



BID DOCUMENT FOR

DESIGN AND CONSTRUCTION OF CIVIL, STRUCTURES AND TRACK WORKS FOR DOUBLE LINE RAILWAY INVOLVING FORMATION IN EMBANKMENTS/CUTTINGS, BALLAST ON FORMATION, TRACK WORKS, BRIDGES, STRUCTURES, BUILDINGS, YARDS, INTEGRATION WITH IR EXISTING RAILWAY SYSTEM AND TESTING & COMMISSIONING ON DESIGN-BUILD LUMP SUM BASIS FOR MUGHALSARAI – NEW BHAUPUR SECTION OF EASTERN DEDICATED FREIGHT CORRIDOR

CIVIL, STRUCTURES AND TRACK WORKS

CONTRACT PACKAGE NOS: 201 & 202

Issued on: **12.02.2014**

ICB No.: HQ/EN/EC/D-B/Mughalsarai - New Bhaupur

(Part-1)

EMPLOYER: DEDICATED FREIGHT CORRIDOR CORPORATION OF INDIA LTD

(A GOVERNMENT OF INDIA ENTERPRISE)

MINISTRY OF RAILWAYS

COUNTRY: INDIA

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PART 1

Bidding Procedures

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Section I. Instructions to Bidders

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Section I. Instructions to Bidders

A. General

1. **Scope of Bid**
 - 1.1 In connection with the Invitation for Bids indicated in the Bid Data Sheet (BDS), the Employer, as indicated in the BDS, issues this Bidding Document for the procurement of Works as specified in Section VI, Employer's Requirements. The name, identification, and number of lots (contracts) of the International Competitive Bidding (ICB) are **provided in the BDS**.
 - 1.2 Unless otherwise stated, throughout this Bidding Document definitions and interpretations shall be as prescribed in the General Conditions, Section VII.
2. **Source of Funds**
 - 2.1 The Borrower or Recipient (hereinafter called "Borrower") **indicated in the BDS** has applied for or received financing (hereinafter called "funds") from the International Bank for Reconstruction and Development (hereinafter called "the Bank") toward the cost of the project **named in the BDS**. The Borrower intends to apply a portion of the funds to eligible payments under the contract(s) for which this Bidding Document is issued.
 - 2.2 Payments by the Bank will be made only at the request of the Borrower and upon approval by the Bank in accordance with the terms and conditions of the financing agreement between the Borrower and the Bank (hereinafter called the Loan Agreement), and will be subject in all respects to the terms and conditions of that Loan Agreement. No party other than the Borrower shall derive any rights from the Loan Agreement or have any claim to the funds.
 - 2.3 The Loan Agreement prohibits a withdrawal from the loan account for the purpose of any payment to persons or entities, or for any import of equipment, plant, or materials, if such payment or import is prohibited by a decision of the United Nations Security Council taken under Chapter VII of the Charter of the United Nations.
3. **Corrupt Practices**
 - 3.1 The Bank requires that Borrowers (including beneficiaries of Bank loans), as well as Bidders, Suppliers, Contractors and their agents (whether declared or not), personnel, subcontractors, sub-consultants, service providers and suppliers, under Bank-financed contracts, observe the highest standard of ethics during the procurement and execution of such contracts. In pursuit of this policy, the Bank:

- (a) defines, for the purposes of this provision, the terms set forth below as follows:
- (i) “corrupt practice” is the offering, giving, receiving or soliciting, directly or indirectly, of anything of value to influence improperly the actions of another party¹;
 - (ii) “fraudulent practice” is any act or omission, including a misrepresentation, that knowingly or recklessly misleads, or attempts to mislead, a party to obtain a financial or other benefit or to avoid an obligation²;
 - (iii) “collusive practice” is an arrangement between two or more parties³ designed to achieve an improper purpose, including to influence improperly the actions of another party;
 - (iv) “coercive practice” is impairing or harming, or threatening to impair or harm, directly or indirectly, any party⁴ or the property of the party to influence improperly the actions of a party;
 - (v) “obstructive practice” is
 - (aa) deliberately destroying, falsifying, altering or concealing of evidence material to the investigation or making false statements to investigators in order to materially impede a Bank investigation into allegations of a corrupt, fraudulent, coercive or collusive practice; and/or threatening, harassing or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation, or
 - (bb) acts intended to materially impede the exercise of the Bank’s inspection and audit rights provided for under sub-clause 3.2 below.

¹ “another party” refers to a public official acting in relation to the procurement process or contract execution]. In this context, “public official” includes World Bank staff and employees of other organizations taking or reviewing procurement decisions.

² “Party” refers to a public official; the terms “benefit” and “obligation” relate to the procurement process or contract execution; and the “act or omission” is intended to influence the procurement process or contract execution.

³ “Parties” refers to participants in the procurement process (including public officials) attempting to establish bid prices at artificial, non competitive levels.

⁴ “Party” refers to a participant in the procurement process or contract execution.

- (b) will reject a proposal for award if it determines that the Bidder recommended for award has, directly or through an agent, engaged in corrupt, fraudulent, collusive, coercive or obstructive practices in competing for the contract in question;
- (c) will cancel the portion of the loan allocated to a contract if it determines at any time that representatives of the Borrower or of a beneficiary of the loan engaged in corrupt, fraudulent, collusive, or coercive practices during the procurement or the execution of that contract, without the Borrower having taken timely and appropriate action satisfactory to the Bank to remedy the situation; and
- (d) will sanction a firm or an individual, at any time, in accordance with prevailing Bank's sanctions procedures^a, including by publicly declaring such firm or individual ineligible, either indefinitely or for a stated period of time: (i) to be awarded a Bank-financed contract; and (ii) to be a nominated^b sub-contractor, consultant, manufacturer or supplier, or service provider of an otherwise eligible firm being awarded a Bank-financed contract.

3.2 In further pursuance of this policy, Bidders shall permit the Bank to inspect any accounts and records and other documents relating to the Bid submission and contract performance, and to have them audited by auditors appointed by the Bank. Furthermore, Bidders shall be aware of the provision stated in the General Conditions (GC) - 15.2).

4. Eligible Bidders

4.1 A Bidder may be a private entity or a government-owned entity—subject to ITB 4.5—or any combination of such entities in the form of a joint venture, or association (JVA) under an existing agreement or with the intent to enter into such an agreement supported by a letter of intent. In the case of a joint venture, or association:

- (a) **unless otherwise specified in the BDS**, all partners shall be jointly and severally liable for the execution of

^a A firm or an individual may be declared ineligible to be awarded a Bank-financed contract upon completion of the Bank's sanctions proceedings as per its sanctions procedures, including inter alia: (i) temporary suspension in connection with an ongoing sanctions proceeding; (ii) cross-debarment as agreed with other International Financial Institutions, including Multilateral Development Banks; and (iii) the World Bank Group corporate administrative procurement sanctions procedures for fraud and corruption.

^b A nominated sub-contractor, consultant, manufacturer or supplier, or service provider (different names are used depending on the particular bidding document) is one which either has been: (i) included by the bidder in its pre-qualification application or bid because it brings specific and critical experience and know-how that are accounted for in the evaluation of the bidder's pre-qualification application or the bid; or (ii) appointed by the Borrower.

- the Contract in accordance with the Contract terms, and
- (b) the JVA shall nominate a Representative who shall have the authority to conduct all business for and on behalf of any and all the partners of the JVA during the bidding process and, in the event the JVA is awarded the Contract, during contract execution.
- 4.2 A Bidder, and all partners constituting the Bidder, shall have a nationality of an eligible country, as defined in *Guidelines: Procurement under IBRD Loans and IDA Credits*, January 2011, (hereinafter referred to as the Guidelines), in accordance with Section V, Eligible Countries. A Bidder shall be deemed to have the nationality of a country if the Bidder is a national or is constituted, incorporated, or registered and operates in conformity with the provisions of the laws of that country. This criterion shall also apply to the determination of the nationality of proposed subcontractors or suppliers for any part of the Contract including related services.
- 4.3 A Bidder shall not have a conflict of interest. All Bidders found to have a conflict of interest shall be disqualified. A Bidder may be considered to have a conflict of interest with one or more parties in this bidding process, if :
- (a) they have a controlling partner in common; or
 - (b) they receive or have received any direct or indirect subsidy from any of them; or
 - (c) they have the same legal representative for purposes of this bid; or
 - (d) they have a relationship with each other, directly or through common third parties, that puts them in a position to have access to information about or influence on the bid of another Bidder, or influence the decisions of the Employer regarding this bidding process; or
 - (e) a Bidder submits more than one bid in this bidding process, either individually or as a partner in a joint venture, except for alternative offers permitted under ITB Clause 13. This will result in the disqualification of all such bids. However, this does not limit the participation of a Bidder as a subcontractor in another bid or of a firm as a subcontractor in more than one bid. or
 - (f) a Bidder or any of its affiliates participated as a consultant in the preparation of the design or technical specifications of the Works that are the subject of the

bid.

- (g) A Bidder or any of its affiliates has been hired (or is proposed to be hired) by the Employer or the Borrower as Engineer for the contract.

4.4 A Bidder that has been sanctioned by the Bank in accordance with the above ITB 3.1 (d), or in accordance with the Bank's Guidelines on Preventing and Combating Corruption in Projects Financed by IBRD Loans and IDA Credits and Grants, shall be ineligible to be awarded a Bank-financed contract, or benefit from a Bank-financed contract, financially or otherwise, during such period of time as the Bank shall determine.

4.5 Government-owned entities in the Borrower's country shall be eligible only if they can establish that they (i) are legally and financially autonomous, (ii) operate under the principles of commercial law, and (iii) are not dependent agencies of the Employer or the Borrower.

4.6 Bidders shall provide such evidence of their continued eligibility satisfactory to the Employer, as the Employer shall reasonably request.

4.7 In case a prequalification process has been conducted prior to the bidding process, this bidding is open only to prequalified Bidders.

4.8 Firms shall be excluded if:

- (a) as a matter of law or official regulation, the Borrower's country prohibits commercial relations with that country, provided that the Bank is satisfied that such exclusion does not preclude effective competition for the supply of goods or related services required; or

- (b) by an act of compliance with a decision of the United Nations Security Council taken under Chapter VII of the Charter of the United Nations, the Borrower's country prohibits any import of goods or contracting of works or services from that country or any payments to persons or entities in that country.

**5. Eligible
Materials,
Equipment and
Services**

5.1 The materials, equipment and services to be supplied under the Contract shall have their origin in eligible source countries as defined in ITB 4.2 above and all expenditures under the Contract will be limited to such materials, equipment and services.

5.2 For purposes of ITB 5.1 above, "origin" means the place

where the materials and equipment, or component parts thereof are mined, grown, produced or manufactured, and from which the services are provided. The materials and equipment components are produced when, through manufacturing, processing, or substantial or major assembling of components, a commercially recognized product results that is substantially in its basic characteristics or in purpose or utility from its components.

B. Contents of Bidding Document

6. Sections of Bidding Document

- 6.1 The Bidding Document consists of Parts 1, 2, 3 and 4, which include all the Sections indicated below, and should be read in conjunction with any Addenda issued in accordance with ITB 8.

PART 1 Bidding Procedures

- Section I. Instructions to Bidders (ITB)
- Section II. Bid Data Sheet (BDS)
- Section III. Evaluation and Qualification Criteria
- Section IV. Bidding Forms
- Section V. Eligible Countries

PART 2 Employer's Requirements

- Section VI. Employer's Requirements

PART 3 Conditions of Contract and Contract Forms

- Section VII. General Conditions (GC)
- Section VIII. Particular Conditions (PC)
- Appendix to Tender
- Section IX. Contract Forms

PART 4 Reference Documents

- 6.2 The Invitation for Bids issued by the Employer is not part of the Bidding Document.
- 6.3 The Employer is not responsible for the completeness of the Bidding Document and its addenda, if they were not obtained directly from the source stated by the Employer in the Invitation for Bids.
- 6.4 The Bidder is expected to examine all instructions, forms, terms, and specifications in the Bidding Document. Failure to furnish all information or documentation required by the Bidding Document may result in the rejection of the bid.

7. Clarification of Bidding Document, Site Visit, Pre-Bid Meeting

7.1 A prospective Bidder requiring any clarification of the Bidding Document shall contact the Employer in writing at the Employer's address **indicated in the BDS** or raise his enquiries during the pre-bid meeting if provided for in accordance with ITB 7.4. The Employer will respond to any request for clarification, provided that such request is received no later than twenty-eight (28) days prior to the deadline for submission of bids. The Employer's response shall be in writing with copies to all Bidders who have acquired the Bidding Document in accordance with ITB 6.3, including a description of the inquiry but without identifying its source. Should the Employer deem it necessary to amend the Bidding Document as a result of a request for clarification, it shall do so following the procedure under ITB 8, ITB 19.2 and ITB 35.2.

In addition a prospective Bidder pointing out any error/discrepancy in Employer's Requirement shall contact the Employer in writing at the Employer's address indicated in the BDS. The Employer will respond to any such suggestion, provided that such request is received no later than twenty-eight (28) days prior to the deadline for submission of bids. The Employer's response shall be in writing with copies to all Bidders who have acquired the Bidding Document in accordance with ITB 6.3, including a description of the error/discrepancy and accepted suggestion by the Employer but without identifying its source.

7.2 The Bidder is advised to visit and examine the site of Works and its surroundings and obtain for itself on its own responsibility all information that may be necessary for preparing the bid and entering into a contract for the design and construction of Works. The costs of visiting the site shall be at the Bidder's own expense.

7.3 The Bidder and any of its personnel or agents will be granted permission by the Employer to enter upon its premises and lands for the purpose of such visit, but only upon the express condition that the Bidder, its personnel, and agents will release and indemnify the Employer and its personnel and agents from and against all liability in respect thereof, and will be responsible for death or personal injury, loss of or damage to property, and any other loss, damage, costs, and expenses incurred as a result of the inspection.

7.4 The Bidder's designated representative is invited to attend a pre-bid meeting, if **provided for in the BDS**. The purpose of the meeting will be to clarify issues and to answer questions

on any matter that may be raised at that stage.

- 7.5 The Bidder is requested, as far as possible, to submit any questions in writing, to reach the Employer not later than one week before the meeting.
- 7.6 Minutes of the pre-bid meeting, including the text of the questions raised, without identifying the source, and the responses given, together with any responses prepared after the meeting, will be transmitted promptly to all Bidders who have acquired the Bidding Document in accordance with ITB 6.3. Any modification to the Bidding Documents that may become necessary as a result of the pre-bid meeting shall be made by the Employer exclusively through the issue of an Addendum pursuant to ITB 8 and not through the minutes of the pre-bid meeting.
- 7.7 Nonattendance at the pre-bid meeting will not be a cause for disqualification of a Bidder.

8. Amendment of Bidding Document

- 8.1 At any time prior to the deadline for submission of bids, the Employer may amend the Bidding Document by issuing addenda.
- 8.2 Any addendum issued shall be part of the Bidding Document and shall be communicated in writing to all who have obtained the Bidding Document from the Employer in accordance with ITB 6.3.
- 8.3 To give prospective Bidders reasonable time in which to take an addendum into account in preparing their bids, the Employer may, at its discretion, extend the deadline for the submission of bids, pursuant to ITB 19.2 and/or ITB 35.2

9. Cost of Bidding

- 9.1 The Bidder shall bear all costs associated with the preparation and submission of its Bid, and the Employer shall not be responsible or liable for those costs, regardless of the conduct or outcome of the bidding process.

10. Language of Bid

- 10.1 The Bid, as well as all correspondence and documents relating to the bid exchanged by the Bidder and the Employer, shall be written in the language **specified in the BDS**. Supporting documents and printed literature that are part of the Bid may be in another language provided they are accompanied by an accurate translation of the relevant passages in the language specified in the BDS, in which case, for purposes of interpretation of the Bid, such translation shall govern.

C1. First Stage Technical Proposals: Preparation

- 11. Documents Comprising the First Stage Technical Proposal**
- 11.1 The first stage technical proposal submitted by the Bidder shall comprise the following:
- (a) Letter of First Stage Bid;
 - (b) alternative technical proposals in accordance with ITB 13;
 - (c) written confirmation authorizing the signatory of the Bid to commit the Bidder, in accordance with ITB 17.2;
 - (d) documentary evidence established in accordance with ITB 14 that the materials, equipment and services offered by the Bidder in its bid or in any alternative bid are eligible;
 - (e) documentary evidence in accordance with ITB 15 establishing the Bidder's eligibility and qualifications to perform the contract if its Bid is accepted;
 - (f) documentary evidence established in accordance with ITB 16 that the materials, equipment and services offered by the Bidder conform to the Bidding Document;
 - (g) in the case of a technical proposal submitted by a JVA, JVA agreement, or letter of intent to enter into a JVA including a draft agreement, indicating at least the parts of the Works to be executed by the respective partners;
 - (h) list of subcontractors, in accordance with ITB 16.3; and
 - (i) any other document **required in the BDS.**
- First stage technical proposals are unpriced proposals and shall contain no prices or price schedules or other reference to rates and prices for completing the facilities. First stage technical proposals containing such price information will be rejected.**
- 12. Letter of First Stage Bid and Attachments**
- 12.1 The Letter of First Stage Bid and any attachments shall be prepared using the relevant forms furnished in Section IV, Bidding Forms. The forms must be completed as instructed in each form.
- 13. Alternative Technical Proposals**
- 13.1 Bidders shall note that they are permitted to propose technical alternatives with their first stage technical proposals in addition to or in lieu of the requirements specified in the bidding documents, provided they can document that the proposed technical alternatives are to the benefit of the Employer, that they fulfill the principal objectives of the contract, and that they meet the basic performance and

technical criteria specified in the bidding documents.

13.2 Any alternative technical proposal submitted by bidders as part of their first stage technical proposal will be the subject of clarification with the Bidder, pursuant to ITB 25.

**14. Documents
Establishing the
Eligibility of
Materials ,
Equipment and
Services**

14.1 To establish the eligibility of the materials, equipment and services in accordance with ITB Clause 5, Bidders shall provide documentary evidence consisting of a statement on the country of origin of the materials, equipment and services offered.

**15. Documents
Establishing the
Eligibility and
Qualifications of
the Bidder**

15.1 To establish its eligibility and qualifications to perform the Contract in accordance with Section III, Evaluation and Qualification Criteria, the Bidder shall provide the information requested in the corresponding information sheets included in Section IV, Bidding Forms.

15.2 Domestic Bidders, individually or in joint ventures, applying for eligibility for domestic preference shall supply all information required to satisfy the criteria for eligibility as described in ITB 46.

**16. Documents
Establishing
Conformity of the
Materials ,
Equipment and
Services**

16.1 The Bidder shall furnish a Technical Proposal including a statement of work, methods, equipments, personnel, schedule and any other information as stipulated in Section IV, in sufficient detail to demonstrate the adequacy of the Bidders' proposal to meet the work requirements and the completion time.

16.2 The documentary evidence of the conformity of the material, equipment and services with the bidding documents may be in the form of literature, drawings and data, and shall include:

a) Adequate evidence demonstrating the substantial responsiveness of the material, equipment and services to those specifications. Bidders shall note that standards for workmanship, materials and equipment designated by the Employer in the Bidding Document are intended to be descriptive (establishing standards of quality and performance) only and not restrictive. The Bidder may substitute alternative standards, brand names and/or catalog numbers in its technical proposal, provided that it demonstrates to the Employer's satisfaction that the substitutions are substantially equivalent or superior to the standards designated in the Specification.

16.3 For major items of supply or services as listed by the Employer in Section III, Evaluation and Qualification Criteria,

which the Bidder intends to purchase or subcontract, the Bidder shall give details of the name and nationality of the proposed Subcontractors, including manufacturers, for each of those items. In addition, the Bidder shall include in its technical proposal information establishing compliance with the requirements specified by the Employer for these items.

16.4 The Bidder shall be responsible for ensuring that any Subcontractor proposed complies with the requirements of ITB 4, and that any materials, equipment or services to be provided by the Subcontractor comply with the requirements of ITB 5 and 15.1.

17. Format and Signing of First Stage Technical Proposal

17.1 The Bidder shall prepare one original of the documents comprising the bid as described in ITB 11 and clearly mark it "FIRST STAGE TECHNICAL PROPOSAL - ORIGINAL." Alternative bids, if permitted in accordance with ITB 13, shall be clearly marked "FIRST STAGE TECHNICAL PROPOSAL - ALTERNATIVE". In addition, the Bidder shall submit copies of the bid, in the number **specified in the BDS** and clearly mark them "FIRST STAGE TECHNICAL PROPOSAL - COPY" and, "FIRST STAGE TECHNICAL PROPOSAL – ALTERNATIVE - COPY" In the event of any discrepancy between the original and the copies, the original shall prevail.

17.2 The original and all copies of the first stage technical proposal shall be typed or written in indelible ink and shall be signed by a person duly authorized to sign on behalf of the Bidder. This authorization shall consist of a written confirmation as **specified in the BDS** and shall be attached to the first stage technical proposal. The name and position held by each person signing the authorization must be typed or printed below the signature. All pages of the first stage technical proposal where entries or amendments have been made shall be signed or initialed by the person signing the bid.

17.3 A bid submitted by a JVA shall be signed so as to be legally binding on all partners.

17.4 Any interlineations, erasures, or overwriting shall be valid only if they are signed or initialed by the person signing the bid.

C2. First Stage Technical Proposals: Submission and Opening

18. Submission, Sealing and Marking of First

18.1 Bidders may always submit their first stage technical proposals by mail or by hand. When so **specified in the BDS**, bidders shall have the option of submitting their first stage

**Stage Technical
Proposals**

technical proposals electronically.

- (a) Bidders submitting first stage technical proposals by mail or by hand, shall enclose the original and each copy of the technical proposal, including alternative technical proposals, if permitted in accordance with ITB 13, in separate sealed envelopes, duly marking the envelopes as “FIRST STAGE TECHNICAL PROPOSAL - ORIGINAL”, “FIRST STAGE TECHNICAL PROPOSAL - ALTERNATIVE” and “FIRST STAGE TECHNICAL PROPOSAL - COPY” and, “FIRST STAGE TECHNICAL PROPOSAL – ALTERNATIVE - COPY” These envelopes containing the original and the copies shall then be enclosed in one single envelope. The rest of the procedure shall be in accordance with ITB 21.2 and 21.3.
- (b) Bidders submitting first stage technical proposals electronically shall follow the electronic submission procedures **specified in the BDS.**

18.2 The inner and outer envelopes shall:

- (a) bear the name and address of the Bidder;
- (b) be addressed to the Employer in accordance with ITB 19.1;
- (c) bear the specific identification of this bidding process indicated in accordance with ITB 1.1; and
- (d) bear a warning not to open before the time and date for bid opening.

18.3 If all envelopes are not sealed and marked as required, the Employer will assume no responsibility for the misplacement or premature opening of the technical proposal.

**19. Deadline for
Submission of
First Stage
Technical
Proposals**

19.1 First stage technical proposals must be received by the Employer at the address and no later than the date and time **indicated in the BDS.** Any first stage technical proposal received by the Employer after the deadline for submission of bids shall be declared late, rejected, and returned unopened to the Bidder.

19.2 The Employer may, at its discretion, extend the deadline for the submission of first stage technical proposals by amending the Bidding Document in accordance with ITB 8, in which case all rights and obligations of the Employer and Bidders previously subject to the deadline shall thereafter be subject to the deadline as extended.

- 20. Substitution and Modification of First Stage Technical Proposals**
- 20.1 In case a Bidder wishes to substitute or modify its first stage technical proposal after it has been submitted and prior to the deadline for first stage technical proposal submission, it may do so by sending a written notice, as per ITB 19.1 and its substituted or modified first stage technical proposal will be opened as per ITB 21.
- 21. Opening of First Stage Technical Proposals by Employer**
- 21.1 The Employer shall conduct the bid opening of the first stage technical proposals in public, in the presence of Bidders` designated representatives and anyone who choose to attend, and at the address, date and time **specified in the BDS**. Any specific procedures required if electronic bidding is permitted in accordance with ITB 18.1 shall be as **specified in the BDS**.
- 21.2 The names of all bidders who submitted first stage technical proposals will be read out, and other such details as the Employer, at its discretion, may consider appropriate, will be announced at the opening.
- 21.3 The Employer shall prepare a record of the first stage technical proposal opening that shall include, as a minimum: the name of the Bidder, including any alternative bids. The Bidders` representatives who are present shall be requested to sign the record. The omission of a Bidder`s signature on the record shall not invalidate the contents and effect of the record. A copy of the record shall be distributed to all Bidders who submitted technical proposals in time, and posted online when electronic bidding is permitted.
- C3. First Stage Technical Proposals: Evaluation**
- 22. Determination of Responsiveness of First Stage Technical Proposals**
- 22.1 The Employer will examine the first stage technical proposals to determine whether they are complete, whether the documents have been properly signed and whether the bids are generally in order. Any bids found to be non responsive or not meeting the minimum levels of the performance or other criteria specified in the bidding document will be rejected by the Employer and not included for further consideration. The Employer will also carry out a preliminary examination of any alternative bids submitted by bidders.
- 22.2 The Employer may request that the Bidder submit the necessary information or documentation, within a reasonable period of time, to rectify nonmaterial omissions in the first stage technical proposal related to documentation requirements. Failure of the Bidder to comply with the request may result in the rejection of its technical proposal.
- 23. Technical Evaluation of**
- 23.1 The Employer will carry out a detailed evaluation of the first stage technical proposals in order to determine whether the

**First Stage
Technical
Proposals**

technical aspects are in compliance with the Bidding Document. In order to reach such a determination, the Employer will examine and compare the technical proposals on the basis of the information supplied by the bidders, taking into account overall completeness and compliance with the Employer's Requirements and the technical merits of alternatives offered;

- (a) overall completeness and compliance with the Employer's Requirements; the technical merits of alternatives offered; conformity of the Works offered with specified performance criteria, including conformity with the specified minimum (or maximum, as the case may be) requirement corresponding to each functional guarantee, as indicated in the Specification and in Section III - Evaluation and Qualification Criteria; suitability of the Works offered in relation to the environmental and climatic conditions prevailing at the site; and quality, function and operation of any process control concept included in the bid;
- (b) Compliance with the time schedule called for in the corresponding Appendix to the Contract Agreement and any alternative time schedules offered by bidders, as evidenced by a milestone schedule provided in the technical proposal;
- (c) other relevant factors, if any, listed in Section III, Evaluation and Qualification Criteria; and
- (d) any deviations to the commercial and contractual provisions stipulated in the bidding documents

23.2 The Employer will also review complete alternative technical proposals, if any, offered by the Bidder, pursuant to ITB 13, to determine whether such alternatives may constitute an acceptable basis for a Second Stage bid to be submitted on its own merits.

**24. Eligibility and
Qualification of
the Bidder**

24.1 The Employer shall determine to its satisfaction whether Bidders determined as having submitted responsive First Stage Technical Proposals are eligible and meet the qualification criteria specified in Section III, Evaluation and Qualification Criteria.

24.2 The determination shall be based upon an examination of the documentary evidence of the Bidder's qualifications submitted by the Bidder, pursuant to ITB 15, and on any additional information which the Employer may request from the Bidder to support such evidence.

24.3 An affirmative determination will be a prerequisite for the Employer to invite the Bidder to a clarification meeting in

accordance with ITB 25. A negative determination will result in rejection of the Bidder's first stage technical proposal.

- 24.4 The capabilities of the manufacturers and subcontractors proposed to be used by the Bidders for Employer-identified major items of supply or services will also be evaluated for acceptability in accordance with Section III, Evaluation and Qualification Criteria. Should a manufacturer or subcontractor be determined to be unacceptable, if invited to submit a Second Stage Bid, the Bidder will be required to substitute an acceptable manufacturer or subcontractor.

D. Clarification of First Stage Technical Proposals

25. Clarification Procedures

- 25.1 The Employer may conduct clarification meetings with each or any Bidder to clarify any aspects of its First Stage technical proposal that require explanation and to review any Bidder's proposed alternative solutions or reservations to the commercial or contractual provisions of the bidding documents. The Employer may also seek clarifications in writing.
- 25.2 The Employer may bring to the attention of the Bidder any amendments or changes which the Employer may require to be made to the First Stage technical proposal; however the Employer may not require amendments or changes at variance from the Employers' requirements unless the Employer intends to amend the Bidding Document in accordance with ITB 26.1(a).
- 25.3 The Employer will advise the Bidder of any deviations to the commercial or contractual provisions of the bidding documents in the First Stage technical proposal, that are unacceptable and that are to be withdrawn in the Second Stage bid.
- 25.4 The Employer will also advise the Bidder whether the proposed alternative technical proposal, if any, is acceptable, and will identify the degree (if any) to which such an alternative bid may be incorporated in the Bidder's Second Stage bid.
- 25.5 The Employer will issue a Memorandum titled "**Changes Required Pursuant to First Stage Evaluation,**" documenting the clarifications made in writing and/or in a meeting, if any, and including an Annex listing all decisions, and required amendments or changes resulting from the clarification of the First Stage technical proposal. The Memorandum will be communicated to the Bidder as part of the invitation to submit the Second Stage bid.

- 26. Invitation to Submit Second Stage Bids**
- 26.1 At the end of the clarification process pursuant to ITB 25, conducted as necessary:
- (a) the Employer may need to issue an amendment to the Bidding Document resulting from the First Stage evaluation and clarification process, with the objective of clarifying the requirements and improving competition without compromising essential project objectives and/or
 - (b) in regard to all bidders, the Employer will either:
 - (i) invite the Bidder to submit a final updated technical and a commercial Second Stage bid based on its First Stage technical proposal taking into account the Bidding Document, if and as amended, and any other modifications as recorded in the Annex to the Memorandum entitled “Changes Required Pursuant to First Stage Evaluation”. Bidders will be allowed to submit only one Second Stage Bid, or
 - (ii) notify the Bidder that its bid has been rejected on the grounds of being substantially non-responsive, or that the Bidder does not meet the minimum qualification requirements set forth in the Bidding Document.
- 26.2 The deadline, for submission of Second Stage bids will be specified in the invitation to submit Second Stage bids, pursuant to ITB 35.1.
- 26.3 Bidders are not allowed to form JVA(s) with other bidders, nor change the partner or structure of the JVA if the Bidder in the First Stage was a JVA.

E1. Second Stage Bid Preparation

- 27. Documents Comprising the Bid**
- 27.1 The Second Stage Bid submitted by the Bidder shall comprise the following:
- (a) Letter of Bid
 - (b) Completed schedules as required, including Price Schedules, in accordance with ITB 28 and 29;
 - (c) Bid Security, in accordance with ITB 32;
 - (d) written confirmation authorizing the signatory of the Bid to commit the Bidder, in accordance with ITB 33.2;
 - (d) the updated first stage technical proposal, comprising any modifications required to the first stage technical

proposal as recorded in the Memorandum entitled “Changes Required Pursuant to First Stage Evaluation”;

- (f) documentary evidence established in accordance with ITB 14 that any additional or varied materials, equipment and services offered by the Bidder, and not included in the first stage technical proposal, are eligible;
- (g) documentary evidence regarding any changes that may have occurred between the time of submitting the First and Second Stage bids that have any material effect on the Bidder’s eligibility and qualifications to perform the Contract.
- (h) documentary evidence establishing that any additional or varied facilities to be supplied and installed by the Bidder, in accordance with the requirements of the Memorandum entitled “Changes Required Pursuant to First Stage Evaluation”, are technically acceptable. The documentary evidence of the conformity of the materials, equipment and services to the requirements of the Memorandum entitled “Changes Required Pursuant to First Stage Evaluation” may be in the form of literature, drawings and data. The functional guarantees of any additional or varied materials, equipment and services shall be stated in the applicable form in Section IV Bidding Forms.
- (i) If the Bidder proposes to engage any Subcontractors additional to or different from those named in its first stage technical proposal for major items of supply or services as listed by the Employer in Section III, Evaluation and Qualification Criteria, which the Bidder intends to purchase or subcontract, the Bidder shall give details of the name and nationality of the proposed Subcontractors, including manufacturers, for each of those items. In addition, the Bidder shall include in its bid information establishing compliance with the requirements specified by the Employer for these items. Quoted rates and prices will be deemed to apply to whichever Subcontractor is appointed, and no adjustment of the rates and prices will be permitted.
- (j) other documentation and information which may be **specified in the BDS.**

28. Letter of Bid, and Schedules

28.1 The Bidder shall complete the Letter of Bid and Schedules, including the appropriate Price Schedules, using the relevant forms furnished in Section IV, Bidding Forms. The forms

must be completed as instructed in each form.

29. Bid Prices and Discounts

- 29.1 Unless otherwise **specified in the BDS**, bidders shall quote for the entire Works on a “single responsibility” basis such that the total bid price covers all the Contractor’s obligations mentioned in or to be reasonably inferred from the bidding document in respect of the design, manufacture, including procurement and subcontracting (if any), delivery, construction, installation and completion of the Works. This includes all requirements under the Contractor’s responsibilities for testing, pre-commissioning and commissioning of the Works and, where so required by the bidding document, the acquisition of all permits, approvals and licenses, etc.; the operation, maintenance and training services and such other items and services as may be specified in the Bidding Document, all in accordance with the requirements of the General Conditions. Items against which no price is entered by the Bidder will not be paid for by the Employer when executed and shall be deemed to be covered by the prices for other items.
- 29.2 Bidders shall give a breakdown of the prices in the manner and detail called for in the Price Schedules (under Terms and Procedures for Payment) included in Section IV, Bidding Forms.
- 29.3 The prices shall be either fixed or adjustable as **specified in the BDS**.
- 29.4 In the case of **Fixed Price**, prices quoted by the Bidder shall be fixed during the Bidder’s performance of the contract and not subject to variation on any account. A bid submitted with an adjustable price quotation will be treated as non responsive and rejected.
- 29.5 In the case of **Adjustable Price**, prices quoted by the Bidder shall be subject to adjustment during performance of the contract to reflect changes in the cost elements such as steel, cement, labour, fuel & lubricants and machinery & machine tools in accordance with the procedures specified in the corresponding Appendix to Tender in Section VIII, Part 3 of the bid documents.
- 29.6 If so indicated in ITB 1.1, bids are being invited for individual lots (contracts) or for any combination of lots (packages). Bidders wishing to offer any price reduction (discount) for the award of more than one Contract shall specify in their Letter of Bid the price reductions applicable to each package, or alternatively, to individual Contracts within the package, and

the manner in which the price reductions will apply.

29.7 Bidders wishing to offer any unconditional discount shall specify in their Letter of Bid the offered discounts and the manner in which price discounts will apply.

29.8 **Unless otherwise specified in the BDS**, all duties, taxes and other levies payable by the Contractor under the contract, or for any other cause, as of the date 28 days prior to the deadline for submission of bids, shall be included in the total Bid Price submitted by the Bidder.

30. Currencies of Bid and Payment

30.1 The currency (ies) of the bid and the currency (ies) of payments shall be, as **specified in the BDS**.

30.2 Bidders may be required by the Employer to justify, to the Employer's satisfaction, their local and foreign currency requirements.

31. Period of Validity of Bids

31.1 Second Stage Bids shall remain valid for the period specified in the BDS after the bid submission deadline date prescribed by the Employer pursuant to ITB 35.1. **A bid valid for a shorter period shall be rejected by the Employer as non responsive.**

31.2 In exceptional circumstances, prior to the expiration of the bid validity period, the Employer may request Bidders to extend the period of validity of their bids. The request and the responses shall be made in writing. If a bid security is requested in accordance with ITB 32, the Bidder granting the request shall also extend the bid security for twenty-eight (28) days beyond the deadline of the extended validity period. A Bidder may refuse the request without forfeiting its bid security. A Bidder granting the request shall not be required or permitted to modify its bid, except as provided in ITB 31.3.

31.3 In the case of fixed price contracts, if the award is delayed by a period exceeding fifty-six (56) days beyond the expiry of the initial bid validity, the Contract price shall be adjusted by a factor or factors specified in the request for extension. Bid evaluation shall be based on the Bid Price without taking into consideration the above correction.

32. Bid Security

32.1 The Bidder shall furnish as part of its bid, either a Bid-Securing Declaration or a bid security as specified in the BDS, in original form and in the amount **specified in the BDS**.

32.2 A Bid-Securing Declaration shall use the form included in Section IV Bidding Forms.

32.3 If a bid security is specified pursuant to ITB 32.1, the bid security shall be a demand guarantee in any of the following forms, unless otherwise specified in the BDS, at the Bidder's option,:

- (a) an unconditional guarantee issued by a bank *or surety*;
- (b) an irrevocable letter of credit;
- (c) a cashier's or certified check; or
- (d) another security **indicated in the BDS**,

from a reputable source from an eligible country. If the unconditional guarantee is issued by an insurance company or a bonding company located outside the Employer's Country, the issuer shall have a correspondent financial institution located in the Employer's Country to make it enforceable. In the case of a bank guarantee, the bid security shall be submitted either using the Bid Security Form included in Section IV, Bidding Forms or in another substantially similar format approved by the Employer prior to bid submission. In either case, the form must include the complete name of the Bidder. The bid security shall be valid for twenty-eight days (28) beyond the original validity period of the bid, or beyond any period of extension if requested under ITB 31.2.

32.4 If a bid security is specified pursuant to ITB 32.1, any bid not accompanied by a substantially responsive bid security or Bid-Securing Declaration shall be rejected by the Employer as non responsive.

32.5 If a bid security is specified pursuant to ITB 32.1, the bid security of unsuccessful Bidders shall be returned as promptly as possible upon the successful Bidder's furnishing of the performance security pursuant to ITB 54.

32.6 The bid security of the successful Bidder shall be returned as promptly as possible once the successful Bidder has signed the Contract and furnished the required performance security.

32.7 The bid security may be forfeited or the Bid-Securing Declaration executed:

- (a) if a Bidder withdraws its bid during the period of bid validity specified by the Bidder on the Letter of Bid, or
- (b) if the successful Bidder fails to:
 - (i) sign the Contract in accordance with ITB 53; or
 - (ii) furnish a performance security in accordance with

ITB 54.

- 32.8 The Bid Security or the Bid Securing Declaration of a JVA shall be in the name of the JVA that submits the bid. If the JVA has not been constituted into a legally enforceable JVA at the time of bidding, the Bid Security shall be in the names of all future partners as named in the letter of intent referred to in ITB 4.1.
- 32.9 If a Bid-Securing Declaration is executed in accordance with ITB 32.7, the Employer will declare the Bidder ineligible to be awarded a contract by the Employer for the period of time stated in the Form of Bid-Securing Declaration.
- 32.10 If a bid security is not required in the BDS, and
- (a) if a Bidder withdraws its bid during the period of bid validity specified by the Bidder on the Letter of Bid Form, except as provided in ITB 32.2, or
 - (b) if the successful Bidder fails to: sign the Contract in accordance with ITB 53; or furnish a performance security in accordance with ITB 54;

the Borrower may, **if provided for in the BDS**, declare the Bidder disqualified to be awarded a contract by the Employer for a period of time **as stated in the BDS**.

**33. Format and
Signing of Second
Stage Bid**

- 33.1 The Bidder shall prepare one original of the documents comprising the bid as described in ITB 27 and clearly mark it "SECOND STAGE BID - ORIGINAL." In addition, the Bidder shall submit copies of the bid, in the number **specified in the BDS** and clearly mark them "SECOND STAGE BID - COPY." In the event of any discrepancy between the original and the copies, the original shall prevail.
- 33.2 The original and all copies of the bid shall be typed or written in indelible ink and shall be signed by a person duly authorized to sign on behalf of the Bidder. This authorization shall consist of a written confirmation as **specified in the BDS** and shall be attached to the bid. The name and position held by each person signing the authorization must be typed or printed below the signature. All pages of the bid where entries or amendments have been made shall be signed or initialed by the person signing the bid.
- 33.3 A bid submitted by a JVA shall comply with the following requirements:
- (a) Unless not required in accordance with ITB 4.1 (a), be

signed so as to be legally binding on all partners and

- (b) Include the Representative's authorization referred to in ITB 4.1 (b), consisting of a power of attorney signed by those legally authorized to sign on behalf of the JVA.

33.4 Any interlineations, erasures, or overwriting shall be valid only if they are signed or initialed by the person signing the bid.

E2. Second Stage Bids: Submission and Opening

34. Submission, Sealing and Marking of Second Stage Bids

34.1 Bidders may always submit their bids by mail or by hand. When so **specified in the BDS**, bidders shall have the option of submitting their bids electronically. Procedures for submission, sealing and marking are as follows:

34.2 Bidders submitting bids by mail or by hand shall enclose the original and each copy of the Bid, in separate sealed envelopes, duly marking the envelopes as "SECOND STAGE BID - ORIGINAL", and "SECOND STAGE BID - COPY." These envelopes containing the original and the copies shall then be enclosed in one single envelope. The rest of the procedure shall be in accordance with ITB 34.2 and 34.3.

34.3 Bidders submitting bids electronically shall follow the electronic bid submission procedures **specified in the BDS**.

34.4 The inner and outer envelopes shall:

- (a) bear the name and address of the Bidder;
- (b) be addressed to the Employer in accordance with ITB 35.1;
- (c) bear the specific identification of this bidding process indicated in the BDS 1.1; and
- (d) bear a warning not to open before the time and date for bid opening.

34.5 If all envelopes are not sealed and marked as required, the Employer will assume no responsibility for the misplacement or premature opening of the bid.

35. Deadline for Submission of Second Stage Bids

35.1 Second Stage bids must be received by the Employer at the address and no later than the date and time indicated in the Letter of Invitation to submit Second Stage Bids.

35.2 The Employer may, at its discretion, extend the deadline for the submission of bids by amending the Bidding Document in accordance with ITB 8, in which case all rights and

obligations of the Employer and Bidders previously subject to the deadline shall thereafter be subject to the deadline as extended.

36. Late Bids

36.1 The Employer shall not consider any bid that arrives after the deadline for submission of bids, in accordance with ITB 35. Any bid received by the Employer after the deadline for submission of bids shall be declared late, rejected, and returned unopened to the Bidder.

37. Withdrawal, Substitution, and Modification of Second Stage Bids

37.1 A Bidder may withdraw, substitute, or modify its bid after it has been submitted by sending a written notice, duly signed by an authorized representative, and shall include a copy of the authorization in accordance with ITB 33.2, (except that withdrawal notices do not require copies). The corresponding substitution or modification of the bid must accompany the respective written notice. All notices must be:

- (a) prepared and submitted in accordance with ITB 33 and ITB 34 (except that withdrawals notices do not require copies), and in addition, the respective envelopes shall be clearly marked "SECOND STAGE BID - WITHDRAWAL," "SECOND STAGE BID - SUBSTITUTION," "SECOND STAGE BID - MODIFICATION;" and
- (b) received by the Employer prior to the deadline prescribed for submission of bids, in accordance with ITB 35

37.2 Bids requested to be withdrawn in accordance with ITB 37.1 shall be returned unopened to the Bidders.

37.3 No bid may be withdrawn, substituted, or modified in the interval between the deadline for submission of Second Stage bids and the expiration of the period of bid validity specified by the Bidder on the Letter of Bid or any extension thereof.

38. Second Stage Bid Opening

38.1 The Employer shall conduct the Second Stage bid opening in public, in the presence of Bidders` designated representatives and anyone who choose to attend, and at the address, date and time specified in the Letter of Invitation to submit Second Stage Bids. Any specific electronic bid opening procedures required if electronic bidding is permitted in accordance with ITB 34.1, shall be as **specified in the BDS.**

38.2 First, envelopes marked "SECOND STAGE BID - WITHDRAWAL" shall be opened and read out and the envelope with the corresponding bid shall not be opened, but returned to the Bidder. No bid withdrawal shall be permitted unless the corresponding withdrawal notice contains a valid authorization to request the withdrawal and is read out at bid

opening. Next, envelopes marked "SECOND STAGE BID - SUBSTITUTION" shall be opened and read out and exchanged with the corresponding bid being substituted, and the substituted bid shall not be opened, but returned to the Bidder. No bid substitution shall be permitted unless the corresponding substitution notice contains a valid authorization to request the substitution and is read out at bid opening. Envelopes marked "SECOND STAGE BID - MODIFICATION" shall be opened and read out with the corresponding bid. No bid modification shall be permitted unless the corresponding modification notice contains a valid authorization to request the modification and is read out at bid opening. Only bids that are opened and read out at bid opening shall be considered further.

- 38.3 All other envelopes shall be opened one at a time, reading out: the name of the Bidder and the Bid Price(s), including any discounts, and indicating whether there is a modification; the presence or absence of a bid security or a Bid-Securing Declaration; and any other details as the Employer may consider appropriate. Only discounts read out at bid opening shall be considered for evaluation. No bid shall be rejected at bid opening except for late bids, in accordance with ITB 36.1.
- 38.4 The Employer shall prepare a record of the bid opening that shall include, as a minimum: the name of the Bidder and whether there is a withdrawal, substitution, or modification; the Bid Price, per lot if applicable, including any discounts; and the presence or absence of a bid security or a Bid-Securing Declaration. The Bidders' representatives who are present shall be requested to sign the record. The omission of a Bidder's signature on the record shall not invalidate the contents and effect of the record. A copy of the record shall be distributed to all Bidders who submitted bids in time, and posted online when electronic bidding is permitted.

E3. Second Stage Bids: Evaluation and Comparison

39. Confidentiality

- 39.1 Consistent with the requirements of transparency and intellectual property rights, in revising the Second Stage Technical Proposal, information contained in the Bidder's Technical Proposal reviewed in the first stage shall not be disclosed to Bidders or any other persons not officially concerned with such process until information on contract award is communicated to all Bidders,.
- 39.2 Any attempt by a Bidder to influence the Employer in the evaluation of the first and second stage bids or Contract award decisions may result in the rejection of its bid.

- 39.3 Notwithstanding ITB 39.2, from the time of First Stage technical proposal opening to the time of Contract award, if any Bidder wishes to contact the Employer on any matter related to the bidding process, it should do so in writing.
- 40. Clarification of Bids**
- 40.1 To assist in the examination, evaluation, and comparison of the bids, and qualification of the Bidders, the Employer may, at its discretion, ask any Bidder for a clarification of its bid. Any clarification submitted by a Bidder that is not in response to a request by the Employer shall not be considered. The Employer's request for clarification and the response shall be in writing. No change in the prices or substance of the bid shall be sought, offered, or permitted, except to confirm the correction of arithmetic errors discovered by the Employer in the evaluation of the bids, in accordance with ITB 44.1.
- 40.2 If a Bidder does not provide clarifications of its bid by the date and time set in the Employer's request for clarification, its bid may be rejected.
- 41. Deviations, Reservations, and Omissions**
- 41.1 During the evaluation of bids, the following definitions apply:
- (a) "Deviation" is a departure from the requirements specified in the Bidding Document;
 - (b) "Reservation" is the setting of limiting conditions or withholding from complete acceptance of the requirements specified in the Bidding Document; and
 - (c) "Omission" is the failure to submit part or all of the information or documentation required in the Bidding Document.
- 42. Determination of Responsiveness**
- 42.1 The Employer's determination of a bid's responsiveness is to be based on the contents of the bid itself, as defined in ITB 27.
- 42.2 A substantially responsive bid is one that meets the requirements of the Bidding Document and has properly incorporated all modifications listed in the Memorandum entitled "*Changes Required Pursuant to First Stage Evaluation*", without material deviation, reservation, or omission. A material deviation, reservation, or omission is one that,
- (a) if accepted, would:
 - (i) affect in any substantial way the scope, quality, or performance of the Works specified in the Contract; or
 - (ii) limit in any substantial way, inconsistent with the

Bidding Document, the Employer's rights or the Bidder's obligations under the proposed Contract;
or

- (b) if rectified, would unfairly affect the competitive position of other Bidders presenting substantially responsive bids.

42.3 A Second Stage bid containing technical or commercial alternatives not submitted as part of the first stage technical proposal will be treated as non responsive.

42.4 If a bid is not substantially responsive to the requirements of the Bidding Document, it shall be rejected by the Employer and may not subsequently be made responsive by correction of the material deviation, reservation, or omission.

**43. Nonmaterial
Nonconformities**

43.1 Provided that a bid is substantially responsive, the Employer may waive any nonconformities in the bid that do not constitute a material deviation, reservation or omission.

43.2 Provided that a bid is substantially responsive, the Employer may request that the Bidder submit the necessary information or documentation, within a reasonable period of time, to rectify quantifiable nonmaterial nonconformities in the bid related to documentation requirements. Requesting information or documentation on such nonconformities shall not be related to any aspect of the price of the bid. Failure of the Bidder to comply with the request may result in the rejection of its bid.

43.3 Provided that a bid is substantially responsive, the Employer shall rectify nonmaterial nonconformities related to the Bid Price. To this effect, the Bid Price shall be adjusted, for comparison purposes only, to reflect the price of a missing or non-conforming item or component. The adjustment shall be made using the method indicated in Section III, Evaluation and Qualification Criteria.

**44. Correction of
Arithmetical
Errors**

44.1 Provided that the bid is substantially responsive, the Employer shall correct arithmetical errors on the following basis:

- (a) where there are errors between the total of the amounts given under the column for the price breakdown and the amount given under the Total Price, the former shall prevail and the latter will be corrected accordingly;
- (b) if there is a discrepancy between words and figures, the amount in words shall prevail, unless the amount expressed in words is related to an arithmetic error, in which case the amount in figures shall prevail subject to

(a) above.

44.2 If the Bidder that submitted the lowest evaluated bid does not accept the correction of errors, its bid shall be declared non-responsive.

45. Conversion to Single Currency

45.1 For evaluation and comparison purposes, the currency (ies) of the bid shall be converted into a single currency as **specified in the BDS.**

46. Margin of Preference

46.1 No margin of domestic preference shall apply.

47. Evaluation of Second Stage Bids

47.1 The Employer shall use the criteria and methodologies indicated in this Clause. No other evaluation criteria or methodologies shall be permitted.

Technical Evaluation

47.2 The Employer will carry out a detailed evaluation of the Second Stage bids not previously rejected to determine whether the technical aspects concerning the modifications to the technically acceptable base or alternative bid detailed in the Memorandum entitled “Changes Required Pursuant to First Stage Evaluation”, pursuant to ITB 26.1, have been properly addressed and are substantially responsive to the requirements set forth in the Bidding Document.

Economic Evaluation

47.3 To evaluate a bid, the Employer shall consider the following:

- (a) the bid price, excluding provisional sums and the provision, if any, for contingencies in the Price Schedules;
- (b) price adjustment for correction of arithmetic errors in accordance with ITB 44.1;
- (c) price adjustment due to discounts offered in accordance with ITB 29.6 and ITB 29.7;
- (d) price adjustment due to quantifiable nonmaterial nonconformities in accordance with ITB 43.3;
- (e) converting the amount resulting from applying (a) to (d) above, if relevant, to a single currency in accordance with ITB 45; and
- (f) the evaluation factors, if any, indicated in Section III, Evaluation and Qualification Criteria.

47.4 If price adjustment is allowed in accordance with ITB 29.3, the estimated effect of the price adjustment provisions of the

Conditions of Contract, applied over the period of execution of the Contract, shall not be taken into account in bid evaluation.

47.5 If this Bidding Document allows Bidders to quote separate prices for different lots (contracts), and the award to a single Bidder of multiple lots (contracts), the methodology to determine the lowest evaluated price of the lot (contract) combinations, including any discounts offered in the Letter of Bid, is specified in Section III, Evaluation and Qualification Criteria.

48. Comparison of Bids

48.1 The Employer shall compare all substantially responsive bids in accordance with ITB 47.3 to determine the lowest evaluated bid.

49. Qualification of the Bidder

49.1 The Employer shall determine to its satisfaction whether the Bidder that is selected as having submitted the lowest evaluated and substantially responsive bid still meets the qualifying criteria specified in Section III, Evaluation and Qualification Criteria.

49.2 An affirmative determination shall be a prerequisite for award of the Contract to the Bidder. A negative determination shall result in disqualification of the bid, in which event the Employer shall proceed to the next lowest evaluated bid to make a similar determination of that Bidder's qualifications to perform satisfactorily.

49.3 The participation of the manufacturers and subcontractors proposed in its Bid to be used by the lowest evaluated Bidder should be confirmed with a letter of intent between the parties, as needed. The capabilities of additional or different manufacturers and subcontractors proposed in its Bid to be used by the lowest evaluated Bidder will also be evaluated for acceptability in accordance with Section III, Evaluation and Qualification Criteria. Should any additional or substitute manufacturer or subcontractor be determined to be unacceptable, the Bid will not be rejected, but the Bidder will be required to substitute an acceptable manufacturer or subcontractor without any change to the bid price. Prior to signing the Contract, the corresponding Appendix to the Contract Agreement shall be completed, listing the approved manufacturers or subcontractors for each item concerned.

- 50. Employer's Right to Accept Any Bid, and to Reject Any or All Bids** 50.1 The Employer reserves the right to accept or reject any bid, and to annul the bidding process and reject all bids at any time prior to contract award, without thereby incurring any liability to Bidders. In case of annulment, all bids submitted and specifically, bid securities, shall be promptly returned to the Bidders.

F. Award of Contract

- 51. Award Criteria** 51.1 Subject to ITB 50.1, the Employer shall award the Contract to the Bidder whose offer has been determined to be the lowest evaluated bid and is substantially responsive to the Bidding Document, provided further that the Bidder is determined to be eligible and qualified to perform the Contract satisfactorily.

- 52. Notification of Award** 52.1 Prior to the expiration of the period of bid validity, the Employer shall notify the successful Bidder, in writing, that its bid has been accepted. The notification letter (hereinafter and in the Conditions of Contract and Contract Forms called the "Letter of Acceptance") shall specify the sum that the Employer will pay the Contractor in consideration of the execution and completion of the Works (hereinafter and in the Conditions of Contract and Contract Forms called "the Contract Price").

- 52.2 At the same time, the Employer shall also notify all other Bidders of the results of the bidding, and shall publish in UNDB online and in the dgMarket the results identifying the bid and lot numbers and the following information: (i) name of each Bidder who submitted a Bid; (ii) bid prices as read out at Bid Opening; (iii) name and evaluated prices of each Bid that was evaluated; (iv) name of bidders whose bids were rejected and the reasons for their rejection; and (v) name of the winning Bidder, and the Price it offered, as well as the duration and summary scope of the contract awarded.

- 52.3 Until a formal contract is prepared and executed, the notification of award shall constitute a binding Contract.

- 52.4 The Employer shall promptly respond in writing to any unsuccessful Bidder who, after notification of award in accordance with ITB 52.1, requests in writing the grounds on which its bid was not selected.

- 53. Signing of Contract** 53.1 Promptly upon notification, the Employer shall send the successful Bidder the Contract Agreement.
- 53.2 Within twenty-eight (28) days of receipt of the Contract Agreement, the successful Bidder shall sign, date, and return it to the Employer.

53.3 Notwithstanding ITB 53.2 above, in case signing of the Contract Agreement is prevented by any export restrictions attributable to the Employer, to the country of the Employer, or to the use of the materials, equipment and services to be supplied, where such export restrictions arise from trade regulations from a country supplying those materials, equipment and services, the Bidder shall not be bound by its bid, always provided, however, that the Bidder can demonstrate to the satisfaction of the Employer and of the Bank that signing of the Contract Agreement has not been prevented by any lack of diligence on the part of the Bidder in completing any formalities, including applying for permits, authorizations and licenses necessary for the export of the materials, equipment and services under the terms of the Contract.

54. Performance Security

54.1 Within twenty-eight (28) days of the receipt of notification of award from the Employer, the successful Bidder shall furnish the performance security in accordance with the General Conditions of Contract, using for that purpose the Performance Security Form included in CF-03, Section IX, Contract Forms, or another form acceptable to the Employer. If the performance security furnished by the successful Bidder is in the form of a bond, it shall be issued by a bonding or insurance company that has been determined by the successful Bidder to be acceptable to the Employer. A foreign institution providing a bond shall have a correspondent financial institution located in the Employer's Country.

54.2 Failure of the successful Bidder to submit the above-mentioned Performance Security or sign the Contract shall constitute sufficient grounds for the annulment of the award and forfeiture of the bid security. In that event the Employer may award the Contract to the next lowest evaluated Bidder whose offer is substantially responsive and is determined by the Employer to be qualified to perform the Contract satisfactorily.

Section II. Bid Data Sheet

A. General	
ITB 1.1	The number of the Invitation for Bids is: HQ/EN/EC/D-B/ Mughalsarai-New Bhaupur dated 12.02.2014
ITB 1.1	The Employer is: Dedicated Freight Corridor Corporation of India Limited (DFCCIL) , A Government of India Enterprise
ITB 1.1	<p>The name of the ICB is: Design and Construction of Civil, Structures and Track Works for Double Line Railway involving Formation in Embankments/Cuttings, Ballast on Formation, Track Works, Bridges, Structures, Buildings, Yards, Integration with IR Existing Railway System and Testing & Commissioning on Design-Build Lump Sum Basis for Mughalsarai – New Bhaupur Section of Eastern Dedicated Freight Corridor</p> <p>The identification number of the ICB is: HQ/EN/EC/D-B/Mughalsarai – New Bhaupur</p> <p>The names and identifications of each of the two Contract Packages are as follows:</p> <p>Civil, Structures and Track Works Contract Package No. 201:</p> <p>Design and Construction of Civil, Structures and Track Works for Double Line Railway involving Formation in Embankments/Cuttings, Ballast on Formation, Track Works, Bridges, Structures, Buildings, Yards, Integration with IR existing Railway System and Testing & Commissioning on Design-Build Lump Sum Basis for Mughalsarai – New Karchana Station (including) of Eastern Dedicated Freight Corridor.</p> <p>Civil, Structures and Track Works Contract Package No. 202:</p> <p>Design and Construction of Civil, Structures and Track Works for Double Line Railway involving Formation in Embankments/Cuttings, Ballast on Formation, Track Works, Bridges, Structures, Buildings, Yards, Integration with IR Existing Railway System and Testing & Commissioning on Design-Build Lump Sum Basis for New Karchana Station (excluding) – New Bhaupur station (excluding) of Eastern Dedicated Freight Corridor.</p> <p>Brief details of the Contract Packages are given in the following table:</p>

Contract Package	Existing Railway KM / DFC Chainage		Approximate Total Route Length (Km)	Remarks
	From	To		
201	Km-669.670 (Ch. 119.550)	Km – (Ch. 278.155)	158.605 (DL) 22.430 (SL)	Parallel Length (DL)– 121.985 Km Detour Length (DL) – 36.620 Km Link Line Length (SL)– 22.430 Km*
202	Km – (Ch. 278.155)	Km – (Ch. 507.693)	229.538 (DL) 6.720 (SL)	Parallel Length (DL) – 139.889 Km Detour Length (DL) – 89.649 Km Link Line Length (SL)– 6.720 Km**
<p>* Karchana to Cheoki 4.8 Km; Karchana to Iradatganj 8.9 Km; and Jeonathpur to RTR 8.73 Km</p> <p>** Bhimsen link line (UP) 2.68 Km Kanpur to Rooma 4.04 Km</p> <p>For further details please refer to Part-4: Reference Documents –Site Data. Bidders can bid for the number of Contract Package(s) for which they have been prequalified by DFCCIL.</p>				
ITB 2.1	The Borrower is: Dedicated Freight Corridor Corporation of India Ltd (A Government of India Enterprise)			
ITB 2.1	The name of the Project is: Eastern Dedicated Freight Corridor-2			
ITB 4.3 (d)	<p>The name of Consultant to the Employer is: AECOM Asia Company Ltd. Hong Kong ‘AECOM’ is providing ‘Engineering Consultancy Services’ to the Employer which inter alia includes Preparation of PQ and Bidding Documents and evaluations of the received PQ Applications and Stage 1 & 2 Bids for the Mughalsarai-New Bhaupur (EDFC-2) and Dadri-Khurja-Ludhiana (EDFC-3) Sections of Dedicated Freight Corridor.</p>			
ITB 4.3 (g)	The appointment of Project Management Consultant for the supervision of the above sections is under process and shall be intimated later.			
B. Contents of Bidding Document				
ITB 7.1	<p>For clarification purposes only, the Employer’s address is: Attention: Mr. Ajay Kumar Designation : Group General Manager / Procurement (EC)</p>			

	<p>Street Address: Dedicated Freight Corridor Corporation of India Limited, Metro Station Building Complex, Pragati Maidan</p> <p>Floor/Room number: 5th Floor, Room No. 501</p> <p>City: New Delhi</p> <p>PIN Code: 110001</p> <p>Country: India</p> <p>Telephone: +91 11 23454720</p> <p>Facsimile number: + 91 11 23454701</p> <p>Electronic mail address: ajaykumar@dfcc.co.in</p>
ITB 7.2	<p>Add the following to ITB 7.2: The Bidder is advised to refer clause 1.9 of General Conditions of Contract</p>
ITB 7.4	<p>A Pre-Bid meeting will take place at the following date, time and place: Date: 10.03.2014 Time: 15:00 Hrs Place: Conference Room, 4th Floor, Dedicated Freight Corridor Corporation of India Limited, Metro Station Building Complex, Pragati Maidan, New Delhi – 110001</p> <p>Bidders can provide their request for clarification by mail or in paper copies. In addition they are advised to provide an editable soft copy (MS Word) of the queries raised by them.</p>
ITB 7.6	<p>Minutes of pre-bid meeting shall be intimated only through e-mail to all the bidders, who have purchased the Bid Document from DFCCIL or submitted queries for clarifications, and uploaded on DFCC web site.</p>
ITB 8.2	<p>Addenda to bidding documents shall be intimated only through e-mail to all the bidders, who have purchased the Bid Document from DFCCIL or submitted queries for clarifications, and uploaded on DFCC web site.</p>
ITB 10.1	<p>The language of the bid is: English.</p>
<p>C1. First Stage Technical Proposals: Preparation</p>	
ITB 11.1 (i)	<p>The Bidder shall submit with its First Stage Technical Proposal the following documents: The bidder shall submit the documents as listed in Annexure-1, section III- Qualification and Evaluation Criteria.</p>
ITB 13.1	<p>Bidders are permitted to propose technical alternatives with their First Stage Technical Proposals. Alternative Technical Proposals shall be examined as detailed in para 3 of Section III, Part 1 of Bidding Documents. Bidders are required to propose Technical Alternatives ONLY in the</p>

	Alternative Technical Proposal and NOT in the regular Technical Proposal. Any Technical Alternative proposed in the regular Technical Proposal shall not be evaluated.
ITB 17.1	In addition to the original of the First Stage Technical Proposal, the number of copies is: 3 (three). In addition, 1 (one) soft copy (read only) of the bid shall be submitted. The document submission shall be in spiral / hard bound form only. The Bidders are advised not to submit loose sheets in plastic folders. The Bidders are further advised to machine number all the pages and prepare a table of contents in the beginning of each volume of documents referring the page numbers of the indexed items.
ITB 17.2	The written confirmation of authorization to sign on behalf of the Bidder shall consist of: Legally authorized power of attorney
C2. First Stage Technical Proposals: Submission and Opening	
ITB 18.1 & ITB 18.1 (b)	Bidders do not have the option of submitting their First Stage Technical Proposal electronically.
ITB 19.1	For First Stage Technical Proposal, <u>for submission purposes only</u> , the Employer's address is : Attention: Mr. Ajay Kumar Designation : Group General Manager / Procurement (EC) Street Address: Dedicated Freight Corridor Corporation of India limited Metro Station Building Complex, Pragati Maidan Floor/Room number: 5 th Floor, Room No. 501 City: New Delhi PIN Code: 110001 Country: India The deadline for submission of First Stage Technical Proposals is: Date: 16.04.2014 Time: 15:00 Hrs
ITB 21.1	The opening of First Stage Technical Proposals shall take place at: Street Address: Dedicated Freight Corridor Corporation of India Limited, Metro Station Building Complex, Pragati Maidan Floor/Room number: 4 th Floor Conference Hall. City: New Delhi PIN Code: 110001 Country: India Date: 16.04.2104 Time: 15:30 Hrs
E1. Second Stage Bid Preparation	
ITB 23.1 (b)	Replace the words "Appendix to Contract Agreement" with "Appendix to Tender". Alternative time for completion proposed, if any, by the Bidders shall not be

	accepted.
ITB 27.1 (d)	In Section I, ITB 27.1 (d) has been mentioned twice. Second “27.1 (d)” may be read as 27.1 (e).
ITB 29.1	<p>Bidders shall quote for the entire Works on a single responsibility basis and quote separate Prices for each contract package on which they wish to bid.</p> <p>The price shall be quoted only in the Letter of Bid-Two Stage Bidding, Second Stage Bid (LOB-SS) Section IV, Bidding Forms, Part 1 of the Bidding Documents.</p> <p>Though bid document is common for Contract Packages No. 201 & 202 but submission shall be separate for each Contract Package.</p>
ITB 29.3	The prices quoted by the Bidder shall be adjustable.
ITB 29.8	<p>Add the following after ITB 29.8:</p> <p>“The bidders may note that this DFCC project being funded by the World Bank, qualifies for exemption from payment of Customs Duty and Excise Duty on goods supplied / intended to be supplied to the project in terms of Government of India’s Notification no. 84/97 – customs dated 11.11.1997 and Central Excise Notification no. 108/95-C E Dated 28.08.1995 (read with all subsequent amendments including amendment dated 01.03.2008) respectively.</p> <p>However, while quoting the bid price, bidders are advised to ascertain exemptions of custom & excise duty and / or availability of deemed export benefits for goods required as inputs for completion of the Works under the World Bank Funded Projects. The bidders are also advised to ascertain the availability of the custom / excise exemptions for the goods supplied by their subcontractors used as input for the construction of Works.</p> <p>In this regard bidders’ attention is also drawn to sub-clause 4.11 of the Particular Conditions.”, Section VIII, Part 3 of the Bidding Documents.”</p>
ITB 30.1	<p>The currency(ies) of the bid and the payment currency (ies) shall be as described below:</p> <p>a) The prices shall be quoted by the Bidder entirely in Indian Rupees (the name of the currency of Employer’s country) and further referred to as “the local currency”. A Bidder expecting to incur expenditures in other currencies for inputs to the Works supplied from outside the Employer’s country (referred to as “the foreign currency requirements”) shall indicate the percentage (s) of the Bid Price in the Appendix to Bid, Section IV, Bidding Forms, Part 1 of Bidding Documents, needed by him for the payment of such foreign currency requirements, limited to no more than three foreign currencies.</p> <p>b) For the purpose of conversion of foreign currency in to local currency i.e.</p>

	<p>Indian Rupees (INR) or vice versa, Bidders shall use the Reference Rates of Foreign Currency published by Reserve Bank of India (www.rbi.org.in), on the Base Date (28 days prior to the last date of second stage bid submission)</p> <p>In case a particular currency rate is not published by Reserve Bank of India, then the selling rate of such currency shall be taken from the following internet web site on the Base Date:</p> <p>http://www.oanda.com</p> <p>In case the exchange rates are not available on the above website also, then mid-market rate of such currency shall be taken from the alternate web site http://www.xe.com for the same date.</p> <p>c) In respect of procurement of goods and services from off shore sources Indian cost indices shall not apply but wholesale cost index for the relevant input of the respective country shall apply. In case a published index for such goods or services is not available, the wholesale prices index of relevant category of the respective country shall be used.</p> <p>The rates of exchange as mentioned above shall apply for all payments under the Contract so that no exchange risk will be borne by the successful bidder.</p>
ITB 30.2	Foreign currency requirements shall be indicated only in respect of those goods and services which the bidder expects to procure from off shore sources.
ITB 31.1	The bid validity period shall be 120 days from last date of bid submission.
ITB 32.1	Bid security shall be submitted with the Second stage bid and shall be <i>INR 200 Million</i> for each contract package.
ITB 32.3	The bid security shall be an unconditional guarantee issued by a reputed bank from an Eligible country.
ITB 33.1	The bidder shall submit 1 (one) original and 3 (three) copies of the Bid. In addition, one soft copy (read only) of the bid shall also be submitted.
ITB 33.2	The written confirmation of authorization to sign on behalf of the Bidder shall consist of: Legally authorized power of attorney
E2. Second Stage Bids: Submission and Opening	
ITB 34.1 & ITB 34.3	Bidders will not have the option of submitting their bids electronically.

E3. Second Stage Bids: Evaluation and Comparison	
ITB 47.3 (a)	Provisional Sum and Contingencies under this Contract are NIL
ITB 47.5	As detailed in para 4 of Section III, Evaluation and Qualification Criteria, Part 1 of Bidding Documents.
ITB 49.3	Replace the words “Appendix to Contract Agreement” with “Appendix to Tender”.
ITB 54.1	The Performance Security shall be an unconditional guarantee issued by a scheduled bank in India (included in the second schedule to Reserve Bank of India Act 1934) or the corresponding financial institution of foreign bank located in India. Bond is not acceptable as Performance Security.

Section III. Evaluation and Qualification Criteria

The purpose of this Section is to establish that the Bidder continues to meet the criteria used at the time of prequalification. It contains all the criteria that the Employer shall use to evaluate bids and qualify Bidders in accordance with ITB 23, ITB 47 and ITB 49. The Bidder shall provide all the information requested in this section as well as in the forms included in Section IV, Bidding Forms.

First Stage Technical Proposals

1. Evaluation

The documents required for submission and evaluation of First Stage Technical Proposal are detailed in Annexure-I of this section. In addition, the following factors shall apply in proposal evaluation.

2. Qualification

2.1 Updation of Information

The Bidder and any subcontractors shall continue to meet the criteria used at the time of prequalification and shall give an undertaking to this effect. The Bidder shall fill up Form number ELI 1.1 and ELI 1.2 included in Section IV, Bidding Forms, Part 1 of Bidding Documents.

2.2 Financial Resources

Using Form No FIN 3.3 in Section IV, Bidding Forms, the Bidder must demonstrate meeting the following cash-flow requirements:

For Single Contract Slice

US \$ 50 million (US\$ Fifty million) to be eligible for 1 (one) contract slice

For Both Contract Slices

US \$ 100 million (US\$ One Hundred million) to be eligible for 2 (two) contract slices

Bidder should meet the above cash flow requirement as indicated in paragraph 3.1 (i) of Section (III) - Eligibility and Qualification criteria of Prequalification Document issued on 11 April 2013 for this bid and as modified through addendum.

2.3 Personnel

The Bidder shall propose to arrange the following minimum key personnel during the execution of work for each lot:

SN	Key Position	Minimum Qualifying Requirement		
		Total Works Experience (years)	In Similar Works Experience (years)	Minimum Education Qualification
1	Chief Project Manager	20	10	B.E. (Civil)

SN	Key Position	Minimum Qualifying Requirement		
		Total Works Experience (years)	In Similar Works Experience (years)	Minimum Education Qualification
2.	Project Manager	15	08	B.E. (Civil)
3	Planning Engineer	12	06	B. E. (should be well conversant with Primavera-P6 or equivalent software)
4	Chief Design Engineer*	15	08	B.E. (Civil) + M.E. in Structural Engg. having familiarity with Autocad
5	Contract Manager	10	05	B.E. Civil
6	Bridge Engineer*	12	06	B.E. (Civil)
7	Railway Track Expert*	12	05	Diploma
8	Surveyor	08	04	Diploma in Civil Engg. + Expertise in Autocad
9	Alignment Expert	08	04	Diploma in Civil Engg. and experience in railway alignments
10	Quantity	10	05	Diploma in

SN	Key Position	Minimum Qualifying Requirement		
		Total Works Experience (years)	In Similar Works Experience (years)	Minimum Education Qualification
	Surveyor & Estimator			Civil Engg.
11	Quality Control Expert	12	06	B.E. in Civil Engg.
12	SHE Expert	12	06	Engineering Graduate with Diploma/ Specialization in Safety related field.

*Can be on Sub-contractor's team.

The Bidder shall provide details of the proposed personnel and their experience records in the Form number PER -1 and PER - 2 included in Section IV, Bidding Forms.

Notes:

- (i) The Bidders are advised NOT to submit more than one CV against each of the above mentioned key positions. In case more than one CV is submitted for any key position, such additional CV(s) shall not be considered for evaluation purposes and only the first CV in the bidding document would be considered for evaluation.
- (ii) Bidders, submitting bids for both the Contract Packages, are advised NOT to propose the same Key Personnel for both the Contract Package no. 201 and 202. However this shall not be applicable to the Bidders who have been pre-qualified for only one Contract Package.

2.4 Equipment

The Bidder shall demonstrate that it will have access to essential equipment /plants during the execution of Works. Capacity and number of machines

shall be commensurate with the Works program submitted by the Bidder to enable him to finish the work in stipulated time. The Bidder shall provide ownership/renting/leasing/ arrangement details of proposed items of equipment using Form number EQU in Section IV of Bidding Document.

S.N.	Name of Equipment
A. EARTH WORK	
1.	Excavator
2.	Grader
3.	Dozer
4.	Dumpers
5.	Vibratory Rollers
6.	Similar Earth Moving Equipment
B. BRIDGES	
1.	Hydraulic boring rigs
2.	Concrete Batching Plant
3.	Similar Bridge Construction Equipment
C. TRACK	
1.	Track Laying Train (rails & sleepers)
2.	Utility Track Vehicle/
3.	Suitable Motive Power
4.	Mobile Flash Butt Welding Plant with super puller
5.	Ballast Regulator
6.	Dynamic Track Stabilizer
7.	Multipurpose Tampers (MPT) with provision of tamping plain track and track on turnouts
8.	Similar Track Construction Equipment

Notes:

- (i) The above 'List of Equipment /Plants' is indicative only. The Bidders' are advised to refer to Sub-Clause 4.17 [Contractor's Equipment] of the Conditions of Contract pursuant to which the Contractor shall be responsible for Contractor's all Equipment.

- (ii) Bidders, submitting bids for both the Contract Packages, are advised NOT to propose the same essential equipment for both the Contract Package no. 201 and 202. However this shall not be applicable to the Bidders who have been pre-qualified for only one Contract Package.

2.5 Subcontractors and Suppliers

Subcontractors for major items of supply or services identified in the prequalification document must continue to meet the minimum criteria specified therein for each item.

The Bidder shall demonstrate in its proposal clearly the work and value (in terms of percentage of the approximate total value of the Contract) of that work to be carried out by its main subcontractors, including its proposed designer if the Design is not to be carried out in-house.

Where the Bidder intends to utilize materials, equipment & plants and services including design services procured from subcontractors / suppliers, it should outline such materials and equipment to be procured, in Form SUP, provided in Section IV.

In the case of a Bidder who offers to supply and/or install plant and equipment/ component/ software under the contract that the Bidder did not manufacture or otherwise produce and/or install, the Bidder shall provide the manufacturer's authorization, using the Form Manufacturer's Authorization provided in Section IV, Part 1 showing that the Bidder has been duly authorized by the manufacturer or producer of the related plant and equipment or component to supply and/or install that item in the Employer's country. The Bidder is responsible for ensuring that the manufacturer or producer complies with the requirements of ITB 4 and 5.

3. Technical Proposals

- 3.1 The Employer's Requirement included as a part of the bidding document for this Work generally conforms to the Indian Railways Specifications (IRS).

However, Bidders are encouraged to propose proven new technologies only for following items with their First Stage Technical Proposals, in addition to or in lieu of the requirements specified in the bidding documents, provided they can document that the proposed technical alternatives are proven in other rail systems elsewhere (in organized railways having a minimum axle load of 25 tons) for a minimum continuous period of 5 (five) years, are to the benefit of the Employer, that they fulfill the principal objectives of the contract and that they meet the basic performance and technical criteria specified in the bidding documents. For these areas, the Bidders may adopt the existing IRS designs or suggest new technologies.

3.2 The items for which, the Bidders are encouraged to propose technical alternatives, are as under:

- a. Bearings for Bridge Girders
- b. Switch Expansion Joints
- c. Single Shot Crucible Welding
- d. Pre-Stressed Concrete Sleepers
- e. Fittings
- f. Fastenings

The Employer desires that the type of fittings, fastenings and sleeper shall be uniform for the whole stretch in the section Mughalsarai to New Bhaupur and may amend the Bidding Documents accordingly, after the First Stage Evaluation has been completed and prior to inviting Second Stage Bids.

3.3 The Employer, at its discretion, would review these proposed technical alternatives to consider those bringing economical and technical benefits, besides the practical feasibility of implementing these in the field. In order to respect the confidentiality of the Bidders' technical alternative proposals, no proposals and no Bidder-specific communications concerning them will be shared with other Bidders. However, the Employer may issue addenda to the Bidding Documents disclosing to all prequalified Bidders that certain technical alternatives would constitute an acceptable basis for the Bidders' Second Stage Bids.

3.4 Product/technology proposed by the Bidder should have been successfully used over a period of at least 5 (five) years over a railways system having traffic density and pattern similar to the projected traffic over DFCC. Proven Design on a minimum axle load of 25 tons, on any gauge, shall serve this purpose.

As a part of Alternative Technical Proposal, the Bidder shall submit the following information for each product/technology, the Bidder desires to introduce on the Project.

1. Brief description with site photographs
2. Current manufacturer's - name and address
3. Details of Railways system over which it is being used
4. Test reports under lab conditions as applicable.
5. Test reports under train running conditions as applicable.
6. Performance Certificate of the user Railway covering all operating parameters.
7. Statement concerning copyright ownership and ease of transfer of technology, submission of Copyright undertaking form CU, as attached in Bidding Forms
8. Statement concerning simplicity in operation and maintenance relative to DFCC/ Indian Railways
9. Statement concerning maintainability/ serviceability of the product on long term basis
10. Statement concerning availability of spare parts/ replacement
11. Cost benefit analysis of the alternative product/ technology vis-à-vis the product/ technology in Employer's Requirement, in relation to the execution of the Works.
12. Concept design or equivalent technical illustration of the proposed technical alternative.

4. Second Stage Bid

4.1. Evaluation

The evaluation of the Second Stage bid shall be carried out in accordance with the provisions of ITB 47. Bidders shall submit Second Stage Bid as per the Form - LOB –SS Bidding Forms-Section IV.

4.2. Evaluation of non-material non conformities as per ITB 43.3

Non material non conformities related to the Bid Price will be evaluated considering price implication for the same based upon current market rate/ rate analysis. Decision of employer regarding evaluation of nonmaterial non conformities shall be final and binding on the bidder.

4.3 Evaluation of bid prices for different lots

These Bidding documents allow Bidders to quote separate prices for different lots (contracts), as per ITB 47.5 and the award to a single Bidder of multiple lots (contracts), the methodology to determine the lowest evaluated bid of the lot (contract) combinations, including any discounts offered in the Letter of Bid, shall be as follows:

Substantially responsive bids shall be evaluated so as to determine the bid or combination of bids offering the lowest evaluated cost to the Employer, provided that a Bidder will only be awarded the number of lots (contracts) for which the Bidder has been prequalified.

4.4 Time Schedule for Completion of Works:

The designated period for the completion and taking over the entire Works shall be 1350 days (One Thousand Three Hundred Fifty Days) from the Commencement Date, as indicated with further details in Para 8.2, Appendix to Tender, Part 3, Section VIII of these Bidding Documents. Bidders shall confirm that their First Stage Technical Proposals and subsequently, their Second Stage Bids are based on this Time Schedule for Completion. No credit of any kind will be given in the evaluation of Technical Proposals and Second Stage Bids to a Proposal and/ or a Bid offering to complete the Works earlier than this designated period. However, Technical Proposals and Second Stage Bids offering to complete the Works later than this designated period shall be rejected by the Employer.

Annexure- I

**Documents Required For Bid Submission and Evaluation
 of
 First Stage Technical Proposal**

1 Type of Contract

First Stage Technical Proposals, followed by Second Stage Bids, are being invited for a Lump-Sum Contract for Design and Construction, based on the Employer's Requirements and Concept Design. The detailed design of all components of the freight railway will be carried out by the Contractor based on the technical standards and specifications prescribed in Part 2- Employers' Requirements. The Conditions of Contract will be based on the "Conditions of Contract for Plant and Design-Build for Electrical and Mechanical Plant, and for Building and Engineering Works Designed by the Contractor" First Edition 1999 published by the Fédération Internationale des Ingénieurs-Conseils (FIDIC).

2 Documents Required for First Stage Technical Proposal

The First Stage Technical Proposal will comprise of the following documents including the documents required as per Clause ITB 11:

2.1 General Submittal

TO BE SUBMITTED				
	Documents	By Sole Bidder	By JV	Remarks
(a)	Proposal Letter Two Stage Bidding: First Stage Technical Proposal – (Form – LOB –FS, Bidding Forms-Section IV)	√	√	
(b)	Power of Attorney to submit Bid (Form POA-1, Bidding Forms-Section IV);	√	√	
(c)	Power of Attorney to Authorized Representative of Joint Venture (Form POA-2, Bidding Forms-Section IV);	×	√	
(d)	Proforma Letter of Participation from Each Member of Joint Venture (Form LOP, Bidding	×	√	To be submitted by each member of the JV

TO BE SUBMITTED				
	Documents	By Sole Bidder	By JV	Remarks
	Forms-Section IV);			
(e)	Memorandum of Understanding (Form MOU –Bidding Forms-Section IV);	×	√	
(f)	Bidder Information (Form ELI 1.1 – Bidding Forms-Section IV);	√	√	
(g)	Bidder Party Information (Form ELI 1.2 – Bidding Forms-Section IV);	×	By each member of the JV	Form ELI-1.2, is also to be submitted for each proposed specialist subcontractors.
(h)	Undertaking as required vide para 2.1 Section III Evaluation and Qualification Criteria (FORM-UND, Bidding Forms-Section IV);	√	√	
(i)	Financial Resources (FIN 3.3 – Bidding Forms-Section IV);	√	√	To be submitted for each member of the JV
(j)	Current Contract Commitments / Works in Progress (Form CCC, Bidding Forms-Section IV);	√	√	To be submitted for each member of the JV
(k)	Schedule of Suppliers (Form SUP – Bidding Forms-Section IV);	√	√	
(l)	Undertaking of Copyright (Form CU –Bidding Forms-Section IV);	√	√	
(m)	Manufacturers' Authorisation (FORM-MA, Bidding Forms-Section IV)	√	√	To be submitted by all authorised manufacturers proposed by the bidder
(n)	Alternative Technical Bid, if any, pursuant to Clause 3 of Section	√	√	

TO BE SUBMITTED				
	Documents	By Sole Bidder	By JV	Remarks
	III, Evaluation and Qualification Criteria.			
(o)	Technical Submittals pursuant to clause 2.2 of Annexure-I of Section III, Evaluation and Qualification Criteria.	√	√	

2.2 Technical Submittal

1) Methods Statement

The Bidder shall submit a methods statement which demonstrates the Bidder's understanding of the Project and comprehension of the Works involved. In this methods statement, the Bidder shall submit *inter alia* a detailed plan for survey, layout, Site investigation, Design, earthwork, bridge construction, track laying/construction, testing & commissioning, initial maintenance and handing over the completed Works to the Employer in strict compliance with the Contract requirements. This shall correspond to Site organization, Contractor's equipment, construction schedule and Work Plan being submitted by the Bidder as a part of bid documents.

These methods statement shall also describe the system of mechanized track construction to be adopted by the Bidder. Mechanized track laying / construction under this Contract shall be interpreted as described in para 17.4 of Volume 5, Section VI, Employers Requirement, Part 2. Employer will evaluate and clear the mechanized track construction methodology proposed by the Bidder before it is incorporated by the Bidder in its second stage bid.

2) Organization and Management

The Bidder shall submit an organization chart identifying the management and reporting structure for key positions and all site teams. The Bidder shall submit a commentary that describes the roles and responsibilities of the various key positions in the organization structure, the minimum qualifications, channels of communication, organization they come from and how this organization structure will manage the execution of the works within the scheduled period. The names and CV's of key staff in

the organization chart shall be included, and referenced to form **PER-1 & 2** in Section IV, Bidding Forms.

3) Work Plan

The Bidder shall submit a **Work Plan** which shall indicate how the Bidder intends to organize and carry out the Works, achieve Stages and complete the whole of the Works by the appropriate Key Dates. The Work Plan shall be prepared in terms of weeks from the Date of Commencement of Works, taking D as the Commencement Date and other time schedules marked in D+ format. Bidders are required to provide details of Contractor's Equipment in **Form EQU** as per Bidding Form included in Section IV.

(Refer to Explanatory Note 1 at the end of this Section)

4) Documents for Safety, Quality and Environmental Plans

The Bidder shall submit the following documents, which shall demonstrate clearly the Bidder's proposals for achieving effective and efficient Safety, Quality and Environment protection procedures.

- a) **Outline Safety Plan**
- b) **Outline Quality Plan**
- c) **Outline Environmental Plan**

(Refer to Explanatory Note 2 at the end of this Section)

5) Concept Design & Performance Parameters Compliance

The Bidder shall submit details of compliance with the Employers' Requirements as listed in Part 2 of bidding document. This shall be done in a tabular format on a section by section basis and detail how the compliance is achieved or how an alternative if any would achieve such compliance.

6) Technical Data

The Bidder shall furnish the following details during this submittal:

S.	Item	Design / Drawings to be followed
----	------	----------------------------------

N.		RDSO Reference Nos.	Other than RDSO Reference with details
1.	Bearings for Bridge Girders		
2.	Switch Expansion Joints		
3.	Single Shot Crucible Welding		
4.	Pre-Stressed Concrete Sleepers with fittings and fastenings a) For normal track b) For special locations – (i) SEJ's (ii) Points & Crossings (iii) Bridge Approaches, (iv) Level Crossings		
5.	Fittings		
6.	Fastenings		

Note: RDSO Drawings are for reference only. Bidders are responsible for final design.

Explanatory Note No. 1

Reference Paragraph 2.2 (3) Work Plan : Requirements of Work Plan

- (1) The Work Plan shall show how the Bidder proposes to organize and carry out the Works and to achieve Stages and complete the whole of the Works by the given Key Dates/Milestones. This may be in the form of an Excel spread sheet/ Primavera or similar program output.
- (2) The Work Plan shall follow the instructions given in **Part 2, Section VI, “Employer’s Requirements/ Volume 6 Appendix 4, PROJECT PROGRAM REQUIREMENTS”**
- (3) The Work Plan shall show achievement of all Key Dates and Works Area Access Dates. The Works Programme shall also show Milestones, but the Milestones shall not be taken as imposing any constraints that in any way affect the logic or limit any other dates in the Programme.
- (4) The Works Plan shall take into account the Bidder’s proposed Design Submission Programme and should
 - (a) indicate, wherever possible, dates and periods relating to interfaces with and between others including dates for submission of further documents required by the Contract and periods for their acceptance.
 - (b) be consistent with the overall Work Plan and in accordance with the Employer's Requirements;
 - (c) make adequate allowance for periods of time for review by authorities whose approval is necessary;
 - (d) include a schedule identifying, describing, cross-referencing and explaining the Design packages and submissions which the Bidder intends to submit;
 - (e) take due account of the design co-ordination interface periods during which the Contractor shall be required to undertake and complete all aspects of design co-ordination with other consultants engaged in the review of the design of the Project such design will be compatible and coordinated with others and allowing adequate time for the Employer’s assessments and decisions.
- (5) The Work Plan shall contain sufficient detail to assure the Employer of the feasibility of the plan and approach proposed by the Bidder.
- (6) The Bidder should have regard to the possibility that during the bid evaluation period the Work Plan may be developed into a Programme which, in the event of award, would be the initial submission of the Works Programme. To facilitate this process the Bidder shall, in the preparation of the Work Plan, take due account of the provisions of the Employer's Requirements in so far as they concern the Work Plan.

- (7) The Work Plan shall be accompanied by a narrative statement that shall describe Programme activities, assumptions and logic, and highlight the Bidder's perception of the major constraints and critical areas of concern in the organization, construction and completion of the Works. This narrative statement shall also indicate which elements of the Works the Bidder intends to carry out off-Site and/or outside India with details of the proposed locations of where any such work is to be carried out, the facilities available and any third party undertakings the Bidder may have in this regard. In particular the Bidder must state the assumptions made in respect of the interfaces with the Employer, other contractors and third parties both in detail and time, and any requirements for information on matters which would affect his works.
- (8) All programmes shall include design, procurement periods, major material, on site, offsite, off shore production/ prefabrication, temporary construction, interface and periods for System wide, utility and adjacent contractors, testing and commissioning and integrated testing along with any other training and trial running information.
- (9) The proposed submission of the Work Plan and Design Submission Programme shall not, in any event, be construed as a submission under Clause 8.3 (Programme) of the General Conditions.

Explanatory Note No. 2

Reference Paragraph 2.2(4) Annexure-I - Documents for Safety, Quality and Environmental Plans

OUTLINE SAFETY PLAN

The Bidder shall submit as part of his bid an Outline Safety Plan which shall contain sufficient information to demonstrate clearly the Bidder's proposals for achieving effective and efficient safety procedures. The Outline Safety Plan should include an outline of the safety procedures and regulations to be developed and the mechanism by which they will be implemented for ensuring safety as required as per the Employer's Requirements - Construction and Sub-Clause 4.8 and 6.7 of the Conditions of Contract.

The Outline Safety Plan shall be headed with a formal statement of policy in relation to safety and shall be sufficiently informative to define the Bidder's safety plans and set out in summary an adequate basis for the development of the Site Safety Plan to be submitted in accordance with Sub-Clause 4.8 and 6.7 of the Conditions of Contract including a testing and commissioning strategy/plan for the whole of the Works.

OUTLINE QUALITY PLAN

The Bidder shall submit as part of his bid an Outline Quality Plan which shall contain sufficient information to demonstrate clearly the Bidder's proposals for achieving effective and efficient Quality Assurance and Control System. The Plan should include an outline of the procedures and regulations to be developed and the mechanism by which they will be implemented for ensuring Quality as required in terms of the Employer's Requirements. It shall also include an outline of procedures, verification and validation for all tests and materials for all the Works being done by him under this Contract.

OUTLINE ENVIRONMENTAL PLAN

The Bidder shall submit as part of his bid an Outline Environmental Plan illustrating the intended means of compliance with the requirements of Appendix 13 "ENVIRONMENTAL PROTECTION REQUIREMENTS" to the Employer's Requirements and setting out in summary form an adequate basis for the development of the more detailed document to be submitted under Sub-Clause 4.18 of the Conditions of Contract. The Outline Environmental Plan shall contain sufficient information to demonstrate clearly the proposed method of achieving the Bidder's environmental objectives with regard to the requirement of the Contract.

The Outline Environmental Plan shall be headed with a formal statement of policy in relation to environmental protection and shall be sufficiently informative to define the

Bidder's environmental plans and set out in summary an adequate basis for the submission of a detailed and comprehensive site environmental quality management plan to be submitted in accordance with Sub-Clause 4.18 of the Conditions of Contract.

The Outline Plan shall include the methods and procedures for the Environmental Impact Assessment to be performed under the Contract.

Section IV. Bidding Forms

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Form LOB –FS

(Para 2.1(a), Annexure-I; Section III)

Proposal Letter – Two Stage Bidding, First Stage Technical Proposal

Date: _____

ICB No.: HQ/EN/EC/D-B/Mughalsarai-New
Bhaupur

Invitation for Bid No.: _____

To:

Subject: Technical Proposal for Design and Construction of Civil, Structures and Track Works for Double Line Railway involving Formation in Embankments/Cuttings, Ballast on Formation, Track Works, Bridges, Structures, Buildings, Yards, Integration with IR Existing Railway System and Testing & Commissioning on Design-Build Lump Sum Basis for Mughalsarai – New Bhaupur Section of Eastern Dedicated Freight Corridor

Contract Package No.¹:

Dear Sir

We, the undersigned, declare that:

- (a) We have examined and have no reservations to the bidding document, including Addenda issued in accordance with Instructions to Bidders (ITB)-8_;
- (b) We offer to undertake the procurement of Works under the above named Contract in conformity with the bidding document.
- (c) We, including any subcontractors or manufacturers for any part of the contract, have or will have nationalities from eligible countries, in accordance with ITB-4.2;
- (d) We, including any subcontractors or manufacturers for any part of the contract, do not have any conflict of interest in accordance with ITB-4.3;
- (e) We are not submitting more than one First Stage Technical Proposal for each Contract in this bidding process as a Bidder, either individually or as a partner in a joint venture, in accordance with ITB-4.3, except for alternative offers permitted under ITB Clause 13.

¹ Separate Proposal letter along with separate Technical Proposals are to be submitted for each Contract Package.

- (f) We, including any of our subcontractors or manufacturers for any part of the contract, have not been declared ineligible by the Bank, under the Employer’s country laws or official regulations or by an act of compliance with a decision of the United Nations Security Council;
- (g) We are not a government owned entity/ We are a government owned entity but meet the requirements of ITB-4.5²
- (h) We further undertake, if invited to do so by you, and at our own cost, to attend a clarification meeting at a place of your choice, for the purpose of reviewing our First Stage Technical Proposal and duly noting all amendments and additions thereto, and noting omissions there from that you may require.
- (i) We further undertake, upon receiving your written invitation, to proceed with the preparation of our Second Stage bid, updating our First Stage Technical Proposal in accordance with the requirements from the Memorandum of the clarification meeting, and completing our Second Stage bid for performing the activities of the above noted Works, in accordance with our updated First Stage Technical Proposal, and with ITB Clause 27.
- (j) We have paid, or will pay the following commissions, gratuities, or fees with respect to the bidding process or execution of the Contract:

Name of Recipient	Address	Reason	Amount

(If none has been paid or is to be paid, indicate “none”)

Signature: _____

Name _____ signed in the capacity of

_____ duly authorized to sign the bid for and on behalf of

_____ on Date: [insert day, month, year]

² Delete which is not applicable

Form UND

(para 2.1 (g) of Annexure-1, Section III)

Subject: Technical Proposal for Design and Construction of Civil, Structures and Track Works for Double Line Railway involving Formation in Embankments/Cuttings, Ballast on Formation, Track Works, Bridges, Structures, Buildings, Yards, Integration with IR Existing Railway System and Testing & Commissioning on Design-Build Lump Sum Basis for Mughalsarai – New Bhaupur Section of Eastern Dedicated Freight Corridor

Contract Package No.:

Undertaking Form

We, M/s _____ (insert name of the bidder) hereby undertake and confirm that we and our sub-contractors _____ (insert the name of sub-contractor(s)) continue meeting the criteria used at the time of prequalification.

Signature.....

NameSigned in the capacity of

duly authorized to sign the bid for and on behalf of

Dated on _____ day of _____, _____

Bidder Information Sheet

Date: _____
ICB No. and Title: _____
Invitation for Bid No.: _____
Contract Package Name and Number: _____
Page _____ of _____ pages

1. Bidder's Legal Name:
2. In case of JVA, legal name of each party:
3. Bidder's actual or intended Country of Registration:
4. Bidder's Year of Registration:
5. Bidder's Legal Address in Country of Registration:
6. Bidder's Authorized Representative Information Name: Address: Telephone/Fax numbers: Email Address:
7. Attached are copies of original documents of: <input type="checkbox"/> Articles of Incorporation or Registration of firm named in 1, above, in accordance with ITB Sub-Clauses 4.1 and 4.2. <input type="checkbox"/> In case of JVA, letter of intent to form JVA including a draft agreement, or JVA agreement, in accordance with ITB Sub-Clauses 4.1 and 11.1(i) Single Stage Bidding or 11.1(g) Two Stage Bidding. <input type="checkbox"/> In case of government owned entity from the Employer's country, documents establishing legal and financial autonomy and compliance with the principles of commercial law, in accordance with ITB Sub-Clause 4.5.

Please note that a written authorization needs to be attached to this sheet as required by ITB 21.2 Single Stage Bidding) or ITB 17.2 Two Stage Bidding

Party to Bidder Information Sheet

Date: _____
ICB No. and Title: _____
Invitation for Bid No.: _____
Contract Package Name and Number: _____
Page _____ of _____ pages

1. Bidder's Legal Name:
2. Bidder's Party Legal name:
3. Bidder's Party Country of Registration:
4. Bidder's Party Year of Registration:
5. Bidder's Party Legal Address in Country of Registration:
6. Bidder's Party Authorized Representative Information Name: Address: Telephone/Fax numbers: Email Address:
7. Attached are copies of original documents of: <input type="checkbox"/> Articles of Incorporation or Registration of firm named in 1, above, in accordance with ITB Sub-Clauses 4.1 and 4.2. <input type="checkbox"/> In case of government owned entity from the Purchaser's country, documents establishing legal and financial autonomy and compliance with the principles of commercial law, in accordance with ITB Sub-Clause 4.5.

Form MOU

(para 2.1(e), Annexure 1, Section III)

Draft Memorandum of Understanding (MoU) for Joint Venture Participation

(For Bidders in India to be executed on non-judicial Stamp paper of appropriate value. For Bidders from outside India, to be executed according to the applicable laws in the Bidder's country and by taking into account the Notes shown below.)

This agreement cum memorandum of understanding is made on theday ofmonth.....year

AMONG

M/s _____ having its registered office at _____ (hereinafter referred to as) acting as the authorized representative of the first part,

AND

M/s _____ having its registered office at _____ (hereinafter referred to as) in the capacity of a Joint Member of the second³/ other⁴ part;

AND

M/s _____ having its registered office at _____ (hereinafter referred to as) in the capacity of a Joint Member of the third part.⁵

The expressions of _____ and _____ and _____⁶ shall wherever the context admits, mean and include their respective legal representatives & successors and permitted assigns and shall collectively be referred to as "the Parties" and individually as "the Party"

WHEREAS:

Dedicated Freight Corridor Corporation of India Limited (DFCC) [hereinafter referred to as "Client"] has invited bids for _____ "[Insert name of Contract Package and No.]"

³ Delete the words "second/" in case of only two members forming the Joint Venture.

⁴ Delete the words "/other " in case of three members forming the Joint Venture

⁵ Delete this paragraph in case of only two members forming the Joint Venture.

⁶ Delete the words "and _____" in case of only two members forming the Joint Venture.

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 MOU.
 1. Notice for Invitation for Bids, and
 2. Bidding documents as issued by Dedicated Freight Corridor Corporation of India Limited (DFCC)
 3. Any Addendum/Corrigendum issued by DFCC
 4. The bid submitted on our behalf jointly by the authorized representative.
2. The 'Parties' have studied the documents and have agreed to participate in submitting a 'bid' jointly.
3. M/s _____ shall be the authorized representative of the JV for all intents and purpose and shall represent the Joint Venture in its dealing with the Client. For the purpose of submission of bid proposals, the parties agree to nominate _____ as the authorized representative duly authorized to sign and submit all documents and subsequent clarifications, if any, to the Client. However M/s _____ shall not submit any such proposals, clarifications or commitments before securing the written clearance of the other Member(s) which shall be expeditiously given by M/s _____ and M/s _____⁷ to M/s _____.
4. The 'Parties' have resolved that the distribution of responsibilities and their proportionate share in the Joint Venture is as under:

Joint Venture Member(s)	Financial Share (%)	Responsibilities
(i)		
(ii)		
(iii) ⁸		

5. **JOINT AND SEVERAL RESPONSIBILITY**

The Parties undertake that all partners shall be jointly and severally liable to the Client in the discharge of all the obligations and liabilities in terms of the Bidding

⁷ Delete the words "and M/s _____" in case of only two members forming the Joint Venture.

⁸ Delete the row in case of only two members forming the Joint Venture.

Documents issued by the Client and for the execution of contract in terms of the Contract with the Client, if awarded to the Joint Venture.

6. **ASSIGNMENT AND THIRD PARTIES**

The parties shall cooperate throughout the entire period of this MOU on the basis of exclusivity and none of the Parties shall make arrangement or enter into agreement either directly or indirectly with any other party or group of parties on matters relating to the Project except with prior written consent of the other party.

7. **EXECUTIVE AUTHORITY**

The said Joint Venture shall act through its authorized representative who shall have the authority to conduct all business for and on behalf of any and all the partners of the Joint Venture during the bidding process and, in the event the Joint Venture is awarded the Contract, during contract execution.

The management structure for the project shall be prepared by mutual consultations to enable completion of project to quality requirements of the Contract within permitted cost and time.

8. **GUARANTEES**

Till the award of the work, the authorized representative shall furnish bid guarantees to the Client on behalf of the Joint Venture which shall be legally binding on all the Members of the Joint Venture.

9. **BID SUBMISSION**

Each Party shall bear its own cost and expenses for preparation and submission of the bid and all costs until conclusion of a contract with the Client for the Project. Common expenses shall be shared by the parties in the ratio of their actual participation.

10. **INDEMNITY**

Each Party hereto agrees to indemnify the other Party(ies), against its respective part in case of breach/default, of any liabilities sustained by the Joint Venture.

11. **FINANCING**

For the execution of the respective portions of works and to fulfil its obligations in terms of this Joint Venture Agreement, the Parties shall make their own arrangements to bring the required finance, plants and equipment, materials,

manpower and other resources.

12. DOCUMENTS & CONFIDENTIALITY

Each Party shall maintain confidentiality and not use any commercial / technical information, received or generated in the course of preparation and submission of the bid or in the course of execution of the contract, if awarded to the JV, for any purpose unrelated to the Contract.

13. ARBITRATION

Any dispute, controversy or claim arising out of or relating to this agreement shall be settled, in the first instance, amicably between the Parties.

If an amicable settlement cannot be reached as above, it will be settled by arbitration in accordance with the broad principles provided for arbitration in the Conditions of Contract.

14. VALIDITY

This Agreement shall remain in force till the occurrence of the earliest to occur 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 Joint Venture is declared unsuccessful, or
- b. Cancellation/ shelving of the Project by the client for any reasons prior to award of work
- c. Execution of detailed JV agreement by the parties, setting out detailed terms after award of work by the Client, substantially covering the requirements as mentioned in Section IV of bidding documents read with Sub-Clause 1.14 [Joint Several Liability] of the Conditions of Contract.

15. This MOU is drawn in _____ number of copies with equal legal strength and status. One copy is held by M/s _____ and the other by M/s _____ & M/s _____ and a copy submitted with the proposal.

16. This MOU shall be construed under the laws of the Bidder's actual or intended country of Registration.

17. NOTICES

Notices shall be given in writing by fax confirmed by registered mail or commercial courier to the following fax numbers and addresses.

In witness, where of this agreement has been executed as of the day and year first above

written.

Authorized Representative

Other Member(s)

(Name, Address & Contact Details⁹)

(Name, Address & Contact Details)

IN WITNESS WHEREOF THE PARTIES, have executed this MOU the day, month and year first before written:

M/s _____

(Seal)

M/s _____

(Seal)

Witness

1 _____ (Signature, Name & Address)

2 _____ (Signature, Name & Address)

Notes:

- 1. In case of existing joint venture, the certified copy of JV Agreement may 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 Apostle certificate.*

⁹ Contact Details should contain the telephone & fax numbers and email id.

(para 2.1(d), Annexure 1, Section III)

Proforma Letter of Participation from Each Member of Joint Venture (JV)

(For Bidders in India to be executed on non-judicial Stamp paper of appropriate value. For Bidders from outside India, submission of this form is not mandatory. If an equivalent form is submitted by Bidders from outside India, it is to be executed according to the applicable law in the Bidder's country and by taking into account the Notes shown below.)

(On each Firm's Letter Head)

No. _____

Date _____

From:

To:

The Managing Director

5th Floor, Pragati Maidan Metro Station Building

New Delhi – 110 001

Subject: Technical Proposal for Design and Construction of Civil, Structures and Track Works for Double Line Railway involving Formation in Embankments/Cuttings, Ballast on Formation, Track Works, Bridges, Structures, Buildings, Yards, Integration with IR Existing Railway System and Testing & Commissioning on Design-Build Lump Sum Basis for Mughalsarai – New Bhaupur Section of Eastern Dedicated Freight Corridor

Contract Package No.:

Ref: Your notice for Invitation for Bid (IFB) _____

1. We wish to confirm that our company has formed a Joint Venture with (i) and (ii) * for the purposes associated with IFB referred to above.

[Member(s) who are not the authorized representative of the JV should add the following paragraph].*

‘The JV is led by whom we hereby authorize to act on our behalf for the purposes of the submission of the bid for the above mentioned

work and authorize it to incur liabilities and receive instructions for and on behalf of any and all the Members or constituents of the Joint Venture.’*

OR

*(Member being the authorized representative of the group should add the following paragraph)**

‘In this group we act as authorized representative and, for the purposes of applying for qualification, represent the Joint Venture’ *

2. In the event of our JV is awarded the contract, we agree to be jointly with (i) _____ (ii) _____ (names of other members of our JV) and severally liable to the Dedicated Freight Corridor Corporation of India Limited, its successors and assignees for all obligations, duties and responsibilities arising from or imposed by the contract subsequently entered into between Dedicated Freight Corridor Corporation of India Limited and our JV.
3. We, further agree that entire execution of the contract shall be carried out exclusively through the authorized representative.

Yours faithfully,

(Signature)

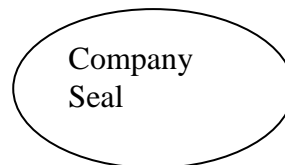
(Name of Signatory) _____

(Capacity of Signatory) _____

* Delete as appropriate

Notes:

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 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 Apostle Certificate.*

(para 2.1(b), Annexure 1, Section III)

Power of Attorney to submit the Bid

(For Bidders in India to be executed on non-judicial Stamp paper of appropriate value. For Bidders from outside India, submission of this form is not mandatory. If an equivalent form is submitted by Bidders from outside India, it is to be executed according to the applicable law in the Bidder's country and by taking into account the Notes shown below.)

Subject: Technical Proposal for Design and Construction of Civil, Structures and Track Works for Double Line Railway involving Formation in Embankments/Cuttings, Ballast on Formation, Track Works, Bridges, Structures, Buildings, Yards, Integration with IR Existing Railway System and Testing & Commissioning on Design-Build Lump Sum Basis for Mughalsarai – New Bhaupur Section of Eastern Dedicated Freight Corridor

Contract Package No.:

Know all men by these presents, we _____ do hereby constitute, appoint and authorize Mr/Ms _____ who is presently employed with us and holding the position of _____ as our attorney, 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 above mentioned work, including signing and submission of all documents and providing information/responses to Dedicated Freight Corridor Corporation of India Limited, representing us in all matters, dealing with Dedicated Freight Corridor Corporation of India Limited in all matters in connection with our bid for the said project.

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

Dated this the _____ day of _____ 2013

(Signature and Name in Block letters of the person whom POA is being delegated)

(Signature and Name in Block letters of the Signatory delegating the POA)

Seal of Company

Witness

Witness 1:

Name:

Address:

Occupation:

Witness 2:

Name:

Address:

Occupation:

Notes:

- 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 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 Appostille certificate.*

Form POA -2

(para 2.1(c), Annexure 1, Section III)

Power of Attorney to the Authorized Representative of Joint Venture (JV)

(For Bidders in India to be executed on non-judicial Stamp paper of appropriate value. For Bidders from outside India, submission of this form is not mandatory. If an equivalent form is submitted by Bidders from outside India, it is to be executed according to the applicable law in the Bidder's country and by taking into account the Notes shown below.)

POWER OF ATTORNEY¹⁰

Whereas, Dedicated Freight Corridor Corporation of India Limited (DFCCIL) has invited bids for the work of ----- [Insert Contract Package Name and Number], and

Whereas we, the members of the Joint Venture comprising of M/s. _____ M/s. _____, and M/s _____, are interested in submission of bid for this work in accordance with the terms and conditions contained in the bidding documents and,

Whereas, it is necessary for the members of the Joint Venture to designate one of them as the authorized representative, with all necessary power and authority to do, for and on behalf of the Joint Venture, all acts, deeds and things as may be necessary in connection with the Joint Venture's bid for the project.

NOW THIS POWER OF ATTORNEY WITNESSETH THAT:

We, M/s _____ and M/s _____ hereby nominate M/s _____, being the lead member of the Joint Venture, as the authorized representative of the Joint Venture, to do on behalf of the Joint Venture, all or any of the acts, deeds or things necessary or incidental to the Joint Venture's bid for the contract, including submission of bid, participating in conferences, responding to queries, submission of information/documents and to represent the Joint Venture in all its dealings with the Dedicated Freight Corridor Corporation of India Limited / Railway or any other Government Agency or any person, in connection with the bid / contract for the said work until culmination of the process of bidding and till the contract agreement, if successful, is entered into with DFCCIL and thereafter till the expiry of the contract agreement.

We hereby, jointly and severally ratify, confirm and agree that all acts, deeds and things lawfully done or caused to be done by our said authorized representative or his

¹⁰ To be executed by all the members of the Joint Venture, except the lead member / authorized representative.

substitute or substitutes, pursuant to this Power of Attorney, shall always be deemed to have been done by us and / or by the Joint Venture.

Dated this the _____ day of _____ 2013

(Signature)	(Signature)
(Name in Block letters of Executant -1)	(Name in Block letters of Executant-2)
Seal of Company	Seal of Company
Witness 1:	Witness 2:
Name:	Name:
Address:	Address:
Occupation:	Occupation:

The above Power of Attorney is hereby accepted by me for and on behalf of the Lead Member

(Signature of the PA Holder).....

(Name of the Power of Attorney Holder).....

(Designation).....

For and on behalf of *(Name of the Lead Member)*

Notes:

- 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 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 Apostile certificate.*

Current Contract Commitments / Works in Progress

Bidders and each partner to a JVA should provide information on their current commitments on all contracts that have been awarded, or for which a letter of intent or acceptance has been received, or for contracts approaching completion, but for which an unqualified, full completion certificate has yet to be issued.

Subject: Technical Proposal for Design and Construction of Civil, Structures and Track Works for Double Line Railway involving Formation in Embankments/Cuttings, Ballast on Formation, Track Works, Bridges, Structures, Buildings, Yards, Integration with IR Existing Railway System and Testing & Commissioning on Design-Build Lump Sum Basis for Mughalsarai – New Bhaupur Section of Eastern Dedicated Freight Corridor

Contract Package No.:

Name of contract	Employer, contact address/ tel/fax/email	In case of JV, Bidder's Percentage Share	Total Contract Amount	Currency (\$/€/£/NR etc.)	Value of outstanding work as on 28 days before last date of submission of bids	Conversion Rate as on 28 days before last date of submission of bids	Current Value of outstanding work (US\$ equivalent) as on 28 days before last date of submission of bids	Estimated Completion Date	Average monthly invoicing over last six months (US\$/month)	Remarks
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1.										
2.										
3.										
4.										
5.										
etc.										

Certified that the above information is correct as per our records and nothing has been concealed.

Signature.....NameSigned in the capacity of duly authorized to sign the bid for and on behalf of on dd/mm/yyyy

Notes:

(i) For the purpose of conversion of foreign currency into Indian Rupees (INR), Bidders shall use the Foreign Currency Reference Rates published by Reserve Bank of India on 28 days prior to last date of bid submission. In case the currency rates are not published by Reserve Bank of India, the same shall be taken from the internet web site– <http://www.oanda.com/currency/historical-rates>. If the rates are not available on this website also, these can be taken from the internet website <http://www.xe.com/ict/>

(ii) In case the Contract is in JV, the Bidder should provide amounts of complete contract in column (4), (6), (8) and (10).

(para 2.1 (h), Annexure 1, Section III)

Financial Resources¹¹

Specify proposed sources of financing, such as liquid assets, unencumbered real assets, lines of credit, and other financial means, net of current commitments, available to meet the total construction cash flow demands of the subject contract or contracts, as indicated in Section III (Evaluation and Qualification Criteria).

Subject: Technical Proposal for Design and Construction of Civil, Structures and Track Works for Double Line Railway involving Formation in Embankments/Cuttings, Ballast on Formation, Track Works, Bridges, Structures, Buildings, Yards, Integration with IR Existing Railway System and Testing & Commissioning on Design-Build Lump Sum Basis for Mughalsarai – New Bhaupur Section of Eastern Dedicated Freight Corridor

Contract Package No.:

Source of financing	Amount (US\$ equivalent)
1.	
2.	
3.	
4.	

Note: For the purpose of conversion of Indian Rupees (INR) / foreign currency into US\$, Bidders shall use the Foreign Currency Reference Rates published by Reserve Bank of India on 28 days prior to last date of bid submission. In case rates of currency are not published by Reserve Bank of India, the same shall be taken from the internet web site–<http://www.oanda.com/currency/historical-rates>. If the rates are not available on this website also, these can be taken from the internet website <http://www.xe.com/ict/>

¹¹In case of Joint Venture, to be submitted by each member
Page 21 of 59

(para 2.1 (j) of Annexure-1, Section III)

Proposed Subcontractors and Suppliers for Major Items of Works

Subject: Technical Proposal for Design and Construction of Civil, Structures and Track Works for Double Line Railway involving Formation in Embankments/Cuttings, Ballast on Formation, Track Works, Bridges, Structures, Buildings, Yards, Integration with IR Existing Railway System and Testing & Commissioning on Design-Build Lump Sum Basis for Mughalsarai – New Bhaupur Section of Eastern Dedicated Freight Corridor

Contract Package No.:

Major Items of Materials, Equipment or Services to be subcontracted	Proposed Subcontractor, Supplier, or Service Provider	Nationality/ Location of the subcontractor, supplier or service provider	Approximate Value of proposed Subcontracting Items (in percentage of the approximate total value of the Contract)

Note:

The Bidder shall enter in this Schedule the proposed names of subcontractors, suppliers or service providers of major items of materials, equipment or services that the Bidder proposes to incorporate in the Works. Notwithstanding the provision of this information, submission of details of materials, equipment and services for approval, as required by the Contract, will be required from the Contractor.

(para 2.1 (k) of Annexure-1, Section III)

Copyright Undertaking

The Managing Director,
Dedicated Freight Corridor Corporation,
Pragti Maidain Metro Station, New Delhi,
India 110001.

Subject: Technical Proposal for Design and Construction of Civil, Structures and Track Works for Double Line Railway involving Formation in Embankments/Cuttings, Ballast on Formation, Track Works, Bridges, Structures, Buildings, Yards, Integration with IR Existing Railway System and Testing & Commissioning on Design-Build Lump Sum Basis for Mughalsarai – New Bhaupur Section of Eastern Dedicated Freight Corridor

Contract Package No.:

Dear Sir,

We, (name of Bidder / Joint Venture) hereby undertake that the Design Data, Geotechnical Investigation Report, Alignment Report, Employer's Requirement, tender Drawings etc. both in hard copy and Digitized format, and the bidding documents purchased as a necessary part of our preparation of this bid shall be used solely for the preparation of the Bid and that if the bid is successful, shall be used solely for the design of the temporary and permanent works.

We further undertake that the aforesaid tender drawings and documents prepared by Dedicated Freight Container Corporation Limited shall not be used in whole, in part or in any altered form on any other project, scheme, design or proposal that the bidder/ Joint Venture /Party to Joint Venture, Sub Contractors of the bidder or Joint Venture /parent company of Party to Joint Venture or the Bidder will be involved with either in India or any other country.

Signature.....

NameSigned in the capacity of

duly authorized to sign the bid for and on behalf of

Dated on _____ day of _____, _____

Manufacturer's Authorization

(para 2.1 (I) of Annexure-1, Section III)

Subject: Technical Proposal for Design and Construction of Civil, Structures and Track Works for Double Line Railway involving Formation in Embankments/Cuttings, Ballast on Formation, Track Works, Bridges, Structures, Buildings, Yards, Integration with IR Existing Railway System and Testing & Commissioning on Design-Build Lump Sum Basis for Mughalsarai – New Bhaupur Section of Eastern Dedicated Freight Corridor

Contract Package No.:

Date: _____

ICB No.: _____

To: The Managing Director
Dedicated Freight Corridor Corporation of India Ltd
5th Floor, Pragati Maidan,
Metro Station Building Complex
New Delhi - 110001

WHEREAS

We (*Insert name of the Manufacturer*) who are official manufacturers of (*Insert Name of manufacturing products*) having factories at (*Insert the location / address of the manufacturing facility*) do hereby authorize (*Insert name of the Bidder*) to submit a bid for Dedicated Freight Corridor (Eastern), Mughalsarai to New Bhaupur Contract No. 201 / 202¹²: Design and Build Contract for Civil, Structures and Track Works, the purpose of which inter alia, is to provide/ use the following goods, manufactured by us for execution of the contract for which bid is proposed to be submitted and to subsequently negotiate and sign the Contract.
Descriptions of Goods:

We hereby extend our full guarantee and warranty in accordance with Clause 11 of the General Conditions of Contract, with respect to the goods offered by the above firm.

Signed: _____

Name: _____

Title: _____

Duly authorized to sign this Authorization on behalf of: _____

Dated on _____ day of _____, _____

¹² Delete whichever is not applicable

Contractor's Equipment

The Bidder shall provide adequate information to demonstrate clearly that it has the capability to meet the requirements for the key Contractor's equipment listed in Section III, Evaluation and Qualification Criteria.

All key equipment /plant proposed by the Bidder shall be filled in this form.

Subject: Technical Proposal for Design and Construction of Civil, Structures and Track Works for Double Line Railway involving Formation in Embankments/Cuttings, Ballast on Formation, Track Works, Bridges, Structures, Buildings, Yards, Integration with IR Existing Railway System and Testing & Commissioning on Design-Build Lump Sum Basis for Mughalsarai – New Bhaupur Section of Eastern Dedicated Freight Corridor

Contract Package No.:

S.N.	Equipment information					Current status		Source of Equipment	Owner				Agreements*
	Item of equipment	Name of manufacturer	Model and power rating	Capacity	Country of Origin and Year of Manufacture	Current location	Details of current commitments	Owned/Rented /Leased/ Specially manufactured	Name of owner	Address of owner	Contact name and title	Telephone /Email	Details of rental/ lease/ manufacture agreements specific to the project
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)

Section IV. Bidding Forms

S.N.	Equipment information					Current status		Source of Equipment	Owner				Agreements*
	Item of equipment	Name of manufacturer	Model and power rating	Capacity	Country of Origin and Year of Manufacture	Current location	Details of current commitments	Owned/Rented /Leased/ Specially manufactured	Name of owner	Address of owner	Contact name and title	Telephone /Email	Details of rental/ lease/ manufacture agreements specific to the project
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)

*Omit this information for equipment owned by the Bidder.

Personnel*

Subject: Technical Proposal for Design and Construction of Civil, Structures and Track Works for Double Line Railway involving Formation in Embankments/Cuttings, Ballast on Formation, Track Works, Bridges, Structures, Buildings, Yards, Integration with IR Existing Railway System and Testing & Commissioning on Design-Build Lump Sum Basis for Mughalsarai – New Bhaupur Section of Eastern Dedicated Freight Corridor

Contract Package No.:

Sl.	Key Position	Minimum Qualifying Requirement (years)			Proposed Personnel by the Bidder				Remarks
		Total Experience	In Similar works	Qualification	Name	Total Experience	In Similar works	Qualification	
1.	Chief Project Manager	20	10	B. E. (Civil)					
2.	Project Manager	15	08	B. E. (Civil)					
3.	Planning Engineer	12	06	B. E. (should be well conversant with Primavera-P6 or equivalent software)					
4.	Chief Design Engineer	15	08	B. E. (Civil) + M.E. in Structural Engg.					

Sl.	Key Position	Minimum Qualifying Requirement (years)			Proposed Personnel by the Bidder				Remarks
		Total Experience	In Similar works	Qualification	Name	Total Experience	In Similar works	Qualification	
				having Familiarity with Autocad					
5.	Contract Manager	10	05	B. E. Civil					
6.	Bridge Engineer	12	06	B. E. (Civil)					
7.	Railway Track Expert	12	05	Diploma Certificate					
8.	Surveyor	10	05	Diploma in Civil Engg. + Expertise in Autocad					
9.	Alignment Expert	08	04	Diploma in Civil Engg. and experience in railway alignment					
10.	Quantity Surveyor & Estimator	10	05	Diploma in Civil Engg.					
11.	Quality Control Expert	10	05	B.E. in Civil Engg.					
12.	SHE Expert	12	06	Engineering Graduate					

Sl.	Key Position	Minimum Qualifying Requirement (years)			Proposed Personnel by the Bidder				Remarks
		Total Experience	In Similar works	Qualification	Name	Total Experience	In Similar works	Qualification	
				with Diploma/ Specialization in Safety related field.					

*As listed in Section III.

Notes:

(i) The CV's of the Key Personnel should be enclosed as FORM PER 2

(ii) The Bidders are advised NOT to submit more than one CV against each of the above mentioned key positions. In case more than one CV is submitted for any key position, such additional CV(s) shall not be considered for evaluation purposes and only the first CV in the bidding document would be considered for evaluation.

Resume of Proposed Personnel

Subject: Technical Proposal for Design and Construction of Civil, Structures and Track Works for Double Line Railway involving Formation in Embankments/Cuttings, Ballast on Formation, Track Works, Bridges, Structures, Buildings, Yards, Integration with IR Existing Railway System and Testing & Commissioning on Design-Build Lump Sum Basis for Mughalsarai – New Bhaupur Section of Eastern Dedicated Freight Corridor

Contract Package No.:

Name of Bidder		
Position		
Personnel information	Name	Date of birth
	Professional qualifications	
Present employment	Name of employer	
	Address of employer	
	Telephone	Contact (manager / personnel officer)
	Fax	E-mail
	Job title	Years with present employer

Summarize professional experience over the previous number of years as required wide paragraph 2.3 of “**Part 1 Bidding Procedures, Section III**”, in reverse chronological order. Indicate particular technical and managerial experience relevant to the project.

From	To	Company / Project / Position / Relevant technical and management experience

From	To	Company / Project / Position / Relevant technical and management experience

Form - LOB –SS
(para 4.1, Section III)

Letter of Bid – Two Stage Bidding, Second Stage Bid

Date: _____
ICB No.: HQ/EN/DB/Mughalsarai-New Bhaupur
Invitation for Bid No.: _____

To: _____

Subject: Bid for Design and Construction of Civil, Structures and Track Works for Double Line Railway involving Formation in Embankments/Cuttings, Ballast on Formation, Track Works, Bridges, Structures, Buildings, Yards, Integration with IR Existing Railway System and Testing & Commissioning on Design-Build Lump Sum Basis for Mughalsarai – New Bhaupur Section of Eastern Dedicated Freight Corridor

Contract Package No.: ¹³

Dear Sir,

We, the undersigned, declare that:

- (a) We have examined and have no reservations to the bidding document, (including the Price Schedules 1.0, 2.0 to 2.9), including Addenda issued in accordance with Instructions to Bidders (ITB)-8, and we confirm that the First Stage Technical Proposal submitted originally by us shall constitute the 'Updated First Stage Technical Proposal', for the purpose of the Second Stage Bid, together with your requirements incorporated in the Memorandum of Changes (as is required pursuant to 'First Stage Technical Proposal' evaluation). We note from Addendum No....¹⁴ to the Bidding Documents that the Employer's Requirements have been revised.
- (b) We offer to submit our bid in conformity with the bidding documents for Contract Number:.....[insert Contract Number]
- (c) Excluding the discounts offered below (if any), the price of our Bid for Contract No. (Insert Contract No.) in INR is :

INR (Insert Bid Price in figures)

INR

¹³ Separate Letter of Bid along with Financial Proposal should be submitted by the Bidder

¹⁴ Insert the relevant Addenda Number(s)

.....(Insert Bid Price in words)

The percentage breakup of Bid Price in INR and not more than 3 foreign currencies is as stated in Appendix to Bid.

(d) The discounts offered and the methodology for their application are:

..... ;

.....

.....

(e) Our bid shall be valid for a period of 120 (one hundred twenty) days from the date fixed for the submission deadline for the Second Stage bids as stipulated in the Letter of Invitation to submit a Second Stage bid, and it shall remain binding upon us and may be accepted at any time before the expiration of that period;

(f) If our bid is accepted, we commit to obtain a performance security, in accordance with the bidding document;

(g) We, including any subcontractors or manufacturers for any part of the contract, have or will have nationalities from eligible countries, in accordance with ITB-4.2;

(h) We, including any subcontractors or manufacturers for any part of the contract, do not have any conflict of interest in accordance with ITB-4.3;

(i) We are not submitting more than one bid for each Contract Number in this bidding process as a Bidder, either individually or as a partner in a joint venture, in accordance with ITB-4.3, except for alternative offers permitted under ITB Clause 13;

(j) We, including any of our subcontractors or manufacturers for any part of the contract, have not been declared ineligible by the Bank, under the Employer's country laws or official regulations or by an act of compliance with a decision of the United Nations Security Council;

(k) We are not a government owned entity/ We are a government owned entity but meet the requirements of ITB-4.5¹⁵

(l) We have paid, or will pay the following commissions, gratuities, or fees with respect to the bidding process or execution of the Contract:

Name of Recipient	Address	Reason	Amount
-------------------	---------	--------	--------

¹⁵ Delete as appropriate

(If none has been paid or is to be paid, indicate “none.”)

- (m) We understand that you are not bound to accept the lowest evaluated bid or any other bid that you may receive.
- (n) We understand that this bid, together with your written acceptance thereof included in your notification of award, shall constitute a binding contract between us, until a formal contract is prepared and executed; and
- (o) We hereby enclose Bid Security of INR 200 Million in terms of ITB 32.1 in Form BS (Section IV- Bidding Forms, Part 1)

Signature.....

NameSigned in the capacity of

duly authorized to sign the bid for and on behalf of

Dated on _____ day of _____, _____

Appendix to Bid

Subject: Technical Proposal for Design and Construction of Civil, Structures and Track Works for Double Line Railway involving Formation in Embankments/Cuttings, Ballast on Formation, Track Works, Bridges, Structures, Buildings, Yards, Integration with IR Existing Railway System and Testing & Commissioning on Design-Build Lump Sum Basis for Mughalsarai – New Bhaupur Section of Eastern Dedicated Freight Corridor

Contract Package No.:

The percentage break up of lump sum bid price for local and foreign currencies for Contract Number(Insert here the Contract Package No.) quoted in the Letter of Bid (LOB-SS) is as follows:

Currency	A Name of Currency	B Percentage of bid price
Local currency (INR)	INR	
Foreign currency # 1		
Foreign currency # 2		
Foreign currency #3		

Form of Bid Security

Required for Second Stage Bid Only

(Bank Guarantee)

On the letterhead of the Bank

Beneficiary: Dedicated Freight Corridor Corporation of India Ltd

Invitation for Bids No: _____

Date: _____

BID GUARANTEE No.: _____

Guarantor: _____

We have been informed that _____ (hereinafter called "the Bidder") has submitted or will submit to the Beneficiary its bid (hereinafter called "the Bid") for the execution of Contract Package Name and Number _____ under Invitation for Bids No. _____ ("the IFB").

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

At the request of the Bidder, we(*Name of the Bank*), as Guarantor, hereby irrevocably undertake to pay the Beneficiary any sum or sums not exceeding in total an amount of _____ (*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 a separate signed document accompanying or identifying the demand, stating that either the Bidder:

(a) has withdrawn its Bid during the period of bid validity set forth in the Bidder's Letter of Bid ("the Bid Validity Period"), or any extension thereto provided by the Bidder;

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 Bidder, (i) has failed to execute the contract agreement, or (ii) has failed to furnish the performance security, in accordance with the Instructions to Bidders ("ITB") of the Beneficiary's bidding document.

This guarantee will expire: (a) if the Bidder is the successful bidder, upon our receipt of copies of the contract agreement signed by the Bidder and the performance security issued to the Beneficiary in relation to such contract agreement; or (b) if the Bidder is not the successful bidder, upon the earlier of (i) our receipt of a copy of the Beneficiary's notification to the Bidder 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.

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

[signature(s)]with seal of the Bank

Note: All italicized text is for use in preparing this form and shall be deleted from the final document

PRICE SCHEDULES

(Sub-clause 14.4, Conditions of Contract)

Price Schedule 1.0: For Payments in Local & Foreign Currencies

Subject: Contract Package for Design and Construction of Civil, Structures and Track Works for Double Line Railway involving Formation in Embankments/Cuttings, Ballast on Formation, Track Works, Bridges, Structures, Buildings, Yards, Integration with IR Existing Railway System and Testing & Commissioning on Design-Build Lump Sum Basis for Mughalsarai – New Bhaupur Section of Eastern Dedicated Freight Corridor

Contract Package No.:

Bid Price for Contract Name and Number (Insert here the Contract Name and number) shall be the same as the sum quoted in the Letter of Bid in INR.

All payments in applicable currencies shall be made as per clause 14.15 of Conditions of Contract. Foreign currency requirements shall be expressed in accordance with ITB 30.1.

For the following items to be procured from outside India the relevant indices for price adjustment shall be as stated in table below:

SN	ITEM NAME	NAME OF PUBLISHED INDEX NEAREST TO THE BASE DATE	SOURCE OF PUBLICATION
(1)	(2)	(3)	(4)
1	Labour Lo		
2	Cement Co		
3	Steel So		
4	Fuel & Lubricant Fo		
5	Machinery & Machine tools Mo		
6	Rail Steel Ro		

The applicable whole sale cost index for the relevant input of the respective country shall apply. In case a published index for such goods or services is not available the whole sale price index of relevant category of the country shall be used. (Refer sub clause 13.8 of Conditions of Contract for further details on price adjustment)

Source of Index shall be as published by the relevant Government or public organization. The bidder should also attach specimens of the publications for the last 12 months. For example,

if Euro is one of the foreign currencies in which the payment of contract price is to be made, the price index should be the index published by the European Union.

Price Schedule 2.0

Apportionment of Contract Price for Payments According to Cost Centres (Sub-clause 14.4 of Conditions of Contract)

S N	Cost Centre	Percentage of Contract Price	
		Contract Package 201	Contract Package 202
(1)	(2)	(3)	(4)
1	Survey, investigation, Design, Setting out and As Built drawings	1.0%	1.0%
2	Earthwork	35.3%	37.9%
3	Bridges (Minor)	11.1%	7.0%
4	Bridges (Major)	13.9%	3.4%
5	Important Bridges	2.2%	6.0%
6	Track Works	31.0%	39.7%
7	Other Engineering Works	1.0%	1.0%
8	Quarters, Stations and other service buildings	1.5%	1.0%
9	Integrated Testing & Commissioning and Inventory supply	3.0%	3.0%
	Total-	100.00%	100.00% %

The percentage figures as filled in column (3) and (4) by the Employer for the apportionment of the Contract Price for completion of the Works corresponding to the items given above are fixed and payment will be released for different cost centre as per above percentage break-up of contract price. Refer Sub-Clause 14.4 – Particular Conditions of Contract for further details.

Price Schedule 2.1

Contract Price Weightage for Interim Payments for Survey, Investigation, Design, Setting Out and As Built Drawing (Sub-clause 14.4 of Conditions of Contract)

Cost Centre	Item of Work		Stage Payment		Contract Package No. 201		Contract Package No. 202		Payment Procedure
					Weightage	Cost	Weightage	Cost	
(1)	(2)		(3)		(4)	(5)	(6)	(7)	(8)
Survey, Investigation, Design, Setting Out and As Built Drawing	1	Survey	1(a)	Site survey and finalization of alignment	5%	1.0 % of the Contract Price	5%	1.0 % of the Contract Price	Unit of measurement is linear length along alignment. Payment of each stage will be made on pro rata completion of linear length as per weightage given in this Schedule
		Geotechnical/ Hydrological Investigations	1(b)	Site data collection, Detailed Geotechnical and Hydrological investigations and report submission	10%		10%		
	2	Preliminary Design	2(a)	Preliminary Design of the formation, bridges culverts, Flyovers /ROB /RUB and FOB.	15%		15%		
			2(b)	Preliminary Design of Track works, fencing, drains, platforms and all other structures.	5%		5%		
	3	Definitive Design	3(a)	Definitive Design of the formation, bridges culverts, Flyovers /ROB /RUB and FOB.	20%		20%		
			3(b)	Definitive Design of the Track works, fencing, drains, platforms, and all other structures.	10%		10%		
	4	Setting Out	4	Setting out of the Final Alignment with	15%		15%		

Dedicated Freight Corridor
 Eastern Corridor, Mughalsarai to New Bhaupur
 Contract Package 201 & 202: Design and Build Contract for
 Civil, Structures and Track Works

Section IV. Bidding Forms

Cost Centre	Item of Work		Stage Payment		Contract Package No. 201		Contract Package No. 202		Payment Procedure
					Weightage	Cost	Weightage	Cost	
(1)	(2)		(3)		(4)	(5)	(6)	(7)	(8)
				location of all structures					
	5	Completion Drawings	5	As Built Drawings	20%		20%		
				Total	100%		100%		

Note: Requirement of Survey investigation, Preliminary design, definitive design etc are described in detail in “Part 2, Section VI- Employer’s Requirement”.

Price Schedule 2.2

Contract Price Weightage for Interim Payment for Earthwork

(Sub-clause 14.4 of Conditions of Contract)

Cost Centre	Item of Work	Stage Payment		Contract Package 201		Contract Package 202		Payment Procedure
				Weightage	Cost	Weightage	Cost	
(1)	(2)	(3)		(4)	(5)	(6)	(7)	(8)
Earthwork	Earthwork in formation including blanketing, drains, retaining structures, turfing, pitching and other incidental works.	1	Earthwork in embankment/cutting including compaction so as to achieve 50% of desired height below bottom of blanketing layer	34%	35.3 % of the Contract Price	30%	37.9 % of the Contract Price	Unit of measurement is linear length along alignment. Payment of each stage will be made on pro rata completion of linear length as per weightage given in this Schedule
		2	Balance earthwork in embankment/ cutting including compaction up to bottom of blanketing layer	34%		30%		
		3	Earthwork in Blanketing layer complete in all respect	25%		33%		
		4	Longitudinal/cross drains, retaining structures, pitching, turfing and other incidental works, complete.	7%		7%		
		Total:		100%		100%		

Note:

- (i) The percentage weightages in column 4 above have been worked out on the basis of existing standard design of earthwork in vogue on IR.
- (ii) In Contract Package 201, the linear length of Mughalsarai Yard will have a weightage of 3 i.e. every 100 linear meter of work done in Mughalsarai Yard will be considered as 300 linear meter.

Price Schedule 2.3

Contract Price Weightage for Interim Payment for Bridges (Minor)

(Sub-clause 14.4 of Conditions of Contract)

Cost Centre	Item of Work	Stage Payment		Contract Package 201		Contract Package 202		Payment Procedure
				Weightage	Cost	Weightage	Cost	
(1)	(2)	(3)		(4)	(5)	(6)	(7)	(8)
Bridges (Minor)	Construction of Minor Bridges, Road Under Bridge, Culverts on Roads, etc.	1	On ground clearance, ground improvement and testing, completion of the foundation works.	10%	11.1 % of the Contract Price	10%	7.0 % of the Contract Price	Cost of each minor bridge including culverts will be determined on the basis of total linear length**, along alignment, of the minor bridges including culverts on pro rata basis. Payment of each stage for a bridge/culvert will be made on the completion of the relevant stage as per the weightage given in this schedule.
		2*	On completion of RCC Boxes, abutment, piers for slab bridges, back filling and approaches.	47%		47%		
		3	On completion of balance works as per drawing like -deck slab along with walkway, railings, wing walls, return walls, all types of protection works, pitching, turfing, river training works, if any, tests on completion, if any etc. complete in all respects	43%		43%		
		Total:		100%		100%		

Note- * If a bridge is constructed using precast elements, then 75 % payment against sub cost centre 2 shall be released upon finishing casting of elements and transporting all such elements to the site of bridge construction. Balance 25% shall be released after completion of stage 2.

** For culverts on roads, the linear length of the bridge would be the horizontal span of the culvert.

Price Schedule 2.4

Contract Price Weightage for Interim Payment for Bridges (Major)

(Sub-clause 14.4 of Conditions of Contract)

Cost Centre	Item of Work	Stage Payment		Contract Package 201		Contract Package 202		Payment Procedure
				Weightage	Cost	Weightage	Cost	
(1)	(2)	(3)		(4)	(5)	(6)	(7)	(8)
Bridges (Major)	Construction of Major Bridges, rail flyovers, modification / construction of existing road over bridges.	1	On completion of Piles up to the bottom of Pile Cap or completion of Well below the Well Cap, or completion of open foundations below the pier base as applicable, including completion of the testing, if any..	40%	13.9 % of the Contract Price	40%	3.4 % of the Contract Price	Cost of each bridge will be determined on the basis of total linear length, along alignment, of the bridges on pro rata basis. Payment of each stage for a bridge will be made on completion of the relevant stage as per the weightage given in this schedule.
		2	On Completion of abutment/piers including pile caps or well caps as applicable, including the work of Pier Cap and Bed Blocks (without bearings) and completion of approaches including back filling.	30%		30%		
		3	On completion of superstructure, bearings, walkways and handrails	20%		20%		

Cost Centre	Item of Work	Stage Payment		Contract Package 201		Contract Package 202		Payment Procedure
				Weightage	Cost	Weightage	Cost	
(1)	(2)	(3)		(4)	(5)	(6)	(7)	(8)
		4	On completion of Wing Walls, Return Walls, Protection works, if any, pitching, turfing, river training works, if any, testing on completion, if any, etc. complete in all respects.	10%		10%		
			Total:	100%		100%		

Note: All the above mentioned four stages will be further subdivided in to the number of piers + 2 abutments, as applicable as per approved drawing by the Engineer, and stage payment for completed work for each pier and abutment shall be made as per the requirement of the stages stated above.

Price Schedule 2.5

Contract Price Weightage for Interim Payment for Important Bridges

(Sub-clause 14.4 of Conditions of Contract)

Cost Centre	Item of Work	Stage Payment		Contract Package 201		Contract Package 202		Payment Procedure
				Weightage	Cost	Weightage	Cost	
(1)	(2)	(3)		(4)	(5)	(6)	(7)	(8)
Important Bridges	Construction of Important Bridges	1	On completion of Piles up to the bottom of Pile Cap or completion of Well below the Well Cap, as applicable, including completion of the testing, if any.	25%	2.2 % of the Contract Price	25%	6.0 % of the Contract Price	Cost of each bridge will be determined on the basis of total linear length, along alignment, of the bridges on pro rata basis. Payment of each stage for a bridge will be made on completion of the relevant stage as per the weightage given in this schedule.
		2	On Completion of abutment/piers including pile caps or well caps as applicable, including the work of Pier Cap and Bed Blocks (without bearings) and completion of approaches including back filling.	15%		15%		
		3	On completion of superstructure, bearings, walkways and handrails.	50%		50%		

Cost Centre	Item of Work	Stage Payment		Contract Package 201		Contract Package 202		Payment Procedure
				Weightage	Cost	Weightage	Cost	
(1)	(2)	(3)		(4)	(5)	(6)	(7)	(8)
		4	On completion of Wing Walls, Return Walls, Protection works, if any, pitching, turfing, river training works, if any, testing on completion, if any, complete in all respects.	10%		10%		
			Total:	100%		100%		

Note: All the above mentioned four stages will be further subdivided in to the number of piers + 2 abutments, as applicable as per approved drawing by the Engineer, and stage payment for completed work for each pier and abutment shall be made as per the requirement of the stages stated above.

Price Schedule 2.6

Contract Price Weightage for Interim Payment for Track Works

(Sub-clause 14.4 of Conditions of Contract)

Cost Centre	Item of Work	Stage Payment		Contract Package 201		Contract Package 202		Payment Procedure
				Weightage	Cost	Weightage	Cost	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Track Works	Procurement of track materials and construction of double line railway track for a maximum operating speed of 100 km/h including yards and its integration with IR existing railway system, integrated testing and commissioning of Works.	1	Ballast supplying and laying initial layer to facilitate mechanized track laying.	8%	31.0 % of the Contract Price	8%	39.7 % of the Contract Price	Unit of measurement is linear length along alignment. Payment of each stage will be made on pro rata completion of linear length as per weightage given in this Schedule
		2	Supply of new 60kg Rails and stacking at site as per the specifications contained in Employer's Requirement	40%		40%		
		3	Supply of new Concrete sleepers and stacking at site as per the specifications contained in Employer's Requirement	15%		15%		
		4	Mechanized Track laying in block section between station limits -on PSC sleepers including – sleepers laying, welding of rails, rail threading, fixing all rail sleeper fittings etc. complete to ensure continuous and complete linkage of track in the block section as per	13%		13%		

Cost Centre	Item of Work	Stage Payment		Contract Package 201		Contract Package 202		Payment Procedure
				Weightage	Cost	Weightage	Cost	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
			track diagram.					
		5	Mechanized Track laying in yards (within station limits) - on PSC sleepers including – sleepers laying, welding of rails, rail threading, fixing all rail sleeper fittings, Points & Crossings, Switch Expansion Joints, derailing switch, all loop lines in yards, etc. complete to ensure continuous and complete linkage of track in the yard as per yard plan.	7%		7%		
		6	Ballast supplying and laying final layer to facilitate lifting of track, making of ballast cushion and profile, de-stressing of LWR, machine tamping for making track fit for 45km/h	7%		7%		
		7	On completion of linking of the DFC yards with the existing IR yards after yard remodelling required for the IR yards as per approved plan.	2%		2%		

Cost Centre	Item of Work	Stage Payment		Contract Package 201		Contract Package 202		Payment Procedure
				Weightage	Cost	Weightage	Cost	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
		8	Ballast supplying and laying final layer to facilitate lifting of track, making of ballast cushion and profile, de-stressing of LWR, machine tamping for making track fit for 100km/h for main line and specified speed for the yard lines.	8%		8%		
			Total:	100%		100%		

Payment against materials for the Works vide item Sub cost centre 2 & sub cost centre 3 above

- i) In Contract Package 201, the linear length of Mughalsarai Yard will have a weightage of 3 i.e. every 100 linear meter of work done in Mughalsarai Yard will be considered as 300 linear meter.
- ii) In respect of rails and concrete sleepers brought by the Contractor to the site for incorporation in the Permanent Works, the Contractor shall be paid 80% of the respective sub-cost centre as per above schedule against an Indemnity Bond, and balance 20% shall be paid when these materials are put to use as per the Employer's Requirement. The Contractor shall ensure that:
 - a. The materials are in accordance with the specification for the works.
 - b. The materials have been delivered to the site and are properly stored and protected against loss, damage and deterioration.
 - c. Proper record of receipts and use of materials are maintained by the Contractor and such records are available for inspection by the Engineer.
- iii) Once the payment for supply of rails and sleepers has been made as above, these shall be deemed to be the property of DFCC and Contractor shall not remove these without prior approval of the Engineer and take due care of the same against theft/ damage etc. at no extra cost.

Price Schedule 2.7

Contract Price Weightage for Interim Payment for Other Engineering Works

(Sub-clause 14.4 of Conditions of Contract)

Cost Centre	Item of Work	Stage Payment	Contract Package 201		Contract Package 202		Payment Procedure
			Weightage	Cost	Weightage	Cost	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Other Engineering Works	Platforms	1. On completion of each platform at locations as per the Employer's Requirement.	7%	1.0 % of the Contract Price	10%	1.0 % of the Contract Price	Unit of measurement is square metres.
	Fencing	2. On completion of fencing works at stations and other locations as per the Employer's Requirement.	16%		24%		Unit of measurement is linear length of fencing works. Payment will be made on pro rata completion of linear length as per weightage given in this Schedule.
	Level Crossing Gates	3. On completion of level crossing at stations and other locations as per the Employer's Requirement.	4%		2%		Unit of measurement is no. of level crossings. Payment of each stage will be made on pro rata completion of no. of

Cost Centre	Item of Work	Stage Payment	Contract Package 201		Contract Package 202		Payment Procedure
			Weightage	Cost	Weightage	Cost	
							level crossings subject to weightage given in this Schedule.
	Foot Over Bridges	4. On completion of Foot Over Bridges at stations and other locations as per the Employer's Requirement.	39%		24%		Unit of measurement is number and payment shall be made on pro rata completion and regulated as per note below.
	Miscellaneous Works	5. (a) Removal of chartered utilities including trees as mentioned in Bidding Document	30%		36%		Unit of measurement is linear length along the alignment. Payment shall be made on prorata completion.
		5. (b) and installation of signages.	4%		4%		
		Total:	100%		100%		

Note: (i) The stage payments for Foot Over Bridges shall be regulated as under:

- | | | |
|------|---|-----|
| 1.1. | On completion of the foundation works - | 20% |
| 1.2. | On completion of the erection work of Foot Over Bridges- | 35% |
| 1.3. | On completion of landings and railings and protection mesh- | 25% |
| 1.4. | On completion of painting, testing on completion etc.
complete in all respects - | 20% |

(ii) The stage payment for the removal / relocation of the utilities shall be regulated as under:

Out of the total length involved in the project, only the kilometers requiring shifting / relocation of the utilities shall be considered. The entire payment of the shifting of the utilities and tree cutting shall be considered only for these kilometers. As and when the shifting / relocation of all the chartered utilities including all trees for a particular kilometer are completed, the Contractor will be entitled to claim payment on pro rata completion of that kilometer. For the purpose of this clause, the length shall be reckoned from the beginning of the whole kilometer to the end i.e. from km 200 to 201, 201 to 202 and so on. No payment will be made for part kilometer completion.

Price Schedule 2.8

Contract Price Weightage for Interim Payment for Quarters, Stations and other Service Buildings

(Sub-clause 14.4, Conditions of Contract)

Cost Centre	Item of Work	Stage Payment		Contract Package 201		Contract Package 202		Payment Procedure
				Weightage	Cost	Weightage	Cost	
(1)	(2)	(3)		(4)	(5)	(6)	(7)	(8)
Quarters, Stations and other Service Buildings	Construction of Quarters, Stations and other Service Buildings	1	On completion of Foundation up to plinth level as per the Employer's Requirement.	20%	1.5 % of the Contract Price	20%	1.0 % of the Contract Price	Cost of each building will be determined on pro rata basis of total area of Building for the project in Sqm. For buildings having more than one storey, the total area of each such building would be found out by adding the area of each storey to arrive at the total area. Payment of each stage will be made as per weightage given in
		2*	On completion of brick work up to roof level including fixing of door and window frames as per the Employer's Requirement.	40%		40%		
		3*	On completion of roof casting, plastering, fixing door / window shutters, Painting door window shutters, Sanitary and water supply works in the buildings, Boundary wall, electrical works and final finishing with all works complete as per the Employer's Requirement.	25%		25%		

Section IV. Bidding Forms

Cost Centre	Item of Work	Stage Payment		Contract Package 201		Contract Package 202		Payment Procedure
				Weightage	Cost	Weightage	Cost	
(1)	(2)	(3)		(4)	(5)	(6)	(7)	(8)
		4	On completion of circulating area, roads, drainage, water supply works outside the buildings, street lighting, if any.	15%		15%		this Schedule.
		Total:		100%		100%		

*Note: For the purpose of these stage payments, the completion of work for each storey will entitle the contractor to claim payment for that stage.

Price Schedule 2.9

Contract Price Weightage for Interim Payment for Integrated Testing & Commissioning and Inventory Supply

(Sub-clause 14.4 of Conditions of Contract)

Cost Centre	Item of Work	Stage Payment	Contract Package 201		Contract Package 202		Payment Procedure
			Weightage	Cost	Weightage	Cost	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Integrated Testing and Commissioning	Integrated Testing and Commissioning	After successful completion of Integrated Testing and Commissioning of Works and supply of inventory as per the list below.	100%	3.0 % of the Contract Price	100%	3.0 % of the Contract Price	Payment for Integrated Testing and Commissioning shall be released after successful completion of Integrated Testing and Commissioning of Works, supply of inventory and certification by Engineer.
		Total:	100%		100%		

Inventory List

List of items to be deposited with DFCC after completion of the Works and before taking over of the same by DFCC

Contract Package No. 201 and 202

SN	ITEM	QUANTITY Percentage of total quantity used in each Contract Package, rounded off to next whole number
(1)	(2)	(3)
1	Concrete Sleepers	2%
2	Fittings for concrete sleepers like rubber pad, elastic clip, liner	5%
3	Special sets of concrete sleepers for SEJ, Level Crossings, Bridge Approaches, derailing switch,	2%
4	Points and crossing sets including sleepers with complete fittings - Left hand and right hand sets	5%
5	SEJs, Derailing switches, glued joints	5%
6	Rails 60 kg (new without holes) 13.0 m long pieces	1%

Above items, in good condition, shall be handed over to the nominated official(s) of DFCC at a location informed by the Engineer.

Section V. Eligible Countries

Eligibility for the Provision of Goods, Works and Services in Bank-Financed Procurement

1. In accordance with Para 1.8 of the Guidelines: Procurement under IBRD Loans and IDA Credits, dated January 2011, the Bank permits firms and individuals from all countries to offer goods, works and services for Bank-financed projects. As an exception, firms of a Country or goods manufactured in a Country may be excluded if:

Para 1.8 (a) (i): as a matter of law or official regulation, the Borrower's Country prohibits commercial relations with that Country, provided that the Bank is satisfied that such exclusion does not preclude effective competition for the supply of the Goods or Works required, or

Para 1.8 (a) (ii): by an Act of Compliance with a Decision of the United Nations Security Council taken under Chapter VII of the Charter of the United Nations, the Borrower's Country prohibits any import of goods from that Country or any payments to persons or entities in that Country.

2. For the information of borrowers and bidders, at the present time firms, goods and services from the following countries are excluded from this bidding:
 - (a) With reference to paragraph 1.8 (a) (i) of the Guidelines: None
 - (b) With reference to paragraph 1.8 (a) (ii) of the Guidelines: None



BID DOCUMENT FOR

DESIGN AND CONSTRUCTION OF CIVIL, STRUCTURES AND TRACK WORKS FOR DOUBLE LINE RAILWAY INVOLVING FORMATION IN EMBANKMENTS/CUTTINGS, BALLAST ON FORMATION, TRACK WORKS, BRIDGES, STRUCTURES, BUILDINGS, YARDS, INTEGRATION WITH IR EXISTING RAILWAY SYSTEM AND TESTING & COMMISSIONING ON DESIGN-BUILD LUMP SUM BASIS FOR MUGHALSARAI – NEW BHAUPUR SECTION OF EASTERN DEDICATED FREIGHT CORRIDOR

CIVIL, STRUCTURES AND TRACK WORKS

CONTRACT PACKAGE NOS: 201 & 202

Issued on: **12.02.2014**

ICB No.: HQ/EN/EC/D-B/Mughalsarai - New Bhaupur

(Part-2)

EMPLOYER: DEDICATED FREIGHT CORRIDOR CORPORATION OF INDIA LTD

(A GOVERNMENT OF INDIA ENTERPRISE)

MINISTRY OF RAILWAYS

COUNTRY: INDIA

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Environment Assessment (EA), Environment Management Framework and Environment Management Plan for Mughalsarai – New Bhaupur Section
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Draft (Final) Resettlement Action Plan for Mughalsarai – New Bhaupur – Section
4. DFCC – SHE Manual

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1.0 OBJECTIVE

- (1) The Work on the Eastern section of the Dedicated Freight Corridor (DFC) between Mughalsarai and New Bhaupur is to be constructed as an electrified (2 x 25kV AC- 50 Hz) double track railway, capable of operating at a maximum train speed of 100km/h. All the bridges, culverts and the entire embankment and cutting shall be constructed for “DFC loading (32.5 tonnes axle load)”. Track infrastructure shall be constructed for an axle load of 25 tonnes. The details of the Work required to be executed in this bid are defined in the ensuing paragraph in “Scope of Works”.
- (2) In full recognition of these objectives and with full acceptance of the obligations, the Contractor shall execute the Works taking into account all liabilities and risks that may be involved.
- (3) The Civil construction has to be carried out in a manner so as to permit the other contractors to carry out system works of Electrification, Signalling and Telecommunication etc. It is anticipated that Systems Contractor(s) shall be in place one year after the Commencement Date of this Work. The necessary coordination required to be done for this purpose shall fall within the ambit of the Scope of the Work of this bid. The designs to be adopted in this bid should be such so as to permit the installation of these systems by the other contractors either simultaneously or at a later date. All the System works are not a part of this bid. However, the Contractor is responsible for the final integrated testing and commissioning of the whole of the Works including electrification and signaling.

2.0 SCOPE OF WORKS

- (1) The Contractor shall undertake the Design, construction, manufacture, supply, installation, testing and commissioning of the Civil, Structure and Track works of the double track system as defined in para 1.0 above. The work includes without limitation, the design, construction and removal of any Temporary Works and diversions of utility services both of IR and other impacted authorities as defined in the Employer’s Requirement. In addition, the Contractor shall undertake the rectification of defects appearing in the Permanent Works in the manner and to the standards within the time stipulated in the Contract. The details of the works required to be carried out are provided in the ensuing paragraphs. Detailed location for Contract Package 201 and 202 is as given below:

Contract Package	Existing Railway KM / DFC Chainage		Approx Total Route Length	Remarks
	From	To		
201	Km-669.670 (Ch. 119.550)	Km – (Ch. 278.155)	158.605 (DL) 22.430 (SL)	Parallel Length (DL) – 121.985 Km Detour Length (DL) – 36.620 Km Link Line Length (SL) – 22.430 Km*
202	Km – (Ch. 278.155)	Km – (Ch. 507.693)	229.538 (DL) 6.720 (SL)	Parallel Length (DL) – 139.889 Km Detour Length (DL) – 89.649 Km Link Line Length (SL) – 6.720 Km**

* Karchana to Cheoki - 4.8 Km;

Karchana to Iradatganj - 8.9 Km; and

Jeonathpur to RTR - 8.73 Km

**** Bhimsen link line (UP) – 2.68 Km**

Kanpur to Rooma – 4.04 Km

For further details please refer to the Site Details - Part 4 of the Bidding Document.

- (2) All the Works shall be based on **Part 2 “Employer’s Requirement, Section VI”** and developed further into the Contractor’s Design.
- (3) The technical data provided by the Employer in **Site Details - Part 4 of Bidding Document** like plan and profile, GAD of bridges, geotechnical details, hydrological data, linear water way for bridges are indicative. However the number of bridges, level crossings, RUBs, ROB, RFOs, Buildings and chartered utilities given in the list are firm and any change will be treated as a variation. Contractor shall validate the indicative plan and profile provided by the Employer as above, after doing detailed topographic survey, hydrological survey, sub-surface and other site investigations. During the survey Contractor is required to capture sufficient details of existing railway network like formation, bridges (catchment area, Highest Flood Level, bed level, protection works etc.), Level Crossings, details of the structures coming on the proposed alignment, utilities and any other infringement at site etc. Based upon the survey the Contractor can modify/change the plan and profile of the alignment so as to get the best fit designed alignment of the section but remaining within the land boundaries set by the Employer.
- (4) All Site investigations, Geo-technical surveys, alignment location, bore holes, interfacing, communication, ancillary works, record keeping, material testing, inspection reports, correspondence etc. shall form part of scope of Works for successful completion of Permanent Works
- (5) Design criteria and Specifications for Design of all components of Permanent and Temporary Works are detailed in **Section VI, Employer’s Requirement Vol.-4 of the Bidding Document**.
- (6) Following are the components of Works to be executed by the Contractor:-

(a) Earthwork In formation

Earthwork in formation, as per approved plan and profile of the alignment should be done as per the RDSO Guidelines and Specifications for Design of formation for Heavy Axle Load report No. RDSO/2007/GE: 0014 (Nov., 2009) Earthwork in formation shall include:

- earthwork in embankment, cutting, provision of longitudinal and cross drains, Nalla (open drain) diversions, construction of retaining walls and ground improvement wherever required, protection work and pitching on the approaches of bridges wherever required, turfing on embankment/cutting slope etc
- provision of blanket and sub-grade in formation, compacted mechanically as per the cross sections and methodology approved by the Engineer

(b) Construction of Bridges

The bridges are classified as Important, Major and Minor bridges. These are defined as follows:

- i. **Important Bridges** are the bridges having linear waterway of 300m or a total waterway of 1000sqm or more;
- ii. **Major Bridges** are bridges, which have a linear waterway of 18m or more or which has a clear opening of 12m or more in spans;
- iii. **Minor bridges** are other than important or major bridges.

The works include construction of one Important Bridge on River Tonse with the indicative span arrangement of the bridge as 7 x 45.7m + 2 x 9.15m in Contract Package 201 and one Important Bridge on River Yamuna with the indicative span arrangement of the bridge as 21 x 45.7m in Contract Package 202. It also includes construction of Major, Minor and Road Under Bridges (RUB), Road Over Bridge, modification to the existing Road Over Bridges, Foot Over Bridge and Rail Flyovers (RFO) as mentioned in the list included in Site Details, Part 4 of Bidding Documents. Significant portion of the work is required to be done close to the existing Indian Railways running lines. Adequate safety of these lines at all times during the execution of the work is of paramount importance. The Contractors should therefore take adequate measures to protect the Indian Railways bank by sheet piling or any other suitable protection measures. The work also includes the construction of river training works at the required locations.

- iv. While designing the bridges standard spans and single/multiple box culverts shall be generally used. Indicative bridge locations, General Arrangement Drawings (GAD) of the bridges are given in Site Details - Part 4; Bidding Document.

(c) **RUBs in replacement of specific existing level crossing(s) in the parallel portion**

The RUBs to be constructed in replacement of the existing level crossings shall cover the distance between the nearest IR track and the adjacent DFC track as indicated in the GADs of the respective RUBs provided in Site Details – Part 4 of the Bidding Document. Scope of work also includes construction of approach roads for the RUBs and connecting to the adjacent roads on DFC side with matching profile. The work of balance portion of RUB along with its approaches on IR side shall be done by Indian Railways.

The necessary road diversions of temporary / permanent nature required in connection with construction of RUBs and modification of the existing level crossing shall also be part of the scope of work. The location and other details of such level crossings have been provided in Site Details - Part 4; Bidding Document.

(d) **Construction / Modification of Road Over Bridges**

The work includes construction of 1 (one) ROB and modification of 2 (two) ROBs for Contract Package 201. It also includes modification of the approach roads and temporary diversion of roads wherever required.

There is no work of construction / modification of ROB for Contract Package 202.

The Contractor shall Design and Construct ROB to accommodate the DFC alignment as per the Schedule of Dimensions (SOD) of Eastern DFC. The location and other details have been provided in **Site Details - Part 4; Bidding Document**. The responsibility of obtaining necessary sanction/clearance of the concerned authorities before undertaking the work rests upon the Contractor. The documentation, if the same become necessary, may be provided by DFCC to enable the contractor in obtaining such sanctions. No claim for delay or compensation from the Contractor on this account shall become tenable.

(e) Construction of Rail Fly Overs (RFOs)

The work involves construction of 3 (three) RFOs in Contract Package 201 and 1 (one) RFO in Contract Package 202. The location and other details have been provided in **Site Details - Part 4; Bidding Document**.

(f) Construction / Modification of Foot Over Bridges (FOB)

The work involves construction of new FOBs at 3 (three) stations and modification of FOBs at 8 (eight) stations in Contract Package 201 and modification of FOBs at 10 (Ten) stations in Contract Package 202. The details have been provided in **Site Details - Part 4; Bidding Document**.

(g) Modifications to railway platforms, Platform sheds, circulating area etc. at existing railway stations

The details of stations requiring modification to platforms and station buildings are in Site Details - Part 4; Bidding Document. The Contractor may please note that at number of stations, the proposed DFC alignment may affect the existing circulating areas and other existing facilities of IR. The construction of the proposed DFC alignment at such locations will therefore require modifications of the existing IR installations. Accordingly, such modifications are also part of the work required to be done by the Contractor. However, modification of the Signalling, Telecommunication installations belonging to IR, Electrical installations above 33kv and IOC pipelines are not a part of the Scope of this work.

(h) Level Crossings

The work includes extension of existing IR level crossings to cover DFC alignment and re-profiling of approach road on DFC side only. The details are listed in **Site Details - Part 4; Bidding Document**. All necessary modification to the existing level crossing gates of IR as also construction of new infrastructure and diversion of road, if any, shall be under scope of this work. Modification/Relocation of the lifting barriers on the existing Level Crossings including interlocking shall be done by another contractor. Dismantling / relocation of gate lodges falls under the scope of work of this contractor.

(i) Station Buildings, Staff Quarters and Other Service Buildings

1. The Contractor shall undertake Design and Construction of following buildings and structures as per Employer's Requirements:

Type of Building	Contract Package 201 (Numbers)	Contract Package 202 (Numbers)
Station buildings at Junction stations	3	2
Station buildings at Crossing stations	3	4
Residential Buildings for Indian Railways	190	-
Residential Buildings for DFCC	104	159
IMD	2	1
IMSD	2	3
Guest House	Nil	1
Club / Institute	Nil	1

2. The scope of work shall also include construction of boundary walls, overhead (service) tanks, water supply, drainage, sewerage, approach road and other allied works, as per requirement. The length of the boundary walls and the approach roads required in connection with residential and service buildings for Contract Package 201 and Contract Package 202 shall be as under:

Contract Package Number	Length of the boundary wall	Length of the approach road
201	2.5 Km	5 Km
202	3.5 Km	14 Km

Internal electrification, street lighting and power supply from nearest substation shall be done only for Residential Buildings constructed on replacement account at Mughalsarai for IR. Other service and residential buildings shall have provision of only concealed conduiting for electrification work. Electrification of these buildings shall be done by another Contractor. All other Civil works as per Employer's Requirement shall be carried out for all the Buildings. The location and other details have been provided in Site Details - Part 4; Bidding Document.

3. The detailed scope and specifications for the buildings are attached as Appendix 18, Volume 6, Part – 2 of the Bidding Document.

(j) Removal/ Relocation of Utilities / Trees

The Contractor shall remove/relocate all Utilities (chartered and uncharted) or trees coming in the way of designed alignment except the following:

- Signalling installations;
- Telecommunication installations belonging to IR
- Electrical utilities above 33 kV;
- IOC pipe lines

All Electrical crossings shall be laid underground and may have to be crossed under IR track also. Methodology for dealing with all types of utilities are detailed in **Part 2 “Employer’s Requirement, Section VI, Volume 6, Appendix 1 - Utilities”**. All chartered utilities Electrical, Signalling & Telecommunication and Civil Structures etc. are listed in **Site Details - Part 4; Bidding Document**.

(k) Permanent Way

The Permanent Way layout for the Works shall generally be based on the provisions contained in Indian Railways Permanent Way Manual, Track Manual, LWR Manual & relevant IRS specifications with latest amendments/corrections. Permanent Way Work includes supply and fixing of:

- Rails, pre-stressed concrete sleepers (at all locations), elastic fastenings, turnouts (switches and crossing), switch expansion joints, derailing switches, insulated glued joints, track signages, welding of rails, buffer stops, supply and spreading of ballast etc. complete to make the track fit for 100 km/h.
- Track shall be laid and tamped by mechanized track laying method with Contractor’s machines/equipments.
- During intermediate stages, indicated in clause 8.2 of GC, Contractor shall make the track fit so as to facilitate the Employer and other Contractors to use the same for movement of material trains and tower cars.

(l) Works in Station area and yards

Contractor shall validate the yard plans provided in the bidding document. The necessary yard remodelling for the existing Indian Railways yards for successful implementation of the project is a part of the Scope of the Work. For this purpose, the shifting of points and crossings, provision of new loops as also dismantling the existing IR lines may also be required to be done. Shifting of existing OHE works, signalling gears and provision of new signalling gears in the yards are not a part of the Scope of Works.

Contractor shall Design, construct and provide on DFCC alignment - Yard complex with track, fencing, platforms, water supply, Friction buffer stops, signages, sitting arrangements for station staff, drainage, sewerage, safety equipments or any other facility as detailed in the Employer’s Requirement.

Contractor would be required to work with other Contractors in the yards for signalling, electrification and other requirements.

(m) Temporary Work

The Contractor shall execute all Temporary Works required to facilitate construction and the cost thereof shall be included in the overall bid price. All temporary arrangements and Works shall be designed and necessary drawings developed to ensure that these remain safe during construction. As a rule temporary Works shall be subsequently dismantled and removed by the Contractor after construction at his own cost. The Engineer however may permit retention of some of the temporary works with mutual consent between the Contractor and the Engineer.

- (n)** The works may require mandatory clearance/approval/sanction from the concerned Commissioner of Railway Safety (CRS)/Railway Authorities/Civil Authorities before they can be undertaken by the Contractor. The responsibility of obtaining necessary sanction/ clearance of the concerned authorities before undertaking the work rests upon the Contractor. Wherever required, the documentation, if the same becomes necessary, may be provided by DFCC to enable the contractor in obtaining such sanctions. No claim for delay or compensation from the Contractor on this account shall become tenable.

(o) Incidental Works

In addition to above the Contractor shall undertake various incidental Works to complete the entire project successfully. The Contractor shall include cost of such incidental Works in his Bid price. Some of the incidental Works are listed below:

- (i) SHE Compliance: - The Bidder shall submit as part of his bid a SHE Plan which shall be in accordance with Part 2, Volume 6, Appendix-12 Site Safety Plan, Appendix-10 First Aid Base and Appendix-13 Environmental Protection Requirements. This plan should include SHE procedures and regulations to be developed by the Contractor and the mechanism by which these will be implemented for ensuring SHE compliance as per the Employer's Requirements.
- (ii) Quality Assurance:-The Bidder shall submit as part of his bid a Quality Assurance Plan which shall include Quality Assurance procedures and regulations to be developed and the mechanism by which these will be implemented for ensuring Quality compliance as per the Employer's Requirements detailed in **Appendix 6, Volume 6, Part 2 of Bidding Document**.
- (iii) Interface Management: - The Contractor for this Work shall also act as an Interface manager for the whole Works and shall bear the overall responsibility for Interface management with other Contractors and agencies. After award of Contract Package the Contractor shall submit an Interface Management Plan which shall include procedures and regulations to be developed and the mechanism by which Interfacing will be implemented as

per the Employer's Requirements detailed in **Appendix 3, Volume 6, Part 2 of Bidding Document.**

- (iv) Integrated Testing and Commissioning:- The Contractor for this Work shall be required to conduct Integrated test for the entire System in coordination with other Contractors and agencies to meet the requirements as mentioned in the bidding documents.
- (v) Restoration of existing roads and services other than chartered/ unchartered utilities dislocated on account of DFC alignment during construction, Road connections for the roads affected by the DFC line and relevant facilities is a part of the Scope of Work. In case the management of traffic around the worksite becomes necessary, the Contractor shall carry out the same at his cost. The Engineer however, may at times request the Contractor to leave the temporary diversion of the road in place. All such requests by the Engineer shall be entertained by the Contractor.
- (vi) While working in close proximity of existing IR track, the Contractor shall obtain permission for Works with or without traffic block from concern Railway authority/interfacing agencies wherever applicable and DFCC shall assist in obtaining such permits. Extra precautions to be observed by the Contractor while working in close proximity of existing Indian railway track as listed in **Volume 5, Construction, Testing and Commissioning Part-2 Employer's Requirements.**
- (vii) Office accommodation for Engineer and Employer including communication and inspection as specified in **Appendix 17, Volume 6, Part 2 of Bidding Document.**
- (viii) Benchmarking, setting out, photography, videography, report submission, permanent markers like land boundary pillars, signages, boards etc. As Built drawings, inspection books, registers for record & maintenance of bridges/ track/ alignment etc. as specified in **Volume 5, Construction, Testing and Commissioning Part-2 Employer's Requirements.**
- (ix) The Contractor shall be responsible for obtaining relevant certificates or clearances from local/civil authorities viz. completion certificate, fire clearance or any other mandatory clearances which may be specified by these authorities from time to time.
- (x) The Contractor shall be fully responsible for obtaining the necessary approvals for all the drawings including General Arrangement Drawings (GADs) from the *concerned* Railway/ State/ Local authorities before the commencement of construction. Where applicable the Employer/Engineer will assist the Contractor in obtaining the approval of such authorities.

Section VI. Employer's Requirement

Volume 2 – General

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1.0 INTRODUCTION

- (1) The Employer's Requirement has been divided into six (6) Volumes as under:
1. **Scope of Works.**
 2. **General:** these apply throughout the Contract.
 3. **Design Procedures and Processes:** these apply in respect of procedures and processes relating to the design of Civil, Structures, and Track Works.
 4. **Design Criteria and Specifications:** these apply in respect of Employer's Requirement/Performance Specifications relating to the design of the Civil, Structures, and Track Works.
 5. **Construction, Testing and Commissioning:** these apply in respect of duties and other requirements relating to construction of the Works.
 6. **Appendices.**

2.0 DEFINITIONS AND INTERPRETATIONS

- (1) In addition to the words and expressions defined in the Conditions of Contract, following words and expressions shall have the meaning assigned to them hereunder except where the context requires otherwise:
- (a) **"As-Built Drawings":** means those drawings produced by the Contractor and endorsed by it as true records of construction of the Permanent Works and which have been agreed with the Engineer.
 - (b) **"Conditions of Contract":** shall mean General Conditions of Contract (Section VII, Part 3) read in conjunction with Particular Condition of Contract as in **Section VIII, Part 3 of Bidding Documents.**
 - (c) **"Construction and/or Manufacture Documents"** means all drawings, calculations, computer software, samples, patterns, models, operation and maintenance manuals and other manuals and information of a similar nature to be submitted by the Contractor.
 - (d) **"Construction Phase":** has the meaning identified in para 4 of this Volume.
 - (e) **"Defect"** is any part of the Work which is not in accordance with the Contract.
 - (f) **"Definitive Design":** prepared and accepted part of drawings, documents, standards, and instructions, which give the abilities for supply, installation and testing. Giving clearance by the Engineer, to the Definitive Design is an obligatory condition for the commencement of construction Works. "Definitive Design" has the meaning identified in Para 2, **Part 2 "Employer's Requirement, Section VI, Volume 3, Design Procedures and Processes for Civil, Structures and Track Works"** of the Bidding Documents.
 - (g) **"Definitive Design Submission":** means the submission of Contractor's Documents which comprise the whole or parts of the proposed Definitive Design and for which the Contractor seeks a Notice.

- (h) **"Design Criteria"**: means the governing specifications and conditions as specified in Employer's Requirement Volume 4 of Bidding Documents.
- (i) **"Design Data"**: means all survey and investigations, specifications, plans, drawings, details, graphs, sketches, models, levels, setting-out dimensions, calculations and other documents related to the design of the Works.
- (j) **"Design Manual"**: means the manual to be prepared and submitted by the Contractor as part of the Preliminary Design and as described in Para 2, **Part 2 "Employer's Requirement, Section VI, Volume 3, Design Procedures and Processes for Civil, Structures and Track Works"** of the Bidding Documents as applicable.
- (k) **"Design Package"**: has the meaning identified in Para 2, **Part 2 "Employer's Requirement, Section VI, Volume 3, Design Procedures and Processes for Civil, Structures and Track Works"** of the Bidding Document as applicable.
- (l) **"Design Phase"**: has the meaning identified in para 4 of this chapter.
- (m) **"Designer"** means the Contractor or part of the group forming the Contractor, person, firm or company or group of companies, or any replacement carrying out the Design of Works or part thereof.
- (n) **"Drawings"** means the Employer's Drawings and the Drawings submitted by the Contractor and any modification of such drawings, if any, furnished from time to time, or for which the Engineer has issued a Notice of No Objection.
- (o) **"Good for Construction Drawings "**: shall be derived directly from the Definitive Design and shall detail and illustrate in full the Permanent & Temporary Works. These drawings are the ones which the Contractor considers sufficient in detail for construction and is cleared by the Engineer for construction.
- (p) **"Interfacing Contractor"** means the Contractor engaged by the Employer or other agencies having an interface issue with the Contractor for this Work.
- (q) **"Key Date"** means the date identified as such in the Contract **"Employer's Requirement, Section VI, Volume 6, Para 2; Appendix 4 – Project Program Requirements"**.
- (r) **"Milestone"** means as defined in clause 1.1.3.10 of GC
- (s) **"Milestone Date"** means the date prescribed in Schedule of Milestones by which a Milestone is to be achieved - **Employer's Requirement, Section VI, Volume 6, Para 2; Appendix 4 – Project Program Requirements"**.
- (t) **"Milestone Certificate"** means the certificate to be issued by the Engineer in relation to the achievement or otherwise of Milestones.
- (u) **"Notice"**: means a Notice of No Objection.
- (v) **"Outline Environmental Plan"** means the environmental plan setting out in summary form, the Contractor's proposed means of complying with his obligations in relation to environmental management as prescribed in the

Employer's Requirements; Part 2 as well as **Reference Documents; Part 4** of the Bidding Documents, submitted during First Stage Technical Proposal.

- (w) **"Outline Quality Plan"** means the quality plan setting out in summary form, the Contractor's proposed means of complying with his obligations in relation to quality assurance as prescribed in the Employer's Requirements, submitted during First Stage Technical Proposal.
- (x) **"Outline Safety Plan"** means the safety plan setting out in summary form, the Contractor's proposed means of complying with his obligations in relation to construction safety as prescribed in the **Employer's Requirements; Part 2** as well as **Reference Documents; Part 4** of the Bidding Documents, submitted during First Stage Technical Proposal.
- (y) **"Preliminary Design"**: means the submission of Contractor's Documents which comprise the initial stage of the design phase.
- (z) **"Preliminary Drawings"** means the drawings prepared by the Contractor that are built on the Reference Drawings and accompany the Contractor's Preliminary Design submissions.
- (aa) **"Railway"** means Railway or any portion of a Railway for public carriage of passengers and goods as defined in the Railway Act 1989. Any reference to railway means the Indian Railways and the respective Zonal Railway.
- (bb) **"Railway Envelope"**: means the zone or zones within the Works which contain the track, platforms and equipment necessary for the operation of the railway by the DFCC. The mandatory distances beyond such structures / equipment defined in the Schedule of Dimensions (*2013 for Eastern Corridor*) shall also be deemed to be a part of the Railway Envelope.
- (cc) **"Reference Drawings"** means the drawings prepared by the Employer and included in the bidding document.
- (dd) **"Safety, Health and Environment Manual"** means the Employer's manual containing the requirements and conditions regarding Safety, Health and Environmental issues to be met during the execution of Works by the Contractor as attached in **Reference Documents; Part 4 of the Bidding Documents**.
- (ee) **"Safety Procedures"**: these shall be the procedures as detailed in SHE manual as well as provisions indicated in Employer's requirement at appropriate places.
- (ff) **"Schedule of Milestones"**: means the schedule included in para 8.2 of Time of Completion – **Appendix to Tender; Part 3 of Bidding Documents**.
- (gg) **"System Works"**: means the work connected with design, construction, manufacture, supply, installation, testing and commissioning related with electrification of Railway line, new signalling and control systems, new telecommunication system. SCADA control system, rolling stock monitoring system, OCC, removal of any temporary works and diversion

of utility service of IR and other authorities as included in the scope of work for system works.

- (hh) **“Systems Contractor”**: means the Electrical and Signalling & Telecommunication Contractor engaged by the Employer to carry out Works related to Systems part of the project.
- (ii) **“Technical Specification”**: means the combined specifications prepared by the Contractor in a format which combines the Technical Specifications and those parts of the Contractor's Technical Proposals which specify standards for design, procurement, manufacture, installation and construction-testing-commissioning which are developed during the Design Phase and fully comply with the Employer’s requirements.
- (jj) **“Works”** also means the work, both permanent and temporary, or services to be carried out, survey and investigation, designed, manufactured, fabricated, delivered to Site, erected, installed, completed, tested, commissioned, (including Integrated Testing and Commissioning) or supplied in accordance with the Contract and include Plant, Equipment and Materials and their accessories.
- (kk) **“Working Drawings”**: comprise the drawings and documents, such as construction drawings, manufacturing drawings, installation drawings, and testing and commissioning documents as are necessary to amplify the Good for construction Drawings for construction etc purposes and endorsed, as required, by the Engineer.
- (ll) **“Works Programme”** means the programme showing the sequence, method and timing of investigations, design, issue of No Objection Notices, execution, manufacture, delivery to site, erection, installation, testing, commissioning of the Works (including Integrated Testing and Commissioning), indigenization (where applicable) and related activities in the form and content prescribed by the Employer’s Requirements, or any amended or varied version thereof, as submitted by the Contractor and for which the Employer’s Representative has issued a Notice of No Objection.

3.0 RELEVANT DOCUMENTS

- (1) These documents shall be read in conjunction with the Conditions of Contract (General and Particular), Employer’s Requirement and any other document forming part of the Contract. This design-build contract shall be fulfilled, managed and commissioned in accordance with the applicable legislation in India, specific IR regulations and railway operations manuals and where none exist with applicable international norms where appropriate. Tentative list of standards is enclosed in **Part 2 “Employer’s Requirement, Section VI, Volume 6, Appendix 16 - Design Standards”**

4.0 CIVIL, STRUCTURES, TRACK DESIGN & CONSTRUCTION PHASES

- (1) The Contractor shall execute the Civil, Structures and Track Works in four (4) phases;

- (a) Phase 1, comprising the submission of the Contractor's Documents which comprises the Design Phase
 - (b) Phase 2, the Construction Phase.
 - (c) Phase 3, Testing, Commissioning & Acceptance; and
 - (d) Phase 4, the Defect Liability Phase.
- (2) The Design Phase shall begin upon the Commencement Date of the Contract. This phase shall include the preparation and submission of:
- (a) the Preliminary Design and Drawings;
 - (b) the Definitive Design and Drawings;
- (3) The requirements for the Preliminary and Definitive Design and Drawing are stated in **Part 2 "Employer's Requirement, Section VI, Volume 3, Design Procedures and Processes for Civil, Structures and Track Works"**.
- (4) The Construction Phase for the whole or a part of the Permanent Works shall commence immediately upon the issue by the Engineer of a Notice in respect of the relevant Drawings Submission and shall terminate when the section is taken over by the Engineer in terms of clause 10.1 of General Conditions of Contract.
- (5) Such Notice may be issued by the Engineer in respect of a Drawings Submission covering a major and distinctive part of the Permanent Works.
- (6) The defect liability phase shall commence immediately upon taking over of the section and issue of necessary certification thereof by the Engineer/ Employer.
- (7) However, construction shall not commence until the original copies of the appropriate Definitive Design and Drawings have been endorsed by the:
- (a) Contractor as "Good for Construction";
 - (b) Engineer that he has no objections to these drawings.

The Construction Phase shall include the completion and submission of the Final Design and the preparation and submission of the As Built Drawings and other records as specified.

- (8) Notwithstanding the above, for those elements identified under of the Design of Civil, Structures and Track, the Construction Phase may commence immediately upon the issue of the Notice in respect of the Definitive Design Submission.
- (9) This Notice may be in respect of each such element subject to availability of the site in accordance with agreed programme.

5.0 SPECIFICATIONS

- (1) The Technical Specifications for the Works shall comply with Standards and Design Codes which are in accordance with or defined and listed in the Design Criteria and also the outline materials and workmanship specifications if any.
- (2) In accordance with the provisions of these documents, the Contractor shall develop the Technical Specifications during the Design stage and submit it as part of the Definitive Design Submission.

- (3) When the Specifications have received a Notice of No Objection from the Engineer, these shall become the Technical Specifications.

6.0 UNITS OF MEASUREMENT

- (1) The Contract shall utilise the SI system of units.

7.0 WORKS PROGRAMME

- (1) The Contractor shall prepare and submit its Works Programme and three (3) months rolling programmes as defined in the detailed requirements contained in **Part 2 “Employer’s Requirement, Section VI, Volume 6, Appendix 4 - Project Program Requirements”**.
- (2) The Stages and the Key Dates are as defined in **Part 2 “Employer’s Requirement, Section VI, Volume 6, Appendix 2 - Works Areas and Contract Stages”** and are based on the Project Calendar as defined at **Part 2 “Employer’s Requirement, Section VI, Volume 6, Appendix 9 - Project Calendar”**.

8.0 MONITORING OF PROGRESS

- (1) The Contractor shall submit to the Engineer five copies of Monthly Progress Report (MPR) in English and on CD/DVD, as described in **Part 2 “Employer’s Requirement, Section VI, Volume 6 Appendix 5 - Monthly Progress Reports”**.
- (2) Engineer will require the Contractor to attend monthly management meeting or any other meetings in order to review the arrangements for future Work, Works progress or other issues set out in the agenda of the meeting. The minutes of the meeting signed by the Contractor and the Engineer shall constitute an official record of matters discussed, but shall not replace any requirement in the Contract for approvals, instructions or decisions to be submitted in writing. Such meetings may be attended by representatives of all Interfacing Parties and other stakeholders as deemed fit by the Engineer or Employer at his discretion. The Employer may also be present in the meeting.

9.0 SAFETY HEALTH AND ENVIRONMENT (SHE)

- (1) The Contractor shall establish and maintain a Safety Health and Environment Assurance System in accordance with **Part 2 “Employer’s Requirement, Section VI, Volume 6, Appendix 13 - Environmental Protection Requirements as well as Part 4 - Reference Documents, SIA and EIA Reports”** for the design, construction procedures and the interfaces between them.
- (2) The Safety Health and Environment Assurance System shall, without limitation, include for Safety Health and Environment Assurance System procedures for Design, Construction, Manufacturing, Supply, Installation, Testing and Commissioning and shall control processes for each stage in the Works such as for design verification and validation, management of change control, non conformance procedures, inspection, testing, auditing and the like.

10.0 QUALITY ASSURANCE

- (1) The Contractor shall establish and maintain a Quality Assurance System in accordance with **Part 2 Employer’s Requirement, Section VI, Volume 6,**

Appendix 6 - Quality Assurance” for the design, construction procedures and the interfaces between them.

- (2) The Quality Assurance Plan shall, without limitation, include for quality assurance procedures for Design, Construction, Manufacturing, Supply, Installation, Testing and Commissioning and shall control processes for each stage in the Works such as for design verification and validation, management of change control, non conformance procedures, inspection, testing, auditing and the like.

11.0 SOFTWARE SUPPORT

- (1) Contractor shall provide to the Employer and the Engineer one (1) each of the software packages with the same software products as those that the Contractor intends to use for the project, inclusive but not limited to programs for business administration, project management, design development etc. Contractor to utilize a shared electronic document management system with the Engineer and the Employer which shall be web/ internet based.
- (2) The Contractor shall provide full support to the Employer and the Engineer for all computer programs to be provided by the Contractor under item (1) above.
- (3) The Contractor shall submit a software support plan within twenty eight (28) days after the Commencement Date in accordance with Sub-Clause 11 (10) of this Volume and Sub-Clause 13(2) of **Part 2 Employer’s Requirement, Section VI, Volume 3, Design Procedures and Processes**”.
- (4) This plan shall require the Contractor to provide all changes, error fixes, updates, modifications, amendments and new versions with the updated instructions, and Operation and Maintenance Manuals of the program as required.
- (5) The Employer and the Engineer shall not be obliged to use any new version of the software and this requirement shall not relieve the Contractor of any of its obligations.
- (6) The Contractor shall provide all tools, equipment, manuals and training necessary for the Employer/Engineer to maintain, re-configure and to make proper use all the software provided under the Contract.
- (7) If any patent, registered design or software is developed by the Contractor specifically for the Works, the title thereto shall vest in the Contractor and the Contractor shall grant to the Employer a non-exclusive irrevocable and royalty-free license to use, repair, copy, modify, enhance, adapt and translate in any form such Software for use over the project.
- (8) If the Contractor uses proprietary software for the purpose of storing or utilizing records, the Contractor shall obtain at his own expense the grant of a license or sub-license to use such software in favour of the Employer and Engineer provided that the use of such software under the license is restricted to use relating to the design, construction, reconstruction, manufacture, completion, reinstatement, extension, repair and operation of the Works or any part thereof.
- (9) The Contractor’s permission referred to above shall be given, inter-alia, to enable the Employer to disclose (under conditions of confidentiality satisfactory to the Contractor) programmes and documentation for a third party to undertake the

performance of services for the Employer in respect of such programmes and documentation.

- (10) If any software is developed under the Contract or used by the Contractor for the purposes of storing or utilizing records over which the Contractor or a third party holds title or other rights, the Contractor shall permit or obtain for the Employer and Engineer the right to use and apply that Software free of additional charge, together with any modifications, improvements and developments thereof, for the purpose of the design, manufacture, installation, reconstruction, testing, commissioning, completion, reinstatement, extension, repair, modification or operation of the Works, or any part thereof, or for the purpose of any Dispute.
- (11) The Employer reserves the right to use other Software in connection with the Works.

12.0 CO-ORDINATION WITH INTERFACING AND OTHER PARTIES

- (1) The Contractor is responsible for detailed co-ordination of his design, manufacturing, installation, construction, testing and commissioning activities and will take the lead in the management of the coordination process with IR, interfacing contractors, utility agencies, statutory authorities, private service providers, consultants and other contractors whether or not specifically mentioned in the contract that may be working on or adjacent to the site for the purpose of the Project. It is anticipated that Systems Contractor(s) shall be in place one year after the Commencement Date of Works. Contractor shall plan his interfacing requirements accordingly. For certain urgent requirements and non availability of requisite information certain assumptions can be made in consultation with the Engineer so that progress of Work is not adversely affected.
- (2) For the purpose of these requirements, Contractor's responsibilities are listed at **Part 2 "Employer's Requirement, Section VI, Volume 6, Appendix 3 - Design and Construction Interfaces"**.

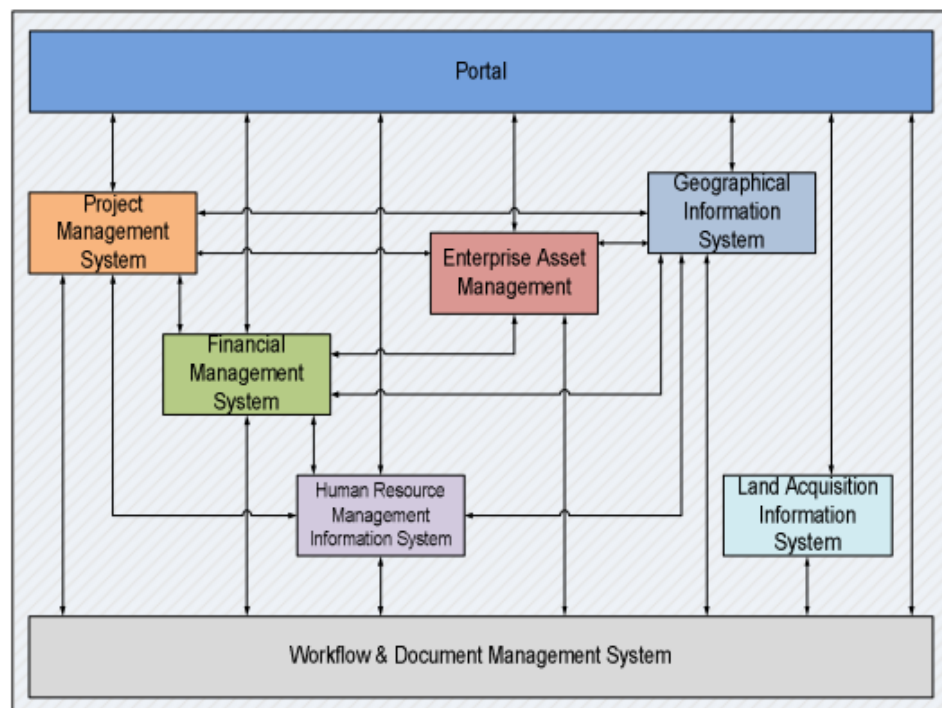
13.0 SURVEY AND SITE INVESTIGATIONS

- (1) The Contractor shall carry out all further site investigations as necessary for the design of the Permanent Works and to enable the determination of the methods of construction and the nature, extent and design of the Temporary Works. It shall be the Contractor's responsibility to find materials from sources outside the DFCC /Indian Railway boundaries. This could be materials for earthworks, aggregate for concrete manufacture, stone for track ballast etc. and it is their responsibility to obtain all necessary permissions, approvals etc from landowners; Local, State or Central government authorities for the extraction, reconstitution and transportation of such materials to the relevant worksite.

14.0 PROJECT MANAGEMENT INFORMATION SYSTEM (PMIS)

- (1) The Contractor shall devise and utilise a PMIS such that all documents generated by the Contractor can be transmitted to the Engineer by electronic means.
- (2) The PMIS shall also allow all documents generated by either party to be electronically captured at the point of origin and be reproduced later, electronically and in hard copy.

- (3) Requirement of PMIS are explained in **Part 2 “Employer’s Requirement, Section VI, Volume 6, Appendix 4 - Project Program Requirements”**
- (4) Enterprise wide IT System
- (A) DFCCIL is in the process of implementing an Enterprise wide IT System through a World Bank Funded Project titled “Supply & Installation of Integrated IT System”. The objective of the IT Plan is to automate core organizational business functions/ processes and develop a working environment that enables higher efficiency and effectiveness, not only in internal functions, but across the entire ecosystem of DFCCIL, including Contractors. A total of eight (8) applications are envisaged for DFCCIL and components of the proposed system include the following elements:
- a) An ERP System for covering Finance & Accounting, HR, Project Managements, General Administration to ensure an integrated management control
 - b) A Document Management System to ensure that all drawings/critical documents related to the construction phase are well documented and archived
 - c) A Geographical Information System that will initially have details of every asset that is created. It will have the entire alignment geo-referenced. The monitoring of various Contracts is proposed to be done through Dashboards that will have a significant component of GIS.
 - d) An Enterprise Asset Management that has spatial co-ordinates of every asset



- (B) The proposed IT system has been designed for facilitating preservation of important artifacts (plans, drawings, notes, documents, reports etc) in a secure and manageable environment in digitized format. Appropriate triggers will generate dashboards and management reports every time an event causes a substantial shift in project risk or timeline or is a deviation in processes developed. The envisaged system would expedite decision making, ensure better planning and co-ordination between different functions, better data management, effective reporting, knowledge management, etc. Program Management will provide senior management with critical information related to various contracts, activities and funds in the form of management dashboards with inbuilt triggers to ensure timely decision making.
- (C) Since most of the Project related Data creation would happen outside DFCCIL core organization, the proposed IT system is largely dependent on data being created and uploaded by Contractors.
- (D) While DFCCIL would define the data collection templates, Contractor would upload actual data into the system. As such, a part of the Scope of Work of the Contractor will include the following elements:
1. Upload/definition of Project Plans as per the template and using the software defined by DFCCIL
 2. Maintenance and updation of uploaded Project Plans in software used by DFCCIL
 3. Upload of drawings/designs created by Contractor as per the classification and on the software platform defined by DFCCIL
 4. Online MB (Measurement Book) Entry in Project Monitoring System, in a template defined by DFCCIL.
 5. Asset details needs to be updated in the system in format prescribed by DFCCIL.
 6. Geo-referencing of the alignment on WGS 84 Coordinates
 7. Capture and upload of geo-referencing coordinates of the assets into GIS
 8. Upload of digitally signed invoices for payment processing
- (E) It will be the responsibility of the Contractor to ensure there is interoperability between the Contractors' IT System and that being developed by DFCCIL so that movement of information and data across the DFCCIL boundaries is feasible in a seamless manner. This must be factored in, by the bidders, while preparing the price bids.”

15.0 TECHNOLOGY TRANSFER

- (1) The Contractor shall ensure that all sub-contractors engaged by him in the Works are given training, guidance and the necessary opportunity for transfer of service technology.

- (2) The training shall be provided in various areas of construction such as bridge construction, instrumentation, safety, quality assurance, track laying etc.

16.0 PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHTS

- (1) Insofar as the patent, copyright or other intellectual property rights in any Plant, Design Data, plans, calculations, drawings, documents, materials, know-how and information relating to the Works shall be vested in the Contractor, the Contractor shall grant to the Employer, his successors and assignees a royalty-free, non-exclusive and irrevocable license to use and reproduce any of the Works, Designs or inventions incorporated and referred to in such plant, documents or materials and any such know-how and information for all purposes relating to the Works, including without limitation the design, manufacture, installation, reconstruction, testing, commissioning, completion, reinstatement, extension, repair and operation of the Works.

17.0 TRANSLATIONS OF CONTRACTOR'S DOCUMENTS

- (1) All documents, reports, drawings, calculations and correspondence and the like shall be submitted by the Contractor in English.

18.0 ALIGNMENT

- (1) The proposed alignment, yard plans and Geo-technical data on alignment route listed in **Part 4 "Site Data Reference Documents."** are based on the preliminary investigations carried out by the Employer and is for reference purpose only.
- (2) The Contractor shall review, verify and revalidate all relevant factors which could have an impact on the Design and construction of the earthwork including but not limited to the topography, subsurface conditions, ground water levels, Temporary Works, dewatering, drainage, climatic conditions, the availability or lack of access, working space, storage, accommodation, restrictions imposed by the existing Indian Railways Tracks, the proximity of adjoining structures and roads, the local regulations regarding the obstruction of public highways and any other limitations imposed by the site and its surroundings, for the satisfactory completion of Works meeting with performance requirements in the stipulated time.
- (3) It will be presumed that Contractor has taken note of all effects of these constraints on his construction operations to ensure on-time completion of the Works.
- (4) No claim by the Contractor on the grounds of lack of foresight or knowledge of the site conditions or any unknown parameters shall be considered.
- (5) The Contractor is permitted to propose minor deviations in alignment to suit his construction proposals, but he must demonstrate that any such deviations shall comply with good design practice and the alignment requirement of the Design Criteria mentioned in **Part 2 "Employer's Requirement, Section VI.**

19.0 CLEARANCES

- (1) The Permanent Works shall not infringe the schedule of dimensions and land boundary limits of DFCC as shown on the drawings as listed in **Part 4; Reference Documents “Site Data”**.
- (2) In addition, the Contractor shall formulate all necessary drawings, plans, documents etc. in accordance with the applicable legislation in India, in compliance with the Contractor definitive design for all clearances.
- (3) If the definitive design requires additional land over and above that already set out in the **Part 4; Reference Documents “Site Data”**, the Contractor will inform the Engineer. Employer shall commence the acquisition procedures for the additional land after this requirement has been agreed by the Employer and the Engineer.

20.0 CLIMATIC CONDITIONS

- (1) The project length, from Mughalsarai to New Bhaupur falls along the Tropic of Cancer.
- (2) During the summer months the temperature can be as high as 45°C with a high level of humidity, nights can be relatively cool with temperatures dipping to 30°C.
- (3) Torrential rains and high humidity accompany the monsoon in late June to early September.
- (4) In the winter months temperatures can vary from a high of 21°C during day to a low of 4°C during night.

21.0 PLANNING SUBMISSIONS

- (1) Submissions for approval of planning works for the project shall be made by the Contractor through Employer to various authorities as detailed in **Part 2 “Employer’s Requirement, Section VI, Volume 3”**.

22.0 STANDARDS

- (1) Equipment, materials and systems shall be designed, manufactured and tested in accordance with the latest issue of approved and recognised codes and standards defined and proposed by the Contractor and approved for the Work as per the base date for the same which is 28 days prior to submission of Second Stage bid.
- (2) References to “standards or to materials and equipment of a particular manufacturer” in these contract documents shall be regarded as followed by the words “or equivalent”.
- (3) The Contractor may propose alternative standard materials, or equipment that shall be equal to or better than those specified. If the Contractor for any reason proposes alternatives to or deviations from the specified equipment, standards, or desires to use materials or equipment not covered by the specified standards, the Contractor shall obtain the approval of the Engineer, giving full justification for the same.
- (4) Tentative list of standards to be followed are indicated in **Part 2 “Employer’s Requirement, Section VI, Volume 6, Appendix 16 - Design Standards”**.

- (5) The Contractor shall provide to the Engineer two original full editions of the publications (such as, but not limited to, Technical Standards and Codes of Practice), the codes and standards proposed for carrying out the Designs, Contractor's Documents, the Drawings and other communications relevant to this Contract. The Contractor shall provide list of all such standards and specifications, which form the basis of his design activities within 28 days of Commencement Date. A copy of other publications referenced in other communications between the Engineer and the Contractor shall be provided by the Contractor to the Engineer within 28 days following the issue of such other communication. These publications shall be for the sole use of the Engineer and Employer and, upon completion of the Contract, shall become the property of the Employer.

23.0 PUBLICITY

- (1) The Contractor / Sub-Contractors shall not publish, present at seminars, forums or otherwise circulate alone or in conjunction with any other person, any articles, photographs or other materials relating to the Contract, the Site, the Works, the Project or any part thereof, nor impart to the Press, or any radio or television network any information relating thereto, nor allow any representative of the media access to the Site, Contractor's Works Areas, or off-Site place of manufacture, or storage except with the permission, in writing, of the Employer. The provisions of this Sub-Clause shall not exempt the Contractor from complying with any statutory provision in regard to the taking and publication of photographs.

Section VI. Employer’s Requirement

Volume 3 – Design Procedures and Processes

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1.0 INTRODUCTION

- (1) This document specifies the procedural requirements for the preparation of the Design of the Works for civil, structures and track.
- (2) These requirements are subdivided into those that are to occur during the Design Phase as well as Construction Phase including those which are necessary for interface with various existing systems & agencies and those that are of general application.
- (3) In addition to the express requirements stated herein, the Contractor shall, whenever the Engineer so requests, provide information and participate in discussions that relate to Design matters.
- (4) Engineer shall obtain specific written consent of the Employer before communicating clearance for all concept design & drawings and GADs submitted by the Contractor for Alignment, Major bridges, Rail Fly Over and Works requiring sanction of Commissioner of Railway Safety, in terms of para 3.1 of General Conditions of Contract.
- (5) The Contractor shall, in accordance with Clause 5.1 of the General Conditions of Contract engage the designer(s) who shall undertake and prepare the Design of the Works.
- (6) The Contractor shall establish an office for his core design team in New Delhi area/Allahabad from where the core design team shall function. He would also ensure deployment of suitable design representative(s) at site as required by the Engineer.
- (7) The Contractor shall ensure that the Designer and his team continue to be represented in India at all times by staff whose seniority and experience in their respective fields of activity, are to the satisfaction of the Engineer and whose representative is available on the Site as necessary or as required by the Engineer.
- (8) The key Designers who shall formally sign the Design must have the necessary qualification required by the applicable legislation in India, as well as their engineer's degree/diploma being recognised in India.
- (9) The Contractor shall submit his Quality Assurance Plan for the Design required in the Contract as specified in **“Part 2 Employer's Requirement, Section VI, Volume 6, Appendix 6 - Quality Assurance”**

2.0 REQUIREMENTS DURING THE DESIGN PHASE

- (1) The principal requirements of the Design Phase are the production of the documents by the Contractor, which shall fully describe the Works and include the Preliminary Design, Definitive Design and “Good for Construction Drawings”.
- (2) The volume and contents of the documents shall be in accordance with the applicable regulations/legislation in India, existing codes, manuals and standards applicable on Indian Railways, or suitable international norms.
- (3) The Contractor shall obtain all necessary approvals and agreements for his designs on his account in accordance with the applicable legislation in India & current practices.
- (4) The Preliminary Design shall incorporate the design and Reference Drawings included in the bidding documents, and to be developed by the Contractor sufficiently to define the main structures, track alignment & track components, non-traction power supplies and building services etc.

- (5) In addition, general construction, manufacture, installation, testing and commissioning methodologies and documentation needed to develop the Definitive Design shall be submitted.
- (6) The Definitive Design shall accord with and incorporate the Contractor's Proposals and shall be the design developed to the stage at which all elements of the structures, track, non-traction power supplies and building services are fully defined and specified. In particular the Definitive Design shall be complete when:
 - (a) all calculations and analyses are complete including verification;
 - (b) all main and other significant elements are defined;
 - (c) all tests, trials and selection of materials and equipments are complete;
 - (d) The effects on the Permanent Works of the proposed methods of construction, installation, testing and commissioning and of the Temporary Works are assessed.
 - (e) The definitive design will be prepared by the Contractor after giving a due cognizance of the comments / modifications suggested by the Engineer, if any, during the scrutiny of the Preliminary Designs.
- (7) For the preparation of the Definitive Design, all surveys, investigations and testing, which may become necessary to satisfactorily complete the Design of the Permanent & Temporary Works shall be undertaken by the Contractor.
- (8) The Contractor shall sub-divide the proposed Definitive Design into Design Packages which shall be clearly identified in the Design Submission Programme.
- (9) These Design Packages shall be related to significant and clearly identifiable parts of the proposed Definitive Design and shall address the design requirements as described herein.
- (10) The Design Packages shall facilitate the review and understanding of the Definitive Design as a whole and shall be produced and submitted in an orderly, sequential and progressive manner for the Definitive Design Submission.
- (11) Four hard copies and one soft copy of these Design Packages shall be submitted for approval to the Engineer.
- (12) Only after this the Contractor may proceed to the next stage of the Project for obtaining notice of No Objection.
- (13) Definitive Design Submissions shall also be prepared for those major elements to be procured through sub-contract.
- (14) Where such work is to be procured by the Contractor on the basis of outline design, design briefs and performance specifications, all such documents may be submitted as Preliminary Design Submissions provided that the Design of these elements is finalised, including verification as part of the Definitive Design which are submitted (see paragraph 2(8) and paragraph 2(10) above).
- (15) Upon issue of the Notice in respect of the Definitive Design Submission, the Contractor shall complete the Design in all respects and produce the Good for Construction Drawings, the purpose of which is to illustrate all the Permanent Works and to be the drawings governing the Construction.

- (16) These drawings shall fully detail the Construction of the elements covered by the Definitive Design, and shall show in full, the Works to be constructed. These will also include the drawings and calculations for the temporary works required to be erected by the contractor for successful completion of the permanent works.
- (17) The Definitive Design shall be prepared in accordance with the requirements for technical design in the codes, manuals & standards applicable on Indian Railways, applicable regulations/legislation in India and existing international norms/standards as agreed with the Engineer.
- (18) All technical solutions, schemes, structures, materials should be fully compatible with requirement of DFCC and should not be in conflict with the applicable rules/codes/manuals & standards as well as the legislation in India.
- (19) The Contractor shall prepare the necessary sets of his designs in English for submitting to the relevant authorities responsible for the approvals in accordance with the contractual provisions & the applicable legislation in India.

3.0 REQUIREMENTS DURING THE LAND ACQUISITION PHASE

- (1) The Contractor is to develop his Definitive Design which enables the construction to be done within the land acquired or proposed to be acquired by the Employer for the project.

4.0 REQUIREMENTS DURING CONSTRUCTION PHASE

- (1) The principal requirements relating to the Contractor's documents during the construction Phase are the production by the Contractor of Working Drawings and documents, the preparation of technical submissions as required under the Contract, the compilation of the final design and the production of the As-Built Drawings and final documentation.
- (2) Working Drawings and documents shall be prepared as required under the Contract.
- (3) The Contractor shall endorse the Working Drawings and documents as being in accordance with the Definitive Design and Good for construction drawings.
- (4) The Contractor shall endorse the submissions required under the contract that "all effects of the designs comprising the submission, on the design of adjacent or other parts of the works have been fully taken into account in the design of these parts".
- (5) Contractor shall submit a schedule for As-built Drawings 3 months prior to the anticipated time of completion of the Works.
- (6) The final design is the design of the Permanent Works embodied in:
 - (a) The latest revisions of the documents comprising the Definitive Design, taking account of comments in the schedules appended to Notices of No Objection;
 - (b) The latest revisions of all the drawings;
 - (c) The calculations (see **Clause 13.0** herein); and
 - (d) Such other documents as may be submitted by the Contractor at the request of the Engineer to illustrate and describe the Permanent Works and for which a Notice has been issued.
- (7) The Contractor shall maintain all records necessary for the preparation of the As-Built Drawings and documents.

- (8) Upon completion of the Works or at such time as agreed to or required by the Engineer, the Contractor shall prepare drawings which, subject to the Engineer's agreement, shall become the As-Built Drawings and final documents.
- (9) All such drawings and documents shall be endorsed by the Contractor as true records of the construction of the Permanent Works and of all Temporary Works that are to remain on the site.
- (10) Where the Contractor requires additional land for Temporary Works such as temporary road diversions, ROB/RUB bypasses etc for the period of construction, to facilitate the construction, the Contractor shall arrange for the same entirely at his own cost and risk. Land required for the Permanent Works only shall be acquired and handed over to the Contractor pursuant to Sub-Clause 2.1 of the Conditions of Contract.
- (11) The Contractor shall maintain all records necessary for the financial completion and commissioning. These records shall form part of completion report and shall consist of as a minimum:
 - (a) The implemented work according to activities, places and price;
 - (b) Used materials – type, name of manufacturer along with batch No., place & price etc.;
 - (c) Any other records as required.

5.0 DESIGN INTERFACES WITH INTERFACING CONTRACTORS

- (1) The Contractor shall be responsible for all co-ordination of all design and installation work with the various interfacing parties including interfacing contractors, to establish the Co-ordinated Installation Plan (CIP) as defined at **Part 2 “Employer’s Requirement, Section VI, Volume 6, Appendix 3 - Design and Construction Interfaces”**.
- (2) The CIP shall be prepared by the Contractor in a format acceptable to the Engineer.
- (3) The Contractor shall co-ordinate with all Interfacing Contractors and Parties to produce a detailed programme of access dates, equipment delivery routes and occupation periods for each equipment room and area inside the railway envelope. It is anticipated that Systems Contractor(s) shall be in place one year after the Commencement Date of Works. However, depending upon the progress of the Project, this period could vary. Contractor shall plan his interfacing requirements accordingly. For certain urgent requirements and non availability of requisite information certain assumptions can be made in consultation with the Engineer so that progress of Work is not adversely affected.

6.0 PLANNING SUBMISSIONS

- (1) Submissions for approval of planning of Works for the project shall be made by the Contractor to the following authorities:
 - a) Station areas including buildings and passenger/public underpasses – Railway Authority, local municipality: the Town Planning official or the Chief Architect or other appropriate local authority.
 - b) Water supply and sewerage – local municipality,
 - c) Power supply – power distribution company or authority

- d) Road traffic control : appropriate local authority
 - e) Reconstruction of Irrigation Systems – State Irrigation Department or other appropriate local authority.
 - f) Reconstruction of road connections to ROB and RUB – Railway authority, Local Public Works Department or other appropriate local authority.
 - g) River corrections – appropriate State or Central river authority
 - h) Archaeological Sites in proximity to the alignment – appropriate State or Central Govt. department;
 - i) Connections to Industrial Areas –with the plant owners
- (2) The list as in 6 (1) above is only an indicative list and it shall be extended, as necessary by the contractor, in compliance with the design and construction stages, structures types etc. in accordance with the applicable legislation in force in India.
- (3) The Employer will assist the Contractor in such activities, as appropriate.

7.0 DESIGN SUBMISSION

7.1 PRELIMINARY DESIGN SUBMISSION

The Preliminary Design shall provide initial design documents for review of all elements of construction and shall be sufficiently detailed to show the elements of the design and documents required for preparation of the Definitive Design. The preliminary design should take into account as far as possible all the interface requirements identified by the Contractor at this stage. It shall also include, but not be limited to:

7.1.1 General

- (a) Design submission programme;
- (b) Geo technical investigation plan including bore holes, machines, methodology etc. complete.
- (c) The quality assurance plan for design within 42 days of Date of Commencement;
- (d) Preliminary construction methodology;
- (e) Basis of Design at this stage, factors influencing the Design and a review of the outline design criteria;
- (f) The identification of design codes and standards;
- (g) Linking of technical specifications proposed for the work or submission of technical specifications if these are not already existing;
- (h) The CAD procedures;
- (i) The Design Manual;
- (j) The submission of proposed software;
- (k) The preliminary off site(manufacturer's premises) testing recommendations;
- (l) The preliminary testing and commissioning report;
- (m) The preliminary maintenance analysis and report;
- (n) The preliminary equipment proposals, layouts and details;

- (o) The utility diversion plan;

7.1.2 Alignment & Field Survey

- a) An alignment review bringing clearly the details of the changes proposed to be made by the Contractor; all such locations where the changes are proposed by the Contractor should clearly indicate the minimum distance between the two tracks of DFCC and that from the Indian Railway tracks.
- b) Proposed site surveys and other field surveys like geological, hydrological, seismic etc.;
- c) Topographic survey of the site.
- d) Preliminary validation of the indicative plan and profile given in the bidding document;
- e) Validation of indicative yard plans given in the bidding document.
- f) Preliminary depot layouts;
- g) Details of reference pillars.
- h) Standard details of preliminary alignment like plan and cross section including bench marking, At a scale no smaller than 1:2500, it should show for the entire route corridor, the track alignment, the shape of the earthworks, the track layouts at Junction Stations, crossing Stations, Maintenance Depots, the necessary highway/road/track works, identify all bridge structures (ROB, RUB, Culvert, RFO, FOB etc) which should be labelled, location of all utilities whether IR, public or private, temporary works such as construction haul roads and compounds, retained level crossings and associated staff shelters, layout of DFCCIL station compounds and associated accesses and outline links to utilities.

7.1.3 Earthwork

- a) Preliminary geo-technical report including collection of site data, sub-soil investigation required for the design;
- b) Preliminary design of formation including drainage system – longitudinal and cross drains, diversions of nalla (open drain) etc;
- c) Preliminary design of retaining wall wherever required.
- d) Reports detailing the identification of borrow areas for formation duly indicating the soil properties of the proposed borrow areas.
- e) Identification of the proposed borrow areas for blanket material, prepared sub-grade along with the soil properties planned to be utilized as borrow areas for these elements
- f) The plan view of the formation showing the width of formation at an interval of 20 meters or closer indicating the centre line of each line of the yard duly indicating the locations of the important structures of the yard.

7.1.4 Bridges

- a) Collection of existing bridge data like chainage, opening size, bed level, HFL, scour level and protection works, if any.

- b) Preliminary seismic report including collection of site data;
- c) Data for catchment area and hydrological report and geotechnical investigation report for each bridge;
- d) Validation of the catchment area and hydrological report for each bridge.
- e) Geotechnical investigation report considering the additional investigations done by the Contractor;
- f) Preliminary recommendation of opening sizes of DFC corridor based upon cross verification between existing opening sizes, discharge calculations and other site related parameters.
- g) Validation of the indicative GAD given in the bidding document;
- h) Preliminary RUB, Rail Fly Over and modification proposals to ROB;
- i) GADs containing the following details (containing formation level, highest flood level, bed level, freeboard, railway chainage, and distance between the track). The GADs for the major and important bridges *shall* indicate the *proposed* bottom level for the foundations;
 - Key plan
 - Details of existing railway bridge,
 - Details of proposed DFC bridge,
 - Their respective half plans, elevations & sections at top and bottom
 - Section of proposed embankment
 - Details of wing wall, return wall, drop and curtain walls
 - Details of bore hole log
 - Details of catch water drains wherever needed
 - Architectural requirements, if any.
 - Details of protection works including that required for the embankment in the vicinity of bridge.
 - Bearing arrangements
 - General Notes indicating the additional site information about the water course collected by the Contractor during the survey.

7.1.5 Permanent Way (Track)

- a) Preliminary track structures including rail, sleeper, fitting, SEJ, points and crossings, derailing switches, track on bridge approaches, track on bridge proper, level crossings, etc,
- b) Preliminary cross section in cutting and embankment showing ballast profile on curve and straight. Typical cross-sections proposed to be followed in the yards at different points in the yards would also be required to be submitted.
- c) Preliminary track layouts including yard plans;
- d) Connectivity details to existing IR yards and modifications there to;

- e) Preliminary signage proposals.

7.1.6 Buildings

- a) Preliminary architectural layouts and main materials,
- b) Preliminary construction methodology,

7.2 DEFINITIVE DESIGN SUBMISSION

The Definitive Design Submission shall be a complete set of Contractor's documents, properly consolidated and indexed and shall fully describe the proposed Definitive Design. In particular, and where appropriate, it shall define but not be limited to:

7.2.1 General

- a) The dimensions of all major features, elements and members;
- b) Schedules of all materials;
- c) Potential forces and movements due to all possible loadings and actions on the structures, and their accommodation;
- d) All stress calculations due to secondary loading;
- e) Standard details;
- f) Proposed Good for Construction drawings pertaining to each component for consideration of the Engineer;
- g) Electrical and mechanical services and equipment and their interaction with the structures;
- h) Erection methods;
- i) Utilities to be diverted /supported;
- j) IR equipment interface recommendations;
- k) Report on interfacing contracts;
- l) Provisions and proposals for construction interfacing with the Interfacing Contractors;
- m) Maintenance report;
- n) Environmental impact correction measures;
- o) Demolition methodologies.

7.2.2 Alignment & Field Survey

- (a) Final location survey, geometry (vertical and horizontal) and setting-out of all main elements and features of alignment including horizontal and vertical curves, transitions, grade compensations etc complete with corresponding calculations and layouts;
- (b) Standard details on updated alignment as mentioned in para 7.1.2 (h) above.
- (c) Final hydrology report with field data and samples for general catchment;
- (d) Final geotechnology report with field data and samples;
- (e) Final seismic report;

7.2.3 Earthwork

- (a) Earthwork design including sub-soil suitability/availability, slopes stability analysis, adequacy of blanketing material used and prepared subgrade etc complete with calculations;
- (b) Cross section of the proposed embankment/cutting at specified intervals (at 20m in straight and 10m on curve) indicating thickness of different layers with specification details;
- (c) Final geo-technical report with field data and samples;
- (d) Borrow pit locations with lead diagrams of cut/ fill / borrow;
- (e) Schedules of all equipments;
- (f) Testing proposals;

7.2.4 Bridges

- a) Updated bridge list for the section.
- b) Definitive GAD which includes the final drawing and design to be adopted for construction. This includes details of
 - Key Plans
 - Existing & proposed bridge
 - Layout
 - Protection work- guide bunds, river training works, wing wall, drop wall, curtain wall, return wall, flooring & toe wall as applicable
 - ,Expansion joints, Construction joints, bearing;
 - Launching arrangement temporary works, equipment deployment
 - General notes
 - References
 - Typical details of reinforcement in structural concrete members;
- c) The locations and nature of all steel structures alongwith relevant joints and connections and details thereof;
- d) Final hydrology report with field data and samples for each bridge;
- e) Schedules of all equipment;
- f) Modifications to existing ROB, plans and detail scheme;
- g) Testing proposals;
- h) Demolition methodologies.

7.2.5 Track

- (a) Survey of the existing track layout with recommendations where connections between DFC and Indian Railway track are to be done;
- (b) Track design including sleepers for all locations, fittings, SEJs, LWR, etc - design and corresponding calculations. This includes calculations for the length of each transition curve, the required cant for each curve and the detailed curve calculations to assess the conformity to the DFC stipulations about cant, cant deficiency, etc;

- (c) Points and crossings, derauling switches with detailing,
- (d) Level crossing arrangements with detailing.
- (e) Methodology of track construction in detail;
- (f) Signage requirements and plan;
- (g) Schedules of all machines and equipment;
- (h) Testing and commissioning proposals;

7.2.6 Buildings

- a) Architectural requirements;
- b) Existing building rehabilitation recommendations, if any;
- c) Potential forces and movements due to all possible loadings and actions on the structures, and their accommodation;
- d) Typical details of reinforcement in structural concrete members;
- e) Schedules of all materials;
- f) Building services documents;

7.2.7 Drawings

- (1) The Definitive Design Submission shall include proposed Good for Construction Drawings that shall illustrate the proposed Definitive Design. After these are agreed by the Engineer, Contractor shall endorse these as Good for Construction. These shall in particular include, but not be limited to:
 - (a) General arrangements;
 - (b) Location plans, geometry (vertical & horizontal), yard plans, yard diagrams and setting out drawings;
 - (c) Structural drawings of bridges and other structures with in the project;
 - (d) Architectural elevations and landscaping;
 - (e) Layouts and details of structural elements ;
 - (f) Associated fittings;
 - (g) Slopes and earthworks;
 - (h) Access roads and temporary road works;
 - (i) Dumping & borrow areas;
 - (j) Catch-water and surface drainage;
 - (k) Existing and proposed utilities;
 - (l) Road-works and works related to traffic management including decking;
 - (m) Track layouts (Horizontal & Vertical Alignment) – the commencement and end of all transition curves must be indicated on the plans;
 - (n) LWR/ CWR plans including those in the loops;
 - (o) Temporary construction depots & depot equipment layouts;
 - (p) Station yard layouts;
 - (q) Track components' details;
 - (r) Equipment schedules;

- (s) Electrical equipment layouts;
- (t) Wiring diagrams;
- (u) Provisions for railway works, electrical and mechanical services and equipment;

7.3 DOCUMENTS

7.3.1 Document submission

- (1) The Contractor's technical proposals shall be amplified during the Preliminary and Definitive Design as required at **Sub Clauses 6(1) and 6(2)** above and shall include but not be limited to the following documents:

7.3.1.1 Technical specifications

- (1) The Specifications included in the Contractor's technical proposals together with the Design criteria shall be amplified so as to comprehensively specify the design and construction of the Works.

7.3.1.2 Design manual

- (1) The Design Manual shall incorporate all design requirements, standards, codes and all other documents or matters which are relevant to and govern the design.
- (2) In addition it shall refer to all materials, codes and standards used, making clear their specific applications.
- (3) The Design Manual shall be produced so that it can be used by those involved in the preparation or review of the design of the Permanent Works as a comprehensive reference text and efficient working document.

7.3.1.3 Building services documents

- (1) These documents shall include detailed designs, performance specifications and all technical requirements relating to the Permanent Works for non-traction power supplies and building services equipment comprised in the Works.

7.3.1.4 Track condition surveys and rehabilitation recommendations

- (1) Surveys of the existing conditions of the track where the structure and substructure is required to be only rehabilitated shall be carried out.
- (2) Recommendations for rehabilitation including any drainage and strengthening measures shall be done.

7.3.1.5 Report on interfacing contracts

- (1) The report shall include details of the Design and Construction of the Works sited adjacent to other contracts, details of provisions required to be provided by the Interfacing Contracts, indicating arrangements for accesses, fixings, casting-in, openings, supports, decks, manholes, trenches and the like, equipment installation in other Interfacing Contractor's works along with updated interface management plan relating to design integration and co-ordination.

7.3.1.6 Testing and commissioning reports

- (1) The report shall include details of proposals for testing and commissioning procedures for all relevant elements and equipment contained in the Permanent Works.

7.3.1.7 Maintenance reports

- (1) The report shall be updating the statement of maintainability in the Contractor's technical proposals and detailing maintenance routines necessary for the achievement of the required life of the various elements of the Works.

7.3.2 Supporting documents

- (1) Where relevant or required, these documents shall be accompanied by a design note stating clearly how the information has been used in the design of the Permanent Works.

7.3.2.1 Construction / manufacturing / installation analysis reports

- (1) A report shall be containing a stage-by-stage construction / manufacturing / installation sequence for all structures/track components / equipment.

7.3.2.2 Construction method statements

- (1) A report shall provide sufficient information on the methods of Construction / Installation of the Contractor's Equipment to allow the Engineer to assess their effects on the Permanent Works and to enable these to be taken into account in the review of the Definitive Design. This shall include the temporary works required to be erected by the Contractor for successful completion of the work.

7.3.2.3 Final geotechnical report

- (1) The report shall include site investigation and laboratory test results covering the geotechnical interpretation of site investigation work including that undertaken by the Contractor in sufficient detail to confirm and justify parameters used in the cuts, foundation and geotechnical designs.
- (2) The report shall also include the full logs and descriptions of confirmatory boreholes drilled by the Contractor, statistical analysis of samples.

7.3.2.4 Survey report

- (1) The report shall cover all survey work undertaken by the Contractor, including checks on mapping, survey stations, co-ordinates and setting-out.
- (2) Updated topographical and survey drawings shall also be included.

7.3.2.5 Utilities report

- (1) The report shall furnish details of arrangements and working methods in respect of the existing utilities (chartered and unchartered) and shall be including protection measures, diversions/shifting, reinstatements and programme allowances.

7.3.2.6 Temporary works design report

- (1) The report shall provide sufficient information on the design of the Temporary Works to allow the Employer's Representative to assess their effects on the Permanent Works and to enable these to be taken into account in the review of the Definitive Design.

7.3.2.7 Hydrology report

- (1) The report shall contain the details of the hydrology, forming the basis for design of the drainage structures and bridges, calculations sheets.

7.3.2.8 Project schedule review

- (1) The Contractor shall, prior to submitting the Definitive Design Submission, review the project schedule against the current version of the Design Submission Programme.

- (2) The Design submission programme should be in accordance with the Project Schedule.
- (3) In the event that the Contractor considers there to be any discrepancies or inconsistencies between the design submission programme and the project schedule, the Contractor shall submit with the Definitive design submission programme, its proposed revisions to the project schedule such that the discrepancies or inconsistencies are removed.
- (4) The Contractor shall provide details of submissions of the proposed Working Drawings and documents and their anticipated timing during the construction phase.
- (5) The Contractor shall identify information required from or actions to be undertaken by the Employer or others and which are necessary to permit the completion of the design of the Permanent Works and the Working Drawings and documents and shall indicate the latest dates by which the information from the Employer is required by him to follow the laid down schedule.
- (6) Dates of the receipt required by the Contractor of such information or for the completion of such actions shall be included with appropriate justification.

7.3.2.9 Use of Works Areas report

- (1) The report shall be updating the proposals from those contained in the Contractor's technical proposals for the use of Works Areas and their reinstatement, detailing the station accesses and access facilities.

8.0 DESIGN SUBMISSIONS – GOOD FOR CONSTRUCTION DRAWINGS

- (1) These drawings shall form part of the Working Drawings to be used for construction purposes.

9.0 DESIGN SUBMISSIONS – CONSTRUCTION PHASE

- (1) On the issue of a Notice in respect of the Good for Construction Drawings, the Contractor shall produce the proposed Working Drawings.
- (2) These shall either be identical to the Good for Construction Drawings or shall be further drawings and documents developed in accordance with these drawings such as fabrication and shop drawings, construction installation and erection sequences and the like and all such drawings shall comply with the requirements of the Contract.
- (3) Prior to submission of the proposed Working Drawings, the Contractor shall endorse the appropriate original paper drawings as "Good for Construction".
- (4) If the Engineer so requires, the endorsed original shall be submitted to the Engineer who shall, if he has no objection to the contents of the submission, further endorse the original by stating that he has no objection to the use of the original drawings as a Working Drawings.
- (5) On the endorsement by the Engineer, the original will forthwith be returned to the Contractor as the Working Drawings.
- (6) Only the Working Drawings endorsed as above or those that the Engineer has expressly stated as not requiring his endorsement shall be issued to the Site and the construction of the Works shall be strictly in accordance with these Working Drawings.

- (7) The Contractor shall finalise details of the proposed method of construction and/or installation and submit such finalised details to the Engineer for review.
- (8) As-Built Drawings and documents, endorsed by the Contractor shall be submitted to the Engineer for agreement in accordance with para 10.0 below.

10.0 DESIGN SUBMISSIONS - REVIEW PROCEDURES

- (1) Design submissions shall be reviewed by the Engineer who shall coordinate the design review for the Employer and communicate the decision within 28 days of receipt of complete information on the subject matter.
- (2) The Contractor shall, prior to the submission of the Design Data, obtain all required and/or statutory approvals that relate to that submission including, where appropriate, the approval of the concerned government authorities and municipalities and utility undertakings, and demonstrate that all required approvals have been obtained.
- (3) All submissions for Temporary and Permanent Works shall be accompanied by two original copies of a 'Design Certificate' as set out in **Part 2 “Employer’s Requirement, Section VI, Volume 6, Appendix 11 – Design Certificate”** hereto and signed by the Contractor and the Designer.
- (4) As-built Drawings and documents in 4 (four) hard copies and 1 (one) soft copy shall be submitted to the Engineer for approval within the time period as mutually agreed by the Engineer and the Contractor.

11.0 DESIGN SUBMISSION PROGRAMME

- (1) The Contractor shall prepare the Design submission programme which should clearly bring out the Contractor's anticipated programme for the preparation, submission and review of the design packages, the Definitive Design Submission and the Good for Construction Drawings submission.
- (2) The Design submission programme should be compatible with the Project Schedule.
- (3) The Design Submission Programme shall:
 - (a) Be consistent with and its principal features integrated into the Works Programme, and show all relevant Milestones and Key Dates;
 - (b) Identify subjects and dates for which the Engineer’s decisions should be made;
 - (c) Make adequate allowance of 28 days for review by the Engineer and other review bodies;
 - (d) Make adequate allowance of 28 days for the Design and development of specialist works;
 - (e) Include a schedule identifying, describing, cross-referencing and explaining the Design Packages into which the Contractor intends to divide the Definitive Design and Good for Construction Drawings; and
 - (f) Indicate the Design Interface and Co-ordination periods for each Interfacing Contractor.
- (4) The Contractor shall submit the Design Submission Programme to the Engineer within twenty eight (28) days of the Commencement Date, and thereafter up-dated versions thereof at intervals of not more than twenty eight (28) days throughout the Design Phase. For this purpose, the Contractor shall maintain a design team in New

Delhi area/Allahabad. He would also ensure deployment of suitable design representative(s) at site as required by the Engineer.

- (5) The Construction and Defect Notification Period shall be as indicated in the Conditions of Contract. The Contractor shall be required to plan the various components of work in such a sequence that the entire work is completed within this time frame. Defect Notification Period shall commence after issue of Taking Over Certificate by the Engineer. Before commissioning of the complete rail system, Integrated Testing of the complete rail system will be done, as mentioned in the Contract. Contractor's Design submission programme shall consider all these aspects.
- (6) The Contractor shall submit complete set of approved "As-Built" Drawings and certificates for conclusion of any legislative procedures.

12.0 SUBMISSIONS PROGRAMME DURING THE CONSTRUCTION PHASE

- (1) The Contractor shall identify submissions required during the Construction Phase in accordance with **Part 2 "Employer's Requirement, Section VI, Volume 2, General"**.

13.0 CALCULATIONS

- (1) Comprehensive set of calculations relevant to the Construction proposals, Definitive Design and Good for Construction Drawings and any Design change shall be submitted for review with the respective Design packages in soft as well as hard copies.
- (2) The Engineer may require the submission of applicable software including in house software programmes/ worksheets developed by the Contractor, computer input and programme logic for its review prior to the acceptance of the computer output.
- (3) Calculations to be included as part of the submission herein shall comprise the up-to-date calculations in respect of the Definitive Design, the Good for Construction Drawings and such further calculations which the Contractor has prepared during the production of Working Drawings.

14.0 DOCUMENT REQUIREMENTS

- (1) Drawings shall be prepared on CAD to the sizes as stipulated in **Part 2 "Employer's Requirement, Section VI, Volume 6, Appendix 7 – Drawings and CAD standards"**.
- (2) The titles & numbering scale of drawings of drawings shall be as per Indian Railway Works Manual (IRWM) as well as above CAD standards to be decided mutually by the Contractor and the Engineer.
- (3) Plans of Continuously Welded Rails shall be prepared as per Para 5.1.3 of IR's Manual of Instructions on LWR (Latest revision).
- (4) The Contractor shall submit 4 hard copies and a soft copy of the Preliminary and Definitive Design and drawings including calculations for review by the Engineer. After receipt of the Notice from the Engineer, the Contractor shall submit 4 hard copies and a soft copy of the final Design and drawings for the use of the Engineer.
- (5) The approval of drawings shall however be certified on the hard copy only.

Section VI. Employer's Requirement

Volume 4 – Design Criteria and Specifications

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1.0 GENERAL DESIGN CRITERIA

1.1 DURABILITY AND MAINTENANCE

- (1) The Permanent Works shall be designed and constructed such that, they shall endure in a serviceable condition throughout their minimum design lives as described in the Design Criteria and standards contained in the technical specifications to minimise the cost of operation and maintenance whilst not compromising safety or the performance characteristics of the railway.
- (2) Electrical and mechanical equipment where supplied shall be of a quality and durability to fully meet the performance and operational requirements described in the Design Criteria.

1.2 OPERATIONAL REQUIREMENTS

- (1) The Permanent Works shall be designed to permit the railway to operate satisfactorily at a maximum design speed of 100Km/h for freight trains. All the bridges, culverts and the entire embankment and cutting would be constructed for “DFC loading (32.5 tonnes axle load)”. Track shall be constructed for an axle load of 25 tonnes.
- (2) In the design and construction of the Works, the Contractor shall, as a fundamental objective and as a priority, ensure that staff and the public will, throughout the operational period of the operating railway, and within the confines thereof, be provided with as safe an environment as is reasonably practicable.
- (3) The Contractor's attention is directed to requirements concerning the role of the Commissioner of Railway Safety (CRS) as mentioned in para 19.1(2) of **Part 2 “Employer’s Requirement, Section VI, Volume 5”**. Sanction of CRS will also be required in terms of Chapter XIII of IRPWM.
- (4) It is a requirement that the Indian Railway (IR) remains operational during the construction phase. However, traffic blocks of short duration, wherever inescapable, shall be permitted.

1.3 RESPONSIBILITY FOR THE CIVIL, STRUCTURES, TRACK and BUILDING WORKS

- (1) The Contractor shall be responsible for detailed design, layout, construction, manufacture, supply, installation, testing and commissioning of the civil, structures, track and building works and building services wherever applicable under this Contract.
- (2) The Contractor undertakes that the designers shall be available to attend discussions with the Engineer and Employer at all reasonable times during the Contract period. The Designer shall be the same entity as proposed by the Contractor at the time of pre-qualification, unless otherwise approved by the Employer.

The Contractor shall be fully responsible, for the suitability, adequacy, integrity, durability and practicality of the Contractor’s proposal.

Wherever there is any inadequacy, insufficiency, impracticality or unsuitability in or the Employer’s Requirements or any part thereof, the Contractor’s proposal shall take into account, address or rectify such inadequacy, insufficiency, impracticality or unsuitability.

The Contractor shall certify that:-

- the Works have been or will be designed, manufactured, installed and constructed to the applicable standards using proven up-to-date good practices.
- the Works will, when completed, comply with enactments and regulations relevant to the Works.
- the design of the Works have taken or will take full account of the effects of the intended manufacturing and installation methods..

The Contractor shall also provide an undertaking from the Designer for his Designs for suitability, adequacy, practicality and absolutely meeting the Employer's Requirements as detailed in **Appendix 11 – Volume 6 Part 2 of Bidding Documents**. The undertaking shall also state that reasonable skill and care expected from a professionally qualified and competent designer experienced in works of similar nature has been exercised. This shall also be applicable for Designs carried out by Contractor's consultants, his sub Contractors and/or his qualified personnel/persons or cause to have been prepared, developed or issued directly or indirectly by the Contractor. All the aforesaid shall be applicable notwithstanding the fact that any part of the work may have been inadvertently accepted, passed and paid for by the Engineer or Employer.

- (3) The Civil, Structures, Track and Building Works shall comply with Indian standards and IR regulations and standards as set down in **Part 2 “Employer's Requirement, Section VI, Volume 6, Appendix 16 - Design Standards”**.

1.4 AESTHETICS

- (1) The Permanent Works for bridges shall be designed to achieve an aesthetic character and provide a feeling of design commonality throughout the project.

1.5 SAFETY, HEALTH & ENVIRONMENTAL CONSIDERATIONS

- (1) The design of the Permanent Works shall be according to Indian laws and regulations related to Safety, Health & Environmental Requirements.

Safety, Health & Environmental aspects shall be kept in mind during the Design/Construction and Testing & Commissioning phase, requirement for which has been specified at appropriate places in the bidding document as well as in **Part 2 “Employer's Requirement, Section VI, Volume 6 Appendix 12 & 13”**. It shall be the overall responsibilities of the Contractor to ensure compliance of Safety, Health & Environmental aspects at all times conforming to the provisions mentioned in this Bidding document.

1.6 QUALITY CONTROL

- (1) Quality control aspects shall be kept in mind during the Design/construction and testing & commissioning phase, requirement for which has been specified at appropriate places in the bidding document as well as in **Part 2 “Employer's Requirement, Section VI, Volume 6, Appendix 6 - Quality Assurance”**. It shall be the overall responsibilities of the Contractor to ensure deliverables of quality products at all times conforming to the provisions mentioned in this bidding document.

2.0 EARTHWORK

2.1 SCOPE

- (1) This section provides the requirements for the design and construction of formation earthwork, drainage and erosion control.
- (2) These requirements include the following components of work which are to be carried out in accordance with the conditions of contract:
 - a) Investigation and testing of borrow areas and additional geotechnical investigations to supplement and/or confirm the subsurface conditions along the alignment.
 - b) Clearing and grubbing the site
 - c) Design, construction and testing of earthwork in excavation and embankment
 - d) Design, construction and testing of any ground improvement / treatment / modifications as required
 - e) Construction and testing of prepared sub-grade and blanket layers
 - f) Design and construction of erosion control measures for fill and cut slope surfaces
 - g) Design and construction of side drains and catch water drains for proper drainage of the formation

2.2 GENERAL

2.2.1 Terminology and definitions

- (1) The following terms appearing in these specifications will have the following meaning:

Blanket:	A layer of select clean and well-graded granular material of specified gradation and properties and designed thickness provided over the full width of the formation just below the ballast.
Formation:	A general term which refers to the whole of blanket, prepared sub-grade, embankment fill and sub-soils below the ballast
Formation level:	The design level of the formation at the top of the blanket
High Embankment:	Embankment having height more than 4.5 meters above toe of the bank on either side of the bank.
Prepared sub-grade:	A layer of soil of superior specifications, which is provided below the blanket
Sub-grade:	The part of the formation which is below the prepared sub-grade and which may comprise of embankment fill or sub-soils
Sub-soils:	Soils of natural ground below embankments or prepared sub-grade in cuts

2.2.2 Submittals

- (1) Prior to the start of construction operations, the Contractor shall submit to the Engineer all relevant documents, drawings, calculations and data including, but not

limited to the following, and shall obtain the approval of the Engineer for the proposed materials, design, construction methods and quality control procedures

- a) Geotechnical investigation reports and evaluation of sub-surface conditions along the alignment.
- b) Geotechnical investigation reports for borrow areas.
- c) Details of earthwork balance (cut & fill), properties of materials to be imported / exported, and management of excess materials Material test reports for embankment fill, prepared sub-grade and blanket.
- d) Slope stability calculations. Analysis of the stability and settlement of formation and design of remedial measures if required. Details of earthwork design solutions and criteria used
- e) Details of proposed instrumentation and monitoring
- f) Details of construction equipment.
- g) Construction quality control plan.
- h) Design Alignment including deviations adopted by the Contractor within the land acquired or proposed to be acquired by the Employer.
- i) Proposed Good for Construction drawings including longitudinal and cross-sections of formation based on final design of alignment.
- j) Proposed Good for Construction drawings including plan, longitudinal sections and cross-sections of the formation at an interval of 20m in the block sections and 10m in the DFCC and Indian Railway yards.
- k) Detailed drawings of the drainage works, retaining walls, erosion control and ground improvement (if any).

2.3 DESIGN

2.3.1 Designed Alignment

- (1) The alignment details are given in **Site Details; Part 4 of Bidding Document**. However, the Contractor is required to review and revalidate it with respect to his own Design and Construction proposals and shall satisfy himself that there is no conflict in regard to new constructions proposed and existing structures to be preserved.
- (2) The Contractor is permitted to propose minor deviations in alignment to suit his construction proposals but he must demonstrate that any such deviations shall comply with good design practice and the alignment requirement of the Design Criteria of bank fulfilling the following conditions :-
 - There is no extra cost to the Employer.
 - Changes proposed are essentially required to suit the Contractor's specific design and shall be accommodated within right of way as shown in the bidding document.

2.3.2 Geometric and Cross-Sectional Features

- (1) The width of formation (measured at the top of the blanket) on straight alignment shall be as follows:

Items	Dimension
Single Line	
Minimum Width in Embankment	7600 mm
Minimum Width in Cutting (excluding side drains)	7500 mm
Double Line	
Minimum Width in Embankment	13500 mm
Minimum Width in Cutting (excluding side drains)	13500 mm

Note: All cuttings and embankments shall have provision for trolley refuges as per IR standards / as approved by the Engineer.

- (2) Contractors shall follow RDSO GE: 0014 issued in Nov. 2009 for 32.5 tonnes axle load “Guidelines and specifications for design of formation of heavy axle load” with the following changes:-
- Width of formation shall be as per clause 2.3.2 (1).
 - At Page 35 of 75 and Page 36 of 75 of the aforesaid guidelines, minimum layer of 1.0 meter of embankment fill above HFL have been indicated. These provisions are not mandatory. For exceptional locations prone to flooding, the Engineer may call for the stability analysis of banks
 - Wherever the height of bank is more than 6.0 m, berms of 1.5 m width shall be provided on either side at every 6.0 m from top of blanket layer.
- (3) The Contractors may please note that the width of formation on curves shall be as per para 1.11.3 of the schedule of dimensions 2013 for Eastern Dedicated Freight Corridor:-
- The Contractors may please note that a uniform total thickness of formation layers of 1.75 m should be provided including blanket, prepared subgrade & top layer of embankment fill etc. (Ref foot note 3 on page 33 of 75 and page 34 of 75 of RDSO “Guidelines and specifications for design of formation of heavy axle load Nov. 2009 (2.0 metre has been changed to 1.75 metre). In case the difference between formation level and ground level is less than required the existing ground will have to be excavated to provide the formation layers of requisite thickness and specifications as mentioned in the said specifications. In case, however, the existing ground soil at a particular level satisfies the specifications of the formation layers at that level, the existing ground is not required to be cut to provide total thickness.
 - Minimum height of embankment shall generally be 1.0 meter except at obligatory points like level crossings, junction yards, bridge approaches etc.
 - Geometrical requirements (except for the formation width as specified in clause 2.3.2 (1) shall be as per RDSO:GE -0014 Guidelines and specifications for design of formation for heavy axle load for 32.5 tonnes axle load.
- (4) Formation levels shown on the longitudinal section sheets furnished as part of the bidding documents shall be reviewed, verified and corrected by the Contractor on the basis of his own surveys and in compliance to the provisions of the Indian Railway Manuals and specifications.

- (5) Signalling and Telecommunication cables of DFCC which will be laid by the Signalling & Telecommunication Contractor and which therefore does not form part of the scope of this Work will be laid at suitable location as per the plan approved by the Engineer.

2.3.3 Geotechnical Investigations

- (1) The Contractor shall carry out additional subsurface investigations along the alignment which may include boring, sounding, trial pits, sampling, field and laboratory testing etc. as required to supplement and confirm the geotechnical information furnished in **Site Details; Part 4 of the Bidding Documents**.
- (2) The additional investigations shall be sufficiently detailed in scope to allow a reliable and comprehensive assessment of the subsurface conditions in accordance with the requirements of design and construction.

2.3.4 Retaining structures

- (1) Where space limitations or other constraints do not permit provision of a stable slope for the formation, retaining walls, Reinforced Soil Walls/Slopes shall be provided to safely retain and support the formation, ballast and the track structure. Such situations may include the following:
 - (a) On parallel sections, where the formation level of the proposed DFC track is at a higher elevation than the existing Indian Railway formation and the space available between the embankments is not sufficient.
 - (b) Locations where the embankment height is large and the right-of-way is not adequate.

Note: Wing walls and abutments required to retain the approaches to bridges, rail flyovers, road under bridges etc. do not come under the purview of this section and are covered elsewhere.

- (2) Retaining walls shall be designed in accordance with accepted engineering practice to resist the lateral earth pressures resulting from weight of retained soil and applied dead and live load surcharges to ensure a minimum factor of safety of 1.5 against sliding, 2 against overturning and 2.5 against bearing failure.
- (3) The structure shall be safe against overturning and sliding forces.
- (4) Materials, structural design and detailing of structural components shall conform to the requirements of relevant IS, Indian Railway or equivalent codes. Equivalent codes will be those proposed and agreed during the Stage 1 Procurement discussions and Agreements.
- (5) The details of the back fill and the drainage for the retaining wall shall be an integral part of structural drawing submitted by the Contractor.
- (6) Weep holes of suitable diameter shall be provided at suitable spacing to prevent development of excess hydro-static pressure on the lining. Weep holes shall have an adequate filter zone to prevent erosion of soils.

2.3.5 Slope erosion control

- (1) The slopes of embankments and cuts shall be protected against erosion by providing a protective vegetative cover comprising perennial turf forming grass.
- (2) The species of grass should be compatible with the local soil and climatic conditions.

- (3) The materials and techniques proposed by the Contractor shall be suitable for the slope height and angle, soil type, and climatic conditions and shall perform its function with minimum maintenance requirements.
- (4) The sod shall consist of dense, well-rooted growth of permanent and desirable grasses, indigenous to the locality where it is to be used, and shall be practically free from weeds or other undesirable matter.
- (5) At the time the sod is cut the grass on the sod shall have a length of approximately 50 mm and the sod shall have been free of debris.
- (6) Thickness of the sod shall be as uniform as possible, with some 50-80 mm or so of soil covering the grass roots depending on the nature of the sod, so that practically all the dense root system of the grasses is retained in the sod strip.
- (7) The sods shall be cut in rectangular strips of uniform width, not less than about 250mm x 300mm in size but not so large that it is inconvenient to handle and transport these without damage.
- (8) During wet weather, the sod shall be allowed to dry sufficiently to prevent rearing during handling and during dry weather shall be watered before lifting to ensure its vitality and to prevent the dropping of the soil in handling.
- (9) Sods shall be delivered in healthy condition and be free from weed and disease.
- (10) Flyover, approaches of bridges High Embankments shall be designed with the provision of slope revetment work to be approved by the Engineer.

2.3.6 Drainage

- (1) Where the alignment is parallel to the existing Indian Railway formation and the distance between the centre lines of the nearest DFC and IR tracks is equal to or more than 8.0 m, open kucha drains shall be provided to ensure satisfactory drainage of the area between the DFC and Indian Railway's formation. These drains shall be designed and shall consist of suitable shape and dimensions to provide adequate flow capacity and permit easy maintenance as per the approval of the Engineer. At locations where it is not possible to provide required area of kucha drain, concrete drain of suitable section shall be provided. As per site requirements these shall be linked with cross drains at suitable intervals wherever required.

Where the distance between the centre lines of DFC and IR tracks is less than 8.0 m (a situation which may arise in existing IR yards / DFC yards) and provision of open drains is not feasible, alternative drainage arrangements in the form of suitably designed drains using good engineering practices and technically sound systems such as perforated pipes etc. should be used with the approval of the Engineer. It should be functional throughout the year and amenable to user-friendly maintenance.

- (2) For the portion in detours, generally no side drains would be required, if the formation is on an embankment. However, the conditions at the site may warrant the provision of the side drains. Such locations would be identified by the Contractor and suitable drainage arrangements to ensure the passage of water would be provided by the Contractor.
- (3) (a) When the formation is in cutting or where the bottom of the blanket is below the existing ground level, Pucca (concrete) side drains shall be provided at suitable distance for the proper drainage of the formation, the invert level of the drains shall be at least 300mm below the bottom of the blanket at the edge of formation. Such side

drains shall be of suitable shape and dimensions to provide adequate flow capacity, permit easy maintenance and shall have a uniform adequate longitudinal gradient. The lining shall be reinforced cement concrete of adequate thickness to prevent erosion and caving. Alternative Designs for this item can also be suggested by the Contractor.

(b) For deeper cuttings the provision of catch water drains would be required to tap the water flowing towards the cutting from the hill slope. Such locations would be identified by the Contractor and suitable profile of the catch water drains would be proposed by the Contractor and approved by the Engineer.

- (4) The Contractor shall be responsible for installation of a good track drainage system and its connection to main drainage system.
- (5) Before work in or in the vicinity of Indian Railway yard is taken up, a drainage plan for protecting DFCC as well as IR track shall be submitted by the Contractor for No Objection of Engineer. Such plans should be sufficiently detailed. The side drains shall be extended as necessary to lead the water clear of the Works to natural drainage courses, culverts or any other suitable outlets.

2.4 MATERIALS

2.4.1 General

- (1) Materials to be used in the work shall conform to the requirements laid down in the Design and drawings agreed by the Engineer.

2.4.2 Borrow Areas

- (1) The borrow areas shall be located outside the land acquired by the DFCC and Indian Railway land and shall be sufficiently away from the project limits so as not to have any adverse impact on the project.
- (2) The Contractor shall arrange the necessary permission from property owners and the required clearances from all pertinent government departments and municipal bodies and shall comply with all applicable rules and regulations.
- (3) The Contractor shall carryout a satisfactory geotechnical investigation of the borrow areas to evaluate the suitability of the materials for construction and submit the same for approval of the Engineer.
- (4) The Contractor shall take all reasonable precautions to avoid any damage to adjacent property or structures, minimize the adverse impact of the excavations on the environment and inconvenience to the local inhabitants.

2.4.3 Blanket, Prepared Sub-grade, Embankment Fill

- (1) Material for blanket, prepared sub-grade, embankment, formation fill shall be conforming to the specification of material as detailed in the relevant specifications of formation.

3.0 BRIDGE DESIGN CRITERIA

3.1 GENERAL

- (1) Bridges to be designed and constructed shall allow simultaneous, unhindered and safe movement of traffic over the DFC and over/under roads, railway or flow of water in canals/nallas/watercourses. The opening sizes of DFC shall be based upon cross verification between existing opening sizes, discharge calculation and other site related parameters.

- (2) For the portion of DFC running parallel or close to the IR tracks, the bridges proposed by the Contractor shall be sized as a minimum to match the existing bridges on the IR tracks in the vicinity with a view to ensure minimum obstruction to the flow of water. At such locations, if the existing opening sizes of bridges are different in adjacent UP & DN IR tracks, the minimum recommended opening size / linear water way for the DFC tracks shall be the maximum of the existing opening sizes.
- (3) The data and information provided by the Employer in **Site Details; Part 4 of the Bidding Documents**, including GADs, are indicative and for guidance only. These should be re-checked, verified and modified by conducting site investigation to suit the site conditions. Site Investigation should include but not limited to topographical survey, hydrological survey and geotechnical surveys.
- (4) The Contractor is fully responsible for delivering a safe, sound, durable and satisfactorily functioning state of the art structures conforming to the project requirements, applicable standards, codes and manuals as listed in **Part 2 “Employer’s Requirement, Section VI, Volume 6, Appendix 16 - Design Standards”**.
- (5) Where there is a gap between the wing walls of the existing IR bridge and new DFC bridge, walls of suitable heights on open foundations between the two set of wing walls on new bridges and existing Indian Railway, bridges are required to ensure smooth flow of water. At such location, the valley formed between the embankments behind such walls will be lined with rubble along with a saucer drain and the water from such valleys shall be discharged through the walls by provision of suitable means.
- (6) Minimum size of RCC Box with or without fill shall be 1.2 x 1.2 m and no pipe culverts are permissible.
- (7) Bridges shall have simply supported spans and shall be designed to accommodate the curvature of track alignment.
- (8) The Design of bridges shall be such that it is capable of allowing the construction to be carried out in minimum possible time as well as to the required quality standards. The use of precast girders / box culverts is permissible. The Design philosophy of the contractor shall have prior agreement of the Engineer in respect of its impact on safety, aesthetics, constructability, serviceability and maintainability.
- (9) All bridges shall have ballasted deck except Important bridges (Yamuna and Tonse) and RFOs. Provision of ballasted deck for important bridges (Yamuna and Tonse) and RFOs is not mandatory. All bridges shall be capable of carrying through LWR/CWR. Forces due to continuation of LWR/CWR shall be as per provisions of UIC 774-3R Oct. 2001 edition with latest modification (if any) read along with the amendment slip No. 45 dated 27/9/2013 issued by Indian Railways.
- (10) The bridge loading for the DFC shall be 32.50T axle load with corresponding locomotives and wagons as per IRS Bridge Rules. Where a bridge is to be constructed for IR tracks, the applicable loading shall be as per the requirements of IR. In addition, the weight of services to the tune of 300 kg/RM shall be considered.
- (11) Clearance in case of overhead and other structures connected with DFC and IR track shall be in accordance with respective Schedule of Dimensions as mentioned in **Appendix 16, Volume 6 – Part 2 of Bidding Documents**.

- (12) (i) Girder Bridges - The deck for each track shall be separate. Minimum width for each track shall be 4.5m. The space between the ballast retainers of UP and DN track shall be covered with precast slabs so as to provide a walkway for the workmen. An additional walkway / duct-way with a width of 900mm shall be provided for both tracks separately.
- (ii) Box Culverts and Slab Top Bridges – All Box Culverts and Slab Top Bridges shall be continuous to cover the requirement for all the tracks passing over the bridge.
- a) Bridges without surcharge- The barrel length of the bridge shall be equal to the top width of the formation on the approaches.
- b) Bridges with surcharge- The bridge shall have an adequate barrel length to accommodate duct-ways of 900mm each on both sides beyond the length required to accommodate the formation.
- (13) Transition on the approaches to the bridge from the embankment leading to the bridge shall provide a smooth passage for rail vehicles by a gradual change in the Track Modulus support stiffness with no settlement.
- (14) All bridge abutments are to be designed with an appropriate drainage system. The drainage system should be adequate to drain off the expected run off and should be so designed so that the water is drained away without dripping along the bridge structure. For this purpose the Contractor shall submit for the approval of Engineer a drainage plan for the bridge to ensure the compliance of this stipulation.
- (15) Reinforced Soil Walls /Slopes and other earth retaining structures may be used in RUBs as well as RFOs, but shall not be designed as an alternative to the abutments or the Wing walls / Return walls. The abutments, Wing walls / Return walls shall be designed for long term deformations considering creep strains. Maximum deflection after such consideration shall be confined to $L/250$ where L is height of the wall.

Reinforced Soil Walls/Structures: Reinforced soil walls/structures should be designed in accordance with any of the following standards/guidelines - BS 8006-1:2010, FHWA GEC-011. The design requirements shall be as follows:

- a. Design life for reinforced soil walls shall be 120 years.
- b. The structures shall be designed to satisfy the requirement to maintain the designed horizontal and vertical alignment of the DFC tracks and to resist the relevant loads and vibrations imposed by the DFC loading.
- c. The minimum embedment of the reinforced soil walls below ground level shall be 1.0 m.
- d. The facing for walls shall be precast concrete discrete panels with a minimum nominal thickness of 180 mm. The thickness at any point (except along joints) shall not be less than 160 mm. The minimum grade of concrete shall be M35.
- e. Steel soil reinforcement and connection fixtures shall be hot dip galvanized with a minimum zinc coating thickness of 140 microns.
- f. The long-term design strength of geo-synthetic reinforcement shall be determined in accordance with ISO/TR 20432 considering the service temperature as 30°C. Certifications from a competent authority or test reports

- from an independent accredited laboratory shall be furnished in support of the reduction factors.
- g. The reinforcement shall be connected to facing using durable mechanical fixtures, fasteners or devices. Purely frictional connections are not permitted. The connections shall be designed to transfer the load without rupture or excessive deformations. Satisfactory documentary evidence to demonstrate the adequacy of the connection including design calculations, test reports and performance report of actual structures should be furnished.
 - h. The long-term design strength of the connection between the facing and reinforcement shall not be less than the long-term design strength of the reinforcement. The long-term design strength of the connection should be determined through appropriate calculations and testing taking into account the actual conditions experienced during construction and in service.
 - i. The fines content (passing 75 micron sieve) of reinforced fill for walls shall not exceed 10%. In the case of geo-synthetic reinforcement, the maximum particle size of fill should not exceed 37.5 mm.
 - j. Satisfactory outlet for surface runoff and water draining out of the ballast and blanket should be provided. The structures should have adequate internal drainage arrangement.
 - k. Provision for supporting masts of the 2x25 KV OHE electrical systems and pipes/ ducts for signaling and telecommunication cables should be made.
 - l. The topmost reinforcement layer shall be minimum 300 mm below the bottom of the blanket to permit future maintenance / replacement of the blanket layer.
 - m. The design, detailing and construction should cater to the stringent requirements of compaction of fill – 100% for blanket, 98% for prepared sub-grade and 97% for embankment fill.
 - n. The design calculations and construction drawings for the reinforced soil structures shall be prepared by a qualified engineer with a minimum of three years experience in the design of similar structures. The construction of the reinforced soil structures shall be supervised by a qualified technician with a minimum of three years experience in the construction of similar structures.
- (16) Back fill arrangement behind abutments shall be as per relevant RDSO guidelines.
- (17) All bridges shall have provision of guard rails as per relevant IR provisions.
- (18) Pier / abutment caps of all bridges should have an adequate plan area so as to accommodate the ladders, OHE masts pedestals, carrying out inspections and for permitting the activities of pre-stressing, replacement of bearings etc. required during the construction and service life of the bridge.
- (19) a) No external strands shall be allowed for permanent pre-stress.
b) The provision for imparting 15% design pre-stress at a future date shall be made in the girders and suitable anchorages; bulkheads diaphragms etc. shall be constructed for the purpose.
- (20) M35 Grade concrete wearing course with minimum thickness 40mm and cross slope of 1 in 40 shall be used on the deck of all ballasted bridges.

- (21) All major / important bridges shall be capable of supporting masts of the 2x25 KV OHE electrical systems. The Contractor shall provide the earthing bars and earthing lugs as per the design provided by the other Contractors / Employer / Engineer. A typical arrangement for the same shall be as indicated in the Site Details – Part 4 of the Bidding Document. The Contractor shall coordinate with other Contractors / Engineers / Employer for the same.
- (22) All bridges shall be capable of carrying signalling and telecommunication cables through pipes/ ducts and drawings prepared by the Contractor shall indicate details of such provisions.
- (23) Bridges shall have trolley / safety refuges as per DFCC standards.
- (24) Behind Abutments and Wing walls backfill material shall be provided as per RDSO report GE-R- 50.
- (25) Suitable provision for providing the foundation for the traction mast separately for all the tracks passing over the bridge shall be made for such bridges where the location of the traction mast on the bridge becomes inevitable. For all bridges having a total span of more than 45 meters, such arrangements would be required at a spacing of 45mts each or on the pier cap of nearest pier.
- (26) Flood gauges with the marking of danger level and HFL would be painted on the bridges as per the details of IR manuals.
- (27) Plaques/boards displaying the number of the bridge and the name of the river would be provided as per the IR Manuals.
- (28) The testing of the pre-stressed concrete bridge girders would be done in accordance with IRS concrete bridge code.
- (29) All footpaths of the bridges are required to be protected with steel tubular railing of 750mm height with 50mm GI-pipe running all along the length of the bridge or other suitable means approved by the Engineer and supported suitably on the bridge structure arrangement.
- (30) Pucca steps shall be provided leading from top of the formation to the bed of the stream. Such steps shall be provided both for UP and DN line.
- (31) The designs proposed by the Contractor should have adequate provisions to permit replacement of components like bearing, expansion joints which may have a shorter design life than that of the main structure. Such provisions should permit replacement of the components with traffic blocks of reasonable durations.
- (32) The Contractor shall submit manufacturer's warranty for all types of bearings as a part of the design submission. These shall be accepted after conforming to relevant codes/manuals. Bearing of the bridges should be procured through RDSO approved source or other International reputed firm to be approved by Engineer.
- (33) Painting/galvanizing steel members including structural as well as supporting to be done as per relevant codes / manuals.
- (34) For construction of RUBs on detours, the Contractor shall design and construct RUBs as per specifications of the IRS Code and MORTH (Ministry of Road Transport and Highways of India) specifications. This includes the drainage / road diversions including road approaches which may become necessary for satisfactory functioning of the proposed RUBs. Adequate approach roads including connection to both approaches after suitable profiling, drainage facilities and road diversions including road approaches etc are to be provided as per latest guidelines of Indian Railways and MORTH.

- (35) All RUBs shall have a provision of height gauges on the both sides as per the IR standards. However on parallel section, such height gauges shall be provided only on the DFC side.
- (36) All modification / construction of ROBs shall be designed to withstand collision from road traffic in accordance with applicable Indian or International Standards and Contractor shall also design and construct the approaches wherever applicable.
- (37) Wherever work is to be executed in electrified territory like construction / extension of ROB, FOB etc. Contractor shall use protective screens as per Para 2.1.9, Appendix VII, Part II Vol II of ACTM and RDSO's letter no: T1/CIV/MS/08 dated 07/07/2009.
- (38) **Construction of RFO** – The GADs of the RFOs are indicative. Construction of RFOs over existing Indian Railway Track with double line / single line should have provision for two future IR tracks, one on either side of existing Indian Railway(s). These RFOs should also have additional openings on both sides to provide roads with 7.5m carriageway.
- (39) Post-tensioned precast segmental box girder construction is not permitted for this project.
- (40) All Reinforcement Steel (TMT Bars) and Structural Steel shall be procured as per specifications mentioned in BIS's documents – IS:1786 and IS:2062 respectively. Independent tests shall be conducted, wherever required, to ensure that the materials procured conform to the specifications. These steel shall be procured only from those firms, which are Established, Reliable and Primary Producers of Steel, having Integrated Steel Plants (ISP), using iron ore as the basic raw material and having in-house iron rolling facilities, followed by production of liquid steel, as per Ministry of Steel's (Government of India) guidelines. However, only certain isolated sections of structural steel, not being rolled by ISPs can be procured from the authorised re-rollers of ISPs or authorised licensee of BIS having traceability system and who use billets produced by ISPs with the approval of Engineer.
- (41) At such of existing IR stations where alignment of proposed DFC lines is passing through the circulating area of existing IR station, a FOB across the proposed DFC lines, with a minimum gangway of 3m or the existing gangway whichever is more, will have to be constructed to facilitate access to IR station building including provision for physically challenged persons as per IR guidelines. The alignment of proposed DFC lines shall be designed in such a way that it does not infringe with the existing IR station building or any other structure existing at IR station. Further, permanent continuous unscalable but see through fencing should be provided on both sides of two DFC lines so as to isolate them from the circulating area. These fencing should extend for a distance equal to the distance between outer most points and crossings on both sides of the station yards or for the length of longest stopping train at the IR station, whichever is more.

3.2 DURABILITY

- (1) The bridges shall be durable and serve satisfactorily for full minimum design life as described in clause 15.1.3 of Concrete Bridge Code for Bridges in "Rest of India".
- (2) The structures shall be designed to withstand conditions of exposure as per the IRS Concrete Bridge Code and relevant BIS codes.
- (3) In order to mitigate the effects of earthquake forces seismic devices shall be provided to prevent girder – bearing separation.

3.3 GEOTECHNICAL INVESTIGATION, HYDROLOGY and HYDRAULICS

- (1) The Contractor is to carry out geo-technical investigation, hydrologic analysis as per relevant codes and manuals.

- (2) The contractor shall take borings and take trial pits as the case may be at each substructure location prior to the commencement of the work to ascertain the subsoil strata.
- (3) For establishing design parameters, samples from the bore taken at each foundation shall be tested and analyzed in the laboratory approved by the Employer/Employer's Representative.
- (4) Test such as standard penetration test, compression and shear test on undisturbed soil samples, UCS, water absorption on rock sample etc., shall be carried out in conformity with the BIS specifications. The Contractor shall submit the entire data to the Employer/Employer's Representative along with his own/laboratory recommendations and obtain approval to the design parameters which shall be in conformity to the standard specifications.
- (5) Hydrological and hydraulic studies and assessments of bridge sites for stream crossings are to be carried out by the Contractor. These are to be submitted along with design.
- (6) The bridge design shall consider stream stability, backwater, flow distribution, stream velocities, scour potential, flood hazard, bridge protection work and river training works.
- (7) Bridges must be designed for the following minimum recurrence interval of flood, in accordance with IR standards:
 - a) For important and major bridges 1 in 100 years;
 - b) For minor bridges 1 in 50 years.
- (8) The Contractor's design shall recognise that the new bridges are to comply with the vertical clearances and freeboard as set down in the applicable standards, irrespective of the vertical clearance and free board of the adjacent IR Bridge. However, for relaxation in freeboard /vertical clearance as specified in the relevant provision of IRS Codes specific approval from the Engineer shall be taken under unavoidable circumstances like non-availability of land or presence of other obligatory points etc.
- (9) For geotechnical information for design of Bridges, Contractor shall make out a detailed geo-technical investigation plan as per IR/IRC standards or equivalent and seek prior approval of Engineer before executing the same. This plan shall include location of borehole samples, type of sample, location of samples in the borehole, plate load tests, equipment for sampling, sampling techniques, location of field labs, field and lab testing programme etc. After the plan is approved, the total results, bore logs, samples, analysis, calculations, conclusions shall be submitted to Engineer as a part of Definitive design submission.

3.3A IMPORTANT BRIDGES

The works include construction of 2 (two) Important Bridges (one in each Contract Package). These bridges have been mentioned in the list included in Site Details – Part 4 of the Bidding Document. The following features must be considered while designing these Important Bridges.

- (1) The minimum discharge of Important Bridge at Tonse River shall be taken as 12,100 cumec and maximum silt factor shall be taken as 1.0.
- (2) Similarly, the minimum discharge for Important Bridge at Yamuna River shall be taken as 56,000 cumec and maximum silt factor shall be taken as 1.0

- (3) However the discharge and silt factor shall be validated by the Contractor and if the discharge calculated by the Contractor is more than mentioned above, the higher values shall be considered for design. Similarly, if the silt factor calculated by the Contractor is less than 1.0, lesser value shall be considered for design as per best engineering practices.
- (4) The Important Bridge for Yamuna River in Contract Package 202 shall be designed with well foundation only.

3.4 SEISMIC ANALYSIS

- (1) The criteria for seismic analysis and design for bridges shall be governed by – IITK-RDSO guidelines of seismic design of Railway Bridges.

3.5 MAINTAINABILITY

- (1) Bridges shall be capable of maintenance with minimum effort with regard to accessibility, cleanability, taking observations etc.
- (2) All sections of the bridge shall be easily accessible for detailed inspection. This includes the accessibility from the deck to the top of each pier and abutment. The details of this requirement shall form a part of design submitted by the Contractor. To this effect the Contractor shall provide a steel ladder at each pier and abutment galvanized to 100 micron and painted with one coat of Zinc Chromate Primer followed by two coats of Synthetic Enamel of selected colour. These ladders shall be sufficiently wide and safe to permit passage of one person at a time. These will be supplemented with suitable catwalks and covered access holes.
- (3) Inspection ladders, walkways, catwalks, covered access holes and the provision of lighting, where necessary, shall be provided where other means of inspection are not practical.
Inspection platform of suitable size shall also be provided for Important Bridges.
- (4) Provision of future strengthening of the structural components shall be kept in mind while finalising the design.
- (5) Structural systems whose maintenance is expected to be difficult are to be avoided.
- (6) Areas around the bearing seats and the deck joints shall be designed to facilitate jacking, cleaning, repair and the replacement of bearings.
- (7) Inaccessible cavities and corners are to be avoided, wherever possible.
- (8) Where such cavities are not avoidable suitable protection is to be provided to prevent bird or animal access.

3.6 RETAINING WALLS

- (1) If the Contractor chooses to construct the Retaining walls, such retaining walls shall be designed for long term deformations considering creep strains. Maximum deflection after such consideration shall be confined to $L/250$ where L is height of the wall.

3.7 AESTHETICS

- (1) The aspect shall be governed by the provisions para 1.4 above.

3.8 TESTING AND COMMISSIONING

- (1) Steel/ Concrete structures shall be tested as per the provisions of relevant IRS and BIS codes.

- (2) Commissioning shall be done after the trial runs to be carried out as per the requirement of Indian Railways / DFC.

3.9 ACCEPTANCE CRITERIA

- (1) Each element of the bridge and the bridge as a whole must conform to approved design, drawing and material specification.
- (2) Every component of each element of the bridge shall conform to the specifications and must satisfy all prescribed tests for quality, strength and durability
- (3) The quality assurance programme shall be in line with Appendix 6, Part 2 Vol 6 of this Bidding Document.
- (4) Results of all tests prescribed in codes and manuals for the completed structure shall be in conformity to acceptable standards as specified therein.

3.10 RESPONSIBILITY

- (1) The Contractor is fully responsible for obtaining the necessary approvals for all the drawings including General Arrangement Drawings (GADs) from the pertinent /Railway/ State/ Local authorities before the commencement of construction. Where applicable the Employer/Engineer will assist the Contractor in obtaining the approval of such authorities.

3.11 CONCRETE FOR STRUCTURES

- (1) Quality of concrete for all structures including in-situ concrete shall conform to the relevant BIS codes. Any deviation shall have prior consent of the Engineer.

4.0 TRACK DESIGN CRITERIA

4.1 TRACK DESIGN

4.1.1 General

- (1) The track layout shall be based on the provisions contained in Indian Railways Permanent Way Manual, Track Manual & relevant IRS specifications with latest amendments/corrections or any other alternative specification which has been agreed during Technical bid evaluation by the Employer. .
- (2) Where the design features any deviations from such provisions these are to be fully justified based upon acceptable international practice and agreed by the Engineer.
- (3) The alignment as shown in project sheets is to be considered only indicative and the Contractor is required to verify the alignment in the field and to check its conformity to the site conditions..
- (4) Wherever there are junction arrangements with the existing IR network, the length of the link line between DFC and the existing IR yards shall be decided to cater for the provision of neutral section.
- (5) The final designs of the track layouts, including horizontal and vertical alignment, station yard layout, LWR/CWR plans, etc. should have the approval of the Engineer before execution.
- (6) Interlocking of switches, earthing and bonding of electrical circuit arrangements in the track will be done by the Systems Contractor. The Contractor shall do necessary interfacing with the Systems Contractor so that there is no delay/ holdup.
- (7) Indian Railways has developed drawings for 25.0 ton axle load for various track components, which are under trial. Contractor may consult these drawings and if the Contractor is satisfied that it meets the Employer's requirement, he may use the same

or the alternatives already agreed by the Employer during First Stage Technical Bid evaluation.

List of RDSO Drawings is Appended below :

S. N.	Description of Drawings	Drawing no. & Location
1.	Prestressed Concrete Sleeper for 25 tone Axle Load for BG	RDSO / T – 7008
2.	Rail seat Assembly on concrete sleeper with 60 kg UIC rails.	RDSO / T- 7009
3.	ERC MK V	RDSO / T- 5919
4.	10 mm thick composite GRSP	RDSO /T – 7010
5.	Fish plates and Fish bolts for UIC 60 rail	RDSO /T- 5916
6.	Weldable CMS crossing	RDSO /T – 6412
7.	Switch Expansion Joints (SEJs)	RDSO / T-6902 RDSO /T – 6922
8.	Fish plates and Fish bolts for UIC 60 rail	RDSO /T- 5916
9.	Prestressed concrete sleeper for SEJ for long welded rails, BG 1676 mm, 60kg (UIC)	RT- 8224 SEJ
10.	PSC sleeper for BG (1676 mm), 60kg (UIC) running rail & 60kg (UIC) guard rail on Bridge approaches	RT – 8229 Bridge approach
11.	PSC guard rail sleeper for 60 kg running rail & 60 kg (UIC) guard rail for BG (1676 mm)	RT- 8228 Ballasted Bridge Deck
12.	PSC sleeper for level crossing with 60 kg (UIC) running rail, 52 kg check rail for 25 t axle load BG (1676 mm)	RT – 8225 Level Crossing
13.	Rail seat assembly for level crossing on PSC sleeper with 52 kg check rail for BG (1676 mm) 60 kg (UIC)	RT- 8226 Level Crossing
14.	CI Bracket for 52kg check rail to be used on PSC sleeper BG (1676 mm) 60 kg (UIC)	RT- 8227 Level Crossing
15.	Glass filled Nylon- 66 insulating liner for use with ERC mk-V on concrete sleeper (RT – 7008) suitable to 60kg UIC rail for 1676mm gauge	RT- 8222 & RT- 8223 Rail Seat
16.	Metal Liners	RDSO /T-8254 to RDSO /T-8256
17.	Switch Assembly	RDSO: T-6216

- (8) Some of IR Drawings referred in the document are for 1673 track gauge which differs from DFC Track Gauge.

4.1.2 Track Gauge

- (1) The nominal DFC track gauge shall be 1676 mm measured at 14 mm below the top of the rail.

4.1.3 Horizontal Curves

- (1) Horizontal curve in the DFC tracks shall be circular with transition curves at either end of such circular curves.

- (2) The horizontal curve radius is measured on the track centre line between the two rails. The DFC tracks will have concentric curves unless otherwise approved by the Engineer.
- (3) All circular curves including their transitions shall be designed for a speed of 100 kmph.
- (4) The normal minimum horizontal curve radius will be 700m (2.5 degree) and in exceptional situations with the approval of Engineer, the radius may be reduced to 585m (3 degree). Curves upto 4 degree can however be permitted at the junction points between DFC and Indian Railways track.
- (5) The maximum actual cant shall be limited to 165mm.
- (6) The maximum cant deficiency shall be 75mm.
- (7) All curves on mainlines shall be provided with transition curves and shall be in a shape of cubic parabola conforming to the equation $y = x^3 / 6RL$.
- (8) The minimum length of the transition shall be the maximum length obtained from the following equation:

$$\begin{aligned} L &= 0.008 * Ca * V \\ &= 0.008 * Cd * V \\ &= 0.72Ca \end{aligned}$$

Where, Ca & Cd = Value of actual cant & cant deficiency respectively in mm

V = Maximum permissible speed in km/h

- (9) For the design of transition length, the value of Ca shall be calculated for speed of 100 km/h with Cd = 0, and V shall be taken as 100km/h, where it is not practical to use 100km/h a reduced speed may be utilised with the approval of the Engineer.
- (10) Transitions between reverse curves may adjoin each other if the rate of change of cant and the cant gradient are constant through both transitions.
- (11) As far as possible, the turnouts should be avoided in the circular curves. Turnouts are not permitted in the transition curves.

4.1.4 Gradients

- (1) The ruling gradient of the section on the main line shall be 0.5% (1 in 200) compensated. The alignment shall be so designed by the Contractor to avoid frequent changes of gradient as far as possible.
- (2) The gradients shall be compensated for curves @ 0.04% per degree of curve and the maximum gradient shall not be steeper than the ruling gradient of the section.
- (3) Maximum gradient in the yards shall be governed as per Schedule of Dimensions of Eastern DFCC. The gradient of the link line and its connections to IR yards shall be governed as per the Schedule of Dimensions of IR.
- (4) No change of gradient is permissible within a turnout.

4.1.5 Vertical Curves

- (1) A vertical curve is to be provided when the algebraic difference in change of gradient at the locations is more than 0.4%.
- (2) Minimum radius of vertical curve shall be 4000 m.

4.1.6 Formation levels

- (1) The formation levels at various chainages along the alignment are indicated in the project sheets for the guidance of the Contractors. These shall be verified and

corrected in the final alignment Design in conformity with the provisions in the bidding documents, IR's manuals and specifications and to ensure adequate clearances/free board under the bridges. The bridges in DFC track in portion running parallel to the IR track may require construction of higher bridges to compensate for the higher HFLs witnessed at those locations after the construction of the IR bridges.

- (2) The formation levels at the level crossings, where the DFC track is running parallel to the existing IR tracks, shall be checked and modified as per the actual site conditions so as to keep the rail level of the DFC track the same as that of the IR tracks/as provided in IRPWM.
- (3) Construction shall only commence after the approval of final track design by the Engineer.

4.1.7 Track Layouts in Railway Station Yards

- (1) Site details showing the number of stations between Mughalsarai and New Bhaupur as well as indicative sketch drawings for all the traffic yards in the project section are enclosed for guidance as “**Site Details; Part 4 of Bidding Document**”.
- (2) The Contractor shall design and prepare the scale plans of each station yard incorporating all the requirements considered necessary for safety as per IRPWM provisions and overall operational considerations of DFCC.
- (3) Contractor shall prepare the detailed yard plans for obtaining the approval of the concerned Railway authority for which Employer shall provide necessary assistance to the Contractor. Yard Plans attached with the Bid Document are indicative and Contractor will ensure the compliance of SOD / Code / Manuals and any other modifications required for efficient operation of the yard.

4.2 RAILS

4.2.1 General Requirements

- (1) All the rails to be laid in the track structure shall be Flat Bottom Rails as per specifications: IRS T12-2009. Only new rails will be used for the permanent works. The broad requirements are as under;

Rail Steel Grade:	880
Rail Section Profile:	As per Appendix-II of IRS T12-2009 for UIC 60kg/m
Class of Rail:	A
Rail Ends:	Undrilled
Colour Code:	As per Appendix IV of IRS T12-2009

4.2.2 Class of Rails

- (1) All rails shall be brand new Class A rails.

4.2.3 Rail Manufacture

- (1) The rails shall be procured from reputed manufactures whose details shall be furnished in the bid by the Contractors along with the following information/confirmation:
 - a) The details of their steel making process which should be as per IRS T12-2009 specs or similar subject to the approval of Engineer and these shall not be altered during contract performance without prior approval of Engineer.
 - b) Detailed method of on-line ultrasonic testing, eddy current testing of rails shall conform to IRS T12-2009.

- c) The manufacturer must confirm that its manufacturing process of rails shall comply with the qualifying criteria regarding residual stress, fracture toughness & fatigue as laid down in sub-Para 1 to 3 of Para 22 of IRS: T12-2009.
- d) The manufacturing process of rails shall be offered to the inspecting agency at the beginning & at intervals as desired by such inspecting agency, to conduct the required tests for qualifying criteria to be satisfied.
- e) The manufacturer of the rails shall operate an independently approved and audited quality assurance system, conforming to the requirements of ISO 9002 or equivalent.

4.2.4 Rail Steel Parameters

- (1) Rail steel of Grade 880 and rails of UIC 60 kg/m section shall conform to the chemical composition & mechanical properties as specified in IRS T12-2009 specifications of Indian Railways.

4.2.5 Rail Section, Marking & Dimensions

- (1) Rails of nominal UIC 60 kg/m as per Appendix-II of IRS T12-2009 shall conform to the dimensions, dimensional tolerances including geometrical defects, **markings and shall be subjected** to the measurements and tests specified therein.

While handling and transportation of rails, guidelines issued by IR on this important aspect will be strictly followed. This, among other things includes providing suitable dunnage/spacers to protect rails against point contact and the protection of rail ends. At ports, availability of proper facilities for handling of rails will have to be ensured.

A method statement describing in detail the precautions that will be taken during handling and transport of rails and the supervision that will be exercised in ensuring compliance of the right procedures, will be submitted to the engineer for his approval.

The engineer at his discretion will inspect the rails on arrival at site against any bruising, rubbing nicks and any other damage, reject them and order for their removal from site, if found damaged.

The guidelines issued vide RDSO drawing no. RDSO/T-6219 will be strictly followed.

- (2) The standard length of rails shall be 13.0 meters or more.
- (3) Normally only standard length rails should be used for the permanent works. The shorter rails may be permitted, if they are not more than 2m shorter than the standard length subject to the proviso that such rails should be supplied in pairs to be used opposite each other. However, number of such rails should not exceed 10% of the total requirement for permanent works.

4.2.6 Defect Free Rails

- (1) The rails must be free from all detrimental defects having an unfavourable effect on the behaviour of the rails in service, such defects include, among others, surface defects & internal defects like cracks of all kinds, flaws, piping, or lack of metal, hot or cold marks, seams, scabs, protrusions etc..
- (2) The rails having defect beyond the specified limits, shall be rejected.

4.2.7 Tests and Acceptance

- (1) The representative(s) of the Engineer and the Employer shall be entitled to observe, by day or night, the method of manufacture and to be present at all tests relating to all batches of casting for this project and to examine the results obtained from such tests.
- (2) The manufacturer shall, at his own expense or at the expense of the Contractor, supply all templates & gauges, prepare and supply test pieces and sample of steel, sample of rails, and supply labour and apparatus/equipments, for testing which may be required by the inspecting agency for carrying out all tests as specified in IRS T12-2009 specs, and render reasonable assistance in execution of such tests as desired by the inspecting agency.

4.2.8 Guarantee

- (1) Guarantee of the rails will be provided by the Contractor as per the provisions of IRS-T12-2009.

4.2.9 Purchase of Rails

- (1) The Contractor is free to purchase rails from any domestic or international supplier.

4.3 CONTINUOUSLY WELDED RAIL TRACK

4.3.1 General

- (1) Rail panels, after laying in track, shall be welded to make Continuously Welded Rail (CWR) track for as much length as possible, for which the Contractor shall prepare the CWR plans for the approval of the Engineer in advance under design submission schedule in accordance with the design principles/provisions contained in LWR Manual. The CWR shall be continued through the turnouts.

4.3.2 Rail Laying Temperature

- (1) The project length falls in temperature zone IV in India as per fig.1.7 in LWR Manual. The de-stressing temperature will be determined on the basis of the data furnished in figure 1.7 of LWR Manual.
- (2) CWR track lengths installed outside this temperature range shall be de-stressed before the laying and final setting of Switch Expansion Joints (SEJ) at the end of breathing length.
- (3) Neutralization of the stresses in the rails during construction shall be carried out as required by the provisions of the LWR Manual.
- (4) Rails after de-stressing shall be checked by a non-destructive rail stress measuring equipment to verify the correctness of the de-stressing temperature. Contractor shall arrange such testing equipments in adequate numbers on its own, which shall also be made available to the Engineer for this purpose. The details of the equipment and its performance characteristics will be submitted to the Engineer and his approval obtained before it is put to use.
- (5) The Contractor shall submit detailed process of neutralisation of stresses in the rails during construction ensuring that the rails in track remain de-stressed in the prescribed temperature range and shall form part of CWR plans submitted by the Contractor in accordance with 4.3.1 above.

4.3.3 Welding of Rails

- (1) Only rail panels having a length of not less than 260m except for points & crossings and any other locations approved by the Engineer would be installed in the track which shall be converted to CWR through in-situ welding. In-situ welding will also be carried through mobile flash butt welding plants. Conversion of single rails to 260m

long panels would be done in the manufacturing unit or in a construction depot through the use of flash butt welding plants. Rails would be welded as per the provision of **Indian Railway's Manual for Flash Butt Welding of Rails-2004 (herein after referred as FBW Manual)**. At special locations where the use of mobile flash butt welding plant is not practicable Single shot, auto thimble Alumino Thermic (AT) weld process may be used, with prior permission of the Engineer.

- (2) The design concepts & performance criteria for Single shot, auto thimble Alumino Thermic (AT) weld process shall be as per the internationally accepted norms or as agreed by the Employer during the evaluation of First Stage Technical proposal.
- (3) The use of rails with holes shall not be allowed unless specifically permitted by the Engineer for specific locations. Drilling of holes of different sizes would be required for the purpose of earthing, bonding etc. These holes would be drilled by the System Contractor. All the interfacing requirements required for drilling holes shall however be part of the contractor's responsibility. Wherever holes in the rails are made, they shall be suitably hardened for its fatigue improvement by the Contractor using well established cold rail hole expansion technology. The methodology for the same shall have the prior approval of the Engineer.

4.4 TURNOUTS AND DERAILING SWITCHES

4.4.1 General

- (1) On the DFCCIL system modern turnouts and derailing switches shall be used with following parameters:

(a) Gauge	1676 mm
(b) Crossing Angle (on main lines and loop lines)	1 in 12
(c) Rail Profile	60 kg (UIC 60 kg/m)
(d) Speed potential on the Main Lines	100 km/h
(e) Speed on sidings with dead ends	15 km/h
(f) Axle Load	25 tonne
(g) Designed Annual Traffic	> 50 GMT
(h) Type of Web	Thick web
(i) Tangential entry and the switch entry angle	$\leq 0^{\circ}-20'-00''$
(j) Maximum Cant deficiency	75 mm

- (2) The Contractor shall be responsible for the detailed design manufacturing and assembling of the turnouts and derailing switches suitable for above requirements. The Contractor shall also be responsible for design, manufacture and installation of track fixture required for the interlocking arrangements. Necessary coordination with the Signalling & Telecommunication Contractor will be done by the Contractor.
- (3) The left hand and right hand turnouts shall be designed with common concrete bearers (PSC fan-shaped layout) and shall have provision of anti-creep fastenings and other relevant fastenings and fixtures. Steel/cast iron bearing plates shall be provided on the common concrete bearers with the fixtures on the bearing plates ensuring the right orientation of the rails. Design of these concrete bearers and the relevant fastenings and fixtures will be cleared at detailed design stage. The signalling system shall be designed and installed by Signalling and Telecommunication Contractor and the Contractor shall be required to interface with appointed Signalling and Telecommunication Contractor for all the information/details, pertaining to signalling

installations/equipment for the detailed design of turnouts. The turn-outs shall meet with all the provisions set out in para 12.40 of chapter XII of Indian Railways Signal Engineering Manual.

- (4) The Contractor shall procure the turnout sets from reputed manufacturers having a “Quality Assurance Programme” which shall be submitted for prior agreement of the Engineer.
- (5) Prior to the mass procurement of turnouts, at least one turnout shall be completely pre-assembled for inspection and clearance by the Engineer.
- (6) All turnouts shall be pre-assembled at a workshop. After these are cleared by the Engineer these shall be dismantled and transported to site in special vehicles for laying them in position using cranes of appropriate capacity.
- (7) All turnouts shall be designed, manufactured and laid at site so as to permit the use of heavy on-site tamping and lining equipment for maintenance purposes.
- (8) The Contractor shall be fully responsible for procuring all the raw materials including the rails and sleepers as per laid down performance and design criteria using his own arrangements.

4.4.2 Rails for Turnouts

- (1) For manufacturing stock, lead, intermediate sections and closure rails, 90 UTS (UIC 60 kg/m) section with IRS: T-12-2009 specifications of rail shall be used.
- (2) For switch rails, thick web section manufactured out of asymmetrical rail section shall be used. Both switch & stock rails shall be of special grade steel (minimum 880 grade as per IRS: T-12-2009) and have hardened heads for better life.
- (3) The rails, for the turnouts, shall have no drilled holes. Drilling of holes will be required for connecting the interlocking arrangements and will be done by the System Contractor at appropriate locations. Contractor shall provide necessary interfacing arrangements in this regard.
- (4) Turnouts shall not be manufactured from any larger sections of rail and all rails so used shall be defect free rails.

4.4.3 Switch Assembly

- (1) Each thick web switch device shall consist of 2 stock rails, one left hand and one right hand and two switch rails, one left hand and one right hand, complete set of PSC sleepers along with all fittings e.g. slide chairs, base plates/special base plates, brackets, rail pads, insulating bushes, washers, all stretcher bars, various blocks, bolts and nuts, any special fittings like spring setting device etc.
- (2) The switch rail shall be one piece without any weld or joint within the switch rail length.
- (3) The end of the asymmetrical switch rail shall be forged to UIC 60 rail profile and shall be suitable for welding or for installation of insulated glued joint.
- (4) The switch shall provide suitable flange way clearance, between the stock rail and switch rail at the end of the head in open position as specified by the Engineer.
- (5) The turn-out system shall be designed to prevent the switch lifting.
- (6) Switches made from asymmetrical thick web rails shall be machined carefully to achieve the profile at different locations.

- (7) The manufacturer shall be responsible to make provisions in switches (stock rail and switch rail) for all the required connections for point machine, clamp lock and any other provisions necessary for connecting the signalling equipment duly interfacing with appointed signalling Contractor.

4.4.4 Intermediate Section

- (1) The fittings for intermediate rails shall be suitably designed to ensure full compatibility and effective fixation of the rails with PSC sleepers with the desired toe load as that of the elastic fastenings in the main line.

4.4.5 Crossing Assembly

- (1) Standard fixed nose CMS crossings shall be provided on all crossings.
- (2) All crossings on the DFC shall be 1 in 12 weldable Cast Manganese Steel (CMS) {manufactured from Austenitic Manganese steel as defined in IRS: T-29-2000} crossing for the turnouts. Contractor may refer Indian Railways drawing no: RDSO/T-6412, which is under trial.
- (3) All CMS crossings shall have welded leg extensions of 60 kg (60 UIC) 880 grade rails. This shall be achieved by flash butt welding in the plant of buffer transition rail piece of suitable thickness to CMS crossings and leg extension duly approved by Engineer. This shall have to undergo standard test regime pertaining to this type of welding.
- (4) Check rails in all turnouts shall have the facility for the adjustment of check rail clearances up to 10 mm over and above the initial designed clearance.
- (5) Each check rail end shall be properly flared by machining.

4.4.6 Elastic Fastenings for turnouts

- (1) Fastenings for the turnouts shall be elastic type and compatible with the main line rail to sleeper fastening system.
- (2) The design of the fastenings for the turnouts shall be suitable for 25 Tonne axle loads and 60kg (UIC 60 kg/m) section of rails laid on PSC sleepers.

4.4.7 PSC Sleepers for Turnouts

- (1) Common concrete bearers (PSC fan-shaped layout) shall be designed for left hand and right hand turnouts equipped with steel / cast iron bearing plates with the fixtures on the bearing plates ensuring right orientation of the rails.
- (2) The design of the sleepers shall be in accordance with the design parameters, specifications of raw materials, specifications of finished products, codes and manual listed for main line PSC mono-block sleepers.
- (3) The design criteria and requirements of the PSC sleepers for the turnouts shall be such as to provide length and fixtures such as to accommodate and fix the turnout components on the sleepers firmly, including check rails, stretcher bars etc.

4.5 PRESTRESSED CONCRETE SLEEPERS

4.5.1 General

- (1) Mono-block pre-stressed precast concrete sleepers shall be used on all DFC tracks for main lines, loop lines, sidings, conforming to the following general requirements and parameters.

a)	Gauge (measured at 14 mm from the top of the rail)	1676 mm
b)	Maximum speed of trains	100 km/h
c)	Traffic Density	>50 GMT per year
d)	Maximum Axle Load	25.0 tonnes
e)	The track shall be track circuited for which adequate electrical resistance as stated in IRS:T-39-1995 required	
f)	Type of traction	2 x 25 KV electric
g)	Rail section to be catered for is 60 kg/m (UIC 60 kg/m)	
h)	Sleeper Density in main lines, shall be 1660 per km with 1540 per km in loop lines and other yard lines.	
i)	Fastening (rail to sleeper) are to be a self tensioning elastic fastening system,	
j)	Ballast cushion below bottom of sleeper is to be a minimum of 350mm on main lines and 250mm in other lines in the yard lines. Slope of ballast profile below the sleeper shall be taken as H:V = 1.5:1	
k)	Design life	40 years

4.5.2 Design Requirements

- (1) For the design and manufacture of sleepers Contractor may refer to Drawing no. T-7008 & T-7009, which are under trial). The Contractors may however use other proven design conforming to the requirements specified under Clause 3.1 of Section III, Part 1 of this Bidding document.
- (2) For the ease and uniformity in maintenance of tracks on the entire route of Dedicated Freight Corridor, the geometrical shape of the PSC sleepers shall be in accordance with RDSO drawing no. T-7008 & T-7009 with tolerances of dimensions indicated in para 4.5.6 below.
- (3) In case, the Contractor use an alternative design of sleepers as agreed during Technical Bid Evaluation, the design of the sleeper proposed to be used by the Contractor should be validated by Chalmers University of Technology, Sweden or any other organisation of International repute.

4.5.3 Design parameters for the PSC sleepers

- (1) The important design parameters to be considered for the PSC sleepers shall be:
 - a) Design load and ballast reaction are to be as set out in the applicable RDSO standard for PSC sleepers
 - b) Ballast pressure 6 kg/cm²
 - c) Load distribution factor 0.55 – 0.60
 - d) Dynamic augment for speed and rail wheel 2.5
 - e) Centre binding co-efficient 0.4
 - f) Factor of safety for resisting bending moment 2
 - g) Load factor at rail seat bottom for bending moment 3
 - h) Static Bending Test Loads

- Cracking Loads (KN) – shall be for Centre Top, Centre Bottom, Rail Seat as per RDSO Drawing No. RDSO/T-7008(Values are 65, 60 & 270 kn respectively).
 - Failure Load at Rail Seat(KN) 490
- i) Initial pre stress force – upto 75% of breaking load
- j) Losses in pre stress - 30% of initial pre stress or as per actual

4.5.4 Design Qualification Tests

- (1) The Design of all types of PSC sleepers and elastic fastenings with rail will be agreed by the Engineer before manufacturing process is initiated by the Contractor. Prior to agreement by the Engineer, the Contractor’s design for the concrete sleepers and fastenings shall be subjected to qualification tests, as listed below, which interalia require that 40 pre-production sleepers from 3 separate concrete pours be tested.
- (2) The Engineer shall select 8 separate complete sleepers plus 3 sleepers which shall be cut in half to produce 3 sleeper blocks equipped with rail fastening system identical to that on the concrete sleepers furnished for testing.

Minimum Design Qualification Tests

Test Type	Track Sleeper	Turnout Sleeper
Rail Seat Vertical Load Test	X	X
Centre Moment Test	X	--
Rail Seat Repeated Load Test	X	X
Fastener Insert Test	X	X*
Fastener Uplift Test	X	X*
Fastener Repeated Load Test	X	X*
Lateral Load Restraint Test	X	X*
Longitudinal Restraint Test	X	X*
Bond Development or Tendon Anchorage Ultimate Load Test	X	X
Rail Pad Test	X	X*

Note:

X = Test required

X* = Test not required if the fastening system provided is identical to the fastening system for concrete track sleepers, and the test on the track concrete sleeper has been successful.

- (3) The Contractor shall check his design of PSC sleeper for 25 tonnes axle load as per the “design qualification tests” as detailed in the table above. Likewise design of pre-stressed concrete sleeper for special locations like bridge approaches, derailing switches, SEJ, level crossings etc shall also have to follow a similar process.
- (4) The “design qualification test” results shall form part of Design process of sleepers.

4.5.5 Manufacture of PSC Sleepers

- (1) The Contractor shall submit for the Engineer’s agreement his proposed method of manufacturing of pre-stressed concrete sleepers which shall cover the following in

addition to the technical specification for manufacturing and supply of plain line PSC sleeper and technical specification for manufacturing and supply of turnout PSC sleeper:

- a) Manufacturing method
 - b) Moulds
 - c) Production machines
 - d) Moulding / de-moulding
 - e) Mould cleaning
 - f) Pin and spacer bar assembly / removal
 - g) Wire hauling / placement
 - h) Tensioning equipment
 - i) Concrete placing / vibrating
 - j) Control of minimum strength at transfer
 - k) Curing
 - l) De-tensioning and wire cutting
 - m) Loading, handling, storage and transportation
- (2) The proposed method of manufacturing must have been used for manufacturing mono-block PSC sleepers which have already been laid in tracks and have given satisfactory performance in similar environmental conditions for a continuous period of five years.

4.5.6 Manufacturing Tolerances

Item	Designed Dimensions	Tolerances
Length	2750 mm	+/- 3 mm
Maximum top width of the sleeper	As per design requirements	+ 1.0 mm & - 0.5 mm
Maximum width of the base of the sleeper	As per design requirements	+/- 3 mm
Height at centre of rail seat	As per the design requirements	+ 4.5 mm & - 3 mm
Track Gauge	1676 mm	+/- 1 mm
Rail Cant	1 in 20	1 in 19.75/1 in 20
Rail seat plane	Smooth surface to be provided	+/- 0.8 mm
Differential tilt of rail seats	To be measured on a width of 150mm	Shall not exceed 1.5mm
Convex or concave camber in any direction on rail seat		Shall not exceed 0.8mm

4.5.7 Concrete for PSC sleepers

- (1) The concrete used for manufacturing PSC sleepers shall fulfil the following minimum requirements:
 - a) Minimum Compressive strength (f_c) is to be 55 N/mm²
 - b) Minimum Compressive strength prior to the transfer of the pre-stress load is to be 40 N/mm²
 - c) Minimum bending stresses
 - a. Compressive 0.4 f_c
 - b. Tensile 0.04 f_c
 - d) Modulus of rupture 5.0 N/mm²
 - e) Cement shall conform to IRS:T-40 or any other similar or equivalent International Standards, the provisions, as stated in clause 3.2 of IRS:T-39-1985 (4th revision – August 2011) Standards for use of cement in the concrete shall be followed to the satisfaction of the Engineer.
 - f) The process and quality control tests shall conform to IS:383 and IRS:T-39-1985 (4th revision – August 2011) standards.

4.5.8 High Tensile Steel (HTS) Wires

- (1) HTS in the form of plain wires or strands shall conform to IS:1785 – Part-I and IS:6006 respectively or equivalent International Standards.
- (2) HTS shall be procured from reputed BIS approved or equivalent international approved manufacturers and each consignment shall be accompanied with the test certificate.
- (3) The prescribed test regime in above mentioned IS codes shall be exercised and checked by the Engineer who will satisfy himself regarding the quality of the material.

4.5.9 Inspection and Quality Control

- (1) The quality control test regime shall be exercised by the inspecting agency as nominated by the Employer and the Engineer for approving the manufacturing factory of PSC sleepers to ensure manufacture of good quality sleepers.
- (2) All the necessary precautions, stage tests and quality control checks as described in IRS:T-39-1985 (4th revision – August 2011) specifications and as stipulated in the approved Design shall be followed. Contractor may suggest an alternative inspection and quality control regime for concrete sleepers which can be adopted by the Engineer after due scrutiny.
- (3) In case of the failure in the prescribed tests in the lot, retesting can be permitted as prescribed in Para 5.3.7.4 of IRS:T-39-1985 (4th revision – August 2011) specifications.

4.5.10 Marking and Painting

- (1) All the sleepers shall have legible permanently inscribed and painted markings on the top as per the drawings agreed by the Engineer.
- (2) The accepted sleepers after inspection and electrical resistance test shall bear the passing marking of the inspecting officer in indelible paint.

4.6 RAIL to SLEEPER ELASTIC FASTENING SYSTEM

- (1) All ballasted tracks, laid on PSC sleepers shall be equipped with self tensioning elastic fastening system, similar to that being used on Indian Railways, having the following components:
 - a) Elastic fastening clip compatible with the rail/ sleeper assembly having a nominal toe load on the rail of 1045kg of appropriate international standard which meets the requirement and as agreed by the Employer during the First Stage Technical proposal.
 - b) Cast in insert as to suit the elastic fastening.
 - c) An under rail pad compatible with toe load, sleeper and rail profile.
 - d) Type of liner is to be used after interface with Systems Contractor.
 - e) Contractor shall furnish relevant analysis and simulation data to the Engineer to substantiate that all fastenings shall have a minimum service life of 07 years after laying in track except rubber pad which shall have a minimum service life of 05 years.
- (2) The components set out above should be compatible with each other and provide an effective fastening system so as to ensure effective sleeper to rail resistance is more than sleeper to ballast resistance with adequate factor of safety.
- (3) The design of the fastening system as a whole shall be in line as agreed during First Stage Technical proposal evaluation.
- (4) The fastening assembly shall be subjected to “design qualification tests” along with the PSC sleepers as described in Para 4.5.4 above for which the acceptance values derived on the basis of the design shall be submitted along with design details.

4.7 INSULATED GLUED JOINTS

- (1) No insulated glued joints will be provided on main line except in turn out zone. All Insulated Glued Joints (IGJs) shall be factory manufactured to be compatible with the UIC 60 rail of 880 grade.
- (2) The Glued Insulated Rail Joints shall comply with the requirements of RDSO’s Manual for Glued Insulated Rail Joints of 1998 with latest amendments upto the base date, or equivalent International Standard of heavy haul operating under similar operating conditions as that of DFC or as agreed by the Employer during the First Stage Technical bid.
- (3) Contractor shall submit, complete design details along with design acceptance & acceptance tests to the Engineer for prior approval before procuring the same.
- (4) To ensure the desired service life in the heavy haul operating environment of DFCC following measures shall be taken as is being done on advance railway systems:
 - a) Head hardening of Rail ends
 - b) High quality polymer for end post and bushes
 - c) Superior glue technology
 - d) Cold expansion of bolt-holes for improving fatigue life
 - e) Forged fishplates of thicker section and superior steel

f) Improved thermit welding techniques

4.8 SWITCH EXPANSION JOINTS

- (1) Switch Expansion Joints (SEJs) shall be manufactured from rail compatible with the rail proposed for the CWR.
- (2) Contractor may refer IR drawing RDSO RT-6902 for 60 kg, RT-6922 for 60 kg, which are under trial. Contractor may refer above drawings and other relevant drawings for Switch Expansion Joints. Proven designs from reputed manufacturers giving satisfactory performance on heavy haul operating environment similar to DFC can also be considered for adoption.
- (3) Contractor shall submit, complete design details along with design acceptance & acceptance tests to the Engineer for prior approval before procuring the same.
- (4) SEJs shall be manufactured and supplied with all corresponding PSC sleepers, fittings, fastenings and fixtures as required for easy installation into the track.

4.9 BALLAST

- (1) All ballast shall be procured from the quarries approved by the Engineer.
- (2) All ballast shall be machine crushed and comply with the specifications set out in IRS GE 1 June 2004.
- (3) When transported by road vehicle all ballast shall be dampened prior to leaving the quarry.

4.10 FISH PLATES AND FISH BOLTS

- (1) Fish plates and fish bolts for UIC 60 rail shall be of the 6 bolt type Contractor may refer IR drawing Drg. No.T-5916 & connected technical specification IRS: T-1 of 1966
- (2) The contractor shall submit, complete design details along with design acceptance tests to the Engineer for prior approval before procuring the same. As a principle there should be no holes in the rails. If required in exceptional cases, the holes shall be suitably hardened for its fatigue improvement by carrying out well established cold rail-hole expansion technology. The equipment and methodology for the same shall be agreed by the Engineer prior to making holes in the rails.

4.11 TRACK STRUCTURE AND ROAD SURFACE AT LEVEL CROSSINGS

- (1) Ballasted track structure will be continued through the level crossing.
- (2) The level crossing shall have a track friendly and relatively maintenance free road surface. Track/Road Infrastructure at Level Crossing may be either of the following:
 - a.) PSC sleeper as per RDSO Drawing RT-8225, with Rail Seat Assembly as per RDSO drawing no. RT- 8226 and Check Rail arrangement as per RDSO Drawing RT- 8227 with concrete panels for road surface which can be easily removed either manually or with the help of small road cranes, to enable continuous working of track maintenance machine through the level crossing. Concrete panels should be designed suitably for the class of road / traffic at that level crossing.
 - b.) PSC sleeper as per RDSO /T- 7008 without check Rail with rubberised panels which can be easily removed either manually or with the help of small road cranes, to enable continuous working of track maintenance

machine through the level crossing. The system should be suitably designed so that it can be easily removed during mechanised maintenance and re-fixed after mechanised maintenance. Further

- I. It should be properly encased in steel casing to provide checkrail clearance as per railway specifications.
- II. It should provide smooth continuity with approach road surface for smooth negotiation of road vehicle across the level crossing.
- III. It should also be extended parallel to track beyond the edge of road surface to avoid entanglement of road vehicle inside track as per Indian Railway provisions.
- IV. Rubberised panels shall be as per following features/specifications:
 - i. High strength and durable with minimum service life of 15 years
 - ii. Skid Resistance: SRT dry (acc. DIN EN 13036-4:2003; BS 7976-2:2002); SRT wet (acc. DIN EN 13036-4:2003; BS 7976-2:2002)
 - iii. Form fitting tongue/groove connection of panels
 - iv. Screw connection of all panels by lock tight system
 - v. Top surface with pyramid structure to enhance water draining; corundum vulcanised in surface to improve slip resistance.
 - vi. Integrated narrow flange groove
 - vii. Proven system used successfully on heavy haul railway system (axle load equal to or more than 25 tonnes) for a continuous period of at least 5 years shall be used.
 - viii. T-kerbstone made of high strength concrete, special mortar and prefabricated concrete sub-base
 - ix. Material Properties of Rubberised Panel.

Property	Standard	Unit	Value for Virgin Material	Value for recycle rubber (Core)
Density	DIN53479	g/cm ³	1.13(+/-)0.015	1.15(+/-)0.04
Hardness	DIN 53505 / ISO 868	Shore A	65(+/-) 5	70(+/-)8
Tensile Strength	DIN 53504 (S1)	N/mm ²	>13	>2

- (3) Mandatory provisions at the level crossings, type and width of road, fencing, clearances, rumble strips, gradient, drainage etc., except gate lodges and equipment for level crossing shall be in accordance with the provisions of Chapter 9 of IRPWM. The level crossing shall be connected to adjacent approach roads after suitable profiling of surface.
- (4) The plan including methodology of work on IR level crossings shall be approved by the Engineer before commencement of works at site.

4.12 FRICTION BUFFER STOPS

- (1) Properly designed Friction type Buffer Stops will be provided in the station yards at the end of over run lines and at buffer ends provided at the station. These friction buffer stops for over run line will be designed for a train load of 6500 tons, coasting at a speed of 10 Kmph. At other locations, the design of friction buffer stops will be site dependent and shall take into account the maximum vehicle mass, probable impact speed and available stopping distance at the location etc. Design of the friction type buffer stops shall be of the type that is being adopted by heavy haul railways operating under similar conditions as on DFC.

4.13 QUALITY CONTROL REGIME

- (1) For all Permanent Way components, the Contractor shall submit the approval of the Engineer, a detailed Quality Control Regime. All inspections required for adherence to the Quality Control Regime shall be carried out by the Contractor at his own cost.

5.0 BUILDING DESIGN CRITERIA

5.1 GENERAL

- (1) The architectural design of the buildings shall include but not be limited to site plans, floor plans, elevations, sections including detailed design and drawings. Structure would have signature architecture in terms of Elevations and other architecture elements including efficient use of Green Building concepts and implementing sustainable building materials.
- (2) All buildings, required to be constructed under this Contract, shall comply with the applicable Indian building standards and codes. Wherever Standard Railway drawings for buildings are available these shall be followed.
- (3) For the service buildings and for the colony, arrangement for rain harvesting would be required. The design for the same should be done by the Contractor for approval of the Engineer.
- (4) Contractor shall submit all building plans for prior agreement of Engineer.
- (5) At each location water supplies shall be derived from the local water utility wherever possible. If local water utility supplies are not available, deep tube wells shall be provided to meet the water supply requirements. At gate lodges hand pumps will be provided.
- (6) Illumination of buildings and installations shall be as per Railway / RDSO guidelines.
- (7) Wherever the Contractor is required to provide electrical fittings, energy efficient fittings shall be provided.
- (8) The layout of Crossing/ Junction station buildings and service buildings like IMD, IMSD, shall be as included in **Site Details, Part 4 of the Bidding Documents**. The contractor shall develop the layout, architectural plan and elevation and detailed design and drawings of various facilities as brought out in the relevant drawings of station building, service building and residential quarters. The General Arrangement drawings will be approved by Engineer and consented by employer.
- (9) Architecture and profile of buildings shall conform to local aesthetic, cultural ethos, etc. and it shall be approved by Engineer and consented by Employer.
- (10) The foundations of buildings shall be designed for at least one storey more than the requirement except residential buildings being constructed for IR at Mughalsarai.

- (11) The plinth level of residential quarters, service buildings like IMDs, IMSDs, and other buildings shall be 900mm above the natural ground level or 600mm above HFL (High Flood Level) whichever is higher. The ceiling height of station buildings and service buildings shall be 4.2 m above floor level.
- (12) The DG room in Crossing/ Junction station buildings should preferably be on extreme corner of building to keep vibrations and exhaust at one end.
- (13) The work inside the various rooms of stations viz. equipment room, relay room, electric switch room, electric equipment room, etc. shall be co-ordinated with other contractor.
- (14) The functional and structural design of station building and service building, shall conform to National building code and bye-laws of local authorities to the extent of their applicability.
- (15) The method of structural analysis shall be appropriate for the structure or the component to be analyzed and it shall be carried out by contractor using established software with the approval of Engineer.
- (16) Load due to earth quake (as applicable for the earth quake zone in which the building falls) shall be assessed as per provisions of relevant IS Code with latest amendments/revisions.
- (17) Load and load combinations shall comply with relevant Indian Standard with latest amendments.
- (18) The overall stability and serviceability requirement shall be checked in accordance with the provisions of relevant Indian Standards.
- (19) All buildings shall be amenable to maintenance with minimum efforts.
- (20) All buildings shall be provided/with concealed ducts/pipes for wiring of telecom facilities in addition to ducts / pipes for power supply and distribution. These arrangements shall be made in consultation with other contractors.
- (21) Station and other Building signages shall be designed and provided.
- (22) The ceiling height for residential quarters shall be approximately 3.5m above floor level. All residential buildings can be single/ multi storeys with each block having maximum four residential quarters. However, the number of storeys and number of quarters on one floor will be decided by Engineer and consented by Employer.

6.0 DURABILITY AND MAINTENANCE

- (1) The Permanent Works shall be designed and constructed such that, they shall endure in a serviceable condition throughout their designed lives as described in the Design Criteria and standards contained in the technical specifications to minimise the cost of operation and maintenance whilst not compromising safety or the performance characteristics of the railway.
- (2) Electrical and mechanical equipment where supplied shall be of a quality and durability, to fully meet the performance and operational requirements described in the Design

7.0 OPERATIONAL REQUIREMENTS

- (1) The Permanent Works near running lines shall be designed to permit the railway to operate satisfactorily at a maximum design speed of 100Km/h for freight trains. The

Contractor shall ensure that proposed size and location of permanent works other contractor's works do not violate Schedule of Dimensions (SOD) of Eastern Dedicated Freight Corridor / Indian Railways.

- (2) The locations of Permanent Structures shall be decided taking due note of the possible operational requirements in coming years.
- (3) In the design and construction of the Works, the Contractor shall, as a fundamental objective and as a priority, ensure that staff and the public will be provided with as safe an environment as is reasonably practicable throughout the execution period of the contract.
- (4) It is a requirement that the Indian Railway (IR) remains operational during the construction Phase.

8.0 AESTHETICS

- (1) The permanent works shall be designed to achieve an aesthetic character and provide a feeling of design commonality throughout the project.

9.0 FENCING AND PLATFORM DESIGN CRITERIA

- (1) All stations shall have the provision of a rail level platform with concrete surface of size 50.0 meters length and 4.0 meters width at a location approved by the Engineer.
- (2) Wherever DFC alignment is passing through/ adjacent to Indian Railway stations, DFC tracks shall have a provision of a permanent continuous un-scalable but see-through fencing on both sides. Such fencing shall cover the entire length between outer most points on both sides of the existing IR stations or to cover the length of 24 coach train, whichever is more.
- (3) A similar fencing will also be required to be provided at locations wherever the alignment is passing close to habitations. The identification of such locations will be done by the Engineer. The total length of fencing for this purpose is 5 kms for Contract Package 201 and 20 kms for Contract Package 202.
- (4) Fencing can be designed as RCC/ Pre-cast or Metal grill of suitable strength.
- (5) All fencing and platform construction shall comply with the applicable Indian building standards and codes.
- (6) The design shall be capable of allowing the construction to be carried out in the minimum time possible and to the required quality standards.
- (7) The fencing and platform shall be designed to withstand severe weather conditions of exposure as per the Indian building codes.
- (8) The architecture and profile of all fencing shall conform to the local buildings, aesthetics, architecture and environment.
- (9) While working at **vulnerable locations from safety and security point of view. like in close proximity of the running track** of Indian Railways the Contractor shall construct temporary fencing, and shall follow the provisions of para 14.2 of Part 2 **“Employer’s Requirement, Section VI, Volume 5”**.
- (10) Contractor shall submit plans of all types of fencing and platforms to the Engineer for prior agreement.

10.0 LEVEL CROSSING DESIGN CRITERIA

- (1) All level crossings on the alignment requiring extension on DFCC alignment or modifications to the existing level crossings on IR alignment shall comply with the provisions of chapter IX of IRPWM in all respects which includes –height gauges, track structure, type and width of road, fencing, clearances, rumble strips, gradient, drainage, construction of gate lodges if required etc., except equipment for level crossing. Alteration of the existing lifting barriers or provision of new lifting barriers shall be the responsibility of another contractor. However, necessary co-ordination with the other contractor shall be done by the Contractor.

The road of the level crossing shall be connected to adjacent approach roads after suitable profiling of surface.

The plan including methodology of work on IR level crossings shall be approved by the Engineer before commencement of works at site.

Section VI. Employer’s Requirement Volume 5 – Construction, Testing And Commissioning

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1.0 CONTRACTOR'S SUPERINTENDENCE

- (1) The Contractor shall submit a staff organisation plan in accordance with the bidding document along with the details of the qualifications and experience of all proposed staff to the Engineer for his approval. This plan shall be updated and resubmitted whenever there are changes.
- (2) The plan shall show the management structure and state clearly the duties, responsibilities and authority of each staff member.

2.0 CONTRACTOR'S TEMPORARY WORKS DESIGN

- (1) The Contractor shall, prior to commencing the construction of the Temporary Works, submit a certificate to the Engineer signed by him certifying that the Temporary Works have been properly and safely designed and checked and that the Contractor has checked the effect of the Temporary Works on the Permanent Works and has found this to be satisfactory.
- (2) Contractor's Temporary Works Design in the Vicinity of IR Track.

The Contractor shall prior to commencing the construction of temporary works submit a drawing and calculations depicting the safety of the temporary works and seek the approval of the Engineer.

3.0 THE SITE

3.1 GENERAL

- (1) Site details furnished by the Employer are those as identified in “**Site Details – Part 4 of the Bidding Documents**”.

3.2 USE OF THE SITE

- (1) All sites located on the DFC or Indian Railway land as well as Contractor's equipment shall not be used by the Contractor for any purposes other than for carrying out the Works, unless otherwise consented in writing by the Engineer.
- (2) Rock crushing plant, if considered essential shall be located with the prior approval of the Engineer. No rock crushing plant shall be used on the site in violation of local bye laws.
- (3) The location and size of each stockpile of materials, including excavated materials, within the Site located on the DFC or Indian Railway land shall be as permitted by the Engineer. Stockpiles shall be maintained at all times in a safe and stable condition with all documentary records.

3.3 ACCESS TO THE SITE

- (1) Access to the Railway Envelope by the Contractor shall be in accordance with procedures, requirements and conditions defined in **Part 2 “Employer’s Requirement, Section VI, Volume 6, Appendix 4 - Project Program Requirements”**.

3.4 CLEARANCE OF THE SITE

- (1) All Temporary Works which are not to remain on the Site after the completion of the Works shall be removed after approval by the Engineer. The dismantling of the

Temporary works would be done in accordance with the detailed programme and methodology submitted by the Contractor to the Engineer and his approval thereon.

- (2) The Site shall be cleared and reinstated as stated in the Contract.
- (3) Any IR material lying on the ground causing an obstruction to the temporary / permanent works shall be removed by the Contractor, transported and stacked to a location identified by the Engineer. Nothing extra would be payable for this.

4.0 SURVEY

- (1) A site survey shall be carried by the contractor for entire Site to establish its precise boundaries and the existing ground levels and features within it.
- (2) This survey shall include a photographic survey sufficient to provide a full record of the state of the Site before commencing the work with particular attention paid to those areas where reinstatement will be carried out later on.
- (3) The survey shall be carried out before the site clearance wherever possible and in any case prior to the commencement of work in any Works Area.
- (4) The plan for survey as well as the final report of the survey shall be made by the Contractor and agreed by the Engineer.
- (5) The Contractor shall relate the construction of the Works to the site grid. To facilitate this, survey reference points have been established and the Engineer will provide benchmarks/ survey points in the vicinity of the site. Upon handing over of site to the Contractor, the maintenance of survey reference points will become the responsibility of the Contractor.
- (6) Before the Contractor commences the setting out of the Works, the Engineer will approve a drawing, provided by the Contractor, showing the position of each survey reference point and bench mark, together with the co-ordinates and/or level assigned to each point.
- (7) The Contractor shall satisfy itself that there are no conflicts between the data given and shall establish and provide all subsidiary setting out points, observation towers and the like which may be necessary for the proper and accurate setting out and checking of the Works.
- (8) The Contractor shall carefully protect all the survey reference points, bench marks, setting out points, observation towers and the like from any damages and shall maintain them and promptly repair or replace any points damaged from any causes whatsoever.
- (9) The Contractor shall maintain all the survey reference points to ensure that no disturbance is caused to the points and would also permit the Engineer to regularly recheck the position of all setting out points, bench marks and the like to the satisfaction of the Engineer.
- (10) The Contractor shall ensure that these survey points continue to remain consistent with the bench marks.
- (11) The checking of any setting-out or of any line or level by the Engineer shall not in any way relieve the Contractor of his responsibility for the accuracy or correctness thereof and the Contractor shall carefully protect and preserve all bench-marks, sight-rails, pegs and other things used in setting out the Works.

5.0 ENVIRONMENTAL REQUIREMENTS

- (1) The Contractor shall comply in all respects with the Acts and Regulations issued by the Government of India and its authorised agents in respect of the protection of the environment. Particular requirements applicable to this Contract for the protection of the environment during construction are defined in **Part 2 “Employer’s Requirement, Section VI, Volume 6, Appendix 13 - Environmental Protection Requirements”**.

6.0 SAFETY MEASURES

6.1 GENERAL

- (1) The Contractor shall be fully responsible for the safety of the Works, his personnel, sub contractors' personnel, the public and all persons directly or indirectly associated with the Works or on or in the vicinity of the Site.
- (2) The Contractor shall treat safety measures as a priority in all his activities throughout the execution of the Works.
- (3) The project site safety requirements have been provided in **Part 2 “Employer’s Requirement, Section VI, Volume 6, Appendix12 - Site Safety Plan”** as well as **SHE manual of DFCC in Part 4, Reference Documents**.
- (4) The Contractor shall comply with these requirements provided that the standards set out in the project Site Safety requirements and Contractor’s Site Safety plan shall be regarded as the minimum to be achieved and shall not relieve the Contractor of any of his statutory duties or his responsibilities under the Contract.
- (5) The provisions of the Contract regarding safety shall apply to and be binding upon the Contractor for any part of the Works and the persons employed by sub-contractors of any tier.
- (6) The Contractor shall ensure that the requirements of the Contract in respect of safety are included in all sub-contracts placed by him.
- (7) The Engineer reserves the right to order an immediate removal and replacement of any item of Contractor's equipment or Temporary Works which, in his opinion, is unsatisfactory for its purpose or is in an unsafe condition.

7.0 CARE OF THE WORKS

7.1 GENERAL

- (1) The Works, including materials for use in the Works, shall be protected from damage due to exposure of weather condition, including ingress of water.
- (2) Water on the Site and water entering the Site shall be promptly disposed of at a location or locations to which the Engineer has given his consent.
- (3) The methods used for keeping the Works free of water shall be such that no damage is caused to new and existing structures.

7.2 PROTECTION OF THE WORKS

- (1) Work shall not be carried out in weather conditions that may adversely affect the Works unless proper protection is provided to the satisfaction of the Engineer.

- (2) Permanent Works, including materials for such Works, shall be protected from exposures of weather conditions that may adversely affect such Permanent Works or materials.
- (3) During construction of the Works storm restraint systems shall be provided where appropriate.
- (4) These systems shall ensure the security of the partially completed and on going stages of construction in all weather conditions.
- (5) The Contractor at all times shall plan and execute the Works and make all protective arrangements such that the Works can be made safe in the event of storms.

7.3 PROTECTION OF THE COMPLETED WORK

- (1) The finished works shall be protected from any damage that could arise from any activities on the adjacent site/ works, water inflow etc.

8.0 DAMAGE AND INTERFERENCE

- (1) Work shall be carried out in such a manner that there is no damage to or interference with:
 - a) watercourses or drainage systems;
 - b) utilities especially those pertaining to train operations of existing IR system like signalling, telecommunication, civil, mechanical, electrical etc.;
 - c) structures (including foundations), roads, or other properties;
 - d) public or private vehicular or pedestrian access;
 - e) monuments, trees other than to the extent that is necessary for them to be removed or diverted to permit the execution of the Works and for which an approval has been taken from Engineer in advance.
- (2) Heritage structures shall not be damaged or disfigured on any account.
- (3) The Contractor shall inform the Engineer as soon as practicable of any items which are not stated in the Contract to be removed or diverted but which the Contractor considers need to be removed or diverted to enable the Works to be carried out.
- (4) Such items shall not be removed or diverted until the consent of the Engineer to such removal or diversion has been obtained.
- (5) Items which are damaged or interfered with as a result of the Works and items which are removed to enable work to be carried out shall be reinstated to the satisfaction of the Engineer restoring them to the condition as existed before the work started
- (6) Contractor shall use cable route locator to identify cables within the zone of construction, and ensure its safety during construction activity. If required these be relocated/removed as detailed in para 9.0 below.
- (7) Any claims by utility agencies due to damage of utilities by the Contractor shall be borne by the Contractor. The Contractor shall negotiate a settlement in respect of such claims and indemnify the Engineer and the Employer in respect of all claims, proceedings, damages, costs, charges and expenses in relation thereto.

9.0 UTILITIES

- (1) Manner of dealing with all types of utilities are defined in **Part 2 “Employer’s Requirement, Section VI, Volume 6, Appendix 1 - Utilities”**.

10.0 STRUCTURES, ROADS AND OTHER PROPERTIES

10.1 GENERAL

- (1) The Contractor shall immediately inform the Engineer of any damage to structures, roads or other properties.

10.2 ACCESS

- (1) The works will be executed in a manner so as not to infringe or block the existing access to various locations. However, if for executing the works, it becomes necessary to temporarily block or divert the existing access, the Contractor may be permitted to do so with approval from the Engineer. In such an event, the existing access shall be immediately restored after the need for the same is fulfilled. The ground shall be restored and reinstated in the form which existed before taking up the activity of blocking/diversion.
- (2) The responsibility of providing and maintaining a proper access to the site devolves on the Contractor. The work for such an access would be provided by the Contractor with the approval of the Engineer.
- (3) Where ever required service road for construction activity, connectivity to the existing road network for the sake of Works has to be made by the Contractor and no extra payment shall be made for the same.
- (4) Proper signage and guidance shall be provided for the traffic / users regarding diversions.

10.3 TREES

- (1) Manner of dealing with removal of trees from the alignment are defined in **Part 2 “Employer’s Requirement, Section VI, Volume 6, Appendix 1 - Utilities”**.

10.4 REMOVAL OF GRAVES AND OTHER OBSTRUCTIONS

- (1) If any graves and other obstructions are required to be removed in order to execute the Works, the Contractor shall draw the Engineer's attention to them in good time. Similarly if there are any permanent structures other than those defined in the utilities, para 9.0 above, these shall be brought to the notice of Engineer in good time to allow all necessary arrangements and authorization for such removal. The modalities of removal shall be decided after mutual discussion between the Contractor and the Engineer.

10.5 PROTECTION OF THE ADJACENT STRUCTURES AND WORKS

- (1) The Contractor shall take all necessary precautions to protect the structures or works being carried out by others adjacent to and, for the time being, within the Site from the effects of vibrations, undermining and any other earth movements or the diversion of water flow arising from its work.

All operations for the execution of the Works shall be carried out so as not to interfere unnecessarily with the convenience of the public or the access to public or private roads or footpaths or properties owned by the Employer or by any other person.

If during the execution of the Works, the Contractor receives any claim arising out of the execution of the Works in respect of damage to any adjacent structures / works etc., he shall immediately report the facts to the Engineer. The Contractor shall negotiate a settlement in respect of such claims and indemnify the Engineer and the

Employer in respect of all claims, proceedings, damages, costs, charges and expenses in relation thereto.

11.0 USE OF ROADS AND FOOTPATHS

11.1 GENERAL

- (1) Public roads and footpaths on the Site in which the work is not being carried out shall be maintained in a clean and usable condition.
- (2) Measures shall be taken to prevent the excavated materials, silt or debris from entering gullies on roads and footpaths; entry of water to the gullies shall not be obstructed.
- (3) Surfaced roads on the Site and leading to the Site shall not be used by tracked vehicles unless protection against damage is provided.
- (4) Contractor's equipment and other vehicles leaving the Site shall be loaded in such a manner that the excavated material, mud or debris will not be deposited on roads.
- (5) All such loads shall be covered or protected to prevent dust being emitted.
- (6) The wheels of all vehicles shall be washed when necessary before leaving the Site to avoid the deposition of mud and debris on the roads.

11.2 REINSTATEMENT OF PUBLIC ROADS AND FOOTPATHS

- (1) Temporary diversions, pedestrian access and lighting, signing, guarding and traffic control equipment, if any, shall be removed immediately when they are no longer required.
- (2) Roads, footpaths and other items affected by temporary traffic arrangements and control shall be reinstated to the same condition as existed before the work started or as permitted by the Engineer immediately after the relevant work is complete or at other times permitted by the Engineer.
- (3) The Contractor shall submit his design for the reinstatement to the relevant authorities and obtain their prior clearances to carrying out the work.
- (4) Reinstatement works shall include:
 - a) Footpath and Kerbs
 - b) Road Signage
 - c) Street Lighting
 - d) Landscaping
 - e) Traffic Lights and Control Cable
 - f) Road Painting
 - g) Telecommunication Tower / Cables

12.0 SITE ESTABLISHMENT

12.1 ENGINEER'S MAIN SITE ACCOMMODATION

- (1) The Contractor shall provide, erect, maintain and remove the Site accommodation for the use of the Engineer/Employer, as are set out in **Part 2 “Employer’s Requirement, Section VI, Volume 6, Appendix 17 - Engineer’s Accommodation”**.

12.2 SITE LABORATORIES

- (1) The Contractor shall provide, erect and maintain in a clean, stable and secure condition a laboratory, equipped for the routine testing of concrete, soil and other construction materials.
- (2) This laboratory shall be at a location agreed to by the Engineer.
- (3) For details of field geotechnical laboratories see Clause 15.2

12.3 CONTRACTOR'S SITE ACCOMMODATION

- (1) The Contractor shall provide and maintain its own site accommodation at locations consented to by the Engineer. Offices, sheds, stores, mess rooms, garages, workshops, latrines and other accommodation on the Site shall be maintained in a clean, safe and secure condition.
- (2) The Contractor shall be responsible for providing water, electricity, telephone, sewerage and drainage facilities for all site accommodation, structures and buildings in accordance with Part 2 “Employer’s Requirement, Section VI, Volume 6, Appendix 8 - Temporary Power Supply and Appendix 17 - Engineer’s Accommodation” and all such services that are necessary for satisfactory performance of the Works.
- (3) Land required for the contractor’s site accommodation shall be arranged by the contractor at his cost. However, the Employer may permit the use of his land free of charge depending upon the availability.

12.3.1 Contractor’s Labour Camp

12.3.1.1 General

- (1) The Employer will not provide living accommodation for the use of the Contractor or any of his staff or labour employed on the Works.
- (2) Living accommodation shall not be established on any land provided to the Contractor by the Employer without prior approval of the Engineer.
- (3) It should be ensured by the Contractor that the camp area is cleared of the debris and other wastes and upon completion of construction, the land should be restored back to its original form.
- (4) Land required for the contractor’s Labour Camp shall be arranged by the contractor at his cost. However, the Employer may permit the use of his land free of charge depending upon the availability.

12.3.2 Provision of Labour Camp

- (1) The Contractor shall make adequate arrangements for the housing, supply of drinking water and provision of bathrooms, latrines and urinals, with adequate water supply, for his staff and workmen as per prevalent labour laws.
- (2) No labour camp shall be allowed at any unauthorised place.
- (3) The Contractor shall maintain all camp sites in a clean and hygienic condition.
- (4) The Contractor shall obey all health and sanitation rules and regulations, and carry out all health and sanitary measures that may from time to time be prescribed by the local/medical authorities and permit inspection of all health and sanitary arrangements at all times by the Employer, Engineer and the staff of the local municipality or other authorities concerned.

- (5) Should the Contractor fail to provide adequate health and sanitary arrangements these shall be provided by the Employer and the cost recovered from the Contractor.
- (6) The Contractor shall provide first aid and medical facilities at the labour camp and at work sites on the advice of the medical authority in relation to the strength of the Contractor's staff and workmen, employed directly or through sub-contractors.
- (7) The Contractor shall provide the following minimum requirements for fire precautions:
 - a) Portable Fire Extinguishers.
 - b) Making and marking exit plan at locations for exit during fires.
- (8) The Contractor shall provide necessary arrangements for keeping the camp area sufficiently illuminated to avoid accidents to the workers.
- (9) Periodic health check ups may be conducted. These activities may be provided by the construction Contractor in consultation with State Public Health Department
- (10) The Contractor shall ensure that electrical works are executed by trained electricians and these installations shall be maintained and daily maintenance records be made available for inspection of the Engineer.

12.3.3 Camp Discipline

- (1) The Contractor shall take requisite precautions, and make best endeavours to prevent any riotous or unlawful behaviour by or amongst his workmen, and others, employed directly or through sub-contractors.
- (2) These precautions shall be for the preservation of peace and protection of the inhabitants and to secure property in the neighbourhood of the Works.
- (3) The sale of alcoholic drinks or other intoxicating drugs or beverages upon the work, in any labour camp, or in any of the buildings, encampments or tenements owned or occupied by, or within the control of, the Contractor or any of his employees directly or through sub-contractors employed on the work, shall be forbidden, and the Contractor shall exercise his influence and authority to secure strict compliance with this condition.
- (4) The Contractor shall also ensure that no labour or employees are permitted to work at the Site in an intoxicated state or under the influence of drugs.
- (5) The Contractor shall remove from his camp such labour and their families, who refuse protective inoculation and vaccination when called upon to do so by the Engineer on the advice of the medical authority.
- (6) Should cholera, plague or any other infectious disease break out, the Contractor shall burn the huts, bedding, clothes and other belongings of or used by the infected parties.
- (7) The Contractor shall promptly erect new accommodation on healthy sites as required by the Engineer, within the time specified by the Engineer, failing which the work may be done by the Engineer and the cost recovered from the Contractor.
- (8) Identification card/ badges incorporating the name and photograph of the person and the name of the direct employer (Contractor, Sub-Contractor, etc.) shall be provided to all staff.

12.3.4 Labour Accommodation

- (1) The Contractor shall provide living accommodation for all staff employed by himself or his sub-contractors as per the prevalent labour laws.
- (2) The buildings shall be constructed so as to have a minimum life of not less than the length of the Contract.
- (3) The roofs shall be watertight and laid with suitable non-flammable materials permissible for residential use under local regulations and for which the consent of the Engineer has been obtained.
- (4) Each unit shall have suitable ventilation with all doors, windows and ventilators provided with security latches and fasteners. Back to back units are to be avoided as far as possible.
- (5) The minimum height of each unit shall be 2.10m and each shall have a separate cooking place.
- (6) The Contractor may provide a common cooking place.
- (7) A suitable number of common toilet/bath shall be provided with separate toilets for ladies.

12.3.5 Water Supply

- (1) The Contractor shall provide an adequate supply of water in the Camp.
- (2) Where piped water supply is available, supply shall be at stand posts and where the supply is from wells / river, storage tanks shall be provided.
- (3) The Contractor shall also make arrangements for the provision and laying of water pipe lines from the existing mains wherever available.

12.3.6 Drainage and Sanitation

- (1) The Contractor shall provide efficient arrangements for draining away surface water so as to keep the camp neat and tidy.
- (2) Surface water shall be drained away from paths and roads and shall not be allowed to accumulate into ditches or ponds where mosquitoes can breed.
- (3) The Contractor shall make arrangements for conservancy and sanitation in the labour camps according to the rules and regulations of the local public health and medical authorities.
- (4) The Contractor shall provide a sewage system that is adequate for the number of residents in the camp, and which meets the requirements of the municipal authorities.
- (5) The Contractor shall provide latrines and wash places for the use of its personnel and all persons who will be on the Site.
- (6) The size and disposition of latrines and wash places shall accord with the numbers and dispositions of persons entitled to be on the Site, which may necessitate their location on structures and, where necessary there shall be separate facilities for males and females.
- (7) The Contractor shall arrange regular disposal of effluent and sludge in a manner that shall be in accordance with local bye-laws/ regulations.

- (8) The Contractor shall be responsible for maintaining all latrines and wash places on the site in a clean and sanitary condition and for ensuring that they do not pose a nuisance or a health threat.
- (9) The Contractor shall also take such steps and make such provisions as may be necessary or directed by the Engineer to ensure that vermin, mosquito breeding etc. are at all times controlled.

12.4 TELEPHONE COMMUNICATION

- (1) The Contractor shall provide, install, test and maintain a telephone communication system for the exclusive use of the Engineer/Employer and his team. The system shall be dismantled and removed at the end of Defect Notification Period.
- (2) The Contractor shall be responsible for obtaining and making all payments in respect of all permits licences and charges involved in the provision and use of the telephone system and for ensuring that such arrangements are safe to use at all times during the construction period.

12.5 ASSISTANCE TO ENGINEER/EMPLOYER

- (1) The Contractor shall provide for the exclusive use of the Engineer at all times during the Contract experienced chainmen, staff men, field and office attendants, messengers, watchmen, instruments, apparatus and protective clothing.
- (2) Chainmen, staff men and office attendants provided by the Contractor shall be bilingual (Hindi/English).
- (3) All instruments and apparatus shall be maintained in good working order to the consent of the Engineer.
- (4) The minimum equipment/ apparatus to be available for the exclusive use of the Engineer/Employer are listed in **Part 2 “Employer’s Requirement, Section VI, Volume 6, Appendix 17 - Engineer’s Accommodation”**.
- (5) The Contractor shall be solely responsible for all such instruments and apparatus and shall ensure that they are at all times in good repair and adjustment and shall replace items as necessary to meet this requirement.
- (6) All equipment other than expendable items shall revert to the Contractor at the end of the Defect Notification Period.
- (7) Any operation of the Works that interferes with the checking of lines and levels shall be temporarily suspended at the request of the Engineer until the checking is complete.
- (8) It may be necessary for chainmen and survey equipment supplied by the Contractor under this Contract to be used occasionally on work outside the Site in connection with the project although not directly associated with construction activities.
- (9) The Contractor shall make all necessary arrangements to permit this requirement to be implemented.

12.6 SUBMISSION OF PARTICULARS

- (1) The following particulars shall be submitted to the Engineer for his consent not more than fifty six (56) days after the Commencement Date of the Works:

- a) drawings showing the layouts within the Site of the Engineer's accommodation, the Contractor's offices, project signboards, principal access and other major facilities required early in the Contract, together with all service utilities;
 - b) drawings showing the layout and the construction details of the Engineer's accommodation; and
 - c) drawings showing the details to be included on the project signboards and diversion boards.
- (2) Drawings showing location of stores, storage areas, concrete batching plants and other major facilities and their access roads/paths shall be submitted to the Engineer for his consent as early as possible but in any case not less than twenty eight (28) days prior to when such facilities are intended to be constructed on the Site.

13.0 SECURITY

- (1) The Contractor shall be responsible for the security of the Site for the full time the Site is in his possession.
- (2) The Contractor shall always maintain all Site boundary fences in good condition. However, the fencing or other security measures taken by the Contractor should not infringe the existing drainage arrangements natural or otherwise for the area.
- (3) Notices shall be displayed at intervals around the Site to warn the public of the dangers of entering the Site.
- (4) During the progress of the Works the Contractor shall maintain such additional security patrols over the areas of the Works as may be necessary to protect its own and its sub-contractor's work and equipment and shall co-ordinate and plan the security of both the work under this Contract and the work of others having access to and across the Site and the Works.
- (5) The Contractor shall liaise with the sub-contractors and the contractors responsible for the adjacent and other interfacing contracts and ensure that co-ordinated security procedures are operated, in particular in respect of vehicles permitted to pass through the Site and/or the adjacent sites in the latter periods of the Contract.

14.0 CONSTRUCTION-EARTHWORKS

14.1 GENERAL

- (1) Prior to the commencement of construction operations, the Contractor shall obtain all necessary clearances from the concerned authorities.
- (2) Prior to the commencement of any site work, the Contractor shall submit and obtain approval of relocation/ removal of all types of utilities as required vide Appendix 1 of Part 2 Vol 6 of this Bidding Document.

14.2 PRECAUTIONS WHILE WORKING IN CLOSE PROXIMITY OF EXISTING INDIAN RAILWAY TRACK

14.2.1 General

- (1) Any construction activity affecting the existing embankment/formation/ running track of the Indian Railways shall be carried out only with the prior specific authorization of the Engineer.

14.2.2 Works being executed outside running lines are further divided into following 3 sub groups depending upon their distance from the IR track:-

- a) works being done within 3.5 meters from centre of track.
- b) works being done between 3.5 meters and 6 meters from centre of track
- c) works being done beyond 6 meters from centre of track

If a work site is located far away from the existing track but the vehicles in connection with the work are required to ply within the distance from center of track as mentioned above, it will be construed that the work in being executed under above classification. This includes even occasional plying of vehicles/ machineries for short durations.

14.2.2.1 Works being done within 3.5 meters from centre of track.

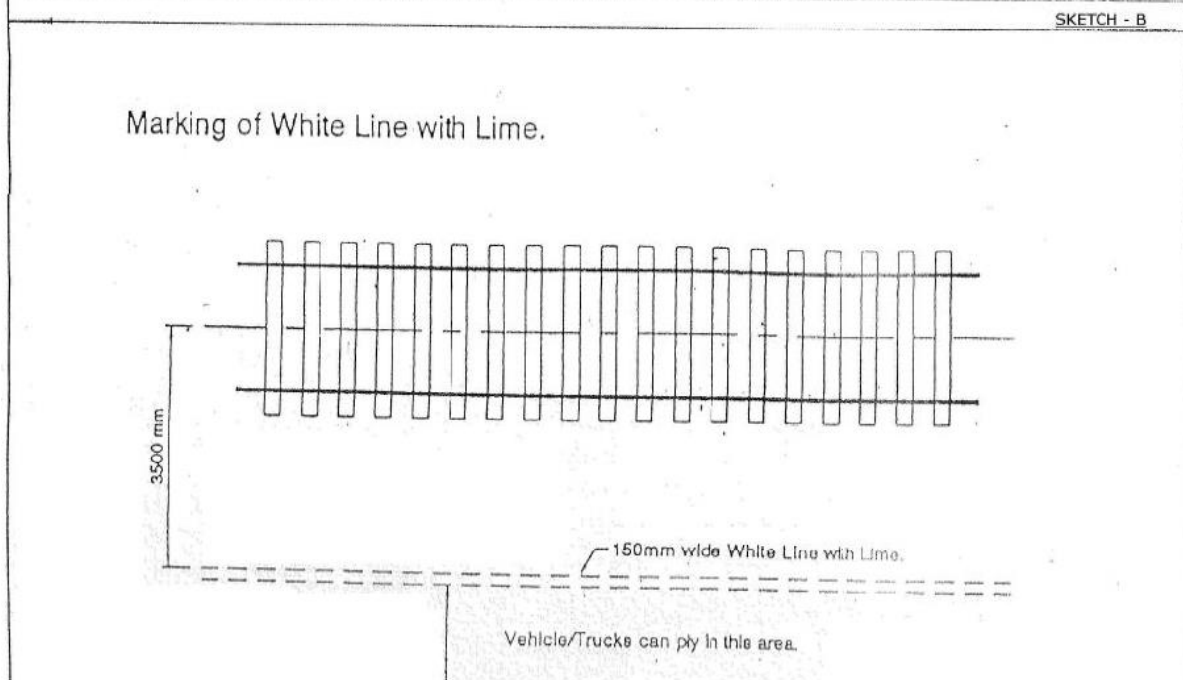
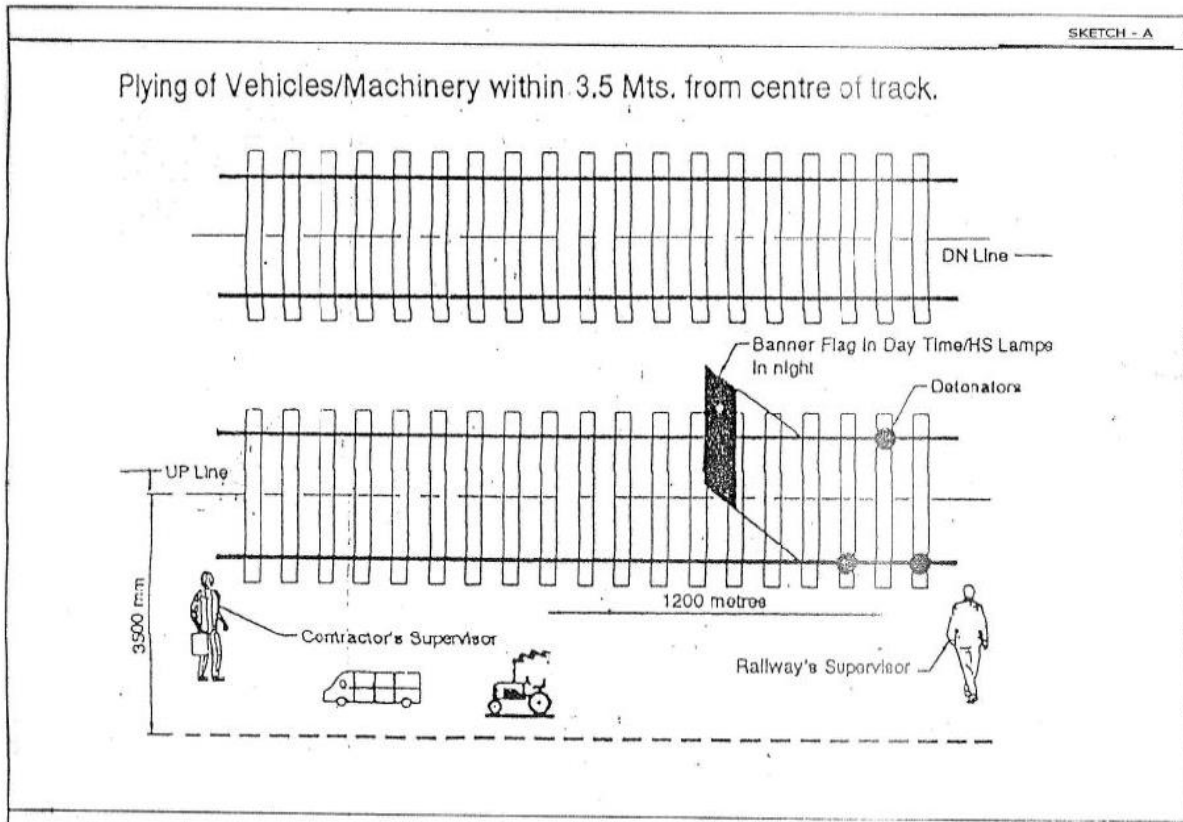
- (i) All works planned within 3.5 meters from centre of running line or which involve working of machineries and vehicles within this zone, are to be done essentially under block protection and necessary safety precautions for protection of track as per para 806 and 807 of IRPWM be taken.

14.2.2.2 Works being done between 3.5 meters and 6 meters from centre of track.

Following precautions be taken when works are required to be done between 3.5 meters to 6 meters from track centre or machines/vehicles are required to work/ply within this zone.

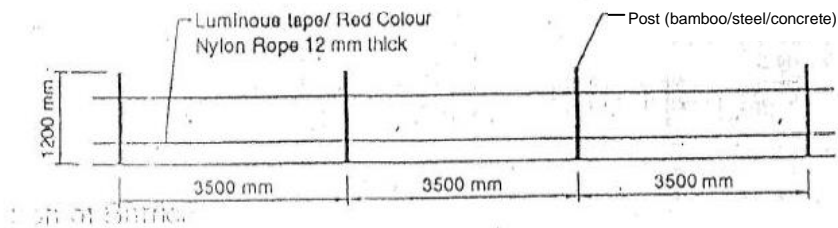
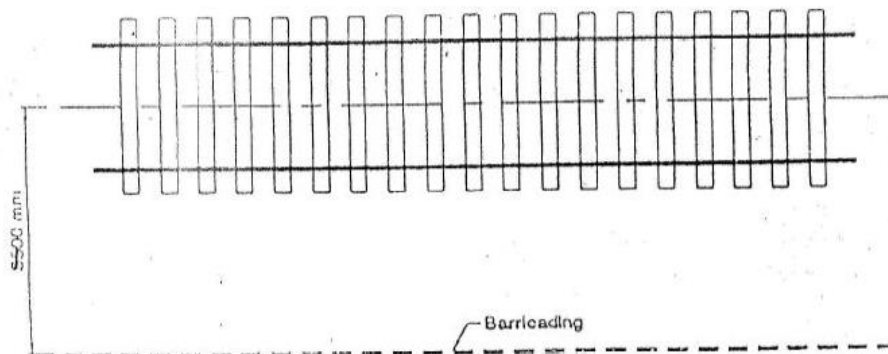
- (i) Before start of work demarcation should be done parallel to running track at a distance of 3.5 meters from centre of track in advance, as per sketch B, by 150 mm wide white line of lime. Any work or movement of machinery infringing this line will need block protection. Barricading should be put up at such locations as per sketch C to ensure that even by carelessness or over sight, vehicles do not infringe fixed dimensions. Barricading design shall be approved by the Engineer.

SAFTY/PROTECTION ARRANGEMENT SKETCHES



SKETCH - C

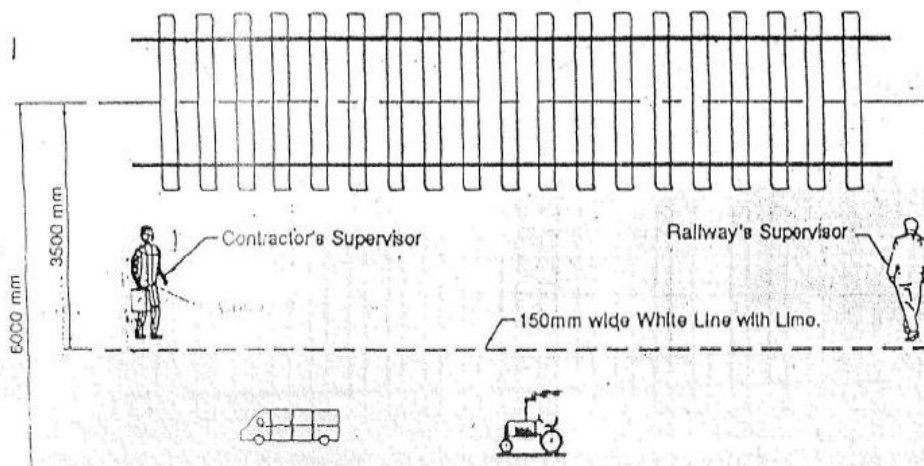
Provision of Barricading.



Elevation of Barricading

SKETCH - D

Plying of Vehicles/Machinery between 3.5 Mts. to 6.0 Mts. from centre of track.



- (ii) In case vehicles have to ply or machineries have to work within this zone, railway's and contractor's supervisors be positioned as shown in sketch D except for the following:
Instead of a Railway supervisor it would be a responsible and trained staff of the Contractor as mentioned in para 14.2.2.1 (ii) above.
- (iii) Additional trained staff of the Contractor, as mentioned in para 14.2.2.1 (ii) above, shall be posted where turning of vehicles is required during working e.g. earth work, bridge work, ballasting etc. Location for reversing vehicles should be nominated and it should be selected in such a way that there is no danger to running trains at such a location. Such trained staff of the Contractor should be available with hand flags so that vehicles do not come closer to track by 3.5 meters. Wherever vehicles have to take turn, it should be done in such a way that the driver is invariably facing the running track at all times.
- (iv) Look out men should be posted along the track at a distance of 800 meters from location of work with red flag and to whistle in face of road vehicles and approaching trains. Look out men shall also be suitably trained staff of Contractor as mentioned in para 14.2.2.1 (ii) above.
- (v) In addition to look out men, caution order needs to be issued to trains and speed restrictions imposed wherever considered necessary through Employer.
- (vi) Arrangements should be made to protect the track in case of emergency at work site.
- (vii) All temporary arrangements required during execution should be done in a manner that moving dimension is not fringed.
- (viii) Individual vehicle/machinery shall not be left unattended at site of work. If it is unavoidable and essential to stable it near running track, it shall be properly secured and manned even during non working hours with all arrangements to protect the track from infringement.
- (ix) Any materials unloaded or shifted along the track should be kept clear of moving dimensions and stacked at a specified distance from running track.
- (x) Movement of vehicle/working of machineries should be prohibited at night. However, in case of emergency when night working is unavoidable, adequate lighting shall be provided with all protection measures as mentioned above in full force. All night working near IR track shall require Engineer's prior approval.
- (xi) The work site should be suitably demarcated to keep public and passengers away. Necessary signages, boards, such as "work in progress" etc should be provided at appropriate location to warn public/passengers.
- (xii) Contractor's drivers/operators handling vehicles/machineries shall be issued a fitness certificate by the safety officer of the Contractor after educating them about safety norms and after taking assurance in writing for working within vicinity of railway's track.
- (xiii) While working on cuttings with machineries or when there is movement of vehicles above cutting, if there is possibility of any of the following circumstances, work has to be done under block protection:
- a) If there is any possibility of the vehicle / machinery of infringement of the track due to toppling or otherwise losing control.

- b) High probability of machineries/vehicles to come within 3.5 meters from track centre though ordinarily working beyond it.

14.2.2.3 Works being done beyond 6 meters from centre of IR track.

No precautions are needed except in cuttings or where the work can affect train running in any way.

14.2.3 Procedure to be followed for cutting of existing IR formation

Locations where it is necessary to cut the existing IR formation for the construction of the DFC formation, are classified into the following two categories:

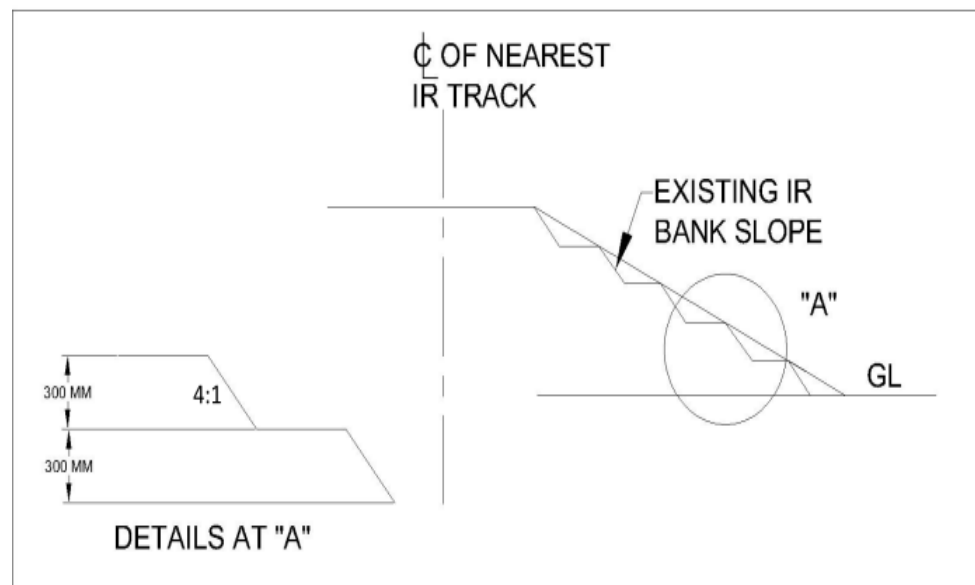
- a) Where the distance between the centre line of existing IR track and the proposed DFC track is less than 8 m
- b) Where the distance between the centre line of existing IR track and the proposed DFC track is greater than or equal to 8 m

14.2.3.1 Distance between centrelines of IR and DFC track is less than 8 m.

- (1) Such a situation may arise while working in existing IR yards. In such cases, if it is agreed with IR to suspend the nearest IR line for the traffic, the existing IR formation can be cut vertically at a distance of 3.8 m from the centre line of the proposed DFC track for the depth required to provide the formation layers (blanket and prepared sub grade) of the DFC track as per specifications. In case it is not agreed to suspend the traffic on nearest IR line, detailed methodology for the work will be submitted by contractor to the Engineer for the approval and work will be executed accordingly following all safety precautions.
- (2) Due care and precautions shall be taken to avoid any slippage of the cut. In case of any slippage, damage or disturbance of the IR track and formation, the Contractor shall rectify and restore the same to its original configuration at his own cost to the satisfaction of the Engineer.

14.2.3.2 Distance between centrelines of IR and DFC track is greater than or equal to 8 m.

- (1) While constructing the bank by the side IR running track, benching of existing slope shall be done, before new earthwork is taken up, to provide proper bonding between old and new earthworks. It should be ensured that there is no humus material left on the benched slope. Care need to be taken to avoid entry of rain water into the formation from this weak junction to avoid development of weakness in formation, slope failure, maintenance problems due to uneven settlement.
- (2) Starting from the toe, benching at every 30cm height shall be done on the sloped surface of existing IR bank as in sketch below, so as to provide proper amalgamation between old and new earthwork.



14.3 CLEARING AND GRUBBING

- (1) Unless otherwise directed by the Engineer, the area to be cleared is that which is occupied by the completed works and stockpile sites, plus a clearance of 2m beyond the toe of embankments and top of cuts.
- (2) The Contractor shall ensure that the operations are only carried out within the project right-of-way limits and only such methods, tools and equipments which will not affect the property outside the limits shall be employed.
- (3) The area within the specified limits shall be cleared and grubbed of all trees, shrubs, vegetation, stumps, stones, debris, trash, organic matter, any other objectionable materials or obstructions except those designated to remain as stated in the contract documents or as directed by the Engineer.
- (4) Any depressions and holes shall be filled with suitable soils and compacted.
- (5) All materials arising from site clearance and preparation work shall be the property of Employer and the same except objects/materials designated to remain or specified for reuse or salvaging or as otherwise specified by the contract documents or directed by the Engineer shall be removed from the site as the work progresses and shall be disposed of in a satisfactory and acceptable manner in locations outside the project limits with the approval of Engineer. Such materials should not be permitted to accumulate and the site shall be maintained in a safe and workman like condition at all times
- (6) Obtaining of all necessary consents, permits and clearances for clearance and disposal shall be the sole responsibility of the Contractor.

14.4 SETTING OUT

- (1) The Contractor shall be responsible for the true and proper setting out of the Works and for the correctness of the position, alignment, levels and dimensions of all parts of the Work.
- (2) The Contractor shall establish a system of horizontal and vertical controls in relation to the reference bench marks and coordinates as specified by the Engineer, as

required for the setting out and verifying the position, line, levels and dimensions of the earthworks and drainage works during the execution.

- (3) The Contractor shall keep updated schedules and drawings of such information and shall submit the same to the Engineer as the setting out proceeds.
- (4) All bench marks and control points shall be of robust construction, facilitate easy identification and shall be checked regularly for accuracy, carefully protected and maintained in good working condition to the satisfaction of the Engineer, till the completion of the contract.
- (5) If any of the bench marks or permanent ground markers become displaced or damaged during the Contract, the Contractor shall re-establish them immediately to the satisfaction of the Engineer and provide the Engineer with the amended position and level details.
- (6) The Contractor shall not commence any construction activity at the site before obtaining the approval of the Engineer to the setting out of the Site boundaries.
- (7) The checking of any setting out or any line, level or dimension by the Engineer or the Engineer's representative shall not in any way relieve the Contractor of his responsibility for the correctness thereof.

14.5 EXCAVATION

- (1) With a view to ensure the safety of the adjacent structures, it should be ensured at all times to take suitable precautions against any soil erosion and water pollution
- (2) Excavations shall be carried out to the lines, levels, dimensions and slopes as shown on the drawings or as directed by the Engineer.
- (3) The Contractor shall not excavate outside the limits set by the Engineer. Undercutting of slopes will not be permitted under any circumstance

14.6 GROUND PREPARATION

- (1) Where ever necessary the ground surface shall be scarified, moisture added as required and compacted so as to ensure a satisfactory foundation for the placement of formation / prepared sub-grade / blanket.
- (2) Any portion of the ground or existing embankment slope steeper than 1v on 4h shall be benched in accordance with standard procedures before filling is placed on it, unless otherwise directed by the Engineer.
- (3) In case the ground surface is too soft or deformable to function as a satisfactory base for the placement and compaction of formation / prepared sub-grade / blanket (as applicable), suitable stabilization should be carried out so that the fill materials can be placed and compacted to the specified density. Details of any such stabilization should be submitted to the Engineer for approval before any stabilization works commence.
- (4) Any foundation treatment required for High Embankments shall be carried out in accordance with the designs, material specifications, drawings and methodology as approved by the Engineer.
- (5) The construction of any section of formation / prepared sub-grade / blanket (as applicable) shall not be commenced until the foundation for that section has been cleared by the Engineer and ground levels recorded jointly.

14.7 FILLING

- (1) Materials arising from site clearance and preparation work shall be subject to relevant acceptability tests to assess its suitability for re-use on site or landfill waste acceptance criteria if applicable. The fill material shall be placed, spread, graded and compacted in layers of uniform quality and thickness, parallel to the camber and grade for the full width of the cross-section unless specified otherwise or approved otherwise by the Engineer.
- (2) The movement of all construction vehicles and other traffic shall be distributed over the full width of the filling area, so as not to damage or overstress the construction.
- (3) Damage by construction plant and other vehicular traffic shall be repaired by the Contractor to the satisfaction of the Engineer. Successive layers shall not be placed until the layer under construction has been thoroughly compacted, tested and passed by the Engineer.
- (4) Additional filling width of 500 mm shall be placed on either side to ensure proper compaction of the fill at the edges, with the extra soil later cut and dressed to avoid any loose earth on the slopes.
- (5) In the absence of field compaction trials, the maximum compacted lift thickness shall be limited to 200mm.
- (6) The Engineer may allow higher lift thickness, provided the Contractor satisfactorily demonstrates the efficacy of the compaction equipment and methodology through field compaction trials.
- (7) Field compaction trials shall be in accordance with Annexure-IV of RDSO GE:G-1.
- (8) Moisture content of fill materials as placed shall be uniform throughout the lift and shall be within the limits specified in accordance with IS:2720:Part 8: 1983 or approved Design and Drawings of formation.
- (9) Each lift of fill shall be compacted using appropriate equipment and standard procedures as agreed with the Engineer, so that the specified relative compaction is achieved uniformly and throughout the full depth of the layer.
- (10) For formation, the minimum relative compaction with respect to the maximum dry density shall be determined in accordance with IS:2720: Part 8:1983 or approved Design and drawings of formation.
- (11) In case any lot or part of the earthworks has failed to meet the acceptance criteria during quality control checks, the entire lot or part shall be rectified to the satisfaction of the Engineer.
- (12) The Contractor shall investigate all such instances of poor quality of work, identify the reasons and shall take the necessary corrective action.
- (13) In case a layer or portion of the earthworks which has been completed and accepted by the Engineer is subsequently damaged or deteriorated at any time till the completion of the contract, the same shall be rectified by the Contractor to the satisfaction of the Engineer.

14.8 PREPARED SUB-GRADE

- (1) The construction procedures for prepared sub-grade are similar to that used for embankment fill, with the additional requirements of higher relative compaction and frequency of quality control testing.
- (2) For prepared sub-grade, the minimum relative compaction with respect to the maximum dry density determined in accordance with IS:2720: Part 8:1983 shall be as per GE - 14 or as per the approved Design and Drawings of formation.

14.9 BLANKET

- (1) The construction procedures for blanket are similar to that for embankment fill, with the additional requirements of higher relative compaction and frequency of quality control testing.
- (2) For blanket, the minimum relative compaction with respect to the maximum dry density determined in accordance with IS:2720: Part 8:1983 shall be as per GE - 14 or as per the approved Design and Drawings of formation.

14.10 FINISHING

- (1) The top surface and side slopes of the formation shall be shaped, dressed and finished to conform to the alignment, levels, cross-sections, dimensions and cross slopes shown on the approved construction Drawings and to the requirements and tolerances stated in this specification. Ballast bed shall be laid only after the top surface has been cleared by the Engineer.

14.11 RETAINING STRUCTURES

- (1) Method and sequence of construction of retaining walls, drainage bay and backfilling shall be in accordance with approved Design and Drawings for this purpose.
- (2) The sequence of activities shall be well-coordinated with the construction of earthworks.
- (3) Quality control of concrete shall conform to the requirements of IS 456.

14.12 EROSION CONTROL

- (1) All erosion control arrangements including revetment/ sodding - type of soil, source of sods, anchoring arrangements, fertilizer usage (if any), small gap filling arrangement etc. shall form part of Design of Embankment/formation and approved before execution at site.
- (2) The surface to be sodded shall be checked to ensure that it has been constructed to the required slope and cross-sections.
- (3) The surface shall be freed of all stones larger than 50 mm, and any other undesirable objects or materials.
- (4) Where the surface to be sodded consists of soils suitable for sustaining vegetation, the soil should be scarified in a direction parallel to the alignment to a depth of about 50mm.
- (5) Where the surface to be sodded consist of soils which cannot be improved sufficiently to support good plant growth by the addition of fertilizers and/or other additives, the surface shall be scarified and a 75 mm thick layer of topsoil shall be placed and compacted using a light-weight compactor.

- (6) The surface of the top soil shall be scarified in a direction parallel to the alignment to a depth of about 50mm.
- (7) Where ever required fertilizer and additives like lime etc. shall be spread uniformly on the prepared surface and worked into the soil. The type and quantum of fertilizer and any other additives and method of application shall be suitable for the sods.
- (8) Immediately prior to implanting sods, the soil shall be uniformly moist to a depth of 150 mm.
- (9) If this condition is not met by natural means, the Contractor shall carryout watering as directed by the Engineer.
- (10) The final prepared surface shall be made slightly rough to ensure a good penetration of roots into the soil.
- (11) Sods once harvested or delivered from a nursery, shall not be allowed to dry out. Sods shall be planted within 24 hours of being removed from the soil or growing medium, unless proper storage arrangements can be made by the Contractor.
- (12) Sods shall be laid in regular rows with staggered joints and with individual pieces closely butting against each other without any openly visible gaps or any overlaps between pieces.
- (13) The first row of sods, where it is possible, shall be laid in a straight line and starting at the bottom of the slope.
- (14) Any gaps shall be planted with a sod cut to the gap size or, filled with top soil.
- (15) Sods shall be suitably tamped to ensure a good bond with the underlying soil.
- (16) Where the slope is 2 (horizontal) to 1 (vertical) or steeper, the sods shall be secured against slippage by anchoring them with stakes, pegs or pins driven almost vertically into the soil to be almost flush with the sods.
- (17) The type, length and spacing of the anchoring fixtures shall be chosen by the Contractor to ensure stability of slopes.
- (18) After completion of planting, the surface shall be cleaned off all excess soil, sods and any other undesirable objects or materials.
- (19) The sods shall be well-watered after planting and not be allowed to deteriorate due to lack of moisture.
- (20) The Contractor shall maintain the sodded areas by watering, fertilizing, replanting etc. as required to establish a uniform and healthy turf free of eroded or bare areas until the completion of the contract period.
- (21) For High Embankment or at certain location, earth slopes may warrant revetment works which shall be carried out as per the approved Drawings and methodology as per 14.12(1) above.

14.13 DRAINAGE

- (1) Methodology, construction and sequence of construction of side drains shall be carried out in accordance with Good For Construction Drawings.
- (2) The level at any point on the surface of the lining shall be within ± 20 mm of the design levels.

- (3) When a 3m long straight edge is laid on the surface of the lining, parallel to the direction of flow, the surface shall not vary more than 10mm from the edge of the straight edge.
- (4) Unless otherwise shown on the Good For Construction Drawings:-
 - Contraction joints shall be provided at intervals of 3m for a minimum of 50% of the cross-sectional area
 - Concrete linings shall conform to the profile of the ditch with weep holes provided at intervals not exceeding 2.0m.
 - Expansion joints of 15mm width for the full depth of the lining shall be provided at intervals not exceeding 15m.
- (5) For other types of drains, the construction shall be carried out as per the Drawings along with methodology agreed by the Engineer.

14.14 RCC PIPES FOR SIGNALLING AND COMMUNICATION CABLES

- (1) While doing earthwork Contractor shall make provisions of suitable RCC pipes at the following locations at his own cost including pipes:-
 - i) At Level Crossing Gates
 - a) 2X200mm dia RCC pipes across the formation near the gate lodge.
 - b) 1X200mm RCC pipe across the road surface on both sides near the lifting barriers.
 - ii) At Crossing Stations
 - a) 2X200mm dia RCC pipes across the formation near the centre line of the station yard.
 - b) 1X200mm RCC pipe at both ends of the station yard near the facing points for the loop lines.
 - iii) At Junction Stations/Yards
 - a) 3X200mm dia RCC pipes across the formation near the centre line of the station yard.
 - b) 2X200mm RCC pipe at both ends of the station yard near the facing points for the loop lines.
 - c) 1X200mm RCC pipe at both ends of the station yard near the outermost cross overs.

15.0 QUALITY CONTROL

15.1 GENERAL

- (1) The Contractor shall be responsible for quality control including all testing, checking and measurement.
- (2) The Employer or the Engineer may carryout independent quality control tests through his own personnel or other agencies.
- (3) The Contractor shall provide all necessary assistance and cooperation to the Employer and the Engineer in obtaining samples for laboratory tests or carrying out field tests.

15.2 FIELD GEOTECHNICAL ENGINEERING LABORATORY

- (1) The Contractor shall establish and operate or hire approved field geotechnical laboratories adequately equipped to carry out all required in-situ and laboratory tests to assess the nature and properties of the sub-soils, monitor and control the properties of the blanket and borrow materials and finished earthworks which are of significance to design, construction and performance of the formation and earthworks.
- (2) The number and location of the laboratories shall be finalized in consultation with the Engineer on the basis of the volume of earthworks, schedule of completion, frequency of testing etc.
- (3) The laboratories shall have all the required facilities, equipment and competent staff for carrying out all the tests which are required for purpose of quality control.
- (4) The number of sets of equipment for each test and the number of staff deployed shall be adequate to ensure the specified frequency of testing without adversely impacting the time schedule of construction
- (5) All equipment and accessories shall conform to the appropriate Indian or approved international standard, from a reputed manufacturer and shall be in good working condition.
- (6) Wherever applicable, the equipments or parts shall be calibrated in accordance with established standards and practices.
- (7) Each laboratory shall be furnished with an original set of the latest version of all relevant standards for all the required test methods
- (8) Contractor shall systematically maintain records of all tests in a format approved by the Engineer.
- (9) The Contractor shall ensure unhindered access at all times to Employer, Engineer or their representatives to inspect the laboratory, equipments and samples, to witness the tests and to verify the records.
- (10) Employer and the Engineer shall have the right to use the field laboratory to make independent assessments of the accuracy and repeatability of the tests and verification of the results by their personnel or representatives from time to time.

15.3 QUALITY CHECK ON MATERIALS

- (1) The tests to be conducted and their frequency for materials used as blanket, prepared sub-grade, formation etc. shall be as specified in IS 2720.

15.4 QUALITY CONTROL OF COMPACTION

- (1) Control on compaction shall be exercised on each lift of compacted materials by taking measurements of the dry density and moisture content of the compacted fill at representative locations selected at random.
- (2) Each sample constituting a set of measurements representing a part or lot of the lift shall comprise a minimum of 6 individual test locations (which may be increased to 10 if considerable variations in individual test results are observed).
- (3) The frequency of sampling will be as per approved specification of earthwork.
- (4) The benchmark test method for dry density shall be the sand replacement method in accordance with IS:2720: Part-28.

- (5) The benchmark test method for moisture content shall be oven-drying in accordance with IS:2720: Part 2.
- (6) Calcium carbide gas pressure moisture tester may be used subject to the condition that reliable soil-specific correlations are established with results obtained in accordance with IS:2720: Part 2
- (7) Nuclear gauge method may be used for the determination of both density and moisture content subject to the following conditions and with prior approval of the Engineer:
 - a) The test is performed by a qualified and competent operator well-trained in the use of the equipment;
 - b) Reliable soil-specific correlations are established with density measurements in accordance with IS:2720:Part-28 and moisture content measurements in accordance with IS:2720: Part 2;
 - c) The equipment is standardized and calibrated in accordance with standard procedures;
 - d) The method shall not be used in locations close to objects or structures which can induce incorrect readings.
- (8) Use of any methods other than listed above shall be only with the permission of the Engineer and provided that the method is demonstrated to be suitable for the soil types and compaction methods used, gives reliable results consistently and offers significant advantages over the standard methods in terms of speed, frequency of sampling, automation, safety etc.
- (9) Control shall not be based on the result of any one individual test but based on the mean value obtained for a sample (comprising a set of minimum of 6 to 10 individual test locations)
- (10) The acceptance criteria for density shall be that the mean density is not less than the specified density plus:

$$\gamma_{d(\text{mean})} \geq \gamma_{d(\text{spec.})} + \left(1.65 - \frac{1.65}{\sqrt{N}}\right) \sigma$$

where:

$\gamma_{d(\text{mean})}$ is the average of the results for N individual measurements of dry density

$\gamma_{d(\text{spec.})}$ is the specified minimum dry density

N is the number of individual measurements

σ is the standard deviation of sample comprising N individual values

15.5 TOLERANCES FOR FINISHED WORKS

- (1) The top width of the formation (measured at the top of the blanket) and the bottom width of cuttings shall not be less than the specified width
- (2) The finished surface of the formation (top of blanket) shall be constructed to the following tolerances:
 - a) The finished level shall be within + 0mm and - 25mm of the level shown on Drawings

- b) The deviation of the finished surface from a 3m straight edge laid on the surface parallel to the alignment shall not exceed 15mm.
 - c) The deviation of the finished surface from a 3m straight edge laid on the surface perpendicular to the alignment shall not exceed 15mm.
 - d) The cross-slope of the formation shall not deviate from the cross-slope shown of the drawings by more than 3mm per metre.
- (3) The cross-slope of the finished surface of cuttings shall not deviate from the cross-slope shown of the Drawings by more than 3mm per metre.
 - (4) Side slopes of fills and cuts shall not be steeper than the slopes shown on Drawings
 - (5) The finished surface of the prepared sub-grade and blanket shall not have depressions or ridges which could hold water or prevent proper drainage

15.6 COMPLETION AND ACCEPTANCE

- (1) The Contractor shall complete the earthworks, erosion control and drainage works in accordance with the drawings agreed by the Engineer.
- (2) The Contractor shall carryout a final survey of the completed earthworks to certify that the earthworks have been placed within the specified tolerances to the design alignment and grades and furnish the results to the Engineer.
- (3) The Contractor shall provide As-Built Drawings for the earthworks, erosion control and drainage works
- (4) The Contractor shall maintain the earthworks, erosion control and drainage works for the Defect Notification Period as specified in the contract.
- (5) The Contractor shall provide a handover package containing, but not limited to, the following data:
 - a) Subsoil investigation reports
 - b) All records related to material testing and quality control including request for inspections and test reports.
 - c) Construction records and feedback reports, instrumentation and performance monitoring details.

16.0 CONSTRUCTION-BRIDGES

- (1) The design shall be capable of allowing the construction to be carried out in the minimum time possible and to the required quality standard.
- (2) The construction methodology to be adopted for Rail Flyovers (RFO's) shall be such as to allow unhindered and safe movement of existing rail traffic with minimum number and duration of traffic block and incorporating suitable temporary arrangements conducive to working under running traffic.
- (3) Construction methodology for modification of ROBs shall be detailed and carried out in a sequence so as to cause minimum disruption to road traffic.
- (4) Where track closures (traffic blocks) are required for construction, the Contractor is responsible for the coordination with IR and will be assisted as applicable by the Employer/Engineer. The methodology followed by the Contractor shall be such so as to complete the work in minimum possible blocks of the track.

- (5) When the Design has assumed a particular sequence of construction in order to account for the construction load effects, the same sequence is to be followed during the construction.
- (6) All structural materials/products like non-pre-stressing and pre-stressing steel, pre-stressing anchorage system, bearings, expansion joints, etc shall be procured from IR/RDSO approved suppliers or from other approved suppliers with the approval of Engineer.
- (7) Concreting process of all structures including insitu, transported, ready mix concrete, batch mixing plant etc. for manufacturing, supplying, placement and testing shall always comply with the provisions of IS 456 or other applicable codes. Any deviation shall have prior consent of the Engineer. Curing of concrete shall be ensured as per the applicable codes of practice.

17.0 CONSTRUCTION-TRACK

17.1 GENERAL

- (1) The Contractor shall co-ordinate during the planning and execution of works with designated Contractors for other related activities e.g. signals, overhead electric traction, power supply distribution, communication, SCADA etc. for construction of the complete system of Dedicated Freight Corridor.
- (2) The installation of all machinery and equipment shall be undertaken at all times by suitably trained and competent employees of the Contractor and to the satisfaction of the Engineer.
- (3) The Contractor shall, prior to starting any installation and construction work, identify any possible hazards, and implement measures of eliminating and/or controlling such potential hazards, in line with safe working practices.
- (4) The Contractor shall require access to information as well as to various locations at stations/depots/tracks/bridges etc. of Indian Railways in stages.
 - a) A written request regarding access to any information shall be given by the Contractor to the engineer sufficiently in advance for arranging the same as available.
 - b) The Contractor shall plan out in consultation with other designated contractors the number and location of the access points and shall submit the same to the Engineer at least two months in advance
- (5) The Track construction work pertaining to this contract shall include, but not limited to the following:
 - a) Survey on site, review and confirm the technical requirements shown in this contract and the Reference Drawings.
 - b) Finalization of the construction and installation program.
 - c) Production of the calculation sheets and construction drawings for Site works and installation.
 - d) Construction and Installation in accordance with the finalized construction Drawings.
 - e) Co-ordination with various designated contractors.
 - f) Obtaining clearances from various stakeholders and authorities.

- g) Submission of the construction and installation reports and records.
- h) Testing and commissioning as per finalized protocol and programme.
- i) Production of As Built Drawings, documents, calculation sheets and records.

17.2 SURVEY ON SITE

- (1) The alignment has been staked at site and the alignment data, as available with Employer, shall be made available to the Contractor as guidance.
- (2) The setting out of the correct alignment for track construction shall however, be the responsibility of the Contractor.
- (3) As such the alignment and related data, as provided by Employer to the Contractor is to be checked and verified by appropriate survey and setting out of Works by surveyors of experience and qualification.
- (4) The Engineer may carry out random checks to verify the accuracy of the setting out and Contractor's compliance of the completed works with given alignment and the requirements, however, full responsibility lies with the Contractor for the accuracy of line and level of the tracks.
- (5) The Contractor shall develop a detailed 'surveyed track analysis' spread sheet on Microsoft EXCEL or similar program. This shall be submitted to the Engineer for acceptance at least one month prior to the commencement of track laying.
- (6) The surveyed track analysis spread sheet shall tabulate against chainage, the vertical difference (high or low) and horizontal difference (left or right) between the actual surveyed track centre line position and the design alignment computed from alignment geometry in the project sheets as already available.
- (7) Derived cant, gauge and twist values shall also be compared against design values on the same spread sheet.
- (8) It shall be Contractor's responsibility to protect and preserve the integrity of the all control markers, grid points, setting out points etc.
- (9) The Contractor shall establish physically on site such setting out points that may be grid or offset points to be used as the reference system for the track work.
- (10) At each site, the position of the site main reference setting out points shall be maintained throughout construction period.
- (11) Such markers shall be checked against the survey control markers by the Contractor at regular intervals to ensure reliability of subsequent works.
- (12) The track shall be sited on the basis of corrected and approved project sheets, both as regards the longitudinal section and the layout.
- (13) The track siting marks corresponding to both the theoretical centre of the track and to the theoretical level of the track running surface, as defined by the relevant project sheets relating to track layout shall be marked in the straight portion and at the beginning and end of each circular curve, transition curve and vertical curve both in the longitudinal and cross directions.
- (14) The said markings shall be put in:
 - a. - In straight sections: every 200-m,
 - b. - In curved sections: every 50-m.

- (15) The track siting marks for the centre of the track shall be shown by angle plates embedded in concrete foundation or plates or nails sealed on the bridge spans, on the upper surface of the slabs as approved by Engineer.
- (16) They shall be referenced by the Cartesian co-ordinates of each point identified in this manner, and registered in the topographical logbook.
- (17) Should there be any discrepancy found by the Contractor with reference to the geometry of civil structure, the same should be brought to the notice of the Engineer for his final decision.
- (18) The inner rail for curve and any rail for straight shall first be set out in its absolute position from setting out points using co-ordinates computed from the alignment geometry, the elevation of the rail shall be checked using a level, the other rail shall be set correctly relative to the first rail.

17.3 TEMPORARY WORKS

- (1) Any temporary arrangements and works, as required to carry out the track work such as temporary connection and access tracks from IR's system, temporary track depots to handle and stack the track materials, temporary stores, offices, fencings etc. shall be done by the Contractor at his own cost.
- (2) The programme and scheme and design of all such temporary works with full justification of the requirement and the approximate period for which these will be needed, shall be submitted to the Engineer for prior approval.
- (3) Construction Depot
 - a) The Contractor will be required to establish at least one temporary construction depot at the site of works where track materials and equipments etc. could be stored for the construction purposes.
 - b) The capacity of the depot should be such that the long rail panels of 260m or more length could be brought or formed after flash butt welding of smaller panels, handled and stacked for preferably 25 track km.
 - c) In case spare land is available with the Employer the same can be handed over to the Contractor free of cost for the purpose of establishing temporary construction depot(s). However, whenever Employer requires this portion of land back, the same shall be handed over to the Employer with a month's notice at no extra cost/compensation to the Contractor. In addition to the land acquired for Right of way, 3 (three) land parcels in Contract Package 201 and 4 (four) parcels in Contract Package 202 each measuring more than 50,000 sqm have been acquired for setting up construction depot (s). Further at each crossing station land has been acquired for CSR of 1500 m for loop line, however, at present Employer will be laying loop lines with 750 m hence balance land available can be utilised for setting up construction depot/staking of material and other temporary. The details may be seen at **Site Details; Part 4 of the Bidding Documents**. Any additional land if required shall be arranged by the contractor at his own cost.
 - d) For the purpose of constructing the depot, the Contractor may be required to lay temporary track, access road, other facilities etc. along with the rail connectivity to the existing IR setup if required, at his own cost. Employer shall assist to coordinate with IR for such a connection.

- (4) The land, as required for all the temporary arrangements and works including the requirement of borrow pits, quarrying, etc. shall be arranged by the Contractor at his own cost. While extracting material from the borrow pits he shall ensure compliance of applicable provisions as per **Environment Management Plan (EMP) of DFCC, included in Reference Document, Part 4 of Bidding Documents.**
- (5) All temporary works shall be removed on completion of permanent works, or as directed by the Engineer.

17.4 CONSTRUCTION METHODOLOGY

17.4.1 General

- (1) The Contractor shall plan and work out the methodology of track construction in various stages as per the requirements detailed in the following paragraphs in consultation and approval of the Engineer taking into account the Contractor's co-ordination and integration responsibilities with the interfacing contractors.

The track construction shall be done by using mechanical track laying method. This shall mean laying of rail panels of 260 meters or more in the track, earlier welded in flash butt welding plant under controlled conditions in depots. Track laying at site will be carried out deploying track laying train, tamping machines, dynamic track stabilizers, shoulder ballast compactors etc.

17.4.2 Construction of Ballast Bed

- (1) The ballast duly inspected by the Engineer shall be brought at site such that it is free from quarry dust and any other contamination.
- (2) Ballast bed shall be laid directly on to the prepared formation and support structure like bridge deck slabs, using methods that keep the amount of road traffic over the formation and support structures to a minimum and that make no damage to the utilities and other structures as existing at or near the site.
- (3) The ballast shall be laid in loose layers of maximum 100mm thickness each and compacted by a minimum of 4 passes of a smooth vibrating roller having a minimum static load of 4kN per 100mm of width or similar.
- (4) The ballast bed shall be laid so as to make an initial neat ballast cushion of 200mm below the bottom of the sleepers after the required rolling. This has to be finally brought up to the desired level as per para 17.4.8 (4) below.
- (5) The ballast bed shall be neatly dressed up so that there is no obstruction to working of the plant and machinery for further activities of rail spreading, sleeper laying etc.
- (6) On completion of the ballast bed a survey shall be undertaken to demonstrate the acceptability of the ballast for track laying. No track laying shall commence until the prepared ballast bed has been inspected and approved by the Engineer.

17.4.3 Handling and Spreading of Rails

- (1) The Contractor will be responsible for transportation of the rail panels to its site through special rail carriers/wagons and shall procure on his own the required equipments, wagons, machinery etc for this purpose.
- (2) The panels of rail shall be handled in the manufacturing plant as well as at the construction site (temporary construction depot if required) in a manner so as to avoid any defects like dents / grip marks, notching or cuts, permanent bends, damage at the ends etc.

- (3) The rail handling during flash butt welding of rail joint, loading and unloading on/to the special rail carriers shall be fully mechanized..

17.4.4 Rail Cutting and Drilling

- (1) The cutting of rails shall be bare minimum and shall be carried out under the supervision of Engineer. Rails shall be cut by using abrasive rail cutting machine only.
- (2) The drilling of holes in rails shall be bare minimum and shall be carried out under the supervision of Engineer as per the process detailed in para 4.10 (2) Volume 4, Part 2 of Bidding Document.
- (3) Any holes if required for signal and traction bonds shall be performed by designated contractors but with prior approval of the Engineer.

17.4.5 Handling and Laying of PSC Sleepers

- (1) The PSC sleepers duly inspected by the Engineer's inspector, shall be carefully handled by mechanized means and transported to the site in track laying train thereby avoiding any damage to the sleepers by way of any cracks, chipping of concrete, dents over the concrete surface etc.
- (2) The PSC sleepers shall be laid over the prepared ballast bed evenly at the design spacing through a mechanized process.

17.4.6 Threading of Rails to Sleepers

- (1) The rail panels, if already spread along the alignment shall be threaded/ mechanically lifted to lay sleepers through the mechanized process. Rail panels can also be automatically placed through the threaders of track laying train.
- (2) The manual handling of rail panels for this activity shall not be permitted to avoid any damage to the rails.

17.4.7 Fixing Elastic Fastening System

- (1) After threading of rails, elastic fastening system consisting of rubber pad, rail liner and elastic clip shall be fixed systematically as indicated vide 17.4.1 above.

17.4.8 Top Ballasting, Tamping and Lining

- (1) Prior to the placing of top ballast the track shall be marked in preparation for tamping and lining operations with the following information:
 - a) All horizontal and vertical tangent points
 - b) Transition curve details
 - c) Circular curve details
 - d) Cant details
 - e) Chainages
- (2) The ballasting of cribs and shoulders shall be done before tamping of newly laid tracks. Once the top ballast is adequately regulated, the track shall be lifted, levelled and aligned as required using on-track tamping / lining machines.
- (3) This shall be followed by a run of adequate passes of dynamic track stabilizer machine to consolidate the track.
- (4) The top ballasting, regulating, tamping and lining shall be repeated in stages of maximum 50 mm lift until the track is at the designed horizontal and vertical

alignment and desired ballast cushion below the sleeper with the desired profile as specified in para 4.5.1(j) of Volume 4; Part 2 is achieved.

- (5) The tamping parameters such as the rate of tamping, number of passes, number of insertions per sleeper, depth of insertion and optimum frequency of vibration for the tamping, squeezing pressure and tamping cycle shall be submitted for the approval of Engineer.
- (6) Concurrent with the tamping and lining, the ballast shoulders and the sleeper cribs shall be compacted with suitable equipment as approved by the Engineer.

17.4.9 Welding and Destressing

- (1) The welding of rail joints to convert the track into LWR/CWR shall be done in accordance with the provisions in Para 4.3 of Volume 4, Section VI, Part 2, Bidding Documents followed by de-stressing where needed as per the temperature records maintained at site at the time of threading.

17.4.10 Installation of Turnouts, Derailing Switches and Switch Expansion Joints

- (1) The assembly sequence of turnouts, derailing switches and rail expansion joints shall be submitted for Engineer's approval as part of the overall method statement for preassembly, handling, storage, transportation, unloading and installation
- (2) All turn-outs, derailing switches and SEJs shall be fully preassembled in a workshop/contractor's yard as per the specifications of the manufacturers duly approved by the Engineer for the inspection and approval of the Engineer, prior to laying at site.
- (3) The Contractor shall provide all gauges and measuring equipments and assistance required for complete check of preassembled lay-outs
- (4) After approval the turnouts, derailing switches and rail expansion joints shall be transported to site and laid by cranes on ballast bed prepared, as described in clause 17.4.2 above i.e. construction of ballast bed.
- (5) All turn-outs and derailing switches laid in track shall comply with the provisions given in Para 12.40 of Indian Railway Signal Engineering Manual. The Contractor shall interface and ensure the designed switch opening while fixation of the first stretcher bar by designated signalling contractor.
- (6) The gap at SEJs shall be adjusted after necessary destressing of LWR/CWR on either side and as per the provisions in IR manual.

17.4.11 Installation of Glued Insulated Rail joints

Normally glued insulated rail joints shall not be required over the project due to joint-less technology being adopted for track occupancy detection arrangement. However, wherever these are required following stipulations shall govern:-

- (1) The glued insulated rail joints, manufactured in the plant as per approved design specifications shall be laid in track at predetermined locations in consultation with designated signaling contractor and as approved by the Engineer in Working Drawings.
- (2) Except in the case of Glued Insulated rail joints in the turn-out zone, its positioning shall be such as to keep a minimum distance of 6.00m from an adjacent weld in the rail.

17.4.12 Connection to Existing IR Track

- (1) Contractor may be required to dismantle the existing Indian Railway track as per the approved yard plan and lay new railway track at no extra cost to the Employer. Before approaching the IR track, specific written approval of Engineer shall be obtained so as not to cause unsafe working in the contiguous area.

17.4.13 Track at Special Locations

- (1) Provisions of IRPWM and LWR Manual, shall be followed while laying track at special locations like sand humps in yard, bridge approaches, approaches to yards, SEJ locations, level crossings, Insulated glued joints in LWR/CWR portions etc.

17.5 TRACK DRAINAGE

- (1) The drainage scheme/arrangement shall be constructed as per the agreed Drawings and methodology.

17.6 FENCING

- (1) The fencing shall be constructed as per the agreed Drawings and methodology. .

17.7 DRESSING OF BALLAST AND CLEANING OF TRACKS

- (1) On completing the track works and after making up the desired track geometry up to laid down standards, the ballast in track shall be properly dressed up in the sleeper cribs and in shoulders as per the IRS standards for LWR/CWR track.
- (2) The track and cess shall be thoroughly cleaned to a standard acceptable to the Engineer, immediately after installation and as required thereafter to maintain the standard until the arrangement of service trials.
- (3) All side drains along track for drainage purpose shall be cleaned off the debris etc. so as to provide clear water-way.

17.8 PERMANENT MARKERS

- (1) Upon completion of the track installation following permanent markers shall be provided as per IRPWM and prior approval by the Engineer of their information, plates/boards, colour scheme and fixation arrangement :
 - a) Kilometre markers;
 - b) Change of gradient markers;
 - c) Curve reference markers;
 - d) LWR/CWR reference markers;
 - e) SEJ markers including its reference markers;
 - f) Fouling point markers;
 - g) Turnout markers.
 - h) Land boundary pillars
 - i) Level crossing markers
 - j) Mandatory “W” boards for level crossings
 - k) Bridge boards/signages
 - l) Fog signal locations
 - m) All markers required to be painted on rails for curves, turnouts and SEJs etc. shall be paint marked by the Contractor as per IRPWM.

17.9 INSPECTION and ACCEPTANCE

17.9.1 General

- (1) A thorough track inspection shall be carried out jointly by the Contractor and the Engineer prior to acceptance of the Works.
- (2) The proforma for the measurement of the track parameters to be submitted by the Contractor shall be as per the provisions of IRPWM in this regard.
- (3) The proforma shall show the design requirement against actual and the differences.
- (4) Other than meeting the mandatory requirements of track parameters in floating condition of track stipulated vide para 17.9.3, the track shall also fulfil the requirements of riding quality stipulated vide para 19.11 below, before declaring as acceptable.

17.9.2 Tests

- (1) The Contractor shall propose the various forms of test and obtain the approval of the Engineer prior to the commencement of the testing, keeping in view the provisions of IRPWM in this regard.

17.9.3 Track Tolerances

- (1) The track parameters for the completed track works shall be measured by the Contractor and confirmed by the Engineer in a format acceptable to the Engineer. Track tolerances as indicated in point (3) below are for measurements taken in floating condition of the track.
- (2) All the track measurement shall be taken in the floating condition by methods and equipment approved by the Engineer prior to the commencement of the measurements.
- (3) The dimensional tolerances shall comply with the following:
 - a) Maximum difference of any point in relation to the design:
 - i. Vertical: +/- 10mm
 - ii. Horizontal: +/- 10mm
 - b) Gauge with reference to 1676mm
 - i. Maximum variation over the prescribed track gauge +3mm to 0mm
 - ii. Maximum variation in track gauge from sleeper to sleeper 1mm/sleeper
 - iii. Average track gauge over 100m length +1.8mm to 0 mm
 - c) Misalignment: +/- 5mm on 20m chord base
 - d) Unevenness: +2mm to -1mm on 10m chord base.
 - e) Maximum deviation of versine on a 20.0 metres chord: +/-5mm
 - f) Cant/Cross Level:
 - i. Straight and curved track +/- 3mm;
 - ii. Sleeper to sleeper variation of cant/cross level +/-1mm

- g) Twist:
- i. On straight or circular curved track: $\pm 1\text{mm/m}$
 - ii. On transition curves: $+0.5\text{mm/m}$ over design value
- h) Turnouts
- i. Stock rail joint in the longitudinal section: $\pm 15\text{mm}$;
 - ii. Nose to nose of Xings in a cross over: $\pm 10\text{mm}$
 - iii. Flange way clearance at the end of the switch planing : $+ 5.0\text{mm}$ to $- 0.00\text{mm}$;
 - iv. Switch Toe opening: $+1.0\text{mm}$ to -0.0mm ;
 - v. Switch Toe squareness: 5.0mm ;
 - vi. Deviation of measured versine over the design value for the switches, intermediate track and curved crossings (measured over a 6.0 metre overlapping chord): $\pm 3.0\text{mm}$;
 - vii. Sleeper spacing: $\pm 10\text{mm}$;
 - viii. Sleeper out of square: $\pm 5.0\text{mm}$
 - ix. Fishplate joint squareness across the track: $\pm 10\text{mm}$;
 - x. Gauge at SEJs: $\pm 1.0\text{mm}$;
 - xi. Gap at the opening of the SEJs: $\pm 2.0\text{mm}$;
 - xii. Out of squareness of switch rails of SEJs: $\pm 2.0\text{mm}$.
- (4) The base of the measurement shall be as below:
- a) Gauge checked every ten (10) sleepers at 14mm below the head of the rail;
 - b) Cross level, twist and cant measured every 3.0 metres;
 - c) Versines in the lead portion of turnouts every 3.0 metres;
 - d) Versines in horizontal curves and transitions every 10.0 metres with an overlapping 20.0 metre chord;
 - e) Vertical curves will be checked with a 10.0 metre overlapping chord.
- (5) No individual component shall exceed the track tolerance limit.

18.0 CONSTRUCTION-BUILDINGS

- (1) Safety, Health & Environmental and Quality Control Aspects aspects shall be kept in mind during the Construction and Testing & Commissioning phase, requirement for which has been specified at appropriate places in the bidding document as well as in **Part 2 Section VI, Volume 6 Appendix 6, 12 & 13**. It shall be the overall responsibility of the Contractor to ensure compliance of Safety, Health & Environmental aspects at all times conforming to the provisions mentioned in this Bidding document.
- (2) The site of the work shall be cleared off the shrubs, vegetation, grass, bushes and other materials upto adequate depth as required as per site condition and rubbish removed outside the periphery of the area being cleared. The enclosed area between the boundary walls/ fencing for the buildings, shall then be filled with earth upto 600

available in phases. mm above Natural ground level (NGL) or 300 above HFL whichever is higher and well compacted by a suitable method as decided by Engineer.

- (3) Boundary wall shall be provided around the buildings with controlled access viz. IMD, IMSDs, Residential quarters, Station buildings for Junction and crossing stations as per Drg. No. DFCC/BOUNDARY WALL.
- (4) The plinth level of station buildings for Junction and crossing stations and Gate Lodges shall be at least 300mm above the rail level.

19.0 WORKS IN MUGHALSARAI YARD IN CONTRACT PACKAGE 201

- (1) Site for construction activities from East Recv. Cabin (as marked in New Mughalsarai Yard Plan) to West Outer Cabin (as marked in New Mughalsarai Yard Plan) will be handed over to the Contractor in phases.
- (2) Site where presently the IR quarters are located will be available only after construction of 190 quarters and other miscellaneous works are completed by the Contractor as per the approved plan.
- (3) Dismantling of old IR quarters and other structures coming in ROW in Mughalsarai yard will be done by the Contractor and debris shall be disposed off at suitable locations outside ROW / Railway land as per instruction of the Engineer. Salvage material shall be the property of the Contractor.
- (4) Dismantling of existing IR tracks, coming in alignment shall also be done by the Contractor. Released material shall be the property of IR.
- (5) Existing drainage of the yard should not be affected. Permanent / Temporary Diversion of drains wherever required, shall be done by the Contractor. Plan for the same shall be prepared by the Contractor and approved by the Engineer.
- (6) Scope of work also includes construction of Road Over Bridge across the yard including suitable connection to the existing approaches at Chainage 124.275 in Mughalsarai as per GAD in Site Details – Part 4 of the Bidding Document. After construction of new ROB and its approaches, old ROB and its approaches will be dismantled for laying of DFC track. The superstructure works for the ROB will be required to be done in the intermittent traffic blocks.
- (7) Extension of 1 (one) existing FOB at Mughalsarai.
- (8) Provision of boundary wall 2.0 m high for a length of 5 kms for IR. The boundary wall shall have a provision of concertina wire at the top.
- (9) Construction of an overhead water tank with a capacity of 250,000 litres.
- (10) Contractor should coordinate with IR for taking over the site, dismantling of IR track, dismantling of buildings and other structures in Mughalsarai yard. A plan for taking up the works in Mughalsarai yard shall be prepared by the Contractor and approved by IR. Traffic blocks required for these activities shall be obtained from IR by the Contractor.
- (11) Permanent way material (rails, sleepers etc) of IR and any other Railway material lying in the yard shall be shifted and stacked at proper locations as decided by the DFCCIL/IR. Dismantling of existing IR tracks causing infringement of Schedule of

Dimensions of EDFC shall also be done by the Contractor. Released material shall be the property of the IR.

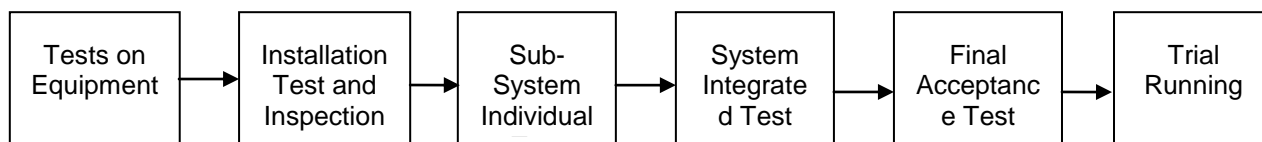
20.0 OTHER ENGINEERING WORKS

- (1) Works of FOB, fencing, platforms, level crossing gates etc. shall be done as per the drawings and procedures agreed by the Engineer based upon the Design criteria mentioned in Volume 4, Employer's Requirement, Part 2 of the Bidding Document.

21.0 TESTING AND COMMISSIONING

21.1 GENERAL

- (1) The Contractor shall provide and perform all forms of testing procedures applicable to the Works and various components including all necessary factory, site and acceptance tests required therein and for the interfacing of the Works with the other Contract works. Until the time the Works are taken over by the Employer, Contractor shall maintain the same in a manner so as to continuously meet the acceptance criteria for all aspects, as per the requirements mentioned in the **Employer's Requirement, Part 2 of Bidding Documents**. Contractor shall make a consolidated list of all the tests required for Testing and Commissioning along with the testing procedures and applicable codes/ manuals and submit the same to the Engineer for enabling a joint program of testing.
- (2) The commissioning activity shall include a period of Integrated Testing of System followed by a period of trial running which may be attended by the CRS or other authorized official and for staff training and familiarisation and timetable proving purposes. Accordingly a typical test sequence may be as shown below:-



- (3) All testing procedures shall be submitted at least twenty eight (28) days prior to conducting any test. The testing procedures shall show unambiguously the extent of testing covered by each submission, the method of testing, the acceptance criteria, the relevant drawing (or modification) status and the location.
- (4) The testing procedures shall be submitted, as required, by the Contractor during the duration of the contract to reflect changes in design of track works, interface systems or the identification of additional testing requirements.
- (5) The Engineer, the Employer's Personnel and authorized agencies shall at all reasonable times:
 - (a) have full access to all parts of the Site and to all places from which natural Materials are being obtained, and
 - (b) During production, manufacture and construction (at the Site and elsewhere), be entitled to examine, inspect, measure and test the materials and workmanship, and to check the progress of manufacture of Plant and production and manufacture of Materials.
 - (c) The Contractor shall give them full opportunity to carry out these activities, including providing access, facilities, permissions and safety equipment. No such

activity shall relieve the Contractor from any obligation or responsibility. They shall be provided the facilities for monitoring all tests and have access to all testing records.

- (6) Ample time shall be allowed within the testing programmes for necessary alterations to equipment, systems and designs to be undertaken, engagement of Engineer, together with re-testing prior to final commissioning.
- (7) All costs associated with the testing as above shall be borne by the Contractor, unless otherwise specified, including the services of any specialised personnel or independent assessors concerned to the work done by him. The Contractor shall also bear any expenses incurred due to replacement necessitated by defects or failure of equipment to meet the requirements of the Contract. .
- (8) Unless agreed in writing by the Engineer, the personnel engaged on testing shall be independent of those directly engaged in the design or installation of the same equipment.
- (9) All testing equipment shall carry an appropriate and valid calibration labels.
- (10) Examination of Works before covering up: No work or part of work shall be covered up or put out of view, without the prior approval of the Engineer or the Engineer's Representative. The Contractor shall uncover any part or parts of the Works, or make openings in or through the same, as the Engineer may from time to time direct, and shall reinstate and make good such part or parts, to the satisfaction of the Engineer.
- (11) If any defect or damage is one requiring immediate attention from a safety, environment or operational aspect, the Engineer has the authority to proceed with the rectification in any manner suitable and deduct the cost from the next due interim payment.

21.2 BATCHES, SAMPLES AND SPECIMENS

- (1) A batch of material is a specified quantity of the material that satisfies the specified conditions.
- (2) If one of the specified conditions is that the material is delivered to the Site at the same time, then material delivered to the Site over a period of a few days may be considered as part of the same batch if in the opinion of the Engineer there is sufficient proof that the other specified conditions applying to the batch apply to all of the material delivered over the period.
- (3) A sample is a specified quantity of material that is taken from a batch for testing and which consists of a specified amount, or a specified number of pieces or units, of the material.
- (4) A specimen is the portion of a sample that is to be tested.

21.3 SAMPLES FOR TESTING

- (1) Samples shall be of sufficient size and in accordance with relevant standards to carry out all specified tests.
- (2) Samples taken on the Site shall be selected by, and taken in the presence of, the Engineer and shall be suitably marked for their identification. An identification marking system should be evolved at the start of works in consultation with the Engineer.

- (3) Samples shall be protected, handled and stored in such a manner that they are not damaged or contaminated and such that the properties of the sample do not change.
- (4) Samples shall be delivered by the Contractor, under the supervision of the Engineer, to the specified place of testing. Samples on which non-destructive tests have been carried out shall be collected from the place of testing after testing and delivered to the Site or other locations instructed by the Engineer.
- (5) Samples which have been tested may be incorporated in the Permanent Works provided that:
 - (a) the sample complies with the specified requirements;
 - (b) the sample is not damaged; and
 - (c) the sample is not required to be retained under any other provision of the Contract.
 - (d) Engineer is in agreement with the proposal of Contractor.
- (6) Additional samples shall be provided for testing if in the opinion of the Engineer:
 - a) material previously tested no longer complies with the specified requirements; or
 - b) material has been handled or stored in such a manner that it may not comply with the specified requirements.

21.4 TESTING

- (1) The Contractor shall be responsible for all on-site and off-site testing and for all in-situ testing.
- (2) All appropriate laboratory tests shall be carried out in the Contractor's laboratory, unless otherwise permitted or required by the Engineer.
- (3) Where the laboratory is not appropriately equipped and/or staffed for some tests, or if agreed to by the Engineer, tests may be carried out in other laboratories provided that:
 - a) they are accredited for the relevant work to a standard acceptable to the Engineer
and
 - b) particulars of the proposed laboratory are submitted to the Engineer for his consent.
 - c) Prior intimation to the Engineer shall be given regarding the date/time and location of testing.
- (4) In-situ tests shall be done in the presence of the Engineer.
- (5) Equipment, apparatus and materials for in-situ tests and laboratory compliance tests carried out by the Contractor shall be provided by the Contractor.
- (6) The equipment and apparatus shall be maintained by the Contractor and shall be calibrated before the testing starts and at regular intervals as permitted by the Engineer.
- (7) The equipment, apparatus and materials for in-the situ tests shall be removed by the Contractor as soon as practicable after the testing is complete.

- (8) The Contractor shall be entitled in all cases to attend the testing carried out in the other laboratories, to inspect the calibration certificates of the testing machines and to undertake the testing on counterpart samples.
- (9) Testing of such samples shall be undertaken in laboratories and particulars of the laboratory proposed shall be submitted to the Engineer for consent prior to the testing.
- (10) Attendance on tests, including that by the Engineer, Contractor and Designer, shall be as laid down in the Quality Assurance procedures.

21.5 COMPLIANCE OF BATCH

- (1) The results of tests on samples or specimens shall be considered to represent the whole batch from which the sample was taken.
- (2) A batch shall be considered as complying with the specified requirements for a material if the results of specific tests for of the specified properties comply with the specified requirements for the properties.
- (3) If additional tests are permitted or required by the Engineer but separate compliance criteria for the additional tests are not stated in the Contract, the Engineer shall determine if the batch complies with the specified requirements for the material on the basis of the results of all tests or may decide to get special tests undertaken.
- (4) The cost of such tests shall be borne by the Contractor.

21.6 RECORDS OF TESTS

- (1) Records of in-situ tests and laboratory compliance tests carried out by the Contractor shall be kept by the Contractor on the Site and a report shall be submitted to the Engineer within seven (7) days, or such other time stated in the Contract or in the Quality Assurance Programme, after completion of each test.
- (2) In addition to any other requirements, the report shall contain the following details:
 - a) material or part of the Works tested;
 - b) location of the batch from which the samples were taken or location of the part of the Works;
 - c) place of testing;
 - d) date and time of tests;
 - e) weather conditions in the case of in-situ tests;
 - f) technical personnel supervising or carrying out the tests;
 - g) size and description of samples and specimens;
 - h) method of sampling;
 - i) properties tested;
 - j) method of testing;
 - k) readings and measurements taken during the tests;
 - l) test results, including any calculations and graphs;
 - m) specified acceptance criteria; and

- n) other details stated in the Contract.
- (3) Reports of tests shall be signed by the Contractors Site Representative or his assistant, or by another representative authorised by the Contractor.
- (4) If requested by the Contractor records of tests carried out by the Employer's staff or by the Engineer shall be given to the Contractor.

21.7 PRODUCTION TESTS (AT WORKS)

- (1) Should the Contract include any equipment not previously proven in service the Contractor shall undertake a thorough testing of pre-production units to the satisfaction of the Engineer.
- (2) The Contractor shall identify any equipment in this category, or equipment which differs significantly from that already in service elsewhere.
- (3) All materials, components, sub-assemblies, unit assemblies (including software, cables and wiring) shall be subject to testing and certification. Notification of these Tests shall be submitted to the Engineer twenty eight (28) days in advance of carrying out any Tests.
- (4) The Engineer will then determine which, if any, items may be accepted based on previous supply or experience.
- (5) Works Tests shall include but not be limited to:
 - a) Physical inspection
 - b) Dimension check
 - c) Electrical check
 - d) Calibration
 - e) Output check
 - f) Operational performance
 - g) Full Load test
 - h) Flash-over test
 - i) Insulation test
 - j) Soak test
 - k) Non-destructive test to assess integrity or strength of parts
- (6) Where processor based equipment is to be used, then the works Test shall include also verification of software used in this application.

21.8 POST INSTALLATION TESTS (ON SITE)

- (1) During and on completion of the installation, the Contractor shall undertake testing of all points and crossings, glued joints, derailing switches, switch expansion joints, buffer stops and other devices, in a progressive sequence and in accordance with the overall testing programme.
- (2) These tests shall culminate in functional tests to verify the correct operation of full apparatus and, where appropriate, correct response to the respective control and physical operation of the device/ components.

21.9 ACCEPTANCE TESTS

- (1) The Contractor shall prepare and organise a comprehensive programme of acceptance tests to demonstrate to the Engineer that all systems, sub-systems and apparatus defined under the Contract meet the specified performance requirements in all respects.
- (2) These tests shall be conducted by the Contractor in the presence of the Engineer.

21.10 INTEGRATED SYSTEM TESTS

- (1) The Contractor shall submit to the Engineer requirements and procedures, in respect of the Contractor's scope of work, for Integrated System Tests in conjunction with the interface contractors to demonstrate that the complete system provided under the Contract is fully operational and meets the specified performance criteria.
- (2) The conducting of these Integrated System Tests, by the Contractor and the interface contractors, shall include a period of test running. Necessary interfacing required with the other contractors shall be done by the Contractor as detailed in **Part 2 "Employer's Requirement, Section VI, Volume 6, Appendix 3 - Design and Construction Interfaces"**
- (3) Tests on Completion shall also include Integrated Testing. The Contractor shall, following satisfactory completion of tests on his Works, equipment, sub-systems or system, perform, at the direction of the Engineer, programme of tests to verify and confirm the compatibility and complete performance of his Works, equipment, sub-systems or system with the Works, equipment, sub-systems or system provided by others.
- (4) The results of the Integrated Testing and Commissioning shall be compiled and evaluated by the Engineer and the Contractor.
- (5) If the Works, or a part thereof, or a section, fail to pass the Integrated Testing and Commissioning, the Engineer shall require such failed tests, to be repeated under the same terms and conditions. If such failure and retesting result from a default of the Contractor and cause the Employer to incur additional costs, the same shall be recoverable from the Contractor by the Employer, and may be deducted by the Employer from any monies due, or to become due, to the Contractor.
- (6) If the Works, or a part thereof, or a Section, fail to pass Integrated Testing and Commissioning and the Contractor in consequence proposes to make any adjustment or modification to the Works or a part thereof, or a section, the Engineer may instruct the Contractor to carry out such adjustment or modification, at his own cost or to other contractor(s) if the item(s) of Works is attributable to other contractor(s) and to satisfy the requirements of Integrated Testing and Commissioning within such time as the Engineer may deem to be reasonable.
- (7) The Contractor along with others shall carry out all statutory tests and trials, under the supervision of the Engineer, necessary for obtaining sanction of the competent authority, if required, for opening the railway system.
- (8) During integrated testing, the Contractor shall be required to carry out coordination with all interfacing contractors and agencies.

21.11 TEST ON COMPLETION

- (1) Following satisfactory completion of the acceptance tests and the Integrated System Test the Engineer will commence an extended period of trial running to prove all

technical systems, to the satisfaction of the CRS or any other authorized official, who will check the system from safety point of view and to allow all technical systems to settle and to train staff in working procedures.

- (2) For the purpose of assessing the riding quality of track and recording combined values of various track parameters an electronic track recording car will be arranged and run by the Employer. This run will be scheduled after the floating parameters recorded vide para 17.9.3 are found to be within acceptable limits. The readings of this trial run shall fall within the following category limits (specified in chapter VI of IRPWM for electronic recording car) to qualify the track for acceptance:-

- Track length outside station limits – Minimum 90% length in category A
- Track length within station limits – Minimum 90% length in category B and above

Station limits for this purpose shall mean the length between the two outermost stop signals. In case the track fails to qualify within the respective categories then a rerun of the recording car will be scheduled after a month to rerecord these parameters.

The Track Geometry Index (TGI) calculated based on Track recording car run, including track within Station limits shall be within the following threshold limits (R.D.S.O.) Report No. TM-115)

Sl. No.	INDICES	TGI Value
1.	60% CFD at the time of testing (i.e. minimum 40% of track shall have TGI)	≥ 115
2.	10% CFD at the time of testing (i.e. minimum 90% of track shall have TGI)	≥ 75

In case the track fails to qualify within the respective categories or the thresholds of TGI laid down, then a rerun of the recording car shall be scheduled after a month to record these parameters.

- (3) Contractor shall allow for attendance in respect of the Contractor's scope of work over the whole of this period, which shall include repair/ correction activities and also further opportunity for technical staff training.

22.0 RECORDS

22.1 DRAWINGS PRODUCED BY THE CONTRACTOR

- (1) Drawings produced by the Contractor including Drawings of Site layouts, Temporary Works, etc. for submission to the Engineer shall generally be to ISO A1 size.
- (2) They shall display a title block with the information as detailed in **Part 2 "Employer's Requirement, Section VI, Volume 6, Appendix 7 - Drawing and CAD Standards"**.
- (3) The number of copies to be submitted to the Engineer shall be as stated in the Contract, or as required by Engineer.

- (4) The Contractor shall provide five sets of As Built Drawings along with read only electronic version of the same on CD/DVD to the Engineer.

22.2 PROGRESS PHOTOGRAPHS AND VIDEOGRAPHY

- (1) The Contractor shall provide monthly progress photographs which have been properly recorded to show the progress of the works to the Engineer.
- (2) The photographs, of not less than 72 in number per month, shall be taken on locations agreed with the Engineer to record the exact progress of the Works. All important events shall be photographed.
- (3) Two sets of photographs shall be provided on CD ROM format with two sets of colour prints of 175 mm x 125 mm size in albums duly labelled.
- (4) The Contractor shall mount each set of each month's progress photographs in a separate album of a type to which the Engineer has given his consent, and shall provide for each photograph two typed self-adhesive labels, one of which shall be mounted immediately below the photograph and one on the back of the photograph.
- (5) Each label shall record the location, a brief description of the progress recorded and the date on which the photograph was taken.
- (6) All photographs shall be taken by a skilled photographer.
- (7) Photo processing shall be carried out by a competent processing firm to the satisfaction of the Engineer.
- (8) The Contractor shall ensure that no photography is permitted on the Site without the consent of the Engineer.
- (9) Important events, construction activities, site visits of VIPs, working of new machinery, weather effects or any occasion advised by the Engineer shall be video graphed. The recording shall be done or converted to .avi format and presented in a CD/DVD with appropriate voice recording describing the event.
- (10) The Engineer may specify any particular activity at the site to be video-graphed. The Contractor shall comply with the request at no extra cost to the Employer.

22.3 RECORDS OF WAGE RATES

- (1) The Contractor shall keep monthly records of the average, high and low wage rates for each trade/tradesman employed on the Site and records shall be made available to the Engineer during inspection.

22.4 REGISTERS FOR MAINTENANCE

- (1) After completion of works, Contractor shall produce the following registers similar to the ones in use over IR and as per IRPWM, IRPWWM as under:-
 - i) Bridge Register (2 sets)
 - ii) Level Crossing
 - iii) Points and Crossing
 - iv) LWR
 - v) Ballast
 - vi) Zero Missing Fitting

- vii) Land Boundary
- viii) L-Section
- ix) Index Plan and Section
- x) Curve Register
- xi) Gradient Register
- xii) SEJ Register
- xiii) Track Diagram
- xiv) Yard Plan
- xv) Yard Diagram
- xvi) Earthworks
- xvii) The above list is not exhaustive and Contractor is required to prepare an Asset database which identifies all infrastructures along the route. This database shall be expandable to allow maintenance requirements to be called up together with an Asset Management and Planned Preventative Maintenance Schedule of DFCC.
- xviii) Any other registers as directed by Engineer to be used during maintenance.

23.0 MATERIALS

- (1) Materials and goods for inclusion in the Permanent Works shall be new unless the Engineer has consented otherwise. Preference shall be given to local materials where available.
- (2) Certificates of tests by manufacturers which are to be submitted to the Engineer shall be current and shall relate to the batch of material delivered to the Site.
- (3) Certified true copies of certificates may be submitted if the original certificates could not be obtained from the manufacturer.
- (4) Parts of materials which are to be assembled on the Site shall be marked to identify the different parts.
- (5) Materials which are specified by means of trade or proprietary names may be substituted by materials from a different manufacturer which has received the consent of the Engineer provided that the materials are of the same or better quality and comply with the specified requirements.
- (6) Samples of materials submitted to the Engineer for information or consent shall be kept on the Site and shall not be returned to the Contractor or used in the Permanent Works unless permitted by the Engineer.
- (7) The samples shall be used as a mean of comparison which the Engineer shall use to determine the quality of the materials subsequently delivered. Materials delivered to the Site for use in the Permanent Works shall be of the same or better quality as the samples which have received consent.
- (8) Contractor shall deposit Track material with the representative of Employer as per the inventory list included in Bidding Forms, Section IV, Part 1 of Bidding Documents.

24.0 PROVISION AND DISPOSAL OF EARTHWORKS MATERIAL

- (1) For fill or dumping sites, the Contractor shall prepare a land plan with details of surface drainage requirements, final formation levels, spreading and compaction of the fill during dumping acceptable to the Engineer.
- (2) The Contractor shall also provide security for such sites. The dumping sites to be used by the Contractor shall be as directed by the Engineer.
- (3) All excavated material, excluding waste material, bentonite fluid and bentonite contaminated material shall be disposed of at the appointed site only.
- (4) This material shall be placed and compacted in accordance with the construction specification for earth works or as otherwise directed by the Engineer's representative.
- (5) The disposal of waste material, bentonite fluid and material contaminated with bentonite shall be the sole responsibility of the Contractor and these materials shall be disposed off by the Contractor at an approved location at his own cost.
- (6) The dumping sites provided by the Engineer, if any, shall not be used for disposal of waste material, bentonite fluid or material contaminated with bentonite.
- (7) Rock deposited as fill material at the dumpsites shall be capable of compaction with single pieces no larger than 300mm.

25.0 DEFECT NOTIFICATION PERIOD

- (1) After the Works are taken over by the Employer in terms of para 10.1 of General conditions of Contract it will be followed by the **Defect Notification Period** of two years.

During this period Contractor shall replace/ remedy the defects occurring under normal usage of Works by the Employer, except for normal wear and tear under such usage.

Maintenance activities to be done during Defect Liability Period shall be done by the Employer at its own cost and through separate agency.

Section VI. Employer’s Requirement

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APPENDIX 1 UTILITIES

1.0 UTILITIES

1.1 General

- (1) The Bidder for this Work is required to remove all chartered and unchartered utilities coming in the way of alignment. Chartered utilities are listed in Part 4 – Reference documents -Site Data of Bidding documents and Contractor shall not be paid extra for removal of chartered utilities. Work of removal of unchartered utilities shall be treated as a Variation to the Contract and shall be dealt as per the provisions for dealing with Variations in Contract. Contractor shall be paid as per the actual work done for removal of unchartered utilities based on the Variation approved by the Engineer, on case to case basis.
- (2) Before removing any utilities Contractor should submit a utility diversion report to the Engineer with the following details, for approval :-
 - a) location of utility;
 - b) name and address of the utility owner;
 - c) nature and sizes of the utilities;
 - d) description and condition of utility;
 - e) temporary or permanent supports required; and
 - f) temporary or permanent diversion required
 - g) use of specific construction methods to complete the underground structures around and below the utilities including support of the utilities during construction.
 - h) Materials required for removing / relocating the utility.
 - i) Time required for removing / relocating the utility.
 - j) For unchartered utilities - As soon as the presence of unchartered utility required to be diverted temporarily or permanently is encountered, the Contractor shall inform the Engineer about the need for diversion of that utility and shall seek the approval of the Engineer for its diversion. The details submitted by the Contractor to the Engineer in this regard shall include date on which the utilities were encountered and the cost involved based upon the proposed Variation to Contract for removal of such utilities.
- (3) A utility diversion plan with schedule of utility removal/ relocation shall be prepared by the Contractor and submitted along with the preliminary Design for all utilities. Unchartered utilities shall be included as soon as these are encountered by the Contractor and the plan updated accordingly. The Contractor shall take into consideration the time taken for utility diversions and shall take all steps to enable the utility diversions to proceed in accordance with the overall Works programme.
- (4) The Contractor shall set up and manage a utility liaison group of experienced personnel for the duration of the Contract which shall maintain close liaison with the utility owners and undertakings.
- (5) The Contractor shall immediately inform the Engineer and the utility agencies of any

- a) damage to utilities;
 - b) leakage of utilities;
 - c) discovery of utilities not previously identified.
- (6) Work of utility removal shall deem to include the following and shall be done by the Contractor at his own cost for this Work:-
- a) Identifying the utilities, their owner and agencies involved in granting clearance for their removal/ relocation.
 - b) Preparing plans/ drawings/ applications for their removal/ relocation.
 - c) Liaisoning and obtaining necessary clearances from the concerned authorities. Employer shall assist the Contractor in this regard.
 - d) Carrying out the removal/ relocation of utilities, to the specified locations within or outside the Site, including all under and over ground structures, temporary or permanent diversions etc. required as per the clearances of concerned authorities/ utility owners.
 - e) Providing temporary/ permanent supports and protection as per the methods proposed by the Contractor and agreed by the utility owner and Engineer wherever required for the safety and security of the utility service and public.
 - f) The work for relocation /modification of all utilities shall be done as per relevant latest standards and specifications prescribed by the concerned utility owner/ authority. It will be the responsibility of the Contractor to obtain such standards/ specifications from the concerned utility owner/ authority.
 - g) Arranging inspection /testing of modified /relocated utilities by the concerned authorities/ utility owners and preparation of test reports and any other reports required under applicable rules, Acts, regulations of such authorities/ utility owners.
 - h) Dismantling of old utilities and disposing off the released material as per agreement arrived at with the owners of the utilities.
 - i) Handing over of relocated / modified utilities to the owners of utilities/ agencies with 'no objection certification' from them.
- (7) The Contractor shall consider following stipulations while relocating / modifying electrical utilities.
- a) Regulations for power line crossings of Railway tracks as per Indian Railways Manual of AC Traction (Vol.-II, Part-II, and Appendix-IV) read along with Correction Slip no.-18 dated Jan 19, 2009 will be followed by the Contractor.
 - b) Contractor/ Sub contractor (engaged by the Contractor for electrical works) should have an electrical contractor license as per Indian Electricity Act 2003.
- (8) No extra payment of any money required to be paid by the Contractor to the utilities owner for supervision charges or on any other account shall be payable by the Employer.
- (9) Records of the existing utilities encountered shall be kept by the Contractor on the Site and a copy provided to the Engineer. The records shall contain the following details:-

- a) location of utility;
 - b) date on which the utilities were encountered;
 - c) date on which the utilities were removed/ relocated;
 - d) nature and sizes of the utilities;
 - e) condition of utility;
 - f) temporary or permanent supports provided; and
 - g) diversions made –temporary or permanent
 - h) details of materials used
 - i) relevant photographs/ drawings of various stages
 - j) clearances of utility owners/ relevant authorities at various stages.
 - k) Any other relevant information required by the Engineer.
- (10) The Contractor shall include the details (completed plans showing clearances of relevant authorities and owners, location, ownership, size and material) of all such utilities in the As Built Drawings.
- (11) The Contractor shall allow, subject to such conditions as the Employer may specify, access to, and use of the Site for laying telephone lines, water pipes, electric cables or other public utilities. For the avoidance of doubt, it is agreed that use of the Site under this Sub-Clause shall not in any manner relieve the Contractor of its obligation to construct the Works in accordance with this Contract and any damage caused by such use shall be restored forthwith at the cost of the Employer.
- (12) The Contractor shall remove/relocate all Utilities (chartered and uncharted) or trees coming in the way of designed alignment except the following:
- Signalling installations;
 - Telecommunication installations belonging to IR
 - Electrical utilities above 33 kV;
 - IOC pipe lines

All Electrical crossings shall be laid underground and may have to be crossed under IR track also.

- (13) Quarters:-
- 190 nos. of Quarters at Mughalsarai for Contract Package 201 shall be constructed under this Contract. At all other locations for both the Contract Packages the IR quarters shall be constructed by another Contractor. However, the dismantling of IR quarters will be done under this Contract. The details are indicated in Site Details Part 4 of the Bidding Document.
- (14) Other Structures:-
- Other structures shall be relocated/ reconstructed on the basis of equivalent plinth area as per the details indicated in Site Details Part 4 of the Bidding Document except gate lodges and new gate lodges which will be constructed as per drawing no. GC/DFCC/GL/505. Provision for a hand pump for all new Gate Lodges and

Gate Lodges required to be relocated shall be made by the Contractor. Five of the existing IR cabins for Contract Package-202 are required to be replaced by Gate Lodges. The identification of these cabins has been indicated in Site details, Part 4 of the Bidding Document.

1.2 Removal of Trees

- (1) The felling/re-plantation of trees is governed by the relevant preservation of trees legislation of the Government of India or the concerned State Government.
- (2) If for the purposes of the works trees are required to be cut/trimmed/replanted or removed, the Contractor must notify the Engineer of the tree felling requirements.
- (3) Such trees shall be limited to those which cause a material adverse effect on the construction of Works.
- (4) Required permission/NOC for tree felling has already been/being obtained by the Employer. Required money for planting of trees in replacement of existing trees likely to be felled has already been/being deposited with the concerned authorities by the Employer.
- (5) The Contractor shall obtain the applicable permits for transportation of such trees from the concerned authorities and the Employer shall assist him in this regard.
- (6) The felled trees shall be deemed to be the property of Contractor unless deemed otherwise by the legislation vide item 1.2 (1) above.
- (7) No cost for cutting/ replanting/ relocating of trees shall be paid to the Contractor as unchartered utility.

APPENDIX 2 WORKS AREAS AND CONTRACT STAGES

1. Works Areas

- (1) The Contractor shall divide the Site into separate Works Areas/Railway Envelopes and shall elaborate a schedule for the time periods of the availability of these areas for his contract performance. This should be synchronized with the **Schedule of access to Site provided in Appendix to Tender, Section VIII – Part 3 of the Bidding documents** taking account of the Contractor's co-ordination and integration responsibilities with the interfacing contractors.
- (2) The Contractor shall indicate the exact nature of the various Works Areas and the extent of works to be carried out prior to the execution of the permanent systems works or making use of the area as working space and/or for temporary Site facilities.
- (3) The schedule as per (1) and (2) above shall include, but not limited to the following data:
 - a) Indication of the Works Areas;
 - b) Description and intended use of the Works Areas;
 - c) The start and the end date of the availability of the Works Areas, required by the Contractor;
 - d) The start and the end date of the periods in which the Contractor is to allow the Works Areas to be accessed by interfacing party(ies).
- (4) The information as in (1) and (2) above shall be submitted as part of the Contractor's preliminary design and shall be subject to agreement by the Employer and approval by the Engineer.
- (5) On the basis of the approved information as in (1) and (2) above the Contractor shall submit proposals for the use and the occupation of the Works Areas, such submissions being at least fifty six (56) days prior to the programmed use of the specific Works Area.
- (6) Prior to the scheduled dates for returning of any of the Works Areas for subsequent use by an interfacing party, the Contractor shall carry out the following activities:
 - a) Construct all Permanent Works within the Works Area, to the extent as defined in the Definitive design and in accordance with the requirements of the Contract;
 - b) Reinstatement of the area to the same condition as it was taken over;
 - c) Form the area to the approved lines and levels and carry out such other works as may be required by the provisions of the Contract;
 - d) Remove all rubbish, debris and other materials.
 - e) Carry out and record jointly with the Engineer and interfacing contractors a condition survey of the area.
- (7) Restrictions on the timing of occupation so as to avoid affecting operation will be made.

- (8) Temporary electrical works provisions in Works Areas are detailed in **“Employer’s Requirement, Section VI, Volume 6, Appendix 8 – Temporary Power Supply”**.
- (9) The interfacing parties shall be required to vacate the Works Areas at least 56 days before the due date for handing back of the Works Areas from the Contractor to the Employer, thus allowing the Contractor to clear and reinstate the works areas in accordance with the Contract.
- (10) Entry to and exit from the Site shall be controlled and shall be only available at the locations for which the Engineer has given his consent.
- (11) The Contractor shall ensure that access to every portion of the Site is continually available to the Employer and Engineer.
- (12) Other contractors engaged for project execution shall also be allowed to use the temporary facilities so created by him to access the Site without any consideration.
- (13) Employer will take over the entire stretch as per para 10.1 of General Conditions of Contract.
- (14) The Contractor shall be responsible for ensuring that any access or egress through the Site boundaries are controlled such that no disturbance to residents or damage to public or private property occur as a result of use of such access or egress by its employees and sub contractors.

2. Standard and Engineering Conditions

The following standard engineering conditions apply to all Works Areas:

a) Forming of Areas

- i. The Works Areas shall be formed to the levels shown on the drawings.
- ii. No levels shall be amended without prior consent of the Engineer.
- iii. The Works Areas shall be surfaced in a manner agreed with the Engineer, compatible with their intended use, and, in particular, footpaths and roadways connecting facilities shall be provided.
- iv. Measures shall be taken to the satisfaction of the Engineer to ensure all areas are properly drained and kept free of static water.

b) Roads and Parking

- i. Space shall be provided within the Works Areas for parking, loading/unloading and manoeuvring of motor vehicles.
- ii. Any damage caused by the Contractor to the adjoining public roads and fixtures and properties (public or private) shall be made good to the satisfaction of the Engineer and its owner at Contractor’s Cost and using the men and material of the Contractor.

c) Drainage and Sewerage

- i. All storm or rainwater from the Work Areas including any access roads thereto shall be conveyed to the nearest stream course, which has the necessary capacity, catch-pit, and channel or storm water.

- ii. All temporary and permanent Works shall be carried out in such a manner that no damage or nuisance are caused by storm water or rain water to the Site and adjacent property.
 - iii. Damage or obstruction caused to any watercourse, drain, main or other water installations within or adjoining the Works Areas shall be made good to the satisfaction of the Engineer.
 - iv. Treatment and disposal of sewage and wastewater from the Works Area shall be provided to the satisfaction of the Engineer following the ecological requirements.
- d) Buildings
- i. No permanent structures other than those required for the Permanent Works shall be permitted on the Works Areas.
 - ii. The Contractor, as required, for all temporary buildings, shall provide electricity, water, telephone and sewerage.
- e) Pedestrian Access
- Any accesses or passing through the Works Areas shall be maintained in a usable condition at all times to the satisfaction of the Engineer including lighting, signing and guarding.
- f) Fencing and Signboards
- i. For executing the work in urban areas, the Contractor shall erect hoardings, fences and gates around its areas of operations to prevent entry by unauthorised persons to his Works Areas and necessary identity cards /permits should be issued to workers and staff by the Contractor.
 - ii. For executing the work in adjacent to running traffic areas, the Contractor shall erect fences and gates around its areas of operations to prevent accidents as well as post competent flagmen as detailed in **Part 2 “Employer’s Requirement, Section VI, Volume 5 – Construction, Testing and Commissioning”**.
 - iii. For areas other than urban areas, the work Site shall be suitably fenced to prevent, within reason, unauthorised entry / accidents.
 - iv. Project signboards shall be erected before commencement of the Works.
 - v. The types, sizes and locations of project signboards shall be agreed with the Engineer before manufacture and erection. Other advertising signs shall not be erected on the Site.
 - vi. The consent of the Engineer shall be obtained before hoardings, fences, gates or signs are removed. Hoardings, fences, gates and signs which are to be left in positions after the completion of the Works shall be repaired and repainted as instructed by the Engineer.
 - vii. Hoardings, fences, gates and signs shall be maintained in good order by the Contractor until the completion of the Works, whether such hoardings, fences, gates and signs have been installed by the Contractor or by others and transferred to the Contractor during the period of the Works.

- viii. All hoardings, fences, gates and signs installed by the Contractor shall be lit during night or low visibility as required and advised by the Engineer and removed by the Contractor upon the completion of the Works, unless otherwise directed by the Engineer.
- ix. Hoarding/fencing can be reused after removing from one place to other locations/Sites provided they are maintained in good condition and agreed by the Engineer.
- x. Damage/worn-out fencing/hoarding shall be replaced by Contractor within 24 hours. Engineer's decision regarding need for replacement shall be final and binding and if no action is taken by Contractor the cost of any repairs will be deducted by the Engineer from any payment due to the Contractor.

3. Contract Stages

- (1) The Contractor shall divide the Works into Stages.
- (2) These Stages shall be achieved by Key Dates mentioned in **“Employer's Requirement, Section VI, Volume 6, Appendix 4 – Project Program Requirements”**. For this purpose the Contractor shall elaborate a schedule of his own internal schedule to achieve these Key Dates.
- (3) The schedule of achieving these Key Dates as per the previous sub-item shall be submitted as part of the Contractor's Preliminary design and shall be subject to agreement by the Engineer.
- (4) The schedule of Key Dates shall include, but not limited to the following data:
 - a) Stage identification;
 - b) Key Date No.;
 - c) interfacing parties (information to be provided by the Engineer);
 - d) Related bodies and/or organisations certifications/approvals;
 - e) Works to be performed and/or actions to be executed before the Key Date;
 - f) Intended achievements.
- (5) Completion of works at a Key date does not imply handing over of the appropriate Works Area to any other interfacing party.

APPENDIX 3 DESIGN AND CONSTRUCTION INTERFACES

1 GENERAL

- (1) The civil, structures and track works Contractor will be responsible for the interface planning and management of all the civil, structures and track works within the scope of works of Civil, Structures and Track Works contract.
- (2) The systems works contractor will be responsible for the interface planning and management of all the systems works within the scope of the works of the systems works contract. It is anticipated that the System contractor shall be in place by 12 months of Commencement Date.
- (3) The Civil, Structures and Track works Contractor will be responsible for the interface of all the interface planning and management of all the interface issues between the Civil, Structures and Track Works Contract and the Systems Contract.
- (4) The Contractor shall co-ordinate its interface requirements with the Employer and other interfacing contractors, which the Employer may engage from time to time in such a manner as to minimise disruption to any party arising from such concurrent work. For this purpose, the Contractor will create a dedicated Project Team.

DEDICATED CO-ORDINATED TEAM

- a. The Contractor shall establish a dedicated co-ordination team, led by a Co-ordinator reporting to the Contractor's Project Manager.
- b. The primary function of the team is to provide a vital link between the Contractor's design and manufacturing teams and the Civil and other contractors. The Contractor shall provide the Engineer with particulars of the co-ordinator.
- c. The Engineer shall have the right to require the replacement of the co-ordinator if in his opinion the co-ordinator is unable to meet the co-ordination requirements of the Contract.
- d. The Contractor's attention is drawn to the need for the co-ordinator to establish effective dialogues and communication links with the Civil and other interfacing contractors. The Contractor's co-ordination team for interfacing shall comprise a mix of personnel with experience in both design and manufacture of equipment comprising the Works, necessary for effective co-ordination.
- e. The co-ordinator shall assess the progress of co-ordination with Civil and other contractors by establishing lines of communications and promoting regular exchange and updating of information so as to maintain the Contractor's programme
- f. The complexity of the project and the importance of ensuring that work is executed within time limitations require detailed programming and monitoring of progress so that early programme adjustments can be made in order to minimise the effects of potential delays.
- g. The Co-ordinator in conjunction with the civil and other contractors shall identify necessary provisions in the Works for plant, equipment and facilities of the civil and other contractors. These provisions shall be allowed by the Contractor in his design of the Works.

- (5) The co-ordination responsibilities of the Contractor shall include but not limited to the following:
- (a) Provision of all information reasonably required by the interfacing parties in a timely and professional manner to allow them to proceed with their design or construction activities and specifically to meet their contractual obligations.
 - (b) Assurance that the interfacing parties' requirements are provided to all other interfacing parties in time providing them ample opportunity to do their part of requirement for interfacing.
 - (c) Receipt from the interfacing parties of such information as is reasonably required to enable the Contractor to meet the design submission schedule as identified in **Part 2 "Employer's Requirement, Section VI, Volume 3 – Design Procedures and Processes"**.
 - (d) Where the execution of the work of the interfacing parties depends upon the Site management or information to be given by the Contractor, the Contractor shall provide to such interfacing parties the information required to enable them to meet their own programme or to enable them to construct their work. Such information shall be communicated by the Contractor in a reasonable time frame so as not to cause any delays in the working of interfacing parties.
 - (e) Co-ordination of track possessions, access and delivery routes, and assurance that all provisions for access and delivery of Plant are co-ordinated with and reflected in the interfacing parties' delivery route drawings. The Contractor shall convey an advance information to the interfacing parties about the programme of track possessions.
 - (f) Co-ordination with the interfacing parties on attendance.
 - (g) The Contractor shall cause conduction of separate meetings with the interfacing parties as necessary to clarify particular aspects of the interfacing requirements of the Works. Request from the interfacing parties for conduction of any interface meetings shall be acceded in a reasonable time frame.
 - (h) The party convening the meeting shall prepare minutes recording all matters discussed and agreed at the meeting.
 - (i) Assurance, copies of all those correspondence, drawings, meeting minutes, programmes, etc. relating to the Contractor's co-ordination with the interfacing parties are issued to all concerned parties and four (4) copies issued to the Engineer no later than seven (7) calendar days from the date of such correspondence and meetings.
- (6) The Contractor shall, in carrying out his co-ordination responsibilities, provide sufficient information for the Engineer to decide on any disagreement between the Contractor and the interfacing parties as to the extent of services or information required to pass between them.

- (7) If such disagreement cannot be resolved by the Contractor despite having taken all reasonable efforts, the decision of the Engineer shall be final and binding on the Contractor.
- (8) Where an interfacing contract is yet to be awarded, the Contractor shall proceed with the co-ordination activities with the Engineer until such time as the interfacing contractor is appointed.
- (9) The Contractor shall note that the information exchange is an iterative process requiring the exchange and updating of information at the earliest opportunity and shall be carried out on a regular and progressive basis so that the process is completed for each design stage by the respective dates.
- (10) The Contractor shall co-ordinate with the Engineer on all matters relating to works that may affect the IR operation on the existing railway. Such works shall be carried out in accordance with IR Rules and Regulations.
- (11) The contractor should also produce log for those areas where he has been unable to determine the interface requirements.

2 INTERFACE MANAGEMENT PLAN

- (1) Contractor shall be responsible for identifying all internal and external interfaces and shall develop and maintain a full interface management system which shall cover the functional and technical aspects of all the internal and external interfaces of the Contractor.
- (2) The Contractor shall prepare an Interface Management Plan within twenty eight (28) days of Commencement Date which shall identify the interface manager, the structure and responsibilities of the interface management team and the procedures that will be implemented to identify and close out all interfaces.
- (3) The Interface Management Plan shall:
 - a) identify the sub-systems as well as the civil works and facilities with interfacing requirements
 - b) define the authority and responsibility of the Contractor's and the civil and all other contractors' (and any relevant sub-contractors') staff involved in interface management and development
 - c) identify the information to be exchanged, precise division of responsibility between the Contractor and the other contractors and integrated tests to be performed at each phase of the Contractor's and the civil and other contractors' works
 - d) Address the works programme of the Contract to meet the key dates of each contractor and highlight any programme risks requiring the Employer's attention keeping in view timeline of systems contractor as mentioned in item 1 (2) above.
 - e) Address the interface issues during Design as well Construction as detailed in para 2.1 and 2.2 below.
- (4) The Interface Management Plan shall include procedures for identifying and resolving interfaces within the Contractor's scope of work, between the Contractor and the Employer and between the Contractor and other contractors.

- (5) The timescale for resolving interfaces shall be set down in Co-ordinated Interfacing and Installation Plans (CIIP) and with the other contractors as detailed in para 2.2 (4) below.
- (6) All interfaces shall be documented through the use of interface co-ordination documents to ensure that each interface is identified, the responsibilities to provide information are defined, the criteria for resolution are agreed and the progress to resolution can be tracked at all times.

2.1 DESIGN INTERFACE

- (1) The design interface shall comprise but not limited to the following:
 - a) Definition and agreement with other contractors of interface areas and contract limits;
 - b) Definition and design approach by the Contractor with the other contractors and/or Indian Railways regarding continuation of formation, bank, drains, track structure, alignment, embedded ductwork and cables, other cast-in items such as lifting hooks and eyes, fixing bolts and sockets, environmental control requirements, system functionality requirements and control interfaces;
 - c) Agreement of combined service drawings and structural opening drawings
- (2) The Contractor shall commence the design interface with the interfacing contractor as soon as he has been notified by the Engineer that an interfacing contract has been awarded.
- (3) In the case of utility agencies and other statutory boards, interfacing shall commence as soon as it is practicable.
- (4) The Contractor shall, immediately upon award of the Contract, gather all necessary information and develop his design to a level where meaningful interaction can take place.
- (5) The Contractor shall submit together with each of his Design submissions a joint statement from the Contractor and the relevant interfacing party confirming that design co-ordination has been completed and that they have jointly reviewed the appropriate document to ensure that a consistent design is being presented.
- (6) The design interface is an iterative process requiring regular exchange and update of interfacing information and the Contractor shall ensure that the information it requires from the interfacing parties is made known at the outset of each design interface so that the information can be provided in time for the Contractor and the interfacing parties to complete their design to meet their various design submission stages.

2.2 CONSTRUCTION INTERFACE

- (1) Construction interfacing will be necessary throughout the duration of the Works commencing from the time the Contractor mobilises on the Site to the completion of the Works. Construction interfacing will overlap the design interface and involve the definition of interfacing parties' requirements for provision of cast-in and buried items in the Contractor's works such as pipes for the interfacing parties' services, supports including support brackets, plinths, ducts, service

buildings, openings, cableways, trenches etc., that are to be incorporated at the initial stages of the Contractor's installation up to provision of attendance during the testing and commissioning stage.

- (2) The Contractor shall ensure that there is no interference with the Works of the interfacing parties and shall maintain close co-ordination with them to ensure that their work progresses in a smooth and orderly manner.
- (3) The Contractor shall carry out and complete the Works, or any part thereof, in such order as may be agreed by the Engineer or in such revised order as may be instructed by the Engineer from time to time.
- (4) The Contractor shall liaise with the other contractors in the preparation of CIIP which shall be plans prepared collectively and agreed between the Contractor and other interfacing parties.

These CIIPs shall show, in respect of each other contractor, a design interface and co-ordination period and a Site access, installation interfacing and co-ordination period. The period shall be sufficient for the Contractor and the other contractors to integrate the designs of their respective works.

- (a) During the construction phase, period shall be agreed between the Contractor and the other contractors to ensure that each has sufficient access to the Site for the purpose of carrying out their respective works.
- (b) The CIIP shall be fully conforming to the approved Works Programme and shall be in logical agreement with all access dates and Key Dates which shall be clearly identified in the CIIP.
- (c) The CIIP shall indicate dates for the commencement and completion of each principal activity on Site, and delivery and installation of principal items of equipment.
- (d) The initial CIIP shall be submitted to the Engineer within twenty eight (28) days of Commencement Date. Thereafter the CIIP shall be updated at regular intervals not exceeding 28 days and agreed with other contractors subject to the approval of the Engineer.
- (e) Should it appear to the Engineer that the actual progress of the Works, the Works Programme or the three month rolling programme do not conform with the CIIP, the Contractor shall be required to revise all such programmes and plans such that they do reflect the actual progress of the Works, are mutually consistent and conform to other provisions of the Contract.
- (f) The CIIP shall allow adequate time periods for each interfacing party and the Contractor to install their plant and equipment in the interfacing areas.
- (g) The CIP shall be agreed with and signed by each interfacing party and then submitted to the Engineer no later than three (3) months before the earliest Works Area access date.

2.3 EMPLOYER'S/ENGINEER'S INPUT

- (1) The Engineer will coordinate the activities of the Contractor with reference to interfacing with other contractors and agencies during all the phases of the Contract.
- (2) The Employer/Engineer, within the scope of the relevant Contract provisions, will support and assist the Contractor in the following fields:
 - (a) Interfacing with Indian Railways Authorities, State and local authorities for timely receipt of the required permits, certificates and approvals related to the design and construction process;
 - (b) Interfacing with State and local tax authorities for VAT reimbursement arrangements;
 - (c) Interfacing with State and local authorities for implementation of the additional land acquisition procedures;
 - (d) Any other fields of activities related to the Contract as may be required with the purpose of facilitating the Contractor's performance.
- (3) This support and assistance of the Employer/Engineer shall **not** release the Contractor of any of his obligations under this Contract.

3 INTERFACE MANAGEMENT

- (1) The Contractor shall create, in co-ordination with the other contractors, an Interface Co-ordination Document (ICD) for each interface, which shall be signed by all the parties involved.
- (2) An interface list shall be prepared and maintained by the Contractor and updated on a regular basis to reflect the actual needs of both parties.
- (3) The Contractor shall co-ordinate all interface items on the list and agreed solutions with the other contractors.

4 INTERFACE CO-ORDINATION DOCUMENT (ICD)

- (1) ICD shall be created for each interface describing, in a formal manner, the particulars of the functional and technical requirements to be implemented.
- (2) ICD shall be updated on a regular basis as information becomes available or agreement is reached between two contractors.
- (3) The Interface Co-ordination document template format and minimum contents shall be agreed to between the Contractor and the Engineer.
- (4) An indicative interface matrix (Table IF 1) is given below which only identifies that an interface exists with another system. Contractor should develop a similar matrix for the current Work and is responsible for identifying, defining, agreeing and detailing all interfaces as per this matrix.

TABLE IF1 - INDICATIVE INTERFACE MATRIX													
	RAD	TEL	MCK	DTN	OCC	SIG	SCA	TPS	CIV	STA	E & M	TRK	OPS
RAD		X	X	X	X	X		X	X	X	X		X
TEL	X		X	X	X			X	X	X	X		X

MCK	X	X		X	X	X	X	X					X
DTN	X	X	X		X	X	X		X	X			X
OCC	X	X	X	X		X	X				X		X
SIG	X		X	X	X			X	X	X	X	X	X
SCA			X	X	X			X					X
TPS	X	X	X		X	X	X		X		X	X	X
CIV	X	X		X		X	X	X		X		X	X
STA	X	X		X		X			X		X	X	X
E & M	X	X			X	X		X		X			X
TRK						X		X	X	X			X

X = Interface Exists

TABLE IF2 SUBSYSTEM ABBREVIATIONS			
RAILWAY SYSTEMS		CIVIL INFRASTRUCTURE	
DTN	Data Transmission Network	CIV	Civil (Formation, Bridges, Structures)
MCK	Master Clock	E & M	Electrical & Mechanical
OCC	Operations Control Centre	STA	Station Construction
RAD	Radio	TRK	Track work
SCA	SCADA	OPS	Operations
SIG	Signalling		
TEL	Telephone		
TPS	Traction Power Supply		

5 CO-ORDINATION WITH OTHER CONTRACTORS AND INDIAN RAILWAYS

- (1) The Contractor shall liaise with the Engineer in developing a uniform identity code system which shall be used to uniquely identify each item of equipment and software component provided under this Contract and provided by the other contractors and/or Indian Railway.
- (2) Such identity codes shall be used for labelling each item of equipment and shall also be used in design reports, drawings and operations and maintenance manuals. Such codes shall comprise mnemonics for location names and equipment types as well as alpha-numeric for unique numbering.
- (3) The Contractor shall undertake Site activity co-ordination with the other contractors and/or Indian Railways within the periods stated for access and installation interfacing and co-ordination in the agreed CIIP.

- (4) The Contractor shall undertake installation and testing in accordance with the milestones set in the Contract and the dates in the CIIP and as agreed with the other contractors and/or Indian Railways.
- (5) The Contractor shall undertake a lead role in the co-ordination of the activities associated with integrated systems testing including the co-ordination of other contractors and/or Indian Railways to test and monitor their systems to prove the design and integrity of the systems as a whole.
- (6) It shall be the responsibility of the Contractor to secure from the other contractors and/or Indian Railways, in a timely and correct manner as per the agreed CIIP, whatever interface provision is required for the Contractor to carry out its duties under the Contract.
- (7) Any additional costs arising to the Contractor due to his late and/or improper interfacing with the other contractors and/or Indian Railways, shall be to the Contractor's account. Such improper interfacing shall include, but not be limited to:
 - a) Late provision of interfacing information
 - b) Failure to adhere to agreed interface
 - c) Changing an interface after it has already been agreed and signed off
- (8) Works will be taken over by the Employer as per clause 10.1 of Contract conditions. This inter-alia mentions - The Permanent Works of entire geographical jurisdiction shall be completed in stages for temporary use of the Employer without carrying out the Tests for Completion (Sub clause 9.1 of GC) and without taking over of the works for carrying out Tests on Completion (Clause 9 of GC), including Integrated Testing, required for taking over entire Permanent Works completed in all respects as per Employer's Requirement mentioned in the Contract. These stages shall be achieved at various time intervals. Contractor shall permit use of these Works so constructed by other contractors at no extra cost. In case of any derailments or damage caused to the Works by the other contractors/agencies, Engineer shall set up an enquiry committee of concerned agencies/ other contractors which shall also include the representative of the Contractor who had constructed this work. This committee shall submit its report in a reasonable time indicated to the Engineer. Decision to apportion the cost of damage shall be taken based upon the findings of this committee by the Engineer and his decision in this regard shall be binding and final.

APPENDIX 4 PROJECT PROGRAM REQUIREMENTS

1. GENERAL

- (1) In accordance with the Conditions of Contract Clause 8.3 the Contractor shall submit his detailed time program to the Engineer within twenty eight (28) days of the Commencement Date of the Works.
- (2) The Programme as per the previous sub-item (1) above shall be supplemented at the time of the Contractor's Preliminary Design submission by **Part 2 “Employer’s Requirement, Section VI, Volume 6, Appendix 2 – Work Areas and Contract Stages”**, duly approved in accordance with the contract provisions, these appendices becoming an inseparable part of the said Programme.
- (3) In compiling its Works Programme and in all subsequent updating and reporting, the Contractor shall make provision for the time required for co-ordinating and completing the design, construction, procurement, manufacture, supply, installation, testing, commissioning and integrated testing of the Works.
- (4) This period shall include but not be limited to design co-ordination periods during which the Contractor shall co-ordinate its design with those of interfacing parties, review procedures, determining and complying with the requirements of all government departments and obtaining all necessary permits.
- (5) This period will include co-ordination with all others whose consent, permissions, authority or licence is required prior to the execution of any work.
- (6) The Works Programme shall take full account of the Design submission programme.
- (7) This supplementing, however, shall not relieve the Contractor from his obligation to observe the overall Contract performance term as mentioned in Contract conditions.
- (8) The Contractor shall, during the progress of the Works, constantly monitor his progress against the programmes described below.
- (9) The Works Programme, and all more detailed or revised versions, shall be submitted to the Engineer for his consent in accordance with the provisions of the conditions of Contract.

2. MILESTONES

- (1) Milestones have been derived from clauses 8.2, 8.7 and 10.1 of Conditions of Contract. These are the broad key deliverables and Contractor is required to develop project program to achieve these deliverables and dates. Accordingly he should set his own internal targets which are commensurate with these Milestones and incorporate in his all internal schedules for approval of Engineer. The details of Milestones and Key Dates are mentioned under appropriate clauses in Appendix to Tender, Section VIII, Part 3 of Bidding Documents.

3. PMIS REQUIREMENTS AND PROCEDURES

- (1) Timely performance is of the essence on this project. The Contractor may complete the project or any part of the Project earlier than as stipulated in the Contract and the Milestone requirements.
- (2) All design and/or construction work, including all sub-contractors’ work, under this Contract shall be planned, scheduled, executed, reported and accomplished

using the precedence diagramming Critical Path Method (hereinafter referred to as CPM). The work required by this section includes the requirement to prepare, maintain, and update all detailed schedules as described in this section. The CPM schedules shall be prepared in such a manner as to permit the orderly planning, organization, and execution of the Work and be sufficiently detailed to accurately depict all the work required by the Contract. The Contractor shall resource (labor and equipment) and cost load its schedule as specified herein.

- (3) All schedules and schedule submittals under this Contract shall be computerized by the Contractor utilizing the latest version of ORACLE PRIMAVERA P6 PROFESSIONAL PROJECT MANAGEMENT SOFTWARE, hereinafter referred to as ORACLE PRIMAVERA P6. The Contractor shall have sufficient capabilities to perform this work and share the PMIS with the Engineer and the Employer.
- (4) The Contractor shall formally transmit all schedule submittals and schedule narratives identified herein to the Engineer in the form of four (4) hard copies and one (1) soft copy on a CD at the times identified herein or at the request of the Engineer.
- (5) The primary objectives of the requirements of this section are:
 - a) To insure adequate planning and execution of the Works by the Contractor;
 - b) To assist the Engineer in evaluating progress of the Works;
 - c) To provide for optimum coordination by the Contractor of its trades, Sub-contractors, and suppliers, and of its work with the Works or services provided by any separate contractors;
 - d) To permit the timely prediction or detection of events or occurrences which may affect the timely execution of the Works;
 - e) To provide a mechanism or tool for use by the Engineer and the Contractor in determining and monitoring any actions of the Contractor which may be required in order to comply with the requirements of the Contract documents relating to the completion of the various portions of the Works by the Contract Milestones and Contract completion specified in the Contract documents.
- (6) The Contractor is responsible for determining the sequence of activities, the time estimates for the detailed design and construction activities and the means, methods, techniques and procedures to be employed. The schedules identified herein shall represent the Contractor's best judgment of how it will execute the Work in compliance with the Contract requirements. The Contractor shall ensure that the schedule is current and accurate and is properly and timely monitored, updated and revised as project conditions may require and as required by the Contract documents.
- (7) The Contractor shall provide the basic data relating to activities, durations, specified Contract Milestones, and sequences to the Engineer, as part of Contractor required schedule submittals. This data shall reflect the Contractor's actual plan for the project, and shall fully comply with all requirements of the Contract documents.

- (8) Subject to the Engineer's agreement and unless identified elsewhere in the Contract documents, the Contractor shall determine when, where, and how it will interface with others performing work on the program and to coordinate its activities with all parties including the Employer and its consultants, suppliers and other contractors.
- (9) The Contractor shall include in the interim schedule and Contract baseline schedule all interface points with others. These points shall be in the form of start milestones for deliverables due to the Contractor from others and as Finish Milestones for deliverables that Contractor must supply to others.

4. SCHEDULER QUALIFICATIONS

- (1) The Contractor shall have within its employment or under contract, throughout the execution of the Work, such expertise in CPM scheduling and experience with ORACLE PRIMAVERA P6 so as to ensure its effective and efficient performance under this Contract.

5. SCHEDULE ORIENTATION SESSION

- (1) The Contractor shall, upon notification from the Engineer, attend a schedule orientation session relating to the schedules and reports requirements for this Contract. The schedule orientation session is designed to review in detail, the objectives of the schedules and reports requirements. The Contractor shall arrange for its Project Manager, superintendent, and scheduler to attend the schedule orientation session.
- (2) The following items shall be discussed during the schedule orientation session:
 - a. The procedures and requirements for the preparation of the interim schedule, contract baseline schedule, and monthly updates by Contractor;
 - b. How the requirements of the Contract documents will be monitored and enforced by the Engineer;
 - c. Long-lead items and time requirements for the Work by sub-contractors will be identified and included in the contract baseline schedule;
 - d. Work packages;
 - e. Coding and logic for the contract baseline schedule; and
 - f. Identification and scheduling of Shop Drawings and other submittals;
 - g. Listing of major project milestones;
 - h. Cost loading of major project summary activities.

6. INTERIM SCHEDULE

- (1) The Contractor shall submit its interim schedule, to the Engineer for review and acceptance at the Pre-Construction conference (or kick-off meeting for the Design portion of the project). The interim schedule shall indicate a detailed work plan for the first fifty six (56) days after the Commencement Date. Work beyond the first fifty six (56) days shall be in summary form. Use of the accepted interim schedule shall not exceed the first fifty six (56) days after the Commencement Date.
- (2) The interim schedule detail plan shall include but not be limited to planned mobilization, sequence of early operations, submittals and procurement of

materials and equipment. The interim schedule shall also include the following information as a minimum:

- a) Activity identification number of the task or event;
 - b) Description of the task or event;
 - c) Duration of the task or event;
 - d) Earliest start and finish dates for the task or event;
 - e) Latest start and finish dates for the task or event;
 - f) Various stages of Design development and Construction completion
 - g) Milestones for activities given in this document and consequent critical points for interface with others.
 - h) Logic links to previous tasks upon which the task is dependent before it can start and to subsequent tasks which are dependent on the task to be completed before they can commence
- (3) During the first fifty six (56) days following the Commencement Date, the interim schedule shall be updated regularly and submitted to the Engineer to indicate the progress of the Work, unless the contract baseline schedule is approved within fifty six (56) days of Commencement Date. Once the contract baseline schedule is accepted by the Engineer, no further updates of the interim schedule are required.

7. CONTRACT BASELINE SCHEDULE

- (1) Within forty-two (42) calendar days after the Commencement Date the Contractor shall complete the contract baseline schedule, which expands the accepted interim schedule, and submit it to the Engineer for review and acceptance. The contract baseline schedule submittal shall not show any progress until it is accepted by the Engineer.
- (2) The Contractor shall submit to the Engineer a complementary and detailed narrative description of its plan for performing the Work with the submittal of the contract baseline schedule. The narrative description shall summarize the overall approach to design and/or construction sequencing, including, but not be limited to:
 - a) The anticipated lost days due to weather;
 - b) The equipment and personnel requirements by craft to complete a resource loaded schedule;
 - c) Whether it proposes the Work be performed on single, double or triple shifts;
- (3) No application for payment shall be accepted until the contract baseline schedule is approved.

8. ACCEPTANCE OF THE INTERIM SCHEDULE AND CONTRACT BASELINE SCHEDULE

- (1) The Engineer and the Contractor shall review and discuss the interim schedule or contract baseline schedule after it has been submitted to the Engineer.

- (2) After the Engineer accepts the interim schedule and contract baseline schedule, these schedules will then be used to monitor and record progress of the Work, forecast completion dates, evaluate revisions and generate the payment application amounts, where applicable. Acceptance of the interim schedule or the contract baseline schedule by the Engineer shall not relieve the Contractor of total responsibility for the Contractor's means and methods, scheduling, sequencing, and executing the Work to comply with the requirements of the Contract.
- (3) The Engineer shall have the right to require the Contractor to revise and resubmit the interim schedule and the contract baseline schedule to modify any Contractor data in the schedules or any portion of the schedules that the Engineer determines to be:
 - a) Impracticable;
 - b) Based upon erroneous calculations or estimates;
 - c) Unreasonable;
 - d) Required in order to ensure proper coordination by the Contractor of the work of its Sub-contractors and with the work or services being provided by any separate contractors;
 - e) Necessary to avoid undue interference with plant operations or those of any utility owners or adjoining property owners;
 - f) Necessary to ensure completion of the Work by the Contract Milestones and Contract completion dates set forth in the Contract documents;
 - g) Required in order for Contractor to comply with any other requirements of the Contract documents;
 - h) Not in accordance with the Contractor's actual operations, unless the revision or modification will change the original scope of Works. The Contractor shall bear the expense of such revisions. If the Engineer requires such revisions, the Contractor shall revise the interim schedule or contract baseline schedule and submit it for Engineer's acceptance within seven (7) calendar days.
- (4) The Engineer reserves the right to require that the Contractor to adjust, add to, or clarify any portion of the schedules that may be determined to be insufficient for monitoring of the Work after the schedules are accepted. No additional compensation shall be provided for such adjustments, additions or clarifications.

9. SCHEDULE CONTENT AND FORMAT

- (1) All construction activity durations shall be given in working days. The Contractor shall develop activities for the schedules so that no single activity shown has duration longer than fourteen (14) working days except for procurement and fabrication, delivery, submittal development and approval activities that may have longer durations and greater values.
- (2) For all equipment and materials to be fabricated or supplied for the Project, the contract baseline schedule shall show a sequence of activities including:
 - a) Preparation of Shop Drawings and sample submissions;

- b) Twenty eight (28) calendar days for review of Shop Drawings and samples;
 - c) Shop fabrication, delivery and storage;
 - d) Erection or installation;
 - e) Testing of equipment and materials.
- (3) The interim schedule and contract baseline schedule shall show dependencies (or relationships) between each activity. Each activity must have a successor and predecessor, except for the project start and finish milestone. The use of date constraints shall be limited to Contract milestones and Contract completion dates only.
- (4) The interim schedule and contract baseline schedule shall contain or be able to demonstrate that the following items have been addressed:
- a) The Project's name;
 - b) The Contractor's name;
 - c) Revision or edition number;
 - d) Activities of completed work;
 - e) Activities relating to different areas of responsibility, such as subcontracted Work which is distinctly separated from that being done by the Contractor directly;
 - f) Labour resources distinguished by craft or crew requirements;
 - g) Equipment and material resources distinguished by equipment and material requirements;
 - h) Distinct and identifiable subdivisions of work such as structural slabs, beams, columns;
 - i) Locations of work within the contract limit lines that necessitates different times or crews to perform;
 - j) Outage schedules for existing utility services that will be interrupted during the performance of the Work;
 - k) Acquisition and installation of equipment and materials supplied and/or installed by the owner or its separate contractors;
 - l) Material to be stored on Site;
 - m) Phases;
 - n) interim milestones and the Contract Completion dates.
- (5) The Contractor shall be responsible for expediting the delivery of all materials and equipment to be furnished by the Contractor so that the progress of construction shall be maintained according to the currently accepted contract baseline schedule for the Works. The Contractor shall notify the Engineer in writing, and in a timely manner, whenever the Contractor anticipates that the delivery date of any material or equipment will be later than the delivery date indicated by the currently accepted contract baseline schedule.

10. MONTHLY SCHEDULE UPDATE

- (1) An update of the accepted interim schedule or contract baseline schedule shall be submitted by the Contractor to the Engineer monthly and with the monthly application for payment generated in ORACLE PRIMAVERA P6 (the “monthly schedule update”). Receipt by the Engineer of the monthly schedule update will be an express condition precedent to processing each invoice.
- (2) On a monthly basis, the Contractor shall arrange for its Project Manager, superintendent, and scheduler to meet at the project Site with the Engineer to review Contractor’s monthly schedule update. The schedule will be marked-up to show the agreed upon progress, signed by the Contractor, and a signed copy issued to the Project Manager. The monthly schedule update shall show up-to-date and accurate progress of the Works, and shall forecast the completion date for activities in progress based on the contract baseline schedule. The monthly schedule update shall be prepared by the Contractor in consultation with all its principal sub- contractors and suppliers.
- (3) The monthly schedule update shall include actual activity data for progress to date, but in the monthly schedule update, the Contractor shall not change the schedule logic, the activity relationships/dependencies, or planned activity durations and shall not add or delete activities. If the Contractor believes that any of these items should be changed, then a proposed revised baseline schedule must be submitted by the Contractor to the Engineer. Although activities shall not be added or deleted in the monthly schedule update, activities associated with Work authorizations that have been recommended for approval shall be included in the next monthly schedule update.
- (4) The Contractor will be notified by the Engineer, in writing, as to acceptance, reasons for rejection, or any revisions required to the schedules. Changes to the schedules agreed upon by the Contractor and the Engineer shall be incorporated by the Contractor into the schedules within seven (7) calendar days after agreement.
- (5) The monthly schedule update shall show actual activity commencement and completion dates, the actual remaining duration in workdays and physical percent complete for those activities commenced and not complete. For the stored materials, the update shall show the amount of material stored, representing the total cost of the materials delivered and properly stored. The monthly schedule update shall also show a graphic comparison of the current status and the baseline plan for each activity in the network.
- (6) Each monthly schedule update shall continue to show all work activities including those already completed. These completed activities shall accurately reflect “as built” information by indicating when activities were actually started and completed.
- (7) Monthly schedule updates shall also contain the following information for each activity:
 - a) Activity identification number, description and estimated original duration in workdays;
 - b) Calculated early and late finish dates;

- c) Actual start and actual finish dates, and remaining duration, in calendar, for those activities started and not completed;
- d) Days ahead and/or behind schedule of the milestones representing the specified Contract Milestones and Contract completion dates;
- e) Physical percent complete for each activity;
- f) A float analysis of the longest path through the schedule detailing potential delays and areas for acceleration. Actual start and finish dates shall be indicated for each activity as appropriate. Completed activities will be omitted from remaining float and late start slots.

11. REVISED BASELINE SCHEDULE

- (1) If the current contract baseline schedule or monthly schedule update no longer represents the actual or planned execution and progress of the Work, the Contractor shall submit (at no additional cost to the Employer, a proposed revision to the current contract baseline schedule in accordance with this section.
- (2) If the Engineer believes that the current contract baseline schedule or monthly schedule update no longer represents the actual or planned execution and progress of the Work, the Engineer may require of the Contractor, and the Contractor shall submit (at no additional cost to the Employer, a proposed revision to the current contract baseline schedule in accordance with this section.
- (3) Schedule Revisions, as defined herein, shall refer to modifications made to activities in the accepted interim schedule or contract baseline schedule in any of the following items:
 - a) Activity duration;
 - b) Changes in logic connections between activities;
 - c) Changes in constraints;
 - d) Changes in value loading;
 - e) Changes to activity descriptions;
 - f) Activity additions and deletions.
- (4) Any proposed revisions to the contract baseline schedule must be submitted to the Engineer for acceptance. This submittal must include, at a minimum, a written narrative with a full description and reasons for each work activity revised a full schedule printout, and a soft copy of the proposed revised contract baseline schedule. For revisions affecting the sequence of work, the Contractor shall provide a schedule diagram Fragmented Network (Fragnet) which compares the original sequence to the revised sequence of work. This diagram shall maintain the Contract Milestone and Contract completion dates.

12. RECOVERY SCHEDULE

- (1) Should the updated interim schedule, contract baseline schedule or monthly schedule update, at any time during Contractor's performance, show that the Contractor is fourteen (14) or more calendar days behind schedule for any Contract interim Milestone, substantial completion or for Contract completion, the Contractor shall prepare a recovery schedule separate from the updated and approved monthly schedule update explaining and displaying how the Contractor

intends to reschedule its work in order to regain compliance with the contract baseline schedule during the immediate subsequent pay period.

- (2) If a recovery schedule is required, the Contractor shall prepare and submit to the Engineer a recovery schedule, incorporating the best available information from sub-contractors and others, which will permit the forecasted completion dates to return to the interim milestones and the Contract completion dates. The Contractor shall prepare a recovery schedule to the same level of detail as the originally accepted contract baseline schedule submittal.
- (3) Within seven (7) working days after submission of the recovery schedule, the Contractor shall meet with the Engineer to review and evaluate the recovery schedule. Within seven (7) working days of that meeting, the Contractor shall submit the recovery schedule, including any revisions necessitated by the review, to the Engineer for its review and acceptance. The recovery schedule, once accepted by the Engineer, shall be implemented as the revised contract baseline schedule for the remaining Work.

APPENDIX 5 MONTHLY PROGRESS REPORTS

1. GENERAL

- (1) The Contractor shall submit to the Engineer, a monthly progress report in accordance with the Conditions of Contract.
- (2) This Report shall be submitted no later than the 7th day of each calendar month and shall account for all work actually performed during the last month.
- (3) It shall be submitted in English in five hard copies and one copy in CD/DVD.
- (4) It shall be submitted in a format agreed to by the Engineer and shall contain sections/sub-sections for, but not be limited to the topics listed in Clauses 2 to 10 below.
- (5) The results of quality audits shall be summarised in the Contractor's monthly reports.

2. SAFETY

- (1) A review of all safety aspects during the month including reports on all accidents and actions proposed to prevent further occurrence including details of safety training and drive conducted during the period and proposed in coming months. This shall be the first item of Monthly Progress Report.

3. FINANCIAL STATUS

- (1) A narrative review of all significant financial matters, and actions proposed or taken in respect to any outstanding matters.
- (2) A spread sheet indicating the status of all payments due and made including recoveries if any.
- (3) A report of the status of any outstanding claims even if these is NIL.
- (4) The report shall in particular provide interim updated accounts of continuing claims.
- (5) Report the Cost Performance Indicator (CPI) = budgeted cost of work performed divided by actual cost of work performed

4. PHYSICAL PROGRESS

- (1) It shall describe the status of work performed in descriptive form, significant accomplishments, including critical items and problem areas including current and anticipated delaying factors and their impact, corrective actions taken or planned and other pertinent activities, and shall, in particular, address interface issues with all agencies involved, problems and resolutions during the period or anticipated.
- (2) It shall include a simplified representation of progress measured in percentage terms compared with percentage planned as derived from the Works Programme.
- (3) Report the Schedule Performance Indicator (SPI) = budgeted cost of work performed divided by budgeted cost of work scheduled

5. PROGRAMME UPDATE (For entire Project)

- (1) Programme updating shall include:
 - a) The monthly programme update which shall be prepared by recording actual activity completion dates and percentage of activities completed up to the last day of the month and expected activity completion based on current progress.

- b) The Programme update shall be accompanied by an activity report and a narrative statement.
- c) The narrative statement shall explain the basis of the Contractor's submittal:
 - i. Early Work and baseline submittals – explains determination of activity duration and describes the Contractor's approach for meeting required Key Dates as specified in the Contract "**Employer's Requirement, Section VI, Volume 6, Appendix 4 – Project Program Requirements**".
 - ii. Updated detail programme submittals – state in the narrative the Works actually completed and reflected along critical path in terms of days ahead or behind allowable dates, specific requirements of narrative are:
 - If the updated detailed work programme indicates an actual or potential delay to Contract Completion date or Key Dates, identify causes of delays and provide explanation of work affected and proposed corrective action to meet Key Dates or mitigate potential delays.
 - Identification of any deviation from previous month's critical path.
 - Identify by activity number and description, activities in progress and activities scheduled to be completed.
 - Discuss variation work order items, Value Engineering items, if any.
- d) Programme Status which shall:
 - i. Show Works Programme status up to and including the current report period, display cumulative progress to date and a forecast of remaining work.
 - ii. Be presented as a bar-chart size A3 or A4 and as a time-related logic network diagram, including activity listings on an A1 size.
- e) The activity variance analysis which shall analyse activities planned to start prior to or during the report period but not started at the end of the report period as well as activities started and/or completed in advance of the Works Programme.

6. THREE-MONTH ROLLING PROGRAMME

- (1) The three month rolling programme shall be issued on a monthly basis.

7. PLANNING AND CO-ORDINATION

- (1) A summary of all planning/co-ordination activities during the month and details of outstanding actions.
- (2) A schedule of all submissions and consents/approvals obtained/outstanding.

8. PROCUREMENT REPORT

- (1) A summary of all significant procurement activities during the month, including action taken to overcome problems.
- (2) A report listing major items of plant and materials which will be incorporated into the Works.

- (3) The items shall be segregated by type and the report should show as a minimum the following activities:
 - a) Purchase order date - scheduled/actual;
 - b) Manufacturer/supplier and origin;
 - c) Letter of credit issued date;
 - d) Manufacturer/supplier ship date - scheduled/actual;
 - e) Method of shipment;
 - f) Arrival date in India- scheduled/actual.

9. PRODUCTION AND TESTING

- (1) A review of all production and manufacturing activities during the month.
- (2) Summaries of all production and manufacturing outputs during the month together with forecasts for the next month.
- (3) Review of all testing activities (both at Site and at the manufacture's premises) during the month

10. ENVIRONMENTAL AND CLIMATIC ISSUES

- (1) A review of all the environmental and climatic issues during the past month including all monitoring reports, weather conditions at Site, mitigation measures undertaken and activities to control environmental impacts as detailed in **Part 2 “Employer’s Requirement, Section VI, Volume 6, Appendix 13 – Environmental Protection Requirements”**.

11. DEPLOYMENT OF MANPOWER MATERIAL AND EQUIPMENT AT SITE

- (1) Detail showing the extent of deployment of manpower, equipments and stock of important construction materials utilized at the Site.
- (2) A list of major construction equipment used on the Project during the reporting period and any construction equipment idle during the reporting period.
- (3) A list of all major or critical materials and equipment, indicating current availability and anticipated job Site delivery dates.
- (4) The total number of personnel by craft actually engaged in the work during the reporting period, defined separately as to office, supervisory, and field personnel.
- (5) A manpower and equipment forecast for the upcoming twenty eight (28) days, stating the total number of personnel by craft, defined separately as to office, supervisory and field personnel.
- (6) Changes or additions to Contractor’s supervisory personnel that occurred from the preceding Monthly Progress Report. The Monthly Progress Report shall accompany the Application for Payment and monthly schedule update.

12. PHOTOGRAPHS and VIDEOGRAPHY

- (1) Submission requirements for photographs and videography are defined in Clause 20.2, **Part 2 “Employer’s Requirement, Section VI, Volume 5, Construction, Testing and Commissioning”**.

APPENDIX 6 QUALITY ASSURANCE

1. GENERAL

- (1) The Contractor shall implement a project quality management plan in accordance with EN ISO-9001-2001, international (ISO 9001-2000), "Quality System" - Model for Quality Assurance in Production, Installation and Servicing" to ensure that all materials, workmanship, plant and equipment supplied and work done under the Contract meets the requirements of the contract.
- (2) This plan shall apply to all activities related to the quality of items, including designing, purchasing, inspecting, handling, assembling, testing, storing, and shipping of materials and equipment and different elements of construction work and installations of components.
- (3) The Contractor shall, within one hundred and nineteen (119) days of the Commencement Date, prepare and submit to the Engineer for review his proposed Quality Assurance Plan, which shall comply with the requirements as mentioned in this **Appendix**.

2. QUALITY ASSURANCE MANAGEMENT PLAN

- (1) The Project Quality Management Plan (PQMP) shall as a minimum address the quality system elements as required by EN ISO 9001-2001, generally noting the applicability to the Contractor's Works Programme for the Project.
- (2) Procedures or quality plans to be prepared by others (suppliers, sub-contractors, etc) and their incorporation in the overall PQMP shall be identified.
- (3) The Contractor shall provide and maintain with the Engineer a Quality Assurance (QA) plan to regulate methods, procedures, and processes to ensure compliance with the Contract requirements.
- (4) The QA Plan, including QA written procedures, shall be submitted to the Engineer for his review.
- (5) Adequate records shall be maintained in a readily retrievable manner to provide documented evidence of quality monitoring and accountability.
- (6) These records shall be available to Engineer at all times during the term of the Contract and during the Defects Notification Period.
- (7) The Plan shall identify:
 - a) special product realisation processes which are product realization activities, control or verify quality and are performed by certified personnel in accordance with documented procedures that have the written consent of the Engineer;
 - b) Measuring and monitoring procedures shall provide for control and reporting of non-conformances conditions to the Engineer; Inspection shall occur at appropriate points in the installation sequence to ensure compliance with drawings, test specifications, process specifications, and quality standards while the Engineer may designate, if necessary, inspection hold points into construction, installation or inspection planning procedures;
 - c) Inspection on delivery procedures to preclude the use of nonconforming materials and to ensure that only correct and accepted items are used and installed;

- d) Identification, tracking and inspection status system to identify and track the progressive inspection status of equipment, materials, components, construction, subassemblies and assemblies as to their acceptance, rejection, or non-inspection shall be maintained;
 - e) Identification and control of items: an item identification and traceability control shall be provided;
 - f) Handling, storage, preservation and delivery: provide for adequate work, surveillance and inspection instructions.
- (8) The QA plan shall ensure that conditions adverse to quality such as failures, malfunctions, deficiencies, deviations, and defects in materials and equipment shall be promptly identified and corrected.
- (9) The QA plan shall provide for establishing, and maintaining an effective and positive system for controlling non-conforming material including procedures for the identification, segregation, and disposal of all non-conforming material while the use or repair of non-conforming materials shall require the Engineer's consent.

3. PLAN IMPLEMENTATION AND VERIFICATION

- (1) The Plan shall clearly define the Quality Assurance (QA) organisation. Management responsibility for the QA shall be set forth on the Contractor's policy and organisation chart.
- (2) The plan shall define the requirements for QA personnel, their skills and training.
- (3) Records of personnel certifications shall be maintained and monitored by the QA personnel. These records shall be made available to the Engineer for review, upon request.
- (4) The QA operations shall be subject to the Engineer's, Employer or his authorised representative's verification at any time.
- (5) Verification will include: surveillance of the operations to determine that practices, methods and procedures of the plan are being properly applied; inspection to measure quality of items to be offered for acceptance; and audits to ensure compliance with the Contract documents.
- (6) The Contractor's quality audit schedule shall be submitted to the Engineer for consent every three months or more frequently as required.
- (7) The results of quality audits shall be summarised in the Contractor's monthly reports.
- (8) The Contractor shall provide all necessary access, assistance and facilities to enable the Engineer to carry out on-Site and off-Site surveillance of QA audits to verify that the quality system which has the consent of the Engineer is being implemented fully and properly.

APPENDIX 7 DRAWING AND CAD STANDARDS

1. INTRODUCTION

- (1) The purpose of this document is to define the minimum Drawing and CAD standard to be achieved by the Contractor for all drawings produced by the Contractor for the purpose of the Works.
- (2) By defining a common format for the presentations of Drawings and CAD files, the exchange of drawn information is improved and will maximise the use of CAD in the co-ordination process.
 - (a) All submissions shall be made to the Engineer’s requirement in a format reviewed without objection by the Engineer in accordance with the requirements in the Contract;
- (3) Paper and drawing sizes shall be “A” series sheets as specified in ISO 5457.
- (4) The following software compatible for use with Intel-Windows based computers shall be used, unless otherwise stated, for the various electronic submissions required:

<u>Document Type</u>	<u>Electronic Document Format</u>
AutoCAD Graphics	CorelDraw, Ver. 12.0/ AutoCAD 2011 or latest versions
Photographic	Adobe Photoshop CS2 or last version
Desktop Publishing	Page Maker 7.0 or latest version
CAD Drawings	AutoCAD 2011 or latest version.

- (5) For electronic file submission one copy shall be submitted unless otherwise stated on CD-ROM media. The media shall be CD-R and the recording method shall not allow any further changes to the recordable disk.
- (6) Internet File Formats/Standards:
 - (a) The following guidelines shall be followed when the Contractor uses an internet browser as the communication media to share information with the Engineer /Employer.
 - (b) All the data formats or standards must be supported by Microsoft Internet Explorer version 7 or above running on Windows XP or above.
 - (c) The following lists the file types and the corresponding data formats to be used on internet. The Contractor shall comply with them unless prior consent is obtained from the Engineer for a different data format:

<u>File Type</u>	<u>Data Format</u>
Photo Image	Joint Photographic Experts Group (JPEG)
Image other than Photo	GIF or JPEG
Computer Aid Design files	Computer Graphics Metafile (CGM) and DWG

(CAD)

Video Window video (.avi)

Sound Wave file (.wav)

- (7) The following states the standards to be used on the internet when connecting to database(s). The Contractor shall comply with them unless prior consent is obtained from the Engineer for a different standard:

<u>Function to be implemented</u>	<u>Standard to be complied with</u>
Database connectivity	Open Database Connectivity (ODBC)
Publishing hypertext language on the World Wide Web	Hypertext Markup Language (HTML)

2. GENERAL REQUIREMENTS

2.1 GENERAL

- (1) The Contractor shall adopt a title block measuring 15 cm x 19 cm on the right top corner of every drawing. This title shall generally contain the following details in order specified below and other details as specified by the Engineer:
- DFCC Approval No.
 - Engineer Approval No.
 - Contractor's Drawing Number
 - DFCC logo with Controlling CPM office Identification
 - Engineer's Name & Address
 - Drawing Title
 - Name of the Project
 - Scale of Drawing
 - Name of the Contractor

The legend and Notes pertaining to that drawing shall be given below the title block. Reference drawings shall be given below the notes.

Signature boxes for signatures of all the approving officials shall be provided in ascending order from left to right at the bottom right corner.

All revisions shall be highlighted with circle giving the revision number of that drawing within that circle at a particular location in the drawing and such revisions shall be tabulated in a box at the suitable location in the drawing and approval of the concerned officials shall be obtained in this box only.

- (2) Each document shall be uniquely referenced by a document number and shall define both the current status and revision of the drawing.

- (3) The current status of each document shall be clearly defined by the use of a single letter code as follows:
- (a) A single letter character denoting the status of the drawings e.g.
- | | |
|---|-----------------------|
| T | Tender Drawing |
| W | Working Drawing |
| M | Manufacturing Drawing |
| S | Site Drawing |
| D | Shop Drawing |
| A | As Built Drawing |
- (b) A single digit code denoting the contract number (for the whole line)
- | | |
|---|--|
| 1 | Design |
| 2 | Civil / Track Works from to..... |
| 3 | Systems Works |
- (c) A two (2) letter code denoting the type of civil works or system elements e.g.
- | | |
|-----|--|
| CG | General Works |
| ST | Stations |
| TU | Tunnels (if any) |
| AL | Alignment |
| RW | Right - Of - Way |
| CE | Civil Engineering (earth work, culverts, pedestrians, foot bridge, agricultural underpass, survey, track drainage, etc.) |
| RB | Railway Bridges |
| ROB | Road Over Bridges |
| RUB | Road Under Bridges |
| EC | Environmental Control System |
| UT | Utilities (Power, Gas, Telecoms, Electric, Water supply, Sewer lines) |
| SE | Structural Engineering (structural steel, reinforced concrete etc.) |
| GE | Geotechnical Engineering (Instrumentation, ground treatment, de-watering, etc.) |
| AR | Architecture |
| LS | Landscape |
| EE | Electrical Engineering (low voltage) |
| ME | Mechanical Engineering (ventilation, fire fighting, plumbing) |
| PS | Power Supply (high voltage, traction power) |

SG	Signalling (train control)
CM	Telecommunications, SCADA System
TK	Track-work
TM	Traffic Management (Roads, Pavements)
WS	Water Supply

- (d) A unique four (4) digit number (from 0001 to 9999), identifying each drawing.
- (e) A single letter (A to Z except I and O) denoting the sequence of revision to the drawing. The initial drawing issue will carry a revision letter "A".

Example: Drawing Title Block:

Status	Drawing No:	Revision:
D	1 / ST / 0235	B

(Note: The comparable computer reference is "1ST0235B")

Denotes:

(D) Shop Drawing (1) Design (ST) Stations (0235B) Drawing number 0235 Rev. B

2.2 TYPES of DRAWINGS

- (1) 'Working drawings' are those as defined in Volume 2 Section VI, Part 2 of Bidding Documents.
- (2) Site drawings and sketches' are drawings, often in sketch form, prepared on Site to describe modifications of the Working Drawings where Site conditions warrant changes that do not invalidate the design.
- (3) 'Shop drawings' are special drawings prepared by the manufacturer or fabricator of various items within the Works to facilitate manufacture or fabrication.
- (4) 'Reference Drawings' are those as defined in Volume 2 Section VI, Part 2 of Bidding Documents.
- (5) 'As-built drawings' are those as defined in Volume 2 Section VI, Part 2 of Bidding Documents. These drawings shall be completed on a regular basis as the Works progress, and shall not be left until completion of the entire Works.

3. COMPUTER AIDED DESIGN AND DRAWING (CAD) STANDARDS

3.1 INTRODUCTION

- (1) The production of all CAD data files shall comply with the applicable legislation in India, standards for the relevant issue and the requirements as defined hereinafter.

3.2 OBJECTIVES

- (1) The main objectives of the CAD standards are as follows:
 - (a) To ensure that the CAD data files produced for project are co-ordinated and referenced in a consistent manner.

- (b) To provide the information and procedures necessary for a CAD user from one discipline or external organisation to access (and use as background reference), information from a CAD data file prepared by another discipline or external organisation.
- (c) To standardise the information contained within CAD data files which may be common to more than one discipline such as drawing borders, title boxes, grid lines etc.
- (d) To establish procedures necessary for the management of CAD data files.
- (e) To ensure all contractors use 'Model space' and 'Paper space' in the production of their CAD files.

3.3 GENERAL

- (1) To facilitate co-ordination between contractors, it is a requirement that all drawings issued by contractors for co-ordination or record purposes shall be produced using CAD methods.
- (2) The intent of the issue of digital information is to aid the interface design by others.
- (3) The definitive version of all Drawings shall always be the paper or polyester film copies which have been issued by the Contractor or organisation originating the drawing and also held in the Project's electronic document control system.
- (4) Drawings and drawing packages issued for co-ordination, record purposes or for acceptance shall be accompanied by a complete set of the corresponding CAD data files.
- (5) Any contractor or organisation making use of the CAD data from others shall be responsible for satisfying him that such data is producing an accurate representation of the information on the corresponding paper drawing which is satisfactory for the purpose for which he is using it, provided the general principles of this section have been achieved by the originator of the CAD data, contractors making use of the CAD data from others shall not be entitled to require alterations in the manner in which such CAD data is being presented to them.
- (6) In particular, automatic determination of physical dimensions from the data file shall always be verified against the figured dimensions on the paper or polyester drawings.
- (7) Figured dimensions shall always be taken as correct where discrepancies occur.

3.4 TERMINOLOGY AND ASSOCIATED STANDARDS

- (1) Any terminology used within this section that is ambiguous to the user shall be clarified with the Engineer. Indian national and Indian Railways standards are to be used in principle as a guide for drawing practice, convention, CAD data structure and translation.

3.5 PAPER DRAWINGS

- (1) For the Project "Paper" drawings are considered to be the main vehicle for the receipt and transmittal of design and production information, typically plans, elevations and sections.

3.6 CAD QUALITY CONTROL

- (1) Random CAD Quality control audits will be carried out by Engineer on all CAD media received and transmitted.
- (2) These checks DO NOT verify the technical content of the CAD data received or transmitted (as this is the responsibility of the originating organisation); however compliance with project CAD and Drawing Standards shall be checked.
- (3) In addition, all contractors who transmit and receive CAD data from the Project shall have CAD quality control procedures in place.
- (4) A typical quality control procedure shall contain CAD data quality checking routines coupled with standards for CAD data transmittal and archiving.

3.7 CAD DATA TRANSFER MEDIA AND FORMAT

- (1) When CAD data is received and transmittal between the Engineer and the Contractor, the media shall be as follows:
 - (a) All CD-R/RW and DVD+/-R must be labelled on the data shield with:
 - i. Name of Company
 - ii. Project Title
 - iii. Drawing Filenames
 - iv. Disk No. / Total No. of disks
 - (b) All media shall be submitted with a completed form (CAD Disk)
 - (c) The CAD data file transmittal format required by from all contractors shall be in AutoCAD (version 2011) or latest version.

3.8 REVISIONS

- (1) All 'Revisions', 'In abeyance' and 'Deletions' shall be located on a common layer which can be turned on or off for plotting purposes.

3.9 BLOCK LIBRARIES, BLOCKS and NAMES

- (1) All construction industry symbols produced as CAD Cells shall typically conform to Indian Standards.
- (2) All blocks created shall be primitive (i.e. NOT complex) and shall be placed absolute (i.e. NOT relative).
- (3) The Contractor's specific block libraries shall be transmitted to Engineer together with an associated block library list containing the filename (max. 6 characters) and block description.
- (4) The Contractor shall ensure that the library is regularly updated and circulated to all other users, together with the associated library listing.
- (5) All blocks of a common type, symbols or details should initially be created within a CAD "Model Space File" specifically utilised for that purpose. These files will be made available on request by Engineer.
- (6) All blocks created will typically be 2D unless 3D is specifically requested. In both instances they shall have an origin at a logical point located within the extents of each block's masked area or volume.

3.10 CAD DIMENSIONING

- (1) Automatic CAD Dimensioning will be used at all times.
- (2) Any dimensional change must involve the necessary revision to the model space file.
- (3) If the CAD Quality Control Checks find that the revisions have not been correctly carried out, the rejection of the entire CAD submission will result.

3.11 CAD LAYERING

- (1) All CAD elements shall be placed on the layers allocated for each different discipline.
- (2) The Contractor's layer naming convention shall be submitted for the Engineer's approval.

3.12 GLOBAL ORIGIN, LOCATION AND ORIENTATION ON THE ALIGNMENT DRAWINGS

- (1) Location or plan information in "Model Space" files shall coincide with the correct location and orientation on the project grid for each specific contract.
- (2) Location plans shall have at least three setting out points shown on each CAD "Model Space" file. Each setting out point shall be indicated by a simple cross-hair together with related Eastings and Northings co-ordinates.
- (3) The civil, structures and track Contractor(s) will establish the three setting out co-ordinates for their respective works, which will then be used by all other contractors including the Contractor.

3.13 LINE THICKNESS AND COLOUR

- (1) To assist plotting by other users, the following colour codes will be assigned to the following line thickness / pen sizes:

Colour	Code No.	Line Thickness
Red	10	0.18
White	7	0.25
Yellow	2	0.35
Brown	34	0.5
Blue	130	0.7
Orange	30	1.0
Green	3	1.4
Grey	253	2.0

3.14 CAD UTILISATION of 2D and 3D FILES

- (1) Although the project standard is 2D CAD files, certain disciplines and contractors may use 3D CAD files for specific applications or where the isolated use of 3D aids the design and visualisation process (i.e. architecture, survey and utilities).

3.15 CAD FILE NUMBERING

- (1) Contractor's CAD file numbering shall be as described in 2 above.

APPENDIX 8 TEMPORARY POWER SUPPLY

1 INTRODUCTION

- (1) The standard conditions applying to temporary power supply to any Works Area by the Contractor for its Site facilities are given under Clause 2 of this **Appendix**.

2 GENERAL

- (1) The Contractor shall nominate a qualified electrical supervisor, whose name and qualifications shall be submitted in writing to the Engineer for review, who shall be solely responsible for ensuring the safety of all temporary electrical equipment on Site.
- (2) The Contractor shall not install or operate any temporary electrical systems on the Site until this electrical engineer is appointed and has commenced duty.
- (3) The name and contact telephone number of the qualified electrical engineer shall be displayed at the main distribution board for the temporary electrical supply so that he can be contacted in case of an emergency.
- (4) The Contractor shall submit all base electrical circuits, characteristics and the details of the equipment for all temporary electrical installations, together with details of the temporary electrical equipment shall be submitted to the Engineer for his consent.
- (5) All electrical installation work on Site shall be carried out in accordance with the requirements laid down in the Performance Specification and Indian standards.
- (6) All work shall be supervised or executed by qualified engineers or suitably skilled and authorised electricians.
- (7) Temporary electrical Site installations and distribution systems shall be in accordance with the rules and regulation applicable for and/or applied by:
 - a) The local electrical company supply rules;
 - b) Wiring regulations;
 - c) Distribution of electricity on construction and building sites;
 - d) Distribution assemblies for electricity supplies for construction and building sites;
 - e) Regulations for fire safety norms and requirements for civil works; and
 - f) Any other applicable Indian standards and regulations.

2.1 MATERIALS, APPLIANCES AND COMPONENTS

- (1) All materials, appliances and components used within the distribution system shall comply with Indian standards.

2.2 DESIGN CONSIDERATIONS

- (1) Distribution equipment utilised within the temporary electrical distribution system shall incorporate the following features:
 - a) flexibility in application for repeated use;
 - b) suitability for transport and storage;
 - c) robust construction to resist moisture and damage; and

- d) safety in use.
- (2) All cabling shall be run at high level whenever possible and be firmly secured to ensure it does not present a hazard or obstruction to people and equipment.

2.3 MAINS VOLTAGE

“SHE Manual” of DFCC provided in “**Reference Documents - Part 4 of Bidding Documents**” stipulates certain voltages for different works. In case of conflict of provisions regarding voltage under this appendix, then those specified in the SHE manual shall govern.

- (1) The Site mains voltage shall be as per the 400V/ 3 phases 4-wire system 50 Hz.
 - a) Single phase voltage shall be as per the 220V/240V supply.
 - b) Reduced voltages shall conform to Indian Standards.
- (2) The following voltages shall be adopted for typical applications throughout the distribution systems:
 - a) Fixed plant – 400V/ 3 phase;
 - b) Movable plant fed by trailing cable – 400V /3 phase;
 - c) Installations in Site buildings - 220V/240V /1 phase;
 - d) Fixed flood lighting - 220V/240V 1 phase;
 - e) Portable and hand held tools – 12V, 24V or 36V /1 phase;
 - f) Site lighting (other than flood lighting) – 12V, 24V or 36V /1 phase; and
 - g) Portable hand-lamps (general use) – 12V, 24V or 36V /1 phase.
- (3) When the low voltage supply is energised via the Indian Railway’s power supply, any power utilised from that source shall be either 400V 3 phase or 220V/240V single phase as appropriate and the Contractor shall carry out any conversion that may be necessary to enable him to use power from that source.
- (4) Protection of Circuits
 - a) Protection shall be provided for all main and sub-circuits against excess current, under and over voltage, residual current and earth faults.
 - b) The protective devices shall be capable of interrupting (without damage to any equipment or the mains or sub-circuits) any short circuit current that may occur.
 - c) Discrimination between circuit breakers, circuit breakers and fuses shall be in accordance with the Indian Standards.

2.4 EARTHING

- (1) Earthing and bonding shall be provided for all electrical installations and equipment to prevent the possibility of dangerous voltage rises and to ensure that faults are rapidly cleared by installed circuit protection.
- (2) Earthing systems shall conform to the following standards:
 - a) Wiring regulations;
 - b) Guide for safety in AC substation grounding.

2.5 PLUGS, SOCKET OUTLETS AND COUPLERS

- (1) Low voltage plugs, sockets and couplers, as well as the high voltage couplers and 'T' connections shall be colour coded in accordance with, and conform to Indian Standards.

2.6 CABLES

- (1) Cables shall be selected after full consideration of the conditions to which they will be exposed and the duties for which they are required.
- (2) Supply cables shall be in accordance with Indian Standards.
- (3) For supplies to mobile or transportable equipment where operation of the equipment subjects the cable to flexing, the cable shall conform to Indian Standards, as well as one of the following specifications appropriate to the duties imposed on it:
 - a) flexible cables for use at mines and quarries;
 - b) rubber insulated cables for electric power and lighting; and
 - c) insulated flexible cords and cables.
- (4) Where low voltage cables are to be used, reference shall be made to Indian Standards, the following specifications shall also be referred to particularly for underground cables:
 - a) for armoured PVC insulated cables; and
 - b) flexible cables for use at mines and quarries.
- (5) All cables which have a voltage to earth exceeding 65V (except for supplies from welding transformers to welding electrodes) shall be metal sheathed and/or armoured which shall be continuous and effectively earthed. In the case of flexible or trailing cables, such earthed metal sheath and/or armour shall be in addition to the earth core in the cable and shall not be used as the sole earth conductor.
- (6) Armoured cables having an over-sheath of polyvinyl chloride (PVC) or oil resisting and flame retardant compound shall be used whenever there is a risk of mechanical damage occurring.
- (7) For resistance to the effects of sunlight, overall non-metallic covering of cables shall be black in colour.
- (8) Cables with an applied voltage to earth exceeding 12V but not normally exceeding 65V shall be insulated and sheathed with a general purpose or heat resisting elastomer.
- (9) All cables that are likely to be frequently moved in normal use shall be flexible cables. Flexible cables shall be in accordance with Indian Standards.

2.7 LIGHTING INSTALLATION

- (1) Where Site works are required during the night, the lighting circuits shall be run separate from other sub-circuits and shall be in accordance with Indian Standards.
- (2) Voltage shall not exceed 55V to earth except when the supply is to a fixed point and where the lighting fixture is fixed in position.
- (3) Luminaries shall have a degree of protection not less than IP 54.

- (4) In particularly onerous environments where the luminaries are exposed to excesses of dust and water, a degree of protection to IP 65 shall be employed.
- (5) The Contractor shall provide a minimum lighting level of 200 lux by localised lighting in all areas where required for carrying out the works.
- (6) Wherever a risk of damage may occur, luminaries shall be mechanically protected against impact damage by use of wire guards or other such devices.

2.8 ELECTRIC MOTORS

- (1) Totally enclosed fan cooled motors to Indian Standards shall be used.
- (2) Motor control and protection circuits shall be as stipulated in Indian Standards.
- (3) Emergency stop switches shall be provided for all machinery.

2.9 INSPECTION AND TESTING

- (1) Electrical installations on Site shall be inspected and tested in accordance with the requirements of the wiring regulations.

2.10 IDENTIFICATION

- (1) Identification labels shall be affixed to all electrical switches, circuit breakers and motors to specify their purpose.

2.11 MAINTENANCE

- (1) Regular maintenance and checking of control apparatus and wiring distribution systems shall be carried out by a engineer or electrician (duly qualified to carry out the said checks) to ensure safe and efficient operation of the systems.
- (2) All portable electrical appliances shall be permanently numbered (scarf tag labels or similar) and a record kept of the date of issue, date of the last inspection and the recommended inspection period.

2.12 METERING

- (1) The Contractor shall install and register a separately electrometer for each supplies of electricity from the applicable suppliers. The Contractor shall pay all required charges for the supplied electric power.

APPENDIX 9 PROJECT CALENDAR

1. The Project Calendar

- (1) The Project Weeks shall be commenced on a Monday.
- (2) A day shall be deemed to commence at 00:01 hour on the morning of the day in question.
- (3) Where reference is made to the completion of an activity or Milestone by a particular week, this shall mean by midnight on the Sunday of that week.
- (4) Requirements for the computation of Key Dates are given in Paragraph 3, **Part 2 “Employer’s Requirement, Section VI, Volume 6, Appendix 2 – Work Areas and Contract Stages”**.
- (5) A 7 day week calendar shall be adopted for various (Work) programme schedules for scheduling purposes, which shall also display the rest day and holidays.
- (6) For Project purposes, the presentation shall be in ‘Week’ units.

APPENDIX 10 FIRST AID BASE

1. FIRST AID BASE

- (1) First aid bases shall be located at each of the Contractor's principal Works Area.
- (2) The base shall consist of a treatment room fitted with two treatment couches, a hand wash basin, sterilising equipment and lockable cupboards to contain sufficient medical supplies for the Contractor's personnel, the Employer's personnel, the Engineer's personnel and the interfacing contractor working in the area and any visitors to the Site.
- (3) In addition, two stretchers shall be stored, available for instant use.
- (4) The first aid base shall contain a recovery room that shall be furnished with six chairs and a centre table.
- (5) The first aid base shall be air-conditioned, with cooling and heating capability sufficient to maintain the temperature of the inside of the building at 22°C.

2. STAFFING

- (1) A qualified doctor shall be available on call during all times when work is being undertaken on Site.
- (2) A nurse/ para medical staff shall be in attendance at the first aid bases during all times when work is being undertaken on the Site.
- (3) In each Site office and location at least one employee of the Contractor shall be trained in first aid and shall be available during all working hours for the purpose of attending to emergencies.
- (4) The Contractor may conclude a contract with the local health centres where they are unable to implement any of the above services

3. EQUIPMENT

- (1) A fully equipped ambulance and driver shall be available on call during all working hours.
- (2) The ambulance shall be equipped with emergency life support equipment suitable for application in construction Site accidents.
- (3) Portable first aid boxes will be maintained fully equipped at each of local Site offices and work locations where twenty (20) or more persons work at a time.

APPENDIX 11 DESIGN CERTIFICATE

DESIGN CERTIFICATE

This Design Certificate refers to Submission No. which comprises:

[*Design Package No. / the Definitive Design and Drawing Submission No.
/ Technical Submission No.] in respect of:

[description of the Works to which the submission refers]

The contents of this submission are scheduled in Section A below.

The documents scheduled in Section B below, for which a Notice of No Objection has been issued, are of relevance to this submission.

DESIGNER'S STATEMENT

We hereby certify that:

- a) the design of the Works, as illustrated and described in the documents scheduled in Section A below, complies with the specifications requirements and *[see note 1 below]*;
- b) the outline designs, design briefs and performance specifications of those elements of the Works as illustrated and described in the documents scheduled in Section A below comply with the specifications requirements and *[see note 1 below]*;
- c) the design of the Works, as illustrated and described in the documents scheduled in Section A below, complies with the Employer's Requirements specifications requirements and *[see note 1 below]* except in the following respects:
 - (i) (to be completed by Contractor/Designer)
 - (ii) (etc.)
- d) an in-house check has been undertaken and completed to confirm the completeness, adequacy and validity of the design of the Works as illustrated and described in the documents scheduled in Section A below;
- e) all necessary and required approvals relating to the design of the Works, as illustrated and described in the documents scheduled in Section A below, have been obtained and copies of such approvals are annexed in Section C below;
AND (in the case of a submission covering a part of the Works only) :
- f) all effects of the design comprising the submission on the design of adjacent or other parts of the Works have been fully taken into account in the design of those parts.

Signed by 'Authorised Representative'

(for Designer)

Name

Position/ Designation

Date

CONTRACTOR'S CERTIFICATION

This is to certify that all design has been performed utilising the skill and care to be expected of a professionally qualified, competent designer, experienced in work of similar nature and scope. This further certifies that all works relating to the preparation, review, checking and certification of design has been verified by us.

Signed by 'Authorised Representative' (for Contractor)

Name

Position/Designation

Date

Note 1

The Contractor shall insert one of the following, as applicable:

- (i) the Contractor's Technical Proposals
- (ii) the Contractor's Technical Proposals and Design Packages Nos. for which a Notice of No Objection has been issued.
- (iii) Design Packages Nos. for which a Notice of No Objection has been issued if such Design Packages develop and amplify the Contractor's Technical Proposals.
- (iv) The Definitive Design

Section A

Submission no. comprises the following :

Drawings: (*Title, drawing number and revision*)

Documents: (*Title, reference number and revision*)

Others:

Section B

Documents for which a Notice of No Objection has been issued and which are of relevance to this Submission No.

Document:

Submitted with

[*Design Package No. /	}
Definitive Design Submission No. /	}
Good for Construction Drawing Submission No. /	}
Technical Submission No. /	}
Date of Issue of Notice of No Objection	}

The Contractor is required to provide this information in respect of each document in Section B

(* Delete as appropriate)

Section C

[Contractor to attach copies of necessary and required approvals]

APPENDIX 12 SITE SAFETY PLAN

1. GENERAL

- (1) The Contractor shall, within one hundred and nineteen (119) days of the Commencement Date, prepare and submit to the Engineer for review his proposed safety plan, as part of the Contractor's Safety, Health and Environment Plan, which shall contain as a minimum 2 to 15 items as mentioned in this **Appendix**.
- (2) Procedures for updating the site safety plan and associated assurance system shall be given.
- (3) The compensation for affected workers or their relatives shall be paid by the Contractor in such cases utmost expeditiously in accordance with the Workmen's Compensation Act.
- (4) DFCC has prepared its own Safety, Health and Environment (SHE) **manual** which is attached in **Reference documents - Part 4 of Bidding Documents**. Various penalties as stipulated in the said manual shall be applicable under this Contract for violation of relevant stipulations.

2. STATEMENT OF THE CONTRACTOR'S SAFETY POLICY

- (1) The Contractor shall produce a policy statement signed by the managing director of the Contractor or other senior officer acceptable to the Engineer, or the managing directors or other senior officers acceptable to the Engineer of each company of the consortium, partnership or joint venture comprising the Contractor, declaring that the Contractor shall ensure that safety and industrial health are given priority consideration in all aspects of the Works and by the Contractor in discharging his contractual obligations;
- (2) An understanding of and means of ensuring due compliance with the statutory regulations and standards relating to construction work in India;
- (3) The statutory and contractual obligations regarding safety, rescue and industrial health imposed on the Contractor; and the means by which the Contractor will supervise, monitor and audit his site safety assurance system to ensure due compliance with these obligations.

3. SENIOR MANAGEMENT RESPONSIBILITY FOR SAFETY

- (1) The name(s) and experience of person(s) within the Contractor's proposed management structure who would be responsible for co-ordinating and monitoring the overall safety performance of the Contractor, all sub-Contractors and safety officers.

4. APPOINTMENT, DUTIES AND RESPONSIBILITIES OF SAFETY STAFF

- (1) The safety staff and organisational structure, which should identify the personnel to be engaged solely for site safety assurance, the responsibilities of the participants and the subdivision of the site safety assurance tasks into elements which can be effectively controlled, technically and managerially. The staff engaged by the contractor for this purpose should be well versed with the local language.
- (2) Names, addresses, telephone and facsimile numbers of all participants and emergency government organisations shall be listed where known (supplements to the site safety plan will update and complete this information);

- (3) The powers vested in the safety staff, which shall be sufficient to enable them to take urgent and appropriate action to make safe the site and prevent unsafe working practices or other infringements of the safety plan or statutory regulations;
- (4) The proposed interaction and communication procedures between the Contractor's construction personnel and safety staff, including proposals for radio/mobile communication facilities, in particular, the establishment of a regular communication and reporting system between the safety officer, the director responsible for the Contract, the safety officer and the site manager shall be demonstrated;
- (5) The means by which the site safety assurance system will be supervised, monitored and audited by the safety officer to ensure due compliance with the principles and objectives of the site safety plan at all levels of construction shall be given.
- (6) Procedure to be followed for replacement of a regular worker/ operator not being able to work or attend duties.
- (7) The records to be prepared and maintained by the safety officer and safety staff and communication procedures to be adopted by the safety officer such that the Engineer, Employer and others associated with the Works (e.g. sub-Contractor) are kept fully informed on matters relating to site safety and occupational health regulations throughout the period of the Contract shall be mentioned.

5. POLICY FOR IDENTIFYING HAZARDS

- (1) The means by which the Contractor will identify hazards, assess the risks and develop procedures and method statements to minimise the risk for those risks which will occur during the works;
- (2) The aspects of the Temporary Works design which should be communicated to the Engineer and others directly or indirectly associated with the Works if the installation of the associated works has a particular significance on the site safety of the Works;
- (3) The Contractor shall produce a list of safety and health hazards identified for this Contract and the procedures and method statements for achieving effective and efficient minimisation of the risks associated with such hazards;
- (4) The means of minimisation of the effects of climatic exposure (heat, wind and moisture) and an exposure to noxious substances.

6. SAFETY EQUIPMENT

The means by which safety equipment, scaffolds, guard-rails, working platforms, hoists, ladders and other means of access, lifting, lighting, signing and guarding equipment shall be inspected, tested and maintained and the standards below which such items will be removed from the site and replaced shall be elaborated. In case of any removal of safety equipments or associated items, disposal or recycle mechanism shall also be elaborated.

7. CONTRACTOR'S EQUIPMENT

- (1) The Contractor shall produce policy and procedures for ensuring that all his plant and equipment used on the works site is maintained in a safe condition and is operated in a safe manner;
- (2) Also regulations and procedures covering all safety and health aspects of the Works, including where appropriate but not limited to the following shall be produced by the Contractor:
 - a) Housekeeping;
 - b) traffic control and transportation;
 - c) working on or near operating railways;
 - d) fire prevention precautions and fire fighting equipment;
 - e) working in confined spaces;
 - f) working at height;
 - g) hot weather working;
 - h) working during monsoon;
 - i) excavation;
 - j) working with electrical equipment;
 - k) working with welding/cutting operations and other allied equipment;
 - l) personal protection clothing and equipment;
 - m) conveyance, handling and use of explosives;
 - n) operation of cranes and other heavy machines;
 - o) operation of hoists and other lifting appliances;
 - p) manual lifting;
 - q) scaffolding and work platforms;
 - r) ladders;
 - s) power tools;
 - t) hand tools and portable power driven tools;
 - u) hazardous substances;
 - v) structural steel erection;
 - w) lighting;
 - x) protection against falling objects; and
 - y) during public unrest.

8. SUB-CONTRACTORS

- (1) The means by which safety, rescue and industrial health matters and requirements will be communicated to sub-Contractors of all tiers and their due compliance with the site safety plan and all relevant statutory regulations is ensured by the main Contractor.
- (2) The method by which the safety procedures and practices proposed by sub-Contractors will be reviewed for compliance with the site safety plan and statutory regulations including the provision of hazard and risk assessments and method statements.

9. DISCIPLINARY PROCEDURES

- (1) The Contractor's disciplinary procedures with respect to dealing with safety related matters both with his own staff and that of sub-Contractors shall be given.

10. ACCIDENT REPORTING

- (1) The Contractor's procedure for reporting and investigating accidents, dangerous occurrences or occupational illness;
- (2) The Contractor's proposals for statistical measurement and monitoring of the safety and health performance of the Contractor and sub-Contractors of all tiers and how such proposals reflect responsible practice in the construction industry shall be mentioned.
- (3) The means by which the site safety and industrial health performance of the Contractor and sub-Contractors of all tiers can be compared with local and international norms shall be given together with the suggested rationale for establishing such norms.

11. HEALTH and SAFETY PROMOTION

- (1) The Contractor shall appoint full time health officer(s)/ practitioner(s) whose duties throughout the period of the Contract shall be entirely connected with the health aspects of the workers and staff on the site.
- (2) The Contractor shall provide details of the frequency, coverage and intent of site health & safety meetings together with the rationale for attendance.
- (3) The methods of promoting an awareness of site safety and site rescue procedures, and industrial health amongst all persons directly or indirectly associated with the Works;
- (4) This shall include proposals for on-site publicity, training courses for all workmen on the site and at all levels of supervision and management, incentive schemes for the promotion of compliance with safety measures, etc.

12. SITE SECURITY

- (1) The Contractor's system for the protection of authorised and unauthorised visitors to the site;
- (2) The Contractor's system for the security of materials and equipments at the site;
- (3) The Contractor's proposals to ensure that construction methods do not compromise the Contractor's commitment to the site safety plan or its compliance with the statutory regulations.

13. LABOUR HEALTH and SAFETY

- (1) The activities of Contractor shall be co-ordinated with Indian Railways so as to ensure safety of all Contractor's personnel.
- (2) Contractor to ensure adequate habitation arrangements as per the applicable regulations.
- (3) Labour safety arrangements by the Contractor shall be in accordance with the applicable legislation in India.
- (4) The design and construction shall comply with the applicable legislation in India.

- (5) An authorized Contractor's railway safety expert shall be instructed by relevant Indian Railway's experts. This Contractor's railway safety expert shall instruct all the Contractor's staff who are required to work on or adjacent to Indian Railway's operational infrastructure and certify their competence.
- (6) The Contractor shall develop appendixes for the safety of its labour, for each part of the technical design providing all necessary equipment.
- (7) The Contractor shall provide the equipment needed for the labour safety during the operation of the line.

14. LEGISLATION AND CODES OF PRACTICE

- (1) The Contractor shall comply with all safety and industrial health legislation including, without limitation, the rules and regulation of the National Safety Council of India.
- (2) The Contractor shall keep on the site copies of safety and industrial health regulations and documents.
- (3) All regulations and documents referred in this clause shall be translated into languages which are understood by the operators and supervisors engaged by the Contractor or sub-Contractors and such translations shall be displayed or kept alongside those in English language.

15. SITE HEALTH and SAFETY PLAN

The brief outline of site safety plan shall cover the following:

15.1 Safety Personnel

- (1) The Contractor shall appoint a safety officer whose duties throughout the period of the Contract shall be entirely connected with the safety and industrial health aspects of the Contractor's activities on the site.
- (2) The safety officer shall be a suitably qualified and experienced person who shall supervise and monitor compliance with the site safety plan.
- (3) The safety officer shall, in particular but without limitation, carry out auditing of the operation of the site safety plan in accordance with a rolling programme to be submitted, from time to time, to the Engineer for his consent.
- (4) The safety officer's appointment shall be within fifty six (56) days of the Commencement Date and shall be subject to the Engineer's written consent.
- (5) The Contractor shall not undertake any works on the site until the safety officer has commenced duties at site and unless the Engineer has specifically consented in writing.
- (6) The Contractor shall not remove the safety officer from the site without the express permission of the Engineer. Within fourteen (14) days of any such removal or notice of intent of removal, the Contractor shall nominate a replacement safety officer for the Engineer's consent.
- (7) The Contractor shall provide the safety officer with supporting staff in accordance with the staffing levels set out in the site safety plan.
- (8) The supporting staff shall include at least one Deputy safety officer whose appointment(s) shall be subject to the Engineer's consent.

- (9) The Deputy safety officer(s) shall be capable of assuming the duties and functions of the safety officer as contained in the site safety plan whenever necessary.
- (10) The Contractor shall issue identification cards (ID cards) to all the onsite personnel. Entry to the site to be restricted with permit requirements for any visitor(s).
- (11) The Contractor shall ensure that the safety officer maintains a daily site safety diary, such diary comprehensively recording all relevant matters concerning site safety, safety inspections and audits, safety related incidents and the like.
- (12) The site safety diary shall be reviewed and signed on a weekly basis by the Contractor's site representative and shall be available at all times for inspection by the Engineer.
- (13) The Contractor's staff organisation plan shall show direct lines of communication and reporting between the safety officer and the Contractor's site representative and between the safety officer and the person responsible for the Contract.
- (14) The Contractor shall instruct and require the Contractor's site representative and the person responsible to be directly accountable in all matters concerning site safety.

15.2 Site Safety Inspections

- (1) The Contractor will conduct site safety inspections at a regular frequency.
- (2) The findings of the inspections shall be recorded on suitable forms which shall be kept available for inspection by the Engineer.

15.3 Health Officer

- (1) The health officer/ practitioner shall be a suitably qualified and experienced person who shall supervise and monitor compliance with the health regulations.
- (2) Health officer will prevail HIV/AIDS prevention & control for workmen engaged at site.
- (3) The health officer shall, in particular but without limitation, carry out auditing of the site operations in accordance with a rolling programme to be submitted, from time to time, to the Engineer for his consent.
- (4) The health officer's appointment shall be within fifty six (56) days of the Commencement Date and shall be subject to the Engineer's written consent.
- (5) The Contractor shall not remove the health officer (s) from the site without the express permission of the Engineer. Within fourteen (14) days of any such removal or notice of intent of removal, the Contractor shall nominate a replacement health officer for the Engineer's consent.
- (6) The Contractor shall provide the health officer with supporting staff and resources to attend and manage the health of workers in site.
- (7) The supporting staff shall include at least one pharmacist whose appointment(s) shall be subject to the Engineer's consent.
- (8) The pharmacist shall be capable of assuming the duties and functions of the health officer whenever necessary.

- (9) The Contractor shall ensure that the health officer maintains a daily diary, such diary comprehensively recording all relevant matters concerning occupational health hazards, health inspections and audits, health related incidents and the like.
- (10) The health diary shall be reviewed and signed on a weekly basis by the Contractor's site representative and shall be available at all times for inspection by the Engineer.
- (11) The Contractor's staff organisation plan shall show direct lines of communication and reporting between the health officer and the Contractor's site representative and between the safety officer and the person responsible for the Contract.
- (12) The Contractor shall instruct and require the Contractor's site representative and the person responsible to be directly accountable in all matters concerning health of the personnel within the site.

15.4 Health Inspections

- (1) The Contractor shall conduct health inspections at regular intervals.
- (2) The findings of the inspections shall be recorded on suitable forms which shall be kept available for inspection by the Engineer.
- (3) The contractor shall make sure that sufficient resources are available at the site for providing safe & healthy habits within the work force and inefficient resources are immediately replaced.

15.5 Safety / Accident Reporting

- (1) The Contractor shall submit regular site safety reports to the Engineer in accordance with the site safety plan.
- (2) Such reports shall be submitted as part of the Monthly Progress Report. Prior to submission, the site safety report shall be endorsed by the Project Director responsible for the Contract and the Contractor's site representative.
- (3) Site safety reports shall comprehensively address all relevant aspects of site safety and industrial health regulation and, in particular, report on all site safety audits undertaken during the period covered by the report.
- (4) The Engineer shall be notified by the Contractor immediately of occurrence of any accidents whether on-site or off-site in which the Contractor, its personnel or plant, or those of its sub-Contractors are directly or indirectly involved and which results in any injuries to any persons, loss / damage to plant and machinery, disruption of traffic etc.
- (5) Such initial notification may be verbal and shall be followed by a written comprehensive report within 24 hours of the accident.
- (6) Additionally the Contractor shall notify the Engineer in writing within twenty four (24) hours of any incident occurring whether on-site or off-site at which the Contractor or any sub-Contractors are involved and could have resulted in serious injuries to persons or significant damage to the Works. Failure to report such incidences shall be considered as a serious breach of Safety Procedures.

15.6 Sub-Contractors

- (1) The Contractor shall provide its sub-Contractors with copies of the site safety plan and shall incorporate into all sub-contract documentation provisions to ensure the compliance with such plan at all tiers of the sub-contracting.
- (2) The Contractor shall, with the Engineer's consent in writing, shall instruct all sub-Contractors to appoint a safety representative who shall be available on the site throughout the operational period of the respective sub-contract.
- (3) These safety representatives shall ensure that all employees of sub-Contractors working at site are conversant with appropriate sections of the site safety plan and the statutory regulation.

15.7 Safety Meetings

- (1) The Contractor shall form a structure wherein safety induction training is given to all the workers and supervisors on regular interval for safe working habits.
- (2) Convene regular safety meetings in accordance with the safety plan and shall ensure attendance by the safety officer and safety representatives of sub-Contractors unless otherwise agreed by the Engineer.
- (3) All safety meetings shall be notified in advance to the Engineer who may attend in person or by representative at his discretion.
- (4) The minutes of all safety meetings shall be taken and sent to the Engineer within seven (7) days of the meeting.
- (5) A site safety management committee may be established by the Engineer to monitor the implementation of the safety plan and for the purposes set out in the project safety manual.
- (6) The Engineer or his representative will be the Chairman of this committee and the members shall include the Contractor's agent or representative, safety manager and safety officers, sub-Contractors' safety personnel.

15.8 Safety Equipment

- (1) The Contractor shall identify the safety equipment, rescue apparatus and protective clothing which will be required for the Works.
- (2) The identification shall include the quantity, sourcing, standards of manufacture, storage provisions and means of ensuring proper utilisation by all workmen and staff employed directly or indirectly by the Contractor and repair to or replacement of damaged equipment.
- (3) The Contractor shall ensure that safety equipment and protective clothing as described in the safety plan is available and used on the site at all material times and those measures for the effective enforcement of proper utilisation and necessary replacement of such equipment and clothing is incorporated into the site safety plan. Such equipment shall include, but not be limited to: site helmets, goggles and other eye protectors, hearing protectors, safety harnesses, safety equipment for working in confined spaces (e.g. sewers, drains etc.), rescue equipment, equipment to rescue persons from drowning (if applicable), fire extinguishers, first aid equipment, and, where appropriate, suitable fall arrest equipment.

- (4) Site for muster station/ assembly area shall be identified wherein all the workers and staff can gather at times of emergency.
- (5) The Contractor shall regularly inspect, test and maintain all safety equipment, scaffolds, guard-rails, working platforms, hoists, ladders and other means of access and egress, lifting, lighting, signage and guarding equipment.
- (6) Lights and signs shall be kept clear of obstructions and legible to read.
- (7) Equipment which is damaged, dirty, incorrectly positioned or not in working order shall be repaired or replaced immediately.

15.9 First Aid

- (1) The Contractor shall establish, maintain, staff, and fully equip a first aid base as detailed in **Part 2 “Employer’s Requirement, Section VI, Volume 6, Appendix 10 – First Aid Base”**.

15.10 Site Publicity

- (1) The Contractor shall ensure that safety, rescue and industrial health matters are given a high degree of publicity to all persons regularly or occasionally on the site.
- (2) Posters, in both Hindi and English, drawing attention to site safety, rescue and industrial health regulation shall be made or obtained from the appropriate sources and shall be displayed prominently in relevant areas of the site.
- (3) These posters shall be changed on a monthly basis in order to ensure their continued impact.
- (4) All personnel whether permanent, temporary or visitors will be given a site safety induction before they are allowed on to the site.

15.11 Training

- (1) The Contractor shall conduct health and safety orientation training for all the personnel engaged at site.
- (2) The contractor shall conduct regular health & safety training and rescue training drills, the frequency, coverage and application of which shall be in accordance with the site safety plan, and in any case shall not be more than every six months. Engineer may monitor the content of such training programs.
- (3) The Contractor shall require that all sub-Contractors' employees participate in relevant training courses appropriate to the nature, scale and duration of the sub-contract works.
- (4) The Contractor shall produce a description of the safety training courses that are to be provided. The syllabus, frequency, coverage and application of training courses shall be included together with the means of attaining the objective that all workmen shall be required to attend a safety induction course within their first week on site and thereafter at times appropriate to their prospective duties and at intervals of not more than six months. A summary of such training program conducted/ planned shall form part of Monthly Progress Report.

15.12 Breach of Safety Regulations

- (1) Any employees of the Contractor or sub-Contractor of any tiers who commit a serious breach of the safety regulations shall be liable to summary dismissal and shall not be re-employed on the Contract or allowed on any of the sites.
- (2) The due notice of this sanction shall be prominently displayed on the site.

15.13 Safety Devices

- (1) All plant and equipment used on or around the site shall be fitted with appropriate safety devices which shall be operational at all times and shall be regularly inspected and tested.
- (2) These shall include amongst others effective safety catches for crane hooks and other lifting devices.
- (3) Functioning automatic warning devices and, where applicable, an up-to-date test certificate, for cranes and hoists.
- (4) All plant and equipment used on or around the site shall be operated by suitably trained and qualified personnel with valid licences from the appropriate authorities.

15.14 Testing and Certification of Lifting Gear

- (1) The Contractor shall provide and maintain safe mechanical cranes, hoists and conveying facilities for the lifting and transport of materials and shall comply with all relevant codes of practice for safe use of cranes.
- (2) All cranes, hoists and the like shall be fitted with audible overload warning devices.
- (3) All such equipment shall be regularly maintained in accordance with manufacturers' recommendations and standards having regard to local legislation and recommendations from the appropriate statutory authority.
- (4) Prior to use on site, all lifting appliances and lifting gear shall be tested to an approved safety margin and suitably identified in accordance with the requirements of the current legislation.
- (5) The test certificate shall be submitted to the Engineer for review prior to the use of such equipment on site.
- (6) The safe working load shall be clearly and indelibly marked on all lifting appliances and lifting gear either by stamping or by the addition of permanently secured tag labels.
- (7) Stamping shall not be permitted on any stress-bearing part.
- (8) The Contractor shall prepare and maintain an up-to-date register containing test certificates of all lifting and hoisting equipment used on the Works.
- (9) The Contractor shall notify the Engineer of the person responsible for maintaining this register.
- (10) The register shall, from the commencement of construction, be available on site for inspection by the Engineer and relevant authorities.

- (11) Heavy plant or equipment which does not come under the jurisdiction of any local statutory legislation shall be subject to the testing and examination requirements as recommended by its manufacturer or in the absence of such, it shall be the responsibility of the Contractor to submit a standard or method of testing and examination to the Engineer for review.
- (12) Competent operators with certificates certifying that the proposed operator has received training in the general principles of crane operation and specific training in the type of lifting or hoisting equipment he is required to operate shall be provided for the control of all lifting and hoisting equipment.

15.15 Fire Regulations and Safety

- (1) The Contractor shall provide and maintain all necessary temporary fire protection and fire fighting facilities on the site during the construction of the Works, and shall comply with all requirements of the local fire services department.
- (2) These facilities may include, without limitation, sprinkler systems and fire hose reels in temporary site buildings, raw water storage tanks and portable fire extinguishers suitable for the conditions on the site and potential hazards.
- (3) The Contractor shall submit details of these facilities to the Engineer for review prior to commencement of work on the site.
- (4) If, in the Engineer's opinion, the use of naked lights may cause a fire hazard, the Contractor shall take such additional precautions and provide such additional fire fighting equipment as the Engineer considers necessary.
- (5) The term "naked light" shall be deemed to include electric arcs and oxyacetylene or other flames used in welding or cutting metals.
- (6) Oxyacetylene burning equipment will not be permitted in any confined space. If required, the burning equipment of the oxy-propane type shall be used.

15.16 Interface with Indian Railway Operations

- (1) The Contractor will review the interfaces with Indian Railway's operations and prepare a specific safety plan for all works that may affect the operating railway.
- (2) The Contractor will comply with and incorporate Indian Railway's rules and regulations for track, signalling and operations possessions into his safety plan and will operate a permit to work system for all works which may affect the operations of the existing railway.
- (3) Similarly, the site safety plan shall consider with other interfacing contractors in the closed vicinity of the Employer.

15.17 Dangerous Goods and Radiation

- (1) The Contractor shall ensure that all gases, fuels and other dangerous goods are stored and handled in a safe manner and in accordance with the statutory regulations and as required by the Engineer.
- (2) The Contractor shall be responsible for obtaining the requisite licences and permission to store and handle such substance.
- (3) No use of radioactive substances and radiating apparatus or operation involving ionizing, electromagnetic radiation or X-rays shall be carried out without the prior consent of the Engineer.

- (4) The Contractor shall ensure that all personnel and members of the public are properly protected from the effects of any such radiation.
- (5) Each radiation area shall have conspicuous signs and barriers.
- (6) The Contractor shall submit for review by the Engineer details of the training given to nominated employees on the safe use, handling, transport and storage of dangerous goods, radioactive substances, radiation and X-ray equipment prior to their introduction on site.
- (7) A training module shall include the necessary measures to be taken in case of emergency.

15.18 Hazard and Risk Assessments

- (1) The Contractor shall, prior to the commencement of any operation carry out a detailed hazard and risk assessment.
- (2) The results of such assessments shall be recorded and the records kept for inspection by the Engineer.
- (3) The Contractor shall produce detailed method statements for all medium and high risk operations and shall submit them to the Engineer for his consent prior to commencement of any task to which they relate.
- (4) The Contractor shall produce and implement a permit to work system for all high risk operations.
- (5) The permit to work system shall be submitted to the Engineer for consent before application.

15.19 Explosives

- (1) If explosives are required to be used for the work then the Contractor should apply for the permission to appropriate authority after obtaining written consent of the Engineer.
- (2) Before consent to blasting is granted, the Contractor shall prepare a specification as to the size of charge, the method of firing and any other restrictions that may be imposed from time to time.
- (3) Where the Engineer has consented to the use of explosives, the Contractor shall be responsible for obtaining the requisite licences and permits for complying with all statutory requirements for blasting.
- (4) The storage, transportation and use of explosives shall at all times be governed by the Explosives acts and such other statutory regulations which may be applicable and as imposed by the statutory authorities.

15.20 Standby Equipment

- (1) The Contractor shall provide adequate stand-by equipment to ensure the safety of personnel, the Works and the public.
- (2) The Contractor shall provide adequate stand-by PPE resources to ensure good health of personnel.

15.21 Co-operation

- (1) The Contractor shall provide full co-operation and assistance in all safety surveillance carried out by the Engineer or the Employer. Any breaches of the site

safety plan or the statutory regulations or others disregard for the safety of any persons may be the reason for the Engineer to exercise his authority to require the Contractor's site representative's removal from the site besides taking suitable action as mentioned in **“SHE Manual of DFCC” in Part IV, Reference Documents.**

APPENDIX 13 ENVIRONMENTAL PROTECTION REQUIREMENTS

1. Measures for the Mitigation of Environmental Impacts

This section describes mitigation measures to be taken in pre-construction construction and defect notification stages against environmental impacts. While compliance of applicable statutory laws is essential, mitigation measures as described herein are to be adopted for land, water, air, noise, vibration and for protection of flora, fauna, health and safety issues. In case of any discrepancy, detailed Environmental Assessment Report given in **Part-4, Bidding Documents** shall prevail.

2. General

- (1) The Contractor shall develop within 119 days of the Commencement Date its own Environment Management Plan (EMP), as part of the Contractor's Safety Health and Environment Plan (SHE), and submit to the Engineer for approval in accordance with the EA report (included in Part 4 of the Bidding Documents), relevant Government of India Legislation like Pollution Control Board, various environmental monitoring agencies of Government etc.
- (2) The Contractor's detailed technical designs for the Works and operations during construction shall conform to all Indian Environmental Laws and the EA report (included in part 4 of the Bidding Documents) at all times.
- (3) The current national standards established by the Indian Government for control of environmental pollutants such as air, water, noise and visual impacts/aesthetics shall be followed for compliance during pre-construction construction and defect notification stages, .
- (4) The Contractor's designs and plans shall be based upon the applicable provisions in the **Environmental Management Plan of DFCC, Environmental Impact Assessment Report and Social Impact Assessment Report of DFCC** provided in "**Reference documents - Part 4 of Bidding Documents,**". These documents also contain organization framework of DFCC, roles and responsibilities of various stakeholders for implementation of effective EMP.
- (5) The Contractor shall ensure that proper and adequate provisions to this end are included in all sub-contracts placed by him.
- (6) The provisions of this Appendix however, shall not be applicable in the case of emergency works necessary for saving of life and property or safety of the Works which shall have prior approval of Engineer in all cases.
- (7) The Contractor shall undertake environmental monitoring as required under the contract, the Employer's EIA, SIA and supplement to the EIA, SIA recommendations.
- (8) The Contractor shall prepare a plan for self-monitoring over the course of the project and submit to the Engineer for approval.
- (9) The Contractor shall ensure that audits of all the activities detailed in his EMP are carried out at monthly intervals and reported in the Monthly Reports to ensure the continuing effectiveness and compliance with the EMP.
- (10) The Contractor shall make available on request any document, which relates to his recent internal audits.
- (11) The Engineer may conduct quarterly audits of the Contractor's EMP and its effective implementation on the works site.

- (12) During the audit the Contractor shall provide a suitable number of qualified staff as directed by the Engineer to assist the Engineer during the audit.
- (13) Requirements established in the EMP specification shall apply to all sites and all activities of the Contractor, including the detailed technical designs of the civil and track and Systems infrastructure, and shall supplement the Employer's Requirements.
- (14) In the EMP the Contractor shall appoint a suitably qualified manager responsible for the environmental as well as a support team to assist this manager. Roles and responsibilities and key communication links must be highlighted to ensure responsibility for implementing the EMP.
- (15) The project may be a source of electromagnetic fields by transmission of electrical energy and the negative influences of the electromagnetic fields shall be taken into account with respect to clearances to and locations of the new traction power substations and Overhead Transmission lines (OHTL).
- (16) The Contractor shall ensure that its Environment Plan documentation includes but is not limited to the provisions covered in this appendix.

3. Environmental management process

Environmental management is based on the potential impacts assessed for the project. Assessment of potential impacts is based on the review of secondary data substantiated by site visits – environmental monitoring, public consultation, household survey and discussion with concerned Govt. Dept. The implementation of Environmental Management Plan (EMP) requires the following:-

- a) An organizational structure
- b) Assign responsibilities
- c) Define timing of implementation
- d) Define monitoring responsibilities

4. EMP during construction

The project activities shall be executed in a phased manner, pre-construction phase, construction phase and operation phase. The major activities to be undertaken during construction phase are described below.

The environmental issues during construction phase generally involve quality, safety and public health issues. The Contractor is required to comply with the laws with respect to environment protection, pollution control, forest conservation, safety and any other applicable laws. Environmental pollution control during the construction phase shall be the responsibility of the Contractor. EMP is an executable part of project and the activities are to be guided, controlled, monitored and managed as per the provisions provided.

5. Social Impact Management Plan (By DFCCIL)

DFCCIL is responsible for implementation of Social Impact Management & RAP. Rehabilitation of PAFs and removal of affected structures shall be responsibility of DFCCIL.

6. Land Acquisition / Diversion Plan (By DFCCIL)

Acquisition of land is the responsibility of DFCCIL. The proposed alignment traverses through forest, settlement and agricultural areas. Approximately 983 sqm of forest land is likely to be acquired by DFCCIL for Contract Package 201. There is no forest land required for Contract Package 202.

- i. At the outset Right of Way (RoW) along the entire DFC alignment has been established and confirmed from the State Forest, Agriculture and Land Revenue Departments.
- ii. Diversion of forest land is ensured for the project by DFCCIL in compliance to Forest Conservation Act, 1980.
- iii. The acquisition of land and private property shall be carried out in accordance to the Resettlement Action Plan (RAP).

Where temporary land is acquired by the Contractor for setting up labour camp, work site, placing of construction related equipment, dumping of wastes, stacking of excavated earth, construction materials etc., the Contractor shall be responsible for such land acquisition/ hiring from the rightful owners following applicable procedures/ rules, compensation / rent thereof and implementation of EMP provisions for the same.

7. Avoidance of nuisance

- a) The Contractor shall take all precautions to avoid any nuisance arising from his operations. This shall be accomplished, wherever possible by suppression of nuisance at source rather than abatement of the nuisance once generated.
- b) Following site clearing and before construction, the Contractor shall remove all trash, debris and other weeds.
- c) The Contractor shall ensure that the work place is free of trash, garbage, debris and weeds. He shall provide and ensure proper uses of refuse containers to ensure that rodents, insects and other pests are not harboured and attracted.
- d) The Contractor shall provide a dedicated team of workers at each work site who shall be solely employed to keep the site and its surroundings in a clean condition and maintain a good standard of house-keeping on the site.
- e) All vehicles leaving the site shall have their wheels washed to prevent any soil or other material from contaminating the public roads.
- f) The Contractor shall promptly transport all excavation disposal materials of whatever kind so as not to delay work on the project. Stockpiling of materials shall only be allowed at sites designated by the Engineer.
- g) The Contractor shall protect structures, utilities, pavements and other facilities from disfiguration and damage.
- h) The Contractor's temporary dumping areas shall be maintained by the Contractor till the materials are re-utilized for back-filling or any other purpose as per instruction of Engineer.

8. Utility Shifting

While utilities are identified by the DFCCIL for shifting to facilitate construction of DFC, shifting work is to be carried out by the Contractor in consultation with the utility owners as detailed in **Appendix 1 of this Volume**.

9. Construction / Labour Camp Management

During the construction phase, proper construction camp development plan has to be formulated to control degradation of the surrounding landscape due to the location of the proposed construction camp. The Contractor must provide, construct and maintain necessary living condition and ancillary facilities as detailed in para 12.3 of Volume 5, Section VI, Part 2 of Bidding Documents and shall comprise the following:

- a) Sufficient supply of potable water must be provided at camps and working sites. If the drinking water is obtained from the intermittent public water supply, then storage tanks must be provided. All water supply storage may be sufficiently away from the toilets or drains.
- b) Adequate and clean washing and bathing facilities must be provided that also have sufficient drainage.
- c) Adequate sanitary facilities may be provided within every camp. The place must be cleaned daily and maintain strict sanitary conditions. Separate latrine must be provided for women. Adequate supply of water must also be provided.
- d) The contractor must ensure that there is proper drainage system to avoid creation of stagnant water bodies.
- e) Periodic health check ups may be conducted. These activities may be provided by the construction contractor in consultation with State Public Health Department. At every camp, first aid facilities with suitable transport must be provided as detailed in Appendix 10 of this Volume.
- f) Adequate supply of fuel in the form of kerosene or LPG may be provided to construction labour, to avoid felling of trees for cooking and other household activities. No open fires may be allowed in camps.
- g) The sites should be secured by fencing and proper lighting.
- h) The construction contractor may ensure that all construction equipments and vehicle machinery may be stored at a separate place / yard.
- i) Fuel storage and refilling areas may be located 500 m away from the water bodies and from other cross drainage structures.
- j) All the construction workers should be provided with proper training to handle potential occupation hazards and on safety and health which include the following:-
 - Environmental awareness program
 - Medical surveillance
 - Engineering controls, work practices and protective equipment
 - Handling of raw and processed material
 - Emergency response
- k) Construction / labour camps shall be located away from forest areas, settlements, cultural heritage and historical sites and water bodies and dry river beds.
- l) It should be ensured by the construction contractor that the camp area is cleared of the debris and other wastes after the completion of construction. On completion of construction, the land should be restored back to its original form to the satisfaction of DFCCIL.

10. Mitigation Measures of Land Environment during Construction

While DFCCIL is responsible for land acquisition for clear ROW, the Contractor shall be responsible for use of the land during construction. Hence, the Contractor

shall take necessary measures as enumerated in the EMP to prevent/ arrest soil erosion, contamination.

Land acquisition, soil erosion and contamination of soil have emerged as major sources of impact on the land especially in urban areas and nearby watercourses. Proposed project aimed to enhance the efficiency of rail transport system, which shall result in economic growth in the region over time. Possible impacts on land are given below.

Sl. No.	Item	Impact	Impact (Reason)	Mitigation / Enhancement
1.	Change in topography	Marginal impact	Due to embankment raising	Balancing culverts to be provided
2.	Change in geology	Direct, long term, negative impact	Extraction of materials (borrow earth, coarse & fine aggregates)	Quarry redevelopment plan to be prepared. (If material is procured from a private quarry then Contractor is required to arrange and submit such a plan from the quarry owner.
3.	Change in seismology	No negative impact	Natural process	Cross drainage structures shall be checked and complied with the seismological settings of the region as per the applicable Design codes.
4.	Change in land environment	Direct negative impact	May be due to construction activities	Preventive measures against pollution of land/ soil to be taken
a.	Generation of debris	Negative impact	May contaminate air, water and land, if not disposed properly	Disposed properly to avoid contamination
b.	Soil erosion	Moderate, direct, long term negative impact	<ul style="list-style-type: none"> • Slopes and spoils near the bridges • Construction of new bridges and culverts • quarry and borrow areas 	<ul style="list-style-type: none"> • Embankment protection • Residual spoil need to be disposed properly • silt fencing need to be provided, • quarries and borrow areas shall have necessary consents / approvals from authorities. All quarries and borrow areas closed after the project shall be reclaimed. In case of quarries not being operated by Contractor shall submit such approvals or consents from the quarry owner.
5.	Contamination of soil	Direct, long term negative impact	<ul style="list-style-type: none"> • Scarified bitumen wastes • Oil & diesel spills • Emulsion sprayer and lying of hot mix • Production of hot mix and rejected materials • Residential facilities for the labor and officers requiring routine and periodical maintenance 	<ul style="list-style-type: none"> • Hazardous Waste (Management, Handling and Trans-boundary) Rules, 2008 to be enforced. • Oil interceptor shall be provided for accidental spill of oil and diesel • Septic tank or suitable waste disposal facilities shall be constructed for waste disposal
6.	Soil quality monitoring		<ul style="list-style-type: none"> • Effectiveness / shortfall (if any) • Any unforeseen impact 	Measures shall be reviewed & improved to mitigate / enhance environment due to any unforeseen impacts

Plantation shall be carried out to improve the aesthetic look of the construction area as per the plantation plan provided in the Reference Documents, Part 4, Bidding Documents and within the land acquired by the DFCCIL. Selection of species shall be done by the Contractor in consultation with Engineer.

11. Borrow Area Management Plan

Borrow areas shall be identified and finalized by the Contractor in consultation with Engineer. Formal agreement between landowners and the Contractor has to be made. Suitability of borrow areas from civil Engineering as well as environmental consideration has to be ensured. Meeting the guidelines/notifications as stipulated from time to time by the Ministry of Environment and Forests, Government of India, and local bodies, as applicable shall be the sole responsibility of the Contractor.

Besides this, precautions are to be taken by the Contractor for no unauthorized borrowing. No borrow area shall be opened without permission of the Engineer. Engineer in addition to the established practices, rules and regulation shall also consider under-mentioned criteria before approving the Borrow areas.

To avoid any embankment slippage, the borrow areas shall not be dug continuously and the size and shape of borrow pits shall be decided by the Engineer. Redevelopment of the borrow areas to mitigate the impacts shall be the responsibility of the Contractor. The Contractor shall evolve site-specific redevelopment plans for each borrow area location, which shall be implemented after the approval of the Engineer.

To ensure that the spills, which might result from the transport of borrow and quarry materials do not impact the settlements, it shall be ensured that the excavation and carrying of earth shall be done in a careful manner. The unpaved surfaces used for the haulage of borrow materials shall be maintained properly. Borrowing of earth shall be carried out at locations recommended as follows:

Non-Cultivable Lands: Borrowing of earth shall be carried out up to a depth of 2 m from the existing ground level.

Borrowing of earth shall not be done continuously. Ridges of not less than 8m width shall be left at intervals not exceeding 300 m. Small drains shall be cut through the ridges, if necessary, to facilitate drainage. Borrow pits shall have slopes not steeper than 1 vertical in 4 horizontal.

Productive Lands: Borrowing of earth shall be avoided on productive lands. However, in the event of borrowing from productive lands, under circumstances as described above, topsoil shall be preserved in stockpiles. The conservation of topsoil shall be carried out as described in section of this chapter. At such locations, the depth of borrow pits shall not exceed 45 cm and it may be dug out to a depth of not more than 30 cm after stripping the 15 cm top soil aside.

Borrow pits along Roadside: Borrow pits shall be located minimum 5m away from DFCCIL boundary. Depth of the pit should be such that the bottom of the pit shall not fall within an imaginary line of slope 1 vertical to 4 horizontal projected from the edge of the final section of the bank. Borrow pits should not be dug continuously. Ridges of not less than 8 m width should be left at intervals not exceeding 300 m. Small drains should be cut through the ridges to facilitate drainage.

Borrow pits on the riverside: The borrow pit should be located not less than 15m from the toe of the bank, distance depending on the magnitude and duration of flood to be withstood.

Community / Private Ponds: Borrowing can be carried out at locations, where the private owners (or in some cases, the community) desire to develop lands (mostly low-lying areas) for pisciculture purposes and for use as fishponds.

General: Contractor shall ensure the following issues are covered to the satisfaction of Engineer.

- a) Water ponding should be avoided / managed so that no disease spread or mosquito breeding takes place due to water stagnation.
- b) Precautionary measures as the covering of vehicles may be taken to avoid spillage during transportation of borrow area.
- c) Haulage of material to embankments or other areas of fill shall proceed only when sufficient spreading and compaction facility is operating at the place of deposition, to minimize dust pollution.
- d) During rains appropriate measures to be taken to minimize soil erosion, silt fencing to be provided as directed by Engineer/EO.
- e) Borrow pit should have proper guard to prevent accidental falling of children or animals.

The Contractor shall keep record of photographs of various stages i.e., before using materials from the location (pre-project), for the period borrowing activities construction Phase) and after rehabilitation (post development), to ascertain the pre and post borrowing status of the area.

An appropriate Borrow Area Management Plan shall be formulated to control the degradation of the surrounding landscape due to the excavation work. The national standard which applies to the manual borrowing of earth is detailed in IRC-10:1961.

12. Mitigation Measures to Minimize Soil Erosion during construction

- a) Suitable protection measures consisting of bio-Engineering techniques such as plantation of grass and shrubs, may be provided to control erosion. The measures shall be applied along the slopes at high embankment where bridges shall be constructed.

- b) Borrow areas may be finalized in concern with ecological sensitivity of the area. Agriculture land may not be used as borrow areas. Priority may be given to degraded area for excavation of borrows material. Rehabilitation of borrow area may be taken under the project.
- c) Construction work may be avoided during rainy season to evade erosion and spreading of loose material.
- d) Top soil removed from agricultural land may be stored separately in bunded areas and utilized during plantation or refilling of excavated area.
- e) Selection of borrow areas may be done considering the waste land available in the district. Agricultural areas may be not used as borrow areas.

13. Geo-technical issues

The Contractor shall submit within the EMP the expected construction impacts for all major facilities and sections of higher embankments and deeper excavations, including materials used for the building of the formation prior to construction, these impacts should include:

- a) Determination of formation material quality and placement impact;
- b) Stability factors, including seismic migration;
- c) Drainage facilities for groundwater dewatering;
- d) Effects on the local communities and transportation networks from overland truck transport of fill and excavate to and from the specific borrow and fill sites.
- e) Specific mitigation measures and maintenance-of-traffic plans to ensure minimal disruption on local traffic conditions and the environment.

14. Mitigation Measures for Ambient Air Quality

- 1. Pre Construction / preparatory Phase: The dust generation due to pre-construction activities shall be temporary in nature and localized and shall be effectively countered by sprinkling of water wherever required.
- 2. Construction Phase: Contractor shall undertake following e specific measures regarding this aspect:-
 - a) Locating plant at a significant distance from nearest human settlement in the predominant down wind direction.
 - b) Vehicles delivering fine materials like soil and fine aggregates may be covered to reduce spills on existing roads.
 - c) Water shall be sprayed on earthworks, temporary haulage and diversions on a regular basis.
 - d) Batch type hot mix plants fitted with the bag filter / cyclone and scrubber shall be installed for the reduction of the air pollution.
 - e) Hot mix plant and crushers shall be located at least 1 km from habitations and in down wind direction.
 - f) Pollution control systems like water sprinkling and dust extractors and cover on conveyors shall be installed for the crushers.
 - g) All vehicles, equipment and machinery used for construction shall be regularly maintained to ensure that the emission levels conform to the SPCB/CPCB norms.
 - h) Air pollution monitoring plan has been delineated for construction phase separately for checking the effectiveness of the mitigation measures shall be adopted during the construction phase of the Contract

- i) Air quality monitoring shall be conducted during construction period and CPCB standard should be followed. The location and frequency of air monitoring is covered in EA document referred.

15. Mitigation Measures for Water Quality

Due to the proposed project there shall be some direct and indirect long term impacts on the water resources during construction. Table below presents the major adverse impacts on the water resources and the mitigation measures taken. While planning for mitigation measures is the responsibility of the DFCCIL, the Contractor shall be responsible for execution of the same.

Sl. No.	Item	Impact	Impact (Reason)	Mitigation/Enhancement
1.	Loss of water bodies	Not significant as no major water bodies is fully affected	Part or acquisition of source of water	<ul style="list-style-type: none"> Land will be acquired by DFCCIL for ROW Relocation of surface water sources by DFCCIL
2.	Alteration of cross drainage	Very low impact	<ul style="list-style-type: none"> Major bridge over existing causeway Widening of minor bridges and culverts 	Construction of new bridges and bridging of existing causeways, if detailed in the Scope of Works.
3.	Runoff and drainage	Direct impact	<ul style="list-style-type: none"> Siltation of water bodies Reduction in ground recharge Increased drainage discharge 	<ul style="list-style-type: none"> Silt fencing to be provided Recharge well to be provided to compensate the loss of precious surface water, at critical locations and as detailed in the Employer's Requirements. Continuous drain is provided, unlined in rural area and lined in urban areas at critical locations and as detailed in the Employer's Requirements..
4.	Water requirement for construction work (to be organized by Contractor)	Direct impact	<ul style="list-style-type: none"> Water requirement for construction activity. Water requirement of labour 	Contractor needs to obtain approval for taking adequate quantities of water from surface and ground water sources from applicable competent authority.
5.	Water Quality			
a.	Increased sedimentation	Direct impact	<ul style="list-style-type: none"> Increased sediment laden run-off alter the nature & capacity of the watercourse 	Guidelines for sediment control shall be followed
b.	Contamination of water	Direct adverse impact	<ul style="list-style-type: none"> Scarified bitumen wastes Oil & diesel spills Emulsion sprayer and laying of hot mix Production of hot mix and rejected materials Residential facilities for the labour and officers Routine and 	<ul style="list-style-type: none"> Hazardous Wastes (Management, Handling and Transboundary) Rules, 2008 to be enforced Oil interceptor shall be provided for accidental spill of oil and diesel by Engineer Septic tank or suitable disposal arrangements shall be provided for waste disposal

Sl. No.	Item	Impact	Impact (Reason)	Mitigation/Enhancement
			periodical maintenance	
6.	Water quality monitoring	Data to be monitored w.r.t. statutory norms	<ul style="list-style-type: none"> Effectiveness / shortfall (if any) Any unforeseen impact 	Measures shall be reviewed & improved to mitigate / enhance environment due to any unforeseen impact

15.1 Water Quality Management

Contractor shall undertake following measures to avoid contamination of water bodies:-

- Oil interceptor shall be provided at plant site and material trucks unloading area.
- Construction work close to the streams or water bodies may be avoided during monsoon.
- The discharge standards promulgated under the Environmental Protection Act, 1986 shall be strictly adhered to. All wastes arising from the project shall be disposed off in a manner that is as per the provisions of the State Pollution Control Board (SPCB).
- Unless otherwise authorised by the local sanitary authority, arrangements for proper disposal of excreta by incineration at the workplace suitably approved by the local medical health or municipal authorities shall be made.
- Water quality shall be monitored regularly near the construction site.

16. Noise Environment – Mitigation Measures

Following mitigation measures will be implemented by the Contractor.

Sl. No.	Item	Impact	Impact (Reason)	Mitigation / Enhancement
1	Sensitive receptors (planning stage)	Direct impact	Increase in noise pollution	Noise barrier or suitable measures to be provided as per the EMP
2	Noise pollution (pre-construction)	Direct impact, short duration	<ul style="list-style-type: none"> Man, material and machinery movements Establishment of labor camps onsite offices, stock yards and construction plants 	<ul style="list-style-type: none"> Area specific and for short duration Machinery to be checked & complied with noise pollution regulations. Camps to be setup away from the settlements, in the down wind direction.
3	Noise Pollution (Construction Stage)	Marginal impact	<ul style="list-style-type: none"> stone crushing, asphalt production plant and batching plants, diesel generators etc Community 	<ul style="list-style-type: none"> Camps to be setup away from the settlements, in the down wind direction. Noise pollution regulation to be monitored and enforced. Temporary, as the work zone will be changing with completion of

Sl. No.	Item	Impact	Impact (Reason)	Mitigation / Enhancement
			residing near to the work zones	construction
4	Noise Pollution Monitoring (Construction stage)	Data to be monitored w.r.t. statutory norms	Effectiveness / shortfall (if any) Any unforeseen impact	Measures will be reviewed & improved to mitigate/ enhance environment due to any unforeseen impact.

17. Sensitive Receptors – Mitigation Measures

All schools, hospitals and cultural properties have been identified by the DFCCIL as pre-project activity and those that are close to the project i.e. within 100 m distance require noise control measures. Noise barriers shall be provided at these fifteen locations to reduce the noise level. The noise level may be reduced up to 10-15 dB(A) erecting suitable barrier to accommodate the long term impact. List of sensitive receptors along the project corridor is presented in table below.

Sl. No.	Chainage (Km.)	Name of Receptor	Distance from the proposed track (m.)	Impact	Mitigation / Enhancement
1.	692	Hospital	90	Direct impact, high noise level	Noise barrier shall be provided that ensures compliance with the applicable noise standards during construction phase. Typical designs may be referred in EA reports provided in part 4 of the bidding documents.
2.	704	Health Centre	30	Direct impact, high noise level	
3.	736	School	45	Direct impact, high noise level	
4.	738	School	45	Direct impact, high noise level	
5.	751	School	60	Direct impact, high noise level	
6.	755	School	60	Direct impact, high noise level	
7.	795	Hospital	85	Direct impact, high noise level	
8.	805	Degree college	40	Direct impact, high noise level	
9.	839	Govt .hospital	30	Direct impact, high noise level	
10.	839	School	40	Direct impact, high noise level	
11.	843	Religious	25	Direct impact, high noise level	
12.	857	Hospital	38m from IR track	Direct impact, high noise level	
13.	1004	School	45	Direct impact, high	

Sl. No.	Chainage (Km.)	Name of Receptor	Distance from the proposed track (m.)	Impact	Mitigation / Enhancement
				noise level	
14.	1020	Institute	40	Direct impact, high noise level	
15.	1045	Primary School	45	Direct impact, high noise level	

18. Mitigation Measures for Noise during Construction Phase

- a) Noise standards shall be strictly enforced on all vehicles, plants, equipment, and construction machinery. All construction equipment used for an 8-hour shift shall conform to a standard of less than 90 dB(A). If required, high noise producing generators such as concrete mixers, generators, graders, etc. shall be provided with noise shields/ mufflers.
- b) Machinery and vehicles shall be maintained regularly, with particular attention to silencers and mufflers, to keep construction noise levels to minimum.
- c) Workers in the vicinity of high noise levels shall be provided earplugs/ ear mufflers helmets and shall be engaged in diversified activities to prevent prolonged exposure to noise levels of more than 90 dB(A) per 8 hour shift. CPCB standard is to be observed.
- d) During construction vibratory compactors will be used with due care within the urban areas. In case of complaints from nearby residents, the Engineer shall ask the Contractor to take suitable steps of restricting the work hours even further or use an alternative roller.
- e) Proposed tree and shrub plantations planned for avenue plantation especially close to settlements, may form an effective sound buffer during the operation stage.
- f) People have to be convinced / educated to prevent sensitive land uses from developing up adjacent to the project corridors.

19. Control requirements

Under the Contract, the Contractor shall:

- a) Perform work within the procedures outlined herein and comply with applicable codes, regulations, and standards established by the Indian Government and their agencies.
- b) Schedule and conduct operations in a manner that shall minimize, to the greatest extent feasible, the disturbance to the public in areas adjacent to the construction activities and to occupants of buildings in the vicinity of the construction activities.
- c) Submit to the Engineer a Noise Monitoring and Control Plan (NMCP), within 4 months from Commencement Date, which shall form part of the overall EMP, including full and comprehensive details of all powered mechanical equipment, which he proposes to use during daytime and night-time and of his proposed working methods and noise level reduction measures.
- d) The NMCP shall include detailed noise calculations to demonstrate the anticipated noise generation by the Contractor.

- e) The NMCP prepared by the Contractor shall guide the implementation of construction activity.
- f) The NMCP will be reviewed on a regular basis and updated as necessary to ensure that current construction activities are addressed.
- g) It shall appear as a regular agenda item in project coordination meetings

20. Mitigation Measures for Hydrological Condition (Rivers and Lakes)

- 1) Construction Phase
 - a) To avoid any unwanted accumulation of water/ water logging, provision of temporary drainage arrangement due to construction activities shall be made by Contractor.
 - b) Silt fencing may be provided near water bodies.
 - c) Proper drainage may be planned in the area to avoid water logging.
- 2) Implementation Phase
 - a) Local drainage is likely to be affected due to formation of Railway Embankment as per DFCCIL plan.
 - b) Cross drainage structures shall be provided at appropriate locations as indicated in the scope of Works.

21. Mitigation Measures for Flora during construction

- a) DFCCIL has identified number of trees to be felled for clearing the ROW and it is mentioned in the EA report, **Part 4 Reference Documents of Bidding Documents**. DFCCIL will obtain clearance/ permission of forest department for tree felling and pay compensation thereof. However, the Contractor shall carry out tree cutting, stacking of wood and disposal. Subject to compliance with the aforementioned legislation, arrangements for tree felling shall be made by the Contractor and appropriate replacement of felled trees, as required by the legislation shall also be made by the Contractor at his own cost as detailed in Appendix 1 of this Volume.
- b) For temporary land / site hired/ acquired by the Contractor for construction labour camp, materials stacking/ storage, operating equipment etc. cutting of trees will be the responsibility of the Contractor. The Contractor shall follow all procedures as per Forest Department and / or statutory law/ guidelines including compensation. Fruit bearing trees shall be compensated including 5 years fruit yield.
- c) Trees falling outside the RoW shall not be felled.
- d) Labour camps and office site shall be located outside and away from the forest area.

22. Mitigation Measures for Fauna during construction

- a) Crossing passages must be made for animal movement by provision of under pass followed with some plantation so that it resembles with the habitat. List of such openings in the embankments are indicated in the Scope of Works.
- b) Water bodies may be developed inside forest area where forest land is acquired for non-forest (i.e., DFC) work, as the birds prefer water bodies. Details of such water bodies are indicated in the **Reference Documents Part 4 of the Bidding Documents**.

- c) Borrow areas can be also developed as ponds with grasses and shrubs planted around it.
- d) Silt fencing may be used near water bodies to avoid runoff into the water bodies.
- e) Construction activity may be avoided during night hours in forest area.
- f) Poaching must be strictly banned in the forest area. It may be ensured by the Contractor that no hunting or fishing is practiced at the site by any of the worker and that all site personnel are aware of the location, value and sensitivity of the wildlife resources. The Wildlife (Protection) Act, 1972 will be applicable.
- g) Awareness programme on Environment and Wildlife Conservation may be provided to the work force. Forest Act and Wildlife Act may be strictly adhered to.

23. Landscape

Construction Phase

Landscaping plan may be formulated for restoration, levelling and landscaping of the area once construction activities are over. This can involve the following:-

- a) The stockpiles may be designed such that the slope does not exceed 1:2 (vertical to horizontal) and the height of the pile to be restricted to 2 m.
- b) Stockpiled topsoil may be used to cover the disturbed areas and cut slopes. The top soil shall be utilized for redevelopment of borrow areas, landscaping along slopes, incidental spaces etc.
- c) Incorporation of suitable and effective contractual clauses for rehabilitation and restoration of borrow areas and other temporary works and landscaping it with surrounding area immediately after its use shall be made by the Contractor with its Sub Contractor for earthworks.
- d) Landscaping of surrounding area with plantation, ornamental plants may be planted near DFCC station, as indicated in the yard plans of respective stations (**Reference Documents Part 4 of the Bidding Documents**).

24. Vibration level limit

- a) The vibration level limits adjacent to the alignment shall conform to appropriate legislation of Government of India in this regard. In absence of any Indian standard, relevant international standards may be referred.
- b) The scheme for monitoring the vibration level at the site shall be submitted to Engineer for his approval.
- c) The scheme shall include:
 - i. monitoring requirements for vibrations at regular intervals throughout the construction period;
 - ii. pre-construction structural integrity inspections of historic and sensitive structures close to project activity is to be conducted by the Contractor in consultation with Engineer;
 - iii. Information dissemination about the construction method, probable effects, quality control measures and precautions to be used.

25. Archaeological chance find

The Uttar Pradesh being rich in archaeological sites, there may be 'chance finds' in the form of coin or relics and some underground structure.

Any structure/ article of archaeological importance found during construction stage along the alignment, shall be dealt as per the relevant Act and procedure detailed in Environmental Management Framework.

26. Public Health and Safety

The Contractor is required to comply with all the precautions required for the safety of the workmen. The Contractor must comply with all regulation regarding scaffolding, ladders, working platform, excavation, etc. as per SHE manual of DFCCIL. Silica Exposure Reduction Strategies to be implemented by the Contractor during construction is given at Annexure-I attached with this Appendix.

27. Green Belt

Green belt shall be developed within the land acquired by the DFCCIL for the project. Trees which the Contractor is required to plant in replacement of felled trees, as required by the legislation, shall be done in this green belt. This belt shall be developed and maintained by the Contractor at his own cost until the expiry of defect liability period. After the defect liability period, DFCCIL shall be responsible to maintain the green belt.

a) Preparation of the Plantation Area

A green belt is to be proposed along the alignment within the land acquired by DFCCIL after catering to the requirements of land for the project as per the applicable schedule of dimensions. Plantation site shall be cleared from all wild vegetation. Suitable soil and water conservation measures shall be adopted, if required. Since planting area may be large, it may be divided into blocks inter-linked by paths laid out in such a way that every tree is accessible for all post plantation care. The planting arrangement and size should be based on the optimum use of the available land and quantum of irrigation water.

b) Preparation of Pits and Sapling Transplantation

The location of each pit should be marked according to the design and distance of the plantation. Planting of the tree should be done under guidance of a horticulturist. While planting the trees, care should be taken that the installation structure should be difficult to see through the foliage when seen from a point outside the green envelop. For preventing the horizontal dispersion of the pollutants, the trees should be planted in alternate rows in a straight line. Tree trunks are free from foliage up to a height of 2 - 3 meters, it is advisable to grow shrubs in front of tree so as to provide coverage to the open portion.

Tree saplings are to be provided with guard for preventing animals/ human damaging the same.

c) Time of Plantation

Plantation should be done two weeks after the rain starts, as the trees benefit from the seasonal rains.

d) Protection of Greenbelt

Protection measures for survival of green belt shall be taken right from plantation stage during construction.

The Contractor shall maintain the green belt till defect liability period is over.

e) **Selection of Tree Species**

List of some plant species for greenbelt plantation purpose is given in the table below. However, local species shall be preferred for easy survival.

Sl. No.	Botanical Name	Common Name
1	<i>Alstonia scholaris</i>	Chattiyan
2	<i>Mimusops elengi</i>	Bakul
3	<i>Cassia fistula</i>	Amaltas
4	<i>Bauhinia purpurea</i>	Khairwal
5	<i>Zizyphus mauritiana</i>	Ber
6	<i>Cassia siamea</i>	Senna
7	<i>Ficus religiosa</i>	Peepal
8	<i>Albizia lebbek</i>	Siris
9	<i>Pongamia pinnata</i>	Karanj
10	<i>Polyalthia longifolia</i>	Ashok
11	<i>Diospyros melanoxylon</i>	Tendu
12	<i>Ailanthus excelsa</i>	Mar Maharakha
13	<i>Melia azedarach</i>	Bakain
14	<i>Tamarindus indica</i>	Imli
15	<i>Terminalia arjuna</i>	Arjuna
16	<i>Azadirachta Indica</i>	Neem
17	<i>Grevillea robusta</i>	Savukkamaram
18	Shrubs & Grasses	
	• <i>Calotropis gigantea</i>	Akand
	• <i>Nyctanthus arboriristis</i>	Harsighar
	• <i>Nerium indicum</i>	Kaner

f) **Plantation for Noise Pollution Control**

Trees having thick and fleshy leaves with petioles flexible and capacity to withstand vibration are suitable. Heavier branches and trunks of the trees also deflect or refract the sound waves. The density, height and width are critical factors in designing adequate noise screen with vegetation.

Combination of trees and shrubs together appears to be the best system for combating pollution. The following species are suggested for noise pollution:

- i. *Alstonia scholaris*
- ii. *Azadirachta indica*
- iii. *Melia azedarach*
- iv. *Grevillea robusta*
- v. *Tamrindus indica*
- vi. *Terminalia arjuna*

28. Waste

28.1 Control of waste generation during construction and its safe disposal is the responsibility of the Contractor.

- a) Principle of 3R's (Reduce, Reuse, Recycle) shall be followed while handling waste from the construction Site. The Contractor is required to develop, institute and maintain a Waste Management Programme (WMP) during the construction of the project for his works, which may include:-
 - i. Identification of disposal sites.
 - ii. Identification of quantities to be excavated and disposed off.
 - iii. Identification of split between waste and inert material
 - iv. Identification of amounts intended to be stored temporarily on site location of such storage.
 - v. Identification of intended transport means and route.
 - vi. Obtaining permission, wherever required, for disposal.
- b) A mechanism shall be developed to ensure that the pre-designated area is available for the segregation and temporary storage of reusable and recyclable materials. This shall be incorporated in the WMP. The WMP should be prepared and submitted to the Engineer for approval.
- c) The Contractor shall handle waste in a manner that ensures that wastes are held securely, maintained and waste storage area is cleaned regularly.
- d) The Contractor shall remove waste at regular interval and dispose at landfill sites, if available nearby, after obtaining approval/ consent of concerned authority. If such authority or landfill site is not available nearby, the wastes may be dumped at a pre-designated site within Project area in consultation with SPCB & Engineer.
- e) Burning of wastes is prohibited. The Contractor shall not burn debris or vegetation or construction waste on the site but remove as per relevant Rules.
- f) The Contractor shall make arrangements to disposal off metal scrap and other wastes which can be sold to authorized dealer(s) and maintain record of such sale for inspection by the Engineer.

28.2 Hazardous Waste Management (by Contractor)

- 1) Any waste classified as hazardous under the "Hazardous Wastes (Management, Handling and Transboundary) Rules, 2008, shall be disposed according to the concerned Rules.
- 2) Chemicals classified as hazardous chemicals under "Manufacture, Storage and Import of Hazardous Chemical Rules, 1989 shall be stored in compliance with the said Rules.
- 3) The Contractor shall identify the nature and quantity of hazardous waste generated as a result of his activities and shall file a "Request for Authorization" to SPCB along with a map showing the location of storage area.
- 4) Outside the storage area, the Contractor shall place a display board clearly mentioning 'Hazardous Wastes' and quantity and nature of wastes, on date. Hazardous Waste needs to be stored in secured manner..
- 5) It shall be the responsibility of the Contractor to ensure that hazardous wastes are stored, based on the composition, in a manner suitable for handling, storage and

transport. The labelling and packaging is required to be easily visible and be able to withstand physical conditions and climatic factors.

- 6) The Contractor shall approach only registered & authorized Recyclers of Hazardous Waste for direct sale/ disposal of Hazardous Waste, under intimation to SPCB.

29. Electromagnetic compatibility

- a) The Contractor shall be responsible for the detailed co-ordination of his Design and construction activities and shall take lead in the management of Electromagnetic Compatibility (EMC) concerning to his works.
- b) The Contractor shall be responsible for protection from electromagnetic interference. Contractor’s EMC responsibilities shall include but not be limited to the following:
- i. Provision of all information reasonably required by the interfacing with Parties in timely and professional manner at all times.
 - ii. The Contractor shall co-ordinate with the Engineer on all matters concerning EMC relating to works that may affect the IR operation of the existing route and pay special attention to the EMC protection of international, national, regional, private and IR telecommunication, radio and TV nets where such work shall be carried out in accordance with IR rules and regulations.

30. Environmental management plan & responsibilities

Table below presents summary of Environmental Management Plan (EMP) with the objective to minimize adverse environmental impacts during pre and during construction activities. The table covers possible environmental issues involved in the project and the corresponding necessary mitigation measures. Taking appropriate mitigation measures for the construction phase shall be the responsibility of the Contractor, and of the construction projects’ Environmental Engineer who shall supervise the implementation of the EMP.

The Contractor shall implement EMP during pre and during construction phases while mitigation measures during the operation phase shall be implemented by the DFCCIL. The details of Environmental Management Programme and Environmental Management Unit (EMU) are discussed in the subsequent paragraphs.

S. No.	Environmental Issue	Action to be Taken	Implementation By	Supervision By
Pre-construction phase				
1.	Removal of Trees	Trees are likely to be felled in the existing and acquired area for the proposed corridor The forest land along the railway line is being acquired for the project Compensation shall be made by DFCCIL for tree felling.	Construction Contractor	DFCCIL through Engineer or other nominated agencies
2.	Relocation of Cultural and Religious Properties	Identified structures to be shifted Relocation should be complete before construction work is taken up as detailed in Appendix 1 of this Volume.	Construction Contractor	DFCCIL through Engineer or other nominated

S. No.	Environmental Issue	Action to be Taken	Implementation By	Supervision By
				agencies
Construction Phase				
1.	Soil	<p>Suitable protection measures to be provided to control erosion.</p> <p>Borrow areas to be finalized as per instruction of Engineer. Agriculture land shall be avoided as a borrow area. Priority may be given to degraded area for excavation of borrow material.</p> <p>Rehabilitation of borrow area to be taken up. Construction work may be avoided during rainy season to avoid erosion and spreading of loose material.</p> <p>Top soil removed from agricultural land shall be stored separately in protected area for utilization during plantation or refilling of excavated area.</p>	Construction Contractor	DFCCIL through Engineer or other nominated agencies
2.	Water Bodies	<p>Provision of temporary drainage arrangement due to construction activities may be made by Contractor</p> <p>Silt fencing may be provided near water bodies</p> <p>Proper cross drainage structure may be planned at the crossing of the canal in consultation with Irrigation Department as detailed in the Scope of Works</p> <p>Proper drainage may be planned in the area to avoid water logging</p>	Construction Contractor	DFCCIL through Engineer or other nominated agencies
3.	Flora	<p>Felling of trees to be undertaken in coordination with Engineer and after obtaining permission of Forest dept.</p> <p>Trees outside the ROW shall not be felled.</p> <p>Labour Camps and office site shall be located outside & away from Forest area.</p> <p>Green belt development and social forestry may be practiced for success of the plantation as detailed in the write up.</p>	Construction Contractor	DFCCIL through Engineer or other nominated agencies
4.	Fauna	<p>Crossing passages shall be made for wildlife near forest areas such as under- pass followed with some plantation as detailed in the Scope of Works.</p> <p>Ponds may be developed inside forest areas as the birds prefer water bodies. Borrow areas may be considered for the purpose.</p> <p>Silt fencing may be used near water bodies to avoid runoff into the water bodies.</p> <p>Construction activity may be avoided during night hours in forest area.</p> <p>Poaching is strictly banned in the Forest area as per relevant Act. The Contractor and its personnel shall be follow the same.</p>	Construction Contractor	DFCCIL through Engineer or other nominated agencies

S. No.	Environmental Issue	Action to be Taken	Implementation By	Supervision By
5.	Chance find :Archaeological structure/ article	Any archaeological structure / article found during construction stage along the alignment, shall be dealt as per relevant Act and procedures	Construction Contractor	DFCCIL through Engineer or other nominated agencies
Pollution monitoring				
1.	Air	Adequate dust suppression measures to be undertaken to control fugitive dust. Plantation activity to be undertaken at the construction sites. Workers to be provided with mask to prevent breathing problems while working with dust generating machine/ earth excavation / filling process. Trucks carrying soil, sand and stone may be covered to avoid spilling. Low emission construction equipment, vehicles and generator sets shall be used Plants, machinery and equipment should be handled in a manner to minimize dust generation. All crushers used in construction shall confirm to relevant standards. Air quality monitoring to be conducted at construction sites periodically.	Construction Contractor	DFCCIL through Engineer or other nominated agencies / SPCB
2.	Water	Silt fencing shall provide near water bodies to avoid spillage of construction material. Discharge of waste from construction / labour camp into water bodies without treatment is strictly prohibited. Construction methodologies with minimum or no impact on water quality to be adopted. Construction debris /wastes to be disposed at designated sites	Construction Contractor	DFCCIL through Engineer or other nominated agencies / SPCB
3.	Soil	Asphalt emulsifier shall be handled with caution and any leakage detected shall be immediately rectified. Construction work may be avoided during rainy season to avoid erosion and spreading of loose material	Construction Contractor	DFCCIL through Engineer or other nominated agencies
4.	Solid Waste	Construction work shall be carried in such a way that minimum or no solid waste is generated at construction site. Extra earth material produced may be utilized for refilling of borrow areas. Rainy season may be avoided to minimize spreading of loose materials. Solid waste management plan may be framed	Construction Contractor	DFCCIL through Engineer or other nominated agencies / SPCB

S. No.	Environmental Issue	Action to be Taken	Implementation By	Supervision By
		for implementation in camp areas. Dustbins to be provided in the Camps. Proper sanitation facilities must be provided in Camp by the Contractor.		
5.	Noise & Vibration	Noise from construction machines to be minimized by selection of right machine and noise suppressor wherever possible. Construction equipment's and vehicles shall be in good working condition, properly lubricated and maintained to keep noise within permissible limits. Suitable noise barrier at Sensitive Receptors as detailed at paragraph 17 shall be provided. Temporary noise barriers to be installed at settlements and forest area, if required Plantation may be carried at the work site. Head phones, ear plugs to be provided to the workers working with high noise generating equipment at construction site. Noise level monitoring shall be conducted during construction phase. All vehicles, equipment and machinery used in construction shall be fitted with exhaust silencers.	Construction Contractor	DFCCIL through Engineer or other nominated agencies / SPCB
6.	Land Subsidence	Plantation shall be done to control erosion at specific areas	Construction Contractor	DFCCIL through Engineer or other nominated agencies
7.	Bottom Sediment	Silt fencing may be provided to avoid runoff into the river. Construction activity may be taken in dry season to avoid spreading of construction material and minimize impact on water quality	Construction Contractor	DFCCIL through Engineer or other nominated agencies

31. ENVIRONMENTAL MONITORING

The environmental monitoring shall be undertaken during construction and operation phases as per the details given the Table below. While the Contractor will be responsible for monitoring of environmental components during construction and necessary mitigation measures, DFCCIL will be responsible during operation phase.

Construction Phase

Sl. No.	Environmental Component	Parameter	Standards	Location	Frequency	Implementation by	Supervision
1	Air Quality	SPM, RPM, CO, NOx, SOx	CPCB standards	Stretch of the Project in progress near settlements and junctions stations. The preferred locations are at chainage 692, 704, 736, 738, 751, 755, 795, 805, 839, 843, 857, 1004, 1020, 1045 (list of SRs at para 17 may be referred).	3 times in a year (once in every season except monsoon)	Construction Contractor	DFCCIL through Engineer or other nominated agencies
2	Water Quality	As per IS:10500 standards	CPCB standards	Near water bodies and construction camps along the Project.	Once in three months during construction period, excluding monsoon		
3	Noise	Noise level on dB (A) scale	CPCB standards	Junction & stations and settlements along the Project. The preferred locations are at chainage 692, 704, 736, 738, 751, 755, 795, 805, 839, 843, 857, 1004, 1020, 1045 (list of SRs at para 17 may be referred).	4 times in a year (once in every season)		
4	Soil Quality	NPK, Sodium Absorption Ratio, Oil & Grease	CPCB Standards	Junction & stations and settlements along the Project. The preferred locations are at chainage 692, 704, 736, 738, 751, 755, 795, 805, 839, 843, 857, 1004, 1020, 1045 (list of SRs at para 17 may be referred).	Once in a year		

Annexure – I

Silica Exposure Reduction Strategies (by Contractor during construction)

A. General Application

i. Description

- a) This addendum specifies minimum environmental health and safety equipment, practices and procedures to minimize exposures to airborne silica dust during quarry operations, stone crushing, transport, and site construction. The scope of this section is limited to dust controls and employee protection in these environments.
- b) This addendum shall take precedence over overlapping requirements in the Technical Specification unless otherwise stated.
- c) This document is an integral part of the contract and the contractor has the responsibility to fully implement it. Any request to deviate from any specified requirement shall be made in writing to the project sponsor.
- d) This addendum supplements all local, regional and national laws and regulations concerning the location, environmental emissions, and occupational safety in these operations. If regulatory requirements are more stringent, or require more frequent verification than outlined in this standard, then the regulatory provisions shall take precedence and become the de facto requirement in that jurisdiction.
- e) Contractor(s) shall provide a copy of the licensing documentation (NOC/ Consent to Establish) for each facility from where they purchase crushed stone including each quarry, stone crusher mill, and hot mix plant indicating they meet all applicable requirements.

ii. General Site Requirements Quarries:

- a) Operator must establish a reliable source of water with adequate capacity and pressure to run all dust suppression systems at the quarry site;
- b) Operator must establish a reliable source of power for all mechanical equipment at the stone quarry site;
- c) Residential areas and temporary employee housing must be located a minimum of 100 meters from any quarrying operations;
- d) Stone drilling, cutting and conveying operations shall be equipped with either continuous wet suppression system or dry dust collectors designed and operated per minimum requirements below.
- e) Dust controls in quarries must include water fed compressed air drilling equipment, enclosed screens; enclosed transfer points, covered conveyors, and chutes.
- f) Wet the surface of rock materials with a hose before blasting operations.

iii. General Site Requirements Stone Crusher Mills and Hot Mix Plants:

- 1) Contractor shall submit a detailed plan for any temporary stone crusher or hot mix plant sites intended to be utilized for this project. The plan shall show adjacent areas within 100 meters and depict all structures and roadways. All temporary sites must meet all requirements specified in this addendum and must obtain a Consent to Establish/ (NOC) from the applicable authorities.
- 2) Temporary or permanent stone crusher sites or hot mix plants must meet all of the following requirements:

- a) Site must be at least 250 meters from National and State Highways and 500 meters from schools, educational institutions and religious places.
- b) Establish green belt zone as required by applicable local requirements;
- c) Residential areas and temporary employee housing must be located a minimum of 200 meters from any stone crushing equipment or operations;
- d) Operator must establish a reliable source of water with adequate capacity and pressure to run all dust suppression systems installed at the stone crusher site;
- e) Operator must establish a reliable source of electricity for powering all mechanical equipment and pollution controls installed at the stone crusher site;
- f) Crushing, screening, and conveying operations shall be equipped with either continuous wet suppression system or dry dust collectors designed and operated per minimum requirements below.
- g) Crushing, screening, and conveying operations must be enclosed with sheet metal or other rigid material. Do not use cloth or plastic enclosures.
- h) Roadways inside the crusher mill shall be metalled, paved or otherwise treated with chemical suppressants for dust suppression.
- i) Waste dust materials from stone crushing operations shall be stored in closed containers or closed structures.
- j) Lorries exiting the site must be cleaned with shovel and broom to minimize dust being tracked off site.
- k) Minimize drop heights to storage piles;
- l) Windbreak walls that are at least six times longer than its height shall be in place.
- m) Regularly remove and safely dispose of waste materials (rock dust) from the plant site in covered lorries;
- n) Fugitive emissions including emissions from stockpiles, conveyors and other areas shall be minimized as far as practicable. Emissions from these sources shall be substantially free from visible dust emission.

B. General Site Requirements Construction Sites:

The following requirements shall be implemented during the following operations:

- i. Stockpiling;
 - ii. Earth moving/ earth works, grading, and levelling;
 - iii. Transfer from stock pile to work site;
 - iv. Final placement; and
 - v. Laying the track.
- a) Operator must establish a reliable source of water with adequate capacity and for all dust suppression required at the construction site;
 - b) Regularly remove and safely disposing of waste materials (rock dust) from the site in covered lorries;
 - c) Waste dust materials from stone crushing operations if used for fill shall be covered within 4 hours;
 - d) Minimize spillage of raw materials. Promptly clean up all spillage and accumulations of dust.
 - e) Fugitive emissions including emissions from stockpiles and other areas shall be minimized as far as practicable. Emissions from these sources shall be substantially free from visible dust emission.

1. General Environmental Protection:

The Contractor shall take steps to protect the environment and surrounding populations from silica dust hazards. Ensure that the water required for dust suppression operations is sourced from a supply that will not impact the quality or availability of water in the surrounding environment. Follow all State requirements for siting criteria and obtain consent from applicable state pollution control board. Ensure that emissions, surface discharges and site closure practices shall comply with all applicable laws including but not limited to:

- a) The water (prevention and control of pollution) act 1974; no. 6 of 1974.
- b) The air (prevention and control of pollution) act, 1981; no. 14 of 1981.

2. Technical Requirements to Minimize Airborne Dust Emissions

i. General

The handling of raw materials, products, wastes or by-products should be carried out as to minimize the release of airborne dust. Use Table 1 below for guidance in employing dust suppression methods.

Feasible Control Measures for Open Dust Sources: Fugitive Emission Control Measure

Source	Enclosures	Wet Suppression	Chemical Stabilization	Green Belt	Surface Cleaning	Wind Break Walls
Unpaved roadways and staging areas		X	X			
Storage piles	X	X	X			X
Stone crushing operations	X	X		X	X	X
Paved roadways and staging areas					X	
Exposed areas	X	X	X	X		X
Batch drop operations	X	X				X
Continuous drop operations	X	X				X

ii. Wet Methods: Water spray Dust Suppression Systems for Stone Crushing Mills

Details of system components for all stone crusher facilities:

- (a) Minimum number and locations of pressure spray nozzles:
 - 1 nozzle on the top of the crusher
 - 2 nozzles at the delivery point of crushing material
 - 1 nozzle on the bottom of the vibrator screen or rotary screen

- 2 nozzles within the storage hopper
 - 1 nozzle at the delivery point of raw materials
 - 1 nozzle at the bottom of the dust hopper
- (b) A water pump with adequate motor horsepower and discharge pressure as required for optimal performance of spray nozzles.
- (c) Covered water storage tank, with a manhole type maintenance provision. The cover should prevent atmospheric dust from entering the tank. The tank can be located at the ground level. Water from a bore well or other source could be pumped to fill the tank periodically.
- (d) Centrifugal monoblock type self-priming pump capable of delivering 3 to 5 kg/cm² pressure and 72 liters per minute.
- (e) 100 stainless steel mesh online water filter with two parallel cells. Parallel cells should be set up in order for to allow connections to be reversed such that one cell undergoes backwash cleaning while the other cell is in operation. Only filtered water should be supplied to the spray nozzles.
- (f) Chemical surfactants or wetting agents may be added to water used in the spraying systems.
- (g) All spraying systems used for dust suppression shall be maintained in good condition. The flow rate and operating pressure of the spraying liquid/solution shall be sufficient to suppress dust emissions from the corresponding sources. The spraying system shall be able to cover the areas of emission points concerned.
- (h) All water spray equipment shall be operational during all stone crushing operations at the site.
- (i) No domestic showers, sprinklers, or other general water spray devices may be substituted for pressure misting nozzles. Nozzles may be hollow cone, solid cone or fan type.

iii. Dry Methods: Dust Extraction Systems for Stone Crusher Mills/ Hot Mix Plants

Details of system components:

- (a) Minimum requirements for dry dust capture and collection systems:
- Hood or enclosure to capture emissions;
 - Dust collector that separates particulates (e.g. centrifugal dust collectors); and
 - Duct to transport particulates in air stream from dust collector to air pollution control device (e.g. baghouse).
- (b) Capture hoods shall be installed over all crusher units and screens. Enclosures shall surround all sources of dust to the extent possible.
- (c) Dust collector shall be connected in-line via an enclosed duct to a cyclone and baghouse for dust removal.
- (d) Air handling system shall be a suitable size to prevent the escape of untreated airborne dust. Maintain minimum airflow as per design. A minimum draft velocity of 1 meter/ second shall be maintained through all open hoods.
- (e) Inspect bag filters routinely and at least once per month for damage and clean, repair or replace as needed.

iv. Dust Containment Enclosures for Stone Crusher Mills and Hot Mix Plants:

Particulate emissions shall be controlled by installing dust containment enclosures at the following locations:

(a) Primary crusher discharge area

Enclosure shall cover discharge areas to all conveyor belts or secondary crusher.

(b) Vibratory screen

All vibratory screens shall be totally enclosed. Screen houses shall be rigid and reasonably dust tight with self-closing doors or close-fitted entrances and exits for access. Where conveyors pass through the screen house, flexible covers should be installed at entries and exits of the conveyors to the housing.

(c) Conveyor belts (optional)

The enclosures should be complete from all the four sides and roof. There should not be any open windows/openings etc. Any opening should be kept closed during operation. The gaps should be sealed using gaskets or wool type packing etc. Crusher enclosures shall be rigid and be fitted with self-closing doors and close-fitting entrances and exits. Where conveyors pass through the crusher enclosures, flexible covers should be installed at entries and exits of the conveyors to the enclosure.

(d) Inlet hopper

The inlet hopper shall be enclosed on three sides.

(e) Rotary dryer

The plant rotary dryer in a hot mix plant.

Malfunctioning or breakdown of equipment leading to abnormal emissions shall be dealt with promptly. In any case, the abnormal emission due to equipment failure shall be stopped as soon as practicable. The dust collection system shall be routinely inspected and maintained in good condition and shall be used as required. The owner shall conduct an inspection of the dust control system at least once per month.

v. Minimize Fugitive Dust From Roadways and Stock Piles

Minimize fugitive dust emissions from all sites where crushed rock is stored. Particulate emissions from unpaved roads and stock piles shall be controlled with the application of suitable compounds to minimize the control of dust. Petroleum-based products, waste oils or other waste products shall never be used for this purpose. Acceptable compounds for this purpose include:

- a) Acrylic polymers;
- b) Solid recycled asphalt;
- c) Chloride compounds (calcium chloride and magnesium chloride);
- d) Lignin compounds (lignin sulfate and lignin sulfonate powders);
- e) Natural oil resins (soybean oil); and

f) Organic resin emulsions.

Contractor shall provide a product information sheet prepared by the manufacturer or distributor indicating the chemical composition, application instructions, and other environmental, safety and health considerations 30 days in advance of its intended application to Engineer's Representative. The product information shall be reviewed and approved in writing before the contractor proceeds to apply it on the project site.

vi. Minimize Fugitive Dust From Heavy Equipment and Road Transport Vehicles

Minimize fugitive dust emissions from all vehicles when loading, unloading and operating vehicles on project sites, staging areas, or stone crusher mills. Settled dust and particulate emissions from lorries used to transport stone or waste products generated in stone crushing operations, and other heavy construction vehicles, shall be minimized in accordance with the following practices:

Lorries shall be filled with the material using wet methods. Load waste fine materials and powders onto tankers or closed trucks through a lengthy sleeve attached to the spout to minimize drop height and dust release.

Lorries once filled with stone or other waste materials shall be covered before leaving the site. A single layer impermeable tarp shall be placed over the entire load and secured with rope or other tension bar.

Designate a decontamination area that is required to be used by all vehicles before exiting the site. This area shall be covered with an impervious tarp. Use wet methods to wipe all accessible exterior surfaces of vehicles and tires.

Impose strict speed limits for all vehicles operating on service roads, loading areas, or staging areas.

vii. Minimize Fugitive Dust During Rock Quarry Operations

Particulate emissions shall be controlled during drilling, blasting, loading, and hauling with wet methods using surfactants applied in either water or foam spray.

Dust controls for stone drilling shall use water fed into the compressed air to suppress the dust.

viii. Work Practices for Reducing Employee Exposures

This section pertains to all activities with potential for dust exposure to workers employed in quarries, stone crusher units, hot mix plants, and construction sites.

Use wet methods where feasible to reduce dust emissions from working surface or equipment.

Use a gentle spray or mist to moisten settled dust particles. When washing large quantities of dust from a surface, increase the water force only after pre-wetting

all the dust with a gentle spray. Use only the minimum amount of water needed to get the job done without creating runoff.

Rewet surfaces as necessary to control dust.

C. Technical Requirements for Worker Medical Surveillance
i. General

This section pertains to workers employed in quarries, stone crusher units, and hot mix plants.

ii. Medical Monitoring

Medical monitoring shall be conducted for each worker before the start of work and at least at annually thereafter. Examination shall as a minimum meet requirements as set forth below:

Examination

- a). The employer shall ensure that all medical examinations and procedures are performed by a licensed physician, and are provided at no cost to the employee and at a reasonable time and place.
- b). Persons employed under the licensed physicians may administer the pulmonary function testing, chest x-ray or other testing procedures required by this section if adequately trained by an appropriate academic or professional institution.
- c). A physical examination directed to the pulmonary system, including a chest x-ray to be administered and pulmonary function tests of forced vital capacity (FVC) and forced expiratory volume at one second (FEV(1)). Interpretation and classification of chest roentgenograms shall be conducted in accordance with ILO classification system. Interpretation of the chest x-ray shall be conducted under the ILO Classification of Radiographs of Pneumoconiosis by a reader trained under this protocol. Evaluate chest x-ray for possible tuberculosis because people exposed to silica have increased susceptibility.

Report from Medical Examination: A report must be submitted from all medical examinations conducted within the last 12 months to document compliance with this medical surveillance requirement for each worker employed in quarries and stone crusher units. Submit, at a minimum, for each worker the following:

Name and Employee Identification Number

Physician's Written Opinion from examining physician including at a minimum the following:

- 1) Whether worker has any detected medical conditions that would place the worker at an increased risk of material health impairment from exposure to silica.
- 2) A statement that the worker may wear a negative pressure respirator or any recommended limitations on the worker or on the use of personal protective equipment such as respirators.
- 3) Statement that the worker has been informed by the physician of the results of the

medical examination and of any medical conditions that may result from dust exposure.

iii. Record Keeping

- a) The employer shall establish and maintain accurate records of medical surveillance to include the physician's written opinion on each employee's health status.
- b) Records shall be maintained for at least the duration of the contract period.
- c) A copy of each employee's records must be provided to the affected employee who has undergone the medical surveillance stipulated above within 30 days of the date of the examination.

D. Requirements for Employee Training

i. General

- a. This section pertains to all workers employed in quarries, stone crusher units, hot mix plants, and any construction workers using powered tools or equipment to cut, grind, core, or drill concrete or masonry materials. The training provided under this section shall be provided to workers at no cost to these employees and in a language understood by workers at each training program. The course shall be taught by an environmental health and safety specialist with adequate education, experience and training.
- b. Incorporate general information about silica dust hazards in all orientation and site training sessions covering health or safety aspects.

ii. Training Topics

The employer shall provide training on the following topics to all employees prior to their assignment to jobs where the employer will be conducting these operations during this project:

- a) The potential health hazards of exposure to airborne silica dust including silicosis, tuberculosis, lung cancer, chronic obstructive lung disease (COPD) and decreased lung function.
- b) Methods used by the employer to control employee exposures to airborne silica dust including wet or dry methods for stone crushing, drilling, cutting, local exhaust ventilation systems, and isolation of the process from employees by means of distance, enclosure, or other means, as applicable.
- c) Proper use and maintenance of dust reduction systems, including the safe handling and disposal of waste materials.
- d) The importance of good personal hygiene and housekeeping practices when working in proximity to silica dust including:
 - Not smoking tobacco products; appropriate methods of cleaning up before eating, and appropriate methods of cleaning clothes.
 - Avoiding, to the extent practical, activities that would contribute significantly to exposure to airborne dusts.

E. Worker Protection

i. General

Contractors shall supply respirators and other specified safety equipment to all workers employed in quarries, stone crusher units, hot mix plants, and any construction workers using powered tools or equipment to cut, grind, core, or drill concrete or masonry materials as described below:

- a. Do not eat, drink, smoke, chew or smoke tobacco in the work area. To eat, drink, chew, or smoke, workers shall follow the procedures described below and leave the work area.
- b. Provide workers with a clean source of water for a facility to wash hands and face with soap and water. This should be done before eating, smoking or drinking and at the end of the day before going home. Hand washing facilities shall be set up adjacent to the work area.
- c. Engineering and work practice controls must be used whenever the possibility exists that employee may be exposed to silica including during stone crushing and construction operations.
- d. The use of compressed air, dry sweeping, or any cleaning method that would cause elevated silica dust air concentrations are prohibited.

ii. Respiratory Protection

Minimum Respiratory Protection: Require that the minimum level of respiratory protection used be Respirator Class FFP3 under European standard EN 143 or N99 under the U.S. National Institute for Occupational Safety and Health (NIOSH) classification. Respirators shall be single use disposal respirators for dusts or reusable half-face air-purifying respirators with high efficiency particulate air filters.

Require that a respirator be worn by anyone in a Work Area at all times during any operation. Do not allow the use of surgical masks or other types of disposable respirators not specified above for any purpose.

Fit testing shall be conducted on any reusable air-purifying respirator assigned to the worker.

Only assign respirators to workers medically approved to wear negative pressure respirators as per the physicians' written opinion following an annual medical examination as per the requirements in Part 3 of this addendum.

iii. Protective Equipment

Do not allow workers to leave the work place wearing any clothing or equipment worn during the work shift. Provide the following:

- a) **Eye Protection:** Provide eye protection as needed for the type of work being performed.
- b) **Shoes:** Provide shoes to all workers and require that they be worn at all times in the Work Area.
- c) **Hearing protection:** Provide all workers at all quarries, stone crushing sites, and hot mix plants and all other workers exposed to loud noise with ear plugs or other suitable hearing protection.

F. Emission and ambient air limits

i. General

Contractors shall conduct all required emissions monitoring as required to prove compliance with all applicable State Pollution Control Board Regulations and the

limits specified within this section. This section applies to all permanent and temporary stone crushing mills and hot mix plants.

ii. Suspended Particulate Matter (SPM)

The Suspended Particulate Matter (SPM) at a distance of 40 meters from a stone crusher unit in a cluster should be less than 600 micro gram per cubic metre (micro-gm/Nm³):

The concentration of total particulate matter in any contained emissions to air, for example the bag filter exhaust air outlet, shall not exceed 150 ug per cubic metre (150ug/Nm³). The introduction of dilution air to achieve the emission concentration limits shall not be permitted.

Monitoring of the 24-hour average concentration of the total suspended particulate and/or respiratory suspended particulate in ambient air shall be conducted at the site boundary and/or any other locations to be agreed by the Authority. SPM sampling shall conform to the United State Environmental Protection Agency's Reference Method for the Determination of Suspended Particulate Matter in the Atmosphere (High-volume Method) and shall be conducted at a frequency of not less than once every 6 months.

G. Chain-of-custody for Crushed Stone

(1) General

Contractor shall maintain records of suppliers for each load of crushed stone brought to the construction site with the procedures as outlined below. Such records shall be collected at a central location at least monthly during the duration of the project and be available for inspection by Engineer's Representative.

(2) Supplier Validation

Contractor shall maintain records of all suppliers and all internally sourced supplies of crushed stone brought to the construction site to include:

- a) Name of supplier;
- b) Location of stone crusher operation;
- c) Location and name of the quarry;
- d) Proof of registration and consent from the applicable Mining Department;
- e) Proof of registration and consent for operation from applicable Pollution Control Board;
- f) The supplied material size and quantity (by weight or volume);
- g) Date and specific location material was brought to site.

H. Restoration of temporary stone crusher sites

i. General

This section applies to the removal of any temporary stone crusher sites established and used during the duration of the project. During operation all temporary operations shall meet the requirements specified in Parts 1 and 2 above.

ii. Equipment removal

Temporary equipment shall be cleaned before being taken down and prepared for offsite transport. Clear off all temporary structures and garbage.

iii. Site restoration

Remove all debris and visible accumulations of dust from ground surfaces. Cover all bare soil surfaces with vegetation or pavement to reduce exposure to residual silica dust.

APPENDIX 14 RELIABILITY, AVAILABILITY and MAINTAINABILITY (RAM)

- (1) Historically, civil work designs do not generally undergo separate RAM analysis processes, as reliability, availability; maintainability and safety are built into the design standards for civil works.
- (2) Calculations, such as structural strength/design life, etc (reliability/availability calculations) are normally carried out as an integral part of the design process and are not recorded as separate RAM elements.
- (3) This also applies to maintainability issues
- (4) Accordingly, RAM management by the Contractor for earthworks, structures and track works shall be by ensuring adherence to the appropriate standards and contractual specifications, and by validation of the as-built designs.
- (5) A qualitative assessment of each civil Work design element shall be undertaken and issue of a 'Design Certificate' shall signify that all RAM issues as brought out in KPI in business plan of DFCCIL have been taken into consideration.
- (6) The contactors shall ensure that the RAM requirements for all passive and non-passive systems are captured via a requirements management process that will cover issues such as life expectancy (Reliability and Availability requirements) and access for maintenance activities (Maintainability requirements).

APPENDIX 15 TRAFFICE BLOCK (POSSESSION) MANAGEMENT

1. GENERAL

- (1) The Contractor shall comply with the traffic block (Possession) management system operated by Indian Railways (IR).
- (2) The Contractor shall appoint a responsible person who shall coordinate with IR and with the other adjacent civil, structures and track works contractors and the systems contractor as applicable and who will act as the traffic block coordinator for the Contractor only.
- (3) The person appointed must have experience of IR operations and must be fully aware of IR rules and regulations related to possession of track for construction of railway works and in accordance with IR regulations to issue possession requests.
- (4) For the purpose he shall be duly certified in accordance with the said rules.

2. POSSESSION PERIODS

- (1) The Contractor may use possessions on the line for execution of works as per approved plan following strict safety procedures.
- (2) Line closures may be agreed subject to IR approval.
- (3) The Employer gives no warranty that line closures and possession periods will be available during the period of the Works.
- (4) The Employer will however provide any assistance necessary to the Contractor to enable him to obtain the line closures and possessions required by him for the Works but will not be responsible if any Possession requests are refused by IR.
- (5) The Contractor shall prepare technological and organizational schedule for construction which shall include the work times in the weekends and during the dark part of the day.
- (6) The Contractor shall submit his requests for ‘possessions’ at least fourteen (14) days earlier and inform IR at least 48 hours earlier if he is not able to use the permitted ‘possessions’.

APPENDIX 16 DESIGN STANDARDS

Following is the indicative list of Design standards. All codes and manuals with correction slips issued upto 28 days prior to last date of submission of Second Stage bid shall be applicable for this bid. Any other applicable code, circular, instruction of UIC are to be referred with the approval of the Engineer.”

In case of any contradiction in the various codal provisions, the order of precedence shall be as follows:

- a) Specific provisions in Part 2 Employer’s Requirements.
- b) IRS codal provisions
- c) IRC codal provisions
- d) IS (BIS) codal provisions
- e) Provisions in other foreign codes.

However, in case of road related structures, IRC codal provisions shall prevail over IRS codal provisions.

Earthworks

- a) IS:2720 Part 2 Determination of water content.
- b) IS:2720 Part-4 Grain size analysis.
- c) IS:2720 Part-5 Determination of liquid and plastic limits.
- d) IS:2720 Part-8 Determination of water content – dry density relation using heavy compaction.
- e) IS:2720 Part-16 Laboratory determination of CBR.
- f) Ministry of Railways guidelines and Specifications Design of Formation for Heavy Axle Load, Report No. RDSO/2007/GE : 0014.
- g) Ministry of Road Transport and Highways Specification for Bridge Works, 4th edition.
- h) Report on “Guidelines for Use Of Geosynthetics On Railway Formation Including Specifications” (Provisional) Report No. RDSO/2007/GE:G-0009(D) July 2008
- i) Concept And Design Of Reinforced Earth Structures Report No. GE: R – 73 June – 2005. Ministry of Railways guidelines for Earthwork in railway Projects, guideline No. GE:G-1.

Civil Structures

- a) DFC Loading Standards.
- b) IR Bridge Rules.
- c) IR Code of Practice for the Design of Substructures and Foundation of Bridge (Bridge Substructure and Foundation Code).
- d) IR Manual of Design and construction of Pile and Well Foundations.
- e) IR Code of Practice for Plain and Reinforced Concrete Bridge Construction (Concrete Bridge Code).
- f) BS 5400 for Bearings of Bridges
- g) DFC Schedule of Dimensions.

- h) Indian Railway Schedule of Dimensions.- to be consulted with the approval of Engineer where provisions in DFC schedule of dimensions do not cover the particular situation.
- i) IR Steel Bridge Code.
- j) Indian Railway Works Manual.
- k) Indian Railway Bridge Manual.
- l) IS 456- Code of Practice for Plain and Reinforced Concrete.
- m) IS 2911 (all Parts) Code of Practice for Design and Construction of Pile Foundations.
- n) IS 1493- Design of Bored and Cast in Situ Piles Founded in Rock.- Guide lines.
- o) IS 1893- Indian Seismic Code
- p) IS 1343 – Code of Practice for Pre-stressed Concrete.
- q) IRC 5: Standard Specifications and code of practices for Road Bridges Section I – General features of design.
- r) IRC 6: Standard Specifications and code of practices for Road Bridges Section II – Loads and stresses.
- s) IRC 18: Design Criteria for Prestress Concrete Road Bridges (Post-tensioned concrete).
- t) IRC 21: Standard Specifications and code of practices for Road Bridges Section III – Cement Concrete (Plain and reinforced).
- u) IRC 22: Standard Specifications and code of practices for Road Bridges Section VI – Composite construction.
- v) IRC 78: Standard Specifications and code of practices for Road Bridges Section VII – Foundation and Substructure.
- w) IRC 83 Bearing Design.
- x) UIC 772/R- Specifications for Neoprene Bearings.
- y) UIC 774-3R- Track / Bridge Interaction.
- z) Code of practice for Readymix concrete – IS 4926
- aa) MMD of Eastern DFC

Track

- a) Indian Railway Permanent Way Manual.
- b) IRS T 12-2009 for UIC 60KG/m.
- c) UIC Leaflet 860 8th edition.
- d) Manual of Instructions on LWRs of IR.
- e) IR Manual for Flash Butt Welding of Rails 2004.
- f) IR Standards Specification for Fusion Welding of Rails Alumino-Thermic Process.
- g) IRS T 29 2000 Cast manganese Steel Crossings.
- h) IRS T 39 1985 Pretress Concrete Sleepers.

- i) IS:1785-Part 1 High Tensile Steel Wire.
- j) IRS GE 1 June 2004 Ballast specification.
- k) IRS T 1966 Fish Plates and Fish Bolts.

Fire Standards

- a) IS 1641 : 1988 Code of practice for fire safety of buildings (general) : General principles of fire grading and classification (first revision).
- b) IS 3844 : 1989 Code of practice for installation and maintenance of internal fire hydrants and hose reels on premises (first revision).
- c) IS 1646 : 1997 Code of practice for the safety of buildings (general) : Electrical installations (second revision).
- d) IS 11360 : 1985 Specification for smoke detectors for use in automatic electrical fire alarm system.
- e) IS 1644 : 1988 Code of practice for fire safety of buildings (general) : Exit requirements and personal hazard (first revision).
- f) IS 2175 : 1988 Specification for heat sensitive fire detectors for use in automatic fire alarm system (second revision).
- g) IS 11360 : 1985 Specification for smoke detectors for use in automatic electrical fire alarm system.
- h) IS 2189 : 1999 Code of practice for selection, installation and maintenance of automatic fire detection and alarm system (second revision).
- i) IS 884 : 1985 Specification for first-aid hose reel for fire fighting (first revision).
- j) IS 940 : 1989 Specification for portable fire extinguisher, water type (gas cartridge) (third revision).
- k) IS 2878 : 1986 Specification for fire extinguisher, carbon-dioxide type (portable and trolley mounted) (second revision).
- l) IS 11833 : 1986 Specification for dry powder fire extinguisher for metal fires.

Electricity Standards

- a) Power supply installations and other electric installations shall comply with Indian Electricity Standards.
- b) Internal wiring of buildings shall comply with Indian Building code of practice.
- c) All electrical installations shall be earthed as per relevant Indian standard code for earthing of electric installations.
- d) In station buildings electric fittings and electric gadgets shall be provided as per Indian Railways Boards letter No. 99/Electric/(G)/136/1 dated 17.03.2006.
- e) Deviations if any to improve performance standards shall be with the approval of Engineer.
- f) Regulations for Power line Crossings of Railway tracks as per Indian Railways Manual of AC Traction

Additional Codes and Standards

The following Indian Codes and Standards shall be referred to where applicable:

- The Energy Conservation Act, 2001
- Guidelines on Equipment issued by the Bureau of Energy Efficiency
- Energy Conservation Building Code
- IR General and Subsidiary rules
- IR Safety Rules
- Relevant pollution control codes
- Applicable labour laws like Workmen's Compensation Act etc.

APPENDIX 17 ENGINEER'S ACCOMMODATION

1.0 TEMPORARY FACILITIES FOR THE USE BY EMPLOYER AND ENGINEER

1.1 OFFICE REQUIREMENTS

The Contractor shall design, construct, equip and furnish accommodation for the Employer's and Engineer's use within 90 days after the commencement date. The Contractor shall also maintain the offices in good conditions and provide services including, but not limited to maintenance of the office equipment and furniture, repairing and mending, cleaning, consumable replenishment in respect of toiletries, cartridges for the plotter and colour laser writers, first aid box, batteries / battery cells, drinking water etc. Design of all the Site Offices shall be submitted to the Engineer for review prior to commencement of the construction of those facilities as per the following details. These facilities shall be maintained by the Contractor till issue of Taking-Over Certificate unless otherwise directed by the Engineer.

The approximate total number of Engineer's staff for Contract Packages 201 and 202 is expected to be about 130 including the Chief Resident Engineer (CRE) who will operate from Allahabad. The Contractor shall provide the office accommodation including audio and video conference facilities as also the rest area facilities as per the following details.

Contract Package	Main Office			Satellite Subsidiary Office		
	Accommodation for	Area (sqm)	Nos.	Accommodation for	Area (sqm)	Nos.
201	Resident Engineer + Experts (40 Officials) Office + Conference Room	300	1 (One)	Office and Conference (10 officials)	160	2 (Two)
202	Chief Resident Engineer + Resident Engineer (50 Officials) Office + Conference Room	500	1 (One)	Office and Conference (10 officials)	160	2 (Two)

The area mentioned above will be split up in rooms and halls. The rooms would be required for the following in the Main and Satellite Offices for Contract Packages 201 and 202.

- 1) Chief Resident Engineer (for Contract Package 202 only)
- 2) Resident Engineers
- 3) Employer's Representative
- 4) Site Engineers
- 5) Material Engineers
- 6) QA/QC Managers
- 7) Safety officer / Engineers
- 8) Site Inspectors

- 9) Material Inspectors
- 10) Surveyors, Quantity Surveyors
- 11) Administrative Assistant
- 12) Visitor's Room
- 13) First Aid room
- 14) Pantry
- 15) Toilets

Note: Detailed lay out of the office accommodation can undergo minor variations with the approval of the Engineer but all these variations would be within the ceiling of the area indicated above.

1.2 PARKING FACILITIES

At the main and satellite office compounds, the Contractor shall provide hard covered sheds sufficient for fifteen (15) and ten (10) vehicles respectively.

1.3 ENGINEER'S ACCOMMODATION FOR OFF SITE WORK

- (1) Where any portion of the Works is prepared or fabricated off-Site or at any fabrication facilities away from the Site, whether by the Contractor or one of his subcontractors or suppliers, the Contractor shall provide and maintain office accommodation, furnishings, and equipment for the use of the Engineer and its staff at each such location for the duration of such work.
- (2) The accommodation furnishings and equipment shall be suitable and sufficient for the purposes of the Engineer and shall be according to the Engineer's consent.

Where the off-Site work requires the presence of the Engineer and/or any of its staff at any off-Site location for a period exceeding three (3) calendar months, the Contractor shall provide and maintain office accommodation, furnishings and equipment, at least to a standard equal to the Engineer's Site accommodation furnishings and equipment, for the exclusive use of the Engineer, including a facsimile machine, and a photocopier, together with a telephone for each of the Engineer's personnel at the off-Site location.

1.4 REST AREAS

In addition to the area indicated above, rest house facility of a minimum plan area of 100 sqm for main site office and 60sqm for each satellite office shall be provided by the Contractor for each Contract Package. These rest houses should have facilities for an overnight stay. The facilities would include air-conditioning, beds and bedding (including regular replacement thereof) and all other appropriate items. Each rest area shall be fully furnished and equipped with kitchen, mess hall and WCs/ showers.

1.5 FURNISHING REQUIREMENTS

The Contractor shall supply the new furniture and equipment to the Engineer's offices in the manner required by the Engineer. Given below is the indicative list of items required for Engineer's office in the main and satellite subsidiary compounds.

S.N	Description	Contract Package 201	Contract Package 202
General Office Requirement			
1	Conference table	3	3
2	Conference chairs	50	50
3	Glass-fronted lockable bookcase	5	5
4	Double pedestal desk (size 1500 mm x 900 mm)	10	10
5	Single pedestal desks (size 1200 mm x 900 mm)	50	50
6	Swivel office chair with armrests	10	10
7	Swivel office chair without armrests	50	50
8	Typist chair	10	10
9	Visitors chair	10	10
10	3-shelf bookcase	50	50
11	4-drawer filing cabinet	10	10
12	Plan chest (A1 size)	3	3
13	Tables (size 1500mm x 900mm)	5	5
14	Lock-able cupboard 6 ft high with internal shelves	10	10
15	AO size drawing hanger for 1000 drawings	5	5
16	Heavy Duty Paper Shredders	3	3
17	Floor mounted safe (size -750mm x 450mm x 600mm)	3	3
18	A0 Digital document System (Xerox 8830 DDS or similar) capable of printing, scanning, copying, reduction and enlargement	3	3

19	Required spares, ink cartridges and papers of sizes and types for Scanner, Printer cum Photocopier as mentioned in items 18 and 19 above including maintenance contract for the machines to ensure defect free operations for the period upto Defect Notification period.	As per requirement	As per requirement
20	Communication Facility		
A	One set tele-facsimile transmission/reception facility connected to a dedicated line at RE and CRE Office	3	3
B	Telephone switchboard connected to 1 external line at each Site office, as well as Principal Office with independent internal communication facilities with 30 handsets with auto answering / message recording facility. The above shall include all charges, rental cost of calls Up to a maximum total of 35,000 units per month for 7 external lines (4 for principal, 3 for Site offices) throughout the contract period.	3	3
21	Waste paper baskets	50	50
22	Desk tray sets	50	50
23	Fully automatic camera with video recording facility date and time recording facility downloadable to a PC	3	3
24	First aid kits for up to 30 persons	5	5
25	Safety helmets	60	60
26	Noise Retarder Ear Caps	60	60
27	Safety harness	20	20

28	Pairs steel toed construction boots sizes to be advised	60	60
29	Safety Jacket	60	60
30	Pairs steel handling gloves	30	30
31	Pairs industrial safety goggles	60	60
32	Breathing masks and filters	30	30
33	2 L kettles	5	5
34	Potable water dispenser with hot/cold taps and paper/plastic cups	5	5
35	Hot water heaters for kitchen and showers	6	6
36	cups and saucers	60	60
37	Side plates	60	60
38	15 piece dinner service	6	6
39	15-piece cutlery service	6	6
40	Fire extinguisher	6	6

In addition to the above listed items, the Contractor shall provide the following personnel for each Contract Package:

Chainmen / Staff men	6 Nos.
Field / Office Attendants	6 Nos.
Messengers	4 Nos.
Watchmen/Security Guard	2 Nos. (round the clock) for each Main and site office.

1.6 SANITATION AND SEWERAGE

- (1) Sanitation and Sewerage systems for the Employer and Engineer's site offices shall be installed and made operational within the specified period of construction as mentioned above in respect of the respective site offices.
- (2) The Contractor shall provide a properly designed and constructed septic tank approved by the Engineer for the disposal of domestic sewage from each building in the Engineer's site offices
- (3) Each septic tank shall be regularly emptied, maintained and serviced by the Contractor to ensure proper functioning.

1.7 OFFICE CLEANING, WASTE AND GARBAGE DISPOSAL

- (1) The Contractor shall provide personnel and perform daily cleaning of all rooms in the Employer and Engineer's site offices.
- (2) The Contractor shall collect and dispose of, in a location and manner consented by the Engineer, all domestic waste and garbage from the Employer's and Engineer's site offices on daily basis.

1.8 SURVEY EQUIPMENT

- (1) All the survey instruments required by the Engineer shall be provided by the Contractor. The surveying instruments, to be provided for exclusive use of the Employer's and Engineer's site staff, shall be brand new, of the latest design and manufactured by Wild, Kern, Nikon or other reputable manufacturer as acceptable to the Engineer / Employer. The instruments shall include all items necessary for the Engineer to be able to establish horizontal and vertical control both on the surface and underground and to check the Contractor's surveying work.
- (2) The Contractor shall present to the Engineer for consent the adequate number of equipment with proposed make, type, and models with parts and performance catalogues and manufacturer's warranty, prior to purchase.
- (3) The Contractor shall furnish the survey equipment within 56 days after the Commencement Date and maintained in good conditions until the issue of Taking-Over Certificate unless otherwise authorized by the Engineer.
- (4) All the survey instruments shall be maintained by the Contractor shall be regularly checked and calibrated.
- (5) Any instrument which has been damaged or been non-operational shall be immediately replaced or repaired by the Contractor. Equivalent replacement shall be provided by the Contractor in such cases.

2.0 GENERAL REQUIREMENTS

- (1) Materials used for the construction of the offices shall be of good quality and finish. Materials shall be chosen such that the buildings when erected shall give good heat and sound insulation. Both external and internal walls shall be sound proof.
- (2) Windows to each room shall be of an area not less than 10% of the floor area. All windows to ground floor offices shall be fitted with burglar bars firmly attached to the structure of the building. All windows shall be fitted with mosquito netting. All windows shall be fitted with venetian blinds.
- (3) Internal doors shall be hollow core flush doors and shall be fitted with door closers, lever latches, mortise lock and keys.
- (4) External doors shall have barrel bolts both at top and bottom of one leaf and a Yale lock on the other leaf. External doors shall be of solid external quality and hung with heavy-duty hinges. All sets of keys shall be delivered to the Engineer.
- (5) All buildings shall be supplied with continuous (24 hour) running potable water to the kitchens and wash rooms. The toilets may use raw water for flushing, shall be equipped with water closets and sitting type stools and shall be adequately

ventilated. The Contractor shall also arrange for the constant and hygienic disposal of all effluent, sewage and rubbish from the buildings. Storage tanks will be required due to restricted water supply at most locations.

- (6) All buildings shall be supplied with electricity at 220 voltage and 50 Hz that shall be distributed to each room in accordance with the regulations. Lighting and electrical power points shall be provided in each room. The disposition and location of light and power points will be as directed by the Engineer. A backup generator is required to be provided to meet the full power load in case of power disruption. The expenses for consumption of the electricity and fuel for the Engineer's accommodation shall be borne by the Contractor.
- (7) Each kitchen shall be provided with worktops, a 2 drainer stainless steel double sink, cupboards beneath the worktop and mounted on the walls, a cooker with 2 gas rings and a microwave oven and a 5 cu ft. refrigerator. Tea/Coffee making facilities for 20 persons shall be provided. Tiling shall be provided to the walls above the kitchen table top.
- (8) Changing and shower facilities shall be provided as follows:
 - Male facilities: 3 showers and 3 wash basins with 15 clothes lockers and benching with pegs over for 6 persons.
 - Female facilities: 1 showers and 1 wash basins with 5 clothes lockers and benching with pegs over for 2 persons.

Each shower shall be provided with hot and cold water supply and shall be contained in an individual cubicle with a screen or curtain to the entrance. Modesty screens shall be provided adjacent to the entrance to all changing and shower facilities.

- (9) Fire fighting equipment shall be provided in accordance with the recommendations of the local fire brigade station.
- (10) All furniture supplied by the Contractor shall be new.
- (11) Offices shall be at locations agreed by the Engineer.
- (12) The office accommodation shall be retained until the expiry of the Defects Notification Period unless otherwise instructed to the contrary by the Engineer.
- (13) Prior to commencing the erection of the Engineer's accommodation the Contractor shall obtain the consent of the Engineer to the accommodation, including layout, equipping, electrification plan and furnishings proposed by the Contractor.
- (14) The Contractor shall make such reasonable amendments to the layout and furnishings as the Engineer may request.
- (15) Unless otherwise permitted by the Engineer, the Contractor shall complete the accommodation and provide all equipment and furnishing in sufficient time to allow the Engineer to occupy the offices prior to the commencement of excavation or any Permanent Works.
- (16) From the Commencement Date of the Works until such time as the Engineer's offices have been completed and accepted by the Engineer, the Contractor shall provide such temporary offices and equipment and furnishings at such location or locations as the Engineer may require.

- (17) The accommodation shall be maintained in a clean, stable and secure condition and shall be cleaned at least daily.
- (18) Equipment provided for the use of the Engineer shall be maintained in a clean and serviceable condition and all consumables shall be replenished when required.
- (19) Measuring and testing equipment shall be calibrated before they are used and at regular intervals to which the Engineer has given his consent.
- (20) Survey equipment shall be maintained by the service agent and shall be regularly checked but the overall responsibility shall rest with the Contractor.
- (21) Equivalent replacements shall be provided for equipment which are not in working order or otherwise are not in a serviceable condition or are being repaired or serviced.
- (22) The consent of the Engineer shall be obtained before accommodation or equipments are removed.
- (23) In addition to the aforesaid accommodation, the Contractor shall also provide portable accommodation to cover the exigency of temporary camping at the site in case the work warrants such a provision.

3.0 USE OF CONTRACTOR'S FIRST AID STATIONS

The Contractor's emergency medical care and first aid services shall be made available, for use by the Employer's and Engineer's site staff and their families living at the Site or the Work Areas, free of charge.

APPENDIX 18 BUILDINGS AND STRUCTURES

1.0 OBJECTIVE AND SCOPE OF WORKS

1.1 OBJECTIVE

- 1.1.1** The work involved in this bid is design, construction, completion, testing, and Commissioning of the buildings and structures in Mughalsarai – New Bhaupur section of Eastern Dedicated Freight Corridor, by the contractor in the manner and time stipulated in the contract and to achieve the standard, performance & functionality specified in the contract.
- 1.1.2** In full recognition of the purpose, and full acceptance of the obligation, liabilities & risks that may be involved, the contractor shall undertake the design, construction, manufacture, supply, installation, testing and commissioning of the, Building works including and without limitations the design, construction and removal of all the temporary works and handover the completed works to the employer in a condition in which the employer shall immediately use the works for the intended purpose and/or to make them available to the other contractors who shall commence and carry out their works without delay or disruption. In full recognition of these objectives and full acceptance of the obligations, the contractor shall execute the works taking into account all liabilities' and risks that may be involved.
- 1.1.3** The contractor shall be responsible for designing, preparation of drawings for buildings and structures, obtaining all necessary approvals from the relevant authorities in design, construction and commissioning of the works.
- 1.1.4** In addition, the contractor shall be responsible for rectification of the defects in the permanent works in a manner and to the standard as stipulated in the Employers requirement.

1.2 SCOPE OF WORKS

1.2.1 Architectural and General

The architectural design shall include but not be limited to site plans, floor plans, elevations, sections including detailed design and drawings. Structure would have signature architecture in terms of Elevations and other architecture elements including efficient use of Green Building concepts and implementing sustainable building materials.

1.3 STATION BUILDINGS, STAFF QUARTERS AND OTHER SERVICE BUILDINGS

The work involved in this bid is Design, Construction, installation, commissioning and testing of Station buildings, Staff quarters and other service buildings viz Integrated Maintenance Depots (IMD), Integrated Maintenance Sub Depots (IMSD), Guest Houses, Club / Institute and Gate Lodges etc. The general requirements for these buildings and structures without limitation, shall be provided as per the following requirements:-

- (1) Typical floor plans, elevations and sections of buildings shall be in compliance with local construction regulations.
- (2) All civic amenities including water supply, sewer, rain water harvesting, parking of vehicles and landscape matching with the surrounding environment.

- (3) Integration of local land use plan in relation to local Transportation plan.
- (4) Environmental friendly material and equipment shall be used to the greatest possible extent.
- (5) Exterior wall finishes shall withstand the natural weathering effects with minimal periodic maintenance.
- (6) Roofing system shall be selected and detailed to ensure minimal periodic maintenance.
- (7) Hard floor finishes shall be selected so as to withstand normal wear & tear and to avoid frequent cleaning.
- (8) Creating a community of architectural distinct construction with high energy efficiency, carefully designed amongst the existing contours, natural features & landscape.
- (9) Staff quarters are to be designed with careful integration of indoor & outdoor spaces with outdoor landscape.
- (10) Elevation and massing of construction shall follow accepted practices of good design including aesthetically pleasing proportions, symmetry, appropriate degree of detailing and ornamentation and consistency of elements.
- (11) Natural and artificial lighting sources to provide adequate light for work activities while avoiding detrimental glare and contrast.
- (12) Landscape should continue to have a look & feel of the existing natural setting with necessary embellishments as needed to create pleasing streetscape and yards. Existing native vegetation / landscape may be retained and incorporated into the landscape, wherever possible/feasible.
- (13) The layout plan of the Staff Quarters shall be planned, considering the topography, local byelaws, availability of water supply, sewerage or septic tank and surrounding existing environment landscape.
- (14) Mechanical/Electrical/Plumbing (MEP) Services as per Employers requirements.
- (15) Detailed designs and drawings of structures shall be provided by the contractor for approval of the Engineer duly ascertaining requirement, examining site constraints analysing the impact of existing and/or proposed development on its environment and any other physical features at site.
- (16) Internal roads & footpaths connecting various facilities with the station complex as required.
- (17) Proper display of Signages & other guiding maps etc. should be ensured. This includes the colonies, stations and other service buildings.
- (18) Arrangement should also be made for Rain Water Harvesting for all buildings.
- (19) All public & service buildings including the Junction stations/Crossing Station buildings, IMD/IMSD etc shall have access for differently abled persons. All guidelines issued by ministry of urban development & Ministry of welfare & social justice issued from time to time shall be scrupulously followed in this regard.

1.4 The Contractor shall undertake Design and Construction of following buildings and structures, with minimum facilities as required by Employer

- (i) Station Building for Junction Stations
- (ii) Station Building for Crossing Stations
- (iii) Integrated Maintenance Depots (IMD)
- (iv) Integrated Maintenance Sub Depots (IMSD)
- (v) Residential Buildings for replacement of Indian Railways residential Buildings.
- (vi) Residential Buildings for DFC requirements
- (vii) Gate lodges
- (viii) Guest House
- (ix) Club/Institute

For the Residential Buildings for replacement of existing Indian Railways Residential Buildings at Mughal-sarai the scope of work shall also include internal electrification, street lighting and power supply from nearest sub-station. Other buildings of DFC as mentioned in Employers requirement shall have provision of conduiting for electrical works. Electrification of these DFC buildings shall be done by other contractor.

All other civil works as per Employers requirement shall be carried for all the Buildings

2.0 DESIGN PROCEDURES AND DESIGN STANDARDS

2.1 GENERAL DESIGN CRITERIA

2.1.1 Durability and Maintenance

- (1) The Permanent Works shall be designed and constructed such that, they shall endure in a serviceable condition throughout their designed lives as described in the Design Criteria and standards contained in the technical specifications to minimise the cost of operation and maintenance whilst not compromising safety or the performance characteristics of the railway.
- (2) Electrical and mechanical equipment where supplied shall be of a quality and durability, to fully meet the performance and operational requirements described in the Design

2.1.2 Operational Requirements

- (1) The Permanent Works near running lines shall be designed to permit the railway to operate satisfactorily at a maximum design speed of 100Km/h for freight trains. The Contractor shall ensure that proposed size and location of permanent works other contractor's works do not violate Schedule of Dimensions (SOD) of EDFQ/ Indian Railways.
- (2) The locations of Permanent Structures shall be decided taking due note of the possible operational requirements in coming years.

- (3) In the design and construction of the Works, the Contractor shall, as a fundamental objective and as a priority, ensure that staff and the public will be provided with as safe an environment as is reasonably practicable throughout the execution period of the contract.
- (4) It is a requirement that the Indian Railway (IR) remains operational during the construction Phase.

2.2 DESIGN PROCEDURES AND PROCESSES

The requirements of Design procedures and processes during Design and Construction phases including those necessary for interface with various existing systems and agencies and those that are of general nature have been detailed in Part 2 Section VI, Volume 3 ,DESIGN PROCEDURES AND PROCESSES.

2.3 CONTRACTOR'S RESPONSIBILITIES

- (1) The Contractor shall be responsible for detailed design, layout, construction, manufacture, supply, installation, testing and commissioning of the buildings, structures and building services wherever applicable under this Contract.
- (2) The Contractor shall undertake that the designers shall be available to attend discussions with the Engineer and Employer at all reasonable times during the Contract period. The Designer shall be the same entity as proposed by the Contractor at the time of pre-qualification, unless otherwise approved by the Employer.

The Contractor shall be fully responsible, for the suitability, adequacy, integrity, durability and practicality of the Contractor's proposal.

Wherever there is any inadequacy, insufficiency, impracticality or unsuitability in or of the Employer's Requirements or any part thereof, the Contractor's proposal shall take into account, address such inadequacy, insufficiency, impracticality or unsuitability.

The Contractor shall certify that:-

- The Works have been or shall be designed, manufactured, installed and otherwise constructed to the applicable standards available using proven upto-date good practice.
 - The Works shall, when completed, comply with enactments and regulations relevant to the Works.
 - The design of the Works have taken or shall have taken full account of the effects of the intended manufacturing and installation methods, Temporary works and Contractor's equipment.
- (3) The Building Works shall comply with Indian standards and IR regulations and standards as set out in this document.

2.4 AESTHETICS

The permanent works shall be designed to achieve an aesthetic character and provide a feeling of design commonality throughout the project.

2.5 SAFETY, HEALTH & ENVIRONMENTAL CONSIDERATIONS

- (1) The design of the Permanent works shall be according to Indian laws and regulations related to Safety, Health & Environmental Requirements.
- (2) Safety, Health & Environmental aspects shall be kept in mind during the Design/Construction and Testing & Commissioning phase, requirement for which has been specified at appropriate places in the bidding document as well as in **Part 2 Section VI, Volume 6 Appendix 12 & 13**. It shall be the overall responsibilities of the Contractor to ensure compliance of Safety, Health & Environmental aspects at all times conforming to the provisions mentioned in this Bidding document.

2.6 QUALITY CONTROL

Quality control aspects shall be kept in mind during the Design/construction and testing & commissioning phase, requirement for which has been specified at appropriate places in the bidding document as well as in **Part 2, Section VI, Volume 6, Appendix 6 – Quality Assurance**. It shall be the overall responsibilities of the Contractor to ensure deliverables of quality products at all times, conforming to the provisions mentioned.

2.7 GENERAL DESIGN CRITERIA FOR STATION, BUILDINGS, IMDs, IMSDs, STAFF QUARTERS, GATE LODGES, GUEST HOUSE, CLUB/INSTITUTE and OTHER STRUCTURES

- (1) The layout of Crossing/ Junction station buildings and service buildings like IMD, IMSD, shall be as included in indicative reference drawings. The contractor shall develop the layout, architectural plan and elevation and detailed design and drawings of various facilities as brought out in the relevant drawings of station building, service building and residential quarters. The General Arrangement drawings will be approved by Engineer and consented by employer.
- (2) Architecture and profile of buildings shall conform to local aesthetic, cultural ethos, etc. and it shall be approved by Engineer and consented by Employer.
- (3) The foundations of buildings shall be designed for at least one storey more than the requirement.
- (4) The site of the work shall be cleared off the shrubs, vegetation, grass, bushes and other materials upto adequate depth as required as per site condition and rubbish removed outside the periphery of the area being cleared. The enclosed area between the boundary walls/ fencing for the buildings, shall then be filled with earth upto 600 mm above Natural ground level (NGL) or 300 above HFL whichever is higher and well compacted by a suitable method as decided by Engineer.
- (5) Boundary wall shall be provided around the buildings with controlled access viz. IMD, IMSDs, Residential quarters, Station buildings for Junction and crossing stations as per Drg.No. DFCC/BOUNDARY WALL.
- (6) The plinth level of station buildings for Junction and crossing stations and Gate Lodges shall be at least 300mm above the rail level.

- (7) The plinth level of residential quarters, service buildings like IMDs, IMSDs, and other buildings shall be 900mm above the natural ground level or 600mm above HFL (High Flood Level) whichever is higher. The ceiling height of station buildings and service buildings shall be approximately 4.2 m above floor level.
- (8) The DG room in Crossing/ Junction station buildings should preferably be on extreme corner of building to keep vibrations and exhaust at one end.
- (9) The work inside the various rooms of stations viz. equipment room, relay room, electric switch room, electric equipment room, etc. shall be co-ordinated with other contractor.
- (10) The functional and structural design of station building and service building, shall conform to National building code and bye-laws of local authorities to the extent of their applicability.
- (11) The method of structural analysis shall be appropriate for the structure or the component to be analyzed and it shall be carried out by contractor using established software with the approval of Engineer.
- (12) Load due to earth quake (as applicable for the earth quake zone in which station building falls) shall be assessed as per provisions of relevant IS Code with latest amendments/revisions.
- (13) Load and load combinations shall comply with relevant Indian Standard with latest amendments.
- (14) The overall stability and serviceability requirement shall be checked in accordance with the provisions of relevant Indian Standards.
- (15) All buildings shall be amenable to maintenance with minimum efforts.
- (16) All buildings shall be provided/with concealed ducts/pipes for wiring of telecom facilities in addition to ducts / pipes for power supply and distribution. These arrangements shall be made in consultation with other contractors.
- (17) Station and other Building signages shall be designed and provided.
- (18) The ceiling height for residential quarters shall be approximately 3.5m above floor level. All residential buildings can be single/ multi storeys. Number of storeys and number of quarters on one floor will be decided by Engineer and consented by Employer.

3.0 EMPLOYER'S REQUIREMENTS – FUNCTIONAL

3.1 GENERAL

- (1) The building should be energy efficient using green building concepts.
- (2) Plinth area of the layout proposed by the contractor should not be less than the plinth area shown in the indicative plan given in this document.

The minimum standard of finish shall be as listed in Annexure-1.

3.2 JUNCTION STATIONS

- (1) Junction stations are the interchange stations with Indian Railways. The list of Junction stations and their indicative chainages on Mughalsarai – New Bhaupur section are as detailed below.

(a) Contract package 201

S. No	Name of Station	Approximate DFC Chainage
1	Mughalsarai	Ch. 124.626
2	New Ahrauraroad	Ch. 138.675
3	New Karchana	Ch. 269.155

(b) Contract package 202

S. No	Name of Station	Approximate DFC Chainage
1	New Kanpur	Ch. 461.369
2	New Bhimsen	Ch. 486.349

- (2) Indicative plan and elevation of Junction station is given in Drawing GC/DFCC/JS/101&102 (Part 4 – Reference Documents – Site Data – Bidding Document). Plinth area should not less be less than 670 Sqm with two storeys structure.
- (3) The General specifications for the materials to be used for various rooms of
- (4) Junction Station are listed in the Annexure-1.
- (5) Minimum standard of finish shall be as listed in Annexure-1

3.3 CROSSING STATIONS

- (1) The list of Crossing stations and their indicative chainages on Mughalsarai – New Bhaupur section are as detailed below:-

(a) Contract package 201

S. No	Name of Station	Approximate DFC Chainage
1	New Dagmagpur	Ch. 162.700
2	New Mirjapur	Ch. 192.700
3	New Unchdih	Ch. 234.900

(b) Contract package 202

S. No	Name of Station	Approximate DFC Chainage
1	New Manauri	Ch. 296.155
2	New Sujatpur	Ch. 334.144
3	New Rasulabad	Ch. 378.558
4	New Malwan	Ch. 423.062

- (2) Indicative plan and elevation of Crossing station building is at Drawing No.GC/DFCC/J S/201&202 (Part 4 – Reference Documents – Site Data – Bidding Document). Total Plinth area should not be less than 514 Sqm with two storeys structure.

- (3) The minimum standard of finish shall be as listed in Annexure-1.

3.4 INTEGRATED MAINTENANCE DEPOTS (IMDs):

- (1) DFCCIL will follow mechanised maintenance of track. For maintenance of assets an Integrated Maintenance Depot shall be constructed. The indicative plan and elevation for IMDs is as brought out in Drawing No. GC/DFCC/IMD/301 (Part 4 – Reference Documents – Site Data – Bidding Document). The Contractor shall develop the architectural plan and elevation, detailed design and drawings for construction of Integrated Maintenance Depots (IMD) between Mughalsarai – New Bhaupur.

- (2) The details of IMDs to be constructed are as below,

(a) Contract package 201

S. No	Name of Station	Approximate DFC Chainage
1	Mughalsarai	Ch. 124.626
2	New Karchana	Ch. 269.155

(b) Contract package 202

S. No	Name of Station	Approximate DFC Chainage
1	New Kanpur	Ch. 461.369

The number mentioned above is fixed. The locations given are indicative. The exact Km / Chainage / location will be decided by Engineer after obtaining approval of Employer.

- (3) The building should be energy efficient using Green building concepts. Plinth area of the layout proposed by the contractor shall not be less than the plinth area shown in the indicative plan.
- (4) The minimum standard of finish shall be as listed in Annexure-1.

3.5 INTEGRATED MAINTENANCE SUB DEPOTS (IMSDs)

- (1) The indicative plan and elevation for IMSDs is as brought out in Drawing No. GC/DFCC/IMD/401 (Part 4 – Reference Documents – Site Data – Bidding Document).The Contractor shall develop the architectural plan and elevation, detailed design and drawings for construction of Integrated Maintenance Sub Depots (IMSDs) between Mughalsarai – New Bhaupur stations.

- (2) The details of IMSDs to be constructed are as below:-

(a) Contract package 201

S. No	Name of Station	Approximate DFC Chainage
1	New Dagmaipur	Ch. 162.700
2	New Unchdih	Ch. 234.900

(b) Contract package 202

S. No	Name of Station	Approximate DFC Chainage
1	New Manauri	Ch. 296.155
2	New Rasulabad	Ch. 378.558
3	New Malwan	Ch. 423.062

The number mentioned above is fixed. The locations given are indicative. The exact Km / Chainage / location will be decided by Engineer after obtaining approval of Employer.

- (3) The building should be energy efficient using Green building concepts. Plinth area of the layout proposed by the contractor shall not be less than the plinth area shown in the indicative plan.
- (4) The minimum standard of finish shall be as listed in Annexure-1.

3.6 RESIDENTIAL BUILDINGS

3.6.1 Residential Buildings for replacement of Indian Railways Residential Buildings.

(a) Contract Package 201

- (1) At Mughalsarai Station the alignment is passing through residential buildings / other buildings. The new Residential Buildings in lieu of existing have to be constructed by the contractor. The details of buildings are given below:

S.No	Type of quarter	No. Of Quarters to be constructed	Reference indicative drawing
1	Type II (IR)	190	Eastern Rly. Drg. – CE's – A-406/82

- (2) The contractor shall prepare the required architectural and structural drawings. Plinth area of the layout proposed by the contractor shall not be less than the plinth area shown in the indicative drawings.
- (3) These quarters shall be located at Mughalsarai as per location and layout shown in Plan number DRM/MGS 37-2013. For the residential buildings at Mughalsarai the scope of work shall also include internal electrification and fixtures, street lighting, colony road, parks, boundary wall and Power supply from nearest substation. The layout of buildings and the Residential Complex having 190 quarters shall be approved by Employer. The buildings shall be maximum three

storeys. The specification and standards for all works for these residential buildings shall be as per standards of E.C. Railway. Facilities/items required to be provided in the quarters but not covered in the ECR specifications will be as per the Annexure-1.

(b) Contract Package 202

Residential buildings to be constructed in lieu of existing residential buildings in package 202 are NIL.

3.6.2 Residential Buildings for DFC

- (1) It is proposed to construct residential quarters as given in table below. The indicative schematic plan for various types of quarters shall be as per table below:-

a) Contract Package 201

S. No	Type of quarter	Reference to indicative drawing	Numbers to be constructed
1	Type A	GC/DFCC/QTRS – 701	80
2	Type B	GC/DFCC/QTRS – 702	Nil
3	Type C	GC/DFCC/QTRS – 703	20
4	Type D	Area 115 Sqm	4
5	Type D-SPL	Area 175 Sqm	Nil
6	Type E	Area 200 Sqm	Nil

b) Contract Package 202

S. No	Type of quarter	Reference to indicative drawing	Numbers to be constructed
1	Type A	GC/DFCC/QTRS – 701	48
2	Type B	GC/DFCC/QTRS – 702	5
3	Type C	GC/DFCC/QTRS – 703	80
4	Type D	Area 115 Sqm	16
5	Type D-SPL	Area 175 Sqm	6
6	Type E	Area 200 Sqm	4

- (2) The Contractor shall prepare the required architectural and structural drawings. Plinth area of the layout proposed by the Contractor shall not be less than the area indicated in the Plan as described in Site Details of Part – 4 of the Bidding Document.

- (3) These quarters shall be located either at DFC crossing stations or near about that location as decided by the Engineer.
- (4) The minimum standard of finish shall be as listed in Annexure-1.

3.7 GUEST HOUSE, CLUB / INSTITUTE ETC.

- (1) The Contractor shall construct Club / Institute, guest house as per the details given below:
 - a) Contract Package 201 – Nil
 - b) Contract Package 202 – Guest House one (1) number and one (1) number Club / Institute,
- (2) The contractor shall develop the architectural plan and Elevation, detailed design and drawings and construct the Guest House, Club / Institute at Allahabad. The Architectural plan and elevation shall be approved by Engineer.
- (3) The plinth area to be constructed for Guest House shall not be less than 500 Sqm and for Club / Institute the plinth area shall not be less than 1000 Sqm. These buildings shall be part of scope of Contract Package 202.
- (4) The minimum standard of finish shall be as listed in Annexure-1.

3.8 Gate Lodges

An indicative plan, elevation section is at Drawing No- GC/DFCC/GL/505. The minimum standard of finish shall be as listed in Annexure-1. Plinth area of the layout proposed by the Contractor shall not be less than the plinth area less than that of the area shown in the indicative drawings. The gate lodges shall be constructed at such level crossings where the existing gate lodges are falling between the IR tracks and proposed DFC alignment and need to be relocated.

Annexure 1-

TABLES AND LIST OF DRAWINGS

Table 1: General Specifications for Junction Station / Crossing Stations / IMD / IMSD / Ancillary structures

Sr. No.	Description	Specification	Skirting/Dado
1	All rooms	Flooring with Marble Mosaic Tiles/Ceramic Tiles (except Sore rooms in IMDs and IMSDs)	Same with 100 mm high
2	Toilet/Bath/WC	Flooring tiles (anti skid) Table Top for WB Granite	Same with 2100 mm high
3	Battery Room/DG Room	Flooring with Acid & Alkali Resistance tiles	Same with 1500 mm high
4	Staircase/Porch Verandah	Kota Stone (Polished) flooring	Same with 100 mm high
5	Workshop/Shed	Vacuum dewatered cement concrete flooring	Same with 100mm high
6	Internal Finish	All walls finish in POP followed by acrylic/oil bound paint and ceiling in Toilet white wash.	
7	Railing	Steel railing duly painted with approved paint & shade.	
8	Door/Window ventilator	Door/Window Frame	Steel section
		Shutter Door	Aluminium shutter with particle Board panel (both side laminated).
		Window Shutter	Aluminium with Glass panel
		Grill	Aluminium / Steel grill as decided by Engineer
9	External Finish	Washed Grit Agra Stone of Dholpur Chip aggregate with groove.	
10	False Ceilings	600 x 600mm calcium silicate panels for Air conditioned rooms	

Besides water supply, plumbing & sewerage, Provision for Rain water harvesting are also to be provided at all locations/stations.

Table 2: General Specification for Guest-House & Institute/Club

Sr. No.	Description	Specification	Skirting/Dado
1	All rooms, Verandah	Flooring with vitrified tiles , Granite in reception / entrance foyer	Same with 100 mm high
2	Toilet/Bath/WC	Flooring tiles (anti skid), Granite Table Top for Wash Basin.	Same with 2100 mm high
3	Kitchen/dining hall	Floor Tiles (Non-Glazed), Granite table top with stainless steel sink	Same with 100mm high &600mm above table-top.
4	Staircase/Porch	Kota Stone (Polished) flooring	Same with 100 mm high
5	Internal Finish	All walls finish in POP followed by acrylic/oil bound paint and white wash in Toilet ceiling.	
6	Railing	Stainless steel railing	
7	Door/Window ventilator	Door/Window Frame	Aluminium Box section
		Door Shutter	Aluminium shutter with particle Board panel (both side laminated). Aluminium sliding shutter with Glass panel at entrance.
		Window Shutter	Aluminium shutter with Glass panel.
		Grill	Aluminium
8	External Finish	Washed Grit Agra Stone of Dholpur Chips aggregate with grooves.	
9	Terrace finishing	FPS brick tiles of class designation 10 grouted with cement mortar 1:3 mixed with 2% of integral water proofing compound by weight of cement over a 12mm layer of cement mortar of 1:3 and finished neat.	
10	False Ceiling	600x600mm calcium silicate panels for Air conditioned rooms	

Besides water supply, plumbing & sewerage, Provision for Rain water harvesting are also to be provided at all locations.

Table 3: General Specification for Staff Quarters

Sr. No.	Description	Specification	Skirting/Dado
1	All rooms, Verandah	a) Flooring with vitrified tiles – For type D & E Quarters b) Flooring with Marble / Mosaic Tiles/Precast Terrazzo Tiles – For other Quarters	Same with 100 mm high
2	Toilet/Bath/WC	Flooring tiles (Non-Glazed), Granite Table Top for Wash Basin.	Same with 2100 mm high
3	Kitchen/dining hall	Floor Tiles (Non-Glazed), Granite table top with stainless steel sink	Same with 100mm high & 600mm above table-top.
4	Staircase/Porch	Kota Stone (Polished) flooring	Same with 100 mm high
5	Internal Finish	All walls finish in POP followed by acrylic/oil bound paint and white wash in Toilet ceiling.	
6	Railing	Steel railing with paint	
7	Door/Window ventilator	Door/Window Frame	1 st class Sal wood section
		Shutter Door	1 st class teak wooden frame with panelled shutter of particle board both side laminated & Wire-mess (Fly-proof) in Kitchen & external doors.
		Window Shutter	1 st class Teakwood shutters with Glass panel
		Grill	Steel with paint
8	External Finish	Cement plaster on all walls and finished with Snowcem paint or equivalent.	

9	Terrace finishing	FPS brick tiles of class designation 10 grouted with cement mortar 1:3 mixed with 2% of integral water proofing compound by weight of cement over a 12mm layer of cement mortar of 1:3 and finished neat.
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Besides water supply, plumbing & sewerage, provision for Rain water harvesting is also to be provided at all locations/stations. Integration with the existing Indian Railways water supply network for drawing adequate supply of water wherever possible would be permitted. However, if this is not possible because of capacity or other constraints, the Contractor shall make his own arrangements for supplying appropriate quantity and quality of water. Wherever municipal sewer connections are not available, Septic Tanks are to be provided.

Table 4: General Specification for Gate Lodges

Sr. No.	Description	Specifications	Skirting / Dado
1	Duty Room / Verandah	Cement Concrete flooring	Same with 100 mm high
2	Toilet	Cement Concrete flooring & Indian type WC	Same with 100 mm high
3	Door / Window / Ventilator	Door/Window Frame	Steel section painted with Enamel paint
		Shutter Door	Water proof flush Door
		Window Shutter	1 st class Teakwood shutters with Glass panel finished with Enamel Paint
		Grill	Steel painted with Enamel paint.
4	Internal Finish	Cement Plaster on all walls / ceiling and finished with Colour Wash.	
5	External Finish	Cement Plaster on all walls and finished with Snowcem paint or equivalent	

LISTS OF DRAWINGS

Sr. No.	Drawing Names	Drawing Numbers
1	Junction Station Building (Including Resting facilities)	Drawing No-GC/DFCC/JS/101&102
2	Crossing Station Building (Including Resting	Drawing No-GC/DFCC/CS/201&202

	facilities)	
3	Integrated Maintenance Depot.	Drawing No-GC/DFCC/IMD/301
4	Integrated Maintenance Sub Depot	Drawing No-GC/DFCC/IMSD/401
5	Gate Lodge	Drawing No-GC/DFCC/GL/505
6	Staff quarters for replacement of Indian Railways staff quarters	Eastern Railway Drawing No-CEs – A-406/82
7	Staff Quarters for DFC	Drawings no-GC/DFCC/QRTS/701-To-703
8	Boundary wall	Drawing No-DFFC/Boundary wall



BID DOCUMENT FOR

DESIGN AND CONSTRUCTION OF CIVIL, STRUCTURES AND TRACK WORKS FOR DOUBLE LINE RAILWAY INVOLVING FORMATION IN EMBANKMENTS/CUTTINGS, BALLAST ON FORMATION, TRACK WORKS, BRIDGES, STRUCTURES, BUILDINGS, YARDS, INTEGRATION WITH IR EXISTING RAILWAY SYSTEM AND TESTING & COMMISSIONING ON DESIGN-BUILD LUMP SUM BASIS FOR MUGHALSARAI – NEW BHAUPUR SECTION OF EASTERN DEDICATED FREIGHT CORRIDOR

CIVIL, STRUCTURES AND TRACK WORKS

CONTRACT PACKAGE NOS: 201 & 202

Issued on: **12.02.2014**

ICB No.: HQ/EN/EC/D-B/Mughalsarai - New Bhaupur

(Part-3)

EMPLOYER: DEDICATED FREIGHT CORRIDOR CORPORATION OF INDIA LTD

(A GOVERNMENT OF INDIA ENTERPRISE)

MINISTRY OF RAILWAYS

COUNTRY: INDIA

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PART 3

Conditions of Contract & Contract Forms

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Section VII. General Conditions (GC) As per FIDIC Yellow Book 1999-Edition

GENERAL CONDITIONS OF CONTRACT (GC) REFER TO

The conditions of Contract comprise the “General Conditions” which form part of the conditions of Contract for Plant and Design Build first edition 1999 published by the Federation Internationale Des Ingenieurs – Conseils (FIDIC) and the following “Particular Conditions” which include amendments and addition to such General Conditions.

Copies of the above FIDIC publication i.e. “Conditions of Contract for Plant and Design Build” can be obtained from

International Federation of Consulting Engineers
FIDIC Bookshop – Box- 311 – CH – 1215 Geneva 15 Switzerland
Fax: +41 22 799 49 054
Telephone: +41 22 799 49 01
E-mail: fidic@fidic.org
www.fidic.org

Section VIII. Particular Conditions

The Conditions of Contract comprise the “**General Conditions**”, which form part of the “Conditions of Contract for Plant and Design Build for Electrical and Mechanical, and for Building and Engineering Works designed by the Contractor”, First Edition, 1999 published by the Fédération Internationale des Ingénieurs-Conseils (**FIDIC**), and the following “**Particular Conditions**”, which include amendments and additions to such General Conditions. The General Conditions are incorporated herein by reference only and are not set out at length. The Contractor is deemed to have obtained for himself and read and fully understood the General Conditions in their entirety. The following Particular Conditions shall supplement the General Conditions in Section VII. Whenever there is a conflict, the provisions herein shall prevail over those in the General Conditions.

Clause	PROVISIONS
Sub-Clause 1.1.3.1	Insert the words “Second Stage” before the word “Tender” in second line of the Sub-Clause 1.1.3.1.
Sub-Clause 1.1.3.10	Insert additional Sub-Clause 1.1.3.10 “Milestone” means the completion of a part of the Works, or the occurrence of an identified event.
Sub-Clause 1.1.3.11	Insert additional Sub-Clause 1.1.3.11 “Stage” means the part of the Works identified as such and more particularly described in the Price Schedules, Part I Section IV Bidding Forms.
Sub-Clause 1.1.3.12 Reference to Period	Insert additional Sub-Clause 1.1.3.12: “Reference to period” means period commencing ‘from’ a specified day or date and ‘till’ or ‘until’ a specified day or date shall include both such days and dates.”
Sub-Clause 1.1.6.9	Delete the existing clause and substitute with the following: Variation means any change to the Employer’s Requirements with reference to change in Scope of Works, Design Criteria & Specifications and Criteria for the Testing & Performance of the completed Works specified in the Employer’s Requirements or the Works, which is instructed

	or approved as a variation under clause 13 [Variations and Adjustment].
Sub-Clause 1.1.6.10 General Clauses Act 1897	Insert the following Sub-Clause 1.1.6.10: Any word or expression used in this Contract shall, unless otherwise defined or construed in this Contract, bears its ordinary English meaning and, for these purposes, the General Clauses Act 1897 shall not apply.
Sub-Clause 1.2. Interpretation	Insert the following sub-paragraphs after sub-paragraph (d): (e) the word “tender” is synonymous with “bid”, and “tenderer” with “bidder” and the words “tender documents” with “bidding documents”.
Sub-Clause 1.3 Communication	Add the following paragraph at the end of this Sub-Clause: “In this Contract, unless the context otherwise requires, any Contract, consent, approval, authorisation, notice, communication, information or report required under or pursuant to this Contract from or by any Party or the Engineer shall be valid and effective only if it is in writing under the hand of a duly authorised representative of such Party or the Engineer, as the case may be, in this behalf and not otherwise”
Sub-Clause 1.5	Delete sub paragraphs (a) to (h) and replace with the following: 1) The Contract Agreement; 2) Letter of Acceptance; 3) Minutes of meeting of pre-award clarifications / negotiations after opening of the Second Stage Bid, if any; 4) Addenda to Bidding Documents, if any 5) (i) Letter of Bid-(Two Stage Bidding, Second Stage Bid), (ii) Appendix to Bid (Percentage Breakup of Lump Sum Bid Price for local & foreign currencies

	<p>(iii) Price Schedules submitted by the Contractor;</p> <p>6) Appendix to Tender;</p> <p>7) Particular Conditions;</p> <p>8) General Conditions;</p> <p>9) Memorandum titled ‘Changes Required Pursuant to First Stage Evaluation’;</p> <p>10) (i) Employer’s Requirements; (ii) Letter of Bid (First Stage Bidding)</p> <p>11) Contractor’s Updated Technical Proposal;</p> <p>12) Part 4 (Reference Documents) of Bidding document; and</p> <p>13) Any other documents forming part of the Employer’s requirements and Bidding documents.</p> <p>Subject to the above, in case of ambiguities or discrepancies within this Contract, the following shall apply:</p> <p>(a) between two or more Clauses of this Contract, the provisions of a specific Clause relevant to the issue under consideration shall prevail over those in other Clauses;</p> <p>(b) between the written description on the Drawings and the Specifications, the latter shall prevail;</p> <p>(c) between the dimension scaled from the Drawing and its specific written dimension, the latter shall prevail; and</p> <p>(d) between any value written in numerals and that in words, the latter shall prevail.</p>
<p>Sub- clause 1.7 Assignment</p>	<p>Delete Sub-clause 1.7 (a)</p>
<p>Sub- clause 1.9 Errors in Employer’s Requirements</p>	<p>Delete Sub-clause 1.9 and replace with:</p> <p>“If the Contractor suffers delay and/or incurs Cost as a result of an error in the Employer's Requirements with reference to purpose, scope, design and /or other technical criteria for the works and an experienced contractor exercising due care would not have discovered the error when scrutinizing the</p>

	<p>Employer's Requirements with respect to purpose, scope, design and/or other technical criteria for the works under Sub-Clause 5.1 [General Design Obligations], the Contractor shall give notice to the Engineer and shall be entitled subject to Sub-Clause 20.1 [Contractor's Claims] to:</p> <p>(a) an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.4 [Extension of Time for Completion], and</p> <p>(b) payment of any such Cost plus reasonable profit, which shall be included in the Contract Price.</p> <p>After receiving this notice, the Engineer shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine</p> <p>(i) whether an experienced Contractor could not have discovered the error?</p> <p>(ii) if the answer to the matter stated above in paragraph (i) is yes, to what extent the Contractor could not reasonably have discovered the error; and</p> <p>(iii) the matters described in sub-paragraphs (a) and (b) above to the extent under paragraph (ii) above.</p>
<p>Sub- clause 1.14 Joint and Several Liability</p>	<p>Delete Sub- clause (b) and replace with:</p> <p>In case of a joint venture or consortium or group of two or more persons performing the Contract, one of the members shall be nominated as the lead partner, who shall be the point of contact for the Employer. Each member of the joint venture or consortium or group of two or more persons shall furnish a power of attorney in favour of the lead partner to take all actions on behalf of the joint venture or consortium and bind the joint venture consortium. However, the nomination of such lead partner shall not in any way affect the joint and several liability of the joint venture or consortium members under (a) above.</p>
<p>New Sub- clause 1.15 Inspections and Audits by the Bank</p>	<p>The Contractor shall permit, and shall cause its Subcontractors and sub-consultants to permit, the Bank and/or persons appointed by the Bank to inspect the Site and all accounts and records relating to the performance of the Contract and the submission of the Bid, and to have such</p>

	<p>accounts and records audited by auditors appointed by the Bank if requested by the Bank. The Contractor's and its Subcontractors' and sub-consultants' attention is drawn to Sub-Clause 1.16 [Fraud and Corruption] which provides, inter alia, that acts intended to materially impede the exercise of the Bank's inspection and audit rights provided for under Sub-Clause 1.15 constitute a prohibited practice subject to contract termination (as well as to a determination of ineligibility pursuant to the Bank's prevailing sanctions procedures)</p>
<p>New Sub- clause 1.16 Fraud & Corruption</p>	<p>If the Employer determines that the Contractor and/or any of its personnel, or its agents, or its Subcontractors, sub-consultants, services providers, suppliers and/or their employees has engaged in corrupt, fraudulent, collusive coercive, or obstructive practices, in competing for or in executing the Contract, then the Employer may, after giving 14 days notice to the Contractor, terminate the Contractor's employment under the Contract and expel him from the Site, and the provisions of Clause 15 shall apply as if such expulsion had been made under Sub-Clause 15.2.</p> <p>For the purposes of this Sub-Clause,</p> <ul style="list-style-type: none"> (i) "corrupt practice" is the offering, giving, receiving or soliciting, directly or indirectly, of anything of value to influence improperly the actions of another party¹; (ii) "fraudulent practice" is any act or omission, including a misrepresentation, that knowingly or recklessly misleads, or attempts to mislead, a party to obtain a financial or other benefit or to avoid an obligation²;

¹ "Another party" refers to a public official acting in relation to the procurement process or contract execution]. In this context, "public official" includes World Bank staff and employees of other organizations taking or reviewing procurement decisions.

² "Party" refers to a public official; the terms "benefit" and "obligation" relate to the procurement process or contract execution; and the "act or omission" is intended to influence the procurement process or contract execution.

	<p>(iii) “collusive practice” is an arrangement between two or more parties³ designed to achieve an improper purpose, including to influence improperly the actions of another party;</p> <p>(iv) “coercive practice” is impairing or harming, or threatening to impair or harm, directly or indirectly, any party⁴ or the property of the party to influence improperly the actions of a party;</p> <p>(v) “obstructive practice” is</p> <p>(aa) deliberately destroying, falsifying, altering or concealing of evidence material to the investigation or making false statements to investigators in order to materially impede a Bank investigation into allegations of a corrupt, fraudulent, coercive or collusive practice; and/or threatening, harassing or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation, or</p> <p>(bb) acts intended to materially impede the exercise of the Bank’s inspection and audit rights provided for under Sub-Clause 1.15.</p>
<p>Sub- clause 2.1 Right of Access to Site</p>	<p>Delete Sub- clause (b) in para 3 and replace with:</p> <p>(b) Payment of any such cost plus reasonable profit subject to a maximum of Rs. 2000.00 (Two Thousand) per day for every km. For length less than a kilometer pro-rata amount shall be calculated. Provided further that if such delay in handing over does not affect the execution of formation works for laying of tracks, provisions under para 2.1(b) of this sub clause shall not apply.</p>
<p>Sub-Clause 3.1 Engineer’s Duties and Authorities</p>	<p>Delete 4th paragraph “However, whenever given approval” of this Sub-Clause.</p> <p>Add the following at the end of this Sub-Clause:</p>

³ “Parties” refers to participants in the procurement process (including public officials) attempting to establish bid prices at artificial, non competitive levels.

⁴ “Party” refers to a participant in the procurement process or contract execution.

	<p>“Notwithstanding anything contained hereinabove, the Engineer is required to obtain specific written approval of the Employer before exercising specific authorities as listed below:</p> <ul style="list-style-type: none">i) Consenting to proposed Subcontractors / specialist subcontractors pursuant to Sub-Clause 4.4 (b) for Earthwork, Bridges, Important Bridge over perennial river, Track laying Works and Designing of the Works;ii) Clearance of concept design & concept drawings and GADs submitted by the Contractor for alignment, Major/Important bridges, Rail Fly Over and Works requiring sanction of Commissioner of Railway Safety;iii) Taking action in connection with variations in the Employer’s Requirements which have been initiated by the Employer;iv) Determination of any additional payment in accordance with Sub-Clause 3.5 read with Sub-Clause 2.5 & 20.1;v) Determination of Extension of Time for Completion in accordance with Sub-Clause 8.4 read with Sub-Clause 20.1;vi) Issuing of Taking over certificate pursuant to Clause 10vii) Instructing or approving Variations pursuant to Sub-Clauses 13.1, 13.2 and 13.3 except;<ul style="list-style-type: none">a. In an emergency affecting the safety of life or of the works or of adjoining property or track, he may, without relieving the Contractor of any of his duties and responsibility under the Contract, instruct the Contractor to execute all such things as may, in the opinion of the Engineer, be necessary to abate or reduce the risk. In case the emergency mentioned above occurs on account of failure of Contractor, by way of not adhering to the sound industry practice or not taking adequate safety precautions, then no amounts shall be paid to the Contractor for attending to such emergencies.b. If the variation is within a limit of 0.1% of original
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	<p>contract price in a single instance and combined with all variation orders previously issued, increase the original Contract Price by less than 2%.</p> <p>The Employer shall, on the best effort basis, give its decision on Engineer’s proposal of variation within 21 (twenty one days) of the receipt of the proposal.”</p>
<p>Sub-clause 4.2 Performance Security</p>	<p>Add the following after “given” at the end of para 4(d): “in which event the Employer shall forfeit the amount of the Performance Security as indicated in Sub-Clause 15.4.”</p> <p>Delete paragraph 5 of Sub-clause 4.2 “The Employer ... claim.” and substitute with the following: In case the Employer makes a claim on the Performance Security, which it was not entitled to make, the Employer shall forthwith refund such amount of claim to the Contractor.</p>
<p>Sub-clause 4.4 Subcontractors</p>	<p>Delete first line and substitute with the following: The contractor shall not subcontract more than 30% of the total Works.</p>
<p>Sub-clause 4.7 Setting Out</p>	<p>Delete paragraph 2, 3 & 4 of Sub-clause 4.7 and substitute with the following: Accuracy of these specified items of reference shall be deemed to have been verified by the Contractor. Accordingly, the Contractor shall have no right to claim towards time or cost caused due to errors in these specified items of reference.</p>
<p>Sub-Clause 4.10 Site Data</p>	<p>Add at the end of paragraph 1 of Sub-Clause 4.10. Accordingly, the Contractor shall have no claim in this regard.”</p> <p>In paragraph 2 of Sub-Clause 4.10. Delete the words “To the extent which was practicable (taking account of cost and time). Start the word “the” with a capital letter.</p> <p>Delete “To the same extent” from the fourth line and Start</p>

	<p>the word “the” with a capital letter.</p>
<p>Sub-Clause 4.11</p>	<p>Add the following after Sub-Clause 4.11 [Sufficiency of the Accepted Contract Sum]</p> <p>“DFCC project being funded by the World Bank, qualifies for exemption from payment of custom duty and Excise duty on goods supplied/intended to be supplied to the Project in terms of Government of India’s Customs notification no. 84/97 – customs dated 11.11.1997 and Central Excise Notification no. 108/95-CE dated 28.08.1995 (read along with all subsequent amendments) respectively, provided the goods brought in to the project are not withdrawn by the supplier or the Contractor.</p> <p>Under various notifications of the Department of Excise and Customs, Government of India, goods brought in to the project funded by the International Bank of Reconstruction and Development (IBRD) and / or awarded after conducting process under the International Competitive Bidding are exempt from Customs and Excise duties and / or are eligible for Deemed Export Benefits, provided the said goods are not withdrawn by the supplier or Contractor.</p> <p>The certificates required for claiming exemption of customs duty and excise duty and / or for claiming deemed export benefits on goods by the Contractor shall be issued by the Employer. The Contractor shall be solely responsible for obtaining such duty exemptions and / or deemed export benefits and in case of failure to avail such benefits for any reasons whatsoever; the Employer shall not reimburse any such duties.</p> <p>The above stated certificate(s) shall be issued for the bonafide and reasonable quantities of goods to be used as input in the construction of Works, on the recommendations of the Engineer taking in to account the Work Programme [Sub-Clause 8.3 of the Conditions of Contract] and approved methodology.</p> <p>Any delay in procurement of the goods as a result of any delay, in the issuing of the above mentioned certificates and / or availing the exemptions, shall not be entertained as a reason for granting any</p>

	<p>Extension of Time for Completion and / or additional cost. No customs duty or excise duty or any tax, fee, royalty etc. will be reimbursed by the Employer.”</p>
<p>Sub-clause 4.12 Unforeseeable Physical Conditions</p>	<p>Delete the Sub-Clause and Substitute with the following: In this Sub-Clause, "physical conditions" means man-made or natural physical conditions including sub-surface and hydrological conditions which the Contractor encounters at Site during the execution of the Works. Except as otherwise stated in the Contract: (a) the Contractor accepts total responsibility for having foreseen all difficulties and physical conditions; and (b) the Contract Price shall not be adjusted to take account of any unforeseen physical conditions.</p>
<p>Sub-clause 4.25 Change of Control</p>	<p>Insert the following additional Sub-clause Any change in Control of the Contractor, or in case if the Contractor is a JV/consortium of members, any change of Control of any of the members of the JV/consortium, shall require prior approval of the Employer. Such approval shall not be unreasonably withheld, unless, such change in Control, if had taken prior to the date of submission of the bid, would have rendered the Contractor or any such member in case the Contractor is a JV/consortium, ineligible to bid for the Project in terms of the Instructions to Bidders or in the opinion of the Employer such change in Control shall jeopardize national security or interest. For the purposes of this clause “Control” shall mean the possession, directly or indirectly, of the power to direct or cause the direction of the management and affairs of such person, whether through the legal and beneficial ownership of more than 50% (fifty per cent) of the voting securities of such person, by agreement or otherwise or the power to elect majority of directors, partners or other individuals exercising similar authority with respect to such person.</p>
<p>Sub-clause 5.1 General Design Obligations</p>	<p>Delete Sub-Clause 5.1 and substitute with the following: The Contractor shall carry out, and be responsible for, the design of the Works. Design shall be prepared by qualified</p>

	<p>designers who are engineers or other professionals who comply with the criteria (if any) stated in the Employer's Requirements with reference to purpose, scope, design and/or other technical criteria for the works. Unless otherwise stated in the Contract, the Contractor shall submit to the Engineer for consent the name and particulars of each proposed designer and design Subcontractor.</p> <p>The Contractor warrants that he, his designers and design Subcontractors have the experience and capability necessary for the design. The Contractor undertakes that the designers shall be available to attend discussions with the Engineer at all reasonable times, until the expiry date of the relevant Defects Notification Period.</p> <p>Upon receiving notice under Sub-Clause 8.1 [<i>Commencement of Works</i>], the Contractor shall scrutinise the Employer's Requirements with reference to purpose, scope, design and /or other technical criteria for the works. (including design criteria and calculations, if any) Within the period stated in the Appendix to Tender, calculated from the Commencement Date, the Contractor shall give notice to the Engineer of any error, fault or other defect found in the Employer's Requirements with reference to purpose, scope, design and /or other technical criteria for the works.</p> <p>After receiving this notice, the Engineer shall determine whether Clause 13 [<i>Variations and Adjustments</i>] shall be applied, and shall give notice to the Contractor accordingly. If and to the extent that (taking account of cost and time) an experienced contractor exercising due care would have discovered the error, fault or other defect when examining the Site and the Employer's Requirements with reference to purpose, scope, design and/or other technical criteria for the works before submitting the Tender, the Time for Completion shall not be extended and the Contract Price shall not be adjusted.</p>
<p>Sub-Clause 6.12 Employment of Foreign Nationals</p>	<p>Insert the following New Sub-Clause:</p> <p>The Contractor acknowledges, agrees and undertakes that employment of foreign personnel by the Contractor and/or its Subcontractors may be subject to grant of requisite regulatory permits and approvals including employment/residential visas and work permits, required if any, and the obligation to</p>

	<p>apply for and obtain the same shall always be of the Contractor. Notwithstanding anything to the contrary contained in the Contract, refusal of or inability to obtain any such permits and approvals by the Contractor or any of its Subcontractors shall not constitute Force Majeure event, and shall not in any manner excuse the Contractor from the performance and discharge of its obligations and liabilities under the Contract.”</p> <p>The Employer, on a best effort basis, will provide reasonable assistance in obtaining such visas and permits, but without thereby incurring any liability whatsoever towards the Contractor.</p>
<p>Sub-Clause 7.4 Testing</p>	<p>Insert the following at the end of this Sub-Clause:</p> <p>The Contractor shall not be released from any liability or obligation under the Contract by reason of any such inspection or testing or witnessing of testing, or by the submission of reports of inspection or testing to the Engineer.</p>
<p>Sub-Clause 8.2 Time for Completion</p>	<p>Delete this Sub-Clause and substitute with the following:</p> <p>The Contractor shall complete the whole of the Works within 1350 (One Thousand Three Hundred Fifty) days from the Commencement Date and the Time of Completion for achieving each of the Milestones shall be as follows:</p> <p>Milestone-1: 400 (Four Hundred) days from the Commencement Date</p> <p>Prior to the occurrence of Milestone-1, the Contractor shall have commenced the construction of the Permanent Works and shall have completed various construction activities entitling him a total payment of at least 10% of the Accepted Contract Amount.</p> <p>Note: 10% of the accepted contract amount shall not include advance payment made to the contractor as per Clause 14.2 of GC.</p> <p>Milestone-2: 700 (Seven Hundred) days from the Commencement Date</p> <p>Prior to the occurrence of Milestone-2, the Contractor shall have achieved the following:</p>

	<p>(i) 50% of the total number of Major Bridges and 60% of the total number of Minor Bridges stated in the Employer's Requirement should have been completed (excluding protection works and road approaches); and</p> <p>(ii) Various construction activities entitling him a total payment of at least 30% of the Accepted Contract Amount should have been completed.</p> <p>Note: 30% of the accepted contract amount shall not include advance payment made to the contractor as per Clause 14.2 of GC.</p> <p>Milestone-3: 1150 (One Thousand One Hundred Fifty) days from the Commencement Date</p> <p>Prior to the occurrence of Milestone-3, the Contractor shall have completed the linking of main line track in the 95% length of the Contract and made it fit for the use of the Employer or the Employer's other Contractors for construction and / or for running of material trains, tower wagons, rail cum road vehicle etc. without carrying out the Tests on Completion pursuant to Clause 9 of General Conditions.</p> <p>Milestone-4: 1250 (One Thousand Two Hundred Fifty) days from the Commencement Date</p> <p>Prior to the occurrence of Project Milestone-4, the Contractor shall have completed the Tests on Completion pursuant to Clause 9 of the Conditions of Contract including integrated Testing required, complete in all respects as per Employer's Requirement mentioned in the Contract.</p> <p>Milestone-5: 1350 (One Thousand Three Hundred Fifty) days from the Commencement Date</p> <p>Prior to the occurrence of Project Milestone-5, the Contractor shall have completed all necessary works required as per the Contract to enable certification of track fit for 100 kmph by an authority nominated by the Employer and taking over the Works pursuant to Clause 10 of the Conditions of Contract.</p>
<p>Sub-Clause 8.3</p>	<p>Delete para 3 of Sub- Clause 8.3</p>

	<p>“The Contractor shall [<i>Variation Procedure</i>].”</p>
<p>Sub-Clause 8.4</p>	<p>Delete Sub-Clauses (c) Delete “(d)” and substitute as under:- Unforeseeable shortages in the availability of Goods caused due to changes in laws in accordance with the provisions of Sub-Clause 13.7 Add Sub-Clause (f) - A cause of delay in handing over possession of Site in accordance with the provisions of Sub-clause 2.1</p>
<p>Sub-Clause 8.7 Delay Damages</p>	<p>Delete Sub-Clause 8.7 and substitute with the following: The Contractor shall complete the Works in accordance with the Time for Completion schedule set forth in Sub-Clause 8.2 [Time for Completion]. In the event that the Contractor fails to achieve any Milestone on the date set forth for such Milestone in the Time for Completion, unless such failure has occurred due to Force Majeure or for reasons solely attributable to the Employer, the Contractor shall pay Delay Damages to the Employer in a sum calculated at the rate stated in the Appendix to Tender until such Milestone is achieved; provided that if the construction period for any or all Milestones is extended in accordance with the provisions of this Contract, the dates set forth in the Sub-Clause 8.2 [Time for Completion] shall be deemed to be modified accordingly and the provisions of this Sub-Clause shall apply as if Appendix to Tender has been amended accordingly; provided further that in the event Whole of the Works are completed within the Time for Completion as stated in the Sub-Clause 8.2 [Time for Completion] of the Particular Conditions, the Delay Damages paid under this Sub-Clause shall be refunded by the Employer to the Contractor, but without any interest thereon. It is agreed that recovery of Damages under this Sub-Clause shall be without prejudice to the rights of the Employer under this Contract including the right of Termination thereof. The Parties hereby accept that delays cause loss to the public and the national economy for whose benefit the Works is meant, and that the loss is not susceptible to precise measurement. The Parties hereby agree that the rate of Delay</p>

	<p>Damages agreed in this Clause 8.7 is a reasonable pre-determined amount, and that the Delay Damages are not by way of penalty. Further, the total amount of Delay Damages under Sub-Clause 8.7 shall not exceed the maximum amount of delay damages (if any) stated in the Appendix to Tender.</p>
<p>Sub Clause 8.8 Suspension of Works</p>	<p>Delete Sub-Clause 8.8, Substitute deletion by the following:</p> <p>In the event of the failure of the Contractor to duly and effectively perform any of its obligations or to perform proper execution of the Works in accordance with the provisions of this Contract, the Engineer may by notice require the Contractor to suspend forthwith the performance of any obligations under the Contract or the whole or any part of the Works.</p> <p>The Contractor shall, pursuant to the notice under this Sub-Clause, suspend the Works or any part thereof for such time and in such manner as may be specified by the Engineer and thereupon carry out remedial measures to rectify the defects and secure the safety of the suspended works. The Contractor may by notice require the Engineer to inspect such remedial measures forthwith, with a request that the suspension hereunder may be revoked. The Engineer shall either revoke such suspension or instruct the Contractor to carry out such other and further remedial measures as may be necessary and the procedure set forth in this Sub-Clause shall be repeated until the suspension hereunder is revoked.</p> <p>All reasonable costs incurred for maintaining and protecting the Works and remedying the defects during the period of suspension shall be borne by the Contractor.</p> <p>During the period of Suspension, the Employer may at its own discretion, on behalf of the Contractor, undertake to fulfill any of the Contractor's obligations for remedying and rectifying the cause of Suspension. Provided that any cost incurred by the Employer in fulfilling the obligations of the Contractor for the remedying or rectifying the cause of Suspension shall be borne by the Contractor. The Employer</p>

	<p>shall have the right to deduct any such expense incurred and another twenty percent thereof as Damages from any payment due or to be due to the Contractor under the provisions of this Contract.</p> <p>If and to the extent the cause for the suspension is the responsibility of the Contractor, the following Sub-Clauses 8.9, 8.10, and 8.11 shall not apply.</p> <p>The Contractor shall not be entitled to extra cost (if any), incurred by him, during the period of suspension of Work, if such suspension is:</p> <ul style="list-style-type: none"> (a) provided for in the Contract; or (b) necessary for proper execution of Woks or by reasons of weather condition or by some default on the part of the Contractor; or (c) necessary for the safety of Works or any part thereof; or (d) necessary for the safety of adjoining public or other property or safety of the public or workmen or those who have to be at the site; or (e) to ensure safety and to avoid disruption of traffic and utilities, as also to permit fast repairs and restoration of any damaged utilities.
<p>Sub-Clause 10.2 Taking Over of Parts of the Works</p>	<p>Delete the Sub-Clause 10.2 in its entirety.</p>
<p>Sub-Clause 13.2</p>	<p>After the Sub-Clause add the following ;-</p> <p>The value engineering proposal shall not impair the essential character, functions or characteristics of the Work, including service life, economy of operation, ease of maintenance, desired appearance, or design, safety standards would not result in any reduction to the standard, or quality of works, or the performance of the Contractor and his obligations under the Contract.</p> <p>If the proposal of variation as a result of Value Engineering is approved, the reasonable share to be given to the Contractor shall be 30% of the net saving resulted due to</p>

	Value Engineering.
<p>Sub-Clause 13.3 Variation procedure</p>	<p>Add the following below the last paragraph:</p> <p>For varied works of items due to variation as per Sub-Clause 1.1.6.9 determination of adjustment to the Contract Price shall be based on the following:</p> <ul style="list-style-type: none"> a. Inputs of man-days, machine hours and quantities of materials; b. (i) Prevailing market rates for Materials, hiring of equipment; (ii) Rates being paid by the Contractor for unskilled, semi-skilled and skilled worker as per the records maintained by the Contractor in accordance with the Laws; c. Contractor's overheads and profit at the rate of 15 (fifteen) per cent of the cost arrived at on the basis of (a) and (b) above and; d. Applicable taxes. <p>No price adjustment shall apply.</p> <p>The approval for Variation shall state the period of extension of time, if any, allowed for the Variation. If no extension of time is allowed, the same shall be stated.</p>
<p>Sub-Clause 13.7 Adjustments for Changes in Legislation</p>	<p>Delete first paragraph of the Sub-Clause and Substitute with the following:</p> <p>The Contract Price shall be adjusted to take account of any increase or decrease in Cost after the Base Date resulting from:</p> <ul style="list-style-type: none"> a. a change in the Laws of the Country (including the introduction of new Laws and the repeal or modification of existing Laws); or b. in the judicial or official governmental interpretation of such Laws, or c. the commencement of any Indian law which has not entered into effect until the Base Date; or d. any change in the rates of any of the Taxes or royalties on Materials that have a direct effect on the Project

	<p>which affect the Contractor in the performance of its obligations under the Contract.</p> <p>Insert at the end of the Sub-Clause:</p> <p>If as a result of change in law, interpretation, or rates of taxes or royalties, the Contractor benefits from any reduction in costs for the execution of this Contract, save and except as expressly provided for in this Sub-Clause or in accordance with the provisions of this Contract, the Contractor shall, within [28] days from the date he becomes reasonably aware of such reduction in cost, notify the Employer with a copy to the Engineer of such reduction in cost.</p>
<p>Sub-Clause 13.8 Adjustment for Changes in Cost</p>	<p>Delete Paragraph 3 of this Sub-Clause and Substitute with the following:</p> <p>The adjustment to be applied to the amount otherwise payable to the Contractor, as valued in accordance with the appropriate Schedule and certified in Payment Certificates, shall be determined from formulae for each of the currencies in which the Contract Price is payable. No adjustment is to be applied to work valued on the basis of Cost at current prices.</p> <p>The formula for adjustment for changes in cost shall be as follows:</p> $P_n = a + b(L_n/L_o) + c(C_n/C_o) + d(S_n/S_o) + e(F_n/F_o) + f(M_n/M_o) + g(R_n/R_o)$ <p>where:</p> <p>"P_n" is the adjustment multiplier to be applied to the contract amount paid against cost center / stage as per Price Schedule in the relevant currency for the completed stage of work;</p> <p>"a" is a fixed coefficient, stated in the table of adjustment data as given below, representing the non-adjustable portion for various cost center as per price schedule;</p> <p>"b" is a fixed coefficient, stated in the table of adjustment data as given below, representing the adjustable portion for labour component for various cost center as per price schedule;</p> <p>"c" is a fixed coefficient, stated in the table of adjustment data as given below, representing the adjustable portion for cement component for various cost center as per price</p>

	<p>schedule;</p> <p>"d" is a fixed coefficient, stated in the table of adjustment data as given below, representing the adjustable portion for steel component for various cost center as per price schedule;</p> <p>“e” is a fixed coefficient, stated in the table of adjustment data as given below, representing the adjustable portion for fuel & lubricant component for various cost center as per price schedule;</p> <p>“f” is a fixed coefficient, stated in the table of adjustment data as given below, representing the adjustable portion for Machinery & Machine tools for various cost center as per price schedule;</p> <p>“g” is a fixed coefficient, stated in the table of adjustment data as given below, representing the adjustable portion for Rails for relevant cost center as per price schedule; and</p> <p>Values of a, b, c, d, e, f and g for various cost centres are detailed in the Appendix to tender</p> <p>"Ln", "Cn", "Sn", "Fn", "Mn" and "Rn" are the current cost indices or reference prices for period "n", expressed in the relevant currency of payment, each of which is applicable to the relevant tabulated cost element on the date 49 days prior to the last day of the period, (to which the particular Payment Certificate relates) as detailed in the Appendix to tender.</p> <p>"Lo", "Co", "So", "Fo", "Mo" and "Ro" are the base cost indices or reference prices, expressed in the relevant currency of payment, each of which is applicable to the relevant tabulated cost element on the Base Date, as detailed in the Appendix to tender.</p>
<p>Sub-Clause 14.1 Contract Price</p>	<p>Add the following after the last paragraph -</p> <p>The Contract Price includes all duties, taxes, royalties, premiums for various insurances, licenses and fees that may be levied in accordance with the laws and regulations in force as on the Base Date on the Contractor's Equipment, Plant, Materials and supplies acquired for the purpose of the Contract and on the services performed under the Contract.</p>

	<p>Nothing in the Contract shall relieve the Contractor from its responsibility to pay any tax including any tax that may be levied in India on profits made by it in respect of the Contract.</p>
<p>Sub-Clause 14.3 Application for Interim Payment Certificates</p>	<p>Delete first paragraph of this Sub-Clause and substitute with the following:</p> <p>The Contractor shall prepare his monthly bill, in the format agreed with the Engineer, in six copies (hard) and a soft copy. This shall be accompanied by supplementary details in two hard copies and a soft copy. All hard copies shall bear the original signatures of the Contractor and submitted to the Engineer. If these are found in order then Engineer shall forward and the same with copy of supplementary details to the Employer, with Interim Payment Certificate, as per clause 14.6, for payment to the Employer, otherwise return back all documents to the Contractor for rectification and resubmission. Responsibility of preferring the bill and entering the details shall vest with the Contractor. It is his responsibility to ensure that under no circumstances the payment claimed is more than the amount equivalent of Work done for that stage. If it is discovered otherwise during the check by the Engineer or the Employer then a warning will be issued in the first instance and in the second instance amount equivalent to 10% of excess claimed shall be forfeited besides denying the extra claim.</p> <p>While submitting the bills all supplementary details like measurements, sketches, drawings, approvals, calculations etc. shall accompany the bill so that payment can be substantiated by the Engineer as well as the Employer.</p> <p>Even if no stage of work is completed during the month or Contractor does not choose to prefer a bill a 'NIL' bill shall be submitted by him.</p> <p>Paragraph 2 (a) third line Delete the word “(g)” and substitute with “(h)”</p> <p>Add the following paragraph at the end</p> <p>(h) any amount to be deducted for taxes/ cess in accordance with the applicable laws.</p>

<p>Sub-Clause 14.4 Schedule of Payments</p>	<p>Delete this Sub-Clause and substitute with the following:</p> <p>The Employer shall make interim payments to the Contractor as certified by the Engineer under Sub-Clause 14.6 on the basis of the estimated value of the Works executed as determined in accordance with the following procedure:</p> <ul style="list-style-type: none">(a) The Price Schedules 1, 2 and 2.1 to 2.9 lay down the frame work for estimating the value of stages of work completed. The Price Schedules specify the Contract Price for the Works offered by the Contractor and accepted by the Employer, along with the estimated value of work of different cost centres. The description of items of work in the Schedules does not limit in any way the Contractor's obligations under the Contract to provide all the Works described in the Employer's Requirements.(b) The entire Works have been divided into nine (9) cost centres along with their respective weightage percentages of the Contract Price in Schedule 2. Each of the cost centres has been broken into items of works with percentage weightage of the Contract Price to items of the works/stages as indicated in Schedules 2.1 to 2.9.(c) The Bidder shall compute, and supply to the Engineer, the total quantities (in units as described in the Price Schedule-2) of various items of works and components on the basis of detailed design reviewed/approved by the Engineer.(d) The Contractor shall base its claim for interim payment for each stage for various items of the work on completion till the end of the month for which the payment is claimed, supported with documents and an up-dated programme in accordance with the Employer's Requirements.(e) The weightage/percentage assigned to cost centre will apply only to the Contract Price stated in the Contract Agreement. It shall not apply to any additions or subtractions to the Contract Price arising from the issue of any Variation Orders. Each Variation Order shall specify the manner of interim payments and
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	<p>completion of stages for it.</p> <p>(f) For items of unchartered utilities, extra payment over and above the Contract Price shall be made in accordance with variation proposals made on case to case basis as per the provisions of Contract. Contractor shall make a detailed report/ proposal for removal/ relocation of unchartered utilities as per the procedure outlined in Part 2 “Employer’s Requirement, Section VI, Volume 6, Appendix 1 - Utilities</p>
Sub-Clause 15.2 Termination by Employer	<p>Delete the words “the whole of” in Sub-Clause (d) and Substitute with the following words</p> <p>“more than the percentage specified in Sub-Clause 4.4”</p>
Sub-Clause 15.3 Valuation at Date of Termination	<p>Delete the last line of this Sub-clause “work executed Contract” and substitute with the following:</p> <p>Work completed up to any defined stage of payment in accordance with the Contract. Extent of damages to the Employer due to termination under sub-clause 15.2 has been fixed as (1) Forfeiture of Performance Security (2) Forfeiture of Retention money (3) five per cent (5%) of the cost of the balance work at the date of termination. The Parties hereby agree that the rate of these damages agreed in this is a reasonable pre-determined amount, and that these damages are not by way of penalty.</p>
Sub-Clause 15.4 Payment after Termination	<p>Delete the Sub-Clause 15.4 and substitute with the following:</p> <p>After a notice of termination under Sub-Clause 15.2 [<i>Termination by Employer</i>] has taken effect, the Employer may:</p> <p>(a) proceed in accordance with Sub-Clause 2.5 [<i>Employer's Claims</i>];</p> <p>(b) withhold further payments to the Contractor until the actions in accordance with the following sub-paragraphs (c), and (d) are completed;</p> <p>(c) encash and forfeit the whole of the amounts of Performance Security and Retention Money and take possession of Plant and Materials delivered to Site, for</p>

	<p>which payment has been made by the Employer;</p> <p>(d) encash and appropriate the bank guarantee for the Advance Payment to recover the outstanding amount, if any, of the Advance Payment; and</p> <p>(e) pay to the Contractor any sums due under Sub-clause 15.3 [Valuation at Termination], after the full amounts of the Performance Security and Retention Money and five per cent (5%) of the cost of the balance work (as per clause 15.3) and any other amount due from the Contractor have been received by the Employer. Any outstanding amounts against the Contractor shall immediately become due and payable by the Contractor to the Employer.</p>
Sub-Clause 16.2 Termination by the Contractor	<p>Delete the Sub-Clause 16.2 (d)</p> <p>Delete the following words from 16.2 (e)</p> <p>“ of Sub-clause 1.7 [Assignment]”</p>
Sub-Clause 17.3 Employer’s Risks	Sub-paragraph (h) - Delete
Sub-Clause 18.1 General Requirement of Insurance	<p>Delete Sub-paragraph 6 (b) and replace with the following</p> <p>“ (b) copies of the policies for the insurances described in</p> <ul style="list-style-type: none"> (i) Sub-Clause 18.2 [Insurance for Works and Contractor’s Equipment], (ii) Sub-Clause 18.3 [Insurance against Injury to Person and Damage to Property], and (iii) Sub-Clause 18.5 [Professional Indemnity Insurance]”
Sub-Clause 18.2 Insurance of Works and Contractor’s Equipment	Sub-paragraph 4 (d) Delete the words “(c), (g) and (h)”, and substitute with the words “(c) and (g)”.
Sub-Clause 18.3 Insurance Against Injury to Persons and Damage to Property	<p>Add the following at the end of this Sub-Clause:</p> <p>The insurance policy shall include a cross liability clause such that the insurance shall apply to the Employer, the Contractor and his Subcontractors (wherever applicable) as</p>

	<p>separately insured.</p> <p>The Employer shall not be liable for or in respect of any damages or compensation payable to any workman or other person in the employment of the Contractor or of any of his Sub- Contractor(s) (wherever applicable), other than death or injury resulting from any act or default of the Employer, his agents or employees. The Contractor shall indemnify and keep indemnified the Employer against all such damages and compensation, other than those for which the Employer is liable as aforesaid, and against all claims, proceedings, damages, costs, charges, and expenses whatsoever in respect thereof or in relation thereto.</p>
<p>Sub-Clause 18.5 Professional Indemnity Insurance</p>	<p>Add the following new Sub-Clause:</p> <p>The Contractor shall obtain the professional indemnity insurance, to cover the risk of professional negligence in the design of the Works carried by him, for the amount(s) stated in the Appendix to Tender and the insurance shall be maintained in full force and effect from the Commencement Date of the Works until 03 (three) years after the expiry of the Defects Notification /Extended Defects Notification Period. The insurance policy is required to indemnify the Employer as joint insured and the cover shall apply separately to each insured as though a separate policy had been issued for each of the joint insured.</p> <p>The Engineer will not certify any Payment Certificate until the Contractor has provided evidence of this insurance and its period of effectiveness.</p>
<p>Sub Clause 20.6 Arbitration</p>	<p>Delete Sub-Clause 20.6 and substitute with the following:</p> <p>Any dispute not settled amicably and in respect of which the DAB's decision (if any) has not become final and binding shall be finally settled by arbitration. Unless otherwise agreed by both parties, arbitration shall be conducted as follows:</p> <ul style="list-style-type: none"> (a) For contract with foreign contractors <ul style="list-style-type: none"> (i) International arbitration in accordance with the rules of arbitration of the International Chamber of Commerce. (ii) The seat of arbitration shall be Singapore/Dubai.

	<p>(iii) The number of Arbitrators shall be three (3) and language of communication will be English.</p> <p>(b) For contract with domestic contractors (For the purpose of this sub-clause, the term “Domestic Contractor” means a Contractor who is registered in India and is juridical person created under Indian Law as well as a joint venture between an Indian partner and a foreign partner where Indian partner is authorized representative of the JV or Lead Member).</p> <p>(i) In accordance with rules of Arbitration of the International Centre for Alternative Dispute Resolution, New Delhi or such other rule as may be mutually agreed by the parties and shall be subject to the provision Indian Arbitration and Conciliation Act, 1996</p> <p>(ii) The seat of arbitration shall be New Delhi.</p> <p>(iii) The number of Arbitrators shall be three (3) and language of communication will be English.</p> <p>The arbitrator(s) 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 DAB, relevant to the dispute. Nothing shall disqualify the Engineer from being called as a witness and giving evidence before the arbitrator(s) on any matter whatsoever relevant to the dispute.</p> <p>Neither Party shall be limited in the proceedings before the arbitrator(s) to the evidence nor in arguments previously put before the DAB to obtain its decision, or to the reasons for dissatisfaction given in its notice of dissatisfaction. Any decision of the DAB 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 DAB shall not be altered by reason of any arbitration being conducted during the progress of the Works.”</p>
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APPENDIX TO TENDER

Item	GC Sub- Clause	Data
Employer	1.1.2.2 & 1.3	Dedicated Freight Corridor Corporation of India Limited, 5 th Floor Pragati Maidan, Metro Station Building Complex New Delhi, India – 110001
Contractor	1.1.2.3 & 1.3	To be filled in later
Engineer	1.1.2.4 & 1.3	to be filled in later
Time for Completion	1.1.3.3	The Contractor shall complete the whole of the Works within 1350 (One Thousand Three Hundred Fifty) days from the Commencement Date and each of the Milestones shall be achieved as per Sub-clause 8.2 of the Particular Conditions of Contract.
Defects Notification Period	1.1.3.7	2 (Two) years
Communications	1.3	In case of communication is through fax or e-mails, it should be confirmed through hard copy (paper) within 48 hours of transmission of fax or email. In case of delayed confirmation, the date and time of confirmation shall be deemed to be the date and time of hard copy (paper) communication delivered.
Governing Law	1.4	Republic of India
Ruling Language	1.4	English
Right of Access to the Site	2.1	The Employer shall give Right to access to, and possession of Site to the Contractor as per following schedule subject to the Contractor providing Performance Security in terms of Sub-Clause 4.2 of Conditions of Contract. Initially possession of the Site will be handed-over to the Contractor in continuous stretches of at least 10 kms. Thereafter, the Employer shall make efforts to handover Site in chunks of at least 5 km length in isolated locations or minimum 1 km in stretches in continuation to the previously possessed stretch.

Item	GC Sub- Clause	Data																
		<table border="1"> <thead> <tr> <th data-bbox="730 327 790 499">S N</th> <th data-bbox="801 327 1082 499">Period after Commencement Date in days</th> <th data-bbox="1093 327 1457 499">Cumulative percentage of land to be handed over for work with respect to total length*</th> </tr> </thead> <tbody> <tr> <td data-bbox="730 504 790 544">1</td> <td data-bbox="801 504 1082 544">28</td> <td data-bbox="1093 504 1457 544">80%</td> </tr> <tr> <td data-bbox="730 548 790 589">2</td> <td data-bbox="801 548 1082 589">91</td> <td data-bbox="1093 548 1457 589">85%</td> </tr> <tr> <td data-bbox="730 593 790 633">3</td> <td data-bbox="801 593 1082 633">182</td> <td data-bbox="1093 593 1457 633">95 %</td> </tr> <tr> <td data-bbox="730 638 790 678">4</td> <td data-bbox="801 638 1082 678">365</td> <td data-bbox="1093 638 1457 678">100%</td> </tr> </tbody> </table>	S N	Period after Commencement Date in days	Cumulative percentage of land to be handed over for work with respect to total length*	1	28	80%	2	91	85%	3	182	95 %	4	365	100%	<p>*The contents of Column (3) above are not applicable to the land required for the approaches of the Road Under Bridges. The land required for this purpose would be handed over within two years from the Commencement Date by the Employer after coordination with the respective authorities of the State Government.</p> <p>Note for contract Package 201: Residential Buildings for Indian Railways on replacement account at Mughalsarai are to be constructed by the Contractor. On construction of these buildings only, the existing IR Buildings falling on DFC alignment at MGS yard can be dismantled by the Contractor.</p>
S N	Period after Commencement Date in days	Cumulative percentage of land to be handed over for work with respect to total length*																
1	28	80%																
2	91	85%																
3	182	95 %																
4	365	100%																
Amount of Performance Security	4.2	5 (Five) per cent of the Accepted Contract Amount, in local currency.																
General Design Obligations	5.1	56 Days																
Normal working hours	6.5	(Eight) 8 working hours shift in a day and total 48 (Forty eight) working hours in a week.																
Amount of Delay Damages	8.7 & 14.15 (b)	Milestone	Amount of Delay Damages															
		For Milestone-1	₹ 2,00,000/- (Rupees Two Lakh) per day															
		For Milestone-2	₹5,00,000/- (Rupees Five Lakh) per day															
		For Milestone-3	₹15,00,000/- (Rupees Ten Lakh) per day															

Item	GC Sub- Clause	Data	
		For Milestone-4	₹20,00,000/- (Rupees Twenty Lakh) per day
		For Milestone-5	₹25,00,000/- (Rupees Twenty Lakh) per day
Limit of Delay Damages for the whole of the Works	8.7	5 (Five) per cent of the Accepted Contract Amount in Local currency.	
Provisional Sum	13.5	No Provisional Sum is payable under this Contract.	
Price Adjustment	13.8	As detailed in Annexure I below.	
Advance Payment	14.2	<p>Mobilization Advance</p> <p>The Employer shall pay, on written request from the Contractor, an interest free Mobilization Advance up to (Ten) 10 per cent of the Contract Price. The Mobilization Advance shall be released in two instalments as under:</p> <p>(a) Up to (Five) 5 per cent: On Submission of Performance Security and commencement of mobilization process; and</p> <p>(b) Up to (Five) 5 per cent: On Submission of the preliminary design of alignment and field survey, as detailed in paragraph 7.1.2 of Part-2: Volume -3 Design Procedures and Process, for 90% of the total length in the Contract and details of utilisation of initial Mobilization Advance of 5% to the satisfaction of Engineer.</p> <p>The Advance Payment will be released on submission of unconditional Bank Guarantee for an amount equivalent to the component of the advance payment requested by the Contractor.</p> <p>Such Bank Guarantees can be split in to a maximum of 5 (Five) Bank Guarantees for each 5% mobilisation advance (at the option of the Contractor), to be released on repayments. All such Bank Guarantee(s) shall remain effective until the advance payment has been repaid pursuant to the provisions of Sub-Clause 14.2 of the Conditions of Contract, but the amount thereof</p>	

Item	GC Sub- Clause	Data															
		shall be progressively reduced by the amount repaid by the Contractor as indicated in Interim Payment Certificates issued in accordance with this Clause.															
Percentage of Retention	14.3 (c)	10 (Ten) per cent															
Limit of Retention Money	14.3 (c)	5 (Five) per cent of the Contract Price,															
Plant and Materials for payment when delivered to Site	14.5 (c) (i)	1) Rails; and 2) Sleepers															
Delayed Payment	14.8	The financing charges shall be calculated (ii) at an annual rate of LIBOR rate +2% for foreign currency; and (ii) 8% (fixed) for Indian currency															
Retention Money	14.9	A retention amounting to 10 (ten) per cent of the value of the work done shall be deducted by the Engineer in the first and following Interim Payment Certificates, until the amount so retained reaches a limit of retention money of 5 (five) percent of the contract Price. The Contractor may, at his option, replace the Retention Money with an unconditional bank guarantee from the Bank, and valid for the period up to the end of the Defect Notification Period.															
Currencies of Payment ¹	14.15	<table border="1" data-bbox="735 1442 1458 1787"> <thead> <tr> <th data-bbox="735 1442 1007 1615">Currencies unit</th> <th data-bbox="1007 1442 1195 1615">Percentage Payable in the Currency</th> <th data-bbox="1195 1442 1458 1615">Rate of exchange: number of Local per unit of Foreign</th> </tr> </thead> <tbody> <tr> <td data-bbox="735 1615 1007 1659">Local: (INR)</td> <td data-bbox="1007 1615 1195 1659"></td> <td data-bbox="1195 1615 1458 1659">1.000</td> </tr> <tr> <td data-bbox="735 1659 1007 1704">Foreign: [name]</td> <td data-bbox="1007 1659 1195 1704"></td> <td data-bbox="1195 1659 1458 1704"></td> </tr> <tr> <td data-bbox="735 1704 1007 1749">[name]</td> <td data-bbox="1007 1704 1195 1749"></td> <td data-bbox="1195 1704 1458 1749"></td> </tr> <tr> <td data-bbox="735 1749 1007 1794">[name]</td> <td data-bbox="1007 1749 1195 1794"></td> <td data-bbox="1195 1749 1458 1794"></td> </tr> </tbody> </table> <p data-bbox="735 1832 1458 1906">Note: the above table is to be filled before the signing of the Contract Agreement.</p>	Currencies unit	Percentage Payable in the Currency	Rate of exchange: number of Local per unit of Foreign	Local: (INR)		1.000	Foreign: [name]			[name]			[name]		
Currencies unit	Percentage Payable in the Currency	Rate of exchange: number of Local per unit of Foreign															
Local: (INR)		1.000															
Foreign: [name]																	
[name]																	
[name]																	

¹ To be filled at the time of signing the Contract

Item	GC Sub- Clause	Data
Evidence of Insurance	18.1 , 18.5	Before Commencement Date of Works
Relevant Policies	18.1(b)	Within 84 days of Commencement Date of Works
Minimum amount of deductibles for insurance of the Employer's Risk	18.2 (d)	Zero Deductible
Minimum amount of third party Insurance	18.3	Rs 100,000,000 (One hundred million) for any one occurrence.
Professional Indemnity Insurance	18.5	Rs 500,000,000 (Five hundred million)
Appointment of Dispute Adjudication Board	20.2	The DAB shall comprise of three members
Failure to Agree Dispute Adjudication Board	20.3	Appointing Entity: Chairman of the Institution of Engineers (India) Delhi State Center

Annexure – I
 Price Adjustment
 (Sub-Clause 13.8)

1. Values of a, b, c, d, e, f and g for various cost centres shall be as below:

Contract Package No. 201 & 202

Cost Center	Earth Work (2.2)	Bridges (Minor) (2.3)	Bridges (Major and Import) (2.4 and 2.5)	Track Works (2.6)		Other Engineering Works, Quarters, Stations and other Service Buildings (2.7 and 2.8)
				(2) (Rails)	(3) (Sleepers)	
Fix Component (a)	0.15	0.15	0.15	0.15	0.15	0.15
Labour (b)	0.05	0.07	0.07	0.00	0.22	0.20
Cement (c)	0.00	0.17	0.17	0.00	0.15	0.15
Steel (d)	0.00	0.26	0.26	0.00	0.25	0.25
Fuel & Lubricant (e)	0.30	0.15	0.15	0.00	0.05	0.15
Machinery & Machine tools (f)	0.50	0.20	0.20	0.00	0.18	0.10
Rail Steel (g)	0.00	0.00	0.00	0.85	0.0	0.00

2. Values for "Ln", "Cn", "Sn", "Fn", "Mn" and "Rn" shall be taken as follows:

Term	If procured from Employer's Country	If procured from outside the Employer's Country
"Ln",	The All India Consumer Price Index as published by the Labour Bureau, Ministry of labour, Government of India.	The index as provided by the bidder in the Price Schedule 1.0
"Cn"	The wholesale Price Index for Cement (Grey Cement- code: 1309030001) as published by the Economic Advisor, Ministry of Commerce Government of India.	The index as provided by the bidder in the Price Schedule 1.0

“Sn”	The wholesale price index number for steel (Rebars – code: 1310010201) - as published by the Economic Advisor, Ministry of Commerce, Government of India.	The index as provided by the bidder in the Price Schedule 1.0
“Fn”	The wholesale price index number for fuel (High Speed Diesel – code: 1200020005) - as published by the Economic Advisor, Ministry of Commerce, Government of India.	The index as provided by the bidder in the Price Schedule 1.0
“Mn”	The wholesale price index number for Machinery and Machine Tools – (code: 1311000000) - as published by the Economic Advisor, Ministry of Commerce Government of India.	The index as provided by the bidder in the Price Schedule 1.0
“Rn”	The wholesale price index number for ‘rail’ (code: 1310010206), as published by the Economic Advisor, Ministry of Commerce Government of India.	The index as provided by the bidder in the Price Schedule 1.0

3. Values for “Lo”, “Co”, “So”, “Fo”, “Mo” and “Ro” shall be as follows: -

Term	If procured from Employer’s Country	If procured from outside the Employer’s Country
“Lo”	The All India Consumer Price Index as published by the Labour Bureau, Ministry of labour, Government of India, on the Base Date..	The index as provided by the bidder in the Price Schedule 1.0
“Co”	The wholesale Price Index for Cement (Grey Cement- code: 1309030001) as published by the Economic Advisor, Ministry of Commerce Government of India, on the Base Date.	The index as provided by the bidder in the Price Schedule 1.0
“So”	The wholesale price index number for steel (Rebars – code: 1310010201) - as published by the Economic Advisor, Ministry of Commerce, Government of India, on the Base Date.	The index as provided by the bidder in the Price Schedule 1.0
”Fo”	The wholesale price index number for fuel	The index as provided by the

	(High Speed Diesel – code: 1200020005) - as published by the Economic Advisor, Ministry of Commerce, Government of India, on the Base Date.	bidder in the Price Schedule 1.0
“Mo”	The wholesale price index number for ‘Machinery and Machine Tools’ (code: 1311000000), as published by the Economic Advisor, Ministry of Commerce Government of India, on the Base Date.	The index as provided by the bidder in the Price Schedule 1.0
“Ro”	The wholesale price index number for ‘rail’ (code: 1310010206), as published by the Economic Advisor, Ministry of Commerce Government of India, on the Base Date.	The index as provided by the bidder in the Price Schedule 1.0

4. Price Adjustment shall be applied on completion of the specified stage of the item of work (Schedules 2.2 to 2.8). However Price Adjustment shall not be applicable for Price Schedule No. 2.1 and 2.9.
5. Adjustment for each cost centre shall be made separately.
6. Price Adjustment shall not be applicable to Price Schedule 2.6 (Track works) except for Price Schedule 2.6 stage (2) Supply of new 60 Kg rails and Price Schedule 2.6 stage (3) (Supply of new concrete sleeper).
7. Price Adjustment shall be applicable to Price Schedules 2.2 (Earthwork), 2.3 (Bridges minor), 2.4 (Major Bridges), 2.5 (Important Bridges), sub-cost centre 2.6 (2) Supply of new 60 Kg rails and 2.6 (3) (Supply of new concrete sleepers), 2.7 (Other Engineering Works) and 2.8 (Quarters, Stations and other Service Buildings) only.

Section IX. - Contract Forms

Table of Forms

CF No	Sub-Clause	Description	Page
01	1.1.1.3	Letter of Acceptance	2
02	1.6	Form of Contract Agreement	3
03	4.2	Form of Performance Security (Demand Guarantee)	6
04	14.2	Form of Advance Payment Security (Demand Guarantee)	8
05	14.9	Form of Retention Money Security (Demand Guarantee)	10

LETTER OF ACCEPTANCE

(Sub-Clause 1.1.1.3)

[On the letterhead paper of the Employer]

No.

Dated.....

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

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

You are requested to furnish the Performance Security within 28 days in accordance with the Conditions of Contract, using for that purpose Performance Security Form included in Section IX, Contract Forms, of the Bidding Documents.

Authorized Signature: _____

Name and Title of Signatory: _____

Name of Agency: Dedicated Freight Corridor Corporation of India Ltd

Form of

Contract Agreement

THIS AGREEMENT made the _____ day of _____, _____,

BETWEEN

(1) Dedicated Freight Corridor Corporation of India Limited, incorporated under the laws of India and having its principal place of business at 5th Floor, Pragati Maidan Metro Station Building Complex, New Delhi, India – 110001 (hereinafter called ‘**the Employer**’) of the first part

AND

(2) _____ M/S
_____ a
company/ corporation/JV incorporated under the laws of _____ having its
principal place of business at _____ (hereinafter called “**the
Contractor**”) of the other part.

WHEREAS the Employer desires that the Works known as

(*here insert the number and name of the contract*) should be executed by the Contractor, and has accepted a Bid submitted 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.
 - (i) The Letter of Acceptance dated _____;
 - (ii) Certificate regarding Authenticity of Document;
 - (iii) Minutes of meeting of pre-award clarifications / negotiations after opening of the Second Stage Bid, if any;
 - (iv) Addenda to Bidding Documents No. _____ dated _____, (*insert the addenda numbers and date*) if any;

-
- (v) Letter of Bid-(Two Stage Bidding, Second Stage Bidding) dated _____;
- (vi) Appendix to Bid (Percentage Breakup of Lump Sum Bid Price for local & foreign currencies;
- (vii) Price Schedules submitted by the Contractor;
- (viii) Letter of Bid (First Stage Bidding) dated _____;
- (ix) Appendix to Tender;
- (x) Particular Conditions;
- (xi) General Conditions;
- (xii) Memorandum titled ‘Changes Required Pursuant to First Stage Evaluation’;
- (xiii) Employer’s Requirements;
- (xiv) Contractor’s Updated Technical Proposal;
- (xv) Part 4 of Bidding document; and
- (xvi) Any other documents forming part of the Employer’s requirements and Bidding documents.
3. In consideration of the payments to be made by the Employer to the Contractor as indicated 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.
5. The **Commencement Date of the Works** is _____ [insert here date of commencement] as notified by the Engineer vide his letter no. _____ dated _____ and **the Completion date** for Whole of the Works pursuant to Sub-Clause 8.2 of the Conditions of Contract is _____ [insert date of Completion].
6. **The address of the Employer for notice purposes, pursuant to GC 1.3 is:**
The Director (Planning and Projects),
Dedicated Freight Corridor Corporation,
5th Floor Pragati Maidan, Metro Station Building Complex
New Delhi, India – 110001
with a copy endorsed to the Chief Project Manager, DFCCIL,
_____ (insert address of the chief project manager).

7. The address of the Contractor for notice purposes, pursuant to GC 1.3 is:

(insert address of the Contractor).

IN WITNESS whereof the parties hereto have caused this Agreement to be executed in accordance with the laws of Republic of India on the day, month and year indicated above.

Contractor

Employer

Authorised Signature

Authorised Signature

Name:

Name:

Designation:

Designation:

For and on behalf of M/s _____

For and on behalf of Dedicated Freight
Corridor Corporation of India Ltd

Witness-1:

Witness-1:

Signature

Signature

Name:

Name:

Designation:

Designation:

Address:

Address:

Witness-2:

Witness-2:

Signature

Signature

Name:

Name:

Designation:

Designation:

Address:

Address:

Performance Security

(Demand Guarantee)

[Guarantor letterhead or SWIFT identifier code]

Beneficiary: *[insert name and Address of 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 Contractor, which in the case of a joint venture shall be the name of the joint venture]* (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, 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 your demand or the sum specified therein.

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.*

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

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.

[signature(s)]

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

² *Insert the date twenty-eight days after the expected completion date as described in GC Clause 11.9. The Employer should note that in the event of an extension of this date for completion of the Contract, the Employer would need to request an extension of this guarantee from the Guarantor. Such request must be in writing and must be made prior to the expiration date established in the guarantee. In preparing this guarantee, the Employer might consider adding the following text to the form, at the end of the penultimate paragraph: "The Guarantor agrees to a one-time extension of this guarantee for a period not to exceed [six months][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."*

Advance Payment Security

Demand Guarantee

[Guarantor letterhead or SWIFT identifier code]

Beneficiary: *[Insert name and Address of 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 shall be the name of the joint venture]* (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, 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]*¹ 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.

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.*

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]*, 2 *[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.

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.

[signature(s)]

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

² *Insert the expected expiration date of the Time for Completion. The Employer should note that in the event of an extension of the time for completion of the Contract, the Employer would need to request an extension of this guarantee from the Guarantor. Such request must be in writing and must be made prior to the expiration date established in the guarantee. In preparing this guarantee, the Employer might consider adding the following text to the form, at the end of the penultimate paragraph: "The Guarantor agrees to a one-time extension of this guarantee for a period not to exceed [six months][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."*

Retention Money Security

Demand Guarantee

_____ [Bank's Name, and Address of Issuing Branch or Office]

Beneficiary: _____ [Name and Address of Employer]

Date: _____

RETENTION MONEY GUARANTEE No.: _____

We have been informed that [name of Contractor] (hereinafter called "the Contractor") has entered into Contract No. [reference number of the contract] dated [date] with you, for the execution of [name of contract and brief description of Works] (hereinafter called "the Contract").

Furthermore, we understand that, according to the conditions of the Contract, when the Taking-Over Certificate has been issued for the Works and the first half 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 Contractor, we [name of Bank] hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of ([amount in figures]) [amount in words]¹ upon receipt by us of your first demand in writing accompanied by a written statement stating that the Contractor is in breach of its obligation under the Contract because the Contractor used the advance payment for purposes other than the costs of mobilization in respect of the Works.

It is a condition for any claim and payment under this guarantee to be made that the payment of the second half of the Retention Money referred to above must have been received by the Contractor on its account number _____ at [name and address of Bank].

¹ The Guarantor shall insert an amount representing the amount of the second half of the Retention Money or 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 Employer.

This guarantee shall expire, at the latest, 21 days after the date when the Employer has received a copy of the Performance Certificate issued by the Engineer. Consequently, any demand for payment under this guarantee must be received by us at this office on or before that date.

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.

[signature(s)]

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