

SCOPE OF WORK

Name of Work: - Tender for revalidations of available DPR's & preparation of new DPR's, including alignment drawing, technical feasibility, design of structural components of Flyover, its approaches, technical specification, detailed measurement, BOQ, Analysis of Rates, bid documents, detailed specification etc. including Land Acquisition, Resettlement & Rehabilitation, Utility Shifting. Such as electric lines, traffic lights, water supply lines sewerage lines, irrigation channel, removal of encroachment, verification of ROW from land records, preparation of land acquisition plan, submission and verification of ROW from Revenue Authorities, liasoining with Govt. Authorities for getting clearances from respective authorities, Trees Cutting, statutory clearances / approval and Traffic & Transport Management work for Construction of Bridges, Flyovers and Rail Over Bridges (ROBs) at various locations in Uttarakhand.

SCOPE OF WORKS

1. Engineering surveys and investigations.

- 1.1 The Consultant should make an in depth study of proposed route and shall prepare L.A. (Longitudinal Alignment) land width plan topographic maps of the Flyover project and other available relevant information collected by them concerning the existing alignment and will prepare the consolidated bridge wise report.
- 1.2 Detail topographical surveys using total stations and GPS.
- 1.3 Preparation of index map to locate the project area With reference to its connection with the main city and nearby majors / Minor towns. It should give a bird's eye view of the project area and the overall location of bridge and it's approaches connected with other major road and railway network, if any. The alternative sites Investigated/ the general topography of the country along with location of existing bridges on the various / same road, the important towns, villages, etc in the vicinity is to be shown in the index map.
- 1.4 Preparation of site plan along with the detail commentary in the main report to a suitable scale indicating the details of the sites considered under various alternatives. The direction of traffic, the alignment of approach, angle of skew, location and value of permanent benchmark, the location of cross section and longitudinal sections taken, location of trial pits or boring, soil investigation and other details such as building or any permanent structures places of worship, well, nallah, burial ground, outcrop area etc are also to be indicated.
- 1.5 Preparation of detailed engineered plan.
- 1.6 (a): Consultant shall prepare the proposal for permission from Competent Authority for utility shifting. Such as electric lines, traffic lights, water supply lines sewerage lines, irrigation channel, removal of encroachment, verification of ROW from land records, preparation of land acquisition plan, submission and verification of ROW from Revenue Authorities, liasoining with Govt. Authorities for getting clearances from respective authorities, Trees Cutting, statutory clearances / approval and Traffic & Transport Management work, removal of encroachments, survey report for demolition of structures and deciding compensation as per Govt. Policy and shall take permission from any authority as applicable / Railway Department / State Forest Deptt. / MoEF/ Revenue Deptt., any other authority department, regarding cutting of the tree compensatory aforestation, transfer of land, if any under Forest Act & Extent rules in close consultation with concerned Forest/ Revenue Officials & to their total satisfaction & requirements, if required

(b): The Consultant shall get the GAD and other Drawing approved from competent authority of the Railway Department / Statutory Authorities / other Authorities in applicable.
- 1.7 Analysis and evaluation of all design data.

2. Geotechnical Investigation and Sub-Soil Exploration

- 2.1 The Consultant shall carry Geotechnical investigations and subsurface exploration for the proposed Flyovers / ROB's and along its high embankment approaches (greater than 6m) and any location as necessary for design properties of the works as per relevant I.R.C / B.I.S codes and conduct all relevant laboratory and field tests on soil/ rock samples.
- 2.2 However, where a study of geotechnical reports and information available from adjacent crossings over to the same highway and railway bridges indicates that the subsurface variability is such that boring at the suggested spacing will be insufficient to adequately define the conditions for design purposes, the Consultant shall review and finalize the bore hole depth and locations accordingly.
- 2.3 The boring in strata other than rocky (as per I.R.C. 78) shall extend to a depth not less than twice the width of the foundation in question below the proposed foundation level. In case of rocky strata, 3m drilling only is required below founding level as per I.R.C. - 78. The boring shall be done for boulders / gravel / clayey strata etc. as per requirement and shall be governed as per codes or latest practices.
- 2.4 The consultant shall prepare the scheme for the boring locations and the depth of boring and EPI / PWD's approval thereto shall be obtained before starting the work. The scheme may be finalized in consultation with EPI / PWD.
- 2.5 The sub-soil exploration and testing should be carried out either directly by the consultants or through reputed sub-soil investigation Consultants / IIT.
- 2.6 Analysis and interpretation of field & laboratory test data for the preparation of Geo-technical investigation report either directly by consultants or through reputed sub-soil investigation consultants / IIT.

3 Meteorological data

All meteorological data records as per clause 5.3.9 of IRC:SP:54-2000 shall be collected and accordingly will be taken into account.

4. Hydrological data

All Hydrological data records shall be collected for irrigation channels / sewerage channels etc. as per IRC specification or Hydrological Survey of India.

5 Design of Bridges and Structures

- 5.1 The Consultant shall prepare General Arrangement Drawing (GAD) of Flyovers / ROB's and its approaches for proposed Flyover with showing the salient features of the bridges and structures proposed to be constructed along the road sections covered under the scope of work. The structures are to be designed in view of the movement of elephants & wild animals with consultation of CTR and forest administration. These salient features such as

alignment, overall length, span arrangement, cross section, deck level, founding level, type of bridge, number lanes and other components such as superstructure, substructure, foundation, bearing, expansion joint, return wall etc. considering suitable earthquake Zone etc shall be finalized based upon aesthetics and geotechnical studies, cost effectiveness and ease of construction. The GAD shall be supplemented by Preliminary designs only to assess the cost of bridges. In respect of span arrangement, type of bridge and its approaches (like RCC retaining wall/RES/natural earth slope etc) at least three alternatives with cost-benefit implications should be submitted to enable EPI / PWD to approve the best alternative.

- 5.2 The detailed designs of main bridges are to be submitted by the consultants.
- 5.3 The bridges/over bridges shall be designed for loading as per IRC Code.
- 5.4 The consultants shall furnish the detailed design and working drawing for suitable protection works wherever required during the construction phase and thereafter as per requirement of EPI/PWD.
- 5.5 All relevant Railway design parameter shall be incorporated. The consultant shall also incorporate safety provision for CRS approval in Railways Specification and shall get the drawings approvals from Railways Authorities.

6 Detailed Design of Approach Roads, Pavement and other Cross Drainage Structures

- 6.1 The consultant is to carryout detailed designs, prepare and submit working drawings for the following:
 - 6.1.1 Prepare alignment plans, longitudinal sections and cross sections @ 25m interval or lesser interval as decided by EPI / PWD wherever required.
 - 6.1.2 Design of road furniture and road safety/traffic control features as per latest specification of International standards.
 - 6.1.3 Drainage design showing location of turnouts, out falling structures.
 - 6.1.4 Cross drainage structures including bridges/culvert over tributaries/channels, if any.
 - 6.1.5 Design for relocation of existing utility services. Such as electric lines, traffic lights, water supply lines sewerage lines, irrigation channel, removal of encroachment, verification of ROW from land records, preparation of land acquisition plan, buildings, boundary wall, bore well etc.
 - 6.1.6 Horizontal and vertical alignment of carriageway.
- 6.2 The detailed design for geometric elements shall cover, but not be limited to the following major aspects:
 - Horizontal alignment

Longitudinal profile

Cross-sectional elements

Junctions and intersections

- 6.3 The alignment designs shall be verified for available sight distances as per the standard norms. The provision of appropriate markings and signs shall be made wherever the Existing site conditions do not permit the adherence to the site distance requirement as per the standard norms.
- 6.4 The Consultant shall prepare Design of pavement of approach road including drainage as per IRC 37 latest.
- 6.5 The Consultant shall prepare for the most appropriate design option establish on life cycle costing and techno- economic considerations taking design period of 15 years for flexible pavements.
- 6.6 For the design of pavement, each set of design input shall be decided on the basis of rigorous testing and evaluation of its suitability and relevance in respect of in- service performance of the pavement. The design methodology shall accompany the design proposals and shall clearly bring out the basic assumptions, values of the various design inputs, rationale behind the selection of design inputs and the criteria for checking and control during the implementation of works. In other words, the design of the pavement structure should take due account of the type, characteristics of material used in the respective courses, variability of their properties and also the reliability of traffic prediction. Furthermore, the methodology adopted for design of pavement shall be complete with flow charts indicating the various steps in the design process, their interaction with one another and the input parameters required at each step.
- 6.7 The Consultant shall prepare for the most appropriate design option established on present traffic surveys and shall carry out detailed design in view of future projections for traffic taking into consideration urban and local growth of the Region. The Consultant shall carryout traffic survey as per IRC Codes and shall be responsible for accuracy of the data in future also.

7 Design of Embankment

- 7.1 The embankment design should provide for maximum utilization of locally available materials consistent with economy.
- 7.2 The Consultant shall carry out detailed analysis and designs for all embankments height greater than 6m based on relevant IRC publications and computer package on high embankment.
- 7.3 The design of embankment should include the requirements for protection works and traffic safety features.

8 Estimation of Quantities and Project Costs

- 8.1 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 / SOR published by GOU/PWD, CPWD DSR 2012, rates applicable for building works in the Uttarakhand State as published by PWD and market rate for the inputs. The estimation of quantity shall be based on detailed design of various components of the projects.
- 8.2 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.
- 8.3 The consultant shall make himself available for checking of the estimates and giving proofs for adoption of rates as per requirement of EPI/PWD.

9 Time Period for the Service

- 9.1(i) **A total of 2 months** is completion time for the scope of services from the date of handing over of particular Flyover / ROB etc. 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
- 9.2 **MORTH/P.W.D.** 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.

10 Sequencing of Project Preparation

- 10.1 Project preparation activities will be split into two stages as brought out below. Each stage will cover a set of activities to be completed before moving to the next stage and shall be followed with a detailed in respect of each stage.
- Stage 1: Preliminary Project Report (PPR)
Stage 2: Detailed Project Report (DPR)

11.0 Schedule of Submission

Consultants shall be required to complete, to the satisfaction of the EPI / PWD, 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.

11.1.1 Strip Plan and Clearances

The Consultants shall submit the following documents (10 sets) within a period of 1 month after the commencement of services:

Details of the centre line of proposed alignment along with the existing and proposed right-of way limits to appreciate the requirements of land acquisition.

The information concerning the ownership of land to be acquired for the implementation of the project shall be collected from the revenue and other concerned authorities and presented along with the strip plans;

Strip plans showing the positions of exiting utilities and services indicating clearly the position of their relocation;

Details for various clearances such as environment and forest clearances;

Various clearance as applicable from Railway department.

Separate strip plan showing shifting / relocation of each utility services in consultation with the concerned local authorities;

The utility relocation plans should clearly show existing right – of – way (ROW) and pertinent plans topographic details including buildings, major trees, fences and other installations such as water mains, telephone, telegraph and electricity poles and suggest relocation of the services along with their crossing the highway at designated locations as required and prepare necessary details for submission to the Service Departments;

Detail schedule for acquisition of additional land/additional forest land for diversion and additional properties in consultation with the revenue authorities; and Land acquisition plan.

11.1.2 The strip plans and land acquisition plan/forest proposal shall be prepared on the basis of data from reconnaissance and detailed topographic surveys. In other words, the field surveys are suggested to be completed within a period of 30 days after the commencement of services. The consultant shall also prepare a schedule for L.A. as well as forest proposal within 2 months.

11.1.3 The report accompanying the strip plans should cover the essential aspects as given under:

Kilometer- wise/ Chainage-wise Land acquisition plan(LAP)/forest proposal and schedule of ownership thereof and costs as per revenue authorities and also based on realistic rates.

Details of properties such as buildings and structures falling within the right-of-way and cost of acquisition based on realistic rates.

Kilometer- wise /Chainage-wise Utility Relocation Plan and cost for relocation per civil construction as per concerned authorities.

Kilometer- wise /Chainage-wise account in regard to felling of trees of

different type and girth and value estimate of such trees based on realistic rates obtainable from concerned District Forest office.

- 11.1.4 The strip plans shall clearly indicate the scheme for future widening, if possible.

11.2 Land Acquisition Report(10 sets)

The land acquisition report/forest proposal shall be prepared for each section and **shall be submitted within a period of 15 days after the approval of alignment.** The report shall include the detail schedules about acquisition of land holdings and their locations in a strip plan and also the costs as per district authorities/CTR administration and also on market rate basis.

The land acquisition/forest proposal report should be prepared in consultation with affected persons, non-governmental organizations and concerned government agencies and should cover land acquisition and resettlement plan and cost of resettlement and rehabilitation of such affected persons. It should also include plan of compensating afforestation its land requirement with specific locations and cost involved for undertaking all activities in this regard. The consultant shall submit forest proposal for each and every over bridge, major bridge and temporary diversion for above structures. Every proposals shall be got signed by every district agency/authority concerned & CTR administration. After getting signed from district authorities the proposal shall be sent to Nodal Officer of forest at Dehradun **in One month.**

11.3 Submission of Preliminary Project Report

- 11.3.1 The final PPR (8sets) shall be submitted within **15 days** from the date of commencement of services. The report shall be prepared separately for each construction and shall contain the following.

Rehabilitation, improvement and upgrading requirement for existing features and requirements for the additional design of pavement.

Preliminary design of pavement.

Detailed GAD for structures (minor bridges, viaducts etc.) and alignment plan based upon hydraulic and geotechnical investigations and preliminary design calculations.

Detailed GAD and alignment plan for main bridge with different alignment alternatives along with structural alternatives.

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

Preliminary costs.

- 11.3.2 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 as an appendix to PPR

- 11.4.3 The Final PPR incorporating comments, revisions and modifications suggested

by EPI shall be submitted within 7 days of receiving comments from EPI.

11.4 Stage II: Draft Detailed Project Report (DPR)- 6 Sets.

- 11.4.1 The draft DPR submission shall consist of Main Report, Design report, Materials Report Engineering Report, Protection work Design Report, bid documents and drawings.
- 11.4.2 The Report volumes shall be submitted as tabulated above.
- 11.4.3 The documents and drawings shall submitted for the project and shall be in the following format.

Reports

Volume-I, Main Report :

The report will present the project background, details of surveys and investigations carried out, analysis and interpretation of survey an investigation data, traffic studies and demand forecasts, 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 bridges and cross drainage structures. 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 IRC codes. However, there may be situations wherein it has not been possible to strictly adhere to the design standards due to existing site conditions, restrictions and other considerations, the report should clearly bring out the details of these aspects and standards adopted.

Consultant shall also include the launching or erection scheme

(including design)for construction of main bridge.

Consultant has to submit the final design to client 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 :

The MoRTH's Technical Specifications for Road and Bridge works shall be followed for this study, However, this volume shall contain the special technical specifications, which are not covered by MoRTH specifications for Road and Bridge (latest edition/revision) and also specific quality control norms for the construction of 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 scale 1:250V and 1:2500H scale to cover one km in one sheet. In addition, this volume will contain drawings for the following.

- a. Horizontal Alignment and Longitudinal Profile.
- b. Cross section @ 25 m interval / any other interval as decided by EPI/PWD along the alignment within ROW
- c. Typical cross section with details of pavement structure.
- d. Detailed Working drawing of protection works.
- e. GAD of Main Bridge.
- f. Detailed Working drawings of Protection works.
(i) details working drawing of bridge superstructure / sub structure /bearing (including reinforcement schedule)
- g. Drawings for Road sign, Marking, Office cum residential complex for PIU, and other Facilities.
- 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 / PWD 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, crash barriers, delineators and rest areas, but bays, parking areas etc.

Volume-IX, Civil Work Bid Documents:

As per MORT& H Standards the consultant shall submit the bid documents.

Volume X :- Three copies of forest papers already sent to Nodal Officer from District authority and Private land acquisition papers, if any.

Volume XI :- Three copies of Utility shifting estimates for electric lines, traffic lights, water supply lines sewerage lines, irrigation channel, removal of encroachment, verification of ROW from land records, preparation of land acquisition plan, submission and verification of ROW from Revenue Authorities submitted liasoing with Govt. Authorities, getting clearances from respective authorities, Trees Cutting, statutory clearances / approval and Traffic &

Transport Management work already sent to Nodal Officer from District authority and Private land acquisition papers, if any.

- 11.4.4 The consultant shall submit the soft copies of the DPR including all drawings in Auto Cad-Latest format and also shall supply the necessary software such as Auto CAD, STAAD, MS Project, PRIMAVERA, MXROAD etc. in EPI/PWD office and any other software required for association of the work, free of cost.

12. Interaction with EPI/PWD

- 12.1 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/PWD and intimation shall be given to EPI/PWD regarding start of key activities as boring, survey etc. so that inspections of EPI/PWD officials could be arranged in time.
- 12.2 The EPI/PWD 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.
- 12.3 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.
- 12.4 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.

13 Data and Software:

- 13.1 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 / PWD at the time of the submission of the Final Report. The data can be classified as follows:-
- i. Engineering Investigations and Traffic Studies : Material Investigation including test result for sub grade soil. Traffic Studies (Traffic surveys), Sub-soil Exploration Hydraulic data for bridge and culverts, new construction requirement ect. 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 Cad latest format.

- 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 / PWD.**

13.2 Software:

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

- 13.3 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/PWD at the time of submission of the Final Report.

14 Responsibility for Accuracy of project Documents.

- 14.1 **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 / PWD 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.

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

- 15. **The final design will be the property of Govt. & no publication & distribution will be allowed without consent of client.**