Terms of Reference

Consultancy Services for detailed feasibility and detailed engineering design of 221 km state road network

1. Introduction & Background:

1.1. The Government of Himachal Pradesh through the Govt. of India has received loan of US$82 Million from World Bank through Multi-Trenching approachincluding upgradation of roads (approximately 90 Km road lengths) under Tranche-1 and intends to utilize part of the loan component under the contract for Consultancy Services for Preparation of Feasibility Study and Detailed Project Report for Selected Corridors in Himachal Pradesh of about 221 Km of state roads, with the expected outcome of upgradation and Detailed Engineering, including integration of Safeguard Assessment for the proposed H.P State Roads Transformation Project. Detailed Engineering/Safeguard Assessment of 221 Kms. of roads will be used for improvement and up gradation of State Road network under Tranche-2.

1.2. The Implementing Agency of World Bank Project, Himachal Pradesh Infrastructure Development Corporation Limited (HPRIDCL), represented by the - Director (Projects) had undertaken Feasibility Study in year 2006-07 on 1675 km of selected corridors of the Core Road Network of the State and based on the outcome of the feasibility study, the up gradation / improvement of about 435 Km roads was undertaken. HPRIDCL has further updated the feasibility study of the balance network from the previous phase and added new roads, to make a total of 2000 Km of Core Road Network`. These roads have been selected by the HPRIDCL based on their connectivity with other major roads, traffic, and other socio-economic parameters of importance. Based on the outcome of the feasibility study, 650 km of core roads have been prioritized for upgrading under Tranche-1, Tranche-2 and Tranche-3 project adopting appropriate contracting models. Now, HPRIDCL intends to Prepare Feasibility Study and Detailed Project Report for Selected Corridors in Himachal Pradesh of about 221 Km of additional MDR/ODR roads, with the expected outcome of upgradation and Detailed Engineering, including integration of Safeguard Assessment for the proposed H.P State Roads Transformation Project. This Detailed Engineering/Safeguard Assessment of about 221 Kms. of roads will be used for improvement and up gradation of State Road network under Tranche-2.

1.3. The primary objective of the Consultancy services is to prepare the Project in all aspects inter alia: technical, financial, economic, environmental and social safeguards, and procurement structuring and documentation for World Bank loan appraisal.

1.4. The project also aims at the creation of sustainable road assets with high value for money to road users. In addition, one of the important features is corridor and network based approach to improving road safety in the state and better connectivity to adjacent locations, by improving approach roads all along the corridor.

1.5. The Road upgradation improvement works will include upgrading of existing roads to Intermediate / two lanes depending on the traffic, and other economic criteria with/without paved shoulders, construction of bypasses/realignments, tunnels, innovative bridges, viaducts,strengthening culverts and bridges, constructing new bridges and cross-drainage structures, environment protection measures and, Resettlement and rehabilitation. It is stressed that environmental impacts and social impacts should be avoided/minimized, appropriately integrated into design and fully mitigated as per the requirements of WB.

1.6. While MDRs/ODRs will be mandated for development, improvement in connectivity to Major Tourism locations and industrial estates falling around 15 Kms of proposed road stretches is also being mandated because some religious tourist locations adjoining these roads attract large number of tourists and good connectivity is further going to boost the potential of site. This is as per the Tourism Policy of 2005 framed by the State Government under which special efforts are being made to develop unexplored destinations with the assistance of Central Government, to improve the sanitation, roads, parking, toilets,

accommodation, beautification and landscaping of tourist interest places, wayside amenities etc. In addition to this, the Government of India under Swadesh Darshan Scheme is developing theme based tourist circuits on the principles of high tourist value, competitiveness and sustainability in an integrated manner by synergizing efforts to focus on needs and concern of all stakeholders to enrich tourist experience and enhance employment opportunities. Therefore, in the overall project plan, consultants shall also emphasize on such off-highway connectivity, which can create immediate benefits for local communities. Construction of wayside amenities and development of tourist spots falling around 15 Km. of proposed road stretches is proposed to be included in the project to enrich tourist experience and enhance employment opportunities.

1.7. While MDRs/ODRs will be mandated for development, improvement in connectivity to Fisheries/ Agriculture based economy such as fisheries, grains, vegetables, apple and other local fruits falling around 15 Kms of proposed road stretches is also being mandated because good road connectivity is further going to boost the potential of site.

2. Overall Objective and Scope of the Assignment:

a. Objectives:

The main objective of the Consultancy services is to carryout feasibility study and prepare Detailed Project Report (DPR) of a specified length of State Road Network, including safeguard assessment project roads and assist the Client in the procurement of civil works in compliance with the GoHP and World Bank requirements.The consultant will assist HPRIDCL for Loan appraisal with World Bank for the Project roads.

In this regard, HPRIDCL intends to engage a qualified eligible multi-disciplinary consulting Firm for preparation of Detailed Project Reports (DPR) for 221 kms (approx. aggregate length) of hilly terrain State Road Network (list attached as Annex-A1). The scope of the project involves the design of an all-weather roads incorporating bypasses, tunnels, innovative bridges and long-span viaducts to minimize impact on existing habitation, reduce hill cutting, improve road geometry and ensure environmental and social sustainability. The provision of tunnels, innovative bridges and Viaducts is aimed to minimizing the environmental/social impact and enhancing the riding comfort with significant reduction in travel time.

b. Scope of Service:

With a view to accomplish the above-mentioned objectives, the following paragraphs outline the scope of the Consulting services followed by detailed tasks.

2.1. Feasibility, Social, Environmental and Engineering Studies:

The consultant will carry out feasibility study of 221 km of MDR/ODR roads, with the expected outcome of identification of the 221 km roads proposed for upgradation and prioritization of the upgradation interventions. The Consultant shall carry out engineering, economic, environmental and social feasibility studies (to standards appropriate for use in subsequent World Bank project appraisal) for 221 km of roads identified by the Consultant and HPRIDCL in order to confirm their viability, to determine the level of improvement in each case, and to define the priority program to be implemented under the project considering objective financial and implementation constraints in 221 Km of roads.

The up-gradation/rehabilitation will be based on environmental and social screening outcomes, and findings of engineering feasibility study. The screening shall be done in line with World Bank's

Environment and Social Framework (ESF)and relevant Environment, Health, and Safety Guidelines. The environmental screening shall also include off-road (MDR/ODR) connectivity to important tourist/religious places and industrial estates, including future agro-logistics centers for processing key value chains like apple and other fruits along the fruit belts, falling around 15 km of core road network. To achieve the aim of creating sustainable road assets, the consultant shall collate information on environmental settings, Value Engineering Costs (VECs), and key ecosystem services (e.g. water sources, habitat/wildlife corridor) for each road corridor to determine scope of drainage, geo-technical, biodiversity assessment and adopt green highway principles in the engineering design.Climate adaptation/ resilience shall also form part of the analysis and will serve a inputs to the design of the proposed road corridors. The consultant will co-ordinate with relevant stakeholders, including line ministries (Industries, Tourism, etc.), to ensure that the design aligns with regional and national goals.

The consultant has to conduct a thorough vulnerability assessment to ensure that the proposed foundations for viaducts/ tunnels and other structures proposed are structurally sound.

The consultant shall factor-in Environmental and Social Impact Assessments, including noise and vibration impact analysis and consider/incorporating required mitigation measures in the DPR, bidding and contract documents of the upgradation and bridge reconstruction interventions;

The consultant will seek approvals for designs from local authorities, environmental agencies, and other relevant entities to proceed with detailed planning.

2.2. **Detailed Project Reports (DPR):** The DPR should be prepared as an output of the various activities and meet the following but not limited to:

(i) The consultant will prepare DPR and bidding document for upgradation of 221 km of priority state roads with complete considerations of environmental and social assessments of natural, physical and social elements (including project-affected people),and prepare mitigation/management plans as required to meet World Bank appraisal requirements. The consultant will also keep a provision for additional geotechnical investigation using remote sensing technology (to be provided under a provisional sum, as such services will be carried out by the Consultant through specialized areal investigation companies).Prepare Detailed Project Report (DPR) for about221 Km of roads for upgrading/improvement for inclusion in the project, the Consultant should make provision of ground water recharging/ deep drainage using the road runoff & enhancement of natural springs on some of these identified roads, including options for water decontamination, if needed, to enable water sharing with communities.

(ii) To establish the technical, environmental, social, economic, and financial viability of the said projects along with off-road connectivity to key locations, suitable for funding by WB and prepare detailed project reports for standardizing the existing road or upgrading to Intermediate/two-lane with/without paved shoulders configuration with the provision of wider road for rural/urban settlements, bypass and capacity augmentation as required and better connectivity to adjacent tourism locations and Industrial estates by improving approach roads all along the corridor. Assist the Client in the appraisal with the World Bank and State Government. The viability of the project shall be established taking into account the requirements with regard to upgrading and improvement based on highway design, pavement design, provision of service roads/bypass, tunnels, innovative bridges, viaducts wherever necessary, type of intersections, underpasses, flyovers, ROBs, rehabilitation and widening of existing and/or construction of new bridges and structures, road safety features, utility shifting, environment and social management measures quantities of various items of works and cost estimates, economic analysis, financial structuring.

(iii) The Detailed Project Report would inter-alia include Surveys & Investigations, detailed highway design, design of pavement and overlay with options for flexible or rigid pavements, design of bridges and cross drainage structures and grade separated structures, design of service roads/ bypasses, tunnels, innovative bridges, viaducts, Freight Terminal, Truck lay byes, Bus stops, quantities of various items, detailed working drawings, detailed cost estimates including NH SR and market rates, economic and financial viability analyses, environmental and social feasibility, social and environmental action plans as appropriate as per requirements of National and Local laws and WB/ GOHP approved R&R Policy (update existing policy to incorporate recent legislative change or develop new), Encumbrance plans, Land acquisition plans, Safety Audit, and Preparation of bidding documents for various types of EPC, item rate and so on, required for tendering the project on commercial basis for international / local competitive bidding under WB procedures. It is also emphasized that Technical, Financial, Procurement, Environmental, Safety audit and Social safeguard functions will be the dominant requirement in the assignment. HPRIDCL has awarded the work of consultancy services for technical assistance to help upgrade Road Maintenance Management System to Road Asset Management System (RAMS) wherein main task of the RAMS Consultant is to collect data of inventory of pavements, roughness of paved roads, surface distress indicators, pavement strength, Traffic Axle load, Traffic 3 day counts and Bridge visual condition data for the existing roads**.** The data collected by the RAMS Consultant will be shared with Consultant in order to avoid the duplication of data for project roads

(iv) the Consultant shall carry out engineering solutions such as crash barriers, speed calming measures, provision of climbing lane in steep gradient for heavy trucks to move at a reduced speed etc. as part of the accident reduction measures on the project roads.

(v) The Consultant should ensure detailed project preparation incorporating aspects of value engineering, quality audit and Safety Audit requirement in design and implementation.

(vi) The economic and financial assessment will be carried out in accordance with WB's Guidelines for the Economic Analysis of Projects to assess the economic benefits of road sections by comparing "with-project" and "without-project" scenarios. A financial assessment will be carried out to ensure sustainable asset maintenance.

(vii) The services also include assistance in providing expert advice to the Client in procurement of Contractors adopting WB norms, bid process management, preparing a comprehensive contract management plan and dispute resolution mechanism, developing a communication and marketing strategy to promote the concession and engage stakeholders and undertaking value-for-money analysis.

(viii) The consultant shall design monitoring and evaluation framework and for which all the base line surveys shall be carried out by the Consultant along with development of indicators.

(ix) The consultant will study the current policies and procedures for accommodating utility facilities and private telecom lines on core-roads of the State. The consultant will develop the policy guidelines, procedures and implementation strategies for accommodation & re-location of utilities and which support the installation practices that minimize excavation.The consultant will identify and design for the relocation of existing utilities (water, sewage, power lines) in areas where tunnels, bridges, and viaducts will be constructed.The consultant willdevelop design solutions for the integration of necessary utilities into the tunnels, viaducts and bridge structures without compromising functionality

(x) The consultant based on outcome of environmental screening, if required, shall conduct biodiversity assessment study to assist in decision-making on conservation and management of areas with high biodiversity values situated along prioritized core road network and project influence area. Based on the initial analysis, some road works that would cause significant adverse or irreversible impacts on such areas may be excluded. The consultant, in consultation with relevant stakeholders will formulate a Biodiversity Management Plan defining management and enhancement measures, estimating budget and earmark provision for implementation of measures proposed.

(xi) *Noise and vibration analysis:* The consultant shall identify and estimate the nature and magnitude of the impact of the noise and vibration likely to be generated by the construction and traffic on the road side properties and communities. The consultant will identify/work out the physical and social mitigation measures, including preparation of specifications for the remedial works as part of the DPRs/mitigation plans and compensation for social impacts, if needed. The same will be and incorporated the solution in bidding document & ESMP.

(xii) For project road network, the consultant shall identify road stretches requiring forest and/or wildlife clearances and will assist client in obtaining these Clearance/s. The scope shall include marking boundary pillar of proposed right-of-way, conduct tree counting survey and its enumeration, preparation of forest land diversion map and delineate its boundary by conducting DGPS survey, coordinate verification of trees for cutting and forest area to be acquired, presentation of case before MoEF&CC, preparation of forest diversion proposal, coordination and follow-up with forest departments till FC approvals are obtained.

(xiii) Based on detailed geo-hazard/landslide risk assessment the Consultant shall propose bio-engineering solutions to sustainably prevent and protect the risks from landslips/landslides.

2.3. **Assistance in Procurement of Civil Works:** the consultant will provide assistance from start of the preparation to invitation of tenders, evaluation and till signing of the agreements during the period of this assignment of Consultant.

3. Detailed Tasks:

3.1. The Consultant shall carry out engineering, economic, environmental and social feasibility studies (to standards) appropriate for use in subsequent World Bank project appraisal on 221 km of roads identified by HPRIDCL in order to confirm their viability, to determine the level of improvement in each case, and to define the sections in priority and what improvements to be implemented under the project on different modes. The feasibility study report shall give priority list of 221Km road sections to be upgraded to various standards.

3.2. The consultant (environmental, social and technical teams) shall review reports prepared under Phase-I of HPSRP& HPSRTP, and identify good practices and lesson learned from implementation of HPSRP-1&HPSRTP. Based on the review findings,checklists used in HPSRTP, the consultant shall develop design principles guidance manual (process of analysis and associated criteria), which will assist in decision making during preparation of EIA/EMP, SIA/RAP and DPR for HPSRTP.

General tasks identified on 221Km which are to be upgraded

3.2.1. Detailed reconnaissance;

3.2.2. To identify and assess potential improvements to the existing road alignment, addressing issues such as congestion, substandard geometry, social and environmental impacts, landslide-prone areas, and excessive hill cutting. This task involves proposing viable alternatives that may include bypasses, tunnels, bridges, and long-span viaducts, followed by a comprehensive evaluation and comparison of these alternatives based on techno-economic and other relevant factors. Conduct a thorough cost-benefit analysis to evaluate the financial feasibility of the proposed tunnels, bridges, and viaducts, factoring in construction, maintenance, and operation

costs. Provide a comparison of alternative designs to ensure the most cost-effective and sustainable options are chosen;

3.2.3. Inventory and condition surveys for road;

3.2.4. Inventory and condition surveys for bridges, ROB, RUB, etc.: Cross- drainage structures and drainage provisions;

3.2.5. Inventory of valued environment components (VEC) and environmental settings of project roads;

3.2.6. Detailed topographic surveys using Total Stations and GPS;

3.2.7. Pavement investigations; Geo technical investigations: sub-grade characteristics and strength: Geotechnical Investigation of required sub-grade and sub-soil characteristics and strength for road and embankment design and subsoil investigation;

3.2.8. Identification of sources of construction materials;

3.2.9. Safety Audit Plan: Review the safety aspects of existing road at different stages of design and carrying out road safety audit; collection of accident statistics from historical accident data and from Integrated Road Accident Database (IRAD); Preparation of traffic safety and work zone safety plans, corresponding items of works, specifications etc.

3.2.10. Detailed design of road, its x-sections, horizontal and vertical alignment and design of high embankment and slopes. Detailed design will integrate analysis of options for slope stability measures to be undertaken, which shall also include bioengineering measures. The HPRIDCL has already prepared the manuals on bioengineering which shall be used by the consultant in suggesting bioengineering measures according to the specifications presented therein.

3.2.11. Detailed design of structures based on Geotechnical Investigations conducted as per MoRT&H Specifications (latest revision) & IRC-78 (latest revision) for river bridges, tunnels, innovative bridges, viaducts, flyovers, ROBs, RUBs, etc., preparation of GAD and construction drawings etc., and assist the Client in pursuing the Railways/GOI/GOHP authorities for approval of the GAD &Proof checking.

3.2.12. The Geotechnical investigation for the structures shall be carried out as per the provisions of IRC-78 latest edition. The number/depth of bore holes shall be carried out as per the provisions mentioned in IRC-78-2020 latest edition.

3.2.13. Identification of the type and the design of intersections; Identify the Cycle track/ Pedestrian paths, wherever necessary.

3.2.14. Design of complete drainage system and disposal point for storm water; rain harvesting.

3.2.15. Location, layout and design of Freight Terminal, Truck lay byes/ Bus lay byes, way side facilities; and parking areas etc. at appropriate locations.

3.2.16. Quality Assurance Plan.

3.2.17. Detailed design of traffic safety measures including inter alia road signage, road markings, road furniture and safety devices.

3.2.18. Encumbrance Plan; Strip plan indicating the scheme for carriageway widening, location of all existing utility services (both over- and underground) and the scheme for their relocation, type of land uses, trees to be felled and planted.

3.2.19. Preparation of detailed project report, Engineering designs, cost estimate, drawings of "Good for construction" standard, rate analysis, detailed bill of quantities, bidding documents for execution of civil works using appropriate bidding models agreed with the Client. In case of EPC contracts the bill of quantities will be issued to bidders for information only without prejudice.

3.2.20. Carry out environmental & social screening, including identification of significant adverse impacts that would be found unacceptable and application of a mitigation hierarchy (avoid, minimize, compensate/offset) in those cases by exploring alternative design options in accordance with ESS 1 — Assessment and Management of Environmental and Social Risks and Impacts and preparation of the Screening Report. This would also entail identification of patches involving forests areas for which clearances/permissions need to be sought from concerned authorities.

3.2.21. Environmental and social impact assessment, including such as related to cultural properties, natural habitats, involuntary resettlement etc. The same will be reviewed/assessed by the Independent Environment and Social Assessment Consultant.

3.2.22. Noise and vibration analysis: The consultant shall identify and estimate the nature and magnitude of the impact of the noise and vibration to be created by the construction and traffic on the road side properties and communities. During construction and while the roads are in operation (public traffic use) noise and vibration could cause cracks and compromise structural integrity of properties in close proximity to the roads. Noise could disturb and interfere with residential life and commercial activities in properties along the road. In cases underpass or bypass has to be provided in built-up areas the effects of noise and vibrations could be server. The Consultants shall carryout analysis of the nature, magnitude and effect of noise and vibration on properties and structures along the road proposed for upgradation. The Consultants shall identify/work out the physical and social mitigation measures, including preparation of specifications for preventive remedial works and compensation for social impacts. The same will be and incorporated the solution in bidding document & ESMP.

3.2.23. Carry out environmental & social screening, including significant adverse impacts that would be found unacceptable and application of a mitigation hierarchy (avoid, minimize, compensate/offset) in those cases by exploring alternative design options in accordance with ESS 1 — Assessment and Management of Environmental and Social Risks and Impacts. This would also entail identification of patches involving forests areas for which clearances/permissions need to be sought from concerned authorities.

3.2.24. Public consultation with various stakeholders at all the different stages of assignment including identification of appropriate mechanisms for continuous citizen engagement.

3.2.25. Preparation of social management plans for the project affected people as per WB/GOHP approved R&R Policy.

3.2.26. Preparation of existing road Land Schedule on the revenue map and correlating it with the chainages of the road depicting the width of the road in meters at every change and preparation of Land Plan Schedule (LPS) for land proposed for acquisition, if any at certain locations like junction, curves, passing places etc. as per the requirements / other applicable laws and requirements incorporating the extent of land acquisition on the revenue map and at the field and assessing the requirement for the proposed road improvement works.

3.2.27. Preparation of RAP or Abbreviated RAP, Indigenous Peoples Development Plan to mitigate identified impacts as might be deemed necessary.

3.2.28. Preparation of an environmental screening report, including negative screens for significant adverse impacts that would be found unacceptable and application of a mitigation hierarchy (avoid, minimize, compensate/offset) in those cases by exploring alternative design options.

3.2.29. The Consultant shall carry out the preliminary environmental and social risk screening and scoping, ESIA, ESMP, RAP and other studies as per the HPRIDCL's ESMF, RPF, LMP and Hill Road Project SEP (that meets the requirements of the World Bank Environmental and Social Framework)1.

3.2.30. Preparation of Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP): Environmental & Statutory clearances; Plans for tree plantations and arboriculture; detailed specification, bill of quantities, execution drawings and contracting procedures for execution of the environmental mitigation and enhancement measures suggested, separate for pre-construction, construction and operation period. EIA/ EMP should follow the mitigation hierarchy, as noted above, that will guide the design principles for the roads and include a monitoring framework. The ESMP will also include Biodiversity Assessment Report (if required), Comprehensives Construction & Demolition Waste Management Plan and need for other reports to be decided after screening. The ESMP shall include specific or sample plans, such as for management and redevelopment of quarries, borrow areas and construction camps.

[1] *Prepared for World Bank funded Himachal Pradesh State Roads Transformation Project (HPSRTP).*

The ESMP shall include detailed specification, bill of quantities, execution drawings and contracting procedures for execution of the environmental mitigation and enhancement measures suggested, separate for pre-construction, construction and operation period. In addition, the ESMP shall include good practice guides, relates to construction and upkeep of plant and machinery.

3.2.31. Design of way side amenities and development of tourist spots falling around 15Km of proposed road stretches, landscaping strategy & action plan identification of road stretch with available RoW, types and combination of tree/shrubs species (promote indigenous species), technical specification, bill of quantities, O&M strategy. The ESMP shall address in detail labor-influx challenges and child labor and gender based violence, including abusing underage girls.

3.2.32. Procurement & checking of estimates with concerned department (joint site visit) from utility shifting departments.

3.2.33. Preparation of forest cases as per the format of the forest department including fixing boundary pillars of proposed right-of-way, and marking of the forest area proposed for acquisition by fixing the boundary pillars of RCC M-20 grade of 600mm height, conduct tree counting survey and its enumeration, preparation of forest land diversion map and delineate its boundary by conducting DGPS survey, coordinate verification of trees for cutting and forest area to be acquired, presentation of case before MoEF&CC, preparation of forest diversion proposal, coordination and follow-up with forest departments till obtaining FC approvals.

3.2.34. Identification and preparation of cases on behalf of HPRIDCL/ HPPWD for acquisition of suitable dumping sites, crusher sites, mining sites for aggregates and sand, borrow areas. The consultant shall prepare cases for acquisition as per the rules and seek statutory clearances required for these sites on behalf of theHPRIDCL.

3.2.35. Value analysis / value engineering and project costing;

3.2.36. Economic analysis.

3.2.37. Preparation of bidding documents appropriate for tendering based on WB requirements, and appropriate bidding models agreed with the Client.

3.2.38. The consultant will study the current policies and procedures for accommodating utility facilities and private lines on core-roads of the State. The consultant will develop the policy guidelines, procedures and implementation strategies for accommodation & re-location of utilities and which support the installation practices that minimise excavation.

3.2.39. The consultant will consult with telecom and other service providers for highway utility planning for the proposed up-gradation roads.

3.2.40. The use of innovative practices and technologies that help to minimise excavation of roadway should be suggested by the consultant. The best practices in various states and other parts of world shall be studied for burying of optic fiber cables and conduits underground. The consultant will co-ordinate the up-gradation road design with installation of broad- band facilities to save on cost incurred for repeated excavations, maintenance, damages to road and traffic flow disruption. The approach would be to install the underground conduits in the same trench, at the same time on a shared cost basis.

3.3. Provision of ground water recharging using the road runoff & enhancement of natural springs.

3.4. **Monitoring and Evaluation Framework:** Design & Develop a functional Monitoring and Evaluation Framework which should have clear linkage with the National & State Development Strategies. Good monitoring and evaluation design during project preparation should be a much broader exercise than just the development of indicators. Good design should have following components:-

a) Clear statements of measurable objects for the project and its components, for which indicators should be defined.

b) A structured set of indicators, covering outputs of goods and services generated by the project and their impact on beneficiaries.

c) Provisions for collecting data and managing project records so that the data required for indicators are compatible with existing statistics, and are available at reasonable cost.

d) Institutional arrangements for gathering, analyzing, and reporting project data, and for investing in capacity building, to sustain the M&E.

e) Proposals for the ways in which M&E findings will be fed back into decision making.

3.5. Facilities to be provided to Employer: The consultant shall provide the followingfacilities:

a) A3size Duplex Colour Laser Multifunctional Photocopier with Print, Copy and scan having Multi-purpose Tray (Minimum 2 Trays), Print Speed 15/15 ppm (A3), Print Speed 26/26 ppm (A4, A5, A5R etc.), Paper Supply Capacity (Standard: 1200 sheets — 1-no with all the other accessories at Shimla office of Employer. Theconsultant shall bear the expenses of its maintenance & toner/ ink for 12 months.

3.6. **Geo-technical investigation for identification of geo-hazard/landslide risks and provision of civil engineering and bio-engineering solutions**

(i) **Geohazard/landslide risk**: Given the topographic and geo-hazard challenges of improving roads in HP at detailed design stage, the consultant shall carry out a detailed geotechnical investigation and determining the characteristics of the slide plane/side slope along hill side and the remedial measures will reduce the risk of issuing escalated unforeseen circumstance related additional works. Basic geotechnical investigation shall be carried out using conventional distractive methods, such as boring, drilling and refraction wave based natural ground stratum investigation. The Consultants shall investigate past landslide incidences along the Project roads and get better understanding of the geohazard risks. The Consultants shall also assess changes in vegetation coverage and land use in the high geohazard risk areas and determine the potential of new landslide risk occurrence and possible remedial measures, which include bioengineering and free drainage of ground water away from the slide planes and the road structure type solutions. Additional complementary geotechnical investigation could be carried out using nondestructive methods such as AIRBORNE LiDAR **MAPPING/Drone Mapping.** The nondestructive method should enable to determine the nature, including the depth of the slide planes. "The **geotechnical investigation using non-destructive methods such as AIRBORNE LiDAR MAPPING/ could be carried out by a specialized contractor. The prospective/shortlisted consultants shall propose the type of the non-destructive methods and associated costs. The non-destructive method could be applied to about 60km of road sections on mountainous terrain where geo-hazard/landslide occurrence has been observed in the past and stretches with high risk of landslide potential. The specific locations will be determined by the Client after the consultant carryout the basic geo-technical investigation and determining high risk stretches. For comparison of costs, the consultants shall propose a provisional sum for conducting the non-destructive method on 60km. If the non-destructive investigation method cost is affordable within the existing budget the services/investigation could be applied to the 221km of roads proposed for upgradation. Based on the outcome of a negotiated price the payment could be made as reimbursable)". HPRIDCL reserves the right to reject or include all or part of the proposed non-destructive method of investigation or apply on selected stretches as a pilot.**

3.7. **MAINSTREAMINGRESILIENCE**,includingbutnotlimitedto:

a. Conduct hydrological analysis to factor in the DPR the addition impact of increased precipitation due to climate change on slope stabilization and drainagestructures,includingdeterminingtheHFLforbridgesbasedonthe increasedprecipitationidentifiedbythe HP ClimateActionPlanordata to be provided by HPRIDCL/Disaster Management and Preparedness Department of HP.

b. Conduct detailed geotechnical investigation and determine the solutions to stabilize hillside cut and valley side slopes.

c. Determine the solutions to enhance the resilience feature of the road formation and bridges and incorporate the new resilience features,

d. Based on the hydrological analysis results of increased precipitation (HFL) due to climate change resize bridge structures,

e. Based on the hydrological analysis results of increased precipitation due to climate change and conducting geotechnical investigation determine the solutions to protect pile and open foundations from scouring, the requirement to provide relief culverts on approach roads, and protection measures to sides and top of approach roads,

f. Based on the hydrological analysis results of increased precipitation due to climate change resize cross drainage structures (culverts, etc.),

g. Based on the hydrological analysis results of increased precipitation due to climate change resize side drains and determine the protection works, like providing concrete lining, etc.

h. Raise embankment on water logging area and/or above groundwater table with adequate freeboard no less than 600 millimetres.

i. Apply appropriate pavement material specification and higher camber.

j. Sealing shoulders to reduce scouring and erosion.

3.8. **PREPAREWORKSITE SAFETY PLAN AND OCCUPATIONAL HEALTHAND SAFETY (OHS) PLAN:**

Based on the traffic level and construction activity related risks, and detailed geo-hazard/landslideriskassessment the Consultant shall prepare worksite safetyplanand OHS plan. The plans shall include:

WORKSITESAFETYPLAN

a. Worksite safety plan to prevent accidents from hillside cutting including protocols for benching to prevent accident on road users and construction workers.

b. Workareaprotectionplan,includingpitfallonconstructionsiteandquarry sites.

c. Trafficsafetymanagementplanwithallsignsandprotections

d. Valleysidedampingandprotectionoflandslidebyoverburdenmaterial

OHSPLAN

e. Early Warning System to prevent landslide and rock fall accidents on construction and road stretches under the contract.
f. PrepareOccupationalHealthandSafetyCode
g. Protocolforhandinginjuredpersonsontheconstructionsite.
h. Incidencepreventionmeasuresonactivesites/stretchesincludingbutnot limited to:
    - Protectingroadusersfromrockfallandlandslide
    - Protectinglocalcommunitiesfromaccidentsbyconstructionmachineryandpitfalls
    - Installing temporary signs/work in progress sign to alert road users on slide, rockfall and

slippery stretches.

- Flagmen at beginning and end of active construction.
- Installing hard barricades on the valley side.
- Installing ‘slow down’ signs of 15 km/hr upstream and downstream of the work location and in between.

i. Incidence prevention measures off active sites/stretches between the beginning and end chainages of the project/contract road/entire contract length including but not limited to:
   - Installing temporary signs on locations vulnerable to landslide, rockfall and slippery stretches.
   - Installinghardbarricadesoncurvesandreflectivebandsoffsitesalong the entire project/contract road.
   - Install ‘slow down’ signs of 25 km/hr at the beginning and end chainages of the project/contract road/entire contract length and in between.

j. Interventionsonpartiallycompletedroadsincludingbutnotlimitedto:
   - Installing temporary signs on locations vulnerable to landslide, rockfall and slippery stretches
   - Installhardbarricadesandreflectivebandsalongthepartiallycompleted project/contract roads/stretches.

k. Interventionsoncompletedroads(permanentaccidentpreventionfeatures)
   - Installingofcrashbarriers
   - Installingguidepostsandreflectivesigns
   - Installingspeedlimitrestrictionsignsonriskystretches
   - Installingalertsignsonlocationsvulnerabletolandslide,rockfalland slippery stretches.
   - Roadmarking

l. DetailedProjectReport(DPR) reviewtoconfirmtheprovision ofextra wide shoulders in the geometric design to provide:
   - spaceforspeedcalming,pedestrianwalkway,anddoublebeambracedcrashbarrier on the valley side; and
   - slide/rockfalltrap/spaceonthehillside.

m. **Addbillitem**forundertakingtheOHSincidencepreventionmeasures.

3.9. PREPARE BIOENGINEERING AND OR NATURE BASED SOLUTIONS TO STRENGTHEN THE ROAD SIDE SLOPES

(i) Prepare appropriate bioengineering solution design.

prepare concept design and drawings for the bioengineering solutions applicable to the type of soil for under 45-degree slope stabilization/protection on the hill side. The techniques or type of bioengineering methods and species of plants/ grass to be used for managing the water as well as strengthen slope stability should be based on tested guidelines and experiences.

identify the bioengineering solutions applicable to the type of soil for over 45-degree slope stabilization/protection on the hill side. Use of appropriate jute net and or engineering measures may also need to be considered in combination of suitable techniques or type of bioengineering

methods. Suitable species of plants/ grass and techniques to be used for managing the water as well as strengthen slope stability based on tested guidelines and experiences.

identify the bioengineering solutions applicable to the valley side slope protection. Use of appropriate drainages, bamboo crib wall, toe wall may also need to be considered in combination of suitable techniques or type of bioengineering methods. Suitable species of plants/ trees/ grass and techniques to be used to strengthen slope stability based on tested guidelines and experiences.

identify if the small scale engineering such as stone rip rap, small check dams and the bioengineering solutions like vegetative check dams or vegetative pipes (facine) or bamboo crib wall could be effective at the revolute or riverbank protection and approach roads, as required to the latter.

Identify the suitable species of grass, plants for the hill slopes, plants/ tree for the valley slopes based on the local surroundings. Avoid using plants/ grass species not suitable for local area.

(ii) Bio-engineering Solutions: In addition to the civil engineering solutions to reduce the risks from landslides, where ever possible, priority shall be given to bio-engineering solutions. Based on detailed geo-hazard/landslide risk assessment the Consultant shall propose bio-engineering solutions to sustainably prevent the risks from landslips/landslides.

4. Detailed Scope & Specifications of Service:

The detailed scope and specification of the Service pertaining to Engineering, Social, and Environmental are appended separately at the following Appendices,

Appendix la- Tasks for Detailed Feasibility Study.

Appendix lb- Tasks for Detailed Engineering Design

Appendix 2- Tasks for Environmental Assessment and Environmental Management Plan

Appendix 3- Eligibility and experience

Note: (i) The detailed scope and specifications of the Service is indicative as per the assessment of the employer, and consultants should submit the detailed methodology in their technical proposals as per his own assessment (detailed procedure to execute the tasks and what, when & how the various tasks would be conducted) for the feasibility and detailed design of the roads, bridges, tunnels, innovative bridges, viaducts and other task componentsfor the improvement, up gradation and maintenance etc. as per the IRC recommendations, MoRTH, best local and international codes /practices/procedures. This shall be one of the major criteria for technical evaluation.

5. Reports to be submitted by the Consultant

All reports, documents and drawings are to be submitted separately for each of the Project Roads. The suitable package sizes shall be decided based on (i) an analysis of what would be attractive to National/ International bidding and (ii) the geographical distribution of the project roads and the administrative organization of the HPRIDCL in the field (package/subpackage wisein consultation with HPRIDCL). The analysis of data and the design proposals shall be based on the data derived from the primary surveys and investigations carried out during the period of assignment. The sources of data and model relationships used in the reports shall be indicated with complete details for easy reference.

Reports:

The description of the report to be submitted under the DPR is indicated below. However, the report shall not be limited to these and consultants would need to go through all the appendices under this Terms of

Reference in detail on the scope of activities and reports to be submitted. In addition, the consultant should also refer to Para 9 of this Terms of Reference for complete reporting requirements.

Detailed Feasibility Study Report: The feasibility study report of 221Km will determine which can further proceed to detailed engineering design for upgradation / improvement contracts. It will project the analysis and consultation required in order to resolve social-impact and/or environmental issues before proceeding with engineering design. This will require close interaction between the economic, engineering, social impact and environmental members of the consultant's team. The study will be carried out as per the tasks detailed in **Annex Ia.**

Detailed Project Reports:

Volume-I, Main Report:

1) This report will present the project background, social analysis of the project, details of surveys and investigations carried out, analysis and interpretation of survey and investigation data, traffic studies and demand forecasts, designs, cost estimation, environmental aspects, economic and commercial analyses and conclusions. The report shall include an Executive Summary giving brief accounts of the findings of the study and recommendations. The report shall also provide District / Taluk break up the details.
2) The Report shall also include maps, charts and diagrams showing the locations and details of existing features and the essential features of improvement and upgrading.
3) The Environmental Impact Assessment (EIA) Report as well as Social Impact Report for each contract package shall be submitted separately as a part of the main report.
4) The basic data obtained from the field studies and investigations and input data used for the preliminary design shall be submitted in a separate volume as an Appendix to Main Report.

Volume-II, Design Report:

This volume shall contain design calculations, supported by computer printout of calculations wherever applicable. The Report shall clearly bring out the various features of design standards adopted for the study. The consultant shallcompile all design documents, drawings, and analyses into a comprehensive final design report that outlines the rationale behind each design choice and the expected outcomes.The design report will be in two parts. Part-I shall primarily deal with the design of road features and pavement composition while Part-II shall deal with the design of bridges, tunnels, innovative bridges, viaducts, ROBs, VUPs, PUPs and cross- drainage structures. The sub-soil exploration report, including the complete detailed design for all features should be carried out as per the requirements of the Design Standards for the project. However, there may be situations wherein it has not been possible to strictly adhere to the design standards due to the existing site conditions, restrictions and other considerations. The report should clearly bring out the details of these aspects and the standards adopted. It should also give details of road and bridge inventory summary in respect of survey and investigation data.

Volume-III, Materials Report:

This report shall incorporate all the details of material investigation as specified in the TOR.

1) The Materials Report shall contain details concerning the proposed borrow areas and quarries for construction materials and possible sources of water for construction purposes. The report shall include details on locations of borrow areas and quarries shown on maps and charts and also the estimated quantities with mass haul diagram including possible end use with leads involved, the details of sampling and testing carried out and results in the form of important index values with possible end use thereof.

2) The Materials Report shall also include details of sampling, testing and test results obtained in respect physical properties of sub grade soils. The information shall be presented in tabular as well as in graphical representations and schematic diagrams. The Report shall present soil profiles along the alignment.

3) The Material Report should also clearly indicate the locations of areas with problematic / plastic / black cotton soils. Recommendations concerning the improvement of such soils for use in the proposed construction works, such as stabilization (cement, lime, mechanical) should be included in the Report. The materials report should adequately emphasize after adequate due-diligence on use of plastic waste in bituminous work.

Volume-IV, Engineering Report: This Report shall incorporate all the details of engineering surveys and investigations carried out as specified in the TOR, data analysis and interpretation thereof.

Volume-V, Safety Audit Report: This Report shall incorporate all the details of Road Safety review / audit undertaken as specified in the TOR; the report shall separately detail the road safety risks in each corridor of the 221 km of network, design countermeasures with respect to road engineering, enforcement, information and education dissemination, trauma care management. The report shall also include a monitoring framework including the baseline situation before the project. The road engineering countermeasures would be streamlined in the road design and ESMPs.

Volume-VI, Drainage Design Report:

This Report shall incorporate all the details of the drainage system as specified in the TOR.

Volume VII- Encumbrance Report:

Volume-VIII, Environmental and Social Reports

i. Environment and Social Screening Report for the 221 km
ii. Environmental and Social Aspects Verification Report (ESAVR) for 221km. The ESAVR shall include a matrix showing how the recommendation of the independent Environmental and Social Impact Analysis are incorporated in the DPR, as well as the safeguard sections and ESMPs of the bidding and contract documents.
iii. Draft Environmental Impact Assessment and Environmental Management Plans **including** the Report shall be prepared conforming to the Guidelines of the Government of India, State Government and WB as appropriate for each construction package section. The draft EIA and EMP will also include Biodiversity Assessment and Management Report, Comprehensive Construction & Demolition Waste Management Plan and any other additional management and mitigation plan identified based on results from the screening exercise. The draft EMP shall include specific plans, such as for management and redevelopment of quarries, borrow areas, worker's health and safety management, construction camps and plant sites. It shall include detailed specifications, bill of quantities, execution drawings and contracting procedures for execution of the environmental mitigation and enhancement measures, separate for pre-construction, construction and operation period. In addition, the draft EMP shall include monitoring plan (including suggested formats), good practice guides, related to construction and upkeep of plant and machinery. It should follow the mitigation hierarchy, as noted above, that will guide the design principles for the roads.
iv. Resettlement Action Plan/Abbreviated RAP, Social Management Plan, Tribal (Indigenous) Development Plan, HIV AIDS Prevention Plan and Labor Management Plan for 221km
v. Environment and Social Management Framework (ESMF).
vi. Land Plan Schedules shall be prepared conforming to the Guidelines of the Government of India, State Government and WB as appropriate for each construction package section

The ESMF and RPF that will be used to conduct site specific screening, identify potential adverse environmental and social impacts and prepare commensurate mitigation measures, mechanisms to incorporate management plans in the bidding and contract documents.

(a) Assessing the impact of the implementation of the designed road on community health and safety and encapsulate mitigation measures in the bidding and draft contract document.

(b) Assessing the impact of the implementation of the designed road on slopes, forestry, natural resources (water, etc.) and natural habitats and encapsulate mitigation measures in the biddingdocuments.
(c) Assessing the impact of the implementation of the designed road on cultural resources and tribal communities (indigenous people) and incorporate mitigation measures in the biddingdocuments.
(d) Assessing/screening the impact of migrant labor (labor influx) and Gender Based violence (GBV) and incorporate code of conduct in the draft contract document.

HPRIDCL will engage an independent consultant to carry out detailed environmental and social (E&S) assessment and prepare ESIAs, ESMPs and RAPs that will be disclose in public. The DPR consultant shall consider the findings and recommendations of the independent E&S consultant and review the design accordingly and integrate/mainstream the recommendations in the DPR, bidding and contract documents.

Volume IX: Financial Viability and Economic analysis:
This report shall assess the financial viability of the overall project. the impact on the GoHP's fiscal space. The report shall also present the costs and benefit streams, net present values, and sensitivity analysis for each package as well as the overall project for the proposed interventions. It should also establish the economic IRR of undertaking the proposed packages along with improvement initiatives of off-road connectivity plans to key locations within 15Kms of the project stretches, in line with scenario analyses. Please note that the connectivity stretches to key locations should be discussed and finalized with HPRIDCL based on the results of economic analyses.

Volume-X, Technical Specifications:
The MORTH's latest Technical Specifications for Road and Bridge works shall be followed for this study. However, latest MORTH"s Technical Specifications shall contain the special technical specifications which are not covered by MORT&H Specifications for Roads and Bridges (latest edition / revision) and also specific quality control norms for the construction of works. For the bioengineering works, the manuals prepared by the HPRIDCL shall be followed.

Volume-XI, Rate Analysis:
This volume will present the analysis of rates for all items of works contract package wise. The details of unit rate of materials at source, carriage charges, any other applicable charges, labour rates, and machine charges as considered in arriving at unit rates will be included in this volume. The consultant should provide adequate analysis of construction cost based on NH SR and market rates both, and recommend accordingly on practical cost estimate.

Volume-XII, Cost Estimates:
This volume will present the contract package wise cost of each item of work as well as a summary of total cost.

Volume-XIII, Bill of Quantities: This volume shall contain the package-wise detailed Bill of Quantities for all items of works.

Volume-XIV, Drawing Volume:
All drawings forming part of this volume shall be to the standard of good for construction" drawings. All plan and profile drawings will be prepared in scale 1:200V and 1:2000H scale to cover one km in one sheet. In addition, this volume will contain good for construction" drawings for the following:

a. Horizontal Alignment and Longitudinal Profile.
b. Cross-section @ maximum 10m interval or less as per site requirements, along the alignment within ROW, 1:200 for both horizontal and vertical
c. Typical Cross-Sections @ 10 m or less interval with details of the pavement structure.
d. Detailed Working Drawings for typical Culverts and Cross-Drainage Structures.
e. Detailed Drainage Plan.

f. *Detailed Working Drawings for individual Bridges, tunnels, viaducts, innovative bridges, VUPs, PUPs, FOB, Flyover, ROB, RUB and other Structures including layout plans, cross-sections, elevations, and construction details.*
g. *Detailed Drawings for Improvement of At-Grade and Grade-Separated Intersections and interchanges.*
h. *Drawings for Road Sign, Markings and other Facilities.*
i. *Schematic Diagrams (linear chart) indicating but be not limited to be following:*
   - *Widening scheme;*
   - *Locations of median openings, intersections, interchanges, underpasses,*
   - *overpasses, bypasses;*
   - *Locations of service roads;*
   - *Location of traffic signals, traffic signs, road markings, safety features; and, o Locations of parking areas, freight terminals, truck lay byes and bus bays, if any.*
j. *Drawings for Bus Bays, Parking areas etc.*
k. *The typical cross-section drawings should indicate the scheme for future widening of the carriageway. The proposed cross-sections of road segment passing through urban areas should indicate the provisions for pedestrian movements and suitable measures for surface and sub-surface drainage and lighting, as required.*
l. *The typical different bioengineering works on slopes to be carried out to be shown on the linear chart.*
m. *The detailed drawings of the slope stabilizing structures at various locations on the linear chart.*
n. *Typical and working drawings of mitigation and enhancement measures to offset project's environmental impacts.*
o. *Construction sequencing diagrams and method statements, specifying the steps and materials involved in the construction process*.
p. *Design drawings for traffic management during construction, highlighting detours, safety measures, and lane closures.*

All drawings will be prepared in A3 size sheets. The format for plan, cross-section and profile drawings shall be finalized in consultation with the review Consultants engaged by HPRIDCL. The drawings shall also include details of all BM and reference pillars, HIP and VIP. The co-ordinates of all points should be referenced to a common datum, preferably, GPS referencing system in line with GTS. The drawings shall also include the locations of all traffic safety features including traffic signals, signs, markings, crash barriers Delineators and bus bays, parking areas etc.

Volume - XVI, Civil Work Bidding documents/ Contract Agreements/ Technical Schedules:
A civil works bid documents / contract agreement/ Technical Schedules for EPC mode shall be submitted.

Volume - XVII, Project Clearances
All the necessary (project related) clearances (such as from MOEF, Railways in respect of ROB/ RUBs, Irrigation Department and any other concerned agencies) shall be obtained by the Consultant and submitted to HPRIDCL so that project implementation can straight away proceed without any hold up. Necessary assistance will be provided by the Client to the possible extent. It is also the endeavor of the HPRIDCL to have clearances before hand from the mining department on the location of the crusher, borrow areas, muck dumping areas and stone mining areas. These shall be obtained by the Consultant from the concerned agencies and submitted to HPRIDCL.

Volume - XVIII, Monitoring & Performance Indicators and Final Report on all other Balance Tasks.
The consultant has to assess the performance indicators at the base year of start and the indicators expected after the implementation of the project as per the approved DPR and provide monitoring mechanism of the same during and post implementation.

Volume —XIX, Final Detailed Project Report, Documents and Drawings (6 Sets)
The Final package/subpackage-wise DPR consisting of Main Report, Design Report, Materials, Report, Engineering Report, Safety Audit Report, Drainage Design Report, Economic Analysis Report, Environmental and Social impact Assessment Report, Biodiversity Assessment and Management Plan, Resettlement Action Plan (RAP) and Tribal Development (Indigenous Peoples) Plan and Drawings.

Incorporating all revisions deemed relevant following receipt of the comments from HPRIDCL on the draft DPR shall be submitted in hard bound and soft copy (pdf).

6. Personnel requirement:

The Consultants shall be required to form a multi-disciplinary team for this assignment. The consultants Team shall be manned by an adequate number of experts with relevant experience in the execution of similar detailed design assignments. The consultant shall submit the CV's for key, professionals for evaluation. The details of key staff whose CVs will be evaluated are furnished below. The qualifications and experience expected of candidates-for these positions is given in **Appendix 3**.

Sl. No.	Key Expert	Total person month
1	Senior Highway Engineer cum Team Leader	
2	Highway Design Engineer cum Pavement Specialist	
3	Senior Bridge/ Structural Engineer	
4	Material cum Geotechnical Engineer	
5	Environmental Specialist	
6	Social cum Resettlement & Rehabilitation Specialist	
7	Transport Economist	
8	Procurement cum Contract Specialist	
	Total	**46**

It is expected that above team shall be assisted by other sub professional/ support staff for their respective part of the assignment, however, they shall not be considered for purposes of evaluation of technical bid. The consultant shall propose the requisite man-months for the sub professional staff based on his experience.

Non-key staff

Sl. No.	Non-Key Staff
1	Quantity Surveyor / Documentation Expert
2	Hydrologist-cum-Drainage Engineer
3	Assistant Highway Design Engineers
4	Assistant Pavement Engineers
5	Assistant Structural/Bridge Engineers
6	Assistant Quantity Surveyors
7	Social-cum-LA and R&RSupport Staff including revenue persons
8	Environmental Support Staff
9	Assistant Traffic Engineers-
10	Assistant Material-cum-Geotechnical Engineer
11	Road Safety Support Staff
12	Surveyor/Survey Engineers
13	Assistant Hydrologist/ Drainage Engineer
14	Land Acquisition Expert
15	Utility Engineer
16	CAD Draughtsman
17	Office Administrator cum Accounts Officer
18	Office Manager cum Accounts Officer

All the staff manning the key positions is required to be proficient in English. The consultant shall deploy an equal or more number of suitably qualified non-key staff as specified above to assist the key

professionals to render these services in a time bound manner. It must be noted that time is the essence of these services. Age of key personnel shall not be more than 65 years.

i. Consultants have to provide a certificate that all the key personnel as envisaged in the Contract Agreement have been actually deployed in the projects. They have to furnish the certificate at the time of submission of their bills to HPRIDCL from time to time.

ii. The requirement of tunnel/s is to be assessed strictly as per site requirement during the detailed study after mobilisation of consultant on site.

iii. In case Tunnels are to be constructed, necessary input of Tunnel Experts shall be provided in addition to above mentioned Manpower requirement.

iv. Tunnel expert, if required, the remuneration may be provided equivalent to Team Leader remuneration and time period shall be decided by Director (Projects), HPRIDCL.

7. Project Team and Project Office of the Consultant

7.1. The Consultants shall be required to form a multi-disciplinary team for this assignment. The consultants Team shall be manned by adequate number of experts with relevant experience in the execution of similar detailed design assignments.

7.2. All the key personnel mentioned will be evaluated at the time of evaluation of technical proposal. Consultants are advised in their own interest to frame the technical proposal in an objective manner as far as possible so that these could be properly assessed. The bio-data of the key personnel should be signed on every sheet by the personnel concerned and the last sheet of each bio-data should also be signed.

7.3. The Consultant shall establish and maintain a site office within 5 km of theDirector (Projects), HPRIDCL office at Shimla. Additionally, the Consultants shall establish onesite office at Bilaspur near the Project Site manned by senior key personnel during the course of the surveys and investigations. All the project related office work shall be carried out by the consultant in their site offices unless there are special reasons for carrying out part of the office work elsewhere for whichprior approvalofclientshallbeobtained.Theaddressofsite offices including the personnel manning with their Telephone numbers and email Id will be intimated by the Consultant to client before commencement of the services.

7.4. All necessary technical support staff and office support staff shall be provided by the consultant. They should however bring out the details of these personnel and their duration of deployment in the technical proposal.

7.5. The consultant shall mobilize all necessary survey equipment, computers, software, and all other equipment required to fulfill the job.

7.6. The consultant shall include all necessary vehicles, motorcycles etc. in his proposal which may be required to carry out the job.

8. Interaction with Client:

8.1. During entire period of services, the Consultant shall interact continuously with Client and provide any clarification as regards methods being followed and carry out modification as suggested by Client. A program of various activities shall be provided to Client and prior intimation shall be given to Client regarding start of key activities such as boring. survey, testing etc. so that inspections of Client officials could be arranged in time.

8.2. The Consultant Team, consisting of key experts and non-key staff, shall meet in person with HPRIDCL officials and other appointed agencies (such as the Project Management Consultant, Third-Party Review Consultant, etc.) at least every alternate week. These meetings will serve to review project progress, address any issues, and ensure effective communication. However, the frequency of meetings may be changed in due course of time as per the direction of HPRIDCL.

8.3. The Consultant Team will accompany HPRIDCL, World Bank, Project Management Consultant (PMC), and the Third-Party Review Consultant on site visits. During these visits, the team will

evaluate project provisions, review ongoing work, and inspect various project aspects to ensure compliance with project specifications and quality standards.

8.4. In the event of the absence of any key expert(s) during a scheduled meeting, HPRIDCL reserves the right to deduct a lump sum amount from any payment due at any stage of the project. However, if the absence of the key expert(s) is due to reasons beyond the control of the Consultant, the Consultant may submit a request to HPRIDCL to waive the absence, along with appropriate justification. Such requests will be subject to HPRIDCL's approval.It is understood that the absence of any key expert(s) should not exceed a maximum of four meetings per expert during the entire duration of the Contract duration. This provision will remain valid throughout any extended period of the contract, if applicable.

8.5. The consultant shall be required to send 6 copies of concise monthly Progress Report by the 5th day of the following month so that progress could be monitored by the Client. These reports will indicate the dates of induction and de-induction of various key personnel and the activities performed by them. Frequent meetings with the consultant at site office or in Client Head office are foreseen during the currency of project preparation.

8.6. All equipment, software and books etc. required for satisfactory services for this project shall be obtained by the Consultant at their own cost and shall be their property.

8.7. The Consultant is also required to support the Client during the Project Appraisal by the WB. The Consultant is required to furnish relevant reports and update various reports to the satisfaction of the WB during the Project Appraisal.

8.8. The consultant is also required to support the client in disclosure of the safeguard instruments on client's website, including Executive Summary (translated into Hindi) and also organize other stakeholder consultations for disclosure workshop as required.

9. Reporting Requirements/ Deliverables/Payment Schedule:

Sr. No.	Service and deliverables	No. of copies	Due date for submission date of the service (Months) from the start date	Payment (% of Contract Price)
1.	Monthly Progress Reports	6	*By 5th day of every month*	
2.	Inception report	5	1	5
3.	Draft Viability Analysis and Feasibility Report for 221Km	5	3	5
4..	Final Viability Analysis and Feasibility Report for 221Km	5	4	5
5.	Preliminary Social Impact Assessment Report for 221Km	5	5	4
6.	Indigenous People Plan andResettlement Plan for 221Km	5	5	4
7.	Environmental Assessment and EMP (including biodiversity assessment) Report a) Screening Report for 221 km b) ESMF c) Preliminary Environmental Impact Assessment for 221km d) Biodiversity Management Plan (if presence of protected	5	a) 3 b) 5 c) 7 d) 7	5

Sr. No.	Service and deliverables	No. of copies	Due date for submission date of the service (Months) from the start date	Payment (% of Contract Price)
	areas identified)			
8.	Land Acquisition Plan and Utility Shifting Removal Plan for 221km	5	6	5
9.	Draft DPRs with drawings for 221Km.	5	8	14
10.	Final DPRs with drawings for 221Km.	5	9	20
11.	Submission of forest cases, estimates of utilities, valuation of structures/ assets coming with alignment as per the requirement of LAO for 221Km.	1	7	4
12.	Final submission of required documents for mining site of aggregates and sand, crusher site, dumping sites, borrow areas for 221km.	1	7	2
13.	Report from consultant suggesting various suited options for bidding under various contract modes like Item rate, EPC with maintenance period or any other contracting mode for 221Km of major road upgradation/ improvement.	5	7	2
14.	Preparing draft Bid Documents as per the latest World Bank procedures and guidelines	5	10	5
15.	Preparing final Bid Documents as per the latest World Bank procedures and guidelines.	5	11	5
16.	Project Clearances Report Approval of Project clearances from Concerned agencies e.g. from MOEF (environmental clearance including biodiversity, forest clearance, wild life clearance, tree cutting etc.); Rly for approval of GAD and detail engineering drawing of ROB/RUB; IWAI, Irrigation Dept., Utility agencies/ departments and Possession/ Transfer of Land	5 Original NOC/ approval letters from concerned agencies and 3 photocopies of each	12	5
17.	Project Completion Report	5	12	10

(*Note: all deliverables and structure of deliverables should be against identified packages individually or in clusters as viable).

- All the above said report shall be submitted in hard and soft copies (Pen Drive).
- All payments shall be made on submission of pre-receipted bills by the consultants in quadruplicate for respective stages.
- 50% Payment will be made to the Consultant on submission of reports and balance 50% after approval from World Bank and on acceptance of the reports/deliverables by the Review Committee.

- Payment in respect of items 4 to 15 shall be made on pro rata basis for 221km of road length.
- Regarding release of payments for partly completed tasks, the decision for release of payment on pro rata basis shall be taken by the Review committee.

10. Data and Software

10.1. The Pen Drives/ Hard disk containing all basic as well as the processed data from all field studies and investigations, report, appendices, annexure, documents and drawings shall be submitted to the Client &Project Management consultant (PMC)at the time of the submission of the Final Report.

10.2. The Consultant shall also hand-over to Client soft copies containing any general software including the financial model which has been specifically developed for the project.

10.3. The Pen Drives/Hard disk should be properly indexed and a catalogue giving contents of all documents and print-outs of the contents should be handed over to Client& PMC at the time of submission of the Final Report.

11. Data, Facilities and Resources to Be Provided by the Client

The following data shall be provided by the Client on request.

Available base mapping, existing road inventories including data on pavement history and condition, traffic statistics and road accident statistics. geographical maps of all districts including category of road thereon;

Copy of the Feasibility Study report carried out by HPRIDCL in year 2006-07/2019-20 The investigation / data collected and available during Feasibility study.

12. Post DPR Support

- **Post-DPR Support for Major Structures**
  The DPR Consultant shall provide continued support to the client for any design issues or modifications required for the major structures (including tunnels, bridges, road over-bridges (RoBs), underpasses, viaducts, and landslide treatment) beyond the completion and acceptance of the final Detailed Project Report (DPR). This support will be provided for a period of up to three(3) years following the acceptance of the final DPR without any additional cost.

- **Scope of Post-DPR Support**
  The DPR Consultant's support shall include, but not be limited to:
  a. Design Modifications: Assisting in any design modifications or revisions required for the major structures due to unforeseen site conditions, regulatory requirements, or changes in project scope.
  b. Clarifications: Providing technical clarifications and resolving any design-related issues raised by the client, contractors, or stakeholders.
  c. Coordination: Coordinating with other consultants, contractors, and stakeholders to address any design-related challenges during the implementation phase.
  d. Field Support: Offering on-site support, if necessary, to ensure that the design is implemented as intended and to resolve any issues during construction.

- **Client's Right to Request Modifications**
  The client may request the DPR Consultant to make modifications or provide further support related to the major structures during the post-DPR period. The DPR Consultant shall review such requests and provide the necessary services, including detailed technical support, calculations, and design adjustments, as required.

- **Consultant's Obligation**
  The DPR Consultant shall ensure that any design modifications, clarifications, or support provided during this period meet the same quality standards, regulatory requirements, and best engineering practices as outlined in the final DPR.

- **Accuracy of Project Reports**

  The consultants shall be responsible for accuracy of all the data used in project preparation and estimates prepared by him as part of the project. He shall indemnify the client against any inaccuracies in the workduring the course of execution. For this purpose, he shall furnish bank guarantee from scheduled bank for an amount to the extent of 10% of the total consultancy fees to be received by him. The bank guarantee shall be valid for a period of 3 year from the date of acceptance of the final DPRs of the project. The final installment of 10% of the fees shall be released only on receipt of this bank guarantee.

13. Completion of Services

The time for overall completion of the tasks is 12 months. The tentative time-lines for individual activities have been given above in the Reporting Requirements. The consultant shall however furnish the timeline for completion of various tasks for approval from the client at inception stage and the final timelines will be decided thereof. Refer to para 9 of this section for detailed timelines.

All the study outputs, including primary data shall be compiled, classified and submitted by the Consultant to the Authority in soft form apart from the reports indicated in the Deliverables. The study outputs shall remain the property of the Authority and shall not be used for any purpose other than that intended under these Terms of Reference without the permission of the Authority. The Consultancy shall stand completed on acceptance by the Authority of all the Deliverables of the Consultant.

14. Review by the Client of Consultant Outputs and Process.

A reviewing committee (to be restricted to Five members) consisting of the following officers of the GOHP shall review the progress of the work and the reports to be submitted by the consultant.

Review Committee

Director (Projects), HPRIDCL	**Chairman**
Executive Director (Design)-Cum-Superintending Engineer (P&D), HPRIDCL	**Member**
General Manger (F&A)-cum-Joint Controller, HPRIDCL	**Member**
General Manager (civil)-cum-Executive Engineer HPRIDLCL	**Member**

The Review Committee will review the outputs submitted by the Consultant, give suggestions and modifications, if any, within two weeks of receipt and would be the authority to approve the reports. Review Committee may also hold meetings with the Consultant as necessary to discuss reports submitted and review the progress etc.

Annex-A 1

List of Roads of 221 Km. Length		
Sr. No.	**Name of Road**	**Length (in Km.)**
1.	Nadaun-Dhaneta-Barsar-Shahtalai-Bhroli Kalan-BagchalBrdige-Thapna at NH-203	93.00
2.	Kainchi Mode Junction (NH-205 Tunnel 1)-Naina Devi –Bakhra Dam and Spur Roads connecting Naina Devi Temple (MDR 31, MDR 32)	53.00
3.	Rohru-Chirgaon-Tikri (RCT)	21.00
4.	Sungri-Khadrala -Baghi Road	24.00
5.	Palampur to Sheela Chowk Road (MDR 78)	30.00
Total Road Length		**221.00** **Say 221.00**

Appendix la

FEASIBILITY STUDIES

Under the overall broad direction of the HPRIDCL, the consultant will carry out feasibility studies of about 221 km of roads. The consultant will meet with the senior officials responsible for highways, social impact and the environment (including forests), in order to screen priority roads identified in terms of their economic, social and environmental impact.The results of this screening will determine which roads can proceed to engineering design and which will require further analysis and consultation in order to resolve social-impact and/or environmental issues before proceeding with engineering design. This will require close interaction between the economic, engineering, social impact and environmental members of the consultant team and the client, and will involve the activities listed below.

1. **Economic and Financial Analysis** will be undertaken following the tasks given in **Annex la-2,** including, but not necessarily limited to, a socio-economic profile of the state and the area of influence of each road, traffic surveys and growth projections, roughness surveys, estimation of economic costs and benefits in order to determine economic viability and relative priority. This is also to include a separate review of the State's Roads Financing & Investment Capacity, based on analysis of the State's (and where relevant, national) financial and budget data and performance in the roads sub-sector.

2. Engineering Analysis for feasibility assessment will be carried out following the tasks contained in **Annex la-3**and will result in a classification of roads according to current conditions and performance standards, along with recommendations for improvement and associated preliminary cost estimates.

3. Social and Environmental Screening will be undertaken in parallel to the Economic and Engineering Analysis (outlined above) in order to determine which roads present no major engineering, economic, social or environmental issues and which roads will require further analysis (including the analysis of alternative alignments if appropriate) to resolve such issues. The social and environmental screening will include, but not be limited to, the analysis of available information (supplemented where appropriate by site visits) concerning the general population distribution, concentrations of tribal or cultural groups, concentrations of low-income communities, areas of significant right-of-way (ROW) encroachment, sensitive and/or critical natural habitats (e.g. national parks, reserves, wildlife sanctuaries, sacred groves, protected areas, forests, wetlands, etc.), major rivers and waterways, recorded cultural heritage sites, and any other potentially sensitive areas, based on recent GOI census, official data and information from NGOs (such as WWF) and site visits. The results of this analysis will be plotted on maps and tabulated to clearly identify any major conflicts with proposed priority road improvements along with the nature and extent of such conflicts and recommendations concerning how to resolve them (including recommendations for exclusion, analysis of alternative alignments and/or mitigation) as a precursor to finalizing roads for engineering design and undertaking the required environmental assessment and social impact studies (see **Annex la- 4 and la-5**for details).

4. **Feasibility Study Report** shall be presented as follows:

Executive Summary
State's profile and economic setting
Project description
Socio-economic profile of the Project area(s)
Methodology adopted for the studies
Description of technical/engineering alternatives
Traffic Surveys and Analysis
Accident data and Road safety Analysis
State's Roads Financing and Investment Capacity Outlook
Environmental Screening (refer to Annex la-4 for details)
Design Principle Guidance Manual
Report on consultation process and its analysis
Social Impact Screening including M&E framework
Cost estimates
Economic Analysis
Indicative Design Standards, Methodologies and Specifications
Conclusions and recommendations including priority list and matrix
Location map
Layout plans
Study report and Draft Policy for accommodation & relocation of utilities including OFC cables

Annex la-2

Tasks for Economic and Financial Analysis

1. **Socio-economic Profile of the State:** The following shall be shown in detail in the profile:

   (a) Total population of the State in which the project is located (both urban and rural) and its annual growth rates;
   (b) State GDP (NSDP) and its composition (in percent) by sectors; agriculture (including livestock, fisheries and forestry), industry, mining, construction, transport and communications, services, etc. at current as well as at constant prices;
   (c) State's overall budget (capital and recurrent) and expenditure history and the allocations to the transport sector and the road sector.
   (d) Annual agricultural production in metric tons (mt); area under cultivation in hectors (ha); yields (mt/ha) of the major crop types; production of livestock, fisheries and forestry products; and industrial production (mt) by type of industry;
   (e) Registered vehicles by type of vehicle in the state.
   (f) Sale of petroleum products like petrol, diesel, engine oil and other lubricants in the state.
   (g) Quantitative information on key aspects of the road transport industry's operations in the State, clearly indicating the number, categories and size of state's public and private transport operators. Fares per passenger/KM, freight rates per tonne /KM, average freight range, etc., are also to be indicated clearly, wherever these are available;
   (h) Road network in km by (i) jurisdictional classification, viz. National Highways (NH), State Highways (SH), District Roads (Major and other), and Rural Roads (RR); (ii) by carriageway width (Single & including intermediate lane and Double), and (iii) by surface type (bituminous concrete/cement concrete (BC/CC), gravel (including WBM), and earth;
   (i) Annual expenditures by road class indicating separately construction, periodic and routine maintenance, and administration expenditures in the last 5 years;
   (j) Unit, road and other taxes levied on motor vehicles by the State and local governments (separately by tax type, vehicle type and State or federal tax);
   (k) Annual proceeds of the road taxes;
   (l) Organizational structure of the HPRIDCL
   (m) Information on road accidents and casualties in the last five years
   (n) State per capita income (PCI) both urban and rural and its annual **growth rate.**

2. **Socio-economic Profile in the Particular 'Area of Influence' of the Road:** Define the 'area of influence' used in the study and provides a descriptive and quantified socioeconomic profile of the area of influence of each road under study and their likely effect on traffic and road network.
3. **Homogeneous Road Sections:** Project roads are to be divided into homogeneous sections.
4. **Traffic Surveys:** These are to be prepared based on both regular counts of traffic conducted by [HPPWD] and special counts, with specific origin/destination data collection and axle load survey data included, as indicated immediately below.

5. **Traffic Growth Rates:** A forecast shall be prepared of future normal traffic on the road section. In other words, traffic growth must be related to the area's specific economic activity. Passenger and goods traffic should be projected using any suitable econometric or time series model/package with the appropriate independent variables as justified or suggested from the results of OD and other surveys. Similarly, projections should be made for future generated and diverted traffic as a result of the project.
6. **Roughness Survey:** Roughness surveys shall be carried out for the road using homogeneous subsections with uniform roughness and future roughness shall be estimated by means of the HDM 4 model (or a clearly-identified country specific comparable technique).
7. **Economic Analysis:** Economic costs (both construction and vehicle operating costs) shall be estimated, in a commonly dated monetary unit, by deducting customs duties and taxes from the financial costs, and/or by using a conversion factor where appropriate (e.g. for the foreign exchange component of the project and its labor component) for representative vehicles in the "with project" and "without project" conditions. Benefits and costs for diverted and generated traffic must be calculated separately from those accruing from projected normal traffic growth. The distribution of road user benefits (especially savings in VOC and travel time) among different road user groups should be calculated.
8. The economic analysis shall be done using the HDM IV model and/or any other proven equivalent methodology capable of modeling congestion effect. Consultants should evaluate several possible improvement options for each road section, in order to determine the optimum solution.
9. The benefit and cost streams should be presented with "best estimate" economic internal rate of return (EIRR) and Net Present Value (NPV) for each road and the project as a whole. Sensitivity analysis and switching value study should assess the likely effects of project risks (such as implementation delay, cost increase, benefit decrease, etc.) and uncertainties on economic indicators. **The report should present, at least for the project as a whole and each component (improvement / up-gradation), the annual benefit, separately for each benefit (savings in VOC, time, generated traffic, accident, others), and cost, separately for each cost, streams and EIRR/NPV in a spreadsheet format.**
10. In cases where a new by-pass is an option, the economic evaluation should be carried out separately for improving the existing road and for the bypass option, and should evaluate the latter both with respect to the option of improving the existing road through the town and with respect to the "without project" alternative.
11. Economic analysis should also be used as an integral part of alternative design analysis in the feasibility study stage. Economic analysis should be applied to inform decisions such as choice of pavement, lane configuration and bypass alignment selection.
12. **Road Sub-Sector Financing and Investment Capacity:** Detailed information on the state financial capacity to meet counterpart funding requirements for the project, in a sustainable manner, need to be collected. This information should be presented in a summarized form, highlighting any key trends and/or issues affecting the sustainability of the State's road infrastructure investment plans and its approach to SH/MDR road maintenance requirements.

Annex la-3

Tasks to be taken up in Engineering Analysis for Feasibility Study Reports

1. Survey, Investigations and Designs: The project is todesign of an all-weather roads incorporating bypasses, tunnels, innovative bridges and long-span viaducts to minimize impact on existing habitation, reduce hill cutting, improve road geometry and ensure environmental and social sustainability. The provision of tunnels, innovative bridges and Viaducts is aimed to minimizing the environmental/social impact and enhancing the riding comfort with significant reduction in travel time. Additionally, the project studies should be directed at upgrading the road's geometric standard and structural integrity, to the levels needed to meet the requirement of the forecast traffic.
2. Survey, investigations, design standards and methodologies, and preparation of the project shall generally be based on relevant Indian Roads Congress (IRC) codes and guidelines. Bureau of Indian Standards (BIS) codes and guidelines shall be followed where everappropriate. The consultant will also compare with Transport Research Laboratory (TRL), UK, American Association of State Highway and Transportation Officials (AASHTO) and/or other internationally accepted standards and methods; and will recommend the most appropriate Indian and/or international standards and methods to be adopted for this project.
3. Special care should be taken to assess existing pavement conditions. To this end, the following test procedures shall generally be undertaken:

    (a) Pavement roughness shall be measured using a bump integrator or alternative calibrated equipment. Rutting, cracking and raveling should also be measured and sections where excessive fattening/bleeding of bitumen has occurred should be noted down;
    (b) Measurements of road deflections shall be carried out utilizing the Falling Weight Deflectometer and shall be made following the procedures in IRC, but with a frequency conforming to the sections of homogeneous roughness;
    (c) When pavements are too distressed to give meaningful deflection results, then California Bearing Ratio tests should be carried out at intervals sufficient to indicate the extent and severity of the problem;
    (d) A survey for assessing the surface, sub-surface and roadside drainage condition of the road section shall be conducted.
4. Detailed subsurface investigations shall be carried out for all road sections where therehas been a subgrade failure to assess the causes of such failure and to facilitate preparation of an appropriate pavement redesign for such stretches. Normally, all failed sections would be reconstructed from the subgrade upwards to prevent similar future failure.
5. Detailed Hydrological investigations should be carried out for the major watercourses to assess the adequacy / enhancement requirement of bridges. The requirement of roadside drainage / cross drainage structures at the town / village locations and at the other waterlogged sections and integration of the drainage system with the existing municipal / storm water drainage network would be studied.
6. All the foregoing information shall be shown on a strip-map to facilitate the evaluation of the proposed pavement.
7. For low-lying road sections subject to flooding, the road embankment should be raised so that the formation (sub-grade) level has a free board of about one meter above the highest recorded level or designated design criterion. For the design of high embankments including

bridge approaches where appropriate, IRC Publication 75-2019 or latest should be followed as a minimum standard.

8. Traffic engineering analysis should identify requirements for improved road layout, signs and markings, and appropriate provision for pedestrians, non-motorized vehicles and other slow-moving transport. For junctions involving high traffic flows, the consultant should identify situations where improved layouts or grade separations should be considered now, or provided for in the future. Where appropriate and practicable, consideration should be given to segregation of slow-moving road users, provision of service roads, future development of way-side amenities and transport industry facilities. A road safety review should be conducted and appropriate provisions made in the designs to enhance road safety and traffic flows.
9. All existing CD structures shall be assessed for sufficiency in width and strength and their capability of taking modern day wheel loadings. if required, special tests to assess residual concrete strength, reinforcement cover sufficiency, reinforcement corrosion, soil properties etc. should be undertaken. Based on the above points but not limited to them, decision regarding the reconstruction, strengthening or 'do-nothing' should be taken.
10. The consultant should specify plans to enhance the environmental aspects of the project through such measures as roadside landscaping and tree planting, planting of bushes in the central median, and other relevant stabilizing/preservation measures for the road-adjoining areas. All possible steps must be taken to minimize the adverse environmental effects of the project, both during construction works and subsequently in road operations.
11. Axle load surveys shall be analyzed to identify the extent of overloading on state roads. A review should be conducted, and appropriate plans made to curb the extent of overloading through various measures to minimize its adverse effects.

Annex la-4

TASKS FOR ENVIRONMENTAL SCREENING

Background

1. Environmental Screening and subsequent Environmental Impact Assessment (EIA), including an EMP, process is a decision-making tool to ensure that the project design and implementation are environmentally sound and sustainable. During the preparation phase, the objective of the EIA is to provide inputs to the feasibility study; preliminary and detailed design of the project. During the implementation phase, environmental management plans (developed as a part of the EIA during the preparation phase) serve as a framework for executing the mitigation, enhancement and monitoring measures.

2. In the early project preparation phase, environmental screening shall achieve the following objectives:

   - Define the project and its area of influence, including any associated facilities that may be present and pose additional environmental, health or safety risks (e.g. labor camps).
   - the scope of environmental risks and impacts and their potential significance, to be confirmed by EIA.
   - Potentially unacceptable risks that may necessitate an exclusionary approach if there's certainly that the mitigation hierarchy (avoid, minimize, compensate/ offset) cannot be applied successfully through design changes.

3. Based on the initial screening, the subsequent EIA shall be able to achieve the following:

   - To establish the environmental baseline in the study area, and to identify any significant environmental issue;
   - To assess these impacts and provide for measures to address the adverse impacts by the provision of the requisite avoidance, mitigation and compensation measures;
   - To integrate the environmental issues in the project planning and design;
   - To develop appropriate management plans for implementing, Monitoring and reporting of the environmental mitigation and enhancement measures suggested.

4. The environmental impact assessment studies and reporting requirements to be undertaken under these TOR must conform to the GoHP, GOI regulations and the World Bank guidelines , which comprise of, inter alia: The Environmental Impact Assessment Notification, MOEF, 2006 and its subsequent amendments; Guidelines for Environmental Impact Assessment for Highway Project (IRC:104-1988); Environmental Impact Assessment Guidance Manual for Highways, MoEF, 2010;Guidelines on Requirements for Environmental Clearance for Road Projects (IRC:SP-93-2017) the operational policies, guidelines and the reference materials of the World Bank.

5. The EA comprises the following stages — environmental screening, project EA and the EMPs. The following section gives the detailed scope of work in each of these stages.

Scope of work

Inception

6. The Consultants shall use the inception period to familiarize with the project details. The Consultants shall recognize that the remaining aspects of the project, such as engineering and social, are being studied in parallel, and it is important for these aspects to be incorporated. The Consultants should also recognize that due care and diligence planned during the inception stage helps in improving the timing and quality of the EA reports.

7. During the inception period the Consultants shall (a) study the project information to appreciate the context within which the EIA should be carried-out, (b) identify the sources of secondary information on the project, on similar projects and on the project area, (c) select sample corridors based on simple criteria and carry out a reconnaissance survey, and (d) undertake preliminary consultations with selected stakeholders, the proceedings of the consultation with stakeholders shall be video recorded.

8. Following the site visits and stakeholder consultations, as well as a review of the conditions of contract between the consultant and the Client, the consultant shall analyse the adequacy of the allocated manpower, time and budgets and shall clearly bring out major/minor deviations, if any. The Consultants shall study the various available surveys, techniques, models and software in order to determine what would be the most appropriate in the context of this project.

9. The Phase-I of Himachal State Road Project has implemented measures to minimise the impacts of project on overall environment by undertaking interventions like design modification and adoption of innovative technologies with objectives to create a sustainable road. The interventions intended to enhance, but not limited to, road safety, slope stabilization, erosion control, biodiversity conservation measures, aesthetic of landscape etc. The consultant (environmental, social and technical) shall review all reports of Phase-I of HPSRP, HPRSTP and identify good practices and lesson learned from implementation of HPSRP-1. Based on the review findings, the consultant shall develop design principles guidance manual (process of analysis and associated criteria), which will assist in decision making during preparation of EIA/EMP, SIA/RAP and DPR for HPSRTP.

10. The Consultants shall interact with the engineering and social team members to determine how the EIA work fits into the overall project preparation/ project cycle; how overlapping areas are to be jointly addressed; and to appropriately plan the timing of the deliverables of the EIA process. The Consultant shall develop criteria/methodology for Environmental Screening of selected road corridor and for selecting appropriate EIA instrument (s) for subsequent stage of project preparation. In addition, a mechanism for continuous interaction between the engineering, environmental and social teams shall be formalized and succinctly documented in the Inception Report.

Environmental Screening

11. General: Environment screening is done in the early stages of the project preparation to make preliminary assessment and review of the environment issues that are relevant to the proposed project, and to make the project environmentally sound and sustainable. It determines the

appropriate extent and type of project EIA to be undertaken, provides information/input that are required for assessing technical, economic and financial feasibility of the project, and recommends possible modifications in the preliminary project design.

12. The Consultants shall carry out environmental screening as per the work plan and methods described in the Inception Report, and in *consideration of the comments of the Client and the Bank* on the same. The Consultants shall keep in mind the particular requirements of the project, especially the needs of the overall feasibility studies in carrying out the screening. The environmental surveys be coordinated with the social and engineering surveys, as far as practical.

13. Surveys: The Consultants shall collect information on the existing environment scenario from authentic secondary sources, and identify gaps to be filled, relevant to the environmental screening needs from primary surveys. Primary surveys shall include baseline (air, water and noise) pollution monitoring at representative and sensitive locations, and identification of all macro-level environmental issues within the project's influence area. The consultants shall extensively use the video records of the project road (carried out as part of the engineering surveys).

14. The consultants shall survey the environmentally sensitive locations on and along the project road, as well as within the project's influence area. All regionally or nationally recognised environmental resources and features within the project's influence area shall be clearly identified, and studies in relation to the proposed scope of the project. Typically, these will include stretches of roadside trees; environmental and common property resources such as forests, water bodies; land use types; archaeological sites and major physical cultural properties. All these may be depicted using a line diagram or a strip map.

15. Review of Environmental Legal Requirements: Taking cognizance of existing state and national environmental regulatory framework, the consultant shall identify environmental acts, rules and regulations and assess their applicability to the project. The permissions and clearances required to be obtained beforehand for implementation of the project shall be listed out and assist the client in obtaining the same.

16. Identification of the Valued Environment Components (VECs): The consultants shall determine the VECs and key ecosystem services that may be affected considering the baseline information (from both secondary and primary sources), the preliminary understanding of the activities proposed in the project and, most importantly, the stakeholder consultations. For further details see The World Bank, *Roads and Environment, A Handbook (World Bank Technical Paper No. 376),* Washington DC, 1997 (pp 25)].

17. Preliminary Analysis of Impacts and Management Measures: The consultants shall conduct a *preliminary* analysis of the nature, scale and magnitude of the impacts that the project is likely to cause on the environment, especially on the identified VECs, and classify the same using established methods. For the negative impacts identified, alternative avoidance/mitigation/management options shall be examined (in line with mitigation hierarchy described above), and the most appropriate ones suggested. For the positive measures identified, alternative and preferred enhancement measures shall be proposed.

18. Scoping: This shall be a direct outcome from the environmental screening. The consultants shall define boundaries of the project EA after a careful consideration of the baseline

scenario, likely impacts on the identified VECs, and the proposed mitigation and enhancement measures. The scoping shall include that which will be covered in the project EA along with the "how, when and where" of each activity recommended. It shall include a listing of other environment issues that do not deserve a detailed examination in the project EA (covering induced impacts that may be outside the purview of the client) along with a justification. The scoping needs to identify and describe the specific deviations or inclusions vis-a-vis the original ToR, if any, along with a justification; modify the ToR for the project EA. if required; and recommend studies that need to be conducted in parallel but are outside the purview of the EA process.

19. Environmental inputs to feasibility study & preliminary project design: The consultants shall make location-specific design recommendations, wherever possible or required related to alignment (major/minor shifts or bypass or altogether different route alternative), road cross-sections, construction material use, slope stabilization, erosion control, and mitigation & enhancement measures. For all the different alternative improvement proposals under consideration, using acceptable/established valuation techniques, the consultants shall prepare {a} an estimate of economic costs of the environment damage (primarily the impact on the VECs), and economic benefits from the direct positive impacts that the project is likely to cause, and {b} an estimate of financial cost on the mitigation and enhancement measures that the project is likely to require, and financial benefits, if any.

20. The consultants shall consult with the engineering team and familiarize themselves with the project's overall feasibility analyses models, so that the EIA inputs are in conformity to the needs of the overall feasibility study. In addition, wherever economic and financial costs of the environmental impacts cannot be satisfactorily estimated, or in the cases of significant irreversible environmental impacts, the consultants shall make recommendations to avoid generating such impacts.

21. Stakeholder Assessment & Consultation: The consultants shall carry out consultations with communities that are likely to be affected, NGOs, selected Government Agencies and other stakeholders to (a) collect baseline information, (b) obtain a better understanding of the potential impacts and (c) appreciate the perspectives/concerns of the stakeholders. Consultations shall be preceded by a systematic stakeholder analysis, which would (a) identify the individual or stakeholder groups relevant to the project and to environmental issues, (b) include expert opinion and inputs, and (c) determine the nature and scope of consultation with each type of stakeholders, (d) determine the tools to be used in contacting and consulting each type of the relevant stakeholders. Consultation with the stakeholders shall not be treated as a project information dissemination session, but be used to improve the plan and design of the project and shall continue through project implementation.

22. The consultants shall prepare an Environmental Screening Report. and Design Principles Guidance Manual The reports will be revised in *consideration of the comments of the Client and the World Bank.*

Note:- Any additional comments on the environmental aspect to be considered by the DPR consultant would be provided before the pre proposal meeting.

Annex la-5

TASKS FOR SOCIAL IMPACT ASSESSMENT AND RAP PREPARATION

A. Background

The consultant is required to conduct all types of Census and Baseline Surveys, HouseholdSurveys, Land Surveys, effective consultations with the project affected people and local community. Broadly, the consultant will undertake the following activities:

1. Prepare Land Plan Schedules for 221 km of upgradation roads.
2. Undertake preliminary level SIA for the 221 km of upgradation roads; and

SIAs will be undertaken as per requirements of the World Bank's new Environment and Social Framework Policy and Standards.

B. Preparing Land Plan Schedule

The consultant after discussion with HPRIDCL shall determine the actual extent of Patta lands and Government lands of other departments required for each of the road sections. This may vary depending upon the number of lanes, location (rural, village or urban), terrain and the environmental and social impacts. The consultant shall determine in reference to Government land records the actual extent of patta lands of Private Person(s) / Temples and Mutts / Churches /Mosques /Waqf/ other worship forum / Central or State Government Undertakings and Institutions, etc., and Government lands of each of the departments (other than HPPWD). Calculate the amount of land acquisition cost for all patta lands after taking into account the available Right of Way (RoW). The Land Plan Schedule (LPS) shall be prepared by the consultant to comply with requirements of Land acquisition act (or as per laws and guidelines as applicable) and shall have the following details:

a) The co-ordinates (latitude and longitude in terms of metres upto mm accuracy) for the new centerline of the proposed improvements.
b) The distance between new and existing centerline (in metres upto mm accuracy)
c) The new centerline shall be marked with nails wherever possible and shall be traceable in other places.
d) The new land boundary shall be firmly marked on field and LPS shall be prepared in such a way that actual extent affected in each survey no. including sub-divisions shall have markings in field measurement book sheet for that survey number. Also, the LPS shall be marked in the combined village map showing the cumulative effect of land acquisition for the road sections.
e) Mark the buildings owned by the Private Persons / Temples and Mutts / Churches /Mosques /Waqf/ other worship forum/ Central or State Government Undertakings and Institutions, etc., and other immovable assets including trees that are required to be removed lying within the proposed new boundary line of the road and valuation statements for the affected buildings and other assets including trees shall be prepared. In the case of partly affected immovable assets, extent affected (in Sq.mt) and extent not affected (in Sq.mt) shall be noted.
f) Mark immovables such as Heritage / Archeological Monuments, Water Courses, Burial and Bum Ground, Bridges, Culverts, Railway lines, Community Assets, Cultural Properties, Mines, Quarries, Pits, Hills, Wild Animal/Elephant Migration passage ways, National Parks, Wild Life Sanctuaries, Birds Sanctuaries, etc. and Public Utilities on the land and over the land and also other important structures within the proposed new boundary line of the road. In the case of partly affected

above immovables, extent affected (in Sq.mt) and extent not affected (in Sq.mt) shall be noted.

g) Collect and up-date database on affected people and their losses, various losses of community assets, cultural properties and public utility assets on the basis of the final engineering design with respect to acquired RoW zone.

h) In consultation with government authorities finalize the detailed cost estimates for all types of affected assets and for other assistance and allowances in accordance with R&R policy in accordance with R&R described in latest national R&R draft policy.

Social Screening and Social Impact Assessment (SIA) process is decision-making tool to ensure that the project design and implementation take cognizance of social issues, impacts and risks and are socially sustainable. The objective of the SIA is to provide inputs to the feasibility study; preliminary and detailed design of the project. Subsequently the Resettlement Action Plans and Indigenous Peoples Development Plans that are developed following the SIA serve as a mitigation instrument to address these identified social issues, impacts and risks and monitor implementation measures.

C. Scope of work

The scope of work is as follows:

a) Social Screening of 221km roads;

b) Social Impact Assessment of 221km of road for up-gradation, followed by RAP and IPDP preparation. Prioritising and completing SIA & RAP for

i. Nadaun-Dhaneta-Barsar-Shahtalai-Bhroli Kalan-BagchalBrdige-Thapna at NH-203 (93Km),
ii. Kainchi Mode Junction (NH-205 Tunnel 1)- Naina Devi –Bakhra Dam and Spur Roads connecting Naina Devi Temple (MDR 31, MDR 32)(53Km),
iii. Rohru-Chirgaon-Tikri (21Km),
iv. Sungri-Khadrala -Baghi Road (24Km) and
v. Palampur to Sheela Chowk Road (MDR 78) (30Km)

D. Detailed Scope of Work

Task 1: Activities to be undertaken during Inception Stage

i. *Familiarize with project: The* Consultants shall use the inception period to familiarize with the project details. Consultants shall (a) study the project information to appreciate the context within which the SIA needs to be carried-out, (b) identify the sources of secondary information on the project, on similar projects and on the project area, (c) select sample corridors based on simple criteria and carry out a reconnaissance survey, and (d) undertake preliminary consultations with selected stakeholders. The Consultants shall coordinate with engineering and environmentalstudies that are being undertaken in parallel and incorporate recommendations as appropriate. In addition, a mechanism for continuous interaction between the engineering, environmental and social teams shall be formalized and documented in the Inception Report.

ii. *Review adequacy of* workplan: Following the site visits and stakeholder consultations, as well as a review of the conditions of contract between the consultant and the Client, the consultant shall analyse the adequacy of the allocated manpower, time and budgets. The Consultants shall study the various available surveys and other material in order to determine what would be the most appropriate in the context of this project.

iii. *Review and revise methodology:* As the consultancy services has varying scope of works, and considering project state geographical setting, a pre-defined approach may not be suitable to accomplish deliverables in the Terms of Reference. The consultant after appreciation of site conditions and scope of consultancy services shall provide methodologies to be used for: social screening, SIA for up-gradation roads.

Task 2: Undertaking Social Screening for 221km stateroad network as part of Feasibility study and prioritization of road

Social screening is done in the early stages of the project preparation to make preliminary assessment and review of the social issues that are relevant to the proposed project. The Consultants shall carry out social screening as per the work plan and methods described in the Inception Report and in consideration of the comments of the Client and the Bank on the same. Specifically, at this stage, the consultant shall carry out the following tasks:

i. *Preliminary Analysis of Impacts:* The consultants shall conduct a preliminary analysis of the nature, scale and magnitude of the impacts that the project is likely to cause. They shall collect information on the existing right of way, types of land to be impacted, estimate type and number of prevalent structures — private, government and community owned through review of revenue records and preliminary survey, etc.

ii. *Review of applicable legislation and regulatory framework:* The consultant shall undertake a preliminary review to list down national and state and acts, rules and regulations that might be applicable to the project.

iii. *Scoping for in-depth study:* Scoping needs to identify potential social issues, risks and impacts that should be studied in-depth during SIA stage to comply the requirements of Environmental and Social Standards (ESSs) of the World Bank.

iv. *Review affected groups to identify presence of Tribals/Indigenous Peoples:* As part of screening, consultant identify project corridors to ascertain presence of tribals whose characteristics match with requirements as listed under ESS 7 and thereby assess need for preparing Tribal Development Plans for those specific corridors.

v. *Preliminary Stakeholder Engagement Plan: The consultant shall develop a stand-alone preliminary* Stakeholder Engagement Plan (SEP)[2](²refer to World Bank site for template on preparing SEP)that shall guide the process of engaging with all stakeholders. In preparing this plan, the consultants shall carry out preliminary consultations with communities that are likely to be affected on select sample roads, relevant Government Agencies and other stakeholders. The Stakeholder Engagement Plan shall specify what is required for information disclosure and to achieve meaningful consultation. The plan will be such that it shall ensure appropriate project information is disclosed to stakeholders in a timely understandable, accessible and appropriate manner. It shall be revised and refined subsequently.

Outputs at this stage: The consultants shall prepare: i) Social Screening Report and ii) preliminary SEP. These reports will be reviewed and finalized incorporating comments of the HPRIDCL and the World Bank.

Task 3: SIA for 221 km (upgradation roads) and preparation of RAP/ARAP and IPDP

The specific objectives of the SIA are:

a) To carry out a socio-economic, cultural and political/institutional analysis to identify potential social impacts of the proposed development of the key transport corridors;

b) To identify all relevant stakeholders, undertake consultations on topics including perceived benefits and impacts, as well as issues related to Gender Based Violence (GBV) concerns about the overall project.

c) To provide inputs to the project design at the detailed design stage including specific recommendations in selection of design alternatives (identification of areas that may require adjustments in project designs); and

d) To ensure that results of the SIA provide inputs to the preparation of RAP and also for monitoring of project impacts during implementation and to the evaluation of project outcomes at completion;

See **Annexure A**for outline of ESIA **Specific Tasks and Annexure D for** Outline of Environmental and Social Management Plan (EMP) **Specific Tasks**

i. ***Environmental and Social Analysis of Alternatives:*** As the overall design options are in draft stage, the social analysis of alternatives shall follow the mitigation hierarchy as outlined in ESS 1, in relation to siting, design including the "without project" situation.

ii. ***Consultations with stakeholders:*** Conduct detailed consultations with each stakeholder category and present a Stakeholder Analysis of local stakeholders such as local government, associations, who could play a role in the project implementation process (including R&R) with positive/negative influence on the outcomes. Record and analyse people's perception of the project, its adverse impacts, and minimum acceptable mitigation measures (relocation options, if any are required assistance offered) that will enable them to cope with displacement or loss of livelihoods — temporary or permanent in nature, if any. Besides, hold discussions with disadvantaged and vulnerable individuals or groups including women. Additionally, in case of tribals, conduct Free Prior Informed Consultations to ascertain if broad community consent for the project exists. *Also, in case of those physically challenged (disabled), consultations and FGDs should be conducted to identify disability risks and impacts as well as identify opportunities to include accessibility measures in project design, where financially and technically feasible.* Summarize the concerns, suggestions by stakeholder for consideration by project authorities during design.

iii. ***Identification of Adverse (on the finalized alternative) and positive impacts of the project through consultations and quantitative survey:*** Survey should cover all categories of impacted persons and results of the Census and Socio-economic survey on affected households, segregated by gender and social category should be presented. Establishing impact categories is critical to the determination of potential adverse impacts and analysis of the relative vulnerability of, and risks to, the affected communities. Analyse key impacts on different groups of people (such as landowners, small, farmers; small businesses, shopkeepers; commercial establishments, SCs/STs, women), and communities (common properties, lands). Segregate these impacts by pre-construction and construction stage (such as disruption, loss of access, loss of livelihood, debris disposal following hill cutting, impact on host community, if any, issues arising due to influx of migrant labour, etc.). Besides all the affected community assets such as worship place, drying up of drinking water source, impacts to schools and the community facilities (sheds, panchayat bhawans, handpumps) need to be recorded. As some of the districts have presence of scheduled tribes, and if the Screening exercise indicates the need, the SIA needs to assess the current sociocultural living style of the tribals in line with the World Bank's ESS 7 and ascertain required measures.

iv. ***Entitlement policy and assistance package:*** Based on discussions with GoHP and WB, establish the criteria for eligibility of compensation and other resettlement assistance and present entitlements by type of impacted assets and category of impacted persons.

v. ***Identification of gender concerns:*** Carry out specific assessment of access, road safety, benefits from increase in mobility, access to water points (often along the roads), fuel and fodder paths, etc. shall help inform the projects through gender perspective, by holding separate FGDs with women households and road users. Hold separate focused group

discussions (FGDs) with women on all project related as well on issues related to GBV-related concerns about the project. In addition, explore areas for skill development/enhancement for women and men — which HPRIDCL in support from a Training/Partner agency (ITI, etc.), could support under the project.

vi. ***Identify modes for citizen engagement:*** As persons and communities would be impacted/influenced by the project activities, there would be a need to continuously engage with citizen/communities in respect to design and mitigation measures, monitoring, grievance mechanisms. Hence, consultant during the SIA stage, should identify most effective means of information dissemination and consultation and engagement with all relevant stakeholders.

vii. ***Institutional Assessment:*** Assess the role of the key institutions, departments, and stakeholders involved in the project and describe their roles, responsibilities and relationship with the project activities. Present an assessment of the implementing agency, specific to implementation of RAP/ARAP, IPDP. Provide an assessment of the strengths, weaknesses and opportunities for capacity enhancement to address social and gender issues.

viii. ***Grievance Redressal Mechanism and procedures:*** Assess existing grievance redressal mechanisms (available for HPSRP I& HPSRTP, road related grievance mechanisms and also for the state as a whole) including customer complaint mechanisms with different agencies and propose suitable redressal mechanisms/measures in discussion with HPRIDCL.

ix. ***Update ESMF, RPF and IPPF (if required):*** The consultant shall update existing Environmental and Social Management Framework (ESMF), Resettlement Policy Framework and Tribal Peoples Planning Framework (TPPF).

x. ***Resettlement Action Plan:*** The scope and level of detail of the resettlement plan vary with the magnitude and complexity of resettlement. The plan shall be prepared based on social assessment survey and should cover the impacts on the community and other adversely affected groups and mitigation measures. (See Annexure B for indicative contents of RAP).

xi. ***Indigenous Peoples Development Plan:*** On the basis of the social assessment and in consultation with the affected Indigenous Peoples' communities, consultant shall prepare an Indigenous Peoples Plan (IPDP) that sets out the measures through which the project will ensure that (a) Indigenous Peoples affected by the project receive culturally appropriate social and economic benefits; and (b) when potential adverse effects on Indigenous Peoples are identified, those adverse effects are avoided, minimized, mitigated, or compensated for. (See Annexure C for indicative contents of IPDP).

xii. ***Monitoring and Evaluation:*** The above documents should also include propose mechanisms for Internal and External monitoring for monitoring of implementation of environmental and social mitigation instruments — RAP/ARAP, ESMP and IPDP implementation and its periodic Evaluation (mid-term and end-term) along with suitable measuring indicators.

xiii. ***Capacity building/Training: Prepare*** an indicative action plan by type of training, audience and frequency. The management plans shall describe the implementation arrangement needed for the project, especially the institutional capacity-building proposals, including the staffing of the environmental and social units (as and when recommended) adequate to implement the environmental and social mitigation and enhancement measures. For each staff position recommended, detailed job responsibilities should be defined. A training plan and schedule shall be prepared specifying the target groups for individual training program, the content and mode of training.

xiv. ***Revise the Stakeholder Engagement Plan:*** Following the SIA, the preliminary SEP should be reviewed and revised as appropriate.

xv. ***Labour influx Management Plan.*** As the project will require to comply with applicable labor laws, the assessment will scope out impact and absorptive capacity on host communities to address risks that arises from labour influx. Provisions to address laborinflux as well as Gender based violence that might arise/increase due to labor influx will need to be incorporated in the bid documents for the civil works contractor.

xvi. ***HIV Prevention Plan (HPP):*** As such road activities could contribute to spread of HIV/AIDs, a prevention plan is to be prepared for the project to ensure that development initiatives do not contribute to HIV spread. Based on above, a Report with details of actions to be adopted by the construction contractors to combat HIV/AIDS transmission among the construction workers and the community around camps along withreporting requirements shall be prepared as part of the bid documents.

xvii. ***Disclosure of mitigation instruments:*** The consultants are to provide support and assistance to HPRIDCL to meet the disclosure requirements, which at the minimum shall meet the World Bank's policy on public disclosure and in accordance with SEP. This will include: a plan for in-country disclosure, specifying the timing and locations; translation of key documents -summary of ESMF, RPF and IPPF; Executive summary of RAPs and IPDPs in local language. The consultants shall also help the client to draft newspaper announcements for disclosure; and help the client to place these mitigation instruments on HPRIDCL's website.

SIA Methods and Tools:

(a) For socio-economic, cultural and political/institutional analysis combine multiple tools and employ a variety of methods for collecting and analyzing data, including both quantitative and qualitative methods (expert and key informant interviews, focus group discussions, beneficiary assessments, rapid and participatory rural appraisal, gender analysis).

(b) Develop scoping techniques, interview schedules, field survey instruments and checklist for data collection and discussions.

(c) Screen and scope to prioritize social issues through different techniques such as ranking and composite index.

(d) For determining the magnitude of impact and analysis of alternatives develop strip map and indicate all information on structures, utilities and abutting land use that is likely to be affected within the project impact zone.

(e) The selection of SIA methodology should emphasize consultation and participation of project affected persons (PAPS), project implementing and executing agencies at the state, district and village level. The discussions with the relevant government officials, other institutions and organizations in the civil society, should be participatory and broad-based, leading to the identification, selection and agreement on project.

Output at this stage: The consultants shall submit the following deliverables for the overall project

i. Draft Environment and Social Impact Assessment (ESIA)

ii. Draft Environment and Social Management Framework

iii. Draft Resettlement Policy Framework

iv. Draft Tribal Peoples Planning Framework

Based on processing of Tranche-2 as finalized by HPRIDCL, the consultant shall submit

v. Social Impact Assessment for
    - Nadaun-Dhaneta-Barsar-Shahtalai-Bhroli Kalan-BagchalBrdige-Thapna at NH-203 (93Km),
    - Kainchi Mode Junction (NH-205 Tunnel 1)- Naina Devi–Bakhra Dam and Spur Roads connecting Naina Devi Temple (MDR 31, MDR 32) (53Km),
    - Rohru-Chirgaon-Tikri (21Km),
    - Sungri-Khadrala -Baghi Road (24Km) and
    - Palampur to Sheela Chowk Road (MDR 78) (30Km)

vi. Draft Resettlement Action Plan (RAP) — corridor specific plans

vii. Draft Tribal Development Plan (IPDP) — corridor specific plans

viii. Draft Stakeholder Engagement Plan

All these reports will be reviewed and finalized incorporating comments of the Client and the World Bank.

Note:- Any additional comments on the social aspects to be considered by the DPR consultant would be provided before the pre proposal meeting.

AnnexureA— Indicative Outline of ESIA

a) Executive Summary
b) Legal and Institutional Framework
c) Project Description
d) Baseline Data
e) Environmental and Social Risks and Impacts
f) Mitigation Measures
g) Analysis of Alternatives
h) Design Measures
i) Key Measures and Actions for the Environmental and Social Commitment Plan (ESCP)
j) Appendices

For details refer to www.worldbank.orgiesf

Annexure B— Elements of Resettlement Action Plan

1) Description of the project.
2) Potential impacts.
3) Objectives of the resettlement program.
4) Census survey and baseline socioeconomic studies.
5) Legal framework
6) Institutional framework
7) Eligibility
8) Valuation of and compensation for losses
9) Community participation
10) Implementation schedule.
11) Costs and budget
12) Grievance redress mechanism.
13) Monitoring and evaluation
14) Arrangements for adaptive management.

Additional planning requirements where resettlement involves physical displacement

15) Transitional assistance.
16) Site selection, site preparation, and relocation.
17) Housing, infrastructure, and social services.
18) Environmental protection and management.
19) Consultation on relocation arrangements.
20) Integration with host populations.

Additional planning requirements where resettlement involves economic displacement

21) Direct land replacement.
22) Loss of access to land or resources.
23) Support for alternative livelihoods.
24) Consideration of economic development opportunities
25) Transitional support

Annexure C— Outline of Tribal Development Plan (TDP)/Indigenous Peoples Development Plan (IPDP)

1. Project Description
2. Objectives of TDP
3. Methodology for preparation of TDP (include results from the Screening exercise)
4. Minimization of impacts
5. Free and prior informed consultations (FPIC) for Broad community support
6. Social Assessment
   a. Household survey findings
   b. Impact details - positive impacts and adverse impacts on assets, community resources, livelihood etc.
7. Action Plan
   a. mitigation measures (as outlined in the TDF)
   b. FPICs to be undertaken during implementation
   c. implementation schedule (by activities and months)
      i. FPIC
      ii. Provision of mitigation measures
      iii. monitoring of implementation
   d. monitoring indicators (as necessary by sub-project)
   e. implementation budget including cost of
      i. mitigation measures
      ii. conducting FPICs - material, logistics
      iii. miscellaneous contingency
   f. grievance mechanisms (by level of mechanism)

Annexure D— Outline of Environmental and Social Management Plan (EMP)

a. Project Description
b. Objective of EMP
c. Methodology for EMP preparation
d. Environmental and social risk and impacts
e. Mitigation Measures
f. Monitoring
g. Capacity Building and Training
h. Implementation Schedules and cost estimates
i. Integration of EMP with Project

Appendix 1b

Tasks for Detailed Engineering Design and Project Report Preparation

1. GENERAL

General Scope of Services shall cover but be not limited to the following major tasks (additional requirements for Preparation of Detailed Project Report for Hill Roads and Major Bridges are given in **Supplement I and II** respectively):

1.1 The tasks to be executed by the Consultant under this activity will include, but not be limited to, those set out below. In carrying out this component of the consultancy, it is expected that the consultant will make extensive use of current computer-based survey and design techniques, for both road and structural works, and will base the design work on current international practices for the type of road works. The consultant will not limit the type of construction to what is currently available or practiced in India. The engineering designs shall factor in and integrate Green Highways principles including design and construction specifications that facilitates lower Green House Gas (GHG) emissions, improvements and enhancement of community assets that are amenable for integration in road designs, roads, road safety, and landscaping elements that are environment and community friendly. All activities related to field studies, design and documentation shall be done as per the latest guidelines / circulars of MORT&H and relevant publications / codes of Indian Road 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 Consultant, upon award of the Contract may finalize this in consultation with the HPRIDCL and reflect the same in the Inception Report. All notations used in the reports, documents and drawings shall be as per IRC: 71-1977.

1.2 Engineering design will adequately address the issues usually experienced during construction including traffic safety and work zone safety management.

a. The objective of the road improvement proposal should be to minimize the impact on existing habitation, reduce hill cutting, improve road geometry, and ensure environmental and social sustainability, while enhancing riding comfort and significantly reducing travel time, without compromising the standards and specifications outlined in the relevant IRC guidelines. To achieve this, multiple bypasses/realignment options, along with tunnels, special bridges, and long-span viaducts, should be designed. Additionally, proposals for improving connectivity to key industrial locations, tourist spots, and urban and rural areas should be made, supported by suitable justifications to deliver maximum benefits to the region and local communities. For identification purposes, the consultant should conduct ground consultations and engage with line ministries such as the Department of Industries and Commerce, Tourism, etc., to understand their plans and preferences. The goal is to create synergies for development.
b. The Consultant will also make suitable proposals for widening/improvement of the existing road to 2 lane with paved shoulder with or without service lane and strengthening of the carriageways, as required at appropriate time to maintain the level of service over the design period by considering creation of sustainable road assets with high value for money to road users. In addition, a key feature of the program is the corridor concept with signal free main carriageway and better connectivity to adjacent tourism locations and Industrial estates by improving approach roads all along the corridor.
c. The Consultant shall also assess the maintenance intervention required for contracts and incorporated in the DPR and include the same in the BOQ and bid documents.
d. Technical Schedules to bid packages to the standard of "good for construction" shall be prepared.

e. Environmental Impact Assessment, Environmental Management Plan and Social Impact Assessment. Rehabilitation and Resettlement Studies shall be carried out by the Consultant meeting the requirements of the WB guidelines and Design Principles Guidance Manual prepared from experience of Phase-1 & HPSRTP of Himachal Pradesh State Road Project.
f. Consultant will liaise with concerned authorities and arrange all clarifications. Approval of all drawings including GAD and detail engineering drawings will be got done by the consultant from the Railways, PWD and other agencies as per regulations available.
g. The Consultant in consultation with all related utility department/ agencies will map all underground and above ground utilities which requires relocation and shall prepare utility relocation maps and procure estimates in congruence with the detailed engineering plans from the concerned departments.
h. Consultant shall examine suitability of all new materials / technologies accredited by IRC, approved/ accredited in the country of origin and those based on best global practices in the industry and their suitability with respect to Indian conditions, their initial cost and life cycle cost.

2. REVIEW OF DATA AND DOCUMENTS

The Consultant shall collect the available data and information relevant for the Study.

3. SURVEYS AND INVESTIGATIONS:

The consultant shall carry out different traffic surveys, field topographic surveys, Engineering surveys, Hydraulic surveys, Geotechnical examination and relevant tests to assess the design requirement. All the surveys, tasks, studies shall be carried out as outlined in IRC SP:19-2020, IRC SP- 54, MORT&H and other relevant IS and IRC codal provisions. For aspects not covered in IRC/ BIS, reference may be made to British/ American Standards.

3.1 Traffic Surveys

Traffic survey shall be done based on regular counts of traffic and special counts with specific origin/ destination data collection and axle load survey (as per latest IRC Guidelines). The consultant shall make use of the data available after undertaking the due review and revalidation of the previous feasibility Report available with HPRIDCL. In addition, the consultant shall undertake the following traffic related surveys which are not covered in the Feasibility Study report as per industry best practices.

a) Speed-Delay Surveys
b) Pedestrian / animal cross traffic surveys
c) Truck Terminal Surveys
d) Any other surveys relevant to the task

4. ENGINEERING SURVEYS AND INVESTIGATIONS

4.1 Reconnaissance and Alignment

1. The Consultant should make an in-depth study of the available land width (ROW) topographic maps, and available satellite imageries of the project area and other available relevant information collected by them concerning the existing alignment. Consultant himself has to arrange the required maps and the information needed by him from the potential sources. Consultant should make efforts for minimizing land acquisition.
2. The detailed ground reconnaissance may be taken up immediately after the study of maps and other data.

3. The data derived from the reconnaissance surveys are normally utilized for planning and programming the detailed surveys and investigations. All field studies should be taken up on the basis of information derived from the reconnaissance surveys.

4. The data and information obtained from the reconnaissance surveys should be documented. The data analysis and the recommendations concerning alignment and the field studies should be included in the Data Report with draft design concepts. The data obtained from the reconnaissance surveys should form the core of the database which would be supplemented and augmented using the data obtained from detailed field studies and investigations.

5. The data obtained from the reconnaissance surveys should be compiled in the tabular as well as graphical (chart) form indicating the major physical features and the proposed widening scheme for comments.

4.2 Topographic Surveys

1. 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 normally be taken up after the completion of reconnaissance surveys.Topographical surveys are to be conducted to assess the terrain, soil stability, and rock formations for the proposed tunnels, bridges and viaduct locations.

2. The carrying out of topographic surveys will be one of the most important and crucial field tasks under the project. The detailed field surveys shall be carried out using high precision instruments i.e. Total stations/GPS. The data from the topographic surveys shall be available in (x, y, z) format for use in a sophisticated digital terrain model (DTM) preferably in Mx Roads platform.The Consultant is fully responsible for any inaccuracy in surveys.

3. The width of the survey corridor will generally be selected by the consultant as per best practices.

4. The proposed alignment shall be transferred on to the ground as under:i. *Bench Mark/ Reference pillar of size 15 cm X 15 cm X 45 cm shall be cast in RCC of grade M 20 with a nail fixed in the centre of the top surface. The reference pillar shall be embedded in concrete up to suitable depth. The balance 15 cm above ground shall be painted yellow. The spacing shall be at-least four (4) per kilometre.Additionally, GPS pillars shall be fixed at suitable intervals.*

4.3 The consultant shall also mark the Right of Way of proposed/ acquired land width by fixing Boundary pillars along the proposed alignment on the extreme boundary on either side of the project roads at 50 m interval.

4.4 Longitudinal and Cross-Sections: These shall be collected as per the site conditions in order to have best estimates.

4.5 Details of utility Services and Other Physical Features:

1. The Consultant shall collect details of all important physical features along the alignment. These features affect the project proposals and should normally include buildings and structures, monuments, burial grounds, cremation grounds, places of worship, areas of high biodiversity value, railway lines, stream / river / canal, water mains, sewers, gas/ oil pipes, crossings, trees, plantations, utility services such as electric, and telephone lines (O/H & U/G) and poles, optical fiber cables (OFC) etc. 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 locations.

2. The information collected during reconnaissance and field surveys shall be shown on a strip plan so that the proposed improvements can be appreciated and the extent of land acquisition,

utility removals of each type 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. The consultant would also extend facilitation service to the HPRIDCL Engineers for endorsement of the utility relocation plans by the respective utility agency along with duly approved utility shifting cost estimate.

4.6 Road and Pavement Investigations

The Consultant shall carry out detailed field studies in respect of road and pavement. The data collected through road inventory and pavement investigations should be sufficient to establish pavement strategies.

4.7 Road Inventory Surveys

1. Detailed road inventory surveys shall be carried out to collect details of all existing road and pavement features along the existing road sections. The inventory data shall be collected as per the best practices.

2. The data should be collected in sufficient detail. The data should be compiled and presented in tabular as well as graphical form. The inventory data would be stored in computer files using simple utility packages, such as MS-EXCEL.

4.8 Pavement Investigation

1. Pavement Composition

The data concerning the existing pavement composition shall be collected. The consultant shall make trial pits to ascertain / validate the pavement composition. The test pit interval will be per the best practices.

2. Road and Pavement Condition Surveys

Detailed field studies shall be carried out using ROMDAS / Advance Data Collection Equipment (ADCE) to collect road and pavement surface conditions. 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 Advance Data Collection Equipment (ADCE) supplemented by actual measurements and in accordance with the widely accepted methodology (AASHTO, IRC, OECD, TRL and WB Publications) adapted to meet the study requirements. The measurement of rut depth would be made using standard straight edges. The shoulder and embankment conditions shall also be evaluated 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. v. For sections with severe distresses, additional investigations as appropriate shall be carried out to determine the cause of such distresses. It shall also include survey of drainage aspects like General condition, connectivity to natural topography etc.

The data obtained from the condition surveys should be analysed and the road segments of more or less equal performance may be identified using the criteria given in IRC: 81- 1997.

4.9 Pavement Roughness:

The roughness surveys shall be carried out and the results of the survey shall be expressed in terms of BI and IRI and shall be presented in tabular and graphical forms. The processed data shall be analysed using the cumulative difference approach to identify road segments homogenous with respect to surface roughness.

4.10 Pavement Structural Strength:

The Consultant shall carry out structural strength surveys for existing pavements using Falling Weight Deflectometer as per the IRC or any other standards acceptable to the client. The intervals and other investigations shall be done as per the best practices and standards.

4.11 Subgrade Characteristics and Strength

The data on soil classification and mechanical characteristics for soils along the existing alignments shall be collected by the Consultant as per requirements specified in IRC SP 19, IRC SP 54 and other IRC & IS codal requirements. Only reputed laboratory who have carefully carried out similar geotechnical / pavement / material testing for major DPR assignments shall alone be deployed as sub-consultants. Details of the proposed laboratories shall be furnished as part of Technical proposal for review. The testing scheme shall also be submitted with proposal as per the best practices. Any wilful negligence or lapse in this regard will be construed as a default of the Consultant and the Client shall claim damages consequent to the same as specified in GCC.

4.12 Investigations for Bridges and Structure

4.12.1 Inventory of Bridges, Culverts and Structures

The Consultant shall make an inventory of all the structures (bridges, viaducts, ROBs, culverts, etc.) along the road under the project. The inventory for the bridges, viaducts and ROBs shall include the parameters required as per the guidelines of IRC-SP:35-1990. The inventory of culverts shall be presented in a tabular form covering relevant physical and hydraulic parameters.

4.12.2 Hydraulic and Hydrological Investigations

1. The hydrological and hydraulic studies shall be carried out in accordance with IRC Special Publication No.13 ("Guidelines for the Design of Small Bridges and Culverts") and IRC:5-2015 ("Standard Specifications & Code of Practice for Road Bridges, Section I General Feature of Design"). These investigations shall be carriedout for all existing drainage structures along the road sections under the study.

2. Additionally, the Consultant shall perform hydrological studies to understand water flow patterns, drainage systems, and flood risks that may affect tunnels, special bridges, viaducts and bridge construction.

4.12.3 Condition Surveys for Bridges, Culverts and Structures

1. The Consultant shall carry out a detailed inspection of every bridge and other structures such as railway over/under bridges, overpasses, underpasses and grade separators including flyovers. (For guidance, see IRC: SP:35 and IRC: SP:52).

2. The Consultant shall thoroughly inspect the existing structures and shall prepare a report about their condition including all the parameters given in the Inspection pro-forma of IRC-SP; 35-1990. The condition and structural assessment survey of the bridges / culverts / structures shall be carried out by senior experts of the Consultants For the bridges identified to be in a distressed condition based upon the visual condition survey, supplementary testing shall be carried out as per IRC-SP:35 and IRC-SP:40. Selection of tests may be made based on the specific requirement of the structure.

3. The assessment of the load carrying capacity or rating of existing bridges shall be carried out.

4. Consultant shall carryout necessary surveys and investigations to establish the remaining service life of each retainable bridge or structure with and without the proposed strengthening and rehabilitation according to acceptable international practice in this regard.

4.12.4 Geo-technical Investigations and Sub-Soil Exploration

1. The Consultant shall carry out geo-technical investigations and sub-surface explorations including borehole drilling, rock testing, and soil sample analysisfor the proposed tunnels/Bridges/Road over bridges/viaducts/interchanges 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 adopting IRC 78-latest edition, IS 1892 and other IRC/ MORT&H codal provisions. Additionally,

identify potential challenges related to tunnelling, such as groundwater levels, seismic risks, and rock stability.

2. Sub-soil investigations should be done as per IRC 78- latest edition.
3. The soil testing reports shall be in the format prescribed in relevant IRC Codes.
4. For the road pavement, consultant shall suggest the bore holes location selection criteria. Appropriate tests to be carried out on samples collected from these boreholes to determine the suitability of various materials for use in widening of embankments or in parts of new pavement structure.
5. Scope of Geo-technical Investigations (boring) (Quantity = 500 running meter)
   - The minimum scope of geo-technical investigations for bridge and structures shall be as under:

   - **Location of Boring**

Sl. No.	Description	Location of Boring
1.	Overall length >6m to 30m	One Each abutment location and at least one intermediate location between abutments for structures having more than one span.
2.	Overall length >30m to 60m	One Each abutment location and at least one intermediate location between abutments for structures having more than one span.
3.	Overall length > 60m	Each abutment and each pier locations.

The deviation(s), if any, by the Consultants from the scheme presented above should be approved by HPRIDCL.

- However, where a study of geo-technical reports and information available from adjacent crossings over the same waterway (existing highway and railway bridges) indicates that subsurface variability is such that boring at the suggested spacing will be insufficient to adequately define the conditions for design purposes, the Consultants shall review and finalize the bore hole locations in consultation with the HPRIDCL officers.
- 4. Geotechnical Investigations and Sub soil Explorations shall be carried out to determine the nature and properties of existing strata in bed, banks and approaches with trial pits and bore hole sections showing the levels, nature and properties of various strata to a sufficient depth below the level suitable for foundations, safe intensity of pressure on the foundation strata, proneness of site to artesian conditions, seismic disturbance and other engineering properties of soil etc. Geotechnical investigation and Sub-soil Exploration will be done as per IRC 78.
- The scheme for the boring's locations and the depth of boring shall be prepared by the Consultants and submitted to HPRIDCL for approval. These may be finalized in consultation with HPRIDCL.
- The sub-soil exploration and testing should be carried out through the Geo-technical Consultants who have done Geotechnical investigation work in similar project. In case of outsourcing Geo-Technical Investigation, the firm selected by the Consultant for this purpose should also be got approved from HPRIDCL before start of such works. The soil testing reports shall be in the format prescribed in relevant IRC Codes.

- For the project road pavement, bore holes at each major change in pavement condition or in deflection readings or at 2 km intervals whichever is less shall be carried out to a depth of at least 2 m below embankment base or to rock level and are to be fully logged. Appropriate tests to be carried out on samples collected from these bore holes to determine the suitability of various materials for use in widening of embankments or in parts of new pavement structure. Geological Mapping and also the Geo-technical Investigations of the Slides Areas. The Consultant shall also carry out the Geo-logical Mapping and also the Geo-Technical Investigations of the Slide Areas. The Consultancy will employ specialized agency to advise on the quantum of investigations into the slide areas and the scheme of Investigations of the Slide Areas shall be duly approved by HPRIDCL before they are carried out at site.
- The Consultant is required to quote the rate for Geo-Technical Investigation (Boring) per running meter for bridges/structures and for road part in the financial breakdown. In case of any change in the quantity of Geotechnical Investigation (Boring), the payment to the consultant will be adjusted in accordance to the quoted prices for boring.

6. The Design consultant will investigate past landslide incidences on the project roads for assessment of Geotechnical risks. For roads to be considered for upgradation, the consultant shall carry out non-destructive/ Drone Mapping/AIRBORNE LiDAR MAPPING of all critical landslide locations, conducting detailed geotechnical investigations to determine the characteristics of slide plane and proper remedial measures to reduce the risks.

4.13 Material Investigations

1. Material investigations shall be carried out as per IRC SP 19 and other codal requirements.

2. The Consultant shall identify sources (including use of fly-ash/ slag), 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 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.

4.14 Field units of Client/ Public Works Department may be assigned with the task of monitoring the engineering surveys and investigation to be carried out by the Consultant. Consultant shall fully cooperate in this regard for effective data collection.

5. Detailed Design of Road and Pavements, Bridges, Structures

5.1 General

The Consultant is to carryout detailed design and prepares working drawings as per the requirements and best practices.

5.2. Design Standards

All activities related to field studies, design and documentation shall be done as per the latest guidelines / circulars of MOR&TH and relevant publications / codes of Indian Road 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 Consultant, upon award of the Contract may finalise this in consultation with the HPRIDCL and reflect the same in

the Inception Report. All notations used in the reports, documents and drawings shall be as per IRC: 71-1977.

5.3. Geometric Design

1. The design of geometric elements shall, therefore, take into account the essential requirements of such facilities.The Consultant shall design the geometric alignment of the roads, considering horizontal and vertical alignments for tunnels and bridges to ensure smooth traffic flow.The Consultant shall ensure that the road geometry adheres to IRC guidelines for safe design speeds, gradients, and clearances.The Consultant shall design clearances for large vehicles, and consider the need for any widening or curve modification where required.
2. The existing incidental spaces along the highways and oxbow areas created due to geometric improvements/ curve corrections shall be identified with reference to road chainages and shall be assessed for integrating in the overall road development with type designs such as rest areas, areas for landscaping, wayside facilities, etc.
3. The Consultant shall make detailed analysis of traffic flow 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 and strengthening of intermediate or 2 lane requirements with respect to the different horizon periods taking into account special problems such as road segments with isolated steep gradients.
4. The consultant shall prepare complete road and pavement design including drainage for new bypass option identified around congested town enroute.
5. The consultant after discussion with HPRIDCL shall determine the extent of land required for each of the road sections. This may vary depending upon the number of lanes, location (rural, village or urban), terrain and the environmental and social impacts.
6. The consultant shall identify number of trees and forest land area for acquisition after taking into account the available right of way. The Forest Land Diversion schedule shall be prepared by the consultant as detailed in tasks.
    1) *The co-ordinates (latitude and longitude in terms of metres upto mm accuracy) for the new center line of the proposed improvements.*
    2) *The distance between new and existing center line (in metres upto mm accuracy)*
    3) *The new center line shall be marked with nails wherever possible and shall be traceable in other places.*
    4) *The new land boundary shall be marked on field with 15 cm x15 cm x 60 cm RCC M-20 grade ROW pillars on either side of the project road at-least 50m center to center. The forest land diversion schedule shall be prepared in such a way that each survey no. and area affected, including forest ranges and sub-divisions shall have separate field markings.*
    5) *The consultant through DPGS survey shall establish co-ordinates for boundary of forest land parcels proposed for diversion. The coordinates shall be verified as per requirements in Forest (Conservation) Act, 1980. To assist during land verification process, forest land area impacted shall be marked in the village/revenue map and forest map.*
    6) *The consultant shall determine Net Present Value of forest land proposed for diversion by following regulatory framework of GoHP and MoEF&CC.*

7. The consultant shall calculate the amount of land acquisition after taking into account the available right of way. The Land Plan Schedule (LPS) shall be prepared by the consultant as detailed in tasks.
    1) *The co-ordinates (latitude and longitude in terms of metres upto mm accuracy) for the new centerline of the proposed improvements.*
    2) *The distance between new and existing centerline (in metres upto mm accuracy)*
    3) *The new centerline shall be marked with nails wherever possible and shall be traceable in other places.*
    4) *The new land boundary shall be marked on field with RCC ROW pillars of M-20 grade of 15 Cm X 15 Cm X 60 Cm as per IRC requirements at 50m distance on either side of the project road., and LPS shall be prepared in such a way that each survey no. affected including sub-divisions shall have separate field markings.*
    5) *Procure or create digitized, geo referenced cadastral/land revenue maps for purpose of land acquisitions activities. The digitized map should exactly match the original map so that the dimensions and areaof plot can be extracted from map itself. Also, the LPS shall be marked in the village map also showing the cumulative effect of land acquisition. Every affected survey no. must be referred with Geo tagging.*
    6) *The consultant shall prepare a valuation statement which is must be certified by registered Evaluator for the buildings and other assets including trees that are required to be removed lying within the proposed new boundary line of the road.*

5.4. Pavement Design

1. The detailed design of pavement shall involve:
    i. *strengthening of existing road pavement and design of the new widening pavement;*
    ii. *pavement design for bypasses; and,*
    iii. *iii. design of shoulders.*
2. The design of pavement shall primarily be based on IRC codal provisions and the design of pavement shall be rigorous and shall make use of the latest Indian and International practices.
3. For the design of overlays for the existing pavement, the strengthening requirement shalldulytake into account the strength of the existing pavement vis-à-vis the remaining life.
4. The pavement design task shall also cover working out the maintenance and strengthening requirements and periodicity and timing of such treatments as per relevant IRC codal provisions.

5.5. Design of Embankments

1. The embankments design should provide for maximum utilization of locally available materials consistent with economy. Use of fly ash wherever available within economical leads must be considered. In accordance with Government instructions, use of fly-ash within 100 km from Thermal Power Stations is mandatory. However, the Consultant shall check economy, availability, planning of work before suggesting the same.
2. The Consultant shall carry out detailed analysis and design for all embankments of height greater that 6 m based on relevant IRC publications.
3. The design of embankments should include the requirements for protection works and traffic safety features.

5.6. Design of Bridges, Tunnels, Special Bridges, Viaducts and Other Structures

1. The Consultant shall prepare General Arrangement Drawing (GAD) and Alignment Plan showing the salient features of the bridges, tunnels, special bridges, viaducts and other 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, bridges located u/s & d/s and ease of construction. The Consultant shall develop preliminary design concepts for tunnels, bridges, and viaducts based on the site investigations and feasibility studies. Initial sketches and conceptual drawings for various alternatives, considering design aesthetics, structural integrity, and functional requirements are to be created. The Consultant will evaluate and propose innovative bridge designs, such as cable-stayed, extradosed, suspension, or arch bridges, and provide justification for the selected approach. The Consultant shall conduct detailed structural design studies for tunnels, bridges, and viaducts, ensuring that they meet safety standards and can withstand anticipated loads and environmental conditions.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 submitted to enable HPRIDCL to approve the best alternative.

2. The location of all at-grade level crossings shall be identified falling across the existing level crossings for providing ROB at these locations. The Consultant shall prepare preliminary GAD for necessary construction separately to the Client. The Consultant shall pursue the Indian Railways Authorities or/and any statutory authority of State/Central Government for approval of the GAD of bridges/ ROB"s from concerned Authorities.
3. Subsequent to the approval of the GAD and Alignment Plan by HPRIDCL and Railways for river bridges and ROB, the Consultant shall prepare detailed design as per IRC codes and Railways guidelines and working drawings for all components of the bridges and structures for highway portion. The Consultant shall furnish the design and working drawings for suitable protection works and/or river training works wherever required.
4. Dismantling/ reconstruction of existing structures shall be avoided as far as possible except where considered essential in view of their poor structural conditions/ inadequacy of the provisions etc.
5. The existing structures having inadequate carriageway width shall be widened/ reconstructed in part or fully as per the latest MoRT&H guidelines. The Consultant shall furnish the detailed design and working drawings for carrying out the above improvements.
6. 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.
7. Subsequent to the approval of the GAD and the alignment plan by HPRIDCL, detailed design shall also be carried out for the proposed tunnels, special bridges, viaducts, bridge structures, underpasses, overpasses and interchanges.The Consultant shall Prepare detailed designs for tunnel structures, including the tunnel cross-section, portal design, lining, and ventilation systems.Develop detailed structural designs for bridges and viaducts, including foundation details, superstructure design, and support systems.For long-span viaducts, prepare design calculations for spans, load-bearing capacity, materials, and construction methodology.Specify materials and construction methods for different elements of the tunnels, bridges, and viaducts.
8. The Consultant shall also carry out the design and make suitable recommendations for protection works for bridges and drainage structures.

9. In case land available is not adequate for embankment slope, suitable design for RCC retaining wall shall be furnished. However, RE wall may also be considered depending upon techno-economic suitability to be approved by HPRIDCL.
10. All design shall be carried out using computer software, preferably in STAAD. The consultant shall Perform structural analysis using software tools to model the behaviour of the proposed tunnels, bridges and viaduct designs under various load conditions (traffic loads, seismic forces, wind loads). The consultant shall also carry out dynamic analysis for long-span viaducts and innovative bridges to ensure stability under wind, traffic, and seismic loads. If required, software may be temporarily loaded at a designated location for cross verification / discussion as per the direction of the HPRIDCL.
11. Client has engaged a separate agency for proof checking of major bridges/ special bridges/ ROBs, tunnels, viaducts. The cost of the Proof Checking will be borne by the Client. The Consultant shall coordinate with the Proof Checking agency to finalize the design of bridges, ROBs etc. All cost associated with the coordination works with the Proof Checking Agency shall be borne by the Consultant. The Technical institution (TIET) & PMC engaged by the Client will review the DPRs/reports submitted by theConsultant.

5.7. Drainage System: The Consultant shall study and design the drainage all along the reach of the project roads as per IRC provisions.Additionally, design an appropriate drainage system for tunnels and viaducts, ensuring water management for stormwater, groundwater, and runoff. Include systems for tunnel ventilation and water discharge, ensuring that the designs align with environmental protection measures. Prepare drainage design drawings for the road alignment, viaducts, and approach areas, considering local topography and drainage needs.

6. Traffic Safety Features, Road Furniture and Road Markings: The Consultant shall design suitable road junctions, traffic safety features and road furniture including traffic signals, signs, markings, overhead sign boards, crash barriers, delineators etc 'as per IRC provisions. Separate drawings in this regard shall be prepared as part of DPR.Additionally, design safety features for tunnels, bridges, and viaducts, such as guardrails, barriers, escape routes, and emergency evacuation provisions. Include provisions for pedestrian access where necessary, especially in tourist and urban areas, and ensure accessibility for people with disabilities. Incorporate safety standards as per IRC guidelines, focusing on vehicle safety and user comfort.

The Consultant shall prepare Road Marking &Traffic Signage Plan showing all the proposed signboards and road markings.

7. Road Safety Review/ Audit

7.1. A comprehensive road safety review will be undertaken along the project road and at the identified black spots. The review will be made in accordance with IRC manual for safety in road design and other international best practices. Road safety will be fully integrated in engineering design and this should be subjected to Road safety Audit.

7.2 Road safety audit shall be carried out for each road project 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 WB's Road Safety Audit for Road Projects 7.3 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.

8. Detailed Design — Road Safety Measures, Traffic Control and Other Facilities

1. Recommendations from road safety review will be integrated in the engineering design in the form of improved intersection layout, traffic segregation arrangement for slow moving vehicles, pedestrian facilities, improved road geometrics and installation of traffic signs, road delineators, reflectorized marker pots and other traffic calming and road safety measure.
2. Pavement marking and sign layout plans will be prepared for safe and efficient traffic movement. Both are to be based on current international practice for roads of this type, adjusted through discussion with the HPRIDCL to suit Indian conditions.
3. Roadway lighting designs for sections through urban areas and other areas where lighting is required will be prepared. Lighting design is to be based on a recognized international standard.

9. **Integrating work zone safety aspects in the Engineering Designs and Bidding Documents** Prepare detailed checklists for work zone safety, include standalone pay items in the bill of quantities, prepare suitable technical specifications and contract terms / clauses to address work zone safety aspects.
10. **Specifications and Construction Plans** Prepare specifications for all aspects of the works, based on current and acceptable Indian / international standards and work methods for project of this type. Prepare safety and traffic management plans as well as construction phasing/ sequencing plans to be implemented during construction to ensure minimum hindrance/ interruption to traffic flow and road safety.
11. **Landscaping and Arboriculture:** The Consultants shall work out appropriate plan for planting of trees (specifying type of plantation), horticulture, floriculture on the surplus land of the right-of way with a view to beautify the highway and making the environment along the highway pleasing. The existing trees / plants shall be retained to the extent possible.
    1. The landscaping would involve the development of a landscape strategy and action plan for highways with the intent to integrate the same in road safety and maintain aesthetics. This should be based on, but not limited to a real time assessment of highways condition in the context of road safety and visual driving experience. This will align itself to the proposed upgradation and strengthening works proposed under the highway upgradation programme.
    2. Landscaping strategy and specific implementable action plan shall be developed and the technical specifications shall be integrated in the highway designs. The strategy typically needs to provide landscape advice for different typologies of highways. The action plan will necessarily provide corridor specific landscaping designs covering:
        (i) landscaping for road intersections;
        (ii) plantation details safeguarding the existing vegetation. This will include plantation of trees, shrubs, bushes and floriculture areas with a view to improve highway aesthetics; source of material, including if nurseries are to be set up specifically for this purpose etc; mix of plants; schedule of implementation with reference of overall construction plan;
        (iii) enhancement plans for roadside landmarks and cultural properties, etc.;
        (iv) beautification of incidental spaces along the highways; and
        (v) roles and responsibilities, integration of technical specs and BoQs, and maintenance plans for the landscaping elements.
12. **Freight Terminal, Truck Lay-byes, Bus Bays, Parking Areas, Cycle track, Way side facilities**

    The Consultant shall select suitable sites for freight terminals, truck lay-byes, bus bays, parking areas, cycle track and way side facilities and prepare suitable separate designs in this regard. The facilities should be planned appropriately addressing project specifics. The Consultant shall also use the experience of existing Freight Terminals, Truck Lay Byes, Bus Bays, Parking

Areas and way side amenities constructed in National Highways while selecting the site for the above in these corridors.

a) **Designing freight terminals: Truck stops at critical nodes, including district HQs and Block HQs, and Mandis where agricultural and MSME products are consolidated and handled in coordination with independent ESIA Consulting Firm and in accordance with HPRIDCL's ESMF, RPF, LMP and project specific SEP incorporating inclusiveness of disability.**
The data derived from the O-D, speed-delay, other surveys and also supplementary surveys shall be analyzed to assess requirements for present and future development of truck terminals, provision of Bus Bays and Parking for car/ 3 wheelers/ 2 wheelers at suitable locations enroute. The consultant shall clearly bring out with proper justification of requirements of all kinds of highway amenities (Truck Lay-Bye, Bus Bays, Passenger Shelters, Rest Area, Parking Areas for 2 & 4 wheelers etc.).

b) The rural freight terminals (truck stops) on the project roads will be combined with passenger transport bus and taxi stops. The DPR consultant shall consider identifying the locations and design the space/parking area for the roadside rural freight and passenger transportation terminals/hubs serving a band of 20km (10km on each side) and truck and bus/taxi stands wherever required as per IRC guidelines.

i. The DPR will provide the design for the space and hillside protection for the hubs, which will include parking, handling facilities, electric vehicle support service station, rest stop and refreshment, and market shades. The building and shades design and construction will be handled separately.

ii. At the truck and bus/taxi stands the DPR will provide a road cross-section that includes parking lane on each side. Shades at the stands will be part of the road construction.

13. Quality Assurance Plan (QAP)

1. The Consultants should have detailed Quality Assurance Plan (QAP) for all field studies including topographic surveys, traffic surveys, engineering surveys and investigations, design and documentation activities. The detailed Draft QAP Document must be discussed and finalised with the Client immediately upon the award of the Contract and submitted as part of the inception report.
2. It is imperative that the QAP is approved by Client before the Consultants start the field work.

14. Estimation of Quantities and Project Costs

1. The Consultant shall prepare detailed estimates for quantities (considering designs and mass haul diagram) including maintenance intervention required for EPC Contracts and project cost for the entire project (civil packages wise), including the cost of environmental and social safeguards proposed based on MoRT&H's Standard Data Book and schedule of rate / market rate for the inputs. The estimation of quantities shall be based on detailed design of various components of the projects. The estimation of quantities and costs would have to be worked out separately for each civil work Package as defined in this TOR.
2. The Consultant 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.

3. The consultant shall Prepare unit cost estimates for each of the item included in the items included in the scope of work. These detailed estimates are to be developed from the cost of basic inputs — materials, equipment, labor, together with overheads, profit, etc.— and are to be checked against rates for similar works bid in India and State road sector projects.Materials shall be selected based on strength, durability, environmental conditions, and sustainability, ensuring cost-effectiveness and long-term performance.
4. Combine these costs with the quantities developed by the detailed engineering design activity group, for the priority lengths, to produce project base costs. These are to be prepared:
   i. on a kilometer basis to allow subsequent repackaging if necessary; and ii. on a contract package basis
5. Undertake an estimate on the proportions of the project's base costs in terms of
   (i) foreign exchange cost (including direct and indirect foreign exchange costs)
   (ii) local currency cost, and
   (iii) taxes. Calculations are to be spreadsheet or similar software based.
6. After discussion with HPRIDCL, make suitable allowance for physical and price contingencies, and produce final engineering estimates for each of the contract packages.
7. These are to be presented in the form of the final Bill of Quantities for each contract package, and are to be supported by a report detailing all calculations, and are to be accompanied by a disk copy suitably documented.

15. Economic Analysis

1. The Consultant shall carry out economic analysis for the different scenarios of the project, to be agreed with the client. The analysis should be for each of the sections covered under this TOR. The benefit and cost streams should be worked out for the project using HDM-IV or other recognized life-cycle costing model.
2. The economic analysis shall take into account all ongoing and future road and transport infrastructure projects and future development plans in the project area.

16. Contract Documentation, Estimates and Packaging

1. The tasks to be executed by the consultant under this activity group will include the preparation of detailed estimates, the definition of suitable package sizes, contract duration based on
   (i) a scientific analysis of what would be attractive to National and / or International bidding and
   (ii) the geographical distribution of the project roads and the *administrative organization* of the HPRIDCL in the field.
2. Based on the Banks Standard Bidding Documents, prepare draft documents for National Competitive Bidding (NCB) and/ or International Competitive Bidding (ICB) in consultation with HPRIDCL. This will be done in two stages, the first for the commercial documentation (Instructions to Bidders, Conditions of Contract, outline Bills of Quantities with schedules, etc.) and the second for the technical documentation (drawings, specifications, completed Bills of Quantities, etc.).
3. Submit bidding and post/ pre qualification documents to the HPRIDCL including bill of quantities, drawings, specifications, EMP, post qualification criteria, consistent with WB guidelines, local procurement regulations and ready for issuance to contracting agencies.
4. After receipt of comments from the HPRIDCL, prepare the final versions of the documents in the required number of copies as specified in the reporting requirements and provide soft copies (Pen Drive/Hard disk) of all documents, suitable documented in a format that

HPRIDCL can regularly put on its website for contractors to download as and when required.

17. **Training:** The Consultant shall also impart training to HPRIDCL / PWD staff in Project Preparation, MX Road, Ms Project for 10 persons in a professional institute of repute to be finalised after discussion with HPRIDCL. Training shall be given after the submission of Inception Report.

18. **Miscellaneous Works**

1. The Consultant shall make suitable designs and layout for miscellaneous works including vehicle parking areas, way side amenities, telecommunication facilities (OFC Cables) etc. wherever appropriate.
2. The Consultant shall prepare detailed plan for the traffic management and safety and work zone safety during the construction period.
3. The Consultant shall assess and propose any other required facilities as per IRC manual for 2 laning appropriate for EPC contracts.
4. The DPR should be accompanied with a walk through video on Google Earth or 3D video as required by the Authority, clearly showing the project road its major features, Land acquisition details, Major bridges, Flyovers, ROBs etc.
5. In the event that in the period between the Consultant's field survey and invitation of bids for a particular road works there is either
   (i) a delay of more than one monsoon or
   (ii) a major natural or manmade change effecting the use or condition of a road, the Consultant shall carry out appropriate revalidation survey of the design and BOQ before the Client issues notification inviting bids.
6. Wherever feasible, the Consultant shall enter data collected from the field as part of the scope of service into the Client's Road Information System.
7.

i) Review existing system for accommodating utility facilities and private lines
ii) Study the best practices in various states and other parts of world for burying of optic fibre cables and conduits underground with particular reference to hilly roads.
iii) Develop best practice including dig once requirements, use of private investment in developing IT infrastructure, determining fair market value for use of rights of way and relocate/re-establish road assets disturbed by installation.
iv) Provide set of best practices that can accommodate changes in broad band technology and minimise excavations consistent with competitive broad band deployment.
v) Develop guidelines for allowing govt., private and other entities to accommodate or construct, maintain in a safe and secure manner and utilise broad-band facilities on govt's right of way.
vi) Develop procedures, requirements, frame the policy and its implementation strategy for dig once requirements and/or similar policies for broad-band infrastructure and to relocate/re-establish highway assets disturbed by installation.
vii) Ensure that in the processes developed, there is a consistency in approach with regard to existing acts, rules and procedures and all the stakeholders are identified and consulted.
viii) The consultant shall in consultation with participating govt., private and other facility providers, draft the engineering plans and work out estimated construction costs to be included in the DPR.

8. Develop templates for application forms, master contracts and terms & conditions for govt. and non-government entities and assess the fees for such access for deployment of broad band facilities

Appendix 1b

SUPPLEMENT-I:

ADDITIONAL POINTS TO BE CONSIDERED FOR HILL ROADS IN ADDITION TO POINTS COVERED IN MAIN TOR

Sl. No.	Additional points
1.	a) Provisions of tunnels if required.
2.	1. Design of tunnels, if required 2. Design of protective works, slope stabilization measures, erosion control measures, land slide control/protection measures snow drift control/snow clearance measures, avalanche protection measures, if required
3.	Feasibility study and preparation of detailed project report for hill roads shall be done in accordance with best international practices and wherever practicable/feasible steep gradients and hair pin bends may be avoided by realignments by provision of structures and provision of tunnels if required
4.	a) Inventory and condition survey for tunnels, if required. b) Identification of faults in rock strata and impact of faults in design of tunnels, if required c) Detailed design of road considering and incorporating specific aspects related to hill region like terrain, topographic conditions, extreme weather conditions, altitude effects etc. d) Design of protective works, slope stabilization measures, erosion control measures, land slide control/protection measures, snow drift control/snow clearance measures, avalanche protection measures, if required e) Design of scenic overlooks/watering points etc.
5.	All activities related to field studies, design and documentation shall be done as per the latest guidelines/circulars of MORT&H and relevant publications of the Indian Roads Congress (IRC)/Bureau of Indian Standards (BIS) for hill roads. For aspects not covered by IRC and BIS, international standard practices, such as, British and American Standards may be adopted.
6.	Review of data and documents pertaining to a) Terrain and soil condition b) Condition of tunnels, if required. c) Sub-surface and geo-technical data for existing tunnels, if required. d) Drawing and details of existing tunnels, if required. e) Existing protective works, erosion control and land slide control/protection works, slope stabilization measures, snow drift control measures, avalanche protection measures. f) Existing land slide and snow clearance facilities

Sl. No.	Additional points
	g) Geological details of rock strata in the area in case of tunnels
7.	The Consultant should make an in-depth study of available geological and Meteorological maps of the area.
8.	The primary tasks to be accomplished during the reconnaissance survey shall also include: a) details of terrain (steep or mountainous), cliffs and gorges, general elevation of the road including maximum heights negotiated by main ascents and descents, total number of ascents and descents, hair pin bends, vegetation etc. b) Climatic conditions i.e. temperature, rainfall data, snowfall data, fog conditions, unusual weather conditions etc. c) Realignment requirements including provision of tunnels, if required. d) Inventory of tunnels and geologically sensitive areas like slip prone areas, areas subject to landslides, rockfall, snow drifts, erosion, avalanche activity etc.
9.	Cross sections shall be taken at every 10 m. in case of hill roads and at points of appreciable changes in soil conditions. While taking cross sections, soil conditions shall also be recorded.
10.	The inventory data shall also include: a) General elevation of road indicating maximum & minimum heights negotiated by main ascents & descents and total no. of ascents & descents. b) Details of road gradients, lengths of gentle & steep slopes, lengths & location of stretches in unstable areas, areas with cliffs, areas with loose rocks, land slide prone areas, snow drift prone areas, no. & location of hairpin bends etc. c) Details of tunnels d) Details & types of protective structures, erosion & land slide control/protection measures, snow drift control measures, avalanche protection/control measures etc.
11.	Pavement: a) Location of crust failures along with their causes b) Conditions of camber/cross falls/super elevations etc., whether affected by subsidence Embankment: Extent of slope erosion on hill and valley side
12.	Condition Surveys & Investigation for Slope Stabilization, Erosion Control, Landslide Correction/Protection & Avalanche Protection Measures: a) Inventory & Condition Surveys of Existing Protective/Control Measures: The consultant shall make an inventory of all the structures related to Slope Stabilization, Erosion Control, Landslide Control/protection, Avalanche Protection etc. This shall include details of effectiveness of control measures already done and condition of protective/control structures. b) Landslide Investigation This shall be carried out to identify landslide prone areas, to suggest preventive measures or alternate routes that are less susceptible to landslide hazard. Further in existing slide areas this shall help to identify factors responsible for instability and to determine appropriate control measures needed to prevent or minimize recurring of instability problems. Initial preliminary studies shall be carried out using available

Sl. No.	Additional points
	contour maps, topographical maps, geological/geo-morphological maps, aerial photographs etc. for general understanding of existing slide area and to identify potential slide areas. This shall be followed by further investigations like geological/geotechnical/hydrological investigation to determine specific site conditions prevailing in the slide area as per relevant IRC specifications/ publications, MORT&H circulars and relevant recommendations of the international standards for hill roads. The result of the investigations shall provide basis for engineering analysis and the design of protection/remedial measures.
13.	a) For tunnels if required, geotechnical and subsurface investigation shall be done as per IRC:SP:91. b) Geotechnical and subsurface investigation and testing for tunnels shall be carried out through the geotechnical Consultants who have the experience of geotechnical and subsurface investigation in similar project.
14.	The Consultant shall also carry out detailed designs and prepare working designs for the following: a) cross sections at every 10 m intervals b) Slope stabilization and erosion control measures c) Design of protection/control structures in areas subject to subsidence, landslides, rock fall, rock slide, snow drifts, icing, scour, avalanche activity etc. d) Design of protective structures in slip prone and unstable areas e) Design of scenic overlooks, watering points etc. f) Safety features specific to hill roads
15.	The Consultant shall evolve Design Standards and material specifications for the Study primarily based on IRC publications, MORT&H Circulars and relevant recommendations of the international standards for hill roads for approval by HPRIDCL. 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, tunnels if required, traffic safety and materials.
16.	Wherever practicable/feasible hairpin bends and steep gradients shall be avoided by realignments, provision of structures or any other suitable provisions.
17.	While designing pavement for hill roads specific aspects relevant to hill regions like terrain & topographic conditions, weather conditions, altitude effects etc. shall be duly considered and suitably incorporated in design so that pavement is able to perform well for the design traffic and service life. Effects of factors like heavy rainfall, frost action, intensive snow and avalanche activity, thermal stresses due to temperature difference in day and night, damage by tracked vehicles during snow clearance operations etc. must also be considered along with traffic intensity, its growth, axle loads and design life.
18.	The design of embankments should include the requirements for protection works and traffic safety features including features specific to hill roads.
19.	Design and Drawing of Tunnels: The Consultant shall prepare design and drawings for tunnels, if required as per the results of feasibility study, as per the relevant specifications of IRC:SP:91/MORT&H and other international specifications.
20.	a) Topography of hills generates numerous water courses and this coupled with

Sl. No.	Additional points
	continuous gradients of roads in hills and high intensity of rainfall calls for effective drainage of roads. The drainage system shall be designed to ensure that the water flowing towards the road surface may be diverted and guided to follow a definite path by suitable provision of road side drains, catch water drains, interceptors etc. and flow on valley side is controlled so that stability is not affected. b) Further, adequate provision shall be made for sub-surface/subgrade drainage to take care of seepage through the adjacent hill face of the road & underground water flows.
21.	The Consultant shall design suitable traffic safety features and road furniture including traffic signals, signs, markings, overhead sign boards, crash barriers, delineators etc. including any feature specific to hill roads. The locations of these features shall be given in the reports and also shown in the drawings.
22.	The Consultant shall make suitable designs and layout for miscellaneous works including rest areas, bus bays, vehicle parking areas, telecommunication facilities, scenic overlooks, watering points etc. wherever appropriate.
23.	Volume II: Design Report: • Inventory of protection measures and other structures • Inventory of tunnels, if required. • Proposed preliminary designs for tunnels, if required. Volume III: Drawings • Drawings for protection/control measures and other structures • Drawings for tunnels, if required.
24.	Volume II: Design Report (Part-II) Part-II of Design Report shall also deal with design of tunnels, if required and design of other protection/control structures. Volume IXV: Drawing Volume This shall also include: a) Detailed working drawings for tunnels, if required. b) Detailed working drawings for protection/control structures

Appendix 1b

SUPPLEMENT-II:

ADDITIONAL POINTS TO BE CONSIDERED FOR BRIDGES IN ADDITION TO POINTS COVERED IN MAIN TOR

Model Studies for Bridges

1. Objective

Physical/ Mathematical Model study for detailed Hydraulic / Hydrologic investigations regarding the proposed bridge for hydraulic design of the bridge and assessment and hydraulic design of required river training works.

2. Methodology

Physical/Mathematical Model study shall be carried out at a reputed/recognized institution. The consultant will be responsible for identifying the institution, supplying Information /Documents /Data required for modal studies as indicated in para 4 below and coordinating the model study with the institution concerned

3. Scope of Work

3.1 Physical Model study

Physical modeling with appropriate model scale for Hydraulic and Hydrologic Investigations to:

i. Finalize span arrangement causing uniformity in flow distribution, and work out the alignment and orientation of river training works and bridge axis.

ii. Provide information on estimated/observed maximum depth of scour.

iii. Provide information on required river training works for proposed bridge

iv. Provide hydraulic design for the bridge and the required river training works.

v. Quantify the general direction of river course through bridge, afflux, extent and magnitude of flood, effect of backwater, if any, aggradation/degradation of bed, evidence of scour etc. shall be used to augment the available hydrological data. The presence of flood control/irrigation structures, if affecting the hydraulic characteristics like causing obliquity, concentration of flow, scour, silting of bed, change in flow levels, bed levels etc. shall be studied and considered in Hydraulic design of proposed bridge. The details of any planned work in the immediate future that may affect the river hydraulics shall be studied and considered.

vi. Analyze effects of Wind Load on the Structures.

3.2 Mathematical Model study

Mathematical modeling for detailed Hydraulic/ Hydrologic investigations regarding the proposed new bridge to:

i. Finalize the site/location of the proposed new bridge based on mathematical modeling.

ii. Provide information on estimated/observed maximum depth of scour.
iii. Provide information on required river training works for proposed bridge
iv. Provide hydraulic design for the bridge and the required river training works.
v. Quantify the general direction of river course through bridge, afflux, extent and magnitude of flood, effect of backwater, if any, aggradation/degradation of bed, evidence of scour etc. shall be used to augment the available hydrological data. The presence of flood control/irrigation structures, if affecting the hydraulic characteristics like causing obliquity, concentration of flow, scour, silting of bed, change in flow levels, bed levels etc. shall be studied and considered in Hydraulic design of proposed bridge. The details of any planned work in the immediate future that may affect the river hydraulics shall be studied and considered.
vi. Analyze effects of Wind Load on the Structures

4. Information/Documents/Data required for Physical /Mathematical Model study

(i) Plan layouts showing the locations of the proposed bridge as well as the existing bridges /barrages etc., in the vicinity of the proposed bridge with the chainages with respect to a standard reference marked on it.

(ii) High flood discharges and corresponding flood levels at the locations of the existing bridges in the vicinity of the proposed bridge.

(iii) General arrangement drawing (GAD) of the existing bridges showing number of spans, pier and well dimensions, founding levels, maximum scour level, the design discharge and the HFL, guide bund details. On this, the plan form of the river course with the bridge alignment may also be shown as far as possible.

(iv) General arrangement drawing (GAD) of the proposed new bridge showing number of spans, pier and foundation dimensions. On this, the plan form of the river course with the bridge alignment may also be shown as for as possible.

(v) River cross sections at 500m longitudinal spacing (maximum) up to a distance of 2 times the bridge total length on the upstream side and up to a distance equal to the bridge total length on the downstream with right bank and left bank clearly marked on it. At least one cross section to be provided at the location of the proposed bridge. At each cross section, the bed levels to be taken at a maximum lateral distance of 8 m in flow section and at 25 m in non-flow section respectively. The abrupt variations in the bed levels to be captured by taking measurements at closer locations both in longitudinal as well as lateral directions.

(vi) The cross sections, as for as possible, from high bank to high bank.

(vii) The longitudinal profile of the river along the length of the proposed alignment.

(viii) Size distribution of the river bed material and the bore log data at different locations at the site of the proposed bridge.

(ix) The series of annual peak rainfall and flood of the river for at least 30 years period

Appendix 2 for ToR

Tasks for Environment Assessment and Preparation of Environmental Management Plan

1. Overall Objective

Among other components of DPR, the Environmental Assessment (EA) is conceived as an integral part of developing the project roads as Green Highways. The EIA shall significantly contribute to the overall effort of the project to construct "Complete Highways" which will be "Better than Before". The EA including the Environmental Management Plans (EMP) shall focus on "Do Good", beyond the conventional approach of "Do no Harm" to the environment and ecology. The EA shall be conducted as an integral part to achieve the core objectives of imbibing Green Highway principles in the road selection process and its detailed engineering design. The EA shall comply with the regulatory requirements of the Government of India, Government of HPand the WB's ESF.

2. Environmental Screening and Scoping

The outcomes of environmental screening shall be an objective evaluation of project corridors and should fit in to overall criteria for selection of project corridors (technical, social, economic criteria) and the outputs shall provide: (a) exclusion of project corridors, which should not be taken up due to potential immitigable and significant environmental impacts (such as permanent obstruction to wildlife corridors, or opening up increased access to threatened biodiversity resource hotspots, or construction on top of eroded and vulnerable flood embankments); (b) specific environmental inputs for prioritization and selection of project corridors; (c) scope of corridor specific EAs including stakeholder consultation plans to be undertaken based on the environmental issues identified as the regulatory requirements of GOI and GoHP, and WB's ESF; (d) preliminary identification of specific aspects that need to be assessed in detail during EIA for integrating green highway concepts (such as community and environmental enhancements, improving and/or developing micro watersheds/water harvesting, landscaping elements of importance, etc. along the road corridors). Further, the scoping shall necessarily identify the issues that need to be studied in detail - related to sensitive receptors / land uses that could be affected due to road improvements with a view to integrate appropriate measures in the designs

Scope of Surveys: Based on the screening, the consultant shall specify the surveys that will be conducted as part of detailed EA that will establish baseline environmental status within the suitable width of the project corridors as well as project influence area as specified in the inception report. The intent of surveys shall be to: (a) to provide baseline; (b) facilitate the design and integration of appropriate management / mitigation measures; and (c) comply with the regulatory requirements and to facilitate GoHP/GOI (as applicable) to process relevant environmental clearances.

3. Detailed EIA of Selected Project Corridors

This includes carrying out the detailed EA and preparing various reports that include the EIA report and implementable corridor specific Environmental Management Plans (EMPs). EIA shall include details on potential significant impacts related to road construction and operation include but are not limited to: community health and safety;waste generation and waste disposal, including re-useopportunities; disruption of economic activities, loss of natural habitats and tree cover; interference with wildlife dispersion or migration; dust emissions, soil erosion, noise nuisance from contractors, rubble and solid wastes, effluent discharge, fumes emissions, damage on historic and cultural sites; effects on water resources; alternative future land use and possible land use conflicts.

4. Baseline Surveys

a. The Consultant will {a} collect information from secondary sources that are relevant to understanding the baseline, as well as the design of mitigation and enhancement measures, as pertaining to physical, biological and socio-cultural environments; {b} carry out site visits and investigations of all the environmentally sensitive locations (based on the inventory of valued eco-system components) and document them on the base maps to identify conflict points with preliminary designs (including verification of these from authentic sources of information, such as from the revenue and forest records); and {c} prepare detailed specific maps showing details of candidate sites for environmental enhancements.

b. All surveys shall be carried out in compliance with the GoHP, GoI standards/guidelines/norms. Wherever such guidelines/norms are not available, the techniques, tools and samples employed for the surveys shall conform to the International practices. Whenever directly relevant secondary data is available, these should be used, while indirectly relevant data should be verified through primary survey. Environmental quality (air, water and noise) monitoring shall include an adequate number of samples, as established on a sampling network to provide a representative picture of pollution levels along all the road corridor (in addition to the samples collected during environmental screening). Additional data for sensitive environmental / ecological receptors, if any, shall be collected such as to analyze and predict the possible impacts to a degree and precision of acceptable standards. The surveys shall necessarily cover inventory of trees in project corridors, including preparation of tree cutting schedules. Further, additional specialized surveys, such as biodiversity assessment survey, and hydrological surveys shall be conducted, if and when recommended by environmental scoping described earlier.

c. The Consultant shall also collect information on all regionally or nationally recognized environmental resources and features within the project influence area shall be clearly identified and studied in relation to activities proposed under the project. These will include all protected areas (national parks, wildlife sanctuaries, reserved forests, sites, biosphere reserves, wilderness zones), unprotected and community forests and forest patches, all wetlands, rivers, rivulets and other surface water bodies. The Consultant shall consolidate all these information on maps of adequate scale (1:250,000 minimum), superimposed with the projects roads corridor.

5. Biodiversity Assessment Study.

Biodiversity Assessment Report (if required), that shall include mapped area of interest, including boundaries of project area; flora and fauna in the area crossed by the roads; list and maps of known or potentially occurring high biodiversity values/ environmentally sensitive areas, if any and interaction with legally protected areas and internationally recognized areas, including maps; interaction with global and national conservation priorities or initiatives, including maps; if field surveys are conducted, a full description of methods used and sampling effort must be provided this includes: dates, duration, location, expertise and techniques used); interaction with potentially sensitive habitats (e.g. globally or regionally unique or threatened ecosystems); findings regarding human settlements and infrastructure, agricultural areas, social context (ethnicity, major social trends and land use activities), history of land use and development trends, including future plans (e.g. spatial planning maps, development initiatives and existing/proposed commercial exploitation and production licenses); list of names, organizational affiliation, contact details and meeting dates for all stakeholders interviewed or consulted; list of all data sources reviewed.

6. Stakeholder Consultation: The Consultant shall undertake community consultation sessions at the state, district, village and roadside community levels, as per the consultation plan prepared during the environmental screening stage. Consultations should be carried out with all relevant stakeholders identified through stakeholder analysis. The objective of the consultation sessions shall be to improve the project's interventions regarding environmental management. Two rounds of consultations shall be carried out— the first to seek views from the stakeholders on the environmental issues and the ways these could be resolved, and the second to provide feedback to the stakeholders that their views have been taken care in the project. Further, the residual feedbacks received shall be analyzed, and the consultants shall determine how these can be addressed in the final EMP and in the project designs. The consultation program shall be coordinated with the social and the engineering teams.

7. It is recommended that some of the consultation sessions may be organized in coordination with the social and engineering consultants, as feasible, and when stakeholders consulted are the same.

8. Environmental Analysis of Alternatives: As the overall alignments are final at this stage, the environmental analysis of alternatives shall focus on bypasses, if any, (including alignment), cross-sections, materials and sources of materials from an environment management perspective. To minimize project's carbon footprint, the consultant shall suggest on efficient use of eco-friendly construction materials and considering the integration of green spaces or noise barriers in urban or residential areas. This analysis shall also cover comparisons in relation to citing, design, technology selection, construction techniques and phasing, and operating and maintenance procedures.Ensure compliance with environmental protection regulations, including the use of appropriate techniques for tunnel excavation, viaduct and bridge construction to minimize the disruption to the surrounding environment.

9. Impact Prediction & Management:

a. The Consultant shall determine the potential impacts due to the project through identification, analysis and evaluation on sensitive areas (natural habitats; sites of historic, cultural and conservation importance), urban settlements and

villages/agricultural areas or any other identified VEC. These will be identified as significant positive and negative impacts, direct and indirect impacts, immediate and long-term impacts, and unavoidable or irreversible impacts.

b. For each impact predicted as above, feasible and cost-effective mitigation measures shall be identified to reduce potentially significant adverse environmental impacts to acceptable levels.

In line with the recommendations of the Environmental Screening, for common road construction operations, the Consultant shall develop standardized management measures and/or codes of practice and explore the possibility of integrating the same into the PWD operations manual. The consultants shall explore and recommend different environmental site-specific mitigation measures like community and environmental enhancements, improving and/or developing micro watersheds, water harvesting, landscaping elementsof importance, compensatory afforestation and noise barriers, as well as enhancements including roadside landscaping, separation of non-motorized lanes in an aesthetically appealing manner, provision of pilgrimage pathways, and development of cultural properties or improving access along the corridor. The capital and recurrent costs of the measures, and institutional, training and monitoring requirements to effectively implement these measures shall be determined. At this stage, it would be important to identify the need for further environmental studies for issues that cannot be dealt with during the project preparation stage but should be undertaken during project implementation.

10. Institutional Arrangement to Manage Environment Impacts Effectively: The Consultant shall identify institutional/organizational needs to implement the recommendations of the project EA and to propose steps to strengthen or expand, if required. This may extend to new agency functions, inter-sectoral arrangements, management procedures and training, staffing, operation and maintenance, training and budgeting.

11. Other Assistance to the Client: The Consultant shall support the client to furnish any relevant information required for obtaining clearance from various state and central government agencies. This may include {a} assisting the client in the submission of application for the Clearance of Reserved or Protected Forests to the State Forest Department; {b} completion of forms and submission of the same for obtaining No-objection Certificates (NoC) under the Water and Air Acts from the HP State Pollution Control Board; {c} completion and submission of the MoEF&CC questionnaire for Environmental Appraisal for the project; {d} assistance in presentation to the Wildlife Board of the MoEF&CC in obtaining clearance for any section or road passing through the Wildlife Reserves or Sanctuaries or other protected areas, if any; {e} assistance in submission for any other clearance requirements with respect to the environmental components relevant to the project; {f}to prepare presentation for any kind of clearance required from MOEF&CC, Wildlife Board of MOEF&CC; {g} consultation with WB Mission as and when required upon instruction of client; {h} to attend all progress review meetings with Team Leader as and when called by the client as well as to prepare progress review reports.

12. The consultants shall prepare an Environmental Assessment Report. In doing so, while finalizing the recommendation for EMP, the environment team of the consultant shall

discuss the findings and their recommendations with engineering and social team members. The report will be revised in consideration of the comments by the Client and WB.

Environment Management Plan

13. Based on the environmental impacts assessed, EMPs, separate for each of the construction contract packages, shall be prepared in such a manner that these are amenable to incorporation in the bidding/contract documents. EMP should follow the mitigation hierarchy, as noted above, that will guide the design principles for the roads. The EMP shall be prepared as per the requirements of WB safeguard policy statement and shall, among others, include a list of design modifications recommended by the project Executing Agency, along with the change. The report will be revised in consideration of the comments from the Client and WB.

14. EMP shall include technical details for each mitigation measure, including the type of impact to which it relates, the conditions under which it is required (e.g., continuouslyor in the event of contingencies), as well as preliminary design, equipment descriptions, and operating procedures, as appropriate.

15. The Consultant shall recommend feasible and cost-effective measures to prevent or reduce significant negative impacts to acceptable levels. Apart from mitigation of the potential adverse impacts on the environmental component, the EMP shall identify opportunities that exist for the enhancement of the environmental quality along the corridor. This shall include but not limited to the enhancement of specific locations as water bodies; micro-watershed; innovative Storm Water Management Practices — practices like rainwater harvesting and bio-retention apart from preventing/improving water logging conditions in the adjoining settlements affected due to raising of the highway; enhancement of scenic areas along the corridor; enhancement of community and cultural assets, etc. Residual impacts from the environmental measures shall also be clearly identified. The EMP shall include specific or sample plans, such as for management and redevelopment of quarries, borrow areas and construction camps. The EMP shall include detailed specification, bill of quantities, execution drawings and contracting procedures for execution of the environmental mitigation and enhancement measures suggested, separate for pre-construction, construction and operation period. In addition, the EMP shall include good practice guides, relates to construction and upkeep of plant and machinery. Responsibilities for execution and supervision of each of the mitigation and enhancement measures shall be specified in the EMP.A plan for continued consultation to be conducted during implementation stage of the project shall also be appended. To monitor implementation of EMP, for different stage of project (pre-construction, construction, post construction), the consultant shall identify the performance indicators, approach of monitoring, and frequency. The performance indicators should include both quantitative and qualitative types, but the consultant shall consider practicality aspect and provide approach for monitoring each identified indicator.

16. The consultant shall also prepare Emergency Response Plan, particularly for the operations stage.

17. The consultant shall also prepare a detailed contractor management plan with specified actions to be taken by the contractors and sub-contractors with regard to waste management, noise, occupational health and safety, labor influx (workers accommodation, HIV/ AIDS prevention etc.) and other key impacts under contractors' control

Co-ordination by DPR Consultant

18. The consultant shall at the direction of HPRIDCL ensure absolute coordination and shall include but not limited to the following as part of the scope of work:

a. The Consultant will coordinate with Independent ESIA consultant (hired by HPRIDCL) who will independently assess environmental processes adopted and reports produced by DPR consultant in line with ESF requirements of the World Bank.
b. Help HPRIDCL as appropriate in preparation of the project.
c. Shall establish a strong co-ordination mechanism with the other project-preparation /management consultants stationed in the department and in the respective implementing agencies.
d. Assist the HPRIDCL in disclosure and consultation process of the environmental studies in compliance with the ESF of the World Bank.
e. Ensure the timely flow/exchange of information and documents between consultant and stakeholders of the project.

Capacity Building & Training

19. The EMPs shall describe the implementation arrangement needed for the project, especially the capacity building proposals including the staffing of the environment unit (as and when recommended) adequate to implement the environmental mitigation and enhancement measures. For each staff position recommended to be created, detailed job responsibilities shall be defined. Equipment and resources required for the environment unit shall be specified, and bill of quantities prepared. A training plan and schedule shall be prepared specifying the targets groups of individual training programs, the content and mode of training. Training plans shall normally be made for the client agency (Including the environmental unit), the supervision consultants and the contractors.At least three trainings/workshops for atleast 50 persons shall be given by the Consultant during the Contract Period. The schedule shall be finalized in consultation with HPRIDCL.

Supervision & Monitoring

20. The EMP shall specify the environmental supervision, monitoring and auditing requirements. The monitoring program shall specify parameters, reference standards, monitoring method, frequency, duration, location, reporting responsibilities, and what other inputs (e.g., training) are necessary. In addition, the program will specify what action should be taken and by whom if the proposed mitigation measures fail, either partially or totally, to achieve the level of environmental protection expected.

21. The EMP shall list all mandatory government clearance conditions, and the status of procuring clearances. Additionally, the EMPs shall include as separate attachments, if

applicable, Natural Habitat plan and/or Cultural Properties Plan to satisfy the requirements.

Public Disclosure

22. The Consultant will prepare a plan for in-country disclosure, specifying the timing and locations; translate the key documents, such as the Environmental Assessment Summary in local language draft for the newspaper announcements for disclosure; and help the client to place all the related Environmental Assessment reports on the client's website. 20.2. The Consultant shall prepare a non-technical EA Summary Report for public disclosure.

Training of Client's Staff

23. The Consultant shall conduct atleast three trainings for the client at various levels. The training should as far as possible be conducted in the HPRIDCL office at Shimla. This is to ensure that the knowledge, skills and perspectives gained by the consultants is transferred to the client so that these can be utilized effectively during project implementation. Here again, the training should be focused on the EMP"s covering both central and field offices.

24. The Consultant shall develop a plan for training the client's staff. The plan should specify the types of training, the participants for each training type, the number of sessions required, the duration of each session and when it should be conducted. At the end of the training, when the EMPs are ready, brief reports shall be prepared for the training conducted and observations relevant for future training, if any.

Inputs to be Provided by the Client

25. The Client shall provide all necessary and reasonable support to the consultant to collect secondary data by issuing authorization letters. The Consultant will be responsible for any translation of documents and for processing of data. The Project Director or his representative will liaise with the consultant for all activities and participate as possible in the study. The HPRIDCL will provide the following reports:

26. All relevant documents related to the specific projects and any other background documentation and studies, available with HPRIDCL.

27. Making all necessary arrangements for supporting the work of the Consultant(s), by e.g. facilitating access to government authorities and other project stakeholders and infrastructure facilities.

Note- Any additional comments on the Environmental aspect to be considered by the DPR Consultant would be provided before the pre proposal meeting.

Appendix 3 for TOR

Staff Qualification and Experience of Key and sub-key personnel

1. The key and sub-key staff positions whose qualifications and experience will be evaluated in accordance with the criteria and weight, age set down in the data sheet are as follows. Please note that sub-key staff positions will not be used for scoring. However, positions must be also proposed in line with the requirements mentioned below, unless mentioned otherwise.
2. **The project experience pertaining to the projects on item rate & EPC shall be given higher preference over other types of project experience (like BOT, PPP etc.) for evaluation of CVs pertaining to Team Leader-cum-Senior Highway Engineer, Highway Engineer and Procurement Specialist.**

Senior Highway Engineer cum Team Leader

i)	**Educational Qualification**	
	Essential	Graduate in Civil Engineering
	Desirable	Masters in Civil Engineering (Highways Engineering/ Transportation Engineering/Infrastructure Engineering)
ii)	**Essential Experience**	
	a) Total Professional Experience	Min. 15 years
	b) Experience in Highway projects	• Min. 10 years in Planning, project preparation and design of Highway projects, including 2/4/6 laning of NH/SH/ expressways/ externally aided projects. • Have handled at least two highway DPR projects of clients like MoRT&H/NHAI/PWD as Team Leader. • For hill roads, respective hill roads experience is required. Experience in hill road shall be preferred. • Planning, Project Preparation and Design of 50 km of hill roads (intermediate/ two/four lane) as Highway Engineer or Team Leader. • 5 years as 'Highway Engineer' in major DPR/ Construction Supervision projects. • Experience in projects funded by World Bank/ADB/AIIB/NDB or any other external aid agency in DPR preparation for upgradation on SHs/MDRs. • Thorough experience on design, procurement and management of major highway projects is essential especially on projects funded by World Bank/ADB/AIIB/NDB etc. Knowledge of international "best practices" and modern highway

		construction technology is important. • The candidate must have proven record as Team Leader for preparation of DPR of a large project or as project manager for several projects concurrently.
	c) Experience in similar capacity (Either as Team Leader or in Similar capacity)	In Feasibility Study of two / Four/Six Laning works and DPR/ Construction Supervision of Two/Four/six laning of major highway projects (NH/SH/Expressways)/ feasibility study cum detailed project report of two/ four laning projects of minimum aggregate length of 100 km. For hill roads, respective hill roads experience is required.

Highway Design Engineer cum Pavement Specialist

i)	**Educational Qualification**	
	Essential	**Degree in Civil Engineering**
	Desirable	Masters in Civil Engineering (Highways Engineering/ Transportation Engineering/ Infrastructure Engineering)
ii)	**Essential Experience**	
	a) Total Professional Experience	Min. 15 years
	b) Experience in Highway projects	• 10 years in planning, project preparation and design Of Highway projects including intermediate/two/four laning of major highway projects (NH/SH/MDR/ Expressways/ externally aided projects) of aggregate length of minimum 100 km. • Experience in pavement design, rehabilitation, maintenance and construction of highways. • The person should be thoroughly conversant with • various internationally accepted design methodologies applicable for tropical countries, both flexible and rigid pavements, and fully familiar with international 'best practices'. • Experience in pavement and sub-grade investigations including deflection tests/FWD and in design of pavement rehabilitation and strengthening is a necessity. • The person must have experience in designing appropriate cost-effective pavements making best use of locally available materials. • For hill roads, respective hill roads design experience is required. • The person should be involved as highway engineer in similar highway projects involving Upgradation to 2 laning/4 laning. • Experience in projects of similar nature hilly regions will be preferred. • 5 years as 'Highway Engineer' in major DPR/

		Construction Supervision projects. • Good working experience & knowledge of highway design software like MX Road / Open Roads.
	c) Experience in similar capacity	In Feasibility Study of intermediate/two / four laning works and DPR/Construction Supervision of intermediate/two/ four laning of major highway projects (NH/SH/MDR/ Expressways)/ feasibility study cum detailed project report of single/intermediate/two/ four laning Projects of length of about 100 km. For hill roads, respective Pavement design for major highway projects (intermediate/ two/ four lane Expressways /externally aided projects) of aggregate length of about 100 km. For hill roads, respective hill roads experience is required.

Senior Bridge/ Structural Engineer

i)	**Educational Qualification**	
	Essential	Graduate in Civil Engineering or equivalent
	Desirable	Masters in Bridge Engineering / Structural Engineering
ii)	**Essential Experience**	
	a) Total Professional Experience	Min. 15 years
	b) Experience in Bridge projects	• Min. 10 years in project preparation, design and construction of bridges and structures in bridge projects. • 5 years as 'Bridge/ Structural Engineer' in major DPR/ Construction Supervision projects. • Knowledge of various internationally accepted design codes & methodologies and familiarity with international 'best practices' is essential. • The candidate must have capability to design bridges using most economical sections with various alternative materials and structural arrangements. • Experience in designing and implementing bridge rehabilitation is required. • The candidate must have the experience of planning and monitoring geotechnical and hydraulic investigations for the bridges and interpreting the findings thereof. • Good working experience & knowledge of bridge design software like STAAD Pro / MIDAS.
	c) Experience in similar capacity	Bridge Engineer in highway design consultancy projects (2/4/6 lane NH/SH/Expressways/ externally aided projects) involving design of minimum two **major bridges** (length more than 200 m)

Material – cum – Geotechnical Engineer

i)	**Educational Qualification**	
	Essential	Graduate in Civil Engineering or M.Sc. Geology
	Desirable	**Masters in Soil Mechanics and Foundation Engineering / Soil Mechanics / Geotechnical Engineering**
ii)	**Essential Experience**	
	a) Total Professional Experience	Min. 15 years
	b) Experience in Highway Projects	• Minimum 10 years in soil and material surveys &investigations, identification of borrow &quarry areas, determination of density &CBR of subgrade soil, identification of dumping yard for disposal of unsuitable material during execution of civil works, **sub-soil/ geo-technical Investigations for deep foundations for bridges, or shallow or deep foundations for other structures and embankment/ slope design,** laboratory and field testing, analysis of results, report preparation, **slope stability analysis, embankment (low/ high) design, identifications of chronic slip zones &mitigation measures for slope stabilization, finalization of foundation types for bridges/structures** etc. in highway design and/or construction projects. • In addition, the candidate must have wide experience on designs using alternative and local materials, in use of materials in pavement structures and in preparing specifications for the construction materials. • 10 years as Material-cum-Geo-technical Engineer in DPR/ Feasibility Study of intermediate/2/4 laning works or Construction Supervision of Major highway projects i.e. intermediate/2/4 laning of NH/ SH/ MDR/ Expressways. • For hill roads, respective hill roads experience is required.
	c) Experience in similar capacity	Material cum Geo-technical Engineer on highway Projects (single/intermediate/2/4 lane NH/SH/MDR /Expressways /externally aided projects) of aggregate length about 80 km or more including major bridges (length > 60 m).

Environmental Specialist

i)	**Educational Qualification**	
	Essential	Graduate in Civil Engineering / Environmental Engineering / Environmental Science
	Desirable	Post Graduate in Environmental Engineering/

		Environmental Science
ii)	**Essential Experience**	
	a) Total Professional Experience	Min. 15 years
	b) Experience in Highway Projects	• Minimum 10 years on environmental impact assessment of development projects and conversant with WB / ADB requirements under safeguard Policy Statement. • 5 years in base line survey, environment impact assessment, monitoring and Environmental Management Plan (EMP), preparation of EIA reports, Environmental/ Forest/ Wildlife clearance reports of highway infrastructure projects/ externally aided projects. • The candidate should have experience of conducting environmental impact assessment for roads located in hilly area and should be conversant in preparing management/mitigation measures for at least three projects of similar type and scale. • Related experience of about 5 years in developing countries is essential. • The candidate must have full knowledge of the international financial institutions' guidelines, procedures and operational policies/directives. • Experience of working as environmental specialist in at least two international financial institutions funded projects is required. • The candidate must have the experience of preparing environmental management plans and supervising and monitoring implementation of the plans. The candidate should have organized participatory consultation workshops.
	c) Experience in similar capacity	Environmental Specialist in at least 3 highway project (intermediate /2/4/6 laning of NH/ SH/ MDR/ Expressways/ externally aided projects). Environmental Specialist in preparation of DPR/ Feasibility Study of intermediate/ 2/ 4 laning works of major highway projects (NH/ SH/ MDR/ Expressways/externally aided projects) of aggregate length of about 100 km.

Social cum Resettlement & Rehabilitation Specialist

i)	**Educational Qualification**	
	Essential	Graduate in Social Science
	Desirable	Masters in Social Science
ii)	**Essential Experience**	
	a) Total Professional Experience	Min. 15 years

	b) Experience in Highway Projects	• Experts should have 15 years of post-graduate experience out of which about 10 years' experience of working as social/resettlement expert for major civil engineering projects. • The person should have experience of working as social/ Resettlement expert for at least 3 major road project (s) in similar geographic/ environmental condition. • 5 years in resettlement & rehabilitation impact assessment and related studies, preparation of Resettlement & Rehabilitation plan, in externally aided project in developing country is required and conversant with WB / ADB projects. • The candidate must have full knowledge of international financial institutions' relevant policies and guidelines and operational directives, and must have worked as social/resettlement expert on at least three internationally funded projects. Thorough knowledge of prevailing land acquisition Act/ Policies. • Experience in supervising and monitoring the implementation of the resettlement action plans is preferred. • 5 years in Joint Measurement Survey (JMS) of affected land & properties to be acquired, Land Acquisition (LA) Plan, Draft LA Notifications and LA Reports of infrastructure projects / externally aided projects. • Thorough knowledge of prevailing land acquisition Act, states jantri values as well as current draft land Acquisition and Resettlement Act as well as state's/National Resettlement Policy on Resettlement and Rehabilitation for Project/ WB/ADB's R&R policy etc. He should have thorough knowledge of complete procedure of private and Government land acquisition up to the award stage. • Familiarity with local language and past experience as social/resettlement expert in development projects in India will be advantageous.
	c) Experience in similar capacity	Social/ Resettlement & Rehabilitation Specialist in at least 5 highway projects in preparation of DPR/ Feasibility Study of intermediate/ 2/ 4 laning works of major highway projects (NH/ SH/ MDR/ Expressways/ externally aided projects) of total aggregate length of about 100 km.

Transport Economist

i)	**Educational Qualification**	
	Essential	'Graduate in Economics' or 'Graduate in Civil Engineering and Masters in Transportation Engineering'
	Desirable	Masters in Economics

ii)	**Essential Experience**	
	a) Total Professional Experience	Min. 15 years
	b) Experience in Highway Projects	• Experts should have minimum 10 years of experience in Transport Economics of road Projects in DPR/ Feasibility Study of single/ intermediate/ 2/4 laning works of major highway projects (i.e. NH/SH/MDR/Expressways/externally aided projects). • The person should be worked as Economist in Highway projects involving 2/4/6 laning. • The Person should be involved in preparation of Economic/Financial Models for Highway projects. • The person should desirably have experience of working as Specialist for major road project(s) and relevant experience gained from working in more than one country. • The person should Experience in undertaking economic and financial viability analysis of the proposed roads under the project. Assessment will be in the line with WB publications "key" areas of economic analysis of investment projects".
	c) Experience in similar capacity	Transport Economist in at least two highway projects in preparation of DPR/ Feasibility Study of single/ intermediate/ 2/ 4 laning works of major highway projects (NH/ SH/ MDR/ Expressways/externally aided projects) of aggregate length of about 100 km

Procurement cum Contract Specialist

i)	**Educational Qualification**	
	Essential	Bachelors in Engineering or related field from a recognized University/Institute.
	Desirable	Diploma in Public procurement or equivalent.
ii)	**Essential Experience**	
	a) Total Professional Experience	Min. 15 years
	b) Role specific experience	• Practicing senior eminent Procurement/ Contract Specialist • Responsibilities with a substantial content of his/her position in the procurement area (use of internationally accepted contract documents for works, goods and services; sound understanding of principles underlying good procurement practices and international agencies; procurement guidelines; understanding of Government's procurement Rule/ Act; analytical capability in identifying and resolving procurement issues)

		• Experience in preparation of Terms of Reference, RFP, RFB, bidding document/contract documents for the road/highway projects funded by the international funding agencies particularly the World Bank. • Thorough knowledge of various procurement procedures and technical specifications prescribed by the Indian Roads Congress. • Adequate working experience and knowledge on management of social and environmental aspects for highway projects in India is desirable. • Adequate knowledge on guidelines of Ministry of Environmental and Forest, Government of India and environmental and social policies of World Bank is essential.

2. Qualification and Experience requirements of Sub-Key Professional staff

Quantity Surveyor/Documentation Expert

i)	**Educational Qualification**	
	Essential	Graduate or equivalent in Civil Engineering / Certificate course from 'Institution of Quantity Surveying'
	Desirable	Masters in Economics
ii)	**Essential Experience**	
	a) Total Professional Experience	Min. 15 years
	b) Experience in Highway Projects	• Minimum 10 years in Preparation of Bill of Quantities, rate analysis, cost estimate, Contract documents and documentation for major highway projects / externally aided projects involving two/ four laning. • The person should have about 2 years' experience on major highway projects funded by WB / ADB or similar multilateral agencies. • Experience in DPR/ Feasibility Study of single/ intermediate/ 2/4 laning works of major highway infrastructure projects i.e. single/ intermediate/ 2/4 laning of NH/ SH/ MDR/ Expressways (Aggregate length of about 100 km).
	c) Experience in similar capacity	• As Quantity Surveyor/ Documentation Expert in construction supervision of at least two highway projects 2/4 laning works (NH/ SH/ Expressways/ externally aided projects). • Quantity Surveyor / Documentation expert in preparation of DPR/ Feasibility Study of intermediate/ 2/4 laning works of major highway projects (NH/ SH/ MDR/ Expressways/externally aided projects) of length of about 100 **km.**

Hydrologist-cum-Drainage Engineer

i)	**Educational Qualification**	
	Essential	Graduate in Civil Engineering
	Desirable	Master's degree in Hydraulics/ Hydrology Engineering/ Water Resources Engineering
ii)	**Essential Experience**	
	a) Total Professional Experience	Min. 15 years
	b) Experience in Highway Projects	• 10 years experience in road/highway drainage design for infrastructure projects including Surface and sub-surface water, hydraulic modelling, hydrological analysis and the preparation of designs reports, drawings, technical specifications, BOQ, Cost estimate and detailed project reports of road side and cross drainage system. • Ability to design and model drainage networks (2d/3d) including SuDS features. • Fully conversant with software like Micro Drainage / Sewer GEMS / Sewer CAD, Civil 3d etc. • Experience of 5 years in highway and bridge projects is preferred. • The person should be fully familiar with the internationally acceptable study methods, code &'best practices' and should have experience of successfully using various methods in different situations. • Experience in catchment area analysis, determining flood levels, discharge calculations using different methods, model study, preparing schemes for proper cross-drainage and determining the regime/waterway widths for highway projects is required. • Experience in DPR/ Feasibility Study of single/ intermediate/ 2/4 laning works of major highway infrastructure projects i.e. single/intermediate/2/4 laning of NH/ SH/ MDR/ Expressways (Aggregate length of about 100 km).
	c) Experience in similar capacity	As Hydrologist/ Drainage Engineer in at least two major highway projects in preparation of DPR/ Feasibility Study of intermediate/ 2/ 4 laning works of major highway projects (NH/ SH/ MDR/ Expressways/ externally aided projects) of minimum aggregate length of 100 km.
iii)	Age Limit	70 years on the date of submission of Proposal

Assistant Highway Design Engineer

i)	**Educational Qualification**	
	Essential	Graduate in Civil Engineering and Masters Degree in Highway/Transportation Engineering/Infrastructure Engineering
ii)	**Essential Experience**	
	a) Total Professional Experience	Min. 7 years
	b) Role specific experience	• 5 years in highway design projects. • The person must have the capability to handle the road design software independently and have the experience of carrying out all computer-aided design and drawing works for highway projects. • The candidate must be responsive to design requirements to integrating safety, environmental, community friendly features in to highway designs. • Experience in road Projects in DPR/ Feasibility Study of intermediate/2/4 laning works of major highway projects (i.e. NH/SH/MDR/ Expressways/externally aided projects).

Assistant Pavement Engineer

i)	**Educational Qualification**	
	Essential	Graduate in Civil Engineering and Master Degree in Highway/Pavement/Transportation Engineering/ Infrastructure Engineering
ii)	**Essential Experience**	
	a) Total Professional Experience	Min. 7 years
	b) Role specific experience	• 5 years on pavement design, rehabilitation, maintenance and construction. The candidate should have 3-years experience in similar road projects, particularly in Asian countries. • The person should be thoroughly conversant with various internationally accepted design methodologies applicable for tropical countries, both flexible and rigid pavements, and fully familiar with international 'best practices'. • Experience in pavement & subgrade investigations including FWD deflection tests and in design of pavement rehabilitation & strengthening is a necessity. • The person should have experience in designing

		appropriate cost-effective pavements making best use of locally available materials. • He should be registered with relevant professional bodies. • The candidate must be responsive to design requirements to integrating safety, environmental, community friendly features in to highway designs. • Experience in road Projects in DPR/ Feasibility Study of intermediate/2/4 laning works of major highway projects (i.e. NH/ SH/ MDR/ Expressways/ externally aided projects).

Assistant Bridge/ Structural Engineer

i)	**Educational Qualification**	
	Essential	Graduate in Civil Engineering and Master's Degree in Bridge/Structural Engineering
ii)	**Essential Experience**	
	a) Total Professional Experience	Min. 7 years
	b) Role specific experience	• 5 years experience on design of bridges and structures. • Knowledge of various nationally/ internationally accepted design codes &methodologies and familiarity with international best practices is essential. • The candidate must have capability to design bridges with various alternative materials and structural arrangements. • Experience in designing and implementing bridge rehabilitation is required. • The candidate must have the experience of planning & monitoring geotechnical and hydraulic investigations for the bridges and interpreting the findings thereof. • Experience in road Projects in DPR/ Feasibility Study of intermediate/2/4 laning works of major highway projects (i.e. NH/ SH/ MDR/ Expressways/ externally aided projects).

Assistant Quantity Surveyor

i)	**Educational Qualification**	
	Essential	Graduate or Diploma in Civil Engineering
ii)	**Essential Experience**	
	a) Total Professional Experience	Min. 7 years

	b) Role specific experience	• 5 years of experience on quantity surveying. • The person should have at least 2 years experience on major highway projects funded by international lending agencies. • In-depth knowledge and experience on preparation of civil works estimates, bid documents and analysis of rates are essential. • Experience in road Projects in DPR/ Feasibility Study of intermediate/2/4 laning works of major highway projects (i.e. NH/ SH/ MDR/ Expressways/ externally aided projects).

Social-cum-LA and R&R Support Staff including revenue persons

The CV of the candidates need not be specified at the RFP stage. However, within 1 month of finalization of alignment, such experts in adequate numbers as mentioned or more shall be appointed by the consultant at its own cost. It is preferred that significant percentage of such candidates be recruited from amongst, land acquisition officers, revenue department officers of the state /private (Patwari, Kanungo) to enable smoother process. While HPRIDCL will provide adequate support, it will be responsibility of the consultants to ensure timely delivery of deliverables.

Environmental support staff

The CV of the candidates need not be specified at the RFP stage. However, within 1 month of signing of contract, such experts in adequate numbers as mentioned or more shall be appointed by the consultant at its own cost. It is preferred that significant percentage of such candidates be recruited from amongst retired environment and forest department, pollution control board, wildlife, state environment impact assessment authority officers of the state to enable smoother process. While HPRIDCL will provide adequate support, it will be responsibility of the consultants to ensure timely delivery of deliverables.

Assistant Traffic Engineer

i)	**Educational Qualification**	
	Essential	• Graduate in Civil Engineering • Master degree in Traffic/ Transportation Engineering/ Transport Planning/ Infrastructure Engineering
ii)	**Essential Experience**	
	a) Total Professional Experience	Min. 7 years
	b) Role specific experience	• 5 years of experience on major highway projects.

		• Experience in traffic surveys, studies, analysis, planning, traffic forecast and capacity analysis. • The candidate must be conversant with the latest analysis and planning tools. • Experience in road Projects in DPR/ Feasibility Study of intermediate/2/4 laning works of major highway projects (i.e. NH/ SH/ MDR/ Expressways/ externally aided projects).

Assistant Material-cum-Geotechnical engineer

i)	**Educational Qualification**	
	Essential	• Graduate in Civil Engineering • Master's degree in Soil Mechanics\Soil Mechanics & Foundation/Geo-Technical Engineering
ii)	**Essential Experience**	
	a) Total Professional Experience	Min. 7 years
	b) Role specific experience	• 5 years of experience on major highway projects. • Thorough knowledge on modern techniques of materials investigation and laboratory testing is essential. • The candidate must have wide experience on designs using alternative and local materials, in use of materials in pavement structures and in preparing specifications for the construction. • Experience in road Projects in DPR/ Feasibility Study of intermediate/2/4 laning works of major highway projects (i.e. NH/ SH/ MDR/ Expressways/ externally aided projects).

Road Safety Support Staff

i)	**Educational Qualification**	
	Essential	• Graduate in Civil Engineering • Master's degree in Highway/Traffic/ Transportation Engineering
ii)	**Essential Experience**	
	a) Total Professional Experience	Min. 7 years
	b) Role specific experience	• 5 years of experience on major highway projects. • Experience in road safety design and management.

		• The candidate should have undertaken formal road safety audits, including at design stages. • `The candidate must be conversant with the latest national and international road safety codes and guidelines. • Experience in road Projects in DPR/ Feasibility Study of intermediate/2/4 laning works of major highway projects (i.e. NH/ SH/ MDR/ Expressways/ externally aided projects).

Surveyor/ Survey Engineer

i)	**Educational Qualification**	
	Essential	Graduate or Diploma in Civil Engineering
ii)	**Essential Experience**	
	a) Total Professional Experience	Minimum 5 years
	b) Role specific experience	• 5 years of experience as survey engineer for highways projects. • Experience in road Projects in DPR/ Feasibility Study of intermediate/2/4 laning works of major highway projects (i.e. NH/ SH/ MDR/ Expressways/ externally aided projects).

Assistant Hydrologist/ Drainage Engineer

i)	**Educational Qualification**	
	Essential	• Graduate in Civil Engineering • Master degree in Hydraulics/ Hydrology Engineering/ Water Resources Engineering
ii)	**Essential Experience**	
	a) Total Professional Experience	Minimum 7 years
	b) Role specific experience	• 5 years of experience on major highway and bridge projects. • The person should be fully familiar with the internationally acceptable study methods, 'best practices' and should have experience of successfully using various methods in different situations. • Experience in determining flood levels, discharges,

		model study, preparing schemes for proper cross-drainage and determining the regime/waterway widths for highway projects is required. Experience in designing the road drainage system will be an advantage. • Experience in road Projects in DPR/ Feasibility Study of intermediate/2/4 laning works of major highway

Land Acquisition Expert

i)	**Educational Qualification**	
	Essential	Graduate or equivalent
ii)	**Essential Experience**	
	a) Total Professional Experience	• 15 years as Deputy-Tehsildar or above • Desirable: Ex- revenue officers like Ex-ADM/SDM, Ex-Tehsildar, Ex-Deputy- Tehsildar etc.
	b) Role specific experience	• Min 10 years in Land acquisition for government/ authority projects

Utility Engineer

i)	**Educational Qualification**	
	Essential	Graduate or equivalent in major engineering disciplines viz. mechanical/ electrical/ civil engineering
ii)	**Essential Experience**	
	a) Total Professional Experience	Min 15 years Desirable: Ex- officers or engineers from utility agencies
	b) Role specific experience	• Min. 10 years in Utility estimation and relocation/ erection of electric/ gas/ other utilities • Desirable: Experience with utilities along the highway/road.

CAD Draftspersons

i)	**Educational Qualification**	
	Essential	Diploma in Civil Engineering
ii)	**Essential Experience**	
	a) Total Professional Experience	Min 7 years
	b) Role specific experience	• 5 years of experience as CAD Draftsman for highways projects. • Experience in road Projects in DPR/ Feasibility Study

		of intermediate/2/4 laning works of major highway projects (i.e. NH/ SH/ MDR/ Expressways/ externally aided projects).

Office Administrator-cum-Accounts Officer

i)	**Educational Qualification**	
	Essential	Graduate or equivalent
ii)	**Essential Experience**	
	• Total Professional Experience	Minimum 7 years in office administration
	• Role specific experience	• Experience in managing budgets and expenses • Experience in developing internal processes and filing systems

Office Manager-cum-Accounts Officer The candidate should have bachelors' degree and relevant experience.