

**Government of Jammu & Kashmir,
Project Management Unit
Jhelum & Tawi Flood Recovery Project (World Bank Funded)**

BID [TENDER] NO: NEW/JTFRP/MISSINGLINKS/01

Construction of Drainage Network for Missing Link Zone - 1
NATIONAL COMPETITIVE BIDDING
(Single Stage, Single Envelope Bidding Process without e-Procurement)

NAME OF WORK : **Construction of Drainage Network for Missing Link Zone - 1**

PERIOD OF SALE OF : FROM 20 – 09 – 2019
BIDDING DOCUMENT TO 28 – 10 – 2019.

TIME AND DATE OF : DATE 01 – 10 – 2019; TIME 1130 HOURS
PRE-BID MEETING¹

LAST DATE AND TIME FOR : DATE 28 – 10 – 2019; TIME 1630 HOURS
RECEIPT OF BIDS

* TIME AND DATE OF OPENING: DATE 28 – 10 – 2019 TIME 1700 HOURS
OF BIDS

PLACE OF OPENING OF BIDS : ERA Commercial Complex, Rambagh Srinagar.

OFFICER INVITING BIDS : Director Technical

INVITATION FOR BIDS
(IFB)

**Government of Jammu & Kashmir,
Project Management Unit
Jhelum & Tawi Flood Recovery Project (World Bank Funded)**

INVITATIONS FOR BIDS (IFB)

NATIONAL COMPETITIVE BIDDING

Date: 20 – 09 – 2019.

Bid No.: NEW/JTFRP/MISSINGLINKS/01

1. The Government of India has received credit for financing from the World Bank towards the cost of Jhelum & Tawi Flood Recovery Project and intends to apply a part of the funds to cover eligible payments under the contracts for construction of works as detailed below.
2. Bidding will be conducted through National Competitive Bidding procedures agreed with the World Bank. Bidding is open to all eligible bidders as defined in the World Bank's Guidelines: Procurement of Goods, Works and Non-Consulting Services under IBRD Loans and IDA Credits & Grants by World Bank Borrowers, January 2011 revised July 2014.
3. Bidders from India should, however, be registered with the Government of J&K or other State Governments/Government of India, or State/Central Government Undertakings. Bidders from India, who are not registered as above, on the date of bidding, can also participate provided they get themselves registered by the time of contract signing, if they become successful bidders. **Bidders are advised to note the clauses on eligibility (Section I Clause 4) and minimum qualification criteria (Section III – Evaluation and Qualification Criteria), to qualify for the award of the contract.** In addition, please refer to paragraphs 1.6 and 1.7 of the World Bank's Guidelines setting forth the World Bank's policy on conflict of interest.
4. The Director Technical, PMU JTFRP invites sealed bids for the construction of works detailed below in the table. The bidders may submit bids for any or all of the works indicated therein. Interested bidders may obtain further information and inspect the bidding documents at the address given below during office hours.
 - PMU JTFRP office, ERA Commercial Complex, Rambagh Srinagar, J&K.
 - 2nd Floor, JKPC Building Railhead Complex Jammu, J&K.
5. Bidding documents may be purchased from the above mentioned addresses office - from **20-09-2019 to 28-10-2019** for a non-refundable fee as indicated in the table below, in the form of Demand Draft (DD) on any Scheduled/Nationalized bank payable atin favour of Chief Accounts Officer PMU JTFRP .***The bidding documents and addenda if any can also be downloaded from the website www.jtfrp.in. The cost of bid document in shape of DD should accompany the bid submission failing which the bid will be treated non responsive .***

6. All Bids must be accompanied by a bid security of the amount specified for the work in the table below, drawn in favour of Chief Accounts Officer, PMU JTFRP. Bid security will have to be in any one of the forms as specified in the bidding document and shall have to be valid for 45 days beyond the validity of the bid.
7. Bids must be delivered to the following address :

PMU JTFRP office, ERA Commercial Complex, Rambagh Srinagar, J&K.

on or before 1630 hours on **28 – 10 – 2019** and will be publicly opened on **28-10-2019 1700 hours**, in the presence of the bidders designated representatives who wish to attend. If the office happens to be closed on the date of receipt of the bids as specified, the bids will be received and opened on the next working day at the same time and venue. Late Bids will be rejected.

8. A pre-bid meeting will be held on **01 – 10 – 2019 at 1130 hours** at the office of Director Technical, PMU JTFRP, ERA Complex, Rambagh Srinagar to clarify the issues and to answer questions on any matter that may be raised at that stage as stated in ITB Clause 7.4 of 'Instructions to Bidders' of the bidding document. Bidders are advised to obtain the bidding document prior to the pre-bid meeting in order for bidders to have a good understanding of the scope of work under this contract for discussion and clarification at the pre-bid meeting.
9. Other details can be seen in the bidding documents.
10. The address for communication is as under:

- Name & Designation of Officer : Iftikhar Ahmed Kakroo.
- Official Address :
 - (a) PMU JTFRP office, ERA Commercial Complex, Rambagh Srinagar, J&K.
 - (b) 2nd Floor, JKPC Building Railhead Complex Jammu, J&K (Contact Person : Narinder Kalay).
- Email : dirpmujk@gmail.com/dirpnc@gmail.com
- Telephone 0194-2437320, 9419153731, 7006966231, 9419194825, 9419016749

Package No	Name of Work	Bid Security (Rs.)	Cost of Document (Rs.)	Period of Completion
1	2	3	4	5
1	Construction of Drainage Network for Missing Link Zone - 1	INR 90.00 Lacs	INR 10,000/=	18 months.

Sd/-
Director Technical, JTFRP.

PART 1 – Bidding Procedures

Section I. Instructions to Bidders

These Instructions to Bidders shall not be part of the Contract Agreement and shall cease to have effect once the Contract is signed.

Section 1 - Instructions to Bidders

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Section I - Instructions to Bidders

A. General

1. **Scope of Bid**
 - 1.1 The Employer, as **indicated in the BDS**, issues this Bidding Document for the procurement of the Works as specified in Section VII (Works' Requirements) & Invitation for Bids (IFB). The name, identification, and number of contracts of this bidding are **specified in the BDS**.
 - 1.2 Throughout this Bidding Document:
 - (a) the term "in writing" means communicated in written form and delivered against receipt;
 - (b) except where the context requires otherwise, words indicating the singular also include the plural and words indicating the plural also include the singular;
 - (c) "day" means calendar day; and
 - (d) "ESHS" means environmental, social (including sexual exploitation and abuse (SEA) and gender based violence (GBV)), health and safety.
2. **Source of Funds**
 - 2.1 The Borrower or the Recipient (hereinafter called "Borrower") **specified in the BDS** has received/applied for financing (hereinafter called "funds") from the International Bank for Reconstruction and Development or the International Development Association (hereinafter called "the Bank") in an amount **specified in the BDS**, towards the cost of the project **specified 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 Payment by the Bank will be made only at the request of the Borrower and upon approval by the Bank, and will be subject, in all respects, to the terms and conditions of the Loan (or other financing) Agreement. The Loan (or other financing) Agreement prohibits a withdrawal from the Loan (or other financing) account for the purpose of any payment to persons or entities, or for any import of goods, 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. No party other than the Borrower shall derive any rights from the Loan (or other financing) Agreement or have any claim to the proceeds of the Loan (or other financing).

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- 3. Corrupt and Fraudulent Practices**
- 3.1 The Bank requires compliance with its policy in regard to corrupt and fraudulent practices as set forth in Section VI.
- 3.2 In further pursuance of this policy, Bidders shall permit and shall cause their agents (whether declared or not), sub-contractors, sub-consultants, service providers, or suppliers and any personnel thereof, to permit the Bank to inspect all accounts, records and other documents relating to any prequalification process, bid submission, and contract performance (in the case of award), and to have them audited by auditors appointed by the Bank.
- 4. Eligible Bidders**
- 4.1 A Bidder may be a firm that is a private entity, a state-owned entity or institution subject to ITB 4.5, or any combination of such entities in the form of a Joint Venture (JV) under an existing agreement or with the intent to enter into such an agreement supported by a letter of intent, unless otherwise **specified in the BDS**. In the case of a joint venture, all members shall be jointly and severally liable for the execution of the entire Contract in accordance with the Contract terms. The JV shall nominate a Representative who shall have the authority to conduct all business for and on behalf of any and all the members of the JV during the Bidding process and, in the event the JV is awarded the Contract, during contract execution. This authorization shall be evidenced by submitting a power of attorney signed by legally authorized signatories of all members. Unless **specified in the BDS**, there is no limit on the number of members in a JV. The joint venture agreement shall be registered in the place **specified in BDS** so as to be legally valid and binding on members.
- 4.2 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 for the purpose of this bidding process, if the Bidder:
- (a) directly or indirectly controls, is controlled by or is under common control with another Bidder; or
 - (b) receives or has received any direct or indirect subsidy from another Bidder; or
 - (c) has the same legal representative as another Bidder; or
 - (d) has a relationship with another Bidder, directly or through common third parties, that puts it in a position to influence the bid of another Bidder, or influence the decisions of the Employer regarding this bidding process; or
 - (e) participates in more than one bid in this bidding process. Participation by a Bidder in more than one Bid will result in

the disqualification of all Bids in which such Bidder is involved. However, this does not limit the inclusion of the same subcontractor in more than one bid; or

- (f) 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; or
- (g) any of its affiliates has been hired (or is proposed to be hired) by the Employer or Borrower as Project Manager (Engineer) for the Contract implementation; or
- (h) would be providing goods, works, or non-consulting services resulting from or directly related to consulting services for the preparation or implementation of the project specified in the BDS ITB 2.1 that it provided or were provided by any affiliate that directly or indirectly controls, is controlled by, or is under common control with that firm; or
- (i) has a close business or family relationship with a professional staff of the Borrower (or of the project implementing agency, or of a recipient of a part of the loan) who: (i) are directly or indirectly involved in the preparation of the bidding documents or specifications of the contract, and/or the bid evaluation process of such contract; or (ii) would be involved in the implementation or supervision of such contract unless the conflict stemming from such relationship has been resolved in a manner acceptable to the Bank throughout the procurement process and execution of the contract.

4.3 A Bidder may have the nationality of any country, subject to the restrictions pursuant to ITB 4.7. A Bidder shall be deemed to have the nationality of a country if the Bidder is constituted, incorporated or registered in and operates in conformity with the provisions of the laws of that country, as evidenced by its articles of incorporation (or equivalent documents of constitution or association) and its registration documents, as the case may be. This criterion also shall apply to the determination of the nationality of proposed sub-contractors or sub-consultants for any part of the Contract including related Services.

4.4 A Bidder that has been sanctioned by the Bank in accordance with the above ITB 3.1, including in accordance with the Bank's Guidelines on Preventing and Combating Corruption in Projects Financed by IBRD Loans and IDA Credits and Grants ("Anti-Corruption Guidelines"), shall be ineligible to be prequalified for, bid for, or 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 have determined. The list of debarred firms and individuals is available at the electronic address **specified in the BDS**.

- 4.5 Bidders that are Government-owned enterprises or institutions in the Employer's Country may participate only if they can establish that they (i) are legally and financially autonomous (ii) operate under commercial law, and (iii) are not dependent agencies of the Employer. To be eligible, a government-owned enterprise or institution shall establish to the Bank's satisfaction, through all relevant documents, including its Charter and other information the Bank may request, that it: (i) is a legal entity separate from the government (ii) does not currently receive substantial subsidies or budget support; (iii) operates like any commercial enterprise, and, inter alia, is not obliged to pass on its surplus to the government, can acquire rights and liabilities, borrow funds and be liable for repayment of its debts, and can be declared bankrupt; and (iv) is not bidding for a contract to be awarded by the department or agency of the government which under their applicable laws or regulations is the reporting or supervisory authority of the enterprise or has the ability to exercise influence or control over the enterprise or institution.
- 4.6 Not used.
- 4.7 Firms and individuals may be ineligible if so indicated in Section V and (a) as a matter of law or official regulations, 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 the contracting of works or 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 any country, person, or entity in that country.
- 4.8 Bidder shall provide such evidence of eligibility satisfactory to the Employer, as the Employer shall reasonably request

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| 5. Eligible Materials, Equipment and Services | 5.1 The materials, equipment and services to be supplied under the Contract and financed by the Bank may have their origin in any country subject to the restrictions specified in Section V, Eligible Countries, and all expenditures under the Contract will not contravene such restrictions. At the Employer's request, Bidders may be required to provide evidence of the origin of materials, equipment and services. |
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B. Contents of Bidding Document

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| 6. Sections of Bidding Document | 6.1 The Bidding Document consist of Parts 1, 2, and 3, which include all the Sections indicated below, and should be read in conjunction with any Addenda issued in accordance with ITB 8. |
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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
 Section VI - Bank Policy-Corrupt and Fraudulent Practices

PART 2 Work's Requirements

Section VII – Works' Requirements

PART 3 Conditions of Contract and Contract Forms

Section VIII - General Conditions of Contract (GCC)
 Section IX - Particular Conditions of Contract (PCC)
 Section X - Contract Forms

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| 6.2 | The Invitation for Bids issued by the Employer is not part of the Bidding Document. |
| 6.3 | Unless obtained directly from the Employer, the Employer is not responsible for the completeness of the Bidding Documents, responses to requests for clarification, the minutes of the pre-Bid meeting (if any), or Addenda to the Bidding Documents in accordance with ITB 8. In case of any contradiction, documents obtained directly from the Employer shall prevail. |
| 6.4 | The Bidder is expected to examine all instructions, forms, terms, and specifications in the Bidding Documents and to furnish with its bid all information and documentation as required by the Bidding Documents. |

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| 7. Clarification of Bidding Document, Site Visit, Pre-Bid Meeting | <p>7.1 A prospective Bidder requiring any clarification on the Bidding Document shall contact the Employer in writing at the Employer's address indicated in the BDS or raise his inquiries during the pre-bid meeting if provided for in accordance with ITB 7.4. The Employer will respond in writing to any request for clarification, provided that such request is received prior to the deadline for submission of bids, within a period specified in the BDS. The Employer shall forward copies of its response 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. If so specified in the BDS, the Employer shall also promptly publish its response at the web page identified in the BDS. <i>(where electronic downloading of bid document is permitted, the Employer will upload the addenda on the website and it will be the responsibility of the bidders [who downloaded the bidding documents] to search the website for any addenda)</i>. Should the clarification result in changes to the essential elements of the Bidding Documents, the Employer shall amend the Bidding Documents following the procedure under ITB 8 and ITB 22.2.</p> <p>7.2 The Bidder is advised to visit and examine the Site of Works and its surroundings and obtain for itself, on its own risk and responsibility, all information that may be necessary for preparing the bid and entering into a contract for construction of the Works. The costs of visiting the Site shall be at the Bidder's own expense.</p> <p>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.</p> <p>7.4 If so specified in the BDS, the Bidder's designated representative is invited to attend a pre-bid meeting and/or a Site of Works visit. The purpose of the meeting will be to clarify issues and to answer questions on any matter that may be raised at that stage.</p> <p>7.5 The Bidder is requested, to submit any questions in writing, to reach the Employer not later than one week before the meeting.</p> <p>7.6 Minutes of the pre-bid meeting, including the text of the questions raised, without identifying the source, and the</p> |
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responses given, together with any responses prepared after the meeting, will be transmitted promptly to all Bidders who have acquired the Bidding Documents 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 Documents 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. The Employer shall also promptly publish the addendum on the Employer's web page in accordance with ITB 7.1.

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 22.2

C. Preparation of Bids

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 in no case 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 English. 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 English, in which case, for purposes of interpretation of the Bid, such translation shall govern.

11. Documents Comprising the Bid

11.1 The Bid shall comprise the following:

(a) Letter of Bid;

(b) completed Schedules including priced bill of quantities, in accordance with ITB 12 and 14, as **specified in BDS**;

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- (c) Bid Security, in accordance with ITB 19;
 - (d) alternative bids, if permissible, in accordance with ITB 13;
 - (e) written confirmation authorizing the signatory of the Bid to commit the Bidder, in accordance with ITB 20.2;
 - (f) documentary evidence in accordance with ITB 17 establishing the Bidder's qualifications to perform the contract, if its Bid is accepted;
 - (g) Technical Proposal in accordance with ITB 16;
 - (h) Construction methodology proposed as detailed in Para 1.1 of Section III Evaluation Criteria;
 - (i) Contractor Registration certificate (as per IFB); and
 - (j) Any other document **required in the BDS**.

11.2 In addition to the requirements under ITB 11.1, bids submitted by a JV (where permitted) shall include a copy of the Joint Venture Agreement entered into by all members. Alternatively, a letter of intent to execute a Joint Venture Agreement in the event of a successful bid shall be signed by all members and submitted with the bid, together with a copy of the proposed Agreement.

11.3 The Bidder shall furnish in the Letter of Bid information on commissions and gratuities, if any, paid or to be paid to agents or any other party relating to this Bid.

12. Letter of Bid and Schedules

12.1 The Letter of Bid, Schedules including the Bill of Quantities, and all documents listed under Clause 11, shall be prepared using the relevant forms in Section IV (Bidding Forms), if so provided. The forms must be completed without any alterations to the text, and no substitutes shall be accepted. All blank spaces shall be filled in with the information requested.

13. Alternative Bids

13.1 Bidders shall submit offers that comply with the requirements of the bidding documents, including the basic technical design as indicated in the drawing and specifications. Alternatives will not be considered.

14. Bid Prices and Discounts

14.1 The prices and discounts (including any price reduction) quoted by the Bidder in the Letter of Bid and in the Schedules shall conform to the requirements specified below.

14.2 The Bidder shall submit a bid for the whole of the works described in ITB 1.1 by filling in prices for all items of the Works (both in figures and words), as identified in Section IV, Bidding Forms along with the total bid price (both in figures

and words). The Bidder shall fill in rates and prices for all items of the Works described in the Bill of Quantities. **Items against which no rate or price is entered by the Bidder will not be paid for by the Employer when executed and shall be deemed covered by the rates for other items and prices in the Bill of Quantities.** Corrections if any in the bid shall be made by crossing out, initialling, dating and rewriting.

- 14.3 The price to be quoted in the Letter of Bid in accordance with ITB 12.1, shall be the total price of the Bid, excluding any discounts offered.
- 14.4 Discounts, if any, and the methodology for their application shall be quoted in the Letter of Bid, in accordance with ITB 12.1.
- 14.5 Unless otherwise **specified in the BDS** and the Conditions of Contract, the rates and prices quoted by the Bidder shall be fixed
- 14.6 If so indicated in ITB 1.1, bids are invited for individual lots (contracts) or for any combination of lots/contracts (packages). Bidders wishing to offer any price reduction for the award of more than one Contract shall specify in their bid the price reductions applicable to each package, or alternatively, to individual Contracts within the package. Price reductions or discounts shall be submitted in accordance with ITB 14.4, provided the bids for all lots/contracts are opened at the same time.
- 14.7 All duties, taxes, and other levies payable by the Contractor under the Contract, or for any other cause, as applicable on the deadline for submission of Bids, shall be included in the rates and prices and the total bid price submitted by the Bidder.
- 14.8 Bidders may like to ascertain availability of tax/duty exemption benefits available in India. They are solely responsible for obtaining such benefits which they have considered in their bid and in case of failure to receive such benefits for reasons whatsoever, the Employer will not compensate the bidder (Contractor). The bidder shall furnish alongwith his bid a declaration to this effect in the Declaration Format provided in Section IV of the bidding documents.

Where the bidder has quoted taking into account such benefits, it must give all information required for issue of certificates in terms of the Government of India's relevant Notifications as per the declaration format. In case the bidder has not provided the required information or has indicated to be furnished later on in the Declaration Format, the same shall be construed that the goods/construction equipment for which certificate is required is

Nil.

To the extent the Employer determines the quantities indicated therein are reasonable keeping in view the quantities in bill of quantities, construction program and methodology, the certificates will be issued within 60 days of signing of the contract and no subsequent changes will be permitted. In case of materials pertaining to Variation items and quantities, the certificate shall be issued only on request from the Contractor when in need and duly certified by the Project Manager.

No certificate will be issued for items where no quantity/capacity of equipment is indicated in the statement.

If the bidder has considered the tax/duty exemption for materials/construction equipment to be bought for the work, the bidder shall confirm and certify that the Employer will not be required to undertake any responsibilities of the Government of India Scheme or the said exemptions being available during the contract execution, except issuing the required certificate. The bids which do not conform to the above provisions or any condition by the bidder which makes the bid subject to availability of tax/duty exemption for materials/construction equipment or compensation on withdrawal of any variations to the said exemptions will be treated as non-responsive and rejected.

Any delay in procurement of the construction equipment/machinery/goods as a result of the above shall not be a cause for granting any extension of time.

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| 15. Currencies of Bid and Payment | 15.1 | The unit rates and prices shall be quoted by the Bidder and shall be paid for, entirely in Indian Rupees. |
| 16. Documents Comprising the Technical Proposal | 16.1 | The Bidder shall furnish a Technical Proposal including a statement of work methods, equipment, personnel, schedule and any other information as per details stipulated in Section IV (Bidding Forms), in sufficient detail to demonstrate the adequacy of the Bidders' proposal to meet the work requirements and the completion time. |
| 17. Documents Establishing the Qualifications of the Bidder | 17.1 | To establish Bidder's eligibility in accordance with ITB 4, Bidders shall complete the Letter of Bid, included in Section IV, Bidding Forms. |
| | 17.2 | To establish its qualifications to perform the Contract in accordance with Section III, Evaluation and Qualification Criteria, the Bidder shall provide the complete information as requested in the corresponding information sheets included in |

Section IV (Bidding Forms).
**18. Period of
Validity of Bids**

- 18.1 Bids shall remain valid for 90 days or for a period **specified in the BDS** after the bid submission deadline date prescribed by the Employer in accordance with ITB 22.1. A bid valid for a shorter period shall be rejected by the Employer as nonresponsive.
- 18.2 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 19, it shall also be extended for forty five (45) 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.
- 18.3 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 determined as follows:
- (a) In the case of fixed price contracts, the Contract price shall be the bid price adjusted by the factor **specified in the BDS**.
 - (b) In the case of adjustable price contracts, no adjustment shall be made.
 - (c) In any case, bid evaluation shall be based on the bid price without taking into consideration the applicable correction from those indicated above.

19. Bid Security

- 19.1 Unless otherwise **specified in the BDS**, the Bidder shall furnish as part of its bid, in original form, a bid security for the amount **shown in BDS**, for this particular work.
- 19.2 The bid security shall be a demand guarantee, at the Bidder's option, in any of the following forms:
- (a) an unconditional bank guarantee, issued by a Nationalized/ Scheduled bank located in India;
 - (b) an irrevocable letter of credit issued by a Nationalized or Scheduled bank located in India;
 - (c) a cashier's or certified check; or demand draft from a Nationalized or Scheduled Bank located in India;
 - (d) another security **indicated in the BDS**.

In case of a bank guarantee, the bid security shall be

submitted using the Bid Security form included in the Section IV (Bidding Forms). The form must include the complete name of the Bidder. The bid security shall be valid for forty five (45) days beyond the original validity period of the bid, or beyond any period of extension if requested under ITB 18.2.

- 19.3 If a Bid Security is specified pursuant to ITB 19.1, any bid not accompanied by a substantially responsive Bid Security shall be rejected by the Employer as non-responsive.
- 19.4 If a bid security is specified pursuant to ITB 19.1, the bid security of unsuccessful Bidders shall be returned as promptly as possible upon the successful Bidder's signing the contract and furnishing of the performance security and if required in the BDS, the Environmental, Social, Health and Safety (ESHS) Performance Security pursuant to ITB 42.
- 19.5 If a bid security is specified pursuant to ITB 19.1, 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 and if required in the BDS, the Environmental, Social, Health and Safety (ESHS) Performance Security.
- 19.6 The bid security may be forfeited:
 - (a) if a Bidder withdraws/modifies/substitutes its bid during the period of bid validity specified by the Bidder on the Letter of Bid, or any extension thereto provided by the Bidder in accordance with ITB 18.2 or
 - (b) if the Bidder does not accept the correction of its Bid Price pursuant to ITB 31 or
 - (c) if the successful Bidder fails to:
 - (i) sign the Contract in accordance with ITB 41; or
 - (ii) furnish a performance security and if required in the BDS, the Environmental, Social, Health and Safety (ESHS) Performance Security in accordance with ITB 42.
- 19.7 The Bid Security of a JV shall be in the name of the JV that submits the bid. If the JV has not been constituted into a legally-enforceable JV, at the time of bidding, the Bid Security shall be in the names of all future members as named in the letter of intent mentioned in ITB 4.1 and ITB 11.2.

20. Format and

- 20.1 The Bidder shall prepare one original of the documents comprising the bid as described in ITB 11 and clearly mark it

Signing of Bid

“ORIGINAL”. Alternative bids, if permitted in accordance with ITB 13, shall be clearly marked “Alternative” In addition, the Bidder shall submit copies of the bid in the number **specified in the BDS**, and clearly mark each of them “COPY.” In the event of any discrepancy between the original and the copies, the original shall prevail.

- 20.2 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.
- 20.3 In case the Bidder is a JV, the Bid shall be signed by an authorized representative of the JV on behalf of the JV, and so as to be legally binding on all the members as evidenced by a power of attorney signed by their legally authorized representatives
- 20.4 Any amendments such as interlineations, erasures, or overwriting shall be valid only if they are signed or initialed by the person signing the bid.

D. Submission and Opening of Bids**21. Sealing and Marking of Bids**

- 21.1 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:
- (a) Bidders submitting bids by mail or by hand shall enclose the original and each copy of the Bid including alternatives if permitted in accordance with ITB 13, in separate sealed envelopes, duly marking the envelopes as “ORIGINAL”, “ALTERNATIVE” and “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 sub-Clauses 21.2 and 21.3.
 - (b) Bidders submitting bids electronically shall follow the electronic bid submission procedures **specified in the BDS**.
- 21.2 The inner and outer envelopes shall:
- (a) bear the name and address of the Bidder;

(b) be addressed to the Employer as provided in the BDS pursuant to ITB 22.1;

(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.

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

21.4 E-mail, Telex, Cable or Facsimile bids will be rejected as non-responsive.

22. Deadline for Submission of Bids

22.1 Bids must be received by the Employer at the address and no later than the date and time **indicated in the BDS**. Bidders submitting bids electronically (when permitted) shall follow the electronic bid submission procedures **specified in the BDS**.

In the event of the specified date for the submission of Bids being declared a holiday for the Employer, the Bids will be received up to the appointed time on the next working day.

22.2 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.

23. Late Bids

23.1 The Employer shall not consider any bid that arrives after the deadline for submission of bids, in accordance with ITB 22. Any bid received by the Employer after the deadline for submission of bids shall be declared late, rejected, and returned unopened to the Bidder.

24. Withdrawal, Substitution, and Modification of Bids

24.1 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 20.2, (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 20 and ITB 21 (except that withdrawal notices do not require copies), and in addition, the respective envelopes shall be clearly marked "WITHDRAWAL," "SUBSTITUTION," "MODIFICATION;" and

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- (b) received by the Employer prior to the deadline prescribed for submission of bids, in accordance with ITB 22.

24.2 Bids requested to be withdrawn in accordance with ITB 24.1 shall be returned unopened to the Bidders.

24.3 No bid may be withdrawn, substituted, or modified in the interval between the deadline for submission of bids and the expiration of the period of bid validity specified by the Bidder on the Letter of Bid or any extension thereof. This will result in the forfeiture of the Bid Security pursuant to ITB 19.6.

25. Bid Opening

25.1 Except in the cases specified in ITB 23 and 24, the Employer shall publicly open and read out in accordance with ITB 25.3 all bids received by the deadline, at the date, time and place **specified in the BDS** in the presence of Bidders' designated representatives and anyone who chooses to attend. Any specific electronic bid opening procedures required, if electronic bidding is permitted in accordance with ITB 21.1, shall be as **specified in the BDS**.

In the event of the specified date of bid opening being declared a holiday for the Employer, the bids will be opened at the appointed time and location on the next working day.

25.2 First, envelopes marked "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 "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 "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 envelopes that are opened and read out at bid opening shall be considered further.

25.3 All other envelopes shall be opened one at a time, reading out: the name of the Bidder and whether there is a modification, the total Bid Price, per lot (contract) if applicable, including any discounts and alternative bids, the presence or absence of a bid security; and any other details as the Employer may

consider appropriate. Only discounts and alternatives and modifications read out at bid opening shall be considered for evaluation. The Letter of Bid and the Bill of Quantities are to be initialed by representatives of the Employer attending bid opening in the manner **specified in the BDS**. The Employer shall neither discuss the merits of any bid nor reject any bid at bid opening (except for late bids, in accordance with ITB 23.1).

- 25.4 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 contract if applicable, including any discounts and alternative bids; and the presence or absence of a bid security, if one was required. 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.

E. Evaluation and Comparison of Bids

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| 26. Confidentiality | <p>26.1 Information relating to the examination, evaluation, comparison, and post-qualification of bids and recommendation of contract award, 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 in accordance with ITB 40.</p> <p>26.2 Any attempt by a Bidder to influence the Employer in the evaluation of the bids or Contract award decisions may result in the rejection of its bid.</p> <p>26.3 Notwithstanding ITB 26.2, from the time of bid opening to the time of Contract award, if any Bidder wishes to contact the Employer on any matter related to the bidding process, it shall do so in writing.</p> |
| 27. Clarification of Bids | <p>27.1 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, giving a reasonable time for response. 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, including any voluntary increase or decrease 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</p> |

accordance with ITB 31.

- 27.2 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.

**28. Deviations,
Reservations,
and Omissions**

- 28.1 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.

**29. Determination of
Responsiveness**

- 29.1 The Employer's determination of a bid's responsiveness is to be based on the contents of the bid itself, as defined in ITB 11.
- 29.2 A substantially responsive bid is one that meets the requirements of the Bidding Document 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.
- 29.3 The Employer shall examine the technical aspects of the bid submitted in accordance with ITB 16, Technical Proposal, in particular, to confirm that all requirements of Section VII (Works' Requirements) have been met without any material deviation, reservations or omissions.
- 29.4 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.

**30. Nonconformities,
Errors, and**

- 30.1 Provided that a bid is substantially responsive, the Employer may waive any non-conformities in the bid which do not

Omissions	constitute a material deviation, reservation or omission.
	<p>30.2 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 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 or substance of the bid. Failure of the Bidder to comply with the request may result in the rejection of its bid.</p> <p>30.3 Provided that a bid is substantially responsive, the Employer shall rectify quantifiable 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 in the manner specified in the BDS.</p>
31. Correction of Arithmetical Errors	<p>31.1 Provided that the bid is substantially responsive, the Employer shall correct arithmetical errors on the following basis:</p> <ul style="list-style-type: none"> (a) only for unit price contracts, if there is a discrepancy between the unit price and the total price that is obtained by multiplying the unit price and quantity, the unit price shall prevail and the total price shall be corrected; (b) if there is an error in a total corresponding to the addition or subtraction of subtotals, the subtotals shall prevail and the total shall be corrected; and (c) if there is 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) and (b) above. <p>31.2 Bidders shall be requested to accept correction of arithmetical errors. Failure to accept the correction in accordance with ITB 31.1, shall result in the rejection of the Bid and the Bid Security may be forfeited in accordance with ITB Sub-Clause 19.6.</p>
32. Conversion to Single Currency	32.1 Not used.
33. Margin of Preference	33.1 Not used.
34. Sub-contractors	34.1 Unless otherwise stated in the BDS , the Employer does not intend to execute any specific elements of the Works by sub-contractors selected in advance by the Employer.

35. Evaluation of Bids

- 34.2 The Employer may permit subcontracting for certain specialized works as indicated in Section III. When subcontracting is permitted by the Employer, the specialized sub-contractor's experience shall be considered for evaluation. Section III describes the qualification criteria for sub-contractors.
- 34.3 Bidders may propose subcontracting upto the percentage of total value of contracts or the volume of works as **specified in the BDS**. Subcontractors proposed by the Bidder shall be fully qualified for their parts of the Works.
- 35.1 The Employer shall use the criteria and methodologies listed in this Clause. No other evaluation criteria or methodologies shall be permitted.
- 35.2 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 Summary Bill of Quantities, but including Daywork items, where priced competitively;
 - (b) price adjustment for correction of arithmetic errors in accordance with ITB 31.1;
 - (c) price adjustment due to discounts offered in accordance with ITB 14.4;
 - (d) Not Used,
 - (e) price adjustment due to quantifiable nonmaterial nonconformities in accordance with ITB 30.3;
 - (f) the additional evaluation factors as specified in Section III, Evaluation and Qualification Criteria;
- 35.3 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.
- 35.4 If this Bidding Document allows Bidders to quote separate prices for different lots (contracts), and to award multiple contracts to a single Bidder, the methodology to determine the lowest evaluated price of the contract combinations, including any discounts offered in the Letter of Bid, is specified in Section III, Evaluation and Qualification Criteria.
- 35.5 If the bid, which results in the lowest Evaluated Bid Price, is seriously unbalanced, front loaded or substantially below updated estimates in the opinion of the Employer, the Employer may require the Bidder to produce detailed price analyses (with breakdown of unit rates) for any or all items of

the Bill of Quantities, to demonstrate the internal consistency and justification of those prices with the construction methods and schedule proposed. After evaluation of the price analyses, taking into consideration the schedule of estimated contract payments, the Employer may require that the amount of the performance security be increased at the expense of the Bidder to a level sufficient to protect the Employer against financial loss in the event of default of the successful Bidder under the Contract.

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| 36. Comparison of Bids | 36.1 | The Employer shall compare the evaluated prices of all substantially responsive bids established in accordance with ITB 35.2 to determine the lowest evaluated bid. |
| 37. Qualification of the Bidder | 37.1 | The Employer shall determine to its satisfaction whether the Bidder that is selected as having submitted the lowest evaluated and substantially responsive bid meets the qualifying criteria specified in Section III, Evaluation and Qualification Criteria. |
| | 37.2 | The determination shall be based upon an examination of the documentary evidence of the Bidder's qualifications submitted by the Bidder, pursuant to ITB 17.1. The determination shall not take into consideration the qualifications of other firms such as the Bidder's subsidiaries, parent entities, affiliates, subcontractors (other than Specialized Subcontractors if permitted in the bidding document), or any other firm(s) different from the Bidder. |
| | 37.3 | An affirmative determination of qualification 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. |
| 38. Employer's Right to Accept Any Bid, and to Reject Any or All Bids | 38.1 | 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

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| 39. Award Criteria | 39.1 | Subject to ITB 37.1, 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 |
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be qualified to perform the Contract satisfactorily.

40. Notification of Award

- 40.1 Prior to the expiration of the period of bid validity, the Employer shall notify the successful Bidder, in writing, via the Letter of Acceptance included in the Contract Forms, that its bid has been accepted. 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”).
- 40.2 Until a formal contract is prepared and executed, the notification of award shall constitute a binding Contract.

41. Signing of Contract, Publication of award and Recourse to unsuccessful Bidders

- 41.1 The Contract Agreement shall incorporate all agreements between the Employer and the successful Bidder. It shall be kept ready in the office of the Employer for the signature of the Employer and the successful Bidder, within 21 days following the date of Letter of acceptance. Within 21 days of receipt of Letter of acceptance, the successful Bidder shall sign the Agreement and furnish the performance security and if required in the BDS, the Environmental, Social, Health and Safety (ESHS) Performance Security in accordance with ITB Clause 42 and revised construction methodology. If the successful bidder is a JV, it shall also furnish the JV agreement duly signed by all the members, if it had submitted only a letter of intent to execute the JV agreement alongwith the bid.
- 41.2 The Employer within 3 weeks of issue of notification of award shall publish in a national website (<http://tenders.gov.in> or <http://goi.gov.in> Central Public Procurement Portal <https://eprocure.gov.in/cppp/>) or on the Employer’s website with free access, the results identifying the bid and lot numbers and the following information: (i) name of each bidder who submitted the 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.
- 41.3 The Employer shall promptly respond in writing to any unsuccessful Bidder who, after publication of contract award, requests the Employer in writing to explain on which grounds its bid was not selected.

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| 42. Performance Security | <p>42.1 Within twenty-one (21) days of the receipt of notification of award from the Employer, the successful Bidder shall furnish the performance security and if required in the BDS, the Environmental, Social, Health and Safety (ESHS) Performance Security in accordance with the conditions of contract, subject to ITB 35.5, using for that purpose the Performance Security and ESHS Performance Security Forms included in Section X (Contract Forms). The performance security and if required in the BDS, the Environmental, Social, Health and Safety (ESHS) Performance Security of a Joint Venture shall be in the name of the Joint Venture specifying the names of all members.</p> <p>42.2 Failure of the successful Bidder to submit the above-mentioned Performance Security and if required in the BDS, the Environmental, Social, Health and Safety (ESHS) Performance Security, or to sign the Contract Agreement 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.</p> <p>42.3 Upon the successful Bidder's signing the Agreement and furnishing of the Performance Security and if required in the BDS, the Environmental, Social, Health and Safety (ESHS) Performance Security, pursuant to ITB Clause 42.1, the Employer shall promptly notify the name of the winning bidder to each unsuccessful bidder and shall discharge the Bid Securities of the bidders pursuant to ITB Clause 19.4 and 19.5.</p> |
| 43. Adjudicator | <p>43.1 The Employer proposes the person named in the BDS to be appointed as Adjudicator under the Contract, at the daily rate specified in the BDS, plus reimbursable expenses (actual boarding, lodging, travel and other incidental expenses). If the Bidder disagrees with this proposal, the Bidder should so state in Letter of Bid. If, in the Letter of Acceptance, the Employer does not agree on the appointment of the Adjudicator proposed by the Bidder, the Employer will request the Appointing Authority designated in the Particular Conditions of Contract (PCC) pursuant to Clause 23.1 of the General Conditions of Contract (GCC), to appoint the Adjudicator.</p> |

Section II - Bid Data Sheet (BDS)

The following specific data for the Works to be procured shall complement, supplement, or amend the provisions in the Instructions to Bidders (ITB). Whenever there is a conflict, the provisions herein shall prevail over those in ITB.

[Instructions for completing the Bid Data Sheet are provided, as needed, in the notes in italics mentioned for the relevant ITB.]

A. Introduction

ITB 1.1	<p>The Employer is: The Employer is: Chief Executive Officer J&K ERA/JTFRP</p> <p>ERA Complex Rambagh Srinagar AND</p> <p>JKPCC Building, 2nd Floor, Rail Head Complex, Jammu-180012</p>
ITB 1.1	<p>The name of the work is: Construction of Drainage Network for Missing Link Zone - 1</p> <p>The identification number of the work is:</p> <p><i>NEW/JTFRP/MISSINGLINKS/01</i></p>
ITB 2.1	<p>The Borrower is Government of India.</p> <p>The Sub-Borrower is Government of J&K</p> <p>The Employer is: Chief Executive Officer, J&K ERA Complex, Rambagh Srinagar, J&K. /JKPCC Building, 2nd Floor, Rail Head Complex, Jammu-180012 (J&K)</p>
ITB 2.1	<p>The name of the Project is: <i>Jhelum and Tawi Flood Recovery Project.</i></p> <p>Loan or Financing Agreement amount: <i>USD 250 Million.</i></p>
ITB 4.1	Bids from Joint ventures are acceptable.
	Maximum number of members in the JV shall be: <i>One lead member plus two other members</i>
	Place where the agreement to form JV to be registered is: anywhere in India

ITB 4.4	A list of debarred firms and individuals is available at the Bank's external website www.worldbank.org/debarr .
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B. Contents of Bidding Documents

ITB 7.1	For <u>clarification purposes</u> only, the Employer's address is: Attention: <i>Director Technical</i> <i>ERA Commercial Complex, Rambagh Srinagar, J&K.</i> JKPCC Building, 2nd Floor, Rail Head Complex, Jammu-180012 (J&K)
ITB 7.1	www.jtfrp.in
ITB 7.4	A Pre-Bid meeting <i>shall</i> take place. If a Pre-Bid meeting will take place, it will be at the following date, time and place: Date: 01 – 10 – 2019, Time: 1130 hours Place: Office of the Director Technical, PMU, ERA Commercial Complex, Rambagh Srinagar, J&K.

C. Preparation of Bids

ITB 11.1 (b)	The following schedules shall be submitted with the bid: (a) original bid security in approved form; (b) Bid Processing Fee towards the cost of the document in approved form (c) Original affidavit regarding correctness of information furnished online along with their Technical bid. (d) JV agreement in case of bid is submitted as a JV. (e) Legally valid Power of Attorney to demonstrate the authority of the signatory to sign the Bid. In the case of Bids submitted by an existing or intended JV, the authorization shall be evidenced by a Power of Attorney signed by legally authorized signatories of all the members.
ITB 11.1 (j)	NA
ITB 13.1	Alternative bids <i>shall not be</i> permitted.

ITB 14.5	The prices quoted by the Bidder <i>shall</i> not be <i>subject</i> to adjustment during the performance of the Contract.
ITB 18.1	The bid validity period shall be: 120 days.
ITB 19.1	The Bidder shall furnish a bid security for an amount of INR 90.00 Lacs.
ITB 19.2 (d)	Other types of acceptable securities are: Fixed Deposit/Time Deposit certificate issued by a Nationalized or Scheduled Bank located in India for equivalent or higher values are acceptable as bid security provided it is pledged in favour of <i>Chief Accounts Officer, PMU JTFRP</i> , and such pledging has been noted and suitably endorsed by the bank issuing the certificate.
ITB 20.1	In addition to the original of the bid, the number of copies is: <i>two</i>
ITB 20.2	The written confirmation of authorization to sign on behalf of the Bidder shall consist of: (a) <i>Legally valid Power of Attorney is required to demonstrate the authority of the signatory to sign the Bid; and</i> (b) <i>In the case of Bids submitted by an existing or intended JV, if permitted as per ITB 4.1, the authorization shall be evidenced by a Power of Attorney signed by legally authorized signatories of all the members</i>

D. Submission and Opening of Bids

ITB 21.1 & 22.1	Electronic bidding is not permitted; bidders shall not have the option of submitting their bids electronically.
ITB 22.1	For <u>bid submission purposes</u> only, the Employer's address is Attention: Director Technical <ul style="list-style-type: none">PMU JTFRP office, ERA Commercial Complex, Rambagh Srinagar, J&K. Country: INDIA

	<p>The deadline for bid submission is:</p> <p>Date: 28– 10 – 2019.</p> <p>Time: 1630 hours.</p> <p>Electronic bidding is not permitted.</p>
ITB 25.1	The bid opening shall take place at: PMU JTFRP office, ERA Commercial Complex, Rambagh Srinagar, J&K.
ITB 25.1	Electronic bidding is not permitted, bids shall not be opened electronically.

E. Evaluation and Comparison of Bids

ITB 25.3	The Letter of Bid and Priced Bill of Quantities shall be initialled by representatives of the Employer conducting Bid opening: <i>Each Bid shall be numbered, any modification to the unit or total price shall be initialed by the Representative of the Employer.</i>
ITB 30.3	The adjustment shall be based on the highest price of the item or component as quoted in other substantially responsive Bids, subject to a maximum of the estimated price of the item. If the price of the item or component cannot be derived from the price of other substantially responsive Bids, the Employer shall use its best estimate.
ITB 34.1	At this time the Employer does not intend to execute certain specific parts of the Works by sub-contractors selected in advance.
ITB 34.3	<p>(A) After award of the Contract, the subcontracting of any part of the work, except for those subcontractors and sub consultants nominated in the Bid, shall require the prior written consent of the Owner. Notwithstanding such consent, the Bidder shall remain responsible for the acts, defaults, and neglects of all subcontractors and sub consultants during Contract implementation.</p> <p>(B) Contractor's proposed subcontracting: Maximum percentage of subcontracting permitted is: <i>30% of the total contract amount</i></p> <p>(C) Bidders planning to subcontract more than 10% of total volume of work shall specify, in the Bid Submission Form, the activity (ies) or parts of the works to be subcontracted along with complete details of the sub-contractors and their qualification and experience. The qualification and experience of the sub-contractors must meet the minimum criteria for the relevant work to be sub-contracted failing which such sub-contractors will not be permitted to participate.</p> <p>(D) Sub-contractors' qualification and experience will not be considered for evaluation of the Bidder. The Bidder on its own (without taking into account</p>

	the qualification and experience of the sub-contractor) should meet the qualification criteria.
ITB 35.4	Not Applicable
ITB 42.1 and 42.2	The successful Bidder shall also be required to submit performance security equal to 05% of accepted contract amount and an Environmental, Social, Health and Safety (ESHS) Performance Security equal to 1% of accepted contract amount. .
ITB 43.1	The Adjudicator/Dispute Review Expert proposed by the Employer <u>shall be decided at the time of signing the Contract agreement.</u> The daily fee for this proposed Adjudicator/Dispute Review Expert shall be: INR 5000.

Section III - Evaluation and Qualification Criteria

1. Evaluation

In addition to the criteria listed in ITB 35.2 (a) – (e) the following criteria shall apply:

1.1 Adequacy of Technical Proposal

Evaluation of the Bidder's Technical Proposal will include:

(i) an assessment of the Bidder's technical capacity to mobilize key equipment and personnel for the contract consistent with its proposal regarding work methods, scheduling, material sourcing and Quality Control/Assurance in sufficient detail and fully in accordance with the requirements stipulated in Section VII (Works' Requirements).

For this purpose, the Bidder should also submit:

a detailed note outlining its proposed methodology and program of construction including compliance with the Environmental, Social, Health and Safety (ESHS) obligations under this contract, backed with equipment planning and deployment, materials and manpower planning and deployment, duly supported with broad calculations and quality control system/assurance procedures proposed to be adopted, justifying their capability of execution and completion of the work as per technical specifications within the stipulated period of completion as per milestones.

(ii) an assessment of the details of subcontracting elements of works amounting to more than 10% of the bid price; for each element proposed to be sub contracted furnish details whether the identified Sub-contractor possesses the required qualifications and experiences to execute that element satisfactorily. [*Work should not be split into small parts and sub-contracted*].

1.2 Multiple Contracts if permitted under ITB 35.4, will be evaluated as under.

If works are grouped in multiple contracts pursuant to Sub-Clause 35.4 of the Instructions to Bidders, the Employer will evaluate and compare Bids on the basis of a contract, or a combination of contracts, or as a total of contracts in order to arrive at the least cost combination for the Employer by taking into account discounts offered by Bidders in case of award of multiple contracts. If a bidder submits several successful (lowest evaluated substantially responsive) bids, the evaluation will also include an assessment of the Bidder's capacity to meet the aggregated requirements regarding:

- Experience
- Financial situation
- Current contract commitments,
- Cash flow capacity,
- Equipment to be allocated, and

- Personnel to be fielded.
- Bid Capacity

1.3 Specialised Subcontractors

If permitted under ITB 34, only the specific experience of sub-contractors for specialized works permitted by the Employer will be considered. The general experience and financial resources of the specialized sub-contractors shall not be added to those of the Bidder for purposes of qualification of the Bidder.

The specialized sub-contractors proposed shall be fully qualified for their work proposed, and meet the following criteria:

Qualification

Eligibility and Qualification Criteria			Compliance Requirements				Documentation
No.	Subject	Requirement	Single Entity	Joint Venture where permitted			Submission Requirements
				All Parties Combined	Each Partner	One Partner	

2.1 Eligibility

2.1.1	Nationality	Nationality in accordance with ITB Sub-Clause 4.3.	Must meet requirement	Existing or intended JV must meet requirement	Must meet requirement	N / A	Forms ELI –1.1 and ELI-1.2 With attachments
2.1.2	Conflict of Interest	No conflicts of interest in ITB Sub-Clause 4.2.	Must meet requirement	Existing or intended JV must meet requirement	Must meet requirement	N / A	Letter of Bid
2.1.3	Bank eligibility	Not having been declared ineligible by the Bank, as described in ITB Sub-Clause 4.4.& 4.7.	Must meet requirement	Existing JV must meet requirement	Must meet requirement	N / A	Letter of Bid
2.1.4	Government Owned Entity	Applicant required to meet conditions of ITB-A Sub-Clause 4.5. The entity should not be a dependent agency of the borrower or sub-borrower or Employer.	Must meet requirement	Must meet requirement	Must meet requirement	N / A	Forms ELI -1.1 and 1.2 with attachments
2.1.5	United Nations resolution or Borrower's country law	Not having been excluded as a result of prohibition in the Borrower's country laws or official regulations against commercial relations with the Bidder's country, or by an act of compliance with UN Security Council resolution, both in accordance with ITB 4.7 and Section V.	Must meet requirement	Must meet requirement	Must meet requirement	N / A	Forms ELI -1.1 and 1.2 with attachments

Eligibility and Qualification Criteria			Compliance Requirements			Documentation
No.	Subject	Requirement	Single Entity	Joint Venture where permitted		Submission Requirements
				All Parties Combined	Each Partner	

Historical Contract Non-Performance

2.2.1	History of Non-Performing Contracts	Non-performance of a contract ² did not occur as a result of contractor default since 1 st January 2014 .	Must meet requirement by itself or as partner to past or existing JV	N / A	Must meet requirement by itself or as partner to past or existing JV	N / A	Form CON – 2
2.2.2	Suspension due to withdrawal of the Bid within Bid validity	Not under suspension due to withdrawal of the Bid pursuant ITB 19.6.	Must meet requirement	Must meet requirement	Must meet requirement	N/A	Letter of Bid
2.2.3	Pending Litigation	Bidder's financial position and prospective long term profitability sound according to criteria established in 2.3.1 below and assuming that all pending litigation will be resolved against the Bidder	Must meet requirement by itself or as partner to past or existing JV	N / A	Must meet requirement by itself or as partner to past or existing JV	N / A	Form CON – 2

Eligibility and Qualification Criteria			Compliance Requirements				Documentation
No.	Subject	Requirement	Single Entity	Joint Venture where permitted			Submission Requirements
				All Parties Combined	Each Partner	One Partner	
2.2.4	Litigation History	No consistent history of court/arbitral award decisions against the Bidder ³ since 1 st January 2014	Must meet requirement by itself or as partner to past or existing JV	Must meet requirement	Must meet requirement by itself or as partner to past or existing JV	N/A	Form CON – 2
2.3	Declaration: Environmental, Social, Health, and Safety (ESHS) past performance	Declare any civil work contracts that have been suspended or terminated and/or performance security called by an employer for reasons related to the non-compliance of any environmental, or social, or health or safety requirements or regulations in the past five years ⁴ .	Must make the declaration. Where there are Specialized Sub-contractor/s, the Specialized Sub-contractor/s must also make the declaration.	N/A	Each must make the declaration. Where there are Specialized Sub-contractor/s, the Specialized Sub-contractor/s must also make the declaration.	N/A	Form CON-3 ESHS Performance Declaration

³The Bidder shall provide accurate information on the letter of Bid about any litigation or arbitration resulting from contracts completed or ongoing under its execution over the last five years. A consistent history of court/arbitral awards against the Bidder or any member of a joint venture may result in disqualifying the Bidder.

Qualification Criteria			Compliance Requirements				Documentation
No.	Subject	Requirement	Single Entity	Joint Venture where permitted			Submission Requirements
				All Parties Combined	Each Member	One Member	

2.3 Financial Situation and Performance

2.3.1	Financial Capabilities (a) The Bidder shall demonstrate that it has access to, or has available, liquid assets, unencumbered real assets, lines of credit, and other financial means (independent of any contractual advance payment) sufficient to meet the construction cash flow requirements estimated as INR 20.00 Crores for the subject contract(s) net of the Bidders other commitments (b) The Bidders shall also demonstrate, to the satisfaction of the Employer, that it has adequate sources of finance to meet the cash flow requirements on works currently in progress and for future contract	(a) Must meet requirement	(a) Must meet the requirement	(a) Must meet at least 25% of the requirement as a minimum	(a) Must meet at least 50% of the requirement as a minimum	Form FIN - 3.1 with attachments
		(b) Must meet requirement	(b) Must meet requirement	N/A	N/A	

Qualification Criteria			Compliance Requirements				Documentation
No.	Subject	Requirement	Single Entity	Joint Venture where permitted			Submission Requirements
				All Parties Combined	Each Member	One Member	
		commitments (c) The audited balance sheets or, if not required by the laws of the Bidder's country, other financial statements acceptable to the Employer, for the last <i>five</i> years shall be submitted and must demonstrate the current soundness of the Bidder's financial position and indicate its prospective long-term profitability.	(c) Must meet requirement	N/A	(c) Must meet requirement	N/A	
2.3.2	Annual Construction Turnover	Achieved in at least two financial years (in the last five years) a minimum annual financial turnover ⁵ in civil engineering construction work of INR 80 Crores [Eighty Crore Rupees] calculated as total certified payments received for contracts in progress or completed.	Must meet requirement	Must meet requirement	Must meet twenty five percent (25%) of the requirement	Must meet fifty percent (50%) of the requirement	Form FIN - 3.2

⁵ At price level. Financial turnover of previous years shall be given weightage @5% per year based on rupees value to bring them to the price level of the financial year in which bids are received.

Qualification Criteria			Compliance Requirements			Documentation	
No.	Subject	Requirement	Single Entity	Joint Venture where permitted			Submission Requirements
				All Parties Combined	Each Member	One Member	

2.4 Experience

2.4.1	General Construction Experience	Experience under construction contracts for similar works such as those pertaining to construction of Drainage/ Sewerage works in the role of contractor, JV member, subcontractor, or management contractor for at least the last seven [7] years prior to the bid submission deadline.	Must meet requirement	N/A	Must meet requirement of having executed works of similar nature	N/A	Form EXP – 4.1
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2.4.2 (a)	Specific Construction Experience	Bidder should have successfully completed as a prime contractor, JV member, management contractor or subcontractor, One contract with a value not less than INR 48 Crores substantially for the last seven (7) years (FY 2012-13.to FY 2018-19), which is similar to the proposed works of construction of drainage / sewerage works.	Must meet requirement	Must meet requirement	Must meet requirement for one contract of 25% value	Must meet requirement for one contract of 50% in value	Form EXP 4.2(a). The contractor should have borne responsibility for execution of works to the extent he claims experience. A contractor should not claim experience for the works he has never executed.
<p><i>In the case of JV, the value of contracts completed by its members shall not be aggregated to determine whether the requirement of the minimum value of a single contract has been met. Instead, each contract performed by each member shall satisfy the minimum value of a single contract as required for single entity. In determining whether the JV meets the requirement of total number of contracts, only the number of contracts completed by all members each of value equal or more than the minimum value required shall be aggregated</i></p>							

Qualification Criteria			Compliance Requirements			Documentation	
No.	Subject	Requirement	Single Entity	Joint Venture where permitted			Submission Requirements
				All Parties Combined	Each Member	One Member	
2.4.2 (b)	Specific Experience	For the above or other contracts executed during the period stipulated in 2.4.2(a) above, a minimum construction experience in the following key activities: a) Construction of drainage/ sewerage network by way of laying of RCC/ PCC Cast in situ or RCC/ DI /other pipe material at least 3000 mts.	Must meet requirements	Must meet requirement	Should meet the criteria in full, at least for one of key activities listed in column 3.	N/A	Form EXP-4.2(b)
<p>2.4.2 (c) For a bidder (either individually as a single entity or as a JV partner) to qualify for a group of lots (contracts), he must demonstrate having experience and resources sufficient to meet the aggregate of the qualifying criteria for all the contracts in question.</p>							
2.4.2 (d)	<p>Bidders who meet the minimum qualification criteria will be qualified only if their available bid capacity for construction work is equal to or more than the total bid value of the work. The available bid capacity will be calculated as under:</p> <p>Assessed Available bid capacity = (A*N*2 – B)</p> <p>Where,</p>						

	<p>A = Maximum value of civil engineering works executed in any one year during the last five years (updated to the price level of the financial year at the rate of 5% per year), taking into account the completed as well as works in progress).</p> <p>N = Number of years prescribed for completion of the works for which bids are invited (period upto 6 months to be taken as half-year and more than 6 months as one year).</p> <p>B = Value, at the current price level, of existing commitments on on-going works to be completed during the period of completion of the works for which bids are invited.</p> <p>Note: <i>the statements in Section IV showing the value of existing commitments of on-going works as well as the stipulated period of completion remaining for each of the works listed should be countersigned by the Engineer in charge, not below the rank of an Executive Engineer or equivalent.</i></p>
2.4.2 (e)	<p>Even though the bidders may meet the above qualifying criteria, they are subject to be disqualified if they have: -</p> <ul style="list-style-type: none"> - made misleading or false representations in the forms, statements, affidavits, and attachments submitted in proof of the qualification requirement; - Record of poor performance such as abandoning the works, not properly completion or financial failures etc. - Consistent history of litigation or arbitration awards against the bidder or any partner or the joint venture. - Participated in the previous bidding (if this is a re-bidding) for the same work and had quoted unreasonably high bid price and could not furnish any rational justification for the same to the employer.

2.5 Personnel

The Bidder must demonstrate that it will have the personnel for the key positions that meet the following requirements. The Contractor shall require the Employer's consent to substitute or replace the Key Personnel (reference the Particular Conditions of Contract 9.1).

S. No	Designation of Personnel (Position)	No.	Minimum Qualification	Minimum years of experience	Minimum experience in similar works.
1.	Project Manager (Civil)	01	B.E (Civil)	25 Years	10 Years
2.	Construction Manager.	01	B.E (Civil)	15 years	5 Years
3.	Civil Engineer	04	B.E (Civil)/ Diploma (Civil)	8 / 10 years	5 / 7 years
4.	Surveyor	02	Diploma (civil)	7 years	5 years
5.	Safety officer	01	Diploma in Construction safety/Occupational safety with skill & experience in handling the Health, Environmental, safety issues in handling the linear infrastructure projects.	5 Years	3 Years

The Bidder must not have in his employment:

- [i] A near relations (defined as first blood relations, and their spouses, of the bidder or the bidder's spouse) of persons of Jhelum Tawi Flood Recovery Project / JKERA.
- [ii] Without Government permission, any person who retired as gazetted officer within the last one year.

The Bidder shall provide details of the proposed personnel and their experience records in the relevant Forms included in Section IV, Bidding Forms.

2.6 Equipment

The Bidder must demonstrate that it will have access to the key Contractor's equipment listed hereafter:

S.No.	Equipment Type and Characteristics	Capacity	Minimum Number required
1	Excavator cum loader	--	03 No's
2	Tipper	--	06 No's
3	Hydra/Crane	10 - 15 Ton	02No's
4	Carrier Vehicle	3 Ton	04 No's
5	Hydraulic Vibrator Road Roller	8-10 Ton	01 No's
6	D.G sets (Potable)	10-255 KVA.	2 No's
7	Concrete Mixer with Hooper capacity not less than 1 Cum.(Mini Batching Plant)	Min.1cum	02 No's
8	Welding Sets .		2 No's
9	Storage tanker	10KL	02 No's
10	Needle vibrator with needle set of all sizes	--	04 sets
11	Water Tanker	10 KL	01No's
12	Diesel Engine dewatering pumps ,mud pumps	1-5 Cusec	06 No's
13	Total Station Survey Equipment & Auto level	--	1no & 03 No's

The Bidder shall provide further details of proposed items of equipment using the relevant Form in Section IV.

Section IV - Bidding Forms

Letter of Bid

The Bidder must prepare the Letter of Bid on stationery with its letterhead clearly showing the Bidder's complete name and address.

Note: All italicized text is for use in preparing these forms and shall be deleted from the final products.

Date: _____

Invitation for Bid No.: _____

To: ***(Insert name of the Employer)***

We, the undersigned, declare that:

- (a) We have examined and have no reservations to the Bidding Documents, including Addenda issued in accordance with Instructions to Bidders (ITB 8);
- (b) We meet the eligibility requirements and have no conflict of interest in accordance with ITB 4;
- (c) We offer to execute in conformity with the Bidding Documents the following Works:
_____;
- (d) The total price of our Bid, excluding any discounts offered in item (e) below is:
 - In case of only one lot, total price of the Bid ***[insert the total price of the bid in words and figures];***
 - In case of multiple lots, total price of each lot ***[insert the total price of each lot in words and figures];***
 - In case of multiple lots, total price of all lots (sum of all lots) ***[insert the total price of all lots in words and figures];***
- (e) The discounts offered and the methodology for their application are:
 - (i) The discounts offered are: ***[Specify in detail each discount offered.]***
 - (ii) The exact method of calculations to determine the net price after application of discounts is shown below: ***[Specify in detail the method that shall be used to apply the discounts]*** _____;
- (f) Our bid shall be valid for a period of _____ ***[insert validity period as specified in ITB 18.1.]*** days from the date fixed for the bid submission deadline in accordance

with the Bidding Documents, and it shall remain binding upon us and may be accepted at any time before the expiration of that period;

- (g) We accept the appointment of *[insert name proposed in Bid Data Sheet]* as the Adjudicator

[or]

We do not accept the appoint of *[insert name proposed in Bid Data Sheet]* as the Adjudicator, and propose instead that *[insert name]* be appointed⁶ as Adjudicator, whose daily fees and biographical data are attached;

- (h) If our bid is accepted, we commit to obtain a performance security *[and an Environmental, Social, Health and Safety (ESHS) Performance Security, **Delete if not applicable**]* in accordance with the Bidding Document;
- (i) We are not participating, as a Bidder, in more than one bid in this bidding process in accordance with ITB 4.2,
- (j) Our firm, its affiliates or subsidiaries, including any Subcontractors or Suppliers for any part of the contract, has 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 (ITB 4.7);
- (k) We are not a government owned entity / We are a government owned entity but meet the requirements of ITB 4.5⁷;
- (l) We have paid, or will pay the following commissions, gratuities, or fees with respect to the bidding process or execution of the Contract:⁸ *[insert complete name of each Recipient, its full address, the reason for which each commission or gratuity was paid and the amount of each such commission or gratuity]*

Name of Recipient	Address	Reason	Amount

- (m) We hereby certify that we have taken steps to ensure that no person acting for us or on our behalf will engage in any type of fraud and corruption.
- (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;

⁶ In case appointment of Adjudicator was proposed from the list provided by an Institution in ITB 43, the replacement should also be proposed from the list of same institution.

⁷ *Use one of the two options as appropriate.*

⁸ *If none has been paid or is to be paid, indicate "none".*

-
- (o) We understand that you are not bound to accept the lowest evaluated bid or any other bid that you may receive; and
- (p) If awarded the contract, the person named below shall act as Contractor's Representative: _____

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

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

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

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

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

*: In the case of the Bid submitted by joint venture specify the name of the Joint Venture as Bidder

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

Bill of Quantities

PREAMBLE TO THE BILL OF QUANTITIES

1.0 General

- 1.1 The bill of quantities shall be read in conjunction with the Instruction to Bidder, General and Conditions of Contract, Specifications and Drawings.
- 1.2 The Contractor shall be deemed to have visited the site and read and examined the Tender Documents before completing the Bill of Quantities and filling the rates. The Drawings, Specifications, Schedules etc. are to be considered as explanatory of each other and no advantage shall be taken of any omission in tender documents.
- 1.3 The Contractor shall be deemed to be fully conversant with and to have made full allowance in his Tender for the site conditions, the nature and complexity of the work to be undertaken, the other extensive development and construction work currently being or which may be executed on and around the Site and all changes in the nature and condition of the Site from that existing at the time of Tender.
- 1.4 General directions and descriptions of scope of work and materials given in the Specification or shown in the Drawings are not necessarily repeated in the Bill of Quantities and reference is to be made to the Specification and the Drawings for this information.
- 1.5 The Bill of Quantities is an estimate of the quantities of work involved and is to be used as a basis for pricing of the Tender and for valuation of the work executed, in conjunction with instructions to Bidders, General and Condition of contract, Technical specifications and Drawings
- 1.6 The quantities shown in the Bill of Quantities are approximate only and may be subject to variation. The quantities shown should not be considered as limiting or defining the extent of work to be done and material to be supplied by the Contractor. The contractor shall ascertain the actual quantities of materials required before placing orders.
- 1.7 Quantities given in the Bill of quantities for the various items are approximate only and are given to provide a common basis for tendering. The basis of payment will be the actual quantities of work carried out, as measured by the Engineer and valued at the rates of prices quoted in the Bills of Quantities where applicable, and otherwise at such rates for prices as may be fixed within the terms of the contract. Variations in the quantities of work in the Schedule shall not vitiate the contract.
- 1.8 Extra items of work shall not vitiate the Contract. The Contractor shall be bound to execute extra items of work as directed by the Engineer. The rates for extra items of works will be as per rates decided under Contract Conditions.
- 1.9 The rates quoted in the schedule shall be all inclusive value for the work described and be deemed to include for all the Contractor's liabilities and obligations and all risks set forth or implied in the document and all matters and things necessary for the proper construction, of the Works including surveying, setting out, plant, labour, supervision, materials, erection, maintenance, insurance, profit, taxes and duties together with all general risks liabilities and obligations set out or implied in the Contract.
- 1.10 It is to be expressly understood that the measured work is to be taken net (notwithstanding any system or practice to the contrary) according to the actual quantities wherein finished according to the Drawings or as may be ordered from time to time by the Engineer and the cost calculated at the respective prices, without any additional charges for any necessary or contingent works connected therewith. The rates quoted are for works in-situ and complete in every respect. Unless the Bill of Quantities specially indicates to the contrary, the constructional plant and temporary works will not be measured.
- 1.11 Unless otherwise stated, all items are measured net and no allowance will be made for wastage, working space, bulking or shrinkage, overlaps and the like. For supply or transportation of sand etc., deduction for bulk age/voids will be done as per provisions in IS codes /CPWD specifications.
- 1.12. The unit rate should be entered against each item in the Bill of Quantities and shall be written in figures. Any item left un-priced will be deemed to be included for elsewhere in the Bill of Quantities or the Schedule and hence the rate for that item will be taken as NIL.

-
- 1.13. In case any discrepancy is found between the quoted rates and the amounts, the unit rates will be taken as correct.
- 1.14. Provisional sums included and designated in the BOQ shall be expended in whole or in part at the discretion and direction of the Engineer in accordance with the conditions of contract. It shall include shifting of utility services, electrical works on HT Side, and electrical energy charges during O&M period with additional 2 months, etc.”The amount for provisional sum shall be Rs 300 Lacs. The bidders , however, shall not have to quote this amount in the BOQ & the same shall be added to the lowest evaluated bidder at the time of award. The expenditure out of the provisional sum shall be carried out only after prior approval of the employer and shall be paid as per the actual work done, supported by the relevant documents

2.0 Earthworks

- 2.1 The unit of measurement for earthworks where measured separately shall be Cubic Meters for all types of soils including hard rock.
- 2.2 The rates for excavation shall include for all plant, materials and labour required for excavation irrespective of depth in any material and in any location and shall also include for all temporary diversions, support and protection of any existing services and utilities, temporary support and maintenance of the excavation, dewatering, any additional excavation necessary to provide working space, refilling to any over excavation with materials as required by the specification or shown on the drawings, multiple handling and stack piling materials required for filling anywhere on the site, backfilling with materials as required by the specification or shown on the drawing(excluding the cost of outside material) compaction. Disposal of surplus earth is included in excavation item.

3.0 Dewatering

- 3.1 The rates for all items in Bill of Quantities shall be deemed to include all charges on account of dewatering, diversions, ring bund, protection bunds of any kind etc and all such hidden arrangements/items that are not listed and are necessary for execution of all BOQ items, to entire satisfaction of engineer in charge.
- 3.2 Nothing extra shall be paid on account of dewatering of any kind which the contractor has to carry out during the execution of works, the rate of dewatering of all kinds such as but not limited to, rainfall, snowfall, springs, wells, underground, sub-surface or surface water, water from broken PHE Lines, drainage pipe lines, drains or any other utility, stagnant water of any kind , flood water, is deemed to be included

4.0 Approach to Work Site

Provision for access and approach to all construction sites is the responsibility of contractor and no payment will be made on this account.

5.0 Safety

The contract rates for such items in BOQ shall include all costs of compliance with safety requirements (barricading of roads ,night lamps for lighting ,watch and ward caution boards, safety ribbons sign boards & etc) & Specifications. The rates for such items given in BOQ shall be deemed to include all costs on account of traffic diversions and all such hidden assessment/items, which are not listed but have to be complied to entire satisfaction of Engineers In charge.

Note:

Following points shall be kept in view while filling up the BOQ in financial bid.

- 1. Item for which no rate or price has been entered in will not be paid for by the Employer when executed and shall be deemed covered by the other rates and prices in the Bill of Quantities*
- 2. Unit rates and prices shall be quoted by the bidder in Indian Rupees*
- 3. Where there is a discrepancy between the unit rate and the line item total resulting from multiplying the unit rate by quantity, the unit rate quoted shall govern as explained in*

Where there is a discrepancy between the rate in figures and words, the rates in words will govern.

Bill of Quantities (BOQ) :

Sl. No.	Description	Qty.	Unit	Rate (INR)		
				In Figures	In Words	Amount
Drainage Work						
1	Earth work in excavation in trenches for laying of pipes ,construction of RCC drains for all depths, in all types of soil including boulders,picking of metalled roads with bitumen or tar macadam road surfaces cuttings,tiles floors,devri stones etc. (by manual or mechanical means)with all leads lifts dressing of sides, ramming of bottom including dewatering caused by any means to any extent, construction of diverssion and ring bunds etc..Complete job and didposal of surplus excavated earth within a lead of 10 kms by mechanical transporet,disposal of surplus excavated earth to be levelled and neatly dressed or as directed by the engineer I/C as per site condition (complete job)	108647.00	Cum			
2	Providing & laying stone soling above 75 mm size including dewatering job complete including carriage of materials from nearest source to site of work by mechanical transport including loading, unloading and stacking.	5769.00	Cum			

3	Providing and laying in position cement concrete of 1:4:8 (1 Cement : 4 coarse sand : 8 graded stone aggregate 40 mm nominal size) excluding the cost of centering and shuttering including dewatering job.	3215.00	Cum			
4	Close timbering/ steel shoring for depths exceeding 1.5 meter in trenches including strutting, shoring and packing cavities (wherever required) complete, (Measurements to be taken of the face area timbered).	79500.00	Sqm			
5	Supplying and filling of Local Sand / Stone Crushed Dust including watering, ramming, dressing , dewatering, carriage of materials from nearest source to site of work by mechanical transport including loading, unloading and stacking.	14872.00	Cum			
6	Providing & Laying of stone aggregate of 40 mm size and below on horizontal level including ramming, all leads and lifts, cost and carriage of material, dewatering etc. complete job.	11218.00	Cum			
7	Providing & laying nallah muck (GSB) in trenches in layers not exceeding 20 cm in depth consolidating each layer by ramming / watering and compacting including all carriages upto site of work (complete job).	57683.00	Cum			

	Supply, laying & jointing of rubber ring jointed non-pressure NP-3 class socket & spigot R.C.C. pipes of specified internal dia & thickness with jointing materials as per BIS with Stiff mixture of cement mortar in the proportion of 1:2 (1 cement: 2 fine sand) including dewatering, loading, unloading, freight, stacking & transportation at site & testing of joints etc. complete job as per drawing specifications & as directed by Engineer Incharge.					
8.1	300 mm dia	11507.00	M			
8.2	350 mm dia	5393.00	M			
8.3	400 mm dia	3950.00	M			
8.4	450 mm dia	2522.00	M			
8.5	500 mm dia	3831.00	M			
8.6	600 mm dia	2549.00	M			
8.7	700 mm dia	1068.00	M			
8.8	800 mm dia	995.00	M			
8.9	900 mm dia	1119.00	M			
8.10	1000 mm dia	501.00	M			
9	Providing and laying in position ready mixed M-30 grade. for reinforced cement concrete work, using cement content as per approved design mix, manufactured in fully automatic batching plant, transported to site of work in transit mixer for all leads & lifts, having continuous agitated mixer, including pumping of R.M.C. from transit mixer to site of laying, cost of admixtures in recommended proportions as per IS : 9103 to accelerate/ retard setting					

	of concrete, improve workability without impairing strength and durability as per direction of the Engineer - in - charge for all works up to floor five level. including cost of stone soling ,PCC & RCC raft in foundation work, supplying and fixing 560 mm dia. SFRC manhole frame and cover, supply and fixing of cast iron footsteps staggered at 30cms apart as directed, watering, curing, including earth work in excavation , shoring strutting, shuttering & reinforcement (hysd) ,RCC slabs in construction of RCC manholes & providing and laying of nallah muck (GSB) in filling around the manholes as per the specifications & details of approved drawings with all leads and lifts for all depths. Contractor to Quote Rate Including dewatering (Nothing extra will be paid on account of dewatering".)					
9.1	900 mm dia	976.00	Nos.			
9.2	1200 mm dia	365.00	Nos.			
9.3	1500 mm dia	325.00	Nos.			
9.4	1800 mm dia	81.00	Nos.			
9.5	2000 mm dia	25	Nos.			
10	Supply and fixing of 560mm dia polycrrete perforated manhole cover and frame as per IS-12592.	49.00	Nos.			
11	Supplying, Delivering, Placing in position and fixing of 150 mm dia RCC Pipes grade confirming to NP3 including jointing of pipe with gully trap in rich cement mortar as directed	3492	M			

	by the Engineer incharge including all carriage upto site of work including testing if any (150 mm dia)					
12	Providing and laying in position cement concrete of 1::3:6 (1 Cement : 3 coarse sand : 6 graded stone aggregate 40 mm nominal size) excluding the cost of centering and shuttering including dewatering job.	728.00	Cum			
13	Providing and laying in position RCC /PCC for all types of works etc. any thickness in Cement concrete 1:2:4 using 20mm and down grade crushed stone aggregate including cost and carriage of all materials equipments and dewatering et. complete as directed by the Engineer in charge. (excluding cost of reinforcement, centering and shuttering)	2479.00	Cum			
14	Providing and laying in position ready mixed M-25 grade concrete for reinforced cement concrete work in Slabs using cement content as per approved design mix, manufactured in fully automatic batching plant and transported to site of work in transit mixer for all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work, including pumping of R.M.C. from transit mixer to site of laying , excluding the cost of centering, shuttering	75.00	Cum			

	finishing and reinforcement, including cost of admixtures in recommended proportions as per IS : 9103 to accelerate/ retard setting of concrete, improve workability without impairing strength and durability as per direction of the Engineer - in - charge. M- 25 grade reinforced cement concrete. all works upto floor five level.					
15	Reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete. Thermo-Mechanically Treated bars.(Fe 500 D)	5950.00	Kg			
16	Providing and fixing ,centering and shuttering works for Foundations, footings, bases of columns, etc.including strutting, proper etc to give an even and smooth surface for all depth and heights complete and removal of frame work for all types of works etc.Including cost and carriage of material ,equipment ,dewatering,diversion and ring bunds etc.Complete job as per drawing, specifications and as directed by the engineer incharge	13405	Sqm			
17	Structure steel work welded in built up sections, trusses and framed work, including cutting, hoisting, fixing in position and applying a	234959.00	Kg			

	priming coat of approved steel primer all complete.(For MS Gratings fabricated. Complete job.					
18	Filling available Excavated Earth (Excluding Rock) in trenches, plinth, side of foundation etc. layer not exceeding 20 cm in depth, consolidating each deposit layer by ramming & watering lead upto 50 m & lift upto 1.5 m	1583.00	Cum			
	Road Works					
19	Banking excavated earth in layers not exceeding 20 cm. In depth, breaking clods, watering, rolling each layer with 1/2 tonne roller, or wooden or steel rammers, and rolling every 3rd and top-most layer with power roller of minimum 8 tonnes and dressing up, in embankments for roads, floods banks, marginal banks, and guide banks etc., lead upto 50 m and lift upto 1.5 m.					
19.1	290m x 16.00 Sqm	4640.00	Cum			
19.2	460m x 1.00Sqm	460.00	Cum			
20	Providing, laying, spreading and compacting stone aggregates of specific sizes to water bound macadam specification including spreading in uniform thickness, hand packing, rolling with 3 wheeled steel/ vibratory roller 8-10 tonnes in stages to proper grade and camber, applying and brooming requisite type of screening/ binding					

	Materials to fill up the interstices of coarse aggregate, watering and compacting to the required density.					
21	Grade - I as per Technical specification Morth 404.	8671.00	Cum			
22	Grade - II as per Technical specification Morth 404.	8671.00	Cum			
23	Providing and laying bituminous macadam with 100-120 TPH hot mix plant producing an average output of 75 tonnes per hour using crushed aggregates of specified grading premixed with bituminous binder, transported to site, laid over a previously prepared surface with paver finisher to the required grade, level and alignment and rolled as per clauses 501.6 and 501.7 to achieve the desired compaction (50mm)	3331.00	Cum			
24	Providing and laying semi dense bituminous concrete with 100-120 TPH batch type HMP producing an average output of 75 tonnes per hour using crushed aggregates of specified grading, premixed with bituminous binder @ 4.5 to 5 per cent of mix and filler, transporting the hot mix to work site, laying with a hydrostatic paver finisher with sensor control to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MoRTH specification clause No. 508 complete in all respects (25	2731.00	Cum			

	mm)					
25	Providing and applying primer coat with bitumen emulsion on prepared surface of granular Base including clearing of road surface and spraying primer at the rate of 0.60 kg/sqm using mechanical means.	65375.00	Sqm			
26	Providing and applying tack coat with bitumen emulsion using emulsion pressure distributor at the rate of 0.25 kg per sqm on the prepared bituminous/granular surface cleaned with mechanical broom.	109205.00	Sqm			
27	Providing/Laying of Seal coat sealing the wides in Bituminous Surface laid to specified levels,grade & cross fall using type B seal coat	109205.00	Sqm			
	Total Bid Cost in Figures (INR) A					
	Total Bid Cost in Words (INR)					
	Provisional Sum B					20000000

	Total Cost including provisional sum (A+B)					
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Note:

1. *Item for which no rate or price has been entered in will not be paid for by the Employer when executed and shall be deemed covered by the other rates and prices in the Bill of Quantities (refer: ITB Clause 14.2 and GCC Clause 41.3)*
2. *Unit rates and prices shall be quoted by the bidder in Indian Rupees (refer: ITB Clause 14.1 and ITB Clause 15.1)*
3. *A Provisional Sum of **INR 2 Crore** is reserved for the miscellaneous works not included in the BOQ. The bidder shall not quote for the Provisional Sum in BOQ. Any expense out of the Provisional Sum shall be subject to prior approval of the project manager both in terms of quantity and scope of work.*
4. *Where there is a discrepancy between the unit rate and the line item total resulting from multiplying the unit rate by quantity, the unit rate quoted shall govern (refer: ITB Clause 31).*
4. *Where there is a discrepancy between the rate in figures and words, the rates in words will govern (refer: ITB Clause 31)*

Form of Bid Security - Bank Guarantee

[Guarantor letterhead or SWIFT identifier code]

Bid Guarantee No.....*[insert guarantee reference number]*

Date.....*[insert date of issue of the guarantee]*

WHEREAS, _____ *[name of Bidder]*⁹ (hereinafter called "the Bidder") has submitted his Bid dated _____ *[date]* or will submit his Bid for the construction of _____ *[name of Contract]* (hereinafter called "the Bid") under Invitations for Bids No.....*[insert number]* (hereinafter called "the IFB")

KNOW ALL PEOPLE by these presents that We _____ *[name of bank]* of _____ *[name of country]* having our registered office at _____ (hereinafter called "the Bank") are bound unto _____ *[name of Employer]* (hereinafter called "the Employer") in the sum of _____¹⁰ for which payment well and truly to be made to the said Employer the Bank binds itself, his successors and assigns by these presents.

SEALED with the Common Seal of the said Bank this _____ day of _____ 20____.

THE CONDITIONS of this obligation are:

- (1) If after Bid opening the Bidder (a) withdraws his bid during the period of Bid validity specified in the Letter of Bid; or (b) does not accept the correction of the Bid Price pursuant to ITB 31;

or

- (2) If the Bidder having been notified of the acceptance of his bid by the Employer during the period of Bid validity:
 - (a) fails or refuses to execute the Contract Agreement in accordance with the Instructions to Bidders, if required; or
 - (b) fails or refuses to furnish the Performance Security, and if required, the Environmental, Social, Health and Safety (ESHS) Performance Security, in accordance with the Instruction to Bidders.

⁹ Insert name of the Bidder, which in the case of a joint venture shall be (a) the name of the joint venture that submits the bid if the JV has been constituted into a legally enforceable JV, or (b) the names of all future members of the JV as named in the letter of intent to execute the JV Agreement submitted by the bidder alongwith its bid.

¹⁰ The Bidder should insert the amount of the guarantee in words and figures denominated in Indian Rupees. This figure should be the same as shown in Clause 19.1 of the Instructions to Bidders.

we undertake to pay to the Employer upto the above amount upon receipt of his first written demand, without the Employer having to substantiate his demand, provided that in his demand the Employer will note that the amount claimed by him is due to him owing to the occurrence of one or any of the four conditions, specifying the occurred condition or conditions.

This Guarantee will remain in force upto and including the date _____¹¹
days after the deadline for submission of Bids as such deadline is stated in the Instructions to Bidders or as it may be extended by the Employer, notice of which extension(s) to the Bank is hereby waived. Any demand in respect of this guarantee should reach the Bank not later than the above date.

DATE _____ SIGNATURE _____ OF _____ THE _____ BANK

WITNESS _____ SEAL _____

[signature, name, and address]

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

¹¹ 45 days after the end of the validity period of the Bid.

Technical Proposal

Technical Proposal Forms

- **Site Organization**
- **Method Statement**
- **Mobilization Schedule**
- **Construction Schedule**
- **Environmental, Social, Health, and Safety Management (ESHS) Strategies and Implementation Plans**
- **Code of Conduct (ESHS)**
- **Equipment**
- **Personnel**
- **Sub-contracting elements or works which in aggregate adds to more than 10% of Bid price (*for each the qualifications and experiences on the identified subcontractor in the relevant field should be given.*)**
- ***Note: Work should not be split into small parts and sub-contracted; but sub-contracting specialized elements of works is acceptable.***
- **Others**

Technical Proposal – Site Organization

[Insert Site Organization information]

Technical Proposal – Method Statement

[insert method Statement – A detailed note should be submitted outlining bidders proposed methodology and program of construction including Environmental, Social, Health and Safety Management Strategies and Implementation Plans (ESHS-MSIP), backed with equipment, materials and manpower planning and deployment, duly supported with broad calculations and quality control system/assurance procedures proposed to be adopted, justifying their capability of execution and completion of the work as per technical specifications within the stipulated review of completion as per mile stones]

Technical Proposal – Mobilization Schedule

[Insert Mobilization Schedule]

Technical Proposal – Construction Schedule

[Insert Construction Schedule]

Technical Proposal – Sub Contracting

[Insert proposal of sub-contracting elements of works amounting to more than 10% of the bid price for each element and indicate the name of the sub-contractor, its qualifications and experiences to execute that element satisfactorily]

ESHS Management Strategies and Implementation Plans

(ESHS-MSIP)

The Bidder shall submit comprehensive and concise Environmental, Social, Health and Safety Management Strategies and Implementation Plans (ESHS-MSIP) as required by ITB 11.1 (j) of the Bid Data Sheet. These strategies and plans shall describe in detail the actions, materials, equipment, management processes etc. that will be implemented by the Contractor, and its subcontractors.

In developing these strategies and plans, the Bidder shall have regard to the ESHS provisions of the contract including those as may be more fully described in the Works Requirements described in Section VII.

Code of Conduct: Environmental, Social, Health and Safety (ESHS)

The Bidder shall submit the Code of Conduct that will apply to the Contractor's employees and subcontractors as required by ITB 11.1 (j) of the Bid Data Sheet. The Code of Conduct shall ensure compliance with the ESHS provisions of the contract, including those as may be more fully described in the Works Requirements described in Section VII.

In addition, the Bidder shall submit an outline of how this Code of Conduct will be implemented. This will include: how it will be introduced into conditions of employment/engagement, what training will be provided, how it will be monitored and how the Contractor proposes to deal with any breaches.

Forms for Personnel

Form PER – 1: Proposed Personnel

Bidders should provide the names of suitably qualified personnel to meet the specified requirements for each of the positions listed in Section III (Evaluation and Qualification Criteria). The data on their experience should be supplied using the Form below for each candidate.

S. No.	Position	Name	Qualification	Years of Experience	Years of Experience in proposed position			
					Building* works	E&M* works	Others*	Total

(* Modify this as appropriate to suit the works for which bids are invited,
As listed in Section III)

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

[illegible]

Declaration

I, the undersigned Key Personnel, certify that to the best of my knowledge and belief, the information contained in this Form PER-2 correctly describes myself, my qualifications and my experience.

I confirm that I am available as certified in the following table and throughout the expected time schedule for this position as provided in the Bid:

Commitment	Details
Commitment to duration of contract:	<i>[insert period (start and end dates) for which this Key Personnel is available to work on this contract]</i>
Time commitment:	<i>[insert the number of days/week/months/ that this Key Personnel will be engaged]</i>

I understand that any misrepresentation or omission in this Form may:

- (a) be taken into consideration during Bid evaluation;
- (b) my disqualification from participating in the Bid;
- (c) my dismissal from the contract.

Name of Key Personnel: *[insert name]*

Signature: _____

Date: (day month year): _____

Countersignature of authorized representative of the Bidder:

Signature: _____

Date: (day month year): _____

Form for Equipment

The bidder shall provide adequate information to demonstrate clearly that it has the capability to meet the requirements for the key equipment listed in Section III (Evaluation and Qualification Criteria). The Bidder shall provide all the information requested below.

S. No.	Item of Equipment	Description	Make	Capacity	Age (years)	Condition	No. available and present location	Owned	Leased	Purchased

Form SC-Sub Contracting

SCHEDULE OF SUBCONTRACTORS

Item	Element of work	Approximate value of sub-contract	% of bid price	Name and address of sub-contractor	Qualification and experience of sub-contractor on similar works of the elements executed

The Bidder shall enter in this schedule a list of the major sections and appropriate value of the work for which he proposes to use subcontractors *[for those costing more than 10% of the bid price for each element]*, together with the names, addresses and experiences of the proposed subcontractors.

The capability of the sub-contractor will also be assessed (on the same lines as for the main Contractor) before according approval to him.

(Work should not be split into small parts and sub-contracted; but, sub-contracting specialized elements of works is acceptable).

Bidder's Qualification

To establish its 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 hereunder

Form-ELI -1.1: Bidder Information Form

Date: *[insert day, month, year]*

NCB No. and title: *[insert NCB number and title]*

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

1.1 Bidder Information			
Bidder's legal name			
In case of JV, legal name of each member			
Bidder's country of constitution			
Bidder's year of constitution			
Bidder's legal address in country of constitution			
Bidder's authorized representative (name, address, telephone numbers, fax numbers, e-mail address)			
<p>Attached are copies of the following original documents.</p> <ol style="list-style-type: none">1. In case of single entity, articles of incorporation or constitution of the legal entity names above, in accordance with ITB 4.1 and 4.3.2. Authorization to represent the firm or JV named in above, in accordance with ITB 20.2.3. In case of JV, letter of intent to form JV or JV agreement: in accordance with ITB 4.1 read with BDS4. In case of government-owned entity, documents establishing legal and financial authority and compliance with the principles of commercial law in accordance with ITB 4.5 read with Sub-clause 2.1.4 of Qualification Criteria.5. Included are the organizational chart, a list of Board of Directors, and the beneficial ownership.			

Form-ELI -1.2: JV Information Form

(Where permitted as per BDS ITB 4.1)

Each member of a JV must fill in this form

Date: *[insert day, month, year]*

NCB No. and title: *[insert NCB number and title]*

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

JV/Specialist Subcontractor Information			
Bidder's legal name			
JV Member's legal name			
JV Member's country of constitution			
JV Member's year of constitution			
JV Member's legal address in country of constitution			
JV Member's authorized representative information (name, address, telephone numbers, fax numbers, e-mail address)			
<p>Attached are copies of the following original documents.</p> <ol style="list-style-type: none"> 1. Articles of incorporation or constitution of the legal entity named above, in accordance with ITB 4.1 read with BDS. 2. Authorization to represent the firm names above, in accordance with ITB 20.2. 3. In the case of government-owned entity, documents establishing legal and financial autonomy and compliance with commercial law, in accordance with ITB Sub-Clause 4.5 read with Sub-Clause 2.1.4 of Qualification Criteria. 4. Included are the organizational chart, a list of Board of Directors, and the beneficial ownership. 			

Form ELI -1.2 A

Specialized Subcontractor's Information Form (to be completed for each Specialized Subcontractor)

Date: *[insert day, month, year]*

NCB No. and title: *[insert NCB number and title]*

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

Bidder's legal name:

Specialized Subcontractor's legal name:

Specialized Subcontractor's country of registration:

Specialized Subcontractor's year of constitution:

Specialized Subcontractor's legal address in country of constitution:

Specialized Subcontractor's authorized representative information

Name: _____

Address: _____

Telephone/Fax numbers: _____

E-mail address: _____

Attached are copies of original documents of

- ☐ Articles of Incorporation (or equivalent documents of constitution or association), and/or registration documents of the legal entity named above, in accordance with ITB 4.4.
- ☐ Authorization to represent the Specialized Subcontractor.

DETAILS OF PARTICIPATION IN THE JOINT VENTURE

PARTICIPATION DETAILS	FIRM 'A' (Lead Member)	FIRM 'B'	FIRM 'C'
Financial			
Name of the Banker(s)			
Planning			
Construction Equipment			
Key Personnel			
Execution of Work (Give details on proposed contribution of each)			

The Joint Venture should indicate the details of participation as above.

Form CON – 2

Historical Contract Non-Performance, Pending Litigation and Litigation History

[The following table shall be filled in for the Bidder and for each member of a Joint Venture]

Bidder's Name: [insert full name] Date: [insert day, month, year]

Joint Venture Party Name: [insert full name]

NCB No. and title: [insert NCB number and title]

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

Non-Performed Contracts in accordance with Section III, Qualification Criteria and Requirements			
<input type="checkbox"/> Contract non-performance did not occur during the <i>(number)</i> years specified in Section III, Qualification Criteria and Requirements, Sub-Factor 2.2.1.			
<input type="checkbox"/> Contract(s) not performed during the <i>(number)</i> of years specified in Section III, Qualification Criteria and Requirements, requirement 2.2.1			
Year	Non-performed portion of contract	Contract Identification	Total Contract Amount (in Indian Rupees)
<i>[insert year]</i>	<i>[insert amount and percentage]</i>	Contract Identification: <i>[indicate complete contract name/ number, and any other identification]</i> Name of Employer: <i>[insert full name]</i> Address of Employer: <i>[insert street/city/country]</i> Reason(s) for non-performance: <i>[indicate main reason(s)]</i>	<i>[insert amount]</i>
Pending Litigation, in accordance with Section III, Qualification Criteria and Requirements			
<input type="checkbox"/> No pending litigation in accordance with Section III, Qualification Criteria and Requirements, Sub-Factor 2.2.3.			
<input type="checkbox"/> Pending litigation in accordance with Section III, Qualification Criteria and Requirements, Sub-Factor 2.2.3 as indicated below.			

Year of dispute	Amount in dispute (Rupees)	Contract Identification	Total Contract Amount (Rupees)
<i>[insert year]</i>	<i>[insert amount]</i>	Contract Identification: <i>[indicate complete contract name, number, and any other identification]</i> Name of Employer: <i>[insert full name]</i> Address of Employer: <i>[insert street/city/country]</i> Matter in dispute: <i>[indicate main issues in dispute]</i> Party who initiated the dispute: <i>[indicate "Employer" or "Contractor"]</i> Status of dispute: <i>[Indicate if it is being treated by the Adjudicator, under Arbitration or being dealt with by the Judiciary]</i>	<i>[insert amount]</i>
Litigation History in accordance with Section III, Evaluation and Qualification Criteria <input type="checkbox"/> No litigation history in accordance with Section III, Qualification Criteria and Requirements, Sub-Factor 2.2.4. <input type="checkbox"/> Litigation history in accordance with Section III, Qualification Criteria and Requirements, Sub-Factor 2.2.4 as indicated below.			
Year of award	Outcome as percentage of Net Worth	Contract Identification	Total Contract Amount (Rupees)
<i>[insert year]</i>	<i>[insert percentage]</i>	Contract Identification: <i>[indicate complete contract name, number, and any other identification]</i> Name of Employer: <i>[insert full name]</i> Address of Employer: <i>[insert street/city/country]</i> Matter in dispute: <i>[indicate main issues in dispute]</i> Party who initiated the dispute: <i>[indicate "Employer" or "Contractor"]</i> Reason(s) for Litigation and award decision <i>[indicate main reason(s)]</i> Status of dispute: <i>[Indicate if it is being treated by the Adjudicator, under Arbitration or being dealt with by the Judiciary]</i>	<i>[insert amount]</i>

Form CON – 3: Environmental, Social, Health, and Safety Performance Declaration

[The following table shall be filled in for the Bidder, each member of a Joint Venture and each Specialized Subcontractor]

Bidder's Name: _____

Date: _____

Joint Venture Member's or Specialized Subcontractor's Name: _____

NCB No. and title: _____

Page _____ of _____ pages

Environmental, Social, Health, and Safety Performance Declaration in accordance with Section III, Qualification Criteria, and Requirements			
<input type="checkbox"/> No suspension or termination of contract: An employer has not suspended or terminated a contract and/or called the performance security for a contract for reasons related to Environmental, Social, Health, or Safety (ESHS) performance since the date specified in Section III, Qualification Criteria, and Requirements, Sub-Factor 2.2.5.			
<input type="checkbox"/> Declaration of suspension or termination of contract: The following contract(s) has/have been suspended or terminated and/or Performance Security called by an employer(s) for reasons related to Environmental, Social, Health, or Safety (ESHS) performance since the date specified in Section III, Qualification Criteria, and Requirements, Sub-Factor 2.2.5. Details are described below:			
Year	Suspended or terminated portion of contract	Contract Identification	Total Contract Amount (Rs.)
<i>[insert year]</i>	<i>[insert amount and percentage]</i>	Contract Identification: <i>[indicate complete contract name/ number, and any other identification]</i> Name of Employer: <i>[insert full name]</i> Address of Employer: <i>[insert street/city/country]</i> Reason(s) for suspension or termination: <i>[indicate main reason(s) e.g. for GBV/ SEA breaches]</i>	<i>[insert amount]</i>
<i>[insert year]</i>	<i>[insert amount and percentage]</i>	Contract Identification: <i>[indicate complete contract name/ number, and any other identification]</i> Name of Employer: <i>[insert full name]</i> Address of Employer: <i>[insert street/city/country]</i> Reason(s) for suspension or termination: <i>[indicate main reason(s)]</i>	<i>[insert amount]</i>

...	...	<i>[list all applicable contracts]</i>	...
Performance Security called by an employer(s) for reasons related to ESHS performance			
Year	Contract Identification		Total Contract Amount (Rs.)
<i>[insert year]</i>	Contract Identification: <i>[indicate complete contract name/ number, and any other identification]</i> Name of Employer: <i>[insert full name]</i> Address of Employer: <i>[insert street/city/country]</i> Reason(s) for calling of performance security: <i>[indicate main reason(s) e.g. for GBV/ SEA breaches]</i>		<i>[insert amount]</i>

Financial Situation

FORMAT 3.1 Historical Financial Performances

Bidder's Legal Name: _____ Date: _____
 JV Member Legal Name: _____ Bidding No.: _____
 Page _____ of _____ pages

To be completed by the Bidder and by each member of a Joint Venture

SUMMARY OF FINANCIAL STATEMENTS								
Name of bidder/JV Member:								
(Equivalent Rs. Million)								
S. No.	Financial Information in Rupee equivalent with exchange rate at the end of concerned year	Actuals for Previous five years excluding the current financial year					Ref. of Page Nos. of Balance Sheets	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
1.	Total Assets							
2.	Total Turnover							
3.	Current Assets							
4.	Current Assets + Loan & Advances							
5.	Total Liabilities							
6.	Current Liabilities							
7.	Current liabilities & provision							
8.	Profit before Interest and Tax							
9.	Profit before Tax							
10.	Profit after Tax							
11.	Shareholder's Funds (Net Worth)=(Paid up equity +Reserves)-(revaluation reserves + Miscellaneous expenditure not written off) Depreciation							
12.	Current Ration (2)/(5)							
13.	Net cash accruals= Profit after Tax + depreciation							
14.								

This information should be extracted from the Annual Financial Statements/ Balance sheets, which should be enclosed. Year 1 will be the latest year for which audited financial statements are available. Year 2 shall be the

year immediately preceding year 1 and year 3 shall be the year immediately preceding Year 2.
--

2. Financial documents

The Bidder and its parties shall provide copies of the balance sheets and/or financial statements for *[number]* years pursuant Section III, Qualifications Criteria and Requirements, Sub-factor 2.3.1. The financial statements shall:

- (a) reflect the financial situation of the *Bidder* or member to a JV, and not sister or parent companies.
 - 1. (b) be audited by a certified Chartered Accountant.
 - 2. (c) be complete, including all notes to the financial statements.
- (d) Correspond to accounting periods already completed and audited (no statements for partial periods shall be requested or accepted).
- ☐ Attached are copies of financial statements (balance sheets, including all related notes, and income statements) for the *[number]* years required above; and complying with the requirements (If the most recent set of financial statements is for a period earlier than 12 months from the date of bid, the reason for this should be justified)
- ☐ Attached is a copy of certificate given from the commercial bank assuring cash flow (working capital for contraction) in the format attached.

FORM FIN – 3.1(A)

FORMAT FOR EVIDENCE OF ACCESS TO OR AVAILABILITY OF CASH FLOW [To be given from a Nationalized or Scheduled Bank in India]

Clause 2.3.1(b) of Section II – Qualification Criteria

(1) AVAILABILITY OF CASH FLOW (WORKING CAPITAL)

This is to certify that M/s. _____ is a reputed company with a good financial standing.

If the contract for the works, namely _____ [funded by the World Bank] is awarded to the above firm, we shall be able to provide overdraft/credit facilities to the extent of Rs. _____ to meet their capital requirements for executing the above contract.

-- Sd. --

Name of Bank Manager

Senior Bank Manager

Address of the Bank

*** Change the text as follows for Joint venture:**

This is to certify that M/s. who has formed a JV with M/s. and M/s. for participating in this bid, is a reputed company with a good financial standing.

If the contract for the work, namely [funded by the World Bank] is awarded to the above Joint Venture, we shall be able to provide overdraft/credit facilities to the extent of Rs. to meet the working capital requirements for executing the above contract.

[This should be given by the JV members in proportion to their financial participation.]

Form FIN - 3.2

Annual Construction Turnover

[The following table shall be filled in for the Bidder and for each member of a Joint Venture]

Bidder's/Joint Venture Member's Legal Name: [insert full name]

Date: [insert day, month, year]

JV Party Legal Name: [insert full name]

NCB No. and title: [insert NCB number and title]

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

Annual turnover data (construction only)*		
Year	Amount in Rupees	
<i>[indicate year]</i>	<i>[insert amount]</i>	

* *Annual construction turnover calculated as total certified payments received for work in progress or completed, for 5 years. Specified in Section III, Qualification Criteria and Requirements, Sub-Factor 2.3.2. This should be certified by a Chartered Accountant.*

JOINT VENTURE

Names of all members of a joint venture
1. Member in charge
2. Member
3. Member

Total value of annual construction turnover, in terms of work billed to clients, in Rupees

Annual Turnover Data (construction only; in Rupees *)							
Member	Form 2 page no.	Year 1	Year 2	Year 3	Year 4	Year 5	Average
1. Member in charge							
2. Member							
3. Member							
TOTALS							

*** To be certified by a chartered accountant**

1. Name and address of Bankers to the Joint Venture

Provide details regarding financial responsibility and participation (percentage share in the total) of each firm in the Joint Venture. Attach a Memorandum of Understanding for the Proposed Agreement of joint Venture which should lay down responsibility regarding work and financial arrangements in respect of each of the firm in the Joint Venture (Refer also ITB Clause 4.1).

Form EXP - 4.1

General Construction Experience

[The following table shall be filled in for the Bidder and for each member of a Joint Venture]

Bidder's/Joint Venture Member's Legal Name: [insert full name]

Date: [insert day, month, year]

JV Party Legal Name: [insert full name]

NCB No. and title: [insert NCB number]

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

[Identify contracts that demonstrate continuous construction work over the past [5] years pursuant to Section III, Qualification Criteria and Requirements, Sub-Factor 2.4.1. List contracts chronologically, according to their commencement (starting) dates.]

Starting Month / Year	Ending Month / Year	Contract Identification	Role of Bidder
<i>[indicate month/year]</i>	<i>[indicate month/year]</i>	Contract name: <i>[insert full name]</i> Brief Description of the Works performed by the Bidder: <i>[describe works performed briefly]</i> Amount of contract: <i>[insert amount in Rupees]</i> Name of Employer: <i>[indicate full name]</i> Address: <i>[indicate street/number/town or city/country]</i>	<i>[insert "Contractor" or "Subcontractor" or "Contract Manager"]</i>
		Contract name: <i>[insert full name]</i> Brief Description of the Works performed by the Bidder: <i>[describe works performed briefly]</i> Amount of contract: <i>[insert amount in Rupees]</i> Name of Employer: <i>[indicate full name]</i> Address: <i>[indicate street/number/town or city/country]</i>	<i>[insert "Contractor" or "Subcontractor" or "Contract Manager"]</i>
		Contract name: <i>[insert full name]</i> Brief Description of the Works performed by the Bidder: <i>[describe works performed briefly]</i> Amount of contract: <i>[insert amount in Rupees]</i> Name of Employer: <i>[indicate full name]</i> Address: <i>[indicate street/number/town or city/country]</i>	<i>[insert "Contractor" or "Subcontractor" or "Contract Manager"]</i>

Form EXP - 4.2(a) Similar Construction Experience

[The following table shall be filled in for contracts performed by the Bidder, each member of a Joint Venture, and specialist sub-contractors]

Bidder's/Joint Venture Member's Legal Name: [insert full name]

Date: [insert day, month, year]

JV Party Name: [insert full name]

NCB No. and title: [insert NCB number and title]

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

(A) Work performed as prime Contractor or Sub-Contractor or Management Contractor *(in the same name and style)* on construction works of a similar nature and volume over the last five years¹². *[Attach certificate from the Engineer-in-charge.]*

Project Name	Name of Employer	Description of work	Contract No.	Value of contract	Date of Issue of Work Order	Stipulated Date of Completion	Actual Date of Completion	Remarks explaining reasons for Delay, if any

¹² Immediately preceding the financial year in which bids are received.

Form EXP - 4.2(b)

Construction Experience in Key Activities

Bidder's/ Joint Venture Member's Legal Name: *[insert full name]* Date: *[insert day, month, year]*

JV Party Name: *[insert full name]*

Nominated Sub-contractor's Legal Name¹³

NCB No. and title: *[insert NCB number and title]*

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

(B) Quantities of work executed as prime contractor or Sub-Contractor (in the same name and style) in the last five years:¹⁴

Year	Name of the Work	Name of the Employer *	Quantity of Work performed (cum) @				Remarks * (indicate contract agreement Ref for each year)
			Cement Concrete	Masonry	Earth Work	Piling	
20...20...							
20...20...							
20...20...							
20...20...							
20...20...							

@ the items or work for which date is requested should tally with that specified in Qualification Criteria

*** Attach certificates from Engineer in-charge**

¹³ If applicable

¹⁴ Immediately preceding the financial year in which bids are received.

Form for Current Contract Commitments/Works in Progress

Bidders and each member to a JV 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.

(A) Existing commitments and on-going works:

Description of Work	Place & State	Contract No. & Date	Name and Address of Employer	Value of Contract (Rs. equivalent in million)	Stipulated period of completion	Value of works ¹⁵ remaining to be completed (Rs. equivalent in million)	Anticipated date of completion	Average Monthly Invoicing Over Last Six Months (Rs./month) Equivalent in millions)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)

¹⁵ Attach certificate(s) from the Engineer(s)-in-Charge.

(B) Works for which bids already submitted and likely to be awarded – expected additional commitment.

Description of Work	Place & State	Name and Address of Employer	Estimated value of Works (Rs. equivalent in million)	Stipulated period of completion	Date when decision is expected	Remarks, if any
(1)	(2)	(3)	(4)	(5)	(6)	(7)

Form.....

(Name of the Project)

(Declaration regarding tax/duty exemption for materials/construction equipment bought for the work)

(Bidder's Name and Address)

To:

(Name of the Employer & address)

Dear Sir:

Re: [Name of Work].....

Certificate for Import/Procurement of Goods/Construction Equipment

Government Order/Circular Number under which tax/duty Exemption is being sought: ...

1. We confirm that we are solely responsible for obtaining tax/duty waivers which we have considered in our bid and in case of failure to receive such waivers for reasons whatsoever, the Employer will not compensate us.
2. We are furnishing below the information required by the Employer for issue of the necessary certificates in terms of the Government of India's relevant Notifications.
3. The goods/construction equipment for which certificates are required are as under:

Items (modify the list suitably for each specific work)	Make/ Brand Name	Capacity [where applicable]	Quantity	Value	State whether it will be procured locally or imported [if so from which country]	Remarks regarding justification for the quantity and their usage in works.
Goods						
[a] Bitumen						
[b] Cement						
[c] Steel						
Construction Equipment						

4. We agree that no modification to the above list is permitted after bids are opened.
5. We agree that the certificate will be issued only to the extent considered reasonable by the Employer for the work, based on the Bill of Quantities and the construction program and methodology as furnished by us along with the bid.

-
6. We confirm that the above goods and construction equipment will be exclusively used for the construction of the above work and the construction equipment will not be sold or otherwise disposed of in any manner for a period of five years from the date of acquisition.

Date: _____

(Signature) _____

Place: _____

(Printed Name) _____

(Designation) _____

(Common Seal) _____

[This certificate will be issued within 60 days of signing of contract and no subsequent changes will be permitted.]

*** Modify the above to suit the requirements given in Government of India's Notifications as current of date of bidding.**

Section V - Eligible Countries

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

1. In reference to ITB 4.7, and 5.1, for the information of the Bidders, at the present time firms, goods and services from the following countries are excluded from this bidding process:

Under ITB 4.7 (a) and 5.1 : *None*

Under ITB 4.7 (b) and 5.1 : *None*

Section VI. Bank Policy - Corrupt and Fraudulent Practices

(Section VI shall not be modified)

Guidelines for Procurement of Goods, Works, and Non-Consulting Services under IBRD Loans and IDA Credits & Grants by World Bank Borrowers, dated January 2011:

“Fraud and Corruption:

1.16 It is the Bank’s policy to require that Borrowers (including beneficiaries of Bank loans), bidders, suppliers, contractors and their agents (whether declared or not), sub-contractors, sub-consultants, service providers or suppliers, and any personnel thereof, observe the highest standard of ethics during the procurement and execution of Bank-financed contracts.¹⁶ In pursuance 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 party;¹⁷
 - (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 obligation;¹⁸
 - (iii) “collusive practice” is an arrangement between two or more parties designed to achieve an improper purpose, including to influence improperly the actions of another party;¹⁹
 - (iv) “coercive practice” is impairing or harming, or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence improperly the actions of a party;²⁰
 - (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

¹⁶In this context, any action to influence the procurement process or contract execution for undue advantage is improper.

¹⁷ For the purpose of this sub-paragraph, “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.

¹⁸ For the purpose of this sub-paragraph, “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.

¹⁹ For the purpose of this sub-paragraph, “parties” refers to participants in the procurement process (including public officials) attempting either themselves, or through another person or entity not participating in the procurement or selection process, to simulate competition or to establish bid prices at artificial, non-competitive levels, or are privy to each other’s bid prices or other conditions.

²⁰ For the purpose of this sub-paragraph, “party” refers to a participant in the procurement process or contract execution.

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 paragraph 1.16(e) below.
- (b) will reject a proposal for award if it determines that the bidder recommended for award, or any of its personnel, or its agents, or its sub-consultants, sub-contractors, service providers, suppliers and/or their employees, has, directly or indirectly, engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices in competing for the contract in question;
- (c) will declare misprocurement and cancel the portion of the loan allocated to a contract if it determines at any time that representatives of the Borrower or of a recipient of any part of the proceeds of the loan engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices during the procurement or the implementation of the contract in question, without the Borrower having taken timely and appropriate action satisfactory to the Bank to address such practices when they occur, including by failing to inform the Bank in a timely manner at the time they knew of the practices;
- (d) will sanction a firm or individual, at any time, in accordance with the prevailing Bank's sanctions procedures,²¹ 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 nominated²²;
- (e) will require that a clause be included in bidding documents and in contracts financed by a Bank loan, requiring bidders, suppliers and contractors, and their sub-contractors, agents, personnel, consultants, service providers, or suppliers, to permit the Bank to inspect all accounts, records, and other documents relating to the submission of bids and contract performance, and to have them audited by auditors appointed by the Bank."

²¹ A firm or individual may be declared ineligible to be awarded a Bank financed contract upon: (i) completion of the Bank's sanctions proceedings as per its sanctions procedures, including, inter alia, cross-debarment as agreed with other International Financial Institutions, including Multilateral Development Banks, and through the application the World Bank Group corporate administrative procurement sanctions procedures for fraud and corruption; and (ii) as a result of temporary suspension or early temporary suspension in connection with an ongoing sanctions proceeding. See footnote 14 and paragraph 8 of Appendix 1 of these Guidelines.

²² A nominated sub-contractor, consultant, manufacturer or supplier, or service provider (different names are used depending on the particular bidding document) is one which has either been: (i) included by the bidder in its pre-qualification application or bid because it brings specific and critical experience and know-how that allow the bidder to meet the qualification requirements for the particular bid; or (ii) appointed by the Borrower.

PART 2 – Works Requirements

Section VII – Works’ Requirements

CHAPTER - 1

1.1 INTRODUCTION

1.1.1 Back Ground

The Jammu & Kashmir region owing to its geographical and geo-climatic setting is a multi-hazard prone region that has experienced natural disasters like earthquakes, floods, landslides, avalanches, high velocity winds, and snowstorms. Most parts of the Kashmir Valley fall in Seismic Zone V. The rest of the State falls in the Seismic Zone IV. Floods and flash floods are also frequent. Floods generally occur in the summer when heavy rains are followed by snowmelt. Flooding of the river Jhelum is the main cause of floods in the region. Floods also occur occasionally in Jammu and neighbouring districts. In September 2014, the northern region of India experienced torrential monsoon rains in the region causing major flooding and landslides. The continuous spell of rains from September 2nd to 6th, 2014, caused Jhelum and Chenab Rivers as well as many other streams/tributaries to flow above the danger mark. The Jhelum River also breached its banks flooding many low-lying areas in Anantnag, Srinagar and adjoining districts. In many districts, the rainfall exceeded the normal by 600 percent. The Indian Meteorological Department records precipitation above 244.4 mm an extremely heavy rainfall and the region received 588 mm of rain fall in June- September period, as against the normal 477.4 mm. For example the district of Qazigund recorded 550 mm of rainfall in 6 days as against a historic normal of 6.2 mm over the same period. Due to the unprecedented heavy rainfall the catchment areas particularly the low laying areas were flooded more than two weeks. Some areas in urban Srinagar stayed flooded for 28 days. Water level was as high as 27 feet in many parts of Srinagar. The areas from the main tributaries of river Jhelum vis-a-vis Brengi nallah, Vishav nallah, Lider nallah and Sundran nallah started overflowing due to the heavy rainfall causing water levels in Jhelum River to rise. Subsequently, the discharge of the river Suran was 200 thousand cusecs as against an average 50 thousand cusecs. With the excessive discharge of water, the river Suran affected the basin areas and also took a different course at various locations causing damages to the surrounding villages in the catchment area. Water level also increased in rivers of Chanab and Tawi, both of which the water flowing above normal levels. Due to the rivers overflowing nearly 20 districts were impacted. The total damage ad loss caused by the flood is about INR 211,975 million, most of it to housing, livelihoods, and roads and bridges, which combined represented more than 70% of the damages in terms of value. Public service infrastructure and equipment of hospitals and education centres were also severely damaged and are still not fully operational. The project “Jhelum & Tawi Flood Recovery Project” will focus on restoring critical infrastructure using international best practice of resilient infrastructure. Given the region’s vulnerability to both flood and earthquakes, the infrastructure will be designed with upgraded resilient features, and will include contingency planning for future disaster events. Therefore, the project aims at both restoring essential services disrupted by the floods and improving the design standards and practices to increase resilience.

1.2 Project Objective

The project objective is to connect uncovered areas (MISSING LINKS) to a suitable point of the existing pipe drain/cc drain leading to respective D/W pumping station of the area on Project Components:

The objective of this DPR is a step towards development of gaps in the existing stormwater drainage system by way of construction of missing links in areas under Zone I.

1.3 Need of the Project

The need of this project is to fill up the gaps that have remained undone due to some reason while constructing the storm water drainage system under the domain of respective pumping stations.

7.1 SPECIFICATIONS OF WORKS

7.1.1 CIVIL WORKS

SUB-SECTION – 1

General

Note: The Specifications of all items will be as per CPWD book of specifications and MORTH. However, for guidance purposes, the specifications of some items are given below. Wherever there is a discrepancy between CPWD book of Specifications, MORTH and Specifications given below in this section, the superior specifications will prevail.

7.1.1. 1. SCOPE

Bids scope shall broadly include but not be restricted to "Manufacture, supply, laying, jointing, testing and commissioning of RCC NP3 class pipes of varying diameters, construction of covered cement concrete drain. Entire work shall be carried out under overall supervision of PIU/ERA to their full satisfaction.

7.1.1. 2. DESCRIPTION OF WORK

The major works covered are as given below:

- Earthwork excavation for trenches of pipe line
- Manufacture, supply, laying, jointing, testing and commissioning of RCC NP3 class pipes varying from 300 mm to 1000 mm diameter & construction of covered cement concrete drains.
- Construction of circular type reinforcement cement concrete manholes including inlet and necessary connections to the manholes wherever required.
- Refilling trenches with approved sand/crushed stone dust.
- Laying of pipe line works & construction of CC drains/restoration of road/pavements and all allied civil works..
- Field test of pipe line/ manholes
- Any other works to be carried with the approval of Engineer.

7.1.1. 3.SPECIFICATION DRAWINGS

The specifications and drawings are incorporated in bid documents. These drawings are made for bidder's guidance only. "Good for construction" drawings will be issued to the contractor during progress of the work. "Good for construction" drawings may be revised and revised copies shall be issued to the contractor, wherever necessary, during execution of the work. It shall be appreciated that for type of the work included in this contract, there are limitations for issuing construction

drawings at bidding stage and hence "Good for Construction" drawings, to be issued progressively during construction & broadly conforming to the basic scheme as shown in the bid drawings, shall form a part of the contract. No claim will be entertained on the score that details shown on "Good for Construction" drawings are different from those shown in the bid drawings, unless the drawings indicate that such items of work are not a part of the Bill of Quantities of contract agreement.

7.1.1.4.ENVIRONMENTAL IMPACT

The contractor should comply with state and national environmental standards and guidelines.

7.1.1.5. MATERIALS

Approval of Materials

Approval of all sources of material for Works shall be obtained in writing from the Engineer before their use on the project.

Quality assurance plan of the material RCC pipe etc. shall be submitted before the dispatch of the material from the works for the approval of the Engineer.

Cement, sand, aggregate, bricks, steel, steel frame etc. samples shall be submitted for the approval of the Engineer

The term "Materials" shall mean all materials, goods and articles of every kind whether raw, processed or manufactured and equipment and plant of every kind to be supplied by the Contractor for incorporation in the works. The materials required for construction purposes are includes of all mechanical as well as manual carriages.

Materials shall be transported, handled and stored in such a manner as to prevent deterioration, damage or contamination failing which such damaged materials will be rejected and shall not be used on any part of the Works under this contract and shall be removed as directed by the Engineer.

7.1.1.6.SAMPLES AND TESTS OF MATERIALS

- A. The Contractor shall submit samples of such materials including manhole covers, RCC NP3 pipes as may be required by the Engineer and shall carry out the specified tests directed by the Engineer at the site, at the supplier's premises or at a laboratory approved by the Engineer. (The rates shall include cost of Np3 pipes & polycrrete manhole covers with frame which are taken for testing of thickness, reinforcement & leakage tests as per the standard procedure and engineering practices for sampling & testing of such items and nothing extra shall be paid for such destructive tests.)
- B. Samples shall be submitted and tests carried out sufficiently early to enable further samples to be submitted and tested if required by the Engineer.
- C. The Contractor shall give the Engineer seven days notice in writing of the date on which any of the materials will be ready for testing or inspection at the supplier's premises or at a

laboratory approved by the Engineer. The Engineer shall attend the test at the appointed place within seven days of the said date on which the materials are expected to be ready for testing or inspection according to the Contractor, failing which the test may proceed in his absence unless instructed by the Engineer to carry out such a test on a mutually agreed upon date in his presence. The Contractor shall in any case submit to the Engineer within seven days of every test such number of certified copies (not exceeding six) of the test readings as the Engineer may require.

- D. Approval by the Engineer as to the placing of orders for materials or as to samples or tests shall not prejudice any of the Engineer's powers under the Contract particularly as to the provisions of under the Conditions of Contract. The provisions of this clause shall also apply to materials supplied under any nominated sub-contract.

7.1.1.7. QUALITY CONTROL ON WORKS AND MATERIALS

The Contractor shall be responsible for the quality of the work in the entire construction work within the contract. He shall, therefore, have his own independent and adequate set-up for ensuring the same.

The Engineer shall inspect the work from time to time during and after construction and ascertain the quality of the work tested (by himself, by his Testing and Quality Control Units or by any other agency deemed fit by him), procedures and tests as directed by the Engineer shall be followed.

The Contractor shall provide necessary cooperation and assistance in conducting the tests and obtaining the samples for tests and carrying out the field tests as required by the Engineer from time to time. This may include provision of labour, attendance, assistance in packing and dispatching and any other assistance considered necessary in connection with the tests.

The Contractor shall carry out modification in procedure of work, if any, as directed by the Engineer during inspection.

Works falling short of quality shall be rectified by the Contractor as directed by the Engineer at his own cost.

Where the Engineer considers that in the interest of the control of the quality on materials or workmanship, modifications, if any, are necessary, such modifications shall be carried out by the Contractor at no extra cost.

The Contract rate quoted for various items of work in the Bill of Quantities shall be deemed to be inclusive of all costs of the provisions indicated in the above mentioned clauses.

7.1.1.8. STANDARDS

The special attention of the Contractor is drawn to the relevant Sections and Clauses of the National Building Code of India 1984 and latest IS specifications (latest editions as amended) and should follow all the specifications and conditions.

-
- a. Materials and workmanship shall comply with the relevant Indian Standards (with amendments) unless a more recent amendment is specified hereinafter, or with the requirements of any other authoritative standard approved by the Engineer which shall be no less exacting in the opinion of the Engineer than the corresponding standard quoted herein.
 - b. Where the relevant standard provides for the furnishing of a certificate to the Employer, at his request, stating that the materials supplied comply in all respects with the standard, the Contractor shall obtain the certificate and forward it to the Engineer.
 - c. The specifications, standards and codes listed below are made a part of this specification. All standards, tentative specifications, specifications, codes of practice referred to herein shall be the latest editions including all applicable official amendments and revisions.
 - d. If no standard is indicated, the relevant Indian Standard, if any, shall apply. Indian standards are published by:

Indian Standards Institution
Manak Bhavan, 9, Bahadur Shah Zafar Marg NEW DELHI - 110002
 - e. In case of discrepancy between the Specification and the Standards referred to herein, the Specification shall govern.

SUB-SECTION - 2

SUBMITTALS

1.DESCRPTION

This section covers additional requirements for submittals and forms a part of all other sections in which submittals are required. It is subjected to General Conditions of Contract. Submittal requirements to be included:

- i. CPM Progress Schedule
- ii. Samples
- iii. Material lists and equipment
- iv. Factory test reports
- v. Certificates
- vi. Laboratory test reports

2.SUBMITTAL REQUIREMENTS

Work Schedule:

Within 14 days of award of the bid, the contractor shall submit a critical path method analysis for construction progress control and make such revisions as are required for approval. The contractor shall clearly indicate all construction activities, sub activities like Pre construction survey, soil investigation, preparation and submission of survey drawings, Providing & laying of pipe line/ covered C.C drain, manholes & collection chambers & Road restoration, & internal road/pavement & etc.), to achieve the mile stones fixed for completion of the work in a time oriented manner. The contractor shall update and resubmit the charts monthly, flag all slippage's and mile posts and attach a narrative description of the proposed corrective actions to the resubmitted charts. Include the following minimum information for each activity and critical path item:

- i. Date and initial submittal, as applicable.
- ii. Ordering dates for long lead time items.
- iii. Dates for materials on site.
- iv. Testing and clean up.
- v. Final completion and handing over.

3. SAMPLES

The Contractor has to submit samples of all materials used for the work prior to start the works and get the approval of the Engineer in charge. Label or tag each sample or set of samples, identifying the manufacturer's name and address, brand name, catalogue number, project title and intended use.

4.MATERIAL LISTS AND EQUIPMENT DATA

The Contractor has to submit all material lists. Equipment lists etc. well in advance before starting the work and get the approval from the Engineer in charge.

5.PROGRAM OF WORKS

In respect of the program of works required, the works shall be programmed in such a way

as to minimize disruption to public traffic

- Works shall not be carried out simultaneously over large areas of the site but shall be sequenced so that all operations likely to cause disruption to public traffic shall be undertaken and completed in discrete area before commencement of operations in other areas.
- Works which, by their nature, will create disruption and / or obstructions to vehicular or pedestrian traffic, such as pavement rehabilitation or trench – work shall be programmed to be undertaken in a continuous sequence of events from the initial disruption until the restoration of access without and significant delay between operations.
- The program submission shall be accompanied by outline traffic management plans in sufficient detail to indicate to the Engineer that the Contractor has considered this aspect the work in his program. Notwithstanding, acceptance of the Contractor's program will not in any way relieve of his responsibilities for traffic management under Specification.
- The Contractor's Program shall, in so far as it is practicable to do so, take into consideration the commercial interest of individual shopkeepers e.g. operations should not be sequenced so as to disrupt access to individual shops having only one access from the road.

The Contractor's Program of Works, submitted in accordance with the General Conditions of Contract, shall be subject to the approval of the Engineer and of Employer. If the Contractor's program, in the opinion of the Engineer/Employer has not properly achieved the objectives of the program, then the Contractor shall be instructed to revise his Program and the Contractor shall do so forth; for this reason the Contractor is advised to liaise closely with the Engineer during the production of his Program.

In addition to the Works Program required under the General Conditions of Contract, the Contractor shall produce individual program for each element of the works likely to cause significant disruption to public and vehicular traffic, for the approval of the Engineer and prior to commencement of the element of the works, clearly showing the sequencing of construction operations in such a manner as to minimize the duration of the disruption.

The Contractor shall note that different work in various parts of site by other contractors may be in progress or may commence during the Contract Period. It will be the Contractor's responsibility to liaise with contractors on adjacent sites in order to ensure the detail progress. The Contractor's Program may be phased and the Contractor shall make full allowance for the need for a cooperative timing with adjacent contractors.

The Contractor has to decide the following issues:

Check the profile of road, longitudinally and laterally, the type, strata and evolve a complete system from starting and completion with due interaction with owners,. The system shall be so evolved that there shall not be any hindrance to any day-to-day activities taking place in the area. He shall spell out likely danger, difficulty, and hindrance and suggest & provide suitable remedial measures to obviate them, keeping authorities in confidence. Suitable sign boards shall be designed and exhibited at proper places in local and English language to keep users informed of the guidance, notice etc.

Fixing of the levels of entry and exist keeping in view profile conditions of existing road surface, minimum cover required for safety and structural safety as to avoid collapse of the road surface. This shall be also be reviewed and requirement to be included in the quoted price with respect to natural soil conditions, water table, water logging etc., with suitable provisions for diversion, dewatering including well point system, sheet piling etc., as required for expeditious completion of the work.

SUB-SECTION-3

SITE PREPARATION

1.BENCH MARKS

Permanent bench marks shall be fixed, carried from nearest GTS Bench marks before any work is started by the contractor in any section; These benchmarks shall be fixed away from the field of work so as not to be disturbed during the contract period and shall be accurately fixed in concrete. No separate payment shall be paid towards fixing of bench marks.

2.CLEARING SITE OF LARGE TREES, STRUCTURES ETC.

This shall include the removal of large trees, stumps, structures, services such as cables, water supply pipeline, urban drain drains etc. or parts thereof lying along the alignment of pipe line. The contractor should inform the Engineer in charge before removing trees, structures, other services and structures etc. well in advance. Large trees and other valuables are the property of the Government and it should be properly stacked along the side of the road and conveyed to the place as per directions of the departmental Engineer. The cutting of trees or demolition of structure are done in such a way that it should not disturb the traffic and pedestrians.

3.REMOVAL OF TOP SOIL, SHRUBS AND OTHER VEGETATION

The work has to be tackled in between two adjacent manholes only. All shrubs, vegetation and other plants shall be removed and cleared from the selected stretch of the site. All debris and unsuitable material up to a depth of 30 cm between ground level or road level shall be removed. All debris and unsuitable material shall be carted away from the site as per the direction of departmental engineer. The payment against this item as per Bill of Quantities includes loading, unloading, carting the material to a site selected by the contractor at his own cost.

4.PREPARATORY WORK, SIGHT-RAILS AND BONING STAVES

The centre line of the trench is first marked out on the ground duly driving pegs at convenient intervals. Before commencement of earth work excavation, levels shall be taken along the centre line of the proposed pipe line at intervals of say 10 m and at the manhole locations. A longitudinal section (LS) of the profile of the ground surface showing the proposed pipeline, indicating the gradients and giving the invert levels of the pipeline as well as the manholes is provided with the bid. This L.S may be updated by the contractor and approved by the Engineer before taking up the work. The width of the trench to be excavated is marked on both sides of the centre line and excavation lines cut out.

Two wooden posts 100mmx100mmx1800mm high shall be firmly, erected/fixed across the centre line i.e. on either side at nearly equal distance, from the centre line and sufficiently clear of all intended excavation such that the poles/posts are not disturbed during the course of execution of the work. These posts are so arranged and fixed that a sight rail when fixed at a level against these posts shall cross the centre line of pipeline or centre of the manhole, as the case may be.

The sight-rail made from 250 mm wide x 40 mm thick wooden planks shall be screwed to the poles. The sight-rails shall be truly horizontal. The centre line of the pipeline shall be marked on the sight-rail by fixing a nail or otherwise as determined by the Engineer. The sight-rails may be fixed about 1.25 m above the ground, which is convenient distance for sighting by a leveling instrument. The

sight-rails have to be so fixed that when a line sighted along the top edge of the sight-rails shall represent the true fall or gradient of the proposed pipeline. This gradient is transferred below the ground level by means of boning-rod. Boning is carried out between the sight-rails with the help of a cord or a rope extended from nail to nail fixed on the sight-rails.

Boning rods with cross section 75x50 mm of various lengths shall be prepared with wood. Each length shall be a certain number of meters and shall have fixed tee-head. (A cross piece of 450x 100 mm is to be fixed with nails at the top of the boning rod so as to form shape like a Tee-square) and a cross piece about 300 mm long fixed at the bottom of the boning staff. The distance between the top of Tee head and the cross piece shall depend upon the site requirements viz., dia. of pipe, depth of cutting, level of sight-rail, designed level of pipeline, etc. The boning rod must be marked on two sides to indicate its full length. According to the circumstances of each case, a suitable length of boning rod, duly fixing the cross piece, will be determined upon the reduced level of the invert of pipe at each sight-rail.

The sight-rail and vertical posts shall be perfectly square and planed smooth on all sides and edges. This arrangement of erecting poles with sight-rail shall be done at suitable intervals depending on the site requirements, as directed by the Engineer. The posts and rails must in no case be removed until the trench is excavated, the pipes are laid and permission given to proceed with the filling in.

5. PROBING PITS

Before starting the excavation of trenches, the contractor shall dig probing pits of size 1 m x 1 m and 1.5 m deep including road cutting at every 100 m interval along the alignment to accurately locate and determine the position of existing utilities and obstructions. The contractor shall refill the probing pits in layers of 15 cm. with excavated earth up to the original ground level. In all cases the probing pits are to be excavated in accordance with the specification for excavation, refilling etc. No separate payment will be made for these probing pits.

6. UTILITIES PROTECTION

All utilities known to exist within the site, such as water, storm and sewage mains, will generally be shown on the drawings. The accurate location also can be had from the probing pit results at various intervals. All utility lines and structures, whether indicated on the drawings or not, which are to remain in service shall be protected by the contractor from any damage likely to result from his operations. Relocation wherever necessary, shall be with the approval of the Engineer and the Utility Authority. Payment will be made only for relocating the utilities. Any damage to any utility resulting from the contractor's operations shall be repaired at the contractor's expense.

7. PAVEMENT REMOVAL

The contractor must inform the Engineer before the starting of work well in advance so that it can be communicated to other concerned departments. The contractor must provide and maintain proper and efficient traffic control system such as safety lamps, sign boards etc. operating day and night for the full duration of work. PIU ERA shall not be responsible under any circumstances for any mis-happenings. The width of trenches shall be minimum as per table-1 and only such widths shall be taken into account for computing quantities for payment. For other elements of work such as

manholes, making cross connections, fixing other appurtenances etc. the engineer shall prescribe the dimensions for removal of pavement from time to time.

8. MAINTENANCE OF TRAFFIC AND CLOSING OF STREETS

The work shall be carried out in such a manner which will cause the least interruption to traffic, and the road/street may be closed in such a manner that it causes the least interruption to traffic, Where it is necessary for traffic to cross open trenches, suitable bridges shall be provided. Suitable signs indicating that a street is closed shall be placed and necessary detour signs for the proper maintenance of traffic shall be provided.

9. INTERRUPTION TO SERVICE

No valve or other control of the existing services shall be operated without the permission of the authority.

10. WORKS DURING NIGHTS

It is expected that the intensity of traffic is likely to be less in the nights from 10.00 hours to 5.00 hours. Hence, for efficient uninterrupted work, the contractor shall equip himself with the required manpower, materials, and machinery to do the work exclusively in the above periods alone. No extra payment will be made for doing the work in the nights. The contractor shall get prior approval from the Engineer-in-charge before starting the work during nights.

SUB-SECTION-4

EARTH WORK

1.DESCRPTION

The work specified in this section includes the provision of all labor, machinery, construction equipment and other appliances required to perform all earth work shown on the drawing or otherwise specified or required, in a sound, workmanlike manner.

2.GENERAL

Excavation shall be required to be done for the following works:

- a. for underground pipelines
- b. for pipeline lines below service utilities
- c. for manholes, collection chambers.

3.Scope

This Specification covers the general requirements of earthwork in excavation in trenches and drains or otherwise and in different varieties of soil for the construction of drains and allied works in accordance with requirements of the specifications and as shown in the drawings or as directed by the Engineer. This specification also includes side grading, filling in trenches, filling back around foundations, conveyance and disposal of surplus soils or stacking them properly and all operations covered within the intent and purpose of this specification. Excavation will also include the shoring & strutting of trenches in any kind of soil.

4.Applicable Codes

All applicable Indian Standard Codes, unless otherwise specified herein, shall be applicable. In all cases, the latest revision of the codes shall be referred to.

Safety code for excavation work.

Code of practice for measurement of Civil Engineering Works.

Method of test of soils (All parts)

Classification & identification of soils for General Engineering Purposes

5.SOIL INVESTIGATIONS

Soil analysis reports of proposed pipeline alignment are available in the DPR. Additional soil tests if necessary shall be carried out along the alignment and the soil boring logs shall be prepared by the contractor at his own cost. Where off-site materials have to be used, the contractor shall, if the Engineer desires, make available certified soil test reports including information regarding sieve analysis, plastic limit, liquid limit, maximum density, optimum moisture content etc. from an approved testing laboratory.

6. CLASSIFICATION

The excavation work shall be classified into the following categories:

- a) For pipeline line trenches
 - i) Loamy, clayey soils like BC soils, red earth, ordinary gravels, hard gravel, mixture of gravel and soft disintegrated rock, ordinary gravel, stony earth and earth mixed with fair

sized boulders, hard disintegrated rock or soft rock or conglomerate rock, to be removed by pick axes and crow bars,

- ii) Hard rock and boulders to be removed only by chiseling and benching.

b) Manholes.

- i) Loamy, clayey soils like BC soils, red earth, ordinary gravels, hard gravel, mixture of gravel and soft disintegrated rock, ordinary gravel, stony earth and earth mixed with fair sized boulders, hard disintegrated rock or soft rock or conglomerate rock, to be removed by pick axes and crow bars.
- ii) Hard rock and boulders to be removed by benching and chiseling.

7. Classification of Excavated Material

Authority for classification

The classification of excavation shall be similar for all kind of soils or as decided by the Engineer and his decision shall be final and binding on the Contractor.

8. TRENCH EXCAVATION

GENERAL

Trench excavation means excavation of trenches into which the pipe is to be laid/covered C.C drain is to be constructed. The line and levels of trenches shall be as shown on the drawings or as may be directed by the Engineer in charge. Before commencing trench excavation, the alignment of the trenches shall be pegged out accurately and the natural ground levels shall be recorded/agreed with the Engineer in charge.

9. Excavation

Excavation shall be taken out to such widths, lengths, depths and profiles as are shown on the drawings or to such other lines and grades as may be specified by Engineer.

Contractor may, for facility of his work or similar other reasons, excavate, and also backfill later, if so approved by Engineer, at his own cost, outside the lines shown on the drawings or directed by Engineer. Should any excavation be taken below the specified level, contractor shall fill it up to the required level as directed by the Engineer. No extra payment shall be claimed by contractor on this account.

All excavations shall be done to the minimum dimension as required for safety and working facility. Prior approval of Engineer shall be obtained by contractor in each individual case, for the method he proposes to adopt for the excavation, including setting out, dimensions, side slopes, dewatering, disposal, etc. This approval, however, shall not in any way relieve contractor of his responsibility for any consequent loss or damage. The excavation must be carried out in the most expeditious and efficient manner. Side slopes shall be as directed by the Engineer and precaution shall be taken to prevent slips. Should slips occur, the slipped material shall be removed and the slope dressed to a modified stable slope. Removal of the slipped earth will not be paid for. Excavation dimensions shall be as indicated in the drawings.

Sometimes it may not be possible to store the excavated material beside the working area because of site construction. In such cases the contractor will be required to haul the excavated materials to a nearby storage space and subsequently bring back the selected excavated material during

backfilling. The contractor only under exclusive approval of the Engineer shall take up such work. No extra payment for such item will be made. The bidder must study the sites thoroughly to ascertain such conditions before quoting.

The width of trenches measured at the crown of the pipe shall permit adequate working space. The trenches shall be widened at sockets and other structures as may be found necessary. The widths to be adopted are shown in drawings. If the widths of actual excavation are more than the widths shown in drawings, it has to be made by the contractor. Care should be taken to avoid excessive trench widths and thereby increasing the load on the pipes.

10. DEPTH OF EXCAVATION OF TRENCH

The depths for the trenches will be calculated from the existing ground level to the bed of the pipes and in case when a layer of bedding is to be placed below the pipe line, the depth to the bottom of the bedding will be paid. The depth of excavation for manholes shall be measured from the surface of the existing ground level to the bottom of foundation. No payment will be given beyond this depth.

11. MAXIMUM LENGTH OF OPEN TRENCH

The stretch of work to be tackled shall be limited to two adjacent manholes. However, the Engineer may permit only reasonable trench excavation in advance of the lengths between two adjacent manholes to ensure laying and jointing of pipes can reasonably be expected to be completed and the trench refilled not later than 3 days after excavation of the trench. The Contractor will not be permitted to keep trenches open for unduly long periods, creating public hazards. The Engineer's decision in this respect shall be final.

12. TRENCH SIDES

Loose boulders shall be removed from the sides of the trenches before allowing workmen into the excavation, and the trench sides shall be stabilized with screening or other methods approved by the Engineer. Trench slopes shall be kept moist where necessary to prevent local sliding as ordered by the Engineer.

1. WIDENING TRENCH AT JOINTS, ETC.

Any widening or deepening of the trench, whether in ordinary soil or rock, necessary to accommodate curves, joints or bends as shown on the drawings or ordered by the Engineer shall be carried out by the contractor.

14. OVER-EXCAVATION OF TRENCH BOTTOMS

All excavation carried below the grades shown on drawings, shall be refilled with compacted bedding material at the Contractor's expense.

15.EXCAVATED MATERIAL

The material from the excavation shall be deposited on either side of the trench leaving clear space of at least 40 cm wide on either side of the trench or at such further distance from the edges of the trench as may be necessary to prevent the weight of materials from causing the side of the trench to slide down, or at such a distance and in such a manner as to avoid covering fire-hydrants, sluice valves, manhole covers and the like so as to avoid damage to any wall or structure or causing inconvenience to the public or other persons or otherwise as the engineer may direct, till it is carted away.

The excavated soil should be so placed and handled as not to cause inconvenience to the usual traffic, till it is carted away. The contractor should also provide necessary walk ways over the excavated trenches for the house-holders and pedestrians to cross over and vehicular crossings if required anywhere at no extra cost. If the Engineer decides that there is no hindrance to traffic due to not carting away the excavated earth, he will give instructions to that effect.

16.PIPE BEDDING

Bedding for the pipe

The type of bedding to be provided shall be as per the specifications & details of construction drawings or as decided by the Engineer. The various types of bedding are specified below:

While laying Pipe line with spigot and socket joints, the socket ends shall face upstream. In case the foundation conditions are found unusual such as in the proximity of trees or holes etc. the pipe shall be encased all-around in 15 cm thick cement concrete 1:4:8 (1 cement : 4 fine sand : 8 graded stone aggregate 30 mm nominal size) or filled with compacted sand or gravel.

Gravel Bedding

The time interval between placing bedding material on the trench formation and commencing pipe laying shall be as short as is practicable. The bedding material shall extend to the full width of the trench and shall be compacted in layers not exceeding 200 mm. The bedding material shall be carefully compacted using a plate vibrator or other approved equivalent mechanical method. Sufficient passes of a plate vibrator or other approved mechanical method are required to achieve positive deflection of flexible pipes to ensure that final deflections are within the specified limits. Hand tamping or punning will only be permitted where insufficient space is available to allow the use of mechanical plant.

Recesses shall be formed in the bedding to accommodate pipe joints while ensuring continuous even support along the pipe length. Bedding material shall be prevented from entering pipe joints. After the joint has been made bedding material shall be carefully placed and hand compacted beneath the joint barrel to close any void left by the recess.

Wherever rock is met with, it shall be removed up to minimum 150 mm below the bottom level of the pipe to a minimum width equal to the width of the trench and the resulting space shall be filled up with good quality compacted gravel/moorum. The granular material shall be filled in the trench up to the level of 1/2 the outer diameter of the pipeline, above the bottom of trench and well compacted. Unless otherwise directed by the Engineer, rock excavation shall progress at least 20 m in advance of the pipe length proposed to be laid.

The graded granular bed material shall be used in Class B bedding and surrounding fill shall consist of durable gravel, crushed stone or disintegrated rock. Any imported bed and surround materials shall be to the approval of the Engineer and shall be supplied with certification, which gives details of its content, source and grading. In all cases the soluble sulphate and chloride

content of the granular material shall not exceed 0.5% and 0.06% by weight respectively. All graded material shall pass through test sieves to IS 460 (Part 1) in the following proportions by mass:

Aperture Size	% Passing
50 mm	100 %
37.5 mm	90 – 100 %
20 mm	35 – 70 %
14 mm	25 – 55 %
10 mm	10 – 40 %
5 mm	0– 5 %

Special bedding in poor sub grades

During the progress of work, if the sub grade is observed to be of poor quality which is unsuitable for laying the pipe line and which is not the result of the Contractor's negligence, the Engineer may direct the Contractor to strengthen the sub grade. The strengthening shall be done either by crushed stone or local lime stone, or by gravel, with depth not exceeding 225 mm or by plain concrete of mix 1:4:8 or as directed by the engineer.

17.TRENCH EXCAVATION IN HARD ROCK

If any material which in the opinion of the Contractor can be classified as rock, is encountered, he shall immediately inform the Engineer and the level, extent and description of the material encountered shall be measured jointly and recorded before excavation. Only such proportion of material notified and measured which is certified by the Engineer as "rock", shall be paid for as rock excavation.

Excavation for trenches in rock shall be so carried out that the clearance between the pipe, when laid in position and the sides and trench bottom shall be kept to the minimum limits necessary to provide for specified thickness of bedding, and surround to the pipe as specified. Excavation outside the limits shall not be paid for and any additional expenses incurred in providing additional strength to the pipe to overcome the increased trench loads on account of increased width shall be at the Contractor's expenses.

18.EXCAVATION FOR APPURTENANCE

Excavation in trenches for foundation of manholes,. shall be as per the plan or as directed by the Engineer. The dimensions of the excavation shall be measured as per the projection in plan of the

outermost edges of the structure.

19.DEWATERING BY PUMPING OR DIVERSION FOR GRAVITY.

General

The works included in this Section are as follows:

Dewatering

If water is met within the excavations due to seepage, subsoil water level & rain, it shall be removed by suitable diversions, pumping or bailing out and the excavation kept dry whenever so required during the course of execution or as directed by the Engineer. Care shall be taken to discharge the drained water into suitable outlet so as not to cause damage to the works or any other property. Dewatering shall not cause choking of other drain/drainage pipes. If it does so, then the choking shall be removed / cleaned by contractor at no extra cost. Sumps made for dewatering must be kept clear off the excavations / trenches required for further work. Method of dewatering/ pumping shall be approved by Engineer; but in any case, the pumping arrangement shall be such that there shall be no movement of subsoil or blowing in due to differential head of water during pumping. Pumping arrangements shall be adequate to ensure no delays in construction.

When there is a continuous considerable inflow of water along with sand boiling 'Well Point System' - single stage or multistage may be adopted as directed by the Engineer. Contractor shall submit to Engineer his scheme of well point system including the stages, the spacing, number and diameter of well points, headers, discharge point etc. and the number, capacity and location of pumps for approval as per provisions of the contract

The Contractor shall be responsible for the adequate pumping, drainage and bailing out of water from the excavation. Dewatering shall be either continuous or intermittent using diesel pump or any other method approved by the Engineer. The method of dewatering shall depend on site condition and should be furnished by the Contractor and approved by the Engineer. The method of dewatering shall be either sump pumping or well pointing system. The effectiveness of each method will depend upon the nature of the soil, the proportions of the trench and degree of lowering required. Pumping test may be necessary to determine which method is suitable. If sump pumping is not practicable, then other control methods shall be considered and should be approved by the Engineer. The trenches should be kept dry till the completion of work, which includes excavation, pipeline laying, jointing, testing and commissioning and backfilling. Precaution should be taken against the flotation of the pipes. The Contractor shall conduct ground studies if found necessary and the cost for such studies have to borne by the Contractor himself.

The Contractor shall be responsible for the adequate pumping, drainage and bailing out of water met due to all causes from the excavation for laying drainage pipe lines, construction of manholes, wet wells and all types of constructions in the scope of work . In case of failure to make such provisions or any other provisions, which may result in unsuitable sub-grade conditions, the Contractor shall replace and repair the sub-grade as directed to the satisfaction of the Engineer, at his own cost and responsibility.

Should the Contractor select to use a gravel sub-grade with or without un jointed pies with the gravel layers to facilitate flow of water to pumps or other points of disposal, such gravel sub grade with or without conveying pipes shall not be measured or paid as an extra item.

20. PUMPING OUT WATER

The contractor shall provide and work at his own cost all pumps, engines and machinery requisite to keep the trenches for the pipelines or foundations and all other excavations clear of water, whether sub-soil water, urban drain, sewage, leakage from tanks, wells, drains, pipelines, water mains or pipes etc., so that there may be no accumulations of such water and that no setting out may be done, no masonry may be laid, no concrete deposited, no joints made and no measurements taken in water. The pumping shall be continued so long after execution of any portion of the work and repeated so after as the Engineer may consider necessary. The pumps and power applied must be such as the Engineer may consider necessary for the work to set. The pumps and power applied must be such as the Engineer may determine to be sufficient to any particular time, or he may himself supply pumps and power at contractor's expense, so he may stop the work altogether until he is satisfied and also impose a fine upon the contractor.

21.KEEP EXCAVATION CLEAR OF WATER

Where ground water is encountered or anticipated the contractor shall provide sufficient pumps to handle the ingress of water and must provide and maintain in working order. Standby pumping units are to be made available and employed in the event of mechanical failure. The contractor must also arrange for night and day operation of the pumps wherever necessary to ensure that the work proceeds at all times.

22.BARRICADING, WATCHING, LIGHTING

The parts of the barricading shall be as per details in drawings, securely fixed in the ground. They shall not be less than 1.5 m above the surface of the ground.. All along the edges of the excavated trenches, a bund of earth about 1 m high shall be formed when so required by the Engineer for further protection. Proper provision shall be made for lighting at night and watchmen shall be kept to see that this is properly done and maintained. In addition to the normal lighting arrangements the contractor shall provide, whenever such work is in progress, battery operated blinking lights (6 volts) in the beginning and end of a trench with a view to provide suitable indication to the vehicular traffic. The contractor shall also provide and display special boards printed with fluorescent prints indicating the progress of work along-the road. In the event of the contractors not complying with the provisions of the clause, they will be imposed a fine at Rs.250/- per day. Further, in all such cases the work may be carried out departmental at the risk and cost of the contractor. The contractor shall be held responsible for all claims for compensation as a result of accident or injury to person/non-provision of red flags. The contractor shall provide all notice boards before opening of roads as directed by the Engineer. Arrangements shall be made by the contractors to direct traffic when work is in progress. Payments for such Items of work shall be paid as per the provisions in BOQ.

23.REFILLING TRENCHES

Backfilling

Backfilling of trenches and excavations shall be done as directed by the Engineer with approved sand /dust. The backfilling shall be carried out in such a way as not to cause undue thrust on any part of the construction. The compaction shall be done with the help of suitable equipment such as mechanical tamper, rammer, plate vibrator etc., after necessary watering, so as to achieve at least 95% proctor density. Fill material shall be free from clods, salts, sulphates, organic or other foreign material. The whole backfilling shall have to be carried out with local approved sand/dust as directed by Engineer. The sand used shall be clean, medium grained and free from impurities. The filled-in-sand shall be kept flooded with water to ensure maximum consolidation.

Testing, backfilling and compaction

In general, requirement of routine testing for backfilling is not being anticipated in this project. However, Engineer may ask for standard proctor density test for any compacted back filling at site. In any case extent of such testing will be kept limited to one number for every 500m. However, requirement for such tests shall be at the sole discretion of the Engineer. Contractor shall demonstrate adequately at his cost, by field and laboratory tests that the specified density has been obtained. To ensure that the fill has been compacted as specified, field and laboratory tests shall be carried out by Contractor at his own cost.

- A. With a view to restrict the length of open trenches, on completion of the pipe, laying operations, refilling of trenches shall be started immediately by the contractor. Pipe laying and testing shall follow closely upon the progress of trench excavation and the contractor shall not permit unreasonable excessive lengths of trench excavation to remain open while waiting testing of the pipe line.
- B. The trench shall be filled by sand/crushed stone dust up to at least 20 cm. above the top of pipe, back filling is to be done keeping at least 90 cm. length of pipe open at the joints, for verification of joints for water tightness during testing.
- C. Care shall be taken while back filling, not to injure or disturb the pipe. Filling shall be carried out simultaneously on both the sides of the pipes so that unequal pressure does not occur.
- D. Walking or working on the completed pipeline shall not be permitted unless the trench has been filled to a height of at least 30 cm over the top of the pipe except as may be necessary for tamping, etc., during back filling work.
- E. Filling-in shall be done in layers not exceeding 150 mm in thickness accompanied by adequate watering, ramming, etc., so as to get good compaction up to 300 mm above the top of the pipe. Above this level, nallah muck/GSB free from big boulders shall be placed in layers of 225 mm, watered and compacted by tamping.
- F. The trench shall be refilled so as to build up to the original ground level, keeping due allowance for subsequent settlement likely to take place.

- G. Before and during the backfilling of the trench, precautions shall be taken against the floatation of the pipeline due to the entry of large quantities of water into the trench causing an uplift of the empty or the partly filled pipeline.

24.DISPOSAL OF EXCAVATED MATERIALS

Excavated materials shall not be used for refilling etc. and shall be carted to the outskirts of corporation for a distance and disposing safely as directed by the engineer in charge for which payment shall be governed by Bill of Quantities of contract agreement. Where the Engineer feels that there is no hindrance to the traffic by not carting away the material, he will give instructions to that effect.

25.ALL WORKS TO BE CLEAR, CLEAN AND PERFECT

The contractor, after completion of entire work and before seeking settlement of his final bill, shall prove at his expense that the entire line is clear, clean and perfect in the presence of the Engineer or his authorized subordinate. He should provide suitable instruments, appliances etc., and pass them through the pipes and shall show that water passes freely through the entire reach from higher end to lower end.

Note: Necessary precautions such as those indicated hereunder may be taken by the contractor while checking the completed pipeline line for its effective functioning, wherever required.

The manholes should be kept open, as required for one hour prior to the starting of checking operations and should be so kept open during the whole duration of checking operations. This is to be done for allowing the gases to escape, naturally. In order to prevent the fire and explosions, endangering the life, properties, pipelines and other utility services due to presence of combustible gases, no lighted match sticks or other similar material should be thrown in the manhole.

Meshes should be placed over the opened manholes to prevent pedestrians etc., from falling in. Likewise, caution boards printed in fluorescent letters such as "DANGER MANHOLE IS KEPT OPEN" etc., shall be provided.

26. MEASUREMENT AND PAYMENT

The payment of excavation shall be made on quantity basis as per the actual dimensions of the trench excavated limited to the width shown in construction drawings.

All excavation in earthwork shall be measured net. Dimensions for purpose of payment shall be reckoned on the mean of the excavation multiplied by the mean depth from the surface below the road hard crust (whenever applicable) as given in BOQ. All planks, boards, walling, verticals, struts, props and all other materials required for close timbering/shoring and subsequent safe dismantling and removal shall be quoted separately under the relevant item of BOQ of contract.

Excavation for road crust shall be included in the earth excavation item and shall not be taken separately for making the payments.

Cost of all operations involved in filling inside excavated trenches with selected material shall be deemed to have been covered in the rate quoted for filling. Payment for filling item of work will be made on the basis of net fill dimensions i.e. excavated dimension minus the volume occupied by

structures or pipes etc.

Actual quantity of consolidated sand filling, stone crushed dust, nallah muck/ GSB supplied by the contractor shall be measured and paid in cubic meters as per B.O.Q

a) Trench excavation

The length of the trench excavation shall be measured along the centre line of pipe at various depths stated in the Bill of Quantities, the total length being segregated into stretches according to the various depths of excavation contained in the Bill of Quantities to fall into the specified categories. Within each stretch the depth applicable shall be within the range specified in Bill of Quantities.

The depth of excavation shall be measured from the top of the trench at the centre before excavation up to the bottom of the bedding under the pipe. If no bedding is provided, the measurement shall be to the level of the bottom of the pipe line. The width of the trench shall be measured on the basis of vertical side walls and the widths given in construction drawings. No additional payment shall be made for the widening at sockets, specials, haunching or surrounds beyond the dimensions contained in construction drawings.

b) Structures

Measurement for structure excavation shall be made as per the projection in plan of the outermost edges of the, structure as per the plan at the bottom.

c) Disposal of excavated material

Nothing extra shall be paid to the contractor for disposal of surplus excavated earth as the earth work in excavation item in Bill of Quantities includes loading, unloading, transporting of surplus excavated earth for its disposal to a dumping site for a lead specified there in or as directed by the Engineer.

SUB-SECTION 5

Concrete And Allied Works

1.General

The quality of materials, method & control of manufacture and transportation of all concrete work irrespective of mix, whether reinforced or otherwise shall conform to the applicable portions of this specification.

The Engineer in-charge shall have the right to inspect the source/s of material/s, the layout and operation of procurement and storage of materials, the concrete batching and mixing equipment, and the quality control system. Such an inspection shall be arranged and Engineer-in-charge's approval obtained, prior to starting of concrete work. However, this shall not relieve the contractor with any of his responsibilities and all the materials, which do not conform to the specifications, will be rejected.

2.Applicable Codes

The following specifications, standards and codes, including all official amendments/revisions and other specifications & codes referred to therein to therein, should be considered a part of this specification. In all cases the latest issue/edition/revision shall apply. In case of discrepancy between this specification and those referred to herein this bid document, this specification shall govern.

Materials

- IS: 29 Specification for 33 grade ordinary Portland cement
- IS: 455 Specification for Portland slag cement.
- IS: 1489 Specification for Portland-pozzolana cement.
- IS: 8112 Specification for 43 grade ordinary Portland cement.
- IS: 12330 Specification for Sulphate resisting Portland cement.
- IS: 383 Specification for coarse and fine aggregates from natural sources for concrete
- IS: 432 Specification for mild steel and medium tensile steel (Parts-I & II) bars and hard-drawn steel wires for concrete reinforcement.
- IS: 1786 Specification for high strength deformed steel bars and wires for concrete reinforcement.
- IS: 1566 Specification for hard-drawn steel wire fabric for (Part-I) concrete reinforcement.
- IS: 9103 Specification for admixtures for concrete.
- IS: 2645 Specification for integral cement waterproofing compounds.
- IS: 4990 Specification for plywood for concrete shuttering work.

Material Testing

- IS: 4021 Methods of physical tests for hydraulic cement. (Parts-1 to 13)
- IS: 4032 Method of chemical analysis of hydraulic cement.
- IS: 650 Specification for standard sand for testing of cement.
- IS: 2430 Methods for sampling of aggregates for concrete.
- IS: 2386 Methods of test for aggregates for concrete. (Parts-I to VIII)
- IS: 3025 Methods of sampling and test (physical and chemical) water used in industry
- IS: 6925 Methods of test for determination of water-soluble chlorides in concrete admixtures

Materials Storage

- IS: 4082 Recommendations on stacking and storing of construction materials at site.

Concrete Mix Design

IS: 10262 Recommended guidelines for concrete mix design.

SP: 23 Handbook on Concrete Mixes. (S & T)

Concrete Testing

IS: 1199 Method of sampling and analysis of concrete.

IS: 516 Method of test for strength of concrete.

IS: 9013 Method of making, curing and determining compressive strength of accelerated cured concrete test specimens.

IS: 8142 Method of test for determining setting time of concrete by penetration resistance.

IS: 9284 Method of test for abrasion resistance of concrete.

IS: 2770 Methods of testing bond in reinforced concrete.

Equipment

IS: 1791 Specification for batch type concrete mixers.

IS: 2438 Specification for roller pan mixer.

IS: 4925 Specification for concrete batching and mixing plant.

IS: 5892 Specification for concrete transit mixer and agitator.

IS: 7242 Specification for concrete spreaders.

IS: 2505 General Requirements for concrete vibrators: Immersion type.

IS: 2506 General Requirements for screed board concrete vibrators.

IS: 2514 Specification for concrete vibrating tables.

IS: 3366 Specification for pan vibrators.

IS: 4656 Specification for form vibrators for concrete.

IS: 7251 Specification for concrete finishers.

IS: 2722 Specification for portable swing weigh batchers for concrete (1 & 2 bucket type).

IS: 2750 Specification for steel scaffoldings.

Codes of Practice

IS: 456 Code of practice for plain and reinforced concrete.

IS: 457 Code of practice for general construction of plain and reinforced concrete for dams and other massive structures.

IS: 3370 Code of practice for concrete structures for storage of liquids (Parts-I to IV)

IS: 3935 Code of practice for composite construction.

IS: 2204 Code of practice for construction of reinforced concrete shell roof.

IS: 2210 Criteria for the design of reinforced concrete shell structures and folded plates.

IS: 25 Code of practice for bending and fixing of bars for concrete reinforcement.

IS: 5525 Recommendation for detailing of reinforcement in reinforced concrete works.

IS: 2751 Code of practice for welding of mild steel plain and deformed bars used for reinforced concrete construction.

IS: 9417 Specification for welding cold worked bars for reinforced concrete construction.

IS: 3558 Code of practice for use of immersion vibrators for consolidating concrete.

IS: 3414 Code of practice for design and installation of joints in building.

IS: 4326 Code of practice for earthquake resistant construction of building.

IS: 4014 Code of practice for steel tubular scaffolding. (Parts-I & II)

IS: 2571 Code of practice for laying in-situ cement concrete flooring.

- IS: 7861 Code of practice for extreme weather concreting Part-I: Recommended practice for hot weather concreting; Part-II: Recommended practice for cold weather concreting.
 IS:13920 Ductile Detailing of Reinforced Concrete Structure subjected to 1993 seismic forces
 SP-16 Design Aids for Reinforcement Concrete to IS: 456-1978 (S&T) - 1980
 SP-24 Explanatory Handbook on IS: 456-1978
 SP-34 Handbook on Concrete Reinforcement and Detailing (S&T) – 1987

Construction Safety

- IS: 3696 Safety code for scaffolds and ladders. (Parts-I & II)
 IS: 7969 Safety code for handling and storage of building materials
 IS: 8989 Safety code for erection of concrete framed structures.

Measurement

- IS: 1200 Method of measurement of building and engineering works.
 IS: 3385 Code of practice for measurement of civil engineering

3. Materials for Standard Concrete

The ingredients to be used in the manufacture of concrete shall consist solely of Ordinary Portland Cement, and Sulphate resistant cement, clean sand, natural coarse aggregate, clean water, and admixtures, if specifically called for on conditions at site warrant its use. Only good quality sand shall be used for all works.

4. Cement

The contractor will have to make own arrangements for procuring cement and steel. The Contractor will have to make his own arrangements for transport from supplier go down and storage of adequate quantity of cement. Cement bags shall be stored in a dry enclosed shed (storage under tarpaulins will not be permitted), well away from the outer walls and insulated from the floor to avoid contact with moisture from the ground and so arranged as to provide ready access. Damaged or reclaimed or partly set cement will not be permitted to be used and shall be removed from the site. The storage bins and storage arrangement shall be approved by the Engineer-in-charge. Consignments of cement shall be stored as received and shall be consumed in the order of their delivery.

Cement held in storage for a period of ninety (90) days or longer shall be tested. Should at any time the Engineer-in-charge have reasons to consider that any cement is defective, then irrespective of its origin, date of manufacture and or manufacturer's test certificate, such cement shall be tested immediately at the Contractor's cost at an approved laboratory and until the results of such tests are found satisfactory, it shall not be used in any work. Testing certificates for each batch of cement should be submitted by the contractor to the Engineer in charge, before starting the concreting work. The Contractor shall not be entitled to any claim of any nature on this account.

Aggregates

6. General

Aggregate" in general designates both fine and coarse inert materials used in the manufacture of concrete (Vide BIS 456 & BIS 383) and confirming to tests as per BIS: 2386 (Part I to VI) "Coarse

Aggregate” is aggregate most of which is retained when passed through on 4.75 mm BIS sieve. All fine and coarse aggregates proposed for use in the works shall be subject to the Engineer-in-charge’s approval and after specific materials have been accepted, the source of supply of such materials shall not be changed without prior approval of the Engineer-in-charge.

Aggregates shall consist of natural sands, stone (crushed or uncrushed) and gravel from a source known to produce satisfactory aggregate for concrete and shall be chemically inert, non-flaky, strong, hard, durable against weathering, of limited porosity and free from deleterious materials that may cause corrosion of the reinforcement or may impair the strength and or durability of concrete. The grading of aggregates shall be such as to produce a dense concrete of specified strength and consistency that will work readily into position without segregation and shall be based on the “mix design” and preliminary tests on concrete specified later. Aggregate source shall be approved by Engineer.

7.Sampling and Testing

Samples of the aggregates for mix design and determination of suitability shall be taken under the supervision of the Engineer in-charge and delivered to the laboratory, well in advance of the scheduled placing of concrete. Records of tests, which have been made on proposed aggregates and on concrete made from this source of aggregates, shall be furnished to Engineer in-charge in advance of the work, for use in determining aggregate suitability. The costs of all such tests, sampling etc. shall be borne by the contractor.

8.Storage of Aggregates

All coarse and fine aggregates shall be stacked separately in stock piles in the material yard near the work site in bins properly constructed to avoid inter mixing of different aggregates. Contamination with foreign material and earth during storage and while heaping the materials shall be avoided. The aggregates must be of specified quality not only at the time of receiving at site but more so at the time of loading into mixer. Aggregates shall be piled in layers not exceeding 1.20 m in height to prevent coning or segregation. Each layer shall cover the entire area of stockpile before succeeding layers are started. Aggregates that have become segregated shall be rejected.

9.Specific Gravity

Aggregates having a specific gravity below 2.4 (saturated surface dry basis) shall not be used.

10.Fine Aggregate

- a. Fine aggregate shall consist of natural or crushed sand conforming to BIS 383 confirming to tests as per BIS 2386 part I to VI. The sand shall be clean, sharp, hard, strong and durable and shall be free from dust, vegetable substances, adherent coating, clay, alkali, organic matter, mica, salt, or other deleterious substances, which can be injurious to the setting qualities/strength/durability of concrete.

- b. Screening and Washing: Sand shall be prepared for use by such screening or washing, or both, as necessary, to remove all objectionable foreign matter while separating the sand grains to the required size fraction.

Foreign Material limitations: The percentage deleterious substances in sand delivered to the mixer shall not exceed the following:

Table: Foreign Material Limitations in Fine Aggregate

Foreign Material	% by weight uncrushed	% by weight crushed
Material finer than 75 micron BIS sieve	3	15
Shale	1	-
Coal and Lignite	1	1
Clay Lumps	-	1
Total	5	17

Gradation: Unless otherwise directed or approved by the Engineer-in-charge, the grading of sand shall be within the limits indicated hereunder:

Table : Grading of Sand for Fine Aggregate

BIS : Sieve Designation	Grading Zone I	Grading Zone II	Grading Zone III	Grading Zone IV
10 mm	100	100	100	100
4.75 mm	99-100	90-100	90-100	95-100
2.36 mm	60-95	75-100	85-100	95-100
1.18 mm	30-70	55-90	75-100	90-100
600 microns	15-34	35-59	60-79	80-100
300 microns	5-20	8-30	12-40	15-50
150 microns	0-10	0-10	0-10	0-15

Where the grading falls outside the limits of any particular grading zone of sieves, other than 600 microns IS sieve, by total amount not exceeding 5%, it shall be regarded as falling within that grading zone. This tolerance shall not be applied to percentage passing the 600 micron IS sieve or to percentage passing any other sieve on the coarser limit of grading zone I or the finer limit of grading zone IV. Fine aggregates conforming to grading zone IV shall be used. Mix designs and preliminary tests shall show its suitability for producing concrete of specified strength and workability.

Fineness Modulus: The sand shall have a fineness modulus of not less than 2.2 or more than 4.2. The fineness modulus is determined by adding the cumulative percentages retained on the following IS sieve sizes (4.75 mm, 2.36 mm, 1.18 mm, 600 microns and 150 microns) and dividing the sum by 100. Only Good quality sand shall be used.

11.Coarse Aggregate

Coarse aggregate for concrete, except as noted above, shall conform to IS 383 & IS 2386. This shall consist of crushed stone and shall be clean and free from elongated, flaky or laminated pieces, adhering coatings, clay lumps, coal residue, clinkers, slag, alkali, mica, organic matter or other deleterious matter.

Screening and Washing: Crushed rock shall be screened and or washed for the removal of dirt or dust coating, if so requested by the Engineer in-Charge.

Grading

i) Coarse aggregate shall be either in single size or graded, in both cases the grading shall be within the following limits:

BS sieve Size (mm)	Percentage passing for single sized aggregate of normal size in mm					Percentage Passing For Graded Aggregate Of normal Size in mm			
	40	20	16	12.5	10	40	20	16	12.5
63	100	-	-	-	-	100	-	-	-
40	85-100	100	-	-	-	95-100	-	-	-
20	0-20	85-100	100	-	-	30-70	95-100	100	-
16	-	-	85-100	100	-	-	-	90-100	-
12.5	-	-	-	85-100	100	-	-	-	90-100
10	0-5	0-20	0-30	0-45	85-100	10-35	25-35	30-70	40-85
4.75		0-5	0-5	0-10	0-20	0-5	0-10	0-10	0-10
2.36	-	-	-	--	0-5	-	-	-	-

ii) The pieces shall be angular in shape and shall have granular or crystalline surfaces. Friable, flaky and laminated pieces, mica and shale, if present, shall be only within tolerance limits which will not affect adversely the strength and or durability of concrete. The maximum size of coarse aggregate shall be 40 mm for M-7.5 and M-10 and 20mm for M-15 to M-20 concrete, or as directed by the Engineer-in-charge or specified otherwise. The maximum size of coarse aggregate shall be the maximum size specified above but in no case greater than 1/4th of the minimum thickness of the member, provided that the concrete can be placed without difficulty so as to surround all reinforcement thoroughly and fill the corners of the form. For plain concrete the maximum size of aggregate shall be of 40 mm. For heavily reinforced concrete members, the nominal maximum size of the aggregate shall be 5 mm less than the minimum clear distance between the reinforcing main bars or 5 mm less than the minimum cover to reinforcement whichever is smaller.

12.Foreign material limitations

The percentage of deleterious materials in the aggregate delivered to the mixer shall not exceed the following:

Table: Foreign Material Limitations in Coarse Aggregate

Foreign Material	% by weight uncrushed	% by weight crushed
Material finer than 75 micron BIS	3	3
Coal and Lignite	1	1

Clay Lumps	1	1
Soft fragments	3	-
Total	8	5

13. Water

- a. Water used for washing, mixing and curing shall be free from injurious amounts of deleterious materials. Potable water is generally satisfactory for mixing and curing concrete. Physical and chemical analysis of the water should be submitted to the Engineer-in-charge, before starting the work.
- b. In case of doubt, the suitability of water for making concrete shall be ascertained by the compressive strength and initial setting time test specified in IS 456. The sample of water taken for testing shall be typical of the water proposed to be used for concreting, due account being paid to seasonal variation. The sample shall not receive any treatment before testing other than that envisaged in the regular supply of water proposed for use in concrete. The sample shall be stored in a clean container previously rinsed out with similar water.
- c. Average 28 days compressive strength of at least three 15 cm concrete cubes prepared with water proposed to be used shall not be less than 90% of the average strength of three similar concrete cubes prepared with distilled water. The cubes shall be prepared, cured and tested in accordance with the requirements of BIS: 516.
- d. The initial setting time of test block must be made with the appropriate test cement and the water proposed to be used. It shall not be less than 30 minutes and shall not differ by more than +30 minutes from the initial setting time of control test block prepared with the appropriate test cement and distilled water. The test block shall be prepared and tested in accordance with the requirements of BIS: 4031.
- e. Where water can be shown to contain an excess of acid, alkali, sugar or salt, Engineer-in-charge may refuse to permit its use. As a guide, the following concentrations represent the maximum permissible values.
 1. To neutralize 200 ml sample of water, using phenolphthalein as indicator, it should not require more than 2 ml of 0.1 normal NaOH. The details of test shall be as per BIS: 3025.
 2. To neutralise 200 ml sample of water, using methyl orange as an indicator, it should not require more than 10 ml of 0.1 Normal HCl. The details of test shall be as per BIS: 3025.
 3. Percentage of solids, when tested in accordance with the method indicated below shall not exceed the following:

• Solids	• Perc ent	• Method of test
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14. Controlled Concrete

All concrete in the works shall be “Controlled Concrete” as defined in IS: 456

• Refer to Column in IS:3025 Organic	•	•
• (organic solid = total solids minus ignited residue)	• 0.02	• 10 and 11
• Inorganic	• 0.03	• 11(ignited residue)
• Sulphates (as So ₄)	• 0.05	• 20
• Alkali Chlorides (as Cl)	• 0.20	• 24
• Suspended matter	• 0.20	• 12
• The pH value of water shall not generally be less than 6.		

except for M-7.5 and M-10 for which normal mix concrete shall be used. Whether reinforced or otherwise, all concrete works to be carried out under this specification shall be divided into the following classifications:

Note: It shall be very clearly understood that whenever the grade of concrete such as M-20, etc. is specified it shall be contractor's responsibility to ensure the minimum crushing strength stipulated for the respective

Class	• Preliminary Test N/mm ²		Works Test N/mm ²		• Maximum Size of Aggregate mm	• Locations For Use As indicated
	7 days	28 days	7 days	28 days		
M40	33.5	50	27	40	20	Specifications/ as
M35	30	44	23.5	35	20	-do-
M30	25	38	20	30	40 or 20	-do-
M25	22	32	17	25	40 or 20	-do-
M20	17.5	26	13.5	20	40 or 20	-do-
M15	13.5	20	10	15	40 or 20	-do-

grade of concrete is obtained at works. Minimum cement content in the concrete used for liquid/water retaining structures shall be 390 kg/m³ for 20 mm downgraded aggregate.

15. Mix Design

General

It is essential for investigating the grading of aggregates, water-cement ratio, workability and the quality of cement required to give preliminary and works cubes of the minimum strength specified. The proportions of the mix shall be determined by weight. Adjustment of aggregate proportions due to moisture present in the aggregate shall be made. Determination of mix proportions shall be carried out as per the “Recommended guidelines for Concrete Mix Design” conforming to IS: 10262.

Whenever there is a change either in required strength of concrete, or water-cement ratio or workability or the source of aggregates and/or cement, preliminary tests shall be repeated to determine the revised proportions of the mix to suit the altered conditions. While designing proportions, over-wet mixes shall always be avoided.

While fixing the value for water/cement ratio for preliminary mixes, assistance may be derived from the graph Appendix A, BIS 456 showing the relationship between the 28 day compressive strengths of concrete mixes with different water/cement ratios and the 7-day compressive strength of cement tested in accordance with IS: 269.

Preliminary tests

Test specimens shall be prepared with at-least two different water/cement ratios for each class of concrete, consistent with work ability required for the nature of the work. The materials and proportions used in making preliminary tests shall be similar in all respects to those to be actually employed in the works as the object of these tests is to determine the properties of cement, aggregates and water necessary to produce concrete of required consistency and to give the specified strength, it will be contractor's sole responsibility to carry out these tests and he shall therefore furnish to Engineer-in-Charge a statement of proportions proposed to be used for the various concrete mixes. For preliminary tests, the following procedure shall be followed.

Materials shall be brought to the room temperature and all materials shall be in a dry condition. The quantities of water cement and aggregates for each batch shall be determined by weight to an accuracy of 1 part in 100 parts.

Mixing concrete shall be done by hand (for small quantities, as directed by Engineer-in-Charge) or in a small batch mixer as per IS: 516 in such a manner as to avoid loss of water. The cement and fine aggregate shall first be mixed dry until the mixture is uniform in color. The coarse aggregate shall then be added, mixed and water added and the whole batch mixed thoroughly for a period of not less than two minutes until the resulting concrete is uniform in appearance. Each batch of concrete shall be such a size as to leave about 10% excess concrete, after molding the desired number of test specimens.

The consistency of each batch of concrete shall be measured immediately after mixing, by the slump test in accordance with IS: 1199. If in the slump test, care is taken to ensure that no water or other material is lost, the material used for the slump test may be re-mixed with the remainder of the concrete for making the specimen test cubes. The period of re-mixing shall be as short as possible yet sufficient to produce a homogeneous mass.

The samples for compression tests of concrete shall be made as per IS: 516 on 15 cm cubes. Each mould shall be provided with a metal base plate having a plate surface so as to support the mould during filling without leakage. The base plate shall be preferably attached to the mould by springs or screws. The parts of the mould when assembled shall be positively and rigidly held together. Before placing concrete, the mould and base plate shall be cleaned and oiled. The dimensions and internal faces of the mould shall be accurate within the following limits. Height and distance between the opposite faces of the mould shall be of specified size ± 0.2 mm. The angle between the adjacent internal faces and between internal faces and top and bottom faces of mould shall be 90-degree ± 0.5 degree. The interior faces of the mould shall be plane surfaces with a permissible variation of 0.03 mm.

Concrete test cubes shall be moulded by placing fresh concrete in mould compacted as specified in IS 516.

Curing shall be as specified in IS 516. The cubes shall be kept in moist air of at least 90% relative humidity at a temperature of $27^{\circ}\text{C} \pm 2^{\circ}\text{C}$ for 24 hours ± 2 hours from the time of adding water to the dry ingredients. Thereafter they shall be removed from the moulds and kept immersed in clean,

fresh water and kept at 27°C +2 degree C temperature until required for test. Curing water shall be renewed every seven days. A record of maximum and minimum temperatures at the place of storage of the cubes shall be maintained during the period they remain in storage.

The strength shall be determined based on not less than five cube test specimens for each age and each water cement ratio. All these laboratory test results shall be tabulated and furnished to the Engineer-in-charge. The test results shall be accepted by the Engineer-in-charge if the average compressive strengths of the specimens tested is not less than the compressive strength specified for the age at which specimens are tested subject to the condition that only one out of the five consecutive tests may give a value less than the specified strength for that age. The Engineer-in-charge may direct the contractor to repeat the tests if the results are not satisfactory and also make such changes, as he considers necessary to meet the requirements specified. All these preliminary tests shall be conducted by the contractor at his own cost in an approved laboratory.

16.Proportioning, Consistency, Batching and Mixing of Concrete

The determination of the water cement ratio and proportion of aggregates to obtain the required strength shall be made from preliminary tests by designing the concrete mix. Controlled concrete shall be used on all concrete work complying with all the requirements of IS: 456. Cube tests shall be carried out by the contractor on the trial mixes before the actual concreting operation starts. Based on the strength of the concrete mix sanction for the use has to be obtained from engineer in charge.

If during the execution of the works it is found necessary to revise the mix because of the cube tests showing lower strengths than the required one due to inconsistency of quality of material or otherwise, The Engineer in charge shall ask for fresh trial mixes to be made by the contractor. No claim to alter the rates of concrete work shall be entertained due to such change in mix variations, as it is the contractor's responsibility to produce the concrete of the required grade.

Great care shall be exercised when mixing the actual works concrete using the proportions of the selected trial mix. The final concrete mix shall have the same proportions of cement, fine and coarse aggregates and water as that of the approved selected mix.

A reasonable number of bags should be weighed separately to check the Net weight, where the weight of cement is determined by accepting the manufacturer's weight per bag at the site. Proper control of mixing water is deemed to be of paramount importance. If mixers with automatic addition of water are used, water should be either measured by volume in calibrated buckets, tins or weighed. All measuring equipment shall be maintained in a clean serviceable condition and their accuracy periodically checked and certified and the Engineer-in-Charge's approval obtained.

The Engineer-in-Charge may require the contractor to carry out moisture content tests in both fine and coarse aggregates. The amount of the added water shall then be adjusted to compensate for any observed variations in the moisture contents. BIS: 2386 shall be referred to for determination of moisture content.

No substitution in material, used on the work or alteration in the established proportions shall be made without additional tests to show that the quality and strength of concrete are satisfactory. No alterations shall be permitted without the prior sanction of the Engineer-in-Charge.

17.Mixing of Concrete

The mixing of concrete shall be strictly carried out in an approved type of mechanical Concrete mixer. The mixing equipment shall be capable of combining the aggregates. Cement and water within the specified time into a thoroughly mixed and uniform mass, and of discharging the mixture without segregation. The entire batch shall be discharged before recharging. Mixing

periods shall be measured from the time when all of the solid materials are in the mixing drum, provided that all of the mixing water shall be introduced before one fourth of the mixing time has elapsed. The mixing time in no case shall be less than two minutes. The mixer speed shall not be less than 14 or more than 20 revolutions per minute.

Mixing shall be continued until there is a uniform distribution of the materials and the mass is uniform in color and consistency. Hand mixing of concrete shall not be permitted at all.

18. Grade of Concrete

The different grades of concrete specified shall conform to the strengths as required by IS: 456-1987. Standard deviation shall be calculated as stated in 14.5 of IS: 456-1978. The acceptable criteria for concrete shall be as stated in clause 15 of IS: 456 -1978. The assumed standard deviations as given in table 6 of IS: 456-1978 has to be followed and are given here under. However, the minimum cement content shall be as per “Table: Grade of Concrete” in this bid document.

Table: Grade of Concrete

Grade of Concrete	Assumed Standard Deviation N/sq.mm
M 10	2.3
M 15	3.5
M 20	4.6
M 25	5.3

In order to get a quick idea of quality of concrete the optional tests are conducted as stipulated in 14.1.1 of IS: 456-1978 and the results are analyzed according to table 5 on page 41 of IS: 456-1978.

Controlled Concrete

Controlled concrete shall be used on all concreting works except where specified otherwise the mix proportions for all grades of concrete shall be designed to obtain strengths corresponding to the values specified in “Table : Compressive Strengths at 28 days” below for respective grades of concrete.

Table : Compressive Strengths at 28 days

• Grade	• Specified Characteristic Compressive Strength (Works strength) at 28 days (N/sq.mm)
• M10	• 10
• M15	• 15
• M20	• 20
• M25	• 25
• M30	• 30

The maximum Water: Cement ratio for all controlled concrete works shall be as specified in IS: 456-1978 as Preliminary tests as specified in the BIS code and required by the Engineer-in-Charge shall be carried out sufficiently ahead of the actual commencement of the work with different grades of concrete made from representative samples of aggregates and cement expected to be used on the job to ascertain the ratios by weight of cement of total quantity of fine and coarse aggregates and the water cement ratio required to produce a concrete of specified strength and desired workability.

The minimum cement content for each grade of concrete shall be as per “Table: Minimum Cement Content in Concrete” Table: Minimum Cement Content in Concrete

• Grade of Concrete	• Minimum Cement Content in Concrete
• M 15	• 310
• M 20	• 390
• M 25	• 425
• M30	• 500

At least 4 (four) trial batches are to be made and 7 test cubes should be taken for each batch noting the slump on each mix. These cubes shall then be properly cured and two cubes for each mix shall be tested in a testing laboratory approved by the Engineer-in-Charge at 7 days and others at 28 days for obtaining the ultimate compressive strength. The test reports shall be submitted to the Engineer in charge. The cost of mix design and testing shall be borne by the contractor. On the basis of the preliminary test reports for trial mix, a proportion of mix by weight and water cement ratio will be approved by the Engineer in charge, which will be expected to give the required strength. Consistency and workability and the proportions so decided for different grades of concrete shall be adhered to during all concreting operations. If however at any time the Engineer-in-Charge feels that the quality of material, being used has been changed from those used for preliminary mix design, the contractor shall have to run similar trial mixes to ascertain the mix proportions and consistency.

The mix once approved must not be varied without prior approval of the Engineer-in-Charge. However should the contractor anticipate any change in the quality of future supply of materials than that used for preliminary mix design, he shall inform the same to the Engineer in charge and bring fresh samples sufficiently ahead to carry out fresh trial mixes. The engineer in charge shall have access to all places and laboratory where design mix is prepared. Design mix will indicate by means of graphs and curves etc. the extent of variation in the grading of aggregates which can be allowed.

In designing the mix proportions of concrete, the quantity of both cement and aggregate shall be determined by weight. All measuring equipment shall be maintained in clean and serviceable condition and their accuracy periodically checked.

To keep the water cement ratio to the designed value, allowance shall be made for the moisture contents in both fine and course aggregates and determination of the same shall be made as frequently as directed by the Engineer-in-Charge. The determination of moisture contents shall be according to IS: 2386 (Part III).

19.Strength Requirements

Where ordinary Portland cement conforming to IS: 269 or Portland blast furnace slag cement conforming to IS: 455 are used the compressive strength requirements for various grades of concrete shall be as shown in table below. Where rapid hardening Portland cement is used the 28 days compressive strength requirements specified in Table hereunder shall be met in 7 days. The strength requirements specified in table shall apply to both controlled concrete and ordinary concrete.

Table : Strength Requirements of Concrete

• Grade of Concrete	• Minimum Compressive Strength of 15 cm cube specimen (IS:			
	• at 7 days		• at 28 days	
	• Work	• Preliminary	• Work	• Preliminary
M 15	• 100	• 135	•	• 200
M 20	• 135	• 175	•	• 260
M 25	• 170	• 220	•	• 320
M 30	• 200	• 250	•	• 380

Other requirements of concrete strength as may be desired by the Engineer in charge shall be in accordance with Indian Standard IS: 456 (latest revision). The acceptance of strength of concrete shall be as per clause 5.4 “Sample size and Acceptance Criteria” of IS: 456 (latest revision) subjects to stipulation and/or modifications stated elsewhere in this specification if any.

Concrete work found unsuitable for acceptance shall have to be dismantled and replaced to the satisfaction of the Engineer-in-Charge by the contractor free of cost of the owner. No payment will be made for the dismantled concrete, the relevant Formwork and reinforcement; embedded mixtures etc. wasted in the dismantled portion shall be made. In the course of dismantling if any damage is done to the embedded items or adjacent structures, the same shall also be made good free of charge by the contractor to the satisfaction of the Engineer in charge. If the water quantity has to be increased in special cases, cement also is increased proportionately to keep the ratio of water to cement same as adopted in trial mix design for each grade of concrete.

20. Workability

The workability of concrete shall be checked at frequent intervals by slump test. Where facilities exist and if required by the Engineer-in-Charge, alternatively the compacting factor test in accordance with IS: 1199 shall be carried out. The degree of workability necessary to allow the concrete to be well consolidated and to be worked into the corners of form work and round the reinforcement to give the required surface finish shall depend on the type and nature of the structure and shall be based on experience and tests. The limits of consistency for structures are as specified in the “Table Limits of Consistency” below:

Table : Limits of Consistency

Placing Conditions	Degree of Workability	Values of Workability
Concreting of shallow Sections with vibration	Very low	• 20-10 seconds VB time or 0.75-0.80 compacting factor
• Concreting of lightly Reinforced sections With vibration	Low	• 10-5 seconds or 0.80-0.85 compacting factor

<ul style="list-style-type: none"> • Concreting of lightly Reinforced sections Without Vibration or Heavily reinforced Section with Vibration 	Medium	<ul style="list-style-type: none"> • 5-2 seconds VB time or 0.85-0.92 compacting factor or 25-75 mm slump for 20 mm Aggregate
<ul style="list-style-type: none"> • Concreting of heavily Reinforced sections compacting Without vibration factor 	High	<ul style="list-style-type: none"> • Above 0.92 compacting factor or 75-125 mm slumps for 20 mm aggregate

Workmanship

All workmanship shall be according to the latest relevant standards. Before starting a pour the contractor shall obtain the approval of the Engineer-in-Charge in a “Pour Card” maintained for this purpose. He shall obtain complete instructions about the material and proportion to be used, slump, workability of water per unit of cement, number of test cubes to be taken, finishing to be done and any admixture to be added etc.

Sampling and Testing Concrete in the Field

- a) Facilities required for sampling materials and concrete including whether proof buildings to house the facilities in the field, should be provided by the contractor at no extra cost. The following equipment with operator shall be made available in serviceable conditions.
 - i. Concrete cube-testing machine suitable for 15 cm³ of 100 MT capacity with proving calibration ring - 1 no.
 - ii. Cast iron cube moulds 15 cm size - 6 nos. (min)
 - iii. Slump cone complete with tamping rod - 1 set
 - iv. Laboratory balance to weigh up to 5 kg with sensitivity of 10 gm - 1 no.
 - v. BIS sieves for coarse and fine aggregates - 1 set
 - vi. Set of measures from 5 liters to 0.1 liter - 1 set
 - vii. Electric oven with thermostat up to 120°C - 1 no.
 - viii. Flakiness gauge - 1 no.
 - ix. Elongation index gauge - 1 no.
 - x. Sedimentation pipette - 1 no.
 - xi. Calibrated glass jars 1.0 liter capacity - 2 nos.
 - xii. Glass flasks and metal containers - As required
 - xiii. Chemical reagents like sodium hydroxide, tannic acid, litmus paper etc—

As required Laboratory balance of 2 kg capacity and sensitivity of 1 gm - 1 no

- b) No concrete of any kind may be placed until the field concrete testing laboratory as specified is provided to the satisfaction of the Engineer. The contractor shall notify the Engineer in advance of all concrete and concrete material testing as provided in the clause to provide the Engineer/his representative with an opportunity to witness all prescribed tests.
- c) At least 6 test cubes of each class of concrete shall be made of every 50cum concrete or part thereof or from different batches as directed by Engineer-in-charge. Such samples shall be drawn on each day for each type of concrete. Of each set of 6 cubes, three shall be tested at 7 days age and three at 28 days age. The cubes must be casted from various batches to arrive

at an average strength. The laboratory test results shall be tabulated and furnished to the Engineer. The Engineer will pass the concrete if average strength of the specimens tested is not less than the strength specified, subject to the condition that only one out of three consecutive tests may give a value less than the specified strength but this shall not be less than 90% of the specified strength.

- d) Consistency: Slump tests shall be carried out as often as requested by the Engineer and invariably from the same batch of concrete from which the test cubes are made. Slump tests shall be done immediately after sampling.

21. Concrete Tests

The Engineer-in-Charge, may order tests to be carried out on cement, sand, coarse aggregate, and water in accordance with the relevant Indian standards.

Tests on Cement shall include:

- Fineness test
- Test for normal consistency
- Test for setting time
- Test for soundness
- Test for tensile strength
- Test for compressive strength
- Test for heat of hydration (by experiment & calculations) as per BIS 269

Tests on Sand shall include:

- Sieve test
- Test for organic impurities
- Decantation test for determining clay and silt content
- Specific gravity test
- Test for unit weight and bulk age factor
- Test for sieve analysis and fineness modulus

Tests on Coarse Aggregate shall include:

- Sieve analysis
- Specific gravity and unit weight of dry, loose and ridded aggregate
- Soundness and alkali aggregate reactivity
- Petrography examination
- Deleterious materials and organic impurities
- Test for aggregate crushing value

Any or all these tests would normally be ordered to be carried out only if the Engineer feels the materials are not obtained and shall be performed by the contractor at an approved test laboratory. The contractor shall bear the charges of these optional tests. Concrete not made to the requirements of specification in all respects may be rejected by the Engineer-in-Charge in which case it shall be removed and reconstructed entirely at the expense of the contractor.

Load test on Members or any other tests

- a. In the event of any work being suspected of material or workmanship or both, the Engineer-in-charge requiring its removal and reconstruction may order, or the contractor may request that it should be load tested in accordance with the following provisions.
- b. The test load shall be 125% of the maximum superimposed load for which the structure was designed. Such test load shall not be applied before 56 days after the effective hardening of concrete. During the test, struts strong enough to take the whole load shall be placed in position leaving a gap under the members. The test load shall be maintained for 24 hours before removal.
- c. If within 24 hours of the removal of the load, the structure does not show a recovery of at least 75% of the maximum deflection shown during the 24 hours under load, the test loading shall be repeated after a lapse of at least 72 hours. The structure shall be considered to have failed to pass the test if the recovery after the second test is not at least 75% of the maximum deflection shown during the second test. If the structure is certified as failed by the Engineer-in-Charge, the cost of all the new construction and the load tests shall be borne by the contractor.
- d. Any other tests, e.g. taking out in an approved manner concrete cores, examination and tests on such cores removed from such parts of the structure as directed by the Engineer-in-charge, sonic testing etc. shall be carried out by the contractor, if so directed, at no extra cost.

22.Unsatisfactory tests

Should the results of any test prove unsatisfactory, or the structure shows signs of weakness, undue deflection or faulty construction, the contractor shall remove and rebuild the member or members involved or carry out such other remedial measures as may be required by the Engineer-in-Charge.

23.Admixtures

General

Admixtures may be used in concrete where required, only with the approval of the Engineer-in-Charge. However it should be seen that, with the passage of time, neither the compressive strength nor its durability is reduced. Calcium chloride shall not be used for accelerating set of the cement for any concrete containing reinforcement or embedded steel parts. When calcium chloride is permitted to be used, such as in mass concrete works, it shall be dissolved in water and added to the mixing water in an amount not to exceed 1.5% of the weight of the cement in each batch of concrete. When admixtures are used, the designed concrete mix shall be corrected accordingly. Admixtures shall be used as per manufacturer's instruction and in the manner and with the control specified by the Engineer-in-Charge.

24.Air Entraining Agents

Neutralized Vinson resin or other approved air in the concrete mix agents shall conform to the requirements of ASTM standard 6.260; Air Entraining Admixtures for Concrete. The recommended total air content of the concrete is 4% + 1%. The method of measuring air content shall be as per IS: 1199.

Water Reducing Admixtures

Water reducing lignosulfonate admixture may be added in quantities approved by the Engineer-in-charge. The admixtures shall be added in the form of a solution.

25.Retarding Admixtures

Retarding agents may be added to concrete mix in quantities approved by the Engineer-in-Charge.

26.Water Proofing Agent

Water proofing agents shall conform to IS: 2645.

27.Other Admixtures

The Engineer-in-Charge may at his discretion allow the contractor to use any other admixture in the concrete.

28.Preparation Prior to Concrete Placement, Final Inspection and Approval

- i. Before the concrete is actually placed in position, the insides of the Formwork shall be inspected to see that they have been cleaned and oiled. Temporary openings shall be provided to facilitate inspection, especially at bottoms of columns and wall forms, to permit removal of sawdust, wood shavings, binding wire, dirt etc. Openings shall be placed or holes drilled so that these materials and water can be removed easily. Such openings/holes shall be suitably plugged later.
- ii. The various agencies shall be permitted ample time to install drainage and plumbing lines, floor and trench drains, conduits, hangers, anchors, inserts, sleeves, bolts, frames and other miscellaneous embedment to be cast in the concrete as specified or required or as is necessary for the proper execution of the work as specified in the drawings.
- iii. All embedded parts, inserts, etc. the contractor shall be correctly positioned and securely held in the forms to prevent displacement during depositing and vibrating of concrete.
- iv. All anchor bolts shall be positioned and kept in place with the help of properly manufactured templates unless specifically waived in writing by the Engineer-in-charge.
- v. Slots, openings, holes, pockets etc. shall be provided in the concrete work in the position specified in drawing or required or as directed by the Engineer-in-charge.
- vi. Reinforcement and other items to be cast in concrete shall have clean surfaces that will not impair bond.
- vii. Prior to concrete placement, all work shall be inspected and approved by the Engineer-in-Charge and if found unsatisfactory, concrete shall not be poured until after all defects have been corrected.
- viii. Approval by the Engineer-in-Charge of any and all materials and work as required herein shall not relieve the contractor from his obligation to produce finished concrete in accordance with the requirements of the specifications.
- ix. Rain or wash water: No concrete shall be placed in wet weather or on a water-covered surface. Any concrete that has been washed by heavy rains shall be entirely removed, if there is any sign of cement and sand having been washed away from the concrete mixture. To guard against damage, which may be caused by rains, the works shall be covered with

taraulins immediately after the concrete has been placed and compacted before leaving the work unattended. Any water accumulating on the surface of the newly placed concrete shall be removed by approved means and no further concrete shall be placed thereon until such water is removed. To avoid flow of water over/around freshly placed

- x. Concrete, suitable drains and sumps shall be provided. During summer season, temperature of water should be maintained, as per the criteria and for the same, icing should be done for concreting work.
- xi. Bonding Mortar: Immediately before concrete placement begins, prepared surfaces except Formwork, which will come in contact with the concrete to be placed, shall be covered with a bonding mortar as specified.
- xii. The corrosive matters on the reinforcement should be removed by means of wire brush.
- xiii. Laitance should be removed by means of chiseling from top concrete layer which was earlier concreted.

28.Transportation

General

All buckets, containers or conveyors used for transporting concrete shall be mortar-tight, leak proof irrespective of the method of transportation adopted; concrete shall be delivered with the required consistency and plasticity without segregation or loss of slump. However, chutes shall not be used for transport of concrete without the written permission of the Engineer-in-charge and concrete shall not be re-handled before placing.

Re-tempered or Contaminated Concrete

Concrete must be placed in its final position before it becomes too stiff to work. On no account, water shall be added after the initial mixing. Concrete, which has become stiff or has been contaminated with foreign materials shall be rejected and disposed off as directed by the Engineer-in-Charge.

30.Avoiding Segregation

Concrete shall, in all cases, be deposited as nearly as practicable directly, in its final position and shall not be re-handled to flow in a manner which will cause segregation, loss of materials, displacement of reinforcement, shuttering or embedded insets, or impair its strength. For locations where direct placement is not possible, and in narrow forms, the Contractor shall provide suitable drop and “Elephant Trunks” to confine the movement of concrete. Special care shall be taken when concrete is dropped from a height, especially if reinforcement is in the way, particularly in column and the walls.

31.Placing by Manual Labour

Except when otherwise approved by the Engineer-in-Charge, concrete shall be placed in the shuttering by shovels or other approved implements, and shall not be dropped from a height more than 1.0 m or handled in a manner, which will cause segregation.

33.Types of Buckets

Central-bottom-dump buckets of a type that provides for positive regulation of the amount and rate of deposition of concrete in all dumping positions shall be employed. In placing concrete in large open areas, the bucket shall be spotted directly over the position designated and then lowered for dumping. The open bucket shall clear the concrete already in place and the height of drop shall not exceed 1.0 m. The bucket shall be opened slowly to avoid high vertical bounce. Dumping of buckets on the swing or in any manner, which results in separation of ingredients or disturbance of previously placed concrete, will not be permitted.

34.Placement of Restricted Forms

Concrete placed in restricted forms by barrows, bugles, cars, short chutes or hand shoveling shall be subject to the requirement for vertical delivery of limited height to avoid segregation and shall be deposited as nearly as practicable in its final position.

35.Chuting

Where it is necessary to use transfer chutes, specific approval of Engineer-in-charge must be obtained to type, length slopes, baffles, vertical terminals and timing of operations. These shall be so arranged that an almost continuous flow of concrete be obtained at the discharge and without segregation. Concrete should flow smoothly in the chute and there should not be any obstruction to the flow. To allow for the loss of mortar against the sides of the chutes, the first mixes shall have less coarse aggregate. During cleaning of chutes, the wastewater shall be kept clear of the forms. Concrete shall not be permitted to fall from the end of the chutes by more than 1.0 m. Chutes, when approved for use shall have slopes not flatter than 1 vertical, 3 horizontal and not steeper than 1 vertical, 2 horizontal. Chutes shall be of metal or metal lined end of rounded cross section. The slopes of all chute sections shall be approximately the same. The slopes of all chute sections shall be approximately the same. The discharge end of the chutes shall be maintained above the surface of the concrete in the forms.

36.Placing by Pumping/Pneumatic Placers

Concrete may be conveyed and placed by mechanically operated equipment e.g., pumps or pneumatic placers only with the written permission of the Engineer-in-Charge at no extra cost. The slump shall be held to the minimum necessary for conveying concrete by this method.

When pumping is adopted, before pumping of concrete is started, the pipeline shall be lubricated with one or two batches of mortar composed of one part cement and two parts sand. Care shall be taken to avoid stoppages in work once pumping has started.

When a pneumatic placer is used, the manufacturer's advice on layout of the pipeline shall be followed to avoid blockages and excessive wear. Restraint shall be provided at the discharge box to cater for the reaction at this end. Manufacturer's recommendations shall be followed regarding concrete quality and all other related matters when pumping/ pneumatic placing equipment is used. It should be noted that no extra payment is made for these items, if required and directed by Engineer-in-Charge.

Concrete in layers

Concreting, once started, shall be continuous until the pour is completed. Concrete shall be placed in successive horizontal layers of uniform thickness ranging from 15 cm to 45 cm directed by Engineer-in-Charge. These shall be placed as rapidly practicable to prevent the formation of cold joints or planes of weakness between each succeeding layer within the pour. The thickness of each layer shall be such that it can be deposited before the previous layer has stiffened. The bucket loads or other units of deposit shall be spotted progressively along the face of the layer with such overlap as will facilitate spreading the layer to uniform depth and texture with a minimum shoveling. Any tendency to segregation shall be corrected by shoveling stones into mortar rather than mortar on to stones. Such a condition shall be corrected by redesign of mix or other means, as directed by the Engineer-in-charge.

37.Cover Blocks

Cover blocks of required size depending on the cover of the reinforcement as mentioned in the drawings should be prepared in 1:3 cement mortar with fine aggregates.

38.Bedding of layers

The top surface of each pour and bedding planes shall be approximately horizontal unless otherwise instructed. Top layer should be rough and with key for further extension of work.

39. Compaction

Concrete shall be compacted during placing with approved vibrating equipment until the concrete has been consolidated to the maximum practicable density, as specified in the IS, is free of pockets of coarse aggregate and fits tightly against all form surfaces, reinforcement and embedded fixtures. Particular care shall be taken to ensure that all concrete placed against the form faces and into corners of forms against hardened concrete at joints is free from voids or cavities. The use of vibrators shall be consistent with the concrete mix and caution exercised not to over vibrate the concrete to the point those segregation results.

40. Type of vibrators

Vibrators shall conform to BIS specifications. Type of vibrator to be used shall depend on the structures where concrete is to be placed. Shutter vibrators to be effective, shall be firmly secured to the formwork which must be sufficiently rigid to transmit the vibration and strong enough not to be damaged by it. Immersion vibrators in sufficient numbers and each of adequate size shall be used to properly consolidate all concrete. Tapping or external vibrating of forms by hand tools or immersion vibrators will not be permitted.

Use of Vibrators

The exact manner of application and the most suitable machines for the purpose must be carefully considered and operated by experienced men. Immersion vibrators shall be inserted vertically at

points not more than 450 mm apart and withdrawn when air bubbles cease to come to the surface. Immersion vibrators shall be withdrawn very slowly. In no case shall immersion vibrators be used to transport concrete inside the forms. Particular attention be paid to vibration at the top of a lift e.g. in a column or wall.

41.Melding Successive Batches

When placing concrete in layers, which are advancing horizontally as the work progresses, great care shall be exercised to ensure adequate vibration blending and melding of the concrete between the succeeding layers.

42.Penetration of Vibrators

The immersion vibrator shall penetrate the layer being placed and also penetrate the layer below while the under layer is still plastic to ensure good bond and homogeneity between the two layers and prevent the formation of cold joints.

43. Vibrating against Reinforcement

Care shall be taken to prevent contact of immersion vibrators against reinforcement steel. Immersion vibrators shall not be allowed to come in contact with reinforcement steel after start of initial set. They shall also not be allowed to come in contact with forms or finished surfaces.

44.Use of Form Attached Vibrators

Form attached vibrators shall be used only with specific authorization of the Engineer-in-Charge.

45. Use of surface vibrators

The use of surface vibrators will not be permitted under normal conditions. However, for thin slabs, surface vibrating by specially designed vibrators may be permitted, upon approval of Engineer-in-charge.

46.Stone Pockets and Mortar Pondages

The formation of stone pockets and mortar pondages in corners and against faces of forms shall not be permitted. In case of these occur, they should be dug out, reformed and refilled to sufficient depth and shape for thorough bonding, as directed by the Engineer-in-charge.

47.Placement Interval

Except when placing with slip forms, each placement of concrete in multiple lift work shall be allowed to set for at least 24 hours after the final set of concrete and before the start of a subsequent placement.

48.Special Provision in Placing

When placing concrete in walls with openings, in floors of integral slabs and beam construction and other similar conditions, the placing shall stop when the concrete reaches the top of the opening in walls or bottom horizontal surface of the slab, as the case may be. Placing shall be resumed before the concrete in place takes initial set, but not until it has had time to settle as determined by the Engineer-in-Charge.

49. Placing Concrete through Reinforcing Steel

When placing concrete through reinforcing steel, care shall be taken to prevent segregation of the coarse aggregate. Where the congestion of steel makes placing difficult, it may be necessary to obtain Engineer in-Charge's permission for temporarily moving the top steel aside for proper placement & for restoring reinforcement as per drawing.

50.Bleeding

Bleeding or free water on top of concrete being deposited into the forms shall be the cause to stop the concrete pour and the conditions causing this defect corrected before any further Concreting is resumed.

51.Application of Araldite for Bonding of New and Old Concrete

General

Araldite epoxy resins will be used to bond fresh concrete to concrete that is fully cured, to give a monolithic bond capable of transmitting high stresses when traditional bonding agents such as cement slurry cannot always be relied upon to provide good adhesion which is particularly the case when large areas are involved.

- The Araldite based formulation shall be applied to suitably prepare concrete sub-strata and fresh concrete poured as soon as possible, but always during the 'open time' of adhesive.
- Materials used shall be of best quality and approved by the Engineer.
- Manufacturer's instructions shall be followed in all respects.
- No separate payment shall be paid for this item of work.

52.Formulation

Araldite	GY250	100	Parts by weight
HardenerHY825	20		Parts by weight
HardenerHY830	20		Parts by weight
HardenerHY850	20		Parts by weight
Silica Flour	20		Parts by weight

53.Application

Preparation of the Substrata

To obtain good adhesion, it is necessary to have clean and sound substrata. Preparation can be carried out using a variety of techniques including chemical treatment and mechanical methods such as grinding, milling, and abrading, planning and sand blasting. Dust and loose particles resulting from the pre-treatment should be removed by vacuum cleaning or oil-free or blast.

54.Mixing

The resin and hardener should be thoroughly mixed in the dry filler. The mixed, ready to use adhesive should not contain lumps of un wetted filler and should be of uniform color. For a total weight of 1 kg or less hand mixing should be sufficient. For quantities in excess of 1 kg, the use of a mechanical mixer is recommended

Pot life and 'Open time'

The pot life is the period during which the ready to use ARALDITE based formulation must be applied. After this period, the mix can no longer be worked and will have begun to set in its container. The table below indicates the pot life at different temperatures:

Mix Temperature (Degree Celsius)	Pot life (minutes)
25	90
30	60
35	45
(The figures in this table are for batches less than 1 kilogram).	

The 'Open time' is the maximum period of time allowable between application of the ARALDITE adhesive and pouring the fresh concrete. Exceeding the 'Open time' would result in considerably reduced adhesion. The adhesive should be applied to the pre-treated substrata as soon as the components have been mixed and fresh concrete poured immediately afterwards. Accurate knowledge of the 'Open time' is essential in case the work is interrupted.

Table gives the 'Open time' of ARALDITE based formulations as a function of substrata temperature. In all cases, the adhesives shall be applied immediately after mixing. Any delay between mixing and application will reduce the 'Open time'. Fresh concrete must be poured before the adhesive begins to gel. New to old concrete bonding is not recommended at temperatures below 5oC, as curing cannot be assured under these circumstances.

55.Methods of Application

The shape and size of the concrete structure will determine the method of application used. The ARALDITE based adhesive may be applied by hand using brushed, brooms or any other suitable applicator.

56.Suitability of Fresh Concrete

Best results are obtained when the water/ cement ratio of the new concrete is low as is practicable.

57.Coverage

One kilogram of the mixed ARALDITE adhesive including hardeners and filler covers an area of 2 to 3 m². When applied with a stiff nylon bristle brush. However, the coverage is very much dependent on the finish in the concrete.

58.Handling Precautions

Epoxy resins can cause irritation of the skin in sensitive person if incorrectly handled. Certain safety precautions must therefore be observed and those handling the resins and hardeners should be given suitable instructions. Those working with epoxy resins should, above all, be instructed that personal cleanliness at the place of work is essential. The resin and hardener should not be allowed to come into direct contact with the skin. The most effective protection is achieved by wearing rubber or polythene gloves, the latter having the advantage that they can be replaced when dirty. They are more pleasant to wear if cotton gloves are worn underneath. Parts of the skins, which have come into contact with the resin or hardener, should be washed with lukewarm water and a mild soap. Special cleaning creams may be used as they have proved to be highly suitable.

59.Tolerances in Concrete Surfaces

- Concrete surfaces for the various classes of unformed and formed finishes specified in various clauses shall comply with the tolerances shown in Table hereunder, except where different tolerances are expressly required by the specification.
- In the table 'line and level' and 'dimension' shall mean the lines, levels and cross-sectional dimensions as specified and required.
- Surface irregularities shall be classified as 'abrupt' or 'gradual'. Abrupt irregularities include by shall not be limited to offsets and fins caused by displaced or misplaced formwork, loose knots and other defects in formwork materials, and shall be tested by direct measurement. Gradual irregularities shall be tested by means of a straight template for plane surfaces and 1.5 m long formed surfaces.

Class of finish	Maximum tolerance (mm) in:			
	Line & level	Abrupt irregularity	Gradual irregularity	Dimension
U 1	12	6	6	--
U 2	6	3	3	--
U 3	6	3	3	--
F 1	12	6	6	+12-6
F 2	6	6	6	+12-6
F 3	3	3	3	+6-6

60.Curing, Protecting, Repairing and Finishing

Curing

All concrete shall be cured by keeping it continuously damp for the period of time required for complete hydration and hardening to take place. Preference shall be given to the use of continuous sprays, or ponded water, continuously saturated coverings of sacking, canvas, hessian or other absorbent materials, or approved effective curing compounds applied with spraying equipment capable of producing a smooth, even textured coat. Extra precautions shall be exercised in curing concrete during cold and hot weather as outlined hereinafter. The quality of curing water shall be the same as that used for mixing concrete.

61.Curing with Water

Fresh concrete shall be kept continuously wet for a minimum period of 10 days from the date of placing of concrete, following a lapse of 12 to 14 hours after laying of concrete. The curing of horizontal surfaces exposed to the drying winds shall however begin as soon as the concrete has hardened. Water shall be applied to formed surfaces immediately upon removal of forms. Quantity of water applied shall be controlled so as to prevent erosion of freshly placed concrete.

62.Continuous Spraying

Curing shall be assured by use of an ample water supply under pressure in pipes, with all necessary appliances of hose, sprinklers and spraying devices. Continuous fine mist spraying or sprinkling shall be used, unless otherwise specified or approved by the Engineer-in-charge

63.Alternate Curing Methods

Whenever in the judgment of the Engineer-in-charge, it is necessary to omit the continuous spray method, a covering of clean sand or other approved means such as wet gunny bags, which will prevent loss of moisture from the concrete, may be used. No type of covering will be approved which would stain or damage the concrete during or after the curing period. Covering shall be kept continuously wet during curing period. For curing of concrete in sidewalks, floors, flat roofs of other level surfaces, the ponding method of curing is preferred. The method of containing the ponded water shall be approved by the Engineer-in-charge. Special attention shall be given to edges and corners of the slabs to ensure proper protection to these areas. The ponded areas shall be kept continuously filled with water during the curing period.

64.Curing Compound

Surface coating type-curing compounds shall be used only by special permission of Engineer-in-Charge. Curing compounds shall be liquid type white pigmented, conforming to US Bureau of Reclamation specification. No curing compound shall be used on surfaces where future blending with concrete, water of acid proof membrane or painting is specified.

65.Curing Equipment

All equipment & materials required for curing shall be on hand and ready for use before concrete is placed.

66.Protecting Fresh Concrete

Fresh concrete shall be protected from defacements and damage due to construction operations by leaving forms in place for an ample period. Newly placed concrete shall be protected by approved means such as tarpaulins from rain, sun and winds. Steps as approved by the Engineer-in-Charge shall also be taken to protect immature concrete from damage by debris, excessive lading, vibration, abrasion or contact with other materials, etc. that may impair the strength and/or durability of the concrete. Workmen shall be warned against and prevented from disturbing green concrete during its setting period. If it is necessary that the workmen enter the area of freshly placed concrete, the Engineer-in-Charge may require that bridges be placed over the area.

67.Repair and Replacement of Unsatisfactory Concrete

General

Immediately after the shuttering is removed, the surface of concrete shall be very carefully gone over and all defective areas called to the attention of the Engineer-in-charge who may permit patching of the defective areas or also reject the concrete unit either partially or in its entirety. Rejected concrete shall be removed and replaced by the contractor. Holes shall be filled with mortar composed of one part of cement to one and half parts of sand passing 2.36 mm IS sieve after removing any loose stones adhering to the concrete. Concrete surfaces shall be finished as described in specifications or as directed by the Engineer-in-charge. Superficial honey combed surfaces and rough patches shall be similarly made good immediately after removal of shuttering, in the presence of the Engineer-in-charge and superficial water and air holes shall be filled in. The mortar shall be well worked into the surface with a wooden float. Excess water shall be avoided. Unless instructed otherwise by the Engineer-in-charge, the surface of the exposed concrete placed against shuttering shall be rubbed down immediately on removal of shuttering to remove fine or other irregularities, care being taken to avoid damaging the surface. Surface irregularities shall be removed by grinding. If reinforcement is exposed or the honeycombing occurs at vulnerable positions e.g. ends of beams or columns, it may be necessary to cut out the member completely or in part and reconstruct. The decision of the Engineer-in-charge shall be final in this regard. If only patching is necessary, the edges being cut perpendicular to the affected surface or with a small undercut if possible. Anchors, tees or dovetail slots shall be provided whenever necessary to attach the new concrete securely in place. An area extending several centimeters beyond the edges and the surfaces of the prepared voids shall be saturated with water for 24 hours immediately before the patching material is placed.

68.Use of Epoxy

The use of epoxy for bonding fresh concrete used for repairs will be permitted upon written approval of the Engineer-in-charge. Epoxies shall be applied in strict accordance with the instructions of the manufacturer.

69.Method of Repair

Small size holes having surface dimensions about equal to the depth of the hole, holes left after removal of form bolts, grout insert holes and slots cut for repair of cracks shall be repaired as follows:

The hole to be patched shall be roughened and thoroughly soaked with clean water until absorption stops. A 5 mm thick layer of grout of equal parts of cement and sand shall be well brushed into the surface to be patched, followed immediately by the patching concrete which shall be well consolidated with a wooden float and left slightly protrude of the surrounding surface. The concrete patch shall be built up in 10 mm thick layers, after an hour or more, depending upon weather conditions, it shall be worked off flush with a wooden float and a smooth finish obtained by wiping with hessian. A steel trowel shall be used for this purpose. The mix for patching shall be of the same materials and in the same proportion as that used in the concrete being repaired, although some reduction in the maximum size of the coarse aggregates may be necessary and the mix shall be kept as dry as possible. Mortar filling by air pressure (gunniting) shall be used for repair of areas too large and/or too shallow for patching with mortar. Patched surfaces shall be given a final treatment to match the color and texture of the surrounding concrete. White cement shall be substituted for ordinary cement, if so directed by the Engineer-in-charge, to match the shade of the patch with the original concrete.

Curing of Patched Work

The patched area shall be covered immediately with an approved non-staining, water-saturated material such as gunny bags which shall be kept continuously wet and protected against sun and wind for a period of 24 hours. Thereafter, the patched area shall be kept wet continuously by a fine spray, or sprinkling for not less than 10 days. All fillings shall be tightly bounded to the concrete and shall be sound, free from shrinkage cracks after the fillings have been cured and dried.

Approval by the Engineer-in-Charge

All materials, procedures and operations used in the repair work shall be subject to the approval of the Engineer-in-Charge.

70.Finishing

General

The type of finish for formed concrete surfaces shall be as follows, unless varied by the Engineer-in-Charge. When the structure is in service all the surfaces shall receive no special finish, except repair of damaged or defective concrete, removal of fine and abrupt irregularities, filling defective concrete, filling of holes left by form ties and rods and clean up of loose or adhering debris. Surfaces which will be exposed to the weather and which would normally be level shall be sloped for drainage. Unless a horizontal surface or the slope required is specified, the tops of narrow surfaces such as stair treads, walls, curbs and parapets shall be sloped across the width approximately 1 in 30. Broader surfaces such as walkways and platforms shall be sloped about 1 in 50. Surfaces that will be covered by backfill or concrete, subfloors to be covered with concrete topping, terrazzo or quarry tiles and similar surfaces shall be smooth ascended and leveled to

produce even surfaces. Surface irregularities shall not exceed 6 mm. Surfaces which will not be covered by backfill, concrete or tile toppings such as outside decks, floors of galleries and sumps, parapets, gutters, side-walks, floors and slabs, shall be consolidated, screened and floated. Excess water and laitance shall be removed before final finishing. Floating may be done with hand or power tools and started as soon as the screened surface has attained a stiffness to permit finishing operations and these shall be the minimum required to produce a surface uniform in texture and free from screened marks or other imperfections. Joints and edges shall be tooled as specified or as directed by the Engineer-in-Charge.

71. Standard Finish for Exposed Concrete

Exposed concrete shall mean any concrete, other than floors or slabs, exposed to view upon completion of the works. Unless otherwise specified, the standard finish for exposed concrete shall be a smooth finish. A smooth finish shall be obtained with the use of lined or plywood forms having smooth and even surfaces and edges. Panels of forms shall be of uniform size and be as large as practicable and installed with closed joints. Upon removal of forms the joint marks shall be smoothed off and all blemishes, protections etc., removed leaving the surfaces smooth.

72. Integral cement concrete finish

When specified, integral cement concrete finish of specified thickness for floors and slabs shall be applied either monolithic or bonded, as specified or directed by the Engineer-in-charge. The surface shall be tested with a straight edge and any high and low spots eliminated. Floating or toweling of finish shall be permitted only after all surface water has evaporated. Dry cement or a mixture of dry cement & sand shall not be sprinkled directly on the surface of the cement finish to absorb moisture or to stiffen the mix.

73. Rubbed finish

A rubbed finish shall be provided only on exposed concrete surfaces. Upon removal of forms, all fins and other projections on the surfaces shall be carefully removed, offsets leveled and voids and/or damaged sections immediately saturated with water and repaired by filling with a concrete or mortar of the same composition as was used in the surface. The surfaces shall then be thoroughly wetted and rubbed with carborundum or other abrasive. Cement mortar may be used in the rubbing, but the finished surfaces shall not be brush coated with either cement or grout after rubbing. The finished surfaces shall present a uniform and smooth appearance.

74. Protection

All concrete shall be protected against damage until final acceptance by the Engineer-in-Charge.

Placing Concrete Underwater

- a. Under all ordinary conditions, all foundations shall be completely dewatered and concrete placed in the dry. However, when concrete placement under water is necessary, all work shall conform to IS: 456 and the procedure shall be as follows:

- Method of Placement: Concrete shall be deposited underwater by means of tremies, or drop bottom buckets of approved type.
 - Direction, Inspection and Approval: All work requiring placement of concrete underwater shall be designed, directed and inspected with due regard to local circumstances and purposes. All underwater concrete shall be placed according to specifications approved by Engineer-in-Charge.
- b. Special care shall be taken for prevention of lifting of concrete due to uplift pressure of subsoil water.

75.Precast Concrete

General

Precast concrete units, whether manufactured on or off site, shall comply in every way with the provisions of the contract for in situ concrete. Wherever possible, precast units shall be hydraulically pressed. When ready for incorporation in the works, precast units shall be responsible for the accuracy of the level, shape of the bed or platform. A suitable serial number and the date of casting shall be impressed or painted on each unit.

76.Stripping Forms

Side shutters shall not be struck in less than 24 hours after depositing concrete and no precast unit shall be lifted until the concrete reaches strength of at least twice the stress to which the concrete may be subjected to at the time of lifting.

77.Precast Units

The lifting and removal of precast units shall be undertaken without causing shock, vibration or undue bending stresses to or in the units. Before lifting and removal takes place, contractor shall satisfy the Engineer-in-charge or his representative that the methods he proposes to adopt for these operations will not over-stress or otherwise affect seriously the strength of the precast units. The reinforced side of the units shall be distinctly marked.

78.Curing

All precast work shall be protected from the direct rays of the sun for at least 7 days after casting and during that period each unit shall be kept constantly watered or preferably be completely immersed in water if the size of the unit so permits.

79.Slots, Openings, etc.

General

Slots, openings or holes, pockets, etc., shall be provided in the concrete work in the approved positions or as directed by Engineer-in-charge. Short pipes with puddle collar shall be fixed in the sidewall of suction pipes. They shall be supplied at the appropriate time during construction. Any deviation from the approved drawings shall be made good by contractor at own expense, without damaging any other work. Sleeves, bolts, inserts etc., shall also be provided in concrete work where so required.

80. Grouting

Standard Grout

The proportions of grout shall be such as to produce a flow able mixture consistent with minimum water content and shrinkage. Grout proportions shall be limited as per “Table: Proportions for Standard Grout.”

Table: Proportions for Standard Grout.

	Use	Grout thickness	Mix proportions	W/c ratio (max.)
1	Fluid	Under 25 mm	1 part cement:1 part	0.44
2	General	• 25mm & over but	1 part cement:2 parts sand	0.53
3	Stiff Mix	50mm & over	1 part cement:3 parts sand	0.53

Sand shall be such as to produce a flow able grout without any tendency to segregate. Sand for general grouting purposes shall be graded within the following limits:

- Passing BIS 2.36 mm sieve 95 to 100%
- Passing BIS 1.18 mm sieve 65 to 95%
- Passing BIS 300 micron sieve 10 to 30%
- Passing BIS 150 micron sieve 3 to 10%

Sand for fluid grouts shall have the fine material passing the 300 and 150 micron sieves at the upper limits specified above. Sand, for still grouts, shall meet the usual grading specifications for concrete laitance. Anchor bolts, anchor bolt holes and the bottoms of equipment and column base plates shall be cleaned of all oil, grease, dirt and loose material. The use of hot, strong caustic solution for this purpose will be permitted. Prior to grouting, the hardened concrete surfaces to be grouted shall be saturated with water. Water in anchor bolt holes shall be removed before grouting is started. Forms around base plates shall be reasonably tight to prevent leakage of the grout. Adequate clearance shall be provided between forms and base plate to permit grout to be worked properly into place. Grouting, once started, shall be done quickly and continuously to prevent segregation, bleeding and breakdown of initial set. Grout shall be worked from one side of one end to the other to prevent entrapment of air. To distribute the grout and to ensure more complete contact between base plate and foundation and to help release trapped air, link chains can be used

to work the grout into place. Grout throughout holes in base plates shall be by pressure grouting. Variations in grout mixes and procedures shall be permitted if approved by the Engineer-in-charge.

81.Non-Shrinking Grout for Equipment Foundation

Non-shrinking grout shall be used for grouting of machine base plates, anchor bolts, other anchoring devices and at locations where ordinary grouts are ineffective due to shrinkage. It shall be composed of a type of expansive hydraulic sheeting binder and select-graded aggregates. It shall have properties as per “ Table: Proportions for Non-Shrinking Grout”.

Table: Proportions for Non-Shrinking Grout

S.N.	Properties	Values
1	Maximum grain size	6 mm
2	Water % (for 80% flow)	15.17
3	Density of hardened grout	2.27 - 2.30 gm/ml
4	Compressive strength N/sq.mm	
	- Minimum 3 days	23
	- 7 days	34
	- 28 days	45
5	Expansion %	
	- Free	0.10 - 0.20
	- Restrained	0.08 - 0.12

Mixing, batching, cleaning, preparation of surface and curing of non-shrinking grout shall be done as per manufacturer's instructions.

83.Inspection

- All materials, workmanship and finished construction shall be subject to continuous inspection and approval of the Engineer-in-Charge.
- All materials supplied by the Contractor and all work or construction performed by the Contractor which is rejected as not being in conformity with the specifications and requirements, shall be immediately replaced.
- All concrete shall be protected against damage until final acceptance by the Engineer-in-Charge.

84.Clean-Up

- Upon completion of the concrete work, all forms, equipment, construction tools, protective coverings and any debris resulting from the work shall be removed from the premises.
- All debris i.e. empty containers, scrap wood, etc., shall be removed to “dump” daily, or as directed by the Engineer-in-Charge.
- Finished concrete surfaces shall be left in a clean condition satisfactory to the Engineer-in-Charge.

85.Records of Concreting

An accurate and up to date record showing times, dates, weather and temperature conditions when various positions of all the concrete structures forming the works were concreted will be kept by the Engineer-in-charge and shall be countersigned by the Contractor. If the Contractor fails to sign

the Engineer-in-Charge's record; it shall nevertheless be regarded as correct and binding on the Contractor. The Contractor has to submit concrete pour card in duplicate duly to be signed to the Engineer-in-Charge for each type of concreting work. Contractor shall keep copy of it, after Engineer-in-Charge has checked and signed the pour card.

86. Supply of Cement

Contractor shall procure / purchase the cement and shall be stacked and well maintained as specified in the earlier sections. Contractor shall procure cement in those quantities required for maximum one month of concreting work and more than the prescribed time limit is not allowed. For any damage to cement the contractor will be responsible and the damaged cement should not be used in the work.

87. Foundation Bedding, Bonding and Jointing

- a. All surfaces upon or against which concrete will be placed shall be suitably prepared by thoroughly cleaning, washing and dewatering, as specified or as the Engineer-in-charge may direct, to meet the various situations encountered in the work.
- b. Soft or spongy areas shall be cleaned out and backfilled with lean concrete or clean sand fill compacted.
- c. Prior to construction of formwork for any item where soil will act as bottom form, approval shall be obtained from the Engineer-in-Charge for the suitability of the soil.

88. Preparation of Rock Strata of Foundations

- a. To provide tight bond with rock foundations, the rock surface shall be prepared and the following general requirements shall be observed.
- b. Concrete shall not be deposited on large sloping rock surfaces. Where required by the Engineer-in-charge, the rock shall be cut to form rough steps or benches to provide roughness or a more suitable bearing surface.
- c. Rock foundation stratum shall be prepared by picking, barring, wedging and similar methods which will leave the rock in an entirely sound and unshattered condition.
- d. Shortly before concrete is placed, the rock surface shall be cleaned with high pressure water and air jet even though it may have been previously cleaned in that manner.
- e. Prior to placing concrete, the rock surface shall be kept wet for a period of 2 to 4 hours unless otherwise directed by the Engineer-in-Charge.
- f. Before placing concrete on rock surfaces all water shall be removed from depressions to permit thorough inspection and proper bonding of the concrete to the rock.

SUB-SECTION-6

FORMWORK

1.Fixing of Formwork

All formwork shall be constructed of plywood or sheet metal. Plywood used for form work shall be conforming to IS: 4990 i.e. Specification for plywood for concrete shuttering works. The materials for form work shall get approved by the Engineer before starting the work. Form work shall be firmly supported, adequately strutted, braced and tied to withstand the placing and vibrating of concrete and the effects of weather. The tolerance on line and level shall not exceed 3 mm and the soffits of beams other than pre-stressed beams shall in the absence of any specified camber, be erected with an upward camber of 6 mm for each 3 meters of span.

The Contractor shall be responsible for the calculations and designs for the formwork, and if required, shall submit them to the Engineer for approval before construction. on formwork to external faces which will be permanently exposed, all horizontal and vertical formwork joints shall be so arranged that joint lines will form a uniform pattern on the face of the concrete. Where the Contractor proposes to make up the formwork for standard sized manufactured formwork panels, the size of such panels shall be approved by the Engineer before they are used in the construction of the Works. The finished appearance of the entire elevation of the structure and adjoining structures shall be considered when planning the pattern of joint lines caused by formwork and by construction joint to ensure continuity of horizontal and vertical lines. Faces of formwork in contact with concrete shall be free from adhering foreign matter, projecting nails and the like, splits or other defects, and all formwork shall be clean and free from standing water, dirt, shavings, chippings or other foreign matter. Joints shall be sufficiently watertight to prevent the escape of mortar or the formation of fins or other blemishes on the face of the concrete.

Formwork shall be provided for the top surfaces of sloping work where the slope exceeds 150 from the horizontal (except where such top surface is specified as spaded finish) and shall be anchored to enable the concrete to be properly compacted and to prevent flotation, care being taken to prevent air being trapped.

Openings for inspection of the inside of the formwork and for the removal of water used for washing down shall be provided and so formed as to be easily closed before placing concrete. Before placing concrete, all bolts, pipes or conduits or other fixtures which are to be built in shall be fixed in their correct positions, and cores and other devices for forming holes shall be held fast by fixing to the formwork or otherwise. Holes shall not be cut in any concrete without approval of the Engineer.

All exterior angles on the finished concrete of 900 or less shall be given 20 mm x 20 mm chamfers unless otherwise ordered by the Engineer.

No ties or bolts or other device shall be built into the concrete for the purpose of supporting formwork without the prior approval of the Engineer. The whole or part of any such supports shall be capable of removal so that no part remaining embedded in the concrete shall be nearer than 50 mm from the surface in the case of reinforced concrete and 150 mm in the case of un-reinforced concrete. Holes left after removal of such supports shall be neatly filled with well rammed dry-pack mortar.

Formwork in contact with the concrete shall be treated with a suitable non-staining mould oil to prevent adherence of the concrete except where the surface is subsequently to be rendered. Care shall be taken to prevent the oil from coming in contact with reinforcement or with concrete at construction joints. Surface retarding agents shall be used only where ordered by the Engineer.

2. Removal of Formwork

Formwork shall be so designed as to permit any removal without resorting to hammering or levering against the surface of the concrete. The periods of time elapsing between the placing of the concrete and the striking of the loads likely to be imposed on the concrete and shall in any case be not less than the periods showed in Table below. Where soffit formwork is constructed in a manner during and after such removal of a sufficient number of adequate supporting props in an undisturbed condition, the Contractor may, with the agreement of the Engineer, remove the formwork at the earlier times listed below provided that the props are left in position.

Position of Form Work	Days for Striking
Walls	1
Sides of beams and columns	2
Slabs (Drops left under)	3
Props to slabs (Span not exceeding 4.5 m)	7
Props to slabs (span exceeding 4.5 m)	14
Beams soffits (props left under)	7
Props to beams (Span not exceeding 6 m)	14
Props to beams (span exceeding 6 m)	21

Notwithstanding the foregoing, the Contractor shall be held responsible for any damage arising from removal of formwork before the structure is capable of carrying its own weight and any incidental loading.

Striking shall be done slowly with utmost care to avoid damage to projections and without shock or vibration, by gently easing the wedges. If after removing the form work it is found that timber has been embedded in the concrete. It shall be removed and made good as specified earlier.

Reinforced temporary openings shall be provided, as directed by the Engineer, to facilitate removal of formwork which otherwise may be inaccessible.

The rods, clamps, form bolts, etc. which must be entirely removed from walls or similar structures shall be loosened not sooner than 24 hours not later than 40 hours after the concrete has been deposited. Ties, except those required to hold forms in place, may be removed at the same time. Ties, withdrawn from walls and grade beams shall be pulled toward the inside face. Cutting ties back from the faces of the walls and grade beams will not be permitted.

For liquid retaining structures, no sleeves for through bolts shall be used nor shall through bolts be removed as indicated above. The bolts, in this case, shall be cut at 25 mm depth or more from the surface and then the hole shall be made good by cement sand mortar of the same proportions as the concrete just after striking the formwork.

3. Formed Surfaces – Classes of Finish

Finishes to formed surfaces of concrete shall be classified as F1, F2, or F3, or such other special finish as may be particularly specified. If class of finish is not specified the concrete shall be finished to Class F1. Formwork for Class F3 finish shall be lined with as large panels as possible of non-staining material with a smooth unblemished surface such as sanded plywood or hard compressed fiber board, arranged in a uniform approved pattern and fixed to back formwork by oval nails. Enfaced wrought boarding or standard steel panels shall not be permitted.

Formwork for Class F2 finish shall be faced with wrought tongued and grooved boards or plywood or metal panels arranged in a uniform approved pattern free from defects likely to detract from the appearance of the surface.

Formwork for Class F1 finish shall be constructed in sheet metal. Surfaces subsequently to be rendered, plastered or tiled shall be adequately scabbled or hacked as soon as the formwork is removed to reduce the irregularities to not more than half the thickness of such rendering, plastering or bedding for tiles and to provide a satisfactory key.

4. Defects in Formed Surfaces

Workmanship in formwork and concreting shall be such that concrete shall normally require no making good, surfaces being perfectly compacted and smooth.

If any blemishes are revealed after removal of formwork, the Engineer's decisions concerning remedial measures shall be obtained immediately. These measures may include, but shall not be limited to the following:

- i) Fins, pinhole bubbles, surface discoloration and minor defects may be rubbed down with sacking immediately after the formwork is removed.
- ii) Abrupt and gradual irregularities may be rubbed down with carborundum and water after the concrete has been fully cured. These and any other defects shall be remedied by methods approved by the Engineer which may include using a suitable epoxy resin or, where necessary, cutting out to a regular dovetails shape at least 75 mm deep and refilling with concrete over steel mesh reinforcement sprung into the dovetail.

5. Holes to be Filled

Holes formed in concrete surfaces by formwork supports or the like shall be filled with dry-pack mortar made from one part by weight of ordinary Portland cement and three parts fine aggregate passing IS sieve 1.18 mm. The mortar shall be mixed with only sufficient water to make the materials stick together when being moulded in the hands.

The contractor shall thoroughly clean any hole that is to be filled with dry-pack mortar and where the surface has been damaged, the contractor shall break out any loose, broken or cracked concrete or aggregate. The concrete surrounding the hole shall then be thoroughly soaked after which the surface shall be dried so as to leave a small amount of free water on the surface. The surface shall then be dusted lightly with ordinary Portland cement by means of a small dry brush until the whole surface that will come into contact with the dry-pack mortar has been covered and darkened by absorption of the free water on the surface. The surface shall then be dusted lightly with ordinary Portland cement by means of a small dry brush until the whole surface that will come into contact with the dry-pack mortar has been covered and darkened by absorption of the free water by the cement. Any dry cement in the hole shall be removed.

The dry-pack material shall then be placed and packed in layers having a compacted thickness not greater than 15 mm. The compaction shall be carried out by use of a hardwood stick and a hammer and shall extend over the full area of the layer, particular care being taken to compact the dry-pack against the sides of the hole. After compaction, the surface of each layer shall be scratched the dry-pack fill and striking the block several times. Steel finishing tools shall not be used and water shall not be added to facilitate finishing.

6.Tolerances

Tolerance is a specified permissible variation from lines, grade or dimensions given in approved drawings. No tolerance specified for horizontal or vertical building lines or footings shall be construed to permit encroachment beyond the legal boundaries. Unless otherwise specified, the following tolerances will be permitted:

Tolerances for RCC Structures

- i) Variation from the plumb
 - a) In lines and surfaces of columns, piers, walls 5 mm per 2.5 m or 25 mm, whichever is less?
 - b) For exposed corner columns and other conspicuous lines
 - In any bay or 5 m maximum 5 mm
 - In 10 m or more 10 mm
- ii) Variation from the level or from the grades indicated on the approved drawings
 - a) In slab soffits, ceilings, beam soffit, and in arises
 - In 2.5 m 5 mm
 - In any bay or 5 m maximum 10 mm
 - In 10 m or more 15 mm
 - b) For exposed lintels, sills, parapets, horizontal grooves and other conspicuous lines
 - In any bay or 5 m maximum 5 mm
 - In 10 m or more 10 mm
- iii) Variation of the linear building lines from established position in plan and related position of columns, wall and partitions
 - In any bay or 5 m maximum 10 mm
 - In 10 m or more 20 mm
- iv) Variation in the sizes and locations of sleeves, openings in walls and floors except in the case of and for anchor bolts 5 mm
- v) Variation in cross sectional dimensions of columns and beams and in the thickness of slabs and walls
 - Minus 5 mm
 - Plus 10 mm
- vi) Footings
 - a) Variation in dimension in plan
 - Minus 5 mm
 - Plus 10 mm
 - b) Misplacement or eccentricity 2% of footing width in the direction of misplacement but not more than 50 mm
 - c) Reduction in thickness Minus 5% of specified thickness subject to a maximum of 50 mm
- vii) Variation in steps
 - a) In a flight of stairs
 - Rise 3 mm
 - Tread 5 mm

b)	In consecutive steps	
	Rise	1.5 mm
	Tread	3 mm

Tolerances in other Concrete Structures

viii) All structures

- | | | |
|----|---|-------|
| a) | Variation of the constructed linear outlines from established position in plan | |
| | In 5 m | 10 mm |
| | In 10 m or more | 15 mm |
| b) | Variations of dimensions to individual structural features from established positions | |
| | In 20 m or more | 25 mm |
| | In buried construction | 50 mm |

- | | | |
|----|---|-------|
| c) | Variation from plumb, from specified batter or from curved surfaces of all structures | |
| | In 2.5 m | 10 mm |
| | In 5 m | 15 mm |
| | In 10 m or more | 25 mm |

In buried construction twice the above amounts

- d) Variation in level or grade indicated on approved drawings in slab, beams, soffits, horizontal grooves and visible arises

- | | | |
|----|--|-------------------------|
| | In 2.5 m | 5 mm |
| | In 7.5 m or more | 10 mm |
| | In buried construction | twice the above amounts |
| e) | Variation in cross-sectional dimensions of columns, beams, buttresses, piers and similar members | |
| | Minus | 5 mm |
| | Plus | 10 mm |

ix) Footings for columns, piers, walls, buttresses and similar members

- | | | |
|----|---|-------|
| a) | Variation of dimensions in plan | |
| | Minus | 10 mm |
| | Plus | 50 mm |
| b) | Misplacement or eccentricity | |
| | 2% of footing width in the direction of misplacement but not more than 50 mm. | |
| c) | Reduction in thickness | |
| | 5% of specified thickness subject to a maximum of 50 mm | |

- x) Tolerance in other types of structures shall generally conform to those given in Clause 2.4 of Recommended Practice for Concrete Formwork (American Concrete Institute Act 347).

xi) Tolerance in fixing anchor bolts shall be as follows:

- | | | |
|----|------------------------------|----------------------------------|
| a) | Anchor bolts without sleeves | + 5 mm |
| b) | Anchor bolts with sleeves | + 5 mm for bolts up to 20 mm dia |
| | | + 3 mm for bolts above 32 mm dia |
| c) | Embedded parts | + 5 mm in all directions |

7. Bracing, Struts and Props

Formwork shall be braced, strutted, propped and so supported that it shall not deform under weight and pressure of the concrete and also due to the movement of men and other materials. Bamboos shall not be used as props or cross bearers.

The formwork for beams and slabs shall be so erected that the formwork on the sides of the beams and under the soffit of slabs can be removed without disturbing the beam bottoms. Re-propping of beams shall not be done except when props have to be reinstated to take care of construction loads anticipated to be in excess of the design load. Vertical props shall be supported on wedges or other measures shall be taken whereby the props can be gently lowered vertically while striking the formwork.

If the formwork for a column is erected for the full height of the column, one side shall be left open and built up in sections as placing of the concrete proceeds, or windows may be left for pouring concrete from the sides to limit the drop of concrete to 1.0 m as directed by the Engineer.

SUB-SECTION-7

REINFORCEMENT

1.General

Reinforcement shall be high strength deformed bars as per IS: 1786. Wire mesh or fabric shall be in accordance with IS: 1566. Substitution of reinforcement will not be permitted except upon written approval of the Engineer.

2.Storage

The reinforcement shall not be kept in direct contact with the ground but stacked on top of an arrangement of timber sleepers or the like.

If the reinforcing rods have to be stored for a long duration, they shall be coated with cement wash before stacking and/or be kept under cover or stored as directed by the Engineer.

Fabricated reinforcement shall be carefully stored to prevent damage, distortion, corrosion & deterioration.

3.Quality

No re-rolled material will be accepted. If requested by the Engineer, the contractor shall submit the manufacturer's test certificate for the steel. Random tests on steel supplied by the contractor may be performed by the Engineer as per relevant Indian Standards. All costs incidental to such tests shall be at the contractor's expenses. Steel not conforming to specifications shall be rejected.

All reinforcements shall be clean, free from grease, oil paint, dirt, loose mill scale, loose rust, dust bituminous material or any other substances that will destroy or reduce the bond. All rods shall be thoroughly cleaned before being fabricated. Pitted and defective rods shall not be used. No welding of rods to obtain continuity shall be allowed unless approved by the Engineer. If welding is approved, the work shall be carried out as per IS: 2751 according to the best modern practices and as directed by the Engineer. In all cases of important connections, tests shall be made to prove that the joints are of full strength of bars welded. Special precautions, as specified by the Engineer, shall be taken in the welding of cold worked reinforcing bars and bars other than mild steel.

4.Laps

Laps and splices for reinforcement shall be as per IS: 456. Splices in adjacent bars shall be staggered and the locations of all splices shall be approved by the Engineer.

5.Bending

Reinforcement bars supplied bent or in coils, shall be straightened before they are cut to size. Straightening of bars shall be done cold and without damaging the bars. All bars shall be accurately bent according to the sizes and shapes shown on the approved detailed working drawings/bar bending schedules. They shall be bent gradually by machine or other approved means. Reinforcing bars shall not be straightened and re-bent in a manner that will injure the material; bars containing cracks/splits shall be rejected. They shall be bent cold, except bars of over 25 mm in diameter which may be bent hot if specifically approved by the Engineer. Bars which depend for their strength of cold working shall not be bent hot. Bars bent hot shall not be treated beyond cherry red colour (nor exceeding 845°C) and after bending shall be allowed to cool slowly without quenching. Bars incorrectly bent shall be used only if the means used for straightening and re-bending be such as shall not, in the opinion of the Engineer, injure the material. No reinforcement shall be bent when in position in the work without approval, whether or not it is partially embedded in hardened concrete. Bars having kinks or bends other than those required by design shall not be used.

6.Fixing

Reinforcement shall be accurately fixed by any approved means and maintained in the correct position shown in the approved Drawings by the use of blocks, spacers and chairs, as per IS:2502, to prevent displacement during placing and compaction of concrete. Bars intended to be in contact at crossing points shall be securely bound together at all such points with number 16 gauge annealed soft iron wire. The vertical distances required between successive layers of bars

in beams or similar members shall be maintained by the provision of mild steel spacer bars at such intervals that the main bars do not perceptibly sag between adjacent spacer bars.

7.Nominal Cover to Reinforcement

Nominal cover is the design depth of concrete cover to all steel reinforcements, including links. It is the dimension used in design and indicated in the drawings. It shall be not less than the diameter of the bar.

Minimum values for the nominal cover of normal weight aggregate concrete which should be provided to all reinforcement, including links depending on the condition of exposure described in Clause-8.2.3 and as given in Table –16 of IS:456/2000.

However for a longitudinal reinforcing bar in a column nominal cover shall in any case not be less than 40 mm, or less than the diameter of such bar. In the case of columns of minimum dimension of 200 mm or under, whose reinforcing bars do not exceed 12 mm, a nominal cover of 25 mm may be used. For footings minimum cover shall be 50 mm.

Table IS: 456 - 2000 – Nominal cover to meet Durability Requirements

Exposure	Normal Concrete cover in mm not less than	
Mild	20	
Moderate	30	
Severe		45
Very severe		50
Extreme	75	

The correct cover shall be maintained by cement mortar cubes or other approved means. Reinforcement for footings, grade beams and slabs on sub-grade shall be supported on pre-cast concrete blocks as approved by the Engineer. The use of pebbles or stones shall not be permitted.

The 28 days crushing strength of cement mortar cubes/precast concrete cover blocks shall be at least equal to the specified strength of concrete in which these cubes/blocks are embedded.

The minimum clear distance between reinforcing bars shall be in accordance with IS: 456.

8.Inspection

Erected and secured reinforcement shall be inspected and approved by the Engineer prior to placement of concrete.

9.Welding of Reinforcement

Reinforcement which is specified to be welded shall be welded by any process which conforms with the requirements of IS:2751 and which the Contractor can demonstrate by bend and tensile tests will ensure that the strength of the parent metal is not reduced and that the weld possesses a strength not less than that of the parent metal. The welding procedure established by successful test welds shall be maintained and no departure from this procedure shall be permitted.

Welds in positions other than those shown on the approved Drawings shall not be permitted. Tack welding to lightly secure reinforcement in place will be permitted subject to approval of the Engineer.

10. Supply of Reinforcing Bars

Contractor shall make their own arrangements for the supply of steel reinforcement, high yield strength (fe 500D) deformed bars etc. required for the works. Further, the Contractor shall be responsible for payments of applicable duties and taxes etc.

SUB-SECTION – 8

PIPE LINE APPURTENANCES

1.MANHOLES

Manholes shall be constructed in RCC on the drains in the positions shown in the drawings or in such position as the Engineer may direct. The work shall be done strictly in accordance with the detailed drawings except where alterations are required by the Engineer. The excavation shall not be larger than sufficient to admit of the trench being properly timbered.

The bottom of the excavation shall be properly leveled up, rammed and a bed of concrete laid thereon. When the concrete has sufficiently set the construction of the brick walls shall then be proceeded with and all stoneware pipe connections through the walls shall be made and all ironwork fixed in as constructions proceeds.

Manholes shall be topped with a circular frame with cover or cover of such pattern may be ordered by the Engineer. The manhole frame shall be fixed to the top in cement concrete.

The Contractor shall include in his prices for completing all manholes in accordance with the drawings.

The manhole shall be provided with extra heavy duty FRC manhole cover frame of size 560 mm dia for manholes.

The following Indian Standards and its latest revisions shall be applicable for the works included in the contract unless otherwise mentioned below: IS: 4111(part1)-1986

- i) The manhole shaft and corbelling portion shall be constructed with RCC M25 grade. The thickness of corbelling and the barrel thickness is to be provided as per details of the construction drawings .
- ii) Depth
The depth of the manholes shall be reckoned from the ground level/road level to the top of raft.
- iii) Rungs
Rungs shall be provided in all manholes and shall be of plastic coated steps and of suitable dimensions as per IS: 5455-1969. These rungs may be 300 mm apart vertically and shall project a minimum of 100 mm beyond the finished surface of the manhole wall. The top rung shall be 450 mm below the manhole cover and the lowest not more than 300 mm above the benching.
- iv) FRC Manhole covers and frames
The size of manhole covers shall be such that there shall be clear opening of not less than 560 mm diameter for manholes. When heavy duty fiber reinforced concrete manhole covers and frames are used they shall conform to IS: 1728 (Parts 1) 1974. The frames of manhole shall be firmly embedded in concrete alignment and level in plain concrete on the top.

2.Drop Manholes

Wherever the difference between the invert levels of downstream pipe and upstream pipe is greater than 60 cm, a drop manhole shall be provided at that position. The locations of the drop manholes shall be provided in construction drawings.

SUB-SECTION 09

RCC SOCKET SPIGOT NON-PRESSURE PIPES

1.GENERAL

RCC NP3 class pipes shall be used. These pipes shall be in accordance with the specifications mentioned in IS: 458-1988 with amendments NO.1 & 2 and subsequent modifications made thereon, if any.

2.MATERIALS

For pre cast concrete pipes, materials complying with the requirements given in (i) to (v) shall be used.

- i) Cement: Cement used for the manufacture of reinforced concrete pipes shall conform to IS: 2691989.
- ii) Aggregates: Aggregates used for the manufacture of reinforced concrete pipes shall conform to IS: 3831970. The maximum size of aggregate should not exceed one third the thickness of the pipe or 20 mm, whichever is smaller.
- ii) Reinforcement: Reinforcement used for the manufacture of the reinforced concrete pipes shall be mild steel Grade I or medium tensile steel bars conforming to IS: 226-1975. Where soft grade wire is used, it shall conform to IS: 280-1978.
- iv) Concrete or Mortar: Concrete used for the manufacture or reinforced cement concrete pipes and collars shall conform to IS: 456-1978 and shall also be in accordance with Concrete and Allied works Section of Technical Specifications.
The concrete for non-pressure pipes shall have a minimum compressive strength of 20 N/mm² at 28 days. If mortar is used, it shall have a minimum cement content of 450kg/m³ and a compressive strength not less than 20 N/mm² at 28 days. Compressive strength tests shall be conducted on 15 cm cubes in accordance with the relevant requirements of IS: 456-1978 and IS: 516-1959.
The manufacturer shall give a certificate indicating quantity of cement in the concrete mix.
- v) Rubber Ring: Rubber ring chords used in pipe Joints shall conform to Type 1A of IS: 5382-1985.

3.DESIGN

- i) General

Reinforced concrete pipes either spun or cast shall be designed such that the maximum tensile stress in the circumferential steel due to specified hydrostatic test pressure does not exceed the limit of 125 N/mm² in the case of mild steel rods, 140 N/mm² in the case of hard-drawn steel wires and high strength deformed steel bars and wires, the barrel thickness shall be such that under the specified hydrostatic test pressure, the maximum tensile stress in concrete, when considered as effective to take stress along with the tensile reinforcement shall not exceed 2 N/mm² but the wall thickness shall be as per IS:458-1988.

Longitudinal reinforcement shall be provided to ensure rigidity and correct location of cages (grids)

longitudinally and to limit the effects of transverse cracking. Minimum longitudinal reinforcement shall be as given in Table 2 of 7 of IS:458.

ii) Reinforcement

The reinforcement in the reinforced concrete pipe shall extend throughout the length of the pipe and shall be so designed that it may be readily placed and maintained to designed shape and in the proper position within the pipe mould during the manufacturing process. The circumferential and longitudinal reinforcement shall be adequate to satisfy the requirements specified under (i) above. The pitch of circumferential reinforcement shall be not more than the following:

- a) 200 mm for pipes of nominal internal diameter 80 to 150 mm,
- b) 150 mm for pipes of nominal internal diameter 200 to 350 mm, and
- c) 100 mm for pipes of nominal internal diameter 400 mm and above.

The pitch shall also be not less than the maximum size of aggregate plus the diameter of the reinforcement bar used.

The quantity and disposition of steel in pipes may be decided by mutual agreement between the PIU ERA and the supplier; however, it shall be proved by calculations and tests that the quality of the pipes conforms to all the requirements specified in the standard. In the absence of calculations and tests, the reinforcement given in Tables 2 to 7 of IS:458 shall be used as minimum reinforcement.

If so required by the Engineer, the manufacturer shall give a certificate indicating the details relating to quality, quantity and dispersion of steel in the pipes as well as the clear cover to the steel provided in the pipe.

iii) Ends of Pipes

Dimensions of spigot and socket for rubber ring roll on jointed pipes shall be as given in Tables 9 to 13 of IS:458. Reinforcement in socket of rubber ring jointed pipes shall be as given in Table 14 of IS458-1988.

4.MANUFACTURE

i) General

The methods of manufacture shall be such that the form and dimensions of the finished pipe are accurate within the limits specified in this standard. The surfaces and edges of the pipes shall be well defined and true, and their ends shall be square with the longitudinal axis.

ii) Concrete mixing

Concrete shall be mixed in a mechanical mixer. Mixing shall be continued until there is a uniform distribution of the materials and the mass is uniform in colour and consistency, but in no case shall mixing be done for less than two minutes. Water-cement ratio shall be less than 0.5.

The concrete shall be placed before setting has commenced. It should be ensured that the concrete is not dropped freely so as to cause segregation. The concrete shall be consolidated by spinning.

Vibrating, spinning combined with vibrations, or other appropriate mechanical means.

iii) Reinforcement Cages

Reinforcement cages for pipes shall extend throughout the pipe barrel. The cages shall consist of spirals or rings and straight of hard-drawn steel wire or mild steel rod and may be circular. Circular cages and longitudinal reinforcement shall be placed symmetrically with respect to the thickness of the pipe wall. The spirals shall end in a complete ring at both the ends of a pipe.

Pipes having barrel thickness above 75 mm shall have double reinforcement cage and the amount of steel in the outer cage shall be 75% of the mass of the inner cage whilst the total shall conform to the requirements specified in the relevant tables of this standard. The total longitudinal steel pipe shall be given in the relevant tables of the standard but the distribution shall be such that the round shape of the cage is not disturbed.

Diagonal reinforcement may be provided in pipes for which the cages are not welded so as to help in binding the cage securely. It shall, however, be ensured that the clear cover for any reinforcement is not below the limits specified in 5.4 of IS 458. If diagonal reinforcement is provided, it shall be considered as part of the longitudinal reinforcement given III Tables 2 to 7 of IS.458. Single reinforcement cage shall be located near the inner surface of the pipe with adequate clear cover.

iii) Water Curing

Pipes manufactured in compliance with this standard shall be water cured for a period of not less than 2 weeks in case of pipes made from ordinary Portland Cement or Portland slag cement or Portland pozzuolana cement or hydrophobic Portland cement, and not less than 1 week in case of pipes made from rapid-hardening Portland cement or 43 grade ordinary Portland cement. Pipes may be water-saturated material or by a system of perforated pipes, mechanical sprinklers, porous hose, or by any other approved method that will keep the pipe moist during the specified curing period. In the case of large pipe projecting partly above the water level, the projected portion shall be kept wet by any suitable means.

5. DIMENSIONS

i) Pipes

The internal diameter, wall thickness, length of pipes, minimum reinforcements and strength test requirements for different classes of pipes shall be as specified in Tables 1 to 7 of IS 458. The manufacturer shall inform the PIU of the effective length of spigot and socket that he is able to supply. All the Pipes shall be manufactured using Sulphate resistant cement. The ends of the pipes shall conform to Clause 5.3 of IS 458 as applicable for S&S joints. The rubber ring shall conform to IS 5382 and IS 12820 as applicable for drainage pipe lines and shall be of type 'IA'. The diameters of pipes shall be as required for drainage pipes as per designs and drawings.

The method of manufacture shall be such that the form and dimensions of the finished pipes are accurate within the limits specified in relevant IS: 458. Pipes manufactured in compliance with IS: 458 shall be either water cured or steam cured in accordance with the relevant requirements of IS: 458.

The Internal diameter, wall thickness, length of barrel, reinforcement (longitudinal and spiral), type of ends and minimum clear cover to reinforcement, strength test requirements, tolerances on - overall length, internal diameter or dimensions of sockets / spigots of pipes shall be as per the relevant clauses / tables of IS: 458. Minimum clear cover to reinforcement shall be 15 mm. The tolerances regarding overall length, internal diameter of pipes or socket and barrel wall thickness shall be as per relevant clauses of IS: 458. Each pipe can be in lengths of 2 m to 4 m based on availability, ease in handling, transportation and laying.

Dimensions		Tolerances	
a.	Overall length		+1% of standard
	length		
b.	Internal diameter of pipes/socket:		
	i) up to and including 300 mm		+ 3 mm
	ii) Over 300 mm up to and including 600 mm		+ 5 mm
	iii) Over 600 mm up to and including 300 mm to 800 mm		+ 7 mm
	iv) over 300 mm to 800 mm		+ 10mm
c.	Up to 30 mm (Including)		+/- 2 mm
i.	Over 30 mm up to and including 50 mm		+/- 3 mm
ii.	Over 50 mm up to and including 65 mm		+/- 4 mm
iii.	Over 65 mm up to and including 80 mm		+/- 5 mm
iv.	Over 80 mm up to and including 95 mm		+/- 6 mm
v.	Over 95 mm		+/- 7 mm

The workmanship and finish for the pipe will conform to the relevant Standard Specifications. Cleaning of pipes shall conform to Standard Specifications. Jointing of pipes with Spigot and socket joints shall conform to Standard Specifications.

6. Testing of pipes during manufacture

During manufacture, tests on concrete shall be carried out as per IS: 456. The specimen of pipes for the following tests shall be selected in accordance with Sub-Clause 9.1 of IS: 458 and tested in accordance with the methods described in IS: 3597:

1. Hydrostatic testing
2. Three edge bearing test
3. Absorption test

7. Laying of the pipe

Laying of concrete pipes shall conform to the Code of practice of IS: 783. Pipes shall be laid underground with a minimum earth cover of 1.0m. Pipes shall be generally laid in sections of 300 m each. Laying of pipes shall be as per Clause 15, Standard Specifications for Procurement of Project Works. All pipes, fittings and material shall be tested and approved by the Engineer before being laid. Any pipes, fittings or material placed before they are tested and approved shall be removed and replaced with tested and approved material. Before laying the pipe, necessary bedding shall be provided wherever required as per Sub-Clauses 6.4.1, 6.4.2, 6.4.3 and 6.4.4 of this section.

Pipes and fittings shall be laid and jointed in accordance with all relevant recommendations of the manufacturer. Any variations between the manufacturer's recommendations and this specification shall be highlighted in the Contractor's Method Statements and a ruling will be given with the Engineer's agreement. Pipes and fittings shall be checked for soundness and be thoroughly cleaned out immediately prior to laying and jointing.

The setting of the pipeline to the required levels and alignment shall be carried out by approved procedure such as boning between sight rails or the use of laser systems. Sight rails, if used, shall be at a suitable height vertically above the line of pipes or immediately adjacent thereto, and there shall, at no time, be less than three sight rails in position on each length of pipelines under construction to any one gradient. Large diameter pipes, 1000 mm diameter or greater, shall be individually set to level and line by instrument.

For pipelines laid in trenches and headings the permissible tolerances in line and level unless otherwise specified shall be ± 3 mm in level and ± 12 mm from centre line between manholes or access points. Also where a gravity pipeline shown as a straight line between manholes it will not be accepted as having passed the final test unless a full circular light can be sighted through the bore of the pipe for the length concerned.

8. Jointing of pipes

The pipe joints shall be of flexible joints, jointed by rubber ring of type 'IA', as per IS 783-1985. The sections of the pipe shall be jointed in such a manner that there shall be as little unevenness as possible along the inside of pipe. Care should be taken while jointing to provide the correct gap between the end of spigot and back of the socket to ensure flexibility at each joint and correct location. For pipeline jointing systems incorporating flexible jointing rings pipes shall be laid with a gap between the end of the spigot and the base of the socket, or between spigots. This gap shall be not less than 6 mm or greater than one third of the straight draw test dimension specified for the pipe joint or as recommended by the pipe manufacturer, and it shall be achieved by approved means, such as marking the outside of the pipe or using removable metal or hardwood feelers.

The annular space between the pipe and the socket at a flexible joint shall be sealed with an approved joint sealant to prevent the ingress of loose material or concrete. Sealing shall be done on completion of a satisfactory preliminary testing prior to concreting or backfilling, but not prior to the test.

After laying a length of pipeline but before preliminary testing is carried out, the pipeline shall be checked for level and gradient on top of the pipes. If a pipe is not at the correct level, it shall be unjointed and removed, the bed shall be adjusted and the pipe shall be re-laid and rechecked for line and level. After the joint has been made and the preliminary testing completed the annular gap at a

socket or collar outside the flexible jointing ring shall be closed with fine grained clayey soil or cotton waste to prevent the entry of granular material.

Pipelines shall be temporarily capped when pipe laying ceases to prevent the ingress of foreign matter. The Contractor shall ensure that the pipes remain clean and free from obstructions, and if required by the Engineer, the pipelines shall be cleaned out using approved methods and equipment which do not damage the internal lining of the pipes and manholes. The joints shall be finished as directed by the Engineer. The quality of rubber ring, tolerances, etc., shall be in conformity with IS 5382-1985.

9.Measurement of pipes

The length of the drainage pipes shall be measured between the inner surfaces of consecutive manholes at the invert level of the pipes along the central line of pipeline to the nearest centimeter.

10.Testing and Commissioning

Site Testing of all Appliances

Following tests shall be carried out as per IS 1742

Smoke Test:

All soil pipes, waste pipes, and vent pipes and all other pipes when above ground shall be approved gas tight by a smoke test conducted under a pressure of 25 mm of water and maintained for 15 minutes after all trap seals have filled with water. The smoke shall be produced by burning oil or tarpaper or similar material in the combustion chamber of a smoke machine, Chemical smokes shall not be used.

Water Test

After laying and jointing of GSW, RCC and CI Pipes and before backfilling the trenches, the entire section of the drainage pipe is to be checked for water tightness as per Sub-Clause 7.1.5.1 of CPHEEO Manual on "Drainage pipe age and Sewage Treatment", second edition.

The pipeline shall be tested for Water tightness of joints. The test shall be carried out from manhole to manhole. All pipe ends in the manholes except those of the section under testing, shall be closed and the pipeline shall be filled with water so that water level is upto the top of the manholes.

The pipeline shall be subject to a test pressure of 2.5 meters head of water at the highest point of section under test for 10 minutes. The leakage or quantity of water to be supplied to maintain the test pressure during the period of 10 minutes shall not exceed 0.2 lit/mm dia. of pipe per km length per day.

For non-pressure pipe it is better to observe the leakage for 24 hrs if feasible.

A knuckle bend shall temporarily be joined at the top end and a sufficient length of the vertical pipe jointed so as to provide the required test head or the top end may be plugged with a connection to a hose ending in a funnel which could be raised or lowered till the required head is obtained and fixed suitably for observation. Subsidence of the test water may be due to one or more of the following causes:

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- a. Absorption by pipes and joints
 - b. Sweating of pipes or joints
 - c. Leakage at joints or from defective pipes and
 - d. Trapped air

Allowance shall be made for (a) by adding water until absorption has ceased after which the test procedure should commence. Any leakage will be visible and the defective part of the work should be cut and made good. A slight amount of sweating which is uniform may be overlooked, but excessive sweating from a particular pipe or joint shall be watched for and taken as indicating a defect to be made good. This test will not be applicable to sanitary pipe work above ground level.

The pipe section shall be retested after rectification of defects. In case joints are found to leak, they shall be repaired or redone and test shall be repeated until the joints are approved by Engineer-in-Charge, without any extra cost.

After completion of the test all temporary seals will be removed, the test water shall be drained out / pumped out and the line cleaned properly.

Test for Straightness and obstruction

Before commissioning the cleanliness of the pipeline is to be checked by the following tests.

11. Torch & Mirror Test

In this method of testing, a torch will be held one end of the pipeline inside a manhole and its image through the pipeline will be reflected and seen on a mirror held at the opposite end of the pipeline, inside the next manhole. Any obstruction / debris / major mis-alignment will not give a clear image in which case the pipeline will again be cleaned / rectified and the test re-done.

Ring Test

In this method of testing two steel/ wooden rings of suitable thickness and design shall be fixed facing each other at a distance of 2 feet or more. The block of rings shall be inserted from one end of the pipeline, inside manhole and pulled by a rope fixed to the block from the other end of the pipeline, inside the next manhole. The rings shall be of dia 2" less than the inside dia of pipe under testing. The rope used for pulling the ring block may be inserted in the pipeline by suitable means. Any construction / debris/major misalignment will prevent the ring to pass through the pipeline in which case the pipeline will again be cleaned/rectified and the test redone, and no extra payment will be made. The ring test shall be performed for the complete network of the drainage pipe system before the same is put in commission and/or

By inserting at the high end of the drainage pipe or drain a smooth ball of a diameter 13 mm less than the pipe bore. In the absence of obstruction, such as yarn or mortar projecting through the joints, the ball should roll down the invert of the pipe and emerge at the lower end.

12. Test Records

Complete test records shall be kept of all tests carried out of drainage pipes both during construction and after being service. All tests at factory at site shall be carried out in the presence of the Engineer or his representative only.

Commissioning

After satisfactory testing of the entire drainage pipe lines including laterals, branch and mains shall be commissioned for operation.

13.Trial Run of the Water Carriage System (UGD SYSTEM)

After commissioning, the Contractor shall run the system for 30 (thirty) days to demonstrate satisfactory performance to the Engineer prior to taking over by the Employer. The cost towards Contractor's Engineer and other operating personnel during the said period of trial run, along with cost of tools and spare parts, which are required for maintenance of the system, shall be borne by the Contractor and shall be included in his price.

In the event that the system or any of the facilities do not satisfactorily achieve the required performance standards during this period, the trial run period shall be extended until such time as the Contractor has satisfactorily rectified any deficiencies as may be necessary to satisfy the performance requirements. No additional compensation will be paid to the Contractor for such extension.

SUB-SECTION 10

Road Restoration Works

EXTRACT OF SECTION 400 OF MORTH AND SPECIFICATIONS. WATER BOUND MACADAM SUB- BASE / BASE

1.Scope.

This work shall consist of clean, crushed aggregates mechanically interlocked by rolling and bonding together with screening, binding material where necessary and water laid on a properly prepared sub grade / sub-base/ base or existing pavement, as the case may be and finished in accordance with the requirements of these Specifications and in close conformity with the lines, grades, cross-sections and thickness as per approved plans or as directed by the Engineer.

It is, however, not desirable to lay water bound macadam on an existing thin black topped surface without providing adequate drainage facility for water that would get accumulated at the interface of existing bituminous surface and water bound macadam.

2. Materials

Coarse aggregates: Coarse aggregates -shall be either crushed or broken stone, crushed slag, over burnt (Jhama) brick aggregates or any other naturally occurring aggregates such as kankar and laterite of suitable quality. Materials other than crushed or broken stone and crushed slag shall be used in sub-base courses only. If crushed gravel/ shingle is used, not less than 90 per cent by weight of the gravel/ shingle pieces retained on 4.75 mm sieve shall have at least two fractured faces. The aggregates shall conform to the physical requirements set forth in Table 400-6. The type and size range of the aggregate shall be specified in the Contract or shall be as specified by the Engineer. If the water absorption value of the coarse aggregate is greater

than 2 %, the soundness test shall be carried out on the material delivered to site as per IS: 2386 (Part 5).

Crushed or broken stone: The crushed or broken Stone shall be hard, durable and free from excess flat, elongated, soft and disintegrated particles, dirt and. other deleterious material.

TABLE 400-6. Physical Requirements of Coarse Aggregates For Water Bound Macadam for Sub-Base/Base Courses.

Z	Test Method	Requirements
1. Los Angeles Abrasion value * Aggregate Impact value	IS:2386 (Part4) IS:2386 (Part-4) or IS:5640	40% (Max) 30% (Max)
2. Combined Flakiness Elongation Indices (Total)	IS:2386 (Part-1)	30% (Max)

* Aggregate may satisfy requirements of either of the two tests.

** Aggregates like brick metal, kankar, laterite etc. which get softened in presence of water shall be tested for Impact value under wet conditions in accordance with IS: 5640.

*** The requirement of flakiness index and elongation index shall be enforced only in the case of crushed broken stone and crushed slag.

Crushed slag: Crushed slag shall be made from air-cooled blast furnace slag. It shall be of angular shape, reasonably uniform in quality and density and generally free from thin, elongated and soft pieces, dirt or other deleterious materials. The weight of crushed 'slag shall not be less than 11.2 kN per m³ and the percentage of glossy material shall not be more than 20. It should also comply with the following requirements:

Chemical stability: To comply with requirements of appendix of BS: 1047

Sulphur content : Maximum 2 per cent

Water absorption: Maximum 10 per cent

- . Over burnt (Jhama) brick aggregates: Jhama brick aggregates shall be made from over burnt bricks or brick bats and be free from dust and other objectionable and deleterious materials.
- . Grading requirement of coarse aggregates: The coarse aggregates shall conform to one of the Grading given in Table 400-7 as Specified, provided, however, the use of Grading No.1 shall be restricted to sub-base courses only.

TABLE 400-7. GRADING REQUIREMENTS OF COARSE AGGREGATES

Grading No.	Size Range	IS Sieve Designation	% by weight passing
1	90 mm to 45 mm	125 mm	100
		90 mm	90-100
		63 mm	25-60
		45 mm	0-15
		22.4 mm	0-5
		90 mm	100

3	53 mm to 22.4 mm	63 mm	90-100
		53 mm	25-75
		45 mm	0-15
		22.4 mm	0-5
		11.2 mm	0-5

Note: The compacted thickness for a layer with Grading 1 shall be 100 mm while for layer with other Gradings i.e. 2 & 3, it shall be 75 mm.

Screenings: Screenings to fill voids in the coarse aggregate shall generally consist of the same material as the coarse aggregate. However, where permitted, predominantly non-plastic material such as moorum or gravel (other than rounded river borne material) may be used for this purpose provided liquid limit and plasticity index of such material are below 20 and 6 respectively and fraction passing 75 micron sieve does not exceed 10 per cent.

Screenings shall conform to the grading set forth in Table 400-8. The consolidated details of quantity of screenings required for various grades of stone aggregates are given in Table 400-9. The table also gives the quantities of materials (loose) required for 10 m² for sub-base/base compacted thickness of 100/75 mm.

The use of screenings shall be omitted in the case of soft aggregates such as brick metal, kankar, laterites, etc. as they are likely to get crushed to a certain extent under rollers.

TABLE 400-8. GRADING FOR SCREENINGS

Classification	Size of Screenings	IS Sieve	% by weight passing the IS Sieve
A	13.2 mm	13.2 mm	100
		11.2 mm	95-100
		5.6 mm	15-35
		180 micron	0-10
B	11.2 mm	11.2 mm	100
		5.6 mm	90-100
		180 micron	15-35

TABLE 400-9. Approximate Quantities Of Coarse Aggregates and Screenings Required For 100/75 MM Compacted Thickness Of Water Bund Macadam (WBM) Sub-Bas/Base Course For 10M² AREA.

Classification	Size Range (mm)	Compacted Thickness (m)	Loose Qty.	Screenings	
				Stone Screening	Crushable type such as Moorum or Gravel

				Grading Classification & Size (mm)	For WBM, Sub-base / base course (Loose quantity)	Grading Classification & Size	Loose quantity
Grade 1	90 to 45	100	1.21 to 1.43 m ³	Type A 13.2	0.27 to 0.30 m ³	Not uniform	0.30 to 0.32 m ³
Grade 2	63 to 45	75	0.91 to 1.07 m ³	Type A 13.2	0.12 to 0.15 m ³	Not uniform	0.22 to 0.24 m ³
- do -	- do -	- do -	- do -	Type B 11.2	0.20 to 0.22 m ³	Not uniform	- do -
Grade 3	53 to 22.4	75	- do -	- do -	0.18 to 0.21 m ³	Not uniform	- do -

Binding material : Binding material to be used for water bound macadam as a filler material meant for preventing raveling, shall comprise of a suitable material approved by the Engineer having a Plasticity Index (PI) value of less than 6 as determined in accordance with IS: 2720 (Part-5).

The quantity of binding material where it is to be used will depend on the type of screenings. Generally, the quantity required for 75 mm compacted thickness of water bound macadam will be 0.06-0.09 m³ / 10m² and 0.08-0.10 m³ / 10m² for 100 mm compacted thickness.

The above-mentioned quantities should be taken as a guide only, for estimation of quantities for construction etc.

Application of binding materials may not be necessary when the screenings used are of crushable type such as moorum or gravel wearing course where water bound macadam is proposed to be laid over it. However, where the intensity of rain is low and the interface drainage facility is efficient, water bound macadam can be laid over the existing thin bituminous surface by cutting 50 mm x 50 mm furrows- at an angle of 45 degrees to the centre line of the pavement at one meter intervals in the existing road. The directions and depth of furrows shall be such that they provide adequate bondage and also serve to drain water to the existing granular base course beneath the existing thin bituminous surface.

Inverted choke: If water bound macadam is to be laid directly over the sub grade, without any other intervening pavement course, a 25 mm course of screenings (Grading B) or coarse sand shall be spread on the prepared sub grade before application of the aggregates is taken up. In case of a fine sand or silty or clayey sub grade, it is advisable to lay 100 mm insulating layer of screening or coarse sand on top of fine grained soil, the gradation of which will depend upon whether it is intended to act as a drainage layer as well. As a preferred alternative to inverted choke, appropriate geosynthetics performing functions of separation and drainage

may be used over the prepared sub grade as directed by the Engineer. Section 700 shall be applicable for use of geosynthetics.

Spreading coarse aggregates: The coarse aggregates shall be spread uniformly and evenly upon the prepared sub grade/sub-base/ base to proper profile by using templates placed across the road about 6 m apart, in such quantities that the thickness of each compacted layer is not more than 100 mm for Grading 1 and 75 mm for Grading 2 and 3, as specified in Clause 404.2.5. Wherever possible, approved mechanical devices such as aggregate spreader shall be used to spread the aggregates uniformly so as to minimise the need for manual rectification afterwards. Aggregates placed at locations which are inaccessible to the spreading equipment, may be spread in one or more layers by any approved means so as to achieve the specified results.

The spreading shall be done from stockpiles along the side of the roadway or directly from vehicles. No segregation of large or fine aggregates shall be allowed and the coarse aggregate, as spread shall be of uniform gradation with no pockets of fine material.

The surface of the aggregates spread shall be carefully checked with templates and all high or low spots remedied by removing or adding aggregates as may be required. The surface shall be checked frequently with a straight edge while spreading and rolling so as to ensure a finished surface as per approved drawings.

The coarse aggregates shall not normally be spread more than 3 days in advance of the subsequent construction operations.

Rolling: Immediately following the spreading of the coarse aggregate, rolling shall be started with three wheeled power rollers of 80 to 100 kN capacity or tandem or vibratory rollers of 80 to 100 kN static weight. The type of roller to be used shall be approved by the Engineer based on trial run.

Except on super elevated portions where the rolling shall proceed from inner edge to the outer, rolling shall begin from the edges gradually progressing towards the centre. First the edge/edges shall be compacted with roller running forward and backward. The roller shall then move inward parallel to the centre line of the road, in successive passes uniformly lapping preceding tracks by at least one half widths

Rolling shall be discontinued when the aggregates are partially compacted with sufficient void space in them to permit application of screenings. However, where screenings are not to be applied, as in the case of crushed aggregates like brick metal, laterite and kankar, compaction shall be continued until the aggregates are thoroughly keyed. During rolling, slight sprinkling of water may be done, if necessary. Rolling shall not be done when the sub grade is soft or yielding or when it causes a wave-like motion in the sub grade or sub-base course.

The rolled surface shall be checked transversely and longitudinally, with templates and any irregularities corrected by loosening the surface, adding or removing necessary amount of aggregates and re-rolling until the entire surface conforms to desired cross fall (camber) and grade. In no case shall the use of screenings be permitted to make up depressions.

Material, which gets crushed excessively during compaction or becomes segregated shall be removed and replaced with suitable aggregates.

It shall be ensured that shoulders are built up simultaneously along with water bound macadam courses as per Clause 407.4.1.

Application of screenings: After the coarse aggregate has been rolled to Clause 404.3.4, screenings to completely fill the interstices shall be applied gradually over the surface. These shall not be damp or wet at the time of application. Dry rolling shall be done while the screenings are being spread so that vibrations of the roller cause them to settle into the voids of the coarse aggregate. The screenings shall not be dumped in piles but be spread uniformly in successive thin layers either by the spreading motions of hand shovels or by mechanical spreaders, or directly from tipper with suitable grit spreading arrangement Tipper operating for spreading the screenings shall be so driven as not to disturb the coarse aggregate.

The screenings shall be applied at a slow and uniform rate (in three or more applications) so as to ensure filling of all voids. This shall be accompanied by dry rolling and brooming with mechanical brooms, hand-brooms or both. In no case shall the screenings be applied as fast and thick as to form cakes or ridges on the surface in such a manner as would prevent filling of voids or prevent the direct bearing of the roller on the coarse aggregate. These operations shall continue until no more screenings can be forced into the voids of the coarse aggregate.

The spreading, rolling, and brooming of screenings shall be carried out in only such lengths of the road which could be completed within one day's operation.

Sprinkling of water and grouting: After the screenings have been applied, the surface shall be copiously sprinkled with water, swept and rolled. Hand brooms shall be used to sweep the wet screenings into voids and to distribute them evenly. The sprinkling, sweeping and rolling operation shall be continued, with additional screenings applied as necessary until the coarse aggregate has been thoroughly keyed, well-bonded and firmly set in its full depth and a grout has been formed of screenings. Care shall be taken to see that the base or subgrade does not get damaged due to the addition of excessive quantities of water during construction.

In case of lime treated soil sub-base, construction of water bound macadam on top of it can cause excessive water to flow down to the lime treated sub-base before it has picked up enough strength (Is still "green") and thus cause damage to the sub-base layer. The laying of water bound macadam layer in such cases shall be done, after the sub-base attains adequate strength, as directed by the Engineer.

Application of binding material: After the application of screenings in accordance with Clauses 404.3.5 and 404.3.6. the binding material where it is required to be used (Clause 404.2.7) shall be applied successively in two or more thin layers at a slow and uniform rate. After each application, the surface shall be copiously sprinkled with water, the resulting slurry swept in with hand brooms, or mechanical brooms to fill the voids properly, and rolled during which water shall be applied to the wheels of the rollers if necessary to wash down the binding material sticking to them. These operations shall continue until the resulting slurry after filling of voids, forms a wave ahead of the wheels of the moving roller.

Setting & drying: After the final compaction of water bound macadam course, the pavement shall be allowed to dry overnight. Next morning hungry spots shall be filled with screenings or binding material as directed, lightly sprinkled with water if necessary and rolled. No traffic shall be allowed on the road until the macadam has set. The Engineer shall have the

discretion to stop hauling traffic from using the completed water bound macadam course, if in his opinion it would cause excessive damage to the surface.

The compacted water bound macadam course should be allowed to completely dry and set before the next pavement course is laid over it. Surface Finish and Quality Control of Work

The surface finish of construction shall conform to the requirements of Clause 902.

Control on the quality of materials and works shall be exercised by the Engineer in accordance with Section 900.

The water bound macadam work shall not be carried out when the atmospheric temperature is less than 0°C in the shade.

Reconstruction of defective macadam: The finished surface of water bound macadam shall conform to the tolerance of surface regularity as prescribed in Clause 902. However, where the surface irregularity of the course exceeds the tolerances or where the course is otherwise defective due to sub grade soil mixing with the aggregates, the course to its full thickness shall be scarified over the affected area, reshaped with added material or removed and replaced with fresh material as applicable and recompacted. In no case shall depressions be filled up with screenings or binding material.

Arrangement for Traffic

During the period of construction, the arrangement of traffic shall be done as per clause 112.

3. Measurements for payment

Water bound macadam shall be measured as finished work in position in cubic meters.

Rate

The Contract unit rate for water bound macadam sub-base/base course shall be payable in full for carrying out the required operations including full compensation for all components listed in Clause 401.8 (i) to (v) including arrangement of water used in the work as approved by the Engineer.

EXTRACT OF SECTION - 500 OF MORTH & SPECIFICATIONS PRIME COAT OVER GRANULAR BASE

Scope

This work shall consist of the application of a single coat of low viscosity liquid bituminous material to a porous granular surface preparatory to the superimposition of bituminous treatment or mix.

Materials

Primer: The choice of a bituminous primer shall depend upon the porosity characteristics of the surface to be primed as classified in IRC: 16. These are:

- Surfaces of low porosity; such as wet mix macadam, water bound macadam.
- Surfaces of medium porosity; such as cement stabilised soil base.

- Surfaces of high porosity; such as a gravel base.

Primer viscosity: The type and viscosity of the primer shall comply with the requirements of IS 8887, as sampled and tested for bituminous primer in accordance with these standards. Guidance on viscosity and rate of spray is given in Table 500-1.

TABLE 500-1. VISCOSITY REQUIREMENT AND QUANTITY OF LIQUID BITUMINOUS PRIMER

Type of surface	Kinematic Viscosity of Primer at 60° Centistokes	Quantity of Liquid Bituminous Material per 10 m ² /kg
Low porosity	30- 60	6 to 9
Medium porosity	70 -140	9 to 12
High porosity	250 - 500	12 to 15

4.Choice of primer: The primer shall be bitumen emulsion, complying with IS 8887 of a type and grade as specified in the Contract or as directed by the Engineer. The use of medium curing cutback as per IS 217 shall be restricted only for sites at sub-zero temperatures or for emergency applications as directed by the Engineer.

5.Weather and Seasonal Limitations

Bituminous primer shall not be applied to a wet surface (see 502.4.2) or during a dust storm or when the weather is foggy, rainy or windy or when the temperature in the shade is less than 10°C. Surfaces which are 155 to receive emulsion primer should be damp, but no free or standing water shall be present.

6.Construction

Equipment: The primer distributor shall be a self-propelled or towed bitumen pressure sprayer equipped for spraying the material uniformly at specified rates and temperatures. Hand spraying of small areas, inaccessible to the distributor, or in narrow strips shall be sprayed with a pressure hand sprayer, or as directed by the Engineer.

Preparation of road surface: The surface to be primed shall be prepared in accordance with Clauses 501.8. and 902 as appropriate. Immediately prior to applying the primer the surface shall be carefully swept clean of dust and loose particles, care being taken not to disturb the interlocked aggregate. This is best achieved when the surface layer is slightly moist (lightly sprayed with water and the surface allowed to dry) and the surface should be kept moist until the primer is applied.

Application of bituminous primer: The viscosity and rate of application of the primer shall be as specified in the Contract, or as determined by site trials carried out as directed by the Engineer. Where a geosynthetic is proposed for use, the requirements of Clauses 703.3.2 and 703.4 shall apply. The bituminous primer shall be sprayed uniformly in accordance with Clause 501. The method for application of the primer will depend on the type of equipment to

be used, size of nozzles, pressure at the spray bar and speed of forward movement. The Contractor shall demonstrate at a spraying trial, that the equipment and method to be used is capable of producing a uniform spray, within the tolerances specified.

Curing of primer and opening to traffic: A primed surface shall be allowed to cure for at least 24 hours or such other period as is found to be necessary to allow all the volatiles to evaporate before any subsequent surface treatment or mix is laid. Any unabsorbed primer shall first be blotted with an application of sand, using the minimum quantity possible. A primed surface shall not be opened to traffic other than that necessary to lay the next course. A very thin layer of clean sand may be applied to the surface of the primer, to prevent the primer picking up under the wheels of the paver and the trucks delivering bituminous material to the paver.

Tack coat: Over the primed surface, a tack coat should be applied in accordance with Clause 503.

7. Quality Control of Work

For control of the quality of materials supplied and the works carried out, the relevant provisions of Section 900 shall apply.

8. Arrangements for Traffic

During construction operations, arrangements for traffic shall be made in accordance with the provisions of Clause 112.

9. Measurement for Payment

Prime coat shall be measured in terms of surface area of application in square meters.

Rate

The contract unit rate for prime coat with adjustments as described in Clause 502.7 shall be payment in full for carrying out the required operations including full compensation for all components listed in Clause 401.8 (i) to (v) and as applicable to the work specified in these Specifications. Payment shall be made on the basis of the provision of prime coat at an application rate of 0.6 kg per square meter, with adjustment, plus or minus, for the variation between this amount and the actual amount approved by the Engineer after the preliminary trials referred to in Clause 502.4.3.

10. TACK COAT

Scope

This work shall consist of the application of a single coat of low viscosity liquid bituminous material to an existing bituminous road surface preparatory to the superimposition of a bituminous mix, when specified in the Contract or instructed by the Engineer.

11.Materials

Binder: The binder used for tack coat shall be bitumen emulsion complying with IS 8887 of a type and grade as specified in the Contract or as directed by the Engineer. The use of cutback bitumen as per IS 217 shall be restricted only for sites at sub-zero temperatures or for emergency applications as directed by the Engineer.

12.Weather and Seasonal Limitations

Bituminous material shall not be applied to a wet surface or during a dust storm or when the weather is foggy, rainy or windy or when the temperature in the shade is less than 10°C. Where the tack coat consists of emulsion, the surface shall be slightly damp, but not wet. Where the tack coat is of cutback bitumen, the surface shall be dry.

13.Construction

Equipment: The tack coat distributor shall be a self-propelled or towed bitumen pressure sprayer, equipped for spraying the material uniformly at a specified rate. Hand spraying of small areas, inaccessible to the distributor, or in narrow strips, shall be sprayed with a pressure hand sprayer, or as directed by the Engineer.

Preparation of base: The surface on which the tack coat is to be applied shall be clean and free from dust, dirt, and any extraneous material, and be otherwise prepared in accordance with the requirements of Clauses 501.8 and 902 as appropriate. Immediately before the application of the tack coat, the surface shall be swept clean with a mechanical broom, and high pressure air jet, or by other means as directed by the Engineer.

Application of tack coat: The application of tack coat shall be at the rate specified in the Contract, and shall be applied uniformly. If rate of application of Tack Coat is not specified in the contract then it shall be at the rate specified in Table 500-2.

TABLE 500-2. RATE OF APPLICATION OF TACK COAT

Type of Surface	Quantity of liquid bituminous material (Kg/m ²)
i) Normal bituminous surfaces	0.20 to 0.25
ii) Dry and hungry bituminous surfaces	0.25 to 0.30
iii) Granular surfaces treated with primer	0.25 to 0.30
iv) Non bituminous surfaces	
a) Granular base (not primed)	0.35 to 0.40
b) Cement concrete pavement	0.30 to 0.35

The normal range of spraying temperature for a bituminous emulsion shall be 20°C to 70°C and for a cutback, 50°C to 80°C if RC-70/MC-70 is used. Where a geosynthetic is proposed for use, the provisions of Clauses 703.3.2 and 703.4.4 shall apply. The method of application of the tack coat will depend on the type of equipment to be used, size of nozzles, pressure at the spray bar, and speed of forward movement. The Contractor shall demonstrate at a spraying trial, that the equipment and method to be used is capable of producing a uniform spray, within the tolerances specified.

Where the material to receive an overlay is a freshly laid bituminous layer that has not been subjected to traffic or contaminated by dust, a tack coat is not mandatory where the overlay is completed within two days.

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Curing of tack coat: The tack coat shall be left to cure until all the volatiles have evaporated before any subsequent construction is started. No plant or vehicles shall be allowed on the tack coat other than those essential for the construction.

14. Quality Control of Work

For control of the quality of materials supplied and the works carried out, the relevant provisions of Section 900 shall apply.

15. Arrangements for Traffic

During the period of construction, arrangements for traffic shall be made in accordance with the provisions of Clause 112

16. Measurement for Payment

Tack coat shall be measured in terms of surface area or application in square meters.

17. Rate

The contract unit rate for tack coat shall be payment in full for carrying out the required operations including for all components listed in Clause 401.8 (i) to (v) and as applicable to the work specified in these Specifications. The rate shall cover the provision of tack coat at 0.2 kg/m², with the provision that the variance in actual quantity of bitumen used will be assessed and the payment adjusted accordingly.

18. SEMI DENSE BITUMINOUS CONCRETE

Scope

This clause specifies the construction of Bituminous Concrete, for use in wearing and profile corrective courses. This work shall consist of construction in a single or multiple layers of bituminous concrete on a previously prepared bituminous bound surface. Single layers shall be 25mm 50 mm in thickness.

19. Materials

Bitumen: The bitumen shall be paving bitumen of Penetration grade complying with Indian Standard Specification for Paving Bitumen, IS: 73 and of the penetration indicated in Table

500-18, for bituminous concrete, or this bitumen as modified by one of the methods specified in Clause 521, or as otherwise specified in the Contract. Guidance on the selection of an appropriate grade of bitumen is given in The Manual for Construction and Supervision of Bituminous Works.

Coarse aggregates: The coarse aggregates shall be generally as specified in Clause 507.2.2, except that the aggregates shall satisfy the physical requirements of Table 500-17.

Fine aggregates: The fine aggregates shall be all as specified in Clause 507.2.3.

Filler: Filler shall be generally as specified in Clause 507.2.4. . Where the aggregates fail to meet the requirements of the water sensitivity test in Table 500-17 then 2 % by total weight of aggregate, of hydrated lime shall be added without additional cost.

Aggregate grading and binder content: When tested in accordance with IS: 2386 Part 1 (Wet grading method), the combined grading of the coarse and fine aggregates and added filler shall fall within the limits shown in Table 500-18 for gradings 1 or 2 as specified in the Contract.

20.Mixture Design

Requirements for the mixture: Apart from conformity with the grading and quality requirements for individual ingredients, the mixture shall meet the requirements set out in Table 500-19. The requirements for minimum % voids in mineral aggregate (VMA) shown in Table 500-12.

Binder content: The binder content shall be optimised to achieve the requirements of the mixture set out in Table 500-19 and the traffic volume as specified in the Contract. The Marshall method for determining the optimum binder content shall be adopted as described in the Asphalt Institute Manual MS-2, replacing the aggregates retained on the 26.5mm sieve and retained on the 22.4mm sieve, where approved by the Engineer.

TABLE 500-17.Physical Requirements for Coarse Aggregate for Bituminous Concrete Pavement Layers

Property	Test	Specification
Cleanliness (dust)	Grain size analysis'	Max 5% passing 0.075mm sieve
Particle shape	Flakiness and Elongation Index	Max 30% (Combined)2
Strength*	Los Angeles Abrasion Value 3 Aggregate Impact Value 4	Max 30% Max 24 %
Polishing	Polished Stone Value 5	Min 55
Durability	Soundness:6 Sodium Sulphate Magnesium Sulphate	Max 12% Max 18%
Water Absorption	Water absorption 7	Max 2%
Stripping	Coating and Stripping of Bitumen Aggregate Mixtures 9	Minimum retained coating 95%
Water Sensitivity	Retained Tensile Strength 8	Min 80%

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Notes:

1. IS: 2386 Part I	6. IS: 2386 Part 5
2. IS: 2386 Part I	7. IS: 2386 Part 3
(the elongation test to be done only on non-flaky aggregates in the sample) .	
3. IS: 2386 Part 4*	8. AASHTO T283**
4. IS: 2386 Part 4*	9. IS: 6241
5. BS: 812 Part 114	

* Aggregate may satisfy requirements of either of these two tests.

** The water sensitivity test is only required if the minimum retained coating in the stripping test is less than 95%.

Job mix formula: The procedure for formulating the job mix formula shall be generally as specified in Clause 507.3.3 and the results of tests enumerated in Table 500-19 as obtained by the Contractors.

Plant trials - permissible variation in job mix formula: The requirements for plant trials shall be all as specified in Clause 507.3.4 and permissible limits for variation as shown in Table 500-13.

Laying trials: The requirements for laying trials shall be all as specified in Clause 507.3.5.

21. Construction Operations

Weather and seasonal limitations: The provisions of Clause 501.5.1 shall apply.

TABLE 500-18. COMPOSITION OF BITUMINOUS CONCRETE PAVEMENT LAYERS

Grading	1	2
Nominal aggregate size	19mm	13mm
Layer Thickness	50-65 mm	30-45 mm
IS Sieve' (mm)	Cumulative % by weight of total aggregate passing	
45		
37.5		
26.5	100	
19	79-100	100
13.2	59-79	79-100
9.5	52-72	70-88
4.75	35-55	53-71
2.36	28-44	42-58
1.18	20-34	34-48
0.6	15-27	26-38
0.3	10-20	18-28
0.15	5-13	12-20
0.075	2-8	4-10
Bitumen content % by mass of total mix 2	5.0 - 6.0	5.0 - 7.0
Bitumen grade (pen)	65	65

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Notes: 1. The combined aggregate grading shall not vary from the low limit on one sieve to the high limit on the adjacent sieve. 2. Determined by the Marshall method.

TABLE 500-19. REQUIREMENTS FOR BITUMINOUS PAVEMENT LAYERS

Minimum stability (kN at 60°C)	9
Minimum flow (mm)	2
Maximum flow (mm)	4
Compaction level (Number of blows)	75 blows on each of the two faces of the Specimen
Per cent air voids	3-6
Per cent voids in mineral aggregate (VMA)	See table 500-12
Per cent voids filled with bitumen (VFB)	65-75
Loss of stability on immersion in water at 60°C (ASTM D 1075)	Min 75 percent retained strength

Preparation of base: The surface on which the bituminous concrete is to be laid shall be prepared in accordance with Clauses 501 and 902 as appropriate, or as directed by the Engineer. The surface shall be thoroughly swept clean by mechanical broom and dust removed by compressed air. In locations where a mechanical broom cannot access, other approved methods shall be used as directed by the Engineer.

Geosynthetics: Where Geosynthetics are specified in the Contract this shall be in accordance with the requirements stated in Clause 703:

Stress absorbing layer: Where a stress absorbing layer is specified in the Contract, this shall be applied in accordance with the requirements of Clause 522.

Tack coat: Where specified in the Contract, or otherwise required by the Engineer, a tack coat shall be applied in accordance with the requirements of Clause 503.

Mixing and transportation of the mixture: The provisions as specified in Clauses 501.3 and 501.4 shall apply.

Spreading: The general provisions of clauses 501.5.3 and 501.5.4 shall apply.

Rolling: The general provisions of clauses 501.6 and 501.7 shall apply, as modified by the approved laying trials.

22.Opening to Traffic

The newly laid surface shall not be open to traffic for at least 24 hours after laying and the completion of compaction, without the express approval of the Engineer in writing.

23.Surface Finish and Quality Control

The surface finish of the completed construction shall conform to the requirements of Clause 902. All materials and workmanship shall comply with the provisions set out in Section 900 of this Specification.

24.Arrangements for Traffic

During the period of construction, arrangements for traffic shall be made in accordance with the provisions of Clause 112

25.Measurement for Payment

The measurement shall be all as specified in Clause 507.8.

26.Rate

The contract unit rate shall be all as specified in Clause 507.9, except that the rate shall include the provision of bitumen at 5.0 per cent, by weight of total mixture. The variance in actual percentage of bitumen used will be assessed and the payment adjusted up or down, accordingly.

27.SURFACE DRESSING**Scope**

This work shall consist of the application of one coat or two coats of surface dressing, each coat consisting of a layer of bituminous binder sprayed on a previously prepared base, followed by a cover of stone chips rolled in to form a wearing course to the requirements of these Specifications. For information on the Design of Surface Dressing refer to the Manual for Construction and Supervision of Bituminous Works.

28.Materials

Binder: The binder shall have a kinematic viscosity lying in the range 1×10^4 to 7×10^5 centistokes at the expected range of road surface temperatures at the construction site during the period of laying. The type of binder to be used will be stated in the Contract documents and shall comply with one of the following:

Paving Bitumen	IS: 73
Bitumen Emulsion	IS: 8887

Aggregates: The chips shall conform to the requirements of Clause 504.2.2, except that their water absorption shall be restricted to a maximum of 1% and they shall have a Polished Stone value, as measured by the method given in BS812 (Part 114), of not less than 60. The chips shall be single sized, clean, hard, durable, of cubical shape, free from dust and soft or friable matter, organic or other deleterious matter and conforming to one of the gradings given in Table 500-21.

Rates of spread of binder and chips: For the purpose of pricing the Bill of Quantities the rates of spread given in Table 500-20 shall be priced.

TABLE 500-20. NOMINAL RATES OF SPREAD FOR BINDER AND CHIPPINGS

Nominal Chipping Size mm	Binder (penetration grade bitumen) kg/m ²	Chips m ³ /m ²
19	1.2	0.015
13	1.0	0.010
10	0.9	0.008
6	0.75	0.004

Note:

1. These rates of spread are for pricing purposes (Clause 510.2.3 and Clause 51^8)
2. For emulsion, these rates of spread are for the residual bitumen and appropriate adjustment must be made to determine the total quantity.
3. Refer to Manual for Construction and Supervision of Bituminous Works for the procedure of determining the rates of spread of binder and chips.

Anti-stripping agent: Where the proposed aggregate fails to pass the stripping test then an approved adhesion agent (Appendix 5 for details) may be added to the binder in accordance with the manufacturer's instructions. The effectiveness of the proposed anti-stripping agent must be demonstrated by the Contractor, before approval by the Engineer.

Pre-coated chips: As an alternative to the use of an adhesion agent the chips may be pre-coated before they are spread except when the sprayed binder film is a bitumen emulsion. Pre-coating the chips may be carried out in any one of the two methods:

- a) Mixing them with 0.75 to 1.0 per cent of paving bitumen by weight of chips in a suitable mixer, the chips being heated to 160°C and the bitumen to its application temperature. The pre-coated chips shall be allowed to cure for at least one week or until they become non sticky and can be spread easily.
- b) Spraying the chips with a light application of creosote, diesel oil or kerosene at ambient temperature. This spraying can be done in a concrete mixer or on a belt conveying the chips from stockpile to gritting lorries.

29. Construction operations

Weather and seasonal limitations: Clause 501.5.1 shall apply.

TABLE 500-21. GRADING REQUIREMENTS FOR CHIPS FOR SURFACE DRESSING

IS Designation	Sieve mm	Cumulative % by weight of total aggregate passing for the following nominal sizes (mm)			
		19	13	10	6
26.5		100	-	-	-
19		85-100	100	-	-
13.2		0-40	85-100	100	-
9.5		0-7	0-40	85-100	100
6.3		-	0-7	0-35	85-100
4.75		-	-	0-10	-
3.35		-	-	-	0-35
2.36		0-2	0-2	0-2	0-10
0.60		-	-	-	0-2
0.075		0-1.5	0-1.5	0-1.5	0-1.5
Minimum 65% by weight of aggregate		Passing 19 mm, retained 13.2mm	Passing 13.2 mm, retained 9.5 mm	Passing 9.5mm, retained 6.3mm	Passing 6.3 mm, retained 3.35 mm

Preparation of base: The base on which the surface dressing is to be laid shall be prepared, shaped and conditioned to the specified lines, grade and cross section in accordance with Clause 501 or as directed by the Engineer. Prime coat, where needed, shall be provided as per Clause 502 or as directed by the Engineer. Where the existing surface shows signs of fattening up, the excess bitumen shall be removed by burning off, or manually, as specified in the Contract or directed by the Engineer. The bituminous surface to be dressed shall be thoroughly cleaned either by using a mechanical broom and / or compressed air, or any other approved equipment / method as specified in the Contract or by the Engineer. The prepared surface shall be dust free, clean and dry, (except in the case of cationic emulsion where the surface shall be damp).

Application of binder: The equipment and general procedures shall all be in accordance with the Manual for Construction and Supervision of Bituminous Works. The application temperature for the grade of binder used shall be as given in Table 500-22 and the rate of spray as given in 510.2.3.

Application of stone chips: The equipment and general procedure shall all be in accordance with the Manual for Construction and Supervision of Bituminous Works. For relatively small areas of surface dressing, careful application of chips by hand may be acceptable if approved by the Engineer. The rate of application of chips shall be as determined by the procedure given in the Manual for Construction and Supervision of Bituminous Works. Immediately after application of the binder, clean, dry chips (in the case of emulsion binder the chippings may be damp) shall be spread uniformly on the surface so as to cover the surface completely with a single layer of chips.

TABLE 500-22. SPRAYING TEMPERATURES FOR BINDERS

Binder grades	Whirling spray jets		Slot jets	
	Min°C	Max°C	Min°C	Max°C
Penetration Grades				
400 / 500	160	170	140	150
280 / 320	165	175	150	160
180 / 200	170	190	155	165
80 /100	180	200	165	175

Rolling: Rolling of the chips should preferably be carried out by a pneumatic tyred roller in accordance with Clause 501.6 and Clause 501.7. Traditional steel wheeled rollers tend to crush the aggregates and if their use cannot be avoided their weight should be limited to 8 MT Rolling shall commence at the edges and progress towards the centre except in super-elevated and un-directional cambered portions where it shall proceed from the lower edge to the higher edge. Each pass of the roller shall uniformly overlap not less than one-third of the track made in the preceding pass. While rolling is in progress additional chips shall be spread by hand in necessary quantities required to make up irregularities. Rolling shall continue until all aggregate particles are firmly embedded in the binder and present a uniform closed surface.

Application of second coat of surface dressing: Where surface dressing in two coats is specified, the second coat should not be applied until the first coat has been open to traffic for 2 or 3 weeks. The surface on which the second coat is laid must be clean and free of dust. The construction operations for the second coat shall be the same as described in Clauses 510.3.3 to 510.3.5.

30.Opening to Traffic

Traffic shall not be permitted to run on any newly surface dressed area until the following day. In special circumstances, however, the Engineer may allow the road to be opened to traffic immediately after rolling, but in such cases traffic speed shall be limited to 20 km per hour until the following day.

31.Surface Finish and Quality Control of Work

The surface finish of construction shall conform to the requirements of Clause 902.

For control on the quality of materials supplied and the works carried out, the relevant provisions of Section 900 shall apply.

32.Arrangements for Traffic

During the period of construction, arrangements for traffic shall be made in accordance with the provisions of Clause 112.

Measurement for Payment

Each coat of surface dressing shall be measured as finished work, for the area instructed to be covered, in square meters.

33.Rate

The Contract unit rate for surface dressing, based on the notional rates of spread for binder and each size of chippings given in Clause 510.2.3, which shall be adjusted, plus or minus, for the difference between the notional rates of spread and the rates of spread determined as described in the Manual for Construction and Supervision of Bituminous Works, and approved by the Engineer, multiplied by the rates entered in the Bill of Quantities for binder and each size of Chipping. The adjusted rate shall be payment in full for carrying out the required operations including full compensation for all components listed in Clause 501.8.8.2. (i) to (xi).

OTHER CONDITIONS

ADVERSE WEATHER CONDITIONS

Cold Weather Concreting:

Where concrete is to be deposited at or near freezing temperature, precautions shall be taken to ensure that at the time of placing, it has a temperature of not less than 5 degrees Celsius and that the temperature of the concrete shall be maintained above 4 degrees Celsius until it has thoroughly hardened. When necessary, concrete ingredients shall be heated before mixing but cement shall not be heated artificially other than by the heat transmitted to it from other ingredients of the concrete. Stock-piled aggregate may be heated by the use of dry heat or steam. Aggregates shall not be heated directly by gas or on sheet metal over fire. In general, the temperature of aggregates or water shall not exceed 65 degrees Celsius. Salt or other chemicals shall not be used for the prevention of freezing. No frozen material or materials containing ice shall be used. All concrete damaged by frost shall be removed. It is recommended that concrete exposed to freezing weather shall have entrained air and the water content of the mix shall not exceed 30 litres per 50 kg of cement.

.PROTECTION AND CURING

Concreting operations shall not commence until adequate arrangements for concrete curing have been made by the Contractor.

Curing and protection of concrete shall start immediately after compaction of the concrete to protect it from:

- Premature drying out particularly by solar radiation and wind
- High internal thermal gradients
- Leaching out by rain and flowing water
- Rapid cooling during the first few days after placing
- Low temperature or frost.

Vibration and impact which may disrupt the concrete and interfere with its bond to the reinforcement. Where members are of considerable size and length, with high cement-content, accelerated curing methods may be applied, as approved by the Engineer.

Water Curing

Water for curing shall be as specified in Section 1000.

Exposed surfaces of concrete shall be kept continuously in a damp or wet condition by ponding or by covering with a layer of sacks, canvas, Hessian or similar materials and shall be kept constantly wet for a period of not less than 14 days from the date of placing of concrete.

Curing Compounds.

Curing compounds shall only be permitted in special circumstances and will require specific approval of the Engineer. Curing compounds shall not be used on any surface which requires further finishing to be applied. All construction joints shall be moist, cured and no curing compound will be permitted in locations where concrete surfaces are required to be bonded together.

Curing compounds shall be continuously agitated during use. All concrete cured by this method shall receive two applications of the curing compound. The first coat shall be applied immediately after acceptance of concrete finish. If the surface is dry, the concrete shall be saturated with water and curing compound applied as soon as the surface film of water disappears, the second application shall be made after the first application has set. Placement in more than two coats may be required to prevent streaking.

FINISHING

Immediately after the removal of forms, exposed bars or bolts, if any, shall be cut inside the concrete member to a depth of at least 50 mm below the surface of the concrete and the resulting holes filled with cement mortar. All fins caused by form joints, all cavities produced by the removal of form ties and all other holes and depressions, honeycomb spots, broken edges or corners, and other defects, shall be thoroughly cleaned, saturated with water, and carefully pointed and rendered true with mortar of cement and fine aggregate mixed in the proportions used in the grade of concrete that is being finished and of as dry a consistency as is possible to use. Considerable pressure shall be applied in filling and pointing to ensure thorough filling in all voids. Surfaces, which have been pointed, shall be kept moist for a period of twenty four hours. Special pre-packaged proprietary mortars shall be used where appropriate or where specified in the drawing.

All construction and expansion joints in the completed work shall be left carefully tooled and free from any mortar and concrete. Expansion joint filler shall be left exposed for its full length with clean and true edges. Immediately on removal of, forms, the concrete work shall be examined by the Engineer before any defects are made good.

The work that has sagged or contains honeycombing to an extent detrimental to structural safety or architectural appearance shall be rejected. Surface defect of a minor nature may be accepted. On acceptance of such work by the Engineer, the same shall be rectified as directed by the Engineer.

.TOLERANCES

Tolerances for dimensions/shape of various components shall be as indicated in these specifications or shown on the drawings or as directed by the Engineer.

.TESTS AND STANDARDS OF ACCEPTANCE

Concrete shall conform to the surface finish and tolerance as prescribed in these specifications for respective components.

Random sampling and lot-by-lot of acceptance inspection shall be made for the 28 days cube strength of concrete.

Concrete under acceptance shall be notionally divided into lots for the purpose of sampling, before commencement of work. The delimitation of lots shall be determined by the following:

- No individual lot shall be more than 30 Cum in volume
 - At least one cube forming an item of the sample representing the lot shall be taken from concrete of the same grade and mix proportions cast on any day.
- Different grades of mixes of concrete shall be divided into separate lots
- Concrete of a lot shall be used in the same identifiable component of the bridge

Sampling and testing

Concrete for making 3 test cubes shall be taken from a batch of concrete at point of delivery into construction, according to procedure laid down in IS: 1199.

A random sampling procedure to ensure that each of the concrete batches forming the lot under acceptance inspection has equal chance of being chosen for taking cubes shall be adopted.

150 mm cubes shall be made, cured and tested at the age of 28 days for compressive strength in accordance with IS: 516. The 28-day test strength result for each cube shall form an item of the sample.

Test specimen and sample strength: Three test specimens shall be made from each sample for testing at 28 days. Additional cubes may be required for various purposes such as to determine the strength of concrete at 7 days or for any other purpose.

The test strength of the sample shall be the average of the strength of 3 cubes. The individual variation should not be more than ± 15 per cent of the average.

Frequency: The minimum frequency of sampling of concrete of each grade shall be in accordance with Table 1700-8

TABLE 1700-8

Quantity of Concrete in work, m ³	No. of samples
1 - 5	1
6-15	2
16-30	3
31-50	4
51 and above	4 plus one additional sample for each additional 50 m ³ or part thereof

At least one sample shall be taken from each shift of work.

Acceptance criteria

Compressive Strength

When both the following conditions are met, the concrete complies with the specified compressive strength:

- The mean strength determined from any group of four consecutive samples should exceed the specified characteristic compressive strength.
- Strength of any sample is not less than the specified characteristic compressive strength (-)3 MPa.
- The quantity of concrete represented by the test results include the batches from which the first and last samples were taken, together with all intervening batches.

Chloride and Sulphate Content.

The total chloride and sulphuric anhydride (SO₃) content of all the constituents of concrete as a percentage of mass of cement in the mix shall not exceed the values given in this section of the specifications.

Density of Fresh Concrete

Where minimum density of fresh concrete is specified, the mean of any four consecutive samples shall not be less than the specified value and any individual sample result shall not be less than 97.5 per cent of the specified value.

Density of Hardened Concrete

Where minimum density of hardened concrete is specified, the mean of any four consecutive samples shall not be less than the specified value and any individual sample result shall not be less than 97.5 per cent of the specified value.

Permeability Test

The concrete should pass the following test if it is properly compacted and is not considered permeable. Prepare a cylindrical test specimen 150 mm dia and 160 mm high. After 28 days of curing, the test specimen is fixed in a machine such that the specimen can be placed in water under pressure up to 7 bars. A typical machine is shown in Appendix

At first a pressure of one bar is applied for 48 hours, followed by 3 bars for 24 hours and 7 bars for next 24 hours..

After the passage of the above period, the specimen is taken out and split in the middle by compression applied on two round bars on opposite sides above and below.

The water penetration in the broken core is to be measured with a scale and the depth of penetration assessed in mm (max. permissible limit 25 mm).

If the concrete is not able to meet any of the standards of acceptance as prescribed, the effect of such deficiency on the structure shall be investigated by the Contractor as directed by the Engineer. The Engineer may accept the concrete as sub-standard work. Any additional work required by the Engineer for such acceptance shall be carried out by the Contractor at his cost. In case the concrete is not found to be acceptable after investigation, the Contractor shall remove the rejected concrete forthwith.

MEASUREMENTS FOR PAYMENT

Structural concrete shall be measured in cubic meters. In reinforced or pre-stressed concrete, the volume occupied by reinforcement or pre-stressing cables and sheathing shall not be deducted. The slab shall be measured as running continuously through and the beam as the portion below the slab.

.RATE

The contract unit rate for structural concrete shall cover costs of all materials, labour, tools, plant and equipment required for mixing, transporting and placing in position, vibrating and compacting, finishing and curing as per this Section or as directed by the Engineer, including all incidental expenses, sampling and testing, quality assurance and supervision. Unless mentioned separately as an item in the Contract, the contract unit rate for concrete shall also include the cost of providing, fixing and removing formwork required for concrete work as per Section 1500.

Where concrete is found to be acceptable as sub-standard work, the Contractor shall pay a discount over the contract unit rate, as decided by the Engineer. For deficiency in compressive strength of concrete when accepted by the Engineer, the reduction in rate may be applied as under:

Per cent reduction = $100 \times (\text{Design Strength} - \text{Observed Strength}) / (\text{Design Strength})$

7.3 Drawings

Drawings are provided in Annexure-1

Note :- Drawings are attached as Annexure I in a separate folder alongwith with this document.

Environmental, social, health and safety requirements

The Environment and Social Management Plan is attached as Annexure II at the end of this document.

PART 3 – Conditions of Contract and Contract Forms

General Conditions of Contract

A. General

1. Definitions

1.1 Boldface type is used to identify defined terms.

- (a) The Accepted Contract Amount means the amount accepted in the Letter of Acceptance for the execution and completion of the Works and the remedying of any defects.
- (b) Not used.
- (c) The Adjudicator is the person appointed jointly by the Employer and the Contractor to resolve disputes in the first instance, as provided for in GCC 23.
- (d) Bank means the financing institution **named in the PCC**.
- (e) Bill of Quantities means the priced and completed Bill of Quantities forming part of the Bid.
- (f) Compensation Events are those defined in GCC Clause 42 hereunder.
- (g) The Completion Date is the date of completion of the Works as certified by the Project Manager, in accordance with GCC Sub-Clause 53.1.
- (h) The Contract is the Contract between the Employer and the Contractor to execute, complete, and maintain the Works. It consists of the documents listed in GCC Sub-Clause 2.3 below.
- (i) The Contractor is the party whose Bid to carry out the Works has been accepted by the Employer.
- (j) The Contractor's Bid is the completed bidding document submitted by the Contractor to the Employer.
- (k) The Contract Price is the Accepted Contract Amount stated in the Letter of Acceptance and thereafter as adjusted in accordance with the Contract.
- (l) Days are calendar days; months are calendar months.
- (m) Not used.
- (n) A Defect is any part of the Works not completed in accordance with the Contract.

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- (o) The Defects Liability Certificate is the certificate issued by Project Manager upon correction of defects by the Contractor.
 - (p) The Defects Liability Period is the period named in the PCC pursuant to Sub-Clause 34.3 and calculated from the Completion Date.
 - (q) Drawings means the drawings of the Works, as included in the Contract, and any additional and modified drawings issued by (or on behalf of) the Employer in accordance with the Contract, include calculations and other information provided or approved by the Project Manager for the execution of the Contract.
 - (r) The Employer is the party who employs the Contractor to carry out the Works, as **specified in the PCC**.
 - (s) Equipment is the Contractor's machinery and vehicles brought temporarily to the Site to construct the Works.
 - (t) "In writing" or "written" means hand-written, type-written, printed or electronically made, and resulting in a permanent record;
 - (u) The Initial Contract Price is the Contract Price listed in the Employer's Letter of Acceptance.
 - (v) The Intended Completion Date is the date on which it is intended that the Contractor shall complete the Works. The Intended Completion Date is **specified in the PCC**. The Intended Completion Date may be revised only by the Project Manager by issuing an extension of time or an acceleration order.
 - (w) Materials are all supplies, including consumables, used by the Contractor for incorporation in the Works.
 - (x) Plant is any integral part of the Works that shall have a mechanical, electrical, chemical, or biological function.
 - (y) The Project Manager is the person **named in the PCC** (or any other competent person appointed by the Employer and notified to the Contractor, to act in replacement of the Project Manager) who is responsible for supervising the execution of the Works and administering the Contract.
 - (z) PCC means Particular Conditions of Contract.
 - (aa) The Site is the area **defined as such in the PCC**.

- (bb) Site Investigation Reports are those that were included in the bidding documents and are factual and interpretative reports about the surface and subsurface conditions at the Site.
- (cc) Specification means the Specification of the Works included in the Contract and any modification or addition made or approved by the Project Manager.
- (dd) The Start Date is **given in the PCC**. It is the latest date when the Contractor shall commence execution of the Works. It does not necessarily coincide with any of the Site Possession Dates.
- (ee) A Subcontractor is a person or corporate body who has a Contract with the Contractor to carry out a part of the work in the Contract, which includes work on the Site.
- (ff) Temporary Works are works designed, constructed, installed, and removed by the Contractor that are needed for construction or installation of the Works.
- (gg) A Variation is an instruction given by the Project Manager which varies the Works.
- (hh) The Works are what the Contract requires the Contractor to construct, install, and turn over to the Employer, **as defined in the PCC**.

2. Interpretation

- 2.1 In interpreting these GCC, words indicating one gender include all genders. Words indicating the singular also include the plural and words indicating the plural also include the singular. Headings have no significance. Words have their normal meaning under the language of the Contract unless specifically defined. The Project Manager shall provide instructions clarifying queries about these GCC.
- 2.2 If sectional completion is **specified in the PCC**, references in the GCC to the Works, the Completion Date, and the Intended Completion Date apply to any Section of the Works (other than references to the Completion Date and Intended Completion Date for the whole of the Works).
- 2.3 The documents forming the Contract shall be interpreted in the following order of priority:
 - (a) Agreement,
 - (b) Letter of Acceptance,
 - (c) Contractor's Bid & Priced Bill of Quantities,

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- (d) Particular Conditions of Contract,
 - (e) General Conditions of Contract including Appendices,
 - (f) Specifications,
 - (g) Drawings,
 - (h) Joint Venture Agreement [where applicable], and
 - (i) any other document **listed in the PCC** as forming part of the Contract.

3. Language and Law

- 3.1 The language of the Contract and the law governing the Contract are **stated in the PCC**.

Salient features of major labour and other laws that are applicable to construction industry in India are given as Appendix 1 to these General Conditions of Contract.

- 3.2 Throughout the execution of the Contract, the Contractor shall comply with the import of goods and services prohibitions in India when

(a) as a matter of law or official regulations, India prohibits commercial relations with that country; 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, India prohibits any import of goods from that country or any payments to any country, person, or entity in that country.

4. Project Manager's Decisions

- 4.1 Except where otherwise specifically stated, the Project Manager shall decide contractual matters between the Employer and the Contractor in the role representing the Employer.

However, if the Project Manager is required, under the rules and regulations and orders of the Employer, to obtain approval of some other authorities for specific actions, he will so obtain the approval. Provided further that any requisite approval shall be deemed to have been given by the Employer for any such authority exercised by the Project Manager.

5. Delegation

- 5.1 Unless otherwise **specified in the PCC**, the Project Manager may delegate any of his duties and responsibilities to other people, except to the Adjudicator, after notifying the Contractor, and may revoke any delegation after notifying the Contractor.

6. Communica-

- 6.1 Communications between parties that are referred to in the

tions

Conditions shall be effective only when in writing. A notice shall be effective only when it is delivered. All oral instructions shall be confirmed in writing in seven working days.

- 7. Subcontracting**
- 7.1 The Contractor may subcontract with the approval of the Project Manager upto a ceiling **specified in PCC**, but may not assign the Contract without the approval of the Employer in writing. Subcontracting shall not alter the Contractor's obligations.
- 7.2 The Project Manager should satisfy himself before recommending to the Employer whether:
- a) the circumstances warrant such sub-contracting; and,
 - b) the sub-Contractor so proposed for the Work possesses the experience, qualifications and equipment necessary for the job proposed to be entrusted to him in proportion to the quantum of Works to be sub-contracted.
- 7.3 If payments are proposed to be made directly to that sub-contractor, this should be subject to specific authorization by the prime contractor so that his arrangement does not alter the contractor's liability or obligations under the contract.
- 7.4 The Contractor shall not be required to obtain any consent from the Employer for:
- (a) the sub-contracting of any part of the Works for which the Sub-Contractor is already named in the contract;
 - (b) the provision for labour, or labour component, and,
 - (c) the purchase of materials which are in accordance with the standards specified in the contract.

(Note: 1. All bidders are expected to indicate clearly in the bid, if they proposed sub-contracting elements of the works amounting to more than 10 percent of the Bid Price. For each such proposal the qualification and the experience of the identified sub-contractor in the relevant field should be furnished alongwith the bid to enable the Employer to satisfy himself about their qualifications before agreeing for such sub-contracting and include it in the contract. In view of the above, normally no additional sub-contracting should arise during execution of the contract.

2. However, [a] sub-contracting for certain specialized elements of the work is not unusual and acceptable for carrying out the works more effectively; but vertical splitting of the works for sub-contracting is not acceptable. [b] in any case, proposal for sub-contracting in addition to what was specified in bid and stated in contract agreement will not be acceptable if the value of such additional sub-contracting exceeds 25% of value of work which was to

be executed by Contractor without sub-contracting.

3. Assignment of the contract may be acceptable only under exceptional circumstances such as insolvencies/liquidation or merger of companies etc.)

**8. Other
Contractors**

- 8.1 The Contractor shall cooperate and share the Site with other contractors, public authorities, utilities, and the Employer between the dates given in the Schedule of Other Contractors, as **referred to in the PCC**. The Contractor shall also provide facilities and services for them as described in the Schedule. The Employer may modify the Schedule of Other Contractors, and shall notify the Contractor of any such modification.

9. Personnel and Equipment

- 9.1 The Contractor shall employ the key personnel and use the equipment identified in its Bid and **referred to in the PCC**, to carry out the Works or other personnel and equipment approved by the Project Manager. The Project Manager shall approve any proposed replacement of key personnel and equipment only if their relevant qualifications or characteristics are substantially equal to or better than those proposed in the Bid.
- 9.2 The Project Manager may require the Contractor to remove from the Site of Works, a member of the Contractor's staff or his work force, who:
- (a) persists in any misconduct or lack of care,
 - (b) carries out duties incompetently or negligently,
 - (c) fails to conform with any provisions of the Contract, or
 - (d) persists in any conduct which is prejudicial to safety, health, or the protection of the environment.
- 9.3 If the Employer, Project Manager or Contractor determines, that any employee of the Contractor be determined to have engaged in corrupt, fraudulent, collusive, coercive, or obstructive practice during the execution of the Works, then that employee shall be removed in accordance with Clause 9.2 above
- 9.4 In all the above cases, the contractor shall ensure that the person leaves the site within seven days and has no further connection with the work in the contract. The Contractor shall appoint a suitable replacement within 28 days or earlier as may be agreed to between the Project manager and the Contractor.
- 9.5 The Contractor shall not employ any retired Gazetted officer who has either not completed two years after the date of retirement or has not obtained permission from the Government authorities for employment with the Contractor²³.
- 9.6 The Contractor shall, unless otherwise provided in the Contract, make his own arrangements for the engagement of all staff and labour, local or other, and for their payment, housing, feeding and transport. The Contractor shall, if required by the Project Manager, deliver to the Project Manager a return in detail, in such form and at such intervals as the Project Manager may prescribe, showing the staff and the numbers of the several

²³Based on Government Directives.

classes of labour from time to time employed by the Contractor on the Site and such other information as the Project Manager may require.

Compliance with Labour Regulations

9.7 During continuance of the Contract, the Contractor and his Sub-Contractors shall abide at all times by all existing labour enactments and rules made there under, regulations, notifications and bye laws of the State or Central Government or local authority and any other labour laws (including rules), regulations, bye laws that may be passed or notification that may be issued under any labour law prevailing on the Base Date either by the State or the Central Government or the local authority. The Contractor shall keep the Employer indemnified in case any action is taken against the Employer by the competent authority on account of contraventions including amendments. If the Employer is caused to pay or reimburse, such amounts as may be necessary to cause or observe, or for non-observance of the provisions stipulated in the notifications/bye laws/Acts/Rules/regulations including amendments, if any, on the part of the Contractor, the Project Manager/ Employer shall have the right to deduct any money due to the Contractor including his amount of performance security and if applicable, the Environmental, Social, Health and Safety (ESHS) Performance Security. The Employer/ Project Manager shall also have right to recover from the Contractor any sum required or estimated to be required for making good the loss or damage suffered by the Employer.

9.8 The employees of the Contractor and the Sub-Contractor in no case shall be treated as the employees of the Employer at any point of time.

9.9 The Contractor shall duly comply with the provisions of the Apprentices Act 1961 (III of 1961) and the rules made there under, and comply, failure or neglect to shall be subject to all liabilities and penalties provided in the said Act and Rules.

10. Employer's and Contractor's Risks

10.1 The Employer carries the risks which this Contract states are Employer's risks, and the Contractor carries the risks which this Contract states are Contractor's risks.

11. Employer's Risks

11.1 From the Start Date until the Defects Liability Certificate has been issued, the following are Employer's risks:

- (a) The risk of personal injury, death, or loss of or damage to property (excluding the Works, Plant, Materials, and

Equipment), which are due to

- (i) use or occupation of the Site by the Works or for the purpose of the Works, which is the unavoidable result of the Works or
- (ii) negligence, breach of statutory duty, or interference with any legal right by the Employer or by any person employed by or contracted to him except the Contractor.

- (b) The risk of damage to the Works, Plant, Materials, and Equipment to the extent that it is due to a fault of the Employer or in the Employer's design, or due to war or radioactive contamination directly affecting the country where the Works are to be executed.

11.2 From the Completion Date until the Defects Liability Certificate has been issued, the risk of loss of or damage to the Works, Plant, and Materials is an Employer's risk except loss or damage due to

- (a) a Defect which existed on the Completion Date,
- (b) an event occurring before the Completion Date, which was not itself an Employer's risk, or
- (c) the activities of the Contractor on the Site after the Completion Date.

12. Contractor's Risks

12.1 From the Starting Date until the Defects Liability Certificate has been issued, the risks of personal injury, death, and loss of or damage to property (including, without limitation, the Works, Plant, Materials, and Equipment) which are not Employer's risks are Contractor's risks.

13. Insurance

13.1 The Contractor shall provide, in the joint names of the Employer and the Contractor, insurance cover from the Start Date to the end of the Defects Liability Period, in the amounts and deductibles **stated in the PCC** for the following events which are due to the Contractor's risks:

- (a) loss of or damage to the Works, Plant, and Materials [which are incorporated in works];
- (b) loss of or damage to Construction Equipment;
- (c) loss of or damage to property (except the Works, Plant, Materials, and Equipment) in connection with the Contract; and
- (d) personal injury or death.

13.2 Policies and certificates for insurance shall be delivered by the Contractor to the Project Manager for the Project Manager's approval before the Start Date. All such insurance shall provide for compensation to be payable in the types and proportions of currencies required to rectify the loss or damage incurred.

13.3 If the Contractor does not provide any of the policies and certificates required, the Employer may effect the insurance which the Contractor should have provided and recover the premiums the Employer has paid from payments otherwise due to the Contractor or, if no payment is due, the payment of the premiums shall be a debt due.

13.4 Alterations to the terms of insurance shall not be made without the approval of the Project Manager.

13.5 Both parties shall comply with any conditions of the insurance policies.

14. Site Data

14.1 The Contractor shall be deemed to have examined any Site Data **referred to in the PCC**, supplemented by any information available to the Contractor.

15. Contractor to Construct the Works including protection of environment, and assurance of public health and

15.1 The Contractor shall construct and install the Works in accordance with the Specifications and Drawings and as per instructions of Project Manager.

15.2.1 The Contractor shall take all reasonable steps to protect the environment on and off the Site and to avoid damage or nuisance to persons or to property of the public or others resulting from pollution, noise or other cause arising as a consequence of his methods of operation.

safety	15.2.2 During continuance of the contract, the contractor and his sub-contractors shall abide at all times by all existing enactments on environmental protection and rules made thereunder, regulations, notifications and by-laws of the State or Central Government, or local authorities and other law, bye-law, regulations that may be passed or notification that may be issued in this respect in future by the State or Central Government or the local authority. Salient features of the major laws are given in Appendix 1 to the General Conditions of Contract.
16 The Works to Be Completed by the Intended Completion Date	16.1 The Contractor may commence execution of the Works on the Start Date and shall carry out the Works in accordance with the Program submitted by the Contractor, as updated with the approval of the Project Manager, and complete them by the Intended Completion Date.
17 Approval by the Project Manager	<p>17.1 The Contractor shall submit Specifications and Drawings showing the proposed Temporary Works to the Project Manager, for his approval.</p> <p>17.2 The Contractor shall be responsible for design of Temporary Works.</p> <p>17.3 The Project Manager's approval shall not alter the Contractor's responsibility for design of the Temporary Works.</p> <p>17.4 The Contractor shall obtain approval of third parties to the design of the Temporary Works, where required.</p> <p>17.5 All Drawings prepared by the Contractor for the execution of the temporary or permanent Works, are subject to prior approval by the Project Manager before this use.</p>
18 Safety	18.1 The Contractor shall be responsible for the safety of all activities on the Site.
19 Discoveries	19.1 Anything of historical or other interest or of significant value unexpectedly discovered on the Site shall be the property of the Employer. The Contractor shall notify the Project Manager of such discoveries and carry out the Project Manager's instructions for dealing with them.
20 Possession of the Site	20.1 The Employer shall give possession of all parts of the Site to the Contractor. If possession of a part is not given by the date stated in the PCC , the Employer shall be deemed to have delayed the start of the relevant activities, and this shall be a Compensation Event.

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| 21 Access to the Site | 21.1 The Contractor shall allow the Project Manager and any person authorized by the Project Manager access to the Site and to any place where work in connection with the Contract is being carried out or is intended to be carried out. |
| 22 Instructions, Inspections and Audits | <p>22.1 The Contractor shall carry out all instructions of the Project Manager which comply with the applicable laws where the Site is located.</p> <p>22.2 The Contractor shall keep, and shall make all reasonable efforts to cause its Subcontractors and sub-consultants to keep, accurate and systematic accounts and records in respect of the Works in such form and details as will clearly identify relevant time changes and costs.</p> <p>22.3 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/or the accounts and records relating to the performance of the Contract and the submission of the bid, and to have such 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 25.1 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 22.2 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> |
| 23 Appointment of the Adjudicator | <p>23.1 The Adjudicator named in PCC shall be appointed jointly by the Employer and the Contractor, at the time of the Employer's issuance of the Letter of Acceptance. If, in the Letter of Acceptance, the Employer does not agree on the appointment of the Adjudicator, the Employer will request the Appointing Authority designated in the PCC, to appoint the Adjudicator within 14 days of receipt of such request.</p> <p>23.1.1 The Adjudicator should be in position before "notice to proceed with work" is issued to the Contractor and an agreement should be signed with the Adjudicator jointly by the Employer and the Contractor in the form attached – Appendix 3.</p> <p>23.2 Should the Adjudicator resign or die, or should the Employer and the Contractor agree that the Adjudicator is not functioning in accordance with the provisions of the Contract; a new Adjudicator shall be jointly appointed by the Employer</p> |

and the Contractor. In case of disagreement between the Employer and the Contractor, within 30 days, the Adjudicator shall be designated by the Appointing Authority **designated in the PCC** at the request of either party, within 14 days of receipt of such request.

24 Procedure for Disputes

- 24.1 If the Contractor believes that a decision taken by the Project Manager was either outside the authority given to the Project Manager by the Contract or that the decision was wrongly taken, the decision shall be referred to the Adjudicator within 14 days of the notification of the Project Manager's decision.
- 24.2 The Adjudicator shall give a decision in writing within 28 days of receipt of a notification of a dispute.
- 24.3 The Adjudicator shall be paid daily at the rate **specified in the PCC**, together with reimbursable expenses of the types **specified in the PCC**, and the cost shall be divided equally between the Employer and the Contractor. Whatever decision is reached by the Adjudicator, either party may refer that decision to an Arbitrator within 28 days of the Adjudicator's written decision. If neither party refers the dispute to arbitration within the above 28 days, the Adjudicator's decision shall be final and binding.
- 24.4 The arbitration shall be conducted in accordance with the arbitration procedures published by the institution named and in the place **specified in the PCC**.

The Arbitrator(s) shall give a decision in writing within 120 days of start of the proceedings unless otherwise agreed to by the Parties. The Arbitrators shall entertain only those issues which have been earlier referred to the Adjudicator and either party is dissatisfied with the decision given by the Adjudicator.

25. Corrupt And Fraudulent Practices

- 25.1 The Bank requires compliance with its policy in regard to corrupt and fraudulent practices as set forth in Appendix A to the GCC.
- 25.2 The Employer requires the Contractor to disclose any commissions or fees that may have been paid or are to be paid to agents or any other party with respect to the bidding process or execution of the Contract. The information shall be disclosed as and when such payments are made or agreed to, and compliance with the disclosure requirement shall be furnished, while submitting each monthly statement for payments; such disclosure must include at least the name and address of the agent or other party, the amount and currency, and the purpose

of the commission, gratuity or fee.

B. Time Control

26. Program

- 26.1 Within the time **stated in the PCC**, after the date of the Letter of Acceptance, the Contractor shall submit to the Project Manager for approval a revised Program showing the general methods, arrangements, order, and timing for all the activities in the Works alongwith monthly cash flow forecasts.
- 26.2 An update of the Program shall be a program showing the actual progress achieved on each activity and the effect of the progress achieved on the timing of the remaining work, including any changes to the sequence of the activities.
- 26.3 The Contractor shall submit to the Project Manager for approval an updated Program at intervals no longer than the period **stated in the PCC**. If the Contractor does not submit an updated Program within this period, the Project Manager may withhold the amount **stated in the PCC** from the next payment certificate and continue to withhold this amount until the next payment after the date on which the overdue Program has been submitted.
- 26.4 The Project Manager's approval of the Program shall not alter the Contractor's obligations. The Contractor may revise the Program and submit it to the Project Manager again at any time. A revised Program shall show the effect of Variations and Compensation Events.

27. Extension of the Intended Completion Date

- 27.1 The Project Manager shall extend the Intended Completion Date including milestones if a Compensation Event occurs or a Variation is issued which makes it impossible for Completion to be achieved by the Intended Completion Date as per agreed milestones without the Contractor taking steps to accelerate the remaining work, which would cause the Contractor to incur additional cost.
- 27.2 The Project Manager shall decide whether and by how much to extend the Intended Completion Date/milestones within 21 days of the Contractor asking the Project Manager for a decision upon the effect of a Compensation Event or Variation and submitting full supporting information. If the Contractor has failed to give early warning of a delay or has failed to cooperate in dealing with a delay, the delay by this failure shall not be considered in assessing the new Intended Completion Date/milestones.

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| 28. Acceleration | <p>28.1 When the Employer wants the Contractor to finish before the Intended Completion Date, the Project Manager shall obtain priced proposals for achieving the necessary acceleration from the Contractor. If the Employer accepts these proposals, the Intended Completion Date shall be adjusted accordingly and confirmed by both the Employer and the Contractor.</p> <p>28.2 If the Contractor's priced proposals for acceleration are accepted by the Employer, they are incorporated in the Contract Price and treated as a Variation.</p> |
| 29. Delays Ordered by the Project Manager | <p>29.1 The Project Manager may instruct the Contractor to delay the start or progress of any activity within the Works.</p> |
| 30. Management Meetings | <p>30.1 Either the Project Manager or the Contractor may require the other to attend a management meeting. (Which will be held at the place indicated in PCC. The periodicity to be fixed by Project Manager / Contractor jointly). The business of a management meeting shall be to review the progress of construction with reference to the construction program given in accordance with GCC 26.1, the plans for remaining work and to deal with matters raised in accordance with the early warning procedure.</p> <p>30.2 The Project Manager shall record the business of management meetings and provide copies of the record to those attending the meeting and to the Employer. The responsibility of the parties for actions to be taken shall be decided by the Project Manager either at the management meeting or after the management meeting and stated in writing to all who attended the meeting.</p> |
| 31. Early Warning | <p>31.1 The Contractor shall warn the Project Manager at the earliest opportunity of specific likely future events or circumstances that may adversely affect the quality of the work, increase the Contract Price, or delay the execution of the Works. The Project Manager may require the Contractor to provide an estimate of the expected effect of the future event or circumstance on the Contract Price and Completion Date. The estimate shall be provided by the Contractor as soon as reasonably possible.</p> <p>31.2 The Contractor shall cooperate with the Project Manager in making and considering proposals for how the effect of such an event or circumstance can be avoided or reduced by anyone involved in the work and in carrying out any resulting</p> |

instruction of the Project Manager.

C. Quality Control

32. Quality Assurance

- 32.1 The Contractor shall institute Quality Assurance (QA) and Quality Control (QC) systems in accordance with Quality Assurance Plan to demonstrate compliance with the requirements of the Contract as approved by the Project Manager.
- 32.2 Compliance with the QA/QC systems shall not relieve the Contractor of any of his duties obligations or responsibilities under the Contract.

33. Tests

- 33.1 The Contractor shall provide all apparatus, assistance, documents and other information, electricity, equipment, fuel, consumables, instruments, labour, materials, and suitably qualified and experienced staff, as are necessary to carry out the specified tests efficiently.
- 33.2 If the Project Manager instructs the Contractor to carry out a test not specified in the Specification to check whether any work has a Defect and the test shows that it does, the Contractor shall pay for the test and any samples. If there is no Defect, the test shall be a Compensation Event.

34. Identifying and Correction of Defects

- 34.1. The Project Manager shall check the Contractor's work and notify the Contractor of any defects that are found specifying a time by which it should be corrected. Such checking shall not affect the Contractor's responsibilities. The Project Manager may instruct the Contractor to search for a Defect and to uncover and test any work that the Project Manager considers may have a Defect.
- 34.2 The contractor shall permit the Employer's Technical auditor to check the contractor's work and notify the Project Manager and Contractor of any defects that are found. Such a check shall not affect the Contractor's or the Project Manager's responsibility as defined in the Contract Agreement
- 34.3 The Project Manager shall give notice to the Contractor of any Defects [specifying a time limit by which it should be corrected] before the end of the Defects Liability Period, which begins at Completion, and is **defined in the PCC**. The Defects Liability Period shall be extended for as long as Defects remain to be corrected.
- 34.4 Every time notice of a Defect is given, the Contractor shall

correct the notified Defect within the length of time specified by the Project Manager's notice.

35. Uncorrected Defects

- 35.1 If the Contractor has not corrected a Defect within the time specified in the Project Manager's notice, the Project Manager shall assess the cost of having the Defect corrected and the Contractor shall pay this amount.

Note: 1. Where in certain cases, the technical specifications provide for acceptance of works within specified tolerance limits at reduced rates, Project Manager will certify payments to Contractor accordingly.

2. Where the failure to correct a particular defect within the specified time is considered as a fundamental breach of contract a notice should be given to the contractor as stated in GCC 57.2(e).

D. Cost Control

36. Contract Price

- 36.1 The Bill of Quantities shall contain priced items for the Works to be performed by the Contractor. The Bill of Quantities is used to calculate the Contract Price. The Contractor will be paid for the quantity of the work accomplished at the rate in the Bill of Quantities for each item.

37. Changes in the Contract Price

- 37.1 If the final quantity of the work done differs from the quantity in the Bill of Quantities for the particular item by more than 25 percent, provided the change exceeds 1 percent of the Initial Contract Price, the Project Manager shall adjust the rate to allow for the change.
- (a) If the quantity of work executed exceeds the quantity of the item in BOQ beyond the higher specified limit the Project Manager shall fix the rate to be applied for the additional quantity of the work executed.
 - (b) If the quantity of work executed less than the quantity of the item in BOQ lesser than the lower specified limit, the Project Manager shall fix the rate to be applied for whole of the quantity of the work so executed.
- 37.2. The Project Manager shall not adjust rates from changes in quantities if thereby the Initial Contract Price is exceeded by more than 15 percent, except with the prior approval of the Employer.
- 37.3 If requested by the Project Manager, the Contractor shall

provide the Project Manager with a detailed cost breakdown of any rate in the Bill of Quantities.

38. Variations

- 38.1 All Variations shall be included in updated Programs, produced by the Contractor.
- 38.2 The Contractor shall provide the Project Manager with a quotation (with breakdown of unit rates) for carrying out the Variation when requested to do so by the Project Manager. The Project Manager shall assess the quotation, which shall be given within seven (7) days of the request or within any longer period stated by the Project Manager and before the Variation is ordered.
- 38.3 If the work in the Variation corresponds to an item description in the Bill of Quantities and if, in the opinion of the Project Manager, the quantity of work above the limit stated in Sub-Clause 37.1 or the timing of its execution do not cause the cost per unit of quantity to change, the rate in the Bill of Quantities shall be used to calculate the value of the Variation. If the cost per unit of quantity changes, or if the nature or timing of the work in the Variation does not correspond with items in the Bill of Quantities, the quotation by the Contractor shall be in the form of new rates for the relevant items of work.
- 38.4 If the Contractor's quotation is unreasonable, [*or if contractor fails to provide the Project Manager with a quotation within a reasonable time specified by Project Manager in accordance with GCC38.2*] the Project Manager may order the Variation and make a change to the Contract Price, which shall be based on the Project Manager's own forecast of the effects of the Variation on the Contractor's costs
- 38.5 If the Project Manager decides that the urgency of varying the work would prevent a quotation being given and considered without delaying the work, no quotation shall be given and the Variation shall be treated as a Compensation Event.
- 38.6 The Contractor shall not be entitled to additional payment for costs that could have been avoided by giving early warning.

39. Cash Flow Forecasts

- 39.1 When the Program, is updated, the Contractor shall provide the Project Manager with an updated cash flow forecast. The cash flow forecast shall be in Indian Rupees.

40. Payment Certificates

- 40.1 The Contractor shall submit to the Project Manager monthly statements of the estimated value of the work executed less the

cumulative amount certified previously alongwith details of measurement of the quantity of works executed in a tabular form approved by the Project Manager.

- 40.2 The Project Manager shall check the details given in the Contractor's monthly statement and within 14 days certify the amounts to be paid to the Contractor after taking into account any credit or debit for the month in question in respect of materials for the works in the relevant amount and under conditions set forth in GCC Sub-Clause 49.4 [*Secured Advance*]
- 40.3 The value of work executed shall be determined by the Project Manager after due check and measurement of the quantities claimed as executed by the contractor
- 40.4 The value of work executed shall comprise of the value of the quantities of work in the Bill of Quantities that have been completed;
- 40.5 The value of work executed shall include the valuation of Variations and Compensation Events.
- 40.6 The Project Manager may exclude any item certified in a previous certificate or reduce the proportion of any item previously certified in any certificate in the light of later information.

41. Payments

- 41.1 Payments shall be adjusted for deductions for advance payments, retention, other recoveries in terms of contract & taxes to be deducted at source [TDS] as per applicable law. The Employer shall pay the Contractor the amounts certified by the Project Manager within 28 days of the date of each certificate. If the Employer makes a late payment, the Contractor shall be paid interest on the late payment in the next payment. Interest shall be calculated from the date by which the payment should have been made upto the date when the late payment is made at the rate **stated in the PCC**.
- 41.2 If an amount certified is increased in a later certificate or as a result of an award by the Adjudicator or an Arbitrator, the Contractor shall be paid interest upon the delayed payment as set out in this clause. Interest shall be calculated at the rate stated in GCC 41.1 above, from the date upon which the increased amount would have been certified in the absence of dispute.
- 41.3 Items of the Works for which no rate or price has been entered

in shall not be paid for by the Employer and shall be deemed covered by other rates and prices in the Contract.

42. Compensation Events

42.1 The following shall be Compensation Events:

- (a) The Employer does not give access to a part of the Site by the Site Possession Date pursuant to GCC Sub-Clause 20.1.
- (b) The Employer modifies the Schedule of Other Contractors in a way that affects the work of the Contractor under the Contract.
- (c) The Project Manager orders a delay or does not issue Drawings, Specifications, or instructions required for execution of the Works on time.
- (d) The Project Manager instructs the Contractor to uncover or to carry out additional tests upon work, which is then found to have no Defects.
- (e) The Project Manager unreasonably does not approve a subcontract to be let.
- (f) Ground conditions are substantially more adverse than could reasonably have been assumed before issuance of the Letter of Acceptance from the information issued to bidders (including the Site Investigation Reports), from information available publicly and from a visual inspection of the Site.
- (g) The Project Manager gives an instruction for dealing with an unforeseen condition, caused by the Employer, or additional work required for safety or other reasons.
- (h) Other contractors, public authorities, utilities, or the Employer does not work within the dates and other constraints stated in the Contract, and they cause delay or extra cost to the Contractor.
- (i) The advance payment is delayed.
- (j) The effects on the Contractor of any of the Employer's Risks.
- (k) The Project Manager unreasonably delays issuing a Certificate of Completion.

42.2 If a Compensation Event would cause additional cost or would

prevent the work being completed before the Intended Completion Date, the Contract Price shall be increased and/or the Intended Completion Date shall be extended. The Project Manager shall decide whether and by how much the Contract Price shall be increased and whether and by how much the Intended Completion Date shall be extended.

42.3 As soon as information demonstrating the effect of each Compensation Event upon the Contractor's forecast cost has been provided by the Contractor, it shall be assessed by the Project Manager, and the Contract Price shall be adjusted accordingly. If the Contractor's forecast is deemed unreasonable, the Project Manager shall adjust the Contract Price based on the Project Manager's own forecast. The Project Manager shall assume that the Contractor shall react competently and promptly to the event.

42.4 The Contractor shall not be entitled to compensation to the extent that the Employer's interests are adversely affected by the Contractor's not having given early warning or not having cooperated with the Project Manager.

43. Tax

43.1 The rates quoted by the Contractor shall be deemed to be inclusive of the VAT, Sales and other taxes that the Contractor will have to pay for the performance of this Contract. The Employer will perform such duties in regard to the deduction of such taxes at source [TDS] as per applicable law.

43.2 The Project Manager shall adjust the Contract Price if taxes, duties, and other levies are changed between the deadline for the submission of bids for the Contract and the date of the last Completion certificate. The adjustment shall be the change in the amount of tax payable by the Contractor, provided such changes are not already reflected in the Contract Price.

44. Currencies

44.1 All payments shall be made in Indian Rupees.

45. Price Adjustment

45.1 Contract price shall be adjusted for increase or decrease in rates and price of labour, materials, fuels and lubricants and other inputs to the works in accordance with the principles and procedures outlined below. A table of adjustment data is **included in the PCC** which indicates the coefficients of various inputs and the sources of indices for various schedules of BOQ. If the PCC does not include a table of adjustment data this sub clause shall not apply and there shall be no price adjustment.

(a) The price adjustment according to sub para (d) below,

shall apply for the work done from the start date given in the PCC upto the end of the Intended Completion Date. If there is delay in completion beyond such date for reasons attributable to the contractor, the Price Adjustment for the work carried out during such period, for reasons attributable to the Contractor, shall be regulated by sub-para (g) below.

- (b) The Contract Price shall be adjusted to take account of any increase or decrease in cost after the base date, which affect the Contractor in performance of obligations under the Contract.
- (c) The total value (R) of the work done during the specified period [GCC 40.1] shall be as under:

$$R = \text{SUM} (R_{S1} + R_{S2} + R_{S3} + \dots R_{Sn}),$$

Where,

‘ R_{sn} ’ is the value of work done during the specified period to which the price adjustment shall be applied for the relevant schedule of Bill of Quantities (BOQ) specified in P.C.C during the specified period, and represented as under:

$R_{sn} = (V_{sn} + S_{sn})$ minus (amount of secured advance recovered in the same period + value of works executed under variations for which price adjustments will be worked separately based on terms mutually agreed between the Project Manager and the Contractor)

where,

V_{sn} is the total value of work done during the specified period for the respective schedule of BOQ, and

S_{sn} is the secured advance paid during the specified period for the respective schedule of BOQ,

- (d) The adjustment to be applied to the amount otherwise payable to the Contractor, as valued in accordance with the appropriate schedule of BOQ and certified in Payment Certificates, shall be determined from formulae which shall be of the following general type:

$$P_n = a + b L_n/L_o + c E_n/E_o + d M_n/M_o + \dots$$

where,

“ P_n ” is the adjustment multiplier to be applied to the value of the work done during the period “ n ”, this period being a month unless otherwise stated in the PCC.

“ a ” is a fixed coefficient, stated in the relevant table of adjustment data, representing the non-adjustable portion in contractual payments;

“ b ”, “ c ”, “ d ”,... are coefficients representing the estimated proportion of each cost element related to the execution of the Works, as stated in the relevant table of adjustment data; such tabulated cost elements may be indicative of resources such as labour, equipment and materials;

“ L_n ” [*Labour*], “ E_n ” [*Equipment*], “ M_n ” [*Material*], are the current cost indices or reference prices for period “ n ”, each of which is applicable to the relevant tabulated cost element [*Labour, Equipment, Steel, Cement, Fuel/Lubricants, Bitumen, others*] on the date, specified in the Table-2 of Adjustment Data, prior to the last day of the period (to which the particular Payment Certificate relates); and

“ L_o ”, “ E_o ”, “ M_o ”,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.

- (e) The cost indices or reference prices stated in the tables of adjustment data given in PCC shall be used. The base date shall be the deadline for the submission of bids.
- (f) If the Contractor fails to complete the Works within the Intended Completion date, adjustment of prices thereafter shall be made using either:
 - (i) index or price applicable for each cost element tabulated in the tables of adjustment data on the specified date prior to the expiry of the Intended Completion Date, or
 - (ii) the current index or price applicable for the period in question whichever is more favourable to the Employer.
- (g) The weightings (coefficients) for each of the factors of

cost stated in the table(s) of adjustment data shall only be varied by the Project Manager if they have been rendered unreasonable, unbalanced or inapplicable, as a result of Variations.

- (h) Unless otherwise **stated in the P.C.C.**, the Price adjustment shall be done in each monthly Interim Payment Certificate [IPC]. The coefficients and indices are given in the Tables of Adjustment Data in Contract data.

To the extent that full compensation for any rise or fall in costs to the contractor is not covered by the provisions of this or other clauses in the contract, the unit rates and prices included in the contract shall be deemed to include amounts to cover the contingency of such other rise or fall in costs

46. Retention

- 46.1 The Employer shall retain from each payment due to the Contractor the proportion **stated in the PCC** until Completion of the whole of the Works
- 46.2 Upon the issue of a Certificate of Completion of the Works by the Project Manager, in accordance with GCC 53.1, half the total amount retained shall be repaid to the Contractor and half when the Defects Liability Period has passed and the Project Manager has certified that all Defects notified by the Project Manager to the Contractor before the end of this period have been corrected. On completion of the whole works the Contractor may substitute the balance retention money with an “on demand” Bank guarantee.

47. Liquidated Damages

- 47.1 The Contractor shall pay liquidated damages to the Employer at the rate per day **stated in the PCC** for each day that the Completion Date is later than the Intended Completion Date (for the whole of the works or the milestones as stated in the PCC). The total amount of liquidated damages shall not exceed the amount **defined in the PCC**. The Employer may deduct liquidated damages from payments due to the Contractor. Payment of liquidated damages shall not affect the Contractor’s liabilities.

Time is the essence of the contract and payment or deduction of liquidated damages shall not relieve the contractor from his obligation to complete the work as per agreed construction program and milestones, or from any of the Contractor’s other obligations and liabilities under the contract.

	47.2	If the Intended Completion Date including milestones is extended after liquidated damages have been paid, the Project Manager shall correct any overpayment of liquidated damages by the Contractor by adjusting the next payment certificate. The Contractor shall be paid interest on the overpayment, calculated from the date of payment to the date of repayment, at the rates specified in GCC Sub-Clause 41.1.
48. Bonus	48.1	Not used.
49. Advance Payment	49.1	The Employer shall make advance payment to the Contractor of the amounts stated in the PCC by the date stated in the PCC , against provision by the Contractor of an Unconditional Bank Guarantee in a form and by a bank acceptable to the Employer in amounts in Indian Rupees equal to the advance payment. The Guarantee shall remain effective until the advance payment has been repaid, but the amount of the Guarantee shall be progressively (<i>each instalment not less than Rs. 500,000</i>) reduced by the amounts repaid by the Contractor. Interest shall not be charged on the advance payment.
	49.2	The Contractor is to use the advance payment only to pay for Equipment, Plant, Materials, and mobilization expenses required specifically for execution of the Contract. The Contractor shall demonstrate that advance payment has been used in this way by supplying copies of invoices or other documents to the Project Manager.
	49.3	The advance payment shall be repaid by deducting proportionate amounts from payments otherwise due to the Contractor, following the schedule of completed percentages of the Works on a payment basis. No account shall be taken of the advance payment or its repayment in assessing valuations of work done, Variations, price adjustments, Compensation Events, Liquidated Damages.
Secured Advances	49.4	The Project Manager shall make advance payment in respect of materials intended for but not yet incorporated in the Works in accordance with conditions stipulated in the PCC .
50. Securities	50.1	The Performance Security and an Environmental, Social, Safety and Health (ESHS) Performance Security shall be provided to the Employer no later than the date specified in the Letter of Acceptance and shall be issued in the amounts specified in the PCC (for GCC 50.1), and shall be issued by a Nationalized or Scheduled bank in India. The Performance Security including additional security for unbalanced bids, and the ESHS

Performance Security, shall be valid until a date 28 days from the date of issue of the Certificate of Completion.”

51. Dayworks 51.1 Not used.

52. Cost of Repairs 52.1 Loss or damage to the Works or Materials to be incorporated in the Works between the Start Date and the end of the Defects Correction periods shall be remedied by the Contractor at the Contractor’s cost if the loss or damage arises from the Contractor’s acts or omissions.

E. Finishing the Contract

53. Completion 53.1 The Contractor shall request the Project Manager to issue a Certificate of Completion of the Works, and the Project Manager shall do so upon deciding that the whole of the Works is completed.

54. Taking Over 54.1 The Employer shall take over the Site and the Works within seven days of the Project Manager’s issuing a certificate of Completion.

55. Final Account 55.1 The Contractor shall supply the Project Manager with a detailed account of the total amount that the Contractor considers payable under the Contract at the end of the Defects Liability Period. The Project Manager shall issue a Defects Liability Certificate and certify any final payment that is due to the Contractor within 56 days of receiving the Contractor’s account if it is correct and complete. If it is not, the Project Manager shall issue within 56 days a schedule that states the scope of the corrections or additions that are necessary. If the Final Account is still unsatisfactory after it has been resubmitted, the Project Manager shall decide on the amount payable to the Contractor and issue a payment certificate within 56 days of receiving the contractor’s revised account.

56. Operating and Maintenance Manuals 56.1 If “as built” Drawings [including a compact disk containing digitized drawings] and/or operating and maintenance manuals are required, the Contractor shall supply them by the dates **stated in the PCC**.

56.2 If the Contractor does not supply the Drawings [including a compact disk containing digitized drawings] and/or manuals by the dates **stated in the PCC** pursuant to GCC Sub-Clause 56.1, or they do not receive the Project Manager’s approval, the Project Manager shall withhold the amount **stated in the PCC** from payments due to the Contractor.

57. Termination

- 57.1 The Employer or the Contractor may terminate the Contract if the other party causes a fundamental breach of the Contract after giving fourteen (14) days written notice.
- 57.2 Fundamental breaches of Contract shall include, but shall not be limited to, the following:
- (a) the Contractor stops work for 28 days when no stoppage of work is shown on the current Program and the stoppage has not been authorized by the Project Manager;
 - (b) the Project Manager instructs the Contractor to delay the progress of the Works, and the instruction is not withdrawn within 28 days;
 - (c) the Employer or the Contractor is made bankrupt or goes into liquidation other than for a reconstruction or amalgamation;
 - (d) a payment certified by the Project Manager is not paid by the Employer to the Contractor within 84 days of the date of the Project Manager's certificate;
 - (e) the Project Manager gives Notice that failure to correct a particular Defect is a fundamental breach of Contract and the Contractor fails to correct it within a reasonable period of time determined by the Project Manager;
 - (f) the Contractor does not maintain a Security, which is required;
 - (g) the Contractor has delayed the completion of the Works by the number of days for which the maximum amount of liquidated damages can be paid, as **defined in the PCC**; or
 - (h) if the Contractor, in the judgment of the Employer, has engaged in corrupt, fraudulent, collusive, coercive or obstructive practices in competing for or in executing the Contract, then the Client may, after giving fourteen (14) days written notice to the Contractor, terminate the Contract and expel him from the Site.
 - (i) The contractor has contravened Clauses 7 and 9 of GCC.
 - (j) The contractor does not adhere to the agreed construction program, agreed ESHS-MSIP [Clause 26 of GCC] and also fails to take satisfactory remedial action as per agreements reached in the management meetings [Clause 30 of GCC] for a period of 60 days.
 - (k) The contractor fails to carry out of the instructions of the

Project Manager within a reasonable time determined by the Project Manager in accordance with GCC Clause 15.1 and 22.

- (l) The contractor (in case of Joint Venture) has modified the composition of the joint venture and/or the responsibility of each member of the joint venture from what is stated in joint venture agreement without the prior approval of the Employer.

57.3 When either party to the Contract gives notice of a breach of Contract to the Project Manager for a cause other than those listed under GCC Sub-Clause 57.2 above, the Project Manager shall decide whether the breach is fundamental or not.

57.4 Notwithstanding the above, the Employer may terminate the Contract for convenience.

57.5 If the Contract is terminated, the Contractor shall stop work immediately, make the Site safe and secure, and leave the Site as soon as reasonably possible.

58. Payment upon Termination

58.1 If the Contract is terminated because of a fundamental breach of Contract by the Contractor, the Project Manager shall issue a certificate for the value of the work done and Materials ordered less advance payments received upto the date of the issue of the certificate less other recoveries due in terms of contract, less taxes to be deducted at source [TDS] as per applicable law, and less the percentage to apply to the value of the work not completed, as **indicated in the PCC**. Additional Liquidated Damages shall not apply. If the total amount due to the Employer exceeds any payment due to the Contractor, the difference shall be a debt payable to the Employer.

58.2 If the Contract is terminated for the Employer's convenience or because of a fundamental breach of Contract by the Employer, the Project Manager shall issue a certificate for the value of the work done, Materials ordered, the reasonable cost of removal of Equipment, repatriation of the Contractor's personnel employed solely on the Works, and the Contractor's costs of protecting and securing the Works, and less advance payments received upto the date of the certificate less other recoveries due in terms of the contract and less taxes due to be deducted at source [TDS] as per applicable law.

59. Property

59.1 All Materials on the Site, Plant, Equipment, Temporary Works, and Works shall be deemed to be the property of the Employer if

the Contract is terminated because of the Contractor's default.

60. Release from Performance

- 60.1 If the Contract is frustrated by the outbreak of war or by any other event entirely outside the control of either the Employer or the Contractor, the Project Manager shall certify that the Contract has been frustrated. The Contractor shall make the Site safe and stop work as quickly as possible after receiving this certificate and shall be paid for all work carried out before receiving it and for any work carried out afterwards to which a commitment was made.

61. Suspension of Bank Loan or Credit

- 61.1 In the event that the Bank suspends the Loan or Credit to the Employer, from which part of the payments to the Contractor are being made:
- (a) The Employer is obligated to notify the Contractor of such suspension within 7 days of having received the Bank's suspension notice.
 - (b) If the Contractor has not received sums due it within the 28 days for payment provided for in Sub-Clause 40.1, the Contractor may immediately issue a 14-day termination notice.

APPENDIX A TO GENERAL CONDITIONS

Bank's Policy- Corrupt and Fraudulent Practices

(Text in this Appendix shall not be modified)

Guidelines for Procurement of Goods, Works, and Non-Consulting Services under IBRD Loans and IDA Credits & Grants by World Bank Borrowers, dated January 2011 Revised July 2014:

“Fraud and Corruption:

1.16 It is the Bank's policy to require that Borrowers (including beneficiaries of Bank loans), bidders, suppliers, contractors and their agents (whether declared or not), sub-contractors, sub-consultants, service providers or suppliers, and any personnel thereof, observe the highest standard of ethics during the procurement and execution of Bank-financed contracts.²⁴ In pursuance 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 party;²⁵
 - (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 obligation;²⁶
 - (iii) “collusive practice” is an arrangement between two or more parties designed to achieve an improper purpose, including to influence improperly the actions of another party;²⁷
 - (iv) “coercive practice” is impairing or harming, or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence improperly the actions of a party;²⁸
 - (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

²⁴In this context, any action to influence the procurement process or contract execution for undue advantage is improper.

²⁵ For the purpose of this sub-paragraph, “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.

²⁶ For the purpose of this sub-paragraph, “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.

²⁷ For the purpose of this sub-paragraph, “parties” refers to participants in the procurement process (including public officials) attempting either themselves, or through another person or entity not participating in the procurement or selection process, to simulate competition or to establish bid prices at artificial, non-competitive levels, or are privy to each other's bid prices or other conditions.

²⁸ For the purpose of this sub-paragraph, “party” refers to a participant in the procurement process or contract execution.

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 paragraph 1.16(e) below.
- (b) will reject a proposal for award if it determines that the bidder recommended for award, or any of its personnel, or its agents, or its sub-consultants, sub-contractors, service providers, suppliers and/or their employees, has, directly or indirectly, engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices in competing for the contract in question;
- (c) will declare misprocurement and cancel the portion of the loan allocated to a contract if it determines at any time that representatives of the Borrower or of a recipient of any part of the proceeds of the loan engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices during the procurement or the implementation of the contract in question, without the Borrower having taken timely and appropriate action satisfactory to the Bank to address such practices when they occur, including by failing to inform the Bank in a timely manner at the time they knew of the practices;
- (d) will sanction a firm or individual, at any time, in accordance with the prevailing Bank's sanctions procedures,²⁹ 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 nominated³⁰;
- (e) will require that a clause be included in bidding documents and in contracts financed by a Bank loan, requiring bidders, suppliers and contractors, and their sub-contractors, agents, personnel, consultants, service providers, or suppliers, to permit the Bank to inspect all accounts, records, and other documents relating to the submission of bids and contract performance, and to have them audited by auditors appointed by the Bank."

²⁹ A firm or individual may be declared ineligible to be awarded a Bank financed contract upon: (i) completion of the Bank's sanctions proceedings as per its sanctions procedures, including, inter alia, cross-debarment as agreed with other International Financial Institutions, including Multilateral Development Banks, and through the application the World Bank Group corporate administrative procurement sanctions procedures for fraud and corruption; and (ii) as a result of temporary suspension or early temporary suspension in connection with an ongoing sanctions proceeding. See footnote 14 and paragraph 8 of Appendix 1 of these Guidelines.

³⁰ A nominated sub-contractor, consultant, manufacturer or supplier, or service provider (different names are used depending on the particular bidding document) is one which has either been: (i) included by the bidder in its pre-qualification application or bid because it brings specific and critical experience and know-how that allow the bidder to meet the qualification requirements for the particular bid; or (ii) appointed by the Borrower.

APPENDIX B

Environmental, Social, Health and Safety (ESHS)

Metrics for Progress Reports

[Note to Employer: the following metrics may be amended to reflect the Employer's environmental, social, health and safety policies and/or the ESHS requirements of the project. The metrics that are required should be determined by the ESHS risks of the Works and not necessarily by the scale of the Works]

Metrics for regular reporting:

- a. *environmental incidents or non-compliances with contract requirements, including contamination, pollution or damage to ground or water supplies;*
- b. *health and safety incidents, accidents, injuries and all fatalities that require treatment;*
- c. *interactions with regulators: identify agency, dates, subjects, outcomes (report the negative if none);*
- d. *status of all permits and agreements:*
 - i. *work permits: number required, number received, actions taken for those not received;*
 - ii. *status of permits and consents:*
 - *list areas/facilities with permits required (quarries, asphalt & batch plants), dates of application, dates issued (actions to follow up if not issued), dates submitted to resident engineer (or equivalent), status of area (waiting for permits, working, abandoned without reclamation, decommissioning plan being implemented, etc.);*
 - *list areas with landowner agreements required (borrow and spoil areas, camp sites), dates of agreements, dates submitted to resident engineer (or equivalent);*
 - *identify major activities undertaken in each area in the reporting period and highlights of environmental and social protection (land clearing, boundary marking, topsoil salvage, traffic management, decommissioning planning, decommissioning implementation);*
 - *for quarries: status of relocation and compensation (completed, or details of activities and current status in the reporting period).*
- e. *health and safety supervision:*
 - i. *safety officer: number days worked, number of full inspections & partial inspections, reports to construction/project management;*

- ii. number of workers, work hours, metric of PPE use (percentage of workers with full personal protection equipment (PPE), partial, etc.), worker violations observed (by type of violation, PPE or otherwise), warnings given, repeat warnings given, follow-up actions taken (if any);
- f. *worker accommodations:*
 - i. number of expats housed in accommodations, number of locals;
 - ii. date of last inspection, and highlights of inspection including status of accommodations' compliance with national and local law and good practice, including sanitation, space, etc.;
 - iii. actions taken to recommend/require improved conditions, or to improve conditions.
- g. *HIV/AIDS: provider of health services, information and/or training, location of clinic, number of non-safety disease or illness treatments and diagnoses (no names to be provided);*
- h. *gender (for expats and locals separately): number of female workers, percentage of workforce, gender issues raised and dealt with (cross-reference grievances or other sections as needed);*
- i. *training:*
 - i. number of new workers, number receiving induction training, dates of induction training;
 - ii. number and dates of toolbox talks, number of workers receiving Occupational Health and Safety (OHS), environmental and social training;
 - iii. number and dates of HIV/AIDS sensitization and/or training, no. workers receiving training (this reporting period and in the past); same questions for gender sensitization, flag person training.
 - iv. number and date of GBV /SEA sensitization and/or training, number of workers receiving training on code of conduct (in the reporting period and in the past), etc.
- j. *environmental and social supervision:*
 - i. environmentalist: days worked, areas inspected and numbers of inspections of each (road section, work camp, accommodations, quarries, borrow areas, spoil areas, swamps, forest crossings, etc.), highlights of activities/findings (including violations of environmental and/or social best practices, actions taken), reports to environmental and/or social specialist/construction/site management;
 - ii. sociologist: days worked, number of partial and full site inspections (by area: road section, work camp, accommodations, quarries, borrow areas, spoil areas, clinic, HIV/AIDS center, community centers, etc.), highlights of activities (including violations of environmental and/or social requirements observed, actions taken), reports to environmental and/or social specialist/construction/site management; and
 - iii. community liaison person(s): days worked (hours community center open), number of people met, highlights of activities (issues raised, etc.), reports to environmental and/or social specialist /construction/site management.

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- k. *Grievances*: list new grievances (e.g. allegations of GBV / SEA) received in the reporting period and unresolved past grievances by date received, complainant, how received, to whom referred to for action, resolution and date (if completed), data resolution reported to complainant, any required follow-up (Cross-reference other sections as needed):
- i. Worker grievances;
 - ii. Community grievances
- l. *Traffic and vehicles/equipment*:
- i. traffic accidents involving project vehicles & equipment: provide date, location, damage, cause, follow-up;
 - ii. accidents involving non-project vehicles or property (also reported under immediate metrics): provide date, location, damage, cause, follow-up;
 - iii. overall condition of vehicles/equipment (subjective judgment by environmentalist); non-routine repairs and maintenance needed to improve safety and/or environmental performance (to control smoke, etc.).
- m. *Environmental mitigations and issues (what has been done)*:
- i. dust: number of working bowzers, number of waterings/day, number of complaints, warnings given by environmentalist, actions taken to resolve; highlights of quarry dust control (covers, sprays, operational status); % of rock/spoil lorries with covers, actions taken for uncovered vehicles;
 - ii. erosion control: controls implemented by location, status of water crossings, environmentalist inspections and results, actions taken to resolve issues, emergency repairs needed to control erosion/sedimentation;
 - iii. quarries, borrow areas, spoil areas, asphalt plants, batch plants: identify major activities undertaken in the reporting period at each, and highlights of environmental and social protection: land clearing, boundary marking, topsoil salvage, traffic management, decommissioning planning, decommissioning implementation;
 - iv. blasting: number of blasts (and locations), status of implementation of blasting plan (including notices, evacuations, etc.), incidents of off-site damage or complaints (cross-reference other sections as needed);
 - v. spill cleanups, if any: material spilled, location, amount, actions taken, material disposal (report all spills that result in water or soil contamination);
 - vi. waste management: types and quantities generated and managed, including amount taken offsite (and by whom) or reused/recycled/disposed on-site;
 - vii. details of tree plantings and other mitigations required undertaken in the reporting period;

- viii. details of water and swamp protection mitigations required undertaken in the reporting period.

n. compliance:

- i. compliance status for conditions of all relevant consents/permits, for the Work, including quarries, etc.): statement of compliance or listing of issues and actions taken (or to be taken) to reach compliance;
- ii. compliance status of C-ESMP/ESIP requirements: statement of compliance or listing of issues and actions taken (or to be taken) to reach compliance
- iii. compliance status of GBV/SEA prevention and response action plan: statement of compliance or listing of issues and actions taken (or to be taken) to reach compliance
- iv. compliance status of Health and Safety Management Plan re: statement of compliance or listing of issues and actions taken (or to be taken) to reach compliance
- v. other unresolved issues from previous reporting periods related to environmental and social: continued violations, continued failure of equipment, continued lack of vehicle covers, spills not dealt with, continued compensation or blasting issues, etc. Cross-reference other sections as needed.

Section IX. Particular Conditions of Contract

Except where otherwise indicated, all PCC should be filled in by the Employer prior to issuance of the Bidding Documents. Schedules and reports to be provided by the Employer should be annexed.

A. General			
GCC 1.1 (d)	The financing institution is: IDA		
GCC 1.1 (r)	The Employer is: Chief Executive Officer J&K ERA/JTFRP ERA Commercial Complex, Rambagh Srinagar. 2 nd Floor JKPCC Building, Panama Chowk Jammu.		
GCC 1.1 (v)	The Intended Completion Date for the whole of the Works shall be 18 months.		
GCC 1.1 (y)	The Project Manager is Executive Engineer <i>PMU JTFRP</i> .		
GCC 1.1 (aa)	The Site is situated in district Srinagar.		
GCC 1.1 (dd)	The Start Date shall be one week after the date of issue of notice to proceed with works to the contractor.		
GCC 1.1 (hh)	The Works consist of Construction of Drainage Network for Missing Link Zone - 1 Identification number of Contract is NEW/JTFRP/MISSINGLINKS/01		
GCC 1.1 (ii)	The following is added as GCC 1.1. (ii) “ESHS” means environmental, social (including sexual exploitation and abuse (SEA) and gender based violence (GBV)), health and safety.		
GCC 2.2	Not applicable		
GCC 2.3 (i)	The following documents also form part of the Contract:		
	S. No.	Document	Description of the document
	1.	Construction Methodology	Construction methodology given in bid amended as per comments of employer given in letter of acceptance.
	2.	Quality control	Quality control procedures and assurance plans given in the bid and amended as per comments of

			Employer given in letter of acceptance.															
	3	ESMP	Environment and Social Management Plans given in the Bid Document.															
GCC 3.1	The language of the contract is <i>English</i> . The law that applies to the Contract is the laws of Union of India.																	
GCC 5.1	The Project Manager <i>may</i> delegate any of his duties and responsibilities.																	
GCC 7.1	The ceiling for sub-contractor is 30%																	
GCC 8.1	Schedule of other contractors: Not Applicable																	
GCC 9.1	Key Personnel and equipment: Given at Section III.																	
GCC 9.2	The following is inserted as GCC 9.2 (e): “breaches the Code of Conduct (ESHS) (e.g. spreading communicable diseases, sexual harassment, gender based violence, (GBV), sexual exploitation or abuse, illicit activity or crime).”																	
GCC 13.1	The minimum insurance amounts and deductibles shall be: <table><tr><td>S. No.</td><td>Description</td><td>Minimum cover for Insurance</td></tr><tr><td>(i)</td><td>Works and Plant and Materials which are incorporated in works</td><td>Cost of contract plus 10% excluding maintenance cost</td></tr><tr><td>(ii)</td><td>Loss or damage to Construction Equipment</td><td>10% of contract amount excluding maintenance cost</td></tr><tr><td>(iii)</td><td>Other Property</td><td>5% of contract amount excluding maintenance cost</td></tr><tr><td>(iv)</td><td>Personal injury or death insurance: a) for other people;</td><td>Rs 10 lakh for each person</td></tr></table>			S. No.	Description	Minimum cover for Insurance	(i)	Works and Plant and Materials which are incorporated in works	Cost of contract plus 10% excluding maintenance cost	(ii)	Loss or damage to Construction Equipment	10% of contract amount excluding maintenance cost	(iii)	Other Property	5% of contract amount excluding maintenance cost	(iv)	Personal injury or death insurance: a) for other people;	Rs 10 lakh for each person
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	<table> <tr> <td>b) for Contractor's Employees</td><td>In accordance with the statutory requirements applicable in India.</td></tr> <tr> <td colspan="2">Deductibles shall be as per actual premium of the insurance policies.</td></tr> </table>	b) for Contractor's Employees	In accordance with the statutory requirements applicable in India.	Deductibles shall be as per actual premium of the insurance policies.	
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GCC 14.1	Site Data are: <i>Site Plans, Drawings etc.</i>				
GCC 16.1 (add new 16.2)	<p>ESHS Management Strategies and Implementation Plans</p> <p>The following is inserted as a new sub-clause 16.2:</p> <p>“16.2 The Contractor shall not carry out any Works, including mobilization and/or pre-construction activities (e.g. limited clearance for haul roads, site accesses and work site establishment, geotechnical investigations or investigations to select ancillary features such as quarries and borrow pits), unless the Project Manager is satisfied that appropriate measures are in place to address environmental, social, health and safety risks and impacts. At a minimum, the Contractor shall apply the Management Strategies and Implementation Plans and Code of Conduct, submitted as part of the Bid and agreed as part of the Contract. The Contractor shall submit, on a continuing basis, for the Project Manager's prior approval, such supplementary Management Strategies and Implementation Plans as are necessary to manage the ESHS risks and impacts of ongoing works. These Management Strategies and Implementation Plans collectively comprise the Contractor's Environmental and Social Management Plan (C-ESMP). The C-ESMP shall be approved prior to the commencement of construction activities (e.g. excavation, earth works, bridge and structure works, stream and road diversions, quarrying or extraction of materials, concrete batching and asphalt manufacture). The approved C-ESMP shall be reviewed, periodically (but not less than every six (6) months), and updated in a timely manner, as required, by the Contractor to ensure that it contains measures appropriate to the Works activities to be undertaken. The updated C-ESMP shall be subject to prior approval by the Project Manager.”</p>				
GCC 20.1	<p>The Site Possession Date(s)</p> <p>The Site Possession Date shall be immediately after finalization of contract agreement.</p>				
GCC 23.1 & GCC 23.2	Name of the agreed Adjudicator/Dispute Review Expert shall be agreed at the time of signing of contract				
GCC 24.3	Daily rate and types of reimbursable expenses to be paid to the Adjudicator/Dispute Review Expert: INR5000/day				
GCC 24.4	The procedure for arbitration will be as follows:				

	As laid down in Arbitration and Conciliation Act 1996 ,with amendments from time to time and rules thereof.
B. Time Control	
GCC 26.1	The Contractor shall submit for approval a Program for the Works within 14 days of delivery of the Letter of Acceptance.
GCC 26.2	<p>ESHS Reporting</p> <p>Inserted at the end of GCC 26.2</p> <p>“In addition to the progress report the Contractor shall also provide a report on the Environmental, Social, Health and Safety (ESHS) metrics set out in Appendix B. In addition to Appendix B reports, the Contractor shall also provide immediate notification to the Project Manager of incidents in the following categories. Full details of such incidents shall be provided to the Project Manager within the timeframe agreed with the Project Manager.</p> <ul style="list-style-type: none"> (a) confirmed or likely violation of any law or international agreement; (b) any fatality or serious (lost time) injury; (c) significant adverse effects or damage to private property (e.g. vehicle accident, damage from fly rock, working beyond the boundary) (d) major pollution of drinking water aquifer or damage or destruction of rare or endangered habitat (including protected areas) or species; or (e) any allegation of gender based violence (GBV), sexual exploitation or abuse, sexual harassment or sexual misbehavior, rape, sexual assault, child abuse, or defilement, or other violations involving children.
GCC 26.3	<p>The period between Program updates is 60 days.</p> <p>The amount to be withheld for late submission of an updated Program is INR 500000</p>
GCC 30	Venue of management meeting will be Srinagar/ Jammu
C. Quality Control	

GCC 34.3	<p>The Defects Liability Period is: 365 days.</p> <p>The DLP shall commence from the date of successful completion of Operation and Maintenance period.</p>
D. Cost Control	
GCC 38.2	<p>In GCC 38.2, add the following after the first sentence:</p> <p>“The Contractor shall also provide information of any ESHS risks and impacts of the Variation.”</p>
GCC 40	<p>Add new GCC 40.7:</p> <p>“40.7 if the Contractor was, or is, failing to perform any ESHS obligations or work under the Contract, the value of this work or obligation, as determined by the Project Manager, may be withheld until the work or obligation has been performed, and/or the cost of rectification or replacement, as determined by the Project Manager, may be withheld until rectification or replacement has been completed. Failure to perform includes, but is not limited to the following:</p> <ul style="list-style-type: none"> (i) failure to comply with any ESHS obligations or work described in the Works’ Requirements which may include: working outside site boundaries, excessive dust, failure to keep public roads in a safe usable condition, damage to offsite vegetation, pollution of water courses from oils or sedimentation, contamination of land e.g. from oils, human waste, damage to archeology or cultural heritage features, air pollution as a result of unauthorized and/or inefficient combustion; (ii) failure to regularly review C-ESMP and/or update it in a timely manner to address emerging ESHS issues, or anticipated risks or impacts; (iii) failure to implement the C-ESMP e.g. failure to provide required training or sensitization; (iv) failing to have appropriate consents/permits prior to undertaking Works or related activities; (v) failure to submit ESHS report/s (as described in Appendix C), or failure to submit such reports in a timely manner; (vi) failure to implement remediation as instructed by the Engineer within the specified timeframe (e.g. remediation addressing non-compliance/s).

GCC 41.1	<p>The following changes are applicable</p> <p>The Employer shall pay the Contractor the amounts certified by the Project Manager within 56 days of the date of each certificate.</p> <p>Payment for the electrical and mechanical equipment, metallic pipes and other specials shall be made only when these are delivered to site as per the payment schedule given as under:</p> <p>(c) 70% of the price, when delivered to the site and properly stored</p> <p>(d) 15% after installation,</p> <p>(e) 10% after testing the system,</p> <p>(f) 5% on commissioning of system</p>						
GCC 45.1	Price Adjustment is not applicable.						
GCC 46.1	The proportion of payments retained (Retention Money) shall be 6% from each bill subject to the maximum of 5% of final contract price.						
GCC 47.1	The liquidated damages for the whole of the Works are <i>0.05 percent of the final contract cost per day</i> . The maximum amount of liquidated damages for the whole of the Works is <i>10%</i> of the final Contract Price.						
GCC 49.1	<p>The amount of the advance payment are:</p> <table><tr><td><u>Nature of Advance</u></td><td><u>Amount (Rs.)</u></td><td><u>Conditions to be fulfilled</u></td></tr><tr><td>1. Mobilization</td><td>10 % of the Contract price</td><td>10% of accepted contract amount payable in two equal installments. 1st installment will be released immediately after signing of agreement & on submission of unconditional bank guarantee. 2nd installment will be released after establishing site office, site laboratory, submission of works programme, mobilization of</td></tr></table>	<u>Nature of Advance</u>	<u>Amount (Rs.)</u>	<u>Conditions to be fulfilled</u>	1. Mobilization	10 % of the Contract price	10% of accepted contract amount payable in two equal installments. 1 st installment will be released immediately after signing of agreement & on submission of unconditional bank guarantee. 2 nd installment will be released after establishing site office, site laboratory, submission of works programme, mobilization of
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	<p>construction equipments.</p> <p>Repayment of advance payment for mobilization:</p> <p>The advance shall be repaid with percentage deductions from the interim payments certified by the Engineer under the Contract. Deductions shall commence in the next Interim Payment Certificate following that in which the total of all such payments to the contractor has reached not less than 15 percent of the Contract Price or 04 months from the date of payment of first instalment of advance, whichever period concludes earlier, and shall be made at the rate of 10% of the amounts of all Interim Payment Certificates until such time as the advance has been repaid, always provided that the advance shall be completely repaid prior to the expiry of the original time for completion.</p>
GCC 50.1	<p>The Performance Security for 5 percent of contract price plus 50% of the amount of differential cost i.e. Difference between Engineer's estimated cost and quoted rate of bidder as additional security for unbalanced bids and frontloaded items in the BOQ [<i>in terms of ITB Clause 34.5</i>]</p> <p>An Environmental, Social, Safety and Health (ESHS) Performance Security 'shall' be provided to the Employer. EQUAL TO 1% of accepted contract amount.</p> <p>The standard form of Performance Security acceptable to the Employer shall be an <u>unconditional</u> Bank Guarantee from a Scheduled or Nationalized bank in India of the type as presented in Section X of the Bidding Documents</p>
E. Finishing the Contract	
GCC 56.1	<p>* The date by which operating and maintenance manuals are required is within 28 days of issue of certificate of completion of whole or section of work, as the case may be[<i>insert date</i>]</p> <p>* The date by which "as-built" drawings (in scale...) including a compact hard disc containing digitized drawings in 2 sets are required is within 15 days of issue of certificate of completion of whole or section of the work, as the case may be[<i>insert date</i>].</p>
GCC 56.2	<p>The amount to be withheld for failing to produce "as built" drawings and/or operating and maintenance manuals *by the date required in G.C.C. 56.1 is Rs. Rs.5,00000/=</p>

GCC 57.2 (g)	The maximum number of days is: <i>200</i>
GCC 58.1	The percentage to apply to the value of the work not completed, representing the Employer's additional cost for completing the Works, is 20%.

Appendices

Appendix 1

Salient Features of Labour & Environment Protection Laws³¹

SALIENT FEATURES OF SOME MAJOR LABOUR LAWS APPLICABLE TO ESTABLISHMENTS ENGAGED IN BUILDING AND OTHER CONSTRUCTION WORK

- (a) Employees Compensation Act 1923: The Act provides for compensation in case of injury, disease or death arising out of and during the course of employment.
- (b) Payment of Gratuity Act 1972: gratuity is payable to an employee under the Act on satisfaction of certain conditions on separation if an employee has completed 5 years' service or more or on death at the rate of 15 days wages for every completed year of service. The Act is applicable to all establishments employing 10 or more employees.
- (c) Employees P.F. and Miscellaneous Provision Act 1952 (since amended): The Act provides for monthly contribution by the employer plus workers @ 10% or 8.33%. The benefits payable under the Act are:
 - (i) Pension or family pension on retirement or death, as the case may be.
 - (ii) Deposit linked insurance on the death in harness of the worker.
 - (iii) Payment of P.F. accumulation on retirement/death etc.
- (d) Maternity Benefit Act 1961: The Act provides for leave and some other benefits to women employees in case of confinement or miscarriage etc.
- (e) Sexual Harassment of Women at the Workplace (Prevention, Prohibition and Redressal) Act, 2013: This Act defines sexual harassment in the workplace, provides for an enquiry procedure in case of complaints and mandates the setting up of an Internal Complaints Committee or a Local Complaints Committee
- (f) Contract Labour (Regulation & Abolition) Act 1970: The Act provides for certain welfare measures to be provided by the Contractor to contract labour and in case the Contractor fails to provide, the same are required to be provided, by the Principal Employer by law. The Principal Employer is required to take Certificate of Registration and the Contractor is required to take license from the designated Officer. The Act is applicable to the establishments or Contractor of Principal Employer if they employ 20 or more contract labour.
- (g) Minimum Wages Act 1948: The Employer is supposed to pay not less than the

³¹ This list is only illustrative and not exhaustive. Bidders and Contractors are responsible for checking the correctness and completeness of the list. The law as current on the date of bid opening will apply.

Minimum Wages fixed by appropriate Government as per provisions of the Act if the employment is a scheduled employment. Construction of Buildings, Roads, Runways are scheduled employments.

- (h) Payment of Wages Act 1936: It lays down the mode, manner and by what date the wages are to be paid, what deductions can be made from the wages of the workers.
- (i) Equal Remuneration Act 1976: The Act provides for payment of equal wages for work of equal nature to male and female workers and for not making discrimination against Female employees in the matters of transfers, training and promotions etc.
- (j) Payment of Bonus Act 1965: The Act is applicable to all establishments employing 20 or more employees. Some of the State Governments have reduced this requirement from 20 to 10. The Act provides for payments of annual bonus subject to a minimum of 8.33% of the wages drawn in the relevant year. It applies to skilled or unskilled manual, supervisory, managerial, administrative, technical or clerical work for hire or reward to employees who draw a salary of Rs. 10,000/- per month or less. To be eligible for bonus, the employee should have worked in the establishment for not less than 30 working days in the relevant year. The Act does not apply to certain establishments.
- (k) Industrial Disputes Act 1947: the Act lays down the machinery and procedure for resolution of Industrial disputes, in what situations, a strike or lock-out becomes illegal and what are the requirements for laying off or retrenching the employees or closing down the establishment.
- (l) Trade Unions Act 1926: The Act lays down the procedure for registration of trade unions of workmen and employers. The Trade Unions registered under the Act have been given certain immunities from civil and criminal liabilities.
- (m) Child Labour (Prohibition & Regulation) Act 1986: The Act prohibits employment of children below 14 years of age in certain occupations and processes and provides for regulation of employment of children in all other occupations and processes. Employment of Child Labour is prohibited in the Building and Construction Industry.
- (n) Inter-State Migrant workmen's (Regulation of Employment & Conditions of Service) Act 1979: The Act is applicable to an establishment which employs 5 or more inter-state migrant workmen through an intermediary (who has recruited workmen in one state for employment in the establishment situated in another state). The Inter-State migrant workmen, in an establishment to which this Act becomes applicable, are required to be provided certain facilities such as housing, medical aid, traveling expenses from home upto the establishment and back, etc.

- (o) The Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act 1996 and the Building and Other Construction Workers Welfare Cess Act, 1996 (BOCWW Cess Act): All the establishments who carry on any building or other construction work and employ 10 or more workers are covered under these Acts. All such establishments are required to pay cess at the rate not exceeding 2% of the cost of construction as may be notified by the Government. The Employer of the establishment is required to provide safety measures at the building or construction work and other welfare measures, such as Canteens, First – Aid facilities, Ambulance, Housing accommodations for workers near the work place etc. The Employer to whom the Act applies has to obtain a registration certificate from the Registering Officer appointed by the Government.
- (p) Factories Act 1948: the Act lays down the procedure for approval of plans before setting up a factory engaged in manufacturing processes, health and safety provisions, welfare provisions, working hours, annual earned leave and rendering information regarding accidents or dangerous occurrences to designated authorities. It is applicable to premises employing 10 persons or more with aid of power or 20 or more persons without the aid of power.
- (q) Weekly Holidays Act -1942
- (r) Bonded Labour System (Abolition) Act, 1976: The Act provides for the abolition of bonded labour system with a view to preventing the economic and physical exploitation of weaker sections of society. Bonded labour covers all forms of forced labour, including that arising out of a loan, debt or advance.
- (s) Employer's Liability Act, 1938: This Act protects workmen who bring suits for damages against employers in case of injuries endured in the course of employment. Such injuries could be on account of negligence on the part of the employer or persons employed by them in maintenance of all machinery, equipment etc. in healthy and sound condition.
- (t) Employees State Insurance Act 1948: The Act provides for certain benefits to insured employees and their families in case of sickness, maternity and disablement arising out of an employment injury. The Act applies to all employees in factories (as defined) or establishments which may be so notified by the appropriate Government. The Act provides for the setting up of an Employees' State Insurance Fund, which is to be administered by the Employees State Insurance Corporation. Contributions to the Fund are paid by the employer and the employee at rates as prescribed by the Central Government. The Act also provides for benefits to dependents of insured persons in case of death as a result of an employment injury.
- (u) The Personal Injuries (Compensation Insurance) Act, 1963: This Act provides for the employer's liability and responsibility to pay compensation to employees

where workmen sustain personal injuries in the course of employment.

- (v) Industrial Employment (Standing Order) Act 1946: It is applicable to all establishments employing 100 or more workmen (employment size reduced by some of the States and Central Government to 50). The Act provides for laying down rules governing the conditions of employment by the Employer on matters provided in the Act and get the same certified by the designated Authority.

SALIENT FEATURES OF SOME OF THE MAJOR LAWS THAT ARE APPLICABLE FOR PROTECTION OF ENVIRONMENT.

1. The Environment (Protection) Act, 1986 and as amended: This provides for the protection and improvement of environment and for matters connected therewith, and the prevention of hazards to human beings, other living creatures, plants and property. ‘Environment’ includes water, air and land and the inter-relationship which exists among and between water, air and land, and human beings, other living creatures, plants, micro-organism and property.
2. The Forest Conservation Act, 1980, as amended, and Forest (Conservation) Rules, 1981 as amended: These provides for protection of forests by restricting conversion of forested areas into non- forested areas and prevention of deforestation, and stipulates the procedures for cutting any trees that might be required by the applicable rules. Permissions under the Act also stipulates the norms and compliance requirements of the employer and any contractor on behalf of the employer.
3. State Tree Preservation Acts as may be in force: These provide for protection of trees of important species. Contractors will be required to obtain prior permission for full or partial cutting, uprooting, or pruning of any such trees.
4. The Wildlife (Protection) Act, 1972, and as amended: This provides for protection of wildlife through notifying National Parks and Sanctuaries and buffer areas around these zones; and to protect individuals of nationally important species listed in the Annex of the Act.
5. The Biological Diversity Act, 2002: This provides for conservation of biological diversity, sustainable use of components of biological diversity, and fair and equitable sharing of the benefits arising out of the use of biological resources, knowledge and for matters connected therewith or incidental thereto.
6. The Public Liability Insurance Act, 1991 as amended and The Public Liability Insurance Rules, 1991 as amended: These provide for public liability insurance for the purpose of providing immediate relief to the persons affected by accident occurring while handling hazardous substances and for matters connected herewith or incidental thereto. Hazardous substance means any substance or preparation which is defined as hazardous substance under the Environment (Protection) Act 1986, and exceeding such quantity as may be specified by notification by the Central Government.
7. The Ancient Monuments and Archaeological Sites and Remains Act, 1958 and the Ancient Monuments and Archaeological Sites and Remains (Amendment and Validation) Act, 2010, the Ancient Monuments and Archaeological Sites and Remains Rules, 1959 amended 2011, the National Monuments Authority Rules, 2011 and the similar State Acts: These provide for conservation of cultural and historical remains found in India. Accordingly, area within the radii of 100m and 300m from the “protected property” are designated as “protected area”

and “controlled area” respectively. No development activity (including building, mining, excavating, blasting) is permitted in the “protected area” and development activities likely to damage the protected property is not permitted in the “controlled area” without prior permission of the Archaeological Survey of India (ASI) or the State Departments of Art and Culture or Archaeology as applicable.

8. The Environmental Impact Assessment Notification, 2006 and as amended: This provides for prior environmental clearance for new, modernization and expansion projects listed in Schedule 1 of the Notification. Contractors will be required to ensure that no work starts until applicable clearances under the Notification is not available. Contractors will be responsible for implementation of any environmental management plan stipulated as per the permission under this Notification; and will be required to prepare and submit to the employer and compliance report stipulated in the permission under the Notification.
9. The Water (Prevention and Control of Pollution) Act, 1974 as amended, and the Water (Prevention and Control of Pollution) Rules, 1975 as amended: These provide for the prevention and control of water pollution and the maintaining and restoring of wholesomeness of water. ‘Pollution’ means such contamination of water or such alteration of the physical, chemical or biological properties of water or such discharge of any sewage or trade effluent or of any other liquid, gaseous or solid substance into water (whether directly or indirectly) as may, or is likely to, create a nuisance or render such water harmful or injurious to public health or safety, or to domestic, commercial, industrial, agricultural or other legitimate uses, or to the life and health of animals or plants or of aquatic organisms. Contractors will need to obtain consent for establishment and consent for operation of any item of work or installation of equipment that generates waste water, and observe the required standards of establishment and operation of these items of work or installations; as well as install and operate all required waste water treatment facilities.
10. The Water (Prevention and Control of Pollution) Cess Act, 1977 and The Water (Prevention and Control of Pollution) Cess Rules, 1978: These provide for the levy and collection of a cess on water consumed by persons carrying on certain industries and by local authorities, with a view to augment the resources of the Central Board and the State Boards for the prevention and control of water pollution under the Water (Prevention and Control of Pollution) Act, 1974.
11. The Air (Prevention and Control of Pollution) Act, 1981 as amended, and the Air (Prevention and Control of Pollution) Rules, 1982: These provides for prevention, control and abatement of air pollution. ‘Air Pollution’ means the presence in the atmosphere of any ‘air pollutant’, which means any solid, liquid or gaseous substance (including noise) present in the atmosphere in such concentration as may be or tend to be injurious to human beings or other living creatures or plants or property or environment. Contractors will need to obtain consent for establishment and consent for operation of any item of work or installation of equipment that generates air pollution such as batching plants, hot mix plants, power generators, backup power generation, material handling processes, and observe the required standards of establishment and operation of these items of work or installations.

12. Noise Pollution (Control and Regulation) Rules, 2000, and as amended: This provides for standards for noise for day and night for various land uses and specifies special standards in and around sensitive receptors of noise such as schools and hospitals. Contractors will need to ensure compliance to the applicable standards, and install and operate all required noise control devices as may be required for all plants and work processes.
13. Chemical Accidents (Emergency Planning, Preparedness and Response) Rules, 1996: This provides for Requirement of preparation of on-site and off-site Disaster Management Plans for accident-prone areas.
14. The Explosives Act 1884 and the Explosives Rules, 2008: These provide for safe manufacture, possession, sale, use, transportation and import of explosive materials such as diesel, Oil and lubricants etc.; and also for regulating the use of any explosives used in blasting and/or demolition. All applicable provisions will need compliance by the contractors.
15. The Petroleum Rules, 2002: This provides for safe use and storage of petroleum products, and will need to be complied by the contractors.
16. The Gas Cylinder Rules 2004 and amendments: This provides for regulations related to storage of gas, and possession of gas cylinder more than the exempted quantity. Contractors should comply with all the requirements of this Rule.
17. Manufacture, Storage and Import of Hazardous Chemical Rules of 1989 and as amended: These provide for use and storage of hazardous material such as highly inflammable liquids like HSD/LPG. Contractors will need to ensure compliance to the Rules; and in the event where the storage quantity exceeds the regulated threshold limit, the contractors will be responsible for regular safety audits and other reporting requirements as prescribed in the Rules.
18. Hazardous & Other Wastes (Management and Transboundary Movement) Rules, 2016: These provide for protection of general public from improper handling storage and disposal of hazardous waste. The rules prescribe the management requirement of hazardous wastes from its generation to final disposal. Contractors will need to obtain permission from the State Pollution Control Boards and other designated authorities for storage and handling of any hazardous material; and will to ensure full compliance to these rules and any conditions imposed in the permit.
19. The Bio Medical Waste Management Rules, 2016: This provides for control, storage, transportation and disposal of bio-medical wastes. As and where the contractor has any first aid facility and dispensaries, established in either temporary or permanent manner, compliance to these Rules are mandatory.
20. Construction and Demolition Waste Management Rules, 2016: This provides for management of construction and demolition waste (such as building materials possible to be reused, rubble and debris or the like); and applies to all those waste resulting from construction, re-modelling, repair or demolition of any civil structure. Contractor will need

to prepare a waste disposal plan and obtain required approval from local authorities, if waste generation is more than 20 tons in any day or 300 tons in any month during the contract period; and ensure full compliance to these rules and any conditions imposed in the regulatory approval.

21. The E-Waste (Management) Rules, 2016: This provides for management of E-wastes (but not covering lead acid batteries and radio-active wastes) aiming to enable the recovery and/or reuse of useful material from e-waste, thereby reducing the hazardous wastes destined for disposal and to ensure the environmentally sound management of all types of waste of electrical and electronic equipment. This Rule applies to every manufacturer, producer, consumer, bulk consumer, collection centers, dealers, e-retailer, refurbisher, dismantler and recycler involved in manufacture, sale, transfer, purchase, collection, storage and processing of e-waste or electrical and electronic equipment listed in Schedule I, including their components, consumables, parts and spares which make the product operational.
22. Plastic waste Management Rules, 2016: This provides for control and management of the plastic waste generated from any activity. Contractors will ensure compliance to this Rule.
23. The Batteries (Management and Handling) Rules 2001: This provides for ensuring safe disposal and recycling of discarded lead acid batteries likely to be used in any equipment during construction and operation stage. Rules require proper control and record keeping on the sale or import of lead acid batteries and recollection of the used batteries by registered recyclers to ensure environmentally sound recycling of used batteries. Contractors will ensure compliance to this Rule.
24. The Ozone Depleting Substances (Regulation and Control) Rules, 2000 and as amended: This provides for regulation of production and consumption of ozone depleting substances in the country, and specifically prohibits export to or import from countries not specified in the Rules, and prohibits unless specifically permitted, any use of ozone depleting substance.
25. The Coastal Regulation Zone Notifications, 1991 and as amended: This provides for regulation of development activities within the 500m of high tide line in coastal zone and 100m of stretches of rivers and estuaries influenced by tides. Contractors will be required to ensure that no work starts until applicable clearances under the Notification is not available. Contractors will be responsible for implementation of any plan stipulated as per the permission under this Notification; and will be required to prepare and submit to the employer and compliance report stipulated in the permission under the Notification.
26. The Motor Vehicle Act 1988 as amended (and State Motor Vehicle Acts as may be in force) and the Motor Vehicle Rules, 1989, and as amended (and State Motor Vehicle Rules as may be in force): To minimize the road accidents, penalizing the guilty, provision of compensation to victim and family and check vehicular air and noise pollution. Contractors will be required to ensure full compliance to these rules.
27. Easement Act, 1882: This provides for the rights of landowners on groundwater. Contractors will need to ensure that other landowners' rights under the Act is not affected by

any groundwater abstraction by the contractors.

28. State Groundwater Acts and Rules as may be in force and the Guidelines for Groundwater Abstraction for drinking and domestic purposes in Notified Areas and Industry/Infrastructure project proposals in Non-Notified areas, 2012: These provide for regulating extraction of ground water for construction/industrial and drinking and domestic purposes. Contractors will need to obtain permission from Central/State Groundwater Boards prior to groundwater abstraction through digging any bore well or through any other means; and will to ensure full compliance to these rules and any conditions imposed in the permit.
29. The Mines Act, 1952 as amended; the Minor Mineral and concession Rules as amended; and the State Mineral (Rights and Taxation) Acts as may be in force: These provide for for safe and sound mining activity. The contractors will procure aggregates and other building materials from quarries and borrow areas approved under such Acts. In the event the contractors open any new quarry and/or borrow areas, appropriate prior permission from the State Departments of Minerals and Geology will need to be obtained. Contractors will also need to ensure full compliance to these rules and any conditions imposed in the permit.
30. The Insecticides Act, 1968 and Insecticides Rules, 1971 and as amended: These provide for regulates the manufacture, sale, transport, distribution, export, import and use of pesticides to prevent risk to human beings or animals, and for matters connected therewith. No one should import or manufacture; sell, stock or exhibit foe sale; distribute, transport, use: (i) any misbranded insecticides, (ii) any insecticide the sale, distribution or use of which is for the time being prohibited under the Act; and (iii) any insecticide except in accordance with the condition on which it was registered under the Act.
31. National Building Codes of India, 2005 and as amended: This provides guidelines for regulating the building construction activities in India. The code mainly contains administrative regulations, development control rules and general building requirements; stipulations regarding materials, structural design and construction; and building and plumbing services. Contractors will be required to comply with all Bureau of Indian Standards Codes dealing with: (i) use and disposal of asbestos containing materials in construction; (ii) paints containing lead; (iii) permanent and temporary ventilations in workplace; (iv) safety, and hygiene at the workplace; (v) prevention of fire; (vi) prevention of accidents from faulty electrical gadgets, equipment and accessories; and all other such codes incidental to the Contract.

Appendix 2

Tables of Adjustment Data

(Cl. 45 of GCC)

Table 1: Coefficients governing the adjustment for changes in cost.

S. No.	Coefficients Name	Symbol	Schedules (Reference Number)								
			<i>[Description of each schedule is given below]</i>								
			S ₁	S ₂	S ₃	S ₄	S ₅	S ₆	S ₇	S ₈	S ₉
1.	Fixed	a	15	15	15	15	15	15	15	15	15
2.	Labour [L]	b									
3.	Steel [S]	c									
4.	Cement [C]	d									
5.	Plant & Equipment spares [E]	e									
6.	Diesel and Petroleum products [D]	f									
7.	Bitumen [B]	g									
8.	Others [O]	0									
	Total		100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %

[Fixed element is normally 15%]

BOQ SCHEDULES

[The following Schedules are for example only. The schedules may be modified and specified as appropriate for each work]

Schedule 1: Earth Work in Formation
 Schedule 2: Civil Engineering Work (Bridge)
 Schedule 3: Civil Engineering Work Building,
 Schedule 4: Steel Fabrication Works
 Schedule 5: Road Works –WBM
 Schedule 6: Road BTM
 Schedule 7:

Table 2: Cost Indices and Reference Prices (applicable for specific items) for adjustment in contract prices [as per GCC 45].

WPI with base 2004-2005 = 100 on the Base Date

Base Date = Deadline for submission of bids

S. No.	Cost Element	Sym bol	Indices or Cost on the Base Date	Index for adjustment	Sources of Index
[1]	[2]	[3]	[4]	[5]	[6]
1.	Fixed	a			
2.	Labour	b	L _o - all India average Consumer Price Index (CPI) Number for Industrial Workers for centre ³² (Base 2001 = 100) on the base date.	L _n -CPI for the month for which the IPC is related	Labour Bureau, Ministry of Labour and Employment, Government of India.
3.	Steel	c	S _o – Whole-sale Price Index (WPI) for Steel [<i>Steel Long</i>]	S _n -WPI for the month which is two months prior to the month to which IPC is related	Economic Advisor, Ministry of Commerce and Industry, Government of India.
4.	Cement	d	C _o -WPI for Grey Cement	C _n -WPI for the month which the cement is brought to site or one month prior to the month to which IPC is related, whichever is less	Economic Advisor, Ministry of Commerce and Industry, Government of India
5.	Plant & Equipme nt spares	e	E _o -WPI for “Construction machinery ”	E _n – WPI for the month to which IPC is related	Economic Advisor, Ministry of Commerce and Industry, Government of India
6.	Diesel ³³	f	Do-Unit Cost from the identified depot on the base date	Dn-Unit Cost for on the first day of the month to which the IPC relates	From the Depot
7.	Bitumen ³⁴	g	Bo-Unit Cost from the identified refinery on the base date	Bn- Cost per unit quantity on the first day of the month in which the material is brought to site or two months prior to the date to which IPC is related	From Refinery
8.	Others	h	Oo- All India Wholesale Price Index(WPI) for all commodities	On- All India WPI for all commodities for the month to which IPC is related	Economic Advisor, Ministry of Commerce and Industry, Government of India

IPC – Interim Payment Certificate

³² The Centre to be specified should be the relevant one for which CPI is published by the Labour Bureau.³³ The PCC specifies the identified depot for the rate of diesel for the base date and the applicable date for price adjustment.³⁴ The PCC specifies the identified refinery for the rate of Bitumen for the base date and the applicable date price adjustment.

Appendix -3³⁵
Appointment of Adjudicator

Suggested Draft of Letter of Appointment of Adjudicators in civil works contracts

Sub: _____ (Name of the Contract)

To

Name and address of the Adjudicator

We hereby confirm your appointment as Adjudicator for the above contract to carry out the assignment specified in this Letter of Appointment.

For administrative purpose _____ (*name of the officer representing the Employer*) has been assigned to administer the assignment and to provide the Adjudicator with all relevant information needed to carry out the assignment on behalf of both the Employer and the contractor. The services will be required during the period of contract for the work of (Name of the Contract) _____.

The Adjudicator shall visit the worksite once in 3 (three) months till the completion of the work indicated above or as specifically requested by Employer/ Contractor for the period upto the end of defects liability period with prior intimation to the Employer and the contractor. The duration of each visit shall ordinarily be for one day only. These durations are approximate and (*Name of the Employer and Name of the Contractor*) may find it necessary to postpone or cancel the assignment and/or shorten or extend the duration.

The appointment will become effective upon confirmation of letter by you. The appointment of Adjudicator shall be liable for termination under a 30 (thirty) days written notice from the date of issue of the notice, if both Employer and the Contractor so desire. Also the appointment shall automatically stand terminated 14 days after the defect notice / correction period as stated in Clauses 23 and 24 of the Conditions of Contract is over.

The Adjudicator will be paid a fee of Rs. _____ (Rupees _____ only) per each day of visit at the worksite. The actual expenses for boarding and traveling in connection with the assignment will be reimbursed to the Adjudicator. The Adjudicator will submit a pre-receipted bill in triplicate to the Employer indicating the date of the visit, fees for the visit and a proof in support of the actual expenditure [only for items valued above Rs. 200 each] incurred by him against boarding, lodging and traveling expenses after performing the visit on each occasion. The Employer will make the admissible payment (both the Employer's and the Contractor's share) to the Adjudicator within 30 days of the

³⁵ If ITB 43 makes provision of an Adjudicator from list provided by an institution, kindly modify Appendix 3 to state that the fee and reimbursable payable to the adjudicator shall be as per the rules of the Institution.

receipt of the bill. The Contractor's share on this account (half the paid amount) will be recovered by the Employer from the Contractor's bills against the work.

In accepting this assignment, the Adjudicator should understand and agree that he is responsible for any liabilities and costs arising out of risks associated with travel to and from the place of emergency repatriation, loss or damage to personal/professional effects and property. The Adjudicator is advised to effect personal insurance cover in respect of such risks if he does not already have such cover in place. In this regard, the Adjudicator shall maintain appropriate medical, travel, accident and third-party liability insurance. The obligation under this paragraph will survive till termination of this appointment.

Procedures for resolution of disputes by the Adjudicator is described in the contract of _____(name of the contract) between the Employer and the contractor vide clause no.24 of the General Conditions of Contract. Your recommendation should be given in the format attached, within 28 days of receipt of a notification of dispute.

The Adjudicator will carry out the assignment in accordance with the highest standard of professional and ethical competence and integrity, having due regard to the nature and purpose of the assignment, and will conduct himself in a manner consistent herewith. After visiting the worksite, the Adjudicator will discuss the matter with the Employer and if necessary with the Contractor before arriving at any decision.

The Adjudicator will agree that all knowledge and information not within the public domain, which may be acquired while carrying out this service shall be all time and for all purpose, regarded as strictly confidential and held in confidence, and shall not be directly or indirectly disclosed to any party whatsoever, except with the permission of the Employer and the contractor. The Adjudicator's decision should be communicated in the form of a speaking order specifying the reasons.

The Adjudicator will agree that any manufacturing or construction firm with which he might be associated with, will not be eligible to participate in bidding for any goods or works resulting from or associated with the project of which this consulting assignment forms a part

Read and Agreed

Name of Adjudicator
Signature

Place:

Date:

Name of Employer

Signature of authorized representative of Employer

Name of the Contractor

Signature of authorized representative of Contractor

Attachment: Copy of contract document between the Employer and contractor and format for recommendation.

SUMMARY OF ADJUDICATOR'S RESPONSIBILITIES

The Adjudicator has the following principal responsibilities:

1. Visit the site periodically.
2. Keep abreast of job activities and developments.
3. Encourage the resolution of disputes by the parties.
4. When a dispute is referred to it, conduct a hearing (no legal presentation), complete its deliberations, and prepare a recommendations in a professional and timely manner(as per sample format)

Sample Format of Adjudicator's Recommendation

[Project Name] Recommendation of Adjudicator

Dispute No. XX [NAME OF DISPUTE]

Hearing Date: _____

Dispute

Description of dispute. A one or two sentence summation of the dispute.

Contractor's Position

A short summation of the contractor's position as understood by the Adjudicator.

Employer's Position

A short summation of the Employer's position as understood by the Adjudicator.

Recommendation

The Adjudicator's specific recommendation for settlement of the dispute. (*The recommended course is consistent with the explanation*).

Explanation

(*This section could also be called Considerations, Rationale, Findings, Discussion, and so on.*)

The Adjudicator's description of how each recommendation was reached.

Respectfully submitted,

Date : _____

Date : _____

Date : _____

ANNEXURE II

1. ENVIRONMENTAL MANAGEMENT PLAN

1.1. Background

The Jammu & Kashmir region owing to its geographical and geo-climatic setting is a multi-hazard prone region, which experiences natural disasters like earthquakes, floods, etc. Floods and flash floods are frequent in the region. Floods generally occur in the summer when heavy rains are followed by snow melting. Flooding of the river Jhelum is the main cause of floods in the region. In September 2014, the northern region of India experienced torrential monsoon rains in the region causing major flooding and landslides. The continuous spell of rains from September 2nd to 6th, 2014, caused Jhelum and Chenab Rivers as well as many other streams/tributaries to flow above the danger mark. The Jhelum River breached its banks causing flooding in many low-lying areas in Anantnag, Srinagar and adjoining districts. Due to the unprecedented heavy rainfall, the catchment areas particularly the low laying areas were flooded for more than two weeks. Some areas in urban Srinagar stayed flooded for 28 days. The water level was as high as 27 feet in many parts of Srinagar city. The areas from the main tributaries of river Jhelum *vis-a-vis* Brengi nallah, Vishav nallah, Lider nallah and Sundran nallah started overflowing due to the heavy rainfall causing water levels in Jhelum River to rise. Subsequently, the discharge of the river Suran was 200 thousand cusecs against an average of 50 thousand cusecs. With the excessive discharge of water, the river Suran affected the basin areas and also took a different course at various locations causing damages to the surrounding villages in the catchment area. The water level also increased in rivers of Chenab and Tawi, both of which were flowing above normal levels. Due to severe flood in Srinagar city, public service infrastructure, equipment of hospitals and education centers were also severely damaged and are still not fully operational. The project “Jhelum & Tawi Flood Recovery Project (JTFRP)” focuses on restoring critical infrastructure using the international best practice of resilient infrastructure. Under the JTFRP, it is proposed to improve/re-construct the damages caused by 2014 September Floods in Srinagar city through efficient drainage system/ pumping station in areas lacking drainage system and by taking the machine floor level 1 m above HFL as recorded in 2014.

During pre-construction, construction and operation stages of Storm Water Drainage (SWD) Works of Zone 1 in Srinagar City under the JTFRP, several direct and indirect environmental impacts are anticipated. To mitigate anticipated environmental impacts

during different stages of construction of a stormwater drainage system in the Zone 1 areas, an implementable environmental management plan has been prepared.

1.2. Proposed Works of Storm Water Drainage

The proposed components of the stormwater drainage scheme (Missing Links) in Zone 1 of Srinagar City consist of the following main works:

- Laying of stormwater drainage network (pipes of different dia) in the different areas as per drawing.
- Restoration of existing roads, where RCC pipes would be laid down for the stormwater drainage.

1.3. Outline of EMP and its Implementation Strategy

The EMP is a guiding tool that discusses the potential environmental impacts and specific mitigation and management measures for the proposed stormwater drainage scheme of Zone-1 in Srinagar City. It refers to the responsibilities person ensuring commitment for implementation and means of verifying and supervision whether the same has been implemented. The timing and frequency of monitoring along with the supervision responsibility and reporting requirements are also provided in the Environmental Management Plan. As a part of the EMP, the contractors will commit to identification of the environmental and social impacts at the individual sub-project sites. In case of any future changes in the sub-project design, the EMP will need to be updated to reflect the new scope of the activities. Such revisions will be finalized in consultation with the World Bank.

The PIU will be responsible for the performance of all contractors with the overall accountability resting with the JTFRP-PMU. Whereas, the TAQAC will have go for periodic quality audit/ guidance to the PIU and by imparting regular training, monitoring and ensuring that all EMP commitments and policy requirements are translated into 'contractors' requirements and that these requirements are implemented to their full intent and extent.

The overall responsibility will be of the Contractor for effective implementation and adherence to all the mitigation measures as outlined in this EMP associated with their respective activities. The Contractor will be required to comply with the provisions of the EMP.

1.4. Environmental Management Plan

The Environmental Management Plan (EMP) will guide the environmentally-sound construction of the "Storm Water Drainage Scheme in Zone 1 areas in Srinagar City" and ensure efficient lines of communication between the PIU, PMU, Contractor, and TAQAC. The EMP identifies the three stages of development as: (i) Pre-construction Stage; (ii) Construction Stage; and (iii) Demobilization/ Operational Stage. EMP for Storm Water Drainage Scheme of Zone-1 in Srinagar City has been prepared. Various guidelines,

checklists, strip mapping plan and reporting formats for implementation of EMP have been prepared and will form part of main Environmental Assessment (EA) as Annexures. The purpose of the EMP is to ensure that the activities are undertaken in a responsible non-detrimental manner with the objectives of: (i) provide a pro-active, feasible and practical working tool to enable the measurement and monitoring of environmental performance on-site; (ii) guide and control the implementation of findings and recommendations of the environmental assessment conducted for the subproject; (iii) detail specific actions deemed necessary to assist in mitigating the environmental impact of the subproject; and (iv) ensure that safety recommendations are complied with. Budgetary provisions for implementation of EMP shall be integrated the bid/construction contract in the form of technical specifications and environmental performance requirements. The costs to be incurred on implementation of EMP shall be incidental to the civil works and therefore, no separate environment budget/cost will be provided to the contractor for implementation of EMP. The contractor will ensure the effective implementation of EMP during pre-construction, construction, and demobilization/operation stages. EMP for operation stage will be implemented by Srinagar Municipal Corporation (SMC).

The Contractor is deemed not to have complied with the EMP if within the boundaries of the project site/ ancillary sites, site extensions and haul/ access roads there is evidence of contravention of clauses. If environmental damage ensues due to negligence, the contractor fails to comply with corrective action measures or other instructions issued by the PIU/ JTFRP-PMU within a specified timeframe and the Contractor fails to respond adequately to complaints from the public.

1.5. Institutional Arrangements for Implementation of EMP

The subproject will be implemented by the Project Implementation Unit (PIU) of the J&K Economic Reconstruction Agency (ERA). Qualified and experienced Environmental Expert of PIU to supervise implementation of mitigation measures as defined in EMP for the Storm Water Drainage Scheme (Missing Links) of Zone-1 in Srinagar city.

The Environmental Specialist of PMU-JTFRP will overall monitor the implementation of EMP with the assistance of Environmental Expert of TAQAC.

S. No.	Environmental Issues	Environmental Mitigation Measures	Responsible Agency
			Planning and Execution
I.	Pre-Construction Stage		
A.	Pre-construction Activities By the Contractor		

A-1	Regulatory Approvals	<ul style="list-style-type: none"> • Prior permission will be taken from line department offices of Electricity (PDD), Telecommunications (for OFC underground cables, etc), water Pipelines (PHE), etc. Utility shifting required to be undertaken by the contractor in the supervision of PIU. • Labour license from Department of Labour. • For setting-up of Batching Plant, Stone Crusher Plant, HMM Plant (required during restoration works), D.G Sets- Consent to Establish and Consent to Operate will be obtained from J&K State Pollution Control Board (J&KSPCB) or if contractor intends to procure construction materials from local authorized third party agencies then the contractor will collect and submit clearance/approval from authorized third party agencies. 	Co
A.2	Appointment and Mobilization of Environment & Safety Officer	The contractor will appoint qualified and experienced Environment & Safety Officer (ESO), who will dedicatedly work and ensure implementation of EMP including Occupational, Health and Safety measures at stormwater drainage scheme (Missing Links) of Zone 1 in Srinagar city.	Co
A.3	Construction Camp Locations - Selection, Design & Layout	<ul style="list-style-type: none"> • If a contractor decides to establish a labour camp, the siting of the camp will be as per the guidelines given in Annexures and the layout of camp will be approved by PIU. • Labour camp will not be established within 250 m from the nearest settlement to avoid conflicts and stress with the local community. 	Co
A.4	Arrangements for Temporary Land for Camp	The Contractor will obtain consent from land owners in writing for temporary use of labour camp, etc.	Co
A.5	Tree cutting	<ul style="list-style-type: none"> • Few indigenous trees like Willow/ Poplar mainly small trees/ saplings are required to be cut down or transplanted in areas of Zone 1. • Loss of trees will be compensated by 1:3 ratio (i.e. for loss of 1 tree 3 trees will planted or greater including transplantation of the same trees in the periphery of the PS (Bund Side) site in consultation with the Environmental Specialist of PMU. 	Co
A.6	Construction Vehicles, Equipment and Machinery	<ul style="list-style-type: none"> • All vehicles and equipment to be procured for construction of stormwater drainage works will conform to the relevant Bureau of Indian Standard (BIS) norms. The discharge standards promulgated under the Environment Protection Act, 1986 and Motor Vehicles Act, 2019 will be strictly adhered to. • The silent/quiet equipment like DG set as per regulations will be used at the construction site or labor camp. • The contractor will maintain records of Pollution Under Control (PUC) certificates for all vehicles used during the contract period, which will be produced to PIU for Monitoring whenever required. 	Co
A.7	Labour Requirement	The contractor preferably will use unskilled/semiskilled labor from the local area to give the maximum benefit to the local community. Community to avoid any additional stress on the existing facilities (medical services, power, water supply, etc). At an average >160 labours/ day will be required during construction stage depending upon extent of construction work	Co

A.8	Traffic Management Plan	<ul style="list-style-type: none"> • The construction of the Storm Water Drainage (SWD) Scheme (Missing Links) is located in Zone-1 of Srinagar City comprising mainly areas on left bank of River Jhelum. The excavation of trenches, laying of drainage pipes and the construction of manholes will lead to disruption of traffic movement in the area. • The Storm Water Drainage scheme (Missing links) having a total drainage network length of 38269 km. These missing links are mainly internal colony roads. It is essential that before start of the construction works, the contractor will prepare site-specific traffic management plan in consultation with PIU to transport construction materials, excavation activities, laying of drainage pipes/ manhole construction, etc. Community heads of the locals should be taken into confidence in order to streamline pedestrian and vehicular movement within the affected areas. • Contractor to ensure construction works like excavation for laying of drainage pipes and manholes to be constructed on priority basis in winter period (December-March period when schools in Srinagar usually remain closed for the winter vacation) in order to avoid any such hindrances in normal functioning of the school. Contractor to incorporate the above measures in the traffic management plan. • The contractor will make an effort to transport materials to the site in non-peak hours or at night time. Contractor to follow timing schedule as per SMC protocol i.e., 8:00 pm to 8:00 am. 	Contractor
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A-9	Utility Shifting & Accessibility	<ul style="list-style-type: none"> • Construction of stormwater drainage scheme (missing links) of Zone-1 will involve excavation activities of trenches for laying of drainage pipes (RCC-NP3) and construction of main holes, which may impact existing utilities and cause disruption in services and inconvenience to the community. All the drainage works will be carried out following the center alignment of the existing road. • Existing underground utilities include PHE- water supply pipelines (main/ household/religious places, school connections), telecommunication lines like Optical Fiber Cables (OFC), PDD electric poles and transformers (distribution type) poles above ground may also get disrupted, etc. • Before commencement of works, a joint field inspection will be conducted by the Contractor, TAQAC, PIU along with the concerned line departments of PHE, PDD, Telecommunication/ private agencies to map out the alignments, to check if any utility is being impacted due to construction works such as water pipelines, underground telecommunication lines, PDD electric poles/ transformers etc. • Checking for accommodating utilities crossing the drains- raising, lowering or re-location if required • Get maps/ alignments of the underground infrastructure from the relevant institutions/ line departments • Contractor to mobilize experienced Utility Crew (Plumber, Electrician, etc) and Utility vehicle for repair/ restoration on immediate basis for any damage caused to utilities like PHE-Water Pipelines, telephone line, etc. in coordination with concerned line departments, during the execution of construction works. • Contractor in coordination with PIU to sensitize the workers (especially JCB operator/ supervisor) carrying out excavations so that they exercise caution to minimize the chances of underground utility damage. • Prior permission will be taken from regional offices of Electricity, Telecommunications, Waterworks, etc by PIU during excavation activity • Any Utility shall be relocated at the earliest, in case of damage and the services shall be restored within the shortest time. • Any common property resource, if removed due to the construction activity shall be restored/ relocated at the earliest with the consent of the immediate local community using it. 	Cont
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A-10	³⁶ Stockyard/ Storage of Construction Material and Establishing Equipment Lay- down Area	<ul style="list-style-type: none"> Contractor in consultation with PIU shall identify the site for temporary use of land for construction sites /storage of construction materials including pipes etc. These sites shall not cause an inconvenience to the local population/traffic movement. These locations shall be approved by the PIU. Selection of location for materials storage and equipment lay-down areas must take into account prevailing winds, distances to adjacent land uses, general on-site topography and water erosion potential of the soil. Impervious surfaces must be provided wherever necessary. Protect material stockpiles from stormwater (e.g. by excavating a cut-off ditch around stockpiles to keep away stormwater). Enclosed storage for fuel with non- permeable flooring. The contractor shall cover material stockpiles with tarpaulin or other materials. Avoid stockpiling material near water bodies. Proper cover and stacking of loose construction material will be ensured during the construction of outfall structures at the construction site to prevent surface runoff and ³⁷contamination of receiving water bodies. Staff dealing with these materials/substances must be aware of their potential impacts and follow the appropriate safety measures. The contractor must ensure that its staff is made aware of the health risks associated with any hazardous substances like bitumen, diesel, used oil and has been provided with the appropriate protective clothing/equipment in case of spillages or accidents and have received the necessary training. Necessary training and awareness programs shall be carried out to make aware the contractor and its staff aware of the hazardous nature of substances. 	Contractor
A-11	Information Dissemination and Communication Activities	<ul style="list-style-type: none"> Prior to construction activity, information dissemination will be undertaken the contractor at the project site. The wider dissemination of information to the public will be undertaken by PMU through the disclosure of EIA / EMP reports on the website of PMU-JTFRP. Project information Board showing the name of work, project cost, duration, date of commencement, date of completion, executing agency and contact details (including telephone numbers) shall be displayed both sides of the both roads in both English and in Vernacular. Information boards will also be set up at the sites of construction camps, labour camps, plants and stockyard site. Details of nodal officer with telephone numbers will be displayed for registering compliant/grievances by stakeholder/general public. 	PMU Contractor
A-12	Environmental Monitoring- Baseline Data	Ambient air quality, noise levels, and water quality monitoring on a six monthly basis as per the environmental monitoring plan and in accordance with the instruction of the Environmental Specialist of PMU.	PIU
B.	Construction Stage		
B.1	Site Clearance & Levelling		

³⁶ These storage areas can be hazardous, unsightly and can cause environmental pollution if not designed and managed carefully

³⁷ The most expected source of watercourse contamination is excavated soil or loose material being washed into water body during construction of drainage works

B.1.1	Clearing, grubbing and levelling	<ul style="list-style-type: none"> Minimum shrubs and ground flora will be removed from the designated site. All works will be carried out in such a way that the damage or disruption to flora other than those identified for cutting is minimum. Only ground cover/shrubs that impinge directly on the permanent works or necessary temporary works will be removed with prior approval of PIU. The Contractor, under any circumstances will not cut or damage trees. Trees identified under the project will be cut only after receiving clearance from the Forest Dept (as applicable). Vegetation with girth size of over 30 cm will be considered as trees and shall be compensated. 	Co
B.2	Procurement of Construction Materials		
B.2.1	Procurement for Aggregate and other construction materials	<ul style="list-style-type: none"> The contractor will procure aggregate and other construction materials for concrete/reinforcement works for laying of drainage pipes, manholes, foundations and structures of pump house from authorized suppliers only. The contractor will also work-out a road network to transport aggregate and other construction materials to the project site in synchronization with active works and report to PIU, which will be inspected before approval. 	Co
B.2.2	Transporting Construction Materials	<ul style="list-style-type: none"> The contractor will maintain all roads, which are used for transporting construction materials, equipment and machineries. All vehicles delivering fine materials like aggregate, cement, earth, sand, etc, to the site will be covered by Tarpaulin to avoid spillage of materials and windblown dust from top of the vehicles. Existing road used by vehicles of the contractor or any of his subcontractors or suppliers of materials will be kept clear of all dust/mud or other extraneous materials dropped by such vehicles. Most of the material transportation shall take place from the Lasjan. As such most of the material sourcing like stone crusher plants, WMM, HMM, Batching plants, etc shall be procured from the Lasjan which is known for the construction material hub. The contractor will make an effort to transport materials to the site in non-peak hours or in the night time. 	Co
B.3	Construction Work		
B.3.1	Labour Camp Site	<ul style="list-style-type: none"> The project information board will be displayed at the labor campsite. Electrical cables and wires will be properly arranged with proper electrical safety. Loose electrical connections will not be allowed at the labor camp. Red danger sign with bone & skull will be displayed as per The Electrical Rules at three stage motors, electrical panels and electrical machines, DG sets, etc. Housekeeping at the labor camp will be maintained properly. Daily sweeping and cleaning will be done at the labor camp. HIV Aids awareness posters will be displayed at the campsite. Solid waste generated at the campsite will be collected in covered waste bins. Then, it will be segregated as biodegradable (food waste, paper, etc) and non-biodegradable (plastic, polyethylene bag, etc) wastes. Polyethylene/plastic wastes will be stored in empty cement bags and to be sent for recycling through scrap dealers. Biodegradable (food waste, paper, etc) solid waste will be disposed of in compost pit. Non-biodegradable inert wastes will be sent to the landfill site of Srinagar Municipal Corporation (SMC). Proper drinking water, well ventilated accommodation, sanitation, canteen facilities will be provided to workers at the labour camp. Suitable signages will be displayed at labour camps. 	Co

B.3.2	Safeguarding of Trees And Plantation	<ul style="list-style-type: none"> During construction, the tree along the periphery of the road will be covered/ wrapped with protective green mesh fiber cloth around the base tree trunk area by 6 feet in height. No stockpiling of any construction will be allowed around or close to the tree particularly in case of scheduled tree. Make-shift steel barricading will be provided around the trees (5 feet) in an active work zone where excavation takes place. Any other trees within the area near the construction site will be marked with the same horizontal retro-reflective strip and green mesh as per the above measures. 	Contractor
B.3.3	Pedestrian and Vehicular Traffic Movement Management	<ul style="list-style-type: none"> Wherever the entry and exit to houses/ establishments are affected due to construction activities of excavation of existing roads for laying of drainage pipes, an alternate temporary arrangement for crossing over shall be provided. Detailed traffic control plans will be prepared and submitted to the PIU for approval, one week prior to the commencement of works. The traffic control plans shall contain details of temporary diversion, details of arrangements for construction (road stretches, timing, and stages). Provide the construction itinerary in advance so that the potentially affected population can use alternative routes and start early to get to their destinations on time. Erect warning and safety signs of ongoing works. Access of residents should be facilitated by installing appropriate temporary bridges/ solid racks over the trenches. Entry should be bridge type as lateral access along with the longitudinal access to be provided along the trench. Suitable fluorescent (reflective) warning signs should be placed near construction locations and should be visible at night. Alternative access ways should be communicated to the community by way of announcement appropriately for the public information. Install signage, barricading, fencing as required and include safety measures for transport of materials/equipment, which shall be limited to certain times, and arrangements for flagmen at intersection. 	Contractor
B.3.4	Excavation for Laying of Drainage Pipes, Foundations for Manholes	<ul style="list-style-type: none"> During excavation for laying of Reinforced Cement Concrete (RCC) drainage pipes and foundation works for man holes, necessary safety measures will be taken by the contractor as defined below; <ul style="list-style-type: none"> At the excavation site, warning signboards will be displayed in vernacular language and English. The entry of general public/unauthorized persons will be restricted. Excavation of 1.5 meters deep or greater requires a side protection (Close Timbering and step cutting) unless the excavation is made entirely in stable rock. To ensure all the excavation activity in Zone-1 missing link network to be opened and executed only under the strict supervision of PIU. Contractor to follow strict protocol during excavation near sensitive receptors like schools, religious places (mosques), near graveyards, etc. Safe access and egress will be required including ladders, steps, ramps, or other safe means of exit of workers in excavated depth of 4 feet (1.22 meters) or deeper. Excavated earth will be collected and disposed of in a pre-identified site with the approval of PIU. Casted drain block and drain cover will not be stacked on the road. To ensure the elimination of excavation hazards, excavation will be carried in the presence of a competent person. Suitable barricading will be provided around the excavation site. Suitable personal protective equipment will be provided to the workers. 	Contractor

B.3.5	Safe Disposal of Excavated Earth	<ul style="list-style-type: none"> • The excess excavated earth from drains will be collected and disposed of in a pre-identified site with the approval of PIU. • The excavated earth/ silt may be utilized by the locals for their use in filling purposes like lawn/ garden raising etc. For this purpose, the locals have to get written consent from the PIU. • All vehicles delivering material to the site shall be covered to avoid material spillage. • During excavation greater than 1.5 meters., protection (timber support) along the excavated drains are mandatory in order to avoid collapsing which may trigger the damage to the boundary walls (brick type). In case of damage, the contractor will inform the PIU immediately in order to ascertain the damages and reconstruction of the same 	Co
B.3.6	Handling of Cement Bags	<ul style="list-style-type: none"> • Cement bags will be stored and emptied in a covered area to control fugitive dust emissions. • While handling and emptying of cement bags, workers will wear masks, hand gloves, and protective goggles. • The manual transferring of cement bags from one place to another place will not be allowed. For this purpose, the trolley will be used. 	Co
B.3.7	Machinery and Concreting Works	<ul style="list-style-type: none"> • Workers will be given induction training for machinery and concreting works. • Workers engaged in concrete pouring will wear alkali-resistant gloves, cover the body with long sleeves and full-length pants, waterproof gumboots and eye protection. • Safety barricading will be provided around the concrete pouring site. • Proper access will be provided to workers to engage in concrete pouring. • After concrete pouring, workers should be instructed to wash their skin with soap and eyes with fresh water. 	Co
B.3.8	Sensitive Receptors- Impact Management	<ul style="list-style-type: none"> • The missing links of Zone-1 have number of identified sensitive receptors like schools, mosques, and in general residential houses. Following measures to be implemented during the construction activity; <ul style="list-style-type: none"> ○ The construction operations in these areas should be limited to the time period from 7:30 am to 6:00 pm. ○ Contractor to ensure construction works like excavation for laying of drainage pipes and manhole to be constructed on priority basis in winter period (Dec-March period when schools in Srinagar usually remains closed for the winter vacation) in order to avoid any such hindrances in normal functioning of the school. During excavation works near mosques, safe access ramps/ bridges to be provided along with lateral access in order to avoid any hindrance. Contractor to incorporate the above measures in the traffic management plan. ○ Periodic maintenance and calibration of construction equipment/ vehicles to meet applicable CPCB emission standards. ○ Noise barriers shall be installed during the construction stage to protect the school from the noise from construction activities. ○ Adequate barricading and safety measures to protect dust pollution and noise impacts on sensitive receptors like schools and religious places etc. due to vehicle movement to be ensured prior to the start of work and their effectiveness to be checked during construction. 	Co

B.3.9	Occupational Health and Safety of Workers	<ul style="list-style-type: none"> The contractor will follow the OHS plan in Annex VI, including provisions for emergency response and night time work All workers will be provided with required personal protective equipment Provision of all workers with requisite personal protective equipment will be made; 	Contractor
B.4	Pollution		
B.4.1	Water Pollution		
B.4.1.1	Water Pollution from Construction Wastes	<ul style="list-style-type: none"> The contractor will take all precautionary measures to prevent entering of wastewater into streams, water bodies or the irrigation system during construction. Contractor will avoid construction works close to the streams or water bodies during rainy season. Contractor shall not wash his vehicles in river water and shall not enter riverbed for that purpose. Any type construction wastes will not be disposed in rivers or water bodies. No workers/ staff are permitted to use water from near water bodies for the purposes of bathing, washing of clothing or for any construction or related activities. 	Contractor
B.4.1.2	Waste Water from Labour Camp	<ul style="list-style-type: none"> Wastewater generated from the sanitary facilities at labour camp will be treated in a septic tank followed by soak pit. No untreated raw sewage/ wastewater will be discharged into river and water bodies Workers will not be allowed for open defecation. Proper toilets fitted with septic tank and soak pit will be provided for workers at camp and construction sites. At the bridge construction site portable toilets shall be provided for workers and sewage from portable toilets shall be passed through septic tank followed by soak pit. 	Contractor
B.4.2	Air Pollution		

B.4.2.1	Dust Pollution	<ul style="list-style-type: none"> The contractor will take every precaution to reduce the level of dust from the Storm Water Drainage (SWD) construction sites of Zone-1 missing links. The contractor will procure the construction machineries, which conforms to the pollution control norms specified by the MoEF&CC/CPCB/J&KSPCB. The excavated earth /construction materials will be stored properly so that it does not generate fugitive emissions. Regular maintenance of vehicles to be used for material transportation and equipment will be carried and vehicular pollution checks should be made mandatory. LPG will be used as a fuel source for cooking food in a labour camp instead of fuelwood. The kitchen area should be well ventilated equipped with the standard exhaust fan. At labor camp, persons/ cook dealing with the LPG gas stoves/ cylinders should be well sensitized for the operating procedures and the importance of maintaining ventilation. Sensitization to be provided by the ESO of the Contractor. Mask and other PPE should be provided as a mandatory effort to the construction workers in dust prone areas. While painting of piping, standard masks shall be used by workers. The following safety measures will be ensured like common precautions including good ventilation and protection against fire will be ensured, painting on piping will be carried in such a way spillage on the ground is negligible, workers will be provided mask and hand gloves while carrying painting on piping, paint residue left in containers will be stored properly and disposed in environmentally sound manner. The location of the proposed dewatering station's outfall disposal pipe should be well away from the school and the pumping station should be designed in accordance with environmental standards and odor control shall be maintained. 	Co
B.4.2.2	Emission from Construction Vehicles, Equipment and Machinery	<ul style="list-style-type: none"> The contractor will ensure that all vehicles, equipment, and machinery used for construction works are regularly maintained and conform that pollution emission levels and comply with the requirements of CPCB and/Motor Vehicles Rules. The contractor will submit Pollution Under Control (PUC) certificates for all vehicles for the project. DG set will be provided with the chimney of adequate height as per CPCB guidelines (Height of stack in meter = Height of the building + $0.2 \sqrt{\text{KVA}}$). The environmental monitoring is to be conducted as per the monitoring plan. 	Co
B.4.3	Noise Pollution		

B.4.3.1	Noise Levels from Construction Vehicles and Equipment's	<p>The contractor will confirm the following:</p> <ul style="list-style-type: none"> • All construction equipment used in excavation, concreting, etc, will strictly conform to the MoEF&CC/CPCB/J&KSPCB noise standards. • All vehicles and equipment used in construction works will be fitted with exhaust silencers/mufflers. • Maintenance and servicing of all construction vehicles and machinery will be done regularly. • Only acoustic enclosures fitted DG sets will be allowed at the construction site and labor camp. • The erection of the new pump station will be such that noise generation is minimal. • At the construction sites within 150 m of the nearest habitation, noisy construction work and use of high noise generation equipment will be stopped during the night time between 10.00 pm to 6.00 am. • Working hours of the construction activities will be restricted around educational institutes/health centers (silence zones) up to a distance of 100 m from the sensitive receptors. • Noise monitoring shall be carried out in construction areas as per the monitoring plan 	Contractor
B.5	Personal Safety		
B.5.1	Personal Safety Measures for Labours and Staff	<p>The contractor will take necessary measures for the personal safety of workers:</p> <ul style="list-style-type: none"> • Protective safety shoes, gumboots, hand gloves, protective goggles, etc (as required) will be provided to the workers employed in excavation, steel rebaring and bending, concrete works, erection of pump station, etc. • Welder's protective eye-shields will be provided to workers who are engaged in welding works. • Earplugs will be provided to the workers exposed to high noise levels. • Safety vests will be used by workers when on a construction site. • The contractor will comply with all the precautions as required for ensuring the safety of the workmen as far as those are applicable to this contract. • The Contractor will comply with all regulations regarding safe scaffolding, ladders, working platforms, gangway, stairwells, excavations, trenches and safe means of entry and egress. • The contractor will make sure that during the construction work all relevant provisions of Building and other Construction Workers (Regulation of Employment and Conditions of Services) Act, 1996 are adhered to. • The Contractor will not employ any person below the age of 14 years for any work. 	Contractor

B.5.2	Emergency Management	<ul style="list-style-type: none"> Emergency numbers will be displayed at the construction sites and campsite, First boxes will be made available at the construction sites and campsite, Fire extinguishers for petroleum oil fire and electrical fire will be made available, construction sites, and campsite. Designated vehicles, which can be used as an ambulance, will be available at the construction site all the time. 	Co
B.5.3	Risk Force Measure	<ul style="list-style-type: none"> The contractor will make required arrangements so that in case of any mishap during, operation of machinery/ construction vehicles, dismantling, excavation, concrete pouring, and erection of pumps, all necessary steps can be taken for prompt first aid treatment. Construction Safety Plan for stormwater drainage scheme of Zone-1 to be prepared by the contractor and will identify necessary actions in the event of an emergency. 	Co
B.5.4	First Aid Facility	<p>The contractor will arrange for :</p> <ul style="list-style-type: none"> A readily available first aid unit including an adequate supply of sterilized dressing materials, burn ointment and appliances as per the state Factories Rules will be maintained all the time by the contractor. The availability of first aid trained persons will be ensured at the project site during the construction stage. The availability of suitable transport will be ensured at all times to take the injured or sick person(s) to the hospital. 	Co
	Informatory Signs and Hoardings	The Contractor will provide, erect and maintain informatory/safety signs, hoardings written in English and local language, wherever required or as suggested by the Environmental Specialist of PIU.	Co
B.6	Labour Camp and Project Site Management		
B.6.1	Accommodation for Labourers	<ul style="list-style-type: none"> The contractor will follow all relevant provisions of the Building and the other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 for construction and maintenance of labor camp. The location, layout and basic facility provision of each labour camp will be submitted to the Environmental Expert of PIU prior to their construction. The construction will commence only upon the written approval of the Environmental Expert of PIU. The contractor will maintain necessary well ventilated living accommodation, toilets, bathrooms and ancillary facilities in a functional and hygienic manner. Proper ventilation along with standard exhaust fans will be provided in labor accommodation rooms. Regular cleaning and sweeping will be ensured at the labor campsite. Systematic waste collection management at labor camp to be managed as per SWM Rules 2016. 	Co
B.6.2	HIV/AIDS Prevention Measures	<ul style="list-style-type: none"> Necessary HIV/AIDS prevention measures will be taken at labor camp HIV/AIDS awareness program will be organized by the contractor's Environment & Safety Officer (ESO). 	Co

B.6.3	Potable Water for Workers	<ul style="list-style-type: none"> The contractor will construct and maintain labor accommodation in such a fashion that uncontaminated clean water is available for drinking, cooking, bathing, and washing. The contractor will also provide potable water facilities within the precincts of workplace/pump stations in an accessible place, as per standards set by the Building and other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996. The contractor will also provide the following: <ul style="list-style-type: none"> a) Supply of sufficient quantity of potable water (as per IS) at construction site/labor camp (site at suitable and easily accessible places and regular maintenance of such facilities) b) If any water storage tank is provided that will be kept such that the bottom of the tank at least 1 meter above the surrounding ground level. c) If water is drawn from any existing well/hand pump, which is within 30 meters of proximity of any toilet, drain or other source of pollution, the well will be disinfected before water is used for the drinking. Environmental Expert of PIU will be required to inspect the labor camp once in a week to ensure the compliance of the EMP. 	Contractor
B.6.4	Sanitation and Sewage System at Labour Camp	<p>The contractor will ensure that :</p> <ul style="list-style-type: none"> The sewage system for the camp will be designed, built and operated in such a fashion that no health hazard occurs and no pollution to the air, groundwater or adjacent watercourses take place, Separate toilets/bathrooms, as required, will be provided for men and women, marked in vernacular language, Toilets will be provided with a septic tank followed by a soak pit. Adequate water supply will be provided in all toilets and urinals, Night soil can be disposed of with the help of a municipality or disposed of by putting a layer of it at the bottom of a permanent pit prepared for the purpose and covered with 15 cm layer of waste or refuse and then covered with a layer of earth for a fortnight. 	Contractor
B.6.5	Waste Disposal	<ul style="list-style-type: none"> The contractor will provide garbage bins in the camp & construction site and ensure that these are regularly emptied and disposed of in a hygienic manner according to Solid Waste Management Plan as per Solid Waste Management Rule 2016. The burning of wastes at the construction site, labour camp and road side will not be allowed. Solid waste generated at the construction site & labor camp, will be collected in covered waste bins and segregated as biodegradable (food waste, paper, etc) and non-biodegradable (plastic, polyethylene bag, etc) wastes. Polyethylene/plastic wastes will be stored in empty cement bags and to be sent for recycling through scrap dealers. Biodegradable (food waste, paper, etc) solid waste will be disposed of in the compost pit. 	Contractor
B.7	Environmental Monitoring		
B.7.1	Environmental Monitoring- Construction Stage	<ul style="list-style-type: none"> The PIU will carry out environmental monitoring for Ambient Air Quality, Noise levels, and Water Quality on a six monthly basis as per environmental monitoring plan and in accordance with the instruction of Environmental Specialist of PMU. 	PIU
D1.4	Compensatory Plantation	<ul style="list-style-type: none"> Trees affected will be compensated by 1:3 ratio (i.e. for loss of 1 tree 3 trees will be planted or greater including transplantation of the same trees/saplings in the in the open spaces in consultation with the Environmental Specialist of PMU. 	PIU

C.	Contractor's Demobilization		
C.1	Clean-up Operations, Restoration and Rehabilitation	<ul style="list-style-type: none">• The contractor will prepare a project and labor campsite restoration plan, which will be approved by the PIU-Environmental Expert. The clean-up and site restoration operations are to be implemented by the contractor prior to demobilization from the construction site and labor camp. The contractor will clear all temporary structures, debris, construction wastes, garbage, night soils, etc in an environmental sound manner.• All disposal pits or trenches will be filled in and effectively sealed off.• Construction places including camp and any other area used/affected due to the project operations will be left clean and tidy at the contractor's expense to the entire satisfaction to the PIU.	Co
C.2	Land Rehabilitation	<ul style="list-style-type: none">• All surfaces hardened due to construction activities will be ripped & imported materials thereon removed.• All rubbles to be removed from the site to an approved disposal site. Burying of rubble on-site is prohibited.• Surfaces are to be checked for waste products from activities such as concreting or asphaltting and cleared in a manner approved by the Engineer.• All embankments are to be trimmed, shaped and replanted to the satisfaction of the PIU.• Borrow pits are to be closed and rehabilitated in accordance with the pre-approved management plan for each borrow pit. The Contractor shall liaise with the PIU regarding these requirements.	Co
D.	Operation Stage		
D1 Management and Maintenance of Storm Water Drainage			
D1.1	Public Awareness-Storm Water Management on Efficient lines	The SMC with support from JTFRP-PMU would need to carry out education and awareness campaigns on efficient stormwater drainage management through periodic visit to Zone-1 areas by way of announcement, sharing of pamphlets, Radio/ FM programs, regarding their 'responsible' activities in relation to drainage management, and discourage solid waste dumping, disposing of wastewater in the drainage system.	

D1.2	Public Health	<ul style="list-style-type: none"> • SMC to ensure that no household wastewater connections are connected with the stormwater drainage man-holes/ network. SMC will ensure that the drains carry only the stormwater. • Drains are designed as closed/ covered in RCC type with cover on top which will curtail dumping of solid waste in drains. • The stormwater drains would need to be periodically de-silted in-order to maintain its carrying capacity. • SMC to go for periodic checking and source of waste generation and its identification, and additional bins in critical locations will be provided and frequent collection and disposal of waste will be ensured. This exercise will minimize the contamination from leaching solid/ liquid waste into the SWD system. • All structures comprising the construction camp/ ancillary sites are to be removed from the sites to be checked for spills of substances such as oil, paint, etc. and these shall be cleaned up. • PIU/ SMC to ensure that the stormwater drains are not clogged and correct operation and maintenance of drains and waste screen. • The drains will require regular inspection and maintenance with clearance of any accumulated silt or waste, and the waste screen will need regular removal of waste, the clearance interval will be shorter in the wet weather flow than in the dry weather flow. • Drains will be regularly inspected and cleaned especially prior to the rainy season. • SMC to ensure muck and silt that are removed from the drainage system will not be left alongside the drain and will be immediately disposed in the designated waste collection vehicles of SMC and subsequently ensure that it will be disposed at an approved municipal solid waste site in Srinagar 	SMC
D2. Maintenance (Zone-1 Missing Links)			

D.2.1	Operation of Pumping Stations (Missing Links)	<ul style="list-style-type: none"> • Standard Operating Procedure (SOP) for pump operation will be displayed at pumping stations of Zone-1 (Missing Links) • Pump stations will be maintained clean and do's and don'ts for pumping station will be displayed. • Earthing and earth resistance of the earth pits will be checked every year. • Dry Chemical (ABC) type fire extinguisher for electrical fire will be kept in the pump station. • DG set will be fitted with an acoustic enclosure. • Stack height to DG set will be provided as per CBCB guidelines to vent out stack gases into the atmosphere. • Proper ventilation will be maintained in the pump station. • First Aid Box will be kept ready at the pump station. • Necessary personal protective equipment like electrical resistance hand gloves, safety shoes, helmet, mask, etc will be kept ready in the pump station. • Waste collection bin will be provided, which will be cleaned daily and collected wastes will be disposed of at designated places by Srinagar Municipal Corporation. 	
D.2.2	Maintenance of Pumping Station (Zone-1 Missing Links)	<ul style="list-style-type: none"> • Predictive and preventive maintenance schedules will be prepared as per manufacturer recommendation. • Checklist will be prepared by SMC for maintenance for pumping station • During maintenance, necessary personal protective equipment will be used by workers. 	
D.2.3	Monitoring of sewage to be pumped (Zone-1 Missing Links)	<ul style="list-style-type: none"> • SMC will ensure the monthly monitoring of wastewater to be pumped by pump stations. The monitoring parameters will be in line with discharge standards of CPCB i.e. Temperature, pH, Turbidity, Total Suspended Solid (TSS), T. Alkalinity, Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Oil & Grease (O&G), Fecal Coliform, Total Nitrogen, and Total Phosphate. The records of environmental monitoring will be maintained. 	

D.2.4	Pumping strategy for wastewater into Receiving Water body	<p>Wastewater at pumping stations has considerable variation in flow rates, concentration of pollutants and characteristics during various segments of a day. Usually, in the morning and evening hours flow rates and concentration of water pollutants remain high. The incessant pumping of wastewater into receiving water body has the possibility that the concentration of pollutants in wastewater at pumping might be exceeding discharge standards. Therefore, it is suggested that based on hourly wastewater monitoring, SMC should ensure equalization of wastewater of drain to bring down the concentration of water pollutants like BOD below the discharge standards before discharge into the spill channel.</p> <p>It is highly recommended that SMC to ensure that “No Household Connections” should be linked/ connected with the Storm Water Drainage system and the “Pure Concept of Storm Water Drainage System” will be maintained by the SMC”. In this context, it is observed that the number of existing drainage systems in Srinagar and adjoining areas, are connected with the household wastewater connections resulting in the conversion of stormwater drainage into sewer drainage and disposed of directly into receiving water body causing odour nuisance and contamination of water bodies. This mixed wastewater comprises of high oxygen demanding (BOD) waste, surfactants, higher nutrients (nitrate-phosphates), suspended solids and prevailing anoxic condition result into sulfate precipitation which leads to the formation of <i>Hydrogen Sulphide</i> (which is an obnoxious H₂S gas/odor in drainage network, sumps & outfall discharge channel). This has a long-term impact in a given community along with sensitive receptors like schools, religious places, residents, etc due to the bad engineering practices and decision making.</p> <p>One of the common problems with the SWD system is suspended solids from surface runoffs during peak storm events and dry weather flow. Suspended solids are typically the pollutant of concern, primarily because solids tend to settle down. For this purpose, DWS should be designed in such a way to arrest suspended solids in order to check the flow of sediments into a receiving water body.</p>	SMC
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1.6. Clause for Non-conformity to Environmental Management Plan (EMP) - Protection of the Environment

The Contractor will implement necessary mitigation measures for which responsibility is assigned to him as stipulated in the EMP. Any lapse in implementing the same will attract the damage clause as detailed below:

- Any complaints of public, within the scope of the Contractor, formally registered with the PIU and communicated to the Contractor, which is not properly addressed within the time period intimated by the PIU shall be treated as a major lapse.
- Non-conformity to any of the mitigation measures like unsafe conditions, non-collection of excavated material (during laying of drainage pipes) regularly and other unattended Health, Safety & Environment (HSE) issues, as stipulated in the EMP Report (other than stated above) shall be considered as a minor lapse.
- On observing any lapses, PIU shall issue a notice to the Contractor, to rectify the same.
- Any minor lapse for which notice was issued and not rectified, first and second reminders shall be given after ten days from the original notice date and first reminder date respectively. Any minor lapse, which is not rectified, shall be treated as a major lapse from the date of issuing the second reminder.
- If a major lapse is not rectified upon receiving the notice PIU shall invoke reduction, in the subsequent interim payment certificate.
- For major lapses, 10% of the interim payment certificate will be withheld, subject to a maximum limit of about 0.5% of the contract value.
- If the lapse is not rectified within one month after withholding the payment, **the amount withheld shall be forfeited.**

Section X - Contract Forms

This Section contains forms which, once completed, will form part of the Contract. The forms for Performance Security, ESHS performance security if applicable, and Advance Payment Security, when required, shall only be completed by the successful Bidder after contract award.

Letter of Acceptance

[letterhead paper of the Employer]

[The Letter of Acceptance shall be the basis for formation of the Contract as described in ITB Clause 40. This Standard Form of Letter of Acceptance shall be filled in and sent to the successful Bidder only after evaluation of bids has been completed, subject to any review by the World Bank required under the Loan Agreement.]

[insert date]

Identification No and Title of Contract: *[insert identification number and title of the Contract]*

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

This is to notify you that your Bid dated *[insert date]* for execution of the *[insert name of the Contract and identification number, as given in the PCC]* for the Contract Price *[insert amount in numbers and words]* as corrected and modified³⁸ in accordance with the Instructions to Bidders is hereby accepted by our Agency.

[insert one of the following (a) or (b) options]

- (a) We accept that *[insert name proposed by bidder]* be appointed as the Adjudicator.³⁹
- (b) We do not accept that *[insert name proposed by bidder]* be appointed as Adjudicator, and by sending a copy of this Letter of Acceptance to *[insert name of the Appointing Authority]*, we are hereby requesting *[insert name]*, the Appointing Authority, to appoint the Adjudicator in accordance with GCC 23.⁴⁰

We note that as per your bid, you do not intend to subcontract any component of work.

[OR]

We note that as per your bid, you propose to employ M/s. as sub-contractor for executing

³⁸ Delete "corrected and" or "and modified" if not applicable. See Notes on Standard Form of Agreement, next page.

³⁹ To be used only if the Contractor disagrees in the Bid with the Adjudicator proposed by the Employer in the Instructions to Bidders, and has accordingly offered another candidate.

⁴⁰ To be used only if the Contractor disagrees in the Bid with the Adjudicator proposed by the Employer in the ITB, has accordingly offered another candidate, and the Employer does not accept the counterproposal.

[Delete whatever is inapplicable]

You are hereby requested to furnish Performance Security, plus additional security for unbalanced bids in terms of ITB clause 35.5, and ESHS Performance Security ***[Delete ESHS Performance Security if it is not required under the contract]*** in the form detailed in ITB Clause 42 for amounts⁴¹ of Rs. _____ and Rs. _____ within 21 days of the receipt of this letter of acceptance, and visit this office to sign the contract, failing which action as stated in ITB Clause 42.2 will be taken. The securities shall be valid upto 28 days from the date of completion i.e. upto and shall be as per the Performance Security Form and the ESHS Performance Security Form ***[Delete reference to the ESHS Performance Security Form if it is not required under the contract]***, included in Section X - Contract Forms, of the bidding document.

We have reviewed the construction methodology submitted by you alongwith the bid in response to ITB Clause 16 and our comments are given in the attachment. You are requested to submit a revised Program including ESHS requirements as per Clause 26 of General Conditions of Contract within 14 days of receipt of this letter of acceptance.

Yours faithfully,

Authorized Signature.....

Name and Title of Signatory.....

Name of Agency.....

⁴¹ Insert amounts for (i) Performance Security, plus additional security for unbalanced bids; and (ii) ESHS Performance Security respectively.

Issue of Notice to proceed with the work

(letterhead of the Employer)

_____ (date)

To

_____ (name and address of the Contractor)

Dear Sirs:

Pursuant to your furnishing the requisite securities as stipulated in ITB clause 42.1, insurance policy as per GCC 13, construction methodology as stated in letter of acceptance and signing of the contract agreement for the construction of _____ @ a Bid Price of Rs. _____, you are hereby instructed to proceed with the execution of the said works in accordance with the contract documents.

Yours faithfully,

(Signature, name and title of
signatory authorized to sign on
behalf of Employer)

Attachment: Contract Agreement

Contract Agreement

THIS AGREEMENT made the day of, between
.. *[name of the Employer]*. (hereinafter “the Employer”), of the one part, and
.. *[name of the Contractor]*.(hereinafter “the Contractor”), of the other part:

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

The Employer and the Contractor agree as follows:

1. In this Agreement words and expressions shall have the same meanings as are respectively assigned to them in the Contract documents referred to.
2. The following documents shall be deemed to form and be read and construed as part of this Agreement. This Agreement shall prevail over all other Contract documents.
 - (a) this Agreement
 - (b) the Letter of Acceptance
 - (c) the Contractor’s Bid including completed schedules and priced bill of quantities,
 - (d) the Addenda No’s *[insert addenda numbers if any]*.
 - (e) the Particular Conditions of contract
 - (f) the General Conditions of contract;
 - (g) the Specifications
 - (h) the Drawings; and
 - (i) Construction Program, Methodology, Quality Assurance Program, ESHS Management Strategies and Implementation Plans, and Code of Conduct (ESHs)
 - (j) Joint Venture Agreement [for JVs only]
 - (k) Any other document listed in PCC as forming part of the Contract
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.

IN WITNESS whereof the parties hereto have caused this Agreement to be executed in accordance with the laws of India on the day, month and year indicated above.

Signed by: _____

for and on behalf of the Employer

Signed by: _____

for and on behalf the Contractor

in the
presence of: _____

Witness, Name, Signature, Address, Date

in the
presence of: _____

Witness, Name, Signature, Address, Date

Performance Security - Bank Guarantee
[including Additional Performance Security for unbalanced bids]
[Guarantor letterhead or SWIFT identifier code]

Performance Guarantee No.....*[insert guarantee reference number]*
Date.....*[insert date of issue of the guarantee]*

To: _____ *[name of Employer]*
_____ *[address of Employer]*

WHEREAS _____ *[name and address of Contractor⁴²]*
(hereinafter called "the Contractor") has undertaken, in pursuance of Contract No. _____
dated _____ to execute _____ *[name of Contract and*
brief description of Works] (hereinafter called "the Contract");

AND WHEREAS it has been stipulated by you in the said Contract that the Contractor shall furnish you with a Bank Guarantee by a recognized bank for the sum specified therein as security for compliance with his obligations in accordance with the Contract;

AND WHEREAS we have agreed to give the Contractor such a Bank Guarantee;

NOW THEREFORE we hereby affirm that we are the Guarantor and responsible to you, on behalf of the Contractor, upto a total of _____ *[amount of guarantee⁴³]* _____ *[in words]*, such sum being payable in the types and proportions of currencies in which the Contract Price is payable, and we undertake to pay you, upon your first written demand and without cavil or argument, any sum or sums within the limits of _____ *[amount of guarantee]* as aforesaid without your needing to prove or to show grounds or reasons for your demand for the sum specified therein.

We hereby waive the necessity of your demanding the said debt from the Contractor before presenting us with the demand.

We further agree that no change or addition to or other modification of the terms of the Contract or of the Works to be performed thereunder or of any of the Contract documents which may be made between you and the Contractor shall in any way release us from any

⁴² *In the case of a JV, insert the name of the Joint Venture*

⁴³ *An amount shall be inserted by the Guarantor, representing the percentage of the Contract Price specified in the Contract less provisional sum if any, plus additional performance security for unbalanced bids if any, and denominated in Indian Rupees.*

liability under this guarantee, and we hereby waive notice of any such change, addition or modification.

This guarantee shall be valid until⁴⁴, and any demand for payment under it must be received by us at this office on or before that date.

Signature and seal of the guarantor _____

Name of Bank _____

Address _____

Date _____

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

⁴⁴ *Insert the date twenty-eight days after the expected completion date as described in GC Clause 53.1. 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 Employer's written request for such extension, such request to be presented to the Guarantor before the expiry of the guarantee."*

Environmental, Social, Health and Safety (ESHS) Performance Security - Bank Guarantee

[Guarantor letterhead or SWIFT identifier code]

ESHS Performance Guarantee No.....*[insert guarantee reference number]*

Date.....*[insert date of issue of the guarantee]*

To: _____ *[name of Employer]*
_____ *[address of Employer]*

WHEREAS _____ *[name and address of Contractor⁴⁵]*
(hereinafter called "the Contractor") has undertaken, in pursuance of Contract No. _____
dated _____ to execute _____ *[name of Contract and*
brief description of Works] (hereinafter called "the Contract");

AND WHEREAS it has been stipulated by you in the said Contract that the Contractor shall furnish you with a Bank Guarantee by a recognized bank for the sum specified therein as security for compliance with Environmental, Social, Health and/or Safety (ESHS) obligations in accordance with the Contract;

AND WHEREAS we have agreed to give the Contractor such a Bank Guarantee;

NOW THEREFORE we hereby affirm that we are the Guarantor and responsible to you, on behalf of the Contractor, upto a total of _____ *[amount of guarantee⁴⁶]* _____ *[in words]*, such sum being payable in the types and proportions of currencies in which the Contract Price is payable, and we undertake to pay you, upon your first written demand and without cavil or argument, any sum or sums within the limits of _____ *[amount of guarantee]* as aforesaid without your needing to prove or to show grounds or reasons for your demand for the sum specified therein.

We hereby waive the necessity of your demanding the said debt from the Contractor before presenting us with the demand.

We further agree that no change or addition to or other modification of the terms of the Contract or of the Works to be performed thereunder or of any of the Contract documents which may be made between you and the Contractor shall in any way release us from any liability under this guarantee, and we hereby waive notice of any such change, addition or modification.

⁴⁵ *In the case of a JV, insert the name of the Joint Venture*

⁴⁶ *An amount shall be inserted by the Guarantor, representing the percentage of the Contract Price specified in the Contract less provisional sum if any, and denominated in Indian Rupees.*

This guarantee shall be valid until⁴⁷, and any demand for payment under it must be received by us at this office on or before that date.

Signature and seal of the guarantor _____

Name of Bank _____

Address _____

Date _____

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

⁴⁷ Insert the date twenty-eight days after the expected completion date as described in GC Clause 53.1. 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 Employer'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]

Advance Payment Guarantee No.....*[insert guarantee reference number]*

Date.....*[insert date of issue of the guarantee]*

To: _____ *[name of Employer]*
_____ *[address of Employer]*
_____ *[name of Contract]*

Gentlemen:

In accordance with the provisions of the Conditions of Contract, Sub-clause 49.1 ("Advance Payment") of the above-mentioned Contract, _____ *[name and address of Contractor⁴⁸]* (hereinafter called "the Contractor") shall deposit with _____ *[name of Employer]* a bank guarantee to guarantee his proper and faithful performance under the said Clause of the Contract in an amount of _____ *[amount of guarantee⁴⁹]* _____ *[in words]*.

We, the _____ *[bank or financial institution]*, as instructed by the Contractor, agree unconditionally and irrevocably to guarantee as primary obligator and not as Surety merely, the payment to _____ *[name of Employer]* on his first demand without whatsoever right of objection on our part and without his first claim to the Contractor, in the amount not exceeding _____ *[amount of guarantee]* _____ *[in words]*.

We further agree that no change or addition to or other modification of the terms of the Contract or of Works to be performed thereunder or of any of the Contract documents which may be made between _____ *[name of Employer]* and the Contractor, shall in any way release us from any liability under this guarantee, and we hereby waive notice of any such change, addition or modification.

This guarantee shall remain valid and in full effect from the date of the advance payment under the Contract until _____ *[name of Employer]*

⁴⁸ In the case of a JV, insert the name of the Joint Venture

⁴⁹ An amount shall be inserted by the bank representing the amount of the Advance Payment, and denominated in Indian Rupees.

receives full repayment of the same amount from the Contractor. Consequently any demand for payment under this guarantee must be received by us at this office on or before that date.

Yours truly,

Signature and seal: _____

Name of Bank: _____

Address: _____

Date: _____

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

Retention Money Security
Demand Guarantee
[Guarantor letterhead or SWIFT identifier code]

_____ *[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 contractor⁵⁰]* (hereinafter called "the Contractor") has entered into Contract No. _____ *[reference number of the contract]* dated _____ 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]* 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 the sum or sums not exceeding in total an amount of _____ *[amount in Rupees]* (_____ *[amount in words⁵¹]*) 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 without cavil or argument.

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]*.

This guarantee shall expire, at the latest, 21 days after the date when the Employer has received a copy of the Defects Liability Certificate issued by the Project Manager.

⁵⁰ In the case of a JV, insert the name of the Joint Venture

⁵¹ The Guarantor shall insert an amount representing the amount of the second half of the Retention Money or if the amount guaranteed under the Performance Guarantee when the Taking-Over Certificate is issued is less than half of the Retention Money, the difference between half of the Retention Money and the amount guaranteed under the Performance Security.

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

[Signature(s) and seal of the guarantor]

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