



National High Speed Rail Corporation Limited

(A Joint Venture of Government of India and Participating State Governments)

**Tender Name: Final Alignment design including Aerial
LiDAR survey and other related works for six high speed
rail corridors**

Tender No.: NHSRCL/CO/CONTRACT/LIDAR/2020/03

(Single Stage Two Packet Bid)

Issued in: February 2020

**National High Speed Rail Corporation Limited Asia
Bhawan 2nd Floor, Road No.205, Sector 9, Dwarka,
New Delhi -110077**

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NOTICE INVITING TENDER (NIT)

NATIONAL HIGH SPEED RAIL CORPORATION LIMITED

(A Joint Sector Company of Govt. of India and Participating State Governments)

NOTICE INVITING TENDER (NIT)
(Single Stage Two Packet Bidding)

Tender No.: NHSRCL/CO/CONTRACT/LIDAR/2020/03

Date: 07.02.2020

- National High Speed Rail Corporation Limited (NHSRCL)**, an SPV of Government of India and participating State Governments, having its Registered Office at Asia Bhawan 2nd Floor, Road No.205, Sector 9, Dwarka, New Delhi -110077, invites open bids under **Single Stage Two Packet System for Final Alignment design including Aerial LiDAR survey and other related works for six high speed rail corridors.**

Sl. No.	Name of Work	Bid Security	Contract Period	Cost of Bidding Document
1	Final Alignment design including Aerial LiDAR survey and other related works for six high speed rail corridors	INR 74,24,500/- (INR Seventy Four Lakhs Twenty Four Thousand Five Hundred only) (Demand Draft, Pay Order, Bank Guarantee)	470 days	INR 59,000/- (including GST @18%)

- To participate in the Tender, Tender documents can be purchased during **10.02.2020 (11:00 hrs.) to 10.03.2020 (17:00 hrs.)** on all working days from the office of the National High Speed Rail Corporation Limited, New Delhi . The tender documents shall be given only to the person authorized in writing by your firm/ company. Cost of tender document shall be **INR 59,000/-** (Rupees Fifty Nine Thouand only) inclusive of GST @18%, which is non-refundable. This amount should be paid in the form of Pay Order/Demand Draft payable in favour of M/s National High Speed Rail Corporation Limited payable at New Delhi. Tender received without Tender Document Cost in specified form is liable to be summarily rejected. The GSTIN Certificate of the Bidder purchasing the tender document shall be submitted at the time of purchase of the tender documents.
- Tender Documents can also be downloaded from NHSRCL website <https://www.nhsrcl.in> & <https://eprocure.gov.in/epublish/app> The bids can be submitted on the downloaded document along with a separate demand draft of **INR 59,000/-** (Rupees **Fifty Nine Thousand** only) towards the cost of Tender documents at the time of submission of Bid, in a separate envelope marked "**Cost of Tender documents**", failing which the offer is liable to be summarily rejected.
- Bids must be accompanied by Bid Security of **INR 74,24,500/- (INR Seventy Four Lakhs Twenty Four Thousand Five Hundred only)** in the form of DD/ Pay Order/Bank Guarantee as specified in Clause 15 of Instruction to Bidders in the Tender documents and shall have to be valid for **45 days** beyond the last date of validity of the bid.
- No pre-bid meeting is planned for this tender.
- Date of Receipt and opening of Technical Bids:** The completed Bids must be dropped in the nominated tender box or delivered to the address below during office hours from **10.02.2020** onwards but not later than **15:00 hrs.** on **11.03.2020**. Technical Bids will be opened at **15:30 hrs.** on **11.03.2020** in the presence of Bidders who choose to be present. NHSRCL will not be responsible for any delays in Bidder obtaining the Bidding documents from NHSRCL/Website or receipt of the submitted bid by NHSRCL. However, NHSRCL reserves the right to postpone/defer the opening, if it deems fit.
- Address for Communication:** Interested eligible Bidders may obtain further information from the following address:

National High-Speed Rail Corporation Limited,

2nd Floor, Asia Bhawan, Road No. 205

Sector-9, Dwarka, New Delhi-110077

Email ID: tender.fl_s_fad2020@nhsrcl.in

8. National High Speed Rail Corporation Limited reserves the right to cancel the tender before submission/ opening of tender, postpone the tender submission / opening date and to accept/ reject any or all tenders without assigning any reasons thereof.
9. In case the bidder is registered as a vendor under the category of Micro, Small and Medium Enterprises (MSME), he must state his Udyog Aadhar Memorandum (UAM) number. The onus of proving that the bidder is exempted from payment of cost of tender document and/or EMD lies on the Bidder. In this connection, it should be noted that mere opening of bid does not mean that the bid has to be considered by NHSRCL as a valid bid. If later, it is discovered from the submitted documents that bidder is not exempted from payment of cost of tender and/or EMD, his bid shall be treated as non-responsive.

S/d-

GM/ Contract
National High Speed Rail Corporation Ltd.
2nd Floor, Asia Bhawan, Road No. 205
Sector-9, Dwarka, New Delhi-110077

SECTION-II
SECTION-II / FORM OF BID



LETTER OF TECHNICAL BID

Date: *[insert date of Bid submission]*

Tender No. NHSRCL/CO/CONTRACT/LIDAR/2020/03

To:

GM/ Contract
National High Speed Rail Corporation Limited
2nd Floor, Asia Bhawan, Road No. 205
Sector-9, Dwarka,
New Delhi – 110077, India

Dear Sir,

We, the undersigned, declare that:

- a) We have examined and have no reservations to the Bidding Documents, including addenda issued in accordance with Instructions to Bidders (ITB 8). *[Insert the number and issuing date of each addendum];*
- b) We offer to execute in conformity with the Bidding Documents the following Works: **Final Alignment design including Aerial LiDAR survey and other related works for six high speed rail corridors (NHSRCL/CO/CONTRACT/LIDAR/2020/03)**;
- c) Our Bid shall be valid for a period of 180 days from the date fixed for the Bid submission deadline in accordance with the Bidding Documents, and it shall remain binding upon us and may be accepted at any time before the expiration of that period or last day of the extended bid validity, if any;
- d) We, including any subcontractors or suppliers for any part of the contract, do not have any conflict of interest in accordance with ITB 20;
- e) We are not participating, as a Bidder or as a subcontractor, in more than one Bid in this bidding process in accordance with ITB 20.1(c); and
- f) We hereby certify that we have taken steps to ensure that no person acting for us or on our behalf will engage in any type of fraud, corruption, a misrepresentation.
- g) In case incorrect, fabricated, suppressed information or any misrepresentation is made is noticed after the award of contract, then NHSRCL reserves the right to terminate the contract and forfeit all deposits available with NHSRCL.

Name of the Bidder* *[insert along with complete name of person signing the Bid]*

Name of the person duly authorized to sign the Bid on behalf of the Bidder** *[insert complete name of person duly authorized to sign the Bid]*

Title of the person signing the Bid *[insert complete title of the person signing the Bid]*

Signature of the person named above *Put signature of person whose name and capacity are shown above]*

Date signed *[insert date of signing] day of [insert month], [insert year]*

*: In the case of the Bid submitted by joint venture, a consortium specifies the name of the Joint Venture as Bidder and or that of consortium partners.

** : Person signing the Bid shall have the power of attorney given by the Bidder and the same shall be attached with the Bid.

LETTER OF FINANCIAL BID

[On Bidder's Company letterhead]

To

GM/ Contract
National High Speed Rail Corporation Limited
2nd Floor, Asia Bhawan, Road No. 205
Sector-9, Dwarka,
New Delhi – 110077, India

Dear Sir,

We, the undersigned, declare that:

- a) We have examined and have no reservations to the Bidding Documents, including addenda issued in accordance with Instructions to Bidders. [Insert the number and issuing date of each addendum];
- b) We offer to execute in conformity with the Bidding Documents the following Works:
Final Alignment design including Aerial LiDAR survey and other related works for six high speed rail corridors (NHSRCL/CO/CONTRACT/LIDAR/2020/03)
The total price of our Bid, is: [insert the total price of the Bid in words and figures in INR]
- c) Our Bid shall be valid for a period of 180 days from the date fixed for the Bid submission deadline in accordance with the Bidding Documents, and it shall remain binding upon us and will be accepted at any time before the expiration of that period;
- d) If our Bid is accepted, we commit to provide a Performance Security in accordance with the Bidding Documents;
- e) We understand that this Bid, together with your written acceptance thereof included in your Letter of Acceptance, shall constitute a binding contract between us, until a formal contract is prepared and executed; and
- f) We understand that you are not bound to accept the lowest evaluated Bid or any other Bid that you may receive.

Name of the Bidder [insert complete name of Bidder submitting the Bid]

Name of the person duly authorized to sign the Bid on behalf of the Bidder** [insert complete name of person duly authorized to sign the Bid]

Title of the person signing the Bid [insert complete title of the person signing the Bid]

Signature of the person named above [insert signature of person whose name and capacity are shown above]

Date signed [insert date of signing] day of [insert month], [insert year]

** : Person signing the Bid shall have the power of attorney given by the Bidder to be attached with the Bid.

SECTION-III
INSTRUCTIONS TO BIDDERS (ITB)



INSTRUCTIONS TO BIDDER (ITB)

A. INTRODUCTION

1.0 General

1.1 **Name of the Work:** As indicated in 'Appendix to Tender'.

1.2 The bid should accompany the documents, as specified in this Tender document, duly signed by an authorized person holding the power of attorney.

1.3 The work is proposed to be executed under the following relationship:

a) **Client:** **National High Speed Rail Corporation Limited,
Asia Bhawan, Second Floor,
Road No 205, Sector-9 Dwarka,
New Delhi-110077**

b) **Employer:** National High Speed Rail Corporation Limited; Address as above.

c) **Contractor:** The successful bidder to whom the work is awarded shall become the Contractor for the execution of the Final Alignment design including Aerial LiDAR survey and other related works for six high speed rail corridors.

1.4 Throughout these bidding documents, the terms "bid" and "tender" and their derivatives ("bidder"/ "tenderer"), "bid/tendered", "bidding"/ "tendering", etc.) are synonymous. Day means calendar day. Singular also means plural. The term Consultant may interchangeably read as contractor also.

1.5 **Scope of Work:** The scope of work includes alignment design for six high speed rail corridor after carrying out Aerial LiDAR survey. The works also include selection of routes based on the study of satellite imagery data, etc. as prescribed in TOR.

1.6 **NIT Response:**

The NIT Response must be properly signed & stamped as detailed below:

1. By the proprietor in case of a proprietary firm.
2. By a duly authorized person holding the power of attorney in the case of a limited company or corporation (a certified copy of the power of attorney in original shall accompany the Tender).
3. By the partner holding the power of attorney in the case of a firm in partnership (a certified copy of the power of attorney shall accompany the Bid)

1.7 Bidders may carefully note that they are liable to be disqualified at any time during the tendering process in case any of the information furnished by them is found to be inaccurate or untrue.

1.8 A bidder shall submit only one bid in the capacity of single entity or any combination of such entities in the form of a JV/Consortium. Violation of this condition is liable to a bidder's disqualification.

1.9 It is the NHSRCL's policy that the Contractor under contracts observe the highest standard of ethics & professionalism during the selection and execution of such contracts. In pursuance of this policy, NHSRCL:

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 contractors with or without the knowledge of the Employer, designed to establish prices at artificial, noncompetitive 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) Reject a proposal for award if it determines that the Contractor recommended for award has, directly or through an agent, engaged in corrupt, fraudulent, collusive or coercive practices in competing for the contract in question.

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.

The rates shall be offered in the enclosed "Bill of Quantity (BOQ)". The rates shall include cost of all activities, wages, all allowances and benefits, payment towards entitled medical and annual leave, PF contributions, incidental costs, insurances (as applicable) along with all taxes, but excluding Goods & Services tax, etc. as applicable, as per the description in scope of work and services and BOQ.

2.0 DELETED

3.0 CONTENT OF BIDDING DOCUMENTS

3.1 The bidding documents include the following:

Single Stage Two Packet Bid consisting of Notice Inviting Tender (NIT), Form of Bid, Instruction to Bidders (ITB), Annexure I/ Bid Qualifying Criteria and Evaluation Methodology, Appendix to Tender, Terms of Reference(TOR), Annexures / Performas, General Condition of Contract (GCC), Particular Conditions of Contract (PCC), Contract Forms, Bill of Quantities.

3.2 The bidder is expected to examine all instructions, terms, conditions, forms specifications and any other information in the bidding documents. Failure to furnish all information required by the bidding documents or submission of a bid not substantially responsive to the bidding documents in every respect will be at the bidder's risk and may result in rejection of his bid.

4.0 COST OF BIDDING

4.1 The bidder shall bear all costs associated with the preparation and submission of the bid and the Employer will in no case be responsible or liable for these costs regardless of the conduct or the outcome of the bidding process.

5.0 UNDERSTANDING OF BID DOCUMENTS

5.1 The bidder must obtain for itself on its own responsibility and its own cost all the information including risks, contingencies & other circumstances in execution of the work. It shall also carefully read and understand all its obligations & liabilities given in tender documents.

5.2 The bidder is advised to visit and examine the site where the work is to be executed and its surroundings or other areas as deemed fit by the bidder and obtain for itself on its own responsibility all information that may be necessary for preparing the bid and execution of the contract. The cost of visiting the site and collecting relevant data shall be at the bidder's own expenses. It is a condition of the bid that the bidder is deemed to have visited the site and satisfied him-self with all the conditions prevailing including any difficulties for executing the work.

6.0 PRE-BID MEETING, CLARIFICATIONS AND AMENDMENTS TO TENDER DOCUMENT

6.1 Pre-Bid Meeting

6.1.1 No Pre- Bid meeting is planned for this Tender.

6.2 Bidder's Queries

6.2.1 The bidder should submit query in writing not later than Fourteen (14) days prior to the deadline for submission of Bids. Replies to bidder queries should be sent to the Bidders by email/ courier/ registered post but without identifying the source of inquiry not later than Five (05) days prior to the deadline for submission of Bids.

6.3 Addendum/ Corrigendum

6.3.1 At any time prior to the submission of Bids, the Employer may, whether at its own initiative, or in response to a clarification requested by a firm, amend the bid by issuing an Addendum/ Corrigendum. Addendum/ Corrigendum which will be informed to the Bidders. To give bidders reasonable time in which to take an amendment into account in their Bids, the Employer may at its discretion, if the amendment is substantial, extend the deadline for the bid submission. The issued Addendum(s) and Corrigendum(s) should be considered as part of Bid Document.

C PREPARATION OF BIDS

7.0 LANGUAGE OF BID

7.1 The bid prepared by the bidder and all documents related to the bid shall be written in English.

8.0 SIGNING OF ALL BID PAPERS AND COMPLETING BILL OF QUANTITIES

8.1 All the pages of the Tender documents (including all Addendum, Corrigendum, if any), drawings (if any) and Bill of Quantities and accompanying documents must be properly stamped and signed by the authorized signatory holding the Power of Attorney on each page and submitted along with the Bid. (The bidder is to enclose Power of Attorney in original).

8.2 Bidder shall quote price/rate for all the BOQ items. While filling up the rates in the Bill of Quantities, bidder shall ensure that there is no discrepancy in the rates and amounts. For the Price Bid, the full copy of the duly filled and signed Bill of Quantities should be submitted along with the Letter of Financial Bid.

8.3 The bidder must fill and submit the prices as per instructions given in Bill of Quantities. He shall not make any addition or alteration in BOQ format.

8.4 Any overwriting, erasures or cancellations shall only be valid, if they are initialed by the signatory (ies) to the bid.

8.5 The bid should accompany all documents as mentioned in Instruction to Bidders, duly signed by an authorized person holding the Power of Attorney. Bidder shall compile their Bid document as per the requirements of Instruction to Bidders.

9.0 DEVIATIONS

9.1 In case of bids containing any conditions or deviations or reservations about contents of bidding document, Employer may ask for withdrawal of such conditions/deviations/reservations. If the bidder does not withdraw such conditions/deviations/reservations, the bid shall be treated as non-responsive. Employer's decision regarding responsiveness or non-responsiveness of a bid shall be final and binding.

10.0 PERIOD OF VALIDITY OF THE BID

10.1 The bid shall remain valid for the period indicated in "Appendix to Tender" after the date of the opening of the bid. If the bidder gives validity period less than that fixed/prescribed by Employer, the bid shall be liable to be rejected.

10.2 Notwithstanding the above clause, Employer may solicit the bidders' consent to an extension of the validity period of the bid. The request and the response shall be made in writing.

D SUBMISSION AND RECEIPT OF BIDS:

11.0 DEADLINE FOR SUBMISSION OF BID

11.1 The Bidder shall submit a fully responsive bid including all the supporting documents requested in the Bid document. Once the bids are received and opened, Bidders shall not be required nor permitted to change the substance, quoted fee and so forth except at the time of negotiations carried out in accordance with the provisions of the Bid document. However, the Employer may ask in writing from the Bidders any clarifications/information based on the documents submitted with the bid considered necessary for evaluation, but not having any effect on the quoted fee and the substance of the bid. Bids must be delivered at the address given in the NIT on or before the time and date stated in the NIT or any new date established by NHSRCL according to provisions as set out in relevant Clauses of Instruction to Bidders. The tender duly filled must be received by Employer at address specified not later than the date and time as mentioned in the NIT.

11.2 The Bidders shall submit the bids ensuring the following:

- i. The Bid document in full and all completely filled Forms along with all issued Corrigendum/Addendum issued by the Employer duly initialed and stamped on all pages by the authorized signatory shall be serially enclosed and shall form part of submitted Bid as acceptance to all Terms and Conditions of Tender document by the Bidder.
- ii. All details furnished as per Clause 11.5 of ITB.
- iii. Financial Bid (containing Letter of Financial Bid and Bill of Quantities).
- iv. Tender Cost and Earnest Money Deposit to be deposited as per Tender Conditions.

11.3 Bids shall contain no interlineations or overwriting, (except as necessary to correct errors) made by Bidders themselves. The person(s) who signed the Bid document must initial any such corrections, interlineations or overwriting. Tender received after submission time of the tender shall be rejected and returned unopened to the bidder.

- 11.4 Bids should be submitted in two separate **sealed** Envelopes clearly marked
- i) Technical Bid along with Tender Fees and Earnest Money Deposit
 - ii) Financial Bid (duly filled BOQ and Letter of Financial Bid)
- 11.5 The bidder shall submit the bid compiling all details and information along with all filled in Bid forms as under: -

S. No	PARTICULARS	REMARKS
1.	Checklist of Bid Document submission	Form 1
2.	Financial Credentials of Bidder	Form 2
3.	Financial Performance	Form 3
4.	Contractor's Organization and Experience	Form 4
5.	Contractor's Organization and Experience	Form 5
6.	Experience in Similar Nature of Work	Form 6
7.	Curriculum Vitae (CV) of professional personnel	Form 7
8.	Declaration	Form 8
9.	Format for Payment through "NEFT/RTGS" System Contractor/ Vendor Payment	Form 9
10.	Power of Attorney for Authorised Representative of Sole Bidder	Form 10
11.	Format for Affidavit to be submitted by the Bidder Along with the bid	Form 11
12.	Form of Bid Security (Bank Guarantee)	Form 12
13.	Form – JV or Consortium Agreement	Form 13
14.	Power Of Attorney For Authorised Representative of JV or Consortium Members	Form 14
15.	Form for Asset ownership	Form 15
16.	Power of Attorney to Authorized Representative of JV/Consortium	Form 16

Note: All Bid Forms and Bill of Quantities to be signed and stamped on all pages by Authorized Signatory and submitted in original.

Tender received after submission due date and time shall be rejected and returned unopened to the Bidder.

- 11.6 In case the bidder is registered as a vendor under the category of Micro, Small and Medium enterprises (MSME), he must state his Udyog Aadhaar Memorandum (UAM) number. The onus of proving that the bidder is exempted from payment of cost of tender document and/or EMD lies on the bidder. In this connection, it should be noted that mere opening of

bid does not mean that the bid has to be considered by NHSRCL as a valid bid. If later, it is discovered from the submitted documents that bidder is not exempted from payment of cost of tender and/or EMD, his bid shall be treated as non-responsive.

12.0 WITHDRAWAL OF BID

- 12.1 No tender can be withdrawn after submission and during tender validity period. If the Bid is withdrawn within the Bid validity period, the Earnest Money Deposit (EMD) will be encashed resulting in forfeiture of Bid Security by the Bidder.
- 12.2 Submission of a bid by a bidder implies that he has read all the bid documents including amendments if any, visited the site and has made himself aware of the scope and specifications of the work to be done, local conditions and other factors having any bearing on the execution of the work.

13.0 SEALING AND MARKING OF BID DOCUMENT.

13.1 The bid shall be submitted, duly on or before the due date and time, containing the Technical and Financial Bid in two separate sealed envelopes, addressed to **“GM/ Contract, National High Speed Rail Corporation Ltd., 2nd Floor, Asia Bhawan, Road No. 205, Sector-9, Dwarka, New Delhi-110077”** as described below: -

- (1) The two sealed envelopes one marked “Technical Bid along with Tender Fees and Earnest Money Deposit” and “Financial Bid” shall be sealed in a large envelope. **This envelope shall mention name of work at the top and the name of the submitting Bidder at the left hand corner of the envelope.**
- (2) The Technical Bid shall comprise of duly filled and signed forms under Section-VI: Annexures/ Performas.
- (3) The Financial Bid must contain the Letter of Financial Bid document along with quoted Bill of quantities with rates & amounts duly filled in figures. Total amount of bid offer should also be indicated in words duly signed & stamped.
- (4) If all required documents along with Financial Bid are not submitted simultaneously upto the prescribed time and date of opening, the bid offer shall be summarily rejected.
- (5) The requisite EMD must be submitted along with the Bid. Otherwise, the bid shall be summarily rejected.
- (6) Bidder(s) must give their complete postal address of correspondence correctly with PIN code. NHSRCL shall not be responsible for any failure of despatch of letter by the Postal Department.
- (7) The bidder or his authorised representatives may attend the opening of bid on the specified dates & timings and place.
- (8) The attested copies of the various letters/documentary proofs/statements etc. should be enclosed with bid and shall be properly indexed.

13.2 In addition to the above, the envelope shall also contain the name and address of the bidder to enable bid to be returned / unopened, if so required.

14.0 TRANSFER OF BID DOCUMENTS

Transfer of **bid documents** to another bidder is not permissible. Bidder can submit only one bid on the document issued to him.

15.0 EARNEST MONEY DEPOSIT (BID SECURITY)

15.1 Earnest Money Deposit

The bidder must furnish the Earnest Money Deposit as indicated in 'Appendix to Tender' for the work as specified failing which the bid shall be summarily rejected. The Earnest Money may be in any one of the following forms:

- a) Pay Order/Demand Draft / Bank Guarantee of any Scheduled Bank in India (except Co-operative Bank) in favour of National High Speed Rail Corporation Limited payable at a place as given in Appendix to Tender. It is mandatory for bidders to provide their bankers details (name of bank and branch) along with their own bank details (account no., name of account holder, NEFT / RTGS details).
- b) Employer shall not be liable for payment of any interest on the Earnest Money Deposit.
- c) In case the bidder is registered as a vendor under the category of Micro, Small and Medium Enterprises (MSME), he must state his Udyog Aadhar Memorandum (UAM) number. The onus of proving that the bidder is exempted from payment of cost of tender document and/or EMD lies on the bidder. In this connection, it should be noted that mere opening of bid does not mean that the bid has to be considered by NHSRCL as a valid bid. If later, it is discovered from the submitted documents that bidder is not exempted from payment of cost of tender and/or EMD, his bid shall be treated as non-responsive.

15.2 Forfeiture of Earnest Money:

The Earnest Money Deposit of the Bidder shall be forfeited if he withdraws his bid after opening of the bid during the period of bid validity specified in the "Appendix to Tender" or extended validity period as agreed to in writing by the bidder.

The Earnest Money Deposit shall be forfeited as per the reasons given in tender documents, which are as under:

- a) if a Tenderer/Bidder withdraws its Bid during the period of Bid validity
- b) if a Tenderer/Bidder misrepresents or omits the facts in order to influence the procurement process;
- c) if the successful Tenderer/Bidder fails to:
 - (i) sign the Contract in accordance of tender terms and conditions;
 - (ii) furnish a performance security;
 - (iii) accept the correction of its Bid Price;
- d) if the affidavit submitted by the Tenderer/Bidder or its constituents in or any of the declarations of Form of Bid submitted by the Bidder has been found to be false at any stage during the process of Bid evaluation.

15.3 Return of Earnest Money Deposit:

- a) The Bid Security of unsuccessful Bidders shall be returned as promptly as possible upon the successful Bidder's signing the Contract and furnishing the Performance Security.
- b) The Earnest Money Deposit of the successful bidder shall be dealt as under:

The Bid Security of successful Bidders shall be returned as promptly as possible upon the successful Bidder's signing the Contract and furnishing the Performance Security.

16.0 DELETED

E. BID OPENING AND EVALUATION

17.0 OPENING OF THE BID

- 17.0.1 Technical Bids will be opened at the address mentioned in “Notice Inviting Tender” in presence of bidders or authorized representatives of bidders who wish to attend the opening of bids. Physical presence during bid opening is optional.
- 17.0.2 Bidders or their authorized representatives who are present shall sign register in evidence of their attendance.
- 17.0.3 Bidder name, presence or absence of requisite total cost of work quoted or any other details as Employer may consider appropriate will be announced and recorded at the time of Financial bid opening.

17.1 System of Evaluation of Bids

17.1.1 Bids will be evaluated through the following three stages:

- | | | |
|-------|---------|--|
| (i) | Stage 1 | Evaluation of General Requirements |
| (ii) | Stage 2 | Qualifying Criteria and Evaluation of Technical Bid based upon Combined Quality and Cost Based Selection (CQCBS) |
| (iii) | Stage 3 | Evaluation of Financial Bid |

17.1.2 Part 1 (General Bid Evaluation)

Stage 1: Evaluation of General Requirements

The following General Items will be checked:

- i) The Power of Attorney for the Bid signatory is in the correct form and properly notarised.
- ii) All Bid Forms are duly fulfilled and have been signed by the Authorised Representative.
- iii) All pages of the Bid Documents along with issued Addendum/Corrigendum (if any) have been duly signed on all pages by Authorised Representative and submitted along with the Bid as acceptance to all Terms and Conditions of the Tender document by the Bidder.
- iv) All data to be entered by the Bidder has been provided as per FORM 1.
- v) Any alterations are initialled by Authorised Representative.
- vi) Bid Security and Tender Document Cost Submitted as per Tender Conditions

All Bids which have passed this Stage of the Evaluation will proceed to the next stage i.e. Stage 2.

Stage 2: Qualifying Criteria and Evaluation of Technical Bid based upon Combined Quality and Cost Based Selection (CQCBS) Criteria

The details of Qualifying Criteria and Evaluation of Technical Bid is provided in Annexure I of ITB.

17.1.3 Financial Bid Evaluation

Stage 3: Evaluation of Financial Bid

1. All pages of Bill of Quantities to be submitted as per Proforma provided in Tender document duly signed and stamped at all pages by Authorized Signatory.
2. Bids containing financial information will be checked for computational errors, and prices will be corrected and adjusted as necessary.
3. The Employer shall correct arithmetical errors on the following basis:
 - a) If there is a discrepancy between the unit price and the total price that is obtained by multiplying the unit price and quantity, the unit price shall prevail and the total price shall be corrected, unless in the opinion of the Employer there is an obvious misplacement of the decimal point in the unit price, in which case the total price as quoted shall govern and the unit price shall be corrected;
 - b) If there is an error in a total corresponding to the addition or subtraction of subtotals, the subtotals shall prevail and the total shall be corrected; and
 - c) If there is any discrepancy between quoted figures and words, the amount quoted in words shall prevail.
 - d) The Bidder shall fill in rates and prices for all items of the Works described in the Bill of Quantities. Items against which no rate or price is entered by the Bidder shall be deemed covered by the rates for other items in the Bill of Quantities and will not be paid for separately by the Employer.
4. If the Bidder does not accept the correction of errors, its Bid shall be disqualified and its Bid security may be forfeited.

The details of Qualifying Criteria and Evaluation of Financial Bid is provided in Annexure I of ITB.

On completion of Technical and Financial evaluation of submitted Bids, final ranking of the Bids will be determined. This will be done by normally applying weightage as specified in the procedure listed in Annexure I respectively to the technical and financial score of each evaluated qualifying Technical and Financial Bids and then computing the relevant combined total score for each Bidder. After such final ranking, normally, the first-ranked Bidder shall be awarded the Contract.

18.0 CLARIFICATION OF THE BIDS

- 18.1 To assist the examination, evaluation and comparison of the bids, Employer may at his discretion ask the bidders for any clarifications as considered essential. All such correspondence shall be in writing and no change in price or substance of the bid shall be sought or permitted. The above clarification for submission of the details shall form part of the bid and shall be binding on the bidder.

19.0 NEGOTIATION

- 19.1 The Employer reserves the right to negotiate the offer submitted by the bidder/s to withdraw certain conditions or to bring down the rates to a reasonable level. The bidder must note that during negotiation, rates of items of BOQ can only be reduced and not increased by the bidder. In case the bidder introduces any new condition or increases rates of any item of BOQ, his negotiated offer is liable to be rejected and the original offer shall remain valid and binding on him.

Should NHSRCL decide to negotiate with view to bring down the rates, the bidder called for negotiation should furnish the following form of declaration before the commencement of negotiation.

“I _____ do declare that in the event
of failure of contemplated negotiations relating to bid No.
_____ dated
_____ my original bid shall remain open for acceptance on its original
terms and conditions.”

20.0 CONFLICT OF INTEREST

20.1 A Bidder shall not have a conflict of interest. A Bidder shall not be employed under any of the circumstances set forth below throughout the bidding/selection process and/or the execution of the Contract unless the conflict has been resolved in a manner acceptable to NHSRCL.

- (a) A firm shall be disqualified from providing goods or non-consulting services resulting from or directly related to consulting services for the preparation or implementation of a project that it provided or were provided by any affiliate that directly or indirectly controls, is controlled by, or is under common control with that firm. This provision does not apply to the various firms (consultants, contractors, or suppliers) only due to the reason that those firms together are performing the Contractor's obligations under a turnkey or design and build contract.
- (b) A firm that has a close business relationship with the Borrower's professional personnel, who are directly or indirectly involved in any part of: (i) the preparation of the prequalification and Bidding Documents for the Contract, (ii) the prequalification and Bid evaluation, or (iii) the supervision of such Contract, shall be disqualified.
- (c) Based on the “One Bid Per Bidder” principle, which is to ensure fair competition, a firm and any affiliate that directly or indirectly controls, is controlled by, or is under common control with that firm shall not be allowed to submit more than one Bid, either individually or as a member in a JV. A firm (including its affiliate), if acting in the capacity of a Subcontractor in one Bid, may participate in other Bids, only in that capacity.
- (d) A firm having any other form of conflict of interest other than (a) through (c) above shall be disqualified.

21.0 CANVASSING

21.1 No bidder is permitted to canvass to Employer on any matter relating to this bidding. Any bidder found doing so may be disqualified and his bid may be rejected.

22.0 RIGHT TO ACCEPT ANY BID OR REJECT ALL BIDS

Employer reserves the right to accept, split, divide, negotiate, cancel or reject any bid or to annul and reject all bids at any time prior to the award of the contract without incurring any liability to the affected bidders or any obligation to inform affected bidder, the grounds of such action.

23.0 AWARD OF CONTRACT

23.1 Employer shall notify the successful bidder in writing by a Registered Letter/Courier/ Speed Post/e-mail or per bearer that his bid has been accepted.

23.2 The Parties shall sign a Contract Agreement as per the conditions of contract after the Contractor receives the Letter of Acceptance, unless they agree otherwise. The costs of stamp duties and similar charges (if any) imposed by law in connection with entry into the Contract Agreement shall be borne by the Employer.

24.0 ANNULMENT OF AWARD

22.1 Failure of the successful bidder to comply with the requirement of Clause 23 above shall constitute sufficient ground for the annulment of the award and forfeiture of the EMD in which event the Employer may make the award to any other bidder at his discretion or call for new bids

25.0 JURISDICTION

This Bid shall be governed by and construed in accordance with the laws of India and in any dispute arising out of or relating to this agreement, the Parties submit to the exclusive jurisdiction of the Courts situated at Delhi, India.

ANNEXURE I

BID QUALIFYING CRITERIA AND EVALUATION METHODOLOGY

Annexure I

Bid Qualifying criteria and Evaluation methodology based upon CQCBS for “Final alignment design including Aerial LiDAR survey and other related works for six High Speed Rail Corridors”:

General

1.1 The tenderer’s bid will first qualify the minimum required criteria and thereafter shall be evaluated based on Combined Quality and Cost Based Selection (CQCBS) and procedures described in this tender document. Overall final evaluation of the bidder will be done on the basis of technical as well as financial scores achieved by the bidder. The weightage of technical and financial scores will be 70% and 30% respectively. The minimum technical score required to qualify is 70%. The financial bids of unsuccessful bidders will not be opened and will be returned un-opened. In case of one or no bidder scoring less than 70%, Employer may relax this requirement at its discretion to 60%.

2. Qualifying criteria and Evaluation of Technical Proposal

2.1 The Stage-2 has two parts as Stage-A & Stage-B.

Stage-A - The bid Qualifying and Eligibility criteria consist of Para 2.2.1 & Para 2.2.2.

Stage-B - Bids satisfying Stage-A shall be considered in Stage-B which is Evaluation criteria consisting of CQCBS marking system. Bids shall be evaluated on the basis of their responsiveness against CQCBS based evaluation criteria and marks system specified in para 2.3 below. Each responsive Bidder will be given a total technical score (St). A bid shall be rejected at this stage, if it does not fulfill the Eligibility Criteria Stage-A or if it fails to achieve the minimum technical score (St) of 70 in Stage-B as per para 2.3. In that case such financial bid will not be opened and the same will be returned.

2.2 Qualifying and Eligibility Criteria

STAGE- A (Para 2.2.1 & Para 2.2.2)

2.2.1 The bidder must own/lease (as indicated against each item) the following instrument/ machine/software/ manpower, **as minimum**, to be eligible to bid:

S No	Item	Nos	Own/ Lease	Documents (Form 15 to be filled and submitted)
1	Aerial LiDAR scanner with a range of 1000 m or above and a Pulse Repetition Rate (PRR) of 300 kHz or better along with Inertial Measurement Unit (IMU), Aerial GPS and other associated control units	1	Own	1. Invoice Copy/Bill of Entry 2. Import Documentation – or similar ownership documents 3. Data Sheet of equipment specifying meeting of technical requirements along with equipment manufacturer web page
2	Aerial Imagery Camera with a minimum resolution of 50 MP or better	1	Own	1. Invoice Copy/ Bill of Entry 2. Import Documentation – or similar ownership documents. 3. Data Sheet of equipment specifying meeting of technical requirements



				along with equipment manufacturer web page
3	Aircraft (excluding Drones & Unmanned Aerial Vehicles) / Helicopter	1	Own/ Lease	1. Ownership documents/ Lease Copy 2. NSOP copy of Aircraft operator
4	LiDAR Trajectory Pre-Processing Software compatible to scanner	1	Own	Invoice Copy
5	Terrascan/Terrasolid/Point Tool/or similar Post-Processing Software	1	Own	Invoice Copy
6	Photogrammetry Feature Extraction Software Leica photogrammetry suite of Bentley micro station or similar	1	Own	Invoice Copy
7	FAD Design Software (Bentley Power Rail Track/Civil 3D or similar)	1	Own	Invoice Copy

Note 1:

1. As a proof of ownership, copy of Invoice in case of local purchase OR copy of Bill of entry in case of import in the name of bidder must be submitted along with the bid document.
2. Own/ Lease may be in the name of one of the JV partner.
3. In case of lease, copy of lease agreement containing equipment model no. and serial number must be submitted along with the bid document.
4. Ownership documents/Lease copy and NSOP copy of Aircraft operator should be submitted along with the bid document.

2.2.2 In addition to para 2.2.1, the bidder must also meet the following requirement of eligibility criteria: (Refer- Note-2)

- a. **NET WORTH** - Details to be filled in Form 3, shall be provided for the last three years to demonstrate the current soundness of the Contractor's financial position. As a minimum the Contractors **NET WORTH** calculated as difference between total assets and total liabilities should be positive in last year and for atleast 2 years during the last three years.
- b. **SHARE OF PARTNERS** - The share of partners shall not be less than the specified percentage in Note-2. Form-13 to be filled and submitted.
- c. **AVERAGE ANNUAL TURNOVER** - Minimum Average Annual Turnover in equivalent INR 45 Crores in last 3 financial years. Calculated as total certified payments received for contracts in progress or completed, within the last three financial years i.e. 2016-17, 2017-18, 2018-19. Calculated as total certified payments received for contracts in progress and/or completed with in last three

years divided by three (3). Form 2 to be filled and submitted.

d. **EXPERIENCE OF SIMILAR WORK**

i. Bidder must have satisfactorily completed at least **One single contract of “Aerial LiDAR survey work including data processing for at least 100 km for any linear project in India carried out for Railways, NHAI, CPWD, MES, DOT, State PWD or any other Central / State Government Undertaking”** during the last seven years prior to Closing date of submission of present tender (**Refer Note-3**). Form 4 & 6 to be filled and submitted.

And

ii. Bidder must have satisfactorily completed at least **One single contract of “Final alignment design work for at least 100 km for Railway/ Highway/ Road/ Metro project in India carried out for Railways, NHAI, CPWD, MES, DOT, State PWD or any other Central / State Government Undertaking”** during the last seven years prior to Closing date of submission of present tender (**Refer Note-3**). Form 5 & 6 to be filled and submitted.

NOTE 2: Compliance requirement In case of a JV/Consortium—

1. **NET WORTH** – Each partner (including Lead and others) must meet the requirement.
2. **SHARE OF PARTNERS** – Minimum share Lead partner shall be 40%. Minimum share of each other partner shall be 15%. All combined must meet the requirement of 100%.
3. **AVERAGE ANNUAL TURNOVER** – Lead partner should meet minimum 40% of the requirement. Each other partner should meet minimum 20% of the requirement. All combined must meet the requirement of 100%.
4. **EXPERIENCE** – All partners combined credentials must meet the requirement.
5. Single entity must meet the requirement of para 2.2.2.

NOTE 3:

1. Each contract performed by any one of the JV/ Consortium member shall satisfy the minimum value of a single contract as required for single entity.
2. Only such works shall be considered where physical completion of activity of Aerial LiDAR Survey including data processing and/or Final alignment design (FAD) has been fully completed, however the other overall work of the contract (part of which Aerial LiDAR Survey and/or FAD have been completed) may/ may not be fully completed.
3. **LiDAR Works carried out by another Contractor on behalf of the Bidder on a back to back basis will not be considered for satisfaction of the Qualification Criterion by the Bidder.**
4. For past experience of activities in sub clause 2.2.2 (d), credit shall be given for the execution of the quantity of that specific activity executed by the firm as part of a JV, duly certified by the employer. Credit of JV parties shall be calculated based on responsibility matrix of the respective work activity to the respective JV partner.
5. Wherever required copies of completion certificates issued in any other language other than English need to be translated and apostilled as per norms laid out for the same.
6. Bidder is also required to submit a copy of DGCA/MoD approval for Aerial

Survey of the similar works earlier carried out by agency and certificate from employer for having completed final alignment design as specified in 2.2.2.d.ii.

7. Any work carried out with Unmanned Aerial Vehicle or Drone shall not be considered for satisfaction of the qualifying criteria by the bidder.

2.3 Bid Evaluation Criteria - STAGE-B

Bids which qualifies Stage-A, shall be considered for evaluation criteria as below:

Evaluation criteria	Marks	Weightage	Para
1. Technical Proposal			
Manpower credentials	30	70%	2.4.1
Work experience credentials	70		2.4.2
2. Financial Proposal			
Financial Proposal	100	30%	3.2
	TOTAL	100%	

a. Technical Proposal Evaluation Criteria: Weightage-70%

Technical Proposal evaluation criteria for selection of agency for carrying out “Final Alignment design including Aerial LiDAR survey and other related works for six high speed rail corridors” have been divided into 2 components and marks to be given under each of these are as follows:

2.4.1 Bidder’s Technical Manpower strength - 30 Marks. (Refer Note 4 below)

Manpower	Minimum Number	Credential (Form 7 to be duly filled and submitted by the bidder)	Maximum Marks (*)
Sr. Photo-grammetry Expert (A)	1	i. Graduate in Civil Engineering/ M Sc Geomatics/ M Sc Geology/Surveying and Mapping with minimum of 5 years’ experience in Photogrammetry related works	Max. 7
		ii. Relevant experience in Linear project	Max. 3
Alignment Design Expert (B)	1	i. Graduate in Civil Engineering) 5-year professional experience in the field of alignment design of Railway/Highway/ Metro/ Road project using Autodesk 3D Civil/ Bentley Rail Track or Similar software ii. Relevant experience in Railway/ Highway/ Metro project	Max. 7

			Max. 3
Sr. LiDAR Professional (C)	1	i. (Graduate in Civil Engineering/M Sc Geomatics/M Sc Geology/Surveying & Mapping with minimum of 5 years' experience in LiDAR works. ii. Relevant experience in linear project	Max. 7 Max. 3

Note 4:

1. Maximum marks shall be allotted to the bidder having required professional candidate with maximum number of years of Experience in respective category. **Marks to other bidder(s) shall be allotted in a proportionate manner.**
2. In case the no. of years of experiences of the required professional mentioned by the bidder is not meeting the minimum requirement mentioned above, 'Nil' marks shall be allotted to the bidder against respective manpower professional category.
3. Detailed CV along with Candidate commitment & original signature is required. Letter from HR Dept. for working in the current organization atleast for the past one (01) year from the closing date of submission of bid should be certified. If the person is not working in the current organisation, 'Nil' marks shall be allotted to the bidder against respective manpower professional category
4. Form 7 should be duly filled and submitted.
5. Relevant experience means projects handled by the professional as described in table above. In case no relevant projects handled by the professional 'Nil' marks shall be allotted to the bidder against respective manpower professional category.

2.4.2 Bidder's Credentials Work Experience: 70 Marks (Refer Note 5)

Relevant experience means related works done for various projects as described in table below. Only top five projects (project length-wise) to be listed for evaluation purpose. In case more than five projects are listed, projects mentioned at Sr.No.1 to 5 will only be considered. A project to qualify for evaluation consideration only such works shall be considered where physical completion of activity of Aerial LiDAR Survey including data processing or Final alignment design (FAD) of railway/highway/metro/road has been fully completed, however the overall work of the contract (part of which activity of Aerial LiDAR Survey and/or FAD has been completed) may/may not be fully completed.

S.N.	Credentials	Maximum Marks	Forms
(A)	Average Annual Turnover in Last 3 Financial years	10	Form 2
(B)	Work Experience: Total length of Aerial LiDAR Survey for a linear project (km) along with data processing	30	Form 4 & 6
(C)	Work Experience: Total Linear length (km) of Alignment design of Railways/ Highways/ Road/ Metro.	30	Form 5 & 6

Note 5:

1. For (A) above, Maximum marks will be allotted to the bidder having maximum Average Annual turnover and marks to others bidders will be given on proportionate basis.

2. For (B) above, Maximum marks shall be allotted to the bidder who has completed maximum length of Aircraft/Helicopter LiDAR Survey calculated by combining the total Aerial survey length of top 5 Projects of LiDAR Survey in last 7 years (**In case more than five projects are listed, projects mentioned at Sr.No.1 to 5 will only be considered**). Marks to other bidders shall be allotted proportionately according to flying length.
 3. Drone/UAV LiDAR Survey will not be considered
 4. For (C) above, Maximum marks shall be allotted to the bidder who has completed maximum length of alignment design calculated by combining the total alignment design length of top 5 projects in last 7 years (**In case more than five projects are listed, projects mentioned at Sr.No.1 to 5 will only be considered**). Marks to other bidders shall be allotted proportionately according to design length.
 5. Rounding off will be done to nearest two decimals.
- 3. Evaluation of Financial Proposal (CQCBS)**
- 3.1** The Financial Bid shall be opened in the presence of the bidder's representatives who choose to attend. The name of the bidder, the technical scores and the proposed prices shall be read aloud and recorded when the Financial Bid are opened.
- 3.2 Financial Proposal Evaluation Criteria: Weightage-30%**
- The lowest Financial Proposal (F_m) will be given a financial score (S_f) of 100 points. The financial scores (S_f) of the other Financial Proposals will be computed as per following formula:
- $$S_f = 100 \times F_m / F$$
- S_f = financial score,
 F_m = lowest price and
 F = price of the proposal under consideration
- 3.3** In this CQCBS tendering system, the lowest Financial Bid (F_m) will be given a financial score (S_f) of 100 points. The financial scores (S_f) of the other Financial Bid will be computed. Bids will be ranked according to their combined technical (S_t) and financial (S_f) scores using the weights (T = the weight given to the Technical Bid; P = the weight given to the Financial Bid; $T + P = 1$) indicated in the combined marks sheet S.
- 3.4 Combined Score of Technical and Financial Proposals**
- The weights given to the Technical and Financial Proposals are:
- T (Technical Proposal) = 0.70 and P (Financial Proposal) = 0.30**
- Proposals will be ranked according to their combined technical (S_t) and financial (S_f) scores using the weights as indicated above:
- $$S = S_t \times T\% + S_f \times P\%.$$
- The Bidder achieving the highest combined technical and financial score will be considered for award subject to fulfilment of other relevant terms and conditions.**

SECTION-IV
APPENDIX TO TENDER

APPENDIX TO TENDER

Tender No.	NHSRCL/CO/CONTRACT/LIDAR/2020/03
Name of Work	Final Alignment design including Aerial LiDAR survey and other related works for six high speed rail corridors
Client	National High Speed Rail Corporation Limited (NHSRCL)
Bid to be submitted / deposited / addressed (if it is sent by Post) to the office of	GM/ Contract, National High Speed Rail Corporation Limited, Asia Bhawan, Second Floor, Road No 205, Sector-9 Dwarka, New Delhi-110077.
(a) Cost of Bid document	INR 50,000/- plus GST @ 18% = INR 59,000/- (inclusive of GST)
(b) Earnest Money Deposit	INR 74,24,500/- (INR Seventy Four Lakhs Twenty Four Thousand Five Hundred only)
(c) Time for Completion	470 days for the Works
(d) Date and time of submission of Bid	On 11.03.2020 up to 15:00 hrs.
(e) Date and time of opening of the Bids	On 11.03.2020 at 15:30 hrs.
(f) Validity of Offer	180 days from the date of opening of Bid
(g) Scope of Work	The scope of work includes alignment design for six high speed rail corridor after carrying out Aerial LiDAR survey. The works also include selection of routes based on the study of satellite imagery data, etc. as prescribed in TOR.

SECTION V
TERMS OF REFERENCE

A. TERMS OF REFERENCE

1. Introduction

With an objective to meet growing passenger demand and optimise high speed rail connectivity between major cities/commercial and economic activity centres, a HSR corridor is being planned between Delhi – Varanasi and in five other corridors covering desired obligatory points and major public hubs among other considerations. For this purpose, it is now proposed to undertake Detailed Project Report of these corridors:

Table-1

S No	Corridor	Corridor Length (Approx.)
1	Delhi-Varanasi	865 km
2	Delhi-Ahmedabad	886 km
3	Delhi-Amritsar	459 km
4	Mumbai-Nashik-Nagpur	753 km
5	Mumbai-Pune-Hyderabad	711 km
6	Chennai-Bangalore-Mysore	435 km

1.1. Planning of Detailed Project Report

The development of Final Location Survey for the above corridors is to be broadly planned as per the following stages:

1.1.1. **Stage-1:** This stage shall involve study of Satellite Imagery, DEM, DSM, feature extraction from the satellite ortho-photos to generate topographic maps, site reconnaissance so as to verify obligatory points, station yards etc, development and evaluation of horizontal and vertical alignment with three alternatives and finalization of the final alignment in consultation with the client. The detailed specifications for Stage 1 are provided in section 3.2 below.

1.1.2. **Stage-2:** After finalization of the alignment in Stage 1, the contractor shall undertake a final location survey with Aerial LiDAR technology as per the detailed specifications are provided in Section 3.3 below. The contractor shall also prepare the final alignment design, Hydrological studies, flood plains demarcation and the land acquisition plan as per the detailed specifications in Section 3.3 below

2. Objective of Work:

NHSRCL through this tender intends to appoint a Contractor for undertaking alignment survey and preparing general alignment design for the six proposed High Speed Rail

Corridors as given above by first finalizing alignment using satellite based Mono/Stereo Raw Imagery/ Digital Terrain Model/ Digital Surface Model and orthophoto imagery and then undertaking the review and refinement of one finalized alignment based on detailed engineering grade survey using Aerial LiDAR & Imagery, stability considerations, geological consideration, construction consideration, accessibility, safety maintainability, environmental considerations, etc, fixing of permanent control points using GPS survey, levelling survey from Survey of India GTS benchmarks, geo-referencing of revenue maps etc as per detailed scope given below in Section 3.

2.1. The Contractors shall ensure that:

- a) Due diligence and excellent standards in the performance of the assignment.
- b) Compliance of all rules of NHSRCL related to the contract of the project.
- c) Safety of the works being carried out by the Contractor.
- d) Highest standards of quality assurance in the execution of the contract.
- e) Completion of work in the prescribed time schedule.
- f) That the Contractor assists the NHSRCL for the required coordination with the local administration, infrastructure stake holders, Revenue Authorities and any other stake holders, until the approval are given by the concerned authorities.
- g) Quick response on queries and clarifications sought by NHSRCL

3. Scope of works:

3.1. General

3.1.1. The services to be rendered by the Contractor include all the work described in these technical requirements for the corridors described in Table-1 above. The Contractor shall submit relevant documents for approval wherever required and will interact with the concerned authorities/State Government/other Govt. departments as required.

3.1.2. The work shall be executed in a phased manner unless otherwise directed by NHSRCL so that succeeding tasks can also be initiated as per Schedule for timely completion of the Project.

3.1.3. The scope of work shall be carried out as per NHSRCL's Schedule of Dimension for High Speed Rail. Relevant Design manual ; IS codes and as per International accepted norms. The document submittals shall be in formats as per HSR Codes and manuals, soft copies and hard copies as laid down. The latest modern techniques and software shall be used for this work.

3.2. Scope for Preliminary Alignment Report Stage – 1: Alignment option generation and finalization of most suitable alignment

Preliminary alignment is to be worked out with different technical & economical viable alignment options, (generally up to three) keeping in view the terms of reference, clearly

bringing out advantages/ disadvantages of each option. For doing this, the contractor shall undertake the following:

- 3.2.1. Collection and desk study of Terms of Reference (TOR), previous reports, reports of adjacent projects (if available), data, drawings and documents related to the project prior to fieldwork.
- 3.2.2. Study of provided Raw satellite imagery data DTM/DSM, if required processing to create DEM & DSM and referencing the supplied or created DTM/DSM to Indian MSL using Ground control . The provided satellite data from NRSC Hyderabad shall be as follows:
 - 3.2.2.1. For different corridors, the client shall/may provide either off-the-shelf Orthophotos of 50 cm Ground Sampling Distance (GSD) or Stereo/ Mono Imagery
 - 3.2.2.2. Off-the-shelf DEM & DSM generated from off-the-shelf multi-look mono imagery with accuracy of $\pm 3\text{m}$ at 90% Confidence Interval may be provided by the Employer for some corridors in case Stereo Imagery is not available.
- 3.2.3. DEM/DSM generation from Stereo-Imagery: If required for a corridor, the contractor shall generate DEM/DSM from supplied Stereo-Imagery by undertaking Stereo Image processing for production of 3 m resolution DEM/DSM.
- 3.2.4. DEM/DTM correction and referencing to MSL: The contractor shall undertake detailed ground control using DGPS to reference the generated/supplied satellite based DEM/DSM to Mean Sea Level using Survey of India benchmarks through creation of a local geoid model through standard methods with the prior approval of NHSRCL. Minimum one ground control point shall be established in an area of up to 50 sq km for Satellite DEM creation/correction. Extra Check GCPs (not less than 20 no.) shall be established as per the direction of NHSRCL for checking the accuracy of the final DEM developed. The same control network shall be further used for Aerial LiDAR survey after appropriate densification.
- 3.2.5. Orthophoto generation: If required, the contractor shall ortho-rectify supplied Satellite imagery to generate seamlessly mosaiced orthophotos of 50 cm GSD using the DEM/DSM generated/corrected by the contractor.
- 3.2.6. Contractor shall undertake feature extraction from Orthophotos to generate Topographic Map with layers such as Forest, Flood plains, Roads and railways, Rivers, Nallahs, Powerlines, Habitats etc along with identifying important features in corridor such as ROB's, existing structures and other features as required for alignment development.
 - 3.2.6.1. Contractor shall prepare a topographic map from the satellite imageries and information in scale of 1:5000 with layers of:
 - a. Contours
 - b. Forest/Revenue maps as per available/provided data
 - c. Roads and Railway

- d. Power lines,
 - e. Rivers, Nallas, Flood Plains, Water features etc
 - f. Habitat area etc
 - g. Existing structures such as ROB's
- 3.2.6.2. The updated maps developed from the digital satellite imagery shall be used by the contractor for alignment studies so as to study:
- a. The pattern of urbanization and its area extent to select the possible routes of alignment;
 - b. The extent of forest covers so that the alignment does not pass through the forested area to the extent possible;
 - c. Cross-checking of streams and the width of rivers where the alignments cross the rivers;
 - d. Location of possible sites for Railway Stations connecting the proposed alignments with existing and under construction transport network;
- 3.2.7. Contractor shall further undertake site reconnaissance along the feasible alignment(s) for field verification of obligatory points, stations, yards, depots etc identified above and modify proposed alignments/locations if required from feasibility point of view including local connectivity.
- 3.2.7.1. Field visit to obligatory points and locations of important structures, bridges, viaducts, earth structures, road crossings, tunnels, stations, shafts, environmentally sensitive areas etc, of the various designed alignment by Contractor's team comprising experts in the field of Alignment design, Surveying, etc. along with representatives of NHSRCL (as required) for field verification.
- 3.2.7.2. The Expert Team members shall give the feasibility report of the feasible alignments with their observations and recommendations.
- 3.2.7.3. The Contractor shall be responsible for planning field visits to tunnels, bridges, yards locations etc. along the alignment for NHSRCL representatives (if required) as well as for its own expert team members.
- 3.2.8. Based on the above data, field visits and studies, the contractor shall work out at least three viable options for preliminary alignment by evaluating the technical & economical parameters of the study area and keeping in view the terms of reference. The contractor shall clearly bring out advantages/ disadvantages of each option.
- 3.2.9. Broad geological constraints should be considered. Geological maps of Geological survey of India at scale 1:50000 to be used for Stage-I route selection parameter analysis, wherever required in case of hilly terrain or where tunnelling is likely involved.
- Incorporate the geological aspects, stability, constructability, accessibility considerations etc of the structures in the final recommended alignment.

3.2.10. Discussion with the NHSRCL /Railway/Highways/ Local Authorities and justification on optimum alignment chosen by the Contractor and incorporation of views, thereon.

3.2.10.1. In determining these alignments, the contractor will do the following:

- a. Incorporate all findings of Satellite Imagery orthophotos, DEM/DSM, desk-top studies and reconnaissance survey
- b. Consider environmental issues; including hydrology.
- c. Broad geological constraints should be considered. Geological maps of Geological survey of India scale 1:50000 to be used for Stage-I route selection parameter analysis, wherever required in case of hilly terrain or where tunnelling is likely involved.
- d. Consider community and stakeholder issues; including social issues, threatened & endangered species, historic resources, wetlands & streams, and archaeological resources;
- e. Consider social, landowner and urban development constraints to minimize relocation impact on communities
- f. Consider flood plain and stream crossings;
- g. Consider disaster hazards such as earthquakes, flooding and landslides etc;
- h. Determine the most cost-effective options that meet the defined constraints and demonstrates project viability;
- i. Meet geometric constraints in accordance with the design standards for High Speed Rail in the different topographic areas;
- j. Demonstrate comprehensive consideration of alternatives that provide the community with confidence that all available options have been investigated;
- k. Undertake comprehensive sensitivity analyses (Multi-criteria analysis) of the alignment and construction cost impact of changes to the constraints and/or design standards;
- l. Prepare Index plan and profile including marking of tentative RoW boundary on the Plan based on the data provided by the Client.
- m. The design of preliminary alignments shall be done by using appropriate software such as Bentley Rail or similar software.
- n. Prepare preliminary land acquisition plan by Digitizing the Revenue Maps (to be given by NHSRCL) after mosaicking and Georeferencing, transfer of final alignment approved for LIDAR study on the maps and calculation of area of the land to be acquired along with the details of the plot and its owners and preparation of preliminary land acquisition plan.

3.2.11. Based on the above studies, the contractor shall prepare and submit a detailed draft preliminary alignment study report with the three considered options and the final

recommended alignment option for Stage 1 to the client. The composition of the report shall be as per Section 3.4.4 below.

3.2.11.1. After detailed discussion on technical and economical parameters of the alignment options with the client, including State Authorities, etc, the contractor shall incorporate all the recommended changes and prepare the Final Preliminary Alignment Study report for final approval.

3.2.11.2. The finalized alignment shall be taken up for further refinement based on detailed site survey and studies as per Section 3.3 below.

3.3. Scope for Final Alignment Report Stage – II: Detailed Final Location Survey and Studies with final alignment design

After finalization of the preliminary alignment, the contractor shall further refine the alignment in the selected alignment corridor by undertaking detailed Final Location Survey using Aerial LiDAR technology along with establishment of Ground Control Network, Pillar fixing, Hydrological Survey (wherever required) and final alignment design (horizontal as well as vertical). For doing this, the contractor shall undertake the following:

3.3.1. Aerial LiDAR & Imagery Survey

The contractor will undertake Aerial LiDAR Survey complemented by Aerial Imagery in a corridor width of 300 m (150 m on either side) around the proposed alignment.

Detailed Specifications are provided in TOR and Broadly the work will involve the following:

3.3.1.1. Collection & paper study of existing alignment reports, data, drawing, documents, ground control points etc;

3.3.1.2. Ground Control Survey to be undertaken as follows:

- a. Carrying out reconnaissance survey of the project area for identifying the Control Points locations for carrying out DGPS survey and preparing a plan of a grid network of Control Points on SOI topo-sheets/satellite imagery.
- b. Survey of India Benchmarks to be located during the above reconnaissance survey. These benchmarks shall be tested for stability and the same shall be reported to the client. The entire horizontal and vertical control shall be linked to the approved stable Benchmarks for conversion of LiDAR data to MSL.
- c. Master Control Network comprising of interconnected triangles (with baseline of about 25km) to be established for overall horizontal control with approx. 25 km baseline length throughout the alignment. Secondary Control Network comprising of interconnected triangles weaved with Master control network to be established with a baseline length of approx. 3-5 km throughout the alignment. Target LiDAR points to be established at an interval of approx. 5 km within the final alignment. To

densify Horizontal Control Network, the GNSS triangulation method should be adopted and processing of data for network adjustment should be done to achieve an accuracy of at least 1:100,000 in horizontal.

- d. Establishment of vertical control referenced to Sol MSL Permanent Benchmarks to be undertaken by double tertiary leveling along the entire route by connecting target points. The threshold limit for levelling loop closure accuracy should be $12\sqrt{K}$ mm, where K is circuit length in km.
- e. Monumentation of Master and Secondary Control Points shall be undertaken if required in consultation with client as per Section 3.3.2

3.3.1.3. Applying to DGCA/Ministry of Defence for flying permissions as per DGCA guidelines and procedures along with adherence to all security stipulations issued by Ministry of Defence in the issue of the permit. NHSRCL will provide the necessary support.

3.3.1.4. The contractor will mobilize an aircraft/helicopter to site fitted with state of art Aerial LiDAR and Imagery sensors (equipment as per minimum specification mentioned in Annexure 3) after due security inspection as per MoD stipulations.

3.3.1.5. Preparation of flight plan for the Area of Interest.

3.3.1.6. Acquiring and pre-processing LiDAR data and digital imagery with LiDAR collected at a point density of 10 points per sq m with FHA (Fundamental Horizontal Accuracy) of 10 cm and FVA (Fundamental Vertical Accuracy) of 10 cm both at 95% confidence interval level. Imagery is to be taken at a resolution of 10 cm GSD.

3.3.1.7. Pre-processing data to be referenced to MSL with Sol permanent benchmarks

3.3.1.8. Ground survey/Hydrological survey using traditional methods such as Echo Sounders etc along areas such as river crossings etc where Aerial LiDAR data needs to be complemented, including the following:

- a. 4 km (2 km on each side of centerline) along all river crossings with river cross-sections soundings (or alternate acceptable method) taken at centerline and then at every 500 m distance along upstream and downstream of the river and upto 50 m beyond high bank
- b. The DEM generated from this data shall be suitably merged with the LiDAR DEM in consultation with the client.

3.3.1.9. Post-processing of LiDAR data to produce the following:

- a. Classified Point Cloud in LAS (.las) format (Soft Copy format)
- b. Three-Dimensional Topographical map of 50 m corridor on either side of the finalised alignment on a scale of 1:2500.
- c. Contours of 50 cm interval for the 50 m corridor
- d. Digital Orthophotos of 10 cm GSD resolution (in tiles and seamlessly mosaicked over the survey area)

- e. DSM of 1 m grid
- f. DEM/DTM of 1 m grid
- g. 3 sets of all deliverables to be provided in Hard Copy.
- h. Soft copy of all deliverables to be provided.

Note: The final output should be compatible with AutoCAD Civil 3D Software or similar.

Appropriate QA/QC to be undertaken for the data to ensure adherence to accuracy requirements as per this TOR. Stations, yards and other installations beyond 50 m are also included in post processing output.

All topographical information including natural & man-made features to be captured such as but not limited to streams, river, buildings, wall, fences, roads (Paved, unpaved, dirt), power-pole, power line, light poles, trees, slope top & slope bottom etc

3.3.1.10. Conducting Quality Control/Quality Assurance (QC/QA) to establish correctness of flight operations

3.3.1.11. Validating horizontal and vertical accuracy through independent means

3.3.1.12. Compliance with other product requirements such as file naming, datum and projection, units, etc.

3.3.1.13. Delivery of raw data, other products and supporting reports

3.3.1.14. Contractor may have to process additional data beyond 50 m on either side of alignment, which will be done from Aerial LiDAR data captured within the 150m corridor on either side of alignment. All outputs for additional area also to be provided.

- a. NHSRCL will render assistance to the contractor, if deemed necessary, in obtaining the relevant permissions from various Government agencies like DGCA, MoD, CWC, GSI, SOI etc. as per the request of the Contractor, by way of forwarding request letters etc.
- b. Contractor has to abide by all security stipulations specified by Ministry of Defence/Survey of India including clearance of the personnel working on this data by MHA/IB.

3.3.2. Establishment of Permanent Control Points

Construction of cast in-situ Permanent Control Point pillars of size 500mm x 500mm x 1000mm of RCC (Nominal Mix 1:1½:3) with provision of 700 mm long M.S. angle of size 50 x 50 x 5 mm with brass nailing on the MS angle for marking the Control Points and embossing the CP pillar number on the MS plate of size 125mm x 125mm x 5mm embedded in concrete by four 6 mm dia rods 150 mm long as per approved drawing. The pillar should have the following reinforcement: 4nos-10mm dia longitudinal and 8mm dia rings@150mm c/c. The Foundation size of the pillar should be: 800mm x 800mm x 150mm with a PCC base.

As far as possible permanent control point should be marked on permanent structure and wherever not possible, erected on permanent pillar.

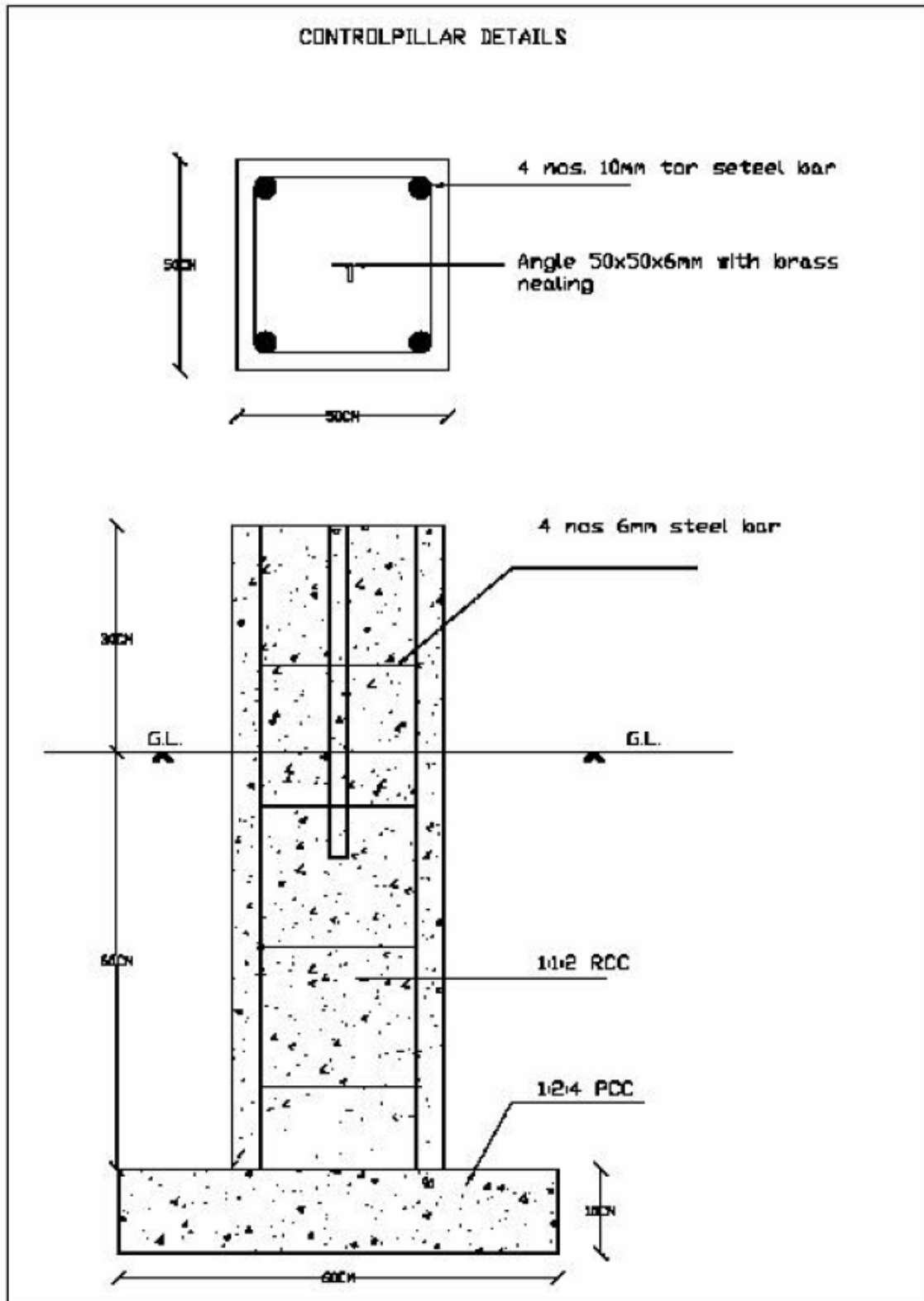


Figure: Reinforcement details of the pillar

3.3.3. Listing of Structures/Transmission Lines/ Distribution Lines

3.3.3.1. Contractor will list out the no. of trees within the following corridor:

- a. RoW within 6.5m on either side of centre line
- b. 5m on either side of 13m wide corridor as per item no. 'a'
- c. Within TSS/DSS/ Ramps, Depot and other facilities

3.3.3.2. Contractor will make a list of buildings/structures for all districts along the corridor which are infringing and lie based on LIDAR data within the following corridors:

Corridors:

- a. RoW within 6.5m on either side of centre line
- b. 5m on either side of 13m wide corridor as per item no. 'a'
- c. Between 11.5m to 50m on either side (Output will be listed in Excel Format and AutoCad drawing)
- d. Within Station, TSS/DSS/ Ramps, Depot and other facilities.

3.3.3.3. Contractor will make a List of Transmission lines/ distribution lines/ Microwave Towers/ High Mast Towers for districts which are parallel and lie within the following corridors room proposed center line of HSR alignment with elevation & span length based on LIDAR data

- a. RoW within 6.5m on either side of centre line
- b. 5 m on either side of 13m wide corridor as per item no. 'a'
- c. Between 11.5m to 50m on either side (Output will be listed in Excel Format and AutoCad drawing)
- d. Within Station, TSS/DSS/ Ramps, Depot and other facilities.

3.3.4. Final Alignment Design including refinement of alignment

The contractor shall undertake refinement of proposed alignments after the detailed studies undertaken above and prepare the final recommended alignment along with Final Alignment design. In this the contractor shall do the following:

3.3.4.1. Incorporate the results of the Aerial LiDAR/Aerial Imagery studies, detailed ground control survey etc and modify the alignment accordingly

3.3.4.2. Details of Hydrological parameters required for FAD will be provided by NHSRCL. Wherever data is not available contractor will perform Hydrological studies of rivers/nallas/khads crossings based on the Hydrological and Topographical survey. The Hydrological studies shall include:

- a. Calculation & finalization of hydraulic design parameters such as design discharge, design HFL, linear waterway etc.
- b. Study of drainage patterns for a feasibility study of tunnels, bridges, slopes, deep cuttings, high embankment, landslide area etc.

- c. Finalization of span configuration of bridges based on linear waterway calculated on the basis of design discharge and other hydraulic design parameters, slope stability, geology, topography, etc. will be performed by the contractor.
 - d. Finalization of span configuration of other crossing structures based on clearance requirement, geology/ Geotech conditions, site feasibility, etc.
- 3.3.4.3. Incorporate the geological aspects, stability, constructability, accessibility considerations etc. in the final recommended alignment. Geological Mapping on the scale of 1:25000 using Geological Survey of India maps and including field visits and studying LiDAR and Imagery Data derivatives. Wherever required Remote sensing studies along the alignment corridor with limited ground checks consisting of interpreting Satellite and field data for preparation of Thematic maps.
- 3.3.4.4. Development of detailed plans, L-sections, Cross Section etc. of Final Alignment of bridges/ structures.
- 3.3.4.5. After finalization of horizontal and vertical alignment of final alignment for the Engineering Department shall be prepared and submitted:
- a. General Map of the country traversed by the project scale of 25 km to 1 cm.
 - b. Index map on a scale of 2.5 km to 1 cm.
 - c. Detail Plan and sections map in in scale 1:2500 horizontal 1:250 vertical (generated from Aerial LiDAR and Imagery) with Datum: WGS-84, Projection: UTM, Vertical Datum: Mean Sea Level. Contour Interval of 0.5 meters. Map template including index, symbology etc. shall be generally as per Survey of India topo maps.
 - d. List of gradient, curves (horizontal and vertical), crossing (like Railway, Highways, etc), details of sanctioned projects, stations.

3.3.5. Land Acquisition Plans

Contractor shall digitize refine the preliminary Land Acquisition Plans after the Aerial LiDAR survey and the subsequent refinement in alignment.

3.3.6. The contractor shall submit the Final Alignment Design – Stage II report to the client as per Section 3.4.5 below

3.3.7. Excluded Works

For the sake of clarification, the following works are excluded from the present work and shall be undertaken separately by NHSRCL:

- a. Traffic Survey & Forecast
- b. Geotechnical Investigations
- c. Social Impact Assessment
- d. Environment Impact Assessment
- e. Detailed design of Stations, Yard Plans, Bridges and other structures (except where required for the overall General Alignment Design)

- f. Design of Power Systems etc
- g. Detailed Costing of the project

3.3.8. List of Map Scales to be provided

For the sake of clarity, the following are the list of outputs with scales:

S.No.	Output	Required Scale	Reference Section
1	Topographic Map derived from Satellite Imagery	1:5000	Section 3.2.6.1
2	3D Topographic Map from LiDAR data	1:2500	Section 3.3.1.9
3	Detailed Plan & Section	1:2500 in Horizontal & 1:250 in Vertical	Section 3.3.7.5 (c)
4	General Map	1:25,00,000	Section 3.3.7.5 (a)
5	Index Map	1:2,50,000	Section 3.3.7.5 (b)

3.3.9. Data to be provided by NHSRCL:

NHSRCL shall provide the data to the Contractor as given in (Annexure-2) latest by 28 days after issuing the Letter of Acceptance. However, the Satellite ortho-imagery and DTM/DSM will be provided as it is received by NHSRCL from NRSC.

3.4. Deliverables and Submission of Various Data, Designs and Reports

For every corridor the following reports, data and designs shall be submitted:

3.4.1. Inception Report

The Inception Report shall be submitted within 30 days from date of commencement of work for the corridor and shall comprise of:

- a. Collection and study of data/information from all concerned and verifying it for accuracy and usage.
- b. Finalization of technical parameters for alignment design.
- c. The approach and methodology to meet the requirement of Scope, Deliverables, and Services for both Stage I and Stage II
- d. Submission of timeframe and assignment of responsible key personnel for various activities.
- e. The identification of design codes, standards and best international practices.

3.4.2. Application to DGCA/MoD for Aerial LiDAR and Imagery permissions will be submitted within 15 days of commencement of work for the corridor and a copy of the same shall be provided to the client for reference and follow-up (if required).

3.4.3. Quality Control and Quality Assurance Plans:

The Quality Assurance Plan (QAP) shall be submitted by the Contractor to the Employer/Engineer for approval before any submission by the Contractor for approval by the Employer/ Engineer. As an example, before submission of Aerial LiDAR data outputs, the QAP for Aerial LiDAR Data Capture and Processing shall be submitted. The QAP shall identify the personnel, procedures, instructions, records, and forms necessary to implement the plan.

The Contractor is responsible for performing all Quality Control (QC) activities associated with their work. The Independent agency will do Quality Assurance (QA) review of the Contractor's QC actions. Quality Audits and monitoring of the Contractor's QAP will be conducted by the Engineer at Intervals commensurate with the Contractor's activities.

The work may be got reviewed/ accepted /approved from the Independent agency (Engineer) to be fixed by NHSRCL. Notwithstanding acceptance by the Employer/ Engineer, the Contractor shall remain responsible for the quality of the deliverables.

3.4.4. Preliminary Alignment Report Stage – I

All deliverables corresponding to each BoQ item shall be submitted. These include:

1. Report on Ground Control undertaken for referencing supplied satellite DEM/DTM to MSL based on SOI benchmarks.
2. Orthophoto generated from satellite imagery (if required)
3. Topographical Map on the scale 1:5000 with required GIS layers. If required, the map may be superimposed on the supplied satellite Ortho-Imagery.
4. Report on Site Reconnaissance Survey
5. Preliminary Land Acquisition Plans
6. Input/output data files of alignment design in soft copy used in Autodesk 3D Civil/Bentley Rail Track or similar software for designing of the alignment for the future use of NHSRCL.
7. Draft Alignment Report Stage I:

The Draft Alignment Report Stage I shall be submitted within 60 days from date of commencement of work for the corridor (or date of supplying of Imagery/DEM/DSM by client whichever is later). NHSRCL will give its comments on the draft Preliminary Alignment report within 15 days after which the contractor shall incorporate the comments and submit the Final Preliminary Alignment Report Stage – I. The same shall be accepted with another 15 days by the client in case there are no further modifications required. This report shall consist of but not limited to the following:

- a. Comments on alignment corridor such as –
 - Take off point, the location of Stations.

- Identification of critical areas /sections such as Bridges/ Viaduct/ RE Walls, deep cuttings, high embankments, Location of HSR Railway Stations etc.
 - Likelihood of difficult conditions which may have major impact on cost and construction based on available maps and literature.
- b. Finalization of basic parameters for the project from Construction and Operational view-point.
 - c. Development of different viable alignment options from various individual block options for the project (at least three). The options should clearly bring advantages and disadvantages on issues related to technical, financial, operational, timeline etc. with comparative study in tabular form with their recommendations. All the important points listed in Section 3.2.5.1 shall be discussed in detail for each alignment option.
 - d. Report on the visit of Experts/Surveyors to various important sites at proposed alignments.
 - e. Refinement of proposed alignments based on onsite visits.
 - f. Comparative study of alignment options by Multi-Criteria analysis by assigning weights to various criteria and sub-criteria in consultation with NHSRCL and recommendation of most preferred alignment.
 - g. Identifying the location of bridges/ other crossing structures.
 - h. The report shall be in sufficient detail for NHSRCL to arrive at a final decision without major back referencing with the contractor.

3.4.5. Final Alignment Report Stage – II

All deliverables corresponding to each BoQ item shall be submitted. These include:

- i. Report on Ground Control Survey undertaken including identification of Sol benchmarks, DGPS network plan for master control, secondary control and target points. Report on levelling. Report on pillars.
- ii. Report on Hydrological Survey
- iii. Report on any other traditional survey used to complement Aerial LiDAR data
- iv. Aerial LiDAR Survey and its outputs i.e.:
 1. Raw Point Cloud and Images
 2. Classified Point Cloud
 3. Three dimensional Topographic survey drawing of 50 m corridor on either side of the railway centerline on a scale of 1:2500.
 4. Contour map at 0.5 m interval for 50 m corridor width
 5. Digital Elevation Model (DEM)/ Digital Terrain Model from topographic survey data
 6. Longitudinal and Cross Sections at 20 m interval

7. Digital Orthophotos of 10 cm GSD resolution (in tiles and seamlessly mosaicked over the survey area)
8. 3 sets of all deliverables to be provided in Hard Copy.
9. Soft copy of all deliverables to be provided.
- v. Report on list of Transmission Lines, Towers falling in RoW as required in TOR
- vi. Report on list of Trees falling in RoW as required in TOR
- vii. Report on list of structures etc falling in RoW as required in TOR
- viii. Final Land Acquisition Plans
- ix. Final Alignment Design outputs include soft copy of design files in the used software along with the alignment design outputs such as Index map, Index Plan & L-section, detailed plan & section and other plans and GAD's
- x. Final Alignment Report Stage II as follows:

The draft Final Alignment Report Stage II shall be submitted within 150 days from date of commencement of work on the corridor. NHSRCL will give its comments within 15 days of the submission of the report. The contractor shall incorporate these comments and submit the Final Alignment Report Stage II within another 15 days post which NHSRCL will give final acceptance of the Stage-II Report within 30 days of submission. NHSRCL will interact with State Authorities/ Railway and other agency for approval of final alignment, however, the Contractor shall attend the meetings in this regard and provide required clarifications/presentations. This report shall consist of but not limited to the following:

 - a. Visit of experts on approved alignment for value addition and site feasibility of bridge locations, tunnels portals, and yard layout etc.
 - b. Refinement of alignment based on field visits, geological inputs given by client, hydrological survey details, Aerial LiDAR and Imagery studies etc.
 - c. Hydrological Studies including; determination of river basins, flood discharge calculations, verification of hydraulic structure dimensions, etc.
 - d. Aerial LiDAR and Imagery Survey of the corridor
 - e. Detailed plans and sections of the final alignment. Description of various components of alignment i.e. tunnels, viaduct/RE walls, bridges, gradients, curves, stations, yards.
 - f. Final land acquisition plan and tree map.
 - g. Additionally, results & deliverables of various activities as given in section 3.3 shall be provided such as
 - i. Report on approach and methodology adopted for the creation of LiDAR outputs like DEM/DTM & DSM and their detailed QA/QC.

- ii. Input/output data files of alignment design in soft copy used in Autodesk 3D Civil/Bentley Rail Track or similar software for designing of the alignment for the future use of NHSRCL.
- iii. Index map, Index Plan & L-section, detailed plan & section and other plans of Final Alignment as per ~~Indian Railway Engineering Code~~/High Speed Rail manual. The locations of Permanent Control Points, Reference pillars, and GTS benchmarks shall be shown with X,Y,Z co-ordinates various maps, plans etc.
- iv. Description of alignment including Statements of Curves, Gradients, Stations, Tunnels, Major/Minor bridges, ROBs/RUs etc as per ~~Indian Railway Engineering Code~~/ High Speed Rail manual.
- v. Span configuration and GADs of all bridges, crossing structures.
- vi. Final Land Acquisition Plan, forest details and related documents such that these can be submitted to Authorities for the purpose of land acquisition and obtaining Forest clearance for Final Railway alignment.
- vii. Submission of design codes, standards and best international practices relevant to the scope of work.
- viii. Soft (in editable format) and hard copies of all the documents obtained and used by the Contractor in the course of alignment design i.e. maps, topo sheets, contour maps, DGPS data, DEM, Bentley Rail Track or similar software files. Hard copy shall be of a size suitable for easy handling and preferably bound.

3.4.6. Instructions to be followed by the Consultant while providing Services

- a. **Augmentation of Data:** In the conduct of the Consultancy service, NHSRCL shall provide available relevant data and reports to the consultant, but these may or may not be adequate. The Consultant shall supplement by collecting:
 - i. Design criteria/standards/Codes/manuals/best practices in a relevant field related to project.
 - ii. Details of all major habitations, demography, features, and structures in the area.
 - iii. Details of other mega projects like the hydro project, roads etc in the area which may have an influence on the alignment design.
- b. Consultant shall be solely responsible for the analysis and interpretation of all data received and collected and for the conclusions and recommendations contained in their reports.

3.5. Reference Codes

The Design Consultant shall utilize the applicable Indian codes as mentioned in Annex-1. All relevant Indian Acts and Regulations shall also be complied with. Should the Design

Consultant propose to use alternative Standards or Codes of Practice or International best practices they shall submit two copies of such standards or codes with justification for their use to NHSRCL for review and acceptance within 30 days from date of commencement of work.

3.6. Use of Proprietary Items: The Consultant shall ensure that there are no named or proprietary products in the documents or on drawings. The Consultant shall indemnify NHSRCL from violation of any copyright infringement and NHSRCL will not be responsible for any act of negligence/ omission in this respect.

3.7. Proof Consultant: NHSRCL may get the Alignment design, Survey, Drawings, Reports, Investigations, Design or any other work executed by the Consultant reviewed/accepted/approved/checked by reputed independent agencies or Proof Consultant to be fixed by NHSRCL. In that case, it will be the responsibility of the Consultant to depute their competent experts/personnel and furnish necessary clarifications/calculation/ assistance for the approval of the Survey, Report, Drawings/design calculations.

3.8. Standard of Services:

The Consultant shall ensure that technically qualified and experienced staff is deployed to perform the work, including all Quality Control associated with it, insufficient number and that accurate, consistent, clear and easily readable drawings & documents are produced in time. The Consultant shall comply with the provisions and procedures covering standards and codes and drawings.

Scheme and methodology of the work to be executed shall be formulated and submitted to NHSRCL. The format of the documentation required for executing the work shall also be submitted to NHSRCL before the start of the work. The documentation should be as per relevant IS codes / International practice.

The Consultant shall be responsible for the accuracy, correctness and technical merit of its Survey, Design, Calculations, Drawings and all other documentation prepared by it in carrying out the services.

If inaccuracies are found in the survey or services of the Consultant by NHSRCL, then the Consultant shall carry out the survey again this own cost and will have to come to a mutually agreed solution with the NHSRCL.

3.9. Schedule of key dates: The Consultant shall deploy the adequate competent and experienced manpower and compatible resources as are required to carry out the Services as per the following Key Dates.

S.No.	Key Activity	Key Dates *
1	Submission of Approach and Methodology Statement as per clause	D+10
2	Submission of Inception Report as per clause 3.4.1	D+30
3	Processing of satellite images procured for map generation, and submission of the report thereof	D+50
4	Submission of Alignment Report Stage-I as per clause 3.4.4	D+80
5	Submission of Alignment Report Stage-II (Final Submission) as per clause 3.4.5	D+170

“D” is the date of commencement of work.

* from the date of Commencement of work

Notes:

- a) The submission shall be done in a phased manner within the key dates so that subsequent investigations/Designs can also be initiated in a phased manner for timely completion of the Project.
- b) NHSRCL will interact with Railway and other agency for approval at different stages wherever required, the Consultant shall attend the meetings in this regards to provide clarifications/ presentations. For adhering to the time schedule, 30 days may be included for approval of NHSRCL wherever required. The Consultant shall provide the submissions in such quality and completeness that NHSRCL is able to take the decision without referring back for queries and clarifications.

ANNEXURE-1 (TOR)

CODES AND SPECIFICATION

1. The execution of all works under this tender shall conform to the specifications and codes of practice mentioned below (as amended from time to time).

- 1 NHSRCL Manuals & Standards.
- 2 Indian Railway Standard Bridge Substructure Code 1985 (revised)
- 3 Schedule of Dimension of High Speed Rail as approved by Ministry of Railways.

2. CODES OF PRACTICE TO BE FOLLOWED:

The following codes of Practice shall be followed generally unless otherwise specified. In the absence of the relevant provision of specifications in the under mentioned BIS/IRS/IRC codes, the reference shall be made to International codes/best available engineering practice but with the approval of Employer. The consultant can adopt International Standards/ Codes/ Best practices, as relevant to High Speed Railway construction/ operation to make his design report for the purpose with the approval of Employer.

- 1 IS:5878(Part I) 1971 Precision Survey and setting out.
- 2 IS4081-2013- Safety Code for Blasting and Related drilling operations.
- 3 IS9103-1999- Admixtures for Concrete.
- 4 IS3764-1992- Safety Code for Excavation work.
- 5 IS4138-1977- Safety Code for Working on Compressed Air.
- 6 IS:7293-1974- Safety Code for Working with Construction Machinery.
- 7 IS:816-1969- Code of practice for use of Metal Arc welding for General Construction in Mild steel.
- 8 IS:1566-1982- Hard Drawn steel wire fabric for Concrete reinforcement
- 9 IS456-2000–Code of Practice for Plain and Reinforced Concrete.
- 10 IS:1893-1984-Criteria for Earthquake resistant design of structure.
- 11 IS:1200 (Part-XXV)1971-Methods of Measurement of Building and Civil Engineering works.
- 12 IS1905-1987-Code of Practice for the Structural safety of Buildings, Masonry walls.
- 13 IS458-2003- Concrete pipes (with and without reinforcement).
- 14 IS: 800-2007–Code of Practice for use of Structural steel in General Building Construction.
- 15 Code of Practice for Laying of Cables etc. For Electrical & S & T works
- 16 IS 2339:2013for Aluminium Paint ready mix;
- 17 IS 2062-1975for Structural Steel fusion welding quality.
- 18 IS 1148-2009–Rivet bars (Mild Steel) for structural purpose.

- 19 IS 1367-2014 for Mild Steel bolts and nuts;
- 20 Indian Electricity Rules
- 21 Indian Explosive Act
- 22 Indian Explosive Rules
- 23 IS 5878 (Various parts) codes of practice for tunneling
- 24 IS 9012 Recommended practice for shotcreting.

NOTES:

- The latest edition of all the codes of practice along with the up to date correction slips shall be applicable.
- The decision of Employer regarding the interpretation of specification shall be final and binding on the Consultant.

ANNEXURE-2 (TOR)

Data to be provided by NHSRCL

1. NHSRCL Manuals and Codes.
2. High resolution 50 cm resolution Ortho-Imagery & DTM/DSM of 3 m accuracy (with confidence interval of 90%) procured from NRSC/ISRO, Hyderabad in digital format or raw satellite imagery from NRSC/ ISRO as required.
3. .kmz file of tentative alignment of HSR corridor derived from desktop study done by NHSRCL. .kmz file for Delhi- Varanasi corridor shall be provided at the issue of LOA. NHSRCL shall provide the .kmz file of subsequent corridors at the interval of approximately 2 months. The sequences of corridors shall be decided after the award of contract.
4. Hydrological investigation for bridges and undertaking hydrological calculation to finalise Water way, HFL & LWL of bridges, Details of Hydrological parameters required for FAD will be provided by NHSRCL. Wherever data is not available Consultant will perform Hydrological studies of rivers/nallas/khads crossings based on the Hydrological and Topographical survey.
5. Revenue map along with ownership details.
6. Schedule of Dimensions (SOD) for FAD clearance as per NHA guidelines.

ANNEXURE- 3 (TOR)

SPECIFICATIONS & METHODOLOGY FOR ENGINEERING SURVEY

Table of Contents

1. General
2. Establishment of Horizontal Control with DGPS
3. Establishment of vertical control
4. Aerial LiDAR and Imagery Specifications
5. Job requirement

1. General

Modern technology for surveying is to be used for establishing Ground Control Points, vertical and horizontal control for verification/correction/maintaining accuracy of generated DEM using Aerial LiDAR technology for detailed survey.

The scope of work involves carrying out reconnaissance survey, preparation of survey plans, establishment of control points.

The services to be rendered by the Consultant include all the work described in these technical requirements. Details not specifically described in these instructions are nevertheless a firm requirement if they can be identified as an item, or items, commonly apart of professional grade work of a comparative nature.

2. Establishment of Horizontal Control with DGPS

Horizontal control will be established to achieve required accuracy for processing of the Aerial LiDAR data.

The stations selected shall be obstruction free towards sky at an angle of 15 degree with a horizontal plane. The pillars/points (henceforth designated as control points) for which coordinates are to be established shall be decided in advance in consultation with NHSRCL.

The Consultant shall plan closed loops consisting of a network of triangles, connecting these control points. The Consultant shall get this network approved by NHSRCL before proceeding to the site. The triangles shall be well-formed and preferably not too acute nor obtuse, with sufficient redundancy so that a baseline could be confirmed by observations from multiple control points. There may be occasions where due to some specific site constraints, this network may require change. The concurrence of NHSRCL representative shall be taken for this change.

The control point locations shall be so selected as to be clear of HT/LT lines, free from multipath problems associated with tall features in the vicinity, free from foliage, open to sky with a clear view of the horizon close to the proposed alignment (when required) where a permanent feature

such as rock outcrop, culvert etc. is available. If such permanent features are not available, control pillars may be erected specifically as per specifications. Differential GPS observations shall be taken on control points in static mode for sufficiently long time using at least 3 receivers forming 3 vertices of a well-formed good triangle.

Minimum common period of observation shall be not less than 3 hours.

The Surveyor shall download the raw GPS data on a PC at the site itself and thereafter applying suitable projection system so as to arrive at grid coordinates (Northing, Easting and Elevation with reference to Mean Sea Level) from geographical coordinates (Latitude, Longitude & Ellipsoidal Height) observed at the site. For doing the network adjustment, one pair permanent control point to be fixed for both horizontal and vertical control. In this case, horizontal control to be fixed with long hour DGPS observation (48 Hours continuous observation). Each day's work shall be compiled and mapped/documentated on the same day.

The parameters used for transformation shall be duly documented in the Report provided by the Consultant.

Both the raw data (in RINEX as well as proprietary formats of GPS manufacturer) as well as the transformed UTM and WGS84 data shall be supplied by the Consultant to NHSRCL.

After carrying out DGPS work, the Consultant shall provide the Coordinates of all Control Points to NHSRCL.

3. Establishment of Vertical Control

Vertical control shall be established by running a closed levelling on control points along the corridor using digital level. The Consultant shall close levelling work on a daily basis and find out the closing error. Closing would mean that levelling work shall be started from a known point (first point) and close data known point (first point where known points are not available). For the purpose, length of the loop, as well as each of its segments, shall be recorded with the help of stadia. Raw data from the digital level shall be submitted along with adjusted levels in tabular form.

The closing error of daily loop closure should not exceed $12\sqrt{K}$ (unless agreed with NHSRCL due to site conditions), where K is the circuit length in kilometer. In case, the accuracy of daily loop closure exceeds the limits defined above, the entire loop should be repeated until the desired accuracy is achieved.

Then, the level line shall be connected with available GTS benchmarks of Survey of India (SOI) at both the ends. Closing error with respect to SOI GTS benchmarks would be computed and adjusted, if required.

The Consultant shall supply adjusted reduced levels of all the control marks along with raw observations, calculation sheet and description of each control mark on excel component of MS office.

4. Aerial LiDAR Survey with Imagery

4.1 General

Aerial LiDAR Survey complemented with Aerial Photography shall be carried out for a 300 m corridor around the centerline of the proposed final corridor or as per consultation with NHSRCL. Data will be captured with reference to control network already established along the corridor.

The broad steps of work have been covered in section 3.3.1

4.2 Detailed Scope of Aerial LiDAR Survey

i. Clearances for Flying

The consultant is responsible to obtain necessary clearances from Director General of Civil Aviation, Ministry of Defence, Government of India as per DGCA procedures and guidelines and other agencies as may be required to complete the job of flying over the Aol, acquire LiDAR and digital camera data etc. The client would provide necessary documentation; however, getting clearance would be the entirely the responsibility of the contractor. There are chances that alignment may change at any stage of the project. The contractor would need to plan accordingly.

ii. Flight Planning

The flight path shall cover the study area completely including enough cross flight lines to eliminate shadowing and allow for proper quality control. Flight line overlap should be 20% or greater, as required, to ensure that there are no data gaps between the usable portions of the swaths. Data collections in high relief terrain should have greater overlap. Any data with gaps between the geometrically usable portions of the swaths will be rejected.

The contractor shall generally avoid missions during inclement weather which have been known to degrade the accuracy of laser return data. The contractor must document mission date, time, flight altitude, airspeed, scan angle, scan rate, laser pulse rates, and other information deemed pertinent.

iii. Sensor Calibration

The consultant must provide calibration certificate of sensor issued by the manufacturer. In addition, the contractor must submit evidence that the total LiDAR system was calibrated prior to current project initiation, for the purposes of identifying and correcting systematic errors. Proper system calibration requires repetitive over-flight of terrain features of known and documented size and elevation using flight paths similar to those that will be used in the Aol

iv. Ground Control Survey

The consultant must use appropriate ground control to achieve required deliverables as listed above.

During data collection, ~~two~~ at least 5 DGPS (preferably 16) base stations will simultaneously be used during the mission. Inter-distance between two base stations should not exceed 25 km.

v. Pre-Processing

The raw LiDAR data should be assembled for clipping, filtering, and processing. The elevation data may then be examined and compared to known values and control. Because of the reflective nature of light, it is common for errors to be recorded because of the reflectivity, or lack thereof, from surfaces within the project area. Though a few points within each mission may be identified as discrepant, it is an insignificant percentage (usually less than 5%) and these should be removed from the data

vi. Post-Processing

The consultant will provide high-resolution, high-accuracy, "bare-earth" ground elevation data at regular spacing (DEM), irregular spacing with mass points and break-lines (DTM), and the elevation data of all top surfaces (DSM). To restrict data to ground elevations only, the contractor must remove elevation points on bridges, buildings, and other structures and on vegetation, from the LIDAR-derived data. In addition to randomly spaced LIDAR points, before and after removal of data associated with structures and vegetation, the consultant must produce a bare-earth DEM. The contractor must use Triangular Irregular Network (TIN) linear interpolation procedures, including break lines, when validating the vertical accuracy of the data models.

vii. Quality Control/Quality Assurance

Quality Control/Quality Assurance (QC/QA) of the LIDAR and/or LiDAR derived data will be the responsibility of the consultant. This QC/QA process shall include reviews of flight alignments and completeness of supporting data (e.g., cross sections, profiles). The client may perform additional QC/QA testing

4.3 Detailed Specification of Aerial LiDAR Survey

i. LiDAR Data Capture Specifications

Coverage	The project will cover a corridor as per TOR. Appropriate flight plans will be prepared so as to achieve the desired point density.
Data density	10 point / m ² .
Fundamental Spatial	Fundamental spatial accuracy of the survey must conform to the following standard:

Accuracy Requirement	<ul style="list-style-type: none"> ➤ Fundamental Vertical Accuracy (FVA) $\leq \pm 10$ cm. 95% confidence interval (1.96 x RMSE) ➤ Fundamental Horizontal Accuracy (FHA) $\leq \pm 10$ cm. 95% confidence interval (1.96 x RMSE)
Horizontal Datum	<p>The World Geodetic Datum 84 (WGS-84).</p>
Map Projection	<p>The coordinate system for all deliverables is Universal Transverse Mercator (UTM).</p>
Vertical Datum	<p>Ellipsoid: All deliverables specified below as ellipsoidal will be in terms of the WGS-84 reference frame. The source of the ellipsoidal height control shall be explained in the 'Post-Survey Spatial Accuracy Report'.</p>
Geoid Model	<p>EGM2008 shall be used to derive Orthometric heights from ellipsoidal data.</p>
Survey Control	<ol style="list-style-type: none"> 1. All raw survey control data used or derived from this contract will be supplied to client to ensure independent Quality Assurance (QA) of the survey operations. 2. The primary ground control and check point surveys must be referenced to the survey of India local vertical datum specified above comprising Survey of India Bench marks. 3. Survey to establish new primary control shall use techniques to achieve a minimum standard of Survey of India for Densification of geodetic survey or equivalent in international standards. This will be mentioned the Project Plan and Project Report submitted to client. 4. Any systematic bias in elevation data will be corrected and must be reported to client.
LiDAR Sensor	<p>The sensor must be capable of:</p> <ol style="list-style-type: none"> 1. Detecting multiple discrete returns, with a minimum of 4 potential returns for each outbound laser pulse. 2. Recording the intensity of each return. <p>LiDAR Sensor:</p> <ol style="list-style-type: none"> 1. Pulse Repetition Rate of 300 kHz or better 2. Range at reflectivity of 20% and 300 kHz PRF to be more than 1000 m 3. Field of view 60 degrees <p>IMU:</p>

	<ol style="list-style-type: none"> 1. Gyro Bias <0.05 deg/hr 2. Data rate > 200 kHz 3. Roll Pitch Accuracy better than 0.003° 4. Heading Accuracy better than 0.007° 5. Velocity Accuracy better than 0.005 m/s <p>DGPS: Dual Frequency GNSS receivers</p>
<p>Collection Requirements</p>	<p>The survey design must plan on:</p> <ol style="list-style-type: none"> 1. A scan angle not exceeding 50° Total FOV (+/- 20° from nadir) 2. Flight line overlap must be 10% or greater, as required to ensure there are no data gaps between the usable portions of the swaths. 3. Data Voids (with void areas more than and equal to 4xNPS²), measured using 1st-returns only within a single swath are not acceptable, except: <ol style="list-style-type: none"> a. where caused by water bodies b. where caused by areas of low near infra-red (NIR) reflectivity c. where appropriately filled-in by another swath 4. The spatial distribution of geometrically usable points is expected to be uniform and free from clustering. In order to ensure consistent data densities throughout the project area. 5. Environmental conditions for data capture are: <ol style="list-style-type: none"> a. Cloud and fog free between the aircraft and the ground. b. Flights would not be undertaken during periods of heavy smoke, haze, and rain. <p>Every effort shall be made to avoid breaks within individual flight lines. Where breaks within a flight line are necessary, the entire flight line composed of the resulting segments shall meet all of the requirements set forth in these specifications</p>

ii. Ortho-Photo Specifications

GSD	GSD of 10 cm
Bands	R G B (Three band natural colour imagery)
End overlap	30% minimum
Side overlap	20% minimum
Collection condition	<p>Same as LiDAR with following additional conditions:</p> <ul style="list-style-type: none"> ➤ Cloud free with minimal smoke, smog, fog and dust.

	<ul style="list-style-type: none"> ➤ Minimum soil moisture. ➤ Every effort shall be made to avoid breaks within individual flight lines. Where necessary, the entire flight line composed of the resulting segments shall meet all of the requirements set forth in these specifications. Where breaks occur, these shall have an overlap of at least four frames to ensure a stereo model of overlap or tie.
Horizontal Datum	The World Geodetic Datum 84 (WGS-84).
Map Projection	The coordinate system for all deliverables is the Universal Transverse Mercator (UTM).
Vertical Datum	Ellipsoid: All deliverables specified below as ellipsoidal will be in terms of the WGS-84 reference frame. The source of the ellipsoidal height control shall be explained in the 'Post-Survey Spatial Accuracy Report'.
Geoid Model	EGM2008/Indian MSL shall be used to derive Orthometric heights from ellipsoidal data.
Camera Specification	Camera with minimum 50 MP resolution
Imagery Product	Seamless mosaic covering the project area and non overlapping, edge-matched tile

iii. Aerial LiDAR Planning and Reporting Specification

Pre-Survey Quality Assurance Plan	<p>The Contractor shall prepare and submit to the client a Quality Assurance Plan that conforms to an identified management system and generally complies with ISO 9001.</p> <p>The plan must address the organisation and management of the project, work procedures, environmental considerations, safety and risk control and test procedures.</p> <p>The Plan must also detail the procedures to be used in verifying that the deliverables meet the required specification including:</p> <ul style="list-style-type: none"> • The procedures and methodologies to be used to verify that the deliverables meet the required specifications.
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	<ul style="list-style-type: none"> • Details of proposed sensor calibration checks and methodology to be used to establish both reference stations and ground test sites. <p>The Project Plan must be submitted at least 15 days prior to commencement of the survey.</p>
<p>Post-Survey Spatial Accuracy Report</p>	<p>The absolute and relative accuracy of the data, both horizontal and vertical, and relative to known control, shall be verified prior to classification and subsequent product development. This validation is limited to the Fundamental Spatial Accuracy, measured in clear, open areas. A detailed report of this validation is a required deliverable.</p> <p>The report will include the following:</p> <ul style="list-style-type: none"> • Flight trajectories as specified below. • Details of system calibration checks. • Results of relative (flight run) matching and details of any adjustments made. • Source of primary ellipsoidal height control. • Details of ellipsoid to Orthometric corrections applied including any final adjustment to local SOI vertical datum supplemental to the standard Geoid correction. • Results of vertical and horizontal accuracy validation. • All survey control coordinates, site id and check point comparisons in both Excel spreadsheet and ESRI shape file formats. • Digital photographs of all survey and check sites, with the site ID included in the filename. The bearing of the photo direction will also be included. • Other related information.
<p>Flight Trajectories</p>	<p>All flight trajectories used for the capture of the delivered LiDAR and photograph data will be supplied in ESRI Shape files. The shape file table's must include the date of capture, local start time, local end time and which reference station was used for each trajectory. The shape file will show photo footprint and its centre.</p>
<p>Project Report</p>	<p>The Project Report will comprise a technical discussion addressing how each of the contract specifications has been</p>

	<p>met, a statement of consistency with any specified standards, results of independent accuracy and validation tests, metadata statements and extra-ordinary issues that may have affected the nature or delivery of the project.</p> <p>All aspects of the project operations must be adequately reported.</p>
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iv. Quality Assurance Specifications

<p>Fundamental Spatial Accuracy Validation (FSA)</p>	<p><u>Vertical Accuracy Validation</u></p> <ol style="list-style-type: none"> 1. Specify fundamental vertical accuracy of the point cloud dataset using check points located in open and flat terrain. 2. The vertical accuracy of the point cloud dataset is to be tested using a TIN surface constructed from bare-earth LiDAR points compared against ground survey check points. 3. Check points are to be surveyed independently of any LiDAR GPS operations. 4. The number of check points (locations) is dependent on the extent of the survey. The following strategy will be used as a guide: <ol style="list-style-type: none"> a. Check points must be established to adequately cover the full extent of the survey area, and be representative of the project area landscape. b. A minimum of 1 check points (locations) will be taken for every 5 km. 5. If additional independent validation is required, data will be assessed in accordance with discussion with the client. Necessary assistance will be provided by the bidder. <p><u>Horizontal Accuracy Validation</u></p> <ol style="list-style-type: none"> 1. The onus for reaching the required accuracy lies with the data supplier. Independent accuracy assessments may also be carried out.
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	<ol style="list-style-type: none"> 2. Consultant is required to report on the expected horizontal accuracy of elevation products as determined from system and sensor calibration studies. 3. In the above circumstances a “compiled to meet” statement of horizontal accuracy at 68 per cent or 95 per cent confidence will be reported. 4. The contractor may use feature based horizontal accuracy measures to report horizontal accuracy and will notify the approach in post-survey spatial accuracy report. 5. If additional independent validation is required, data will be assessed in accordance with mutually agreeable terms.
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v. LiDAR Point Cloud Specifications

<p>Unclassified Point Cloud</p>	<ol style="list-style-type: none"> 1. All returns, all collected points, fully calibrated and adjusted to specified vertical datum, by swath. 1 file per swath, 1 swath per file, (file size not to exceed 2GB). 2. Fully compliant LAS v1.2 (or v1.3), point record format with all standard attributes including: <ol style="list-style-type: none"> a. Intensity values (native radiometric resolution). b. Return number. c. Georeferencing information in all LAS file headers. d. GPS times recorded as adjusted GPS time, at a precision sufficient to allow unique timestamps for each pulse. 3. Data is to be provided in the following Vertical Datums: <ol style="list-style-type: none"> a. Orthometric (Survey of India Vertical Datum) b. Ellipsoidal (WGS-84).
<p>Classified Point Cloud</p>	<ol style="list-style-type: none"> 1. All returns, all collected points, fully calibrated and adjusted to specified vertical datum, and classified as specified below. 2. Fully compliant LAS v1.2 (or v1.3), point record format with all standard attributes including: <ol style="list-style-type: none"> a. Intensity values (native radiometric resolution). b. Return number. c. Georeferencing information in all LAS file headers. d. GPS times recorded as adjusted GPS time, at a precision sufficient to allow unique timestamps for each pulse. e. ALL points not identified as “Withheld” are to be classified.

	<p>3. Data is to be provided in the following Vertical Datums:</p> <ol style="list-style-type: none"> a. Orthometric (Survey of India Vertical Datum) b. Ellipsoidal (WGS-84). <p>4. Tiled delivery, as per Data Supply Specifications below.</p>																														
<p>Required Point Cloud Classification Level</p>	<p>a) All classified point cloud data must adhere to the following classification scheme. (The ASPRS scheme of classification can be seen for reference) [SEP]</p> <p>b) The minimum number of point classes to be delivered according to this scheme is defined by the Classification Level specified below. [SEP]</p> <table border="1" data-bbox="478 672 1276 1904"> <thead> <tr> <th>Number</th> <th>Point Class</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Unclassified</td> <td>Created, never classified</td> </tr> <tr> <td>1</td> <td>Default</td> <td>Unclassified</td> </tr> <tr> <td>2</td> <td>Ground</td> <td>Bare Ground</td> </tr> <tr> <td>3</td> <td>Low Vegetation</td> <td>0-0.3m (essentially sensor "noise")</td> </tr> <tr> <td>4</td> <td>Medium Vegetation</td> <td>0.3-2m</td> </tr> <tr> <td>5</td> <td>High Vegetation</td> <td>>2m</td> </tr> <tr> <td>6</td> <td>Building Structures</td> <td>Buildings, sheds, houses and silos etc.</td> </tr> <tr> <td>7</td> <td>Low/high points</td> <td>Spurious high/low point returns (unusable)</td> </tr> <tr> <td>8</td> <td>Model Key points</td> <td>Reserved for model key points only</td> </tr> </tbody> </table>	Number	Point Class	Description	0	Unclassified	Created, never classified	1	Default	Unclassified	2	Ground	Bare Ground	3	Low Vegetation	0-0.3m (essentially sensor "noise")	4	Medium Vegetation	0.3-2m	5	High Vegetation	>2m	6	Building Structures	Buildings, sheds, houses and silos etc.	7	Low/high points	Spurious high/low point returns (unusable)	8	Model Key points	Reserved for model key points only
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	9	Water	Any point in water
	10	Bridge	Any Bridge or overpass
	11	Not used	Reserved for future definition
	12	Overlap points	Flight line overlap points
	13-31	Not used	Reserved for future definition

vi. Orthophoto Specification

Ortho-rectification	<ol style="list-style-type: none"> 1. The digital elevation data required for this process shall be provided by the LiDAR deliverables specified above. 2. The rectification process shall use the cubic convolution resampling technique to ensure high accuracy and image quality. 3. The mosaicking process shall minimize image distortions and smearing and produce a seamless edge-matched product. 4. Orthorectified Image Chips shall be tonally balanced prior to generation of an image mosaic. Relative join (misalignment) of transportation features between adjacent image chips/tiles shall be within the tolerance defined by the horizontal positional accuracy requirement set out above. 5. The rectification process shall involve a solution of the appropriate photogrammetric equations for each pixel in the output image. It is not preferable to solve photogrammetric equations at anchor points only and then warp the content of the original image between the anchor points. 6. The contractor will describe its approach for ortho-rectification.
Radiometry	<ol style="list-style-type: none"> 1. All images will be clear and sharp in detail with no light streaks, static marks, scratches, or other noticeable blemishes. The imagery will be free from defects, such as out-of-focus imagery, and will not contain inconsistencies in tone and/or density between individual orthos and/or adjacent sheets. To ensure



	<p>consistency, the imagery will be radiometrically and geometrically corrected to enable adjacent files to be displayed simultaneously without obvious distinctions between them.</p> <p>2. The Contractor will describe their technical approach to producing radiometry balance.</p>
Digital ortho images	<p>1. Seamless mosaic at anticipated 10 cm pixel resolution.</p> <p>2. Edge-matched, non-overlapping tiles at anticipated 10 cm pixel resolution</p>

vii. Digital Elevation/Surface Model Specifications

Deliverables	Specifications
Digital Surface Model (DSM)	<p>a) 1 m grid Digital Surface Model (DSM) [SEP]</p> <p>b) The DSM will be generated from the “first return” LiDAR mass point data. This will include ground and non-ground points such as vegetation and buildings. [SEP]</p> <p>c) Void areas (i.e., areas outside the project boundary but within any tiling scheme) shall be coded using a unique “NODATA” value. [SEP]</p> <p>d) ESRI floating point GRID format. [SEP]</p>
Digital Elevation Model (DEM)	<p>a) 1 m grid bare earth Digital Elevation Model (DEM) [SEP]</p> <p>b) The DEM will be generated from the LiDAR mass point data classified as “Ground” only, so that it defines the “bare earth” ground surface. [SEP]</p> <p>c) The DEM generation will employ a Point to TIN and TIN to Raster process with Natural Nearest Neighbour interpolation. [SEP]</p> <p>d) Hydro-flattening will be undertaken for natural and man-made water bodies and water courses as defined below:</p> <ol style="list-style-type: none"> 1. Non-tidal water bodies with a surface area greater (>) than 625 m² [SEP] 2. Water courses greater than 30 m nominal width. [SEP] 3. Flat and level bank-to-bank with a gradient following the immediate terrain. [SEP] 4. Water courses will break at road crossings and bridges. [SEP] 5. Sinks must not be filled. [SEP]

- | | |
|--|---|
| | <p>6. The entire water surface edge must be at or immediately below the surrounding terrain. [SEP]</p> <p>7. Any additional data layers created for the purposes of hydro-flattening such as masks or break-lines must be provided as shape files. [SEP]</p> <p>e) Void areas (i.e., areas outside the project boundary but within any tiling scheme) shall be coded using a unique "NODATA" value [SEP]</p> <p>f) ESRI floating point GRID format. [SEP]</p> |
|--|---|

5. Job Requirements

The work shall be carried out as per well established and sound survey practices by qualified and competent surveyors under the direct supervision of qualified engineer's/ land surveyors.

The levelling work shall be carried out with reference to the existing nearest permanent benchmark of SOI and the Consultant shall transfer the same to site & BM shall be established at the site. All measurements shall be in metric units.

SECTION-VI
ANNEXURES/PERFORMAS

FORM 1

CHECKLIST OF TECHNICAL BID DOCUMENT SUBMISSION (To be filled by bidder and submitted along with tender document)																																																		
S. No.	Document / Items required	Please indicate whether attached or Not Applicable (NA)																																																
<u>TWO PACKET SINGLE STAGE BIDDING SYSTEM</u>																																																		
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3	Attested copies of Affidavit for sole proprietorship / memorandum and Articles of Association/ JV/ Consortium Agreement along with details pertaining to place of registration, principal place of business of the firm, etc.,																																																	
4	Bid Security of INR 74,24,500/- (INR Seventy Four Lakhs Twenty Four Thousand Five Hundred only) in proper form																																																	

	as mentioned in Para 4 of Notice for Invitation of Bids (NIT) of Section-I	
5	GST Registration Certificate & No.	
6	PAN of the firm	
7	Tender Document along with Addendum/Corrigendum/Reply to Bidder's Queries (if any) duly signed & stamped on all pages as Bidder's acceptance to all Terms and Conditions of Tender document.	
8	Details of Tender Cost submitted, if any.	

Bidder's Representative:

Signature :
 Name :
 Position :
 Date :
 Company :
 Company stamp



FORM- 2

FINANCIAL CREDENTIALS OF BIDDER
(Refer Cl. 2.2.2 c of Annexure I of ITB)

[The following table shall be filled in for the Bidder and for each member of a JV/Consortium]

S. No.	Financial Year	Annual Turnover #
1	[2018-19]	
2	[2017-18]	
3	[2016-17]	

The turnover shall be considered for contracted value only for works and supplies and any turnover owing to sale of assets or lease and license will not be considered.

Note:

- The Bidder is not required to submit any document as documentary evidence along with the Bidding Documents. All information furnished in this Form shall be certified by the Chartered Accountant /Company Auditor/ Statutory Auditor.

Bidder's Representative:

Signature :
Name :
Position :
Date : _____
Company : _____
Company stamp

Chartered Accountant /Company Auditor/ Statutory Auditor

Signature :
Name :
Position :
Date : _____
Company : _____
Company stamp
Membership No.....
Address
Contact No
Email ID.....



Financial Performance
(Refer Cl. 2.2.2 a of Annexure I of ITB)

[The following table shall be filled in for the Bidder and for each member of a JV/Consortium]

Date: [insert day, month, year]
Bidder's Legal Name: [insert full name]
JV/Consortium Party Legal Name: [insert full name]
NIT No.: NHSRCL/CO/CONTRACT/LIDAR/2020/03
Page [insert page number] of [insert total number] pages

Financial data

Type of Financial Information in (currency)	Historic Information for Previous 3 (three) Years (amount in currency, currency, INR equivalent)		
	FY 2016-2017	FY 2017-2018	FY 2018-2019
Statement of Financial Position (Information from Balance Sheet)			
Total Assets (TA)			
Total Liabilities (TL)			
Net Worth (NW)			

Note: The Bidder is not required to submit any document as documentary evidence along with the Bidding Documents. All information furnished in this Form shall be certified by a Chartered Accountant/Company Auditor/Statutory Auditor.

Bidder's Representative:

Signature:
Name:
Position:
Date:
Company:
Company stamp:

Chartered Accountant/Company Auditor/Statutory Auditor

Signature:
Name:





Position:

Date:

Company:

Company stamp:

Membership No:

Address:

Contact No:

Email ID:



CONTRACTOR'S ORGANIZATION AND EXPERIENCE

The following table shall be filled in for the Bidder.

Date: [insert day, month, year]

Bidder's Legal Name: [insert full name]

JV/Consortium Party Legal Name: [insert full name]

NIT No.: NHSRCL/CO/CONTRACT/LIDAR/2020/03

Page [insert page number] of [insert total number] pages

SN	Relevant Experience of the Consultant (Company/ Firm) to the assignment		
1	Firms' experience in Aerial LiDAR Survey using Aircraft/ Helicopter for top 5 linear projects length wise in the last seven years.		
	SN	Name of Project	Project Length (KM)
	1		
	2		
	3		
	4		
	5		
	Note:- For each contract mentioned above, the details to be filled separately as per Form 6		

[Bidder to submit each Project in a separate Form for the Top 5 reported Projects]

Note:

- The Bidder is not required to submit any document as documentary evidence along with the Bid other than document mentioned in relevant form (Form-6). All information furnished in this Form shall be certified by the Chartered Accountant /Company Auditor/ Statutory Auditor.

Bidder's Representative:

Signature :
 Name :
 Position :
 Date : _____
 Company : _____
 Company stamp

Chartered Accountant /Company Auditor/ Statutory Auditor

Signature :
 Name :
 Position :





Date :

Company :

Company stamp

Membership No.....

Address

Contact No

Email ID.....



CONTRACTOR'S ORGANIZATION AND EXPERIENCE

The following table shall be filled in for the Bidder.

Date: [insert day, month, year]
 Bidder's Legal Name: [insert full name]
 JV/Consortium Party Legal Name: [insert full name]
 NIT No.: NHSRCL/CO/CONTRACT/LIDAR/2020/03
 Page [insert page number] of [insert total number] pages

SN	Relevant Experience of the Contractor (Company/ Firm) to the assignment		
1	Bidder's experience in Works of Alignment Design for Railways/ Highways/ Road/ Metro in the last seven years (Top 5 Projects length wise)		
	SN	Name of Project/ Contract	Project Length (KM)
	1		
	2		
	3		
	4		
	5		
	Note:- For each contract mentioned above, the details to be filled separately as per Form-6		

[Bidder to submit each Project in a separate Form for the Top 5 reported Projects]

Note:

- The Bidder is not required to submit any document as documentary evidence along with the Bid other than document mentioned in relevamnt form (Form-6). All information furnished in this Form shall be certified by the Chartered Accountant /Company Auditor/ Statutory Auditor.

Representative:

Signature :
 Name :
 Position :
 Date : _____
 Company : _____
 Company stamp

Chartered Accountant /Company Auditor/ Statutory Auditor

Signature :
 Name :
 Position :





Date :

Company :

Company stamp

Membership No.....

Address

Contact No

Email ID.....



EXPERIENCE IN SIMILAR NATURE OF WORK

[The following table shall be filled in for the Bidder and for each member of a JV/Consortium]

Date: [insert day, month, year]
 Bidder's Legal Name: [insert full name]
 JV/Consortium Party Legal Name: [insert full name]
 NIT No.: NHSRCL/CO/CONTRACT/LIDAR/2020/03
 Page [insert page number] of [insert total number] pages

CONTRACT NO.	INFORMATION	
Name of contract/ tender/project		
Contract / LOA Details	[insert contract name and contract agreement number]	
Award Date	[insert day, month, year, e.g. xx xxx, xxxx]	
Completion Date	[insert day, month, year, e.g., xx xxx, xxxx]	
Role in Contract [check the appropriate box]	Prime Consultant/ Contractor	
	Single entity <input type="checkbox"/>	
	JV/ Consortium/Association member <input type="checkbox"/>	
Total contract amount	[insert total contract amount and currency (ies)]	
Total amount received from client	[insert total amount received and currency (ies)]	
If member in a JV/ Consortium, specify participation in total contract amount	[insert a percentage amount]	[insert total contract amount and currency (ies)]
a. Brief description of scope of the contract.		
b. JV/ Consortium and Responsibility matrix for the activity- Aerial/ LiDAR survey and FAD		
c. Whether Aerial LiDAR by Helicopter/ Aircraft and Processing of data completed or not (if completed, specify the length)		
c. Whether Final alignment design completed or not (if completed, specify the length)		



Employer's Name:	[insert full name]
Employer's Address:	[indicate street / number / town or city / country]
Telephone/fax number	[insert telephone/fax numbers, including country and city area codes]
E-mail:	[insert E-mail address, if available]

Note:

1. Bidder is required to furnish the certificate from the employer for having completed the work of Aerial LiDAR survey by helicopter/ aircraft and processing of data as part of the contract for which the details have been furnished above.
2. Bidder is required to submit a copy DGCA/MoD approval in case of Aerial Lidar survey earlier carried out by him.
3. Bidder is required to furnish the certificate from the employer for having completed the work of final alignment design as part of the contract for which the details have been furnished above.
4. The Bidder is not required to submit any other document as documentary evidence along with the Bidding Documents. All information furnished in this Form shall be certified by a Chartered Accountant/Company Auditor/Statutory Auditor. In case of JV, credit shall be given according to the responsibility matrix.

Bidder's Representative:

Signature:
 Name:
 Position:
 Date:
 Company:
 Company stamp:

Chartered Accountant/Company Auditor/Statutory Auditor

Signature:
 Name:
 Position:
 Date:
 Company:
 Company stamp:
 Membership No:
 Address:
 Contact No:
 Email ID:



FORM 7

(Refer Bid Clause – 2.4.1 of Annexure I of ITB)

CURRICULUM VITAE (CV) OF PROFESSIONAL PERSONNEL

FORMAT FOR CV OF Sr. Photogrammetry expert / Alignment Design Expert / Sr. LiDAR Professional PERSONNEL DURING ASSIGNMENT

One CV form for each category to filled and submitted with the bid. [For each position separate form to be filled and submitted]

Proposed Position:

Name of Personnel:

Date of Birth:

Nationality:

Educational Qualifications:

Joining Date in Bidder's Organization:

Summary of Experience:

Qualification/Experience *	Relevant Details
1. Educational qualifications	
2. No. Of years of experience <i>Employment Record: (Starting with present position, list in reverse order every employment held.)</i>	Name of the Employer/ Position held From - To Total No. of years of experience
3. Relevant experience in Railway/highway/other linear Project(s)	Length and type of linear projects handled.

****The qualification and experience should be confirming to Bid clause 2.4.1.***

Certification:

I am willing to work on the Project and will be available for the complete Project assignment as required. I, the undersigned, certify that to the best of my knowledge and belief, this CV correctly describes me, my qualifications and my experience.

(Signature and name of the Professional)

Place

Date

(Signature and name of the Authorised Signatory of the Applicant)

Certified that the above employee is working in the Bidder's organization.

Name and Signature of HR Head of the Bidder's Company



DECLARATION

(Cross out fully which is not applicable)

1. I am/We are not related to any Employee of the NHSRCL in any capacity.

OR

2. I/We draw attention to the fact that I/we am/are related to the following Employees of the NHSRCL.

(Cross out Table diagonally if NOT applicable)

S. No.	Name of the Employee	Department	Degree of Relationship

Signature of Authorized Representative: - _____

Address: - _____



**FORMAT FOR PAYMENT THROUGH “NEFT/RTGS” SYSTEM
CONTRACTOR/VENDOR PAYMENT**

(Separate Form to be filled by each JV/Consortium member)

Sr. No.	Detail given by Contractor/ Vendor	
a.	Name of Party	
b.	Tender/Bid No.	
c.	Date	
d.	Name of Bank	
e.	Name of Bank Branch	
f.	Address	
g.	Place	
h.	Account Number	
i.	MICR Code	
j.	IFS Code	
k.	Mobile No (for SMS)	
l.	E-Mail ID	
m.	PAN Number	

Note: -

- Please attach photo copy of 1st page of pass book (Containing account number, name of account holder, branch name) and photo of one blank cancelled cheque (for IFS code) for payment.
- Form should be filled up in two copies.

(Signature of Authorized Representative of Bidder)

Name : _____
 Position : _____
 Date : _____
 Company : _____
 Company stamp: _____



POWER OF ATTORNEY FOR AUTHORISED REPRESENTATIVE OF SOLE BIDDER

(To be submitted in Original)

I/We _____ do hereby constitute, appoint and authorize Mr/Ms _____ who is presently employed with us and holding the position of _____ as our Representative, to do in our name and on our behalf, all such acts, deeds and things necessary in connection with or incidental to our Bid for the Works of *[Insert Tender Name]*, including signing and submission of all documents and providing information/responses to National High Speed Rail Corporation Limited, representing us in all matters, dealing with National High Speed Rail Corporation Limited in all matters in connection with our Bid for the said Works.

We hereby agree to ratify all acts, deeds and things lawfully done by our said Representative pursuant to this Power of Attorney and that all acts, deeds and things done by our aforesaid representative shall and shall always be deemed to have been done by us.

Dated this the _____ day of _____ 20_____.

(Signature and Name in Block letters of Signatory)
Seal of Company

Witness

<u>Witness 1:</u> Name: Address: Occupation:	<u>Witness 2:</u> Name: Address: Occupation:
---	---



Notes:

This Power of Attorney shall be executed in English/Hindi according to the applicable laws in the Bidder's country, taking into account the notes stated below:

(1) The mode of execution should be in accordance with the procedure, if any, laid down by the applicable law in the Bidder's country and the charter documents of the executants(s) and when it is so required, the same should be under common seal affixed in accordance with the required procedure.

(2) Whenever required, the Bidder should submit for verification the extract of the charter documents and the shareholder resolution in favour of the person executing this document on behalf of the Bidder.

(3) For a required document executed and issued overseas, the document will also have to be legalised by the Embassy of India in the Bidder's country and notarized in the jurisdiction where it is being issued. However, documents provided by Bidders from countries that have signed The Hague Legislation Convention 1961 are not required to be legalized by the Indian Embassy, if they carry a conforming Apostille certificate.

**FORMAT FOR AFFIDAVIT TO BE SUBMITTED BY THE BIDDER
ALONGWITH THE BID**

*(To be executed in presence of Public Notary on a non-judicial stamp paper of the appropriate value in accordance with relevant stamp Act. The stamp paper has to be procured in the name of the Bidder) ***

I (Name and designation) ** appointed as the attorney/authorized signatory of the Bidder, M/s. _____ (hereinafter called the Bidder for the purpose of the Bid for the purpose of the bid for the work of _____ as per the Bid No. _____ of NHSRCL, do hereby solemnly affirm and state on behalf of the Bidder as under:

1. *We declare that the Bidder has not been Blacklisted/ banned for business dealing for all Government Departments, or by Ministry of Railways or by NHSRCL at any time and/or no such blacklisting is in force or under process as on the deadline date for for submission of bids.
2. That the Bidder is neither Bankrupt/Insolvent nor is in the process of winding-up or under insolvency procedure nor such a case is pending before any Court on the deadline of submission of the bids.
3. We declare that the Bidder have, neither changed its name, nor created a new business entity as covered by the definition of "Allied Firm" under para 1002(iii) of chapter X of Vigilance Manual of Indian Railways 2018, with latest amendments and corrections (available on website of Indian Railways), consequent to having been banned business dealings or suspended business.
4. We declare and certify that we have not made any misleading or false representation in the forms, statements and attachments in proof of the qualification requirements, submitted in the bid.
5. We declare that the information and documents submitted along with the offer by us are correct and we are fully responsible for the correctness of the information and documents, submitted by us.
6. We understand that in case we do not fulfill the requirements of the eligibility and qualifying criteria at any time after opening of the proposals and till finalization of proposals, it will be our bounden duty to inform the Employer of our changed status immediately and in case of our failure to do so, our proposal shall be rejected and bid security shall be forfeited. We shall also be liable for Banning of Business dealings with employer upto a period of three years, or for such period as may be decided.
7. We also understand that if the contents of the affidavit are found to be false at any time after the award of the contract it will lead to termination of the contract, forfeiture of performance security and banning of business dealings for a period of upto five years.

SEAL AND SIGNATURE OF THE BIDDER

Verification:

Verified on _____ day of _____ at _____ that the contents of the above mentioned affidavit are true and correct and nothing material has been concealed there from.

SEAL AND SIGNATURE OF THE BIDDER

** Modify the contents wherever necessary, as per Terms of Reference.*

*** The contents in Italics are only for guidance purpose and details as appropriate, are to be filled in suitably by Bidder.*

◆ *Attestation before Magistrate/Public Notary*

FORM OF BID SECURITY (BANK GUARANTEE)

[Insert Guarantor letterhead or SWIFT identifier code]

Beneficiary: *[Insert name and Address of the Employer]*

Date: *[Insert date of issue]*

BANK GUARANTEE No.: *[Insert guarantee reference number]*

Guarantor: *[Insert name and address of place of issue, unless indicated in the letterhead]*

We have been informed that *[insert name of the Bidder]* (hereinafter called "the Applicant") has submitted or will submit to the Beneficiary its Bid (hereinafter called "the Bid") for the execution of "*[Insert Tender Details]*".

Furthermore, we understand that, according to the Beneficiary's conditions, Bids must be supported by a bid guarantee.

At the request of the Applicant, we, as Guarantor, hereby irrevocably undertake to pay the Beneficiary any sum or sums not exceeding in total an amount of *[insert amount in words]* (*[insert amount in figures]*) upon receipt by us of the Beneficiary's complying demand, supported by the Beneficiary's statement, whether in the demand itself or a separate signed document accompanying or identifying the demand, stating that either the Applicant:

- a) has withdrawn its Bid during the period of bid validity set forth in the Applicant's Letter of Bid ("the Bid Validity Period"), or any extension thereto provided by the Applicant; or
- b) having been notified of the acceptance of its Bid by the Beneficiary during the Bid Validity Period or any extension thereto provided by the Applicant, (i) has failed to execute the contract agreement, or (ii) has failed to furnish the Performance Security, in accordance with the Instructions to Bidders of the Beneficiary's bidding documents.

This guarantee will expire and shall be returned: (a) if the Applicant is the successful Bidder, upon our receipt of copies of the contract agreement signed by the Applicant and the Performance Security issued to the Beneficiary in relation to such contract agreement; or (b) if the Applicant is not the successful Bidder, upon the earlier of (i) our receipt of a copy of the Beneficiary's notification to the Applicant of the results of the bidding process; or (ii) twenty-eight days after the end of the Bid Validity Period.

Consequently, any demand for payment under this guarantee must be received by us at the office indicated above on or before that date.

Notwithstanding anything contained herein:

- a) Our liability under this Bank Guarantee shall not exceed Rs _____ (Rupees _____ only)
- b) This Bank Guarantee shall be valid up to _____
- c) We are liable to pay the guaranteed amount or any part thereof under the Bank Guarantee only and only if you serve upon us a written claim or demand on or before _____ (date which is 3 months after date mentioned at (b) above).

This guarantee is subject to the Uniform Rules for Demand Guarantees (URDG) 2010 Revision, ICC Publication No. 758.

[Signature (s)]

[Note: All italicized text is for use in preparing this form and shall be deleted from the final product.]

FORM – JV or CONSORTIUM AGREEMENT

The Partners of the Joint Venture / Consortium shall provide JV/Consortium Agreement for JV/Consortium Participation which includes at least the following

M/s_____ {Insert Name of Lead Partner} _____ having its registered office at _____ (hereinafter referred to as) is the Lead Partner of the JV or Consortium and acting as the Authorized Representative of the JV/Consortium on first part; and

M/s_____ {Insert Name of Partner} _____ having its registered office at _____ (hereinafter referred to as `_____') in the capacity of a Joint Partner of the JV/Consortium on the other part.

M/s_____ {Insert Name of Partner} _____ having its registered office at _____ (hereinafter referred to as `_____') in the capacity of a Joint Partner of the JV/Consortium on the other part.

The expressions of _____ and _____ and _____ shall wherever the context admits, mean and include their respective legal representatives, successor interest and assigns and shall collectively be referred to as "the Parties" and individually as "the Party"

WHEREAS:

National High Speed Rail Corporation Limited, which is owned by the Government of India, [hereinafter referred to as "Employer"] has invited bids for Works of "[Name of Work]).

NOW, THEREFORE, THE PARTIES AGREE AS FOLLOWS:

- (1) The following documents shall be deemed to form and be read and construed as an integral part of this JV or Consortium Agreement.
 - (i) Invitation for bid;
 - (ii) Bidding Documents issued by the Employer
 - (iii) Any Addenda to the Bidding Documents issued by the Employer
 - (iv) The Bid submitted on our behalf jointly by the Authorised Representative from the Lead Partner.
- (2) The `Parties' have studied the Bid Documents and have agreed to participate in submitting a `Bid' jointly.
- (3) Mr./Ms. _____, authorised representative of the Lead Partner and an employee of the Lead Partner whose details are provided as under, shall be the Authorized Representative of the JV or Consortium for all intents and purpose. He / She shall have the authority to conduct all business for and on behalf of any and all the Partners of JV/Consortium during the bidding process and in the event the JV or

Consortium is awarded the Contract, during Contract execution. Thus in the event of the award of Contract, the Authorised Representative will be the Contractor's Representative as per clause 4.3 of General Conditions of Contract.

Name, Designation, Address, Tel/Fax no E Mail ID

(3.1) In the event of the above Authorised Representative being replaced by or dissociating with/leaving the Lead Partner, the Lead Partner shall immediately appoint another of its employee as its Authorised Representative (with the consent of other JV/Consortium Partners (as given in form attached). During any such period when the Lead Partner is not able to have an Authorised Representative, the MD/Chairman of the lead partner will be considered to be the Authorised Representative for the purpose of this Bid and subsequent the Contract (if awarded).

(4) We undertake that

- (a) the Lead Partner of our JV/Consortium------(Name of the Lead Partner) shall have the maximum financial stake amongst the other partners of the JV/Consortium.
- (b) that the nationality of at least one partner is India and the nationality of other partners are [Name of Country].
- (c) The distribution of responsibilities in execution of the Works and the percentage participation amongst various Partners of the JV/Consortium for the subject work shall be as under:

Sl. No.	Name of the Member	Role (Lead Member/ Member)	Distribution of Responsibilities in execution of the Works	% Participation

(5) JOINT AND SEVERAL RESPONSIBILITY

The Parties undertake that they shall be jointly and severally responsible and liable to the Employer in the discharge of all the obligations and liabilities as per the contract with the Employer and for the performance of contract awarded to their JV/Consortium.

In case a Party fails or delays to perform its obligations either partially or fully, it shall be responsible for all the outcomes concerned, and upon such conditions the other Parties shall be obliged to take measures to perform well and fulfil satisfactorily all the obligations under the Contract with the Employer.

(6) ASSIGNMENT AND THIRD PARTIES

The Parties shall co-operate throughout the entire period of this JV/Consortium Agreement on the basis of exclusivity and neither of the Parties shall make any arrangement or enter into any agreement either directly or indirectly with any other party or group of parties on matters relating to the Works except with prior written consent of the other Party or Parties.

(7) EXECUTIVE AUTHORITY



The said JV or Consortium through its Authorized Representative (as specified above) shall receive instructions, payments from the Employer. The management structure for the Works shall be prepared by mutual consultations to enable completion of the Works to quality requirements within permitted cost and time.

(8) GUARANTEES

Till the award of the Contract, all the Bank Guarantees to the Employer shall be furnished in the name of JV or Consortium or in the name of all future members as named in the letter of intent referred to BDS 4.1 & 20.2 which shall be legally binding on all the Partners of the JV or Consortium.

(9) DOCUMENTS & CONFIDENTIALITY

Each Party shall maintain confidentiality and not use for any purpose other than those related to the Project all commercial and technical information received or generated in the course of preparation and submission of the Bid.

(10) ARBITRATION

Any dispute, controversy or claim arising out of or relating to this agreement shall be settled in the first instance amicably between Parties. If an amicable settlement cannot be reached as above, it will be settled by..... [Bidder to specify]

(11) VALIDITY

This Agreement shall remain in force till the occurrence of any of the following (unless by mutual consent, the Parties agree in writing to extend the validity for a further period)

- (a) The bid submitted by the JV/Consortium is declared unsuccessful;
- (b) Cancellation/ shelving of the Project by the Employer for any reasons prior to award of the Contract;
- (c) Execution of detailed JV/Consortium agreement by the Parties, setting out detailed terms after award of the Contract by the Employer, substantially covering the requirements as mentioned in the Bidding Documents; or,
- (d) Successful execution of the Contract and settlement of all/any disputes between the Employer and the Contractor.
- (e) By act of God or any other beyond the reasonable control of the Employer.

(12) This JV/Consortium Agreement shall be construed under the laws of Republic of India.

(13) NOTICES

The names, addresses and fax numbers of authorized representative of the other Partners of the JV/Consortium to which notices may be given in writing by fax confirmed by registered mail or commercial courier shall be as under:

- (a) _____[Name], _____[Designation] _____[Address] _____ [Ph. No., Fax No., E-mail ID
- (b) _____[Name], _____[Designation] _____[Address] _____ [Ph. No., Fax No., E-mail ID
- (c) _____[Name], _____[Designation] _____[Address] _____ [Ph. No., Fax No., E-mail ID]

Notes:

This Agreement shall be executed according to the applicable laws and in English in the Republic of India, the descriptions shown below shall be taken into account:

(14) *In case of existing JV or Consortium, the certified copy of JV or Consortium Agreement shall be furnished.*

(15) *The mode of execution should be in accordance with the procedure, if any, laid down by*

the applicable law in the Republic of India and the charter documents of the executants(s) and when it is so required, the same should be under common seal affixed in accordance with the required procedure.

- (16) *Whenever required, the Bidder should submit for verification the extract of the charter documents and the shareholder resolution in favour of the person executing this document on behalf of the bidder.*
- (17) *For a required document executed and issued overseas, the document will also have to be legalised by Embassy of India in the Bidder's country and notarized in the jurisdiction where it is being issued. However, documents provided by Bidders from countries that have signed The Hague Legislation Convention 1961 are not required to be legalized by the Embassy of India, if they carry a conforming Apostille certificate.*
- (18) *In case of Consortium, the Bank Guarantee can be in the name of lead partner or in the respective shares of each consortium member.*

POWER OF ATTORNEY FOR AUTHORISED REPRESENTATIVE OF JV or CONSORTIUM MEMBERS

(To be submitted in Original)

We _____ do hereby constitute, appoint and authorize Mr/Ms _____ who is presently employed with us and holding the position of _____ as our Representative, to do in our name and on our behalf, all such acts, deeds and things necessary in connection with or incidental to our bid for Works of *[Insert Tender details]*, including signing and submission of all documents and providing information/responses to National High Speed Rail Corporation Limited, representing us in all matters, dealing with National High Speed Rail Corporation Limited in all matters in connection with our bid for the said Works.

We hereby agree to ratify all acts, deeds and things lawfully done by our said representative pursuant to this Power of Attorney and that all acts, deeds and things done by our aforesaid representative shall and shall always be deemed to have been done by us.

Dated this _____ day of _____ 20_____.

(Signature of Authorized Signatory)

(Signature and Name in Block letters of Signatory)

Seal of Company

Witness

Witness 1:	Witness 2:
Name:	Name:
Address:	Address:
Occupation:	Occupation:

Notes:

This Power of Attorney shall be executed according to the applicable laws and in English in the Bidder's country, the descriptions shown below shall be taken into account:

- (1) *In case of existing joint venture, the certified copy of (JV or Consortium) Agreement shall be furnished.*
- (2) *The mode of execution should be in accordance with the procedure, if any, laid down by*



the applicable law in the bidder's country and the charter documents of the executants(s) and when it is so required, the same should be under common seal affixed in accordance with the required procedure.

- (3) *Whenever required, the Bidder should submit for verification the extract of the charter documents and the shareholder resolution in favour of the person executing this document on behalf of the bidder.*
- (4) *For a required document executed and issued overseas, the document will also have to be legalised by the Embassy of India in the Bidder's country and notarized in the jurisdiction where it is being issued. However, documents provided by Bidders from countries that have signed The Hague Legislation Convention 1961 are not required to be legalized by the Indian Embassy, if they carry a conforming Apostille certificate.*

Lead Partner should have at least 40% stake in the JV/Consortium.

FORM FOR ASSET OWNERSHIP
(To be submitted with reference to Cl. 2.2.1 of Annexure I of ITB)

S No	Item	Nos	Own/ Lease	Documents #	Enclosed at Page No.
1	Aerial LiDAR scanner with a range of 1000 m or above and a Pulse Repetition Rate (PRR) of 300 kHz or better along with Inertial Measurement Unit (IMU), Aerial GPS and other associated control units			1. Invoice Copy/Bill of Entry 2. Import Documentation – or similar ownership documents 3. Data Sheet of equipment specifying meeting of technical requirements along with equipment manufacturer web page	
2	Aerial Imagery Camera with a minimum resolution of 50 MP or better			4. Invoice Copy/ Bill of Entry 5. Import Documentation – or similar ownership documents. 6. Data Sheet of equipment specifying meeting of technical requirements along with equipment manufacturer web page	
3	Aircraft (excluding Drones & Unmanned Aerial Vehicles) / Helicopter			3. Ownership documents/ Lease Copy 4. NSOP copy of Aircraft operator	
4	LiDAR Trajectory Pre-Processing Software			Invoice Copy	
5	Terrascan/ Terrasolid/ Point Tool/or similar Post-Processing Software			Invoice Copy	
6	Photogrammetry Feature Extraction Software			Invoice Copy	
7	FAD Design Software (Bentley Power Rail Track/Civil 3D or similar)			Invoice Copy	

SIGNATURE OF THE BIDDER

Power of Attorney to Authorized Representative of JV/Consortium

(To be submitted in Original)

Appointment of Authorised Representative of the JV/Consortium

Whereas, the Managing Director of National High Speed Rail Corporation Limited, which is owned by the Government of India, has invited Bids for the Works of "Final Alignment design including Aerial LiDAR survey and other related works for six high speed rail corridors" [NHSRCL/CO/CONTRACT/LIDAR/2020/03], and

Whereas, the members of the JV/Consortium comprising of M/s. _____

(Lead

Member) _____, M/s. _____,

M/s _____, and M/s _____

are interested in submission of bid for this Works of in accordance with the terms and conditions contained in the Bid documents.

Whereas, it is necessary for the members of the JV/Consortium to designate representative of

the lead member as the authorized representative, with all necessary power and authority to do,

for and on behalf of the JV/Consortium, all acts, deeds and things as may be necessary in connection with the JV/Consortium's Bid for the Works.

NOW THIS POWER OF ATTORNEY WITNESSETH THAT:

We, M/s. _____ (Lead Member) _____, M/s.

_____, M/s _____, and M/s-----

hereby designate Mr/Ms. _____, being the representative of the Lead

Member of the JV/Consortium, as the Authorized Representative of the JV/Consortium, to do

on behalf of the JV/Consortium, all or any of the acts, deeds or things necessary or incidental

to the JV/Consortium's bid for the contract, including submission of the bid, participating in conferences, responding to queries, submission of information/documents and generally to represent the JV/Consortium in all its dealings with National High Speed Rail Corporation Limited in connection with the contract for the said work until culmination of the process of bidding till the Contract Agreement is entered into with National High Speed Rail Corporation

Limited and thereafter till the expiry of the Contract Agreement.

In the event of the above Authorised Representative being replaced by or dissociating with/leaving the Lead Member, the Lead Member shall immediately appoint another of its employee as its Authorised Representative duly with the consent of other JV/Consortium members. During all such period when the lead member is not able to have an Authorised Representative, the MD/Chairman of the Lead Member will be considered to be the Authorised

Representative for the purpose of this bid and subsequent contract (if applicable).

We hereby agree to ratify all acts, deeds and things lawfully done by authorized representative,

our said attorney, pursuant to this power of attorney and that all acts deeds and things done by

our aforesaid attorney shall and shall always be deemed to have been done by us
(JV/Consortium).

Dated this the _____ day of _____ 20_____.

(Signature)

(Name in Block letters of Executants¹)

Seal of Company

Witness 1: Witness 2:

Name: Name:

Address: Address:

Occupation: Occupation:

¹ To be executed by all the members of the JV/Consortium except the Lead Member of the
JV/Consortium.

Notes:

This Power of Attorney shall be executed according to the applicable laws and in English in
the Bidder's country, taking into account the notes stated below:

(1) In the case of an existing JV/Consortium, a certified copy of JV/Consortium Agreement
shall be furnished.

(2) The mode of execution should be in accordance with the procedure, if any, laid down by
the applicable law in the bidder's country and the charter documents of the executants(s)
and when it is so required, the same should be under common seal affixed in accordance
with the required procedure.

(3) Whenever required, the Bidder should submit for verification the extract of the charter
documents and the shareholder resolution in favour of the person executing this document
on behalf of the bidder.

(4) For a required document executed and issued overseas, the document will also have to
be

legalised by the Indian Embassy in the Bidder's country and notarized in the
jurisdiction

where it is being issued. However, documents provided by Bidders from countries that
have signed The Hague Legislation Convention 1961 are not required to be legalized by

the Indian Embassy, if they carry a conforming Apostille certificate.

SECTION-VII
GENERAL CONDITIONS OF CONTRACT (GCC)

Notes on General Conditions

The Conditions of Contract comprise two parts:

- (a) **Standard General Conditions** – GCC (Section VI of the Bidding Documents); and
- (b) **Particular Conditions of Contract** – PCC (Section VII of the Bidding Documents).

The provisions in the General Conditions will be **FIDIC Conditions of Contract for Construction (For Building and Engineering Works Designed by the Employer), Second Edition 2017.**

This Section contains the general clauses to be applied in all contracts. **The text of the clauses in this Section shall not be modified.**

SECTION VIII
PARTICULAR CONDITIONS OF CONTRACT (PCC)

Notes on Particular Conditions

The Particular Conditions of Contract (PCC) complement the General Conditions of Contract (GCC) to specify data and contractual requirements linked to the special circumstances of the country, the Employer, the Engineer, the sector, the overall project and the Works. Whenever there is a conflict, the provisions herein shall prevail over those in the GC.

Part A, Contract Data of the PCC, includes data to complement the GCC in a manner similar to the way in which the Bid Data Sheet complements the Instructions to Bidders.

Part B, the Specific Provisions of the PCC should specify country- or project-specific provisions for PCC in each case.

Clause numbers in the PCC correspond to those in the GCC

Particular Conditions of Contract (PCC)

The following Particular Conditions shall supplement the GCC. Whenever there is a conflict, the provisions herein shall prevail over those in the GCC.

Part A - Contract Data

[The Employer should insert relevant data prior to the issue of the Bidding Documents. Where a number of days is to be inserted it is desirable for the number to be a multiple of seven for consistency with the Conditions of Contract.]

Conditions	Sub-Clause	Data
Defects Notification Period (DNP)	1.1.27	180 days
Employer's name and address	1.1.31	<i>National High-Speed Rail Corporation Limited 2nd Floor, Asia Bhawan, Road No.205, Sector-9, Dwarka, New Delhi-110077, India Tel: +91-11-28070000 Fax: +91-11-28070250. E-mail: To be decided Attention to: To be decided</i>
Engineer's name and address	1.1.35	<i>Employer will act as the Engineer</i>
Time for Completion	1.1.84	<i>470 days for the Works For Milestones refer to the table Summary of Milestones below</i>
Notices and Other Communications	1.3(a)(ii)	Not Applicable
Notices and Other Communications	1.3(d)	<i>address of Employer for communications: National High-Speed Rail Corporation Limited 2nd Floor, Asia Bhawan, Road No.205, Sector-9, Dwarka, New Delhi-110077, India Tel: +91-11-28070000 Fax: +91-11-28070250. E-mail: To be decided Attention to: To be decided</i>
Law and Language	1.4	Contract shall be governed by the law of Republic of India
Law and Language	1.4	Ruling language: English
Law and Language	1.4	Language for communications: English
Employer's Financial Arrangements	2.4	<i>The required funds have been sourced by NHSRCL</i>
Performance Security	4.2	Performance Security (as percentages of the Accepted Contract Amount in Currencies):

Conditions	Sub-Clause	Data
		Percent: 5% Currency: INR <i>[Percent: Five Percent% Currency: Indian Rupees</i>
Working Hours	6.5	From 8:00 AM to 5:00 PM
Commencement of Works	8.1	Within 7 days after the contractor receives the Letter of Acceptance (LOA)
Delay Damages	8.8	Refer to the table Summary of Milestones below
Delay Damages	8.8	Maximum amount of Delay Damages is 5% of Contract Accepted value.
Valuation of the Works	12.3	10%.
Provisional Sums	13.4(b)(ii)	15%
Advance Payment	14.2	5% (ten percent) of the Accepted Contract Amount (excluding the Provisional Sum) payable in the currencies and proportions in which the Accepted Contract Amount is payable.
Advance Payment	14.2	Indian Rupees (INR)
Repayment of Advance Payment	14.2.3	20% of the amount of each Interim payment certificate
Application for Interim Payment	14.3(iii)	Percentage of retention 10%
Application for Interim Payment	14.3(iii)	Limit of Retention Money (as a percentage of Accepted Contract Amount) 5%
Plant and Materials intended for the Works	14.5(b)(i)	Plant and Materials for payment when shipped: Nil
Plant and Materials intended for the Works	14.5(b)(i)	Plant and Materials for payment when delivered to the Site: Nil
Delayed Payment	14.8	These financing charges shall be calculated for: 1. Indian currency: the applicable rate shall be SBI's MCLR (one month), Marginal Cost of Funds based Lending Rate.
Currencies of Payment	14.15	Currencies for payment of Contract Price: Indian Rupees
Constitution of the DAAB	21.1	Not Applicable. All disputes will be dealt directly through Arbitration as per Cl. 21.6 of PCC

Table: Summary of Milestones

S No	Milestone Name/Description (Sub-Clause 1.1.89)	Time for Completion from Commencement Date	Delay Damages (amount per day of delay)
1.	Corridor-1 Delhi-Varanasi	170	Upto 0.05% of accepted contract value of each corridor for each day of delay
2.	Corridor-2	230	
3.	Corridor-3	290	
4.	Corridor-4	350	
5.	Corridor-5	410	
6.	Corridor-6	470	

Work on Delhi- Varanasi corridor will be commenced immediately. Work on other corridors will commence in sequence of one another. Sequences of those corridors will be jointly decided after award of contract.

Part B - Specific Provisions

<p>Sub-Clause 1.1.89 “Milestone”</p>	<p>Add two new Sub-Clause 1.1.89 & 1.1.90 after Sub-Clause 1.1.88 as follows:</p> <p>1.1.89 “Milestone” means a part of the Plant and/or a part of the Works stated in the Contract Data, and described in detail in the Employer’s Requirements as a Milestone, which is to be completed by the Time for Completion stated in Sub-Clause 4.24 [Milestone] but is not to be taken over by the Employer after completion.</p> <p>1.1.90 “Milestone Certificate” means the certificate issued by the Engineer under Sub-Clause 4.24 [Milestone].</p>
<p>Sub-Clause 1.5 Priority of Documents</p>	<p>Replace the first paragraph with the following:</p> <p>The documents forming the Contract are to be taken as mutually explanatory of one another. If there is any conflict, ambiguity or discrepancy, the priority of the documents shall be in accordance with the following sequence:</p> <ul style="list-style-type: none"> (a) Agreement <ul style="list-style-type: none"> i. Contract Agreement ii. Power of Attorney iii. Performance Guarantee (b) Letter of Acceptance (c) The Record of Meeting on Contract Negotiation (d) Addendum(s)/ Corrigendum(s), if any. (e) Letter of Financial Bid and Bill of Quantities (f) Letter of Technical Bid (g) Particular Conditions of Contract (PCC) – Part A (h) Particular Conditions of Contract (PCC) – Part B (i) General Conditions of Contract (GCC) (j) Terms of Reference (TOR) (k) Contactor’s Technical Proposal (l) Any Other Relevant Standards/Codes/Documents
<p>Sub-Clause 4.2 Performance Security</p>	<p>Replace First paragraph of Sub-Clause 4.2.1 with the following:</p> <p>The Contractor shall deliver the Performance Securities to the Employer within 28 days after receiving the Letter of Acceptance, and shall send a copy to the Engineer. The Performance Security shall be issued by a Scheduled Commercial Bank or State Bank of India and shall be in the form annexed to the Particular Conditions or in another form approved by the Employer.</p>

	<p>Add new paragraph after last paragraph of Sub-Clause 4.2 with the following:</p> <p>“In the event the Contractor fails to provide the Performance Security within 28 days from the date of issue of the LOA, it may seek an extension of time for providing the performance security for a period not exceeding a further 15 days, duly extending the validity of bid security accordingly, on payment of damages for such extended period in a sum calculated at the rate of 0.005% of the Accepted Contract Amount less Provisional Sums for each day until the Performance Security is provided.”</p>
<p>Sub-Clause 4.24 Milestone</p>	<p>Add new Sub-Clause 4.24 after Sub-Clause 4.23 as follows;</p> <p>Sub-Clause 4.24 Milestone</p> <p>If no Milestones are specified in the Contract Data, this sub-clause shall not apply.</p> <p>The Contractor shall complete the works of each Milestone (including all work which is stated in the Terms of References (TOR) as being required for the Milestone to be considered complete) within the time for completion of the Milestone as stated in the Contract Data, calculated from the Commencement Date.</p> <p>The Contractor shall include, in the detailed time programme and each revised programme, under Sub-Clause 8.3 [Programme], the time for completion for each Milestone.</p> <p>The Contractor shall apply, by notice to the Engineer, for a Milestone Certificate not earlier than 14 days before the works of a Milestone will, in the Contractor’s opinion, be complete. The Engineer shall within 28 after receiving the Contractor’s notice:</p> <p>(a) issue the Milestone Certificate to the Contractor, stating the date on which the works of the Milestone were completed in accordance with the Contract, except for any minor outstanding work and defects (as shall be listed in the Milestone Certificate); or</p> <p>(b) reject the application, giving reasons and specifying the work required to be done and defects required to be remedied by the Contractor to enable the Milestone Certificate to be issued.</p> <p>The Contractor shall then complete the work referred to in Sub-paragraph (b) of this sub-clause before issuing a further notice of application under this sub-clause.</p> <p>If the Engineer fails either to issue the Milestone Certificate or to reject the Contractor’s application within the above period of 28 days, and if the works of a Milestone are complete in accordance with the Contract, the Milestone Certificate shall be deemed to have been issued on the date which is 14 days after the date stated in the Contractor’s notice of application.</p>
<p>Sub Clause 5.1 Subcontractors</p>	<p>1st Paragraph of Clause 5.1 is deleted.</p>
<p>Sub Clause 12.3 Valuation of Works</p>	<p>Replace Para (b) with the following:</p> <p>(b) The measured quantity of the item is changed by more than 25% from the quantity of this item in the Bill of Quantities or other Schedule.</p>

<p>Sub Clause 13.3 Variation Procedure</p>	<p>Add new Sub-Clauses 13.3.3 after Sub-Clause 13.3.2 as follows: The aspect of vitiation of tender with respect to variation in quantities should be checked and avoided. In case of vitiation of the tender (both for increase as well as decrease of value of contract agreement, the vitiation shall be on the contractor's account (payment shall be restricted to the lowest calculated value of all valid offers).</p>
<p>Sub-Clause 13.4 Provisional Sums</p>	<p><i>This Sub-Clause shall not apply</i></p>
<p>Sub Clause 13.7 Adjustments for Changes in Cost</p>	<p><i>This Sub-Clause shall not apply</i></p>
<p>Sub-Clause 14.1 The Contract Price</p>	<p>Add the following paragraph after the existing Sub-Clause 14.1 as a part of this Sub-Clause: Notwithstanding the provisions of subparagraph (b), Contractor's Equipment, including essential spare parts therefor, imported by the Contractor for the sole purpose of executing the Contract shall be governed by the prevailing laws in this regard.</p>
<p>Sub-Clause 14.2 Advance Payment</p>	<p>Replace the entire second paragraph of Sub-Clause 14.2 with the following four paragraphs. Before any installment of advance is released, the Contractor is required to furnish Advance Bank Guarantee equivalent to 110% of the installment amount from any Scheduled Bank. The duration of the Bank Guarantee will be for a period of one year. After every 11 months during its validity, the same will be further renewed for another full year till the advance mobilization has been fully recovered. On receipt of requisite amount of Bank Guarantee in the format as specified in Tender document, the Employer shall make an advance payment, for mobilisation. The amount of the advance payment and the currencies in which it is to be paid shall be as stated in the Contract Data. Advance Payment will be interest bearing. Such interest rate will be SBI's MCLR (Marginal Cost of Fund based on Lending Rate for 3 months) plus 1% as on bid opening date. The guarantee in accordance to the form attached to the Contract can be split up in three (3) equivalent guarantees of one-year validity each to be released on repayment. The guarantee shall be valid until Time for Completion of the Contract and/or should be remain effective until the Advance Payment has been repaid pursuant to the provision of this Sub-Clause 14.2.</p>
<p>Sub-Clause 14.3 Application for Interim Payment</p>	<p>Add new Sub-Clauses 14.3(xi) after Sub-Clause 14.3(x) as follows: (xi) 90% amount of the statement amount as agreed by the Engineer for provisional payment in accordance with Sub-Clause 14.7(d)</p>

<p>Sub-Clause 14.7 Payment</p>	<p>Replace the sub-paragraph (b) (i) of Sub-Clause 14.7 with the following:</p> <p>(b) (i) the amount certified in each Interim Payment Certificate within 56 days after the Engineer receives the Statement and supporting documents; or, at a time when the Bank's loan or credit (from which part of the payments to the Contractor is being made) is suspended, the amount shown on any statement submitted by the Contractor within 14 days after such statement is submitted, any discrepancy being rectified in the next payment to the Contractor including any amounts due in accordance with a decision by the DAAB which have been included in the Interim Payment Certificate;</p> <p>After the sub-paragraphs (c), add (d) with the following:</p> <p>(d) Provisional amount against the Statement specified in Sub-Clause 14.3: The Employer shall pay 90% of Provisional Interim Payment Certificate as provisional payment within 7 days from the receipt of such evaluated statement from the Engineer. The balance of the amount shall be paid by the Employer as per Sub-Clause 14.7 (b).</p> <p>If the Contractor chooses payment through the Commitment Procedure, then the provisional payment Clause shall not apply and then the payment shall be made within 56 days after the Engineer receives the statement and supporting documents.</p> <p>It shall be the responsibility of the Contractor to claim an amount for the performed services as admissible as per the Contract. If at any time it is observed by the Engineer that the amount claimed in the Statement are higher than the actual admissible performance, the facility of provisional payment will be withheld until such time the excess payment paid is adjusted in the subsequent Interim Payment Certificate. In such a case, warning letter will be issued to the Contractor.</p>
<p>Sub-Clause 14.9 Release of Retention Money</p>	<p>Replace the entire first paragraph of Sub-Clause 14.9 (a) & (b) with the following two paragraphs.</p> <p>When the Taking-Over Certificate has been issued for the Works, the first half of the Retention Money shall be certified by the Engineer for payment to the Contractor. If a Taking-Over Certificate is issued for a Section or part of the Works, a proportion of the Retention Money shall be certified and paid when the Section passes all the tests.</p> <p>The Contractor may substitute the Retention Money deducted from Interim Payment Certificates with an unconditional bank guarantee issued by any bank nationalized or scheduled by the Government of India <i>[or specify other banks as appropriate]</i> having corresponding arrangements with the Indian bank of equivalent amount for the respective currency portions, provided that the refund shall be made in tranches of 1% of the Contract Price. The bank guarantees shall be valid and enforceable until the Contractor has executed and completed the Works and remedied any defects, as specified for the Performance Security in Sub-Clause 4.2. Alternatively, the Contractor may submit such bank guarantee for full Retention Money in advance to avoid deduction of Retention Money from Interim Payment Certificate.</p> <p>Insert the following paragraphs after the second paragraph of Sub-Clause 14.9:</p>

	<p>When the Taking-Over Certificate has been issued and the first half of total of the Retention Money has been certified for payment by the Engineer, the Contractor shall be entitled to substitute a guarantee, in the form annexed to the Particular Conditions or in another form approved by the Employer and issued by any bank nationalized or scheduled by the Government of India or <i>[or specify other banks as appropriate which has corresponding arrangements with the Indian bank]</i> for the second half of the Retention Money. The Contractor shall ensure that the guarantee is in the amounts and currencies of the second half of the Retention Money and is valid and enforceable until the Contractor has executed and completed the Works and remedied any defects, as specified for the Performance Security in Sub-Clause 4.2. On receipt by the Employer of the required guarantee, the Engineer shall certify, and the Employer shall pay the second half of the Retention Money. The release of the second half of the Retention Money against a guarantee shall then be in lieu of the release under the second paragraph of this sub-clause. The Employer shall return the guarantee to the Contractor within 21 days after receiving a copy of the Performance Certificate.</p> <p>If the Performance Security required under Sub-Clause 4.2 is in the form of a demand guarantees, and the amount guaranteed under it when the Taking-Over Certificate is issued is more than half of the Retention Money, then the Retention Money guarantee will not be required. If the amount guaranteed under the Performance Security when the Taking-Over Certificate is issued is less than half of the Retention Money, the Retention Money guarantee will only be required for the difference between half of the Retention Money and the amount guaranteed under the Performance Security.</p>
<p>Sub-Clause 14.16 Payment to Joint Venture/ Consortium</p>	<p>Add new Sub-Clause 14.16 after Sub-Clause 14.15 as follows: Sub-Clause 14.16 Payment to Joint Venture/Consortium</p> <p>The payment shall be made to the joint venture/consortium. However, only in case of consortium, the direct payment to individual members of consortium can be made; on joint certification by the Representative of the consortium and authorized representative of individual members of the consortium, after making requisite recoveries/deductions from the gross payment. In this case, a notarized agreement jointly signed by authorised representatives of all the members of the consortium to this effect need to be submitted to the Employer on Commencement of the Works.</p>
<p>Sub-Clause 15.2 Termination for Contractor's Default</p>	<p>Replace the entire Sub-Clause 15.2.1(h) with the following:</p> <p>If the Employer determines, based on reasonable evidence, that the Contractor has engaged in corrupt, fraudulent, collusive or coercive practices, in competing for or in executing the Contract, then the Employer may, after giving 14 days' notice to the Contractor, terminate the Contract and expel him from the Site, and the provisions of Clause 15 shall apply as if such termination had been made under Clause 15 [<i>Termination by Employer</i>].</p> <p>Should any employee of the Contractor be determined, based on reasonable evidence, to have engaged in corrupt, fraudulent or coercive practice during the execution of the Works, then that employee shall be removed in accordance with Sub-Clause 6.9 [Contractor's Personnel].</p>



<p>Sub-Clause 19 Insurance</p>	<p>Replace the entire Sub-Clause 19 with the following: All the insurances shall be taken as per the law of Republic of India.</p>
<p>Sub-Clause 21.1 Constitution of the DAAB</p>	<p>Clause 21.1 to 21.5 will not be applicable and all references to DAAB will be null and void in GCC and all disputes will be dealt directly through Arbitration as per sub clause 21.6 below.</p>
<p>Sub-Clause 21.6 Arbitration</p>	<p>Replace the entire Sub-Clause 21.6 with the following:</p> <p>Any dispute between the Parties arising out of or in connection with the Contract not settled amicably in accordance with Sub-Clause 21.5 above and in respect of which the DAAB's decision (if any) has not become final and binding shall be finally settled by arbitration. Arbitration shall be conducted as follows:</p> <p>(a) if the Contract is with foreign contractors (or if the lead partner is a foreign contractor, in case of JV), international arbitration with proceedings administered by the International Chamber of Commerce (ICC) and conducted under the ICC Rules of Arbitration; by one or more arbitrators appointed in accordance with said arbitration rules.</p> <p>(b) if the Contract is with domestic contractors, arbitration with proceedings conducted in accordance with the laws of the Employer's country.</p> <p>The place of arbitration shall be a neutral location determined in accordance with the applicable rules of arbitration unless otherwise stated in the Contract Data; and the arbitration shall be conducted in the language for communications defined in Sub-Clause 1.4 [Law and Language].</p> <p>The arbitrators shall have full power to open up, review and revise any certificate, determination, instruction, opinion or valuation of the Engineer, and any decision of the DAAB, relevant to the dispute. Nothing shall disqualify representatives of the Parties and the Engineer from being called as a witness and giving evidence before the arbitrators on any matter whatsoever relevant to the dispute.</p> <p>Neither Party shall be limited in the proceedings before the arbitrators to the evidence or arguments previously put before the DAAB to obtain its decision, or to the reasons for dissatisfaction given in its Notice of Dissatisfaction. Any decision of the DAAB shall be admissible in evidence in the arbitration.</p> <p>Arbitration may be commenced prior to or after completion of the Works. The obligations of the Parties, the Engineer and the DAAB shall not be altered by reason of any arbitration being conducted during the progress of the Works.</p>

SECTION- IX
CONTRACT FORMS

Format for Contract Agreement

THIS AGREEMENT made the *[insert day]* day of *[insert month]*, *[insert year]*, between *[insert name of the Employer]* (hereinafter "the Employer"), of the one part, and *[insert name of the Contractor]* (hereinafter "the Contractor"), of the other part:

WHEREAS the Employer desires that the Works known as *[name of the Contract]* should be executed by the Contractor, and has accepted a Bid by the Contractor for the execution and completion of these Works and the remedying of any defects therein,

The Employer and the Contractor agree as follows:

1. In this Agreement words and expressions shall have the same meanings as are respectively assigned to them in the Contract documents referred to.
2. The following documents shall be deemed to form and be read and construed as part of this Agreement. This Agreement shall prevail over all other Contract documents.

I. Single Stage Two Packet Bid

- (a) Agreement
 - i. Contract Agreement
 - ii. Power of Attorney
 - iii. Performance Guarantee
- (b) Letter of Acceptance
- (c) The Record of Meeting on Contract Negotiation
- (d) Addendum(s)/ Corrigendum(s)/, if any.
- (e) Letter of Price Bid and Bill of Quantities
- (f) Letter of Technical Bid
- (g) Particular Conditions of Contract (PCC)-Part A
- (h) Particular Conditions of Contract (PCC)-Part B
- (i) General Conditions of Contract (GCC)
- (j) Terms of Reference (TOR)
- (k) Contactor's Technical Proposal
- (l) Any Other Relevant Standards/Codes/Documents

For the purpose of interpretation, the priority of the listed documents shall be in accordance with the above listed order.

3. In consideration of the payments to be made by the Employer to the Contractor as specified in this Agreement, the Contractor hereby covenants with the Employer to execute the Works and to remedy defects therein in conformity in all respects with the provisions of the Contract.
4. The Employer hereby covenants to pay the Contractor in consideration of the execution and completion of the Works and the remedying of defects therein, the Contract Price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.

IN WITNESS whereof the parties hereto have caused this Agreement to be executed in accordance with the laws of *[insert the laws of the borrowing country]* on the day, month and year specified above.

Signed by _____

Signed by _____

for and on behalf of the Employer
in the presence of

for and on behalf the Contractor
in the presence of

Witness, Name, Signature, Address, Date

CON 2

LETTER OF ACCEPTANCE

[Insert letterhead paper of the Employer]

[Insert date]

To: *[Insert name and address of the Contractor]*

This is to notify you that your Bid dated *[insert date]* for execution of the *[insert name of the Contract and identification number, as given in the Contract Data]* for the Accepted Contract Amount of the equivalent of *[insert amount in words and figures] [insert name of currency]*, as corrected and modified in accordance with the Instructions to Bidders, is hereby accepted by the Employer.

You are requested to furnish the Performance Security within 28 days in accordance with the Conditions of Contract, using for that purpose one of the Performance Security Forms included in Section- VIII Annex to the Particular Conditions – Contract Forms of the Bidding Documents.

Authorized Signature:

Name and Title of Signatory: _____

Name of Employer: _____

Seal of Company



Performance Security (Demand Guarantee)

[This form is to be used if the BG is to be submitted by individual member of a joint venture/consortium]

[Insert Guarantor letterhead or SWIFT identifier code]

Beneficiary: *[Insert name and Address of the Employer]*

Date: *[Insert date of issue]*

PERFORMANCE GUARANTEE No.: *[Insert guarantee reference number]*

Guarantor: *[Insert name and address of place of issue, unless indicated in the letterhead]*

We have been informed that *[insert name of the joint venture/consortium,]* has entered into Contract No. *[insert reference number of the contract]* dated *[insert date]* with the Beneficiary, for the execution of *[insert name of the contract and brief description of the Works]* (hereinafter called "the Contract").

Where *[insert name of the member of joint venture/consortium]* (hereinafter called "the Applicant") are a member of the joint venture/consortium for the above referred Contract and are jointly and severally liable for the fulfilment of any obligation required as per the Contract.

Furthermore, we understand that, according to the conditions of the Contract, a performance guarantee is required.

At the request of the Applicant, we as Guarantor, hereby irrevocably undertake to pay the Beneficiary any sum or sums not exceeding in total an amount of *[insert amount in figures]* (*[insert amount in words]*),¹ such sum being payable in the types and proportions of currencies in which the Contract Price is payable, upon receipt by us of the Beneficiary's complying demand supported by the Beneficiary's statement, whether in the demand itself or in a separate signed document accompanying or identifying the demand, stating that the Applicant is in breach of its obligation(s) under the Contract, without the Beneficiary needing to prove or to show grounds for its demand or the sum specified therein.

This guarantee shall expire, no later than the *[insert the day]* day of *[insert month]*, *[insert year]*², and any demand for payment under it must be received by us at this office indicated above on or before that date.

The Guarantor agrees to a one-time extension of this guarantee for a period not to exceed one year, in response to the Beneficiary's written request for such extension, such request to be presented to the Guarantor before the expiry of the guarantee.

This guarantee is subject to the Uniform Rules for Demand Guarantees (URDG) 2010 Revision, ICC Publication No. 758, except that the supporting statement under Article 15(a) is hereby excluded.

Notwithstanding anything contained herein:

- a) Our liability under this Guarantee shall not exceed *[insert amount in figures]* (*[insert amount in words]*),
- b) This Guarantee shall be valid up to *[insert the day]* day of *[insert month]*, *[insert year]*,
- c) We are liable to pay the guaranteed amount or any part thereof under the Guarantee only and only if you serve upon us a written claim or demand on or before _____ (date which is 3 months after date mentioned at (b) above).

Date -----

Place -----

[Signature of Authorised person of Bank]

[Name in Block letters] -----

[Designation] -----

[P/Attorney] No. -----

[Note: All italicized text (including footnotes) is for use in preparing this form and shall be deleted from the final product.]

1 The Guarantor shall insert an amount representing the percentage of the Accepted Contract Amount specified in the Letter of Acceptance, less provisional sums, if any and denominated either in the currency(cies) of the Contract or a freely convertible currency acceptable to the Beneficiary.

2 Insert the date twenty-eight days after the expected completion date as described in GC Clause 11.9.

Advance Payment Security (Demand Guarantee)

[Insert Guarantor letterhead or SWIFT identifier code]

Beneficiary: *[Insert name and address of the Employer]*

Date: *[Insert date of issue]*

Advance Payment Guarantee No.: *[Insert guarantee reference number]*

Guarantor: *[Insert name and address of place of issue, unless indicated in the letterhead]*

We have been informed that *[insert name of Contractor, which in the case of a joint venture/consortium shall be the name of the joint venture/consortium]* (hereinafter called "the Applicant") has entered into Contract No. *[insert reference number of the contract]* dated *[insert date of the contract]* with the Beneficiary, for the execution of *[insert name of contract and brief description of Works]* (hereinafter called "the Contract").

Furthermore, we understand that, according to the conditions of the Contract, an advance payment in the sum *[insert amount in figures]* (*[insert amount in words]*) is to be made against an advance payment guarantee.

At the request of the Applicant, we as Guarantor, hereby irrevocably undertake to pay the Beneficiary any sum or sums not exceeding in total an amount of *[insert amount in figures]* (*[insert amount in words]*), upon receipt by us of the Beneficiary's complying demand supported by the Beneficiary's statement, whether in the demand itself or in a separate signed document accompanying or identifying the demand, stating either that the Applicant:

(a) has used the advance payment for purposes other than the costs of mobilization in respect of the Works; or

(b) has failed to repay the advance payment in accordance with the Contract conditions, specifying the amount which the Applicant has failed to repay.

A demand under this guarantee may be presented as from the presentation to the Guarantor of a certificate from the Beneficiary's bank stating that the advance payment referred to above has been credited to the Applicant on its account number *[insert number]* at *[insert name and address of Applicant's bank]*.

The maximum amount of this guarantee shall be progressively reduced by the amount of the advance payment repaid by the Applicant as specified in copies of interim statements or payment certificates which shall be presented to us. This guarantee shall expire, at the latest, upon our receipt of a copy of the interim payment certificate indicating that ninety (90) percent of the Accepted Contract Amount, less provisional sums, has been certified for payment, or on the *[insert day]* day of *[insert month]*, *[insert year]*,² whichever is earlier. Consequently, any demand for payment under this guarantee must be received by us at this office on or before that date.

The Guarantor agrees to a one-time extension of this guarantee for a period not to exceed one year, in response to the Beneficiary's written request for such extension, such request to be presented to the Guarantor before the expiry of the guarantee.

This guarantee is subject to the Uniform Rules for Demand Guarantees (URDG) 2010 Revision, ICC Publication No. 758, except that the supporting statement under Article 15(a) is hereby excluded.

Notwithstanding anything contained herein:

- a) Our liability under this Guarantee shall not exceed *[insert amount in figures]* (*[insert amount in words]*),
- b) This Guarantee shall be valid up to *[insert the day]* day of *[insert month]*, *[insert year]*,
- c) We are liable to pay the guaranteed amount or any part thereof under the Guarantee only and only if you serve upon us a written claim or demand on or before _____ (date which is 3 months after date mentioned at (b) above).

Date -----

Place -----

[Signature of Authorised person of Bank]

[Name in Block letters] -----

[Designation] -----

[P/Attorney] No. -----

[Note: All italicized text (including footnotes) is for use in preparing this form and shall be deleted from the final product.]

¹ The Guarantor shall insert an amount representing the amount of the advance payment and denominated either in the currency(ies) of the advance payment as specified in the Contract, or in a freely convertible currency acceptable to the Employer.

² Insert the expected expiration date of the Time for Completion.

Retention Money Security (Demand Guarantee)

[Insert Guarantor letterhead or SWIFT identifier code]

Beneficiary: *[Insert name and Address of Employer]*

Date: *[Insert date of issue]*

Retention Money Guarantee No.: *[Insert guarantee reference number]*

Guarantor: *[Insert name and address of place of issue, unless indicated in the letterhead]*

We have been informed that *[insert name of Contractor, which in the case of a joint venture/consortium shall be the name of the joint venture/consortium]* (hereinafter called "the Applicant") has entered into Contract No. *[insert reference number of the contract]* dated *[insert date]* with the Beneficiary, for the execution of *[insert name of contract and brief description of Works]* (hereinafter called "the Contract").

Furthermore, we understand that, according to the conditions of the Contract, the Beneficiary retains moneys up to the limit set forth in the Contract ("the Retention Money"), and that when the Taking-Over Certificate- has been issued under the Contract and the first half of total of the Retention Money has been certified for payment, payment of *[insert the second half of the Retention Money or if the amount guaranteed under the Performance Guarantee when the Taking-Over Certificate is issued is less than half of the Retention Money]*, the difference between half of the Retention Money and the amount guaranteed under the Performance Security] is to be made against a Retention Money guarantee.

At the request of the Applicant, we, as Guarantor, hereby irrevocably undertake to pay the Beneficiary any sum or sums not exceeding in total an amount of *[insert amount in figures]* (*[insert amount in words]*), upon receipt by us of the Beneficiary's complying demand supported by the Beneficiary's statement, whether in the demand itself or in a separate signed document accompanying or identifying the demand, stating that the Applicant is in breach of its obligation(s) under the Contract, without the Beneficiary needing to prove or show grounds for its demand or the sum specified therein.

A demand under this guarantee may be presented as from the presentation to the Guarantor of a certificate from the Beneficiary's bank stating that the second half of the Retention Money as referred to above has been credited to the Applicant on its account number *[insert account's number]* at *[insert name and address of Applicant's bank]*.

The Guarantor agrees to a one-time extension of this guarantee for a period not to exceed one year, in response to the Beneficiary's written request for such extension, such request to be presented to the Guarantor before the expiry of the guarantee.

This guarantee is subject to the Uniform Rules for Demand Guarantees (URDG) 2010 Revision, ICC Publication No. 758, except that the supporting statement under Article 15(a) is hereby excluded.

Notwithstanding anything contained herein:

(a) Our liability under this Guarantee shall not exceed *[insert amount in figures]* (*[insert amount in words]*),

(b) This Guarantee shall be valid up to *[insert the day]* day of *[insert month]*, *[insert year]*,

(c) We are liable to pay the guaranteed amount or any part thereof under the Guarantee only and only if you serve upon us a written claim or demand on or before _____ (date which is 3 months after date mentioned at (b) above).

Date -----

Place -----

[Signature of Authorised person of Bank]

[Name in Block letters] -----

[Designation] -----

[P/Attorney] No. -----

[Note: All italicized text (including footnotes) is for use in preparing this form and shall be deleted from the final product.]

1 The Guarantor shall insert an amount representing the amount of the second half of the Retention Money or if the amount guaranteed under the Performance Guarantee when the Taking-Over Certificate is issued is less than half of the Retention Money, the difference between half of the Retention Money and the amount guaranteed under the Performance Security and denominated either in the currency(ies) of the second half of the Retention Money as specified in the Contract, or in a freely convertible currency acceptable to the Beneficiary.

SECTION- X
BILL OF QUANTITIES (BOQ)

SCHEDULE (BILL OF QUANTITIES)

NAME OF WORK: “Final Alignment design including Aerial LiDAR survey and other related works for six high speed rail corridors”.

POINTS TO BE NOTED WHILE QUOTING RATES

THIS IS AN ITEM RATE CONTRACT TENDER.

- The rates for the various items are to be quoted in the Financial Bid (Bill of Quantities) contained in the tender document. The rates to be quoted shall be for the complete scope of work as described in the tender document. Any item of work included in the scope of work may not be exclusively described in Bill of Quantities. The rates to be quoted in the Bill of Quantities shall also take care of all such items of work. No additional amount except for the accepted rates in the Bill of Quantities shall be payable for completing the total scope of work. General directions and descriptions of items are not necessarily repeated nor summarized in the Bill of Quantities. The quoted rates shall be inclusive of all the cost in fulfilling the scope of work, all incidental charges, cost of mobilization/demobilization of personal, equipment etc., cost of lodging/boarding /transportation, cost of attending meetings with NHSRCL and other stakeholders at various places as per requirement, insurance for the contractors personal, taxes, duties except GST. GST shall be paid as per the prevailing tariff. The quantities shown in the attached Bill of Quantities are given as a guide and are approximate only and are subject to variation according to the needs of NHSRCL. NHSRCL does not guarantee work under each item of the Schedule.

Tenderers are required to quote rates for all the items separately as specified in BOQ.

Note: The total scope of BOQ items comprises not only of BOQ item description but also covers relevant clauses of Terms of reference and technical specification given in the tender.

2. Corridor wise BOQ calculation:

S.N.	Corridor	Length KM	Factor for calculating BOQ quantity for the corridor (s)*
1	Delhi-Varanasi	865 km	0.211
2	Delhi-Ahmedabad	886 km	0.215
3	Delhi-Amritsar	459 km	0.112
4	Mumbai-Nashik-Nagpur	753 km	0.183
5	Mumbai-Pune-Hyderabad	711 km	0.173
6	Chennai-Bangalore-Mysore	435 km	0.106
	TOTAL	4109 km	1.000

*The above factors are provided for the purpose of calculating corridor wise BOQ quantities and item value. Quantities shown in BOQ is aggregated quantity for all six HSR corridors. Stage payments for respective corridors will be paid on the values arrived on the basis of above factors.

SCHEDULE (BILL) OF QUANTITIES (RATES TO BE FILLED IN BY BIDDER)

NAME OF WORK: Final Alignment design including Aerial LiDAR survey and other related works for six high speed rail corridors

S. No	Item Description	Unit	Total qty (a)	Rate (to be filled in by Bidder) (b)	Amount Rs. (a) x (b)
	Development of suitable HSR alignment from amongst the rail routes/ corridors.				
1.	Processing of raw satellite mono imagery, DTM/ DSM on ellipsoidal height, ortho ready imagery and create DTM/ DSM to mean sea level using Survey of India (Sol) benchmark by undertaking required ground control survey with prior approval of NHSRCL and preparing seamlessly mosaiced orthophotos from the supplied satellite imagery ortho-rectification by using the corrected DTM referenced to Mean Sea Level using Sol Benchmarks.	Sqkm	22,730.00		
2 a.	Feature extraction from Satellite Imagery to generate Topographic Map (1:5000) with layers such as Forest, Flood plains, Roads and railways, Rivers, Nallahs, Power lines, Habitats etc. along with identifying important features in corridor such as ROB's, existing structures and other features as required for alignment development. Width = 300 m (150 m around centerline of alternatives being studied)	per km	7,576.71		
b.	Carrying out reconnaissance survey of obligatory points and verification of ground features including tunnel portals, station location, river crossings, etc. with Sol topo sheets of scale 1: 50,000 and topo plan prepared with satellite imagery. The work Included service of engineers, alignment design engineers, scientists, surveyors, draftsmen, CAD operators, labours, helpers and others (computer, printers & tracing etc.). Rate is inclusive of all labour, material, tools and taxes (excluding GST). Nothing extra shall be paid for completion. of this job as per condition of contract	per km	7,576.71		
3	Development and evaluation of horizontal and vertical alignment up to three alternatives so as to finalize the most suitable alignment in consultation with the client by evaluation of various technical and economical considerations for each alternative clearly bringing out the advantages and disadvantages of each option. The Contractor should ensure the following during option evaluation:	per km	7576.71		

S. No	Item Description	Unit	Total qty (a)	Rate (to be filled in by Bidder) (b)	Amount Rs. (a) x (b)
	<p>a. Incorporate all findings of Satellite Imagery, DEM, topographic data and reconnaissance survey</p> <p>b. Consider environmental issues; including hydrology and geological constraints.</p> <p>c. Consider community and stakeholder issues; including social issues, threatened & endangered species, historic resources, wetlands & streams, and archaeological resources;</p> <p>d. Consider social, landowner and urban development constraints to minimize relocation impact on communities</p> <p>e. Consider flood plain and stream crossings;</p> <p>f. Consider disaster hazards such as flooding, earthquakes etc.;</p> <p>g. Determine the most cost-effective options that meet the defined constraints and demonstrates project viability;</p> <p>h. Meet geometric constraints in accordance with the design standards for High Speed Rail in the different topographic areas;</p> <p>i. Demonstrate comprehensive consideration of alternatives that provide the community with confidence that all available options have been investigated;</p> <p>j. Undertake comprehensive sensitivity analysis (Multi criteria analysis) of the alignment and construction cost impact of changes to the constraints and/or design standards;</p> <p>k. Prepare plan and profile including marking of tentative (existing or future) IR RoW / NHAI/Expressway / DFC Row boundary on the Plan based on the data provided by the Client. (Deliverables as per TOR)</p> <p>l. Preliminary land acquisition plan- Digitisation of the Revenue Map (to be given by NHSRCL) after mosaicking and Georeferencing, transfer of alternative alignment approved for LIDAR study on the maps and calculation of area of the land to be acquired along with the details of the plot and its owners and preparation of preliminary land acquisition plan.</p>				

S. No	Item Description	Unit	Total qty (a)	Rate (to be filled in by Bidder) (b)	Amount Rs. (a) x (b)
	A detailed Alignment study report shall be submitted for the above as per TOR. The finalized corridor shall be taken up for further refinement through detailed studies.				
4	<p>Final Location Survey using Aerial LiDAR Technology as per Terms of Reference.</p> <p>The work broadly includes:</p> <ul style="list-style-type: none"> (i) Collection & paper study of existing alignment reports, data, drawing, documents, ground control points etc.; (ii) Getting all clearance such as DGCA etc. for Aerial LiDAR survey along the proposed corridor (iii) Mobilization of Aircraft/Helicopter with required LiDAR and Camera equipment (iv) Ground Control Survey as follows: <ul style="list-style-type: none"> a. Carrying out reconnaissance survey of the project area for identifying the Control Points for carrying out DGPS survey and preparing a plan of a grid network of Control Points on SOI topo-sheets/satellite imagery. b. Survey of India Benchmarks to be located during the above reconnaissance survey. These benchmarks shall be tested for stability and the same shall be reported to the client. The entire horizontal and vertical control shall be linked to the approved GTS Benchmarks for conversion of LiDAR data to MSL. c. Master Control Network comprising of interconnected triangles (with baseline of about 25km) to be established for overall horizontal control with approx. 25 km baseline length throughout the alignment. Secondary Control Network comprising of interconnected triangles weaved with Master control network (with base line of 3-5 KM) to be established with a baseline length of approx. 3-5 km throughout the alignment. Target LiDAR points to be established at an interval of approx. 5 km within the final alignment. To densify Horizontal Control Network, the GNSS triangulation method should be adopted and processing of data for network adjustment should be done to achieve an accuracy of 1: 100,000 in horizontal. 	per km	4821.54		

S. No	Item Description	Unit	Total qty (a)	Rate (to be filled in by Bidder) (b)	Amount Rs. (a) x (b)
	<p>d. Establishment of vertical control referenced to Sol MSL Permanent Benchmarks to be undertaken by double tertiary leveling along the entire route by connecting target points. The threshold limit for levelling loop closure accuracy should be $12\sqrt{K}$ mm, where K is in km.</p> <p>(Note: Control points should preferably be fixed on permanent structures. Monumentation of Master and Secondary Control Points if required shall be paid separately in S No 8)</p>				
	<p>(v) Aerial LiDAR data capture with a point density of 10 points per sqm with a Fundamental Vertical and Horizontal Accuracy as per TOR. vi) Aerial Imagery capture with a resolution of 10 cm GSD</p> <p>(vi) Ground survey using traditional methods such as Echo Sounders etc. along areas such as river crossings etc. where Aerial LiDAR data needs to be complemented, including the following:</p> <ol style="list-style-type: none"> a. 4 KM (2 KM on each side of centerline) along all river crossings with river cross-sections soundings (or alternate acceptable method) taken at centerline and then at every 500 m distance along upstream and downstream of the river and up to 50 m beyond high bank b. The DEM from this data shall be suitably merged or complemented suitably with the LiDAR DEM in consultation with the client. Separate cross sections of river @ 500-meter interval shall be provided. ix) Pre-processing and post processing of data to give the final outputs as below: <ol style="list-style-type: none"> i. Classified Point Cloud in LAS (.las) format (Soft Copy format) ii. Three dimensional Topographic survey drawing of 50 m corridor on either side of the railway centerline on a scale of 1:2500 iii. Contour map at 0.5 m interval for 50 m corridor width iv. Digital Elevation Model (DEM)/ Digital Terrain Model from topographic survey data v. Longitudinal and Cross Sections at 20 m interval 				

S. No	Item Description	Unit	Total qty (a)	Rate (to be filled in by Bidder) (b)	Amount Rs. (a) x (b)
	<p>vi. Digital Orthophotos of 10 cm GSD resolution (in tiles and seamlessly mosaicked over the survey area)</p> <p>vii. 3 sets of all deliverables to be provided in Hard Copy.</p> <p>viii. Soft copy of all deliverables to be provided.</p> <p>Note: The final output should be compatible with AutoCAD Civil 3D Software. Appropriate QA/QC to be undertaken for the data to ensure adherence to accuracy requirements as per TOR. Updatons of preliminary land acquisition plan prepared during preliminary stage, as per modified final alignment</p>				
5	Processing of additional data beyond 50 m on either side of alignment, which will be done from Aerial LiDAR data captured within the 150m corridor on either side of alignment. All outputs for additional area also to be provided.	per km	237.51		
6	<p>a. List out the types of structures along with number and Chainage detail falling within corridor of 5 m wide maintenance road on both sides of 13 m wide viaduct, all along the route where alignment is elevated with in the boundary line of each district.</p> <p>b. Contractor will list out the number of trees with in the following corridor –</p> <p>a. ROW with in 6.5 mtr either side of centerline</p> <p>b. 5 mtr on either side of 13 mtr corridor as per item a) above.</p> <p>c. Within Stations, TSS/DSS/Ramps, depot and other facilities.</p>	per km	4109.00		
7	<p>(i) List of Transmission lines / distribution lines for districts which are parallel and lie within the following corridors room proposed center line of HSR alignment with elevation & span length based on LIDAR data</p> <p>a. ROW with in 6.5 mtr either side of centerline</p> <p>b. 5 mtr on either side of 13 mtr corridor as per item a above.</p> <p>c. Between 11.5 mtr upto 50 mtrs on either side.</p>	per km	4109.00		

S. No	Item Description	Unit	Total qty (a)	Rate (to be filled in by Bidder) (b)	Amount Rs. (a) x (b)
	<p>d. Within Stations, TSS/DSS/Ramps, depot and other facilities.</p> <p>(ii) List of other utilities including buildings/structures for all districts along the corridor which are infringing and lie based on LIDAR data within following corridors:</p> <p>a. ROW with in 6.5 mtr either side of centerline</p> <p>b. 5 mtr on either side of 13 mtr corridor as per item a above.</p> <p>c. Between 11.5 mtr upto 50 mtrs on either side.</p> <p>d. Within Stations, TSS/DSS/Ramps, depot and other facilities</p> <p>(Output will be listed in Excel Format and AutoCAD drawing)</p> <p>Type of Utilities:</p> <p>a. High mast (owner & elevation)</p> <p>b. Microwave tower (owner & elevation)</p> <p>c. Well (owner)</p> <p>d. Others If any. (specific details)</p>				
8	<p>Erection of cast in-situ RCC Pillars (1:2:4) of size 500mmx500mmx 1000mm, 300 mm projected above ground level for Master Control Points, Secondary Control Points etc., with the provision of 700mm long M.S. angle of size 50x50x5 mm with brass nailing on the MS angle for marking the Control Points and embossing the CP pillar number on the MS plate of size 125mm x 125mm x 5mm embedded in concrete by four 8mm dia rods 150mm long as per attached drawing. (Wherever feasible, marking should be done on existing permanent structure. Payment to be made only for actual pillars erected at site.)</p>	Nos	4109.00		
9	<p>Topographic Survey of Overhead utilities, Verification of specified points on High Speed Rail corridor which need to be shifted before construction.</p>				

S. No	Item Description	Unit	Total qty (a)	Rate (to be filled in by Bidder) (b)	Amount Rs. (a) x (b)
a)	Topographic survey of different Utility services of Railway or other Central/State Govt./Private authorities as given below: Open/Tube well, pump house, telephone/electric poles, high tension lines, trees etc. above ground	Per Km	4109.00		
10	Final Alignment Design - Design of approved alignment on Integrated Base Map, DTM, Contours and Orthophotos based on Aerial LiDAR Survey and Hydrological Survey Data will be used in conjunction with the parameters of HSR including Yard plans using Bentley PRT or similar software. Activities as per TOR Para 3.3.7 are also covered in the scope of this item.	Per Km	4109.00		
11	Additional Topographic Survey using DGPS/Total stations if required, at critical important locations for development of vertical/horizontal alignment.	Ha	4109.00		
12	Hydrological Investigation for Bridges: Study of major & minor rivers. Cross sections shall be generated for dry River/Nallah from LiDAR data. Cross section for perennial river shall be developed using traditional methods. Collection of Hydrological data and undertaking hydrological calculations to finalize waterway, High flood level HFL, Low water level of the bridges (LWL), Total waterway.	Nos.	200.00		
13	Geological mapping in hilly terrains (for tunnel portion only): Geological mapping of the proposed alignment for a corridor width of 300m (150m on either side) in scale of 1 :25000 and submission of geological plans, L-section along the design alignment in relevant areas(1:25000 H and 1:25000 V) and cross sections across the nallahs / valleys/ streams and across the important Geological features including survey work required (by Total station /GPS for Geological Mapping and Geological survey) for in the proposed alignment, their significance in planning, design & construction of tunnels, bridges and other structures, cuttings in HSR alignment,submission of reports including maps etc. for verification of the design alignment in field inclusive of cost of materials, consumables, T&P, equipment's, supervision, experts , manpower, transportation, lead, all taxes etc. GSI maps of scale 1:50,000 shall be used.	KM	100.00		

S. No	Item Description	Unit	Total qty (a)	Rate (to be filled in by Bidder) (b)	Amount Rs. (a) x (b)
	Rates includes: (i) Geological field work for collecting data for developing the geological model. (ii) Study of Aerial LiDAR & Imagery data derivatives for Geological aspects such as Fault detection.				
	TOTAL AMOUNT				

Note:

1. Above quoted rates will be excluding GST but inclusive of all other taxes, duties & cess, etc
2. GST shall be paid extra on claiming by contractor in their monthly bills/ invoice.

PAYMENT TERMS:

For each corridor the following will be the payment terms:

1. Submission of Inception Report: 10%
2. Remaining 90% payments shall be paid on BoQ Item Wise as follows:

S No	BoQ Item	Payment Terms
1	Feature Extraction from Satellite Imagery (BOQ item 2)	<ol style="list-style-type: none"> 1. 40% payment will be released after completion of field work and submission of draft report. 2. 50% payment will be released after acceptance of report.
2	Site Reconnaissance (BOQ item 2b)	<ol style="list-style-type: none"> 1. 40% on completion of field works and submission of draft preliminary Alignment Stage 1 report 2. 50% on acceptance of Final Preliminary Alignment Stage 1 report
3	Development of alignment alternatives and finalization of Stage 1 Alignment (BOQ item 3)	<ol style="list-style-type: none"> 1. 25% on submission of Quality Assurance Plan 2. 40% on submission of draft preliminary Alignment Stage 1 report 3. 25% on acceptance of Final Preliminary Alignment Stage 1 report
4	FLS using Aerial LiDAR Survey (BOQ item 4)	<ol style="list-style-type: none"> 1. 10% on submission of Quality Assurance Plan for Aerial LiDAR Survey 2. 10% on completion of Ground Control Survey and submission of report 3. 25% on completion of Aerial Data capture and clearance of Data from MoD 4. 20% on submission of Aerial LiDAR Data outputs 5. 25% on acceptance of Aerial LiDAR data outputs
5	Final Alignment Design (BOQ item 10)	<ol style="list-style-type: none"> 1. 20% on submission of Quality Assurance Plan 2. 20% on submission of 50% design reports 3. 25% on submission of remaining design reports and all deliverables including draft Final Alignment Design Stage II Report 4. 25% on acceptance of all deliverables and acceptance of Final Alignment Design Stage II report
6	All other BoQ Items	<ol style="list-style-type: none"> 1. 60% on completion of field work and submission of data and reports. 2. 30% on acceptance and certification.