Q and shall have backlit feature.			
2.4.2	The keyboard shall be cableless or with cable.			
2.4.3	Item 2.1 Desktop, item 2.2 Monitor, item 2.4 Keyboard, and item 2.5 Wireless optical mouse should be compatible with each other.			
2.5.	**Wireless optical mouse**			
	Manufacturer's name; product model/type:			
	Country of origin:			
	Quantity: 16			
2.5.1.	The wireless optical mouse shall have a scroll feature.			

1. Item number	2. Specifications required	3. Specifications offered	4. Notes, remarks, ref to documentation	5. Evaluation committee's notes
2.5.2	Item: 2.1 Desktop, 2.2 Monitor, 2.4 Keyboard, 2.5 Wireless optical mouse should be compatible with each other Item: 2.3 Laptop, 2.4 Wireless optical mouse should be compatible with each other			
2.6.	**Printer**			
	Manufacturer's name; product model/type:			
	Country of origin:			
	Quantity: 1			
2..6.1.	Color laser multifunction (Print, Copy, Scan).			
2.6.2.	Paper size: A4.			
2.6.3.	Print and scan for black and color: Min 600x600 DPI.			
2.6.4.	Speed: Min 20 pages per minute			
2.6.5.	USB, Ethernet, Wi-Fi			

1. Item number	2. Specifications required	3. Specifications offered	4. Notes, remarks, ref to documentation	5. Evaluation committee's notes
2.6.6.	Printer shall be compatible with Mac and Windows.			
2.7.	**Plotter**			
	Manufacturer's name; product model/type:			
	Country of origin:			
	Quantity: 1			
2.7.1	Paper size: A4, A3, A2, A1, A0.			
2.7.2	Ink jet type.			
2.7.3	Print quality: Min 2400x1200.			
2.7.4	Speed: Max 35 sec per A1/D plot.			
2.7.5	USB, Ethernet, Wi-Fi.			
2.7.6	Plotter shall be compatible with Mac and Windows.			
2.8.	**Monitor for meeting room**			
	Manufacturer's name; product model/type:			
	Country of origin:			
	Quantity: 1			

1. Item number	2. Specifications required	3. Specifications offered	4. Notes, remarks, ref to documentation	5. Evaluation committee's notes
2.8.1.	The monitor for meeting room shall be min. 48".			
2.8.2	The monitor for the meeting room shall be min 60 Hz. Resolution of the monitor for meeting room shall be min. 1920 x 1080.			
2.8.3	The monitor for the meeting room shall be LCD.			
2.8.4	The input type of the monitor for the meeting room shall be HDMI.			
2.8.5	The monitor for the meeting room shall have a Speaker.			
2.8.6	The monitor for the meeting room shall have a response time of Max 10 ms. or less.			
2.8.7	The monitor for the meeting room shall have a brightness (cd/m): Min 300 cd.			
2.8.8	The monitor for the meeting room shall have a contrast ratio of :1300:1 or more.			
2.9.	**Mini projector**			
	Manufacturer's name; product model/type:			
	Country of origin:			
	Quantity: 1			

1. Item number	2. Specifications required	3. Specifications offered	4. Notes, remarks, ref to documentation	5. Evaluation committee's notes
2.9.1.	The equipment shall have compatibility with: • HDMI; • Wireless networking; • USB; • Remote control (with battery); • Battery for operation without a powercord; • Speaker.			
2.9.2	Minimum 20.000 hours light source life			
2.9.3	LED lamp type and Digital Light Processing (DLP) technology			
2.9.4	Minimum 500 lumen brightness			
2.9.5	Resolution shall be minimum 1280 x 800 p (WXGA)			
2.9.6	Maximum 200 mm width x 100 mm height x 200 mm depth sizes			
2.9.7	Minimum 10000:1 contrast			
2.9.8	Maximum 2,5 kg weight			

1. Item number	2. Specifications required	3. Specifications offered	4. Notes, remarks, ref to documentation	5. Evaluation committee's notes
2.9.9	Supplied with: All including hardware (cables, and accessories) for full function of the equipment, Device software			
2.10.	**Tablet**			
	Manufacturer's name; product model/type:			
	Country of origin:			
	Quantity: 5			
2.10.1	Max 12" size min 2048x1536 resolution			
2.10.2	The CPU speed min 1.8 GHz			
2.10.3	Internal storage min 64 GB			
2.10.4	RAM min 4 GB			
2.10.5	Processor with min 8 cores			
2.10.6	Camera min 8 MP			
2.10.7	Bluetooth			
2.10.8	Wi-Fi			
2.10.9	Weight max 500 gr			

1. Item number	2. Specifications required	3. Specifications offered	4. Notes, remarks, ref to documentation	5. Evaluation committee's notes
2.11.	**Hard drive**			
	Manufacturer's name; product model/type:			
	Country of origin:			
	Quantity: 3			
2.11.1	Capacity: Min 2 TB			
2.11.2	Size: Max 2,5"			
2.12.	**Video conference camera**			
	Manufacturer's name; product model/type:			
	Country of origin:			
	Quantity: 2			
2.12.1	Minimum 1920*1080 resolution			
2.12.2	Microphone			
2.12.3	Speaker			
2.12.4	USB connection			
2.13	**Presentation remote**			
	Manufacturer's name; product model/type:			

1. Item number	2. Specifications required	3. Specifications offered	4. Notes, remarks, ref to documentation	5. Evaluation committee's notes
	Country of origin:			
	Quantity: 3			
2.13.1	Cableless			
2.13.2	Max output: Less than 1m W Wave Length as a minimum: 640～660nm (red light)			
2.13.3	Battery life (Laser pointer): min 20-hour Battery life (Presenter): min. 1050-hour			