Name of Work: Rendering the Engineering, Design and Consultancy services for preparation of Detailed Project Report for construction / improvement of road Sansari-Killar-Thirot between change km.40.00 to 70.00 and km. 96.00 to 125.00 (Net length 59.00 kms) for Border Roads Organization (BRO) in Himachal Pradesh.

NIT No. DLI/CON/BRO/477 dated 30.07.2015

“SCOPE OF WORK”

Annexure-II : (Page No. 2 to 10)
SCOPE OF WORK

The scope of work involves rendering the engineering, design & consultancy services for preparation of a detailed project report for construction/improvement of road Sansari-Killar-Thirot between km.40.00 to 70.00 and km. 96.00 to 125.00 (Net length 59.00 kms) for Border Roads Organization (BRO) in Himachal Pradesh.

I. Road works
II. Drainage work
III. Bridges / culverts work
IV. Any other works required for project

The consultant is requested to carry out the detailed survey site plan along with design, surveying, drawings and DPR’s for construction/improvement of road Sansari-Killar-Thirot between km.40.00 to 70.00 and km. 96.00 to 125.00 (Net length 59.00 kms) for Border Roads Organization (BRO) in Himachal Pradesh. The work including design, surveying, drawings, soil testing, technical feasibility, technical specification, detailed measurement, BOQ, Analysis of Rates, bid documents, detailed specification etc, Periodic supervision of works and getting clearances from respective authorities.

The general Scope of Services shall cover but not limited to the following major works:

1. **Survey and soil investigations.**
   1.1 Topographical survey and the survey of all existing services and other structure existing in and around the site using total stations and GPS.
   1.2 Prepare the proposal for permission from the State Forest Deptt. / MoEF/ or any other authority, regarding carrying out construction of roads.

   The surveyed reference points shall be transferred on to the ground as under:

   Bench Mark / Reference pillar of size 15 cm X 15 cm X 45 cm shall be cast in RCC of grade M 15 with a nail fixed in the centre of the top surface. The reference pillar shall be embedded in concrete up to a depth of 30 cm with CC M10 (5 cm wide all around). The balance 15 cm above ground shall be painted yellow. The Bench Mark Pillar / Reference Pillar shall be provided as per requirement.

2.0 **Geotechnical Investigation and Sub-soil Exploration**

2.1 The Consultant shall carry Geotechnical investigations and subsurface exploration for the development works as necessary for design of the works in line with the relevant codes and conduct all relevant field and laboratory test on soil and rock samples.

2.2 Investigation of required sub-grade and sub-soil characteristics and strength for road and embankment design and sub soil investigation.

2.3 Soil strata and Bearing capacity for building works.

2.4 Discharge of water source for a minimum period of 3 years. The relevant data (as available and applicable) may be obtained from the concerning department.

2.5 Classification of hard and soft rocks for hill road projects.
2.6 Analysis and interpretation of field & laboratory test data for the preparation of Geotechnical investigation report including recommendation of type of foundation for structures

3.0 Meteorological data

All meteorological data records as per relevant codes shall be collected from the concerned authorities and accordingly will be taken into account.

4.0 Design of Structures/works

4.1 Submission of the draft concept design and make presentation of the scheme and thereafter modification of the draft concept plan taking into account the consults suggestions etc. of the client and the department.

4.2 The detailed designs of various Infrastructure works are to be submitted by the consultant.

4.3 The Infrastructure works shall be designed for loading as per relevant Codes.

4.4 The consultants shall furnish the detailed design and working drawing for suitable protection works wherever required.

4.5 All relevant design parameter shall be incorporated. The consultant shall also incorporate safety provision as per relevant specification.

5.0 Detailed design of different Infrastructure works.

The consultant is to carryout detailed designs, preparation and submission of working drawings for the following:

5.1 Road and Pavement:

5.1.1 Detailed design of road, its x-sections, horizontal and vertical alignment and design of embankment, and road safety features.

5.1.2 The detailed design for geometric elements shall cover, but not be limited to the following major aspects:

   Longitudinal profile

   Cross-sectional elements

   Junctions and intersections

5.1.3 Detailed design of pavement.

5.1.4 Detailed design of shoulders/footpaths.

5.2 Design of Embankment

5.2.1 The embankment design should provide for maximum utilization of locally available materials.
5.2.3 To carry out detailed analysis and designs for embankments based on relevant codes.

5.3 Drainage & landscaping.

5.3.1 Detailed design and working drawing for storm water drainage system of complete drainage network.
   i) The requirement of roadside drainage system and the integration of the same with main drainage system shall be worked out for the project site.
   ii) The drainage system should show locations of turnouts/outfall points with details of outfall structures fitting into natural contours.
   iii) Preparation of specifications & BOQ.

5.3.2 Cross drainage structures including culvert etc. over tributaries/ channels/ nallah, roads crossings, if any.

5.3.3 The Consultants shall work out plan for planting of trees, horticulture, floriculture on the land of the right-of-way or any other area with a view to beautify and making the environment pleasant.

5.4 Standards and Codes of Practices

5.4.1 All activities related to field studies, design and documentation shall be done as per the latest guidelines/ circulars of (i) Uttarakhand State Public Works Department Specification / CPWD (ii) MoRT&H and relevant publications of the Indian Roads Congress (IRC) (iii) Bureau of Indian Standards (BIS) (iv) National Building Codes (v) Procedure and quality standards specified by the ULB (vi) CPHEEO. Norms not covered above and applicable to the construction work with the approval of the authority.

6.0 Environment Impact Assessment

Environmental Impact Assessment shall be carried out by the Consultant meeting the requirements of the Government of India or State govt. etc

6.1. Environment impact assessment or initial environment examination be carried out in accordance with guidelines for infrastructure projects as applicable.

1. To carry out the preliminary environmental screening to assess the direct and induced impacts due to the project.
2. To ensure to document baseline conditions relevant to the project with the objective to establish the benchmarks.
3. To assess the potential significant impacts and identify the mitigate measures to address these impacts adequately.
4. To analysis of alternatives incorporating environmental concerns. This should include with and without scenario and modification incorporated in the proposed project due to environment considerations.
5. To give special attention to the environmental enhancement measures in the project
6. To prepare the bill-of-quantities (BOQ) and technical specifications for all items of work in such a way that these may be readily integrated to the construction contracts.
7. To prepare the application forms and obtain forestry and environmental clearances from the respective authorities including the SPCBs and the MOEF. The consultants
will make presentation, if required, in defending the project to the MOEF Infrastructure Committee.

8. To identify and plan for plantation of the suitable trees in accordance with guidelines.

6.2 Reporting Requirements of EIA

The consultant would prepare the reports as per the requirement of the authority, as applicable, with contents as per the following:

- Executive Summary
- Description of the Project
- Environmental setting of the project.
- Policy, legal and administrative framework. This would include mechanisms at the states and national level for operational policies. This would also include a description of the organizational and implementation mechanism recommended for this project.
- Typical plan or specific designs for all additional environmental items as described in the scope of work.

7.0 Estimation of Quantities and Project Costs

7.1 The consultant shall prepare detailed estimates for quantities considering designs and project cost including the cost of environmental and social safeguards proposed based on MORTH Standard Data Book and market rate for the inputs, PWD Uttarakhand, CPWD schedule of rates. The estimation of quantity shall be based on detailed design of various works of the projects.

7.2 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 respect lead distances for mechanized construction. The unit rate for each item of works shall be worked in terms manpower, machinery Staff and materials.

8.0 Time Period for the Service

8.1(i) A total of 90 days is completion time for the scope of services from the date of handing over of site. The final reports, drawings and documentations should be completed within this time schedule.

(ii) Association of the consultant shall be till completion and handing over of the project to the client. They are required for carrying out all modifications/ deletion /additions /alteration in /drawing / documents as required by client and EPI for proper execution of works at site

8.2 BRO/EPI shall arrange to give approval on all sketches, drawings, reports and recommendations and other matters and proposal submitted for approval by the Consultant in such reasonable time as not delay or disrupt the performance of the Consultant’s services.

9.0 Schedule of Submission

Consultants shall be required to complete, to the satisfaction of the EPI / BRO, all the different stages of study within the time frame indicated in the schedule of submission pertaining to Reports and documents for becoming eligible for payment for any part of the next stage.
9.1.0 Strip Plan
The Consultants shall submit the following documents (06 sets) within a period of 45 days after the commencement of services:

Details of the centre line of proposed alignment along with proposed right-of-way limits for various road sections.

Strip plans and cross-sections showing the positions of different Infrastructure works and services indicating clearly the position of infrastructure works.

Details for various clearances such as environment and forest clearances;

Separate strip plan showing of each infrastructure work in consultation with the concerned local authorities;

The proposed plans should clearly show right–of–way (ROW) and pertinent plans topographic details including major trees, fences and other installations etc. and prepare necessary details for submission to the Service Departments;

9.2.0 Submission of Preliminary Project Report (PPR)

9.2.1 The PPR (6sets) shall be submitted within 30 days from the date of commencement of services. The report shall be prepared separately for each construction and shall contain the following.

Detailed GAD for different infrastructures and alignment plan based upon project requirement and geotechnical investigations and preliminary design calculations.

Number and location of proposed culverts and other structures, if any. Preliminary costs.

9.2.2 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.

9.2.3 The Preliminary PR incorporating comments, revisions and modifications suggested by EPI/BRO shall be submitted within 7 days of receiving comments from them.

9.3.0 Detailed Project Report (DPR)- 6 Sets.

9.3.1 The draft DPR shall be submitted within 45 days from the date of commencement of services and shall consist of Main Report, Design report, Materials Report, Engineering Report, Protection work Design Report, bid documents and drawings.

9.3.2 The DPR consultant should ensure detailed project preparation incorporating Quality audit and safety audit requirement in design and implementation.

9.3.3 The DPR consultant shall examine the feasibility of the construction and appropriate construction methodology shall need to be evolved as available working area.

9.3.4 ‘Good for construction’ drawings shall be prepared.

9.3.5 Wherever required, consultant will liaise with all concerned Govt. agencies including but not limited to Electricity deptt., Irrigation Deptt., Water Resources Deptt., District Development Authority, PWD, Municipality Department, Police Department, Revenue Department, Traffic Police, and secure all clearances. Consultant will also obtain ‘NO
Reports

Volume-I, Main Report:

The report will present the project background, details of surveys and investigations carried out, analysis and interpretation of survey and investigation data, designs, cost estimation, aspects, economic and commercial analysis and conclusions.

The report shall also include maps, charts and diagrams showing locations and details of existing features and the essential features of improvement and upgrading.

The basic data obtained from the field studies and investigations and input data used for the preliminary design shall be submitted in separate volume as an Appendix to Main Report.

The Report shall also include the project clearances from various concerned Govt. agencies that matter for project implementation.

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 design report will be in two parts. Part I shall primarily details with the design of road features and pavement composition while Part II shall deal with the design of cross drainage and drainage network structures, external electrical works, water supply network, overhead tanks, sumps, detail design of CETP etc. The sub-soil exploration report including the complete details of boring done, analysis and interpretation of data and the selection of design parameters shall be included as an Appendix to the Design Report.

The detailed design for all features should be carried out as per relevant codes. However, the report should clearly bring out the details of these aspects and standards adopted.

Consultant shall also include the diversion of existing nallah and construction of culverts etc.

Consultant has to submit the final design to client’s deptt. for proof checking.

Proof checking will be done with concerning of the deptt. by I.I.T. and other Govt. Institute but the cost will be borne by the consultant.

Volume-III, Materials Report:

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 and 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.

The material Report should 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.

The material Report should also clearly indicate the locations of areas / availability of material with problematic 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 Report shall also suggest various steps that the client has to take to own such sources for exploitation purposes for the project implementation phase.

**Volume- IV, Technical Specifications:**
Specifications adopted for designing different infrastructure development works.

**Volume- V, Rate Analysis:**

This volume will present the analysis of rates for all items of works. The details of unit rate of materials at source, carriage charges, any other applicable charges, labour rates, machine charges as considered in arriving at unit rates will be included in this volume.

**Volume- VI, 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- VII, Bill of Quantities:**

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

**Volume-VIII, Drawing Volume:**

All plan and profile drawings will be prepared in appropriate scales. In addition, this volume will contain drawings for the following.

a. Horizontal Alignment and Longitudinal Profile.
b. Cross section @ 25 m interval along the alignment within ROW
c. Typical cross section with details of pavement structure.
d. Typical cross section with network of sewerage system and sewer pumping station.
d. Typical cross section with network of water supply system including over head water tanks and sumps.
d. Detailed Working drawing of protection works.
e. GAD of culverts.
f. Detailed Working drawings of Protection works.

(i) **Detail working drawing of superstructure / sub structure/bearing (including reinforcement schedule)**
g. Drawings for Road sign, Marking, Office cum residential complex for PIU, and other Facilities.
h. Typical cross section with network of electrical distribution system, street/road light, detail working drawing of substation etc.

I. Preliminary Design of CETP with zero water outlet to meet the project requirement. Consultant to provide specifications, process charts.

h. All working drawings will be prepared in A2 size sheets. The format for plan, cross section and profile drawings shall be finalized in consultation with the concerned EPI / BRO officers. 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, GTS referencing system. The drawings shall also include the locations of all traffic safety features including traffic signals, signs, markings, delineators and rest areas, but bays, parking areas etc.

9.3.6 The consultant shall submit the soft copies of the DPR including all drawings in Auto Cad-Latest format.

10.0 Interaction with EPI

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

10.2 The EPI officers and other Government officers may visit the site at any time, individually or collectively to acquaint themselves with the field investigation and survey works.

10.3 The consultant shall be required to send 3 copies of concise fortnightly Progress Report by the 5th day of the following fortnight to the designated officer at his Head Quarter so that progress could be monitored by the PWD. These reports will indicate the dates of induction and de-induction of various key personnel and the activities performed by them. Frequent meeting with the consultant at site office or in EPI Site office or at Delhi Office are foreseen during the project.

10.4 All equipment, software, and books etc. bought for this project shall be listed to the client through progress Report and handed over to the client free of cost at the end of the project.

11.0 Data and Software:

11.1 The CD diskettes 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 EPI / BRO at the time of the submission of the Final Report. The data can be classified as follows:

i. Engineering Investigations and Studies : Material Investigation including test result for sub grade soil. Traffic Studies (Traffic surveys), Sub-soil Exploration Hydraulic data for culverts, new construction requirement etc. in MS EXCEL or any other format which could be imported to widely used utility packages.

ii. Topographic Surveys and Drawings: All topographic data would be supplied in (x,y,z) format along with complete reference so that the data could be imported into any standard highway design software. The drawing files would be submitted in Auto
iii. Rate Analysis: The consultant shall submit the rate analysis for various works items including the data developed on computer in this relation so that it could be used by the Authority later for the purpose of updating the cost of the project.

iv. Reports: All report shall be submitted in electronic media besides required number of Hard copies as stipulated above.

v. Design Report – All design data & design calculation shall be submitted in soft copy as well as hard copy to EPI / BRO.

11.2 Software:

The consultant shall also hand-over to EPI all CD containing any general software including the financial model that has been specified developed for the project.

11.3 The CD diskettes should be properly indexed and a catalogue giving contents of all floppies and printouts of the contents (data from field studies topographic data and drawings) should be handed over to EPI at the time of submission of the Final Report.

12.0 Responsibility for Accuracy of project Documents.

12.1 The consultant shall be responsible for accuracy of the data collected, by him directly or procured from other agencies/authorities, the designs, drawing, estimates and all other details prepared by him as part of these services. He shall indemnify the EPI / BRO against any inaccuracy in the work that might surface during implementation of the project. The consultant will also be responsible for correcting at his own cost and risk, the drawings including any re- survey/investigations and correcting layout etc. if required during the execution of the services.

12.2 The consultant shall be fully responsible for the accuracy of design and drawings of the various structures. All the design and drawings for structures including all their components shall be fully checked by a senior Engineer after completion of the designs. All drawings for structures shall be duly signed by the (a) Designer, (b) Senior Checking Engineer and (c) senior structure Expert. The design and drawings not signed by the three persons mention above shall not be accepted. The consultant shall indemnify the EPI / BRO against any inaccuracy/ deficiency in the design and drawings of the structure noticed during the construction and even thereafter and the EPI /BRO shall bear no responsibility for the accuracy of the designs and drawings submitted by the consultants.

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