

**THE WORLD BANK**  
**TERMS OF REFERENCE**  
**(QUITO METRO PROJECT: MOBILITY MASTER PLAN)**

**A. PROJECT BACKGROUND AND OBJECTIVES**

**I. Background**

1. The MDMQ has a territorial extension of 423,000 ha. of which 18,860 (4.4%) correspond to the city of Quito. The current population of the Metropolitan District of Quito (MDQ) is 2.4 million of inhabitants distributed in 8 macro-zones, divided into 32 urban and 33 suburban districts. The city of Quito as the capital of the Republic and the main political administrative and educational center of the country, brings together a population of around 1.7 million inhabitants.

2. The Metropolitan District of Quito is developed longitudinally in the North-South direction. Its historical center, concentrating most of the economic and financial activities, attracts around 47% of the motorized trips of the entire MDQ. Outside of the historical center, the territory is characterized by lower residential densities. However, the acceleration of the conurbation process in the periphery together with a lack of transport facilities (concentrated in the city center), is negatively impacting the dynamics of mobility and creating a greater need for displacements with bias towards the car.

3. Table 1 shows a summary of the population statistics for the year 2010.

ZONA ADMINISTRATIVA	POBLACIÓN 2010	%	DENSIDAD 2010	TASA CRECIMIENTO 2001-2010
Quitumbe	255.920	10,73	54	2,88
Eloy Alfaro	504.225	21,14	154	1,92
Manuela Sáenz	256.562	10,75	115	0,84
Eugenio Espejo (urbana)	431.120	18,07	75	1,96
La Delicia (urbana)	288.714	12,10	104	2,95
<b>TOTAL URBANO</b>	<b>1.736.541</b>	<b>72,79</b>	<b>92</b>	<b>2,03</b>
Eloy Alfaro (Lloa)	1.561	0,07	0,03	0,66
Eugenio Espejo	16.676	0,70	6,5	3,24
La Delicia	65.655	2,75	3,75	3,36
Noroccidental	16.545	0,69	0,01	2,04
Norcentral	19.140	0,80	0,01	2,22
Calderón	141.527	5,93	16	4,33
Tumbaco	96.591	4,05	10	5,18
Los Chillos	180.695	7,57	3	4,53
Aeropuerto	110.674	4,64	2	4,61
<b>TOTAL SUBURBANO</b>	<b>649.064</b>	<b>27,21</b>		<b>4,3</b>
<b>TOTAL DMQ</b>	<b>2.385.605</b>	<b>100</b>		

4. The city has extended to the northern areas, in the parishes of Calderón, Carapungo, as well as in the south to Guamaní, and in the valleys of Los Chillos and Tumbaco. The displacements are getting longer and the traffic in the city more and more dense. The public transport services in the city are in a critical condition with levels of up to 7 passengers per square meter in 2014 in the Rus Rapid Transport (BRT) Trolleybus System.

## II. MDMQ Transport System

5. Currently, 4.7 million trips are carried out in motorized modes daily; of these, 1.11 million trips (24%) are made by private car (including taxis) and 3.6 million trips (76%) in the public transport system. Of the total trips by public transport 1.9 million are made in the conventional system and 1.3 million in the massive Metrobús-Q system. Although these figures reveal a favorable modal matrix for public transport, the system presents saturation levels that decrease the quality of the service for the user, making it impossible to attract and mobilize additional passengers. This generates a greater demand for taxis and private vehicles.

6. Table 2; indicates the number of trips made daily in the city by the different transport systems. The Transportation Systems in the city are described below:

Modos motorizados	#	%
<b>Total</b>	<b>4.736.083</b>	<b>100,00</b>
Colectivo	3.623.499	76,51
Transporte convencional	1.858.924	51,30
Metrobus-Q	1.263.351	34,87
Escolar	435.887	12,03
Informal	65.337	1,80
Individual	1.112.584	23,49
Auto particular	895.378	80,48
Taxi	217.206	19,52

7. **Private transport.** Motorized transport in Quito has been growing significantly. According to the Mobility Plan 2009-2025, it identifies that the growth of the automotive fleet has accelerated considerably in recent years, with an annual growth rate of 6.5%. The vehicle fleet has doubled from 250 thousand vehicles in 2001, to approximately 500 thousand in 2014, reaching a motorization rate close to 200 vehicles/1000 inhabitants. This is the result of the city's development patterns, recent economic development in the country along with the effects of dollarization, and the reduction in the costs of private vehicles.

8. **Freight transport.** Freight transport is provided by 53 operators and 968 vehicles. Initially conceived for the retail distribution of goods within the urban center and the DMQ areas, it is also used to transport passengers under precarious conditions, due to shortcomings in the conventional transport. There is no available data for the demand of this type of transport. In addition, there are not defined spaces for the loading/unloading of goods, which fosters the misuse of public space.

9. **Commercial Transportation: taxis and school, institutional and touristic vehicles.** The taxi service is offered by 215 operators with 8990 vehicles legalized in the municipality until 2010. To this fleet, 4700 new regularized taxis and non-legalized taxis needs to be added. Non-legalized taxis currently operate informally and represent approximately 50% of the authorized fleet These vehicles mobilize approximately 650 thousand people daily.

10. Touristic vehicles are offered by 30 operators and 242 vehicles that provide service both within the DMQ and outside the metropolitan area. Demand is mainly focused on the sectors close to tourist attraction sites, both in the Historic Center of Quito and outside the metropolitan area.

11. In the school and institutional transport there are 44 operators with a fleet of 4016 units and a daily demand of 326 thousand trips. The authorized fleet does not cover the existing demand, since it has been possible to detect that 12% of the total trips are made in units that are not adequate or authorized to provide the service.

12. **Public transport.** Quito's public transport is subdivided into two systems: i) Metrobús-Q system (mass transport system with articulated buses and trolleybuses), which performs 26% of public transport trips; and ii) Conventional Public Transportation System (traditional system of buses, minibuses and vans), which transports the remaining 74%. The system presents problems that affect certain service parameters such as speed of operation, comfort levels, safety, convenience and travel times.

13. **Metrobus Q.** The BRT network encompasses three BRT trunk lines with a total length of 83.8 km, one of the largest networks in Latin America. First, the Central Trunk Trole (trolleybus) corridor opened in 1995 and reaches the narrow streets of the Historical Center of Quito (Centro Histórico de Quito, CHQ). Quito subsequently expanded its BRT network with the East Trunk (2002) and the Southeast Corridor in 2010. The West Trunk corridor includes the Central North Corridor (2004) and the Southwest Corridor (2012). The expansion of this network, together with significant investments in the existing facilities and bus fleet, resulted in a jump in demand from 400,000 to 828,000 passengers per day from 2010 to 2012. Conventional buses complement and serve as feeders to the future Metro and the Metrobus-Q. A fleet of approximately 2,500 privately owned buses operating in mixed traffic handles 1.8 million daily trips. The lack of dedicated lanes for these conventional buses results in lengthy travel times that particularly affect the poorest people living in the southern part of Quito. However, extending the BRT network is not possible due to lack of physical space. The Quito Metro Line 1 (PLMQ) will solve this bottleneck by becoming the high-capacity backbone of the SITP—allowing Quito to expand the BRT network

14. The Central Trolebús Corridor, totally saturated, handles a daily demand of around 248,000 trips/day, with a commercial speed of 13.5 km/h and a level of service/comfort that exceeds 7 pax/m<sup>2</sup> in the peak times. In the case of the conventional public transport system, it has operational limitations such as oversupply, low reliability, lack of defined stops, inadequate vehicles, low level of maintenance, high rates of accidents and pollution, and lack of incentives for operators to provide a good service.

15. Existing BRT corridors. After the implementation of the Central - Trolleybus corridor, four more corridors have been implemented, the last of which is in a preliminary stage. These BRT-type corridors that make up the Metrobús-Q subsystem are structured on trunk routes with exclusive lanes.

16. Electric and diesel articulated buses circulate in these lanes and connect feeder routes (operated by standard buses) and trunk routes.

17. Table 3 shows some of the relevant data:

Eje	Corredor	Flota Total			Longitud – km		Viajes
		Troncal	Alimentación		Troncal	Alimentador	Día Típico
		Articulados	No líneas	Buses Tipo			

Central	Central - Trolebús	113	10	66	18,0	133,5	230.000
Oriental	Nor Oriental – Ecovía	42	11	65	9,8	195,6	155.000
	Sur Oriental	80	11	70	10,3	151,7	75.000
Occidental	Sur Occidental*	0	24	297	14,0	605,6	235.000
	Central Norte	74	16	136	14,5	344,0	225.000
<b>Total:</b>		<b>309</b>	<b>72</b>	<b>634</b>	<b>66,55</b>	<b>1430,4</b>	<b>920.000</b>

18. **Quito Metro Line 1 (PLMQ).** It has been estimated an initial demand (first year) of 450,000 passengers a day. The PLMQ will have 22 km in length (19.3 km underground and 1.7 km in surface), 15 operational stations and 4 reserve stations (three intermodal transfer stations), 37 km/h average speed, 8 trains of 6 wagons per train (in total 108 wagons), and will transport 1,500 people per trip in every train.

19. For this purpose, the redesign project for the Integrated Passenger Mass Transit System of the Metropolitan District of Quito (SITM) is being considered, which will include all existing public transport subsystems. This project will be the structuring axis of the entire public transport system of the DMQ.

20. **Integrated Mass Transit System for Passengers of the Metropolitan District of Quito (SITM).** This system has been made up of all the subsystems: Metrobús-Q, Conventional, Quito Cables, and Metro de Quito.

21. Its purpose is to integrate all the public transport subsystems of Quito and its suburban area (surrounding valleys). The SITM has the following characteristics:

- expansion of the public transport offer based on the construction of PLMQ;
- fare and operational integration of all bus services (Metrobús-Q and Convencional) with the Metro; and.
- definition of an adequate institutional framework for the new mobility model.

22. It is expected that the main benefits of the proposed model will be the reduction of travel times and operating costs, and the reduction of polluting emissions. In the long term, the SITM is expected to contribute to a reduction in the growth of automotive traffic and urban sprawl.

### III. Policies and Traffic Management

23. **Pico y Placa.** The Municipality of Quito has implemented a restriction measure on the circulation of private vehicles under the system known as Pico y Placa. The influence of the “Pico y placa” applies to different vehicles depending on their license number and the day of the week.

24. The "pico y placa" measure regulates traffic by prohibiting vehicular circulation in the most consolidated urban area of the city of Quito during the busiest hours (peak hours), established between 07:00 a.m. and 09:30 a.m. and between 4:00 p.m. and 7:30 p.m. on weekdays (Monday to Friday).

25. **Parking lots.** The parking system consists of:

- "Blue Zone" system regulates the use of parking on public roads. Currently, this system has 8,671 spaces distributed in 7 areas with high parking demand on the DMQ (6 in Quito and 1 in Cumbayá). The maximum parking time is 2 hours and its hourly rate is USD \$ 0.40, with an average daily rotation of 6 vehicles per lot between 8 a.m. and 6 p.m. from Monday to Friday;
- 7 parking buildings in the Historic Center (6 on the edge of the central area and 1 inside): San Blas, La Ronda, Cadisan, El Tejar, Montufar 1, Montufar 2, and Yacu with a capacity of 2,757 places;
- 14 parking lots distributed in the city with capacity for 2,812 vehicles.

26. **Traffic lights.** The implementation of the new adaptive centralized traffic light system for the city of Quito, which incorporates 600 intersections, is completed. With this technological tool, traffic circulation in the road network can be managed more efficiently, minimizing delays and maximizing the capacity of vehicles at intersections. Although this system will not make the vehicular congestions disappear, it will allow to manage traffic in a more adequate way.

27. **Mobility Management Center (CGM).** The mobility management center has the following among its main activities:

- Allows a greater number of legal interventions;
- Greater coverage of traffic events in the city;
- Better coordination of operational transit control with technological support;
- Attention to institutional and citizen requirements with information generated from the CGM.

#### IV. Non-Motorized Transport

28. **Sunday Cycle.** Sunday Cycle has been carried out since April 2003. Initially every month, then every 15 days and currently every week. It consists of occupying the road space of the main roads of Quito for trips mainly by bicycle, although it is also done in skateboards or simply walking or jogging.

29. This initiative grew from a stretch of 9.5 km to 30 km approximately, attracting followers between 3,000 to 30,000 cyclists every Sunday. The activity takes place between 09:00 a.m. and 2:00 p.m.

30. This initiative has been the "sand box" for the people of Quito to prepare themselves to be daily users of this mode of non-motorized transport in their daily commuting.

31. **Bike-Q.** Based on the experiences of Sunday Cycle initiative, the Municipality of Quito implemented the first phase of Bici-Q public bike system. It is free, users only have to register. It operates from Monday to Sunday between 07:00 a.m. and 07:00 p.m.

32. The system consists of 25 stations distributed in the center and north of the city. There are plans to extend it towards the south sector. Each station has 17 bicycles in average, making a total of 425 bicycles available. The length of bicycle lanes articulated by these stations is of 37.7 km.

33. Every day this mode of sustainable transport is used by around 3,000 people, although there are 38,387 registered. The extension coverage of this system is being revised, with plans to include 30 additional stations and 45 km of bicycle lanes. This would make a total offer of 450 additional bicycles.

34. Apart from Bici-Q, Quito has 60 km of additional bikeways that are distributed in recreational sites (parks, linear parks and eco-routes).

35. The Municipality of Quito is determined to continue consolidating this system as it represents the future of the sustainable transport.

## **V. General Context, Challenges And Opportunities**

36. Transport demand has been rising in Quito because of a growing population and suburbanization. The combined effect of these trends is an increase in the frequency and length of trips. Quito lies in a long, narrow valley that runs south to north, with the poorest population concentrated in the south and other outlying fringes of the metropolitan area. Today 2.6 million people live in the Municipality of the Metropolitan District of Quito (MDMQ). The population in the urban area is growing by 1.7 percent a year, and by 4.2 percent in suburban areas. Lengthy suburban trips are expected to account for nearly a third of trips in MDMQ by 2020. This phenomenon has negative effects such as informal settlements concentrated in risk areas; unsatisfied social demands associated with the provision of basic services and public transport; distancing from food producing sources; environmental costs due to loss of vegetation cover and water reserves, among many others.

37. Mobility has a high impact on the quality of life of the inhabitants of the city: the daily routine of the people in Quito is affected by inefficient conditions regarding the transport system. Accessibility restrictions increases costs and travel times (average speed of displacement in the city: 21.1 km / h), decreases urban productivity and increases costs associated to congestion. The CAF Survey (ECAAF) 2016, shows that the inhabitants of the region spend around 40 minutes moving from home to work (one way).

38. On the other hand, an inequitable use of public space means that private vehicles move around 30% of the population by occupying 70 percent of the public space. Around 15.4% of the journeys are made on foot and only the 0.3% use the bicycle as a means of transport (Resilience Strategy 2016, PMDOT 2015-2025).

39. Although in Quito the vast majority of the population is mobilized by public transport (more than 70% of the trips), it is still inefficient from an environmental perspective. Public transport contributes significantly to greenhouse gas emissions (approximately 3 million tons of CO<sub>2</sub> equivalents per year, according to PMDOT 2015-2025 report published in 2011) and requires a significant subsidy to fares by the Municipality. The level of dissatisfaction with public transport is approximately 14% below the regional average (CAF-RED 2017).

40. To address this situation, in 2009 MDMQ commissioned comprehensive planning studies that recommended creating a citywide Integrated Mass Transit System (SITP). In March 2012, a city law created Quito's SITP. The SITP is intended to provide high-quality transit service by integrating mass transit systems –rail- and bus-based—and by allowing passengers to transfer more easily between the different types of service. The SITP will have three components: the currently under construction high capacity metro system that will serve as the backbone; the currently operational Metrobus-Q bus medium capacity rapid transit system; and the conventional mixed traffic buses that complement and serve as feeders to the first two components. The MDMQ plans a gradual integration of these three modes.

41. The PLMQ is the largest and more important investment project of the MDMQ. The metro is already under construction, supporting by the World Bank and a number of other multilateral and bilateral financing institutions. It consists of a 23-km metro line that extends along a north south axis

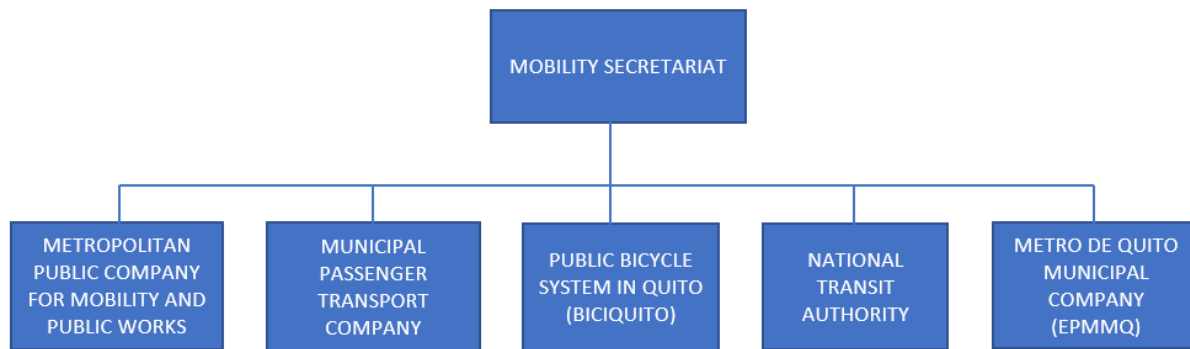
from El Labrador (located at the southern tip of the decommissioned Quito Mariscal Sucre airport) to the Metrobus-Q and inter-municipal bus transport terminal at Quitumbe. The line will have 15 stations, five of which will be physically integrated with the Metrobus-Q BRT network. Rolling stock will include 18 trains (six-car formations, four of which will be automotive) with a maximum capacity of 1,270 passengers each (6 passengers per square meter).

42. The PLMQ is under construction and, provided that works continue at the current pace, should be ready for operations by October 2019. The PLMQ is fully financed by the Government of Ecuador (through multilateral financing and own resources) and the Municipality of Quito. The PLMQ is under the responsibility of the Metro de Quito Municipal Company (EPMMQ) which is under the jurisdiction of the Secretary of Mobility of the Municipality of Quito.

**VI. Governance and Institutions**

43. The Metropolitan District of Quito through the Metro de Quito Municipal Company (EPMMQ), will be directly responsible for obtaining the required results and fulfilling the objectives, in these terms of reference.

44. The review of the reports of this Consultancy will be evaluated by relevant institutions within the mobility sector, such as the Mobility Secretariat, the Municipal Passenger Transport Company, as well as the Metropolitan Institute of Urban Planning (IMPU), linked to the Mayor's Office. The organizational structure of the mobility sector in Quito is the following:



45. The consultant will have to make consultations and request information from a wide range of institutions in Ecuador and in Quito more specifically. Among the most relevant institutions to consider by the consultant, are the following:

- National transit agency (ANT)
- Municipality of Quito
- Secretariat of Mobility of Quito
- Secretariat of Environment of Quito
- Metropolitan Institute of Urban Planning (IMPU)
- Metropolitan Public Company for Mobility and Public Works (EPMMOP)
- Metro de Quito Municipal Company (EPMMQ)
- Municipal Passenger Transport Company (EPMTPQ)
- Public Bicycle System in Quito (BICIQUITO)
- Metropolitan Transit Agency (AMT)

## **VII. Objectives**

46. The ultimate purpose of a Mobility Master Plan (MMP) is to provide short (3 years), medium (10 years), and long-term (20 years) strategies to provide access and mobility for a city's populace. The consultant will prepare a comprehensive Mobility Master Plan for the MDMQ which, within the current financial constraints, improves the accessibility to sustainable mobility services for the city's population and businesses, and is environmentally sound. To achieve this purpose for the MDMQ, the following key objectives are presented:

- To provide long-term (20 years) visions and goals for desirable urban development in MDMQ.
- To illustrate a basic plan for urban development and include a list of proposed urban land use and transport measures to be implemented within a time span of 3 (short-term), 10 (medium-term) and 20 (long-term) years.
- To ensure that the most appropriate, sustainable and cost-effective implementation program is undertaken in the urban transport sector.
- To identify feasible short-, medium- and long-term traffic management measures and transport infrastructure needs to facilitate safe and efficient movement of people for the present and future.

47. To achieve these objectives, the key deliverables will include the design of a Mobility Master Plan that includes: (i) an Institutional Framework Development Plan, (ii) an Urban Development Plan, (iii) an update of the existing Transport demand model, (iv) a Transport system challenges and opportunities report, (v) a report of each of the subplans included in the MMP and a Strategy and Implementation Plan report. For this work, the firm will be required to keep active communication with both local and headquarters World Bank teams.

## **B. SCOPE OF WORK**

48. The Consultant will identify the geographic boundary of the study area to be covered in the Mobility Master Plan (MMP), which should be discussed and approved by the Secretary of Mobility.. The boundary area of the study area along the MDMQ should be coded using GIS.

49. In general, the MMP Strategy Plan should cover a period of 20 years, while the Implementation Plan should identify project priorities in the short (3 years), medium (10 years), and long-term (20 years).

50. The Consultant must conduct the necessary surveys to come up with a clear description of all surveys to be carried out as part of the MMP. The plan should describe the locations, schedule, sampling approach, and staffing plan for each survey. The Inception Report should also include all survey forms that the Consultant plans to use, and the proposed number of surveys, which must be agreed with the Secretary of Mobility and consistent with the consultant proposal.

51. The Consultant is required to prepare a detailed timeline for the MMP preparation process. The timeline should indicate key dependencies and should identify contingencies to account the possibility that certain types of data are not available.

52. The activities delivered by the firm can be divided into two main tasks: Task I – Inception and scoping; Task II – Design of the Mobility Master Plan (MMP).



## **Task I. Inception and Scoping**

53. In coordination with national and local authorities in Ecuador the consultant will identify relevant available tools, datasets, studies, reports and analyses from all existing sources of information. The consultant will present a detailed workplan to implement and deliver as per detailed in this TOR.

54. The consultant will provide local context expertise or plan accordingly for missions/meetings to Quito to collect relevant data with the stakeholders. These missions/meetings should be planned and with sufficient time to allow for adequate data collection. The consultant should bear in mind that important stakeholders might not be widely available at the firm's convenience, so alternative schedules/forms of communication should be arranged in these cases.

55. The work plan presented at this stage should include partial deliveries with two weeks' review time for the local authorities.

## **Task II. Design of the Mobility Master Plan (MMP)**

### **1. Scope**

56. The consultant will review and analyze all relevant documents related to the assignment; available documents and studies on transport development, legal and environmental framework in the MDMQ. The Consultant will summarize and provide comments on the existing limitations as well as local particularities related to the scope of work described in these terms of reference.

57. The Consultant will assess and prepare a 'problem tree' to indicate different issues and their interrelation to properly design and justify strategy, goals and measures in the MMP strategy and implementation plan.

The Consultant will prepare a comprehensive Mobility Master Plan for the MDMQ using as much information and data as possible collected by previous studies. The Mobility Master Plan will include:

- i. Information on current travel demands based on existing and collected data, including the identification of major bottlenecks;
- ii. Identification of urgent transport infrastructure and operational needs, assuming that the current traffic development trend will prevail in the near future;
- iii. Preparation of current accessibility indicators for different population groups and different areas of the MDMQ; and
- iv. At least, a pessimistic, optimistic and moderate scenarios for the purpose of forecasting future travel demands in 2025, 2030, 2035 and 2040. The scenarios will set out assumptions for the main drivers of development and travel demands, such as: population, employment, per capita income, urban sprawl, motorization and quality of public transport service.

58. In order to ensure that the Master Plan is realistic, the Consultant will first estimate overall cost of public transport system in the MDMQ and establish Quito's annual rate of investment in transport infrastructure and equipment (both municipal and private) over the past five years. Taking this as a benchmark and a reference point, the Consultant will set an indicative annual investment envelope for the forthcoming ten-year periods. The Master Plan should be developed within that budget constraint and feasible investment by the private sector.

59. The Consultant will scope the infrastructure and equipment required to meet demand, assess feasibility of specific at a conceptual level, propose an indicative investment plan, and set out

associated policies. In case total demands cannot be met, the Consultant will assess the level of restraint likely to be required, identify the policy options available and describe the environmental consequences of the strategy to satisfy travel demands.

60. The Consultant will conduct an analytical appraisal of investment in public-transport infrastructure and services. It should fully develop priorities for non-motorized travel and public transport, as well as road provision.
61. The Consultant will evaluate the approved/adopted Mobility Master Plan in terms of its effect on mobility, accessibility, economic activities and environment. This will include a Strategic Environmental Assessment to be developed in accordance with pertinent local norms. For the chosen strategy, the Consultant will identify and describe the: i) physical and organizational measures necessary; ii) investments required; and, iii) accessibility indicators. It is required that the Master Plan be discussed by the stakeholders interested in MDMQ's mobility at open workshop to be organized by the consultant in close cooperation with the Secretary of Mobility..

## **2. Available information**

62. The consultant will have to review existing studies, analysis and all kind of information currently available in the MDMQ. Among others, these are the most relevant studies and information that the consultant will have to consider:

- **Mobility Master Plan (2009).**
- **Strategic Mobility Vision 2015-2030**
- Metropolitan Plan for Development and Territorial Planning PMDOT 2015-2025.
- Quito Metro Studio (2010).
- **Update of the transport demand model (2016)**
- **Demand Study conducted by Metro de Madrid S.A (2010).**
- **Demand Study Cal & Mayor (2008).**
- Constitution of Ecuador
- Organic Law of Territorial Planning, Use and Land Management (LOOTUGS)
- Quitocables project demand study.
- Vehicle data in the Guayasamín tunnel and toll.
- Demand study for the new BRT Labrador-Carapungo corridor.
- Information of the traffic signaling system. Information about hourly daily intensities in the set of 900 traffic lights recently centralized in the DMQ.
- "Plan Nacional para el Buen Vivir" (2017-2021)
- Resilience Strategy of the Metropolitan District of Quito study
- Strategic Diagnosis - Territorial Axis
- Strategic Diagnosis - Mobility Axis
- Resolution STHV Eco-efficiency
- Structuring of the tariff model of the metropolitan public transport system of Quito study.
- Structuring of the metropolitan public enterprise Metro de Quito study.
- Reorganization of conventional bus lines (Secretariat of Mobility)
- Atlas of Natural Threats of the Metropolitan District of Quito 2016
- Atlas of the Metropolitan District of Quito 2016
- Resilience Strategy of the Metropolitan District of Quito 2017

## **3. Institutional Framework Development**

63. This is a crucial component of the study since it generates the incentives to be able to support the governmental approach towards urban mobility in the MDMQ. A sustainable transformation of the urban mobility policy in the MDMQ will be fostered with an organizational and institutional strengthening of the relevant institutions. Adjustments to the legal framework and changes to the current institutional framework will be carried out when necessary.

64. In close coordination with the Secretary of Mobility, The consultant will have to identify completed and ongoing studies in the MDMQ and carefully analyze them in order to propose a coordinated and collaborative methodology for the execution of the abovementioned objectives. Among the completed and ongoing studies referenced in the previous section the “Structuring of the tariff model of the metropolitan public transport system of Quito” and “Structuring of the metropolitan public enterprise Metro de Quito” studies are especially relevant to this task. It is considered that, at least, the following tasks must be carried out:

### **3.1. Diagnosis of the current legal-institutional framework**

65. Review and analysis of the current legal and institutional framework, identifying the competencies of each of the institutions, entities and private actors involved. Identify the opportunities and limitations presented by these actors and the global structure of the sector, specifically looking at the planning, management, regulation and control of the different components of the urban mobility system of the MDMQ.

### **3.2. Proposal for legal-institutional restructuring**

66. Based on the results of the diagnosis, a set of alternatives and solutions for the legal-institutional restructuring of the urban mobility of the MDMQ should be presented. This will be discussed with local authorities and the World Bank.

67. This consensual proposal must be developed in detail, defining specific changes in the legal, normative and regulatory framework, changes in the structure of relevant institutions, technical requirements, including professional, administrative and economic aspects of the new structures proposed, or for the reform of existing ones, among other aspects.

68. If consensus is not reached on the restructuring proposal, the implications, risks and opportunities of each proposed approach must be defined in the set of alternatives.

### **2.3. Action Plan for institutional restructuring**

69. It will be necessary to design an action plan for the implementation of the new structure and its reforms. The steps to be followed and the corresponding estimated times for each measure will be identified, as well as the transition measures that are required.

## **4. Urban Development**

70. Urban development and land-use planning are sometimes responsible for important structural urban mobility problems, represented by poor regional and local accessibility to economic activities by certain population groups.

71. In this context, the actions proposed by the consultant in the framework of the Mobility Master Plan for the MDMQ have to be framed in future urban development scenarios that are oriented and articulated towards integrated infrastructure schemes and sustainable mobility services. The consultant will have to propose different scenarios that must be agreed among the different institutions linked to land-use planning and environment. The legal, normative and regulatory

aspects for land use modifications should be identified by the consultant for each of the proposed scenario.

## 5. Data collection

72. Accurately identifying existing conditions in the transport system will provide an effective base from which to define the direction for transport improvements and evaluate alternative transport development scenarios. The following surveys will help to identify the mobility needs of residents.

a) **Review of existing plans and demographic data.** The consultant should obtain and review the following documents on the land use and transport system (as available):

- Comprehensive Traffic and Transport Studies
- Comprehensive Mobility Plans
- Transport-related Detailed Project Reports
- Master Plan, Development Plan, or other land use planning documents
- Road Plan of the MDMQ

In addition to the above the consultants shall collect the following items:

- Small-scale maps and other land use maps.
- Satellite images.
- Socio-economic data.

Data on socioeconomic characteristics, vehicle ownership, the transport network, transport policies, and other available information relevant to the study shall be compiled from these documents. Any inconsistency or deficiency in the information shall be noted. The consultant should compile a list and map of existing transport projects for which a budget allocation has been made or construction has already commenced. These projects should be mapped using geographic information system (GIS) database.

b) **Land use mapping.** The consultant should use existing satellite imagery, validated through site visits, to create a detailed land use map. The consultant will prepare a GIS map of the land use information collected.

c) **Household survey.** The Consultant will carry out a detailed household survey to ascertain demographic characteristics, travel behavior, and other information. The survey will help reveal transport demand characteristics.

d) **Street inventory.** The Consultant will prepare a detailed inventory of public streets in the Study Area. The Consultant will prepare a GIS map of the street centerlines, recording data for each segment.

e) **Crash data.** The Consultant should collect traffic crash types and locations from the Traffic Police and other relevant authorities. The data should be geocoded using the GIS platform in order to create a map of crash “black spots”. Additionally, the consultant will have to collect transport related crime data from different transport modes. Both datasets will be crossed to create a joint map of accidents and crime incidents.

f) **Classified cordon counts.** The classified traffic volume and occupancy counts of all motorized vehicles, non-motorized vehicles, and pedestrians should be carried out.

- g) Public transport frequency-occupancy.** The Consultant will use the results of the traffic counts conducted above to identify major public transport corridors in the metropolitan area. At each of these locations, a detailed frequency-occupancy survey will be conducted to aid in the assessment of the supply and quality of public transport services.
- h) Speed and delay surveys for public transport.** The public transport speed and delay surveys will be conducted on major public transport corridors. Surveyors should make qualitative observations about the cause of delay along each segment. The public transport speed per segment should be mapped using the GIS platform.
- i) Vehicle fleet data.** Vehicle ownership data should be obtained from the Regional Transport Office and other sources to ascertain the personal motor vehicle fleet size, classified by vehicle type.
- j) Parking survey.** Work and business centers, shopping complexes, and tourist attractions are major generators of travel demand. Parking demand should be established by a count of each vehicle type where significant on-street parking occurs. The survey should cover both on-street parking areas as well as off-street public or semi-public parking. Finally, parking fee levels at the respective zone should be noted. All parking data should be recorded using the GIS platform.
- k) Outer cordon survey.** Origin-destination surveys shall be conducted through roadside interviews on outer cordon to supplement the OD information gathered in the household survey. The survey should be conducted at all major entry/exit points and on corridors where important activity locations are situated.
- l) Terminal area survey.** This survey is designed to collect information on freight movement patterns. At major terminals, distribution centers, and market areas, the number of vehicles entering and leaving the complex, including the number of passengers, type of vehicle, and commodity carried should be recorded.

## **6. Analysis of mobility patterns**

- 73. In 2010 Metro de Madrid S.A updated the demand model and transport network information of the MDMQ. In 2016, the MDMQ hired a firm to update the existing demand model from 2010. The consultant will have to update the public and private transport network by collecting information on mobility in public and private transport. The consultant will take as a starting point the information and data collected for the demand model update performed in 2016.
- 74. The consultant will review strategic planning instruments like Metropolitan Plan of Development and Territorial Planning 2015-2025 and Strategic Mobility Vision 2015-2030; as well as other studies and projects regarding mobility developed in the last five years. The consultant will hold meetings with local authorities in the mobility sector to collect data and reports on implemented and ongoing projects.
- 75. The consultant will carry out the necessary data collection for the successful update of the existing demand model. The demand model and the development of future scenarios will be elaborated in close collaboration with local authorities and the World Bank.

### **4.1. Data collection and structuring**

- 76. The consultant will make use of all the data collected in previous activities of this TORs for providing a database for the calibration as well as validation of the transport models. Travel

surveys can be structured to derive personal travel purpose origin–destination matrices for use in the assignment process. Among others, the consultant will collect information on: (i) origin and destination by purpose; (ii) origin and destination by location; (iii) car availability and use for travel purpose; (iv) public transport mode used; (v) cost of travel; (vi) duration of travel; (vii) time of day of travel; (viii) age, gender, income and employment status of the traveler; among others.

77. Person trips will be categorized in many ways, including factors such as trip purpose, trip frequency, trip timing, trip distance and spatial separation of origin and destination (O-D) as well as travel mode used. Further, the socio-economic characteristics of individual travelers and the households to which they belong will also become important determinants in predicting the travel behavior of those individuals.
78. Specific time period (am peak, inter-peak, pm peak and off-peak) trip matrices should be developed to better reflect the different travel making propensities and characteristics during these periods. It is essential that multiple time periods of the day be modelled, at least three, AM peak, PM peak and off-peak.

## **5.2. Four-step transport demand model**

79. The consultant will have access to a transport demand model, and can include an update in the methodology for this assignment. The consultant will have access to the OD matrix and the model in Transcad
80. This TORs propose the Four-step transport demand model as a reference, but the consultant can propose her/his own methodology to develop the new transport model.
81. **Step 1: Trip generation.** In this phase, the consultant will use data on land use, population and economic forecasts to estimate how many person trips are produced within, and attracted to, each zone. The consultant will carry out origin destination surveys that will be complemented with other sources of information such as call detail record (CDR) or other data or land use models.
82. Trip generation uses average trip rates for the study area to estimate the quantum of trips undertaken by various trip purposes such as (i) home-based work trips (such as work trips that begin or end at home); (ii) home-based shopping trips; (iii) home-based education trips (such as from home to primary, secondary and tertiary education); (iv) home-based recreation trips; (v) home-based other trips; (vi) non home-based trips (trips that neither begin nor end at home); (vii) other non-home-based trips (such as service trips and business trips).
83. The consultant may have to consider alternative land use forecasts, such as to assess the implications of alternative urban form proposals for the transport networks, or to consider the robustness of the performance of particular schemes to uncertainties in future land patterns.
84. The consultant should be aware that the trip generation model might also incorporate variables related to the transport network being modelled – both roadway and transit. This will build into the model the capability of representing induced travel demand in the form of more or less travel being made and by changes to land use patterns.
85. Transport zones should ideally contain homogeneous land use (for example, solely residential, industrial or commercial use or parking lots) and they should not cross significant barriers to

travel (such as rivers, freeways and rail lines), and should have reasonably homogeneous access to the modelled transport systems. Land uses with specific trip generation characteristics, which cannot be adequately described by the trip generation equations derived for other land uses, should be coded as separate zones (such as airports, ports, universities, hospitals, intermodal terminals and shopping centers).

86. **Step 2: Trip distribution.** Trip distribution determines where the trip ends - developed in trip generation (Step 1) - will go. These trip ends are linked to form an origin–destination pattern of trips through the process of trip distribution.
87. There are several approaches for trip distribution such as growth factor, gravity model, entropy-maximizing approach, intervening opportunities. The consultant will propose a methodology to be agreed with local authorities to perform this task. The outcome of the trip distribution step will be a matrix of trips from each transport zone to all other transport zones.
88. **Step 3: Mode Choice.** Mode choice allocates the origin–destination trips derived from trip distribution (Step 2) to the available travel modes, by trip purpose. In this step the consultant will have to estimate the choice between travel modes based on the characteristics of the trip maker (income, car ownership, age), the trip itself (trip purpose, the origin and destination) and the characteristics of the travel mode (fares, vehicle operating costs, travel time, parking availability and cost, reliability). Carry out a stated preferences survey to determine the time value by socioeconomic stratum and user segments. Including a more detailed understanding of value of waiting, in-vehicle and transfer times, as well as modal preference and penalties to transfers and other factors. The outcome of this step is an estimate of travel by all available travel modes between all transport zones, by the separate trip purposes.
89. Mode choice can be performed before trip distribution (trip-end mode choice model) or after trip distribution (trip-interchange mode choice model). In this case will be the consultant who will select which methodology to use after agreeing the selected method with local authorities.
90. **Step 4: Trip Assignment.** Trip assignment assigns the various mode-specific trip matrices, by trip purpose, to the alternative routes or paths available across the transport network. To be able to carry out the assignment, the road network and public transport offer will be previously updated to the year of study.
91. Various travel assignment techniques may be used, preferably iterative allocation models such as User Equilibrium or Multi-class Multi-modal network equilibrium will be used to reach a solution. The procedure concludes when users can not improve their travel times when changing routes (Wardrop). This model assumes that users have all the information that allows them to make decisions that minimize their travel time and travel costs and that users assign the same value for the attributes of each transportation system. For each iteration, the number of trips is calculated considering capacity limits and travel times that depend on the degree of congestion.
92. Trip assignment results can be used to:
  - Identify and assess deficiencies in a transport network
  - Assess the transport network performance
  - Evaluate the impacts of transport infrastructure proposals
  - Evaluate alternative transport system and land use policies
  - Provide inputs to economic appraisal.

### **5.3. Elaboration of Future Socioeconomic Scenarios**

93. In addition to a tool that allows assessing how the transport system behaves in 2019, it is essential to perform projections to evaluate the impact of different socioeconomic scenarios in the future. The study should be carried out for the current situation (base year, 2019) and for the future until year 2040. Horizons will be set and analyzed every 5 years. This support the characterization of the spatial distribution of the economic and urban activities that influence the displacement patterns of the MDMQ determining the patterns for future trips.
94. The diagnosis of the base year 2019 will be defined by using data sources that characterize the transportation system, the urban structure and the results of the OD matrixes. For the construction of future scenarios, socioeconomic and urban information should be analyzed from official data sources. The consultant will consider projects that are reflected in the document of Strategic Mobility Vision 2015 - 2030 of the Mobility Secretariat and based on conversations with the current mobility authorities in the MDMQ, including the IMPU as head of long-term strategic city planning.
95. The consultant will elaborate future macroeconomic, spatial distribution and socioeconomic scenarios for horizons 2025, 2030, 2035 and 2040, considering data from official bodies that prospect the behavior of the abovementioned variables, in optimistic, moderate and pessimistic scenarios. From this the feeding of the demand models will be carried out, generating the future travel matrices for the horizon years of the consultancy.
96. To conclude, the projected travel matrices for the horizon years 2025, 2030, 2035 and 2040 will be allocated in the analytical networks of transit and road system. The consultant will perform an evaluation that will consist of an analysis of the results obtained in these allocations for individual transportation and transit, with emphasis on the operational capacity of the rail system, such as: loading and unloading in stations at peak and daily hours, transfers between different modes of transport and indicators: pass, pass \* km, pass \* h by mode.

### **5.4. Evaluation of scenarios**

97. The Consultant should develop a comprehensive evaluation framework in consultation with relevant stakeholders, taking into account all relevant factors such as capital and operating costs; environmental impacts; and the availability of services to the poor and other social impacts, among others.

## **5. The MMP strategy and implementation plan**

98. It is essential that the mobility improvement measures in a MMP form a package with a consistent vision and goals for the desirable direction of the metropolitan urban transport. The consultant should define a vision and goals to guide the policymaking process. While visions are statements of the desirable direction of urban transport development, goals are quantitative/qualitative targets for major indices, to be achieved within the planning horizons.
99. The general criteria for the new Mobility Master Plan of the Metropolitan District of Quito are:
  - To be a structuring instrument of urban settlements and an inducer for urban, social and economic development.
  - Encourage the use of alternative means of transport (Non-motorized transport).
  - Benefit the Intermodal Public Transport Service
  - Analysis of the parking areas of private vehicles and proposal for improvement
  - Reduce dependence on private vehicles



- To improve road safety

100. The final step in the process is to identify interventions from the MMP Strategy Plan that can be incorporated over a 10-year time horizon. These projects should be consistent with the vision and goals of the MMP as well as policy guidance from the national level. The Plan will include the components listed below:

- i. **Multimodal integration plan.** The consultant will identify opportunities to integrate multiple modes of transportation in the MDMQ. Multimodal integration projects and opportunities to expand and coordinate the multimodal system (i.e. park and ride facilities, multimodal hubs, etc) will be identified. In addition, the consultant will examine opportunities for ITS to help implement a more coordinated multimodal transportation system.

The integration of strategic and innovative projects such as metrocable, commuter trains, park and ride transfer stations, integration to mass transport corridors and parking will be sought. The integration of terminals between inter-provincial and urban transport will be analyzed.

Among others, the consultant will seek for improvement and better integration in the following aspects:

- Infrastructure and operational integration – different transport modes connected physically as well as operationally.
- Information integration – information systems help service providers achieve operational integration in addition to providing real-time information to passengers on various modes regarding connectivity options, routes, schedules, and fares.
- Fare integration – integrated payment solutions like smart cards allow seamless access and payment across different modes.

- ii. **Public transport plan.** A public transport improvement plan should be developed. An integral reform of the conventional public transport system will be studied (routes, frequencies and stops). The plan will analyze ways to optimize the Metrobús-Q System, routes, frequencies and potential expansion of the same as well as new corridors.

New contracting schemes and legal terms will be proposed for the incorporation of new operators or routes to the system. The plan will foster the implementation of the Unified Collection System as well as technological aspects and processes for the implementation of a common fund (“Caja común”).

For the implementation of the Public Transport Plan, the following will be taken into account:

- A diagnosis of the Integral Public Transport System considering all modes of transport such as Metro Q, Metro Bus Q, Conventional and non-motorized transport.
- Based on the functional design, the operational design of the new public transport network will consider the level of service being perceived by the user (frequency, comfort, etc.) The plan will promote a tariff integration policy based on an electronic ticketing system.
- The consultant will adjust the characteristics of the network, as well as the programming of the operation of routes, based on a technical evaluation of the same performed on a calibrated transport model.
- In order to strengthen the integrated transport system, the consultant will develop a proposal of policies, prioritization of routes, adoption of a tariff system and integration of a collection system, among others.

- iii. **Transport plan for commercial vehicles: taxis, private cars, schools and institutions.** A private transport improvement plan should be developed. For this plan, the consultant will define the offer of commercial transport services referred to taxis, private cars, schools and institutions, establishing the need for new regulatory processes to meet current and future demand.

The consultant will present the mechanisms to carry out the process of regularization of commercial transport, if necessary. This regularization will contemplate the technical-mechanical aspects, among others.

On the other hand, the diagnosis of the supply and demand of commercial transport will be carried out in order to identify the needs of this type of transport. The necessary guidelines for the development of commercial transport projects will be proposed, allowing the MDMQ's Mobility Secretariat to select and develop the best alternatives.

- iv. **Freight transportation plan.** Freight transportation can have a significant positive impact on the economy of a region. However, communities without a clear strategy or plan for how to accommodate freight transportation may experience a number of negative impacts related to community health, air quality, and safety.

The consultant will develop a plan that aims at aligning land use plans with the movement of goods through and within the MDMQ to support the economic vitality of industries/businesses and reduce the potential for negative impacts (e.g., pollution, congestion, injuries to pedestrians) associated with the movement of freight.

- v. **Non-motorized transport plan.** Planning for pedestrians and bicycles is one of the most important tasks of the MMP Implementation Plan. The plan resulting from this task must contain:

- A solid and concise diagnosis of the current situation of non-motorized transport and the urban environment in which it is used, as well as the existing programs, regulations and instruments, based on the best available information.
- The definition of objectives of the Plan, taking into account aspects of mobility, reduction of greenhouse gas (GHG) emissions and air pollutants, public health, personal wellbeing, road safety and public safety, among others.
- Definition of guidelines for the design of a network of bike paths and complementary interventions, including the necessary infrastructure in the short, medium and long term (horizons of 2, 5 and 10 years). Interventions will aim at satisfying security requirements, direct routes, connectivity, comfort and attractiveness for users.
- Identification, selection and prioritization of corridors, as well as potential interventions.
- Evaluation of the possible impacts of the plan in terms of mobility, environment, social and health.
- Definition of policies and regulatory instruments, of promotion, communication, social participation and others that should be established and / or improved to ensure an adequate implementation of the plan and the achievement of its objectives.
- Design a strategy to promote the use of this means of transport.
- Planning of a roadmap for its implementation, including activities, responsible, calendar, estimated budget, indicators and expected results.

- vi. **Shared mobility plan.** It refers to the shared used of a vehicle, bicycle, or other transportation mode. It is a transportation strategy that allows users to access transportation services on an as-needed basis. Shared mobility is an umbrella term that encompasses a variety of transportation modes including carsharing, bike sharing, peer-to-peer ridesharing, on-demand ride services,

micro transit, and other modes. Each shared mobility service has unique attributes that have a range of impacts on travel behavior, the environment, and the development of cities and urban areas.

The consultant will develop a shared mobility improved Plan including the following aspects, among others:

- A diagnosis of the current situation of shared mobility in the MDMQ. The consultant will identify existing programs, regulations and instruments, based on the best available information.
- As shared mobility is rapidly changing, the consultant will create different scenarios in which shared mobility will evolve in the short, mid and long terms.
- The definition of objectives of the Plan, taking into account aspects of mobility, reduction of greenhouse gas (GHG) emissions and air pollutants, public health, personal wellbeing, road safety and public safety, among others.
- Definition of guidelines and complementary interventions, including the necessary infrastructure in the short, mid and long term (horizons of 2, 5 and 10 years).
- Based on previously defined scenarios, evaluation of the possible impacts of the plan in terms of mobility, environment, social and health.
- Definition of policies and regulatory instruments, of promotion, communication, social participation and others that should be established and / or improved to ensure an adequate implementation of the plan and the achievement of its objectives.
- Design a strategy to promote a correct and sustainable use of this means of transport.
- Planning of a roadmap for its implementation, including activities, responsible, calendar, estimated budget, indicators and expected results.

vii. **Traffic management plan.** The consultant will evaluate the traffic in the Metropolitan District of Quito and propose projects to reduce congestion and traffic pollution. For which he/she will consider the following guidelines:

- Restriction measures and policies will be evaluated by license plates, congestion charges, car-free days, on-street parking, informal and off-road parking.
- Transport management models for corridors and mass transport systems such as Metro.
- Smart signaling projects.
- Definition of toll systems in the city.
- Road signs studies.
- Propose improvements for road intersections.

viii. **Road infrastructure development and maintenance plan.** The consultant will carry out a study for the improvement of the existing road network through the construction of new stretches and road intersections that allow the reduction of travel times in the arterial road network, with a special focus on public transport. Simultaneously, the plan will guarantee the provision of infrastructure for pedestrians and bicycles.

A new Road Plan will be defined prioritizing the most important road projects for the city. Software tools such as HDM-4 will be used to prioritize projects of routine maintenance, periodic and new projects based on travel time savings and vehicle operation costs benefits, as well as a decrease in the number of accidents and environmental pollution.

The main guidelines that the consultant should consider for this plan are the following:

- Obtain an updated database of the road network of the MDMQ.
- Establish a master road network for the MDMQ with a vision of 20 years.
- The Plan must be subject to current regulations in the country.

- Propose a road maintenance program that integrates the tasks corresponding to preventive, routine, periodic and rehabilitation maintenance, prioritizing the needs of the MDMQ.

- ix. **Road Safety plan.** The consultant will come up with a road safety plan that supports the reduction of road crashes by taking coordinated action to improve the safety of roads and vehicles, set safer speeds and to ensure safer road user behavior.

The consultant will prepare a road safety plan by developing a Road Safety Audit System. A baseline of the accident rate will be identified for the MDMQ. A methodology for monitoring and evaluation; as well as development of projects that improve road safety; such as policies; signage, training, driver education, review of current regulations, sanctions and road safety audit projects for the city will be carried out.

The consultant should propose a methodology to guide the management of resources for the control and monitoring of traffic, with a special focus on preventive actions. Emphasis will be placed on the control and surveillance of infractions that represent a serious risk to people and things, such as speeding, prohibited crossings, dangerous maneuvers, driving on berms, disrespect for traffic lights or stop signs, among others.

The consultant will propose a plan to generate collective awareness of traffic accident risk, emphasizing pedestrians, cycle users and school transport, as vulnerable groups to accidents.

- x. **Travel demand management plan.** Measures for travel demand management should be developed along with implications for regulation and enforcement. This plan should elaborate a complete roadmap for parking management, and may also cover additional travel demand management mechanisms.

- xi. **Social, economic and environmental impact assessments plan.** Transport systems serve as a critical link between the promotion of social equity and economic development and the conservation of environmental resources. Effective transport systems allow people to get to their jobs, take care of their health, pursue an education, and obtain the necessary food and goods to support their daily existence. While transport policy was previously influenced by engineering and economic perspectives, its focus has broadened to include an integrated approach for addressing social, economic, and environmental issues.

Therefore, the Consultant will perform preliminary social, economic, and environmental assessments of each priority project identified in the MMP Implementation Plan. While most assessments will utilize data collected through household surveys, travel diaries, census figures, pollution control board figures, as well as outputs from the transport model created under previous tasks, additional data may need to be collected for these steps. Therefore, the consultant must clearly outline the sources of data for each of the assessments.

- xii. **Summary of projects and phasing plan.** The consultant should compile all short- and medium-term projects identified in the all the above-mentioned plans and suggest an intervention phasing plan. The phasing plan should indicate implementation priorities. Project profile sheets should be prepared for short-term projects.

- xiii. **Financing plan.** Fiscal measures should also be considered to achieve balanced modal split, and to secure the budget necessary to implement urban transport projects.

## 6. Stakeholder Consultations

101. Throughout the world, MMPs are more and more the result of thorough local consultation of stakeholders, which in turn raises their acceptance level. Therefore, the Consultant should establish an advisory committee to guide the preparation of the MMP. Roles for external stakeholders and contributors in disseminating the MMP and promoting a common understanding of urban development issues should be developed and communicated to the public. For this, in close coordination with the Secretary of Mobility, the consultants will participate in spaces for public participation and consultations that may be shared with other projects.
102. The MMP should be discussed with the stakeholders throughout the study to identify the gaps in the existing transportation network scenario, public opinion on the alternative proposals, etc.
103. At the Draft MMP Strategy and Implementation Plan, the Consultant will also hold an additional consultation to gain input from the general public. The consultant will include a section in the Plan where the impact of internal and external consultations are addressed. This section will highlight how the initial proposal changed after carrying out consultations.
104. All feedback and the Client's responses will be documented and included in the final Plan. The consultant will have to integrate consultations as relevant selection of alternatives and decision-making mechanisms.

## 7. Knowledge Transfer

105. **Continuous training.** There will be continuous training throughout the development process to update the demand model and develop the MMP. The training of MDMQ technicians in the development and use of the tool from the collection of field data to its completion is of fundamental importance. In each mission the consultant team will be accompanied by officials and technicians of the municipality that will include:
- Delegate of the Mobility Secretariat
  - Delegate of the Passenger Transport Company
  - Delegate of the Quito Metro Company
  - Delegate of the Metropolitan Institute of Urban Planning
106. **Final Training.** This training will include a trip of two specialists for five working days. The consultants will explain the work done and train the technicians that correspond. Up to ten municipal officials can be trained. The consultants will support the participating officials to design a training session to be delivered to other officials upon their return.
107. It includes one-week training for the technicians of the MDMQ mobility entities through a workshop in which the participants will have a computer with the training software license to operate the model. The use and development of the model will be explained step by step, giving special emphasis to its application opportunities.
108. The Consultant will be in charge of managing the loan of five licenses of the software from the supplier of the selected software and the corresponding for a period of 5 years. The MDMQ will send a credential letter to confirm the purpose of the request.

109. A manual of use of the model (**User Manual**) will be provided step by step for each of the stages of data collection and updating, matrix management and modeling (e.g. 4-stage model). The user manual will be registered in Spanish.

110. All Excel sheet models will also be delivered to the contracting entity upon completion of the study, to ensure that the model can be used for subsequent updates and training sessions.

111. **Delivery of a transport modeling software license.** A commercial software license used to update the demand model will be given to the contracting entity (TransCAD, Visum, etc.). The property of the license will be of the contracting entity, with granted access to the Consultant during the development of this consultancy.

112. **Ownership of the demand model.** All data, procedures and results of the demand model will be owned by the MDMQ; that can use them as considered.

### **C. DELIVERABLES/SPECIFIC OUTPUTS EXPECTED FROM CONSULTANT**

113. The deliverables should always be proposed in at least 2 phases; a draft report, for Bank team review and consultation with counterparts, and a revised version, considering the comments/suggestions provided by the local authorities and the Bank. The total expected duration of the work is 12 months. The following deliverables are expected for each task:

Task I. INCEPTION AND SCOPING – DELIVERABLES (draft version within 4 weeks of contract signature)

- a. Inception report

Task II. DESIGN OF THE MOBILITY MASTER PLAN (MMP) (draft version within 12 months of contract signature)

- a. Institutional Framework Development Plan
- b. Urban Development Plan
- c. Transport demand model and methodology
- d. Transport system challenges and opportunities
- e. Subplans of the MMP (Multimodal integration plan, Public transport plan, Transport plan for commercial vehicles: taxis, private cars, schools and institutions, Freight transportation plan, Non-motorized transport plan, Shared mobility plan, Traffic management plan, Road infrastructure development and maintenance plan, Road Safety plan, Travel demand management plan, Social, economic and environmental impact assessments plan).
- f. Workshops.
- g. Final Mobility Master Plan

TASK III. TRAINING AND KNOWLEDGE TRANSFER

- h. Material of consultations.
- i. Material of trainings.
- j. Final Mobility Master Plan

#### **D. SPECIFIC INPUTS TO BE PRESENTED BY THE LOCAL AUTHORITIES**

114. The World Bank team will facilitate missions, suggest relevant counterparts, review deliverables prepared by the firm, and communicate to the firms' specific inputs from the local authorities. While the World Bank team will facilitate access to local authorities/relevant stakeholders, the responsibility of gathering information and relevant data on the ground remains with the firm.

#### **E. SPECIAL TERMS & CONDITIONS / SPECIFIC CRITERIA**

115. The Bank team highly recommends that the methodology proposed by the consultant is limited to 20 pages, and that supporting information and documents, if necessary, are presented in the form of annexes.

116. Terms of Reference (TOR) of key experts are described below:

**Senior Transport Planner / Team Leader:** The Specialist should be a graduate in transport engineering, urban planning or public sector management, or an urban-sector discipline combined with substantial experience in transport infrastructure and traffic management. The Specialist should have at least 10 years of experience in transport planning, transport infrastructure, traffic systems, and implementation of sustainable transport systems. The Specialist should have thorough knowledge and practical experience of corporate/ organizational strategic management processes and performance management systems.

The specialist will organize and manage the consulting team. Therefore, She/He should be experienced as a team leader in urban sector project for a period of minimum 3 years with proven leadership and project management capability. She/He should be familiar with international development partners and their policies and practices and have worked in similar projects.

The Specialist should have in-depth practical experience of public transport planning and urban development, and a sound understanding of legal and other regulatory instruments for urban planning and development. Experience in developing comprehensive mobility plans (CMPs), city strategies, and other area-based plans as a means of economic and social development is required. Sector experience and understanding of transit-oriented development, traffic management, land use and transport integration, bus rapid transport systems, pedestrian safety, and NMT infrastructure planning is advantageous.

**Senior Urban Planner (land use and transport).** The Specialist should be a graduate in urban planning (or other relevant urban sector discipline) with at least 15 years of experience in land use and transport planning, having excellent understanding and experience in planning in Latin American cities. A second qualification in transportation engineering / economics / political science or similar discipline is preferred.

The Specialist should have in-depth practical experience with public transport planning and urban development, and a sound understanding of legal and other regulatory instruments for urban planning and development. Experience in developing comprehensive mobility plans, city strategies, and other area-based plans as a means of economic and social development is mandatory. Sector experience and understanding of transit oriented development, traffic management, land use and transport integration, bus rapid transport systems, pedestrian safety, and NMT infrastructure planning is advantageous.

**Senior Transport Economist.** Post graduate degree at Masters' level or higher in economics, transport economics, or related discipline, with in-depth knowledge of at least one transport subsector (roads, railways, ports, or transport services and logistics) and experience in quantitative analytical tools.

Minimum 10 years of professional experience in infrastructure economics with practical experience in carrying out feasibility analyses and analytical tasks on topics such as transport sector economic evaluations and regulatory frameworks. The Specialist will have general experience in broader transport issues, with an understanding and the ability to work on policy, institutional, and financing aspects, and social and environmental requirements.

The Specialist will have to be experienced in analyzing economic, social, financial and operational data, as well as developing spreadsheet models to assess the economic and financial performance of infrastructure or operational investment proposals.

**NMT Design Specialist.** The Specialist should be a graduate in architecture, landscape architecture, or urban design with at least 10 years of experience in the planning and design of NMT facilities, including experience of working in Latin American cities. Experience with sustainable transport systems, footpath and cycle track design, greenway networks, and placemaking will be considered advantageous.

**Senior Transport Modelling Specialist.** The Specialist should be a graduate in transport engineering, civil engineering, or an urban-sector discipline combined with substantial experience in transportation modelling procedures and tools. She/He must have at least 10 years of experience in modelling transport networks from macro to micro. A good understanding of GIS software is required, and practical experience in integrating transport modelling and urban GIS-based mapping is essential. Experience preparing comprehensive mobility plans, and integrating public transport and NMT with traditional modelling inputs is advantageous.

**Transport Finance Specialist.** The Specialist should have a postgraduate degree in MBA finance (from reputed university /institution), accounting, urban economics, or relevant fields and at least 10 years of experience in municipal finance, accounting, or auditing. A chartered accountant with a broad understanding of a range of urban management projects and experience working on mobility planning or infrastructure development in the urban sector is highly desirable.

**Geographic Information System (GIS) Specialist.** The specialist should have a postgraduate degree in geography, computer engineering, civil engineering, or relevant fields and have at least 8 years of experience in GIS. A good understanding of GIS software is required, and experience in urban GIS - based mapping is essential. Experience preparing comprehensive mobility plans and mapping of public transport and NMT networks is advantageous.

**Environmental and Social Safeguard Specialist.** The consultant should be a graduate in environmental planning, management or social development or a related discipline, with at least 5 years of relevant working experience, preferably on strategic environmental justice, and social equity safeguards related to urban development, transport infrastructure, and traffic management. Experience in preparing environmental assessment reports, and transport equity analysis is highly preferred.

117. For the technical proposal, the firm should include estimates of commitment of the participating teams and a proposed schedule.



## **F. SUPERVISION AND COORDINATION**

118. The selected consultant will work under the overall supervision of the World Bank (hiring entity). Throughout the assignment, the Consultant will also work closely with NTA and GADs, which will serve as main Local authorities and contact point. The Consultant is also expected to have interactions with relevant stakeholders.

119. The findings, proposals and deliverables (reports and presentations) developed as part of this activity must be discussed and validated with the different stakeholders involved to test their applicability. All deliverables must be approved by the Secretary of Mobility before receiving payment.

## **G. BUDGET**

120. The Consultant will provide a budget as part of its proposal that should cover all the fees, travel and subsistence of the international and local staff of the Consultant team, all costs associated with the preparation of documents, reports and presentations, costs associated with office space, local transport and secretarial services.

121. The estimated budget for this activity is US\$1,500,000.

122. The Budget will not include the facilities and logistics costs for the delivery of the interim presentations which have been budgeted for separately.

123. The assignment will require at least three (3) visits to Quito by the lead specialists for the presentation of deliverables.

## **H. DELIVERABLES**

124. The deadline for the deliverables showed below refer to final versions. The consultant will have to plan ahead allowing for a minimum of 2 weeks for the revision of draft versions. The main deliverables expected as products of the Consultant's work are:

<b>DELIVERABLES</b>	<b>By means of</b>	<b>Deadline (From Contract Signature)</b>
a. Task I. Inception report	Report and Power Point.	4 weeks
b. Task II. (A) Institutional Framework Development Plan	Report and Power Point.	4 months
c. Task II. (B) Urban Development Plan	Report and Power Point.	4 months
d. Task II. (C) Transport demand model	Report and Power Point.	6 months
e. Task II. (D) Transport system challenges and opportunities	Report and Power Point.	8 months

f. Task II. (E) Subplans of the MMP  (Multimodal integration plan, Public transport plan, Transport plan for commercial vehicles: taxis, private cars, schools and institutions, Freight transportation plan, Non-motorized transport plan, Shared mobility plan, Traffic management plan, Road infrastructure development and maintenance plan, Road Safety plan, Travel demand management plan, Social, economic and environmental impact assessments plan).	Report and Power Point.	10 months
g. Task II. (F) MMP Strategy and Implementation Plan.	Report and Power Point.	10 months
h. Task II. (G) Material of consultations.	Report and Power Point.	11 months
i. Task II. (H) Material of trainings.	Report and Power Point.	11 months
j. Task II. (I) Final Mobility Master Plan	Report and Power Point.	12 months

125. The consultant will present each report in draft and final versions. Some of the reports shall be accompanied by executive Local authorities' presentations highlighting the key outputs, conclusions and recommendations of each task. All materials, reports and presentations shall be made available in full electronic media.

126. All the deliverables will be produced in Spanish and must include an executive summary / presentation in Spanish.

#### **I. PAYMENT SCHEDULE**

127. Payment of Consultant fees will be done against final reports, which will only be deemed accepted once the World Bank's comments have been effectively incorporated and approved by the World Bank's team.

128. The projected timing for the deliverable of reports and associated payments is presented in the schedule below:

<b>Milestone/Deliverable</b>	<b>% of Lump Sum Fee</b>
a. Task I. Inception report	25%

b. Task II. (A) Institutional Framework Development Plan	-
c. Task II. (B) Urban Development Plan	-
d. Task II. (C) Transport demand model and methodology	25%
e. Task II. (D) Transport system challenges and opportunities	-
f. Task II. (E) Subplans of the MMP	25%
g. Task II. (F) MMP Strategy and Implementation Plan.	-
h. Task II. (G) Material of consultations.	-
i. Task II. (H) Material of trainings.	-
j. Task II. (I) Final Mobility Master Plan	25%
<b>TOTAL</b>	<b>100%</b>