Terms of reference for preparation of a Comprehensive Mobility Plan

1. Introduction

[IMPLEMENTING AGENCY] is requesting applicants to develop Comprehensive Mobility Plans (CMPs) for the city of [CITY]. The CMP will help [CITY] develop a strategy for short-, medium-, and long-term investments to improve accessibility for its residents. The requested CMP will guide every decision taken by the [IMPLEMENTING AGENCY] and other relevant authorities related to mobility and transport. In addition, the CMP will a key document to justify and support transport proposals to the Central Government and multilateral funding agencies.

2. Project Background and Context

[DISCUSS THE LOCAL CONTEXT AND MOTIVATION FOR PREPARING A CMP]

3. Objectives

The ultimate purpose of a CMP is to provide short, medium, and long-term strategies to provide access and mobility for a city's populace. To achieve this purpose for [CITY], the following key objectives are presented:

- To provide long-term visions and goals for desirable urban development in [CITY].

- 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 5 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.

4. Scope of work

In line with the Objectives of the study, the following tasks are identified:

- Task 1: Collect data and analyse the urban transport environment

- Task 2: Prepare the travel demand model

- Task 3: Prepare the CMP Strategy Pan

- Task 4: Prepare the CMP Implementation Plan

- Task 5: Stakeholder Consultations

These tasks, along with their respective deliverables, are explained in greater detail below. Applicants also can also refer to the Guidelines and Toolkits for Comprehensive Mobility Plan (CMP) prepared by Ministry of Urban Development, Government of India.

5. Detailed description of activities

5.1. *Task 1: Define project scope*

The Consultant will begin by preparing an Inception Report with the following contents.

5.2. *Task 1.1: Study area*

The Consultant will identify the geographic boundary of the study area to be covered in the CMP. The boundary area of the study area along with that of each municipality, district, and development authority boundary, should be coded using GIS.

5.3. *Task 1.2: Planning horizon*

The Inception Report will define the planning horizons for the CMP Strategy Plan and Implementation Plan. In general, the CMP Strategy Plan should cover a period of 20 years, while the Implementation Plan should identify project priorities over a 3-year timespan.

5.4. *Task 1.3: Survey plan*

The Consultant must prepare a clear description of all surveys to be carried out as part of the CMP. 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.

5.5. *Task 1.4: Work plan*

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

5.5.1. Task 2. Collect transport data

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.

Task 2.1: 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
- City Road Plan

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.

Task 2.2: 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. The following GIS layers should be created:

- Secondary data (collected in Task 2.1):

    o Proposed land use as per the Master Plan

    o Allowed floor space index (FSI) as per the Master Plan

    o Political boundaries: LPA, municipalities, wards, etc.

    o Ward-wise population as per 2011, 2001, 1991 censuses

- Primary data:

    o Existing (actual, not proposed) land use at the sub-ward level.

    o Consumed FSI at the sub-ward level.

Task 2.3: Household survey

The Consultant will carry out a detailed household survey to ascertain demographic characteristics, travel behaviour, and other information. The study area must be divided into traffic analysis zones (TAZs) at the sub-ward level based on the detailed land use mapping conducted in Task 2.2. A minimum sample size of 2 per cent of households shall be covered. The survey will help reveal transport demand characteristics. The TAZ definitions should facilitate data collection from a representative sample of the population, without bias toward specific income groups or city regions.

The household survey should include a travel diary that covers the previous working day. The travel behaviour of all members of the household should be included (in person or by proxy), including trips of homemakers, children, and elders. Trips of all lengths should be included. Specifically, the Consultant *must NOT exclude short trips, especially those performed by walking* (i.e. trips that are shorter than 1 km or within the TAZ).

For home interviews, the following information will be collected from each household:

- Household address.

- Number of residents.

- Number of personal vehicles available to residents.

- Primary occupation for the household.

- Age and gender of each member of the household.

- Annual income to the household.

The following information is collected regarding each trip segment made by each household member in the travel diary:

- ID of person who made the trip.

- Trip segment origin address.

- Trip segment destination address.

- Starting trip segment time.

- Ending trip segment time.

- Trip destination purpose.

- Mode of transport utilised for the trip segment.

- Cost per trip.

- Time spent waiting per trip.

These household data are analysed to determine the factors that influence user choices among multiple transport options.

5.5.2. Task 2.4: Street inventory

The Consultant will prepare a detailed inventory of public streets in the Study Area with a right-of-way (ROW) of 12 m and above. The Consultant will prepare a GIS map of the street centrelines, recording the following data for each segment (i.e. each segment of approximately 100 m or a segment between two intersections, whichever is shorter):

- Width of the public ROW, as designated in the Master Plan or Development Plan.

- Footpath presence and quality:

  o Clear width of the footpath (if present).

  o The number of obstructions in the clear width per segment.

  o The per cent of the segment length with shade at 2 p.m. (from buildings or trees).

- NMV track presence and quality (same metrics as for footpaths).

- Carriageway:

  o Pavement quality.

  o Effective width for vehicle movement.

  o Width of the ROW occupied by on-street parking.

- Public transport:

  o Name and location of bus stops.

  o Presence of physically separated lanes for public transport (e.g. BRT).

- Utilities:

          o   Presence of storm water drainage.

5.5.3. Task 2.5: 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."

5.5.4. Task 2.6: Classified cordon counts

The classified traffic volume and occupancy counts of all motorised vehicles, non-motorised vehicles, and pedestrians should be carried out for 16 hours per day (from 6:00 to 22:00) over 1 weekday at each cordon line location and should be conducted for each direction separately. For cordon locations with large markets, the survey should be conducted on Sunday in addition to the weekday. Proposed traffic survey locations should be identified during Task 1 and be listed in the Inception Report.

For public transport and paratransit (i.e. shared rickshaws) modes, the Consultant should conduct a frequency-occupancy survey (described below). For personal vehicles, an average occupancy rate determined from a representative sample in each study area is acceptable.

The data must be compiled in using spreadsheet or database software, and the results should be presented in tabular and graphical form. The location for each survey must be cross-referenced in the street network layer in the GIS database. Daily and weekly variations in traffic volumes should be presented. Charts should also be created to compare the passenger mode split at each location and the proportion of street space occupied by each mode. Volumes and mode shares should be mapped to show traffic patterns along each corridor. The results also will be used to calibrate the transport model.

5.5.5. Task 2.6: 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. Each frequency-occupancy survey will be conducted in both directions during the 4-hour peak period with the highest public transport passenger volumes (as identified during the 16 hour traffic counts). The survey should be conducted at enough points to ensure that 95 per cent of bus routes pass through at least one survey location. At each location, the following data should be noted for each public transport vehicle that passes the cordon line:

- Type of service (e.g. city bus, shared rickshaw, intercity bus, etc).

- Vehicle size (e.g. 12 m bus, minibus, diesel rickshaw, etc—to be determined based on the local fleet composition).

- Route number (if applicable). In the case of paratransit vehicles for which the route number cannot be determined from obvious signage, the consultant should devise an alternate methodology to determine the relative frequency of each service on the corridor.

- Number of passengers on the vehicle.

- Time the vehicle passed the cordon line.

The data must be compiled in using spreadsheet or database software, and the location for each survey must be cross-referenced in the street network layer in the GIS database.

5.5.6. Task 2.7: Public transport operating statistics and route definitions

The Consultant should collect the following system-wide data for the previous 6 months from public transport operators in the metropolitan area:

- Fare schedule (i.e. fares vs. travel distance).

- Total daily boardings.

- Average daily revenue by ticket denomination.

- Average daily/weekly/monthly revenue from tickets and passes.

- Daily/monthly vehicle-km operated.

- Operating cost per vehicle-km.

For each route that the agency operates, the following should be collected:

- Route definition (i.e. list of stop names/locations). The bus stops listed in the route itineraries should be reconciled with the stop names identified in the street survey, resulting in a master list of unique bus stops.

- Planned frequency.

- Actual frequency (if available).

For paratransit modes (e.g. shared autorickshaws, taxis, cycle rickshaws, etc), an equivalent set of data should be collected through driver and passenger interviews. A sample survey of these operators shall be conducted inside the city area. Information on vehicle and operating characteristics shall be collected. Surveyors should also gather information on socio-economic characteristics of operators.

5.5.7. Task 2.8: On-board public transport origin-destination surveys

On-board passenger OD surveys should also be completed on the busiest public transport routes (e.g. the routes with the highest loads as observed in the frequency occupancy survey, accounting for at least 90 per cent of total passengers observed). The surveys shall be conducted on a representative sample of trips for each route (minimum of 5 trips per direction surveyed for each route). Electronic ticketing records, if available, are an acceptable data source. Otherwise, the Consultant is expected to conduct manual counts.

5.5.8. Task 2.9: Speed and delay surveys for public transport

The public transport speed and delay surveys will 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.

5.5.9. Task 2.10: 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. Records should be obtained for at least the past 5 years.

5.5.10.   Task 2.11: Parking Survey

Work and business centres, 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. A 16-hour parking survey should be conducted in each zone. The Consultant should record the number of parked vehicles at each hour, classified by vehicle type. The survey

should cover both on-street parking areas as well as off-street public or semi-public parking. The consultant should also conduct a parking duration survey in order to estimate turnover rates. Finally, parking fee levels at the respective zone should be noted. All parking data should be recorded using the GIS platform.

5.5.11. Task 2.12: 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. The survey should be conducted for 16 hours on a working day. The location of survey stations should be finalised in consultation with the Client. The information shall be obtained by trained enumerators and experienced supervisors and include: type of vehicle, make, type of commodity carried, origin and destination, trip purpose, place of residence and employment of road user and frequency of travel (i.e. the same information that is collected in the household survey travel diary). The outer cordon OD survey locations should be included in the list of locations for the classified cordon counts (see above) to facilitate adjustment for sampling.

5.5.12. Task 2.13: Terminal area survey

This survey is designed to collect information on freight movement patterns. At major terminals, distribution centres, 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.

Task 3. Analysis of mobility patterns

Under this task, the Consultant will develop and calibrate a transport model for use in the development of the CMP Strategy Plan and CMP Implementation Plan. The Consultant should prepare a Transport System Challenges and Opportunities report summarising the findings from Task

5.5.13. Task 3.1: Travel demand model setup

In this task, the consultant will develop a travel demand model using the results of the mapping activities, OD surveys, traffic counts, and frequency-occupancy counts conducted under Task 1. The model should allow the Consultant and Client to analyse the impact of changes in land use, population, income, demographics, and other features that influence travel demand. It should also have the capability to measure the impact of specific transport system interventions on the transport network.

The modelling should emphasize person-based travel patterns, using trip generation, trip distribution, and trip assignment modules to predict travel behaviour and vehicle movements. The model should reflect the travel behaviour of different income and social groups in a disaggregate fashion and should reflect the travel mode of the residents in the study area. All transport modes must be included in the model)—not just private vehicles. It must include cycles, pedestrians, and other non-motorised modes. The travel demand model must be created using a modelling application such as TransCAD, CUBE, VISUM, or EMME.

It is important that the consultant develop a detailed coding of public transport service itineraries and stop locations as part of the model. All public transport itineraries must be programmed in the travel demand model. For example, each bus route should be coded as a separate public transport line in the model. Paratransit services operating on fixed routes should be coded in the same manner. Each route must be coded with its actual frequency as observed in the frequency occupancy survey.

It is essential for the modelling process to take mode split as a *dependent* variable. The mode split should be a function of demographic characteristics, the availability of different transport facilities to the user and other factors, not an ex ante assumption. An iterative feedback loop should be used to generate the transport system characteristics and the resulting mode split. The modelling approach also must take into account the probably induced traffic impacts of capacity additions for personal motor vehicles (i.e., the possibility that roadway expansion may induce additional vehicle travel).

Traffic assignment for the existing scenario should be done for the peak hour (either morning or evening, whichever experiences higher overall passenger volumes).

The Consultant should present the main data and assumptions used by the model. Specifically, the appendix should identify the components of the model, the calibration procedure (see next task), the procedure for estimating the mode split, and the procedure for modelling induced traffic. All modelling data and files should be shared with the Client directly as well as in a non-proprietary formats (i.e. direct modelling files should be shared, and input and output data should be exported to XLSX or equivalent spreadsheet formats).

5.5.14.   Task 3.2: Base year scenario development and calibration

All existing streets and public transport services should be coded in the model, along with population and demographic data for the TAZs. This information will serve the basis of the base year scenario. The model should be calibrated using procedures that must include but are not limited to the following:

- Comparison of predicted and actual screenline vehicle counts. The comparison should be done for non-motorised modes, personal vehicles, and public transport separately.

- Comparison of predicted and actual boardings per route on public transport modes.

- Comparison of predicted and actual screenline passenger volumes on public transport modes.

- Comparison of operated public transport km to vehicle-km in the model.

- Comparison of predicted versus actual public transport speeds.

The results of the calibration procedures should be presented to the Client before the consultant progresses to the next step.

5.5.15.   Task 3.3: Evaluation of existing transport conditions

Based on the data collected through primary surveys and the output from the base year scenario, a basic analysis of mobility for the LPA must be completed, identifying characteristics and issues for the city. The following should be highlighted:

- Overview of study area demographics:
  - Physical extent of the planning area
  - Population and socio-economic data, including past and projected growth rates
- Major movement patterns.
- Passenger volumes and mode splits on major corridors.
- Overall mode split and trip length distribution.
- Summary of existing facilities and services:

- Street network, including street ROW widths.

- Presence and quality of walking and cycling facilities.

- Bus and paratransit service fleet sizes, total daily boardings, and distribution of demand throughout the city (including maps of frequencies and passenger volumes).

- Access to public transport services: mapping of areas in the city that have convenient access to public transport (i.e. walking time of 5 min or less).

Task 4: Prepare and evaluate CMP Strategy Plan

5.5.16.   Task 4.1: Visions and goals

It is essential that the mobility improvement measures in a CMP form a coherent package with a consistent vision and goals for the desirable direction of city 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. The major indices must include but are not limited to the following (with desired direction of movement indicated in parentheses):

- Mode share of walking and cycling (increase)

- Mode share of public transport (increase)

- Fraction of households with access to high frequency public transport (increase)

- Fraction of low-income households with access to high frequency public transport (increase)

- Vehicle kilometres travelled (VKT) for personal motor vehicles (decrease)

- Emissions of local pollutants and greenhouse gases (GHGs) (decrease)

- Number of heritage zones that are improved by adjacent sustainable transport zones (increase)

5.5.17.   Task 4.2: Urban growth scenarios

The consultant should create two land use scenarios for the 20-year time horizon of the CMP Strategy Plan:

1. Baseline Land Use Scenario: capturing land use patterns that are expected to arise under existing land use policies.

2. TOD Scenario: capturing land use patterns that can emerge if land use policies are modified to emphasise transit-oriented development (TOD) that allows more people to live in proximity to public transport services.

The Baseline Land Use Scenario can be built up using the survey of existing built form described under Task 1. In addition, new development areas that will affect transport demand in the planning area should be inventoried and recorded using the GIS platform.

The TOD Scenario must be designed on conjunction with the transport scenarios that are developed under Task 3.3. For example, if the Preferred Transport Scenario calls for the implementation of a bus rapid transit (BRT) system, the Preferred Transport Scenario should take into account the impact of policies that facilitate the intensification of residential and commercial uses along the BRT corridors. In general, the Consultant must emphasize land use changes that ensure that everyday services are available by foot and cycle, and that residents can reach employment and recreational destinations

using good public transport connections. In this way, the integrated planning of the land use and transport systems can help reduce trip lengths and give a larger portion of the city's population access to high quality walking, cycling, and public transport systems.

5.5.18.　　Task 3.3. Transport scenarios

The consultant should create two or more transport scenarios for the 20-year time horizon of the CMP Strategy Plan:

1. Baseline Transport Scenario: taking into account existing infrastructure and systems as well as systems that are already budgeted, planned, or under construction.

2. Preferred Transport Scenario 1: incorporating improved connectivity by public transport, walking, and cycling, along with travel demand mechanisms to manage the use of personal vehicles.

3. Other Preferred Transport Scenarios, as needed.

The future transport scenarios can incorporate a variety of transport system improvements that give residents better access to goods and services. The Preferred Transport Scenarios should be consistent with the following guidelines:

- Given the NUTP and Government of Tamil Nadu's emphasis on facilitating the use of sustainable transport modes, these proposals should emphasise improvements in infrastructure and systems for walking, cycling, and public transport.

- Where mass rapid transit solutions are proposed as part of the public transport improvements, the Consultant should focus on cost-effective solutions such as BRT that can be implemented within a reasonable time horizon (i.e. under 3 years).

- The Preferred Transport Scenarios can propose new streets, rail overbridges, and equivalent facilities, provided that these are complete streets/facilities that give priority to public transport and incorporate spaces that prioritise cycling and walking. Street widenings can be proposed, provided that the additional space is dedicated to pedestrians, cyclists, or public transport. Large streets can be proposed in newly developing areas only if they coincide with planned extensions of mass rapid transit corridors.

- Pricing mechanisms should be employed to manage demand for personal motor vehicle use.

5.5.19.　　Task 4.: Evaluation of scenarios

The Consultant should develop a comprehensive evaluation framework in consultation with the ULB and other 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. The scenarios should be compared using (at least) the following indicators:

- Mode split.

- Fraction of households (categorized by income) with access to high frequency public transport and dedicated non-motorised transport infrastructure.

- Efficiency of public transport routes, measured as the number of passenger-km divided by vehicle-km for the respective route (e.g. bus passenger-km divided by bus-km).

- Vehicle kilometres travelled (VKT) for personal motor vehicles.

- Emissions of local pollutants and greenhouse gases (GHGs).

Note that these indicators should all be dependent variables that are estimated through the modelling process, rather than ex ante assumptions. The Consultant should review the impact of the Preferred Transport Scenarios on the each of the indicators listed above, checking whether the indicators change in the direction stated in the goals. If the indicators do not move in the desired direction, the Scenario should be modified and retested. The best performing scenario can be selected as the Final Transport Scenario for use in developing the detailed CMP Implementation Plan, described below. The Final Transport Scenario should be tested with both the Baseline and TOD Scenarios to illustrate the potential benefits of land use reforms that allow more residents to live near the improved transport systems proposed under the Final Transport Scenario. The output will help inform future revisions of the city's Master Plan. The assumptions, impacts, and other features of the final scenarios should be described in detail in the CMP Strategy Plan. The Strategy Plan should also describe the scenarios that were not adopted and explain the reasons for rejection.

The evaluation must also reconcile reconciling the proposed transport solutions and the expected outputs in terms of passenger ridership. Data to be reconciled include:

- Population, trip rates, and daily trips by mode;

- Size of city bus and paratransit fleets;

- Daily passenger-km and bus-km for city bus and paratransit;

- Personal motor vehicle fleets; and

- Proposed length of dedicated right-of-way for public transport.

All of these data should be consolidated in the evaluation section, showing the interrelationships among these variables

5.6. Task 5. Prepare CMP Implementation Plan

The final step in the process is to identify interventions from the CMP Strategy Plan that can be incorporated over a 5-year time horizon. These projects should be consistent with the vision and goals of the CMP Strategy Plan as well as policy guidance from the NUTP. The Plan will include the components listed below.

5.6.1. Task 5.1: Public transport plan
A public transport improvement plan should be developed that covers:

- Planned expansion of the bus fleet to address the following: replacement of the existing fleet when the useful lifetime of vehicles is over; addition of services to capture existing demand currently served by shared autorickshaws and other paratransit modes; addition of services into areas not currently served by public transport; and addition of service for potential customers who currently use personal motorised modes.

- Addition of facilities such as depots with capacity to handle the expected increase in the bus fleet. The consultant should identity desirable sites to minimise dead-km in bus operations, verify each location on the ground, and evaluate the operational and financial implications of each site.

- Bus stop implementation plan to guide the construction of shelters at bus stops and terminals that currently lack them or where existing shelters are insufficient to handle current or expected passenger volumes.

- Paratransit infrastructure implementation plan to guide the construction of shelters and other facilities to enhance the quality of paratransit services.

- Rationalisation of bus routes to achieve a simpler network that is legible to new users, reduce unnecessary vehicle-km, and provide increased service on high demand corridors. The rationalisation plan should include full itineraries, peak hour frequencies, and required fleet sizes of all proposed services.

- Identification of high demand corridors that are candidates for mass rapid transit (MRT) service, as identified in the final Preferred Transport Scenario. The MRT plan should emphasise low-cost modes with fast implementation times, such as BRT.

- Identification of multimodal interchange locations and required improvements.

- Implementation of real-time passenger information and other information technology services across all public transport modes.

- Institutional plan for the operation of bus services, including the potential devolution of public transport system oversight to the ULB.

All of the proposals above should be consistent with the Preferred Transport Scenario selected under Task 3.4. Itemised costs for these items should be covered in the plan.

5.6.2. Task 4.2. Complete streets plan

Planning for pedestrians, bicycles, and cycle rickshaws is one of the most important tasks of the CMP Implementation Plan. The complete streets plan will define a series of priority networks:

- Public transport priority network. Based on the MRT recommendations in the Preferred Transport Scenario, some streets may be identified for public transport priority measures, such as BRT. These streets will form the public transport priority network.

- Cycling priority network. After the MRT corridors are identified, the Consultant will prepare a cycling priority network, indicating where dedicated cycle facilities should be constructed. Where sufficient ROW is available, both public transport lanes and dedicated cycle tracks can be constructed on the same corridor, so the two networks may overlap.

- Pedestrian priority network. All streets with ROWs of 15 m and above need to have high quality pedestrian footpaths, so some degree of pedestrian priority will be adopted throughout the street network. In addition to the footpath network, the Consultant may identify key market streets or cultural zones that have sufficient pedestrian volumes to warrant the creation of pedestrian-only precincts.

Based on the classifications above, the Consultant can create a list of the street typologies present in the network for each observed ROW. The inventory should consist of all streets with ROWs of 15 m and above as well as streets with ROWs below 15 m that play an important role in the city's mobility system. The Consultant will develop standard sections for each street typology plus ROW combination. The standard sections should incorporate the following features:

- Dedicated pedestrian footpaths that meet the Indian Roads Congress' Guidelines for Pedestrian Facilities (103-2012).

- Dedicated cycle tracks (if the corridor falls on the cycle priority network).

- Dedicated bus lanes (if the corridor falls on a public transport priority network).

- Median refuge islands, ensuring that pedestrians do not need to cross more than two lanes at a time at unsignalised crossings.

- A furniture zone as part of the footpath with space for trees, utility boxes, seating, and light poles. Sufficient space to plant trees to provide shade for pedestrians and cyclists as well as decorative landscaping, including compensatory afforestation for the trees removed as part of the project.

- A parking lane with bulb-outs at bus stop locations.

- Storm water drains (see below for more details).

The Consultant will then estimate the cost of developing the streets as per the standard sections and present a phasing plan for their implementation. The Consultant must also develop a list of priority intersections that should be redesigned based on the vehicle crash black spot analysis conducted as part of Task 1. Finally, the Consultant should propose a structure for a Mobility Cell housed in the ULB that can coordinate the planning, design, and maintenance of NMT infrastructure.

5.6.3. Task 4.3. 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 in the LPA, and may also cover additional travel demand management mechanisms. The topics to be covered in this plan include:

- Draft parking policy that emphasises parking management as a travel demand tool, the use of pricing to manage demand, charges based on vehicle size, and other elements of best practice parking management.

- Identification of streets with high on-street parking demand (e.g. over 60 per cent occupancy)

- Estimates of revenue generation potential for different pricing scenarios for on-street parking.

- Institutional plan for parking management, outlining the role of the ULB as the implementing agency and a private party as a service contractor.

- Explore the potential for congestion pricing in the LPA.

- Identify TDM for key festivals and the special ops of Publix transport plan for special events.

5.6.4. Task 4.4. Social, economic and environmental impact assessments

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 CMP Implementation Plan. While most assessments will

utilise data collected through household surveys, travel diaries, census figures, pollution control board figures, as well as outputs from the transport model created under Task 2, 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.

The social, economic, and environmental impact assessments examine the following themes:

- Seeking to enhance benefits for poor and vulnerable people while minimizing or mitigating risk and adverse impacts.

- Establish the socio-economic conditions in the study area, and to identify any significant social issues.

- Assess impacts of the project, and provide for measures to address the adverse impacts by the provision of the requisite avoidance and/or compensation measures.

- Integrate the social and resettlement issues in the project planning and design.

- Ability of the proposed projects to facilitate economic growth by improving the cost effectiveness of transport investments.

- Minimising the impacts of transport systems on public health and the global environment.

Per each proposed transport improvement scenario, the consultant will estimate the impact on each of the following performance measures:

Social equity

An assessment based on social equity would ask that project performance be measured in terms of: "Who benefits?" and "To what extent do they benefit?"

- Per cent of people who cannot afford public transport (population whose annual income < minimum annual cost of public transport)

- Average travel distance by income quartile

- Fare per km (calculated separately for each mode and agency)

- Vehicle kilometres travelled (VKT) by income quartile and SC/ST

- Access to dedicated ROW public transport stations[1] (e.g. BRT, rail) by income quartile

- Expenditure on transport (as per cent of income) by income quartile

- Monthly public transport fare (calculated separately for each mode and agency)

- Per cent of seating designated "women's only" on public transport vehicles

- Per cent of public transport users who are women

- Per cent of public transport vehicles that provide disability access[2] (by public transport mode)

- Per cent public transport stations / bus stops that provide disability access

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[1] In this context, "access" indicates that people live within a 10 minute walking distance of dedicated ROW public transport stations.

[2] Per the Persons with Disability (PWD) Act passed in 1995, the eleventh 5-Year Plan passed in 2007 and the United Nations Convention for the Rights of People with Disability (UNCRPD) ratified in 2007 call for modifications to vehicles, facilities, and services to make them inclusive for all potential users. "Disability Access" facilities must be compliant with the draft National Building Code/BIS Indian Accessibility Standards (2009).

- Public signage / passenger information systems that provide disability access

- Per cent public footpath length (km) that provide disability access

- Per cent of current and past performance measurement data that is made available to the public via online municipal "report card / dashboard"

Economic Development

- Transport system expenditure[3] as a fraction of LPA GDP per capita (GDP per capita)

    o New road infrastructure costs

    o New public transport infrastructure costs

    o Public transport rolling stock costs

    o Operating costs

    o Maintenance and traffic enforcement costs for all of the above

- Amount of time spent per public transport user

- Avoided health impacts due to active transport mode use

Environmental resources / externalities

- Transport-related emissions[4] by ward:

    o SO_2

    o Oxides of Nitrogen (NO_X)

    o SPM: Total Suspended Particulate Matter

    o Particulate matter (PM): size less than 10 microns

    o Carbon Monoxide (CO)

    o Hydrocarbons (HO)

    o Ozone

- Avoided health impacts due to exposure to air pollution

- Exposure to transport noise (e.g. > 55 dB)

- Per cent of public transport fleet in compliance with Indian emissions standards

- Vehicle emissions enforcement

5.6.5. Task 4.4. Summary of projects and phasing plan

The consultant should compile all short- and medium-term projects identified in the public transport, complete streets, and travel demand management plans and suggest a phasing plan. The phasing plan

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[3] Expenditure must include complete cost (road construction, parking area required, etc.) of increased private vehicle usage.

[4] India's Central Pollution Control Board (CPCB) reports on air pollutants for particular urban areas in annual amounts (µg / m^3). CPCB standards should be utilised for the following seven indicators.

should indicate implementation priorities. Project profile sheets should be prepared for short-term projects.

5.6.6. Task 4.5. Financing plan

Fiscal measures should also be considered to achieve balanced modal split, and to secure the budget necessary to implement urban transport projects. The following aspects should be examined in the Financing Plan:

- Summary of capital and annual operating costs for all projects proposed in the CMP Implementation Plan

  Financing plan for capital projects, including ULB resources, state government funding, JNNURM, multilateral development banks, the Clean Development Mechanism, and other potential sources such as the TCP Development Fund, or the Infrastructure amenities fund.

- Estimation of operating gap for public transport operations, after counting customer fare revenue

- Identification of funding sources to close the operating gap for public transport operations, including parking fees, taxes on personal vehicle purchase.

5.7. Task 6: Stakeholder Consultations

Throughout the world, CMPs are more and more the result of thorough local consultation of stakeholders, which in turn raises their acceptance level.[5] Therefore, the Consultant should establish an advisory committee to guide the preparation of the CMP. Roles for external stakeholders and contributors in disseminating the CMP and promoting a common understanding of urban development issues should be developed and communicated to the public. Figure 1 provides a template for coordinating participants in each effort.

Figure 1. Key stakeholders and contributors to CMPs.

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[5] European Metropolitan Transport Authorities (2009), "Mobility Plans: The way forward for a sustainable urban mobility." http://www.emta.com/IMG/pdf/EMTAbrief_2_basse_def_.pdf.

It is important that the framework for public stakeholder consultations be followed in each respective city. The CMP should be discussed with the above stakeholders throughout the study to identify the gaps in the existing transportation network scenario, public opinion on the alternative proposals, etc. Workshops should also be organized at the following stages:

- Inception report: proposed timeline and approach

- Transport System Challenges and Opportunities

- Draft CMP Strategy and Implementation Plans

At the Draft CMP Strategy and Implementation Plan, the Consultant will also hold an additional consultation to gain input from the general public. The draft Plans will be available at the Client's office and posted on the Internet for a period of 30 days during which members of the public can submit feedback. All feedback and the Client's responses will be documented and included as an appendix to the final Plans.

The Consultant should involve the primary stakeholder, the Corporation and its concerned officials, throughout the work, such that all aspects of the study and subsequent updates are within the capacity of such officials by the end of the study.

5.8. Data management

Data available with the [IMPLEMENTING AGENCY] shall be provided to the consultants. The Client shall make available its senior officers for consultation purposes and furnish the available data, documentation, and maps for consultant's reference and study.

The Consultant will provide the Client with all the available data, documentation, and maps available with them, including electronic versions of all GIS maps created, original survey data, compiled survey data, transport model files, exports of transport model files in open formats, and data analysis spreadsheets.

5.9. Outputs, reporting, and schedule for completion of the assignment

	Report	Outputs required	Time to be taken	Related Payments
1	Inception Report	This report shall contain a detailed timeline and work plan for Tasks 1 to 5. Copies of all survey forms must be submitted at this time for approval.	14 days[6] from the date of contract signing.	10%
2	Internal Review 1	Submission of Internal Review 1 meeting minutes.	14 days from the date of the Internal Review 1.	5%
4	Transport System Challenges and Opportunities and	This report shall summarise the findings of Task 1, explain the findings from the primary surveys, and Task 2, explaining	45 days from the date of approval of Inception Report.	25%

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[6] For the purpose of this document, "days" should be taken to mean *calendar* days.

	Report	Outputs required	Time to be taken	Related Payments
		the structure and calibration of the travel demand model.		
5	Internal Review 2	Submission of Internal Review 2 meeting minutes and revisions to the Transport System Challenges and Opportunities report.	14 days from the date of the Internal Review 2.	5%
7	Draft CMP Strategy Plan and CMP Implementation Plan	The CMP Strategy and Implementation Plans will include all deliverables from Tasks 3 and 4.	60 days from the date of approval of Transport System Challenges and Opportunities report.	20%
8	Internal Review 3	Submission of Internal Review 3 meeting notes and revised CMP Strategy and Implementation Plans.	14 days from the date of the Internal Review 3.	5%
9	Public Consultation Meeting	Submission of Public Consultation meeting minutes.	Within 14 days following the Public Consultation.	2.5%
10	Public Comment Period	Submission of compiled Public Comments and proposed responses to comments received.	Within 14 days following the close of the Public Comment period.	2.5%
11	Draft Final CMP Strategy Plan and CMP Implementation Plan	This shall contain the draft final CMP Strategy Plan and final CMP Implementation Plan.	Within 14 days following the approval of the proposed modifications to the CMP based on the public comments received.	5%
12	Final CMP Strategy Plan and CMP Implementation Plan	This shall contain the final CMP Strategy Plan and final CMP Implementation Plan, reflecting all comments from the Client.	Within 21 days following the receipt of comments on the Draft Final CMP Strategy Plan and CMP Implementation Plan	20%

The total study period is 8 months. The consultants shall submit a soft copy and 10 hard copies (printed back-to-back) of each of the above reports. The consultant should submit electronic copies of all database files developed as part of the project, including mapping files (SHP format), data tables (XLSX or ACCDB), and transport model files.

5.10. Expertise requirements

The following Key Professionals are to be engaged by the Consultant along with required support staff. The CV's of the following professional will be reviewed for technical evaluation.

Table 1: Indicative Expertise Requirements

Professional Expertise
1. Senior Transport Planner
2. Senior Urban Planner (land-use and transport)
3. Junior Urban Planner (land-use and transport)
4. Senior Transport Planner / Public Transport Planning Specialist
5. NMT Design Specialist
6. Senior Transport Modelling Specialist
7. Junior Transport Modelling Specialist
8. Transport Finance Specialist (CBA, Project finance)
9. Geographic Information System (GIS) Specialist
10. Environmental and Social Safeguard Specialist
11. CAD Draftsperson and GIS operator
12. Urban Transportation Data Collections / Survey Specialist

5.11. *Terms of reference for professionals*

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/ organisational strategic management processes and performance management systems.

The specialist will organise 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. The Specialist should have been involved at least in one CTTS / CMP Study for a city in India of more than 10 lakh population.

5.11.1.   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 Indian 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.

5.11.2.   Junior Urban Planner (land use and transport)

The Specialist should be a graduate in urban planning (or other relevant urban sector discipline) with at least 5 years of experience in land use and transport planning, having excellent understanding and experience in planning in Indian cities. 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.

5.11.3.   Senior Transport Planner / Public Transport Planning Specialist

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 public transport management. The Specialist should have at least 10 years of experience in public transport capital planning and operations. The Specialist should have thorough knowledge and practical experience with public transport modelling and route rationalization schemes, public transport performance measurement, multimodal integration, intermediate public transport / Paratransit and NMT infrastructure, operations and planning.

5.11.4.   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 Indian cities. Experience with sustainable transport systems, footpath and cycle track design, greenway networks, and placemaking will be considered advantageous.

5.11.5.   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 (specifically INRO's EMME software). 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.

5.11.6.   Junior 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

(specifically INRO's EMME software). She/He must have at least 5 years of experience in modelling transport networks. A good understanding of GIS software is required, and practical experience in integrating transport modelling and urban GIS-based mapping is essential.

5.11.7. 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.

5.11.8. 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.

5.11.9. 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.

5.11.10. CAD Draftsperson and GIS operator

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.

5.11.11. Urban Transportation Data Collections / Survey Specialist

The Specialist should be a graduate of an accredited social science, GIS, transport engineering technician vocational training program, with at least at least 5 years of relevant working experience with GIS and graphic design applications. Experience in collecting transport and traffic data, and geocoding piopulation demographics for urban transportation planning projects is highly preferred.

The above team should be supported by adequate support staff and other experts to ensure that the objectives of the project are achieved within the timeline. The primary execution team must be based in Chennai or the LPA for the duration of the project.

I. 10. Composition of the Review Committee

The Review Committee will consist of following:

- District Collector (Chairman)

- Deputy Director from the O/o Directorate of Town Country Planning (Convenor)

- Regional Director of Municipal Administration from the O/o CMA

- City Engineer or Chief Town Planner, from respective ULB

- Representative from Respective Transport Corporations

- Superintendent of Police and RTO

- Assistant Director, Directorate of Town Panchayats

- Assistant Director, Rural Development and Panchayati Raj Department

- Representatives from TNUIFSL

- Superintending Engineer, Highways Department

- Chief Engineer, Southern Railways

- Chief Engineer, DoHRW

- Representative, Institute for Transportation and Development Policy (ITDP)

The review committee will review the progress of the work. The decisions and suggestions of the committee will be reviewed in the next meeting. The comments or views on the various reports shall be given to the consultant within 15 days of submission. The draft CMP Strategy Plan and CMP Implementation Plan may be reviewed by the World Bank.