TERMS OF REFERENCE FOR MANIPUR STATE ROAD IMPROVEMENT PROGRAM CONSULTANCY SERVICES

A. BACKGROUND

1. The Government of India (GOI) has requested Asian Development Bank (ADB) for a project readiness financing (PRF) loan assistance to support Government of Manipur (GoM) to develop of a comprehensive state roads improvement program to address connectivity issues and focus on planned development of the State by developing the institutional eco-system for the road subsector in Manipur.

2. The state of Manipur is India's gateway to the Association of Southeast Asian Nations (ASEAN) through the border with Myanmar. Manipur accommodates an integral part of regional transport corridors, such as South Asia Sub-regional Economic Cooperation (SASEC) corridors, Asian Highway Network and the India-Myanmar-Thailand Trilateral Highway. The Bangladesh- India-Myanmar corridor from Sylhet via Silchar, Imphal and Moreh to Mandalay also traverses Manipur. The total length of roads in Manipur is 18,437 km (out of which 9,920 km is under State PWD) comprised of 1,724 km of National Highways, 764 km of State Highways, 1,286 km of major district roads, 1,128 km of other district roads and 13,535 km of village roads. A well planned and developed road network in Manipur will support overall economic and social development of the state through promoting growth across all sectors such as agriculture, horticulture, industry, and tourism.

3. The transport system in the State of Manipur is heavily reliant on the road network. Despite continuous efforts by the central and state governments, public and private infrastructure investment in the region remains constrained. The most critical constraint on the region’s rapid infrastructure development is the lack of investment project proposals that are ready for financing and backed by investment prioritization strategies and plans at the sector or state level. Project implementation has also generally been slow, with numerous instances of time and cost overruns. These challenges are associated with insufficient human resources and capacity of the state infrastructure departments to undertake investment and project planning, project preparation including detailed designs, preconstruction activities (such as statutory clearances for environment and forestry, and land acquisition), and project implementation. Moreover, development projects in the north-eastern region have more complex procedures between the state and central government in terms of project appraisal, budgetary process, and fund flow mechanisms, posing additional challenges.

B. OBJECTIVE, SCOPE, AND OUTPUTS

4. Objective. The key objectives of the consultancy services are: (a) to prepare a road sector policy, strategy, strategic road connectivity investment and financing plan for a 10 year horizon for the state of Manipur with an overall review and assessment of the road network, identification of potential projects and prioritization of projects; (b) to prepare detailed engineering design and other project preparatory activities; (c) support institutional capacity building, restructuring of the executing and implementing agencies in project preparation, implementation; (d) facilitate the Client in the ensuing loan/project processing stage of work by undertaking as needed due diligences of economic and financial analyses, project procurement risk/ capacity assessment, environmental safeguards documentation including Initial Environment Examination (IEE), initial poverty and social analysis (IPSA), social safeguards documentation including Resettlement Plans / Due Diligence Reports, indigenous peoples plan (IPP), Gender Equality and Social Inclusion Action Plan (GESI AP), and assessment for resilience to climate risks / climate change impacts and disaster risks, as per relevant ADB – guidelines/ accepted formats and meeting ADB approval requirements; and (e) Identify an action plan for road safety and road maintenance.

5. Scope. The Consultant recruited under the PRF will work in close coordination with Public Works Department (PWD), Government of Manipur and ADB to support delivery of the below Terms of Reference (ToR) and PRF loan outputs.

6. Output 1: Road sector policy, strategy, strategic road connectivity investment and financing plan with a 10-year horizon developed. The study will (i) prepare a road sector policy and strategy; (ii) complete detailed network analysis including cross-border connectivity, intra state and district connectivity including a review and assessment of the present road network comprising state highways and other strategic state roads (e.g. Bypasses, grade separations etc.), as well as road proposals already identified by government; (iii) assess funding requirements for development of a sustainable road transport network for at least 10 years; (iv) develop rational prioritization criteria to rank the road network proposals and identify priorities within funding envelopes and other constraints; and (v) prioritize improvement proposals for about 800 km as candidate subprojects for potential ADB financing under an ensuing loan.

7. Output 2: Feasibility studies and detailed engineering designs for priority subprojects completed. The consultancy will (i) complete initial screening of the list of candidate roads and bridges; (ii) deliver feasibility studies of the shortlisted roads for final selection; (iii) prepare detailed designs for selected road and bridge subprojects (or update/strengthen existing detailed design, where needed) and review sustainability measures; (iv) undertake climate and disaster risk resilience studies, environmental and social safeguard assessments incorporating robust social impact analysis with gender, poverty and community engagement in addition to resettlement and indigenous peoples; (v) prepare environmental and social safeguard planning documents; (vi) perform value engineering exercises and prepare realistic cost estimates benchmarked against contracts of similar size and nature; (vii) prepare bid documents; and (viii) carry out economic analysis and financial management due diligence.

8. Output 3: Institutional capacity of executing agency strengthened. The consultancy services will (i) support safeguards and social development management, financial management and procurement through completion of strategic procurement planning, streamlining decision making processes (ii) assist the bidding process until contract award; (iii) provide assistance in sector analysis and defining institutional strengthening and capacity development components for inclusion in the potential ensuing projects, e.g. road maintenance and road safety; (iv) establish a project management information system; and (v) identify key elements of policy reform for sustainable development and maintenance for inclusion in the potential ensuing loan; and (vi) prepare a documentation framework whereby project preparation activities for other road sector projects in state can be prepared in line with best practices.

A. DETAILED TASKS

9. Detailed Tasks. The Consultant will carry out the following four (4) tasks to support the three (3) project outputs.

10. **Task 1: Road Sector, Policy, Strategy and Investment Plan (RSPSIP):**

(i) Undertake a review of existing information including the, state/region/sector-level visions, policy and/or strategy papers, existing master plans and sector plans, other relevant studies etc.
(ii) Prepare a profile of the road transport sector in Manipur from available documents and consultations, including network characteristics and functions, land use patterns, regional linkages, origin-destination studies, demographic and socio-economic data. Any specific production, consumption, or transportation centres, new and potential townships/ establishments, industrial areas, etc., must be

identified and included. Due to the topographic features of the region and high seismic activity terrain is to be included in the profile.

(iii) Collect existing data, as required, including ongoing projects, GIS database and maps, transport network, traffic volumes, and economic centres, from local, State and Central government departments/ agencies/ authorities, etc.

(iv) In case insufficient data is available with PIU or other Government Departments, the Consultant shall identify data gaps from any existing data collected, including information made available by the Government of Manipur, project implementation unit (PIU), concerned stakeholder agencies, information arranged through ADB, etc., and acquire data to bridge any such data gaps through undertaking necessary surveys, investigations and studies for satisfactory completion of all activities in this ToR.

(v) Develop a regional level transport model for network analysis for base year, horizon year (10-year period) and intermediate years, as required. The development, calibration and validation of the model is to be based on primary survey data and as per national and international best practices. The model should include (a) all key roads in the state of Manipur (NH, SH, MDR, ODR and other key roads if required) including updating of available database on GIS database (preliminary GIS data base is available); the carriage way details, traffic data at key points, travel speed, capacity and other details; (b) socio economic data at city, town and district level and its forecast; (c) establishing parameters linking travel and socio economic characteristics; (d) calibration and validation of the model for the base year and forecasting for future years and for (e) analysis of passenger and freight connectivity and mobility, and selecting the core network and road improvement proposals for the state of Manipur.

(vi) Develop/strengthen road sector policy of the state for next 10 years with vision, objectives and targets for elements of policy such as preservation, connectivity, safety, efficiency, user and eco-friendliness, affordability, efficiency, economic development, sustainability, etc.

(vii) Develop a road sector strategy for Manipur and prepare a phased (short, medium, and long term) road sector development plan.

(viii) Prepare an investment plan with identified projects that also integrates road sector proposals already identified by government as well as possible sources of financing.

(ix) Undertake necessary strategic planning with a prioritization framework, along with stakeholder consultation, to prepare a shortlist of prioritized potential subprojects to take forward to feasibility study followed by preparation of Detailed Project Reports (DPRs), detailed engineering designs and bidding documents, etc., and for subsequent implementation through any ensuing loan(s);

(x) Prepare a documentation framework so that project preparation activities for other road sector projects in the state can be prepared in line with best practices.

(xi) Identify and prioritize improvement proposals for about 800 km as candidate subprojects for funding under a potential ADB ensuing loan.

(xii) Update and finalize the DPR of investment ready projects i/c preparation of safeguard, financial assessment report etc. for posing the projects for project loan for implementation.

11. **Task 2: Feasibility Studies for Prioritized Subprojects (800 km):**

(i) Ascertain the land requirements for the sub projects and the need for land acquisition, rehabilitation and resettlement (R&R). Determine the impact of land acquisition and R&R on the project feasibility as per ADB, State and Central government guidelines.

(ii) Undertake field surveys to ascertain feasibility through site reconnaissance surveys and geological surveys for slope stability and others technical due

diligence as required.

(iii) Undertake road inventory and condition surveys, inventory of bridges, culverts and structures, (Preliminary Road inventory data is available with PWD), preliminary material and geo technical investigation, preliminary traffic studies, analysis and forecasting and other surveys for technical, environmental, social and economic viability of the roads and bridges. LIDAR/NSV shall be used for road inventory and investigations.

(iv) Identify the utilities to be replaced/removed/rehabilitated/upgraded and determine if it is an impediment on the project.

(v) Assess each subproject's site for technical feasibility to determine physical constraints to project implementation. This would include, among others, the issues of terrain, slope stability, and access.

(vi) Conduct environmental and social safeguards assessments to determine such factors that may impact the subprojects and their statutory clearances.

(vii) Prepare and finalize the conceptual plans/designs including possible improvement in alignments to estimate the cost at a block level supported with benchmarking costs of similar subprojects.

(viii) Determine the preliminary economic and financial feasibility of subprojects based on block cost estimates and estimate the economic internal rate of return (EIRR) and if applicable the financial internal rate of return (FIRR).

(ix) The Activity under this task for the predetermined priority roads shall commence concurrently with Task 1 with a time delay of maximum 3 months.

12. **Task 3: Project Preparation Documents for Selected Feasible Projects (400 km), including bridges**

13. Subtask 3.1: Detailed Design:

(i) Prepare detailed engineering designs and any other design works using (a) an integrated approach that adopts smart growth principles, keeping in mind the future needs, potential impacts of such proposed investments on the surrounding land- use and communities in terms of environmental protection, economic development, poverty reduction, gender equity and social inclusion; (b) viable new technologies for enhancing efficiency of service delivery and effective coverage; and (c) adopting low-impact development and green infrastructure planning principles for any site-level master planning/design, as feasible.

(ii) Review all available reports and data, road Inventory and condition surveys for road, bridges, cross-drainage structures and drainage provisions;

(iii) Undertake field surveys (traffic surveys, detailed geotechnical and material investigations including any hydrological surveys as required, considering requirements for design of hill roads and necessity of slope stabilization/protection and any other engineering/ demand/ socio-economic surveys, etc.) and studies to establish a firm basis for design and DPR of project components.

(iv) Identify the utilities to be replaced, removed, rehabilitated or upgraded and prepare a detailed implementation plan with necessary cost estimates, for project sites.

(v) Finalize design parameters with due consideration of climate change, disaster risk resilience and seismicity.

(vi) Prepare and finalize the detailed engineering designs including stabilization/protection works for newly cut slopes and valley side protection works etc., and any other design works and technical specifications for roads and bridges as per the design parameters that meet all the prescribed national standards and international best practices, including ADB's South Asia Department framework and practices, etc. The Consultant shall also determine the technical and economic feasibility for use of different materials in base/sub-base stabilization according to local availability and also use of waste materials such as plastic, etc. for use in pavement construction.

(vii) Prepare and finalize item rate analyses, detailed schedule of quantities and cost estimates that meet all the prescribed national standards and international best practices, including ADB's South Asia Department framework and practices, etc.

A supplement providing further guidance to the above detailed design tasks is attached as Annexure 1.

14. Subtask 3.2: Detailed Economic and Financial Assessment

(i) Prepare detailed economic analysis of the proposed projects using appropriate models for transport projects, e.g. HDM-4 Version 2 computer software for project analysis. The economic analysis should follow ADB's guidelines for the economic analysis of projects.
(ii) Estimate the economic internal rate of return (EIRR) for each subproject.
(iii) Undertake sensitivity analysis on the risk factor basis for various scenarios such as changes to the capacity costs, operation and maintenance costs, traffic volume, and construction period, etc.
(iv) Estimate the required budget for appropriate operation and maintenance of each sub project.
(v) Assess the financial sustainability by comparing the required budget with the current budget allocation and make recommendations as appropriate.
(vi) Develop a preliminary design and monitoring framework for each subproject in accordance with ADB's Guidelines for Preparing a Design and Monitoring Framework. Include in the framework appropriate indicators with baseline data and targets.
(vii) Prepare relevant chapters and appendixes of the DPR with the economic and financial assessment including cost estimates and other relevant parameters.
(viii) Identify potential funding mechanisms where appropriate, including user charges and levies and other possibilities of road asset monetization, to fund maintenance and ensure proper and efficient use of funds.

15. Subtask 3.3: Poverty and Social Assessment

(i) Carry out a poverty and social assessment (PSA), GESI Analysis that focuses on the determinants of poverty and social characteristics of mobility and transport use in the project area of influence. The PSA aims to: (a) determine the scope of poverty and social issues that need to be addressed during the project design; (b) identify groups of people who will be beneficially or adversely affected by the Project; (c) provide the broad characteristics of these groups and relevant subgroups; (d) identify channels through which the poverty reduction can be directly achieved by the Project; (e) identify the possible institutions to be involved in the Project and briefly assess their capacities; and (f) flag poverty and other social issues that need to be examined during the Project design, including gender, child labor, resettlement, indigenous peoples, HIV/AIDS/COVID-19 and human trafficking. The PSA will be in accordance with ADB's Technical Note on Social Analysis in Transport Projects,[1] Guidelines for the Incorporation of Social Dimensions in ADB Operations, and the Handbook on Poverty and Social Analysis.
(ii) Identify key stakeholders, possible barriers to benefiting the Project, prepare initial stakeholder analysis and initial communication and participation plan (see Appendix 5 of the ADB Handbook on Social Analysis, 2007).
(iii) The PSA should provide baseline data that, in coordination with the economic analysis, should be used for the design of a time-bound benefit monitoring and evaluation program, including monitoring indicators, to assess the project benefits

[1] ADB. Technical Note: Social Analysis for Transport Projects: Safeguard Policy Statement (SPS) 2009

to local communities before and after project construction. Further suggestions for additional baseline data should be included. The program should address not only the economic benefits but also poverty reduction impacts and other social benefits such as stability of the region and integration with other parts of the country.

(iv) Conduct desk studies and primary data collection using local experts to undertake the census and data processing, as required.

(v) Collect baseline data for monitoring social impacts. The team should ensure the collection of baseline data (sex-disaggregated, as feasible) on a range of socioeconomic indicators appropriate for the project with focus on needs, demands, constraints faced by the poor, women and vulnerable groups in the project area in terms of their equitable access to the benefits and opportunities associated with the project.

(vi) Identify and describe the intended beneficiary group using gender- disaggregated demographic data.

(vii) The PSA data will be based on (a) sample surveys collected during public consultation meetings and focus group discussions; (b) feedback from discussions during public consultation meetings, focus groups and one-on-one interviews; and (c) secondary data.

(viii) Ensure proper consultations and participation through public consultations/meetings, focus group discussions with key stakeholder groups, and one-on-one interviews. Ensure the representation of women and include relevant community-based groups and civil society organizations in the participatory process. Ensure proper documentation of the consultation process. Through the poverty and social analysis (PSA), assess how participants' concerns can be integrated into the project design.

(ix) Conduct interviews, focus group discussions or other meetings with stakeholders to identify significant issues related to participation, gender, poverty, labor, affordability, or other social risks, including the need to prepare any action or mitigation plans or other measures. Propose follow-up participatory measures for implementation activities.

(x) Assess the existing social characteristics of mobility and transport use. Provide a gender-segregated baseline on the existing primary patterns of transport use, which include, but are not limited to, the characteristics of use/ownership of transport modes; perceptions and satisfaction of public (collective) transport modes; monthly transport expenditure (public/private); ability and willingness to pay for transport services; links between transport and livelihood; key origin-destination patterns of transport users; average travel time to essential services (disaggregate: hospitals, higher education, administrative services, markets, jobs). Assess how social characteristics such as age, ethnicity, religion, disability, and income affect mobility and use of transport services.

(xi) Conduct in-depth social and poverty analysis by providing a 20% socioeconomic profile of the project influenced area, in accordance with ADB's Handbook on Social Analysis (2007) and Poverty Handbook (2006), to assess local demand for the proposed road investments, employment opportunities, child labor, gender specific capacity to take advantage of the likely socioeconomic opportunities that would result from the Project, HIV/AIDS transmission and/or other health and safety risks e.g. COVID-19. Quantify the incidence of risks in the affected populations by age, gender, location and identifying options to mitigate them.

(xii) Identify the direct and indirect impact channels through which the poor and vulnerable will benefit from the project and how these groups are supported through the project designs. With the participation of stakeholders, identify and analyze the reasons behind the vulnerability of at-risk groups, including their exposure to risks. Identify potential proactive measures, in terms of additional components and design options, which will make it easy for the poor and vulnerable to benefit from the project. The in-depth social analysis must cover

demographic, economic and socioeconomic conditions and trends and identifying the extent, dimensions, trends of poverty in the project area and relevance of these issues in the project design.

(xiii) Conduct an assessment of the risk of spread of HIV/AIDS/COVID-19 and other communicable diseases due to the project. Assess the existing prevalence and awareness of HIV/AIDS and provide suggestions for measures to be incorporated in the project to mitigate this risk.

(xiv) Conduct an assessment on the risk of human trafficking. Assess the existing incidence of human trafficking in the project area and map any government or NGO programs and initiatives that address this issue. Identify possible entry points in the project to use social mobilization programs to raise awareness about the dangers of trafficking, such as awareness programs around construction camps, introduction of good behavior codes for construction contractors, services and information to vulnerable people at key points such as bus stops and border crossing points.

(xv) Conduct an assessment of safety practices. Identify existing practices detrimental to safety (use of the right of way, unwillingness to wear seatbelts, helmets, etc.). Identify groups who may be most at risk. Propose measures to increase safety awareness and traffic education campaigns, including build-up of the existing programs conducted by government agencies or NGOs.

(xvi) Explore, in consultation with the PWD Manipur, the opportunities to strengthen the visibility of social/gender-related aspects in the design of the project through: (a) increased focus on the economic empowerment of women in the project area; and/or (b) mitigation of the health/social-related risks and impacts associated with infrastructure development etc.

(xvii) Propose measures to ensure that the project follows national labor laws and international core labor standards.

(xviii) Submit a draft final PSA report to ADB for review and comments.

(xix) Incorporate comments and finalize the PSA accordingly, then re-submit the revised PSA to ADB. Summarize and submit these PSA findings in the SPRSS Report Form.

(xx) Conduct a workshop to provide guidance to the Client on project-related social issues and ADB’s social procedural requirements during project preparation and implementation.

16. Subtask 3.4: Gender Analysis

(i) Prepare a gender analysis of the project in accordance with the guidelines provided in ADB's Handbook on Poverty and Social Analysis (2012) and where relevant propose a Gender Action Plan (GAP) based on the ADB Guidelines for Gender Mainstreaming (2012).

(ii) Assess the general socio-characteristics of women: source of income, decision making power over household budget, time spent in household chores and childrearing activities, and work outside the household. Assess the different needs and demands of women for transport. Provide baseline on the existing primary patterns of transport use and additionally include perceived safety of public transport, including incidence of harassment; use of non-motorized transport; and women employment away from the vicinity of their home.

(iii) Assess (a) women’s access to primary transport services; (b) women’s literacy status; (c) women’s ownership of agriculture land when compared to men; (d) women’s share of wage employment in the agriculture and non-agriculture sector;(e) women’s mobility; participation in household decisions (f) work status: income and number of employment days in a year; and (g) women’s willingness to engage in skills training and income activities, women’s access to development schemes, awareness on trafficking, sexually transmitted diseases including HIV/AIDS and road safety.

(iv) Analyze the proposed project from the gender perspective and identify mechanisms to ensure women's and girl's participation in the project including development of a gender action plan if needed.
(v) Through consultation with the technical experts and the executing agency, assess the feasibility to include design features friendly to women, elderly, and children in the project and other components that could be incorporated in the project to proactively address the needs of women and other vulnerable groups.
(vi) The Consultant will conduct desk studies and primary data collection using local experts to undertake the census and data processing, as required.
(vii) The Consultant, while conducting focus group discussions, in-depth interviews, other interactions, should ensure women's equal participation and carry out a gender assessment. More specifically, the following variables in the survey questionnaires should be included to help design an informed gender action plan for the project.
(viii) Conduct gender analysis and identify project design elements that have the potential to address gender equity if appropriate. Gender analysis will be carried out to inform the design of the project.

17. Subtask 3.5: Initial Involuntary Resettlement and Indigenous Peoples Screening
(i) For each project, carry out a screening of involuntary resettlement and indigenous peoples' impact in accordance with the government's and ADB's Safeguard Policy Statement (2009).12
(ii) Identify whether the project is likely to lead to private land acquisition and impact on non-titled holders. In instances where, land acquisition is required for any stretch of the project, the preparation of the land acquisition plan and land schedule will be also a part of the consultancy. The screening exercise will also include an assessment of past social impacts, specifically if land acquisition has been accomplished in anticipation of the project.
(iii) Identify whether the project will be located in, or pass through, areas of significant indigenous people's settlements, and if this is the case, propose how to specifically include indigenous peoples in project planning and implementation in accordance with ADB's Safeguard Policy Statement (2009). If relevant, make an overview of population characteristics in the project area and anticipate project impacts.
(iv) The Consultant will conduct desk studies and primary data collection using local experts to undertake the census and data processing, as required.
(v) Based on the issues identified in the Initial Poverty and Social Analysis (IPSA), review and analyze relevant available data and reports, and undertake field visits to the proposed Project sites. Together with other team members, conduct interviews, focus group discussions or other meetings with stakeholders to identify permanent and temporary socioeconomic impacts as a result of possible land acquisition, changes of land use, or restrictions of access to assets and common property resources.
(vi) Carry out meaningful consultations in field during the preparation of the Project. Ensure that the consultations are undertaken in an atmosphere free of intimidation or coercion and are gender inclusive and responsive and tailored to the needs of the disadvantaged and vulnerable groups.
(vii) Based on the initial review of existing documentation and field investigations, prepare and submit Involuntary Resettlement screening and impact categorization forms for each project road to ADB and the PWD Manipur for review and comments.
(viii) Based on the initial review of existing documentation and field investigations, prepare and submit Indigenous Peoples screening and impact categorization forms for each project road to ADB and PWD Manipur for review and comments.
(ix) Should impacts on indigenous peoples be identified during the screening process, even if indicative, prepare an indigenous people planning framework (IPPF).

(x) Based on the experience of recent and ongoing resettlement plans financed by ADB and similar multilateral development agencies in the country, review existing resettlement frameworks (RF) and update them to meet government and ADB policy compliance standards. The RF should define categories for impact, eligibility of affected people for compensation, and provide a matrix of entitlements covering compensation and other assistance for all types of impacts. The RF should provide the methodology for the calculation of compensations based on replacement cost to fully replace the asset.
(xi) The RF should be based on a consultative process with PWD Manipur and ADB and draw from broad-level consultations with the communities likely to be affected by the projects.
(xii) Prepare relevant chapters and appendixes of the study report on resettlement and indigenous peoples planning. The appendixes should include the screening checklist for each project, one RF and one IPPF.

18. Subtask 3.6: Detailed Involuntary Resettlement and Indigenous Peoples Planning
(i) If impacts on indigenous peoples are identified, prepare an Indigenous Peoples Plan (IPP) to minimize adverse impacts on tribal communities and to enhance their access to project benefits, in accordance with the Government of India and State of Manipur policy framework and the ADB's Safeguard Policy Statement (2009). The scope and format of the IPP should be consistent with ADB requirements.
(ii) While preparing the IPP, conduct (a) social impact assessment, (b) meaningful consultation and (c) ascertain consent of affected IP communities, if necessary. For items (b) and (c), proper recording and full documentations are required. These documents must be attached to the IPP as annexures.
(iii) The IPP should also incorporate the findings of the resettlement census. Submit the draft IPP to PWD Manipur for ADB for review and comment. Incorporate comments and finalize the IPPs accordingly.
(iv) Prepare a separate resettlement plan (RP) for each project road in accordance with applicable national and state laws and policies, the ADB's Safeguard Policy Statement (2009).
(v) RPs should be based on a complete enumeration (100% census) of all displaced people (DPs) and their affected assets. RPs should also incorporate, where relevant, the findings of the socioeconomic survey.
(vi) Submit draft RPs and IPPs to PWD Manipur and ADB for review and comment. Incorporate comments and finalize the RPs and IPPs accordingly.
(vii) Based on the detailed design, determine the legal status of private land within the right of way, and verify application of customary and traditional laws governing land tenure, usufruct rights, and leasehold. Verify legal boundaries of the right of way with the relevant ministry.
(viii) Based on the detailed design, conduct census survey of 100% of project affected persons (PAP) and inventory of lost assets.
(ix) Conduct a socioeconomic assessment of all PAPs residing/using the corridor of impact to collect data on family composition, details on age and sex of all household members, income levels and occupational pattern, vulnerability status, legal ownership status of land (private, traditional and customary rights, lease), asset occupancy status, and skills possessed.
(x) Assess whether the compensation standards for all types of assets, crops, and trees are based on replacement cost and describe in detail the valuation methodology used. Undertake market surveys to compute replacement value of land.
(xi) Prepare a comprehensive income and livelihood restoration program, supported by adequate budget, to help PAPs improve, or at least restore, their incomes and livelihoods. Identify specific measures for the affected poor, ethnic minorities, or other vulnerable households.

(xii) Conduct in-depth consultations with the affected persons, ensuring the involvement of women in the process. Consultations should take the form of public meetings, focus group discussions, and one-on-one interviews. Ensure that the consultation process is well documented and demonstrate how the concerns of the affected persons are included in the RP design.
(xiii) Establish a cut-off date for eligibility criteria for non-title holders and ensure and document that it has been publicly disseminated.
(xiv) Prepare an overall budget for compensation and resettlement and rehabilitation (R&R) assistance.
(xv) Based on the draft R&R entitlements, prepare an appropriate action plan for additional support required for the vulnerable.
(xvi) Organize workshops on draft R&R policy to receive feedback from identified stakeholders, including the implementing agency, line agencies (specifically revenue, forest, tribal welfare, etc.), nongovernment organizations (NGO), and others.
(xvii) Develop a computerized database management system for recording PAPs and lost assets. The system should reflect the present impact on PAPs and accordingly plan for their entitlements. The system should be in place from the beginning of the resettlement survey. Also, develop cadastral mapping of affected plots for construction of new alignments using the road inventory map developed under the engineering study.
(xviii) Assess the capacity of the government in implementing the proposed RPs and IPPs, recommend improvements and actions required before land acquisition, and propose the necessary training to enable concerned administration officials and the government to implement the RP and IPP and assess the social and resettlement issues of the follow-on subprojects, if required. The scope of training includes ADB involuntary resettlement safeguards policy principles. The training should specifically focus on the differences between the provisions of the ADB policy and the relevant country laws.
(xix) Prepare a resettlement implementation schedule, support the PMU in recruiting an NGO/agency for RP and IPP implementation, if required, and consultants for external monitoring and evaluation.
(xx) Prepare relevant chapters and appendices of the detailed design report on resettlement planning. The appendixes should include the RP and IPP for each project.

19. Subtask: 3.7 Stakeholder Engagement and Communication Strategy
(i) Design and implement a stakeholder engagement and communication strategy for the project.
(ii) Identify and assess the stakeholder groups that influence, have interest in, or are affected by the project, including political organizations, business groups, civil society, and community organizations.
(iii) Identify the resources needed by the PWD Manipur for stakeholder engagement and recommend efficient organizational structures and lines of communication.
(iv) Conduct a training program for PWD Manipur management and staff in support of the stakeholder engagement and communication strategy of the project.
(v) Organize workshops with stakeholders on selected key issues (e.g. pollution, resettlement, indigenous peoples rights and concerns) to inform the stakeholder engagement and communication strategy.
(vi) Define information exchange mechanisms with relevant stakeholders.
(vii) In cooperation with the indigenous peoples expert, design a culturally-appropriate grievance mechanism that has appropriate channels for each stakeholder group.
(viii) Carry out monitoring and reporting on the implementation of the stakeholder engagement and communication strategy 36.

20. Subtask 3.8: Environmental and Climate Change Risk Assessment

(i) Carry out an environmental assessment of the project in accordance with ADB's Safeguard Policy Statement (2009), and the government's environmental regulations and policies.

(ii) Classify the project in accordance with the environmental impact assessment requirements under the Department of Environment (DOE), Ministry of Environment, Forest and Climate Change (MOEFCC), and ADB's Rapid Environmental Assessment (REA) Checklist according to the ADB Safeguard Policy Statement (2009).

(iii) Depending on the classifications, prepare an initial environmental examination (IEE) as per relevant guidelines of the MOEFCC and ADB, and if an EIA is required, prepare the terms of reference (TOR) that are acceptable to the MOEFCC. In preparing the IEE and/or EIA, a minimum of the following issues must be covered:

(iv) Potential impacts on biodiversity including modified, natural, critical habitat and protected areas, and necessary measures to minimize, mitigate, and offset impacts.

(a) Potential waste issues including hazardous materials and wastes and appropriate measures for their disposal, treatment, and other forms of management.

(b) Potential impacts on ambient air and water quality, noise levels, soil, and recommendations for suitable mitigation measures to meet relevant national standards and World Bank Environmental Health and Safety (WB-EHS) standards, whichever is more stringent.

(c) Occupational health safety issues and measures for the construction workers as well as the local communities in and around the project site, with consideration to COVID-19 impacts.

(d) Potential impacts on physical and cultural resources, including sensitive receptors (temples, schools, hospitals, etc.) and measures to avoid, minimize, or mitigate impacts.

(e) Public consultations with affected people in the project area including men, women, vulnerable or indigenous groups, with clear documentation on dates of meeting and issues discussed. Consultations must also be carried out with relevant government agencies (e.g., Forestry Department, Irrigation Department, etc.) and relevant local NGOs, if any.

(f) Grievance redress mechanism to address concerns and grievances of the affected people during the project cycle.

(g) Cumulative and induced impact assessment (brief assessment for IEE and in-depth assessment for EIA);

(h) Alternative analysis including the no-project option (required only for EIA under the ADB SPS; and

(i) Assessment of the institutional setup and capacity of the EA for meeting environment safeguard requirements of the government as well as ADB. Institutional and capacity needs, if any, must be identified and planned for with adequate budge provisions.

(v) Prepare the IEE and EIA reports following the suggested outline in Appendix 1 of the ADB SPS. Modifications may be made, if necessary, to fulfil the requirements of MOEFCC and ADB.

(vi) Prepare individual environmental management plan (EMP) and environmental monitoring plan (EMOP) to implement and monitor the mitigation measures with clear information on costs, time frame, responsible agencies, monitoring methods, and monitoring indicators.

(vii) Incorporate into the EIA/IEE report and EMPs the feedback from all relevant stakeholders, including the EA, ADB, affected persons, and others.

(viii) The outputs will be complete IEE or EIA reports fulfilling the requirements of both

the MOEFCC and the ADB SPS, including Noise Modelling, Air Modelling and as many site-specific details as possible. For roads with different requirements under MOEFCC and ADB SPS (for example, the MOEFCC requires an EIA but ADB requires an IEE), one report will be prepared to fulfil requirements of both agencies.

(ix) During the detailed design stage, provide clear recommendations in the EIA or IEE report for activities that need to be taken. Recommendations may include but are not be limited to (a) updating the EMP to provide more site-specific details or other updates; (b) providing more detailed or updated information and analysis on location, expected impacts, and mitigation measures on sensitive receptors; (c) updating the number of trees required for removal; (d) conducting air and noise impact modeling; and (e) other updates in the reports based on design updates. The output of the detailed design stage will be the final IEE and/or EIA reports fulfilling the requirements of both the MOEFCC and the ADB SPS.

(x) Study integration within the environment to ensure that transport choices support a better environment.

21. Subtask 3.7 Climate Change Risk and Vulnerability Assessment

(i) Undertake literature reviews to: a) collect data and information on projected climate changes in project areas; b) to understand if there are any ongoing climate resilience initiatives being undertaken in the project area/s; c) to understand current practices and lessons learnt on climate change adaptation measures in cities around the world, Asia, and India; d) to understand the typical adaptation measures being taken for similar projects.

(ii) Collection of primary and secondary climate data (rainfall, temperature, highest flood level (HFL) etc.) as necessary for identifying climate risks in the project area/s and India as a whole and in the proposed alignment and sites of the associated structures.

(iii) Identification the key climate risks in the project area/s, including project alignment and locations of associated structures and recommendations for adaptation based on ongoing best practices in the world, Asia, and India.

(iv) Based on the type of climate risks identified, conduct further in-depth studies, if necessary, such as: hydrological analysis and modeling; statistical analysis, GIS based analysis, etc.

(v) Identification of adaptation measures or design modifications to mitigate the key climate risks in consultation with the design engineers. Where feasible, identify innovative measures or best practices being applied successfully in similar projects and/or other countries.

(vi) Estimation of the incremental costs of adaptation measures or design modifications in relation to the total project costs.

(vii) Report on the climate risk assessment and adaptation measures incorporated in the project design.

(viii) Quantification of greenhouse gas emissions (GHG) expected from the construction and operation stages of the project with recommendations for suitable mitigation and/or offset measures. It is recommended that appropriate tools such as TEEMP[2] be used for the GHG quantification exercise.

22. Subtask 3.8: Procurement Support

(i) Conduct a Strategic Procurement Study as per ADB guidelines and prepare a strategic procurement plan for the identified and prioritized projects' contract packages, with estimated costs, contract values, applicable contracting modalities, proposed procurement methods and timeframes, etc., complying to the statutory

[2] Transport Emissions Evaluation Model for Projects is an Excel-based tool that is freely available and can be downloaded. The findings of the traffic studies can be used as inputs in the tool.

approval requirements of PMU, concerned stakeholder agencies, and ADB.

(ii) Prepare draft bid documents for the individual contract packages identified in the strategic procurement plan as per appropriate standard bidding documents (SBD) issued by ADB for works, goods and plant, non-consulting and consulting services' contracts and finalize the bid documents or proposal as per comments received.

(iii) Ensure that draft/finalized bid documents shall include technical specifications, detailed design-/bid-level construction drawings, bill of quantities (BOQs), EMMP, HSMP, GAP or any other documents required by the ADB, including performance targets specified as per subproject's sectoral national standards/benchmarks and/or international standards/best practices context applicability and as decided by the government.

(iv) Assist the PMU in securing administrative / management approvals (such as technical sanctions / administrative sanctions / management approvals) through a designated monitoring/ oversight body for starting the procurement process. All procurement under the PRF will follow ADB Procurement Policy (2017, as amended from time to time); Procurement Regulations for ADB Borrowers (2017, as amended from time to time); ADB Guidance Notes on Procurement (June 2018, as amended from time to time); and latest appropriate SBD issued by ADB for each type of contract (works, goods and plant, and services), as applicable.

(v) Support the PMU in procurement processing, including but not limited to support in the evaluation of the technical and price bid evaluation reports for selection of Contractors for subprojects. This support would also include supporting the PMU through the prior review process of ADB on the draft bid documents or proposal, together with a description of the advertising procedures to be followed for the bidding and the draft Invitation for Bids for each type of contract (works, goods and plant, non-consulting and consulting services) and/or towards the post review (sampling) process of ADB, as stipulated in the procurement plan.

(vi) Prepare a contract management plan as per ADB guidelines.

23. **Task 4: Institutional Development and Capacity Building:**

(i) Conduct a review of institutional or organizational structure, recommend improvements in institutional processes and procedures and/or institutional reforms required, if any; and assess capacity strengthening requirements, including training needs assessment, and undertake necessary programs as required on training/ workshops/ seminars/ conferences etc., to support capacity building and institutional strengthening of the relevant government agencies/other stakeholders during PRF period (under project readiness loan).

(ii) Carry out an internal audit of the existing institutional functions of concerned stakeholders, covering: (a) administration and financial management systems; (b) internal control processes; (c) procurement management system; (d) reliability and integrity of financial and operational information; (e) effectiveness of operations; (f) safeguarding assets; (g) effective, efficient and economical use of resources in service delivery towards meeting national benchmarks, performance appraisal and evaluation, and providing recommendations with user requirement specifications for a suitable monitoring, feedback, and complaint management-resolution system that could be implemented through any ensuing loan(s) to enhance infrastructure service delivery; (h) environment and social development management system; (i) proposing a strategy for achieving the strategic and operational objectives and key results measured through service level national benchmarks or standards and key performance indicators; and (j) identifying capacity gaps and areas that may require improvement.

(iii) Suggest an appropriate institutional development strategy and any reform measures, which could be owned by GOM in the medium term to achieve significant sustainable development in strategic and operational areas including

any transitional steps.

(iv) Develop and institute a project performance monitoring system (PPMS) for regular monitoring and project management purposes.
(v) Develop a road map for subsequent development of Road Asset Management System (RAMS) through subsequent fundings.
(vi) Set-up a financial management system at the PMU, integrated with PPMS.
(vii) Facilitate documentation management for the PMU including retaining all documentation with respect to each contract where prior review/post review (sampling) is required, for at least 2years after the PRF closing date. The documentation will generally include the bid proposals, the original signed contract, the evaluation report (including the analysis of the respective bids or proposals), and recommendations for award, for examination by ADB or by its consultants.

24. Subtask 4.1 Financial Management Assessment

(i) In accordance with ADB requirements and based on the project scope, undertake financial due diligence, including financial analysis of the project consistent with the economic analysis.
(ii) Conduct a financial management assessment of the executing and implementing agencies, including (a) assessing whether previous financial management assessments have been conducted by ADB or other agencies and, if so, reviewing the results and ascertaining whether these can be use as input, (b) assessing capacity for planning and budgeting, management and financial accounting, reporting, auditing, internal controls, and information systems (c) reviewing proposed disbursement and funds-flow arrangements, and (d) providing conclusions on the financial management risk rating and identifying and confirming measures for addressing identified deficiencies.
(iii) Prepare cost estimates and the project financing plan based on verifiable data and that are sufficient to support project implementation.
(iv) Conduct financial evaluations including sensitivity analyses of any project components that have a cost-recovery objective.
(v) Conduct a financial risk assessment. Where significant risks are identified to project financial sustainability or viability, recommend relevant financial performance indicators to be incorporated in financial covenants.
(vi) Recommend financial reporting, auditing and public disclosure arrangements for the project.
(vii) Prepare the project's financial assessment report presenting detailed findings of the financial assessment as described above.

25. Other General Tasks

(i) Facilitate PMU in any ensuing loan/project processing stage of work by undertaking as needed financial management assessment, economic and financial analyses, procurement capacity assessment, environmental assessment and review framework, initial poverty and social analysis/SPRSS assessment, land acquisition, resettlement planning, indigenous peoples planning, poverty reduction strategy, gender equity and social inclusion planning, and assessment for climate change and disaster risk resilience, including developing a DMF and undertaking baseline measurement, as per relevant ADB guidelines and meeting ADB approval requirements; and
(ii) Provide any other specialist services requested by PMU during the assistance period at mutually agreed conditions.
(iii) Follow provisions made in the PRF project administration manual (PAM), and in any other governing/guidance documents of ADB, including those approved by ADB for the PRF works, and duly incorporate any recommended risk

avoidance/minimization measures, and adaptation and/or mitigation measures to address climate change and disaster risk resilience requirements.

(iv) Implementation of Management Information System for the Employer to enable efficient control of the project.

B. CONSULTANT'S INPUTS

26. The assignment will be implemented by a consulting firm and carried out over a period of 24 months from the date of commencement. It is anticipated that about 234 person-months by national experts (NE) and 434 person-months by national support staff (NS) will be required. Suggested staffing for the Consultant's scope of work is shown in Table 1. Consultants will set up an office at Imphal for the project duration and site offices, wherever required. The experts should have sufficient experience and qualification to perform their respective activities. The commencement of services is tentatively expected to be May 2023 and will be further confirmed during contract negotiations.

Table 1: Required National Experts/ National Support Staff

No.	Title	Nos.	Person–Months Inputs	Total Efforts (Person–Months)
A	**National Key Experts**			
NE01	Transport Planner (Team Leader)	1	24	24
NE02	Senior Highway Engineer / Deputy Team Leader	1	24	24
NE03	Bridge / Structure Engineer	1	18	18
NE04	Traffic & Road Safety Expert	1	18	18
NE05	Road / Pavement Engineer	1	18	18
NE06	Transport Modeler	1	9	9
NE07	Environment Safeguards Specialist	1	18	18
NE08	Climate and Disaster Risk Resilience Specialist	1	4	4
NE09	Social Safeguards Expert	1	18	18
NE10	Gender Specialist	1	4	4
NE11	Procurement Specialist	1	15	15
NE12	Geotechnical Engineer	1	12	12
NE13	Transport Economist	1	12	12
NE14	Financial Specialist	1	8	8
NE15	ITS Engineer	1	4	4
NE16	Geologist	1	10	10
NE17	Institutional Development Expert	1	6	6
NE18	Senior Survey Engineer	1	12	12
	SUB TOTAL – A (NE)	**18**		**234**
B	**National Support Staff**			
NS01	Highway Engineer	1	24	24
NS02	Pavement Engineer	1	18	18
NS03	Geotechnical Engineer	1	18	18
NS04	Bridge / Structural Engineer	1	18	18
NS05	Design Engineer	1	18	18
NS06	Quantity Surveyors	2	15	30
NS07	Socio-Economic Surveyor	1	10	10
NS08	Assistant Environment Safeguards Expert	1	12	12
NS09	Assistant Social Safeguards Expert	1	12	12
NS10	Indigenous Peoples Expert	1	12	12
NS11	Geographic Information System (GIS) Analyst	1	10	10
NS12	Auto-CAD Draughtsman	2	24	48
NS13	Office Manager-cum-Accountant	1	24	24
NS14	Computer / Data Entry Operators	3	24	72

No.	Title	Nos.	Person–Months Inputs	Total Efforts (Person–Months)
NS15	Office Assistants	3	24	72
NS16	Survey Engineer	2	18	36
	SUB TOTAL- B (NS)	**23**		**434**
	TOTAL (A+B)	**41**		**668**

NE = National Experts and NS = National Support Staff, PM= Person – Months

C. OUTPUT AND REPORTING REQUIREMENTS

27. The Consultant will carry out activities according to the time schedule given in Table 2 and submit reports and organize workshops about the activities and outputs. The Consultant shall submit a soft copy and 3 hard copies (printed back to back) of each of the above reports. The Consultant should submit electronic copies of all database files developed as a part of the project. Adjustments to the outlines may be proposed by the Consultant according to the field situation but will be subject to the Client's approval.

Table 2: Tentative Reporting Requirements and Workshops

Milestone	Month	Milestone	Month	Milestone	Month
Output -1		**Output -2**		**Output -3**	
Kick Off Meeting (Task 1 - RSPSIP)	0	Kick Off Meeting for Roads Prioritized by Client	2	Kick Off Meeting (Task 4)	11
Inception Report (RSPSIP)	1	Draft FR for Priority Roads	3	Interim Report (Task 4)	17
Workshop 1	5	Final FR for Priority Roads	4	Final Report (Task 4)	22
Interim Report (RSPSIP)	6	Draft DPR for Priority Roads	8		
Draft RSPSIP	9	Final DPR for Priority Roads	10		
Workshop 2	10	Bid Documents and Safeguards Documents for Priority Roads	11		
Final RSPSIP	11	Draft FR for Balance Roads	17		
		Workshop 3	17		
		Final FR for Balance Roads	19		
		Draft DPR for Balance Roads	25		
		Workshop 4	27		
		Final DPR for Balance Roads	30		
		Workshop 5	30		
		Bid Documents and Safeguards Documents for Balance Roads	34		

D. IMPLEMENTATION ARRANGEMENTS AND STAFFING

28. The Public Works Department (PWD) of the Government of Manipur is the oversight body and the executing agency (the Client). The Consultant will also coordinate with other

concerned government agencies and local authorities for carrying out activities of the assignment, with the assistance of the PWD. The GoM will establish a monitoring committee to assess the Consultant's performance from time to time. The PWD may also assign other departments of the GoM (i.e., Engineering, Planning, etc.) and individual experts to review the Consultant's reports and to provide technical guidance as required. The GoM has also established a project Implementation unit (PIU) to implement the project. The PIU will coordinate and communicate with the reviewers and provide comments as well as necessary guidance from time to time to the Consultant.

29. Relevant experience and qualification for key positions are shown in Annexure 2 International experts having experience in India are preferred. National experts having experience in projects financed by ADB and development partners are preferred. Also, full-time employees of the consulting firm are preferred.

30. Consultants will set up an office at Imphal for the project duration together with the respective field offices, as required. All the project personnel will be based in and work out of the Consultant's office at Imphal/ field offices. No consultant shall be allowed to work from their home office unless until it is felt necessary and is in the interest of project. Prior approval and written permission from the Project Director, under exceptional circumstances, is required to allow the expert for such working.

E. CLIENT'S INPUT

31. The PWD Manipur will provide all the data available at the PWD and will facilitate communications with the concerned offices of the PWD. The PWD will assign the PMU counterpart staff for day-to-day project management and facilitation. PWD will also provide related data, maps and plans, drawings and other information if available with Government.

32. All equipment, software and facilities purchased with prior approval of PWD by the Consultants using provisional sums will remain property of the Employer and will be returned to the PWD at the conclusion of the contract. [3]

33. The consultant shall take out and maintain adequate insurance of all equipment and reports etc. at their cost. Such costs are to be included in their financial proposals. The consultant shall be responsible for and shall indemnify the client in respect of loss or damage to equipment and material furnished by the client or purchased by the consultant out of funds provided by the Employer.

34. The terms of reference along with deliverable timelines, payment milestones, etc., will be updated at RFP stage.

F. GUIDELINES OF ADB

35. All projects shall be studied and prepared in line with ADB's guidelines (updated from time to time) and requirements, which includes but not limited to the following:

(i) Procurement Policy (2017) and Procurement Regulations (2017);
(ii) Standard bidding documents;
(iii) Preparing and Presenting Cost Estimates for Projects and Programs Financed by the Asian Development Bank (2014);

[3] All regular design and drawing software, and related-hardware costsconsidered to be included in firm's consultancy fee; the output and deliverables in required file formats being property of the Client, PDMC shall handover the same in updated/ working condition to the satisfaction of PMU on completion of the consulting assignment.

(iv) Financial Analysis and Evaluation Technical Guidance Note (2019);
(v) Technical Guidance note on Financial Management Assessment (2015);
(vi) Guidelines for the Economic Analysis of Projects (2017);
(vii) Safeguard Policy Statement (2009);
(viii) Handbook on Poverty and Social Analysis (2012);
(ix) Gender Tool Kit: Transport (2013);
(x) Guidance Note on Stakeholder Communication Strategies for Projects in South Asia; and
(xi) Guidelines for Climate Proofing Investment in the Transport Sector: Road Infrastructure Projects.

Annexure 1
Supplement to Detailed Design of Road and Bridges Standards and Codes of Practices

1. All activities related to field studies, design and documentation shall be done as per the latest guidelines/ circulars of Ministry of Road Transport and Highways (MORTH) and relevant publications of the Indian Roads Congress (IRC) and Bureau of Indian Standards (BIS). For aspects not covered by IRC and BIS, international standard practices, such as, British and American Standards may be adopted. The Consultants upon award of the Contract, may reflect the same in the inception report.

Quality Assurance Plan (QAP)

2. The Consultants shall have detailed Quality Assurance Plan (QAP) for all field studies including topographic surveys, traffic surveys, engineering surveys and investigations, design, analyses and documentation activities. The draft detailed QAP Document must be discussed and finalized with the officers concerned immediately upon the award of the Contract and submitted as part of the inception report.

Traffic Survey

3. The Consultants shall undertake necessary surveys for classified traffic volume count, origin-destination and commodity movement, characteristics axle loading, characteristics intersection volume count, speed-delay characteristics, pedestrian/animal crossing according to IRC SP:19- 2001 or the latest relevant guidelines of the IRC. The Consultants shall, immediately upon award of the work, submit to PMU, proposals regarding the total number as well as the locations of the traffic survey stations as part of at each stage and the locations shall be finalized in consultation with the PIU. Suitable maps and charts should accompany the proposals clearly indicating the rationale for selecting the location of survey stations. The methodology of collection and analysis of data, number and location of traffic survey stations shall be finalized in consultation with PMU.

Traffic Demand Estimates

4. The Consultants shall make traffic demand estimates and establish possible traffic growth rates in respect of all categories of vehicles, according to IRC SP:19- 2001 or the latest relevant guidelines of the IRC, taking into account the past trends, annual population and real per capita growth rate, elasticity of transport demand in relation to income and estimated annual production increase. The methodology for traffic demand estimates and the location for survey shall be finalized by the Consultants in consultation with PIU. Overall traffic forecast thus made shall form the basis for the design of each pavement type and other facilities/ancillary works.

Engineering Surveys and Investigations, Reconnaissance and Alignment

5. The Consultants shall make an in-depth study of the available land width (ROW), topographic maps, and other available relevant information collected by them concerning the existing alignment. The Consultants in coordination with the PMU will arrange the required maps and the information needed by them from the potential sources. The detailed ground reconnaissance may be taken up immediately after the study of maps and other data. The primary tasks to be accomplished during the reconnaissance surveys include:

(i) Topographical features of the area;
(ii) Typical physical features along the existing alignment within and outside ROW i.e. land use pattern;
(iii) Scheme for the widening of the existing road;
(iv) Realignment requirements;
(v) Preliminary identification of improvement requirements including treatments and measures needed for the cross-roads;
(vi) Traffic pattern and preliminary identification of traffic homogenous links;

(vii) Sections through congested areas;
(viii) Inventory of major aspects including land width, terrain, pavement type, carriageway type, bridges and structures (type, size and location), intersections (type, cross-road category, location) urban areas (location, extent), geologically sensitive areas, environmental features;
(ix) Critical areas requiring detailed investigations; and,
(x) Requirements for carrying out supplementary investigations;
(xi) Soil (textural classifications) and drainage conditions;
(xii) Type and extent of existing utility services along the alignment (within ROW).

6. The data derived from the reconnaissance surveys will be utilized for planning and programming the detailed surveys and investigations. All field studies including the traffic surveys should be taken up on the basis of information derived from the reconnaissance surveys. For survey of hill roads, IRC 52-1981 or its latest version may be followed.

Topographic Surveys

7. The basic objective of the topographic survey would be to capture the essential ground features along the alignment in order to consider improvements and for working out improvements, rehabilitation and upgrading costs. The detailed topographic surveys should be taken up after the completion of reconnaissance surveys. The field surveys shall be carried out using high precision instruments i.e. total station, auto level etc.

Details of Utility Services and Other Physical Features

8. The Consultants shall collect details of all important physical features along the alignment. These features affect the project proposals and should include buildings and structures, monuments, burial grounds, cremation grounds, places of worship railway lines, stream / river / canal, water mains, severs, gas/ oil pipes, crossings, trees, plantations, utility services such as electric, and telephone lines (O/H & U/G) and poles, optical fibre cables (OFC) etc. and other encumbrances. The survey would cover the entire right-of-way of the road on the adequate allowance for possible shifting of the central lines at some of the intersection's locations. The information collected during reconnaissance and field surveys shall be shown on a strip plan so that the proposed improvements can be appreciated and, utility removals of each type and tree cutting etc. assessed and suitable actions can be initiated. Separate strip plan for each of the services involved shall be prepared for submission to the concerned agency.

Road Inventory Surveys

9. Detailed road inventory surveys shall be carried out to collect details of all existing road and pavement features along the existing road sections.

Pavement Investigation

Pavement Composition

10. The data concerning the pavement composition for some stretches is already available with the PWD, Government of Manipur. However, the Consultants shall make trial pits wherever required to ascertain the pavement composition.

Road and Pavement Condition Surveys

11. Field studies shall be carried out to collect road and pavement surface conditions. The data should generally cover (i) pavement condition (surface distress type and extent); (ii) shoulder condition;(iii) embankment condition; and (iv) drainage condition. The objective of the road and pavement condition surveys shall be to identify defects and sections with similar characteristics. All defects shall be systematically referenced, recorded and quantified for the purpose of determining the mode of rehabilitation. The pavement condition surveys shall be carried out using visual means supplemented by actual measurements and in accordance with the widely accepted methodology adapted to meet the study requirements. The shoulder and

embankment conditions shall be evaluated by visual means and the existence of distress modes (cuts, erosion marks, failure, drops) and extent (none, moderate, frequent and very frequent) of such distress manifestations would be recorded. For sections with severe distresses, additional investigations as appropriate shall be carried out to determine the cause of such distresses. The data obtained from the condition surveys should be analyzed and the road segments of more or less equal performance may be identified using the criteria given in IRC: 81-1997.

Pavement Roughness and Structural Strength

12. The roughness surveys, where required, shall be carried out using a network survey vehicle or a laser profilometer. The methodology for the surveys shall be as per the widely used standard practices and would be finalized in consultation with the PIU.

13. The structural strength surveys for existing pavements, where required, should be carried out using a falling weight deflectometer in accordance procedure given in latest IRC guidelines.

Subgrade Characteristics and Strength

14. Based on the data derived from condition (surface condition, roughness) and structural strength surveys, the project road section should be divided into segments homogenous with respect to pavement condition and strength. The type of testing, frequency of test and the methodology should be finalized in consultation with the PWD, Government of Manipur.

Investigations for Bridges and Structure

Inventory and Condition Survey of Bridges, Culverts and Structures

15. The Consultants shall make an inventory of all the structures (bridges, culverts, etc.) along the road under the project. The Consultants shall inspect the existing structures and shall prepare a report about their condition. An initial inventory survey report is already available with PWD.

Hydraulic and Hydrological Investigations

16. The Consultants shall collect information on high flood level (HFL), low water levels (LWL), discharge velocity etc. from available past records, local inquiries and visible signs, if any, on the structural components and embankments. Local inquiries shall also be made with regard to the road sections getting overtopped during heavy rains. The Consultants shall make a desk study of available data on topography, storm duration, rainfall statistics, top soil characteristics, vegetation cover etc. so as to assess the catchment areas and hydraulic parameters for all existing and proposed drainage provisions. The findings of the desk study would be further supplemented and augmented by a reconnaissance along the area. All important hydrological features shall be noted during this field reconnaissance. For bridges and cross drainage structures having inadequate waterway, history of overtopping and are proposed for reconstruction, the detailed hydrological and hydraulic studies shall be carried out. The study and design shall be done as per IRC: SP-13-2004.

Geotechnical Investigations and Sub-Soil Exploration

17. The Consultants shall carry out requisite geo-technical investigations and sub-surface explorations for the proposed new bridges / bridges proposed for reconstruction etc., along high embankments and any other location as necessary for proper design of the works and conduct all relevant laboratory and field tests on soil and rock samples according to Specification for road and bridge works, fifth revision, 2013 of MORTH, IRC 78-2000 and the latest relevant IRC guidelines. Geo-technical investigation of project stretches in the hills/mountainous region shall be carried out to enable further study for adoption and design of suitable slope protection measures. The scheme for the boring locations and the depth of boring shall be prepared by the Consultants and finalized in consultation with PWD, Government of Manipur. The sub-soil exploration and testing should be carried out through

the Geo-technical Consultants empaneled by the MORTH. The soil testing reports shall be in the format prescribed in relevant IRC Codes.

Material Investigations

18. The Consultants shall identify sources, quarry sites and borrow areas, undertake field and laboratory testing of the materials to determine their suitability for various components of the work and establish quality and quantity of various construction materials and recommend their use on the basis of techno-economic principles. The Consultants shall also provide alternatives for use of innovative methods/technology in the form of additives or chemical stabilization of soil, use of geosynthetics or combinations thereof etc. of constructions and construction materials to minimize the use of naturally available construction materials and thus reduce impact on the environment. The Consultant shall also determine the technical and economic feasibility for use of different innovative materials in base/sub-base stabilization according to availability and also use of waste materials such as plastic, etc. for use in pavement construction.

19. The Consultant shall prepare mass haul diagram for haulage purposes giving quarry charts indicating the location of selected borrow areas, quarries and the respective estimated quantities. It is to be ensured that no material shall be used from the right-of-way except by way of leveling the ground as required from the construction point of view, or for landscaping and planting of trees etc. or from the cutting of existing ground for obtaining the required formation levels

20. Environmental restrictions, if any, and feasibility of availability of these sites to prospective civil works contractors, should be duly taken into account while selecting new quarry locations. The Consultants shall make suitable recommendations regarding making good the borrow and quarry areas after the exploitation of materials for construction of works. The Material Investigation aspect shall include preparation and testing of bituminous mixes for various layers and concrete mixes of different design mix grades using suitable materials (binders, aggregates, sand filler etc.) as identified during Material Investigation to conform to latest MORTH specification.

Road Safety Audit

21. Road safety audit shall be carried out for each candidate subproject to identity areas of major concern, including black spots, and measures to be taken for improving detailed engineering design with respect to road safety. The audit should be in line with the ADB's Road Safety Audit for Road Projects - An Operational Toolkit and other references or publications reflecting international best practices. The data on accident statistics should be compiled and reported showing accident type and frequency so that black spots are identified along the project road section. The possible causes (such as poor geometric features, pavement condition etc.) of accidents should be investigated into and suitable cost-effective remedial measures suggested for implementation.

Detailed Design of Road and Pavements, Bridges, and Structures

General

22. The Consultants shall carry out detailed designs that will include the following:

(i) Geometric design of highway with appropriate level of service;
(ii) Design of pavement for the widening and rehabilitation for the existing road, paved shoulders, medians, verge (if applicable)s;
(iii) Bridges, tunnels and structures etc.
(iv) At-grade intersections;
(v) Alignment plans, longitudinal sections and cross-sections;
(vi) Designs for road furniture and road safety/traffic control features;
(vii) Designs and drawings for service road (if applicable), dedicated bus lanes/ public conveyance systems and laybys, tree planting/fencing at locations where necessary /

required;

(viii) Drainage design showing location of turnouts, out falling structures and design of storm water drains;
(ix) Rehabilitation and repair plan with for bridges and structures design and drawings;
(x) Design of Slope Protection/stabilization measures for roads in the hills.
(xi) Traffic amenities (Parking Areas, Weighing Station and Rest Areas, etc.);
(xii) Design of cycle tracks in road stretches where ROW would permit;
(xiii) Landscaping and aboriculture along the highway in areas where ROW would permit, other safety features.

Design Standards

23. The Consultants shall evolve Design Standards and material specifications for the Study primarily based on IRC publications, MORTH Circulars and relevant recommendations of the international standards. The Design Standards evolved for the project shall cover all aspects of detailed design including the design of geometric elements, pavement design, bridges and structures, traffic safety and materials.

Geometric Design

24. The detailed design for geometric elements shall cover, but not be limited to (i) horizontal alignment; (ii) longitudinal profile; (iil) cross-sectional elements; (iv) junctions; and service roads (if applicable). The Consultants shall make detailed analysis of traffic flow, O-D studies and level of service for the existing road and workout the traffic flow capacity for the improved project road. The analysis should clearly establish the widening requirements with respect to the different horizon periods taking into account special problems such as road segments with isolated steep gradients.

25. In the case of closely spaced crossroads the Consultant shall examine different options to reduce conflicts and furnish appropriate proposals for this purpose keeping in view the cost of improvement, impact on traffic movement and accessibility to crossroads. The drawings and cost estimate should include the provisions for realignments of the existing crossroads to allow such arrangements. The Consultant shall also prepare details for intersections taking into account the site conditions, turning movement characteristics, level of service, overall economy and operational safety.

Pavement Design

26. The detailed design of pavement shall be done according to the latest edition of IRC 37. It shall also involve (i) strengthening of existing road pavement and design of the new pavement for the widening / additional lane(s), if the findings of the traffic studies and life-cycle costing analysis confirm the requirement for widening or reconstruction of the road;(ii) design of shoulders. The design of pavement shall primarily be based on IRC publications. However, the Consultants shall use the recommendations given in widely used international practices. The design of pavement shall be rigorous and shall make use of the latest Indian and International practices. The design alternatives and the most appropriate design option shall be established on life-cycle costing and techno-economic consideration.

27. For the design of pavement, each set of design input shall be decided on the basis of rigorous testing and evaluation of its suitability and relevance in respect of in-service performance of the pavement. The design methodology shall accompany the design proposals and shall clearly bring out the basic assumptions, values of the various design inputs, rationale behind the selection of the design inputs and the criteria for checking and control during the implementation of works. In other words, the design of pavement structure should take due account of the type, characteristics of materials used in the respective courses, variability of their properties and also the reliability of traffic predictions. Furthermore, the methodology adopted for the design of pavement shall be complete with flow charts indicating the various steps in the design process, their interaction with one another and the

input parameter required at each step.

28. For the design of overlays for the existing pavement, the strengthening requirement shall duly take into account the strength of the existing pavement vis-a-vis the remaining life. The overlay thickness requirements shall be worked out for each road segment homogenous with respect to condition, strength and sub-grade characteristics. Appropriate and most suited techniques of pavement design and rehabilitation should be duly considered.

29. The pavement design task shall also cover working out the maintenance and strengthening requirements and periodicity and timing of such treatments. The maintenance requirements would be identified and evaluated for a period of 5 years after rehabilitation, together with the bill of quantities and the cost estimates.

Design of Embankments/ High Cutting and Filling in Hill Areas.

30. The embankments design should provide for maximum utilization of locally available materials consistent with economy. In areas where a high embankment in the valley hill side or slope protection in the hill side is required, the design of the embankments and slope protection measures shall be a part of the Consultancy. The consultant shall preferably consider use of the state-of-the-art Non-Conventional Methods incorporating Geo Synthetics, Soil Anchors in the design as per the MoRTH specifications or extent international engineering practices. In areas where required, the Consultant shall also design soil reinforced retaining earth walls as per IRC: SP:102-2014.

Design of Bridges, tunnels and Structures

31. The survey and design for bridges shall be as per IRC 78: 2000 and the latest relevant guidelines of the IRC. The Consultant shall prepare General Arrangement Drawing (GAD) and Alignment Plan showing the salient features of the new bridges and structures proposed to be constructed / reconstructed along the road sections covered under the Study. These salient features such as alignment, overall length, span arrangement, cross section, deck level, founding level, type of bridge components (superstructure, substructure, foundations, bearings, expansion joint, return walls etc.) shall be finalized based upon hydraulic and geo-technical studies, cost effectiveness and ease of construction. Innovative design and latest international best practices should be considered. The GAD shall be supplemented by preliminary designs. In respect of span arrangement and type of bridge a few alternatives with cost-benefit implications should be considered and the best alternative adopted. The Consultants shall also carry out the design and make suitable recommendations for protection works for bridges and drainage structures, wherever required/ found inadequate. For major bridges, the scope of work shall include detailed design of approach road extending at least upto 2 Km on either side of the bridge. The Consultant shall also propose the construction of tunnels where required and the design, GAD and alignment for the same shall be prepared by the Consultant.

32. Subsequent to the approval of the subproject, the Consultant shall undertake detailed design for all components of the bridges and structures. The Consultant shall undertake detailed design for suitable protection works and/or river training works wherever required.

33. Suitable repair / rehabilitation measures shall be suggested in respect of the existing structures as per IRC-SP:40 along with their specifications, drawings and cost estimate in the form of a report. The rehabilitation or reconstruction of the structures shall be suggested based on broad guidelines for rehabilitation and strengthening of existing bridges contained in IRC-SP:35 and IRC-SP:40.

Drainage System

34. The requirement of roadside drainage system and storm water drainage and the integration of the same with proposed cross-drainage system shall be worked out for the

project road sections. In addition to the roadside drainage system, the Consultants shall design the special drainage provisions for sections with super-elevated carriageways, high embankments and for road segments passing through cuts. The drainage provisions shall also be worked out for road segments passing through urban areas. The designed drainage system should show locations of turnouts/outfall points with details of outfall structures fitting into natural contours.

Traffic Safety Features, Road Furniture and Road Markings

35. The Consultants shall design suitable traffic safety features and road furniture including traffic signals, signs, markings, overhead sign boards, crash barriers, delineators etc. The locations of these features shall be given in the reports and also shown in the drawings. A furniture zone as a part of the footpath with space for trees, utility boxes, seating, as well as decorative landscaping would be provided;

Miscellaneous Works

36. The Consultants shall suggest suitable sites for cycle tracks, bus parking, truck laybys, parking areas and rest areas, public utilities and community centers and prepare suitable separate designs and cost estimates in this regard.

37. The Consultants shall prepare detailed plan for the traffic management and safety during the construction period.

Estimation of Quantities and Project Costs

38. The Consultants shall prepare detailed estimates for quantities (considering designs and mass haul diagram) and project cost for the entire project (civil packages wise), including the cost of environmental and social safeguards proposed based on MORTH's Standard Data Book and market rate for the inputs or the local schedule of rates. The estimation of quantities and costs would have to be worked out separately for each civil work package.

39. The Consultants shall make detailed analysis for computing the unit rates for the different items of works. The unit rate analysis shall duly take into account the various inputs and their basic rates, suggested location of plants and respective lead distances for mechanized construction. The unit rate for each item of works shall be worked out in terms of manpower, machinery and materials. The cost estimates shall be benchmarked with contracts with similar conditions in order to get a more realistic cost estimate.

Economic Analysis

40. The subproject will have clear economic rationale. The economic rationale includes an analysis of the market for the subproject's output and assesses its demand. The problem to be address by subprojects should be defined, together with identification of options for technical solutions.

41. The subproject will be cost effective. This usually involves a review of technical options available to address the identified problem and selecting the least cost option. Alternatively, economic efficiency may be demonstrated by the calculation of economic internal rate of return based on "with and without" subproject basis which will be equal to or higher than 9%.

Annexure 2
Expected Relevant Experience and Qualification for Experts

No.	Title	Education	Experience	Specific
NE01	Transport Planner (Team Leader)	Master's degree or post graduate degree in civil engineering/ transport engineering/ transport planning or relevant fields	25 years of experience, including 10 years of overseas experience out of which 5 years shall be in a developed country, in transport planning, regional network planning, road sector policy, strategy, investment planning studies Experience in projects funded by ADB and other multilateral funding agencies is preferable Experience in projects in hilly/ mountainous terrain is desirable	Three projects costing above 200 Million USD as Team Leader of road policy, strategy and investment planning funded by MDBs / MoRTH Two projects costing above 2.8 Million USD (cost of Consultancy) of regional road network planning and development Three projects above 120 Million USD of roads feasibility study and detailed project report Experience in institutional capacity building of road sector agencies
NE02	Senior Highway Engineer / Deputy Team Leader	Graduate in Civil Engineering Preferably Master's degree or post graduate degree in civil engineering (highway engineering, or transportation engineering)	20 years of experience in road/highway design services Experience on projects funded by ADB and other multilateral funding agencies is preferable	Experience in implementation of two projects costing above 100 million USD funded by MDBs / MoRTH as a deputy team leader or resident engineer of a supervision consultant Three projects in road feasibility and detailed project report preparation (NH/SH/MDR/ODR minimum aggregate length of 250 km), cost of project of USD 100 Million 100 km of roads in hill regions as highway engineer, deputy team leader or resident engineer Good knowledge of highway design software Mx Roads, soil stabilization and enhancement of CBR of sub grade through use of admixture, experience and knowledge of use of geo synthetics, rigid grids, knowledge of use of warm/green bitumen is preferable (Details of works or inputs provided in this field should be submitted for consideration of the experience)
NE03	Bridge / Structure Engineer	Graduate in Civil Engineering Preferably Masters or post graduate degree in Bridge Engineering /Structural Engineering	15 years of experience in design of bridges and related / similar structures	Experience of Feasibility study and DPR Preparation of two projects costing above 100 Million USD funded by MDBs / MORTH. Design of minimum three major bridges (each of length > 100m)
NE04	Traffic & Road Safety Expert	Graduate in Civil Engineering	10 years on similar projects as Traffic Engineer / Road	Experience of feasibility study and DPR Preparation of three projects

No.	Title	Education	Experience	Specific
		Preferably Masters or post graduate degree in Traffic Engineering / Transportation Engineering / Transportation Planning	Safety Engineer	costing above 100 Million USD for conducting traffic surveys, axle load surveys, forecasting and analysis (NH/SH/MDR/ODR) funded by MDBs / MoRTH One project as a road safety auditor Experience in traffic junction analysis; conceptual layout based on turning forecast volumes and rationalizes junction control measures in terms of demand/ capacity and average delay. The potential candidate should also demonstrate in depth understanding on collision investigation, identification of road safety issues and development of mitigation measures Experience in projects in hilly / mountainous terrain (minimum aggregate length of 100 km)
NE05	Road / Pavement Engineer	Graduate in Civil Engineering Preferably Masters or post graduate degree in Civil Engineering (highway / transportation / soil mechanics and foundation / geo-technical engineering)	10 years of experience in pavement design and maintenance	Experience of Feasibility study and DPR Preparation of three projects costing above 100 Million USD in road feasibility and detailed project report preparation (NH/SH/MDR/ODR) funded by MDBs / MoRTH 100 km of road pavement design in hilly regions preferably in the Himalayan Region
NE06	Transport Modeller	Graduate in Civil Engineering Preferably Master's degree or post graduate degree in civil engineering / Transport Engineering / transport Planning or relevant fields.	10 years of experience in transport network modelling using commercially available software	Experience of Feasibility study and DPR Preparation of two projects on development of transport model for regional networks with multimodal interactions
NE07	Environment Safeguards Specialist	Master's degree or post graduate degree in environmental science, climate change, or relevant fields	15 years of experience, in environmental impact assessment and preparation and monitoring EMP implementation for infrastructure projects Experience on projects funded by ADB and other multilateral funding agencies is preferable	Experience of Feasibility study and DPR Preparation of 2 projects costing above 50 Million USD with Multilateral Development Banks, particularly, familiarity with ADB's SPS 2009, is preferred Experience in projects in hilly / mountainous terrain (minimum aggregate length of 100 km)
NE08	Climate and Disaster Risk Resilience Specialist	Master's Degree in Climate Sciences, Meteorology, Environmental	15 years of experience in development projects and designing adaptation measures with 5 years	Experience of Feasibility study and DPR Preparation of 2 projects costing above 50 Million USD with multilateral development banks

No.	Title	Education	Experience	Specific
		Engineering and related fields	specialized experience in preparing climate risk assessments and designing adaptation measures in infrastructure projects	Experience in projects in hilly / mountainous terrain (minimum aggregate length of 100 km)
NE09	Social Safeguards	Master's degree or post graduate degree in social science, or relevant fields	10 years of experience in land acquisition, rehabilitation and resettlement services Experience on projects funded by ADB and other multilateral funding agencies is preferable	Experience in R&R impact assessment and related studies, preparation of R&R plan, Land Acquisition (LA) Plan, Draft LA Notifications and LA Reports of infrastructure projects / externally aided projects Thorough knowledge of prevailing land acquisition Act as well as current draft land Acquisition and Resettlement Act as well as State/ National Resettlement Policy on Resettlement and Rehabilitation for Project/ ADB's R&R policy Experience with multilateral development banks, particularly familiarity with ADB's procedures, is preferred Experience of Feasibility study and DPR Preparation of 2 projects costing above 50 Million USD with multilateral development banks Experience in 2 projects in hilly / mountainous terrain (minimum aggregate length of 100 km)
NE10	Gender Specialist	Master's degree or post graduate degree in social science, or relevant fields	10 years of experience in social development, gender equity and social inclusion services	Two projects of preparation of Gender Action Plan (GAP) based on the ADB Guidelines for Gender Mainstreaming (2012)
NE11	Procurement Specialist	Master's degree or post graduate degree in civil engineering, or relevant fields	15 years of experience, in procurement for civil works in roads and bridge projects	Experience of Feasibility study and DPR Preparation of at least four projects in preparation procurement documents of road projects funded under MDBs costing above 200 Million USD Experience in procuring contractors, construction supervision and related consultants
NE12	Geotechnical Engineer	Masters or post graduate degree in Foundation Engineering / Soil Mechanics / Geo-Technical Engineering	15 years of experience as geotechnical expert for highway projects with 100 km of roads in Hill regions Experience in Himalayan region shall be preferable.	Experience of Feasibility study and DPR Preparation of 2 projects funded under MDBs / MoRTH costing above 50 Million USD in soil and material surveys & investigations, determination of density & CBR of subgrade soil, sub-soil/ geo-technical investigations for deep foundations for bridges, foundations for other structures and embankment / slope

No.	Title	Education	Experience	Specific
				design, laboratory and field testing, slope stability analysis, identifications of chronic slip zones & mitigation measures for slope stabilization Finalization of foundation types for bridges / structures in road design
NE13	Transport Economist	Master's degree or post graduate degree in economics, transport planning, or relevant fields	15 years of experience in road project economic analysis/ feasibility studies	Three projects in estimating EIRR of road projects costing above 67 Million USD as per IRC / ADB guidelines Two projects experience in estimating EIRR using HDM IV
NE14	Financial Specialist	Master's Degree in Finance or Business Administration, Chartered Accountant	15 years of experience in financial management, financial analysis, and modelling of infrastructure projects Experience in PPP projects is preferable	Experience in financial due diligence of road sector agencies Experience in preparation of investment plan of two infrastructure projects costing above 67 Million USD funded under MDBs
NE15	ITS Engineer	Master's Degree in Electrical Engineering or relevant	10 years of Experience in intelligent transport systems of road projects including 2 years signal timing and analysis experience	Experience with toll management, accident and safety response system, incident management, and other road related ITS systems of two projects funded under MDBs, costing above 50 Million USD
NE16	Geologist	Masters or post graduate degree in Geology or Geological Science or Engineering Geology	15 years in geological investigations of hill side slope & embankment slope of highways / railways corridor, geological investigations for structures either underground or surface including tunnels & bridges, landslide studies, identification of chronic slip zones, slop stabilization, Q- value/RMR, Rock classification, and geological mapping	Familiar with relevant software and experience in analysis of slip zones, dip etc. of rock formations with 2 projects in hilly / mountainous terrain (minimum aggregate length of 100 km) Experience in Himalayan region shall be preferable
NE17	Institutional Development Expert	Master's Degree in Finance or Business Administration or Engineering	15 years of experience in developing institutional development strategy studies for infrastructure sector	One institutional development strategy project with road sector agency funded by MDBs
NE18	Senior Survey Engineer	Graduate in Civil Engineering Preferably Master's or post graduate degree in Survey Engineering / Surveying / Remote Sensing	15 years of experience in similar projects in project preparation and design with a thorough understanding of computer-based methods of surveying	Experience of Feasibility study and DPR Preparation of 2 projects funded under MDBs/ MORTH costing above 50 Million USD Experience in 2 projects in hilly / mountainous terrain (minimum aggregate length of 100 km)

NE = National Experts and NS = National Support Staff