Term of Reference for Preparation of Metro Rail Detailed Project Report (DPR)

Ministry of Housing & Urban Affairs
Government of India
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1. **TERM OF REFERENCE**

1.1. **DETAILED PROJECT REPORT**

The DPR along with the checklist for compliance with Metro Rail Policy 2017, as given in Annexure V needs to be submitted to the Central Government for approval. The DPR should be prepared in conformity to the Standards and Specifications for Metro Rail projects that have been issued/being issued by MoHUA from time to time.

1.2. **METHODOLOGY FOR PREPARATION OF DETAILED PROJECT REPORT**

The Methodology for preparation of DPR is given below:

1.2.1. **Assessment of existing city profile with existing transport characteristics**

Task 1: A brief overview of the city in terms of its growth, economy, spatial structure and trends, perspectives on the future growth. Overview of study areas and existing plans with land use distribution, review of zoning Regulations, employment distribution by Traffic Zones, land use plan proposals should be done.

Task 2: Brief review of previous transport studies like City Master Plan, Comprehensive Mobility Plan and proposed Metro Rail plan and other urban transport proposals. A brief showing interconnection among City Master Plan, Comprehensive Mobility Plan and proposed Metro Rail plan should be given.

1.2.2. **Travel characteristics and demand estimates**

Task 3: Describes the components of urban transport system in terms of status, trends and gaps based on primary survey data, present travel patterns and forecast for the future travel demand.

Task 4: Based on primary survey data and various traffic and transportation studies undertaken for the city, the present travel patterns and forecast for future travel demand should be done.

Task 5: Travel demand analysis, model framework, model calibration, summary of travel demand patterns and ridership assessment for horizon year.

1.2.3. **System and Technology Selection**

Task 6: Identification of suitable transit technology and the system specification to be adopted for the corridor including the rationale for choosing a particular technology as per the prescribed specification as issued by MoHUA from time to time. The technology chosen should not be a proprietary technology of any vendor.

1.2.4. **Corridor alignment description**

Task 7: Alignment description of approved alignment, with detail about site conditions specifying road geometrics, utilities available along the corridor

Task 8: Detailed analysis of corridor options with grade selection for construction. Design norms for track geometry, fixed structure clearance, geotechnical details with new
innovative techniques to be used for implementation in civil works, track system etc.

Task 9: Identification of existing services/utilities, if any

Task 10: Detailed estimation regarding land requirement for the corridor, depots, stations, parking, multi modal stations etc. with land ownership

1.2.5. Station Planning

Task 11: Station planning with preparation of general layouts based on type of station and site specific conditions focusing on:

- Station Area planning for non-motorized vehicles and pedestrians' facilities, multi modal integration with existing modes, feeder service planning.
- Accessibility for differently abled persons including specifying parking at stations for private and para transit facilities.
- Platform widths based on Station loadings and the minimum width to be provided.

1.2.6. Intermodal Integration

Task 12: Prepare an Intermodal Integration Plan focusing on how the Metro Rail will integrate with the existing transportation systems/proposed transit system and introduction of a feeder system, integrated with the proposed Metro Rail project for improving last mile connectivity. This will include not only preparation of an operational plan for feeder system but also infrastructure that need to be upgraded/improved or introduced for improving the intermodal integration with other modes of public transport to improve the viability of the project. Recommendations for institutional integration, physical integration, fare integration, operational integration and technology integration would also need to be elaborated in the report.

1.2.7. Train Operation Plan

Task 13: System operation approach, station yard planning, trains operation plan including system frequency, timetabling, rolling stock requirement, stabling details.

1.2.8. Signaling and Telecommunication

Task 14: Identification of Signaling and System control, Operation Control Centre (OCC), maintenance requirement, technology selection and choice of automation

Task 15: Identification of Telecommunication System, System Traffic Control, maintenance and emergency communication, Passenger Information System (PIS)

1.2.9. Fare Collection System

Task 16: Detailing the specifications for Automatic fare collection system, Ticketing and pass system, Fare System integrated with other transport Systems including integration of fares of all available modes with the Metro system planned as per the guidelines issued by MoHUA (such as National Common Mobility Card).

1.2.10. Rolling Stock

Task 17: Technology selection, identification of rolling stock adopted as per Guidelines laid by MoHUA. Rationale for deviations, if any in choice of rolling stock parameters from the prescribed specifications and standards prevailing and Rolling stock requirement for various horizon years should be specified.
1.2.11. Power Supply and Traction System
Task 18: Choice of electric traction system. Projected power demand, Source of power supply, Traction and Auxiliary Supply and supervisory control and data acquisition system. No. of tractions and their locations.

1.2.12. Ventilation and Air Conditioning System
Task 19: Need for Ventilation and Air Conditioning, design parameters and design concepts for VAC System with details on tunnel ventilation, station ventilation and air conditioning of ancillary spaces including specifications for control and monitoring facilities.

1.2.13. Depots
Task 20: Identification of Depot locations. Approach to maintenance of depot facilities and workshop along with detailed designs and layout plans.

1.2.14. Environment and Social Impact Assessment
Task 21: Existing scenario, with analysis on water quality, noise level, land environment, biological environment etc.

Task 22: Environmental norms and Regulations, Detailed Environment Impact Assessment (EIA), Environment Management Plan (EMP), formation of an Environmental Management System (EMS) and costs estimates for Environment Impact mitigation measures.

Task 23: Detailed Social Impact Assessment (SIA) including R&R assessment, Resettlement Impacts, Resettlement Assistance Plan (RAP) and Monitoring and Evaluation Framework.

1.2.15. Disaster Management and Security Measures

1.2.16. Cost Estimation
Task 25: Detailed project cost estimates

- Capital cost estimates including taxes and duties
- Innovations proposed to reduce the cost of system
- Estimation of Operations and Maintenance Cost and the assumptions made thereof

1.2.17. Transit Oriented Development Plan
Task 26: The potential for Transit Oriented Development along the metro corridors based on the guidelines issued by MoHUA to be developed including densification of corridor by increasing FSI and land value capture as per the guidelines issued by MoHUA. Guiding list of lands/areas amenable for change in near future e.g. vacant land, low rise development relocation etc., use type.
1.2.18. Financial Analysis and Non Fare Box Revenue Assessment

Task 27: Estimations and inputs for the corridor, estimation for O & M, overheads, phasing of construction and lease of Built up Area (BUA), Operational viability of the project

Task 28: Means of finance, revenue from different sources, fare box revenue, non-fare box revenue, like advertisement, taxes and property development etc, possible ways of funding the project using different approaches. Alternative means of funding the project using different approaches like PPP, BOT, DBFOT, DFBOT, Developer Finance Model etc. and need to identify the proposed funding /implementation model in line with the Metro Policy 2017.

Task 29: Financial Returns: FIRR with 30 year time horizon, Sensitivity analysis should be done based on scenario building with variation in ridership estimates scenarios, costs estimates and Time overrun. Alternative scenarios based on the different options for funding /implementation of the project should be evaluated. A project should be able to meet its financial requirement for cost recovery and under a set of plausible assumptions be able to self-finance its activities. The State Governments will have to ensure the financial sustainability of the project through financial assistance.

1.2.19. Economic Analysis

Task 30: The Economic analysis should include economic cost and benefit analysis of the project and estimation of the EIRR for a period of 30 years as per the methodology for economic cost and benefit analysis as given in Annexure IV.

1.2.20. Implementation Plan

Task 31: Project implementation structure, if proposed to be implemented under various alternatives such as public or PPP model, role, responsibility and involvement (including financial stake) of the city government along with other government agencies in metro rail project, needs to be elaborated in the report.

1.2.21. Institutional Arrangement and Stakeholders Consultation

Task 32: Legal and Institutional Framework for implementation of the project based on the identified implementation plan should be included in the report. Stakeholders’ consultation should be held at each major stage of the project such as the Corridor Alignment Report and the Draft DPR stage.

The Table of Contents for preparation of DPR is given in Annexure I.
2. ANNEXURES

2.1. ANNEXURE I: TABLE OF CONTENTS FOR PREPARATION OF DETAILED PROJECT REPORT (DPR)

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<td>A brief overview of the city in terms of its growth, economy, spatial structure and trends are analysed and perspectives on the future growth are presented.</td>
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<td>Planning study areas and existing plans, existing land use distribution, review of zoning regulations (zoning and FSI pattern and its appropriateness), employment distribution by Traffic Zones, activity locations (Business areas, University, Hospitals, Transport Terminals), land use plan proposals (Master Plan and CDP strategy), road network pattern (Add compliance checklist)</td>
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<td>2.</td>
<td>Existing Transportation System in the City</td>
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<td>Public Transportation System</td>
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<td>Type, status and trends in terms size, service, routing, fare, patronage, financial performance, institutional framework, responsible agency and Act, constraints</td>
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<td>Past proposals from CMP/CTTS/Transport Master Plan</td>
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<td>Based on Transport Master Plan/CMP, it should focus on moving people and not vehicles. It should integrate land use with transport plan including mass transit systems connectivity to all new/ future satellite townships/emerging activity centres (SEZ's), main network and feeder network including pedestrian and NMVs, phasing of implementation</td>
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<td>A brief showing interconnections among city Master Plans/Development plans, Comprehensive Mobility Plan and proposed Metro Rail Plan</td>
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<td>2.13.</td>
<td>Issues and Prospects</td>
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3. Travel Characteristics and Demand Estimates
Based on primary survey data, present travel patterns and forecast the future travel demand
3.1. Details of various traffic and transportation studies undertaken for the city
       Study area, Zoning, Land use surveys, Transportation surveys: Classified
       volume counts, road side interviews, OD Surveys, willingness to pay/use
       Surveys, Traffic surveys, Speed-Delay surveys, Parking surveys
3.2. Socio-Economic Characteristics
       • Age wise distribution of Population, Activity status (Work, Education),
         Income distribution, Vehicle ownership
       • Travel characteristics, trip rate, trip purpose, mode choice, trip length,
         monthly expenditure on travel, spatial pattern of passenger movement,
         mobility patterns and needs of women, old aged, physically challenged
3.3. Travel demand analysis
       model framework, model calibration, summary of travel demand patterns
3.4. Future travel demand scenarios
3.5. Ridership assessment for horizon year

4. System and Technology Selection
4.1. Technology
4.2. System specification to be adopted for the corridor

5. Civil Engineering , Alignment details
5.1. Alignment description of approved alignment, availability of road space
5.2. Analysis of corridor options to be Elevated, Underground or At Grade
5.3. Design norms-Track geometry, Fixed structure clearance, Geo-technical details
       with new innovative techniques to be used for implementation in civil works,
       track system etc.
5.4. Geometric design of Corridor including plan/profile.
5.5. Identification of existing services/utilities, if any
5.6. Land requirement for the corridor, depots, stations, parking , multi modal stations
       etc.
5.7. Ownership details of the land required for the corridor

6. Station Planning
6.1. Station planning-elevated/underground based on site specific
6.2. Station area planning for Non-Motorized Vehicle and pedestrians facilities
6.3. Accessibility for differently-abled
6.4. Parking on stations for public bike sharing, commensurate parking lots for
       cycles and personal vehicles, as well as adequate arrangement for receiving
       and dispatch of feeder buses at all metro stations and for IPT system

7. Intermodal Integration
7.1. Inter modal integration with existing modes
7.2. Feeder service planning from stations, fleet requirement, route planning,
7.3. Physical infrastructure requirement for integration with other modes
7.4. Recommendations for Institutional integration, Physical integration, Fare integration, Operational integration and Technology integration

8. Train Operations Plan
8.1. System operation approach, Station yard planning, Train operations plan
8.2. System frequency, Time-tabling
8.3. Rolling Stock requirement, stabling details

9. Signaling and Telecommunication
9.1. Signaling and System Control, Planning for Operation Control Centre(OCC) with System communication system, Electronic interlocking in stations and Depots, Maintenance requirement for maintaining and running an efficient system, Technology selection and choice of automation
9.2. Telecommunication, System shall cater to the needs of System traffic control, features to supplement signaling system, maintenance and emergency communication, passenger information system, etc.

10. Fare Collection System
10.1. Ticketing and access control
10.2. Automatic fare collection system options available, Ticketing and Pass System
10.3. Fare System integrated with other Transport System

11. Rolling Stock
11.1. Referring to system adopted, type of rolling stock adopted as per guidelines issued by MoHUA from time to time
11.2. Rationale for deviation, if any in choice of rolling stock parameters from the prescribed specifications and standards prevailing
11.3. Rolling stock requirement for various horizon years for identified system

12. Power Supply and Traction
12.1. Choice of electric traction system
12.2. Power supply, total projected power demand
12.3. Source of power supply
12.4. Traction Power Supply and traction overhead equipment, if applicable
12.5. Auxiliary power supply network
12.6. Supervisory control and data acquisition system

13. Ventilation and Air Conditioning System for Rail based System
13.1. Alignment Analysis, need for Ventilation and Air Conditioning
13.2. Internal design conditions in Underground stations, if provided
13.3. Design parameters and design concepts for VAC System
13.4. Station ventilation and Air Conditioning of ancillary spaces
13.5. Tunnel ventilation system, in case the same is provided
13.6. Control and monitoring facilities

14. Depots
14.1. Depot location and number, approach to maintenance
14.2. Design of depot facilities and workshop with layout plans

15. Environment and Social Impact Assessment
15.1. Existing scenario, water quality, noise level, land environment, biological environment, socio-economic survey, archeological sites, if any
15.2. Environmental norms and Regulations
15.3. Detailed Environment Impact Assessment, discussing Impacts due to project location, project design, project construction, project operation, depot etc.
15.4. Positive & Negative Environmental Impacts
15.5. Environment Management Plans
15.7. Summary of Costs
15.8. Social Impact Assessment (SIA), potential resettlement impacts, baseline socio-economic study, eligibility and entitlements, institutional framework, public consultation, resettlement assistance plan and cost, monitoring and evaluation

16. Disaster Management & Security Measures
16.1. Disaster Management, Disaster Management imperatives
16.2. Need for Disaster Management
16.3. Type of Disasters in MRTS
16.4. Objectives of Disaster Management Plan, Systems to cater for disasters
16.5. Preparedness of staff for disasters, preparedness for Disaster Management, Authorities to be coordinated with in case of disaster, Command & Control at the National, State & District Level
16.6. Security measures, essentials of security management, Security system design parameters, Door frame metal detectors, X-ray scanning etc.
16.7. Security systems recommended for MRTS

17. Detailed Project Cost Estimates
17.1. Capital cost estimate of complete system with details of civil engineering works, permanent way, utility diversions, environmental protection, miscellaneous other works, rehabilitation and resettlement, traction and power supply, signaling and telecommunication works, rolling stock, general charges and contingencies

17.2. Innovations proposed to reduce the unit cost of Civil works, Track system, Rolling stock etc.

17.3. Costing of entire project and for each of the phases

17.4. Summary of Capital Cost

17.5. Estimations of Operations and Maintenance Cost

18. Transit Oriented Development Plan

18.1. Assessment of development potential
List Land/Buildings amenable for change in near future e.g. vacant land, low rise development relocation etc., use type, densification of corridor by increasing FSI, land value capture as per the guidelines issued by MoHUA

19. Financial Analysis and Non Fare Box Revenue Assessment

19.1. Estimations and inputs for the corridor, phasing of construction and lease of BUA

19.2. Estimations for operations and maintenance cost, overheads, compare the proposed costs with existing domestic and international benchmarks (including manpower/km), and measures to be taken for improvement in operations and maintenance cost, Innovations to ensure profitability at O&M level

19.3. Operational viability

19.4. Means of finance
Revenue From Different Sources
- Fare box revenue
- Non fare box revenue, like advertisement, taxes and property development etc.

19.5. Financial Returns, FIRR for 30 years time horizon

19.6. Alternative sources for Means of Finance, exploring all possible ways of funding the project using different approaches Like PPP, BOT, DFBOT, DBFOT, Developer Finance Model Etc. and proposed funding model/implementation model.

19.7. Sensitivity Analysis
   i. Expected Ridership
   ii. Costs
   iii. Time overrun

20. Economic Analysis

20.1. Approach and Methodology for Economic Analysis

20.2. Estimation of Economic Project cost of MRTS

20.3. Economic Benefits of MRTS
20.4. EIRR for 30 Years
20.5. Outcome on Economic viability

21. Implementation Plan

21.1. Project Implementation Plan
21.2. Project implementation structure if implemented on PPP model
21.3. Legal and institutional Framework for implementing the project
21.4. Role, responsibility and involvement (including financial stake) the city government shall have in the Metro Rail project