



**Border Roads Organisation
CHIEF ENGINEER PROJECT DANTAK
(Ministry of Defence)
Government of India**

Request For Proposal

For

**“CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND PREPARATION OF
DETAILED PROJECT REPORT FOR DESIGN AND CONSTRUCTION OF
UNIDIRECTIONAL TWIN TUNNELS GANGLAKHA- GEDU ON PHUENTSHOLING-
THIMPHU HIGHWAY OF LENGTH 1.8KM (APPROXIMATE LENGTH) INCLUDING CIVIL
AND ELECTRICAL / MECHANICAL WORK ALONG WITH APPROACHES TO NHDL
SPECIFICATION UNDER PROJECT DANTAK IN BHUTAN”**

Oct 2026

**Border Roads Organisation
CHIEF ENGINEER PROJECT DANTAK
(Ministry of Defence)**

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**BORDER ROADS ORGANISATION HQ CE(P) DANTAK NOTICE
INVITING TENDER (NIT)**

Bid No.: CE(P) DTK/EPC-02/2026-27

Date: Oct 2026

1. **CHIEF ENGINEER PROJECT DANTAK, BORDER ROADS ORGANISATION HAS BEEN ASSIGNED THE WORK OF** “Consultancy Services for Feasibility study and preparation of Detailed Project Report (DPR) for design and construction of uni-directional twin tunnels Ganglakha- Gedu on Phuentsholing-Thimphu highway of length 1.8km (approximate length) including civil and electrical / mechanical work along with approaches to NHDL specification under Project Dantak in Bhutan by Ministry of Defence (as per **Annexure-I**).
2. Proposals are hereby invited from eligible “Consultancy Services for Feasibility study and preparation of Detailed Project Report (DPR) for design and construction of uni-directional twin tunnels Ganglakha- Gedu on Phuentsholing-Thimphu highway of length 1.8km (approximate length) including civil and electrical / mechanical work along with approaches to NHDL specification under Project Dantak in Bhutan”. Consultant submitting Proposal in sole capacity or as an associate shall meet the guidelines contained in Public Procurement (Preference to Make in India) Order, 2017 (amended on 16.09.2020). The Letter of Invitation (LOI) and Terms of Reference (ToR) including Request for Proposal (RFP) is available online on official central Public procurement Portal site <http://eprocure.gov.in/epublish/app>, BRO website www.bro.gov.in and CAB website www.cab.org.bt. Please note that Technical and Financial Bid will be received by the Accepting Officer through offline only at the office of the Chief Engineer (P) Dantak C/O 99 APO or at OIC liaison cell located at Supervisor Mess, 19 BRTF, Jaigaon, West Bengal PIN-736182, Ph 8145087696/9970889254 upto 1100 hrs (BST) on 10 Nov 2026 and Part-I of the tender documents will be opened at 1500 hrs (BST) on **16 Nov 2026** Tender received after the due date and time will not be considered.
3. **The period of consultancy service is 10 Months and tentative cost is Rs 4.41 Cr**
4. Bid Document Fee (Rs 5000/-), Power of Attorney, Integrity Pact etc. shall be submitted physically by the Bidder on or before 10 Nov 2026 (up to 1100 Hours BST) at HQ CE (P) Dantak, C/O 99 APO, Thimphu, Bhutan. The applicant shall furnish as part of its Proposal, a **Bid Security @ 1% of tender amount i.e. Rs 4,41,230 (Rupees Four Lakh Forty One Thousand Two Hundred Thirty only)** in the form of a Bank Guarantee issued by one of the Nationalized/Scheduled Banks in India/ Bhutan in favour of the CE (P) Dantak payable at Hasimara (WB) (account details mentioned in Data Sheet) (the “**Bid Security**”) **valid for a minimum period of 180**

days (i.e. 60 days beyond the validity of the bid) from the last date of submission of proposals.

5. Before submitting the proposal the Consultant shall mandatorily register and enlist themselves (the firm and all key personnel), on the MoRTH portal “INFRACON” and furnish registration details along with its RFP. Registration of Firm on INFRACON should be applicable for Indian Firms and Indian Key Personnel only. The credentials of Indian firms and key personnel will be verified on INFRACON portal.
6. As part of the Standard Operating Procedure for adoption of Integrity Pact, Shri Narayan Murthy Ganapathy, IFoS (Retd.) and Shri Lalatendu Mohanti, IPS (Retd) have been appointed as Independent External Monitor (IEM) in BRO, as per approval of the Central Vigilance Commission and Ministry of Defence, Govt. of India. The contact details are as under:

Shri Narayan Murthy Ganapathy, IFS (Retd) 3/268, Vipul Khand, Gomtinagar, Lucknow-226010 Mob No 9415147429 Email: gana_narayan@yahoo.com	Shri Lalatendu Mohanti, IPS (Retd) A-1 Tower-5, New Motibagh, New Delhi-110023 Mob No 9717095659 Email: L.mohanti@gmail.com
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7. Details of Nodal Officer of Authority: -

S/No	Name	Designation	Phone No.	E-mail ID
a)	Shri Arun Kumar Gupta, SE (Civ)	Director (EPC), HQ DGBR	8491808369	bro-direpc@bro.gov.in
b)	Col Deepak Baskandi	Director (EPC), HQ CE (P) Dantak	Tele : +975 - 2351082/ 2351086.	bro-dtk@nic.in

8. The Bank details of the client is given below:

S/No	Particulars	Details
1.	Name of Beneficiary	Chief Engineer Project Dantak
2.	Name of Bank	State Bank of India, Hashimara
3.	Account No.	11128915231
4.	IFSC Code	SBIN0001447

9.The following schedule is to be followed for this assignment:

S/No	Event Description	Date
1	Invitation of RFP (NIT)	10 Oct 2026 at 1200 Hrs
2	Last date for receiving queries	22 Oct 2026 at 1200 Hrs
3	Pre-BID meeting	16 Oct 2026 at 1200 Hrs
4	Authority response to queries latest by	24 Oct 2026 at 1200 Hrs
5	Bid submission start date	26 Oct 2026 at 1000 Hrs
6	BID Due Date (Physical submission)	10 Nov 2026 at 1100 Hrs
7	Opening of Technical BIDs	16 Nov 2026 at 1500 Hrs
8	Declaration of eligible / qualified Bidders	To be intimated later
9	Opening of Financial BID	To be intimated later

Yours sincerely,

(Kundan Kant)
EE (Civ)
SW
For Chief Engineer

Tel:

Fax:

E-mail: bro-dtk@nic.in

Website: www.bro.nic.in

DISTRIBUTION FOR INFORMATION AND WIDE PUBLICITY

1.	HQ Dte GBR/E8, Seema Sadak Bhawan, Ring Road, Delhi Cantt. New Delhi –10	2.	HQ ADGBR (East) Pin - 900 885 C/o 99 APO
3.	HQ ADGBR (N & W) C/o 56 APO	4.	HQ CE Project _____ _____ C/O 56/99 APO
5.	All India Traders Information Bureau, Post Box No. 25, Shastri Nagar PO, Jaipur – 302 016 (Rajasthan)	6.	R&D Estt PIN-931723 C/o 99 APO
7.	The Chief Engineer, MES, Shillong Zone, Shillong, Meghalaya	8.	HQ 19 BRTF Pin 930019 C/o 99 APO
9.	60 RCC (GREF) PIN : 930060 C/O 99 APO	10.	63 RCC (GREF) PIN : 930 063 C/O 99 APO
11.	64 RCC (GREF) PIN : 930 064 C/O 99 APO	12.	102 RCC (GREF) PIN : 930102 C/O 99 APO
13.	Head Office of Builder Association of India, G-1/G-20, Commerce Centre, 7th Floor, J-Dodajee Road, Tardeo, Mumbai-400 034 (MH)	14.	Director, Indian Trade Journal
15.	MES Builders Association of India, 807,Sahyog, 58 Nehru place, New Delhi -19	16.	Internal/ EDP - Please fwd the confirmation letter on uploading the NIT on BRO website

Letter of Invitation (LOI)

Bid No.: CE(P) DTK/EPC/02/2026-27

Date:10.2026

Dear Sir,

Sub: “Consultancy Services for Feasibility study and preparation of Detailed Project Report (DPR) for design and construction of uni-directional twin tunnels Ganglakha- Gedu on Phuentsholing-Thimphu highway of length 1.8km (approximate length) including civil and electrical / mechanical work along with approaches to NHDL specification under Project Dantak in Bhutan)”

Introduction

- 1.1 The Chief Engineer Project Dantak, Border Roads Organisation has been entrusted with the assignment of “Consultancy Services for Feasibility study and preparation of Detailed Project Report (DPR) **for design and construction of unidirectional twin tunnels Ganglakha- Gedu on Phuentsholing-Thimphu highway of length 1.8km (approximate length) including civil and electrical / mechanical work along with approaches to NHDL specification under Project Dantak in Bhutan)**”
- 1.2 HQ CE(P) Dantak, Border Roads Organisation now invites proposal from Technical consultants for carrying out detailed project report as per details given in **Annexure-1**.
- 1.3 A brief description of the assignment and its objectives are given in the **Appendix-I, “Terms of Reference”**.
- 1.4 The Chief Engineer Project Dantak, Border Roads Organisation invites Proposals (the **“Proposals”**) from eligible consultants who meet the guidelines contained in Public Procurement (Preference to Make in India) Order, 2017 (amended on 16.09.2020) **through e-tender** (offline bid submission) for selection of Technical Consultant (the “Consultant”) who shall prepare detailed project report (DPR).The consultant should have expertise in carrying out similar kind of job, in similar geographical location **(particularly for hill road projects)**. Consultants are here by invited to submit proposal in the manner as prescribed in the RFP document.

A Consultant with “a Particular Team” may submit only one **“proof of eligibility (Part 1)”** and **“Technical Proposal (Part II)”** .

Financial proposal is to be submitted separately in hard copy with the technical bid. The most preferred bidder (H-1) for each package would be determined on the basis of Quality and Cost as mentioned in the RFP.

The consultants are hereby invited to submit proposals in the manner prescribed in the RFP.

1.5 The consultants shall submit proposals in sole capacity only. The sole applicant may include an Associate company also. Any entity which has been barred by the BRO/ Ministry of Road Transport and Highways (MORTH) or its implementing agencies for the works of Expressways, National Highways, ISC and EI Works and the bar subsists as on the date of application, would not be eligible to submit the bid.

1.6 To obtain first hand information on the assignment and on the local conditions, the consultants are encouraged to pay a visit to the client (**Commander 19TF/ OC 60 RCC**) or Dept of Surface Transport, Ministry of Infrastructure and Transport and the project site before submitting a proposal and attend the **pre-proposal conference**. They must fully inform themselves of local and site conditions and take them into account in preparing the proposal.

1.7 Financial Proposals will be opened only for the firms found to be eligible and scoring qualifying marks in accordance with **Para 5** hereof. The consultancy services will be awarded to the highest ranking consultant on the basis of Quality and Cost.

1.8 Please note that (i) costs of preparing the proposal and of negotiating the contract, including visits to the Client, etc., are not reimbursable as a direct cost of the assignment; and (ii) Client is not bound to accept any of the proposals submitted and reserve the right to reject any or all proposals without assigning any reasons.

1.9 The proposals must be properly signed as detailed below:

1.9.1 i. by the proprietor in case of a proprietary firm

ii. by the partner holding the Power of Attorney in case of a firm in partnership (A certified copy of the Power of Attorney on a stamp paper of Rs. 100 and duly notarized shall accompany the Proposal).

iii. by a duly authorized person holding the Power of Attorney in case of a Limited Company or a corporation (A certified copy of the Power of Attorney on a stamp paper of Rs. 100 and duly notarized shall accompany the proposal).

1.10 Pre-proposal conference shall be held on the date, time and venue given in Data Sheet.

1.11 Bid Security

1.11.1 The applicant shall furnish as part of its Proposal, a **Bid Security @ 1% of tender amount i.e. Rs 4,41,230 (Rupees Four Lakh Forty One Thousand Two Hundred Thirty only)** in the form of a Bank Guarantee issued by one of the

Nationalized/Scheduled Banks in India/ Bhutan in favour of the CE (P) Dantak payable at Hasimara (WB) (account details mentioned in Data Sheet) (the “**Bid Security**”) **valid for a minimum period of 180 days (i.e. 60 days beyond the validity of the bid) from the last date of submission of proposals.** This Bid Security is returnable not later than 30 (thirty) days from the date of Opening of the Financial proposals except in case of the two highest ranked Applicants. Bid Security of the Selected Applicant and the Second ranked Team shall be returned, upon the Selected Applicant signing the Agreement. Earnest money is not required to be attached with tender in DPP & Hard copy by MSME registered as micro & small enterprises (MSE) as per Rule 170 (i) of GFR 2017. **Bid Securing Declaration** as per Rule 170 (iii) of GFR 2017 is required to attach by the firm registered with MSME, MSE in lieu of EMD as per following format

BID SECURING DECLARATION

I hereby submit a declaration that the bid submitted by the undersigned, on behalf of the bidder, (Name of the bidder), shall not be withdrawn or modified during the period of validity i.e not less than 180 (one hundred eighty) days from the bid due date.

I, on behalf of the bidder, (Name of the bidder), also accept the fact that in case the bid is withdrawn or modified during the period of its validity or if we fail to sign the contract in case the work is awarded to us or we fail to submit a performance security before the deadline defined in the request for bid documents, the bidder will be suspended for participation in the tendering process for the work of BRO/MoRT&H/NHAI/NHIDCL/Any other Govt. Deptt and work under other centrally sponsored schemes, for a period of Eighteen Months from the bid due date of this work.

(Signature of the Authorised Signatory)
(Official-Seal)

- 1.11.2 Any bid not accompanied by the Bid Security of the required value and minimum required validity shall be rejected by the authority as non-responsive.
- 1.11.3 The CE (P) Dantak shall not be liable to pay any interest on the Bid Security and the same shall be interest free.
- 1.11.4 The Applicant, by submitting its Application pursuant to this RFP, shall be deemed to have acknowledged that without prejudice to the Chief Engineer Project Dantak, Border Roads Organisation any other right or remedy hereunder or in law or otherwise, the Applicant shall be debarred from participating in the future projects of the Border Roads Organisation in the following situations.
- (a) If an Applicant withdraws its Proposal during the period of its validity as specified in this RFP and as extended by the Applicant from time to time.
 - (b) In the case of a Selected Applicant, if the Applicant fails to sign the Agreement.

2. Documents

- 2.1. To enable you to prepare a proposal, please find and use the attached documents listed in the Data Sheet.
- 2.2. Consultants requiring a clarification of the documents must notify the Client, in writing, by 1200 **Hrs 22 Oct 2026**. Any request for clarification in writing or by telefax/e-mail must be sent to the Client's address indicated in the Data Sheet. The Client will upload replies to pre-bid queries in writing by Email.
- 2.3. At any time before the submission of proposals, the Client may, for any reason, whether at its own initiative or in response to a clarification requested by a Consulting firm, modify the Documents by amendment or corrigendum. The amendment will be uploaded on <http://eprocure.gov.in/epublish/app>, BRO website www.bro.gov.in and CAB website www.cab.org.bt. The Client may at its discretion extend the deadline for the submission of proposals and the same shall also be uploaded on <http://eprocure.gov.in/epublish/app>, BRO website www.bro.gov.in and CAB website www.cab.org.bt, and BRO website.

3. Preparation of Proposal

The proposal must be prepared in three parts viz.

Part 1: Proof of eligibility

Part 2: Technical Proposal

Part 3: Financial Proposal

3.1. Document in support of proof of eligibility

- 3.1.1. The minimum essential requirement in respect of eligibility has been indicated in the Data Sheet. The proposal found deficient in any respect of these requirements will not be considered for further evaluation. The following documents must be furnished in support of proof of eligibility as per Formats given in **Appendix-II**:

(i) **Forwarding letter for Proof of Eligibility in the Form-E1.**

(ii) **Firm's relevant experience and performance for the last 10 years:** Project sheets in support of relevant experience as per Form-E2/T3 supported by the experience certificates from clients in support of experience as specified in data sheet for the project size preferably in terrain of similar nature as that of proposed project shall be submitted in hard copies. The same shall be verified on Infracore portal for Indian bidders only. Certificate should indicate clearly the firm's Design/DPR experience, Highway/Railway/Metro tunnel project, details (including configuration) of structures like Adits, vertical shafts, Designed HRR, type of Tunnel, rock bolting, etc. Scope of services rendered by the firm should be clearly indicated in the certificate obtained from the client. The information given in Form E2/T3 shall also be considered as part of Technical Proposal and shall be evaluated accordingly. The Consultants are therefore advised to see carefully the evaluation criteria for Technical Proposal and submit the Project Sheets accordingly.

(iii) **Firm's turnover for the last 5 years:** A tabular statement as in Form E3 showing the turnover of the applicant firm(s) for the last five years beginning with the last financial year certified by the Chartered Account along with certified copies of the audit reports shall be submitted in support of the turnover in hard copies.

(iv) **Document fee:** The non-refundable fee for the document amounting to Rs. 5000/- (Five thousand only) is to be submitted online in Chief Engineer Project Dantak, Border Roads Organisation on account given in data sheet. The proof/ transaction receipt of depositing online fee must be furnished while submitting the proposal. However, Consultants who are Micro and Small Enterprises are exempt from payment of Document Fee. Such Consultants will be required to submit documentary evidence of their being valid Micro or Small Enterprise in hard copy.

(v) **Bid security.**

(vi) Power of Attorney on a stamp paper of Rs.100 and duly notarized authorizing to submit the proposal.

(vii) In case of Association of firms, the proposal shall be accompanied by a certified copy of legally binding Memorandum of Understanding (MOU) on a stamp paper of Rs.100, signed by all firms to the Association as detailed at para 1.9 above.

(viii) Consultants shall comply with the provisions of Integrity Pact (IP) as given in Form T-12 and the Integrity Pact (IP) duly signed by Authorised

signatory shall be submitted by the Consultant with technical Proposal & shall be part of the Contract Agreement.

(ix) A Consultant is required to submit along with its Technical Proposal, a self-certification that the services offered meets the local content requirement for 'Class-I Local supplier'/'Class-II Local Supplier 'as the case may be. In case the Consultant has not submitted the aforesaid certification, the Consultant will be treated as 'Non-Local supplier'. The definition of Class-I Local Supplier, Class-II Local Supplier, Non-Local Supplier and Local Content shall be as given in Public Procurement (Preference to Make in India) Order, 2017 (amended on 16.09.2020). In case of procurement of a value in excess of Rs. 10 crores, the 'Class-I Local supplier'/'Class-II Local Supplier 'shall provide a certificate from the statutory auditor or cost auditor of the company (in case of companies) or from a practicing cost accountant or practicing chartered accountant (in respect suppliers other than companies) giving the percentage of local content.

3.1.2. The minimum essential requirement in respect of eligibility has been indicated in the data sheet, the proposal found deficient in any respect of these requirements will not be considered for further evaluation.

3.1.3. Requirements with respect to Technical Capacity Provision for maximum number of consultancy services to be awarded to one consultant:

- (i) The maximum number of consultancy services to be awarded to one consultant will be governed by the following provisions:

Sl . N o.	Average Annual Turnover of Firm in last 3 Financial Years (from Consultancy Services)	Upto Rs. 10 Crores	More than Rs. 10 crores but less than/equal to Rs. 30 Crores	More than Rs. 30 crores but less than/equal to Rs. 60 Crores	More than Rs. 60 Crores
1	No. of key professionals on full time employment with the consultant (minimum for last one year)	4	25	40	60
2	Max. no. of DPR/AE/IE/CSC consultancy assignments to be awarded to one particular consultant including ongoing consultancy services at a time on National Highways or centrally sponsored road works of MoRTH including its executing agencies	8	16	30	50

Sl. No.	Average Annual Turnover of Firm in last 3 Financial Years (from Consultancy Services)	Upto Rs. 10 Crores	More than Rs. 10 crores but less than/equal to Rs. 30 Crores	More than Rs. 30 crores but less than/equal to Rs. 60 Crores	More than Rs. 60 Crores
3	Max. no. of DPR consultancy assignments to be awarded to one particular consultant including ongoing consultancy services at a time on National Highways or centrally sponsored road works of MoRTH including its executing agencies out of the total number in Sl. No. 2	6	13	24	40
4	Maximum no. of DPR consultancy assignments to be awarded in one financial year to one particular consultant including ongoing consultancy services at a time on National Highways or centrally sponsored road works of MoRTH including its executing agencies out of the total number in Sl. No. 3.	3	7	12	20

Note: (1) Both the conditions of turn over and number of key professionals on full time employment with the consultant have to be satisfied to be eligible for award of maximum no. of consultancy assignments mentioned in Sr. No. 2, 3 & 4 of the above table. In case one condition is fulfilled for higher slab but the other condition is fulfilled for lower slab, consultant will be eligible for award of maximum number of consultancy assignments corresponding to the condition meeting lower slab.

(2) (i) The consulting firms should be encouraged to carry out a mix of DPR and Supervision Assignments like IE/AE/Construction Supervision Consultants (CSC).

(ii) The following assignments would not be counted as ongoing consultancy services for the purpose of determination of technical capacity as above.

(a) IE/AE/CSC assignments where original assignment period + one year is lapsed or provisional completion of civil work is issued, whichever is earlier;

(b) DPR assignments where either (i) the bids for civil works have been received; or (ii) original assignment period + one year has lapsed;

- (c) Special Projects like stand-alone bridge, emergency landing facility, etc.; and
- (d) Assignments having less than 6 months contract period.
- (iv) For the purpose of calculation of maximum no. of consultancy assignments, the assignments awarded on the date of opening of financial proposal and in progress will be taken into consideration as utilized capacity. Projects of DoST/MoRTH and its executing agencies (awarded/ in progress) only shall be considered for the purpose. The Consultant shall provide these details and they shall be solely responsible for accuracy of such details provided.
- (v) The applicants shall submit copies of Form-26 AS in the proposal in order to certify their permanent key personnel (as given in Sr. No. 1 of above table).
- (vi) The applicants shall submit the requisite details for determination of technical capacity in the prescribed format Technical Capacity (Form T-11) enclosed.

Sample Illustration for determination of Technical Capacity is given below.

1. Illustration for Determination of Technical Capacity (Sole Applicant)

1	2	3	4	5	6	7
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Average Annual Turnover of firm in last 3 FY (from consultancy services) of the consultant	No. of Key Professionals on full time rolls (minimum for last one year) with the consultancy firm	Max. no. of consultancy assignments to be awarded to the consultant (sole applicant) including going consultancy services at a time on National Highways or centrally sponsored road works of MoRTH Including its executing agencies		Maximum no. of DPR consultancy assignments to be awarded to the consultant (sole applicant) including ongoing consultancy services at a time on National Highways or centrally sponsored road works of MoRTH including its executing agencies in one financial year	Total ongoing/ awarded consultancy assignments (nos.)		DPR consultancy assignments awarded in CFY (nos.)	Remaining DPR consultancy assignments that can be awarded to the consultant (nos.) CFY
		Total	DPR		Total	DPR	-	
1	2	Section 11	3B	4	5A	5B	6	7
10	4	8	6	3				

* Compare 3B – 5B with 3A – 5A and take lower of the two and in this case, it is 2 (X). Compare 4-6 with X and take lower of the two and in this case, it is 2 (Y). Hence, Y is the remaining DPR consultancy assignments that can be awarded to the consultant during the CFY.

3.2 Technical Proposal

3.2.1 You are expected to examine all terms and instructions included in the Documents. Failure to provide all requested information will be at your own risk and may result in rejection of your proposal.

3.2.2 During preparation of the technical proposal, you must give particular attention to the following:

*Total assignment period is as indicated in the enclosed TOR. **A manning schedule in respect of requirement of key personnel is also furnished in the TOR which shall be the basis of the financial proposal.** You shall make your own assessment of support personnel both technical and administrative to undertake the assignment. Additional support and administrative staff need to be provided for timely completion of the project within the total estimated cost. **It is stressed that the time period for the assignment indicated in the TOR should be strictly adhered to.***

3.2.3 The technical proposal shall be submitted strictly in the Formats given in **Appendix- III** and shall comprise of following documents:

- i) Forwarding letter for Technical proposal duly signed by the authorized person on behalf of the bidder, as in Form-T-1
- ii) Details of projects for which Technical and Financial Proposals have been submitted by a Consultant with a particular Team as in Form-T-2
- iii) Firm's references - Relevant Services carried out in the last Ten years as per Form- E2/T-3. This information submitted as part of Proof of Eligibility shall be evaluated and need not be submitted again as a part of the Technical proposal.
- iv) Site Appreciation: limited to four A4 size pages in 1.5 space and 12 font including photographs, if any (Form-T-4).
- v) The composition of the proposed Team and Task Assignment to individual personnel: Maximum three pages (Form-T-5).
- vi) Proposed methodology for the execution of the services illustrated with bar charts of activities, including any change proposed in the methodology of services indicated in the TOR, and procedure for quality assurance: The proposed methodology should be accompanied by the consultants initial view, key challenges they foresee and potential solutions suggested regarding: a) proposed alignment and bypass required, b)access control, rehabilitation of existing road, drainage and utilities, c) adoption of superior technology along with proof: limited to six A4 size pages in 1.5 space and 12 font including photographs, if any for items a & b, (Form-T- 6) and information in Form-T-8 (as covered in para viii below) for item c vii) The proposal should clearly identify and mention the details of Material Testing lab facilities to be used by the Consultants for the project (Form-T-7). In this connection, the proposals of the Consultants to use in-house lab facilities up to a distance of maximum 400 km from the project site being feasible would be accepted. For all other cases suitable nearby material Testing Laboratory shall be proposed before Contract Agreement is executed.

- viii) The proposal shall indicate as to whether the firm is having the facilities for carrying out the following field activities or these are proposed to be outsourced to specialized agencies in the Form- T-8.

(a). Pavement Investigation

(b). Geo-Physical & Geo-technical Investigation

In case the consultant envisages outsourcing any or all of the above services to the expert agencies, the details of the same indicating the arrangement made with the agencies need to be furnished. These agencies would however, be subject to approval of the client to ensure quality input by such agencies before award of the work. For outsourced services, proposed firms/consultants should have such experience on similar projects

- ix) Details of office equipment and software owned by the firm in Form-T9

- x) **CVs of following 5 (five) key Personnel may be submitted in Form–T-10 a in physical form. The same will be verified from Infracon portal in case of Indian Consultants.**

- a)Team Leader cum Tunnel Expert,
- b)Tunnel Design Expert,
- c)Geo- Physicist/Geologist,
- d)Geotechnical Engineer and Senior ventilation and fire safety expert (E&M)

For remaining key personnel the CVs need to be submitted for approval prior to signing of contract.

- xi) The bidders shall submit the additional details in Form–T-11 for technical proposal.
- xii) In case consultant firms experience or document such as Form E2/T3, Form E3, References (client certificate) is found to be false at any stage i.e. from bidding to completion of services, the consultancy contract shall be terminated and consultant firm shall be debarred for a period of 2 years.

3.2.4 CVs of Key Persons:

- i) The CVs of the five key personnel as mentioned in para 3.2.3(x) above in the format as per Form T-10 is to be furnished in hard copy. It may please be ensured that the format is strictly followed and the information furnished therein is true and correct. The CV must indicate the work in hand and the duration till which the person will be required to be engaged in that assignment. The Firm shall ensure that details furnished in the CV by the personnel are correct.
- a. If an information is found incorrect/fake/inflated in the CV, at any stage, debarment of the key personnel from future BRO/ MoRTH or its Executing

Agencies projects upto 2 years may be taken by BRO/ MoRTH or its Executing Agencies.

- b. In case, the information contained in the CV for the duration in which the key personnel was employed by the firm, proposing his candidature is found incorrect/fake/inflated at any stage, action including termination of the consultancy agreement and debarment of the firm upto 2 years from future BRO/ MoRTH or its Executing Agencies projects shall be taken by BRO or its Executing Agencies.
 - c. In case, the information contained in the CV is found incorrect/fake/inflated at any stage, the consultancy firms shall have to refund the salary and perks drawn in respect of the person apart from other consequences.
-
- ii. The minimum requirements of Qualification and Experience of all key personnel are listed in Enclosure-II of TOR. CV of a person who does not meet the minimum experience requirement as given at enclosure-II of TOR shall be evaluated and the marks obtained shall be taken into consideration during evaluation of Technical Proposal (except Team leader). However, if a firm with such key personnel is declared the “most preferred bidder” , such key personnel should be replaced before signing of contract with a person meeting requirement of Qualification and Experience as given at enclosure-II of TOR and whose CV secures 75 % marks and above. If proposed key personnel does not possess the minimum (essential) educational qualification as given at enclosure-II of TOR, Zero marks shall be assigned to such CV and such CV shall not be evaluated further. **The CV of the proposed Team Leader should score at least 75 % marks otherwise the entire proposal shall be considered to have failed in the evaluation of Technical Proposals and shall not be considered for opening of Financial Proposals.**
 - iii. All key personnel should be available from beginning of the project. Other Key Personnel with intermittent input are allowed to be deployed/proposed in 2 teams at a time. **If same CV is submitted by two or more firms, zero marks shall be given for such CV for all the firms.**
 - iv. The availability of key personnel must be ensured for the duration of project as per proposed work programme. If a firm claims that a key personnel proposed by them is a permanent employee of the firm (the personnel should have worked in the firm continuously for a period of at least 1 year), a certificate to the effect be furnished by the firm.
 - v. The **age limit for key personnel is 65 years** as on the date of bid submission. The proof of age and qualification of the key personnel must be furnished in the technical proposal.

- vi. An undertaking from the key personnel must be furnished that he/she will be available for entire duration of the project assignment and will not engage himself/herself in any other assignment during the period of his/her assignment on the project. After the award of work, in case of non-availability of key personnel in spite of his/her declaration, he/she shall be **debarred for a period of two years for all projects of Border Roads Organisation**
- vii. Age limit for supporting staff to be deployed on project is 65 years as on the date of bid submission.
- viii. A good working knowledge of English Language is essential for key professional staff on this assignment. Study reports must be in English Language.
- ix. Photo, contact address and phone/mobile number of key personnel should be furnished in the CV.
- x. Availability of few key personnel engaged for preparation of Detailed Project Report for the envisaged project may be ensured during first 3 to 4 months after start of the civil work at site during the period of survey and review of DPR by the Supervision consultant/Authority Engineer. For this purpose, payment shall be made as per actual site deployment of the key personnel at the man month rates quoted by the firm in their financial proposal.
- xi. It may please be noted that in case the requirement of the 'Experience' of the firm/consortium as mentioned in the "Proof of Eligibility" is met by any foreign company, their real involvement for the intended project shall be mandatory. This can be achieved either by including certain man-months input of key experts belonging to the parent foreign company, or by submitting at least the draft feasibility report and draft DPR duly reviewed by the parent firm and their paying visit to the site and interacting with BRO Project Dantak . In case of key personnel proposed by the foreign company, they should be on its pay roll for at least last six months (from the date of submission).
- xii. In case a firm is proposing key personnel from educational/research institutions, a '**No Objection Certificate**' from the concerned institution should be enclosed with the CV of the proposed key personnel committing his services for the instant project.

3.2.5 The technical proposal must not include any financial information.

3.3 Financial Proposal

- 3.3.1** The Financial proposal should include the costs associated with the assignment. These shall normally cover: remuneration for staff (foreign and local, in the field, office etc.), accommodation, transportation, equipment, printing of documents, surveys, geotechnical investigations etc. This cost should be broken down into foreign and local costs. Your financial proposal should be prepared strictly using, the formats attached in **Appendix – IV**. Your financial proposal should clearly indicate the amount asked for by you without any assumptions of conditions attached to such amounts. Conditional offer or the proposal not furnished in the format attached in **Appendix-IV** shall be considered non- responsive and is liable to be rejected. **Appendix-IV is only for sample format, the financial proposal be strictly submitted on BOQ uploaded by the department on CPP Portal. Any other format of financial proposal shall be rejected.**
- 3.3.2 The financial proposal shall take into account all types of the tax liabilities and cost of insurance specified in the Data Sheet.
- 3.3.3 Costs shall be expressed in Indian Rupees in case of domestic as well as for foreign Consultant.** The payments shall be made in Indian Rupees by the concerned Commander Task Force, Border Roads Organisation and the Consultant themselves would be required to obtain foreign currency to the extent quoted and accepted by CE(P) Dantak, Border Roads Organisation. Rate for foreign exchange for payment shall be at the rate established by RBI applicable at the time of making each payment installment on items involving actual transaction in foreign currency. No compensation done to fluctuation of currency exchange rate shall be made.
- 3.3.4 Consultants are required to charge only rental of equipments / software(s) use so as to economize in their financial bid.

4. Submission of Proposals

- 4.1 The Applicants shall submit the proposal (Proof of Eligibility and Technical Proposal) comprising the documents as mentioned under clause 3.1.1 and 3.2.3 respectively to meet the requirements of 'Proof of Eligibility 'and 'Technical Proposal 'offline only. A Consultant may submit only one proposal of “proof of eligibility (Part 1 Para 5.1 i, ii &vii)” and “Technical Proposal (Part II)” with a particular team on or before the deadline of submission of bids. Financial proposal are only to be submitted in separate envelope **in hard copy**.

- 4.2 The proposal must be prepared in indelible ink and must be signed by the authorized representative of the consultants. The letter of authorization must be confirmed by a written power of attorney accompanying the proposals. All pages of the Proof of Eligibility and Technical Proposal must be initialed by the person or persons signing the proposal.
- 4.3 The proposal must contain no interlineations or overwriting except as necessary to correct errors made by the Consultants themselves, in which cases such corrections must be initialed by the person or persons signing the proposal.
- 4.4 Your proposal must be valid for the number of days stated in the Data Sheet from the closing date of submission of proposal.

5. Proposal Evaluation

5.1 Stage I- Proof of Eligibility

The proposals would be evaluated by a Committee constituted by Chief Engineer Project Dantak, Border Roads Organisation. A three- stage procedure will be adopted in evaluating the proposal. In the first stage- Proof of Eligibility, it will be examined as to whether:

- i) The proposal is accompanied by proof /transaction receipt of depositing online document fee and bid security amount.
- ii) The firms(s) have required experience.
- iii) The firms(s) have required turnover.
- iv) The documents are properly signed by authorized signatories and whether the proposal contains proper POA as mentioned at para 1.9 above.
- v) The proposals have been received on/ or before the deadline of submission.
- vi) In case of Association of firms, the proposal shall be accompanied by a certified copy of legally binding Memorandum of Understanding (MoU) on a stamp paper of Rs. 100/- signed by all firms to the Association as detailed at para 1.9 above.
- vii) The determination of technical capacity of the bidding consultant shall be evaluated as per Form-T11 in Appendix-III Formats for technical proposals.

In case answers to any of the above items is 'No 'the bid shall be declared as non-responsive and shall not be evaluated further. A consultant satisfying the minimum eligibility criteria as mentioned hereinabove and more specifically in Data Sheet shall be construed as shortlisted for further evaluation of Technical Proposals.

5.2 Stage II- Technical evaluation

In the second stage the Technical proposal shall be evaluated as per the detailed evaluation criteria given in Data Sheet.

A proposal securing 80 points shall be declared pass in the evaluation

Technical Proposal: **The technical proposal should score at least 80 points out of 100 to be considered for financial evaluation. The CV of the proposed Team Leader should score at least 75 % marks otherwise the entire proposal shall be considered to have failed in the evaluation of Technical Proposals and shall not be considered for opening of Financial Proposals.**

5.3 Stage III- Evaluation of Financial Proposal

5.3.1 In case, only one firm is eligible for opening of Financial Proposals, the Financial Proposal shall not be opened, the bids for that package shall be cancelled and Chief Engineer Project Dantak, Border Roads Organisation shall invite fresh bids for this package. For financial evaluation, total cost of financial proposal excluding Goods & Service Tax shall be considered. Goods & Service Tax shall be payable extra.

5.3.2 The evaluation committee will determine whether the financial proposals are complete (i.e., whether they have included cost of all items of the corresponding proposals; if not, then their cost will be considered as NIL but the consultant shall however be required to carry out such obligations without any compensation. In case, if client feels that the work cannot be carried out within overall cost of financial proposal, the proposal can be rejected. The client shall correct any computational errors and correct prices in various currencies to the single currency specified in Data Sheet. The evaluation shall exclude those taxes, duties, fees, levies and other charges imposed under the applicable law & applied to foreign components/ resident consultants.

5.3.3 The procedure as mentioned at Clauses 5.3.4, 5.4 and, 5.5 as mentioned below shall be followed for determining the “most preferred bidder (H-1 bidder)”.

5.3.4 All the bid prices which are 25% or more below average bid prices will be given financial score (SF) of 100 points. The financial score of other bidders shall be computed as follows:
$$SF = 100 \times \frac{\text{amount equal to 25\% below average bid prices}}{\text{bid price of the particular bidder}}$$

5.4 Combined evaluation of Technical and Financial Proposals.

Proposals will finally be ranked according to their combined technical

(ST) and Financial (SF) scores using the weights indicated in the Data Sheet:

$$S = ST \times T + SF \times f$$

Where,

S= Combined Score,

ST= Technical Score out of 100 SF= Financial Score out of 100

T (80%) and f (20%) are values of weightage for technical and financial proposals respectively as given in the Data Sheet.

5.5 Most Preferred Bidder (H-1).

A Consultant having the maximum Combined score (S) shall be declared as the **most preferred bidder** (H-1).

6. Performance Security

- 6.1 The consultant will furnish within 15 days of the issue of Letter of Acceptance (LOA), an unconditional Bank Guarantee equivalent to 5% of the total contract value from a Nationalized Bank of India/Bhutan having a net worth of not less than Rs.1000 crore as per latest Annual Report of the Bank. In the case of a Foreign Bank (issued by a Branch in India) the net worth in respect of Indian operations shall only be taken into account. In case of Foreign Bank, the BG issued by Foreign Bank should be counter guaranteed by any Nationalized Bank in India/ Bhutan valid for a period of **three years** beyond the date of completion of services, or end of civil works contract, whichever earlier. **The Bank Guarantee will be released by** Chief Engineer Project Dantak, Border Roads Organisation upon expiry of 3 years beyond the date of completion of services, or end of civil works contract, whichever earlier, provided rectification of errors if any, found during implementation of the contract for civil work and satisfactory report by Chief Engineer Project Dantak, Border Roads Organisation in this regard is issued. However, if contract is foreclosed / terminated by Chief Engineer Project Dantak Border Roads Organisation at Inception Stage, with no fault of Consultant, Performance Security shall be released within three months from date of foreclosure / termination.

Alternatively, the Consultant may submit a single Bank Guarantee as Performance Security to cover the performance of all the consultancy

assignments being undertaken by the Consultant for the Client for the amount indicated below. If any part of the Omnibus Bank Guarantee has been encashed by the Client, whether before submission of Proposal, during pendency of the Proposal evaluation or during pendency of the Contract, the Consultant shall re-equip the Omnibus Bank Guarantee within a period of 3 working days. The Consultant may initially provide the Omnibus Bank Guarantee towards Performance Security for a period of two years provided that it shall procure the extension of the validity of the Performance Security at least one month prior to the date of expiry thereof. Once the appropriate single Bank Guarantee for Performance Security has been submitted by the Consultant, the existing BGs shall be returned. The Bank Guarantee be submitted in prescribed Proforma.

- 6.2 Further, in case where the bid of the successful consulting firm is less than 85% of the average of all bids received, the successful consulting firm shall have to submit an Additional Performance Security (APS) in the form of a Bank Guarantee for 30% of the differential value between the successful bid and average of all the bids received. The BG shall be valid for a period of [xx+2] months i.e. upto 2 months beyond the expiry of the Contract of [xx] months. The other requirements of APS are same as those of Performance Security.
- 6.3 In the event the Consultant fails to provide the security within 15 days of date of LOA, it may seek extension of time for a period of 15 (Fifteen) days on payment of damages for such extended period in a sum of calculated at the rate of 0.05% (Zero Point Zero Five Percent) of the Bid price for each day until the performance security is provided. For the avoidance of doubt the agreement shall be deemed to be terminated on expiry of additional 15 days time period.
- 6.4 Notwithstanding anything to the contrary contained in this Agreement, the Parties agree that in the event of failure of the Consultant to provide the Performance Security in accordance with the provisions of Clause 6.1 and 6.2 within the time specified therein or such extended period as may be provided by the Authority, in accordance with the provisions of Clause 6.3, all rights, privileges, claims and entitlements of the Consultant under or arising out of this Agreement shall be deemed to have been waived by, and to have ceased with the concurrence of the Consultant and the LoA shall be deemed to have been withdrawn by mutual agreement of the Parties. Authority may take action to debar such firms for future projects for a period of 1 year.

7. Penalty

The consultant will indemnify for any direct loss or damage that accrue due to deficiency in services in carrying out Detailed Project Report. Penalty shall be imposed on the consultants for poor performance/ deficiency in service as expected from the consultant and as stated in General Conditions of Contract.

8. Award of Contract

The Client shall issue letter of award to selected Consultant and ask the Consultant to provide Performance Security as in Para 6 above. If the selected Consultant fail to provide performance security within the prescribed time or the Consultant fail to sign the Contract Agreement within prescribed time, the Client may invite the 2nd highest ranking bidder Consultant and follow the procedure outlined in Para 8 and 9 of this Letter of Invitation.

9. Signing of Contract Agreement

After having received the performance security and verified it, the Client shall invite the selected bidder for signing of Contract Agreement on a date and time convenient to both parties within 15 days of receipt of valid Performance Security.

- 10.** The Client shall keep the bidders informed during the entire bidding process and shall host the following information on CPP portal/ through email:

- i) Notice Inviting Tender (NIT)
- ii) Request For Proposal (RFP)
- iii) Replies to pre-bid queries, if any
- iv) Amendments / corrigendum to RFP

- 11.** It is the Organisation policy that the consultants observe the highest standard of ethics during the selection and execution of such contracts. In pursuance of this policy of the Organisation:

- (a) Defines, for the purpose of this paragraph, the terms set forth below as follows:

- (i) “corrupt practice” means the offering, giving, receiving, or soliciting, directly or indirectly, of anything of value to influence the action of a public official in the selection process or in contract execution;
- (ii) “fraudulent practice” means a misrepresentation or omission of facts in order to influence a selection process or the execution of a contract;
- (iii) “collusive practices” means a scheme or arrangement between two or more consultants with or without the knowledge of the Client, designed to establish prices at artificial, non-competitive levels;
- (iv) “coercive practices” means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in a procurement process, or affect the execution of

a contract.

- (b) will reject a proposal for award if it determines that the Consultant recommended for award has, directly or through an agent, engaged in corrupt, fraudulent, collusive or coercive practices in competing for the contract in question;
- (c) will declare a firm ineligible, either indefinitely or for a stated period of time, to be awarded a contract if it at any time determines that the firm has engaged in corrupt or fraudulent practices in competing for, or in executing, a contract; and
- (d) will have the right to require that a provision be included requiring consultants to permit the Employer to inspect their accounts and records relating to the performance of the contract and to have them audited by authorized representatives of Employer.”

12. Confirmation

We would appreciate you informing us by facsimile/e-mail *whether or not you will submit a proposal.*

Thanking you.

Yours Sincerely,

(Kundan Kant)
EE (Civ)
SW (EPC)
For Chief Engineer

Encl. as above

**DETAILS OF THE STRETCH PROPOSED FOR DPR
PREPARATION**

**CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND PREPARATION OF
DETAILED PROJECT REPORT (DPR)
FOR DESIGN AND CONSTRUCTION OF UNI-DIRECTIONAL TWIN TUNNELS
GANGLAKHA- GEDU ON PHUENTSHOLING-THIMPHU HIGHWAY OF LENGTH 1.8KM
(APPROXIMATE LENGTH) INCLUDING CIVIL AND ELECTRICAL / MECHANICAL WORK
ALONG WITH APPROACHES TO NHDL SPECIFICATION UNDER PROJECT DANTAK IN
BHUTAN.**

S . N o.	NH No.	Section	Country	Tentative Length (in km)	Package No.
1	2	3	4	5	6
1	-	Consultancy Services for Feasibility study and preparation of Detailed Project Report (DPR) for design and construction of uni-directional twin tunnels Ganglakha- Gedu on Phuentsholing-Thimphu highway of length 1.8km (approximate length) including civil and electrical / mechanical work along with approaches to NHDL specification under Project Dantak in Bhutan	Bhutan	To be finalized by the consultant as per the site requirements Tentative tunnel length is 1.8 Km and approach road length is 1.00 KM (tentative)	

DATA SHEET

I (References to corresponding paragraphs of LOI are mentioned alongside)

1. **The Name of the Assignment and description of project as mentioned in Annex- I** (Ref. Para 1.1)

(The Name of project and Package No. should be indicated in the format given in the technical proposal)

2. **The name of the Client is** : The Chief Engineer
Project Dantak,
Border Roads Organisation
C/O 99 APO, Thimphu, Bhutan
email: bro-dtk@nic.in

3. **Duration of the Project:** Duration of the project 10 Months.

4.

Date, Time and Venue of Pre-Proposal

Conference Date: Sep 2026

Time: 15:00 Hrs(BST)

Venue: HQ CE(P) Dantak,
Border Roads Organisation, C/O 99 APO,
Thimphu, Bhutan

5. Pre-proposal conference shall be held through hybrid mode i.e. physical or video conferencing.

5 **The Documents are:**

- i. Appendix-I: Terms of Reference (TOR)
- ii. Appendix-II: Formats for Proof of Eligibility
- iii. Appendix-III: Formats for Technical Proposal
- iv. Appendix-IV: Formats for Financial Proposal
- iv. Appendix-V: Detailed Evaluation Criteria
- vi. Appendix –VI Draft Contract Agreement

(Ref. Para 2.1)

6. Deleted

7. Tax and Insurance (Ref. Para 3.3.2)

(i). The Consultants and their personnel shall pay all taxes (including Goods & service tax), custom duties, fees, levies and other impositions levied under the laws prevailing seven days before the last date of submission of the bids. The effects of any increase / decrease of any type of taxes levied by the Government shall be borne by the Client / Consultant, as appropriate.

(ii). Limitations of the Consultant's Liability towards the Client shall be as per Clause 3.4 of Draft Contract Agreement

(iii). The risk and coverage shall be as per Clause 3.5 of Draft Contract Agreement.

8. Deleted

9. Deleted

10. The date, time and Address of proposal submission are

Date 10 Nov 2026

Time 1100 Hrs

**Address HQ Chief Engineer
Project Dantak,**

C/O 99 APO, Thimphu, Bhutan or

Transit camp 1644, Opposite Jaiswal Medical, Jaigaon, West Bengal-736182

11. Proposal Validity period (Number of days): 120 days (Ref. Para 4.4)

12. Evaluation criteria: (Ref. Para 3 & 5)

12.1 First stage evaluation – eligibility requirement. (Ref. Para 3.1 & 5.1)

13 The cost of Bid/RFP documents as mentioned in Data Sheet through RTGS/NEFT/other online mode to BRO/Dantak's account, as given below :

S/No	Particulars	Details
1.	Name of Beneficiary	Chief Engineer Project Dantak
2.	Name of Bank	State Bank of India, Hashimara
3.	Account No.	11128915231
4.	IFSC Code	SBIN0001447

Table-1: Minimum Eligibility Requirements

S r. N o.	Minimum experience and performance of Preparation of DPR of Tunnel related to Road/rail/metro in the last 10 years (for past performance attach undertaking for any litigation history/ and arbitration).	Annual average turnover
1	A Firm applying should have completed/substantially completed DPR for at least one project of Tunnel related to Road/rail/Metro of minimum 60% of the indicative length(1.08 km). Indicative cross section area of 154.00 Sqm Note: The experience of a firm in preparation of DPR for a private concessionaire/contractor shall not be considered.	Annual average turnover for last 5 years of the firm should be equal to or more than Rs 5 Crores.

Note:

1. Tunnel of cross sectional area less than 50.00 Sqm will not be considered. However, length of Tunnel having cross section area more than 50.00 Sqm will be adjusted on proportionate basis for cross section area of 154.00 Sqm.

- (i) The sole applicant shall fulfill all the requirements given in Table-1.
- (ii) If the applicant firm has / have prepared the DPR/FS projects solely on its own, 100% weightage shall be given. If the applicant firm has prepared the DPR/FS projects as a lead partner in a JV, 75% weightage shall be given. If the applicant firm have prepared the DPR projects as the other partner (not lead partner) in a JV 50% weightage shall be given. If the applicant firm have prepared the DPR/FS projects as an associate, 25% weightage shall be given.
- (iii) Similar project means feasibility and preparation of DPR for tunnel.

13.2 Second stage technical evaluation (Refer 5.2)

S. No.	Description	Points
1	Firm's relevant experience in last 10 years	50
2	Material testing, survey & investigation, equipment and software proposed to be used	10
3	Qualification and Relevant experience of the proposed key personnel	40
	Total	100

Further break-up of each criteria has been detailed out below:

For tunnels, the following is the break-up:

S. No.	Description	Maximum Points	Sub-Points
1	Specific experience of the DPR consultancy related to the assignment for eligibility	20	
1.1	Aggregate Length of DPR / Feasibility study of road/rail/ metro tunnels	11	
1.1.1	> 1 but <=2 the indicative Length applied for		7
1.1.2	>2 but <=3 times the indicative length applied for		8
1.1.3	> 3 but <= 4 times the indicative length applied for		9
1.1.4	> 4 but <=5 times the indicative length applied for		10
1.1.5	> 5 times the indicative length of the package applied for		11
1.2	DPR for road/rail/ metro tunnels each equal to or more than 40 % of indicative length applied for (or Feasibility Study for road/rail/ metro tunnel projects each equal to or more than 60 % of indicative length of a package applied for)	9	

S. No.	Description	Maximum Points	Sub-Points
1.2.1	1 project		5
1.2.2	2 projects		6
1.2.3	3 projects		7
1.2.4	4 projects		8
1.2.5	≥ 5 projects		9
2	Specific experience of firms in terms of turnover	5	
2.1.1	Firm's Average Turnover of last 5 years > 10 crore		5
2.1.2	Firm Average Turnover of last 5 years 5-10 crore		4
2.1.3	Firm Average Turnover of last 5 years > 2.5 but < 5.0 crore		3
3	DPR for tunnels in hill roads		
3.1	DPR of number of tunnels minimum 60% of proposed length and cross section area 154 sqm (less than 50 sqm not eligible and > 50 sqm but < 154 sqm shall be considered on proportionate basis of area)	5	
3.1.1	1 project		1
3.1.2	2 projects		2
3.1.3	3 projects		3
3.1.4	4 projects		4
3.1.5	≥ 5 projects		5

S/No	Description	Maximum points	Sub-Points
4	Tunnel Professionals * working with the firm	10	
4.1	<5 nos.		0
4.2	10 nos.		7
4.3	15 nos.		8
4.4	> 15 nos.		9
4.5	Additional one mark will be given if minimum 20% of the above key personnel have M.Tech in underground structures/ rock mechanics		1
	*The professionals who possess degree in Civil Engineering and 8 years Experience in tunnel with employment in the firm for more than one year. The current Employment Certificate shall be uploaded by Key Personnel on INFRACON.		
5	Quality of Past Performance (based on self certification)	10	
5.1	Average CoS (net of positive and negative) as percentage of contract price in last 5 DPRs prepared by the firm	5	
5.1.1	0		5
5.1.2	> 0 but <=2.5		4
5.1.3	> 2.5 but <=5.0		3
5.1.4	> 5.0 but <=7.5		2
5.1.5	> 7.5 but <=10.0		1
5.1.6	>10		0.0

S/No	Description	Maximum points	Sub-Points
5.2	Delay in completion of DPR as percentage of original contract period in last 5 DPRs prepared by the firm	2.5	
5.2.1	0		2.5
5.2.2	> 0 but <= 25		2.0
5.2.3	>25 but <= 50		1.5
5.2.4	>50 but <= 75		1.0
5.2.5	>75 but <=100		0.5
5.2.6	>100		0.0
5.3	Use of AEM survey survey in Tunnel DPR preparation	2.5	
5.3.1	1 project		0
5.3.2	2 projects		1.0
5.3.3	3 projects		1.5
5.3.4	4 projects		2.0
5.3.5	5 projects		2.5

Note: In case feasibility study is a part of DPR services the experience shall be counted in DPR only.

A. Material testing, survey and investigation, equipment and software proposed to be used (10)

S. No.	Description	Maximum Points	Sub-Points
1	Availability of Material Testing Facilities with persons/resources having operational skills of the equipment	1	
1.1	Owned (Available In House)/Lease/MOU		1.0
2	Availability of Field Investigation Facilities with persons/resources having operational skills of the equipment	2	
2.1	Owned (Available In House)/Lease/MOU		2.0
3	Availability of Office Equipment and Software with persons/resources having operational skills of the equipment	1.5	
3.1	Owned (Available In House)/Lease/MOU		1.5
4	Experience in LIDAR or better technology for topographic survey (Infrastructure sector)	3.5	
4.1	1 project		1
4.2	2 projects		2
4.3	3 projects		2.5
4.4	4 projects		3.0
4.5	≥ 5 projects		3.5

Note:1- The experience of firm in Lidar or equivalent technology shall be supported by experience certificate. The experience of a firm in Lidar or equivalent technology. In case of overseas experience the weightage to be assigned to the certificate for experience in use of the equipment, a self certificate followed by the client certificate may be accepted.

Note:2- In case ownership document of equipment of Consultancy/Associate Firm is found to be false, the consultancy/ Associate firm, as the case may be, shall be put on holiday listing (temporary debarment) for a period upto 12 months.

List of minimum essential equipment which the firm must possess for eligibility:

Material Testing Facilities
a. Aggregate testing facility including flakiness index, elongation index, abrasion, impact, crushing, stripping value etc.
b. Soil testing facility including Atterberg limits, soil classifications, moisture content, density, CBR value, etc.
Field Investigation Facilities
a. DGPS and Total station with appropriate software or equivalent / better
b. Drone with LiDAR sensor or better with appropriate processing software
Office Equipment and Software
a. Office equipment setup including Computer, plotter, A0 printer etc.
b. MX/ Open Roads or equivalent / better
c. AutoCAD
d. MIDAS or equivalent / better
e. Road Estimator 9.9 or better
f. Auto Plotter 10.9 or better
g. MS Project or Primavera or equivalent
h. HDM-4 or equivalent

C. Qualification and relevant experience of the proposed key personnel (40)

Standalone Tunnel Project:

S. No.	Key personnel	Points
1	Team Leader cum Tunnel Expert	10
2	Tunnel Design Expert	9
3	Geotechnical Engineer	9
4	Geophysicist/Geologist	6
5	Senior ventilation and fire safety expert (E & M)	6
	Total	40

The number of points assigned during the evaluation of qualification and competence of key staff are as given below:

S. No.	Description	Maximum Points	Sub-Points
1	General Qualification	25	
1.1	Essential education qualification		20
1.2	Desirable education qualification		5
2	Relevant experience and adequacy for the project	70	
2.1	Total professional experience		15
2.2	Experience in Tunnel Projects		25
2.3	Experience in Tunnel Projects in hilly area		30
3	Employment with the Firm	5	
3.1	Less than 1 Year		0
3.2	1 year		3
3.3	Add 0.5 marks for each subsequent year subject to maximum of 2 marks		Maximum 2

- 3. Detailed evaluation criteria which is to be used for evaluation of technical bids is as indicated at Appendix-V.**

The Consultant should carryout self-evaluation based on the evaluation criteria at Appendix-V. While submitting the self-evaluation along with bid, Consultant shall make references to the documents submitted in their proposal which have been relied upon in self evaluation Result of technical evaluation shall be made available on the website giving opportunity to the bidders to respond within 7 days in case they have any objection

4. Third stage – Evaluation of Financial proposal

Financial Proposals of all Qualified Consultants in accordance with clause 5.2 and 5.3 of Letter of Invitation shall be opened.

The consultancy services will be awarded to the consultant scoring highest marks in combined evaluation of Technical and Financial proposals in accordance with clause 1.3 and 5.4 hereof.

The Factors are:

The weight given to Technical Proposal (T) = 0.80. The weight given to Financial Proposal (F) = 0.20

13. The common currency is **“Indian Rupee”**. (Ref. Para 3.3.3)

Consultant have to quote in Rupees both for domestic Consultant as well as Foreign Consultants

14. Commencement of Assignment (Date, Location): The Consultants shall commence the Services within fifteen days of the date of effectiveness of the contract at locations as required for the project stretch stated in TOR. (Ref. Para 1.2 of LOI and 2.3 of GCC/SC)

TERMS OF REFERENCE (TOR)
**CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND PREPARATION OF
DETAILED PROJECT REPORT FOR DESIGN AND CONSTRUCTION OF
UNIDIRECTIONAL TWIN TUNNELS GANGLAKHA- GEDU ON PHUENTSHOLING-
THIMPHU HIGHWAY OF LENGTH 1.8KM (APPROXIMATE LENGTH) INCLUDING CIVIL
AND ELECTRICAL / MECHANICAL WORK ALONG WITH APPROACHES TO NHDL
SPECIFICATION UNDER PROJECT DANTAK IN BHUTAN**Terms of Reference for

Consultancy Services (TOR)

1. General

- 1.1.** The Chief Engineer project Dantak, Border Roads Organisation has been entrusted with the assignment of Consultancy Services for design and construction of uni-directional twin tunnels Ganglakha- Gedu on Phuentsholing-Thimphu highway of length 1.8km (approximate length) including civil and electrical / mechanical work along with approaches to NHDL specification under Project Dantak in Bhutan. CE(P) Dantak, Border Roads Organisation now invites proposal from Technical consultants for carrying out detailed project report as per details given in **Annexure-1.**
- 1.2.** Chief Engineer project Dantak, Border Roads Organisation will be the employer and executing agency for the consultancy services and the standards of output required from the appointed consultants are of international level both in terms of quality and adherence to the agreed time schedule. The consultancy firm will solely be responsible for submission of quality work in stipulated period.
- 1.3.** The Selected Consultancy firm shall prepare and submit Detailed Project Report (DPR) for the Tunnel along with Approach Road separately

2. Objective

- 2.1.** The main objective of the consultancy service is to establish the technical, economical, and financial viability of the project and prepare detailed project reports for Consultancy Services for design and construction of unidirectional twin tunnels Ganglakha- Gedu on Phuentsholing-Thimphu highway of length 1.8km (approximate length) including civil and electrical / mechanical work along with approaches (approximate length **1.00 km**) to NHDL specification under Project Dantak in Bhutan. The approach road would be of 2-lane configuration based and to match with the adjoining proposed road alignment and levels configuration on both portals. The scope of the work shall be carried out as per IRC-91 and all relevant IS and IRC guidelines. The latest modern techniques and software shall be used for this work.

2.2. The viability of the project shall be established taking into account the requirements with regard to construction of project tunnel as per Annexure I based on tunnel alignment & design, approach roads highway pavement design, Tunnel/road safety features, quantities of various items of works, cost estimate along with economic analysis within the given time frame.

2.3. Planning for a road tunnel requires multi-disciplinary involvement and assessments, and generally adopt the same standards as for surface roads and bridge options, with some expectations. Certain considerations, such as lighting, ventilation, life safety, operation and maintenance, etc must be addressed specifically. In addition to the capital construction cost, a life cycle cost analysis should be performed taking into account the **life expectancy of 120 years for a tunnel**.

2.4. The preparation of Detailed Project Report (DPR) would inter-alia include:

a) Information Study and Conceptual Planning including Site Reconnaissance and Preliminary Survey.

(b) Selection of Alignment, Geophysical Survey, Sub Surface Investigations and Presentation of Geotechnical Reports

(d) Geometric Requirements, Seismic Studies, Geotechnical And Structural Design.

(c) Selection of Construction Methodology

(f) Design Of Lighting, Ventilation and Fire Fighting Services,

(g) Health, Safety & Environmental Aspects

(h) Quality Assurance

(j) Preparation of cost estimate and draft tender documents

Planning for a road tunnel requires multi-disciplinary involvement and assessments, and generally adopt the same standards as for surface roads and bridge options, with some exceptions. Certain considerations, such as lighting, ventilation, life safety, operation and maintenance, etc must be addressed specifically. In addition to the capital construction cost, a life cycle cost analysis should be performed taking into account the life expectancy of 120 years for a tunnel.

2.4.1. The DPR consultant should ensure detailed project preparation incorporating aspects of value engineering, quality audit and safety audit requirement in design and implementation. The Consultant shall ensure to carry out Road/Tunnel Safety Audit at various stages as per **supplement-III (Additional Requirement for Safety Audit) of TOR .**

2.5. The consultant should, along with Feasibility Report, clearly bring out through financial analysis the preferred mode of implementation on which the Civil Works for the stretches are to be taken up. The consultant should also give cost estimates along with feasibility report/ detailed Project Report.

2.6. If at inception stage or feasibility stage, employer desires to terminate the contract, the contract will be terminated after payment up to that stage.

3. SCOPE OF SERVICES FOR TUNNEL (As per IRC SP:91-2019 and other relevant IRC and IS Codes)

3.1. The early investigations study (EIS) for planning and feasibility studies can be confined to information studies and preliminary reconnaissance. Geological mapping and minimum subsurface investigations are typically required for EIS, alternative studies and conceptual design. EIS studies may also include limited topographical and environmental investigations to identify potential “fatal flaws” that might stop the project at a later date. A substantial portion of the geotechnical investigation effort should go into the Preliminary Design Phase to refine the tunnel alignment and profile once the general corridor is selected, and to provide the detailed information needed for design. As the final design progresses, additional test borings might be required for fuller coverage of the final alignment and for selected shaft and portal locations. Lastly, depending on the tunneling method selected, additional investigations may be required to confirm design assumptions, or to provide information for contractor design of temporary works.

3.2. INFORMATION STUDY & CONCEPTUAL PLANNING (As per IRC SP:91-2019

and other relevant IRC and IS Codes)

The first phase of and planning & investigation program for a road tunnel project starts with collection and review of available information to develop an overall understanding of the site conditions and constraints to identify existing conditions and features that may impact the design and construction of the proposed tunnel, and can guide in planning the scope and details of the subsurface investigation program. Published topographical, hydrological, geological, geotechnical, environmental, zoning, and other information must be collected, organized and evaluated. Historical seismic records, records of Avalanches & landslides caused by earthquakes, documented by SASE and other Government Agencies be analyzed to avoid locating tunnel portals and shafts at these potentially unstable areas.

3.2.1. TOPOGRAPHICAL DATA (As per IRC SP:91-2019 and other relevant IRC and IS Codes)

Topographic maps and aerial photographs useful in showing terrain and geologic features (i.e., faults, drainage channels, sinkholes, etc.) when overlapped with published geological maps can often, by interpretation, show geologic structures. Aerial photographs taken on different dates can be used to reveal the site history in terms of Avalanches, erosion and scouring, past construction, etc. Survey of India's topographic maps may be used for preliminary route selection and defining the Project Corridor Influence Area. However, after the project corridor has been defined, new aerial photography should be obtained and photogrammetric maps should be prepared to facilitate portal and shaft design, site access, right-of-way, drainage, depth of cover, geologic interpretation and other studies.

3.3. SITE RECONNAISSANCE AND SURVEYS INCLUDING AEM SURVEY

Site Reconnaissance and Preliminary Surveys (As per IRC SP:91-2019 and other relevant IRC and IS Codes)

3.3.1

Available contour maps published by the **National Land Commission Secretariat (NLCS) Bhutan** or online available contour mapping are sufficient only for initial planning purposes. A preliminary survey will be needed for concept development and preliminary design to expand existing topographical data and include data from field surveys and an initial site reconnaissance. Initial on-site studies should start with a careful reconnaissance over the tunnel alignment, paying particular attention to the potential portal and shaft locations. Features identified on maps and air photos should be verified. Rock outcrops, often exposed along the existing highway and other locations, provide a source for information about rock mass fracturing and bedding and the location of rock type boundaries, faults, dikes, and other geologic features. Features identified during the site reconnaissance should be photographed, documented and if feasible located by handheld GPS equipment. The reconnaissance should cover the immediate project vicinity, as well as a larger regional area so that regional geologic, hydrologic and seismic influences can be accounted for. A preliminary horizontal and vertical control survey may be required to obtain general site data for route selection and for design. The consultant should start developing the geological reference model at this stage and further populate it during the further stages. **Geological base models shall be developed through geological surface mapping.**

Airborne Electro-Magnetic (AEM) Survey (As per IRC SP:91-2019 and other relevant IRC and IS Codes)

3.3.2

The purpose of electromagnetic (EM) methods is to delineate the subsurface resistivity distribution. It measures the distortion of the EM field which is caused by local changes of the electrical resistivity. The AEM Survey preferably be carried out using dual transmitter

mode configuration with a low moment (LM) and a high moment (HM) with a stronger peak moment, capable of a good trade-off between near surface resolution starting at 5 to 10 m and sufficient depth of investigation down to 400 to 800 m. The AEM survey shall be carried out in a width of approx. 1000m (i.e. 500 M on both side of initial proposed alignment) for the entire proposed tunnel length. The airborne survey crew shall include a senior geophysicist, assisted by the project manager, a geophysicist and a field technician. A detailed risk assessment and safe job analysis shall be performed before starting the airborne survey work. It may be noted that the high altitude and wind condition might prevent the survey for few days. Preliminary data will be presented and discussed on site with the authority.

3.3.2.1 Processing method

Processing of the electromagnetic, magnetic, and GPS data shall start immediately after completion of the survey. The DGPS systems are to be used for time stamping, positioning, and correlation of the EM and magnetic datasets.

The raw data processing consists of:

- ☐ Import of the raw voltage with navigation data and automatic conversion to the local UTM coordinate system;
- ☐ Removal of tree top reflections from the altitude data;
- ☐ Editing outliers and areas with poor signal to noise level;
- ☐ Couplings due to man-made structures are removed and checked manually.

The inversion procedure shall consist of:

A preliminary inversion using smooth models and Laterally Constrained Inversion (LCI) methodology. Noisy data, which have not been culled during data processing and which cannot be fitted are removed; An intermediate and a final inversion using a Section 19 model or SCI preferably with (usually) a discrete number of layers.

The inversion results can be visualized in several ways. One way involves creating maps over the investigation area that depict mean resistivity in a certain depth or elevation interval. If viewed successively, these slices show how resistivity changes with depth in the investigation area. Resistivity-depth sections shall also be extracted from the inverted data along profiles.

Ultimately, individual resistivities can be interpreted as different geological units (i.e., bedrock topography). Conductive areas can be distinguished from less conductive areas. Additional geological or geophysical surface data required for reliable interpretation must be obtained.

3.3.2.2 Interpretation and Extraction of Geological Models

The maps and vertical sections shall be interpreted by a team of geophysicist, geologists and geotechnicians. Correlation between the resistivity models and borehole logs can provide potential extend of weakness zones. Requirements and Positions for further subsurface investigations with „Vertical and Inclined Coring“ and „Horizontal and Directional Coring“ shall be recommended based on AEM results.

As a result of the interpretation, based on a better understanding of the resistivity response to the regional geological setting, geophysicists shall extract meaningful

geological units from the resistivity models. These resistivity Section 19 models shall be translated into usable geological models in a format that is the most efficient, potentially in Section 19.

3.4 ALIGNMENT FINALISATION, GEOMETRIC REQUIREMENTS AND CONSTRUCTIBILITY (As per IRC SP:91-2019 and other relevant IRC and IS Codes)

3.4.1 Finalisation of Alignment and Portal Locations

Based on geological models developed as a result of AEM Survey, the Consultant Shall suggest the most viable, economical alignment after carrying out Risk Assessment.

3.4.2 Topographic data compilation

After Finalisation of Alignment and Portal location, detailed topographic maps, plans and profiles must be developed to establish primary control for final design and construction based on a high order horizontal and vertical control field survey. As on a road tunnel system, centerline of the roadway and centerline of tunnel may not identical because of clearance requirements for walkways and emergency passages, A tunnel centerline developed during design should be composed of tangent, circular, and transition spiral sections that approximate the complex theoretical tunnel centerline within a specified tolerance. This centerline should be incorporated into the drawings of the tunnel, and all tunnel control should be based on this centerline.

Topographical survey and mapping, structural and stratigraphical maps, Isopak maps, preparation of cross sections. (Quantum of Survey shall be as per relevant Indian standard (IS Code) or international Code (S) for high way Tunnels)

Ground marking of alignment and report on tentative tunnel alignment, section, grade, portal positions and finding altitude and grid reference of the portal

3.4.3 Geometric Design and Constructability Cross Section

3.4.3.1 A road tunnel cross section must be able to accommodate the horizontal and vertical traffic clearances, as well as the other required elements. The typical cross section elements include:

- Travel lanes
- Shoulders
- Sidewalks/Curbs
- Tunnel drainage
- Tunnel ventilation
- Tunnel lighting
- Tunnel utilities and power
- Water supply pipes for firefighting
- Cabinets for hose reels and fire extinguishers
- Signals and signs above roadway lanes
- CCTV surveillance cameras
- Emergency telephones

- Communication antennae/equipment
- Monitoring equipment of noxious emissions and visibility Life Safety
Emergency egress illuminated signs at low level (so that they are visible in case of a fire or smoke condition)

Additional elements conforming to IRC SP 91 and other standards may also be needed under certain design requirements and should be taken into consideration when developing the tunnel geometrical configuration.

3.4.3.2 HORIZONTAL AND VERTICAL ALIGNMENTS

Planning and design of road tunnel alignments must consider Maximum grade, horizontal and vertical curves, and other requirement/constraints for road tunnel

3.4.3.3 MAXIMUM GRADES

Road tunnel grades should be evaluated on the basis of driver comfort while striving to reach a point of economic balance between construction costs and operating and maintenance expenses. Maximum effective grades in main roadway tunnels preferably **should not exceed 3% as per IRC SP-91.**

3.4.3.4 HORIZONTAL AND VERTICAL CURVES

Horizontal and vertical curves shall satisfy IRC's geometrical requirements. The horizontal alignment for a road tunnel should be as short as practical and maintain as much of the tunnel length on tangent as possible, which will limit the numbers of curves, minimize the length and improve operating efficiency. When horizontal curves are needed, the minimum acceptable horizontal radii should consider traffic speed, sight distances, and the super-elevation provided.

3.4.3.5 SIGHT AND BRAKING DISTANCE REQUIREMENTS

Sight and braking distance requirements cannot be relaxed in tunnels. When designing a tunnel with extreme curvature, sight distance should be carefully examined; otherwise it may result in limited stopping sight distance.

3.4.3.6 TUNNEL CONFIGURATION

Based on the traffic studies and safety requirement, the consultant shall suggest the Tunnel Configuration including cross section of main and egress tunnel as applicable.

3.4.3.7 TRAVEL CLEARANCE PROFILE (TCP)

Clearance profile of all potential vehicles traversing the tunnel shall be established using dynamic vehicle envelopes which consider not just the maximum allowable static envelope, but also other dynamic factors such as bouncing, suspension failure, overhang on curves, lateral motion, resurfacing, etc. The clearance profile should take into consideration potential future vehicle heights, vehicle mounting on curbs, construction tolerances, and any potential ground and structure settlement. Ventilation equipment, lighting, guide signs, and other equipment should not encroach within the clearance profile. Vertical clearance should be selected as per IRC's recommendations. The vertical clearance shall also take into consideration for future resurfacing of the roadway once. Consideration should also be

given for potential truck mounting on the barrier in the tunnel or on low sidewalk and measures shall be used to prevent such mounting from damaging the tunnel ceiling or tunnel system components mounted on the ceiling or the walls.

3.5 SUB-SURFACE INVESTIGATION

Subsurface investigation is the most important type of investigations to obtain ground conditions, as it is the principal means for:

- Defining the subsurface profile (i.e. stratigraphy, structure, and principal soil and rock types)
- Determining soil and rock material properties and mass characteristics;
- Identify geological anomalies, fault zones and other hazards (squeezing soils, methane gas, etc.)
- Defining hydrogeological conditions (groundwater levels, aquifers, hydrostatic pressures, etc.); and
- Identifying potential construction risks.

Subsurface investigations will involve borings, sampling, in situ testing, geophysical investigations, and laboratory material testing. These investigations shall provide factual information about the distribution and engineering characteristics of soil, rock and groundwater at a site, allowing an economical design, determining a reliable construction cost estimate, and reducing the risks of construction. **Geological base models obtained through geological surface mapping and geophysical studies shall be compared and difference in both shall be analyzed to define the sub surface investigation that is location of bore holes.**

Induction of a complete drilling equipment and complete set of accessories including water pumps etc. required for the job at the tunnel site (bore hole location) in good serviceable condition for the first time and induction of directional coring equipment in any length along the proposed directional coring trajectory including its de-induction after completion of all works.

Shifting of a complete drilling equipment and complete set of accessories including water pumps etc. required for the job from one bore hole location to the other at proposed tunnel site.

Notes:

1. Core recovery in bed rock portions shall not be less than 80% for hard rock in general. However the percentage of core-recovery may vary with the type of rock encountered for which the minimum percent recovery will be guided by relevant code provisions. Drilling activity to includes the followings:-
 - a) Boring holes and carrying out all relevant tests for ascertaining rock properties. This includes geological logging, electrical logging, geothermal logging and Geohydrological logging of bore holes.
 - b) Determination of in situ stress field by over coring methods or any other techniques available such as hydro-fracture technique.

- c) Water percolation tests are to be conducted in the hole at ground level, at every six metre depth intervals, at proposed tunnel grade level and at the junction of different lithological strata at three different pressures as per relevant IS Codes.
- d) Any deviation of holes from verticality is to be actually measured accurately and reflected.

2 (a) Bore hole locations and their depths are indicated as guide lines only. Final locations, their dimensions, choice of field tests and their interval, choice of drilling equipment, establishing the correct procedure for drilling, sampling and field tests including any additional holes are to be suitably modified with approval of department.

2(b) The report is to bring out clearly the technical and other problems that may be encountered during the construction and maintenance of the tunnel and also clear recommendations regarding the feasibility of the tunnel in the prevailing conditions. Final portal locations, tunnel sections and geometrics to be defined in this report.

2(c) Preliminary indications of cost of the tunnel project and the time involved for the construction to be indicated. In short, report should be self explanatory to enable the department to take a decision regarding feasibility of the tunnel, expertise available within the country for construction and preliminary costs for purposes of getting Administrative Approval for the works. This report should also bring out other detailed studies involved at pre-construction stage, construction stage and post construction stage.

3.6.1 VERTICAL AND INCLINED TEST BORINGS

Vertical and inclined test borings and soil/rock sampling are key elements of any subsurface investigations for underground projects. The location, depth, sample types and sampling intervals for each test boring must be finalized based on geological models developed after AEM survey and **geological surface mapping. This condition will supersede subsequent paragraphs of same clause, if required, which shall be decided by accepting officer.** In general, borings should be extended to at least 1.5 tunnel diameters below the proposed tunnel invert. However, if there is uncertainty regarding the final profile of the tunnel, the borings should extend at least two or three times the tunnel diameter below the preliminary tunnel invert level. However depth of boreholes may be curtailed depending upon the feasibility of drilling. **Decision of accepting officer shall be final and binding.**

Drilling vertical holes (core drilling) one at each portal sites & at distances as laid down in IRC:SP:91 between portal measured along the proposed tunnel alignment from any portal end down to the tunnel grade (preferably at or near the junction of different lithological strata) which may involved diamond drilling using NX-Bits to the extent of 400 metres for an individual hole. Additional holes if required in this area shall be undertaken by BX- Bits, if unavoidable, will be resorted to only with prior approval of the department.

Drilling 04 vertical boreholes of approx 400 m depth up to tunnel grade along the alignment at suitable locations and Drilling four (4) Inclined holes (core drilling) at an angle

of 30 degrees (Approx) with vertical, one at 50 mtr distance& another at 100 mtr distance from each portal sites measured along the proposed Tunnel alignment or as required, down to the tunnel grade as specified in IRC:SP:91 which may involve diamond drilling using NX-Bits to the extent of 400 meters for an individual hole. The inclined drill holes must intersect the proposed tunnels cross section at tunnel grade level (IRC:SP:91) .Additional holes if required in this area shall be under taken . BX- Bits, if unavoidable, will be resorted to only with prior approval of the department.

3.6.2 HORIZONTAL AND DIRECTIONAL CORING

Horizontal boreholes along tunnel alignments provide a continuous record of ground conditions and information which is directly relevant to the tunnel alignment. The location, length and sample types along the tunnel alignment must be finalised based on geological models developed after AEM survey.

3.6.3 SAMPLING – ROCK CORE

In rock, continuous rock core should be obtained below the surface of rock. Double and triple tube core barrels should be used to obtain higher quality core more representative of the in situ rock. For deeper holes, coring should be performed with the use of wire-line drilling equipment to further reduce potential degradation of the recovered core samples. Boring shall be carried out using at least Nx size coring bits. Core runs should be limited to a maximum length of 3 M in moderate to good quality rock, and 2 M in poor quality rock. The rock should be logged soon after it was extracted from the core barrel. Following information is to be noted for each core run on the rock coring logs:

- Depth of core run
- Core recovery in length and percent
- Rock Quality Designation (RQD) percent
- Rock type, including color texture, degree of weathering and hardness
- Character of discontinuities, joint spacing, orientation, roughness and alteration
- Nature of joint infilling materials.

In addition, drilling parameters, such as type of drilling equipment, core barrel and casing size, drilling rate, and groundwater level logged in the field shall also be recorded. Acoustic bore hole televewers will be used while drilling.

3.6.4 BOREHOLE SEALING

All borings should be properly sealed at the completion of the field exploration, if not intended to be used as monitoring wells. This is typically required for safety considerations and to prevent cross contamination of soil strata and groundwater.

3.6.5 TEST PITS

Test pits are to be excavated to investigate the shallow presence, location and depth of existing utilities, structure foundations, top of bedrock and other underground features that may interfere or be impacted by the construction of shafts, portals and tunnels. The excavation pits are to be backfilled with excavation spoil, and the backfill is compacted to

avoid excessive future settlement. Tampers and rollers may be used to facilitate compaction of the backfill.

3.6.6 SOIL AND ROCK IDENTIFICATION AND CLASSIFICATION

3.6.6.1 SOIL IDENTIFICATION AND CLASSIFICATION

Distinguish between visual identification and classification is important to minimize conflicts between general visual identification of soil samples in the field versus a more precise laboratory evaluation supported by index tests. The field classification of soil for a tunnel project shall be similar to that for other geotechnical applications except that special attention must be given to accurately defining and documenting soil grain size characteristics and stratification features since these properties may have greater influence on the ground and groundwater behavior during tunneling than they may have on other types of construction, such as for foundations, embankments and cuts.

Items of particular importance to tunnel projects which greatly influence ground behavior and groundwater inflow during construction, and the selection of the tunneling equipment and methods are listed below:

- Groundwater levels (general and perched levels), ground permeability (loss of drilling fluid; rise or drop in borehole water level; etc.), and artesian conditions
- Consistency and strength of cohesive soils
- Composition, gradation and density of cohesionless soils
- Presence of lenses and layers of higher permeability soils
- Presence of gravel, cobbles and boulders, and potential for nested boulders
- Maximum cobble/boulder size from coring and/or large diameter borings (and also based on understanding of local geology), and the unconfined compressive strength of cobbles/boulders (from field index tests and laboratory testing of recovered samples)
- Presence of cemented soils
- Presence of contaminated soil or groundwater.

3.6.6.2 ROCK IDENTIFICATION AND CLASSIFICATION

In rock, rock mass characteristics and discontinuities typically have a much greater influence on ground behavior during tunneling and on tunnel loading than the intact rock properties. Therefore, rock classification needs to be focused on rock mass characteristics, as well as its origin and intact properties. Special intact properties are important for tunneling application particularly for selecting rock cutters for tunnel boring machines and other types of rock excavators, and to predict cutter wear. Typical items included in describing general rock lithology include:

- General rock type
- Color
- Grain size and shape
- Texture (stratification, foliation, etc.)
- Mineral composition
- Hardness

- Abrasivity • Strength
- Weathering and alteration.

Rock discontinuity descriptions to be noted in rock classification include:

- Predominant joint sets (with strike and dip orientations)
- Joint roughness
- Joint persistence
- Joint spacing
- Joint weathering and infilling

Other information typically noted during subsurface rock investigations include:

- Presence of faults or shear zones
- Presence of intrusive material (volcanic dikes and sills)
- Presence of voids (solution cavities, lava tubes, etc.)
- Groundwater levels, and evidence of rock mass permeability (loss of drilling fluid; rise or drop in borehole water level; etc.)

Method of describing discontinuities of rock masses is in accordance with International Society of Rock Mechanics (ISRM)'s "Suggested Method of Quantitative Description of Discontinuities of Rock Masses" (ISRM 1981). Index properties obtained from inspection of the recovered rock core include core recovery (i.e., the recovered core length expressed as a percentage of the total core run length), and Rock Quality Designation or RQD (the combined length of all sound and intact core segments equal to or greater than 4 inches in length, expressed as a percentage of the total core run length). Often, materials encountered during subsurface investigations represent a transitional (intermediate) material formed by the in place weathering of rock. Such conditions may sometimes present a complex condition with no clear boundaries between the different materials encountered. Tunneling through the intermediate geomaterial (IGM), in some cases referred as mixed-face condition, can be extremely difficult especially when groundwater is present. In the areas where tunnel alignment must cross this transition zone, the subsurface investigation is conducted much as for rock, and when possible cores are retrieved and classified, and representative intact pieces of rock should be tested.

3.6.6.3 PRESERVATION OF CORE SAMPLES

It is desirable to preserve the rock cores retrieved from the field properly for years until the construction is completed and disputes/claims are settled. The rock cores are to be photographed and preserved in core boxes for review by designers and contractors.

3.6.6.4 GEOTECHNICAL REPORTS:

Preparation of a Geological and Geotechnical Interpretative Report (GIR) which includes a detailed analysis and interpretation of data contained in the above mentioned geological and Geotechnical Factual Report (GFR) culminating in the development of a final geological model of the ground within the route corridor based

on the AEM Survey, Horizontal Directional Coring, and vertical and inclined coring. This final geological model will be created on the basis of direct interference from surface mapping, groundwater chemical studies, petro-graphical studies, and mineralogical studies as well as the reasonable and appropriate extrapolating of the geology and structures from the results of surface mapping. Based on the final geological model, geotechnical hazards shall be identified and characterized allowing the review of selected alignment, if needed the alignment can be modified and frozen.

The final geological model will be presented in the form of a geological longitudinal section (A1 size) clearly demarcating the various interred lithological boundaries and ground types along the alignment, the groundwater conditions permeability and relevant structural information such as the width of fault zones, shear zones and lineaments/discontinuities with attitude and orientation.

3.7 DESIGN OF LIGHTING, VENTILATION, DRAINAGE AND FIRE FIGHTING SERVICES.

The consultant will be required to prepare a lighting plan for approaches, and zones inside tunnel based on the latest IRC SP 91, NBC 2016 Part IV, IS 1641, IS 1646 and relevant national and international road /railway norms.

Ventilation and firefighting systems will be provided based on configuration of the tunnel and envisaged traffic passage. Ventilation system should ensure that quantum of toxic gases and visibility inside tunnel is maintained at internationally acceptable levels. The designs should refer to the guidelines from NFPA for fire safety and PIARC for ventilation design.

The consultant will carry out a risk analysis for probability of fire incidents in the tunnel and will propose an appropriate firefighting mechanism including active and passive measures. The consultant will propose drills to be followed in case of a fire emergency. The consultant will also propose a guideline for carriage of dangerous good through the tunnel.

Consultant should prepare emergency evacuation scheme while planning the tunnel cross-section or plan a parallel tunnel for the same purpose as feels suitable. The consultant should prepare a drainage system in accordance to the alignment of tunnel. The consultant must also specify the maximum water ingress expected during service life (including extreme events such as flooding) and recommend the design of drainage for such event. The consultant should specify if tunnel requires intermediate sumps and their locations.

3.8 HEALTH & SAFETY

3.8.1 Health and Safety

Design of complete safety system of the tunnel. For road tunnel, the consultant will be required to prepare a health and safety assurance plan based on IRC SP 91,

PIARC/National Fire Protection Agency (NFPA) and other relevant national /international norms including NBC 2016 Part IV, IS 1641, IS 1646.

Design of complete Safety System for the railway tunnel implies design of Ventilation. Fire Rescue. Emergency Exit and other system designs as related to train and passenger safety, as per the laid down regulations/guidelines in Technical Specifications for Interoperability (TSI) AIC Code 779-9R for Safety of Railway Tunnels/RDSO, other relevant codes/standards. and other good practices being followed for railway tunnels the world over as per experience of the Design Consultant or otherwise.

This will be presented in form a manual. The manual will prescribe health and safety measures for workers in the tunnel during construction and for users during operation phase of the tunnel. This will include safety arrangements, signage arrangements and operating procedures in case of emergencies.

3.9 ENVIRONMENTAL ISSUES

Although tunnels are generally considered environmentally-friendly structures, certain short-term environmental impacts during construction are unavoidable. Long-term impacts from the tunnel itself, and from portals, vent shafts and approaches on local communities, historic sites, wetlands, and other aesthetically, environmentally, and ecologically sensitive areas must be identified and investigated thoroughly during the project planning and feasibility stages, and appropriately addressed in environmental studies and design. The specific environmental data needed for a particular underground project very much depend on the geologic and geographic environment and the functional requirement of the underground facility. Some common issues can be stated, however, and are identified below in the form of a checklist:

- Existing infrastructure, and obstacles underground and above
- Surface structures within area of influence
- Land ownership and uses (public and private)
- Ecosystem habitat impacts
- Contaminated ground or groundwater
- Long-term impacts to groundwater levels, aquifers and water quality
- Control of runoff and erosion during construction
- Naturally gassy ground, or groundwater with deleterious chemistry
- Access constraints for potential work sites and transport routes
- Sites for muck transport and disposal
- Noise and vibrations from construction operations, and from future traffic at approaches to the completed tunnel
- Air quality during construction, and at portals, vent shafts and approaches of the completed tunnel
- Maintenance of vehicular traffic and transit lines during construction
- Maintenance of utilities and other existing facilities during construction
- Access to residential and commercial properties
- Pest control during construction
- Long-term community impacts
- Long-term traffic impacts
- Temporary and permanent easements

- Tunnel fire life safety and security
- Legal and environmental constraints, enumerated in environmental statements or reports, or elsewhere. Environmental Impact Assessment, Environmental Management Plan and Rehabilitation and Resettlement Studies shall be carried out by the Consultant meeting the requirements of the lending agencies like ADB/ World Bank/JICA, etc.

3.10 SEISMICITY

The release of energy from earthquakes sends seismic acceleration waves traveling through the ground. Such transient dynamic loading instantaneously increases the shear stresses in the ground and decreases the volume of voids within the material which leads to an increase in the pressure of fluids (water) in pores and fractures. Thus, shear forces increase and the frictional forces that resist them decrease. Other factors also can affect the response of the ground during earthquakes.

- Distance of the seismic source from the project site.
- Magnitude of the seismic accelerations.
- Earthquake duration.
- Subsurface profile.
- Dynamic characteristics and strengths of the materials affected.

In addition to the distance of the seismic source to the project site, and the design (anticipated) time history, duration and magnitude of the bedrock earthquake, the subsurface soil profile can have a profound effect on earthquake ground motions including the intensity, frequency content, and duration of earthquake shaking.

11. Deleted
12. The consultant shall be guided in its assignment by the Model Concession/ Contract Agreements for EPC projects, as applicable and the Manual of Specifications and Standards for two/ four/ six laning of highways published by IRC (IRC:SP:73 or IRC:SP:84 or IRC:SP:87, as applicable) (the "Manual") along with relevant IRC codes for design of long bridges.
13. The consultant shall prepare the bid documents including required schedules (as mentioned above) as per EPC documents. For that it is suggested that consultant should also go through the latest EPC documents of MoRTH before bidding the project. The Consultant shall assist the BRO and it's Financial Consultant and the Legal Adviser by furnishing clarifications as required for the financial appraisal and legal scrutiny of the Project Highway and Bid Documents. Submission of reports covering all above information including preliminary indication of cost for the Project and recommendation for further detailed studies. Framing and submission of report covering all the following aspects: -
 - (a) Preparation of preliminary design and schedule of quantities
 - b) Study and analysis of working faces, tunnelling method, cost analysis and types of equipment's for various operations such as drilling, blasting, mucking, haulage and disposal of muck, fire-fighting, extrication of poisonous gases, ventilation, lighting, side cover, power and water supply systems etc.

Possibilities of using TBM are to be evaluated with specific limitations

c) Engineering studies pertaining to leakage, de-watering, grouting, blasting, ground acceleration due to blasting, tunnel closures support system etc. d)

Tentative constructions schedule including critical path analysis

e) Listing of various codes of practice both Indian and Foreign applicable

f) Preparation and submission of phase II report covering all the aspects of studies and recommendations listed and specified at Sr No (a) to (j) of schedule-'A' PHASE- II above

3.12.1 Consultant shall be responsible for sharing the findings from the preparation stages during the bid process. During the bid process for a project, the consultant shall support the authority in responding to all technical queries, and shall ensure participation of senior team members of the consultant during all interaction with potential bidders including pre-bid conference, meetings, site visits etc. In addition, the consultant shall also support preparation of detailed responses to the written queries raised by the bidders.

General

4.13 Primary Tasks

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 are given in **Supplement I**):

- i. Review of all available reports and published information about the project road and the project influence area;
- ii. Environmental and social impact assessment, including such as related to cultural properties, natural habitats, involuntary resettlement etc.
- ii (a). Public consultation, including consultation with Communities located along the road, NGOs working in the area, other stake-holders and relevant Government departments at all the different stages of assignment (such as inception stage, feasibility stage, preliminary design stage and once final designs are concretized).
- iii. Detailed Reconnaissance; iv. Identification of possible improvements in the existing alignment and bypassing congested locations with alternatives, evaluation of different alternatives comparison on techno-economic and other considerations and recommendations regarding most appropriate option;
- v. Traffic studies including traffic surveys and Axle load survey and demand forecasting for next thirty years;
- vi. Inventory and condition surveys for road;
- vii. Inventory and condition surveys for bridges, cross-drainage structures, other Structures, river Bank training/Protection works and drainage provisions;

- viii. Detailed topographic surveys using LiDAR equipped with minimum engineering grade system or any other better technology having output accuracy not less than (a) specified in IRC SP 19 (b) Total Station (c) GPS/ DGPS. The use of conventional high precision instruments i.e Total Station or equivalent can be used at locations such as major bypasses, water bodies etc. where it may not be possible to survey using LiDAR. Use of mobile / Aerial LiDAR survey is preferable.
 - ix. Pavement investigations;
 - x. Sub-grade characteristics and strength: investigation of required subgrade and sub-soil characteristics and strength for road and embankment design and sub soil investigation;
 - xi. Identification of sources of construction materials;
 - xii. Detailed design of road, its x-sections, horizontal and vertical alignment and design of embankment of height more than 6m and also in poor soil conditions and where density consideration require, even lesser height embankment. Detailed design of structures preparation of GAD and construction drawings and cross-drainage structures and underpasses etc.
 - xiii. Identification of the type and the design of intersections;
 - xiv. Design of complete drainage system and disposal point for storm water
 - xv. Value analysis / value engineering and project costing;
 - xvi. Economic and financial analyses;
 - xvii. Contract packaging and implementation schedule.
 - xviii. To find out financial viability of project for implementation and suggest the preferred mode on which the project is to be taken up.
 - xxi. Preparation of detailed project report, cost estimate, approved for construction Drawings, rate analysis, detailed bill of quantities, bid documents for execution of civil works through budgeting resources.
 - xxii. Design of weighing stations, parking areas and rest areas.
 - xxiii. Any other user oriented facility en-route toll facility.
 - xxiv. Tie-in of on-going/sanctioned works of DoST/ other agencies.
 - xxvi. Preparation of social plans for the project affected people as per policy of the lending agencies.
14. While carrying out the field studies, investigations and design, the development plans being implemented or proposed for future implementation by the local bodies, should be taken into account. Such aspect should be clearly brought out in the reports and drawings.

15. The local and slow traffic may need segregation from the main traffic and provision of service roads and physical barrier including fencing may be considered, wherever necessary to improve efficiency and safety.

16. **Standards and Codes of Practices**

1. All activities related to field studies, design and documentation shall be done as per the latest guidelines/ circulars of MoRT&H and relevant publications of the Indian Roads Congress (IRC) and Bureau of Indian Standards (BIS). For aspects not covered by IRC and BIS, international standards practices, may be adopted. The Consultants, upon award of the Contract, may finalize this in consultation with CE(P) Dantak, Border Roads Organisation and reflect the same in the inception report.
2. All notations, abbreviations and symbols used in the reports, documents and drawings shall be as per IRC:71.

4.18 Quality Assurance Plan (QAP)

- (i) 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 quality assurance plans/procedures for different field studies, engineering surveys and investigation, design and documentation activities should be presented as separate sections like engineering surveys and investigations, traffic surveys, material geo-technical and sub-soil investigations, road and pavement investigations, investigation and design of bridges & structures, environment and R&R assessment, economic & financial analysis, drawings and documentation, preparation, checking, approval and filing of calculations, identification and tractability of project documents etc. Further, additional information as per format shall be furnished regarding the details of personal who shall be responsible for carrying out/preparing and checking/verifying various activities forming part of feasibility study and project preparation, since inception to the completion of work. The detailed Draft QAP Document must be discussed and finalized with the concerned CE(P) Dantak, Border Roads Organisation officers immediately upon the award of the Contract and submitted as part of the inception report.
 - (ii) It is imperative that the QAP is approved by CE(P) Dantak, Border Roads Organisation before the Consultants start the field work.
1. Data formats for report and investigation results
 - i. Required data formats for some reports, investigations and documents are discussed in **ENCLOSURE-IV**
 - ii. Formats for submission of Reports and Documents.
 - iii. The consultants will need to propose data formats for use in all other field studies and investigations not covered in enclosure IV.

- iv. The proposed data forms will need to be submitted for the approval of HQ CE(P) Dantak, Border Roads Organisation after the commencement of services.

4.19 Review of Data and Documents

1. The Consultants shall collect the available data and information relevant for the Study. The data and documents of major interest shall include, but not be limited to, the following:
 - i. Climate;
 - ii. Road inventory
 - iii. Road condition, year of original construction, year and type of major maintenance/rehabilitation works;
 - iv. Condition of bridges and cross-drainage structures;
 - v. sub-surface and geo-technical data for existing bridges;
 - vi. Hydrological data, drawings and details of existing bridges;
 - vii. Existing geological maps, catchment area maps, contour plans etc. for the project area
 - viii Condition of existing river bank / protection works, if any.
 - ix. Details of sanctioned / on-going works on the stretch sanctioned by DoST/other agencies for Tie-in purposes
 - x. Survey and evaluation of locally available construction materials;
 - xi. Historical data on classified traffic volume (preferably for 5 years or more);
 - xii. Origin-destination and commodity movement characteristics; if available
 - xiii. Speed and delay characteristics; if available;
 - xiv. Commodity-wise traffic volume; if available;
 - xv. Accident statistics; and,
 - xvi. Vehicle loading behavior (axle load spectrum), if available.
 - xvii Type and location of existing utility services (e.g. Fibre Optical Cable, O/H and U/G Electric, Telephone line, Water mains, Sewer, Trees etc.)
 - xviii Environmental setting and social baseline of the project.

4.8. Social Analysis

The social analysis study shall be carried out in accordance with the MORT&H/World Bank/ADB Guidelines. The social analysis report will, among other things, provide a socio-economic profile of the project area and address in

particular, indigenous people, communicable disease particularly HIV/AIDS poverty alleviation, gender, local population, industry, agriculture, employment, health, education, health, child labor, land acquisition and resettlement .

4.9 Traffic Surveys

All traffic surveys and studies will be completed in feasibility studies.

4.9.1 Number and Location of Survey Stations

1. The type of traffic surveys and the minimum number of survey stations shall normally be as under, unless otherwise specifically mentioned.

Sl. No.	Description	Number of Survey Stations
1.	Classified Traffic Volume Count	3
2.	Origin-Destination and Commodity Movement Characteristics	Minimum 2
3.	Axle Loading Characteristics	2
4.	Intersection Volume Count	All Major Intersections
5.	Speed-Delay Characteristics	Project Road Section
6.	Pedestrian/animal cross traffic count	All major inhabitations along the highway
7.	Turning movement surveys	For all major intersections

2. The number of survey locations indicated in the table above are indicative only for each road stretch under a package. The Consultants shall, immediately upon award of the work, submit to CE(P) Dantak, Border Roads Organisation, proposals regarding the total number as well as the locations of the traffic survey stations as of inception report. Suitable maps and charts should accompany the proposals clearly indicating the rationale for selecting the location of survey Station.
3. The methodology of collection and analysis of data, number and location of traffic survey stations shall be finalized in consultation with CE(P) Dantak, Border Roads Organisation prior to start of the traffic survey.

4.9.2. Classified Traffic Volume Count Survey

1. Consultant shall make use of traffic survey done by using ATCC systems or latest modern technologies.

2. Consultant shall use ATCC systems that can meet the following accuracy levels after validation/ calibration:

(a) Classification of vehicles: better than 95%

(b) Counting of vehicles: better than 98%

Before validation and calibration, the ATCC system shall meet the following accuracy levels:

(a) Classification of vehicles: better than 90%

(b) Counting of vehicles: better than 95%

For verification of above accuracy levels, audit of raw ATCC shall be done by the consultant on a sampling basis and should submit a certificate in this regard.

3. ATCC systems such as Pneumatic Tube Detector, Inductive Detector Loop, Video Image Detection, and Infrared Sensor or latest technologies shall be adopted.
4. The classified traffic volume count surveys shall be carried out for 7 days (continuous, direction-wise) at the selected survey stations. The vehicle classification system as given in relevant IRC code may be followed. However, the following generalized classification system is suggested in view of the requirements of traffic demand estimates and economic analysis:

Motorised Traffic		Non-Motorised Traffic
2-Wheeler		Bi-Cycle
3-Wheeler		Cycle-Rickshaw
Passenger Car		Animal Drawn Vehicle (ADV)
Utility Vehicle (Jeep, Van etc.)		Hand Cart
		Other Non-Motorised Vehicle
Bus	Mini Bus Standard Bus	
LCV	LCV-Passenger LCV-Freight	
Truck	MCV : 2-Axle Rigid Chassis	
	HCV : 3-Axle Rigid Chassis	

	MAV	Semi Articulated
		Articulated

5. All results shall be presented in tabular and graphical form. The survey data shall be analyzed to bring out the hourly and daily variations. The traffic volume count per day shall be averaged to show a weekly average daily traffic (ADT) by vehicle type. The annual average daily traffic (AADT) shall be worked out by applying seasonal factors.
6. The consultant shall compile the relevant traffic volume data from secondary sources also. The salient features of traffic volume characteristics shall be brought out and variations if any, from the traffic census carried out by the State PWD shall be suitably explained.

4.9.3. Origin Destination and Commodity Movements Surveys

1. The consultants shall carry out 1-day (24 hour, both directions) O-D and commodity movement surveys at locations finalized in consultation with HQ CE(P) Dantak, Border Roads Organisation. These will be essentially required around congested towns to delineate through traffic. The road side interviews shall be carried out on random sample basis and cover all four-wheeled vehicles. The location of the O-D survey and commodity movement surveys shall normally be same as for the classified traffic count.
2. The location of origin and destination zones shall be determined in relation to each individual station and the possibility of traffic diversion to the Project Road from/to other road routes including bypasses.
3. The trip matrices shall be worked out for each vehicle type information on weight for trucks should be summed up by commodity type and the results tabulated, giving total weight and average weight per truck for the various commodity types. The sample size for each vehicle type shall be indicated on the table and also in the graphical representations.
4. The data derived from surveys shall also be analyzed to bring out the lead and load characteristics and desire line diagrams. The data analysis should also bring out the requirement for the construction of bypasses.
5. The distribution of lead and load obtained from the surveys should be compared. The axle load surveys shall normally be done using axle load pads or other sophisticated instruments. The location(s) of count station(s) and the survey with those derived from the axle load studies.
6. The commodity movement data should be duly taken into consideration while making the traffic demand estimates.

4.9.4. Turning Movement Surveys

1. The turning movement surveys for estimation of peak hour traffic for the design of major and minor intersections shall be carried out for the Study. The details regarding composition and directional movement of traffic shall be furnished by the Consultant.
2. The methodology for the surveys shall be as per IRC: SP: 41-1994. The details including location and duration of surveys shall be finalized in consultation with HQ CE(P) Dantak, Border Roads Organisation officials. The proposal in response to this TOR shall clearly indicate the number of locations that the Consultants wish to conduct turning movement surveys and the rationale for the same.
3. The data derived from the survey should be analyzed to identify requirements of suitable remedial measures, such as construction of underpasses, fly-overs, interchanges, grade-separated intersections along the project road alignment. Intersections with high traffic volume requiring special treatments either presently or in future shall be identified.

4.9.5. Axle Load Surveys

1. Axle load surveys in both directions shall be carried out at suitable location(s) in the project road stretch on a random sample basis normally for trucks only (both empty and loaded trucks) for 2 normal days - (24 hours) at special count stations to be finalized in consultation with CE(P) Dantak, Border Roads Organisation. However, a few buses may be weighed in order to get an idea about their loading behavior. While selecting the location(s) of axle load survey station(s), the locations of existing bridges with load restrictions, if any, should be taken into account and such sites should be avoided.
2. Axle load surveys shall normally be done using axle load pads or other sophisticated instruments. The location(s) of count station(s) and the survey methodology including the data formats and the instrument type to be used shall be finalized before taking up the axle load surveys
3. The axle load data should be collected axle configuration-wise. The number of equivalent standard axles per truck shall be calculated on the basis of results obtained. The results of the survey should bring out the VDF for each truck type (axle configuration, if the calculated VDF is found to be below the national average, then national average shall be used. Furthermore, the data from axle load surveys should be analyzed to bring out the Gross Vehicle Weight (GVW) and Single Axle Load (SAL) Distributions by truck type (axle configuration).
4. The Consultant shall ascertain from local enquiries about the exceptional live loads that have used the highway in the past in order to assess the suitability of existing bridges to carry such loads.

4.9.6. Speed-Delay Surveys

The Consultants shall carry out appropriate field studies such as moving car survey to determine running speed and journey speed. The data should be analyzed to identify sections with typical traffic flow problems and congestion. The objective of the survey would be to recommend suitable measures for segregation of local traffic, smooth flow of through traffic and traffic safety. These measures would include the provision of bypasses, under-passes, fly-overs, interchanges, grade-separated intersections and service roads.

4.9.7 Pedestrian / animal cross traffic surveys:

1. These shall be conducted to determine if provision of viaduct for pedestrians/animals is necessary to improve the traffic safety.
2. Consultant shall leverage information from local consultations, inputs from local governmental/ non-governmental agencies in selecting sites for checking pedestrian/ animal crossing traffic surveys.
3. Surveys for provision of pedestrian crossings shall minimum be conducted at all junctions being replaced by grade separators.

4.9.8 Truck Terminal Surveys

The data derived from the O-D, speed-delay, other surveys and also supplementary surveys should be analyzed to assess requirements for present and future development of truck terminals at suitable locations enroute.

4.10. Traffic Demand Estimates

1. The consultants shall make traffic demand estimates and establish possible traffic growth rates in respect of all categories of vehicles, taking into account the past trends, annual population and real per capita growth rate, elasticity of transport demand in relation to income and estimated annual production increase. The other aspects including socio-economic development plans and the land use patterns of the region having impact on the traffic growth, the projections of vehicle manufacturing industry in the country, development plans for the other modes of transport, O-D and commodity movement behavior should also be taken into account while working out the traffic demand estimates.

2. The values of elasticity of transport demand shall be based on the prevailing practices in the country. The Consultants shall give complete background including references for selecting the value of transport demand elasticity.
3. It is envisaged that the project road sections covered under this TOR would be completed and opened to traffic after 3 years. The traffic demand estimates shall be done for a further period of 30 years from completion of two/four lane. The demand estimates shall be done assuming three scenarios, namely, optimistic, pessimistic and most likely traffic growth. The growth factors shall be worked out for five-yearly intervals.
4. Traffic projections should be based on sound and proven forecasting techniques. In case traffic demand estimated is to be made on the basis of a model, the application of the model in the similar situation with the validation of the results should be established. The traffic projections should also bring out the possible impact of implementation of any competing facility in the near future. The demand estimates should also take into account the freight and passenger traffic along the major corridors that may interconnect with the project. Impact of toll charges on the traffic estimates should be estimated.
5. The methodology for traffic demand estimates described in the preceding paragraphs is for normal traffic only. In addition to the estimates for normal traffic, the Consultants shall also work out the estimates for generated, induced and diverted traffic.
6. The traffic forecasts shall also be made for both diverted and generated traffic.
7. Overall traffic forecast thus made shall form the basis for the design of each pavement type and other facilities/ancillary works.

4.11. Engineering Surveys and Investigations

4.11.1. Reconnaissance and Alignment

1. The Consultants should make an in-depth study of the available land width (ROW) topographic maps, satellite imageries and air photographs of the project area, geological maps, catchment area maps, contour plans, flood flow data and seismological data 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. Greater use of technology for LA be adopted by the consultant at the DPR stage so as to have a precise land acquisition process.
2. The detailed ground reconnaissance may be taken up immediately after the study of maps and other data. The primary tasks to be accomplished during the reconnaissance surveys include;

- (i). topographical features of the area;
- (ii). typical physical features along the existing alignment within and outside ROW i.e. land use Pattern;
- (iii). possible alignment alternatives, vis-a-vis, scheme for the construction of additional lanes parallel to the existing road;
- (iv). realignment requirements including the provision of bypasses, ROB's / Flyovers and via-duct for pedestrian crossings with possible alignment alternatives;
- (v). preliminary identification of improvement requirements including treatments and measures needed for the cross-roads;
- (vi). traffic pattern and preliminary identification of traffic homogenous links;
- (vii). sections through congested areas;
- (viii). inventory of major aspects including land width, terrain, pavement type, carriageway type, bridges and structures (type, size and location), intersections (type, cross-road category, location) urban areas (location, extent), geologically sensitive areas, environmental features:
- (ix). critical areas requiring detailed investigations; and,
- (x). Requirements for carrying out supplementary investigations.
- (xi). soil (textural classifications) and drainage conditions
- (xii). Type and extent of existing utility services along the alignment (within ROW).
- (xiii). Typical physical features along the approach roads

Possible bridge locations, land acquisition problems, nature of crossings, likely length of approaches and bridge, firmness of banks, suitability of alignment of approach roads.

3. The data derived from the reconnaissance surveys are normally utilized for planning and programming the detailed surveys and investigations. All field studies including the traffic surveys should be taken up on the basis of information derived from the reconnaissance surveys.
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 Inception Report. 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 CE(P) Dantak, Border Roads Organisation comments. The data and the charts should also accompany the rationale for the selection of traffic survey stations.

4.11.2. 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.
2. The carrying out of topographic surveys will be one of the most important and crucial field tasks under the project. Technologies which can meet the following accuracy levels shall be adopted. For land-based surveys (a) Fundamental horizontal accuracy of 5cm or better (b) Fundamental vertical accuracy of 5cm or better (c) More than 50 points shall be measured per sq. m

and for aerial based surveys (a) Fundamental horizontal accuracy of 5 cm or better (b) Fundamental vertical accuracy of 5 cm or better (c) More than 10 points shall be measured per sq. m. To establish accuracy, a check point survey using DGPS (for horizontal accuracy) and Auto Level (for vertical accuracy) shall be carried out to establish the fundamental horizontal and vertical accuracy. A minimum of 25 check points, or check points once every 4 km should be established, and these should be strictly different from any geo-referencing or control network points.

3. The following are the set of deliverables which should be submitted after completion of survey:
 - (a). Raw DGPS data for the entire highway length and adjoining areas of interest
 - (b). Point cloud data or equivalent for the entire highway length and adjoining areas of interest in a format/ platform as per industry good practice which shall be amenable to operations by CE(P) Dantak, Border Roads Organisation / Consultant. CE(P) Dantak, Border Roads Organisation may decide about format/ platform of point cloud data
 - (c). Topographic map of scale as per IRC SP 19 of the entire highway length and adjoining areas of interest.
 - (d). Contour map of 50 cm of entire highway length and adjoining areas of interest
 - (e). Cross section of the highway at every 50 m in drawing format.

- (f). Develop a digital elevation/surface model (bare earth model from survey data) digital terrain model combining topographic data from LiDAR, road inventory and other available sources of data for use while modeling the road alignment and road and structure design.
- (g). For land based surveys, Mobile LiDAR (Light Detection and Ranging) or better technology that can meet above requirements shall be adopted. For aerial based surveys, Aerial Mobile LiDAR (Light Detection and Ranging) or better technology that can meet above requirements shall be adopted. Where possible, mobile/terrestrial LiDAR and total station or better studies should be used to supplement aerial LiDAR for the final alignment chosen. Aerial based surveys shall be used as the primary source of topographical data only in cases where a new/green field alignment is being planned and/or major junctions are being planned where it is necessary to significantly increase the survey corridor beyond the capabilities of mobile LiDAR. In shadow areas such as invert levels below culverts, terrestrial LiDAR shall be used where LiDAR or better technologies cannot survey accurately, traditional methods of Total Station/ Auto Level shall be used to complete the study.
- (h). In case of mobile LiDAR or better technology, 360-degree panoramic images of the entire highway length and adjoining areas of interest shall be submitted. In case of aerial LiDAR or better technology, orthoimages of the entire highway length and adjoining areas of interest shall be submitted.
- (i). The detailed field surveys would essentially include the following activities:
 - i. Topographic Surveys along the Existing Right of Way (ROW): Carrying out topographic survey using LiDAR or better technology along the existing road and realignments, wherever required and properly referencing the same with reference pillars fixed on either side of the centre-line at safe places within the ROW
 - ii. The detailed field surveys would essentially include the topographic surveys along the proposed location of bridge and alignment of approach road.
 - iii. The detailed topographic surveys should be carried out along the approach roads alignment and location of bridge approved by CE(P) Dantak, Border Roads Organisation.
 - iv. Collection/ Extraction of details for all features such as structures (bridges, culverts etc.) utilities, existing roads, electric and telephone installations (both O/H as well as underground), huts, buildings, fencing and trees (with girth greater than 0.3metre) oil and gas lines etc. falling within the extent of survey.

4. The width of survey corridor will generally be as given under:

- (i). The width of the survey corridor should take into account the layout of the existing alignment including the extent of embankment and cut slopes and the general ground profile. While carrying out the field surveys, the widening scheme (i.e. right, left or symmetrical to the centre line of the existing carriageway) should be taken into consideration so that the topographic surveys cover sufficient width beyond the centre line of the proposed divided carriageway. Normally the surveys should extend a minimum of 30 m beyond either side of the centre line of the proposed divided carriageway or land boundary whichever is more
- (ii). In case the reconnaissance survey reveals the need for bypassing the congested locations, the traverse lines would be run along the possible alignments in order to identify and select the most suitable alignment for the bypass. The detailed topographic surveys should be carried out along the bypass alignment approved by CE(P) Dantak, Border Roads Organisation. At locations where grade separated intersections could be the obvious choice, the survey area will be suitably increased. Field notes of the survey should be maintained which would also provide information about traffic, soil, drainage etc.
- (iii). The width of the surveyed corridor will be widened appropriately where developments and / or encroachments have resulted in a requirement for adjustment in the alignment, or where it is felt that the existing

alignment can be improved upon through minor adjustments.

- (iv). Where existing roads cross the alignments, the survey will extend a minimum of 100 m either side of the road centre line and will be of sufficient width to allow improvements, including at grade intersection to be designed.

8. The surveyed alignment shall be transferred on to the ground as under:

- i. Reference Pillar and Bench Mark / Reference pillar of size 15 cm X 15 cm X 45cm 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 upto a depth of 30cm with CC M10 (5 cm wide all around). The balance 15 cm above ground shall be painted yellow. The spacing shall be 250m apart,

incase Bench Mark Pillar coincides with Reference Pillar, only one of the two need be provided.

- ii. Establishing Bench marks at site connected to GTS Bench marks at a interval of 250 metres on Bench mark pillar made of RCC as mentioned above with RL and BM No. marked on it with red paint.
- iii. **Boundary Pillars-** Wherever the proposed alignment follows the existing alignment, the boundary pillars shall be fixed by the DPR consultant at an interval of 200m on either side of proposed Right of Way. Wherever there is a proposal of realignment of the existing Highway and/or construction of New Bypasses, Consultant shall fix boundary pillars along the proposed alignment on the extreme boundary on either side of the project Highway at 50 m interval. Boundary pillars shall be strictly provided as per IRC:25:1967.

4.11.2.1 Longitudinal and Cross-Sections

The topographic surveys for longitudinal and cross-sections shall cover the following:

- i. Longitudinal section levels along final centre line shall be taken at every 10 m interval. The levels shall be taken at closer intervals at the curve points, small streams, and intersections and at the locations of change in elevation. The interval shall also be modified as per IRC:SP-19 for rolling, mountainous & steep terrain.
 - ii. Cross sections at every 50 m interval in full extent of survey covering sufficient number of spot levels on existing carriageway and adjacent ground for profile correction course and earth work calculations. Cross sections shall be taken at closer interval at curves. The interval shall be modified as per IRC SP 19 for rolling, mountainous & steep terrain.
 - iii. Longitudinal section for cross roads for length adequate for design and quantity estimation purposes.
 - iv. Longitudinal and cross sections for major and minor streams shall cover Cross section of the channel at the site of proposed crossing and few cross sections at suitable distance both upstream and downstream, bed level upto top of banks and ground levels to a sufficient distance beyond the edges of channel, nature of existing surface soil in bed, banks & approaches, longitudinal section of channel showing site of bridge etc. These shall be as per recommendations contained in IRC Special Publication No. 13 (Guidelines for the Design of Small Bridges and Culverts) and provisions of IRC:5 ("Standard Specifications & Code of Practice for Road Bridges, Section 1 – General Features of Design").
- 2. At feasibility study stage cross sections at 50m interval may be taken.
 - 3. Consultants shall also develop an as-is map of the road including:

- i. Geo-referenced digital map of as-is project highway
- ii. Earth surface, road layers, utilities, buildings and trees with feature data extracted and mapped in layers, marked on the map and tabulated data provided separately.
- iii. All road, surface, sub surface inventory, pavement investigation and soil survey data to be super-imposed as layers using geo-referencing data

4.11.2.2 Details of utility Services and Other Physical Features

1. The Consultants 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, 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 fibre cables (OFC) etc. The survey would cover the entire right-ofway of the road on the adequate allowance for possible shifting of the central lines at some of the intersections locations.
2. Consultant shall also map out sub-surface utilities. Accurate mapping and resolution of all sub-surface utilities up to a depth of 4 m shall be carried out. Differentiation between sub-surface utilities such as live electric cables, metallic utilities and other utilities shall be indicated and sub-surface utilities radargrams further processed into utility maps in formats such as PDF, JPEG and AutoCAD shall be furnished. To meet the accuracy levels, consultant shall use Ground Penetrating Radar, Induction Locator or better technologies.
3. 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 with LA schedule, 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.

4.11.3. Road and Pavement Investigations

The Consultants 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 meet the input requirements of HDMIV.

4.11.3.1 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 include but not limited to the following:
 - i. Terrain (flat, rolling, mountainous);
 - ii. Land-use (agricultural, commercial, forest, residential etc) @ every kilometre;

- iii. Carriageway width, surfacing type @ every 500m and every change of feature whichever is earlier;
- iv. Shoulder surfacing type and width @ every 500m and every change of feature whichever is earlier;
- v. Sub-grade / local soil type (textural classification) @ every 500m and every change of feature whichever is earlier;
- vi. Horizontal curve; vertical curve vii. Road intersection type and details, at every occurrence; viii. Retaining structures and details, at every occurrence; ix. Location of water bodies (lakes and reservoirs), at every occurrence; x. Height of embankment or depth of cut @ every 200m and every change of feature whichever is earlier.

xi. Land width i.e. ROW xii. Culverts, bridges and other structures (type, size, span arrangement and location)

xiii. Roadside arboriculture xiv. Existing utility services on either side within ROW. There shall be a provision of utility corridor for appropriate categories / combination of utilities in the construction of new 4/6 laning of National Highways. Such structures shall be located at appropriate location preferably as close to the extreme edge of Right of Way (RoW). In this connection, guidelines contained in IRC:98 shall be followed.

xv. General drainage conditions

xvi. Design speed of existing road

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 EXCEL.

4.11.3.2 Pavement Investigation

1. Pavement Composition

- i. The data concerning the pavement composition may be already available with the Project Dantak. However, the consultants shall make trial pits to ascertain the pavement composition. The test pit interval will be as per Para 4 below.
- ii. For each test pit, the following information shall be recorded:
 - test pit reference (Identification number, location):
 - pavement composition (material type and thickness); and
 - subgrade type (textural classification) and condition (dry, wet)
 - embankment (composition and geometry)

2. Road and Pavement Condition Surveys

- i. Detailed field studies shall be carried out to collect road and pavement surface conditions. The data should generally cover:
 - pavement condition (surface distress type and extent);
 - shoulder condition;
 - embankment condition; and
 - drainage condition

Pavement Condition

- cracking (narrow and wide cracking), % of pavement area affected;
- raveling, % of pavement area affected;
- potholing, % of pavement area affected;
- edge break, length (m); and,
- rut depth, mm

Shoulder Condition

- Paved: Same as for pavement
- ☐ Unpaved: material loss, rut depth and corrugation,
- ☐ Edge drop, mm.

Embankment Condition

- ☐ general condition; and extent of
- ☐ slope erosion

- ii. 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.
- iii. In addition to visual means, the pavement condition surveys shall be carried out using Network Survey vehicles mounted with equipments such as high resolution cameras, digital laser profilometer, transverse profiler- the data from which should be geo- referenced using a DGPS receiver and in vehicle data processing software or equivalent technology to accurately measure the pavement surface properties covered earlier. This pavement condition survey shall also be used as a repository for civil work and shall be carried out as per the directions of CE(P) Dantak, Border Roads Organisation.

- iv. Supplemented by actual measurements and in accordance with the widely accepted methodology (AASHTO, IRC, OECD, TRL and World Bank Publications) adapted to meet the study requirements. The measurement of rut depth would be made using standard straight edges.
- v. The shoulder and embankment conditions shall be evaluated by visual means and the existence of distress modes (cuts, erosion marks, failure, drops) and extent (none, moderate, frequent and very frequent) of such distress manifestations would be recorded.
- vi. For sections with severe distresses, additional investigations as appropriate shall be carried out to determine the cause of such distresses.
- vii. Middle 200m could be considered as representative sample for each one km. of road and incase all other things are considered similar.

Drainage Condition

- General condition
- Connectivity of drainage turnouts into the natural topography
- Condition in cut sections
- Condition at high embankments

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

3. Pavement Roughness

- i. The roughness surveys shall be carried out using a network survey vehicle mounted laser profilometer or better technology with specifications as described in para 2 above
- i (a) In addition, the following criteria should be met by the process of defect detection:
 - Roughness measurement with outputs of both raw longitudinal profiles and IRI calculation shall be reported at 100m referenced to the preceding LRP. The roughness must meet ASTM-E950 (equivalent to Class I road profiler).
 - The IRI shall be determined for both wheelpaths over a minimum length of 250m for a minimum of 6 calibration sites with a roughness range between 2m/km and 8m/km. Calibration shall be made for speeds of 20, 30, 40, 50, 60 km/h.
- ii. The surveys shall be carried out along the outer wheel paths. The surveys shall cover a minimum of two runs along the wheel paths for each direction.

- iii. 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 analyzed using the cumulative difference approach to identify road segments homogenous with respect to surface roughness.

4. Pavement Structural Strength

1. **The Consultants shall carry out structural strength surveys for existing pavements using** Falling Weight Deflectometer (FWD) in accordance with IRC 115 or IRC 117 as the case may be.
 - i. It is suggested that the deflection surveys may be carried out as per the scheme given below:
 - mainline testing; and,
 - Control section testing.
 - ii. The deflection tests for the mainline shall be carried out at every 500 m along the road sections covered under the study. The control section testing shall involve carrying out deflection testing for each 100 m long homogenous road segment along the road sections. The selection of homogenous segment shall be based on the data derived from pavement condition surveys. The total length of such homogenous segments shall not be less than 100 m per kilometre. The deflection measurements for the control section testing should be at an interval of not more than 10 m.
 - iii. Test pits shall be dug at every 500 m and also along each homogeneous road segment to obtain pavement composition details (pavement course, material type and thickness) so as to be able to study if a correlation exists between deflection and composition. If so, the relationship may be used while working out the overlay thickness for the existing pavement.
 - iv. Falling weight deflectometre surveys may not be carried out for severely distressed sections of the road warranting reconstruction. The Consultants, immediately upon the award of the contract, shall submit to CE(P) Dantak, Border Roads Organisation the scheme describing the testing schedule including the interval. The testing scheme shall be supported by data from detailed reconnaissance surveys.
 - v. It is mandatory for the consultant to use Falling weight deflectometre or alternative better technique for the evaluation of pavement strength, details of such methods or innovative features for deflection testing using Falling weight deflectometre along with the methodology for data analysis, interpretation and the use of such data for pavement overlay design purposes using IRC or any other widely used practices, such as AASHTO guidelines, should be got approved by HQ CE(P) Dantak, Border Roads Organisation. The sources of such methods should be properly referenced.

4.11.3.3 Subgrade Characteristics and Strength

2. Based on the data derived from condition (surface condition, roughness) and structural strength surveys, the project road section should be divided into segments homogenous with respect to pavement condition and strength. The delineation of segments homogenous with respect to roughness and strength should be done using the cumulative difference approach (AASHTO, 1993).
2. The data on soil classification and mechanical characteristics for soils along the existing alignments may already be available with the PWD. The testing scheme is, therefore, proposed as given under:
 - (i). For the widening (2-Laning) of existing road within the ROW, the Consultants shall test at least three sub-grade soil samples for each homogenous road segment or three samples for each soil type encountered, whichever is more.
 - (ii). For the roads along new alignments, the test pits for sub grade soil shall be @5km or for each soil type, whichever is more. A minimum of three samples should be tested corresponding to each homogenous segment.
3. The testing for subgrade soil shall include:
 - (i). in-situ density and moisture content at each test pit
 - (ii). Field CBR using DCP at each test pit
 - (iii). Characterization (grain size and Atterberg limits) at each test pit and,
 - (iv). Laboratory moisture-density characteristics (modified AASHTO compaction);
 - (v). Laboratory CBR (unsoaked and 4-day soak compacted at three energy levels) and swell.
4. For problematic soils, the testing shall be more rigorous. The characteristics with regard to permeability and consolidation shall also be determined for these soils. The frequency of sampling and testing of these soils shall be finalized in consultation with the CE(P) Dantak, Border Roads Organisation officers after the problematic soil types are identified along the road sections.
5. The laboratory for testing of material should be got approved from CE(P) Dantak, Border Roads Organisation before start of work.

4.11.4 Investigations for Bridges and Structure

4.11.4.1 Inventory of Bridges, Culverts and Structures

The Consultants shall make an inventory of all the structures (bridges, viaducts, ROBs/RUB and other grade separated structures, 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 IRCSP:35. The inventory of culverts shall be presented in a tabular form covering relevant physical and hydraulic parameters.

4.11.4.2 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 ("Standard Specifications & Code of Practice for Road Bridges, Section I General Feature of Design"). These investigations shall be carried out for all existing drainage structures along the road sections under the study.
2. The consultant shall also collect information on observed maximum depth of scour.
3. In respect of major bridges, history of hydraulic functioning of existing bridge, if any, under flood situation, general direction of river course through structure, 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 design of bridges. The details of any future planned work that may affect the river hydraulics shall be studied and considered.
4. The Consultants shall make a desk study of available data on topography (topographic maps, stereoscopic aerial photography), storm duration, rainfall statistics, top soil characteristics, vegetation cover etc. so as to assess the catchment areas and hydraulic parameters for all existing and proposed drainage provisions. The findings of the desk study would be further supplemented and augmented by a reconnaissance along the area. All important hydrological features shall be noted during this field reconnaissance.
5. The Consultants shall collect information on high flood level (HFL), low water levels (LWL), high tide level (HTL), low tide level (LTL) where applicable, discharge velocity etc. from available past records, local inquiries and visible signs, if any, on the structural components and embankments. Local inquiries shall also be made with regard to the road sections getting overtopped during heavy rains.
6. Conducting Model studies for bridges is not covered in the scope of consultancy services. If Model study is envisaged for any bridge, requirement of the same shall be spelt out in the RPF documents separately indicating scope and time frame of such study. Salient features of the scope of services to be included for model study are given in the supplement- II Terms of Reference.

4.11.4.3 Condition Surveys for Bridges, Culverts and Structures

1. The Consultants 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. The condition and structural assessment survey of the bridges / culverts / structures shall be carried out by senior experts of the Consultants.
2. For the bridges identified to be in a distressed condition based upon the visual condition survey, supplementary testing shall be carried out as per IRCSP: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 under one or more of the following scenarios:
 - i. when the design live load is less than that of the statutory commercial vehicle plying or likely to ply on bridge;
 - ii. if during the condition assessment survey and supplementary testing the bridge is found to indicate distress of serious nature leading to doubt about structural and / or functional adequacy, and
 - iii. Design live load is not known nor are the records and drawings available.
4. The evaluation of the load carrying capacity of the bridge shall be carried out as per IRC-SP:37 ("Guidelines for Evaluation of Load Carrying Capacity of Bridges"). The analytical and correlation method shall be used for the evaluation of the load carrying capacity as far as possible. When it is not possible to determine the load carrying capacity of the bridge using analytical and correlation method, the same shall be carried out using load testing. The consultant has to exhaust all other methods of evaluation of strength of bridges before recommending to take up load testing of bridges. Road closure for testing if unavoidable shall be arranged by CE(P) Dantak, Border Roads Organisation for limited duration say 12 hours or so.
5. 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.

4.11.4.4 Geo-technical Investigations and Sub-Soil Exploration

1. The Consultants shall carry out geo-technical investigations and subsurface explorations for the proposed Bridges / Road over bridges/ tunnels/ 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. The minimum scope of geo-technical investigations for bridge and structures shall be as under:

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

2. The deviation(s), if any, by the Consultants from the scheme presented above should be approved by CE(P) Dantak.
3. 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 CE(P) Dantak officers.
4. Geotechnical Investigations and Sub soil Exploration 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.
5. The scheme for the borings locations and the depth of boring shall be prepared by the Consultants and submitted to CE(P) Dantak for approval. These may be finalized in consultation with CE(P) Dantak.
6. The sub-soil exploration and testing should be carried out as per IS 1892. The soil testing reports shall be in the format prescribed in relevant IRC Codes.
7. For the approach 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 in NABL accredited laboratory to determine the suitability of various materials for use in widening of embankments or in parts of new pavement structure.

4.11.5. Material Investigations

1. The Consultants 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 Consultants shall prepare mass haul diagram for haulage purposes giving quarry charts indicating the location of selected borrow areas, quarries and the respective estimated quantities.

“Environment friendly materials”

“As per MORTH circular No. RW /NH-33044/53/2013-S&R(R) dated 20th November, 2013, alternative pavement materials and technologies for road construction shall be assessed and compared in the design stage. The alternative resulting in substantial reduction in GHG emission and with least life cycle cost shall be recommended for implementation.

Technical and economic feasibility of using industrial byproducts, recyclable and waste materials shall be assessed depending on their availability in the concerned region.

2. It is to be ensured that no material shall be used from the right-of-way except by way of leveling the ground as required from the construction point of view, or for landscaping and planting of trees etc. or from the cutting of existing ground for obtaining the required formation levels.
3. Environmental restrictions, if any, and feasibility of availability of these sites to prospective civil works contractors, should be duly taken into account while selecting new quarry locations.
4. The Consultants shall make suitable recommendations regarding making the borrow and quarry areas after the exploitation of materials for construction of works.
5. The Material Investigation aspect shall include preparation and testing of bituminous mixes for various layers and concrete mixes of different design mix grades using suitable materials (binders, aggregates, sand filler etc.) as identified during Material Investigation to conform to latest MoRT&H specification.

4.12 Detailed Design of Road and Pavements, Bridges, Structures

4.12.1. General

1. The Consultants are to carryout detailed designs and prepare working drawings for the following:
 - i. High speed highway with divided carriageway configuration complete in all respects with service roads at appropriate locations;
 - ii. Design of pavement for the additional lanes and overlay for the

- existing road, paved shoulders, medians, verges;
- iii. Bridges, viaduct/subways and other grade separated structures etc.
- iv. At-grade and grade-separated intersections, interchanges (if required);
- v. Prepare alignment plans, longitudinal sections and cross-sections@ 50m intervals; vii. Designs for road furniture and road safety/traffic control features; viii. Designs and drawings for service road/under passes/overpass / cattle passes tree planting/fencing at locations where necessary / required vi) Short bypasses at congested locations vii. Drainage design showing location of turnouts, out falling structures, separate drawings sheet for each 5 km. stretch. viii. Bridges and structures rehabilitation plan with design and drawings xiii. Traffic amenities (Parking Areas, Weighing Station and Rest Areas, etc.). ix. Design of pavement for approach road x. Design of river bank protection / training works. Innovative type of structures with minimum joints, aesthetically, pleasing and appropriate to the topography of the region shall be designed wherever feasible.

4.12.2. Design Standards

1. The Consultants 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 approval by CE(P) Dantak, Border Roads Organisation.
2. The Design Standards evolved for the project shall cover all aspects of detailed design including the design of geometric elements, pavement design, bridges and structures, traffic safety and materials.

4.12.3. Geometric Design

1. The design of geometric elements shall, therefore, take into account the essential requirements of such facilities.
2. Based on the data collected from reconnaissance and topographic surveys, the sections with geometric deficiencies, if any, should be identified and suitable measures for improvement should be suggested for implementation.
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.
4. The detailed design for geometric elements shall cover, but not be limited to the following major aspects:

- i. horizontal alignment; ii. longitudinal profile; iii. cross-sectional elements, including refuge lane (50m) at every 2kms.
 - iv. junctions, intersections and interchanges; v. bypasses; and, vi. service roads as and when require i.e built up area.
5. The alignment design 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 sight distance requirements as per the standard norms.
 6. The consultants 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 requirements with respect to the different horizon periods taking into account special problems such as road segments with isolated steep gradients.
 7. In the case of closely spaced cross roads the Consultant shall examine different options such as, providing grade separated structure for some of them with a view to reduce number of at-grade crossings, services roads connecting the cross-roads and closing access from some of the intersections and prepare and furnish appropriate proposals for this purpose keeping in view the cost of improvement, impact on traffic movement and accessibility to cross roads. The detailed drawings and cost estimate should include the provisions for realignments of the existing cross roads to allow such arrangements.
 8. The Consultant shall also prepare design of grade separated pedestrian crossings (viaducts) for large cross traffic of pedestrians and / or animals on the basis of passenger and animal cross traffic surveys conducted.
 9. The Consultant shall also prepare details for at-grade junctions, which may be adopted as alternative to the grade separated structures. The geometric design of interchanges shall take into account the site conditions, turning movement characteristics, level of service, overall economy and operational safety.
 10. The Consultants shall prepare design and other details in respect of the parallel service roads in urbanized locations and other locations to cater to the local traffic, their effect of the viability of the project on commercial basis if service roads are constructed as part of the project and the implications of not providing the service roads.
 11. The consultant shall prepare complete road and pavement design including drainage for new bypass option identified around congested town en-route.

4.12.4. Pavement Design

1. The detailed design of pavement shall involve:

- i. strengthening of existing road pavement and design of the new pavement if any, if the findings of the traffic studies and life-cycle costing analysis confirm the requirement for widening of the road beyond 2 lane undivided carriageway standard;
 - ii. pavement design for bypasses; and, iii. design of shoulders.
2. The design of pavement shall primarily be based on IRC publications.
3. The design of pavement shall be rigorous and shall make use of the latest Indian and International practices. **The design alternatives shall include both rigid and flexible design options. The most appropriate design, option shall be established on life-cycle costing and techno-economic consideration.**
4. For the design of pavement, each set of design input shall be decided on the basis of rigorous testing and evaluation of its suitability and relevance in respect of in-service performance of the pavement. The design methodology shall accompany the design proposals and shall clearly bring out the basic assumptions, values of the various design inputs, rationale behind the selection of the design inputs and the criteria for checking and control during the implementation of works. In other words, the design of pavement structure should take due account of the type, characteristics of materials used in the respective courses, variability of their properties and also the reliability of traffic predictions. Furthermore, the methodology adopted for the design of pavement shall be complete with flowcharts indicating the various steps in the design process, their interaction with one another and the input parametre required at each step.
5. For the design of overlays for the existing 2-lane pavement, the strengthening requirement shall duly take into account the strength of the existing pavement vis-à-vis the remaining life. The overlay thickness requirements shall be worked out for each road segment homogenous with respect to condition, strength and sub-grade characteristics. The rehabilitation provisions should also include the provision of regulating layer. For existing pavement with acceptable levels of cracking, provision of a crack inhibiting layer should also be included.
- 5 (a) For rehabilitation and strengthening, consultant shall consider the alternatives of rehabilitating the existing pavement, overlaying with the same or alternate pavement type (e.g. white/black topping) and also the option of removal and replacement of existing pavement layers and chose the best alternative basis lifecycle costing, and any local considerations such as material availability, time available for construction etc.
6. Latest techniques of pavement strengthening like provision of geo-synthetics and cold/hot pavement recycling should be duly considered by the consultant for achieving economy. The use of technology particularly environment friendly technology viz. recycling of bituminous mixes, warm mixes and soil stabilization

etc. should be adopted wherever feasible. Clause 519 of the “Specifications for Road and Bridge Works” (Fifth Revision) covers specifications for recycling of existing bituminous pavement materials to upgrade the pavements. These provisions notwithstanding, recycling of existing bituminous materials is yet to be implemented in most of the projects. The reclaiming and reprocessing of pavement materials involve both design (how the pavement should be designed using reclaimed materials with the given properties) and technology (the methods to reclaim and reprocess, equipment, knowhow and quality) issues. After addressing these issues, the recycling of pavements will be environmentally and economically better option for rehabilitation, repair or reconstruction compared to the use of fresh or virgin materials. Indian Road Congress has published IRC: 120-2015 on “recommended practice for recycling of bituminous pavements” giving a detailed procedure for its implementation

7. The paved shoulders shall be designed as integral part of the pavement for the main carriageway. The design requirements for the carriageway pavement shall, therefore, be applicable for the design of shoulder pavements. The design of granular shoulder should take into account the drainage considerations besides the structural requirements.
8. The pavement design task shall also cover working out the maintenance and strengthening requirements and periodicity and timing of such treatments.

4.12.5. 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 with in economical leads must be considered. In accordance with Government instructions, **use of fly ash within 300 km from Thermal Power Stations is mandatory** as per extra ordinary Gazette Notification No. S.O. 254 (E) Part Section – III – Sub Section (ii) dated 25th January, 2016 and subsequent amendment, if any of Ministry of Environment, Forest and Climate change, New Delhi.
2. The Consultants shall carry out detailed analysis and design for all embankments of height greater than 6 m based on relevant IRC publications.
3. The design of embankments should include the requirements for protection works and traffic safety features.

4.12.6. Design of Bridges and Structures

1. The data collected and investigation results shall be analyzed to determine the following:
 - i. HFL ii. LWL iii. LBL iv. Erodibility of bed/scour level v. Design discharge vi. Linear waterway and effective linear waterway vii. Likely foundation depth viii. Safe bearing

capacity ix. Engineering properties of sub soil x. Artesian conditions xi. Settlement characteristics xii. Vertical clearance xiii. Horizontal clearance xiv. Free board for approach road xv. Severity of environment with reference to corrosion xvi. Data pertaining to seismic and wind load xvii. Requirement of model study etc.

2. The Consultant shall prepare General Arrangement Drawing (GAD) and Alignment Plan showing the salient features of the bridges and structures proposed to be constructed / reconstructed along the road sections covered under the Study. These salient features such as alignment, overall length, span arrangement, cross section, deck level, founding level, type of bridge components (superstructure, substructure, foundations, bearings, expansion joint, return walls etc.) shall be finalized based upon hydraulic and geo- technical studies, cost effectiveness and ease of construction. 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 CE(P) Dantak to approve the best alternative. After approval of alignment and GAD the Consultant shall prepare detailed design as per IRC codes /guidelines and working drawings for all components of bridges and structures.
3. The location of all at-grade level crossings shall be identified falling across the existing level crossings for providing ROB at these locations. The Consultants 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 from concerned Authorities.
4. GAD for bridges/structures across irrigation/water way channels shall be got approved from the concerned Irrigation/Water way Authorities. Subsequent to approval of GAD and alignment plan by CE(P) Dantak, Border Roads Organisation, the Consultants shall prepare detailed design as per IRC codes/guidelines for all components of the bridges and structures.
5. Subsequent to the approval of the GAD and Alignment Plan by Organisation and Railways, the Consultant shall prepare detailed design as per IRC and Railways guidelines and working drawings for all components of the bridges and structures. The Consultant shall furnish the design and working drawings for suitable protection works and/or river training works wherever required.
6. 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.

7. 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.
8. 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.
9. Subsequent to the approval of the GAD and the alignment plan by Organisation, detailed design shall also be carried out for the proposed underpasses, overpasses and interchanges.
10. The Consultants shall also carry out the design and make suitable recommendations for protection works for bridges and drainage structures.
11. In case land available is not adequate for embankment slope, suitable design for RCC retaining wall shall be furnished. However, RES wall may also be considered depending upon techno-economic suitability to be approved by Organisation.
12. All the bridge structures having a length of 100 m or less can be used for tapping of water for serving dual purpose i.e., to cross the water body or to store water, if technically feasible. Therefore, such structures shall be designed as bridge cum barrage structures (bridge cum bandhara). Ministry's guidelines in this regard issued vide letter no. RW/NH-34066/89/2015-S&R(B) dated 18.04.2017 may be referred.

4.12.7. Drainage System

1. The requirement of roadside drainage system and the integration of the same with proposed cross-drainage system shall be worked out for the entire length of the project road section.
2. In addition to the roadside drainage system, the Consultants shall design the special drainage provisions for sections with super-elevated carriageways, high embankments and for road segments passing through cuts. The drainage provisions shall also be worked out for road segments passing through urban areas.
3. The designed drainage system should show locations of turnouts/outfall points with details of outfall structures fitting into natural contours. A separate drawing sheet covering every 5 km. stretch of road shall be prepared.

4. The project highway shall be designed to have well designed efficient drainage system, which shall be subsurface, as far as possible. While constructing the underpasses, the finished road level shall be determined so as to ensure that the accumulation of rain water does not take place and run-off flows at the natural ground level. The drains, wherever constructed, shall be provided with proper gradient and connected to the existing outlets for final disposal.
5. The rain water harvesting requirements be assessed taking into consideration the Ministry of Environment & Forest Notification Dt. 14.01.1997 (as amended on 13.01.1998, 05.01.1999 & 06.11.2000). The construction of rainwater harvesting structure is mandatory in and around water scarce / crisis areas notified by the Central Ground Water Board. The provisions for rainwater harvesting be executed as per the requirements of IRC:SP:42-2014 (Guidelines for Road Drainage) and IRC:SP:50-2013 (Guidelines on Urban Drainage).
6. All the bridge structures having a length of 100m or less can be used for tapping of water for serving dual purpose i.e. to cross the water body and to store water, if technically feasible. Therefore, such structures should be designed as bridge cum barrage structures (bridge cum bandhara). Ministry's guidelines in this regard issued vide letter no. RW/NH-34066/59/2015-S&R(B) dated 18.04.2017 may be referred.
7. The locations of the culverts should be planned in such a way that the proposed culvert covers optimum catchment area & the location shall be decided on the basis of topographical survey, local rainfall data, gradient of natural ground and enquiry from the local habitants. All culverts should preferably be box culverts as pipe culverts get filled up with silt, which is rarely cleared.

4.12.8. Traffic Safety Features, Road Furniture and Road Markings

1. The Consultants shall design suitable traffic safety features and road furniture including traffic signals, signs, markings, overhead sign boards, crash barriers, delineators etc. The locations of these features shall be given in the reports and also shown in the drawings.
2. The Consultant should make the provisions for "the overhead (gantry mounted) signs on roads with two or more lanes in the same direction" as per provisions of IRC-67. The minimum height of gantry mounted sign be 5.5 m above the highest point at the carriageway.
3. Road safety shall be the focus of design. The roads shall be forgiving, having self-explaining alignment, safe designed intersections / interchanges segregation and safe crossing facilities for VRUs with crash barriers at hazardous locations. The details of traffic signs and pavement markings with their locations, types and configuration shall be shown on the plan so that they are correctly provided.

4. DPR shall undergo the exercise of Road Safety Audit through the Road Safety Auditor (separate from design team) and recommendations mentioned be incorporated.
5. Road markings and proper signage constitute another important aspect of the Road safety. The DPR shall contain a detailed signage plan, indicating the places, directions, distances and other features, duly marked on the chainage plan. It shall specify the suitable places where FoBs are to be provided. Road marking and signage plan shall be included in DPR and shall be specifically approved by the Organisation.
6. Advanced Traffic Management System (ATMS) shall be in place for all 4/6 lane roads of Organisation being put to tolling. This would provide real time information, guidance and emergency assistance to users. ATMS would include outdoor equipment including emergency call boxes, variable message sign systems, meteorological data system, close circuit TV camera (CCTV) system in addition to any other equipment required to meet the objective. Indoor equipment would include large display board, central computer with Network Management System, CCTV monitor system and management of call boxes system with uninterrupted power supply, all housed in a central control centre.
7. As availability of suitable sight distance has a large effect on road safety, the alignment of all the NHs should be finalized in such a way so as to have double the stopping sight distance available to the road users at all locations.

4.12.11. Weighing Station, Parking Areas and Rest Areas

1. The consultant shall select suitable sites for weighing stations, parking areas and rest areas and prepare suitable separate designs in this regard. The common facilities like petrol pump, first-aid medical facilities, police office, restaurant, vehicle parking etc. should be included in the general layout for planning. For petrol pump, the guidelines issued by OISD of Ministry of Petroleum shall be followed. The facilities should be planned to be at approximately 50 km interval. At least each facility (1 no.) is foreseen to be provided for this project stretch. Weighing stations can be located near toll plazas so that overloaded vehicles can be easily identified and suitably penalized and unloaded before being allowed to proceed further. The type of weighing system suitable for the project shall be brought out in the report giving merits of each type of the state-of-the art and basis of recommendations for the chosen system.
2. The Consultant should take into consideration the provisions for persons with disabilities (PwD) in way side amenity centres / rest areas and provide ramp facilities, exit / entrance door with minimum clear opening of 900 mm and special toilet facilities for use of handicapped persons. The consultant shall also take into consideration, the provisions for Pedestrians facilities as per IRC-103.

4.12.12 Miscellaneous Works

1. The Consultants shall make suitable designs and layout for miscellaneous works including rest areas, bus bays, vehicle parking areas, telecommunication facilities etc. wherever appropriate.
2. The Consultants shall prepare the detailed scheme and lay out plan for the works mentioned in Para 1.
3. The Consultants shall prepare detailed plan for the traffic management and safety during the construction period.

4.13 Environment and Social Impact Assessment

The consultant shall undertake the detailed environmental and social impact assessment in accordance with the standard set by the The Royal Government of Bhutan.

4.13.1 Environmental Impact Assessment

Environment impact assessment or initial environment examination be carried out in accordance with the standard set by the The Royal Government of Bhutan

1. The consultant should carry out the preliminary environmental screening to assess the direct and induced impacts due to the project.
2. The consultant shall ensure to document baseline conditions relevant to the project with the objective to establish the benchmarks.
3. The consultant shall assess the potential significant impacts and identify the mitigation measures to address these impacts adequately.
4. The consultant shall do the 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. The consultant shall give special attention to the environmental enhancement measures in the project for the following:
 - (a) Cultural property enhancement along the highways
 - (b) Bus bays and bus shelters including a review of their location,
 - (c) Highway side landscape and enhancement of the road junctions,
 - (d) Enhancement of highway side water bodies, and
 - (e) Redevelopment of the borrow areas located on public land.

6. The consultant shall 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. The consultant shall establish a suitable monitoring network with regard to air, water and noise pollution. The consultant will also provide additional inputs in the areas of performance indicators and monitoring mechanisms for environmental components during construction and operational phase of the project.
8. The consultant shall provide the cost of mitigation measures and ensure that environmental related staffing, training and institutional requirements are budgeted in project cost.
9. The consultant shall prepare the application forms and obtain environmental clearances from the respective authorities of Royal Government of Bhutan(RGoB) on behalf of CE(P) Dantak, Border Roads Organisation. The consultants will make presentation, if required, in defending the project to the Environment related committee.
10. The consultant shall identify and plan for plantation and Transplantation of the suitable trees along the existing highway in accordance with IRC/ RGoB guidelines.
11. The consultant shall assist in providing appropriate input in preparation of relevant environment and social sections.
- 12 Provision should be made for Noise Barriers wherever (especially where project highway passes through dense habitation) required as a mitigation measure against noise pollution and nuisance. Their location, dimension, type, material and shapes should be determined and defined in environment impact assessment studies forming part of DPR.

4.13.2 Social Assessment

1. The consultant would conduct base line socio-economic and census survey to assess the impacts on the people, properties and loss of livelihood. The socioeconomic survey will establish the benchmark for monitoring of R&R activities. A social assessment is conducted for the entire project to identify mechanisms to improve project designs to meet the needs of different stakeholders. A summary of stakeholder discussions, issue raised and how the project design was developed to meet stakeholders need would be prepared.
2. The consultant shall prepare Land Acquisition Plan and assist Commander Task Force, Border Roads Organisation in acquisition of land under various Acts.

4.13.3 The consultant would prepare Resettlement and Rehabilitation Plan and assess feasibility and effectiveness of income restoration strategies and suitability and availability to relocation sites. The resettlement plan which accounts for land acquisition and resettlement impacts would be based on a 25% socio-economic survey and 100 % census survey of project affected people which provides the complete assessment of the number of affected households and persons, including common property resources. All untitled occupants are recorded at the initial stages and identify cards will be issued to ensure there is no further influx of people in to the project area. All consultations with affected persons (to include list of participants) should be fully documented and records made available to CE(P) Dantak, Border Roads Organisation.

- Assessment on the impact of the project on the poor and vulnerable groups along the project road corridor.
- Based on the identified impacts, developing entitlement matrix for the project affected people.
- Assessment on social issues such as indigenous people, gender, HIV/AIDS, labourers including child labour.
- Implementation budgets, sources and timing of funding and schedule of tasks.
- Responsibility of tasks, institutional arrangements and personnel for delivering entitlement and plans to build institutional capacity.
- Internal and external monitoring plans, key monitoring indicators and grievance redress mechanism.
- Incorporating any other suggestions of CE(P) Dantak, Border Roads Organisation, till the acceptance of the reports by CE(P) Dantak, Border Roads Organisation

4.13.4 Reporting Requirements of EIA

- The consultant would prepare the stand-alone reports as per the requirement of RGoB/ADB/World Bank /CE(P) Dantak, Border Roads Organisation, as applicable, with contents as per the following:
- Executive Summary
- Description of the Project
- Environmental setting of the project.
- Identification and categorization of the potential impacts (during pre-construction, construction and operation periods).
- Analysis of alternatives (this would include correlation amongst the finally selected alternative alignment/routing and designs with the avoidance and environmental management solutions).
- The public consultation process.

- 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.
- Incorporating any other as per the suggestions of the CE(P) Dantak, Border Roads Organisation, till the acceptance of the reports by the CE(P) Dantak, Border Roads Organisation, as applicable.
- EMP Reports for Contract Package based on uniform methodology and processes. The consultant will also ensure that the EMP has all the elements for it to be a legal document. The EMP reports would include the following:
 - Brief description of the project, purpose of the EMP, commitments on incorporating environmental considerations in the design, construction and operations phases of the project and institutional arrangements for implementing the EMP.
 - A detailed EMP for construction and operational phases with recourse to the mitigation measures for all adverse impacts.
 - Detailed plans for highway-side tree plantation (as part of the compensatory afforestation component).
 - Environmental enhancement measure would be incorporated.
 - Enhancement measures would include items described in the scope of work and shall be complete with plans, designs, BOQ and technical specifications.
 - Environmental monitoring plans during and after construction including scaling and measurement techniques for the performance indicators selected for monitoring.
- The EMP should be amendable to be included in the contract documents for the works.
- Incorporating any other as per the suggestions of the Dept of Surface Transport/ RGoB/CE(P) Dantak, Border Roads Organisation, till the acceptance of the reports by the CE(P) Dantak, Border Roads Organisation as applicable.

4.13.5 Reporting requirements of RAP

Analysis on the resettlement plan be conducted based on ADBs Hand Book on Resettlement, A Guide to Good practice 1998 as amended time to time/ World Bank Guidelines / **RGoB guidelines**

- Executive summary
- Description of project
- Objectives of the project.

- The need for Resettlement in the Project and evaluation of measures to minimize resettlement.
- Description and results of public consultation and plans for continued participation of PAPs.
- Definition of PAPs and the eligibility criteria.
- Census and survey results-number affected, how are they affected and what impacts will they experience.
- Legal and entitlement policy framework-support principles for different categories of impact.
- Arrangements for monitoring and evaluation (internal and external)
- Implementation schedule for resettlement which is linked to the civil works contract
- A matrix of scheduled activities linked to land acquisition procedures to indicate clearly what steps and actions will be taken at different stages and the time frame
- The payment of compensation and resettlement during the acquisition process
- An itemized budget (replacement value for all assets) and unit costs for different assets

5.2 Utility shifting proposal and estimates

5.2.1 Identify type and location of all existing utilities within the proposed ROW

1. Consultant will review information available with all utilities agencies in the region, consult maps/plans available with Border Roads Organisation, MoRTH and state road agencies, consult with locals and municipal bodies to ascertain the presence and location of utilities, including but not limited to water-mains, gas, telephone, electricity and fiber-optic installations in and around the project road
2. Deploy ground penetrating radar, inductor locators or better technology to accurately map the location, type and size of utilities in the ROW of the project road as required in the section of this TOR
3. Develop a detailed strip plan and digitized maps showing:
 - i. type, size and current location of all the utilities identified
 - ii. relative offset from the centerline
 - iii. existing right of way

5.2.2 Plan for utilities in future road design

1. Consultants need to identify utilities that will require shifting to enable construction of the proposed project road
2. Incorporate space required for elevated and under-ground utilities corridors and utilities crossings as required for existing and future utilities in consultation with user departments

5.2.3 Develop a utilities relocation plan

1. Consultants need to develop and submit a utilities relocation plan in consultation with Commander 19TF and user departments clearly identifying current utilities and suggested relocations along with crossings as required
2. Plan and conduct discussions, consultations and joint site visits required for the planning of utilities shifting and the development of required drawings and proposals
3. Prepare necessary details, documents and suggested relocation plan to be submitted to user department
4. Develop initial cost estimates based on suggested relocation plan and the latest available schedule of rates for inclusion in the cost of the project at the time of approval

5.2.4 Estimates and approvals

1. Consultants need to obtain draft utilities shifting proposal from user departments for all utilities identified for shifting along project road
2. Prepare utility shifting cost estimates using latest schedule of rates and obtain approval from user departments
3. Review final designs submitted, cost estimates, complete checklist, obtain required declarations and submit to Commander 19TF, Border Roads Organisation for approval
4. Work with user department, as required to incorporate any changes requested in shifting proposal and cost estimate
5. Obtain all required utilities shifting proposal estimates and required approvals from both user departments and HQ CE(P) Dantak, Border Roads Organisation within the time stipulated in DPR contract

5.3 Estimation of Quantities and Project Costs

1. The Consultants shall prepare detailed estimates for quantities (considering designs and mass haul diagram) and project cost for the entire project (civil packages wise), including the cost of environmental and social safeguards

proposed based on MoRT&H's Standard Data Book and 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 civil work Package as defined in this TOR.

2. The Consultants shall make detailed analysis for computing the unit rates for the different items of works. The unit rate analysis shall duly take into account the various inputs and their basic rates, suggested location of plants and respective lead distances for mechanized construction. The unit rate for each item of works shall be worked out in terms of manpower, machinery and materials.
3. The project cost estimates so prepared are to be checked against rates for similar on-going works in India under Border Roads Organisation /World Bank/ ADB financed road sector projects.
4. The Consultant should work out the quantity of Bitumen, Steel and Cement likely to be used in the project and indicate in the summary sheet.

6. Viability and Financing Options and Bidding process

1. The Project Road should be divided into the traffic homogenous links based on the findings of the traffic studies. The homogenous links of the Project Road should be further subdivided into sections based on physical features of road and pavement, sub- grade and drainage characteristics etc. The economic and commercial analysis shall be carried out separately for each traffic homogenous link as well as for the Project Road.
2. The values of input parameters and the rationale for their selection for the economic and commercial analyses shall be clearly brought out and got approved by Chief Engineer Project Dantak.
3. For models to be used for the economic and the commercial analyses, the calibration methodology and the basic parameters adapted to the local conditions shall be clearly brought out and got approved by Chief Engineer Project Dantak.
4. The economic and commercial analyses should bring out the priority of the different homogenous links in terms of project implementation.

6.1. Economic Analysis

1. The Consultants shall carry out economic analysis for the project. 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 internationally recognized life- cycle costing model.
2. The economic analysis shall cover but be not limited to be following aspects:

- i. assess the capacity of existing roads and the effects of capacity constraints on vehicle operating costs (VOC);
 - ii. calculate VOCs for the existing road situation and those for the project; iii. quantify all economic benefits, including those from reduced congestion, travel distance, road maintenance cost savings and reduced incidence of road accidents; and,
 - iv. estimate the economic internal rate of return (EIRR) for the project over a 30-year period. In calculating the EIRRs, identify the tradable and non-tradable components of projects costs and the border price value of the tradable components.
 - v. Saving in time value.
3. Economic Internal Rate of Return (EIRR) and Net Present Value (NPV), “with “and “without time and accident savings” should be worked out based on these cost-benefit stream. Furthermore, sensitivity of EIRR and NPV worked out forth different scenarios as given under:

Scenario – I Base Costs and Base Benefits

Scenario - II Base Costs plus 15% and

Base Benefits Scenario - III Base Costs

and Base Benefits minus 15%

Scenario – IV Base Costs plus 15% and Base Benefits minus 15%

The sensitivity scenarios given above are only indicative. The Consultants shall select the sensitivity scenarios taking into account possible construction delays, construction costs overrun, traffic volume, revenue shortfalls, operating costs, exchange rate variations, convertibility of foreign exchange, interest rate volatility, non-compliance or default by contractors, political risks and force majeure.

4. The economic analysis shall take into account all on-going and future road and transport infrastructure projects and future development plans in the project area.

6.2 Financial Analysis

6.2.1 Need for financial analysis

1. It is envisaged that project stretches should be implemented in a commercial, EPC funded format
2. Therefore, the Consultant will need to study the financial viability of the project under various available commercial formats and suggest a mode of funding and execution that is most likely to be successful

3. The consultant shall study the financial viability of the project under several different traffic volume, user fee scenarios and funding options to arrive at the optimal execution mode and funding modalities

6.2.2 Financial analysis of the project

1. The Consultants shall in consultation with Chief Engineer Project Dantak finalize the format for the analysis and the primary parameters and scenarios that should be taken into account while carrying out the commercial analysis
2. The Financial analysis for the project should cover financial internal rate of return, projected income statements, balance sheets and fund flow statements and should bring out all relevant assumptions.
3. The financial analysis should cover identification, assessment, and mitigating measures for all risks associated with the project. The analysis shall cover, but be not limited to, risks related to construction delays, construction costs overrun, traffic volume, revenue shortfalls, operating costs, exchange rate variations, convertibility of foreign exchange, interest rate volatility, non-compliance or default by contractors, political risks and force majeure.
4. The sensitivity analysis should be carried out for a number of probabilistic scenarios.

6.2.3 Outputs from financial analysis

1. The financial model so developed shall be handed over to and be the property of CE(P) Dantak, Border Roads Organisation.
2. The consultant shall also suggest positive ways of enhancing the project viability and furnish different financial models for implementing on BOT format

6.3 Bidding process

6.3.1 Consultant shall assist the authority in preparing the required bid documents and support the authority through the bidding process in EPC mode of execution

6.3.2 Preparation of documents

1. The consultant shall prepare all required bid documents and technical schedules required for the bidding of the project
2. The Consultants shall prepare separate documents for each type of contract (EPC) for each package of the DPR assignment

3. The consultant shall assist authority in reviewing bid documents and in making any changes required basis their findings or the and finalising bid documents
4. The consultant shall assist the authority in collecting and providing all required supporting documents for initiating bid as defined by the SOP for contracting
5. The DPR consultant will be required to prepare the Bid Documents, based on the feasibility report, due to exigency of the project for execution if desired by Chief Engineer Project Dantak.
 - a. To enable this, consultant should study the financial viability and financial options for the project for EPC modes during the feasibility stage.
6. Provide any and all clarifications required by the authority or other functionaries such as the financial consultant and legal advisor as required for the financial appraisal and legal scrutiny of the Project Highway and Bid Documents.
7. The consultant shall be guided in its assignment by the Model Concession/ Contract Agreements for EPC projects, as applicable and the Manual of Specifications and Standards for two/ four/ six laning of highways published by IRC (IRC:SP:73 or IRC:SP:84 or IRC:SP:87, as applicable) along with relevant IRC codes for design of long bridges.
 - a. It is suggested that consultant should go through the EPC documents of ministry before bidding the project.

6.3.3 Support during the bidding process

1. Consultant shall support Chief Engineer Project Dantak through the entire bid process and shall be responsible for sharing the findings from the preparation stages during the bid process
2. The consultant shall ensure participation of senior team members of the consultant during all interaction with potential bidders including prebid conference, meetings, site visits etc.
3. During the bid process for a project, the consultant shall support the authority in:
 - a. Responding to all pre-bid technical queries
 - b. Preparation of detailed responses to the written queries raised by the bidders

4. The consultant shall assist Chief Engineer Project Dantak and its functionaries as needed in the evaluation of technical bids

7. Time period for the service

1. Time period envisaged for the study of the project is indicated in **Annex-I to LOI**. The final reports, drawings and documentation shall be completed within this time schedule.
2. Chief Engineer Project Dantak, Border Roads Organisation shall arrange to give approval on all sketches, drawings, reports and recommendations and other matters and proposals submitted for decision by the Consultant in such reasonable time so as not to delay or disrupt the performance of the Consultant's services.

8. Project Team and Project Office of the Consultant

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.
2. List of suggested key personnel to be fielded by the consultant with appropriate man- month of consultancy services is given in Enclosure-I as per client's assessment.
3. A Manning Schedule for key personnel mentioned above is enclosed as Enclosure-I along with broad job- description and qualification as Enclosure-II. The information furnished in Enclosures-I & II are to assist the Consultants to understand the client's perception about these requirements and shall be taken by the Consultants for the purpose of Financial Proposal and deployment schedule etc. in technical proposal to be submitted by them. Any deviation proposed may be recorded in the comments on TOR. 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 in respect of points to be given as part of evaluation criteria as mentioned in Data sheet. 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 by the authorized signatory of the Consultants.
4. The Consultants shall establish an office at the project site manned by senior 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 office unless there are special reasons for carrying out part of the office work elsewhere for which prior approval of Chief Engineer Project Dantak, Border Roads Organisation shall be obtained. The address of the site office including the personnel manning it including their Telephone and FAX numbers will be

intimated by the Consultant to Chief Engineer Project Dantak, Border Roads Organisation before commencement of the services.

5. All key personnel and sub professional staff of the DPR Consultants shall use the fingerprint based (biometric) attendance system for marking their daily attendance. Attendance shall be marked at least once a day and anytime during the day. Biometric Attendance System shall be installed by the DPR Consultants at its own cost at the site office and design office in order to facilitate the attendance marking. A copy of attendance records shall be attached at the time of submission of their bills to the Commander 19TF, Border Roads Organisation from time to time. Proper justification shall be provided for cases of absence of key personnel/ subprofessional staff which do not have prior approval from Project Director of Concerned stretch. If CE(P) Dantak, Border Roads Organisation so desires, it shall facilitate electronic linking of the attendance system with the Central Monitoring System of CE(P) Dantak, Border Roads Organisation.

9. **Reports to be submitted by the Consultant : After submitting the draft feasibility report, the consultant should present the findings to the Client (Project dantak, DoST and other stake holders).** The comments and suggestions received from the stakeholders must be incorporated into the final feasibility and other reports. All reports, documents and drawings are to be submitted separately for each of the traffic homogenous link of the Project Road. 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.

1. Project preparation activities will be split into four stages as brought out below.

N o	Stage	Key activities	Report/deliverable submitted
1	Inception	Project planning and mobilization	Inception Report and QAP
2	Feasibility	Alignment finalization, preliminary surveys	Alignment Options Report, Feasibility, Geological and Sub soil Investigation Report
3	DPR	Detailed design of tunnels including approach roads, preparation of detailed project report with drawings	Draft DPR Report, Final DPR Report, documents, Design and drawings
4	Technical Schedules	Preparation of bid documents and technical schedules	Civil Works Contract Agreement and Schedules

Preliminary design work should commence without waiting for feasibility study to be completed.

3. Timelines for the submission of reports and documents

Consultant shall be required to complete, to the satisfaction of the client, all the different stages of study within the time frame indicated in the schedule of submission **in para 10 pertaining** to Reports and Documents for becoming eligible for payment for any part of the next stage.

10 Reports and Documents to be submitted by the Consultant to CE(P) Dantak, Border Roads Organisation

1. The Consultant shall submit to the client the reports and documents in bound volumes (and not spiral binding form) after completion of each stage of work as per the schedule and in the number of copies as given in Enclosure-III. Further, the reports shall also be submitted in USB Pen drive/Hard Drive for soft copy of the reports. In addition to the hardcopies as mentioned in Enclosure-III. Consultant shall submit all other reports mentioned specifically in the preceding paras of the TOR.
2. The time schedule for various submissions prescribed at Sl. No.1 above shall be strictly adhered to. No time overrun in respect of these submissions will normally be permitted. Consultant is advised to go through the entire terms of reference carefully and plan his work method in such a manner that various activities followed by respective submissions as brought out at Sl.No.1 above are completed as stipulated. Consultant is, therefore, advised to deploy sufficient number of supporting personnel, both technical and administrative, to undertake the project preparation activities in construction package (Section) simultaneously. As far as possible, the proposal should include complete information such as number of such persons, name, position, period of engagement, remuneration rate etc. The Consultant is also advised to start necessary survey works from the beginning so as to gain time in respect of various other activities in that stage.

3. DPR Deliverables in each stage of project

1. The key stages, activities and deliverables for the detailed project report are as described in these documents
2. The following section describes the detailed requirements for each report that needs to be submitted
3. Consultants are also advised to refer to ENCLOSURE-IV

4. Formats for submission of Reports and Documents to understand any additional format and content requirements
5. All reports must be submitted along with the relevant checklist form completed and signed off by the consultant

STAGE 1

10.1 Quality Assurance Plan (QAP) Document

1. Immediately upon the award, the Consultants shall submit four copies of the QAP document covering all aspects of field studies, investigations design and economic financial analysis. The quality assurance plans/procedures for different field studies, engineering surveys and investigation, design and documentation activities should be presented as separate sections like engineering surveys and investigations, traffic surveys, material geo-technical and sub-soil investigations, road and pavement investigations, investigation and design of bridges & structures, environment and R&R assessment, economic & financial analysis, drawings and documentation; preparation, checking, approval and filing of calculations, identification and traceability of project documents etc. Further, additional information as per format shall be furnished regarding the details of personnel who shall be responsible for carrying out/preparing and checking/verifying various activities forming part of feasibility study and project preparation, since inception to the completion of work. The field and design activities shall start after the QAP is approved by CE(P) Dantak, Border Roads Organisation.
2. Data formats for report and investigation result submission
 - i. Required data formats for some reports, investigations and documents are discussed in ENCLOSURE-IV
 - ii. Formats for submission of Reports and Documents.
 - iii. The consultants will need to propose data formats for use in all other field studies and investigations not covered in enclosure IV.
 - iv. The proposed data forms will need to be submitted for the approval of CE(P) Dantak, Border Roads Organisation after the commencement of services.

10.2 Inception Report (IR)

1. The report shall cover the following major aspects:
 - i. Project appreciation; ii. Detailed methodology to meet the requirements of the TOR finalized in consultation with the CE(P) Dantak, Border Roads

Organisation officers; including scheduling of various sub activities to be carried out for completion of various stages of the work; stating out clearly their approach & methodology for project preparation after due inspection of the entire project stretch and collection/ collation of necessary information;

- iii. Task Assignment and Manning Schedule; iv. Work programme;
 - v. Proforma for data collection; vi. Design standards and proposed cross-sections;
 - vii. Key plan and Linear Plan; viii. Development plans being implemented and / or proposed for implementation in the near future by the local bodies and the possible impact of such development plans on the overall scheme for field work and design for the study;
 - ix. Quality Assurance Plan (QAP) finalized in consultation with CE(P) Dantak, Border Roads Organisation;
 - x. Draft design standards; and
2. The requirements, if any, for the construction of bypasses should be identified on the basis of data derived from reconnaissance and traffic studies. The available alignment options should be worked out on the basis of available maps. The most appropriate alignment option for bypasses should be identified on the basis of site conditions and techno-economic considerations. Inception Report should include the details regarding these aspects concerning the construction of bypasses for approval by CE(P) Dantak, Border Roads Organisation.
- i. Bypasses should be identified on the basis of data derived from reconnaissance and initial traffic information/traffic studies
 - ii. The available alignment options should be worked out on the basis of available topographic maps, publicly available mapping services or remote sensing based topography and land use maps
 - iii. The most appropriate alignment option for bypasses should be identified on the basis of site conditions and techno-economic considerations

STAGE 2: Feasibility Report

10.3 Alignment options report

- 1. Basis review of the existing project road, local traffic patterns and initial reconnaissance surveys, the consultant shall present possible alignment alternatives for the tunnel.
- 2. Alignment options should include but not be limited to:
 - (i) Greenfield sections of the road
 - (ii) New alignments due to lack of RoW, opportunity to shorten road etc.
 - (iii) New/Re-alignment to cater to local traffic and o-d points

- (iv) Re-alignment due to changes in local network and/or surrounding road network
 - (v) Bypasses as suggested and approved in alignment report
 - (vi) Re-alignment due to need to improve road geometry
 - (vii) Provision of ROBs, flyovers and other structures
 - (viii) Various alignment options of tunnel and feasibility with recommended option
3. The alignment report shall contain:
- i. Drivers for re-alignment of road and re-alignment needed as discussed in para 2 above
 - ii. Alignment alternatives for each section where re-alignment of road is needed
 - iii. Analysis of alignment alternatives bringing out the pros and cons of each alternative including, but not limited to: new construction required, land acquisition requirements, environmental impact, utilities and structures affected, cost of construction, geometry and safety aspects, input from local consultation, Project Dantak, Border Roads Organisation views
 - iv. Recommendations from among the alignment options presented for the authority to consider
 - a. Consultant will enable authority to visualize and compare alignment options by providing alignment options in a GIS environment that should include, but not be limited to:
 - i. Road and tunnel alignment alternative centerlines
 - ii. Digital elevation model of the region
 - iii. Land use / land cover information
 - iv. Hydrology information
 - v. Surrounding road network including key NH, SH, MDR and ODRs
 - vi. Key O/D points and urban settlements
 - vii. High resolution satellite/airborne imagery of the region
 - viii. **Alignment to be approved by Officer nominated by HQ DGBR.**

10.4 Feasibility Report

1. The consultant shall commence the Feasibility Study of the project in accordance with the accepted IR and the report shall contain the following:

- i. Executive summary
 - ii. Overview of organization and activities, and project financing and cost recovery mechanisms
 - iii. Project description including possible alternative alignments/bypasses and technical/engineering alternatives
 - iv. Methodology adopted for the feasibility study v. Socioeconomic profile of the project areas vi. Indicative design standards, methodologies and specifications vii. Traffic surveys and analysis viii. Environmental screening and preliminary environmental assessment ix. Initial social assessment and preliminary land acquisition/resettlement plan
 - x. Cost estimates based on preliminary rate analysis and bill of quantities, xi. Cost analysis of all alternate identified alignments xii. Economic and financial analysis
 - xiii. Conclusions and recommendations
2. In view of para 1 above the consultant has to submit the following documents in six sets:
- i. **Technical Specifications:** The MORT&H's Technical Specifications for Road and Bridge works shall be followed for this study and IRC SP: 91-2019 for tunnel. However, Volume-IV: Technical Specifications shall contain the special technical specifications which are not covered by MORT&H Specifications for Roads, Bridges and tunnel works (latest edition / revision) and also specific quality control norms for the construction of works.
 - ii. **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, and machine charges as considered in arriving at unit rates will be included in this volume for cost of EPC work SOR of PWD, CPWD, MoRT&H data book shall be followed
 - iii. **Cost Estimates:** This volume will present each item of work as well as a summary of total cost for EPC mode of work.
 - iv. **Bill of Quantities:** This volume shall contain the detailed Bill of Quantities for all items of works
3. The basic data obtained from the field studies and investigations shall be submitted in a separate volume as an Appendix to Feasibility Report.

4. The Final Feasibility Study Report incorporating comments, revisions and modifications suggested by CE(P) Dantak, Border Roads Organisation shall be submitted within 15 days of receipt of comments from CE(P) Dantak, Border Roads Organisation on draft feasibility study report.

10.5 Utility relocation plan

1. The consultant shall prepare a kilometre-wise Utility Relocation Plan (URP) and costs for relocation per civil construction package as per estimates from concerned authorities
2. The utility relocation shall contain details regarding:
 - i. All utilities identified in the existing and proposed road RoW such as water-mains, telephone, telegraph and electricity poles
 - ii. Those utilities that will require shifting to enable construction of the project road
 - iii. All necessary details required for submission of utilities shifting proposals to the concerned user agencies
 - iv. Copies of utilities shifting proposals made to the concerned user agencies along with suggested relocation of services along with their crossings across the project road at designated locations as required
 - v. Details of consultations made with local people and user agencies
 - vi. Preliminary scheme for shifting and cost estimates for shifting as per the concerned authorities
 - vii. Separate strip plan showing shifting/relocation of each utility services prepared in consultation with the concerned local authorities
 - viii. Draft map and plans showing road centerline, existing right of way, proposed right of way, pertinent topographic details and existing and proposed location of utilities

10.6 Clearances report

1. The consultant shall prepare a report regarding all other clearances required to enable the construction of the project road such as environment, forest, tree cutting
2. The clearances report shall include kilometre-wise requirement of all clearances required presented along with the strip plan including, but not limited to:
 - i. Requirements for environmental clearances along the project corridor
 - ii. Requirements for forest clearances including type of forest affected, extent of land area needing diversion
 - iii. Account of required felling of trees of different type and girth and value estimate of such trees based on realistic rates obtainable from concerned forest office
 - iv. Plan of compensating afforestation, its land requirement with specific locations and cost involved for undertaking all activities in this regard.
 - v. Requirements for wildlife clearances, if any

- vi. Clearances from Irrigation Authorities regarding Irrigation structures, etc.
3. The clearances report shall also include:
- i. Details of proposals made to concerned agencies and departments
 - ii. Date of submission of clearances proposals, Environmental impact assessment report to the competent authority
 - iii. Copies of all actual clearance proposals made or drafts of proposals yet to be submitted
 - iv. Information regarding points of contact, current status of proposals made, key issues raised and clear next steps to obtaining clearances
3. The consultant shall also assist in attending to queries raised/ furnishing of clarifications towards securing applicable clearances.

STAGE: 3

10.7 Draft Detailed Project Report (DPR)

- 1. The draft DPR Submission shall consist of construction package-wise Main Report(Investigation report, rock classification report, GIR, firefighting, Geometrical Design& Drawing and Structural Design & Drawing, Drainage, Lighting, Safety, E&M, Ventilation of tunnel), Design Report, Materials Report, Engineering Report, Drainage Design Report, Economic and Financial Analysis Report, Environmental Assessment Report including Resettlement Action Plan (RAP), Package-wise bid Documents and Drawings.
- 2. The Report volumes shall be submitted as tabulated in para 10 above.
- 3. The Documents and Drawings shall be submitted for the Package and shall be in the following format:

Reports

- i. **Volume-I, Main Report:** 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 Executive Summary giving brief accounts of the findings of the study and recommendations. A sample executive summary has been enclosed in Appendix VIII.

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 Environmental Impact Assessment

(EIA) Report for contract package shall be submitted as a part of the main report.

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.

- ii. **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 deal with the design of road features and pavement composition while Part-II shall deal with the design of bridges, tunnels and cross-drainage structures. The subsoil exploration report including the complete details of boring done, analyses and interpretation of data and the selection of design parameters shall be included as an Appendix to the Design Report. Latest relevant IS, IRC codes shall be refer for presentation of subsoil exploration data.

The 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 aspect and the standards adopted.

- iii. **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 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.

The materials Report shall also include details of sampling, testing and test results obtained in respect physical properties of subgrade 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 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.

- iv. **Volume - IV, Environmental Assessment Report including Environmental Management Plan (EMP) & Resettlement Action Plan (RAP):** The Report shall be prepared conforming to the Guidelines of the Government of Bhutan/ India and World Bank / ADB as appropriate for construction package.
- v. **Volume-V, Technical Specifications:** The MORT&H's Technical Specifications for Road, Bridge and Tunnel works shall be followed for this study. However, Volume IV: Technical Specifications shall contain the special technical specifications which are not covered by MOST Specifications for Roads and Bridges (latest edition / revision) and also specific quality control norms for the construction of works.
- vi. **Volume - VI, 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.
- vii. **Volume - VII, Cost Estimates:** This volume will present the contract package wise cost of each item of work as well as a summary of total cost.
- viii. **Volume - VIII, Bill of Quantities:** This volume shall contain the package-wise detailed Bill of Quantities for all items of works.
- ix. **Volume - IX, Drawing Volume:** All drawings forming part of this volume shall be 'good for construction' drawings. 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 'good for construction' drawings for the following:
 - *General*
 - (i) *Area Map (1:200000/ 1:75000)*
 - (ii) *General Layout Tunnel – Plan view (1:10000)*
 - (iii) *General layout Tunnel- Longitudinal Section (1:10000)*
 - (iv) *Geotechnical Longitudinal Section of Tunnel with Ground condition and support (1:10000)*
 - (v) *Tunnel System and Installations – (N.T.S)*
 - (vi) *General Construction Sequence – (N.T.S)*
 - *Geometry*
 - (i) *Typical cross Section of Tunnel, Clearance profile and installations, Jet Fan Cabinet, clearance profile and installations , Inner Lining - (1:50)*
 - *Hydraulic System*
 - (i) *General Schematic layout, plan view (N.T.S.)*
 - *Excavation*
 - Excavation and primary support of tunnel, Lighting, fire equipments and ventilation shafts in all support categories- 1:100*
 - *Ventilation shafts*

Typical cross section- 1:50, 1:1000

Main & Subsidiary measuring sections- 1:100

• E&M

- (i) Elementary diagram of safety installations- 1:10000*
- (ii) Typical cross section installations: 1:100*
- (iii) Power supply scheme: N.T.S*
- (iv) Schematic Layout of technical equipment in front and in the inner area of the tunnel - N.T.S*
- (v) Schematic layout of main tunnel lighting - N.T.S*
- (vi) Schematic diagram of video surveillance system- N.T.S*
- (vii) Schematic diagram of Fire alarm and detection system- N.T.S*
- (viii) Schematic diagram of Integrated tunnel control system- N.T.S*
- (x) Operators workplaces main control center - N.T.S*
- (xi) Final lining, Control building, electric Substation/Electric lining/Gen-set for Backup and other required infrastructure for construction, maintenance/operation of tunnel*

Road Portion

- Horizontal Alignment and Longitudinal Profile.
- Cross-section @ 50m interval along the alignment within ROW
- Typical Cross-Sections with details of pavement structure.
- Detailed Working Drawings for individual Culverts and Cross Drainage Structures.
- Detailed Working Drawings for individual Bridges, tunnels and Structures.
- Detailed Drawings for Improvement of At-Grade and GradeSeparated Intersections and Interchanges.
- Drawings for Road Sign, Markings, Toll Plazas, and other Facilities.
- 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,
 - Locations of toll plaza, parking areas, weighing stations, bus bays, rest areas, if any.

- Drawings for Bus Bays, Parking areas, Rest areas, weighing stations etc. All 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 CE(P) Dantak, Border Roads Organisation 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, busbays, parking areas etc.
 - The typical cross-section drawings should indicate the scheme for future widening of the carriageway. The proposed crosssections 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.
 - Digital drawings of proposed highway and features
- a. The consultant shall deliver the final road alignment geometry, proposed road way model and all proposed structures in a Section 19 engineered model with all the required features as proposed in Enclosure IV
 - b. The consultant shall also provide digital versions of all drawings stated in para 1 above in the format proposed in Enclosure IV

(xii) Volume X, Drainage Plan:

- DPRs should be submitted in two volumes (Main and Drainage Plan separately). The DPR should have proper drainage plan prepared on basis of contours of the area, outlet availability and discharge requirements including discharge at the outfall from drains of local bodies.
- Preferably underground drains with well sized and well-spaced manholes may be provided to take care of cleaning. Wherever possible self- cleaning cross-section of drains may be adopted.
- Drainage Plan in DPR will be checked through a joint inspection with the engineers of local body/ Development Authority etc. so that Drainage Plan is totally integrated with the local body Drainage Plan.
- The drain covers should be strong enough to withstand the weight of Light commercial vehicles, wherever required.
- Stretch of the NH passing through a town can have multiple drainage plans/ sub plans due to different contours or due to having different outlets.
- The cross-sections of drains being shown presently in Schedule-B (Typical Cross- Sections) & details of drains being mentioned in Schedule-C (length & type of drains) shall not be mentioned in future as it will vary from location to location based on drainage plan. The

scope of drains in the project shall be on the basis of Drainage Plan drawn at each location and such Drainage Plan shall be made part of Scope of Project.

4. The draft Detailed Project report of specialized projects will be scrutinized by the Peer Review consultant appointed by HQ DGBR, Border Roads Organisation. The peer Review Consultant will be retired professional in the field, drawn from the various Central/State Highway/Road Work departments having adequate knowledge in the field. One professional will be earmarked from the standing panel of Peer Review consultant approved by HQ DGBR, Border Roads Organisation for each DPR. The Peer Review consultant will scrutinize the draft DPR within 15 days of submission and the observations will be complied with and incorporated in the final DPR.

10.8 Final Detailed Project Report, Documents and Drawings (6 Sets)

1. The Final package-wise DPR consisting of Main Report, Design Report, Drainage Design Report and Materials Report, incorporating all revisions deemed relevant following receipt of the comments from CE(P) Dantak, Border Roads Organisation on the draft DPR shall be submitted as per the schedule given in Enclosure-III.

STAGE: 4

10.9 Bid documents and Technical Schedules

1. Bid documents

- a. The consultant shall prepare bid documents for EPC, or other modes of contracting as suggested by CE(P) Dantak, Border Roads Organisation
- b. Individual bid documents will be submitted for each mode suggested and for each individual package or section identified for execution
- c. Consultant shall assemble and provide all supporting documents from the DPR assignment that will be required for the bid, in the format required by the contracting SOP in force at the time of bidding or as maybe required by the authority

2. Technical Schedules

- a. The consultant shall submit a Draft Contract/Concession Agreement derived from the Master Contract/Concession Agreement maintained by the authority with all required modifications and inclusions made with reference to the
- b. The agreement submitted shall contain all required technical schedules updated with the pertinent project details and data required

- c. Draft agreement and schedules shall be finalised in consultation with the authority and submitted for further processing and use with the contractor/concessionaire awarded the bid packages

11. Interaction with CE(P) Dantak, Border Roads Organisation

1. During entire period of services, the Consultant shall interact continuously with CE(P) Dantak, Border Roads Organisation and provide any clarification as regards methods being followed and carryout modification as suggested by CE(P) Dantak, Border Roads Organisation. A programme of various activities shall be provided to CE(P) Dantak, Border Roads Organisation and prior intimation shall be given to CE(P) Dantak, Border Roads Organisation regarding start of key activities such as boring, survey etc. so that inspections of CE(P) Dantak, Border Roads Organisation officials could be arranged in time.
2. The CE(P) Dantak, Border Roads Organisation officers and other Government officers from DoST, RGOB may visit the site at any time, individually or collectively to acquaint/ supervise the field investigation and survey works. CE(P) Dantak, Border Roads Organisation may also appoint a Proof Consultant to supervise the work of the DPR consultant including inter-alia field investigation, survey work, Design work and preconstruction activities
3. The consultant shall be required to **send 3 copies of concise** monthly Progress Report by the 5th day of the following month to the designated officer at his Head Quarter so that progress could be monitored by the CE(P) Dantak, Border Roads Organisation. 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 Delhi are foreseen during the currency of project preparation.
4. 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.

12. Payment Schedule

1. **AEM survey and all types of boring shall be paid as per actual quantity executed based on rates quoted in BOQ and for all other items the Consultant will be paid consultancy fee as a percentage of the contract values as per the schedule given in the Draft Contract Agreement.**

13. Data and Software

1. a. Consultants shall also deliver to HQ CE(P) Dantak, Border Roads Organisation all basic as well as the processed data from all field studies and investigations, report, appendices, annexure, documents and drawings in a digital format as described in Enclosure IV over the course of this assignment and at the submission of the final report in the form of a removable storage device (CD or USB pen drive) and hosted in a secure online file hosting platform

b. If required by CE(P) Dantak, Border Roads Organisation the consultant shall arrange at their own cost necessary software for viewing and measurement of imagery/ point cloud data.

- i. **Engineering Investigations and Traffic Studies:** Road Inventory, Condition, Roughness, Test Pit (Pavement composition), Falling Weight Deflectometer (FWD) Material Investigation including test results for subgrade soils, Traffic Studies(traffic surveys), axle load surveys, Sub-soil Exploration, Drainage Inventory, Inventory data for bridge and culverts indicating rehabilitation, 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 dxf or dwg 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. Economic and Financial Analysis

2. **Software:** The Consultant shall also hand-over to CE(P) Dantak, Border Roads Organisation floppies/CD's containing any general software including the financial model which has been specifically developed for the project.
3. The USB Pen drives/Hard Drive should be properly indexed and a catalogue giving contents of all USB Pen drives/Hard Drive and print-outs of the contents (data from field studies topographic data and drawings) should be handed over to CE(P) Dantak, Border Roads Organisation at the time of submission of the Final Report.
4. Consultant shall include editable soft copies of the final versions of all documents, including but not limited to the strip plan, plan & profile drawings, cross sections of right of way and details of structures as well as any cost workings.

SUPPLEMENT-I

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

Sr. No .	Clause No. of TOR	Additional points
1.	2.2	a) Provisions of tunnels
2.	2.3	a) Design of tunnels b) Design of protective works, slope stabilization measures, erosion control measures, land slide control/protection measures
3.	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
4.	4.1	a) Inventory and condition survey for tunnels,. 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, e) Design of scenic overlooks/watering points etc.
5.	4.5 (1)	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/tunnels. For aspects not covered by IRC and BIS, international standard practices, such as, British and American Standards may be adopted.

6.	4.7	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 (f) Existing land slide mitigation facilities (g) Geological details of rock strata in the area in case of tunnels
7.	4.11.1(1)	The Consultant should make an in depth study of available geological and Meteorological maps of the area.
8.	4.11.1(2)	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, 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, erosion, etc.
9.	4.11.2.1 (3.ii)	Cross sections shall be taken at every 25 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.	4.11.3.1 (1)	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, no. & location of hairpin bends etc. c) Details of tunnels d) Details & types of protective structures, erosion & land slide control/protection measures, etc.
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1 1.	4.11.3.2 (2)	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
1 2.	--	Condition Surveys & Investigation for Slope Stabilization, Erosion Control, Landslide Correction/Protection 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, 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 contour maps, topographical maps, geological/geomorphological 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.	4.11.4.4	a) For tunnels 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.	4.12.1 (1)	The Consultant shall also carry out detailed designs and prepare working designs for the following: a) cross sections at every 25 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, scour 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.	4.12.2 (1) 4.12.2 (2)	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 CE(P) Dantak, Border Roads Organisation. 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, traffic safety and materials.
16.	4.12.3	Wherever practicable/feasible hairpin bends and steep gradients shall be avoided by realignments, provision of structures or any other suitable provisions.

17.	4.12.4	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, thermal stresses due to temperature difference in day and night, damage by tracked vehicles during slide clearance operations etc. must also be considered along with traffic intensity, its growth, axle loads and design life.
18.	4.12.5(3)	The design of embankments should include the requirements for protection works and traffic safety features including features specific to hill roads.
19.	4.12.6	Design and Drawing of Tunnels: The Consultant shall prepare design and drawings for tunnels as per the results of feasibility study, as per the relevant specifications of IRC:SP:91/MORT&H and other international specifications.
20.	4.12.7	a) Topography of hills generates numerous water courses and this coupled with 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.	4.12.8	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.	4.12.11	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.	10.9.3	Volume II: Design Report : a) Inventory of protection measures and other structures b) Inventory of tunnels. b) Proposed preliminary designs for tunnels. Volume III: Drawings a) Drawings for protection/control measures and other structures b) Drawings for tunnels, if required.
24.	10.9.3	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 IX: Drawing Volume This shall also include : a) Detailed working drawings for tunnels. b) Detailed working drawings for protection/control structures

SUPPLEMENT-III

ADDITIONAL REQUIREMENT FOR SAFETY AUDIT

The use of checklists is highly recommended as they provide a useful “aide memoire” for the audit team to check that no important safety aspects are being overlooked. They also give to the project manager and the design engineer a sense of understanding of the place of safety audit in the design process. The following lists have been drawn up based on the experience of undertaking systematic safety audit procedures overseas. This experience indicates that extensive lists of technical details has encouraged their use as “tick” sheets without sufficient thought being given to the processes behind the actions. Accordingly, the checklists provide guidelines on the principal issues that need to be examined during the course of the safety audits.

Stage F-During Feasibility Study

1. The audit team should review the proposed design from a road safety perspective and check the following aspects

CONTENTS	ITEMS
Aspects to be checked	A. Safety and operational implications of proposed alignment and junction strategy with particular references to expected road users and vehicle types likely to use the road. B. Width options considered for various sections. C. Departures from standards and action taken. D. Provision of pedestrians, cyclists and intermediate transport E. Safety implications of the scheme beyond its physical limits i.e. how the scheme fits into its environs and road Hierarchy

A1 : General	Departures from standards Cross-sectional variation Drainage Climatic conditions Landscaping Services apparatus Lay-byes Footpath Pedestrian crossings Access (minimize number of private accesses) Emergency vehicles Public Transport ☐ Future widening Staging of contracts	
	Adjacent development	
A2 : Local Alignment	Visibility New/Existing road interface Safety Aids on steep hills	
A3 : Junctions	Minimise potential conflicts	
CONTENTS		ITEMS
		Layout Visibility
A4 : Non-Motorised road users Provision		Adjacent land Pedestrians Cyclists Non-motorised vehicles
A5 : Signs and Lighting		Lighting Signs/Markings
A6 : Construction and Operation		Build ability Operational Network Management

Stage 1 – Completion of Preliminary Design

1. The audit team should review the proposed check the following aspects design from a road safety perspective and check the following aspects

CONTENTS	ITEMS
Aspects to be checked	A. Safety and operational implications of proposed alignment and junction strategy with particular references to expected road users and vehicle types likely to use the road. B. Width options considered for various sections. C. Departures from standards and action taken. D. Provision of pedestrians, cyclists and intermediate transport E. Safety implications of the scheme beyond its physical limits i.e. how the scheme fits into its environs and road hierarchy
B1 : General	Departures from standards Cross-sectional variation Drainage Climatic conditions Landscaping Services apparatus Lay-byes
	Footpaths Pedestrian crossings Access (minimize number of private accesses) Emergency vehicles ☐Public Transport ☐Future widening Staging of contracts Adjacent development
B2 : Local Alignment	Visibility New/Existing road interface Safety Aids on steep hills
B3 : Junctions	Minimise potential conflicts Layout Visibility

B4 : Non-Motorised road users Provision	Adjacent land Pedestrians Cyclists Non-motorised vehicles
B5 : Signs and Lighting	Lighting Signs/Markings
B6: Construction and Operation	Build ability Operational Network Management

1. The audit team should satisfy itself that all issues raised at Stage 1 have been resolved. Items may require further consideration where significant design changes have occurred.
2. If a scheme has not been subject to a stage 1 audit, the items listed in Checklists B1 to B6 should be considered together with the items listed below.

CONTENTS	ITEMS
Aspects to be checked	A. Any design changes since Stage 1. B. The detailed design from a road safety viewpoint, including the road safety implications of future maintenance (speed limits; road signs and markings; visibility; maintenance of street lighting and central reserves).
C1 : General	Departures from standards Drainage Climatic conditions Landscaping

Stage 2 – Completion of Detailed Design

	Services apparatus Lay-byes Access Skid-resistance Agriculture Safety Fences Adjacent development
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C2 : Local Alignment	Visibility New/Existing road interface
C3 : Junctions	Layout Visibility Signing Lighting Road Marking ☐ T,X,Y-junctions All roundabouts Traffic signals
C4 : Non-Motorised road users Provision	Adjacent land Pedestrians Cyclists Non-motorised vehicles
C5 : Signs and Lighting	Advanced direction signs Local traffic signs Variable message signs Other traffic signs Lighting Network Management

ENCLOSURE-I**MANNING SCHEDULE.**

1. 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 Commander TF, Border Roads Organisation from time to time.
2. The requirement of tunnel/s is to be assessed strictly as per site requirement during the detailed study after mobilisation of Consultant on site. Tunnel expert, if required, the remuneration may be provided equivalent to Team Leader remuneration and time period shall be decided by Commander 19TF, concerned, CE(P) Dantak, Border Roads Organisation

B. Standalone Tunnel Projects

Sr · N o	Key Personnel	Total Project Assignment 300 days*		
		At site (man month)	At design office (man month)	Total Time Period (man month)
1	Team Leader Cum Tunnel Engineer	6	4	10
2	Tunnel Design Expert	2	8	10
3	Geophysicist	3	3	6
4	Geotechnical Engineer	6	4	10
5	Senior ventilation and fire safety expert (E& M Expert)	2	4	6
6	Senior Geologist	6	4	10
7	Senior Survey Engineer	4	0	4
8	Environmental Specialist	4	4	8
9	Material Engineer	As per requirement	As per requirement	6
10	Highway cum Pavement Engineer	As per requirement	As per requirement	6
11	Quantity Surveyor/Documentation Expert	As per requirement	As per requirement	4

12	Utility Expert	5	0	5
	Total			85

ENCLOSURE-II**QUALIFICATION AND EXPERIENCE REQUIREMENT OF KEY PERSONNEL****Highway Engineer**

i)	Educational Qualification	
	Essential	Degree in Civil Engineering
	Desirable	Masters in Civil Engineering
ii)	Experience	
	a)Total Professional Experience	Min. 08 years
	b) Experience in Highway projects	Minimum 06 years' experience in pavement design and maintenance of highways
	c) Experience in similar capacity	Pavement design for major highway projects (2/4/6 lane NH/SH/Expressways) of minimum 2 projects
	d)Training	It is mandatory for the key personnel to have attended training course on "Preparation of Feasibility Study and DPR for Highway Projects" conducted by Indian Academy of Highway Engineers (IAHE) or any other institute specifically approved by MoRTH for minimum 6 days duration.
iii)	Age Limit	65 years on the date of submission of Proposal

Enclosure-II (contd.)

**QUALIFICATION AND EXPERIENCE REQUIREMENT OF KEY PERSONNEL
Survey Engineer**

i)	Educational Qualification	
	Essential	Graduate or equivalent in Civil Engineering or Diploma in Civil Engg or Diploma in Surveying
	Desirable	Masters in Remote Sensing/Photogrammetry or equivalent
ii)	Essential Experience	
	a) Total Professional Experience	Min. 8 years
	b) Experience in Highway projects	Min. 6 years on similar projects in project preparation and construction & thorough understanding of modern computer based methods of surveying
	c) Experience in similar capacity	Survey Engineer for projects preparation of highway projects (NH/SH/Expressways) involving 2/4/6- laning of minimum aggregate length of 80 km.
	d) Training	It is mandatory for the key personnel to have attended training course on "Preparation of Feasibility Study and DPR for Highway Projects" conducted by Indian Academy of Highway Engineers (IAHE) or any other institute specifically approved by MoRTH for minimum 6 days duration
iii)	Age Limit	65 years on the date of submission of Proposal

Enclosure-II (contd.)

Environmental Specialist

i)	Educational Qualification	
	Essential	Graduate or equivalent in Civil Engineering / Certificate course
	Desirable	
ii)	Essential Experience	
	a) Total Professional Experience	Min. 8 years
	b) Experience in Highway Projects	Min. 6 years in Preparation of Bill of Quantities, Contract documents documentation for major highway projects involving two/ four laning and

i)	Educational Qualification	
	Essential	Graduate in Civil Engineering / Environment Engineering / Masters in Environment Science
	Desirable	Post Graduate in Environmental Engineering
ii)	Essential Experience	
	a) Total Professional Experience	Min. 06 years
	b) Experience in Highway Projects	Min. 5 years in environment impact assessment and permitting of highway projects (2/4/6 laning)
	c) Experience in similar capacity	Environmental Specialist in at least two highway projects (2/4/6 laning)

Enclosure-II (contd.)

	d)Training	It is mandatory for the key personnel to have attended training course on "Preparation of Feasibility Study and DPR for Highway Projects" conducted by Indian Academy of Highway Engineers (IAHE) or any other institute specifically approved by MoRTH for minimum 6 days duration
iii)	Age Limit	65 years on the date of submission of bid

Quantity Surveyor

	c) Experience in similar capacity	Quantity Surveyor in highway projects (NH/SH/Expressways) involving two/four/six laning of minimum aggregate length of 80 km.
	d)Training	It is mandatory for the key personnel to have attended training course on "Preparation of Feasibility Study and DPR for Highway Projects" conducted by Indian Academy of Highway Engineers (IAHE) or any other institute specifically approved by MoRTH for minimum 6 days duration
iii)	Age Limit	65 years on the date of submission of Proposal

Enclosure-II (contd.)

Qualification and Experience Requirement of Key Personnel

Team Leader cum Tunnel Expert

I	Educational Qualification	
	Essential	Graduate in Civil Engineering/Tunnel Engineering/Mining Engineering
	Desirable	Post Graduate in Civil Engineering/Tunnel Engineering/Mining Engineering
II	Essential Experience	
	a)Total Professional Experience	Min. 10 years
	b)Experience in Tunnel projects	(i) Professional experience in handling major tunnel projects (Road/Rail/Metro)
		(ii) Experience in major tunnel construction/construction supervision projects (Road/Rail/Metro)
		(iii) Experience in preparation of DPR or Feasibility report of major tunnel projects (Road/Rail/Metro)
		(iv) Experience in DPR preparation of minimum 5 km Tunnel length
		(v) Experience in construction/construction supervision/ preparation of DPR/feasibility report of major tunnel projects (Road/Rail/metro) using NATM
	c)Experience in similar capacity	(i) Experience as Team Leader or similar capacity in major tunnel construction/construction supervision projects (Road/Rail/Metro)
		(ii) Experience as Team Leader or similar capacity in preparation of DPR or Feasibility report of major tunnel projects (Road/Rail/Metro)

Enclosure-II (contd.)

	d)Training	It is mandatory for the key personnel to have attended training course on "Preparation of Feasibility Study and DPR for Highway Projects" conducted by Indian Academy of Highway Engineers (IAHE) or any other institute specifically approved by MoRTH for minimum 6 days duration
III	Age Limit	65 years on the date of submission of proposal

Qualification and Experience Requirement of Key Personnel

Tunnel Design Expert

I	Educational Qualification	
	Essential	Degree in Civil/ Mining Engineering
	Desirable	Post Graduation in Design/ Structural Engineering or equivalent.
II	Essential Experience	
	a)Total Professional Experience	Min. 10 years
	b) Experience in Tunnel projects	(i) Professional Experience in handling major tunnel projects (Road/Rail/Metro)
		(ii) Experience of major tunnel construction/construction supervision projects (Road/Rail/Metro)
		(iii) Experience in preparation of DPR or Feasibility report of major tunnel projects (Road/Rail/Metro)

Enclosure-II (contd.)

	c) Experience in similar capacity	(i) Professional (Structural) Experience as Tunnel Design Engineer
		(ii) Experience as Tunnel Design Engineer (Structural) of major tunnel construction/construction supervision projects (Road/Rail/Metro)
		(iii) Experience as Tunnel Design Engineer (Structural) of major tunnel for preparation of DPR projects (Road/Rail/Metro)
		(iv) Experience as Tunnel Design Engineer (Structural) in preparation of DPR/ Feasibility report of major tunnel projects (Road/Rail/Metro) using NATM
	d) Training	It is mandatory for the key personnel to have attended training course on "Preparation of Feasibility Study and DPR for Highway Projects/ Tunnel Design " conducted by Indian Academy of Highway Engineers (IAHE) or any other institute specifically approved by MoRTH for minimum 6 days duration
III	Age Limit	65 years on the date of submission of Proposal

Qualification and Experience Requirement of Key Personnel

Geotechnical Engineer

I	Educational Qualification	
	Essential	Civil Engineering/Mining Engineering / Engineering Geology
	Desirable	Geotechnical Engineering /Foundation Engineering/Rock Mechanics/Geo science or equivalent
II	Essential Experience	
	a) Total Professional Experience	Min. 10 years
		(i) Professional experience in handling major tunnel projects (Road/Rail/Metro)

	b) Experience in Tunnel Projects	(ii) Experience in major tunnel construction/construction supervision projects (Road/Rail/Metro)
		(iii) Experience in preparation of DPR or Feasibility report of major tunnel projects (Road/Rail/Metro)
	c) Experience in similar capacity	(i) Professional Experience as Senior Geotechnical Engineer
		(ii) Experience as Senior Geotechnical Engineer or construction/construction supervision projects (Road/Rail/Metro)
		(iii) Experience as Senior Geotechnical Engineer or similar capacity in preparation of DPR or Feasibility report of major tunnel projects (Road/Rail/Metro)
		(iv) Experience as Senior Geotechnical Engineer or similar capacity in preparation of DPR/Feasibility report of major tunnel projects (Road/Rail/Metro) using NATM
	d) Training	It is mandatory for the key personnel to have attended training course on "Preparation of Feasibility Study and DPR for Highway Projects/ Geotechnical Works " conducted by Indian Academy of Highway Engineers (IAHE) or any other institute specifically approved by MoRTH for minimum 6 days duration
III	Age Limit	65 years on the date of submission of proposal

Qualification and Experience Requirement of Key Personnel

Geophysicist

I	Educational Qualification	
	Essential	Graduate in Geophysics/Geo science/ Earth science or equivalent.
	Desirable	Post Graduation in Geophysics/Geo science/ Earth science or equivalent
II	Essential Experience	
	a) Total Professional Experience	Min. 10 years

	b) Experience in Relevant works	(i) Professional Experience in handling tunnel/ mineral and oil exploration projects
		(ii) Experience of carrying out AEM survey for tunneling/ mineral and oil exploration or any other similar work for area of more than 2.7 sq km
		(iii) Processing, Interpreting, generating Section 19 resistivity model of AEM survey's raw data for tunneling/mineral and oil exploration or any other similar work for area of more than 2.7 sq km
		(iv) Experience in carrying out AEM survey, processing, interpreting, generating Section 19 resistivity of AEM survey's raw data for major tunnel work (Rail/Road/Metro)
III	Age Limit	65 years on the date of submission of proposal

Enclosure-II (contd.)

Qualification and Experience Requirement of Key Personnel

Geologist

i)	Educational Qualification	
	Essential	Post Graduate Degree in Geology/Related field.
	Desirable	Phd in Geology/Related fields.
ii)	Essential Experience	
	a)Total Professional Experience	Min. 10 years
	b) Experience in Tunnel projects	He should have a minimum 10 years of professional experience and should have involved in project preparation/ DPR/ Tunnel Design for atleast two major Tunnel projects.
	c) Experience in similar capacity	He should have experience in similar capacity per five years on Design/ Construction/ Supervision of Tunnel Projects. The minimum cost of the project handled in the similar capacity should be 2500 Millions.
iii)	Age Limit	65 years on the date of submission of Proposal

Senior ventilation cum Fire safety expert (E&M Expert)

i)	Educational Qualification	
	Essential	Degree in Electrical/Mechanical Engineering.
	Desirable	Post Graduation in Degree in Electrical/Mech Engineering.
ii)	Essential Experience	
	a) Total Professional Experience	Min. 10 years
	b) Experience in Tunnel projects	10 years in Tunnel Projects and should have worked for atleast five years as an E&M Expert for Tunnel Design/ Construction projects.
	c) Experience in similar capacity	He should have handled atleast two tunneling projects in similar capacity.
iii)	Age Limit	65 years on the date of submission of Proposal

Qualification and Experience Requirement of Key Personnel

Material Engineer

i)	Educational Qualification	
	Essential	Graduate in Civil Engineering/Material Science and Engineering or equivalent
	Desirable	Post-graduation in Material Science and Engineering or equivalent
ii)	Essential Experience	
	a) Total Professional Experience	Min. 12 years
	b) Experience in Highway Projects	Minimum 8 years on Tunnel projects in design and /or construction. Experience on Tunnel projects shall be preferred.

	c) Experience in similar capacity	Material Engineer on highway projects (2/4/6 lane NH/SH/Expressway) of minimum aggregate length of 80 km.
	d) Training	It is mandatory for the key personnel to have attended training course on "Preparation of Feasibility Study and DPR for Highway Projects" conducted by Indian Academy of Highway Engineers (IAHE) or any other institute specifically approved by MoRTH for minimum 6 days duration
iii)	Age Limit	65 years on the date of submission of proposal

ENCLOSURE-III

Schedule for submission of Reports and Documents

Stage No.	Activity	No. of copies	Time Period in days from date of commencement
1	Monthly Reports	3	By 10 th day of every month
2	Inception Report (i)Draft Inception Report including QAP document	3	21
	(ii)Inception Report including QAP document	3	30
3	F.S. REPORT i) Draft Feasibility Study Report including option study	4	60
	ii) Comments of client	1	75
	iii) Final Feasibility Study Report incorporating compliance of comments of Client	4	90
4	Detailed Project Report Draft DPR	4	180
	ii) Comments of client	1	210
	iii) Final DPR incorporating compliance of comments of Client	6	240
5	Technical Schedules i) Draft Technical Schedules	4	180
	ii) Comments of client	1	210
	iii) Final technical schedule	6	240
9	6		
	Approval of Project clearances from Concerned agencies of RGoB ; approval of GAD and detail engineering drawing from Competent Authority	Original letters from the concerned agencies and 5 photocopies of each	300

The checklist for different stages of submission of report has been enclosed as under and the same shall be appended with proper references and page numbering. The checklist/s shall be appended with the report without which no payment shall be made.

Schedule for approval of Reports and Documents by PD after submission by Consultant.

Stage No.	Activity	Time Period in days from date of submission of Comment and acceptance by BRO Project Dantak/ DoST, RGoB
1	Inception Report	7 days
2	Feasibility Study Report i) Draft Feasibility Study Report including option study report ii) Final feasibility Study report	15days 7 days
3.	Detailed Project Report i) Draft DPR ii) Final DPR incorporating compliance of comments of Client	30 days 7 days
4	Technical Schedules i) Draft Technical Schedules ii) Final technical schedule	30 days 7 days

The checklist for different stages of submission of report has been enclosed as under and the same shall be appended with proper references and page numbering. The checklist/s shall be appended with the report without which no payment shall be made.

Note 1: Approval/comments shall be communicated by the Client to the Consultant within the time period shown in the schedule above. If no approval/comments are furnished within the indicated time period by the Client, it will be considered as deemed approval. Notwithstanding the deemed approval of submission(s), the Consultant will remain responsible for correctness of the submissions.

ENCLOSURE-IV**Formats for submission of Reports and Documents****1. Standard formats for deliverables**

- i. During the course of the assignment to prepare detailed project report, several reports, drawings and documents will need to be submitted by the consultants to CE(P) Dantak, Border Roads Organisation.
- ii. For the purposes of submission, format requirements have been laid out for some of the reports and drawing deliverables in this enclosure, which shall be adhered to strictly
- iii. In addition, consultants are to align and agree with Project Dantak, Border Roads Organisation officials the format of submission for all reports, during the inception stage as mentioned in clause 10.2 of this terms of reference

2. Format for submission of report deliverables**2.1. Printed hard copies of reports**

- i. All reports and documents shall be submitted in both printed hard copy and digital formats
- ii. For hard copies, the consultant shall submit bound volumes (and not in spiral binding form) after completion of each stage of work as per the schedule and in the number of copies as given in Enclosure III

2.2. Digital copies of reports

- 1. Every report shall also be submitted in digital format to the authority in the following formats:

- i. The final report as submitted in the portable document format (.pdf)
- ii. An editable document in the relevant Open Document Format for Office Applications (ODF) and if available the relevant Microsoft Office document format (MS Office)
- iii. All tables and models used to and referred to in the reports shall also be submitted as spread-sheets in the relevant ODF format and MS

Office format iv. The digital copies of reports shall be submitted in the form of removable storage devices (CD or USB pen drive) and also hosted on a secured online document storage and retrieval platform as described in clause 2 Data products

- 2. The removable storage device submitted at each deliverable stage shall contain;
 - i. Reports for that stage
 - ii. All draft and final reports previously submitted
 - iii. Correspondence with Project Dantak, Border Roads Organisation
 - iv. Clients 'comments on submitted reports

- v. Any communication, letters and approvals to and from other government and local agencies and any other relevant body
 - vi. An updated index of all the contents on the removable storage device
3. Every submission will be accompanied by a table of contents and index of all documents submitted for ease of reference

2 Data products

1. During the course of the assignment, the consultant shall perform several surveys and collect data that will be used for the design of the road and delivered to the client.
2. Consultants are encouraged to keep commonly available software and data packages, and typical uses for data while deciding final formats of data within the constraints of this document or where a format has not been defined
3. As required in relevant clause, consultants are required to agree with CE(P) Dantak, Border Roads Organisation all actual data formats proposed to be used for the project
4. In order to standardise data formats and simplify hand over and re-use of data, some requirements for minimum content and format are laid down below.

Sr No	Data product	Contents required (definition)	Data format
0	Formats to be used	List of data, drawing and design outputs, reporting format, digital format suggested, key data to be included (column headers), units and system to be used	CSV or ODF sheet, .xlsx optional
1	Traffic surveys		
1.1	List of traffic survey points	Point no, location coordinates (lat, long), location of survey point, chainage, no lanes/type of junction, type of survey, date of survey, length of survey, any commentary, equipment/technique used, link to survey output	CSV or ODF sheet, .xlsx optional

1.2	Classified traffic volume count survey	Survey point, survey location, location id (ihmcl), no of lanes, chainage, location coordinates (lat, long), date, time and period of survey	Raw data: IHMCL Traffic survey data format Processed, corrected with AADT: CSV or ODF sheet, .xlsx optional
1.3	O-D, turning movement, axle load and other surveys	Survey point, survey location, location lat, long, chainage, date, time, period of survey, technique/equipment used in addition to the survey data itself	CSV or ODF sheet, .xlsx optional
2	Engineering surveys and investigations		
2.1	Raw DGPS data	Notes must contain Date, time of survey, equipment used, corrections applied is any. Data: Survey benchmarks, benchmark points, location data points	CSV or ODF, Receiver Independent Exchange Format (RINEX)
2.2	LiDAR point cloud	Notes must contain Date, time of survey, equipment, summary post processing applied. Data: Survey benchmarks, data points, point cloud of entire project corridor as defined in	LASer file format for exchange CSV sheet, .xlsx optional
2.3	Images	360 Deg/ ortho images of entire project road way	Geographic Tagged Image File Format (GeoTIFF)
2.4	Video	Traverse video of entire project length	Audio video interleave (.avi) or MPEG-4 file (.mp4)

2.5	Topographic map + contours	Scale of map in accordance with IRC SP 19, 50 cm contours with roadway marked on maps	Contours : geo - shape files or .dxf files, .dwg/.dgn files n options
2.6	Digital elevation model	Digital terrain modeled from aerial and ground surveys	Digital elevation model in USGS Spatial Data transfer standard (SDTS) format
2.7	Longitudinal and cross sections	Location of cross section - existing, design chainage, lat, long, Cross section drawing	.dxf files, .dwg/.dgn files options

2.8	Details of utility	type of utility, no, class and category of utility installation (e.g. 66 kV xlpe), location, distance from centerline, user agency	CSV or ODF sheet, .xlsx optional
2.9	Utility maps	geo-referenced schematic map, existing and design road centerline, type of utility, size, no, class and category	georeferenced shape files (.shp) and drawings in .dxf format
2.10	Road inventory surveys	All data as required in clause 4.11.3.1, geo-referencing for each row of data in lat, long form	CSV or ODF sheet
2.11	Pavement investigation	Test pit reference id, location, chainage, geo-reference (lat, long), pavemet composition - layer no, material type, thickness, sub grade type, and condition	CSV or ODF sheet
2.12	Pavement condition survey	Data as required in clause 4.11.3.2, along with location/chainage and geo-reference for all data	CSV or ODF sheet

2.1 3	Pavement structural strength	FWD results as per IRC guidelines, geo-referencing for test points	CSV or ODF sheet
2.1 4	Sub-grade and soil strength	In the format of the testing lab, summary details must be tabulated and must include: test pit no, location, chianage, lat/long, date, time of test, tester/lab details, in-situ density, moisture content, field CBR, characterization, in-lab moisture and density, lab CBR	Summary in CSV or ODF sheet
3	Proposed roadway designs		
3. 1	Proposed alignment geometry	Georeferenced centerline horizontal and vertical alignment for the road To be presented superimposed on surface map, satellite imagery and digital elevation model of region	Geometry or shape files : .shp/.dxf, .dwg/.dgn files options
3. 2	Final alignment geometry	Georeferenced centerline horizontal and vertical alignment for the road. Additional detail on lanes, super elevation, junctions, structures, under/overpasses, PUP/CUP, wayside amenities etc	Geometry or shape files : .shp/.dxf, .dwg/.dgn files options
3. 3	Proposed roadway model	Proposed digital roadway model and design data- including embankment, road way, road layers, roadside amenities, signals, road furniture, markings and other construction elements in Section 19	.dxf/.dtm
3. 4	Proposed structures	Geo referenced location and alignment, Section 19 model of structure and appurtenances, cross section, plan and profile drawings for construction as per IRC	.dxf/.dtm

3. 5	Proposed highway cross sections	Roadway cross sections for homogenous sections	.dxf files Digital surface model in .dxf format
4	Other deliverables		
4. 2	Financial analysis	Spreadsheet model with instructions, index and containing all inputs and assumptions, time series construction and operating costs, revenues, financing and equity cash flows, NPV/IRR, sensitivity scenarios and results	ODF sheets, MS office

3 Online hosting and archival of deliverables

3.1 Hosting deliverables online

- i. The consultant shall store all deliverables from this assignment on a secure online file hosting platform that is remotely accessible by authorised users on the world wide web
- ii. The consultant shall provide read only access to all relevant officers of Project Dantak, Border Roads Organisation and provide further access to additional users as and when requested by CE(P) Dantak, Border Roads Organisation
- iii. Consultant shall provide a point of contact for access to these files, solving any technical issues and shall respond to all requests in a timely manner
- iv. Consultant shall ensure that the files are hosted in a platform that conforms to any file hosting and file sharing security standards as may be laid down by the government of India

3.2 Deliverables to be hosted

- i. Data and deliverables to be hosted in an online accessible format shall include but not be limited to:

- ii. All draft and final deliverables in the digital formats prescribed in this TOR and in file formats in wide use where formats are not specified
- iii. Data, images and videos from all surveys and investigations conducted of this enclosure
- iv. All correspondence to and from CE(P) Dantak, Border Roads Organisation including clients 'comments on submitted reports
- v. Any communication, letters and approvals to and from other government local agencies and any other relevant body
- vi. The platform shall also contain an index and table of contents of information being hosted for ease of access and use

3.3 Time period and costs

- i. Access to above mentioned files will be provided till the end of construction (final commercial operations date of contractor/ concessionaire) of all packages that form a part of this assignment at the cost of the consultant
- ii. Access to additional users shall also be at no additional cost to the authority

Proof of Eligibility

Form-E1

Letter of Proposal (On Applicant's letter head)

(Date and Reference)

To, *****

Sub: Appointment of Consultant for preparation of Detailed Project Report for

.....

Dear Sir,

With reference to your RFP Document dated, I/we i.e M/s-----

-- ----- (Name of Bidder) having examined all relevant documents and understood their contents, hereby submit our Proposal for selection as Consultant. The proposal is unconditional and unqualified.

2. All information provided in the Proposal uploaded on INFRACON and in the Appendices is true and correct and all documents accompanying such Proposal are true copies of their respective originals.
3. This statement is made for the express purpose of appointment as the Consultant for the aforesaid Project.
4. I/We shall make available to the Authority any additional information it may deem necessary or require for supplementing or authenticating the Proposal.
5. I/We acknowledge the right of the authority to reject our application without assigning any reason or otherwise and hereby waive our right to challenge the same on any account whatsoever.
6. I/We certify that in the last three years, we or any of our Associates have neither failed to perform on any contract, as evidenced by imposition of a penalty by an arbitral or judicial authority or a judicial pronouncement or arbitration award against the Applicant, nor been expelled from any project or contract by any public authority nor have had any contract terminated by any public authority for breach on our part.
7. I/We understand that you may cancel the Selection Process at any time and

that you are neither bound to accept any Proposal that you may receive nor to select the Consultant, without incurring any liability to the Applicants in accordance with Clause 1.7 of the RFP document.

8. I/We declare that we/any member of the consortium, are/is not a Member of any other Consortium applying for Selection as a Consultant.
9. I/We certify that in regard to matters other than security and integrity of the country, we or any of our Associates have not been convicted by a Court of Law or indicted or adverse orders passed by a regulatory authority which would cast a doubt on our ability to undertake the Consultancy for the Project or which relates to a grave offence that outrages the moral sense of the community.
10. I/We further certify that in regard to matters relating to security and integrity of the country, we have not been charge-sheeted by any agency of the Government or convicted by a Court of Law for any offence committed by us or by any of our Associates.
11. I/We further certify that no investigation by a regulatory authority is pending either against us or against our Associates or against our CEO or any of our Directors/Managers/employees.
12. I/We hereby irrevocably waive any right or remedy which we may have at any stage at law or howsoever otherwise arising to challenge or question any decision taken by the Authority [and/ or the Government of India] in connection with the selection of Consultant or in connection with the Selection Process itself in respect of the above mentioned Project.
13. The Bid Security of Rs ***** (Rupees ***** only) in the form of Bank Guarantee is attached, in accordance with the RFP document.
14. I/We agree and understand that the proposal is subject to the provisions of the RFP document. In no case, shall I/we have any claim or right of whatsoever nature if the Consultancy for the Project is not awarded to me/us or our proposal is not opened or rejected.
15. I/We agree to keep this valid for 120 (One hundred and twenty) days from the Proposal Due Date specified in the RFP.
16. A Power of Attorney in favor of the authorized signatory to sign and submit this Proposal and documents is attached herewith.
17. In the event of my/our firm/consortium being selected as the Consultant, I/we agree to enter into any Agreement in accordance with the form Appendix V of the RFP. We agree not to seek any changes in the aforesaid form and agree to abide by the same.

18. I/We have studied RFP and all other documents carefully and also surveyed the Project site. We understand that except to the extent as expressly set forth in the Agreement, we shall have no claim, right or title arising out of and documents or information provided to us by the Authority or in respect of any matter arising out of or concerning or relating to the Selection Process including the award of Consultancy.
19. The Proof of Eligibility and Technical proposal are being submitted in separate covers in hard copy (as per clause 4.1 of Lol). Financial Proposal is being submitted offline only. This Proof of Eligibility read with Technical Proposal and Financial Proposal shall constitute the Application which shall be binding on us.
20. I/We agree and undertake to abide by all the terms and conditions of the RFP Document. In witness thereof, I/we submit this Proposal under and in accordance with the terms of the RFP Document.

Yours faithfully,

(Signature, name and designation of the authorized
signatory) (Name and seal of the Applicant/Lead Member)

Form-E2/T3

FIRM'S REFERENCESRelevant Services Carried out in the Last Ten Years (2013-14 onwards) Which Best Illustrate Qualifications

The following information should be provided in the format below for each reference assignment for which your firm, either individually as a corporate entity or as one of the major companies within a consortium, was legally contracted by the client:

Assignment Name:		Country:
Location within Country :		Professional Staff Provided by your firm:
Name of Client :		No. of Staff :
Address :		No. of Staff Months :
Start Date (Month / Year)	Completion Date (Month / Year)	Approx. Value of Services : (in INR/current USD) :
Name of JV/Association Firm(s) if any :		No. of Months of Professional Staff provided by Associated Firm(s)
Status of your Company in the Assignment i.e., Sole/Associate		
Narrative Description of Project :		
Description of Actual Services Provided by your Company:		

Signature of Authorized Representative

(Certificate from Employer regarding experience should be furnished)

APPENDIX-II

Form- E3 Financial Capacity of the Applicant

Name of Applicant:

Sr · N o.	[Financial Year]*	Annual Revenue (Rs/US \$ in million)
1	Year preceding the year in which the proposal is invited	
2	Year preceding the year in which the proposal is invited by 2 years	
3	Year preceding the year in which the proposal is invited by 3 years	
4	Year preceding the year in which the proposal is invited by 4 years	
5	Year preceding the year in which the proposal is invited by 5 years	

Certificate from the Statutory Auditor\$

This is to certify that ----- (name of the Applicant) has received the payments shown above against the respective years on account of Consultancy Services.

Name of the audit firm Seal of the audit firm Date

(Signature, name and designation of the authorized signatory)

\$In case he Applicant does not have a statutory auditor, it shall provide the certificate from its chartered accountant that ordinarily audits the annual account of the Applicant.

Note:

*Financial year to be modified as applicable

Please do not attach any printed Annual Financial Statement.

Form- E4

APPENDIX-II

BANK GUARANTEE FORMAT FOR BID SECURITY

(To be stamped in accordance with Stamp Act if any, of the country of issuing bank)

Ref.: Tender No. _____, dated _____

Bank Guarantee:

Date:

WHEREAS, _____ (Name of Bidder) _____ (hereinafter called "the bidder") has submitted his bid

dated _____ (date) for the Tender No. _____, dated _____ (hereinafter called "the Bid". KNOW ALL MEN by these presents that We, [Name of Bank] of [Name of Country] having our registered office at (hereinafter called _____ "the Bank") are bound unto [name of employer] (hereinafter called "the Employer") in the sum of Rs. (Rupees Lakhs only) for which payment will and truly to be made to the said employer the bank binds himself, his successors and assigns by these presents. SEALED with the Common Seal of the said Bank this day of 201_.

THE CONDITIONS of this obligation are:

1. If the Bidder withdraws his Bid during the period of bid validity specified in the Bid document; or
2. If the Bidder does not accept the correction of arithmetical errors of his Bid Price in accordance with the Instructions to Bidder; or
3. If the Bidder having been notified of the acceptance of his Bid by the Employer during the period of bid validity,

a. fails or refuses to execute the Form of Agreement in accordance with the Instructions to Bidders, if required; or

b. fails or refuses to furnish the Performance Security, in accordance with the letter of invitation, we undertake to pay the Employer up to the above amount upon receipt of his first written demand, without the Employer having to substantiate his demand, provided that in his demand the Employer will note that the amount claimed by him is due to him owing to the occurrence of one or any of the conditions, specifying the occurred condition or conditions. This Guarantee will remain in force up to and including the date 150 (one hundred and fifty) days after the deadline for submission of bids as such deadline is stated in the Instructions to Bidders or as it may be extended by the Employer, notice of which extension(s) to the Bank is hereby waived. Any demand in respect of this Guarantee should reach the Bank not later than the above date. Notwithstanding anything contained herein before, our liability under this guarantee is restricted to

_____ Rs. _____ (Rs. _____) and the guarantee shall remain valid till _____. Unless a claim or a demand in writing is made upon us on or before _____ all our liability under this guarantee shall cease

DATE _____

SIGNATURE OF THE BANK _____

SEAL OF THE BANK _ SIGNATURE

Name and Address of the Witness _____

The bank guarantee shall be issued by a bank (Nationalized/Scheduled) located in India

(Form-T1)

TECHNICAL PROPOSAL

FROM:

TO:

Sir:

Subject Consultancy Service for

Regarding Technical Proposal

I/We _____ (name of Bidder) Consultant/ Consultancy
firm herewith enclose Technical Proposal for selection of my/our firm/organization as
Consultant for

Yours faithfully,

Signature

Full Name Designation

Address

(Authorized Representative)

(Form-T-2)

Details of projects for which Technical and Financial Proposals have been submitted

Sl. No.	<i>Name of Project</i>	Consultancy Package No.	Names of Proposed Key Personnel

REFERENCES**Relevant Services Carried out in the Last Ten Years Which Best Illustrate Qualifications**

The following information should be provided in the format below for each reference assignment for which your firm, either individually as a corporate entity or as one of the major companies within a consortium, was legally contracted by the client:

Assignment Name:		Country:
Location within Country :		Professional Staff Provided by your firm:
Name of Client :		No. of Staff :
Address :		No. of Staff Months :
Start Date (Month / Year)	Completion Date (Month / Year)	Approx. Value of Services : (in INR/current USD) :
Name of JV/Association Firm(s) if any :		No. of Months of Professional Staff provided by Associated Firm(s)
Status of your Company in the Assignment i.e., Sole/Lead Member/Other Member/Associate		
Narrative Description of Project :		
Description of Actual Services Provided by your Company:		

Signature of Authorised Representative

(Certificate from Employer regarding experience should be furnished)

4

Form- T4

SITE APPRECIATION

Shall give details of site as per actual site visit and data provided in RFP and collected from site supported by photographs to demonstrate that responsible personnel of the Consultant have actually visited the site and familiarized with the salient details/complexities and scope of services.

Composition of the Team Personnel and the task Which would be assigned to each Team Member

I. Technical/Managerial Staff

.No.	Name	Position	Task
	Assignment 1.		
	Support Staff		

No.	Name	Position	Task Assignment
-----	------	----------	-----------------

Sr

2.

3.

4.

II.

Sr.

1.

2.

3.

4.

....

....

**APPROACH PAPER ON METHODOLOGY PROPOSED FOR PERFORMING THE
ASSIGNMENT**

The approach and methodology will be detailed precisely under the following topics.

- 1) Methodology for services, surveying, data collection [not more than 2 pages] and analysis
- 2) Quality Assurance system for consultancy assignment [not more than 1 page]
- 3) The key challenges foreseen and proposed solutions will be detailed precisely under the following topics
 - a) proposed alignment and bypass required
 - b) access control, rehabilitation of existing road, drainage and utilities
 - c) adoption of superior technology along with proof (to be submitted in Form T9)

Replies to items 3) a) to c) should be limited to six A4 size pages in 1.5 space and 12 font including photographs, if any

Details of Material Testing Facility

1. State whether the Applicant has in-house Material Testing Facility Available / Outsourced / Not Available
2. In case answer to 1 is Available, attach a list of Lab equipment and facility for testing of materials and location of laboratory
3. In case laboratory is located at a distance of more than 400 km from the project site, state arrangements made / proposed to be made for testing of materials
4. In case answer to 1 is Outsourced / Not Available state arrangements made / proposed to be made for testing of materials.

Facility for Field investigation and Testing

1. State whether the Applicant has in-house Facility for
 - a) Geo-technical investigation Available (created in-house at site)/ Outsourced/ Not Available
 - b) Pavement investigation Available (created in-house at site)/ Outsourced/ Not Available
2. In case answer to 1 is Available (created in-house at site) a list of field investigation and testing equipments available in-house
3. In case answer to 1 is Outsourced/ Not Available arrangements made/proposed to be made for each of above Field investigation and testing
4. For experience in LIDAR or better technology for topographic survey, GPR and Induction Locator or better technologies for detection of sub-surface utilities and digitization of cadastral maps for land acquisition, references need to be provided in following format:

REFERENCES

Relevant Services Carried Out Which Best Illustrate Qualifications

The following information should be provided in the format below for each reference assignment for which your firm, either individually as a corporate entity or as one of the major companies within a consortium, was legally contracted by the client:

Assignment Name:		Country:
Location within Country :		Professional Staff Provided by your firm:
Name of Client :		No. of Staff :
Address :		No. of Staff Months :
Technology Used:		
Start Date (Month / Year)	Completion Date (Month / Year)	Approx. Value of Services : (in INR/current USD) :
Name of JV/Association Firm(s) if any :		No. of Months of Professional Staff provided by Associated Firm(s)
Status of your Company in the Assignment i.e., Sole/Lead Member/Other Member/Associate		
Narrative Description of Project :		
Description of Actual Services Provided by your Company:		

Signature of Authorised Representative

(Certificate from Employer regarding experience should be furnished)

Form- T-9

Office Equipment and software

Attach a list of office equipment and software owned by the Applicant

(Curriculum Vitae as per INFRACON)

CVs of the Key Personnel should be uploaded on INFRACON and the hard copies of the CVs as uploaded on the INFRACON is to be submitted along with the Technical Proposals.

UNDERTAKING FROM THE PROFESSIONAL

Name of Work:

Position in the Team:

I, (Name) have not left any assignment with the consultants/ contractors engaged by Client viz. MoRT&H /NHAI/NHIDCL/ IAHE/BRO/ State PWD or any other MoRTH implementing agency without completing my assignment. I will be available for the entire duration of the current project for which I am being included in the team. If I leave this assignment in the middle of the completion of the work, I may be debarred for an appropriate period to be decided by Client. I shall also have no objection if my services are extended by Client for this work in future.

I, the undersigned, also certify that to the best of my knowledge and belief, my biodata, information and credentials uploaded on INFRACON portal truly describe myself, my qualification and my experience. I shall be liable for any action, as deemed fit, in case there is any mis-representation in this regard.

Date:

Place:

Signature

(Name of Key Personnel)

UNDERTAKING FROM CONSULTING FIRM

Name of Work:

The undersigned on behalf of (Name of Consulting Firm) with certify that none of the Key Personnel included in our team to the best of our knowledge has left his/her assignment with any consulting/ contracting firm engaged by MoRT&H /NHAI/NHIDCL/ IAHE/BRO/ State PWD or any other MoRTH implementing agency. We also confirm the truthfulness of the credentials uploaded by our firm/Associate and all the Key Personnel proposed in our team on INFRACON.

We understand that if any information about our firm/Associate / Key Personnel is found contrary to what has been uploaded on INFRACON, the Client would be at liberty to remove the concerned personnel from the present assignment and debar our firm/Associate / Key Personnel for an appropriate period to be decided by the Client.

Date:

Place:

Signature
(Name of Authorized Signatory)

Format for Technical Capacity of Applicants

**(TO BE FILLED BY THE SOLE CONSULTANT
BIDDING FOR THE ASSIGNMENT)**

(i) No. of Key Professionals on full time roll:

Sl. No.	Name of the Key Professional	Designation	Continuous Employment from (Date)	Nos. of Years with the firm

Note: Attach copy of Form-26AS to certify permanent. However, Director of the Consultant's company is not required to submit Form-26AS.

(ii) Details of all in-hand DPR projects or DPR projects awarded by MoRTH or its executing agencies for NH works and centrally sponsored road works:

S l. N o .	Project Description	Bids for Civil Works received or Original assignment period+ one year lapsed (Yes/ No)	Start Date	Scheduled Completion	Whether awarded in Current Financial Year (Yes/ No)	In case of JV, share of Contract Fee (%)
1	2	3	4	5	6	7

Format for undertaking by the firm for DPR Projects:

The undersigned on behalf of ----- (name of consulting firm) certify that the firm do not have any other in-hand/ awarded DPR project other than those listed above.

Date: (dd/mm/yyyy)

[Signature of authorized representative of the Firm]

(iii)Details of all in-hand AE/ IE/ SC projects or AE/ IE/ SC awarded by MoRTH or its executing agencies for NH works and centrally sponsored road works:

S I. N o .	Project Description	Civil works Provisionally completed or Original assignment period+ one year lapsed (Yes/ No)	Start Date	Scheduled Completion	Whether awarded in Current Financial Year (Yes/ No)	In case of JV, share of Contract Fee (%)
1	2	3	4	5	6	7

Format for undertaking by the firm for in-hand AE/ IE/ SC Projects:

The undersigned on behalf of ----- (name of consulting firm) certify that the firm do not have any other in-hand/ awarded AE/ IE/ SC project other than those listed above.

Date: (dd/mm/yyyy)

*[Signature
of
authorized
represent
ative of
the Firm]*

Note 1:

The figures in Col 7 be rounded off to the nearest integer i.e. in case remaining bid capacity comes to 0.5 or more then it will be considered as 1, in case less than 0.5 then it will be considered as 0 (Zero). **Note 2:**

Clarification for technical capacity utilised in case of JV with other firm than proposed in current assignment.

In case Firm-1 proposes for new JV with other partner, then capacity utilisation will be calculated on the basis of JV share in existing assignments e.g.

JV in one project with 30% share:-One project $\times$ 0.3=0.3

JV in one project with 70% share:-One project $\times$ 0.7=0.7

JV in one project with 50% share:-One project $\times$ 0.5=0.5

JV in two projects with 80% share:-Two project $\times$ 0.8=1.6

The weighted utilization of the Capacity of Firm-1=3.1

Note 3:

The Consultant shall re-submit the bid capacity details as per above format at the time of opening of Financial Bid.

INTEGRITY PACT FORMAT

This integrity Pact is made at ____ on this ____ day of _____ 20 . BETWEEN
 [President of India through CE (P) Dantak, Border Roads Organisation,
 Ministry of Defence], (hereinafter referred to as the “Principal/Owner”, which
 expression shall, unless repugnant to the context or meaning thereof, include
 its administrators, successors and assigns)

AND

{Name and address of the Firm/Company}, (hereinafter referred to as “The
 Bidder(s)/Contractor(s)/Concessionaire(s)/Consultant(s)” and which
 expression shall unless repugnant to be meaning or context thereof include
 its successors and permitted assigns.)

Preamble

Whereas, the Principal has floated the Tender {NIT
 No.....dtd.....} (here in after referred to as “Tender/Bid”) and
 intends to award, under laid down organizational procedure, contract/s for
 {Name of the work} (hereinafter referred to as the “Contract”).
 And Whereas the Principal values full compliance with all relevant laws of the
 land, rules of land, regulations, economic use of resources and of fairness/
 transparency in its relations with its Bidder(s) and/ or
 Contractor(s)/Concessionaire(s)/Consultant(s).

And whereas to meet the purpose aforesaid, both the parties have agreed to
 enter into this Integrity Pact (hereafter referred to as “Integrity Pact” or “Pact”)
 the terms and conditions of which shall also be read as integral part and parcel
 of the Tender documents and contract between the parties.

Now, therefore, in consideration of mutual covenants contained in this pact, the
 parties hereby agree as follows and this pact witnesses as under:

Article-1: Commitments of the Principal

(1) The Principal commits itself to take all measures necessary to prevent corruption and to observe the following principles:-

(a) No employee of the Principal, personally or through family members, will in connection with the Tender for, or the execution of a Contract, demand, take a promise for or accept, for self, or third person, any material or immaterial benefit which the person is not legally entitled to.

(b) The Principal will, during the Tender process treat all Bidder(s) with equity and reason. The Principal will in particular, before and during the Tender process, provide to all Bidder(s) the same information and will not provide to any Bidder(s) confidential/ additional information through which the Bidder(s) could obtain an advantage in relation to the tender process or the contract execution.

(c) The Principal will exclude all known prejudiced persons from the process, whose conduct in the past has been of biased nature.

(2) If the Principal obtains information on the conduct of any of its employees which is a criminal offence under the IPC/PC Act or any other Statutory Acts or if there be a substantive suspicion in this regard, the Principal will inform the Chief Vigilance Officer and in addition can initiate disciplinary actions as per its internal laid down

Rules/Regulations.

Article – 2: Commitments of the Bidder(s)/ Contractor(s)/ Concessionaire(s)/ Consultant(s).

The Bidder(s)/ Contractor(s)/ Concessionaire(s)/ Consultant(s) commit himself to take all measures necessary to prevent corruption. He commits himself to observe the following principles during his participation in the tender process and during the contract execution.

(a) The Bidder(s)/ Contractor(s)/ Concessionaire(s)/ Consultant(s) will not, directly or through any other person or firm, offer, promise or give to any of the Principal's employees involved in the tender process or the execution of the contract or to any third person any material or other benefit which he/she is not legally entitled to, in order to obtain in exchange any advantage of any kind whatsoever during the tender process or during the execution of the contract.

(b) The Bidder(s)/ Contractor(s)/ Concessionaire(s)/ Consultant(s) will not enter with other Bidders into any undisclosed agreement or understanding, whether formal or informal.

This applies in particular to prices, specifications, certifications, subsidiary contract, submission or nonsubmission of bids or any other actions to restrict competitiveness or to introduce cartelization in the bidding process.

- (c) The Bidder(s)/ Contractor(s)/ Concessionaire(s)/ Consultant(s) will not commit any offence under the relevant IPC/PC Act and other Statutory Acts; further the Bidder(s)/Contractor(s)/Concessionaire(s)/Consultant(s) will not use improperly, for purposes of completion or personal gain, or pass on to others, any information or document provided by the Principal as part of the business relationship, regarding plans, technical proposals and business details, including information contained or transmitted electronically.
- (d) The Bidder(s)/ Contractor(s)/ Concessionaire(s)/ Consultant(s) of foreign origin shall disclose the name and address of the Agents/ Representatives in India, if any. Similarly, the Bidder(s)/ Contractor(s)/ Concessionaire(s)/ Consultant(s) of Indian Nationality shall furnish the name and address of the foreign principle, if any.
- (e) The Bidder(s)/ Contractor(s)/ Concessionaire(s)/ Consultant(s) will, when presenting his bid, disclose any and all payments he has made, is committed to or intends to make to agents, brokers or any other intermediaries in connection with the award of the contract. He shall also disclose the details of services agreed upon for such payments.
- (f) The Bidder(s)/ Contractor(s)/ Concessionaire(s)/ Consultant(s) will not instigate third persons to commit offences outlined above or be an accessory to such offences.
- (g) The Bidder(s)/ Contractor(s)/ Concessionaire(s)/ Consultant(s) will not bring any outside influence through any Govt. bodies/quarters directly or indirectly on the bidding process in furtherance of his bid.

Article - 3 Disqualification from tender process and 9 exclusion from future contracts.

- (1) If the Bidder(s)/ Contractor(s)/ Concessionaire(s)/ Consultant(s), before award or during execution has committed a transgression through a violation of any provision of Article-2, above or in any other form such as to put his reliability or credibility in question, the Principal is entitled to disqualify the Bidder(s)/ Contractor(s)/ Concessionaire(s)/ Consultant(s) from the tender process.
- (2) If the Bidder(s)/ Contractor(s)/ Concessionaire(s)/ Consultant(s) has committed a transgression through a violation of Article-2 such as to put

his reliability or credibility into question, the Principal shall be entitled to exclude including blacklist and put on holiday the Bidder(s)/ Contractor(s)/ Concessionaire(s)/ Consultant(s) for any future tenders/ contract award process. The imposition and duration of the exclusion will be determined by the severity of the transgression. The severity will be determined by the Principal taking into consideration the full facts and circumstances of each case particularly taking into account the number of transgressions, the position of the transgressors within the company hierarchy of the Bidder(s)/ Contractor(s)/Concessionaire(s)/ Consultant(s) and the amount of the damage. The exclusion will be imposed for a maximum of 3 years.

(3) A transgression is considered to have occurred if the Principal after due consideration of the available evidence concludes that “On the basis of facts available there are no material doubts”.

(4) The Bidder(s)/ Contractor(s)/ Concessionaire(s)/ Consultant(s) with its free consent and without any influence agrees and undertakes to respect and uphold the Principal’s absolute rights to resort to and impose such exclusion and further accepts and undertakes not to challenge or question such exclusion on any ground, including the lack of any hearing before the decision to resort to such exclusion is taken. This undertaking is given freely and after obtaining independent legal advice.

(5) The decision of the Principal to the effect that a breach of the provisions of this

Integrity Pact has been committed by the Bidder(s)/ Contractor(s)/ Concessionaire(s)/Consultant(s)shall be final and binding on the Bidder(s)/ Contractor(s)/Concessionaire(s)/ Consultant(s), however, the Bidder(s)/ Contractor(s)/Concessionaire(s)/ Consultant(s) can approach IEM(s) appointed for the purpose of this Pact.

(6) On occurrence of any sanctions/ disqualification etc arising out from violation of integrity pact, the Bidder(s)/ Contractor(s)/ Concessionaire(s)/ Consultant(s) shall not be entitled for any compensation on this account.

(7) Subject to full satisfaction of the Principal, the exclusion of the Bidder(s)/ Contractor(s)/Concessionaire(s)/ Consultant(s) could be revoked by the Principal if the Bidder(s)/Contractor(s)/ Concessionaire(s)/ Consultant(s)can prove that he has restored/ recouped the damage caused by him and has installed a suitable corruption prevention system in his organization. Article – 4: Compensation for Damages.

(1) If the Principal has disqualified the Bidder(s) from the tender process prior to the award according to Article-3, the Principal shall be entitled to forfeit the Earnest Money Deposit/ Bid Security or demand and recover the

damages equivalent to Earnest Money Deposit/ Bid Security apart from any other legal right that may have accrued to the Principal.

(2) In addition to 1 above, the Principal shall be entitled to take recourse to the relevant provisions of the contract related to Termination of Contract due to Contractor/Concessionaire/Consultant's Default. In such case, the Principal shall be entitled to forfeit the Performance Bank Guarantee of the Contractor/ Concessionaire/ Consultant and/ or demand and recover liquidated and all damages as per the provisions of the contract/concession agreement against Termination.

Article – 5: Previous Transgressions

(1) The Bidder declares that no previous transgressions occurred in the last 3 years immediately before signing of this Integrity Pact with any other Company in any country conforming to the anti corruption/ Transparency International (TI) approach or with any other Public Sector Enterprise/ Undertaking in India or any Government Department in India / **Bhutan** that could justify his exclusion from the tender process.

(2) If the Bidder makes incorrect statement on this subject, he can be disqualified from the tender process or action for his exclusion can be taken as mentioned under Article-3 above for transgressions of Article-2 and shall be liable for compensation for damages as per Article-4 above.

Article – 6: Equal treatment of all Bidders/ Contractors/ Concessionaires/ Consultants/Subcontractors.

(1) The Bidder(s)/ Contractor(s)/ Concessionaire(s)/ Consultant(s) undertake(s) to demand from all sub-contractors a commitment in conformity with this Integrity Pact, and to submit it to the Principal before contract signing.

(2) The Principal will enter into agreements with identical conditions as this one with all Bidders/ Contractors/ Concessionaires/ Consultants and subcontractors.

(3) The Principal will disqualify from the tender process all Bidders who do not sign this Pact or violate its provisions.

Article – 7: Criminal charges against violating Bidder(s)/ Contractor(s)/ Concessionaire(s)/Consultant(s)/ Sub-contractor(s).

If the Principal obtains knowledge of conduct of a Bidder/ Contractor/ Concessionaire/Consultant or subcontractor, or of an employee or a

representative or an associate of a Bidder/Contractor/ Concessionaire/ Consultant or Subcontractor, which constitutes corruption, or if the Principal has substantive suspicion in this regard, the Principal will inform the same to the Chief Vigilance Officer.

Article- 8: Independent External Monitor (IEM)

(1) The Principal has appointed Shri. R.S. Gujral as Independent External Monitor (herein after referred to as “Monitor”) for this Pact. The task of the Monitor is to review independently and objectively, whether and to what extent the parties comply with the obligations under this agreement.

(2) The Monitor is not subject to instructions by the representatives of the parties and performs his functions neutrally and independently. He reports to the Director General (Road Development) & Special Secretary.

(3) The Bidder(s)/ Contractor(s)/ Concessionaire(s)/ Consultant(s) accepts that the Monitor has the right to access without restriction to all project documentation of the Principal including that provided by the Bidder(s)/ Contractor(s)/ Concessionaire(s)/ Consultant(s). The Bidder(s)/ Contractor(s)/ Concessionaire(s)/ Consultant(s) will also grant the Monitor, upon his request and demonstration of a valid interest, unrestricted and unconditional access to his project documentation. The same is applicable to Subcontractors. The Monitor is under contractual obligation to treat the information and documents of the Bidder(s)/Contractor(s)/Subcontractor(s) with confidentiality. (4) The Principal will provide to the Monitor sufficient information about all meetings among the parties related to the Project provided such meetings could have an impact on the contractual relations between the Principal and the Contractor. The parties offer to the Monitor the option to participate in such meetings.

(5) As soon as the Monitor notices, or has reason to believe, a violation of this Pact, he will so inform the Management of the Principal and request the Management to discontinue or take corrective action, or to take other relevant action. The monitor can in this regard submit non-binding recommendations. Beyond this, the Monitor has no right to demand from the parties that they act in a specific manner, refrain from action or tolerate action.

(6) The Monitor will submit a written report to the Director General (Road Development) & Special Secretary within 8 to 10 weeks from the date of reference or intimation to him by the Principal and, should the occasion arise, submit proposals for correcting problematic situations.

(7) If the Monitor has reported to the Director General (Road Development) & Special Secretary, a substantiated suspicion of an offence under relevant IPC/PC Act, and the Director General (Road Development) & Special Secretary has not, within the reasonable time taken visible action to proceed

against such offence or reported it to the Chief Vigilance Officer, the Monitor may also transmit this information directly to the Central Vigilance Commissioner.

(8) The word 'Monitor' would include both singular and plural.

Article – 9 Pact Duration

This Pact begins when both parties have legally signed it (in case of EPC i.e. for projects funded by Principal and consultancy services). It expires for the Contractor/ Consultant 12 months after his Defect Liability Period is over or 12 months after his last payment under the contract whichever is later and for all other unsuccessful Bidders 6 months after this Contract has been awarded. (In case of BOT Projects) It expires for the concessionaire 24 months after his concession period is over and for all other unsuccessful Bidders 6 months after this Contract has been awarded. If any claim is made/ lodged during his time, the same shall be binding and continue to be valid despite the lapse of this pact as specified above, unless it is discharged/ determined by Director General (Road Development) & Special Secretary.

Article - 10 Other Provisions.

- (1) This pact is subject to Indian Law. Place of performance and jurisdiction is the Registered Office of the Principal, i.e. New Delhi.
- (2) Changes and supplements as well as termination notices need to be made in writing.
- (3) If the Bidder/Contractor/Concessionaire/Consultant is in a partnership or a consortium Joint Venture partner, this pact must be signed by all partners or consortium members.
- (4) Should one or several provisions of this agreement turn out to be invalid, the remainder of this agreement remains valid. In this case, the parties will strive to come to an agreement to their original intentions.
- (5) Any disputes/ differences arising between the parties with regard to term of this pact, any action taken by the Principal in accordance with this Pact or interpretation thereof shall not be subject to any Arbitration.
- (6) The actions stipulated in this Integrity Pact are without prejudice to any other legal action that may follow in accordance with the provision of the extent law in force relating to any civil or criminal proceedings.

In witness whereof the parties have signed and executed this Pact at the place and date first done mentioned in the presence of following witness:-

(For & On behalf of the Principal)

Office Seal) (For & On behalf of the
Bidder/ Contractor/Concessionaire/
Consultant)

Place

Date_

Witnessed

Witness 1:(Name & Address)

Witness 2: (Name & Address)

{COUNTERSIGNED and accepted by:JV Partner}

(Form-I)

FINANCIAL PROPOSALS

FROM:

TO:

Sir:

Subject: Consultants 'Services for

Regarding Price Proposal

I/We _____ Consultant/consultancy firm herewith enclose
*Price Proposal for selection of my/our firm/organization as Consultant for

Yours faithfully,

Signature

Full Name _____

Designation _____

Address _____

(Authorized Representative)

***The Financial proposal is to be filled strictly as per the format given in RFP.**

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(Form-II)

Format of Financial Proposal

Summary of Cost in Local Currency

No.	Description	Amount (LC)* (INR)
I	Local Consultants Remuneration for Local Staff (inclusive of per diem allowance)	
	Support Staff (inclusive of per diem allowance)	
	Transportation	
	Duty Travel to Site	
	Office Rent	
	Office Supplies, Utilities and Communication	
	Office Furniture and Equipment (Rental)	
	Reports and Document Printing	
IX	Surveys & Investigations a)Topographical Survey b)Investigations c)Network survey & GPR	
	Cost of supply and fixing Boundary Pillars	
	Subtotal Local Consultants :	
	Foreign Consultants	
	Remuneration for Expatriate Staff	
	Mobilization and Demobilization	
	Total Cost Net of Tax :	
Taxes and Duties	I. Income Tax (Expatriate) II. Other Taxes/ Duties (if any) Specify clearly	

	Total cost net of Goods & service tax**	
	Goods & Service Tax	
	TOTAL COSTS (Including GST)	

LC* Local Currency

** Total Cost Net of Goods & Service Tax shall be considered for financial evaluation

Note: No escalation will be payable during the services except where period of consultancy services is more than 18 months. In such cases, payment for any stage shall be modified (+/-) by following formula: Price adjustment (Rs.)=

0.85* payment percentage for particular stage*contract price*L1/L0 where Lo and L1 are the average wage indices for the quarter before the quarter in which base month falls and for the quarter before the quarter in which date of supply falls; respectively. For example for a tender opening on March 17, 2016 (base date), Lo would be average wage index for the quarter of Oct-Dec 2015.

Insurances shall not be allowed separately. These will be incidental to main items.

Rates for all items shall be quoted in figures as well as in words.

(Form-III)

Estimate of Local Currency Costs

I. Remuneration for Local Staff (including per diem allowance)

Note - For proper assessment of utility estimates and proper drainage system provisions, DPR consultant shall also engage utility expert and drainage expert at sub-professional level, with relevant technical expertise in respective fields.

For Standalone Tunnel Project

Sr. No.	Position	Name	Rate (INR)	Staff Month	Amt.(IN R)
	Professional Staff				
1	Team Leader cum Tunnel Expert			10	
2	Tunnel Design Expert			10	
3	Geophysicist			6	
4	Geotechnical Engineer			10	
5	Senior ventilation cum fire safety expert (E&M Expert)			6	
6	Geologist			10	
7	Environmental Specialist			8	
8	Material Engineer			6	
9	Highway/ Pavement Engineer			6	
10	Quantity Surveyor/ Documentation Expert			4	
11	Sr Survey Engineer			4	
12	Utility Expert			5	
	Sub-Total:			85	
	Sub-Professional Staff	(To be assessed by Consultant as per requirement of assignment and one sub-professional be a fresh graduate)			
1	Asst Highway Engineer			10	
2	Jr Material Engineer			10	

3	Traffic Engineer			10	
4	Jr Bridge Engineer			10	
5	Asst Geologist			10	
6	Asst Environmental Specialist			10	
7	Asst Surveyor			10	
	TOTAL			70	

II. Support Staff

N o.	Position	Na me	Staff Months	Billing Rate (INR)	Amount (INR)
1	Office Manager		10		
2	Typist		10		
3	Office Boy		10		
4	Night Watchman		10		
			40	Total :	

III. Transportation (Fixed costs)

S . N o	Description	Qt y.	Nos. of months	Rate/ Month (INR)	Amou nt (INR)
1	The vehicles provided by the Consultants shall include the cost for rental, drivers, operation, maintenance, repairs, insurance, etc. A. For use of consultants	1	10		
	Total				

IV. **Duty Travel to Site (Fixed Costs)**

Trips	Nos	Rate	Amount
12	10		
12	10		

V. **Office Rent (Fixed Costs)**

The rent cost includes maintenance, cleaning,

repairs, etc. per month x 10

Total__

VI. **Office Supplies, Utilities and Communication (Fixed Costs)**

N o.	Item	Months	Monthly Rate (INR)	Amount In INR.
1	Office Supplies Drafting	10		
2	Supplies Computer	10		
3	Running Costs	10		
4	Domestic and International Communication	10		

TOTAL:-----

VII. **Office Furniture and Equipment (Rental)**

N o.	Description	Unit	Quantity	Rate (INR)	Amount (INR)
1	Office Furniture and Equipment		LS		
				Total	

VIII. Reports and Document Printing

No.	Description	No. of Copies	Rate per Copy (INR.)	Amount (INR)
1	Monthly Report @ 3 Per Month	30		
2	Inception Report & QAP	3		
3	Environment and Social Impact Screening Report	4		
4	Draft Feasibility Report	4		
5	Final Feasibility Report	6		
6	Draft Environmental Assessment report & RAP	4		
7	Final Environmental Assessment report & RAP	6		
8	Draft Detailed Design Report & Drawings etc. Draft EMP	4 4		
9	Draft Bidding Documents	4		
13	Final Detailed Project Report with Bill of Quantities, Cost Estimates, Updated Drawings etc. Final EMP	6 6		
14	Final Bidding Documents	6		
			Total	

Note - In case of splitting of the project in packages after alignment is finalized, the additional payment in respect of reports and document printing shall be made on prorata basis of accepted financial proposal according to additional number of documents submitted, as mentioned above.

IX. Survey and Investigation

A. Topographical Survey (Fixed Rate)

N o.	Item	Kms	Rat per Km (INR)	Amou nt (INR)
1	Topographic Survey including hire charges for equipment and supply of survey teams comprising of project survey filed staff etc. inclusive of cost of materials, labourer	4.5		
2	Detailed topographic surveys using mobile/ aerial LiDAR or better technology	4.5		

B. Investigation (Fixed cost)

No.	Description	Quantity (mtr)	Amount (INR)
1	Road and Bridge Inventory	12000	
2	FWD Test and Pavement Evaluation	25000	
3	Roughness Survey	12000	
4	Axle Load Survey	12000	
5	Material Survey and Investigation	12000	
6	Sub-grade Investigation	12000	
7	Traffic Survey	12000	
8	Socio-economic & Census Survey/Studies	1200	

9	Land Acquisition Studies		1800	
10	Geophysical Investigation		800	
10	Any other investigations/surveys		1800	
11	*Sub-Soil Investigation (Boring)	Rate	Qty.	Amount (Rs)
	a) Boring in all type of soils (including hard rock)		2500	
	Total			

Note: * Quantities of borings shall be taken from Financial Proposal Form No. V. For financial evaluation, these quantities and rates quoted by the consultant will be considered. However, Payment shall be made on the actual quantity of boring at rates quoted above by the Consultant, which may be substantially more or less than the estimated quantities.

C. Net Work Survey and GPR

N o.	Description	Un it	Quantity	Rate (INR)	Amount (INR)
1	Network Survey of the existing Highways as a repository for civil work as per directions from Authority.	Job	1		
2	GPR Survey for detection of underground utilities	Job	1		
				Total	

X. Cost of supply and fixing Boundary Pillars

Item	Amount (INR.)
Procuring and fixing boundary pillars and its installation, complete in all respect as per IRC:25,1967: Wherever the proposed alignment follows the existing alignment, the boundary pillars shall be fixed at an interval of 200m on either side of proposed Right of Way. Wherever there is a proposal of realignment of the existing Highway and/or construction of New Bypasses, Consultant shall fix boundary pillars along the proposed alignment on the extreme boundary on either side of the project Highway at 50 m interval. (lumpsum)	

(Form-IV)

Estimate of Costs for Expatriate Consultants (in Indian Rupees)

I. Remuneration of Expatriate Staff including per diem allowances

II. Mobilization and Demobilization

1. International Airfares (Fixed costs)

2 Inland Travel in Home Country (Fixed Costs) Lump Sum

3. Other Miscellaneous expenses (like DA, internal travel expenses other incidentals)
(fixed cost)

Lump Sum

TENTATIVE QUANTITIES FOR SUB-SOIL INVESTIGATIONS

(BORING) (Form –V)

S. No	Stretch Proposed for DPR	NH No.	Approximate Length (in Km.)	Package No.	State	Cumulative Tentative Quantities (in m)
						All type of soil including hard rock
1	Ganglakha-Gedu on Phuentsholing-Thimphu road between km 38.36 and 48.6 (1.8 km) on Asian Highway-48	As per List at Annex- 1	As per List at Annex-1	As per List at Annex-1	As per List at Annex- 1	2500

DETAILED EVALUATION CRITERIA**1. First Stage Evaluation -Proof of Eligibility (Para 12.1 of Data Sheet)****1.1 Eligibility criteria for sole applicant firm.**

The sole applicant firm shall satisfy the following 3 (Three) Nos. of criteria.

(a) & (b) Firm should have experience of preparation of DPR/Feasibility of Tunnel of aggregate length as given below. The firm should have also prepared DPR/Feasibility of at least one project of Tunnel of minimum length as indicated below in the last 10 years.

S. N o.	Pack age No.	Tentativ e Length	Minimum Aggregate Length required	Minimum length of a Eligible Tunnel Project
			DPR/ Feasibility = Tentative Length	DPR = 0.6 xTentative Length
1	2	3	4	5

Note: Similar project means Tunnel Project for which RFP is invited.

(c) Annual Average Turn Over for the last 5 years {In cases where, Audited/Certified copy of Balance Sheet for the FY 2025-26 is available, last five years shall be counted from 2021-22 to 2025-26. However, where audited/certified copy of the Balance Sheet for the FY 2025-26 is not available (as certified by the Statutory auditor) then in such cases last five years shall be considered from 2020-21 to 2024-25} of the firm from Consultancy services should be equal to more than Rs.10 crore.

(Financial Year to be modified as applicable)

(ii) The experience of a firm in preparation of DPR for a private Concessionaire/ contractor shall not be considered.

2. Second Stage Evaluation -Technical Evaluation (Para 12.2 of Data sheet)

S. No	Description	Points
1	Firm's relevant experience in last 10 years	50
2	Material testing, survey & investigation, equipment and software proposed to be used	10
3	Qualification and Relevant experience of the proposed key personnel	40
	Total	100

Further break-up of each criteria has been detailed out below:

For tunnels, the following is the break-up:

S. No.	Description	Maximum Points	Sub-Points
1	Specific experience of the DPR consultancy related to the assignment for eligibility	20	
1.1	Aggregate Length of DPR / Feasibility study of road/rail/ metro tunnels	11	
1.1.1	> 1 but <=2 the indicative Length applied for		7
1.1.2	>2 but <=3 times the indicative length applied for		8
1.1.3	> 3 but <= 4 times the indicative length applied for		9
1.1.4	> 4 but <=5 times the indicative length applied for		10
1.1.5	> 5 times the indicative length of the package applied for		11

S. No.	Description	Maximum Points	Sub-Points
1.2	DPR for road/rail/ metro tunnels each equal to or more than 40 % of indicative length applied for (or Feasibility Study for road/rail/ metro tunnel projects each equal to or more than 60 % of indicative length of a package applied for)	9	
1.2.1	1 project		5
1.2.2	2 projects		6
1.2.3	3 projects		7
1.2.4	4 projects		8
1.2.5	≥ 5 projects		9
2	Specific experience of firms in terms of turnover	5	
2.1.1	Firm's Average Turnover of last 5 years > 10 crore		5
2.1.2	Firm Average Turnover of last 5 years 5-10 crore		4
2.1.3	Firm Average Turnover of last 5 years > 2.5 but < 5.0 crore		3
3	DPR for tunnels in hill roads		
3.1	DPR of number of tunnels minimum 60% of proposed length and cross section area 154 sqm (less than 50 sqm not eligible and > 50 sqm but < 154 sqm shall be considered on proportionate basis of area)	5	
3.1.1	1 project		1
3.1.2	2 projects		2

3.1.3	3 projects		3
3.1.4	4 projects		4
3.1.5	≥ 5 projects		5
4	Tunnel Professionals * working with the firm	10	
4.1	<5 nos.		0
4.2	10 nos.		7
4.3	15 nos.		8
4.4	> 15 nos.		9
4.5	Additional one mark will be given if minimum 20% of the above key personnel have M.Tech in underground structures/ rock mechanics		1
	*The professionals who possess degree in Civil Engineering and 8 years Experience in tunnel with employment in the firm for more than one year. The current Employment Certificate shall be uploaded by Key Personnel on INFRACON.		
5	Quality of Past Performance (based on self certification)	10	
5.1	Average CoS (net of positive and negative) as percentage of contract price in last 5 DPRs prepared by the firm	5	
5.1.1	0		5
5.1.2	> 0 but ≤2.5		4
5.1.3	> 2.5 but ≤5.0		3
5.1.4	> 5.0 but ≤7.5		2
5.1.5	> 7.5 but ≤10.0		1

S. No.	Description	Maximum Points	Sub-Points
5.1.6	>10		0.0
5.2	Delay in completion of DPR as percentage of original contract period in last 5 DPRs prepared by the firm	2.5	
5.2.1	0		2.5
5.2.2	> 0 but <= 25		2.0
5.2.3	>25 but <= 50		1.5
5.2.4	>50 but <= 75		1.0
5.2.5	>75 but <=100		0.5
5.2.6	>100		0.0
5.3	Use of AEM survey survey in Tunnel DPR preparation	2.5	
5.3.1	1 project		0
5.3.2	2 projects		1.0
5.3.3	3 projects		1.5
5.3.4	4 projects		2.0
5.3.5	5 projects		2.5

Note: In case feasibility study is a part of DPR services the experience shall be counted in DPR only.

Note: (i) Weightage to be given when experience by a Firm as Sole Firm/Lead Partner in a JV/Other Partner in a JV/As Associate

N o .	Status of the firm in carrying out DPR/ Feasibility Study	Weightage for experience
	Sole firm	100 %
	Lead partner in a JV	75%
	Other partner in a JV	50 %
	As Associate	25%

(ii) The experience of a firm in preparation of DPR for a private Concessionaire/contractor shall not be considered.

A. Material testing, survey and investigation, equipment and software proposed to be used (10)

S. No.	Description	Maximum Points	Sub-Points
1	Availability of Material Testing Facilities with persons/resources having operational skills of the equipment	1	
1.1	Owned (Available In House)/Lease/MOU		1.0
2	Availability of Field Investigation Facilities with persons/resources having operational skills of the equipment	2	
2.1	Owned (Available In House)/Lease/MOU		2.0
3	Availability of Office Equipment and Software with persons/resources having operational skills of the equipment	1.5	
3.1	Owned (Available In House)/Lease/MOU		1.5
4	Experience in LIDAR or better technology for topographic survey (Infrastructure sector)	3.5	
4.1	1 project		1
4.2	2 projects		2
4.3	3 projects		2.5
4.4	4 projects		3.0
4.5	≥ 5 projects		3.5

Note:1- The experience of firm in Lidar or equivalent technology shall be supported by experience certificate. The experience of a firm in Lidar or equivalent technology. In case of overseas experience the weightage to be

assigned to the certificate for experience in use of the equipment, a self certificate followed by the client certificate may be accepted.

Note:2- In case ownership document of equipment of Consultancy/Associate Firm is found to be false, the consultancy/ Associate firm, as the case may be, shall be put on holiday listing (temporary debarment) for a period upto 12 months.

List of minimum essential equipment which the firm must possess for eligibility:

Material Testing Facilities
a. Aggregate testing facility including flakiness index, elongation index, abrasion, impact, crushing, stripping value etc.
b. Soil testing facility including Atterberg limits, soil classifications, moisture content, density, CBR value, etc.
Field Investigation Facilities
a. DGPS and Total station with appropriate software or equivalent / better
b. Drone with LiDAR sensor or better with appropriate processing software
Office Equipment and Software
a. Office equipment setup including Computer, plotter, A0 printer etc.
b. MX/ Open Roads or equivalent / better
c. AutoCAD
d. MIDAS or equivalent / better
e. Road Estimator 9.9 or better
f. Auto Plotter 10.9 or better
g. MS Project or Primavera or equivalent
h. HDM-4 or equivalent

C. Qualification and relevant experience of the proposed key personnel (40)

Standalone Tunnel Project:

S. No.	Key personnel	Points
1	Team Leader cum Tunnel Expert	10
2	Tunnel Design Expert	9
3	Geotechnical Engineer	9
4	Geophysicist/Geologist	6
5	Senior ventilation and fire safety expert (E & M)	6
	Total	40

The number of points assigned during the evaluation of qualification and competence of key staff are as given below:

S. No.	Description	Maximum Points	Sub-Points
1	General Qualification	25	
1.1	Essential education qualification		20
1.2	Desirable education qualification		5
2	Relevant experience and adequacy for the project	70	
2.1	Total professional experience		15
2.2	Experience in Tunnel Projects		25
2.3	Experience in Tunnel Projects in hilly area		30
3	Employment with the Firm	5	
3.1	Less than 1 Year		0
3.2	1 year		3
3.3	Add 0.5 marks for each subsequent year subject to maximum of 2 marks		Maximum 2

2.4. Qualification and Competence of the Key Staff for adequacy of the Assignment. (Para 12.2 of Data Sheet and Enclosure II of TOR)

2.4.2 HIGHWAY ENGINEER

S. No.	Description		Max. Points
I	General Qualification		25
i)	Degree in Civil Engineering or equivalent [AICTE Approved]		20
ii)	Post graduation in Civil Engg [AICTE Approved]		5
II	Relevant Experience & Adequacy for the Project		70
a)	Total Professional Experience		15
	<8years	0	
	≥8 but <10 years	11	
	≥10 but <12 years	12	
	≥12 but < 14 years	13	
	≥14 but <16 years	14	
	≥ 16 years	15	
(b)	Experience in Tunnel Projects		25
	<6 years	0	
	≥6 but <8 years	17	
	≥8 but <10 years	19	
	≥10 but < 12 years	21	
	≥12 but <14 years	23	
	≥ 14 years	25	
c)	Experience in Similar Capacity		30
(i)	Experience in Tunnel Projects in hilly area		30
	<2 projects	0	
	2 projects	18	
	3 projects	21	

	4 projects	24	
	5 projects	27	
	>5 projects	30	
III	Employment with Firm		5
	Less than 1 Year	0	
	1 year	3	
	Add 0.5 marks for each subsequent year subject to maximum of 2 marks		
	Total		100

2.4.5 MATERIAL ENGINEER cum GEOTECHNICAL ENGINEER

S. No.	Description		Max. Points
I	General Qualification		25
i)	Degree in Civil Engineering /M. Sc. in Geology[AICTE Approved]		20
ii)	Post graduation in Foundation Engineering / Soil Mechanics / Geo Tech Engineering or Phd in Geology[AICTE Approved]		5
II	Relevant Experience & Adequacy for the Project		70
a)	Total Professional Experience		15
	<8 years	0	
	8-10 years	11	
	>10-13 years	13	
	>13 years	15	
b)	Experience in Tunnel projects		25
	<6 years	0	
	6-9 years	19	
	>9 -11 years	22	
	>11 years	25	
c)	Experience in Tunnel Projects in hilly area		30
	1 project	0	
	2 projects	24	
	3 projects	27	
	>= 4 Projects	30	
III	Employment with Firm		5
	Less than 1 Year	0	
	1 year	3	

	Add 0.5 marks for each subsequent year subject to maximum of 2 marks		
	Total		100

2.4.6 SURVEY ENGINEER

S. No.	Description		Max. Points
I	General Qualification		
i)	Degree or equivalent in Civil Engineering / Diploma in Civil Engineering / Diploma in Surveying[AICTE Approved]		
ii)	Post Graduation in Remote Sensing/Photogrammetry or equivalent [AICTE Approved]		5
II	Relevant Experience & Adequacy for the Project		
a)	Total Professional Experience		
	<8 years	0	
	8-10 years	11	
	>10-13 years	13	
	>13 years	14	
b)	Experience in Tunnel Projects	15	
i)	Experience in Tunnel Projects		
	<6 years	0	
	6 -8 years	15	
	>8-10 years	17	
	>10 years	20	
ii)	Knowledge and understanding of modern Computer based method of Surveying		5

	Yes	5	
	No	0	
c)	Experience as Survey Engineer or in Similar Capacity for project preparation of tunnel project		
	1 project	0	
	2 projects	24	
	3 Projects	27	
	>=4 Projects	30	
III	Employment with Firm		5
	Less than 1 Year	0	
	1 year	3	
	Add 0.5 marks for each subsequent year subject to maximum of 2 marks		
	Total		100

2.4.7 ENVIRONMENTAL SPECIALIST

S. No.	Description		Max. Points
I	General Qualification		25
i)	Degree in Civil Engineering / Environmental Engineering or Post Graduate in Environmental Sciences[AICTE Approved]		20
ii)	Post-Graduation in Environmental Engineering [AICTE Approved]		5
II	Relevant Experience & Adequacy for the Project		70
a)	Total Professional Experience		15
	<6 years	0	
	6-8 years	11	
	>8-10 years	13	
	>10 years	15	
b)	Experience in Tunnel projects		25
	<5 years	0	
	5 -7 years	19	
	>7-10 years	22	
	>10 years	25	
c)	Experience in tunnel projects in hilly area		30
	<2 projects	0	
	2- 4 projects	24	
	5-7 projects	27	
	>7 projects	30	
III	Employment with Firm		5
	Less than 1 Year	0	
	1 year	3	
	Add 0.5 marks for each subsequent year subject to maximum of 2 marks		
	Total		100

2.4.8 QUANTITY SURVEYOR

S. No.	Description		Max. Points
I	General Qualification		25
i)	Graduation or equivalent in Civil Engineering / Certificate course from 'Institution of Quantity Surveying'[AICTE Approved]		20
ii)	Graduation Approved] Or equivalent in Civil Engineering [AICTE		5
II	Relevant Experience & Adequacy for the Project		70
a)	Total Professional Experience		15
	<8 years	0	
	8-10 years	11	
	>10-13 years	13	
	>13 years	15	
b)	Experience in preparation of Bill of Quantities, Contract documents and documentation for tunnel projects (		25
	<6 years	0	
	6 -8 years	19	
	>8-10 years	22	
	>10 years	25	
c)	Experience as Quantity Surveyor / Documentation Expert or in tunnel projects in hilly area		30
	1 project	0	
	2 projects	24	
	3 projects	27	
	4 projects	30	
III	Employment with Firm		5
	Less than 1 Year	0	

	1 year	3	
	Add 0.5 marks for each subsequent year subject to maximum of 2 marks		
	Total		

2.4.10 UTILITY EXPERT

S. No.	Description		Max. Points
I	General Qualification		25
i)	Graduation or equivalent		20
ii)	Post Graduation		5
II	Relevant Experience & Adequacy for the Project		70
a)	Total Professional Experience		15
	<10 years	0	
	>10-12 years	11	
	>12-15 years	13	
	>15 years	15	
b)	Experience in Utility estimation and its laying/ erection		30
	<8 years	0	
	>8 -10 years	24	
	>10-12 years	27	
	>12 years	30	
c)	Experience in Utility shifting estimation and its laying/ erection along Highway/ roads		25
	Nil project	0	
	1 project	19	
	2 projects	22	
	3 projects	25	

III	Employment with Firm		5
	Less than 1 Year	0	
	1 year	3	
	Add 0.5 marks for each subsequent year subject to maximum of 2 marks		
	Total		100

TEAM LEADER CUM TUNNEL EXPERT

S. No.	Description	Max. Points
I	General Qualification	25
i)	Degree in Civil Engineering/Tunnel Engineering / Mining Engineering	20
ii)	Post Graduation in Civil Engineering /Tunnel Engineering/Mining Engineering	5
II	Relevant Experience & Adequacy for the Project	65 10
a)	Total Professional Experience	
	<10 years	0
	≥10 but <12 years	6
	≥12 but <14 years	7
	≥14 but < 16 years	8
	≥16 but <18 years	9
	≥ 18 years	10
b)	Experience in Tunnel Projects	40
	(i) Professional experience in handling major tunnel projects (Road/Rail/Metro)	8
	<8 years	0
	≥8 but <9 years	4
	≥9 but <10 years	5
	≥10 but < 11 years	6
	≥ 12 years	8
	(ii) Experience in major tunnel construction/construction supervision projects (Road/Rail/Metro)	8
	<8 years	0
	≥8 but <9 years	4
	≥9 but <10 years	5
	≥10 but < 11 years	6

	≥11 but <12 years	7	
	≥ 12 years	8	
	(iii) Experience in preparation of DPR or Feasibility report of major tunnel projects (Road/Rail/Metro)		8
	<8 years	0	
	≥8 but <9 years	4	
	≥9 but <10 years	5	
	≥10 but < 11 years	6	
	≥11 but <12 years	7	
	≥ 12 years	8	
	(iv) Experience in DPR preparation of minimum 5 km Tunnel length		8

	< 3 projects	0	
	3 projects	5	
	4 projects	6	
	5 projects	7	
	>5 projects	8	
(d)	Experience in construction/construction supervision/ preparation of DPR/feasibility report of major tunnel projects (Road/Rail/metro) using NATM		8
	<8 years	0	
	≥8 but <9 years	4	
	≥9 but <10 years	5	
	≥10 but < 11 years	6	
	≥11 but <12 years	7	
	≥ 12 years	8	
c)	Experience in Similar Capacity		15
	(i) Experience as Team Leader or similar capacity in major tunnel construction/construction supervision projects (Road/Rail/Metro)		7
	2 projects	5	

	3 projects	5	
	4 projects	6	
	>4 projects	7	
	(ii) Experience as Team Leader or similar capacity in preparation of DPR or Feasibility report of major tunnel projects (Road/Rail/Metro)		8
	2 projects	4	
	3 projects	5	
	4 projects	6	
	5 projects	7	
	>5 projects	8	
III	Employment with Firm		10
	Less than 1 Year	0	
	1-2 years	7.5	
	Add 0.5 marks for each subsequent year subject to maximum of 2.5 marks		
	Total		100

2.4.14 Tunnel Design Expert

Sr. No.	Description	Max. Points 25 20 5 65 10
I	General Qualification	
i)	Degree in Civil/ Mining Engineering	
ii)	Post Graduation in Design/Structural Engineering or equivalent	
II	Relevant Experience & Adequacy for the Project	

a)	Total Professional Experience		
	<10 years	0	
	≥10 but <12 years	6	
	≥12 but <14 years	7	
	≥14 but < 16 years	8	
	≥16 but <18 years	9	
	≥ 18 years	10	
b)	Experience in Tunnel Projects		24
	(i) Professional Experience in projects handling major tunnel (Road/Rail/Metro)		8
	<8 years	0	
	≥8 but <9 years	4	
	≥9 but <10 years	5	
	≥10 but < 11 years	6	
	≥11 but <12 years	7	
	≥ 12 years	8	
	(ii) Experience of major tunnel construction/construction supervision p (Road/Rail/Metro)		8
	<8 years	0	
	≥8 but <9 years	4	
	≥9 but <10 years	5	
	≥10 but < 11 years	6	
	≥11 but <12 years	7	
	≥ 12 years	8	
	(iii) Experience in preparation of DPR or Feasibility report of major tunnel projects (Road/Rail/Metro)		8
	<8 years	0	
	≥8 but <9 years	4	
	≥9 but <10 years	5	

	≥10 but < 11 years	6	
	≥11 but <12 years	7	
	≥ 12 years	8	
c)	Experience in Similar Capacity		3 1
	(i) Professional Experience as Tunnel Design Engineer (Structural)		8
	<5 years	0	
	≥5 but <6 years	4	
	≥6 but <7 years	5	
	≥7 but < 8 years	6	
	≥8 but <9 years	7	
	≥ 9 years	8	
	(ii) Experience as Tunnel Design Engineer (Structural) of major tunnel construction/construction supervision projects (Road/Rail/Metro)		8
	<5 years	0	
	≥5 but <7 years	4	
	≥7 but <9 years	5	
	≥9 but < 11 years	6	
	≥11 but <13 years	7	
	≥ 13 years	8	
	(iii) Experience as Tunnel Design Engineer (Structural) of major tunnel for preparation of DPR projects (Road/Rail/Metro)		8
	<5 years	0	
	≥5 but <7 years	4	
	≥7 but <9 years	5	
	≥9 but < 11 years	6	
	≥11 but <13 years	7	

	≥ 13 years	8	
	(iv)Experience as Tunnel Design Engineer (Structural) in preparation of DPR/ Feasibility report of major tunnel projects (Road/Rail/Metro) using NATM		7
	< 3 projects	0	
	3 projects	4	
	4projects	5	
	5 projects	6	
	>5 projects	7	
III	Employment with Firm		10
	Less than 1 Year	0	
	1-2 years	7.5	

	Add 0.5 marks for each subsequent year subject to maximum of 2.5 marks		
	Total		100

2.4.15 Geotechnical Engineer

S. No.	Description	Max. Points
I	General Qualification	25
i)	Degree in Civil Engineering/Mining Engineering / Engineering Geology	20
ii)	Post Graduation in Geotechnical Engineering /Foundation Engineering/Rock Mechanics/Geo science or equivalent	5
II	Relevant Experience & Adequacy for the Project	65
a)	Total Professional Experience	10
	<10 years	0
	≥10 but <12 years	6
	≥12 but <14 years	7
	≥14 but < 16 years	8
	≥16 but <18 years	9
	≥ 18 years	10
(b)	Experience in Tunnel Projects	24
	(i) Professional experience in handling major tunnel projects (Road/Rail/Metro)	8
	<8 years	0
	≥8 but <10 years	4
	≥10 but <12 years	5
	≥12 but < 14 years	6
	≥14 but <16 years	7
	≥ 16 years	8
	(ii) Experience in major tunnel construction/construction supervision projects (Road/Rail/Metro)	8

	<8 years	0	
	≥8 but <10 years	4	
	≥10 but <12 years	5	
	≥12 but < 14 years	6	
	≥14 but <16 years	7	
	≥ 16 years	8	
	(iii)Experience in preparation of DPR or Feasibility report of major tunnel projects (Road/Rail/Metro)		8
	<8 years	0	
	≥8 but <10 years	4	
	≥10 but <12 years	5	

	≥12 but < 14 years	6	
	≥14 but <16 years	7	
	≥ 16 years	8	
c)	Experience in Similar Capacity		31
	(i) Professional Experience as Tunnel Design Engineer (Structural)		8
	<5 years	0	
	≥5 but <7 years	4	
	≥7 but <9 years	5	
	≥9 but < 11 years	6	
	≥11 but <13 years	7	
	≥ 13 years	8	
	(ii) Experience as Senior Geotechnical Engineer or similar capacity in major tunnel construction/construction supervision projects (Road/Rail/Metro)		8
	<5 years	0	
	≥5 but <7 years	4	
	≥7 but <9 years	5	
	≥9 but < 11 years	6	
	≥11 but <13 years	7	
	≥ 13 years	8	
	(iii) Experience as Senior Geotechnical Engineer or similar capacity in preparation of DPR or Feasibility report of major tunnel projects (Road/Rail/Metro)		8
	<5 years	0	
	≥5 but <7 years	4	
	≥7 but <9 years	5	
	≥9 but < 11 years	6	

	≥11 but <13 years	7	
	≥ 13 years	8	
	(iv) Experience in construction/construction supervision/ preparation of DPR/feasibility report of major tunnel projects (Road/Rail/metro) using NATM		7
	<5 years	0	
	≥5 but <7 years	3	
	≥7 but <9 years	4	
	≥9 but < 11 years	5	
	≥11 but <13 years	6	
	≥ 13 years	7	

II	Employment with Firm		10
I	Less than 1 Year	0	
	1-2 years	7.5	
	Add 0.5 marks for each subsequent year subject to maximum of 2.5 marks		
	Total		100

2.4.16 Geophysicist

Sr. No.	Description		Max. Points
I	General Qualification		25
i)	Graduate in Geophysics/Geo science/ Earth science/BSC Geology or equivalent		20
ii)	Post Graduation in Geophysics/Geo science/ Earth Science or equivalent		5
II	Relevant Experience & Adequacy for the Project		65
a)	Total Professional Experience		15
	<10 years	0	
	≥10 but <12 years	8	
	≥12 but <14 years	9	
	≥14 but < 16 years	11	
	≥16 but <18 years	13	
	≥ 18 years	15	
b)	Experience in Relevant works		50
	(i) Professional Experience in handling tunnel/ mineral and oil exploration projects		12
	<8 years	0	
	≥8 but <10 years	7	
	≥10 but <12 years	9	
	≥12 but < 14 years	10	
	≥14 but <16 years	11	
	≥ 16 years	12	

	(ii) Experience of carrying out AEM survey for tunneling/ mineral and oil exploration or any other similar work for area of more than 2.7 sq km		12
	< 2 projects	0	
	2 projects	8	
	3 projects	9	
	4 projects	10	
	5 projects	11	
	>5 projects	12	
	(iii) Processing, Interpreting, generating Section 19 resistivity model of AEM survey's raw data for tunneling/ mineral and oil exploration or any other similar work for area of more than 2.7 sq km		12
	< 2 projects	0	
	2 projects	8	
	3 projects	9	
	4 projects	10	
	5 projects	11	
	>5 projects	12	
	(iv) Experience in carrying out AEM survey, processing, interpreting, generating Section 19 resistivity of AEM survey's raw data for major tunnel work (Rail/Road/Metro)		14
	< 3 projects	0	
	3 projects	8	
	4 projects	9	
	5 projects	10	
	6 projects	12	
	>6 projects	14	
II	Employment with Firm		10
	Less than 1 Year	0	
	1-2 years	7.5	

	Add 0.5 marks for each subsequent year subject to maximum of 2.5 marks		
	Total		100

2.4.17

Senior ventilation cum fire safety expert (E&M expert)

Sr. No.	Description		Max. Points
			25
I	General Qualification		20
i)	Degree in Electrical/Mechanical Engineering		5
ii)	Post Graduation in Electrical/Mech Engineering or equivalent		65
II	Relevant Experience & Adequacy for the Project		10
a)	Total Professional Experience		
	<10 years	0	
	≥10 but <12 years	6	
	≥12 but <14 years	7	
	≥14 but < 16 years	8	
	≥16 but <18 years	9	
	≥ 18 years	10	
b)	Experience in Tunnel Projects		24

	(i) Professional Experience in handling major tunnel projects (Road/Rail/Metro)		8
	<8 years	0	
	≥8 but <9 years	4	
	≥9 but <10 years	5	
	≥10 but < 11 years	6	

	≥11 but <12 years	7	
	≥ 12 years	8	
	(ii) Experience of major tunnel construction/construction supervision projects (Road/Rail/Metro)		8
	<8 years	0	
	≥8 but <9 years	4	
	≥9 but <10 years	5	
	≥10 but < 11 years	6	
	≥11 but <12 years	7	
	≥ 12 years	8	
	(iii) Experience in preparation of DPR or Feasibility report of major tunnel projects (Road/Rail/Metro)		8
	<8 years	0	
	≥8 but <9 years	4	
	≥9 but <10 years	5	
	≥10 but < 11 years	6	
	≥11 but <12 years	7	
	≥ 12 years	8	
c)	Experience in Similar Capacity		31
	(i) Professional Experience as Senior Ventilation cum Fire safety (E&M Expert)		8
	<5 years	0	
	≥5 but <6 years	4	
	≥6 but <7 years	5	
	≥7 but < 8 years	6	
	≥8 but <9 years	7	
	≥ 9 years	8	

	(ii) Experience as Senior Ventilation cum Fire safety (E&M Expert) of major tunnel construction/construction supervision projects (Road/Rail/Metro)	8
	<5 years	0
	≥5 but <7 years	4
	≥7 but <9 years	5
	≥9 but < 11 years	6
	≥11 but <13 years	7
	≥ 13 years	8
	(iii) Experience as Senior cum Fire safety (E&M Expert) of major s preparation of DPR project (Road/Rail/Metro)	8
	<5 years	0
	≥5 but <7 years	4
	≥7 but <9 years	5
	≥9 but < 11 years	6
	≥11 but <13 years	7
	≥ 13 years	8
	(iv) Experience as Senior on cum re afety (E&M Expert) in Ventilati preparation of Fi s major tunnel projects DPR/ Feasibility report of (Road/Rail/Metro)	7
	< 3 projects	0
	3 projects	4
	4projects	5
	5 projects	6
	>5 projects	7
III	Employment with Firm	10
	Less than 1 Year	0
	1-2 years	7.5

	Add 0.5 marks for each subsequent year subject to maximum of 2.5 marks	
	Total	100

Assumptions to be made regarding Similar Capacity for various positions.

Assumptions to be made regarding Similar Capacity for various positions

1. Highway cum Pavement Engineer

- i) On behalf of Consultant: Highway Engineer/Highway Design Engineer/Pavement

Engineer.

- ii) In Government Organizations: Executive Engineer (or equivalent) and above

2. Material Engineer cum Geo Technical Engineer- Geologist

- i) On behalf of Consultant: Material

Engineer/Material

Expert/Geo Technical

Engineer

- ii) In Government Organizations: Executive Engineer (or equivalent) and above

Material Engineer/Material
Expert/Geo Technical
Engineer/Manager (Material)

3. Traffic and Safety Expert

- i) On behalf of Consultant: Traffic
Engineer/Transportation

Engineer/Road
Safety Expert

- ii) In Government Organizations: Executive Engineer (or equivalent) and above

iii) On behalf of Contractor: Traffic

Engineer/Transportation

4. Senior Survey Engineer

Engineer/ Road Safety Expert

i) On behalf of Consultant: Senior Survey Engineer/ Survey

Engineer/ Senior Surveyor

ii) In Government Organizations: Surveyor/Engineer (or equivalent)

iii) On behalf of Contractor: Senior Survey

Engineer/Survey

Engineer/ Senior Surveyor

5. Environmental Specialist

i) On behalf of Consultant /Contractor: Environmental Engineer/

Environmental Specialist/

Environmental Expert

ii) In Government Organization: Officers who has dealt environment/forest matter.

6. Quantity Surveyor/Documentation Expert

i) On behalf of Consultant /Contractor: Quantity Surveyor

(ii) In Government Organizations: Assistant Engineer (or equivalent)

7. UTILITY Expert

i) On behalf of Consultant /Contractor: Utility Expert

(ii) In Government Organizations: Executive Engineer (or equivalent) and above.

8. Team Leader cum Senior Tunnel Expert

- i) On behalf of the Consultant/Contractor: Team Leader/Senior Highway Engineer.
- ii) In Government Organizations: Superintending Engineer (or equivalent) and above

9. Tunnel Design Engineer

- i) On behalf of the Consultant/Contractor: Tunnel Design Engineer
- ii) In Government Organizations: -----

10. Senior E&M Expert

- i) On behalf of the Consultant/Contractor: Senior E&M Expert (Tunnels)
- ii) In Government Organizations: -----

11. Senior Geologist:

- i) On behalf of the Consultant/Contractor: Geologist
- ii) In Government Organizations: Geologist

12. Material Engineer

- i) On behalf of the Consultant/Contractor: Material Engineer/ Material Expert
- ii) In Government Organizations: Executive Engineer (or equivalent) and above

Consultant has to assess the major utility shifting involved and propose the CV accordingly.

Note: While carrying out evaluation of key personnel, the experience in similar capacity is also a criteria of evaluation and assumptions to be made regarding similar capacity have been mentioned above. However, if a key personnel has worked in next lower category to the similar capacity, the marks allotted to key personnel in the category 'experience in similar capacity 'shall be reduced to two thirds of marks in this category. This shall be applicable for evaluation of all key personnel.

DRAFT CONTRACT AGREEMENT

Between

HQ CE(P) Dantak,
Border Roads Organisation
C/O 99 APO

And

M/s **IN Association with M/s**
.....

For

CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND PREPARATION OF
DETAILED PROJECT REPORT (DPR) FOR DESIGN AND CONSTRUCTION OF
UNIDIRECTIONAL TWIN TUNNELS GANGLAKHA- GEDU ON PHUENTSHOLING-
THIMPHU HIGHWAY OF LENGTH 1.8KM (APPROXIMATE LENGTH) INCLUDING CIVIL
AND ELECTRICAL / MECHANICAL WORK ALONG WITH APPROACHES TO NHDL
SPECIFICATION UNDER PROJECT DANTAK IN BHUTAN

(From km _____ to km _____ of NH in ...)

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Appendix B: Consultants' Sub consultants, Key Personnel and Sub Professional Personnel, Task assignment, work programme, manning schedule, qualification requirements of key personnel, schedule for submission of various report.

Appendix C: Hours of work for Consultants' Personnel

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DRAFT CONTRACT FOR CONSULTANT'S SERVICES
CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND PREPARATION OF
DETAILED PROJECT REPORT (DPR) FOR DESIGN AND CONSTRUCTION OF UNI-
DIRECTIONAL TWIN TUNNELS GANGLAKHA- GEDU ON PHUENTSHOLING-THIMPHU
HIGHWAY OF LENGTH 1.8KM (APPROXIMATE LENGTH) INCLUDING CIVIL AND
ELECTRICAL / MECHANICAL WORK ALONG WITH APPROACHES TO NHDL
SPECIFICATION
UNDER PROJECT DANTAK IN BHUTAN

This CONTRACT (hereinafter called the "Contract") is made on the day of the month of -----20 , between, on the one hand, (), (hereinafter called the "Client") and, on the other hand, M/s ----- in JV with ----- and in Association with ----- (hereinafter called the "Consultants").

WHEREAS

- (A) the Client has requested the Consultants to provide certain consulting services as defined in the General Conditions attached to this Contract (hereinafter called the "Services");
- (B) the Consultants, having represented to the Client that they have the required professional skills, personnel and technical resources, have agreed to provide the Services on the terms and conditions set forth in this Contract;

NOW THEREFORE the parties hereto hereby agree as follows:

1 The following documents attached hereto shall be deemed to form an integral part of this Contract:

- (a) The General Conditions of Contract (hereinafter called "GC");
- (b) The Special Conditions of contract (hereinafter called "SC");
- (c) The following Appendices:

Appendix A: Terms of reference containing, inter-alia, the Description of the Services and Reporting Requirements

Appendix B: Consultants 'Sub consultants, Key Personnel and Sub Professional Personnel, Task assignment, work programme, manning schedule, qualification requirements of key personnel, and schedule for submission of various report.

Appendix C: Hours of work for Consultants '

Personnel Appendix D: Duties of the Client

Appendix E: Cost Estimate

Appendix F: Copy of letter of

invitation Appendix G: Copy of

letter of acceptance

Appendix H: Copy of Bank Guarantee for

Performance Security Appendix-I: Minutes of the pre-bid

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2. The mutual rights and obligations of the Client and the Consultants shall be as set forth in the Contract; in particular:

- (a) The Consultants shall carry out the Services in accordance with the provisions of the Contract; and
- (b) Client shall make payments to the Consultants in accordance with the provisions of the Contract.

IN WITNESS WHEREOF, the Parties hereto have caused this Contract to be signed in their respective names as of the day and year first above written.

FOR AND ON BEHALF OF

Witness

()

1. Signature Name

Address

By

Authorized Representative

2. Signature Name

Address

FOR AND ON BEHALF OF
(Consultant)

Witness

1. Signature
 Name

By

Address

Authorized Representative

2. Signature
 Name

Address

1. GENERAL PROVISIONS

1.1. Definitions

Unless the context otherwise requires, the following terms whenever used in this Contract have the following meanings:

- (a)** “Applicable Law” means the laws and any other instruments having the force of law in the Government’s country as they may be issued and in force from time to time;
- (b)** “Contract” means the Contract signed by the Parties, to which these General Conditions of Contract are attached, together with all the documents listed in Clause 1 of such signed Contract;
- (c)** “Effective Date” means the date on which this Contract comes into force and effect pursuant to Clause GC 2.1;
- (d)** “foreign currency” means any currency other than the currency of the Government;
- (e)** “GC” means these General Conditions of Contract;
- (f)** “Government” means the Government of India;
- (g)** “local currency” means the currency of the Government;
- (h)** “Member”, in case the Consultants consist of a joint venture or consortium of more than one entity, means any of these entities, and
“Members” means all of these entities;
- (i)** “Personnel” means persons hired by the Consultants or by any Sub consultant as employees and assigned to the performance of the Services or any part thereof; “foreign Personnel” means such persons who at the time of being so hired had their domicile outside India; and
“local Personnel” means such persons who at the time of being so hired had their domicile inside India;
- (j)** “Party” means the Client or the Consultants, as the case may be, and Parties means both of them;

- (k) “Services” means the work to be performed by the Consultants pursuant to this Contract for the purposes of the Project, as described in Appendix A hereto;
- (l) “SC” means the Special Conditions of Contract by which these General Conditions of Contract may be amended or supplemented;
- (m) “Sub consultant” means any entity to which the Consultants subcontract any part of the Services in accordance with the provisions of Clause GC 3.7; and
- (n) “Third Party” means any person or entity other than the Government, the Client, the Consultants or a Sub consultant.

1.2. Relation between the Parties

Nothing contained herein shall be construed as establishing a relation of master and servant or of agent and principal as between the Client and the Consultants. The Consultants, subject to this Contract, have complete charge of Personnel performing the Services and shall be fully responsible for the Services performed by them or on their behalf hereunder.

1.3. Governing Law and Jurisdiction

This Contract, its meaning and interpretation, and the relation between the Parties shall be governed by the Applicable Laws of India / Bhutan and the Courts at Guwahati shall have exclusive jurisdiction over matters arising out of or relating to this Agreement.

1.4. Language

This Contract has been executed in the language specified in the SC, which shall be the binding and controlling language for all matters relating to the meaning or interpretation of this Contract.

1.5. Table of Contents and Headings

The table of contents, headings or sub-headings in this agreement are for convenience for reference only and shall not be used in, and shall not limit, alter or affect the construction and interpretation of this Contract.

1.6. Notices

- 1.6.1. Any notice, request or consent required or permitted to be given or made pursuant to this Contract shall be in writing. Any such notice, request or consent shall be deemed to have been given or made when delivered in person to an*

authorized representative of the Party to whom the communication is addressed, or when sent by registered mail, facsimile or e- mail to such Party at the address specified in the SC.

1.6.2. Notice will be deemed to be effective as specified in the SC.

1.6.3. A party may change its address for notice hereunder by giving the other Party notice of such change pursuant to the provisions listed in the SC with respect to Clause GC 1.6.2.

1.7. Location

The Services shall be performed at such locations as are specified in **Letter of Acceptance (Appendix-G)** hereto and, where the location of a particular task is not so specified, at such locations, whether in India or elsewhere, as the Client may approve.

1.8. Authority of Member in Charge

In case the Consultants consist of a joint venture of more than one entity, with or without an Associate the Members hereby authorize the entity specified in the SC to act on their behalf in exercising all the Consultants' rights and obligations towards the Client under this Contract, including without limitation the receiving of instructions and payments from the Client.

1.9. Authorized Representatives

Any action required or permitted to be taken, and any document required or permitted to be executed, under this Contract by the Client or the Consultants may be taken or executed by the officials specified in the SC.

1.10. Taxes and Duties

Unless otherwise specified in the SC, the Consultants shall pay all such taxes, duties, fees and other impositions as may be levied under the Applicable Law.

2. COMMENCEMENT, COMPLETION, MODIFICATION AND TERMINATION OF CONTRACT

2.1. Effectiveness of Contract

This Contract shall come into force and effect on the date of the Client's notice to the Consultants instructing the Consultants to begin carrying out the Services. This notice shall confirm that the effectiveness conditions, if any, listed in the SC have been met.

2.2. Termination of Contract for Failure to Become Effective

If this Contract has not become effective within such time period after the date of the Contract signed by the Parties as shall be specified in the SC, either Party may, by not less than four (4) weeks 'written notice to the other Party, declare this Contract to be null and void, and in the event of such a declaration by either Party, neither Party shall have any claim against the other Party with respect hereto.

2.3. Commencement of Services

The Consultants shall begin carrying out the Services at the end of such time period after the Effective Date as shall be specified in the SC.

2.4. Expiration of Contract

Unless terminated earlier pursuant to Clause GC 2.9 hereof, this Contract shall expire when services have been completed and all payments have been made at the end of such time period after the Effective Date as shall be specified in the SC. The Contract shall be treated as closed under following circumstances except for projects spanning across 2 or more states or passing with wildlife sanctuary or protected areas:

In case final DPR and Section 19 has been submitted and no further action is taken by the Client, the DPR shall be considered as completed after 3 year or submission of both final DPR and Section 19 notification, whichever is earlier. One year after scheduled completion period when delay is not attributable to the Consultant.

2.4.1 In case the contract has expired in pursuance to Clause 2.4 of GC and later the Client desires to get the DPR completed with/without modification of original scope and the Consultant agrees to the same, the Client and the Consultant will sign a supplementary agreement to get the DPR completed. The original financial proposal of the consultant shall form the basis for payment of balance/additional services duly enhanced by indexing to WPI (all commodities). The key personnel deployment will also be firmed up in supplementary agreement keeping in view the key personnel proposed by the Consultant in its original proposal.

2.5. Entire Agreement

This Contract contains all covenants, stipulations and provisions agreed by the Parties. No agent or representative of either Party has authority to make, and the Parties shall not be bound by or be liable for, any statement, representation, promise or agreement not set forth herein.

2.6. Modification

Modification of the terms and conditions of this Contract, including any modification of the scope of the Services, may only be made by written agreement between the Parties. Pursuant to Clause GC 8.2 hereof, however, each party shall give due consideration to any proposals for modification made by the other Party.

2.7. Force Majeure

2.7.1. Definition

- (a) For the purposes of this Contract, "Force Majeure" means an event which is beyond the reasonable control of a Party, and which makes a Party's performance of its obligations hereunder impossible or so impractical as reasonably to be considered impossible in the circumstances, and includes, but is not limited to, war, riots, civil disorder, earthquake, fire, explosion, storm, flood or other adverse weather conditions, strikes, lockouts or other industrial action (except where such strikes, lockouts or other industrial action are within the power of the Party invoking Force Majeure to prevent), confiscation or any other action by government agencies.
- (b) Force Majeure shall not include (i) any event which is caused by the negligence or intentional action of a Party or such Party's Sub consultants or agents or employees, nor (ii) any event which a diligent Party could reasonably have been expected to both (A) take into account at the time of the conclusion of this Contract and (B) avoid or overcome in the carrying out of its obligations hereunder.
- (c) Force Majeure shall not include insufficiency of funds or failure to make any payment required hereunder.

2.7.2. No Breach of Contract

The failure of a Party to fulfill any of its obligations hereunder shall not be considered to be a breach of, or default under, this Contract insofar as such inability arises from an event of Force Majeure, provided that the Party affected by such an event has taken all reasonable precautions, due care and reasonable alternative measures, all with the objective of carrying out the terms and conditions of this Contract.

2.7.3. Measures to be Taken

- (a) A party affected by an event of Force Majeure shall take all reasonable measures to remove such Party's inability to fulfill its obligations hereunder with a minimum of delay.
- (b) A party affected by an event of Force Majeure shall notify the other Party of such event as soon as possible, and in any event not later than fourteen (14) days following the occurrence of such event, providing evidence of the nature and cause of such event, and shall similarly give notice of the restoration of normal conditions as soon as possible.
- (c) The Parties shall take all reasonable measures to minimize the consequences of any event of Force Majeure.

2.7.4. Extension of Time

Any period within which a Party shall, pursuant to this Contract, complete any action or task, shall be extended for a period equal to the time during which such Party was unable to perform such action as a result of Force Majeure.

2.7.5. Payments

During the period of their inability to perform the Services as a result of an event of Force Majeure, the Consultants shall be entitled to be reimbursed for additional costs reasonably and necessarily incurred by them during such period for the purposes of the Services and in reactivating the Services after the end of such period.

2.7.6. Consultation

Not later than thirty (30) days after the Consultants, as the result of an event of Force Majeure, have become unable to perform a material portion of the Services, the Parties shall consult with each other with a view to agreeing on appropriate measures to be taken in the circumstances.

2.8. Suspension

The Client may, by written notice of suspension to the Consultants, suspend all payments to the Consultants hereunder if the Consultants fail to perform any of their obligations under this Contract, including the carrying out of the Services, provided that such notice of suspension (i) shall specify the nature of the failure, and (ii) shall request the Consultants to remedy such failure within a period not exceeding thirty (30) days after receipt by the Consultants of such notice of suspension.

2.9. Termination

2.9.1. By the Client The Client may, by not less than thirty (30) days 'written notice of termination to the Consultants (except in the event listed in paragraph (f) below, for which there shall be a written notice of not less than sixty (60) days), such notice to be given after the occurrence of any of the events specified in paragraphs (a) through (f) of this Clause 2.9.1, terminate this Contract:

- (a) if the Consultants fail to remedy a failure in the performance of their obligations are under, as specified in a notice of suspension pursuant to Clause 2.8 hereinabove, within thirty (30) days of receipt of such notice of suspension or within such further period as the Client may have subsequently approved in writing;
- (b) if the Consultants become (or, if the Consultants consist of more than one entity, if any of their Members becomes) insolvent or bankrupt or enter into any agreements with their creditors for relief of debt or take advantage

of any law for the benefit of debtors or go into liquidation or receivership whether compulsory or voluntary;

- (c) if the Consultants fail to comply with any final decision reached as a result of arbitration proceedings pursuant to Clause 8 hereof;
- (d) if the Consultants submit to the Client a statement which has a material effect on the rights, obligations or interests of the Client and which the Consultants know to be false;
- (e) if, as the result of Force Majeure, the Consultants are unable to perform a material portion of the Services for a period of not less than sixty (60) days; or
- (f) if the Client, in its sole discretion and for any reason whatsoever, decides to terminate this Contract.

2.9.2 By the Consultants

The Consultants may, by not less than thirty (30) day's written notice to the Client, such notice to be given after the occurrence of any of the events specified in paragraphs (a) through (d) of this Clause 2.9.2, terminate this Contract:

- (a) if the Client fails to pay any money due to the Consultants pursuant to this contract and not subject to dispute pursuant to Clause 8 hereof within forty-five (45) days after receiving written notice from the Consultants that such payment is overdue;
- (b) if the Client is in material breach of its obligations pursuant to this Contract and has not remedied the same within forty-five (45) days (or such longer period as the Consultants may have subsequently approved in writing) following the receipt by the Client of the Consultants' notice specifying such breach;
- (c) if, as the result of Force Majeure, the Consultant are unable to perform a material portion of the Services for a period of not less than sixty (60) days; or
- (d) if the Client fails to comply with any final decision reached as a result of arbitration pursuant to Clause 8 hereof.

3. Cessation of Rights and Obligations

Upon termination of this Contract pursuant to Clauses 2.2 or 2.9 hereof, or upon expiration of this Contract pursuant to Clause 2.4 hereof, all rights and obligations of the Parties hereunder shall cease, except (i) such rights and obligations as may have accrued on the date of termination or expiration, (ii) the

obligation of confidentiality set forth in Clause 3.3 hereof, (iii) the Consultant's obligation to permit inspection, copying and auditing of their accounts and records set forth in Clause 3.6 (ii) hereof, and (iv) any right which a Party may have under the Applicable Law.

4. **Cessation of Services**

Upon termination of this Contract by notice of either Party to the other pursuant to Clauses 2.9.1 or 2.9.2 hereof, the Consultants shall, immediately upon dispatch or receipt of such notice, take all necessary steps to bring the Services to a close in a prompt and orderly manner and shall make every reasonable effort to keep expenditures for this purpose to a minimum. With respect to documents prepared by the Consultants and equipment and materials furnished by the Client, the Consultants shall proceed as provided, respectively, by Clauses 3.9 or 3.10 hereof.

5. **Payment upon Termination**

Upon termination of this Contract pursuant to Clauses 2.9.1 or 2.9.2 hereof, the Client shall make the following payments to the Consultants (after offsetting against these payments any amount that may be due from the Consultant to the Client):

- (i) remuneration pursuant to Clause 6 hereof for Services satisfactorily performed prior to the effective date of termination.
- (ii) reimbursable expenditures pursuant to Clause 6 hereof for expenditures actually incurred prior to the effective date of termination; and
- (iii) except in the case of termination pursuant to paragraphs (a) through (d) of Clause 2.9.1 hereof, reimbursement of any reasonable cost incident to the prompt and orderly termination of the Contract including the cost of the return travel of the Consultants' personnel and their eligible dependents.

2.9.6 **Disputes about Events of Termination**

If either Party disputes whether an event specified in paragraphs (a) through (e) of Clause 2.9.1 or in Clause 2.9.2 hereof has occurred, such Party may, within forty-five

(45) days after receipt of notice of termination from the other Party, refer the matter to arbitration pursuant to Clause 8 hereof, and this Contract shall not be terminated on account of such event except in accordance with the terms of any resulting arbitral award.

2.9.7

2.9.7.1 Without prejudice to any provision of this Agreement, the Client and Consultant may foreclose this Agreement by mutual consent in circumstances

which does not constitute either party's default without any liability or consequential future liability for either party except as mentioned in this Clause.

2.9.7.2 Should a Party intend to foreclose this Agreement by mutual consent, the intending Party shall issue a notice to the other Party and upon issuance of such notice, the other Party may within 15 days from receipt of such notice either agree to such foreclosure or raise objection(s) to the same by intimating either of the two possible positions to the intending Party in writing. In case the contract is foreclosed on mutual consent, payment upto the completed stage will be paid as per CI 6.3 (b) of GC and remuneration & logistics beyond completed stage will be paid as per actual using the rates quoted in Consultants' financial proposal.

2.9.7.3 If at inception stage or feasibility stage, Client desires to foreclose the contract, the contract will be foreclosed with mutual consent up to that stage and the Consultant's consent is implied without exception.

2.9.7.4 Any attempt or endeavour for foreclosure by mutual agreement shall be without prejudice to the rights and obligations of the Parties herein and the factum of such an attempt or exercise shall not stop either of the Parties from discharging their contractual obligations under this Agreement.

2.9.7.5 For the avoidance of doubt, it is clarified that such foreclosure will be without prejudice to the Consultant and shall not affect the Consultant in any way if it wishes to bid in future projects of the Client.

3. OBLIGATIONS OF THE CONSULTANTS

3.1. General

3.1.1. Standard of Performance

The Consultants shall perform the Services and carry out their obligations here under with all due diligence, efficiency and economy, in accordance with generally accepted professional techniques and practices, and shall observe sound management practices, and employ appropriate advanced technology and safe and effective equipment, machinery, materials and methods. The Consultants shall always act, in respect of any matter relating to this Contract or to the Services, as faithful advisers to the Client, and shall at all times support and safeguard the Client's legitimate interests in any dealings with Sub consultants or Third Parties.

3.1.2. Law Governing Services

The Consultants shall perform the Services in accordance with the Applicable Law and shall take all practicable steps to ensure that any Sub consultants, as well as the Personnel and agents of the Consultants and any Sub consultants, comply with the Applicable Law. The Client shall advise the Consultants in writing of relevant local customs and the Consultants shall, after such notifications, respect such customs.

3.2. Conflict of Interests

3.2.1. Consultants not to Benefit from Commissions, Discounts, etc.

The remuneration of the Consultants pursuant to Clause 6 hereof shall constitute the Consultants' sole remuneration in connection with this Contract or the Services and the Consultants shall not accept for their own benefit any trade commission, discount or similar payment in connection with activities pursuant to this Contract or to the Services or in the Discharge of their obligations hereunder, and the Consultants shall use their best efforts to ensure that any Sub consultants, as well as the Personnel and agents of either of them, similarly shall not receive any such additional remuneration.

3.2.2 Consultants and Affiliates not to be otherwise interested in Project

The Consultants agree that, during the term of this Contract and after its termination, the Consultants and any entity affiliated with the Consultants, as well as any Sub consultant and any entity affiliated with such Sub consultant, shall be disqualified from providing goods, works or services (other than the Services and any continuation thereof) for any project resulting from or closely related to the Services.

3.2.3 Prohibition of Conflicting Activities

Neither the Consultants nor their Sub consultants nor the Personnel of either of them shall engage, either directly or indirectly, in any of the following activities:

- (a) during the term of this Contract, any business or professional activities in the Government's country which would conflict with the activities assigned to them under this Contract; or
- (b) after the termination of this Contract, such other activities as may be specified in the SC.

3. Confidentiality

The Consultants, their Sub consultants and the Personnel of either of them shall not, either during the term or within two (2) years after the expiration of this Contract, disclose any proprietary or confidential information relation to the Project, the Services, this Contract or the Client's business or operations without the prior written consent of the Client.

4. Liability of the Consultants

Subject to additional provisions, if any, set forth in the SC, the Consultants' liability under this Contract shall be as provided by the Applicable Law.

5. Insurance to be taken out by the Consultants

The Consultants (i) shall take out and maintain, and shall cause any Sub consultants to take out and maintain, at their (or the Sub consultants', as the case may be) own cost but on terms and conditions approved by the Client, insurance against the risks, and for the coverage, as shall be specified in the Special Conditions (SC), and (ii) at the Client's request, shall provide evidence to the Client showing that such insurance has been taken out and maintained and that the current premiums therefore have been paid.

6. Accounting, Inspection and Auditing

The Consultants (i) shall keep accurate and systematic accounts and records in respect of the Services hereunder, in accordance with internationally accepted accounting principles and in such form and detail as will clearly identify all relevant time charges and cost, and the bases thereof (including the bases of the Consultants' costs and charges), and (ii) shall permit the Client or its designated representative periodically, and up to one year from the expiration or termination of this Contact, to inspect the same and make copies thereof as well as to have them audited by auditors appointed by the Client.

7. Consultants' Actions requiring Client's prior Approval

The Consultants shall obtain the Client's prior approval in writing before taking any of the following actions:

- (a) appointing such members of the Personnel as are listed in Appendix B;
- (b) entering into a subcontract for the performance of any part of the Services, it being understood (i) that the selection of the Sub-consultant and the terms and conditions of the subcontract shall have been approved in writing by the Client prior to the execution of the subcontract, and (ii) that the Consultants shall remain fully liable for the performance of the Services by the Sub-consultant and its Personnel pursuant to this Contract;
- (c) any other action that may be specified in the SC.

8. Reporting Obligations

The Consultants shall submit to the Client the reports and documents specified in **Appendix A/E** here to, in the form, in the numbers and within the time periods set forth in the said Appendix. Reporting stages, review progress and checklist shall be as reflected in the DPR.

9. Documents prepared by the Consultants to be the Property of the Client

All plans, drawings, specifications, designs, reports and other documents prepared by the Consultants in performing the Services shall become and remain the property of the Client, and the Consultants shall, not later than upon termination or expiration of this Contract, deliver all such documents to the Client, together with a detailed inventory thereof. The Consultants may retain a copy of such documents. Restrictions about the future use of these documents, shall be as specified in the SC.

10. Equipment and Materials furnished by the Client

Equipment and materials made available to the Consultants by the Client, or purchased by the Consultants with funds provided by the Client, shall be the property of the Client and shall be marked accordingly. Upon termination or expiration of this Contract, the Consultants shall make available to the Client an inventory of such equipment and materials and shall dispose of such equipment and materials in accordance with the Client's instructions. While in possession of such equipment and materials, the Consultants, unless otherwise instructed by the Client in writing, shall insure them in an amount equal to their full replacement value.

4. CONSULTANTS' PERSONNEL

4.1. General

The Consultants shall employ and provide such qualified and experienced Personnel as are required to carry out the Services.

4.2. Description of Personnel

- (a)** The titles, agreed job descriptions, minimum qualification and estimated periods of engagement in the carrying out of the Services of each of the Consultants' Key Professional / Sub Professional Personnel are described in Appendix B.
- (b)** If required to comply with the provisions of Clause 3.1.1 of this Contract, adjustments with respect to the estimated periods of engagement of Key Professional / Sub Professional Personnel set forth in Appendix B may be made by the Consultants by written notice to the Client, provided
 - (i)** that such adjustments shall not alter the originally estimated period of engagement of any individual by more than 10% or one week, whichever is larger, and
 - (ii)** that the aggregate of such adjustments shall not cause payments under this Contract to exceed the ceilings set forth in Clause 6.1 (b) of this Contract. Any other such adjustments shall only be made with the Client's written approval.

- (c) If additional work is required beyond the scope of the Services specified in Appendix A, the estimated periods of engagement of Key Personnel set forth in Appendix B may be increased by agreement in writing between the Client and the Consultants.

4.3. Approval of Personnel

The Key Personnel and Sub consultants listed by title as well as by name in Appendix B are hereby approved by the Client. In respect of other Key Personnel which the Consultants propose to use in the carrying out of the Services, the Consultants shall submit to the Client for review and approval a copy of their biographical data. If the Client does not object in writing (stating the reasons for the objection) within twenty- one (21) calendar days from the date of receipt of such biographical data, such Key Personnel shall be deemed to have been approved by the Client.

4.4. Working Hours, Overtime, Leave, etc.

- (a) Working hours and holidays for Key Professional / Sub Professional Personnel are set forth in Appendix C hereto. To account for travel time, foreign Personnel carrying out Services inside the Government's country shall be deemed to have commenced (or finished) work in respect of the Services such number of days before their arrival in (or after their departure from) the Government's country is specified in Appendix C hereto.
- (b) The Key Professional / Sub Professional Personnel shall not be entitled to be paid for overtime nor to take paid sick leave or vacation leave except as specified in Appendix C hereto, and except as specified in such Appendix, the Consultants' remuneration shall be deemed to cover these items. All leave to be allowed to the Personnel is included in the staff-months of service set for in Appendix B. Any taking of leave by Personnel shall be subject to the prior approval of the Client by the Consultants, who shall ensure that absence for leave purposes will not delay the progress and adequate supervision of the Services.
- (c) All key personnel and sub professional staff of the DPR consultants shall use the Aadhar based biometric attendance /geo-tagged selfiebased attendance system for marking their daily attendance for the duration in site office. Aadhar based biometric attendance /geotagged selfie-based attendance system shall be marked at least once a day and any time during the day. Aadhar based biometric attendance /geo-tagged selfie-based attendance system shall be installed by the DPR Consultants at its own cost at the site office in order to facilitate the attendance marking. A copy of Aadhar based biometric attendance /geo-tagged selfie-based

attendance records shall be attached at the time of submission of their bills to the <agency> Proper justification shall be provided for cases of absence of key personal /sub-professional staff which do not have prior approval from project director of concerned stretch. If <Agency> so desires, it shall facilitate electronic linking of the Aadhar based biometric attendance /geo-tagged selfie-based attendance system with the central monitoring system of <Agency>.

- (d) Consultant will intimate concerned project Director/Project In charge immediately after establishing its site office regarding installation Aadhar based Biometric attendance /Geo-tagged selfie-based attendance system and complete address of its site office.

4.5. Removal and/or Replacement of Key Personnel

Removal and/or replacement of Key Personnel shall be regulated as under:

- 4.5.1.** In case notice to commence services pursuant to Clause 2.1 of this Contract is not ordered by Client within 120 days of signing of contract the key personnel can excuse themselves on valid grounds, e.g., selection on some other assignment, health problem developed after signing of contract, etc. In such a case no penalty shall be levied on the Firm or on the person concerned. The firm shall however be asked to give a replacement by an equal or better scoring person, whenever mobilization is ordered.
- 4.5.2.** In case notice to commence services is given within 120 days of signing of contract the, the Authority expects all the Key Personnel specified in the Proposal to be available during implementation of the Agreement. The Authority will not consider any substitution of Key Personnel except under compelling circumstances beyond the control of the Consultant and the concerned Key Personnel. Such substitution shall be limited to not more than three Key Personnel subject to equally or better qualified and experienced personnel being provided to the satisfaction of the Authority. Replacement of the Team Leader will not normally be considered and may lead to disqualification of the Applicant or termination of the Agreement. Replacement of one Key Personnel shall be permitted subject to reduction of remuneration equal to 5 % (five per cent) of the total remuneration specified for the Key Personnel who is proposed to be replaced. In case of second replacement the reduction in remuneration shall be equal to 10% (ten per cent) and for third and subsequent replacement, such reduction shall be equal to 15% (fifteen per cent). The maximum age limit of replaced key personnel shall be 65 years as on the date of submission of proposal for such replacement. The Consultant shall make all endeavours to ensure that replacement of a Key Personnel is approved before the concerned Key Personnel leaves the consultancy assignment, in any case the Consultant shall submit replacement

acceptable to Client not more than 3 weeks after the Key Personnel leaves the consultancy assignment, failing which Client may terminate the Contract in pursuance to Clause 2.9.1(a) of GC.

4.5.3. If the consultant finds that any of the personnel had made false representation regarding his qualification and experience, he may request the Employer for replacement of the personnel. There shall be no reduction in remuneration for such replacement. The replacement shall however be of equal or better score. The personnel so replaced shall be debarred from future projects for 2 years.

4.5.4. Replacement after original contract period is over:

There shall be no limit on the replacements and no reduction in remunerations shall be made. The replacement shall however be of equal or better score.

4.5.5. If the Employer (i) finds that any of the Personnel has committed serious misconduct or has been charged with having committed a criminal action or (ii) has reasonable ground to be dissatisfied with the performance of any of the Personnel, then the consultant shall, at the Employer's written request specifying the grounds therefore, forthwith provide a replacement with qualifications and experience acceptable to him. For such replacement there will be no reduction in remuneration.

4.5.6. If any member of the approved team of a consultant engaged by CE(P) Dantak, Border Roads Organisation leaves that consultant before completion of the job, he shall be barred for a period of 6 months to 24 months from being engaged as a team member of any other consultant working (or to be appointed) for any other Border Roads Organisation.

4.5.7. In case, person permanently employed with the firm is to be replaced, technical score of both the CVs shall be compared excluding the marks given for employment with firm. Replacement would be allowed when the Technical Score (excluding the marks given for employment with firm) of the new key person is equal or better than the existing key person's Technical Score excluding marks assigned for permanent employment with the firm. However, the remuneration of such replacement shall be reduced on proportionate basis in case the overall score of the replacement person is less than the overall score of original person.

4.6. Resident Team Leader and Coordinator

The person designated as the Team Leader of the Consultant's Personnel shall be responsible for the coordinated, timely and efficient functioning of the Personnel. In addition, the Consultant shall designate a suitable person from its Head Office as Project Coordinator who shall be responsible for day to day performance of the Services.

5. OBLIGATION OF THE CLIENT

5.1. Assistance and Exemptions unless otherwise specified in the SC, the Client shall use its best efforts to ensure that the Government shall:

- (a)** provide the Consultants, Sub consultants and Personnel with work permits and such other documents as shall be necessary to enable the Consultants, Sub consultants or Personnel to perform the Services;
- (b)** assist for the Personnel and, if appropriate, their eligible dependents to be provided promptly with all supporting papers for necessary entry and exit visas, residence permits, exchange permits and any other documents required for their stay in India;
- (c)** facilitate prompt clearance through customs of any property required for the Services;
- (d)** issue to officials, agents and representatives of the Government all such instructions as may be necessary or appropriate for the prompt and effective implementation of the Services;

5.2. Access to Land

The Client warrants that the Consultants shall have, free of charge, unimpeded access to all land in the Government's country in respect of which access is required for the performance of the Services. The Client will be responsible for any damage to such land or any property thereon resulting from such access and will indemnify the Consultants and each of the Personnel in respect of liability for any such damage, unless such damage is caused by the default or negligence of the Consultants or any Sub consultants or the Personnel of either of them.

5.3. Change in the Applicable Law

If, after the date of this Contract, there is any change in the Applicable Law with respect to taxes and duties which increases or decreases the cost or reimbursable expenses incurred by the Consultants in performing the Services, then the remuneration and reimbursable expenses otherwise payable to the Consultants under this Contract shall be increased or decreased accordingly by agreement between the Parties hereto, and corresponding adjustments shall be made to the ceiling amounts specified in Clause 6.1(b),

5.4. Services, Facilities and Property of the Client

The client shall make available to the Consultants and the Personnel, for the purposes of the Services and free of any charge, the services, facilities and property described in Appendix D at the times and in the manner specified in said Appendix D, provided that if such services, facilities and property shall not be made available to the Consultants as and when so specified, the Parties shall agree on (i) any time extension that may be appropriate to grant to the Consultants for the performance of the Services, (ii) the manner in which the Consultants shall procure any such services, facilities and property from other sources, and (iii) the additional payments, if any, to be made to the Consultants as a result thereof pursuant to Clause 6.1(c) hereinafter.

5.5. Payment

In consideration of the Services performed by the Consultants under this Contract, the Client shall make to the Consultants such payments and in such manner as is provided by Clause 6 of this Contract.

6. PAYMENT TO THE CONSULTANTS

6.1. Cost Estimates: Ceiling Amount

- (a) An abstract of the cost of the Services payable in local currency (Indian Rupees) is set forth in Appendix E.
- (b) Except as may be otherwise agreed under Clause 2.6 and subject to Clause 6.1(c), the payments under this Contract shall not exceed the ceiling specified in the SC. The Consultants shall notify the Client as soon as cumulative charges incurred for the Services have reached 80% of the ceiling.
- (c) Notwithstanding Clause 6.1(b) hereof, if pursuant to Clauses 5.4 hereof, the Parties shall agree that additional payments shall be made to the Consultants in order to cover any necessary additional expenditures not envisaged in the cost estimates referred to in Clause 6.1(a) above, the ceiling set forth in Clause 6.1(b) above shall be increased by the amount or amounts, as the case may be, of any such additional payments.

6.2. Currency of Payment

- (a) The payment shall be made in Indian Rupees.

6.3. Mode of Billing and Payment

Billing and payments in respect of the Services shall be made as follows:-

- (a) The Client shall cause to be paid to the Consultants an advance payment as specified in the SC, and as otherwise set forth below. The advance

payment will be due after provision by the Consultants to the Client of a bank guarantee by a bank acceptable to the Client in an amount (or amounts) and in a currency (or currencies) specified in the SC, such bank guarantee (i) to remain effective until the advance payment has been fully set off as provided in the SC, and ii) **in such form as the Client shall have approved in writing.**

(b) Payment Schedule-

Payment of AEM survey and all types of boring shall be done based on actual quantity executed and rates quoted in BOQ . For all other items consultant be paid consultancy services as per billing schedule given as under-

S r. N o.	Item	Payment %
1	Submission of final QAP and Inception Report	5%
2	Approval of final Alignment Report	10 %
3	Submission of Geophysical Survey, Sub Surface Investigation including GIR report, Rock identification and classification.	5%
4	Submission of final feasibility Report	10%
5	Submission of all utilities shifting proposals to user agencies and submission of utilities relocation plan to Executing Authority	5%
6	Approval of final DPR report, documents and drawings(Refer Note-2)	20%
7	Approval of bid documents and draft civil works contract agreement along with technical schedules.	20%
8	Final approval of utilities shifting estimates	5%
9	Earlier of award of package to contractor/concessionaire or 6 months from launch of tender process	10%
10	Amount to be released at earlier of projects COD or 3 years from start of civil work	10%
	Total :	100%

Note: Consultants have to provide a certificate that all key personnel as envisaged in the Contract Agreement has been actually deployed in the project. They have to submit this certificate at the time of submission of bills to Commander 19TF from time to time.

* The Concerned Project Director or his authorized representative shall ensure and certify at least 5% test check of all the data collected by the Consultant before releasing the payment to the Consultant.

Note-2: Payment for geotechnical investigations shall be made on submission of geotechnical investigation report by the Consultant for the amount quoted by the Consultant in its financial proposal but limited to 2.5% of ceiling amount of contract +/- the variation amount due to increase/decrease in total length of soil exploration as approved by Client. Payment on approval of final DPR, documents and drawings will be the amount determined by subtracting the amount paid for geotechnical investigations from 10% of the contract value +/- the variation amount due to increase/decrease in total length of soil exploration as approved by Client.

Note:3 Approval of any submission or stage will include deemed approval in accordance with Note:1 below Enclosure III to ToR "Schedule for approval of Reports and Documents by PD after submission by Consultant".

- (c) No payment shall become eligible for the next stage till the consultant completes to the satisfaction of the client the work pertaining to the preceding stage. The payment for the work of subsoil investigation (Boring) will be as per plan approved by the client and will be paid as per actual at the rates quoted by the consultants. The payment for the quantity given by the client for boring will be deemed to be included in the above mentioned payment schedule. Any adjustment in the payment to the consultants will be made in the final payment only.
- (d) The Client shall cause the payment of the Consultants in Para 6.4 (b) above as given in schedule of payment within thirty (30) days after the receipt by the Client of bills. Interests at the rate specified in the SC shall become payable as from the above due date on any amount due by, but not paid on, such due date.
- (e) The final payment under this Clause shall be made only after the final report and a final statement, identified as such, shall have been submitted by the Consultants and approved as satisfactory by the Client. The Services shall be deemed completed and finally accepted by the Client and the final report and final statement shall be deemed approved by the Client as satisfactory one hundred and eighty (180) calendar days after receipt of the final report and final statement by the Client unless the Client, within ninety(90) day period, gives written notice to the Consultants specifying in detailed deficiencies in the Services, the final report or final statement. The Consultants shall thereupon promptly make any necessary corrections, and upon completion of such corrections, the foregoing

process shall be repeated. Any amount which the Client has paid or caused to be paid in accordance with this Clause in excess of the amounts actually payable in accordance with the provisions of this Contract shall be reimbursed by the Consultants to the Client within thirty (30) days after receipt by the Consultants of notice thereof. Any such claim by the Client for reimbursement must be made within twelve (12) calendar months after receipt by the Client of a final report and a final statement approved by the Client in accordance with the above.

- (f) All payments under this Contract shall be made to the account of the Consultants specified in the SC.
- (g) Efforts need to be made by the Consultant to submit the schedule reports of each road stretch / s of a package. However, due to reasons beyond the reasonable control of Consultant, if the schedule submission of reports / documents of each road stretch /s of a package is not done, the payment shall be made on pro-rata basis.
- (h) Consultants will make payment of salary to all key personnel in their respective bank accounts through electronic mode only. No cash transaction w.r.t salary will be made. Proof of salary transfer through electronic mode shall be submitted by the Consultant with his bill.
- (i) **For any additional increase in length of approaches beyond tolerance given at para 10.1.1 of DCA payment shall be made at rate Rs 3.25 lakh per km (including GST and all applicable taxes) and for tunnel portion based on prorata basis of contract amount.**

7. Responsibility for Accuracy of Project Documents

7.1. General

- 7.1.1.** The Consultant shall be responsible for accuracy of the data collected, by him directly or procured from other agencies/authorities, the designs, drawings, estimates and all other details prepared by him as part of these services. He shall indemnify the Authority against any inaccuracy in the work which 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.
- 7.1.2.** The Consultant shall be fully responsible for the accuracy of design and drawings of the bridges and structures. All the designs 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 designs and drawings not signed by the three persons mentioned above shall not be accepted. The Consultant shall indemnify the Client against any inaccuracy / deficiency in the designs and drawings of the bridges and structures noticed during the construction and even thereafter and the Client shall bear no responsibility for the accuracy of the designs and drawings submitted by the Consultants.

7.1.3. The survey control points established by the Consultant shall be protected by the Consultants till the completion of the Consultancy Services.

7.2. Retention Money

An amount equivalent to 5% of the contract value shall be retained at the end of the contract for accuracy of design and quantities submitted and the same will be released at earlier of project COD or 3 years from start of civil work.

7.3. Penalty

7.3.1. Penalty for Error/Variation

- i. If variation in project cost occurs due to Change of scope requests of more than 10% of the total project cost as estimated by the consultant and these change of scope requests arise due to deficiencies in the design provided by the consultant, the penalty equivalent to 4% of the contract value shall be imposed. For this purpose retention money equivalent to 4% of the contract value will be forfeited. This shall exclude any additional/deletion of items/works ordered by the client during the execution
- ii. If there is a discrepancy in land to be acquired during the execution of the project upto an extent of +/- 2% of the area of land, a penalty equivalent to 3% of the contract value shall be imposed. For this purpose retention money equivalent to 3% of the contract value will be forfeited. This shall exclude any additional/deletion of items/works ordered by the client during the execution. For discrepancy of more than + / - 2% of the area of land to be acquired, the firm shall be declared as non performing as per para 7.4.2.
- iii. If there is a variation in quantities of various itmes of utilities shifting during the execution of the project upto an extent of +/- 10% of the quantity estimated by the design consultant, a penalty equivalent to 3% of the contract value shall be imposed. For this purpose retention money equivalent to 3% of the contract value

will be forfeited. This shall exclude any additional/deletion of items/works ordered by the client during the execution

- iii) For inaccuracies in survey/investigation/design work the penalties shall be imposed as per details given in Table below:

Sr . N o.	Item	Penalty (%age of contract value)
1	Topographic Surveys	1.0 to 1.5
	<i>a) The horizontal alignment does not match with ground condition.</i>	
	<i>b) The cross sections do not match with existing ground.</i>	
	<i>c) The co-ordinates are defective as instruments of desired accuracy not used</i>	
2	Geotechnical Surveys	1.0 to 1.5
	<i>a) Incomplete surveys</i>	
	<i>b) Data not analyzed properly</i>	
	<i>c) The substrata substantially different from the actual strata found during construction.</i>	
3	Traffic data found to be varying by more than 25% on resurvey at a later date, unless there are justifiable reasons.	0.5 to 1.0
4	Axle load data found to be varying by more than 25% on resurvey at a later date, unless there are justifiable reasons.	0.5 to 1.0
5	Structural Designs found to be unsafe or grossly over designed	The firm shall be considered as non-performing as per para 7.4.2.

7.3.2 Penalty for delay

In case of delay in completion of services, a penalty equal to 0.05% of the contract price per day subject to a maximum 5% of the contract value will be imposed and shall be recovered from payments due/performance security. However in case of

delay due to reasons beyond the control of the consultant, suitable extension of time will be granted on case to case basis.

7.3.2.1 Penalty for wrong information in technical proposal

(a) If an information is found incorrect/fake/inflated in the CV, at any stage, debarment of the key personnel from future MoRTH or its Executing Agencies projects upto 2 years may be taken by MoRTH or its Executing Agencies.

(b) In case, the information contained in the CV for the duration in which the key personnel was employed by the firm, proposing his candidature is found incorrect/fake/inflated at any stage, action including termination of the consultancy agreement and debarment of the firm upto 2 years from future BRO/ MoRTH or its Executing Agencies projects shall be taken by MoRTH or its Executing Agencies.

(c) In case, the information contained in the CV is found incorrect/fake/inflated at any stage, the consultancy firms shall have to refund the salary and perks drawn in respect of the person apart from other consequences.

(d) In case consultant firms experience or document such as Form E2/T3, Form E3, References (client certificate) is found to be false at any stage i.e. from bidding to completion of services, the consultancy contract shall be terminated and consultant firm shall be debarred for a period of 2 years.

(e) In case ownership document of equipment of Consultancy/Associate Firm is found to be false, the consultancy/ Associate firm, as the case may be, shall be put on holiday listing (temporary debarment) for a period upto 12 months.

7.3.3 Total amount of recovery from all penalties shall be limited to 8% of the Consultancy Fee.

7.3.4 CE(P) Dantak, Border Roads Organisation is in process of evolving performance based rating system for DPR Consultants. Performance of Consultants shall be monitored by CE(P) Dantak, Border Roads Organisation and will be taken into account in technical evaluation of future DPR projects. For this purpose, performance of Consultant in the current project shall also be taken into account to create rating of Consultant.

7.4 ACTION FOR DEFICIENCY IN SERVICES

1. Consultants liability towards the Client

Consultant shall be liable to indemnify the client for any direct loss or damage accrued or likely to accrue due to deficiency in service rendered by him.

2. Debarring / Non Performing

In case of major deficiencies in the Detailed Project Report involving time and cost overrun and adverse effect on reputation of <Agency>, the firm shall be declared as non-performing and the firm will not be eligible for participating in future projects of the BRO for a period of 5 years. Decision as to major deficiencies by Client shall be final and binding. However, the Consultant will be given an opportunity to present its case before it is declared non-performer by the Client.

8. FAIRNESS AND GOOD FAITH

8.1. Good Faith

The Parties undertake to act in good faith with respect to each other's rights under this Contract and to adopt all reasonable measures to ensure the realization of the objectives of this Contract.

8.2. Operation of the Contract

The Parties recognize that it is impractical in this Contract to provide for every contingency which may arise during the life of the Contract, and the Parties hereby agree that it is their intention that this Contract shall operate fairly as between them, and without detriment to the interest of either of them, and that, if during the term of this Contract either Party believes that this Contract is operating unfairly, the Parties will use their best efforts to agree on such action as may be necessary to remove the cause or causes of such unfairness, but no failure to agree on any action pursuant to this Clause shall give rise to a dispute subject to arbitration in accordance with Clause 9 hereof.

9. SETTLEMENT OF DISPUTES

9.1. Amicable Settlement

The Parties shall use their best efforts to settle amicably all disputes arising out of or in connection with this Contract or the interpretation thereof.

9.2. Dispute Resolution

9.2.1. Any dispute, difference or controversy of whatever nature howsoever arising under or out of or in relation to this Agreement (including its interpretation) between the Parties, and so notified in writing by either Party to the other Party (the “**Dispute**”) shall, in the first instance, be attempted to be resolved amicably in accordance with the conciliation procedure set forth in Clause 9.3.

- 9.2.2. The Parties agree to use their best efforts for resolving all Disputes arising under or in respect of this Agreement promptly, equitably and in good faith, and further agree to provide each other with reasonable access during normal business hours to all non – privileged records, information and data pertaining to any dispute.

9.3. Conciliation

In the event of any Dispute between the Parties, either Party may call upon [Director General Border Roads] and the Chairman of the Board of Directors of the Consultant or a substitute thereof for amicable settlement, and upon such reference, the said persons shall meet no later than 10(ten) days from the date of reference to discuss and attempt to amicably resolve the Dispute. If such meeting does not take place within the 10(ten) day period or the Dispute is not amicably settled within 15(fifteen) days of the meeting or the Dispute is not resolved as evidenced by the signing of written terms of settlement within 30 (thirty) days of the notice in writing referred to in Clause 9.2.1 or such longer period as may be mutually agreed by the Parties, either Party may refer the Dispute to arbitration in accordance with the Provisions of Clause 9.4.

9.4. Arbitration

- 9.4.1. **Any Dispute which is not resolved amicably by conciliation, as provided in Clause 9.3, shall be finally decided by reference to arbitration by a Sole Arbitrator appointed in accordance with Clause 9.4.2. Such arbitration shall be held in accordance with the provisions of the Arbitration and Conciliation Act, 1996 as amended. The venue of such arbitration shall be ***** and the language of arbitration proceedings shall be English.**
- 9.4.2. Each dispute submitted by a Party to arbitration shall be heard by a sole arbitrator to be appointed as per the procedure below
- a) Parties may agree to appoint a sole arbitrator or, failing agreement on the identity of such sole arbitrator within thirty(30) days after receipt by the other Party of the proposal of a name for such an appointment by the Party who initiated the proceedings, either Party may apply to the President, Indian Roads Congress, New Delhi for a list of not fewer than five nominees and, on receipt of such list, the Parties shall alternately strike names therefrom, and the last remaining nominee on the list shall be sole arbitrator for the matter in dispute. If the last remaining nominee has not been determined in this manner within sixty (60) days of the date of the list, the president, Indian Roads Congress, New Delhi, shall appoint, upon the request of either Party and from such list or otherwise, a sole arbitrator for the matter in dispute.

9.4.3. **Substitute Arbitrator**

Substitute Arbitrator If for any reason an arbitrator is unable to perform his function, a substitute shall be appointed in the same manner as the original arbitrator.

9.4.4. **Qualifications of Arbitrator**

The sole arbitrator selected pursuant to Clause 8.2.1 hereof shall be expert with extensive experience in relation to the matter in dispute.

9.4.5. The Arbitrators shall make a reasoned award (the "Award"). Any Award made in any arbitration held pursuant to this Clause 9 shall be final and binding on the Parties as from the date it is made, and the Consultant and the Authority agree and undertake to carry out such Award without delay.

9.4.6. The Consultant and the Authority agree that an Award may be enforced against the Consultant and/or the Authority, as the case may be, and their respective assets wherever situated.

9.4.7. This Agreement and the rights and obligations of the Parties shall remain in full force and effect, pending the Award in any arbitration proceedings hereunder

9.4.8. **Miscellaneous**

In any arbitration proceeding hereunder:

- (a) Proceedings shall, unless otherwise agreed by the parties be held in Delhi.
- (b) The English language shall be the official language for all purposes;
- (c) The decision of sole arbitrator shall be final and binding and shall be enforceable in any court of competent jurisdiction, and the Parties hereby waive any objections to or claims of immunity in respect of such enforcement; and
- (d) The schedule of Expenses and Fee payable to the Arbitrator shall be as under

Sum in dispute	Model fee
Up to Rs.5,00,000(Five Lakh)	Rs. 45,000

Above Rs 5,00,000(Five Lakh) and upto Rs 20,00,000(Twenty Lakh)	Rs 45,000 plus 3.5 per cent of the claim amount over and above Rs 5,00,000 (Five Lakh)
Above Rs 20,00,000(twenty Lakh) and upto Rs 1,00,00,000 (One Crore)	Rs 97,500 plus 3 percent of the claim amount over and above Rs 20,00,000 (Twenty Lakh)
Above Rs 1,00,00,000 (One Crore) and up to Rs 10,00,00,000(Ten Crore)	Rs 3,37,500 plus 1 percent of the claim amount over and above Rs 1,00,00,000(One Crore)
Above 10,00,00,000 (Ten Crore) and up to Rs 20,00,00,000 (Twenty Crore)	Rs 12,37,500 plus 0.75 per cent of the claim amount over and above Rs 10,00,00,000 (Ten Crore)
Above Rs 20,00,00,000 (Twenty Crore)	Rs 19,87,500 plus 0.5 per cent of the claim amount over and above Rs 20,00,00,000(Twenty Crore) with a ceiling of Rs 30,00,000 (Thirty Lakh)

Note: Being sole arbitrator, an additional amount of twenty five per cent on the fee set out above shall be paid. The above fee is to be shared equally by both the parties to the arbitration i.e. claimant and respondent, which is inclusive of fee of arbitrator for claim and counter claims i.e. total “Sum in Dispute”, reading charges, declaration/publishing of award. The expenses, such as stay and travelling charges will be paid as per Client’s guidelines.

10. Change of Scope

Change of Scope on account of variation in length of project highway, change from brown field to green field, change in lane configuration etc. shall be dealt as follows:

- 10.1.** During the course of consultancy services in case it is considered necessary to increase/decrease the scope of services (of total length as compared to indicative length as given in the Annex-1 of Letter of Invitation of the RFP) or change from brown field to green field by the Client the same shall be notified by Change of Scope notice. Similarly, if the Consultant determines that change of scope is needed, it will inform the same to the Client. The Client will examine and shall either reject the proposal or issue change of scope notice.

10.1.1. The Consultancy fee shall be revised on account of change of length as below:

- i) In case there is increase/ decrease in total length of project compared to the indicative length as given in the Annex-1 to Letter of Invitation of the RFP, the consultancy fee shall be increased/ decreased in the same proportion in

which the length of the project road is increased/ decreased, if the increase/decrease in length is upto 25% of original length for tunnel portion and for approach road @3.25 lakh per km including GST and all applicable taxes. Beyond 25 % of the original length, revised consultancy fee shall be mutually decided by the Consultant and the Client for tunnel portion and for approach road @3.25 lakh per km including GST and all applicable taxes.

ii) Increase/decrease in length on account of realignment/bypasses shall not be considered as change of scope. However, the total length of the project highway (including bypasses and realignment) along the finally approved alignment shall be compared with the indicative length in the Annex-1 to Letter of Invitation of the RFP for the purpose of calculation of enhancement of consultancy fee.

10.1.2 In case the project highway or part of it is proposed to be designed as green field project whereas it is not so specifically mentioned in the Annex-1 to Letter of Invitation of the RFP, the consultancy fee applicable for the affected part of the project highway shall be enhanced by 5%.

2. In case of increase in configuration of lanes in the project after the submission under a particular stage, the original consultancy fee shall be enhanced by 10%.

3. In case there is change of mode of delivery i. e. EPC/HAM/BOT (Toll) etc.is done after submission of Final DPR, the original consultancy fee shall be enhanced by 2.5%.

4. In case of revision of DPR is done after submission of Final DPR due to revision in standards/guidelines of Indian Roads Congress/MoRTH, the original consultancy fee shall be enhanced by 2.5%.

11. The Consultant shall be evaluated based on its performance in this consultancy services as per rating system given in **Appendix- IX** and the said rating of the Consultant will be utilised in subsequent proposal evaluation.

be appointed as per the procedure below

SPECIAL CONDITIONS OF CONTRACT

Number of GC Clause

A. Amendments of, and Supplements to, Clauses in the General Conditions

Number of GC Clause

5. OBLIGATION OF THE CLIENT

1. Assistance and Exemptions unless otherwise specified in the SC, the Client shall use its best efforts to ensure that the Government shall:
 - (a) provide the Consultants, Sub consultants and Personnel with work permits and such other documents as shall be necessary to enable the Consultants, Sub consultants or Personnel to perform the Services;
 - (b) assist for the Personnel and, if appropriate, their eligible dependents to be provided promptly with all supporting papers for necessary entry and exit visas, residence permits, exchange permits and any other documents required for their stay in India;
 - (c) facilitate prompt clearance through customs of any property required for the Services;
 - (d) issue to officials, agents and representatives of the Government all such instructions as may be necessary or appropriate for the prompt and effective implementation of the Services;

2. Access to Land

The Client warrants that the Consultants shall have, free of charge, unimpeded access to all land in the Government's country in respect of which access is required for the performance of the Services. The Client will be responsible for any damage to such land or any property thereon resulting from such access and will indemnify the Consultants and each of the Personnel in respect of liability for any such damage, unless such damage is caused by the default or negligence of the Consultants or any Sub consultants or the Personnel of either of them.

A. Amendments of, and Supplements to, Clauses in the General Conditions

5. Contractor shall make his own arrangements for obtaining necessary work permit, entry and exit pass residence permits, exchange permits and any other

be appointed as per the procedure below

documents required for their stay in Bhutan and clearance through customs of any property required for the Services from Bhutan authorities for manpower and vehicle/Equipment/Plants for the work in accordance with the rules and regulations of the land.

The client shall approach the competent authorities of Bhutan for issue of all such instructions to the consultant as may be necessary or appropriate for the prompt and effective implementation of the Services;

1. 1(a) The words “**in the Government’s country**” are amended to read “**in INDIA**”

1.4 The language is: **English**

1.6.1 The addresses are:

**For the Client : HQ CE(P) Dantak,
Border Roads Organisation, C/O 99 APO,
Thimphu, Bhutan**

Attention : <Agency>,
<Address> Extn.
.....; Fax: 011-
.....
bro-dtk@nic.in

For the Consultants:

Attention:Name

Designation

Address

Tel:

Fax:

E-mail address

1.6.2 Notice will be deemed to be effective as follows:

- (a) in the case of personal delivery or registered mail, on delivery;
- (b) In the case of facsimiles, 24 hours following confirmed transmission.
- (c) In case of E mail, 24 hours following confirmed transmission.

be appointed as per the procedure below

8. Entity to Act as Member in charge (In case of Joint Venture of Consultants) with or without an Associate: -

.....

9. The Authorized Representatives are:

For the Client : (--)

Director, <Agency> (--)

For the Consultant:

Name Designation

10. The Consultants and the personnel shall pay the taxes, duties, fees, levies and other impositions levied under the existing, amended or enacted laws (prevailing 7 days before the last date of submission of bids) during life of this contract and the Client shall perform such duties in regard to the deduction of such tax as may be lawfully imposed.

2.1 The effectiveness conditions are the following:

- a) The contract has been approved by Border Roads Organisation.
- b) The consultant will furnish within 15 days of the issue of letter of acceptance, an unconditional Bank Guarantee an amount equivalent to 5% of the total contract value to be received by him from a Nationalized Bank, IDBI or ICICI/ICICI Bank/Foreign Bank/EXIM Bank / Any Scheduled Commercial Bank approved by RBI having a net worth of not less than 500 crore as per latest Annual Report of the Bank. In the case of a Foreign Bank (issued by a Branch in India) the net worth in respect of Indian operations shall only be taken into account. In case of Foreign Bank, the BG issued by Foreign Bank should be counter guaranteed by any Nationalized Bank in India. In case of JV, the BG shall be furnished on behalf of the JV or lead partner of JV for an amount equivalent to 5 % of the total contract value to be received by him towards Performance Security valid for a period of **three years** beyond the date of completion of services.
2. The time period shall be "four months" or such other time period as the parties may agree in writing.

be appointed as per the procedure below

3. The time period shall be "fifteen days" or such other time period as the Parties may agree in writing.
4. The time period shall be Ten **months** or such other time period as the parties may agree in writing.

3.4 Limitation of the Consultants 'Liability towards the Client

(a) Except in case of negligence or willful misconduct on the part of the Consultants or on the part of any person or firm acting on behalf of the Consultants in carrying out the Services, the Consultants, with respect to damage caused by the Consultants to the Client's property, shall not be liable to the Client:

- (i) for any indirect or consequential loss or damage; and
- (ii) for any direct loss or damage that exceeds (A) the total payments for Professional Fees and Reimbursable Expenditure made or expected to be made to the Consultants hereunder, or (B) the proceeds the Consultants may be entitled to receive from any insurance maintained by the Consultants to cover such a liability, whichever of (A) or (B) is higher.

(b) This limitation of liability shall not affect the Consultants 'liability, if any, for damage to Third Parties caused by the Consultants or any person or firm acting on behalf of the Consultants in carrying out the Services.

3.5 The risks and the coverage shall be as follows:

- (a) Third Party motor vehicle liability insurance as required under Motor Vehicles Act, 1988 in respect of motor vehicles operated in India by the Consultants or their Personnel or any Sub consultants or their Personnel for the period of consultancy.
- (b) Third Party liability insurance with a minimum coverage, for Rs.1.00 million
- (c)
 - (i) The Consultant shall provide to CE(P) Dantak, Border Roads Organisation Professional Liability Insurance (PLI) for a period of **Five years** beyond completion of Consultancy services or as per Applicable Law, whichever is higher.
 - (ii) The Consultant will maintain at its expense PLI including coverage for errors and omissions caused by Consultant's negligence in the performance of its duties under this agreement, **(A)** For the amount not exceeding total payments for Professional Fees and Reimbursable Expenditures made or expected to be made to the Consultants hereunder

be appointed as per the procedure below

OR **(B)** the proceeds, the Consultants may be entitled to receive from any insurance maintained by the Consultants to cover such a liability, whichever of **(A) or (B) is higher.**

- (iii) The policy should be issued only from an Insurance Company operating in India.
 - (iv) The policy must clearly indicate the limit of indemnity in terms of “Any One Accident” (AOA) and “Aggregate limit on the policy” (AOP) and in no case should be for an amount less than stated in the contract.
 - (v) If the Consultant enters into an agreement with CE(P) Dantak, Border Roads Organisation in a joint venture or ‘in association’, the policy must be procured and provided to CE(P) Dantak, Border Roads Organisation by the joint venture/in association entity and not by the individual partners of the joint venture/ association.
 - (vi) The contract may include a provision whereby the Consultant does not cancel the policy midterm without the consent of CE(P) Dantak, Border Roads Organisation. The insurance company may provide an undertaking in this regard.
- (d) Employer’s liability and workers ’compensation insurance in respect of the Personnel of the Consultants and of any Sub consultant, in accordance with the relevant provisions of the Applicable Law, as well as, with respect to such Personnel, any such life, health, accident, travel or other insurance as may be appropriate; and all insurances and policies should start from the date of commencement of services and remain effective as per relevant requirements of contract agreement.

3.9 The Consultants shall not use these documents for purposes unrelated to this Contract without the prior written approval of the Client.

4.6 The person designated as Team Leader cum Senior Highway Engineer in Appendix B shall serve in that capacity, as specified in Clause 4.6.

6.1 (b) The ceiling amount in local currency is **Rs..... Excluding Goods & Service Tax)**

6.3 (a) No advance payment will be made.

6.3 (e) The interest rate is: @ 12% per annum

6.3 (f) **The account is:**

Account Number : _____

IFSC Code : _____

be appointed as per the procedure below

- 9.2 Disputes shall be settled by arbitration in accordance with the following provisions:

9.2.1 **Selection of Arbitrators**

Each dispute submitted by a Party to arbitration shall be heard by a sole arbitrator to

- a) Parties may agree to appoint a sole arbitrator or, failing agreement on the identity of such sole arbitrator within thirty(30) days after receipt by the other Party of the proposal of a name for such an appointment by the Party who initiated the proceedings, either Party may apply to the President, Indian Roads Congress, New Delhi for a list of not fewer than five nominees and, on receipt of such list, the Parties shall alternately strike names therefrom, and the last remaining nominee on the list shall be sole arbitrator for the matter in dispute. If the last remaining nominee has not been determined in this manner within sixty (60) days of the date of the list, the president, Indian Roads Congress, New Delhi, shall appoint, upon the request of either Party and from such list or otherwise, a sole arbitrator for the matter in dispute.

Appendix A

Terms of reference containing, inter-alia, the Description of the Services and Reporting Requirements

Appendix

B

Consultants 'Sub consultants, Key Personnel and Sub Professional
Personnel

Appendix

C

Hours of work for Consultants 'Personnel

The Consultant's personnel shall normally work for 8 hours in a day and six days a week. Normally Sundays shall be closed for working. In addition they shall also be

Appendix

allowed to avail holidays as observed by the Client's office in the relevant state without deduction of remunerations. In case any person is required to work on Sunday or Holiday due to exigency of work, he/she shall be given compensatory leave within the next 15 days.

Appendix

D

Duties of the Client

Appendix

E

Cost Estimate

Appendix

F:

Copy of letter of invitation

Appendix

G:

Copy of letter of acceptance

**Format for Bank Guarantee for Performance Security BANK GUARANTEE FOR
PERFORMANCE SECURITY**

To,

<Agency, Address>

In consideration of CE(P) Dantak, Border Roads Organisation (hereinafter referred as the "Client", which expression shall, unless repugnant to the context or meaning thereof include its successors, administrators and assigns) having awarded to M/s.....having its office at

..... (Hereinafter referred to as the "Consultant" which expression shall repugnant to the context or meaning thereof, include its successors, administrators, executors and assigns), a contract by issue of client's Contract Agreement no. / Letter of Acceptance No. dated and the same having been unequivocally accepted by the Consultant, resulting in a Contract valued at Rs...../-

(Rupees.....) excluding Goods & service tax for **"Consultancy Services for preparation of Detailed Project Report of**

<Project Description>(Total Length -.....) on NH-.....in the states ofunder – Contract Package No (Hereinafter called the "Contract"), and the Consultant having agreed to furnish a Bank Guarantee to the Client as "Performance Security as stipulated by the Client in the said contract for performance of the above Contract amounting to Rs...../- (Rupees).

We,having registered office at , a body registered/constituted

under the(hereinafter referred to as the Bank), which expression shall, unless repugnant to the context or meaning thereof, include its successors, administrators, executors and assigns) do hereby guarantee and undertake to pay the client immediately on demand any or, all money payable by the Consultant to the extent of Rs.

.....(Rupees.....) as aforesaid at any time up to without any demur, reservation, contest, recourse or protest and/or without any reference to the consultant. Any such demand made by the client on the bank shall be conclusive and binding notwithstanding any difference between the Client and the Consultant or any dispute pending before any Court, Tribunal, Arbitrator or any other authority. We agree that the Guarantee herein contained shall be irrevocable and shall continue to be enforceable till the Client discharges this guarantee.

The Client shall have the fullest liberty without affecting in any way the liability of the Bank under this Guarantee, from time to time to vary or to extend the time for performance of the contract by the Consultant. The Client shall have the fullest liberty without affecting this guarantee, to postpone from time to time the exercise of any powers

vested in them or of any right which they might have against the consultant and to exercise the same at any time in any manner, and either to enforce or to forbear to enforce any covenants, contained or implied, in the Contract between the Client and the Consultant any other course or remedy or security available to the Client. The bank shall not be relieved of its obligations under these presents by any exercise by the Client of its liberty with reference to the matters aforesaid or any of them or by reason of any other act or forbearance or other acts of omission or commission on the part of the Client or any other indulgence shown by the Client or by any other matter or thing whatsoever which under law would but for this provision have the effect of relieving the Bank.

The Bank also agrees that the Client at its option shall be entitled to enforce this Guarantee against the Bank as a principal debtor, in the first instance without proceeding against the Consultant and notwithstanding any security or other guarantee that the Client may have in relation to the Consultant's liabilities.

Notwithstanding anything contained herein,

- a) Our liability under this Bank Guarantee is limited to Rs.(Rupees) and it shall remain in force up to and includingand shall be extended from time to time for such period as may be desired by M/s , on whose behalf this guarantee has been given.
- b) This Bank Guarantee shall be valid up to
- c) We are liable to pay the guaranteed amount or any part thereof under this Bank Guarantee only and only if you serve upon us a written claim or demand on or before (date of expiry of Guarantee).

(Signature of the Authorized Official)

(Name & Designation with Bank Stamp)

NOTE:

- (i) The bank guarantee(s) contains the name, designation and code number of the officer(s) signing the guarantee(s).
- (ii) The address, telephone no. and other details of the Head Office of the Bank as well as of issuing branch should be mentioned on the covering letter of issuing Branch.
- (iii) The bank guarantee for Rs 10,000 and above is signed by at least two officials (or as per the norms prescribed by the RBI in this regard).

Appendix I: Minutes of Pre-bid meeting

