



**GOVERNMENT OF TAMIL NADU
TAMIL NADU IRRIGATED AGRICULTURE
MODERNIZATION PROJECT**

BID DOCUMENT

NANDHIYARU AND KULAIYARU SUB BASIN

Package No. 02 / TN IAMP / WRD / NKR / OFD Works / Phase - II / 2022 -23.

NAME OF WORK : On Farm Development (OFD) works for the work of Rehabilitation and Modernisation of Pullambady Main Canal, 5 Tanks and 1 Anicut in Lalgudy Block and Taluk, 5 Tanks and Pullambady Main Canal Distributory No.1,2,3 in Pullambady Block of Lalgudy Taluk in Trichy District and 19 Tanks in Thirumanur Block of Ariyalur Taluk and District in Nandhiyaru and Kulaiyaru Sub Basin

BID VALUE : **Rs. 142.64 Lakhs (including GST 12%)**

**TRICHY REGION, TRICHY
MIDDLE CAUVERY BASIN CIRCLE, TRICHY
RIVER CONSERVANCY DIVISION, TRICHY
TAMIL NADU – SOUTH INDIA**

GOVERNMENT OF TAMIL NADU

TN IAM PROJECT

REQUEST FOR BIDS No: 02 / TNIAMP / WRD / NKR / OFD Works / Phase-II /
2022 -23

NATIONAL OPEN COMPETITIVE PROCUREMENT
(One - Envelope Bidding Process without e-Procurement)

(FOR ITEM RATE / ADMEASUREMENT CONTRACTS IN CIVIL WORKS)

NAME OF WORK	: On Farm Development (OFD) works for the work of Rehabilitation and Modernisation of Pullambady Main Canal, 5 Tanks and 1 Anicut in Lalgudy Block and Taluk, 5 Tanks and Pullambady Main Canal Distributory No.1,2,3 in Pullambady Block of Lalgudy Taluk in Trichy District and 19 Tanks in Thirumanur Block of Ariyalur Taluk and District in Nandhiyaru and Kulaiyaru Sub Basin (Package No. 02 / TN IAMP / WRD / NKR / OFD Works / Phase - II / 2022 -23)
PERIOD OF SALE OF BIDDING DOCUMENT	: FROM 16.06.2022 TO 18.07.2022
TIME AND DATE OF PRE – BID MEETING	DATE 04.07.2022 TIME 11.00 AM
LAST DATE AND TIME FOR RECEIPT OF BIDS	DATE 19.07.2022 TIME 3.00 PM
*TIME AND DATE OF OPENING OF BIDS PLACE OF OPENING OF BIDS	DATE 19.07.2022 TIME 3.30 PM Superintending Engineer's Chamber, Office of the Superintending Engineer, WRD, Middle Cauvery Basin Circle, Subramaniyapuram, Tiruchirapalli - 620 020 Tiruchirapalli District. Tamil Nadu.
OFFICER INVITING BIDS	Superintending Engineer's Chamber, Office of the Superintending Engineer, WRD, Middle Cauvery Basin Circle, Subramaniyapuram, Tiruchirapalli - 620 020 Tiruchirapalli District. Tamil Nadu. Ph. No. 0431 – 2331860 Fax No. 0431 – 2333598 E.Mail : semcbctry@gmail.com

REQUEST FOR BIDS
(RFB)

GOVERNMENT OF TAMILNADU
Tamil Nadu Irrigated Agriculture Modernisation Project (TN IAMP)

REQUEST FOR BIDS (RFB)
(One-Envelope Bidding Process without e-Procurement)

NATIONAL OPEN COMPETITIVE PROCUREMENT

Name of Project : Tamil Nadu Irrigated Agriculture Modernisation Project

Contract Title : On Farm Development (OFD) works for the work of Rehabilitation and Modernisation of Pullambady Main Canal, 5 Tanks and 1 Anicut in Lalgudy Block and Taluk, 5 Tanks and Pullambady Main Canal Distributory No.1,2,3 in Pullambady Block of Lalgudy Taluk in Trichy District and 19 Tanks in Thirumanur Block of Ariyalur Taluk and District in Nandhiyaru and Kulaiyaru Sub Basin

Loan No. : IBRD - 87970

RFB Reference No. : Package No. 02 / TN IAMP / WRD / NKR / OFD Works / Phase - II / 2022 -23

1. The Government of India has received financing from the World Bank toward the cost of the Tamil Nadu Irrigated Agriculture Modernisation Project and intends to apply part of the proceeds toward eligible payments under the contract¹ for construction of works as detailed below.
2. Bidding will be conducted through national open competitive procurement using a Request for Bids (RFB) as specified in the World Bank's "Procurement Regulations for IPF Borrowers, July 2016, Revised August 2018" ("Procurement Regulations"), and is open to all Bidders as defined in the Procurement Regulations.
3. Bidders from India should, however, be registered with the Government of Tamil Nadu under Class 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 bidders².

¹ Substitute "contracts" where Bids are invited concurrently for multiple contracts. Add a new para. 5as follows: "Bidders may bid for one or several contracts, as further defined in the bidding document. Bidders wishing to offer discounts in case they are awarded more than one contract will be allowed to do so, provided those discounts are included in the Letter of Bid." and renumber paras 5-10.

² Modify or delete, based on registration requirement, if any for bidders from India.

4. The Water Resources Department, Government of Tamil Nadu, For and on behalf of Governor of Tamil Nadu, The Superintending Engineer, WRD, Middle Cauvery Basin Circle, Tiruchirappalli – 620 020, Tiruchirappalli District, Tamil Nadu now invites sealed Bids from eligible Bidders 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 document at the address given below during office hours. 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 3.14 and 3.15 of the “Procurement Regulations” setting forth the World Bank’s policy on conflict of interest.
5. The bidding document (and additional copies) may be purchased by interested eligible Bidders from the office of The Superintending Engineer, WRD, Middle Cauvery Basin Circle, Tiruchirappalli – 620 020, Tiruchirappalli District, Tamil Nadu from 16.06.2022 to 18.07.2022 upon payment of a non-refundable fee (three sets) as indicated in the table below, in the form of Demand Draft (DD)³ on any Scheduled/Nationalized bank payable at Trichy in favour of The Executive Engineer, WRD, **River Conservancy Division, Trichy**. Bidding document requested by mail will be dispatched by courier/speed post on payment of an extra amount of Rs.500/-.The Superintending Engineer, WRD, Middle Cauvery Basin Circle, Tiruchirappalli – 620 020, Tiruchirappalli District, Tamil Nadu will not be held responsible for the postal delay if any, in the delivery of the documents or non-receipt of the same. ***The bidding document can be downloaded from the website <http://www.tenders.tn.gov.in> at free of cost. In such cases, the bidder is responsible for ensuring that any addenda available on the website is also downloaded and incorporated.***
6. Bids must be delivered to The Superintending Engineer, WRD, Middle Cauvery Basin Circle, Tiruchirappalli – 620 020, Tiruchirappalli District, Tamil Nadu on or before 03.00 PM on 19.07.2022 and will be publicly opened on the same day at 03.30 PM, , in the presence of the Bidders’ designated representatives. 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.
7. All Bids must be accompanied by a Bid Security (or “Bid-Securing Declaration,” as appropriate)of the amount specified for the work in the table below, drawn in favour of The Executive Engineer, WRD, **River Conservancy Division, Trichy**, Tamil Nadu. 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.

³*Insert if applicable other methods of payment also for example cashier’s check, certified check (payable at in favour of), direct deposit to specified account number, etc.*

8. A pre-bid meeting will be held on 04.07.2022 at 11.00 AM at the office of The Superintending Engineer, WRD, Middle Cauvery Basin Circle, Tiruchirapalli – 620 020, Tiruchirapalli District, Tamil Nadu 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 document.

10. The address for communication is as under:

- (a) Name and Designation of Officer : Er. R. Thiruvettaisellam, M.Tech, MBA,
Superintending Engineer
- (b) Official Address : Middle Cauvery Basin Circle, WRD,
Tiruchirapalli – 620 020,
Tiruchirapalli District,
Tamil Nadu
- (c) Email Address : semcbctry@gmail.com
- (d) Telephone : 0431 - 233598
- (e) Website : <http://www.tenders.tn.gov.in>
- (f) Fax : 0431-2333598

TABLE

Package No	Name of Work	Bid Security * (Rs.)	Cost of Document (Rs.)	Period of Completion
1	2	3	4	5
02 / TN IAMP / WRD / NKR / OFD Works / Phase - II / 2022 -23	On Farm Development (OFD) works for the work of Rehabilitation and Modernisation of Pullambady Main Canal, 5 Tanks and 1 Anicut in Lalgudy Block and Taluk, 5 Tanks and Pullambady Main Canal Distributory No.1,2,3 in Pullambady Block of Lalgudy Taluk in Trichy District and 19 Tanks in Thirumanur Block of Ariyalur Taluk and District in Nandhiyaru and Kulaiyar Sub Basin	Rs.2,85,500	Rs.15000 + Rs.1800	12 Months**

*For work value inclusive of GST 12%

** Including Water Regulation and Rainy season

***Superintending Engineer, WRD,
Middle Cauvery Basin Circle, Trichy – 20.***

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PART 1 – Bidding Procedures

Section I - Instructions to Bidders

A. General

1. Scope of Bid

- 1.1 In connection with the Specific Procurement Notice - Request for Bids (RFB), **specified in the Bid Data Sheet (BDS)**, the Employer, as **specified in the BDS**, issues this bidding document for the provision of Works as specified in Section VII, Works' Requirements. The name, identification and number of lots (contracts) of this RFB are **specified in the BDS**.
- 1.2 Throughout this bidding document
 - (a) the term "in writing" means communicated in written form (e.g. by mail, e-mail, and fax, including if **specified in the BDS**, distributed or received through the electronic-procurement system used by the Employer) with proof of receipt;
 - (b) if the context so requires, "singular" means "plural" and vice versa;
 - (c) "Day" means calendar day, unless otherwise specified as "Business Day". A Business Day is any day that is an working day of the Borrower. It excludes the Borrower's official public holidays;
 - (d) the term "**ES**" means environmental and Social (including sexual exploitation and abuse (SEA) and Sexual Harassment (SH)
 - (e) "**Sexual Exploitation and Abuse**" "**(SEA)**" means the following:
 - (i) "**Sexual Exploitation**" is defined as any actual or attempted abuse of position of vulnerability, differential power or trust, for sexual purposes, including, but not limited to, profiting monetarily, socially or politically from the sexual exploitation of another.
 - (ii) "**Sexual Abuse**" is defined as the actual or threatened physical intrusion of a sexual nature, whether by force or under unequal or coercive conditions;
 - (f) "**Sexual Harassment**" "**(SH)**" is defined as unwelcome sexual advances, requests for sexual favors, and other verbal or physical conduct of a sexual nature by the Contractor's Personnel with other Contractor's or Employer's Personnel;

(g) “Contractor’s Personnel” is as defined in Sub – Clause 1 (ii) of the General Conditions of Contract; and

(h) “**Employer’s personnel**” is as defined in GCC Sub – Clause 1 (nn) of the General Conditions of Contract.

A non-exhaustive list of (i) behaviors which constitute SEA and (ii) behaviors which constitute SH is attached to the Code of Conduct form in Section IV.

2. Source of Funds

2.1 The Borrower or Recipient (hereinafter called “Borrower”) **specified in the BDS** has received or has 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**, toward the project **named in the BDS**. The Borrower intends to apply a portion of the funds to eligible payments under the contract(s) for which this bidding document is issued.

2.2 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 account for the purpose of any payment to persons or entities, or for any import of goods, equipment, plant, or materials, if such payment or import is prohibited by a decision of the United Nations Security Council taken under Chapter VII of the Charter of the United Nations. 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).

3. Fraud and Corruption

3.1 The Bank requires compliance with the Bank’s Anti-Corruption Guidelines and its prevailing sanctions policies and procedures as set forth in the WBG’s Sanctions Framework, 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), subcontractors, sub-consultants, service providers, suppliers, and their personnel, to permit the Bank to inspect all accounts, records and other documents relating to any initial selection process, prequalification process, bid submission, proposal 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, or a state-owned enterprise or institution subject to ITB 4.6, or any combination of them 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) 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

- (f) 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;
 - (g) 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;
 - (h) 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 document 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 firm that is a Bidder (either individually or as a JV member) shall not participate in more than one Bid, except for permitted alternative Bids. This includes participation as a Subcontractor in other Bids. Such participation shall result in the disqualification of all Bids in which the firm is involved. A firm that is not a Bidder or a JV member may participate as a subcontractor in more than one Bid.
- 4.4 A Bidder may have the nationality of any country, subject to the restrictions pursuant to ITB 4.8. 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 subcontractors or sub-consultants for any part of the Contract including related Services.

- 4.5 A Bidder that has been sanctioned by the Bank, pursuant to the Bank's Anti-Corruption Guidelines, in accordance with its prevailing sanctions policies and procedures as set forth in the WBG's Sanctions Framework as described in Section VI paragraph 2.2 d., shall be ineligible to be prequalified for, initially selected for, bid for, propose 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**.
- 4.6 Bidders that are state-owned enterprises or institutions in the Employer's Country may be eligible to compete and be awarded a Contract(s) only if they can establish, in a manner acceptable to the Bank, that they (i) are legally and financially autonomous (ii) operate under commercial law, and (iii) are not under supervision of the Employer.
- 4.7 A Bidder shall not be under suspension from Bidding by the Employer as the result of the operation of a Bid-Securing or Proposal-Securing Declaration
- 4.8 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. When the Works are implemented across jurisdictional boundaries (and more than one country is a Borrower, and is involved in the procurement), then exclusion of a firm or individual on the basis of ITB 4.8 (a) above by any country may be applied to that procurement across other countries involved, if the Bank and the Borrowers involved in the procurement agree.
- 4.9 A Bidder shall provide such documentary evidence of eligibility satisfactory to the Employer, as the Employer shall reasonably request

**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.

B. Contents of Bidding Document

**6. Sections of Bidding
Document**

- 6.1 The bidding document consists of Parts 1, 2, and 3, which include all the sections specified below, and which should be read in conjunction with any Addenda issued in accordance with ITB 8.

PART 1 Bidding Procedures

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

PART 2 Works' 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

- 6.2 The Specific Procurement Notice - Request for Bids (RFB) issued by the Employer is not part of this bidding document.
- 6.3 Unless obtained directly from the Employer, the Employer is not responsible for the completeness of the bidding document, responses to requests for clarification, the minutes of the pre-Bid meeting (if any), or Addenda to the bidding document 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 document and to furnish with its Bid all information and documentation as is required by the bidding document.

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

- 7.1 A Bidder requiring any clarification of the bidding document shall contact the Employer in writing at the Employer's address **specified in the BDS** or raise its 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**. *(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 document] to search the website for any addenda)*. Should the clarification result in changes to the essential elements of the bidding document, the Employer shall amend the bidding document following the procedure under ITB 8 and ITB 22.2.
- 7.2 The Bidder is advised to visit and examine the Site of Works and its surroundings and obtain for itself on its own responsibility all information that may be necessary for preparing the bid and entering into a contract for construction of the Works. The costs of visiting the Site shall be at the Bidder's own expense.
- 7.3 The Bidder and any of its personnel or agents will be granted permission by the Employer to enter upon its premises and lands for the purpose of such visit, but only upon the express condition that the Bidder, its personnel, and agents will release and indemnify the Employer and its personnel and agents from and against all liability in respect thereof, and will be responsible for death or personal injury, loss of or damage to property, and any other loss, damage, costs, and expenses incurred as a result of the inspection.
- 7.4 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.
- 7.5 The Bidder is requested, to submit any questions in writing, to reach the Employer not later than one week before the meeting.

- 7.6 Minutes of the pre-Bid meeting, if applicable, including the text of the questions asked by Bidders, without identifying the source, and the responses given, together with any responses prepared after the meeting, will be transmitted promptly to all Bidders who have acquired the bidding document in accordance with ITB 6.3. Any modification to the bidding document 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. Nonattendance at the pre-Bid meeting will not be a cause for disqualification of a Bidder.

8. Amendment of Bidding Document

- 8.1 At any time prior to the deadline for submission of bids, the Employer may amend the bidding document by issuing addenda.
- 8.2 Any addendum issued shall be part of the bidding document and shall be communicated in writing to all who have obtained the bidding document from the Employer in accordance with ITB 6.3. 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** prepared in accordance with ITB 12 and ITB 14;

- (b) **Completed Schedules** including priced Bill of Quantities, in accordance with ITB 12 and ITB 14, as specified in BDS;
- (c) **Bid Security or Bid-Securing Declaration in accordance with ITB 19.1;**
- (d) **Alternative Bid**, if permissible, in accordance with ITB 13
- (e) **Authorization:** written confirmation authorizing the signatory of the Bid to commit the Bidder, in accordance with ITB 20.3, and in accordance with ITB 20.4 in case of a JV;
- (f) **Bidder's Eligibility:** documentary evidence in accordance with ITB 17 establishing the Bidder's eligibility to Bid;
- (g) **Qualifications:** documentary evidence in accordance with ITB 17 establishing the Bidder's qualifications to perform the contract if its Bid is accepted;
- (h) **Conformity:** a technical proposal in accordance with ITB 16;
- (i) **Construction methodology** as detailed in Para 1.1 of Section III Evaluation Criteria
- (j) Contractor Registration certificate (as per RFB); and
- (k) 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 Bill of Quantities, and all documents listed under Clause 11, shall be prepared using the relevant forms furnished in Section IV, Bidding Forms. The forms must be completed without any alterations to the text, and no substitutes shall be accepted except as provided under ITB 20.3. All blank spaces shall be filled in with the information requested

13. Alternative Bids

- 13.1 Unless otherwise specified **in the BDS**, alternative Bids shall not be considered
- 13.2 When alternative times for completion are explicitly invited, a statement to that effect will be included **in the BDS** and the method of evaluating different alternative times for completion will be described in Section III, Evaluation and Qualification Criteria.
- 13.3 Except as provided under ITB 13.4 below, Bidders wishing to offer technical alternatives to the requirements of the bidding document must first price the Employer's design as described in the bidding document and shall further provide all information necessary for a complete evaluation of the alternative by the Employer, including drawings, design calculations, technical specifications, breakdown of prices, and proposed construction methodology and other relevant details. Only the technical alternatives, if any, of the Bidder with the Most Advantageous Bid conforming to the basic technical requirements shall be considered by the Employer.
- 13.4 When specified **in the BDS**, Bidders are permitted to submit alternative technical solutions for specified parts of the Works. Such parts will be identified **in the BDS** and described in Section VII, Works' Requirements. The method for their evaluation will be stipulated in Section III, Evaluation and Qualification Criteria

14. Bid Prices and Discounts

- 14.1 The prices and discounts quoted by the Bidder in the Letter of Bid and in the Schedules including Bill of Quantities 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, 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, initialing, 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 The Bidder shall quote any discounts and indicate the methodology for their application 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 prices quoted by the Bidder shall be fixed.
- 14.6 If so specified in ITB 1.1, Bids are invited for individual lots (contracts) or for any combination of lots (packages). Bidders wishing to offer discounts 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. 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 of 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 along with his bid a declaration to this effect in the Declaration Format provided in Section IV of the bidding document

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 stipulated in Section IV, Bidding Forms, in sufficient detail to demonstrate the adequacy of the Bidders' proposal to meet the work's requirements and the completion time. |
| 17. Documents Establishing the Eligibility and qualifications of the Bidders | 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 In accordance with Section III, Evaluation and Qualification Criteria, to establish its qualifications to perform the Contract, the Bidder shall provide the information requested in the corresponding information sheets included in Section IV, Bidding Forms.

18. Period of Validity

- 18.1 Bids shall remain valid for 90 days or for the Bid Validity period **specified in the BDS**. The Bid Validity period starts from the date fixed for the Bid submission deadline (as 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, except as provided in ITB 18.3
- 18.3 If the award is delayed by a period exceeding fifty-six (56) days beyond the expiry of the initial Bid validity period, 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; or
 - (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 The Bidder shall furnish as part of its Bid, either a Bid-Securing Declaration or a Bid Security as **specified in the BDS**, in original form and, in the case of a Bid security, for the amount **specified in the BDS**
- 19.2 A Bid Securing Declaration shall use the form included in Section IV, Bidding Forms
- 19.3 If a Bid Security is specified pursuant to ITB 19.1, the Bid Security shall be a demand guarantee in any of the following forms at the Bidder's option

- (a) an unconditional bank guarantee issued by a Nationalized or 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 issued by a Nationalized or Scheduled bank located in India
- (d) another security **specified in the BDS**

In the case of a bank guarantee, the Bid Security shall be submitted using the Bid Security Form included in 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

- 19.4 If a Bid Security or Bid Securing Declaration is specified pursuant to ITB 19.1, any Bid not accompanied by a substantially responsive Bid Security or Bid Securing Declaration shall be rejected by the Employer as non-responsive.
- 19.5 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 the Performance Security and if required in the BDS, the Environmental and Social (ES) Performance Security pursuant to ITB 48.
- 19.6 The Bid Security of the successful Bidder shall be returned as promptly as possible once the successful Bidder has signed the Contract and furnished the required Performance Security and if required in the BDS, the Environmental and Social (ES) Performance Security.
- 19.7 The Bid Security may be forfeited or the Bid-Securing Declaration executed
 - (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; 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 47; or
 - (ii) furnish a Performance Security and if required in the BDS, the Environmental and Social (ES) Performance Security in accordance with ITB 48.

19.8 The Bid Security or the Bid-Securing Declaration of a JV shall be in the name of the JV that submits the Bid. If the JVh as not been constituted into a legally enforceable JV, at the time of Bidding, the Bid Security or the Bid-Securing Declaration 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

19.9 If a Bid Security is not required in the BDS, pursuant to ITB 19.1, and:

- (a) if a Bidder withdraws its Bid during the period of Bid validity specified by the Bidder in the Letters of Bid or any extended date provided by the Bidder; or
- (b) if the successful Bidder fails to: sign the Contract in accordance with ITB 47; or furnish a Performance Security and if required in the BDS, the Environmental and Social (ES) Performance Security in accordance with ITB 48;

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

20. Format and Signing of Bid

20.1 The Bidder shall prepare one original of the documents comprising the Bid as described in ITB 11 and clearly mark it "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 Bidders shall mark as "CONFIDENTIAL" information in their Bids which is confidential to their business.

- 20.3 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.
- 20.4 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.
- 20.5 Any 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 The Bidder shall deliver the Bid in a single, sealed envelope (one-envelope Bidding process). Within the single envelope the Bidder shall place the following separate, sealed envelopes:
- (a) in an envelope marked "ORIGINAL", all documents comprising the Bid, as described in ITB 11; and
 - (b) in an envelope marked "COPIES", all required copies of the Bid; and
 - (c) if alternative Bids are permitted in accordance with ITB 13, and if relevant:
 - (i) in an envelope marked "ORIGINAL - ALTERNATIVE BID", the alternative Bid; and
 - (ii) in the enveloped marked "COPIES – ALTERNATIVE BID" all required copies of the alternative Bid
- 21.2 The inner and outer envelopes shall:
- (a) bear the name and address of the Bidder ;
 - (b) be addressed to the Employer in accordance with ITB 22.1 ;
 - (c) bear the specific identification of this Bidding process specified in accordance with BDS 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 **specified in the BDS**. When so specified **in the BDS**, Bidders shall have the option of submitting their Bids electronically. Bidders submitting Bids electronically 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 20.3, (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
 - (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 19.7.

25. Bid Opening

- 25.1 Except in the cases specified in ITB 23 and ITB 24.2, the Employer shall publicly open and read out in accordance with this ITB, 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. All Bidders, or their representatives and any interested party may attend a public opening. Any specific electronic Bid opening procedures required if electronic bidding is permitted in accordance with ITB 22.1, 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.
- 25.3 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.
- 25.4 Next, 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.

- 25.5 Next, all remaining 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; or Bid Securing Declaration, if required; and any other details as the Employer may consider appropriate.
- 25.6 Only Bids, alternative Bids, modifications and discounts that are opened and read out at Bid opening shall be considered further for evaluation. The Letter of Bid and the priced Schedules are to be initialed by representatives of the Employer attending Bid opening in the manner **specified in the BDS**.
- 25.7 The Employer shall neither discuss the merits of any Bid nor reject any Bid (except for late Bids, in accordance with ITB 23.1).
- 25.8 The Employer shall prepare a record of the Bid opening that shall include, as a minimum :
- (a) the name of the Bidder and whether there is a withdrawal, substitution, or modification ;
 - (b) the Bid Price, per lot (contract) if applicable, including any discounts ;
 - (c) the presence or absence of a Bid Security, if one was required; and
 - (d) any alternative Bids
- 25.9 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

26. Confidentiality

- 26.1 Information relating to the evaluation of Bids and recommendation of contract award, shall not be disclosed to Bidders or any other persons not officially concerned with the Bidding process until information on Intention to Award the Contract is transmitted to all Bidders in accordance with ITB 43. In cases where ITB 43 is not applicable, such information shall not be disclosed until Notification of Award is transmitted in accordance with ITB 45.

- 26.2 Any effort 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.
- 26.3 Notwithstanding ITB 26.2, from the time of Bid opening to the time of Contract award, if a Bidder wishes to contact the Employer on any matter related to the Bidding process, it shall do so in writing.
- 27. Clarification of bids**
- 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 a 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 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 ITB11.
- 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) (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, in particular, to confirm that all requirements of Section VII, Works' Requirements have been met without any material deviation, reservation or omission.

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. Nonmaterial Non conformities

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

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.

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 nonconforming item or component in the manner **specified in the BDS..**

**31. Correction of
Arithmetical Errors**

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

- (a) only for admeasurements 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.

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 19.7

**32. Conversion to Single
Currency**

32.1 Not Used

33. Margin of Preference

33.1 Not applicable

34. Subcontractors

34.1 Unless otherwise **stated in the BDS**, the Employer does not intend to execute any specific elements of the Works by subcontractors selected in advance by the Employer.

34.2 The subcontractor's qualifications shall not be used by the Bidder to qualify for the Works unless their specialized parts of the Works were previously designated by the Employer **in the BDS** as can be met by subcontractors referred to hereafter as 'Specialized Subcontractors', in which case, the qualifications of the Specialized Subcontractors proposed by the Bidder may be added to the qualifications.

34.3 Bidders may propose subcontracting up to 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. Evaluation of Bids

- 35.1 The Employer shall use the criteria and methodologies listed in this ITB and Section III, Evaluation and Qualification criteria. No other evaluation criteria or methodologies shall be permitted. By applying the criteria and methodologies the Employer shall determine the Most Advantageous Bid. This is the Bid of the Bidder that meets the Qualification Criteria and whose Bid has been determined to be:
- (a) substantially responsive to the bidding document; and
 - (b) the lowest evaluated cost
- 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 for admeasurements contracts ; but including Daywork⁴ 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; and
 - (f) the additional evaluation factors are 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), the methodology to determine the lowest evaluated cost of the contract combinations, including any discounts offered in the Letter of Bid, is specified in Section III, Evaluation and Qualification Criteria

⁴ Daywork is work carried out following instructions of the Project Manager and paid for on the basis of time spent by workers, and the use of materials and the Contractor's equipment, at the rates quoted in the Bid. For Daywork to be priced competitively for Bid evaluation purposes, the Employer must list tentative quantities for individual items to be costed against Daywork (e.g., a specific number of tractor driver staff-days, or a specific tonnage of Portland cement), to be multiplied by the Bidders' quoted rates and included in the total Bid price.

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| 36. Comparison of Bids | 36.1 The Employer shall compare the evaluated costs of all substantially responsive Bids established in accordance with ITB 35.2 to determine the Bid that has the lowest evaluated cost |
| 37. Abnormally Low Bids | <p>37.1 An Abnormally Low Bid is one where the Bid price, in combination with other constituent elements of the Bid, appears unreasonably low to the extent that the Bid price raises material concerns as to the capability of the Bidder to perform the Contract for the offered Bid price.</p> <p>37.2 In the event of identification of a potentially Abnormally Low Bid, the Employer, unless otherwise specified in the BDS, shall seek written clarifications from the Bidder, including detailed price analyses of its Bid price in relation to the subject matter of the contract, scope, proposed methodology, schedule, allocation of risks and responsibilities and any other requirements of the bidding document.</p> <p>37.3 After evaluation of the price analyses, in the event that the Employer determines that the Bidder has failed to demonstrate its capability to perform the Contract for the offered Bid Price, the Employer shall reject the Bid.</p> |
| 38. Unbalanced or Front Loaded Bids | <p>38.1 If the Bid for an admeasurement contract, which results in the lowest evaluated cost, in the Employer's opinion, seriously unbalanced or, front-loaded, the Employer may require the Bidder to provide written clarifications. Clarifications may include detailed price analyses (with breakdown of unit rates) to demonstrate the consistency of the Bid prices with the scope of works, proposed methodology, schedule and any other requirements of the bidding document</p> <p>38.2 After the evaluation of the information and detailed price analysis presented by the Bidder, the Employer may as appropriate.</p> <ul style="list-style-type: none"> (a) accept the Bid without any additional Performance Security; or (b) require that the amount of the Performance Security be increased at the expense of the Bidder to a level not exceeding twenty percent (20%) of the Contract Price to protect the Employer against financial loss in the event of default of the successful Bidder under the Contract; or (c) reject the Bid if the risk cannot be mitigated through additional performance security |
| 39. Qualification of the Bidder | 39.1 The Employer shall determine to its satisfaction whether the eligible Bidder that is selected as having submitted the lowest evaluated cost and substantially responsive Bid meets the qualifying criteria specified in Section III, Evaluation and Qualification Criteria. |

	39.2	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. 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.
	39.3	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 substantially responsive Bid which offers the next lowest evaluated cost to make a similar determination of that Bidder's qualifications to perform satisfactorily.
40. Most Advantageous Bid	40.1	Having compared the evaluated costs of Bids, the Employer shall determine the Most Advantageous Bid. The Most Advantageous Bid is the Bid of the Bidder that meets the Qualification Criteria and whose Bid has been determined to be: <ul style="list-style-type: none"> (a) substantially responsive to the bidding document; and (b) the lowest evaluated cost.
41. Employer's Right to Accept Any Bid, and to Reject Any or All Bids	41.1	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.
42. Standstill Period	42.1	Standstill Period shall not apply.
43. Notice of Intention to Award	43.1	Not Used
F. Award of Contract		
44. Award Criteria	44.1	Subject to ITB 41, the Employer shall award the Contract to the successful Bidder. This is the Bidder whose Bid has been determined to be the Most Advantageous Bid as specified in ITB 40..

- 45. Notification of Award**
- 45.1 Prior to the expiration of the Bid Validity Period, the Employer shall transmit the Letter of Acceptance to the successful Bidder. The Letter of Acceptance shall specify the sum that the Employer will pay the Contractor in consideration of the execution of the contract (hereinafter and in the Conditions of Contract and Contract Forms called "the Contract Price")
- 45.2 Within ten (10) Business Days after the date of transmission of the Letter of Acceptance, the Employer shall publish the Contract Award Notice which shall contain, at a minimum, the following information :
- (a) name and address of the Employer ;
 - (b) name and reference number of the contract being awarded, and the selection method used ;
 - (c) names of all Bidders that submitted Bids, and their Bid prices as read out at Bid opening, and as evaluated ;
 - (d) names of all Bidders whose Bids were rejected either as nonresponsive or as not meeting qualification criteria, or were not evaluated, with the reasons there for; and
 - (e) the name of the successful Bidder, the final total contract price, the contract duration and a summary of its scope
- 45.3 The Contract Award Notice shall be published on a National website (Gol website <http://tenders.gov.in> or Gol Central Public Procurement Portal <https://eprocure.gov.in/cppp/>) or on the Employer's website.
- 45.6 Until a formal contract is prepared and executed, the notification of award shall constitute a binding Contract
- 46. Debriefing by the Employer**
- 46.1 Not used
- 47. Signing of Contract**
- 47.1 Promptly upon Notification of Award, the Employer shall prepare the Contract Agreement, and keep it 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. The Contract Agreement shall incorporate all agreements between the Employer and the successful Bidder.

- 47.2 Within twenty-one (21) days of receipt of the Letter of Acceptance, the successful Bidder shall (a) furnish the performance security and if required in the BDS, the Environmental and Social (ES) Performance Security in accordance with ITB Clause 48, and revised construction methodology; (b) 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 along with the bid; and (c) shall sign, date and return the Agreement to the Employer along with the documents stated at (a) and (b) above.

48. Performance Security

- 48.1 Within twenty-one (21) days of the receipt of the Letter of Acceptance from the Employer, the successful Bidder shall furnish the Performance Security and if required in the BDS, the Environmental and Social (ES) Performance Security in accordance with the General Conditions of Contract, subject to ITB 38.2 (b), using for that purpose the Performance Security and ES Performance Security Forms included in Section X, Contract Forms. The performance security and if required in the BDS, the Environmental and Social (ES) Performance Security of a Joint Venture shall be in the name of the Joint Venture specifying the names of all members.
- 48.2 Failure of the successful Bidder to submit the above-mentioned Performance Security and if required in the BDS, the Environmental and Social (ES) 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 Bidder offering the next Most Advantageous Bid
- 48.3 Upon the successful Bidder's signing the Agreement and furnishing of the Performance Security and if required in the BDS, the Environmental and Social (ES) Performance Security pursuant to ITB Clause 48.1, 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 19.5 and 19.6..

49. Adjudicator

- 49.1 The Employer proposes the person **named in the BDS** to be appointed as Adjudicator under the Contract, at the daily fee **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 his Bid. 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 Particular Conditions of Contract (PCC) pursuant to Clause 23.1 of the General Conditions of Contract (GCC), to appoint the Adjudicator..

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.

ITB Reference	A. General
ITB 1.1	<p>The number of the Request for Bids is: One</p> <p>The Employer is: Er. R. Thiruvettaisellam, M.Tech. MBA. Superintending Engineer, WRD, Middle Cauvery Basin Circle, Tiruchirapalli – 620 020, Trichirapalli District, Tamil Nadu</p> <p>The reference number of the Request for Bids (RFB) is: Package No. 02 / TN IAMP / WRD / NKR / OFD Works / Phase - II / 2022 -23.</p> <p>The name of the RFB is : On Farm Development (OFD) works for the work of Rehabilitation and Modernisation of Pullambady Main Canal, 5 Tanks and 1 Anicut in Lalgudy Block and Taluk, 5 Tanks and Pullambady Main Canal Distributory No.1,2,3 in Pullambady Block of Lalgudy Taluk in Trichy District and 19 Tanks in Thirumanur Block of Ariyalur Taluk and District in Nandhiyar and Kulaiyar Sub Basin.</p> <p>The number and identification of lots (contracts) comprising this RFB is: <u>Not Applicable</u></p>
ITB 2.1	<p>The Borrower is: Government of India. The sub-Borrower is Government of Tamilnadu</p> <p>Loan or Financing Agreement amount: 318 Million US\$</p> <p>The name of the Project is: Tamil Nadu Irrigated Agriculture Modernisation Project</p>
ITB 4.1	<p><i>(State here whether Joint Ventures are acceptable or not)</i> Bids from Joint ventures are not acceptable..</p>
ITB 4.5	<p>A list of debarred firms and individuals is available on the Bank's external website: http://www.worldbank.org/debarr.</p>
ITB 4.7	<p>Deleted (unless the Employer has previously used bid securing declaration as bid security).</p>

B. Contents of Bidding Document	
ITB 7.1	<p>For Clarification of Bid purposes only, the Employer's address is: Attention: The Superintending Engineer, WRD, Middle Cauvery Basin Circle Address: Subramaniyapuram, Pudukkottai Road Floor/ Room number: Second Floor City: Tiruchirapalli PIN Code: 620 020 Country: : INDIA Telephone: +91 - 0431 - 2331860 Facsimile number: +91 0431 - 2333598 Electronic mail address: semcbctry@gmail.com</p>
ITB 7.1	Requests for clarification should be received by the Employer no later than: 14 days prior to the deadline for submission of bids
ITB 7.1	Web page: www.tenders.tn.gov.in
ITB 7.4	<p>A Pre-Bid meeting Shall take place. Details of Date, time and place : Date & Time : 04.07.2022 @ 11.00 AM Place: O/o The Superintending Engineer, WRD, Middle Cauvery Basin Circle, Subramaniyapuram, Pudukkottai Road, Tiruchirapalli – 620020. A site visit shall not be organized by the Employer.</p>
C. Preparation of Bids	
ITB 11.1 (b)	<p>The following schedules shall be submitted with the bid:</p> <ol style="list-style-type: none"> 1. Letter of Bid 2. Priced Bill of Quantities 3. Technical Proposal – Method Statement 4. Technical Proposal – Mobilisation Schedule 5. Technical Proposal – Construction Schedule 6. Bid Security 7. Documentary Evidence establishing bidders qualification 8. Construction Methodology 9. Forms for Personnel 10. Forms of Equipment – PCC – GCC 9.1
ITB 13.1	Alternative Bids shall not be permitted.

ITB 13.2	Alternative times for completion shall not be permitted.
ITB 13.3	Not Applicable
ITB 13.4	Alternative technical solutions shall be permitted for the following parts of the Works: Not Applicable
ITB 14.2	The rates and prices (both in figures and words) for all the items of the Works described in the Bill of Quantities excluding GST along with sum of the quoted tender (bid) value excluding GST at the end (both in figures and words). Refer Attachment -1 to PCC
ITB 14.5	The prices quoted by the Bidder shall be subject to adjustment during the performance of the Contract. The adjustment of contract price, if provided, will be done in accordance with GCC Clause 49 and corresponding provisions under PCC and Appendix 2 to PCC.
ITB 14.7	All duties, taxes, and other levies except GST, payable by the contractor (bidder) under the contract. Refer Attachment -1 to PCC
ITB 18.1	The Bid validity period shall be 90 days.
ITB 18.3 (a)	The Bid price shall be adjusted by the following factor: Not Applicable
ITB 19.1	A Bid Security shall be required. A Bid-Securing Declaration shall be required The Bidder shall furnish a Bid Security in the amount of Rs. 2.855 Lakhs (Rupees Two Lakhs Eighty Five Thousand and Five Hundred only) (including GST 12%) Note: Bid Security is required for each lot as per amounts indicated against each lot. Bidders have the option of submitting one Bid Security for all lots (for the combined total amount of all lots) for which Bids have been submitted, However if the amount of Bid Security is less than the total required amount, the Employer will determine (based on lowest cost combination of bids) for which lot or lots the Bid Security amount shall be applied.
ITB 19.3 (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 provided it is pledged in favour of The Executive Engineer, WRD, River Conservancy Division, Trichy – 620 001, Tiruchirappalli District, Tamil Nadu (implementing agency) and such pledging has been noted and suitably endorsed by the bank issuing the certificate. Online cash transfer : None (if applicable, provide full details)
ITB 19.9	Deleted (unless the Employer proposes use of bid securing declaration as bid security).

ITB 20.1	In addition to the original of the Bid, the number of copies is: TWO
ITB 20.3	The written confirmation of authorization to sign on behalf of the Bidder shall consist of: <i>Legally valid Power of Attorney is required to demonstrate the authority of the signatory to sign the Bid</i>
D. Submission and Opening of Bids	
ITB 22.1	<p>For <u>Bid submission purposes</u> only, the Employer's address is: Er. R. Thiruvettaisellam, M.Tech., MBA., Superintending Engineer, WRD, Middle Cauvery Basin Circle, Tiruchirappalli – 620 020, Tiruchirappalli District, Tamil Nadu Street Address: Middle Cauvery Basin Circle, Subramaniyapuram, Pudukottai Road. Floor / Room number: Second Floor, City: Tiruchirappalli PIN / Postal Code: 620020 Country: INDIA</p> <p>The deadline for Bid submission is: Date : 19.07.2022 Time: 03.00 PM Electronic bidding is not permitted.</p>
ITB 25.1	<p>The Bid opening shall take place at: Office of the Superintending Engineer, WRD Street Address: Middle Cauvery Basin Circle, Subramaniyapuram, Pudukottai Road. Floor / Room number: Second Floor City: Tiruchirappalli PIN Code: 620020 Country: INDIA Date : 19.07.2022 Time: 03.30 PM</p>
ITB 25.6	The Letter of Bid and Schedules shall be initialled by Two numbers representatives of the Employer conducting Bid opening. Each Bid shall be initialled by Deputy Superintending Engineer and Head Draughting Officer representatives of the Employer and shall be numbered, any modification to the unit or total price shall be initialled by the Representative of the Employer, etc.

E. Evaluation and Comparison of Bids	
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 subcontractors selected in advance.
ITB 34.2	N/A
ITB 34.3	NOT APPLICABLE
ITB 37.2	Provisions related to Abnormally Low Bids do not apply
F. Award of Contract	
ITB 48.1 and 48.2	The successful Bidder shall also be required to submit an Environmental and Social (ES) Performance Security. Throughout this bidding document the term 'performance security', unless the context clearly indicates otherwise, means and includes both 'the performance security and the ES performance security' to be submitted by the successful bidder in the amounts specified in GCC/ PCC 54.
ITB 49	<p>The Adjudicator proposed by the Employer is: Er. M. Mohamed Salim Babu, B.E. Superintending Engineer, WRD (Retired) Special Project Circle, Vellor The daily fee for this proposed Adjudicator shall be: Rs.10,000. The biographical data of the proposed Adjudicator is as follows:</p> <p>Education : B.E. (Civil)</p> <p>Experience: 35 years experience in Procurement and Field execution of Project in Water Resources Department.</p> <p>Age : 60 Years</p> <p>Nationality : Indian</p> <p>Present Position : Retired as Superintending Engineer in Government of Tamil Nadu.</p>

Section III - Evaluation and Qualification Criteria

This section contains all the criteria that the Employer shall use to evaluate Bids and qualify Bidders through post-qualification. No other factors, methods or criteria shall be used other than specified in this bidding document. The Bidder shall provide all the information requested in the forms included in Section IV, Bidding Forms.

1. Margin of Preference – Not Applicable

2. Evaluation

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

2.1 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 Contractor's Environmental and Social, Health Management Strategies and Implementation Plans (ES-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 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***].

2.2 Multiple Contracts *Not Applicable*

2.3 Alternative Completion Times (ITB 13.2) – Not Applicable

2.4 Sustainable procurement (Section VII - Specifications) – Not Applicable

2.5 Alternative Technical Solutions for specified parts of Works (ITB 13.4) – Not Applicable

2.6 Specialized Sub contractors - Not Applicable

2.7 Other criteria (if permitted under ITB 35.2(f)):

3. Qualification Criteria

Eligibility and Qualification Criteria				Compliance Requirements			Documentation
No.	Subject	Requirement	Single Entity	Joint Venture (existing or intended) Where permitted			Submission Requirements
				All members Combined	Each Member	Atleast one Member	
1. Eligibility							
1.1	Nationality	Nationality in accordance with ITB 4.4	Must meet requirement	Not applicable	Not applicable	Not applicable	Forms ELI – 1.1 and 1.2, with attachments
1.2	Conflict of Interest	No conflicts of interest in accordance with ITB 4.2	Must meet requirement	Not applicable	Not applicable	Not applicable	Letter of Bid
1.3	Bank Eligibility	Not having been declared ineligible by the Bank, as described in ITB 4.5.	Must meet requirement	Not applicable	Not applicable	Not applicable	Letter of Bid
1.4	State-owned enterprise or institution of the Borrower country	Meets conditions of ITB 4.6	Must meet requirement	Not applicable	Not applicable	Not applicable	Forms ELI – 1.1 and 1.2, with attachments

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 4.8 and Section V.	Must meet requirement	Not applicable	Not applicable	Not applicable	Forms ELI – 1.1 and 1.2, with attachments
2. Historical Contract Non-Performance							
2.1	History of Non-Performing Contracts	Non-performance of a contract ¹ did not occur as a result of contractor default since 1 st January 2016.	Must meet requirement ¹ & ²	Not applicable	Not applicable	Not applicable	Form CON-2

¹ Nonperformance, as decided by the Employer, shall include all contracts where (a) nonperformance was not challenged by the contractor, including through referral to the dispute resolution mechanism under the respective contract, and (b) contracts that were so challenged but fully settled against the contractor. Nonperformance shall not include contracts where Employers decision was overruled by the dispute resolution mechanism. Nonperformance must be based on all information on fully settled disputes or litigation, i.e. dispute or litigation that has been resolved in accordance with the dispute resolution mechanism under the respective contract and where all appeal instances available to the Bidder have been exhausted.

2.2	Suspension Based on Execution of Bid/ Proposal Securing Declaration by the Employer or withdrawal of the Bid within Bid validity period	Not under suspension based on execution of a Bid/ Proposal Securing Declaration pursuant to ITB 4.7 or withdrawal of the Bid pursuant ITB 19.9	Must meet requirement	Not applicable	Not applicable	Not applicable	Letter of Bid
2.3	Pending Litigation	Bidder's financial position and prospective long term profitability sound according to criteria established in 3.1 below and assuming that all pending litigation will be resolved against the Bidder	Must meet requirement	Not applicable	Not applicable	Not applicable	Form CON – 2
2.4	Litigation History	No consistent history of court/arbitral award decisions against the Bidder ² since 1 st January 2016	Must meet requirement	Not applicable	Not applicable	Not applicable	Form CON – 2

²The 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.

2.5	Declaration: Environmental and Social (ES) past performance	Declare any civil work contracts that have been suspended or terminated and/or performance security called by an employer for reasons of breach of environmental, or social (including Sexual Exploitation, and Abuse) contractual obligations in the past five years ³ .	Must make the declaration. Where there are Specialized Sub-contractor/s, the Specialized Sub-contractor/s must also make the declaration.	Not applicable	Not applicable	Not applicable	Form CON-3 ES Performance Declaration
3. Financial Situation and Performance							
3.1	Financial Capabilities	(i) The Bidder shall demonstrate that it has access to, or has available, liquid assets, unencumbered real assets, lines of credit ⁴ , and other financial means (independent of any contractual advance payment) sufficient to meet the construction cash flow requirements estimated as Rs. 35.66 Lakhs (<i>about 3 months cash flow at peak construction period</i>) for the subject contract(s) net of the Bidder's other commitments	Must meet requirement	Not applicable	Not applicable	Not applicable	Form FIN – 3.1, with attachments

³The Employer may use this information to seek further information or clarifications in carrying out its due diligence.

⁴In case the bidder submits a letter of intent from a commercial bank with the bid, firm commitment from the bank to provide line of credit shall be required before contract signing.

		(ii) 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 commitments.	Must meet requirement	Not applicable	Not applicable	Not applicable	
		(iii) 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 five years shall be submitted and must demonstrate the current soundness of the Bidder's financial position and indicate its prospective long-term profitability..	Must meet requirement	Not applicable	Not applicable	Not applicable	
Note: The construction cash flow requirement should be for a number of months determined as the total time needed to pay contractor invoice by the employer. The cash flow should not normally exceed 3 months peak contract requirements and availability should be certified by Bank (Nationalized or Scheduled Bank In India) in Fin 3.3							
3.2	Average Annual Construction Turnover	Minimum average annual construction turnover of Rs. 285.28 Lakhs calculated as total certified payments received for contracts in progress and/or completed within the last five financial years, divided by five	Must meet requirement	Not applicable	Not applicable	Not applicable	Form FIN – 3.2
Note: The amount stated should normally not be less than twice the estimated annual turnover or cash flow in the proposed Works contract (based on a straight-line projection of the Employer's estimated cost, over the contract duration).							

4. Experience							
4.1 (a)	General Construction Experience	Experience under construction contracts Irrigation Structures (indicate details of acceptable similar works) in the role of prime contractor, JV member, subcontractor, or management contractor for at least the last five years, starting 1 st January 2016	Must meet requirement	Not applicable	Not applicable	Not applicable	Form EXP – 4.1
4.2 (a)	Specific Construction & Contract Management Experience	(i) A minimum number of One similar contracts specified below that have been satisfactorily and substantially ⁵ completed as a prime contractor, joint venture member ⁶ , management contractor or sub-contractor ⁷ between 1 st January 2016 and bid submission deadline: (i) One contracts each of minimum value Rs.114.11 Lakhs	Must meet requirement	Not applicable	Not applicable	Not applicable	Form EXP 4.2(a)

⁵ Substantial completion shall be based on 80% or more works completed under the contract.

⁶ For contracts under which the Bidder participated as a joint venture member or sub-contractor, only the Bidder's share, by value, shall be considered to meet this requirement.

⁷ For contracts under which the Bidder participated as a joint venture member or sub-contractor, only the Bidder's share, by value, shall be considered to meet this requirement

4.2 (b)		For the above and any other contracts as prime contractor, joint venture member, or subcontractor between 1st January 2016 and Application submission deadline, a minimum construction experience in the following key activities successfully completed ⁸ : <i>(a) Cement concrete works in foundations, retaining walls, barrel slab, etc – 1030 cum in one year</i> <i>(b) Earth work excavation for foundation and tank bunds – 1520 cum in one year⁹</i>	Must meet requirements	Not applicable	Not applicable	Not applicable	Form EXP – 4.2 (b)
4.2 (c)	Specific Experience in managing ES aspects	For the contracts in 4.2 (a) above and/or any other contracts as prime contractor, joint venture member, or Subcontractor between 1st January 2016 and Application submission deadline, experience in managing	Must meet requirements	Not applicable	Not applicable	Not applicable	Form EXP – 4.2 (c)

⁸ Volume, number or rate of production of any key activity can be demonstrated in one or more contracts combined if executed during same time period.

⁹ The minimum experience requirement for multiple contracts will be the sum of the minimum requirements for respective individual contracts, unless specified.

NOTE: List the monthly or annual production rate for the key construction activity (or activities) in the proposed contract or works, e.g., “one million M³ of rock placed in rock fill dams in one year; X tons of asphalt concrete per month placed in road paving; Y M³ of concrete placed in etc.” The rates should be a percentage (say about 80 percent) of the estimated production rate of the key activity (or activities) in the contract or Works as needed to meet the expected construction schedule with due allowance for adverse climatic conditions.

Borrower should fill this after careful review of the requirements for the work. Where the elements of work are specialized, and it is proposed to accept employment of specialist sub-contractors, this could be so specified for that activity and bidders may be requested to name the sub-contractors and furnish their qualification and experience.

4.2 (c)	<p>Bid Capacity:</p> <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*1.5-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 up to 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: 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.</p> <p>Note: 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.</p>
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Note: In case bids are being invited simultaneously for multiple packages (under separate IFB and Bid Documents), the Employer reserves the right to assess cumulative qualification of the bidders participating in multiple packages.

4. Key Personnel

The Bidder must demonstrate that it will have suitably qualified (and in adequate numbers) minimum Key Personnel, as described in the Table below, that are required to perform the Contract.

The Bidder shall provide details of the Key Personnel and such other Key Personnel that the Bidder considers appropriate, together with their academic qualifications and work experience. The Bidder shall complete the relevant Forms in Section IV, Bidding Forms.

The Contractor shall require the Employer's consent to substitute or replace the Key Personnel (reference the Particular Conditions of Contract 9.1).

Key Personnel

Item No.	Position/ specialization	Relevant academic qualifications	Minimum years of relevant work experience
	Contractor's Representative		
1	Site Engineer	B.E. (Civil) - 2 Nos.	3 Years
2	Site Supervisor	DCE – 6 Nos.	3 Years
<u>Suitable experts in the following specializations</u>			
3	Environment, Health and Safety Officer	B.E. in Civil Engineering / Environmental Engineering	1 Year in similar work environment and Occupational Health and Safety (OHS)
4	Social Development Officer	B.Sc. / B.A. (Social Science, Social work, humanities)	Two Years of monitoring and managing social risks related to labor, GBV/ SEA

The Bidder must not have in his employment:

- [i] the near relations (defined as first blood relations, and their spouses, of the bidder or the bidder's spouse) of persons of the following Government Departments.

WATER RESOURCES DEPARTMENT

- [ii] without Government permission, any person who retired as gazetted officer within the last two years.

5. Equipment

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

<i>Sl. No.</i>	Equipment Type and Characteristics		Minimum Number required
1	Hydraulic Excavator	-	3 Nos.
2	Vibrator	-	4 Nos.
3	Tipper / Lorry	-	5 Nos.
4	Water Lorry	-	4 Nos.
5	Concrete Mixer Machine	-	8 Nos.

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 this Letter of Bid on stationery with its letterhead clearly showing the Bidder's complete name and business address.

Note: All italicized text is to help Bidders in preparing this form.

Date of this Bid submission : 02.02.2022

RFB No.: Package No. 02 / TN IAMP / WRD / NKR / OFD Works / Phase - II / 2022 -23.

Alternative No¹: *[insert identification No. if this is a Bid for an alternative]*

To:

Er. R. Thiruvettasellam, M.Tech., MBA.,
Superintending Engineer, WRD,
Middle Cauvery Basin Circle,
Subramaniyapuram, Pudukkottai Road,
Tiruchirapalli – 620 020 ,
Tiruchirapalli District,
Tamil Nadu

- (a) **No reservations:** We have examined and have no reservations to the bidding document, including Addenda issued in accordance with ITB 8;
- (b) **Eligibility:** We meet the eligibility requirements and have no conflict of interest in accordance with ITB 4;
- (c) **Bid-Securing Declaration:** We have not been suspended nor declared ineligible by the Employer based on execution of a Bid-Securing Declaration or Proposal-Securing Declaration in the Employer's Country in accordance with ITB 4.7
- (d) **Conformity:** We offer to execute in conformity with the bidding document the following Works: **On Farm Development (OFD) works for the work of Rehabilitation and Modernisation of Pullambady Main Canal, 5 Tanks and 1 Anicut in Lalgudy Block and Taluk, 5 Tanks and Pullambady Main Canal Distributory No.1,2,3 in Pullambady Block of Lalgudy Taluk in Trichy District and 19 Tanks in Thirumanur Block of Ariyalur Taluk and District in Nandhiyaru and Kulaiyaru Sub Basin (Package No. 02 / TN IAMP / WRD / NKR / OFD Works / Phase - II / 2022 -23)**
- (e) **(Bid Price:** The total price of our Bid, excluding any discounts offered in item (e) below is: *[Insert one of the options below as appropriate]*
[Option 1, in case of one lot:] Total price is: *[insert the total price of the Bid in Rs. in words and figures];*

Or

[Option 2, in case of multiple lots:] (a) Total price of each lot *[insert the total price of each lot in Rs. in words and figures];* and (b) Total price of all lots (sum of all lots) *[insert the total price in Rs. of all lots in words and figures];*

¹ Delete if not applicable

(f) **Discounts:** 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];*

(g) **Bid Validity Period:** Our Bid shall be valid for a period specified in BDS ITB 18.1 (or as amended if applicable) from the date fixed for the Bid submission deadline specified in BDS 22.1 (or as amended if applicable), and it shall remain binding upon us and may be accepted at any time before the expiration of that period;

(h) **Performance Security:** If our Bid is accepted, we commit to obtain a performance security including *an Environmental and Social (ES) Performance Security*, in accordance with the bidding document;

(i) **One Bid Per Bidder:** We are not submitting any other Bid(s) as an individual Bidder or as a subcontractor, and we are not participating in any other Bid(s) as a Joint Venture member, and meet the requirements of ITB 4.3, other than alternative Bids submitted in accordance with ITB 13;

(j) **Suspension and Debarment:** We, along with any of our subcontractors, suppliers, consultants, manufacturers, or service providers for any part of the contract, are not subject to, and not controlled by any entity or individual that is subject to, a temporary suspension or a debarment imposed by the World Bank Group or a debarment imposed by the World Bank Group in accordance with the Agreement for Mutual Enforcement of Debarment Decisions between the World Bank and other development banks. Further, we are not ineligible under the Employer's Country laws or official regulations or pursuant to a decision of the United Nations Security Council;

(k) **State-owned enterprise or institution:** We are not a state-owned enterprise or institution/ We are a state-owned enterprise or institution but meet the requirements of ITB 4.6²;

(l) **Commissions, gratuities and fees:** We have paid, or will pay the following commissions, gratuities, or fees with respect to the Bidding process or execution of the Contract: *[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

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

²Use one of the two options as appropriate

- (m) **Binding Contract:** We understand that this Bid, together with your written acceptance thereof included in your Letter of Acceptance, shall constitute a binding contract between us, until a formal contract is prepared and executed;
- (n) **Not Bound to Accept:** We understand that you are not bound to accept the lowest evaluated cost Bid, the Most Advantageous Bid or any other Bid that you may receive; and
- (o) **Fraud and Corruption:** We hereby certify that we have taken steps to ensure that no person acting for us or on our behalf engages in any type of Fraud and Corruption; and
- (p) **Adjudicator:** We accept the appointment of *[insert name proposed in Bid Data Sheet]* as the Adjudicator.

[or]

We do not accept the appointment of *[insert name proposed in Bid Data Sheet]* as the Adjudicator, and propose instead that *[insert name]* be appointed³ as Adjudicator, whose daily fees and biographical data are attached.

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

³ In case appointment of Adjudicator was proposed from the list provided by an Institution in ITB 49, the replacement should also be proposed from the list of same institution.

Schedules

Bill of Quantities

Objectives

The objectives of the Bill of Quantities are:

- (a) to provide sufficient information on the quantities of Works to be performed to enable bids to be prepared efficiently and accurately; and*
- (b) when a Contract has been entered into, to provide a priced Bill of Quantities for use in the periodic measurement and valuation of Works executed.*

In order to attain these objectives, Works should be itemized in the Bill of Quantities in sufficient detail to distinguish between the different classes of Works, or between Works of the same nature carried out in different locations or in other circumstances which may give rise to different considerations of cost. Consistent with these requirements, the layout and contents of the Bill of Quantities should be as simple and brief as possible.

Daywork Schedule

A Daywork Schedule should be included only if the probability of unforeseen work, outside the items included in the Bill of Quantities, is high. To facilitate checking by the Employer of the realism of rates quoted by the bidders, the Daywork Schedule should normally comprise the following:

- (a) A list of the various classes of labor, materials, and Constructional Plant for which basic daywork rates or prices are to be inserted by the Bidder, together with a statement of the conditions under which the Contractor shall be paid for work executed on a daywork basis.*
- (b) Nominal quantities for each item of daywork, to be priced by each Bidder at daywork rates as Bid. The rate to be entered by the Bidder against each basic daywork item should include the Contractor's profit, overheads, supervision, and other charges.*

Provisional Sums

A general provision for physical contingencies (quantity overruns) may be made by including a provisional sum in the Summary Bill of Quantities. Similarly, a contingency allowance for possible price increases should be provided as a provisional sum in the Summary priced Bill of Quantities. Additional provisional sums for environmental or social (including Sexual Exploitation, sexual abuse and sexual harassment) requirements may also be added, if required. The inclusion of such provisional sums often facilitates budgetary approval by avoiding the need to request periodic supplementary approvals as the future need arises. Where such provisional sums or contingency allowances are used, the Particular Conditions of Contract should state the manner in which they shall be used, and under whose authority (usually the Project Manager's).

The estimated cost of specialized work to be carried out, or of special goods to be supplied, by other contractors should be indicated in the relevant part of the Bill of Quantities as a particular provisional sum with an appropriate brief description. A separate procurement procedure is normally carried out by the Employer to select such specialized contractors. To provide an element of competition among the Bidders in respect of any facilities, amenities, attendance, etc., to be provided by the successful Bidder as prime Contractor for the use and convenience of the specialist contractors, each related provisional sum should be followed by an item in the Bill of Quantities inviting the Bidder to quote a sum for such amenities, facilities, attendance, etc.

These Notes for Preparing a Bill of Quantities are intended only as information for the Employer or the person drafting the bidding document. They should not be included in the final bidding document.

Preamble : The Conditions of Contract, the specifications and the Drawings are to be read in conjunction with the Bill of Quantities. The cost of complying with all conditions, obligations and liabilities described in the Conditions of contract, Specifications and the Bill of Quantities including all over head charges and profit in carrying out the work as shown on the Drawings shall be deemed to be spread over the included in the prices of sums stated by the Employee in the Bill of Quantities unless separately measured. If the Employee fails to price any items in the Bill of quantities, then the cost of the work under such items shall be held to be spread over and included in the prices given against other items of work. The quantities set out in the Bill of Quantities are provisional and cover the approximate scope of the work anticipated to be performed by the Contractor. The actual quantities used for final measurement purposes will be determined by the Project Manager by measurement of the work completed by the Contractor.

BILL OF QUANTITIES						
Item No.	Description of item (with brief specification and reference to Book of specifications)	Unit	Quantity	Rate in		Amount
				In figures	In words	
1	HGS SS.20.B. Earth work excavating and depositing on bank with initial lead of 10 m & initial lift of 2m in Hard stiff clay, stiff black cotton, hard red earth, shales ,murrum, gravel, stoney earth and earth mixed with small size boulders etc. complete complying with standard specifications and as directed by the Departmental Engineers.	1 Cum (One Cubic Metre)	1899.87 Cum (One Thousand Eight Hundred and Ninety Nine point Eighty Seven cubic metre only)			
2	Providing and placing in position Plain Cement Concrete M10 grade with well graded aggregates and the nominal maximum size of coarse aggregate of size 40mm and down grade to IS specified grading mixing by Mixer machine (to produce concrete of the specified characteristic strength of 10 N/mm2 at 28 days) including dewatering the placement site laying compacting, finishing, watering and curing complete so as to attain the profile and strength specified in the drawing and specification for various heights above ground level as per technical specifications etc., complete etc Complete complying with standard specifications	1 Cum (One Cubic Metre)	363.60 Cum (Three Hundred and Sixty Three point Six Zero cubic metre only)			

3	<p>Providing and placing in position Plain cement concrete M 15 grade with well graded aggregates and the nominal maximum size of coarse aggregate of 20mm weight batching the ingrediance and mixing in approved mixers for batching plant to produce down grade (to produce concrete of the specified characteristic strength of 15 N/MM2 at 28 days) including dewatering the placement site by bailing for pumping wherever necessary laying the concrete in layers and in the bays vibrating compacting, finishing and curing complete. etc Complete complying with standard specification including shuttering wherever necessary for various depths below ground level and various heights above ground level using MS sheets of size 90 x 60 cm and BG 10 gauge stiffened with MS Angles of size 25 x 25 x 2 mm laid over silver oak joist of size 10 x 6.5 cm, spaced at 90cm C/C and supported by casurina props of size 10 to 13 cmdia, spaced at 75 cm C/C etc as per the direction of the Engineer complete in all respect but excluding the cost and placing of reinforced grill in position etc, complete as directed by the Engineer in charge of works and as per the technical specifications</p>	1 Cum (One Cubic Metre)	921.97 Cum (Nine Hundred and Twenty One point Nine Seven cubic metre only)			
4	<p>Supplying and fixing of gauge plate for the water depth measured by the use of steel gauges as per the direction of the Engineer complete in all respect but excluding the cost of gst etc, complete as directed by the Engineer in charge of works and as per the technical specifications</p>	1 No. (One Number)	50 Nos. (Fifty numbers only)			
	(Six items only)				Total	
					GST 12%	
				Total (Rs. In figures)		
	Total (Rs. In words)					

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 45.4).*
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. *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).*

Forms of Bid Security

Form of Bid Security - Bank Guarantee

[Guarantor letterhead or SWIFT identifier code]

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

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

WHEREAS, _____ *[name of Bidder]*¹ (hereinafter called "the Applicant") has submitted his Bid dated _____ *[date]* or will submit his Bid for the construction of **On Farm Development (OFD) works for the work of Rehabilitation and Modernisation of Pullambady Main Canal, 5 Tanks and 1 Anicut in Lalgudy Block and Taluk, 5 Tanks and Pullambady Main Canal Distributory No.1,2,3 in Pullambady Block of Lalgudy Taluk in Trichy District and 19 Tanks in Thirumanur Block of Ariyalur Taluk and District in Nandhiyaru and Kulaiyaru Sub Basin.** *[name of Contract]* (hereinafter called "the Bid") under Request for Bids No. **02 / TN IAMP / WRD / NKR / OFD Works / Phase - II / 2022 -23.** *insert number* (hereinafter called "the RFB")

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 Er. R. Thiruvettaisellam, M.Tech., MBA., **Superintending Engineer, WRD, Middle Cauvery Basin Circle, Tiruchirapalli – 620 020.** (hereinafter called "the Employer") in the sum of _____² 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 Applicant (a) withdraws his bid during the period of Bid validity specified in the Letter of Bid, or any extended date provided by the Applicant ("the Bid Validity Period"); or (b) does not accept the correction of the Bid Price pursuant to ITB 31;

¹Insert 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.

²The Applicant 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.

or

- (2) If the Applicant 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 and Social (ES) Performance Security, in accordance with the Instruction to Bidders.

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

This Guarantee will remain in force up to and including the date _____³ 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.

³45 days after the end of the validity period of the Bid.

Form of Bid-Securing Declaration

Date: *[insert date (as day, month and year)]*

RFB No.: *[insert number of Bidding process]*

Alternative No.: [insert identification No if this is a Bid for an alternative]

To: *[insert complete name of Employer]*

We, the undersigned, declare that:

We understand that, according to your conditions, bids must be supported by a Bid-Securing Declaration.

We accept that we will automatically be suspended from being eligible for bidding or submitting proposals in any contract with the Employer for the period of time of *[insert number of months or years]* starting on *[insert date]*, if we are in breach of our obligation(s) under the bid conditions, because we:

- (a) have not accepted the correction of the Bid Price pursuant to ITB 31; or
- (b) have withdrawn our Bid during the period of Bid validity specified in the Letter of Bid or any extended date provided by us; or
- (c) having been notified of the acceptance of our Bid by the Employer during the period of bid validity, (i) fail or refuse to execute the Contract, if required, or (ii) fail or refuse to furnish the Performance Security and, if required, the Environmental and Social (ES) Performance Security, in accordance with the ITB.

We understand this Bid-Securing Declaration shall expire if we are not the successful Bidder, upon the earlier of (i) our receipt of your notification to us of the name of the successful Bidder; or (ii) forty-five days after the expiration of our Bid.

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[*Note: In case of a Joint Venture, the Bid-Securing Declaration must be in the name of all members to the Joint Venture that submits the Bid.*]

Technical Proposal

Technical Proposal Forms

- **Key Personnel Schedule**
- **Equipment**
- **Site Organization**
- **Method Statement**
- **Mobilization Schedule**
- **Construction Schedule**
- **ES Management Strategies and Implementation Plans**
- **Code of Conduct for Contractor's Personnel (ES)**
- **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**
- **Bidder's Qualification**

Forms for Personnel

Form PER – 1: Key Personnel Schedule

Bidders should provide the names and details of the suitably qualified Key Personnel to perform the Contract. The data on their experience should be supplied using the Form PER-2 below for each candidate.

Key Personnel

1.	Title of position:	
	Name of candidate:	
	Duration of appointment:	<i>[insert the whole period (start and end dates) for which this position will be engaged]</i>
	Time commitment: for this position:	<i>[insert the number of days/week/months/ that has been scheduled for this position]</i>
	Expected time schedule for this position:	<i>[insert the expected time schedule for this position (e.g. attach high level Gantt chart)]</i>
2.	Title of position: <i>[Environmental Specialist]</i>	
	Name of candidate:	
	Duration of appointment:	<i>[insert the whole period (start and end dates) for which this position will be engaged]</i>
	Time commitment: for this position:	<i>[insert the number of days/week/months/ that has been scheduled for this position]</i>
	Expected time schedule for this position:	<i>[insert the expected time schedule for this position (e.g. attach high level Gantt chart)]</i>
3.	Title of position: <i>[Health and Safety Specialist]</i>	
	Name of candidate:	
	Duration of appointment:	<i>[insert the whole period (start and end dates) for which this position will be engaged]</i>
	Time commitment: for this position:	<i>[insert the number of days/week/months/ that has been scheduled for this position]</i>
	Expected time schedule for this position:	<i>[insert the expected time schedule for this position (e.g. attach high level Gantt chart)]</i>

4.	Title of position: <i>[Social Specialist]</i>	
	Name of candidate:	
	Duration of appointment:	<i>[insert the whole period (start and end dates) for which this position will be engaged]</i>
	Time commitment: for this position:	<i>[insert the number of days/week/months/ that has been scheduled for this position]</i>
	Expected time schedule for this position:	<i>[insert the expected time schedule for this position (e.g. attach high level Gantt chart]</i>
5.	Title of position: Sexual Exploitation, Abuse and Harassment Expert <i>[Where a Project SEA risks are assessed to be substantial or high, Key Personnel shall include an expert with relevant experience in addressing sexual exploitation, sexual abuse and sexual harassment cases]</i>	
	Name of candidate:	
	Duration of appointment:	<i>[insert the whole period (start and end dates) for which this position will be engaged]</i>
	Time commitment: for this position:	<i>[insert the number of days/week/months/ that has been scheduled for this position]</i>
	Expected time schedule for this position:	<i>[insert the expected time schedule for this position (e.g. attach high level Gantt chart]</i>
6.	Title of position:	
	Name of candidate	
	Duration of appointment:	<i>[insert the whole period (start and end dates) for which this position will be engaged]</i>
	Time commitment: for this position:	<i>[insert the number of days/week/months/ that has been scheduled for this position]</i>
	Expected time schedule for this position:	<i>[insert the expected time schedule for this position (e.g. attach high level Gantt chart]</i>

Form PER-2:
Resume and Declaration
Key Personnel

Name of Bidder

Position [#1]: <i>[title of position from Form PER-1]</i>		
Personnel information	Name:	Date of birth:
	Address:	E-mail:
	Professional qualifications:	
	Academic qualifications:	
	Language proficiency: <i>[language and levels of speaking, reading and writing skills]</i>	
details	Address of employer:	
	Telephone:	Contact (manager / personnel officer):
	Fax:	
	Job title:	Years with present employer:

Summarize professional experience in reverse chronological order. Indicate particular technical and managerial experience relevant to the project.

Project	Role	Duration of involvement [From - To]	Relevant experience
<i>[main project details]</i>	<i>[role and responsibilities on the project]</i>	<i>[time in role]</i>	<i>[describe the experience relevant to this position]</i>

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) result in my disqualification from participating in the Bid;
- (c) result in 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): _____

Forms 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). A separate Form shall be prepared for each item of equipment listed, or for alternative equipment proposed by the Bidder. The Bidder shall provide all the information requested below, to the extent possible. Fields with asterisk (*) shall be used for evaluation.

Type of Equipment*		
Equipment Information	Name of manufacturer,	Model and power rating
	Capacity*	Year of manufacture*
Current Status	Current location	
	Details of current commitments	
Source	Indicate source of the equipment <input type="checkbox"/> Owned <input type="checkbox"/> Rented <input type="checkbox"/> Leased <input type="checkbox"/> Specially manufactured	

The following information shall be provided only for equipment not owned by the Bidder.

Owner	Name of owner	
	Address of owner	
	Telephone	Contact name and title
	Fax	Telex
Agreements	Details of rental / lease / manufacture agreements specific to the project	

Site Organization

[insert Site Organization information]

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]

Mobilization Schedule

[insert Mobilization Schedule]

In accordance with the Particular Conditions, Sub-Clause 16.2, the Contractor shall not carry out mobilization to Site unless the Project manager gives consent that appropriate measures are in place to address environmental and social risks and impacts, which as a minimum shall include applying the Management Strategies and Implementation Plans (MSIPs) and Code of Conduct for Contractor's Personnel, submitted as part of the Bid and agreed as part of the Contract.

Construction Schedule

[insert Construction Schedule]

The construction schedule shall include the following key milestone - No-objection to the Code of Conduct for Contractor's Personnel and Contractor's MSIPs, which collectively form the C-ESMP, in accordance with the Particular Conditions of Contract Sub-Clause 16.2.

Environmental and Social, Health Management Strategies and Implementation Plans

(ES-MSIP)

The Bidder shall submit comprehensive and concise Environmental and Social Management Strategies and Implementation Plans (ES-MSIP) as required by ITB 11.1 (k) 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 ES provisions of the contract including those as may be more fully described in the Works Requirements in Section VII.(Chapter X- Environmental and Social Requirements).

Code of Conduct for Contractor's Personnel(ES) Form

Note to the Employer:

The following minimum requirements shall not be modified. The Employer may add additional requirements to address identified issues, informed by relevant environmental and social assessment.

The types of issues identified could include risks associated with: labour influx, spread of communicable diseases, and Sexual Exploitation and Abuse(SEA), Sexual Harassment (SH) etc.

Delete this Box prior to issuance of the bidding document.

CODE OF CONDUCT FOR CONTRACTOR'S PERSONNEL

We are the Contractor, [enter name of Contractor]. We have signed a contract with [enter name of Employer] for [enter description of the Works]. These Works will be carried out at [enter the Site and other locations where the Works will be carried out]. Our contract requires us to implement measures to address environmental and social risks related to the Works, including the risks of sexual exploitation, sexual abuse and sexual harassment.

This Code of Conduct is part of our measures to deal with environmental and social risks related to the Works. It applies to all our staff, laborers and other employees at the Works Site or other places where the Works are being carried out. It also applies to the personnel

Note to the Bidder:

The minimum content of the Code of Conduct form as set out by the Employer shall not be substantially modified. However, the Bidder may add requirements as appropriate, including to take into account Contract-specific issues/risks.

The Bidder shall initial and submit the Code of Conduct form as part of its bid.

of each subcontractor and any other personnel assisting us in the execution of the Works. All such persons are referred to as “**Contractor's Personnel**” and are subject to this Code of Conduct.

This Code of Conduct identifies the behavior that we require from all Contractor's Personnel.

Our workplace is an environment where unsafe, offensive, abusive or violent behavior will not be tolerated and where all persons should feel comfortable raising issues or concerns without fear of retaliation.

REQUIRED CONDUCT

Contractor's Personnel shall:

1. carry out his/her duties competently and diligently;
2. comply with this Code of Conduct and all applicable laws, regulations and other requirements, including requirements to protect the health, safety and well-being of other Contractor's Personnel and any other person;
3. maintain a safe working environment including by:
 - a. ensuring that workplaces, machinery, equipment and processes under each person's control are safe and without risk to health;
 - b. wearing required personal protective equipment;
 - c. using appropriate measures relating to chemical, physical and biological substances and agents; and
 - d. following applicable emergency operating procedures.
4. report work situations that he/she believes are not safe or healthy and remove himself/herself from a work situation which he/she reasonably believes presents an imminent and serious danger to his/her life or health;
5. treat other people with respect, and not discriminate against specific groups such as women, people with disabilities, migrant workers or children;
6. not engage in Sexual Harassment, which means unwelcome sexual advances, requests for sexual favors, and other verbal or physical conduct of a sexual nature with other Contractor's or Employer's Personnel;
7. not engage in Sexual Exploitation, which means any actual or attempted abuse of position of vulnerability, differential power or trust, for sexual purposes, including, but not limited to, profiting monetarily, socially or politically from the sexual exploitation of another;
8. not engage in Sexual Abuse, which means the actual or threatened physical intrusion of a sexual nature, whether by force or under unequal or coercive conditions;
9. not engage in any form of sexual activity with individuals under the age of 18, except in case of pre-existing marriage;
10. complete relevant training courses that will be provided related to the environmental and social aspects of the Contract, including on health and safety matters, and Sexual Exploitation, and Abuse (SEA) and Sexual Harassment (SH);
11. report violations of this Code of Conduct; and
12. not retaliate against any person who reports violations of this Code of Conduct, whether to us or the Employer, or who makes use of the grievance mechanism for Contractor's Personnel or the project's Grievance Redress Mechanism.

RAISING CONCERNS

If any person observes behavior that he/she believes may represent a violation of this Code of Conduct, or that otherwise concerns him/her, he/she should raise the issue promptly. This can be done in either of the following ways:

1. Contact [*enter name of the Contractor's Social Expert with relevant experience in handling gender-based violence, or if such person is not required under the Contract, another individual designated by the Contractor to handle these matters*] in writing at this address [] or by telephone at [] or in person at []; or
2. Call [] to reach the Contractor's hotline (*if any*) and leave a message.

The person's identity will be kept confidential, unless reporting of allegations is mandated by the country law. Anonymous complaints or allegations may also be submitted and will be given all due and appropriate consideration. We take seriously all reports of possible misconduct and will investigate and take appropriate action. We will provide warm referrals to service providers that may help support the person who experienced the alleged incident, as appropriate.

There will be no retaliation against any person who raises a concern in good faith about any behavior prohibited by this Code of Conduct. Such retaliation would be a violation of this Code of Conduct.

CONSEQUENCES OF VIOLATING THE CODE OF CONDUCT

Any violation of this Code of Conduct by Contractor's Personnel may result in serious consequences, up to and including termination and possible referral to legal authorities.

FOR CONTRACTOR'S PERSONNEL:

I have received a copy of this Code of Conduct written in a language that I comprehend. I understand that if I have any questions about this Code of Conduct, I can contact [*enter name of Contractor's contact person with relevant experience*] requesting an explanation.

Name of Contractor's Personnel: [insert name]

Signature: _____

Date: (day month year): _____

Countersignature of authorized representative of the Contractor:

Signature: _____

Date: (day month year): _____

ATTACHMENT 1: Behaviors constituting Sexual Exploitation and Abuse (SEA) and behaviors constituting Sexual Harassment (SH)

ATTACHMENT 1 TO THE CODE OF CONDUCT FORM
BEHAVIORS CONSTITUTING SEXUAL EXPLOITATION AND ABUSE (SEA) AND
BEHAVIORS CONSTITUTING SEXUAL HARASSMENT (SH)

The following non-exhaustive list is intended to illustrate types of prohibited behaviors:

(1) **Examples of sexual exploitation and abuse** include, but are not limited to:

- A Contractor's Personnel tells a member of the community that he/she can get them jobs related to the work site (e.g. cooking and cleaning) in exchange for sex.
- A Contractor's Personnel that is connecting electricity input to households says that he can connect women headed households to the grid in exchange for sex.
- A Contractor's Personnel rapes, or otherwise sexually assaults a member of the community.
- A Contractor's Personnel denies a person access to the Site unless he/she performs a sexual favor.
- A Contractor's Personnel tells a person applying for employment under the Contract that he/she will only hire him/her if he/she has sex with him/her.

(2) **Examples of sexual harassment in a work context**

- Contractor's Personnel comment on the appearance of another Contractor's Personnel (either positive or negative) and sexual desirability.
- When a Contractor's Personnel complains about comments made by another Contractor's Personnel on his/her appearance, the other Contractor's Personnel comment that he/she is "asking for it" because of how he/she dresses.
- Unwelcome touching of a Contractor's or Employer's Personnel by another Contractor's Personnel.
- A Contractor's Personnel tells another Contractor's Personnel that he/she will get him/her a salary raise, or promotion if he/she sends him/her naked photographs of himself/herself.

Others

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 proposed 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).

Others

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: _____
RFB No. and title: _____
Page _____ of _____ pages

Bidder's legal name
In case of Joint Venture (JV), legal name of each member: N/A
Bidder's actual or intended country of registration: <i>[indicate country of Constitution]</i>
Bidder's actual or intended year of incorporation:
Bidder's legal address [in country of registration]:
Bidder's authorized representative information Name: _____ Address: _____ Telephone/Fax numbers: _____ E-mail address: _____
1. Attached are copies of original documents of <input type="checkbox"/> Articles of Incorporation (or equivalent documents of constitution or association), and/or documents of registration of the legal entity named above, in accordance with ITB 4.4. <input type="checkbox"/> Authorization to represent the firm or JV named in above, in accordance with ITB 20. <input type="checkbox"/> In case of JV, letter of intent to form JV or JV agreement, in accordance with ITB 4.1. <input type="checkbox"/> In case of state-owned enterprise or institution, in accordance with ITB 4.6 documents establishing: <ul style="list-style-type: none">• Legal and financial autonomy• Operation under commercial law• Establishing that the Bidder is not under the supervision of the Employer
2. Included are the organizational chart, a list of Board of Directors, and the beneficial ownership.

Form ELI -1.2: Information Form for JV Bidders
 (Where permitted as per BDS ITB 4.1)
 (to be completed for each member of Joint Venture)

Date: _____
 RFB No. and title: _____
 Page _____ of _____ pages

JV/Specialist Subcontractor Information
Bidder's Joint Venture legal name: N/A
JV member's legal name:
JV member's country of registration:
JV member's year of constitution:
JV member's legal address in country of constitution:
JV member's authorized representative information Name: _____ Address: _____ Telephone/Fax numbers: _____ E-mail address: _____
1. Attached are copies of original documents of <input type="checkbox"/> 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. <input type="checkbox"/> Authorization to represent the firm or JV named in above, in accordance with ITB 20. <input type="checkbox"/> In case of a state-owned enterprise or institution, documents establishing legal and financial autonomy, operation in accordance with commercial law, and is not under the supervision of the Employer, in accordance with ITB 4.6. 2. 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: _____

RFB No. and title: _____

Page _____ of _____ 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 <input type="checkbox"/> 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. <input type="checkbox"/> 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

[to be completed for the Bidder and for each member of a Joint Venture]

Bidder's Name: _____

Date: _____

Joint Venture Member's Name _____

RFB No. and title: _____

Page _____ of _____ pages

Non-Performed Contracts in accordance with Section III, Evaluation and Qualification Criteria			
<input type="checkbox"/> Contract non-performance did not occur since 1 st January <i>[insert year]</i> specified in Section III, Evaluation and Qualification Criteria, Sub-Factor 2.1.			
<input type="checkbox"/> Contract(s) not performed since 1 st January <i>[insert year]</i> specified in Section III, Evaluation and Qualification Criteria, requirement 2.1			
Year	Non-performed 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 nonperformance: <i>[indicate main reason(s)]</i>	<i>[insert amount]</i>
Pending Litigation, in accordance with Section III, Evaluation and Qualification Criteria			
<input type="checkbox"/> No pending litigation in accordance with Section III, Evaluation and Qualification Criteria, Sub-Factor 2.3.			
<input type="checkbox"/> Pending litigation in accordance with Section III, Evaluation and Qualification Criteria, Sub-Factor 2.3 as indicated below.			

Year of dispute	Amount in dispute (Rs)	Contract Identification	Total Contract Amount (Rs)
<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>
<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, Evaluation and Qualification Criteria, Sub-Factor 2.4. <input type="checkbox"/> Litigation History in accordance with Section III, Evaluation and Qualification Criteria, Sub-Factor 2.4 as indicated below.			

Year of award	Outcome as percentage of Net Worth	Contract Identification	Total Contract Amount (Rs)
<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>	<i>[insert amount]</i>

Form CON – 3: Environmental and Social (ES)

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: _____ *[insert full name]*
 Date: _____ *[insert day, month, year]*
 Joint Venture Member's or Specialized Subcontractor's Name: _____ *[insert full name]*
 RFB No. and title: _____ *[insert RFB number and title]*
 Page _____ *[insert page number]* of _____ *[insert page number]* pages

Environmental and Social 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 or Social (ES) performance since the date specified in Section III, Qualification Criteria, and Requirements, Sub-Factor 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 or Social (ES) performance since the date specified in Section III, Qualification Criteria, and Requirements, Sub-Factor 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 gender-based violence; sexual exploitation or sexual abuse 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 ES 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 gender-based violence; sexual exploitation or sexual abuse breaches]</i>	<i>[insert amount]</i>

Form CCC: Current Contract Commitments / Works in Progress

Bidders and each member of 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 ¹ 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)

¹ 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 FIN – 3.1: Financial Situation and Performance

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

Bidder's Legal Name: _____

Date: _____

Joint Venture Member's Legal Name _____

RFB No. and title: _____

Page _____ of _____ pages

1. Financial data

Type of Financial information in (Rs)	Historic information for previous _____ years, (amount in Rs)				
	Year 1	Year 2	Year 3	Year 4	Year 5
Statement of Financial Position (Information from Balance Sheet)					
Total Assets (TA)					
Total Liabilities (TL)					
Total Equity/Net Worth (NW)					
Current Assets (CA)					
Current Liabilities (CL)					
Working Capital (WC)					
Information from Income Statement					
Total Revenue (TR)					
Profits Before Taxes (PBT)					
Cash Flow Information					
Cash Flow from Operating Activities					

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. Sources of Finance

Specify sources of finance to meet the cash flow requirements on works currently in progress and for future contract commitments.

No.	Source of finance	Amount (Rs)
1		
2		
3		

3. Financial documents

The Bidder and its parties shall provide copies of financial statements for _____years pursuant Section III, Evaluation and Qualifications Criteria, Sub-factor 3.2. The financial statements shall:

- (a) reflect the financial situation of the Bidder or in case of JV member, and not an affiliated entity (such as parent company or group member).
- (b) be independently audited or certified in accordance with local legislation. In case of Indian bidders, the financial statements shall be audited by a certified chartered accountant.
- (c) be complete, including all notes to the financial statements.
- (d) correspond to accounting periods already completed and audited.

☐ Attached are copies of financial statements¹(balance sheets, including all related notes, and income statements) for the _____years required above; and complying with the requirements

¹ 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.

Form FIN - 3.2: Average Annual Construction Turnover

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

Bidder's Legal Name: _____

Date: _____

Joint Venture Member's Legal Name _____

RFB No. and title: _____

Page _____ of _____ pages

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

* See Section III, Evaluation and Qualification Criteria, Sub-Factor 3.2. Annual construction turnover calculated as total certified payments received for work in progress or completed, for 5 years. 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 Rs *)							
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**

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 FIN - 3.3: Financial Resources

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

Source of financing	Amount (Rs)
1.	
2.	
3.	
4.	

FORMAT FOR EVIDENCE OF ACCESS TO OR AVAILABILITY OF CASH FLOW

[To be given from a Nationalized or Scheduled Bank in India]

Clause 3.1(ii) of Section III – 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. equivalent _____ 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 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 Legal Name: _____
 Date: _____
 Joint Venture Member's Legal Name _____
 RFB No. and title: _____
 Page _____ of _____ pages

[Identify contracts that demonstrate continuous construction work over the past [5] years pursuant to Section III, Qualification Criteria and Requirements, Sub-Factor 4.1. List contracts chronologically, according to their commencement (starting) dates.]

Starting Month/ Year	Ending Month/ Year	Contract Identification	Role of Bidder ["Contractor" or "JV Member" or "Subcontractor" or "Contract Manager"]
		Contract name: _____ Brief Description of the Works performed by the Bidder: _____ Amount of contract: _____ Name of Employer: _____ Address: _____	
		Contract name: _____ Brief Description of the Works performed by the Bidder: _____ Amount of contract: _____ Name of Employer: _____ Address: _____	
		Contract name: _____ Brief Description of the Works performed by the Bidder: _____ Amount of contract: _____ Name of Employer: _____ Address: _____	

Form EXP - 4.2(a): Specific Construction and Contract Management 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 Legal Name: _____

Date: _____

Joint Venture Member's Legal Name _____

RFB No. and title: _____

Page _____ of _____ pages

Work performed as prime Contractor or JV Member 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 years². *[Attach certificate from the Engineer-in-charge.]*

Similar Contract No.	Information			
Contract Identification				
Award date				
Completion date				
Role in Contract	Prime Contractor <input type="checkbox"/>	Member in JV <input type="checkbox"/>	Management Contractor <input type="checkbox"/>	Sub-contractor <input type="checkbox"/>
Total Contract Amount			Rs *	
If member in a JV or subcontractor, specify participation in total Contract amount			*	
Employer's Name:				
Address:				
Telephone/fax number				
E-mail:				

²Immediately preceding the financial year in which bids are received.

Form EXP - 4.2(a) (cont.)
Specific Construction and Contract Management Experience (cont.)

Similar Contract No.	Information
Description of the similarity in accordance with Sub-Factor 4.2(a) of Section III:	
1. Amount	
2. Physical size of required works items	
3. Complexity	
4. Methods/Technology	
5. Construction rate for key activities	
6. Other Characteristics	

Form EXP - 4.2(b): Construction Experience in Key Activities

Bidder's Legal Name: _____

Date: _____

Joint Venture Member's Legal Name _____

Subcontractor's Legal Name³ (as per ITB 34.2 and 34.3): _____

RFB No. and title: _____

Page _____ of _____ pages

Subcontractor's Name (as per ITB 34.2 and 34.3): _____

All subcontractors for key activities must complete the information in this form as per ITB 34.2 and 34.3 and Section III, Qualification Criteria and Requirements, Sub-Factor 4.2.

1. Key Activity No One: _____

	Information			
Contract Identification				
Award date				
Completion date				
Role in Contract	Prime Contractor <input type="checkbox"/>	Member in JV <input type="checkbox"/>	Management Contractor <input type="checkbox"/>	Sub-contractor <input type="checkbox"/>
Total Contract Amount			Rs	
Quantity (Volume, number or rate of production, as applicable) performed under the contract per year or part of the year in the last 5 years	Total quantity in the contract (i)	Percentage participation (ii)		Actual Quantity Performed (i) x (ii)
Year 1				
Year 2				
Year 3				
Year 4				
Year 5				

³ If applicable.

	Information
Employer's Name ⁴ :	
Address:	
Telephone/fax number	
E-mail:	

2. Activity No. Two

3.

	Information
Description of the key activities in accordance with Sub-Factor 4.2(b) of Section III:	

⁴ Attach certificate from the Engineer-in-charge

Specific Experience in Managing ES aspects

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

Bidder's Name: _____

Date: _____

Bidder's JV Member Name: _____

RFB No. and title: _____

Page _____ of
_____ pages

1. Key Requirement no 1 in accordance with 4.2 (c): _____

Contract Identification				
Award date				
Completion date				
Role in Contract	Prime Contractor <input type="checkbox"/>	Member in JV <input type="checkbox"/>	Management Contractor <input type="checkbox"/>	Subcontractor <input type="checkbox"/>
Total Contract Amount			Rs.	
Details of relevant experience				

2. Key Requirement no 2 in accordance with 4.2 (c): _____

3. Key Requirement no 3 in accordance with 4.2 (c): _____

...

TN IAMP

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

(Bidder's Name and Address)

To

Er. R. Thiruvettaisellam, M.Tech., MBA.,
 Superintending Engineer, WRD,
 Middle Cauvery Basin Circle,
 Subramaniyapuram, Pudukkottai Road,
 Tiruchirapalli – 620 020
 Tiruchirapalli District,
 Tamil Nadu

Dear Sir:

Ref: On Farm Development (OFD) works for the work of Rehabilitation and Modernisation of Pullambady Main Canal, 5 Tanks and 1 Anicut in Lalgudy Block and Taluk, 5 Tanks and Pullambady Main Canal Distributory No.1,2,3 in Pullambady Block of Lalgudy Taluk in Trichy District and 19 Tanks in Thirumanur Block of Ariyalur Taluk and District in Nandhiyar and Kulaiyar Sub Basin (Package No. 02 / TN IAMP / WRD / NKR / OFD Works / Phase - II / 2022 -23)

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: _____

Place: _____

(Signature) _____

(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 Non-consulting Services in Bank-Financed Procurement

In reference to ITB 4.8, 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 4.8(a) and 5.1 : *None*

Under ITB 4.8(b) and 5.1 : *None*

[Note: as and when some country/ countries become ineligible insert the list of such countries following approval by the Bank to apply the restriction]

Section VI - Fraud and Corruption

(Section VI shall not be modified)

1. Purpose

1.1 The Bank's Anti-Corruption Guidelines and this annex apply with respect to procurement under Bank Investment Project Financing operations.

2. Requirements

2.1 The Bank requires that Borrowers (including beneficiaries of Bank financing); bidders, (applicants/proposers), consultants, contractors and suppliers; any sub-contractors, sub-consultants, service providers or suppliers; any agents (whether declared or not); and any of their personnel, observe the highest standard of ethics during the procurement process, selection and contract execution of Bank-financed contracts, and refrain from Fraud and Corruption.

2.2 To this end, 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;
- ii. "fraudulent practice" is any act or omission, including misrepresentation, that knowingly or recklessly misleads, or attempts to mislead, a party to obtain financial or other benefit or to avoid an obligation;
- 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;
- 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;
- v. "obstructive practice" is:
 - (a) deliberately destroying, falsifying, altering, or concealing of evidence material to the investigation or making false statements to investigators in order to materially impede a Bank investigation into allegations of a corrupt, fraudulent, coercive, or collusive practice; and/or threatening, harassing, or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation; or
 - (b) acts intended to materially impede the exercise of the Bank's inspection and audit rights provided for under paragraph 2.2 e. below.

- b. Rejects a proposal for award if the Bank determines that the firm or individual recommended for award, 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. In addition to the legal remedies set out in the relevant Legal Agreement, may take other appropriate actions, including declaring misprocurement, if the Bank 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 process, selection and/or execution 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. Pursuant to the Bank's Anti- Corruption Guidelines and in accordance with the Bank's prevailing sanctions policies and procedures, may sanction a firm or individual, either indefinitely or for a stated period of time, including by publicly declaring such firm or individual ineligible (i) to be awarded or otherwise benefit from a Bank-financed contract, financially or in any other manner;⁵ (ii) to be a nominated⁶ sub-contractor, consultant, manufacturer or supplier, or service provider of an otherwise eligible firm being awarded a Bank-financed contract; and (iii) to receive the proceeds of any loan made by the Bank or otherwise to participate further in the preparation or implementation of any Bank-financed project;
- e. Requires that a clause be included in bidding/request for proposals documents and in contracts financed by a Bank loan, requiring (i) bidders (applicants/proposers), consultants, contractors, and suppliers, and their sub-contractors, sub-consultants, service providers, suppliers, agents personnel, permit the Bank to inspect⁷ all accounts, records and other documents relating to the procurement process, selection and/or contract execution, and to have them audited by auditors appointed by the Bank.

⁵ For the avoidance of doubt, a sanctioned party's ineligibility to be awarded a contract shall include, without limitation, (i) applying for pre-qualification, expressing interest in a consultancy, and bidding, either directly or as a nominated sub-contractor, nominated consultant, nominated manufacturer or supplier, or nominated service provider, in respect of such contract, and (ii) entering into an addendum or amendment introducing a material modification to any existing contract.

⁶ A nominated sub-contractor, nominated consultant, nominated manufacturer or supplier, or nominated service provider (different names are used depending on the particular bidding document) is one which has been: (i) included by the bidder in its pre-qualification application or bid because it brings specific and critical experience and know-how that allow the bidder to meet the qualification requirements for the particular bid; or (ii) appointed by the Borrower.

⁷ Inspections in this context usually are investigative (i.e., forensic) in nature. They involve fact-finding activities undertaken by the Bank or persons appointed by the Bank to address specific matters related to investigations/audits, such as evaluating the veracity of an allegation of possible Fraud and Corruption, through the appropriate mechanisms. Such activity includes but is not limited to: accessing and examining a firm's or individual's financial records and information, and making copies thereof as relevant; accessing and examining any other documents, data and information (whether in hard copy or electronic format) deemed relevant for the investigation/audit, and making copies thereof as relevant; interviewing staff and other relevant individuals; performing physical inspections and site visits; and obtaining third party verification of information.

PART 2 – Works' Requirements

Section VII - Works' Requirements

Specifications

A set of precise and clear Specifications is a prerequisite for Bidders to respond realistically and competitively to the requirements of the Employer without qualifying or conditioning their bids. The Specifications must be drafted to permit the widest possible competition and, at the same time, present a clear statement of the required standards of workmanship, materials, and performance of the goods and services to be procured. Only if this is done shall the objectives of economy, efficiency, and fairness in procurement be realized, responsiveness of Bids be ensured, and the subsequent task of Bid evaluation facilitated. The Specifications should require that all goods and materials to be incorporated in the Works be new, unused, of the most recent or current models, and incorporate all recent improvements in design and materials unless provided otherwise in the Contract.

Samples of Specifications from previous similar projects in India are useful to prepare Specifications. The use of metric units is encouraged by the World Bank. Most Specifications are normally written specially by the Employer or Project Manager to suit the Contract Works in hand. There is no standard set of Specifications for universal application in all sectors, but there are established principles and practices, which are reflected in these documents.

There are considerable advantages in standardizing General Specifications for repetitive Works in recognized public sectors, such as highways, ports, railways, urban housing, irrigation, and water supply, in the same country or region where similar conditions prevail. The General Specifications should cover all classes of workmanship, materials, and equipment commonly involved in construction, although not necessarily to be used in a particular Works Contract. Deletions or addendums should then adapt the General Specifications to apply them to the particular Works.

Care must be taken in drafting Specifications to ensure that they are not restrictive. In the Specifications of standards for goods, materials, and workmanship, recognized Indian standards should be used as much as possible. Where other particular standards are used, the Specifications should state that goods, materials, and workmanship that meet other authoritative standards, and which ensure substantially equal or higher quality than the standards mentioned, shall also be acceptable. To that effect, the following sample clause may be inserted in the Particular Conditions or Specifications.

“Equivalency of Standards and Codes

Wherever reference is made in the Contract to specific standards and codes to be met by the goods and materials to be furnished, and work performed or tested, the provisions of the latest current edition or revision of the relevant standards and codes in effect shall apply, unless otherwise expressly stated in the Contract. Where such standards and codes do not relate to Indian Standards, other authoritative standards that ensure a substantially equal or higher quality than the standards and codes specified shall be accepted subject to the Project Manager’s prior review and written consent. Differences between the standards specified and the proposed alternative standards shall be fully described in writing by the Contractor and submitted to the Project Manager at least 28 days prior to the date when the Contractor desires the Project Manager’s consent. In the event the Project Manager determines that such proposed deviations do not ensure substantially equal or higher quality, the Contractor shall comply with the standards specified in the documents.”

The method of measurement of completed work for payment shall be in accordance with

[insert the name of a standard reference guide, or full details of the methods to be used so that the bidder can take note of that while quoting prices].⁸

[These Notes for Preparing Specifications are intended only as information for the Employer or the person drafting the bidding document. They should not be included in the final documents]

⁸ The method of measurement should be spelled out precisely in the Preamble to the Bill of Quantities, describing for example the allowances (if any) for timbering in excavation, etc. Many national standard reference guides have been prepared on the subject, and one such guide is the *Standard Method of Measurement* of the U.K. Institution of Civil Engineers.

Chapter 1 PREFACE

INTENT AND REFERENCE TO TAMIL NADU BUILDING PRACTICE AND INDIAN STANDARDS

It is intended by the Tamil Nadu Building Practice to describe.

- a. The character of the materials to be used.
 - b. The method of execution of work
 - c. The contractor's responsibility to the public, Government and his workmen, and general contract conditions which are to be accepted by every contractor who execute the work entrusted to him by the Department.
- 1.2. Wherever the term " standard specification or " specification" or the abbreviations "TNBP No " or TNBP is used in the specifications or estimates or contract document it shall refer to relevant specification in the Tamil Nadu Building practice.
- 1.3. The abbreviation "IS" shall mean " Indian Standard"
- 1.4. Government means Tamil Nadu Government. Department means Tamil Nadu Water Resources Department.

GENERAL SPECIFICATION

The term the Indian standard specification herein after referred to as IS as used herein means ,the relevant Indian Standard Specification with all amendments published upto the date of submission of tenders.- A statements of relevant IS applicable to this context is enclosed

LIST OF INDIAN STANDARDS

Sl. No.	Short title	I.S. Number	TNBP Number
I	CEMENT:		
1	Specification for ordinary (33 grade) Portland cement	269 – 2015	10
2	Specification for Portland slag Cement	455 -2015	
3	43 grade ordinary Portland cement.	8112 - 2013	
4	53 grade ordinary Portland cement	12269 - 2013	
5	Portland Pozzolana cement(fly ash based)	1489 (Part1) 2015	
6	Low heat Portland Cement	12600 -1989	
II	AGGREGATES:		
1	Specification for coarse and fine AGGREGATE from natural source for concrete	383 - 2016	5 & 7
2	Specification for sand for Masonry Mortars	2116 – 1980	7

3	Method of tests for aggregates for concrete	2386 – 1963 (Part I to VIII)	
4	Specification for sand for mortar	1542-1992	
III	BUILDING STONES		
1	Method of Test for Determination of strength properties of natural building stones	1121 – 1974 Part – 1 to Part IV	35
2	Method of Measurement of Buildings and Civil Engineer Works	1200 – 2013 (Part – IV)	
IV	STEEL		
1	Code of Practice for bending and fixing of bars for concrete reinforcement	2502 -1963	30,86
2	Specifications for High Strength Deformed steel bars and Wires for concrete reinforcement.	1786 - 2008	30,86
3	Code of Practice for Welding of M.S. Bars used for reinforced concrete Construction	2751 - 1979	30,86
4	Code of practice for use of Metal and welding for general construction in mild steel	816 – 1969	30, 86
5	Specification for hot rolled mild steel, medium tensile steel and high yield, strength steel deformed bars for concrete reinforcements (revised)	1139 – 1966	30,86
6	Recommendation for detailing of reinforcement in reinforced cement concrete works	5525 – 1969	30,86
7	Specification for Mild Steel and Medium tensile bars for concrete reinforcement	432 – 1966 (Part – I)	30,86
8	Code of practice for safety and health requirement in Electric and Gas welding and Cutting operations	818 – 1968	
9	Code of practice for fire precautions in welding and cutting operations	3016 – 1982	
10	Measurement of Building and Civil Engineering Works. Part – VIII steel work and Iron work	1200 – 1993 (Part – VIII)	
11	Code of practice for manual of metal and welding of mild steel.	823 – 1964	
12	Specification for filler rods and wires for gas welding	1778 – 1977	

13	Structural Steel (Standard quality) (5 th revision with amendment Nos 1 to 5)	226 – 1975	
14	Code of Practice for corrosion Protection of Steel reinforcement in RB and RCC Construction	9077 – 1979	
V	MASONRY		
1	Code of practice for construction of stone Masonry part – I Rubble Stone Masonry	14835 : 2000	3, 35 H
2	Code of Practice for construction of stone masonry Part – I ashlar masonry	14835 : 2000	35,35 D
3	Specification for fly-ash for use as pozzolana and admixture	1489-(Part-I) 2015	
4	Method of measurement of building and civil Engineering works	1200 – 1992 (Part I)	
5	Test for compressive strength of mortar	2250-1981	
6	Sand for Masonry work	2116 -1980	
7	Code of practice for construction of masonry in dams	8605 – 1977	
8	Code of Practice for permeability test for masonry work during and after construction	11216 – 1985	
9	Water absorption, apparent specific gravity and porosity of stones Method of test for determination (First revision)	1124 – 1974	
10	Durability of natural stones, Method test (First revision)	11026 – 1984	
11	Recommendation for pressure grouting of rock foundation in river valley projects. (First revision)	6066 – 1994	
VI	CONCRETE		
1	Method of Measurement of building and Civil Engineering works Part – II concrete works	1700 – 1974 (Part – II)	
2	Concrete works : Code of practice in plain and reinforced concrete	456 – 2000	28,30
3	Specification for precast concrete coping blocks	5751- 1984	

4	Method of test for strength of concrete	516 – 1959	28,30
5	Code of practice for lining in situ cement concrete lining of canals	3873 – 1993	28,30
6	Specification for Admixtures for concrete	9103 – 1999	
7	Method of test for Autoclaved cellular concrete products	6441 – 1977 (1973 part – I to IX)	
8	Method of sampling and analysis of concrete	1199 – 1959	
9	Specification for Batch type concrete mixers .(Second revision)	1991 – 1968	
10	General requirements for concrete vibrators – immersion type	7595 – 1989	
11	Specification for concrete vibrating tables	7514 – 1963	
12	Method of test for permeability of cement mortar and concrete	3917 – 1965	
13	Specification for fly-ash for use as pozzolana as admixture for concrete	3817 – 1966 (Part – II)	
14.	Specification for portable swing weight batch for concrete (Single and double bucket type)	7777 -1964	
15	Code of practice for installation of joints in concrete pavements.	4509 – 1977	
16	Form vibrators for concrete	4656- 1968	
17	Code of practice for general construction of plain and reinforced concrete for dams and other massive structure	457 – 1957	
18	Standard sand for testing of cement (first revision) with amendments 1 to 2 (Reaffirmed 1980)	650 – 1966	
19	Code of practice for use of immersion vibrators for consolidating concrete	3558 – 1983	
20	Method of sampling of aggregates for concrete	21130 – 1969	
21	General requirements for concrete vibrators screed boxed type (First revision)	250 – 1985	
22	Concrete transit mixers and agitators	5892 – 1970	
23	Plywood for concrete shuttering works	4990 – 2011	
24	Code of practice for extreme weather concreting	7861- (Part I & II)1975	

25	Temperature control of Mass concrete for Dams - Guidelines	IS 14591:1999	
VII	EARTH WORKS		
1	Method of measurement of building and Civil Engineering works Part – I Earth work	1200 – 1992 (Part – I)	20 A,B C, 23 24, 25
2	Safety code for piling and other deep foundations	5221 – 1969	
3	Code of practice for Design. Installation observation and maintenance of uplift pressure pipes for Hydraulic structures on permeable foundation	6532 – 1972	
4	Safety code excavation works	3764 – 1992	19.26
5	Protection of slope for Reservoir embankments	8237- 1985	
6	Code of practice for earth work on canals	4701 – 1982	19,26
7	Guidelines for lining for canals in expansive soils	9451 – 1994	
8	Method of test for soils Part – II Determination of water content	2720 – 1973 (Part VIII)	
9	Method of test for soils Determination of moisture content Dry density relation using light compaction	2720 – 1974 (Part VII)	
10	Method of test for soils determination of dry density of soils in place by the core cutter method	2720 -1975 (Part – XXVIII)	
11	Method of test for soils determination or dry density of soils in place by the core cutter method	2720 – 1975 (Pat – XXIX)	
12	Safety code for blasting and related drilling operations	1981 – 1967	
13	Criteria for design of small embankment dam	IS 12169 - 1987	

VIII	OTHER SUBJECTS		
1	Safety code for scaffolds and ladders Part I scaffolds	3696 – 1966 (Part – I)	
2	Safety code for scaffolds and ladders Part II ladders	3696 – 1966 (Part II)	
3	Recommendations on stacking and storages of construction materials at site	4082 – 1996	

In addition to the Indian Standard Specification, the specifications prescribed in Tamil Nadu Building Practice (TNBP) and guidelines issued by Central Water Commission Standard Specification Shall also be followed, where IS specification are not available.

CHAPTER II

Not Applicable - Deleted

CHAPTER III
SITE OF WORK

Sl.No	Name of Tank	Village	Block	Taluk	District
1	Peruvalanallur West Tank	Peruvalanallur	Lalgudi	Lalgudi	Trichy
2	Peruvalanallur East Tank	Peruvalanallur	Lalgudi	Lalgudi	Trichy
3	Pitchai Eri	Pullambadi	Pullambadi	Lalgudi	Trichy
4	Ochakulam	Kovandakuruchi	Pullambadi	Lalgudi	Trichy
5	Kavichankulam	Alambakam	Pullambadi	Lalgudi	Trichy
6	Vinjiraya udaiyar Eri	Vilagam	Thirumanur	Lalgudi	Trichy
7	Viragalur Tank	Viragalur	Lalgudi	Lalgudi	Trichy
8	Kandirathitham Tank	Kandirathitham	Thirumanur	Ariyalur	Ariyalur
9	Two Kuttai Tank	Vetriyur	Thirumanur	Ariyalur	Ariyalur
10	Three Kuttai Tank	Vetriyur	Thirumanur	Ariyalur	Ariyalur
11	Elayaperumal Eri	Keelakulathur	Thirumanur	Ariyalur	Ariyalur
12	Ezha Eri	Sullangudi	Thirumanur	Ariyalur	Ariyalur
13	Lakshmana Moopnar Eri	Vadugapalayam	Thirumanur	Ariyalur	Ariyalur
14	Ramu Pillai Eri	Sullangudi	Thirumanur	Ariyalur	Ariyalur
15	Pudhu Eri	Sullangudi	Thirumanur	Ariyalur	Ariyalur
16	Kuppan Ayyangar Eri	Sullangudi	Thirumanur	Ariyalur	Ariyalur
17	Vannan Eri	Elakurichi	Thirumanur	Ariyalur	Ariyalur
18	Nedungulam Eri	Elakurichi	Thirumanur	Ariyalur	Ariyalur
19	Arasan Eri	Kamarasavalli	Thirumanur	Ariyalur	Ariyalur

3.1 DISCHARGE RECORDS

3.1.1 Discharge Records

The Hydrological data, pertaining to the Tanks and the components of the Tanks furnished in the relevant report and drawings, are for information of bidders and contractors. It should be noted that the data used in preparing these particulars were recorded at work site. The Government (that is Government of Tamil Nadu) does not guarantee the reliability or accuracy of any of the Data and shall assume no responsibilities for any conclusions or interpretations that may be made from them. The Contractor shall undertake at his expense such studies as are necessary to assess the reliabilities and accuracy of the information presented in the Data.

3.2 CLEARING AND GRUBBING

3.2.1 Clearing and Leveling Site

The portion of the right-of-way where required for constructing the work under these specifications shall be cleared of all trees, bushes, rubbish and other objectionable matter. Trees designated by the Engineer-in-Charge shall not be cut and shall be protected from injury. Such cleared material shall be disposed off, as provided in sub-paragraph said below or removed from the site of work before the date of completion of the contract as approved by the Engineer-in-Charge. The clearing operation shall be in accordance with clauses 4.1, 4.1.1, 4.2 and 4.3 of I.S. 4701-1982 Indian Code of Practice for earth work in canals. Surface boulders either loose or partly embedded in the ground will have to be removed and stacked as directed.

3.2.2 Grubbing

The area described or shown on the relevant site plan shall be cleared of all obstructions, loose stones, non-required materials and rubbish of all kinds. All brushwood shall be cleared and the roots grubbed up. No trees shall be cut down and removed without the instructions of the Engineer-in-Charge. Those which are cut down shall be grubbed up. The same remarks apply to jungle clearance. Trees to be preserved will be designated by the Engineer-in-Charge.

The products of the clearing shall be stacked in such place and manner as may be ordered by the Engineer-in-Charge and the ground shall be left in a perfectly clean conditions all products of the clearing shall be the property of Government and shall be disposed of as the Engineer-in-Charge may direct.

All holes or hollows, whether originally existing or produced by digging up roots shall be carefully filled up with earth, well rammed to the design density and leveled off, as may be directed.

Preparation of Bed

Ant hills shall be completely dug out before earth work is started. In the absence of any separate contract schedule provision for removal of shrubs, loose stone and digging of any ant hills involved in the preparation of bed, the contract rate for earth work shall be deemed to include all the work to be done in accordance with this clause. In cases where the work preparation of bed is rather extensive, the Engineer-in-Charge will usually provide a separate schedule provision; the contractor shall understand that his tender rate is inclusive of all such work without extra charge. The contractor shall therefore examine the site before tendering and

provide for all items to be done under his earth work tender rate. Old bunds will be benched and sloped as directed by Engineer-in-Charge before addition of earth, the benches being 500mm X 500mm or of other sizes as specified by the Engineer. The benches or slope shall be inspected by the Engineer-in-Charge designated for the purpose and approved before new earthwork is keyed into them.

3.2.3 Disposal of Cleared and Grubbed Material

The disposal of cleared and grubbed material shall be in accordance with clause 4.1.1 of I.S 4701-1982 code of Practice for earth work on canals. Such grubbed materials has to be buried at designated places identified by site engineer – in – charge or to be conveyed to near by composting yard of local bodies. Cleared off stones and boulder should be disposed off by filling low lying area near the work site. The material to be disposed off may be buried for which Para 1. 2 and 2 of specification 16 of TNBP shall apply.

3.2.4 Payment

For the clearance of light jungle, heavy jungle with or without uprooting etc., payment will be made as provided for in the tender documents. Separate payment will not be made for clearing of site and grubbing including disposal of the cleared and grubbed material required under the above paras unless and otherwise specified in the contract document. The contractor shall include the cost thereof in the prices bid in the bill of quantities of the contract for the relevant finished item of work for which clearing and grubbing as mentioned in the above Para are required. No payment towards removal of small stones and boulders of size less than 0.01 cubic metres will be made, and the rate quoted for excavation will be considered to include this item. However, payment will be made for the removal of surface boulders of sizes greater than 0.01 cubic meter but less than 3 cubic metres, either loose or partly embeddable in the ground, at the rate quoted in bill of quantities for the actual quantity so removed, based on stack measurement applicable for the relevant strata classification after deducting 40% towards voids. Thus cleared off stones and boulder should be disposed off by filling low lying area near the work site.

Benching will be paid as separate item, per 1 (one) running meter of bench at the provided for in the tender documents.

3.3.1 Setting out of the Work

There are permanent Bench Marks fixed by Survey of India and Tamil Nadu Water Resources Organization, Temporary Bench Marks shall be set up by the Department at every 0.5km interval of convenient locations along the canal to serve as reference levels. The Contractor shall establish additional reference Bench Marks as may be needed at his own cost for facilitating the setting out and taking levels for measurement of work, with the approval of the Engineer-in-Charge. The Bench Mark shall be marked on a concrete pillar 30cm (l) x 30 cm (b) x 75 cm (d) which shall be embedded 55 cm into firm ground and projecting 20 cm above the ground. The Bench Mark pillar shall be constructed in plain cement concrete of 1:4:8. The pillar shall be well protected from being disturbed. The RL of bench mark shall be conspicuously carved and painted on the pillar.

- 3.3.2 Before starting any work and during execution (if required), the Contractor shall erect reference Bench Marks, reference lines and profiles of convenient location as per the direction of the Engineer-in-Charge. The center line of the canal and the reference line for all alignments for demarcation purpose shall be laid by dig-belling on the ground. The reference line shall comprise the base line properly dig belled on the ground with the numbered concrete/masonry R.D. pillars suitably spaced.
- 3.3.3 All important levels and all reference points with respect to bench marks and reference lines shall be fixed and co-related by the contractor as per the directions of the Engineer-in-Charge.
- 3.3.4 All materials and labour for setting out works included construction of reference bench mark, reference line, check profiles and surveys, as may be required at the various stages of the construction shall be supplied by the Contractor at his own cost. The cost of such works shall be deemed to have been included in the cost of the items in schedule.

3.4 Monsoon Damages

Damages due to rain or flood either in cutting or in banks shall have to be made good /rectified by the contractor till the work is handed over to the department. The responsibility for desilting and making good the damages due to rain or flood rests with the contractor. No extra cost is payable for such operations and the contractor shall therefore have to take all necessary precautions to protect the work done during the construction period.

3.5 Removal of silt and water

Accumulated silt and water in the canal and structures for the works partly done by the Contractor in this of previous seasons should be removed and no extra payment will be made, for such removal of silt and water. The unit rate of exact of excavation is deemed to include cost for removal of such silt and water. The silt removed shall be used (if suitable) in strengthening the tank bunds. The excess silt after testing if found usable shall given to farmers for use in farmlands.

3.6 Use of Water

1.6.1 Water for Dust Abatement

a. General

The Contractor shall procure and apply water for dust abatement have been included in the concerned unit price bid to the bill of quantities of the contract for the relevant finished item of work for which water for dust abatement is required.

So also the cost of procuring and applying water required for the work shall be included in the price bid in the bill of quantities for the items of such for which the water is used.

If the GW levels in the block of the district fall in unsafe zone, the water for construction should not be sourced from ground in that block.

3.7 Site Drainage

3.7.1 Cross Drainage

The contractor shall handle all flows from natural drainage channel intercepted by the work under these specifications performed any additional excavation and grading for drainage as directed and provide and maintain any temporary construction required to by pass of otherwise cause the flows to be harmless to the work and properly. When the temporary construction is no longer needed and prior to acceptance of the work the contractor shall remove the temporary construction and restore the site to its original condition as approved by the Engineer-in-Charge. The cost of all work and materials required by this paragraph shall be included by the contractor in the unit prices quoted in the bill of quantities and no separate payment will be made for the same.

- 3.7.2 In addition to cross drains, longitudinal drains may be considered necessary for proper drainage. The drainage system will be consisting of network of cross and longitudinal drains led into out fall drains to prevent stagnation of water at the place of construction. The drains shall be constructed to the sections design, and shall be either open or filled up with material to ensure free flow of water without clogging of the filled materials. No construction material, like cement, rubble, debri, etc., shall be allowed to flow into these channels.

Water applied for dust abatement will not be eligible for payment. The cost of procuring and applying water included all expenses for all means of conveying water, to the point of use, their collection, usage, and all other incidental expenses will not be paid separately included creation of source of water and the cost shall be deemed to have been included in the concerned unit price bid in the bill of quantities of the contract for the relevant finished item of work for which water for dust abatement is required.

So also the cost of procuring and applying water required for the work shall be included in the price bid in the bill of quantities for the items of work for which the water is used.

CHAPTER IV

EARTHWORK

4.1 Earthwork - General

4.1.1 Earthwork diagrams and Data

To the extent that they exist, plans and earthwork for the Government's studies of Earthwork for construction will be available for inspection by the Bidders in the office of the concerned Engineer-in-Charge. Such information is made available solely for the convenience of Bidders. They are cautioned that this information is subject to revision and that the Government disclaims responsibility for any interpretations deduction or conclusions, which may be made there from. It is not intended that this information will limit or prescribe the excavation and handling procedures of the contractor, and the government reserves the right to utilize and distribute earthwork materials during the progress of work as it serves the interest of the Government.

4.1.2 Compacting Earth Materials

a. General

Where compaction of earth materials is required, the materials shall be deposited in horizontal layers and compacted as specified in this paragraph. The excavation, placing, moistening and compacting operations shall be such that the material will be uniformly compacted to the required density throughout the required section, and will be homogeneous, free from lenses, pockets, streaks, voids, laminations or other imperfections.

b. Compacting Clay and silty materials

Where compaction of earth materials containing appreciable amount of clay or silt is required the compaction shall be carried out in accordance with clause 6.6.2 of I.S 4701-1982. The materials shall be deposited in horizontal layers. The thickness of each horizontal layer before compaction shall not be more than 25 centimeters (loose layer) and the layer shall be to full width of the embankment. The excavating and placing operation shall be such that the materials when compacted will be blended sufficiently to secure the highest practicable density and best impermeability and stability. If the surface of any compacted layer of earth fill is too dry or too smooth to bond properly with the layer of material to be placed thereon, it shall be moistened and / or scarified in an approved manner to provide a satisfactory bonding surface before the next succeeding layer is placed. All the rollers used on any one layer of fill shall be of the same type and same weight.

Prior to and during compacting operations, the embankment materials shall possess optimum moisture content as required in clause 6.6.4 of I.S 4701-1982. The embankment materials shall have optimum moisture content required for the purpose of compaction and this moisture content shall be fairly uniform throughout the layer. As far as practicable the moistening of the materials shall be performed at the site of excavation but such moistening shall be supplemented as required by sprinkling water at the site of compaction, if necessary. If the moisture content is greater than optimum for compaction, the compaction operations shall be delayed until such time as the material has dried to the optimum moisture content or to the level directed by Engineer-in-Charge. The moisture content of soils shall be determined in accordance with IS 2720 (Part II) 1980.

If the moisture content is not within the limits described above, the compaction operation shall not be proceeded except with the specific approval of the Engineer-in-Charge, until the material has been wetted or allowed to dry out, as may be required to obtain optimum moisture content and no adjustment in price will be made on account of any operations of the contractor in wetting or drying the materials or on account of any delays occurred thereby.

When the material has been conditioned as herein before specified, it shall be compacted by rollers or by hand or power tampers. Where hand or power tampers are used to compact soils in confined areas such as under pipes and at the joints of bank connections with the structures they shall be equipped with suitably shaped heads to obtain the required density.

The dry bulk density of the soil portion in compacted embankment materials shall be not less than 95% of the maximum dry bulk density at optimum moisture content obtained in accordance with I.S. 2720 (Part – VII) – 1980 – Indian Code of Practice of determination of moisture content, dry density relation using light compaction.

The dry density of soil in field shall be determined in accordance with I.S. 2720 Part XXVIII – 1974. Indian code of practice for determination of dry density of soil in place by sand replacement or by I.S. 2720 Part – XXIX – 1975 Indian code of practice for Determination of dry density of soil in place by the core cutter method.

Moisture content of soil shall be determined in accordance with I.S. 2720 Part – II – 1980 – Indian Code of practice for determination of moisture content.

The optimum moisture content is the moisture content the corresponds to the laboratory maximum dry density determined in accordance with I.S. 2720 (Part – VII) – 1980.

The above compaction tests will be conducted by contractor in the presence of department officers at his cost and the contractor shall ensure compaction, till the Engineer-in-Charge or his authorized representative is satisfied that the maximum dry density at optimum moisture content is obtained, and permits the laying of next layer.

c. Compacting Cohesionless Materials

Where compaction of Cohesionless, free draining materials, such as sands and gravels is required, the materials shall be deposited in horizontal layers and compacted to the relative density specified below. The excavating and placing operation shall be such that the materials when compacted will be blended sufficiently to secure the best practicable degree of compaction and stability. Water shall be added to the materials as may be required to obtain the specified density by method of compaction being used.

As envisaged in clause 6.6.2.1 of I.S. 4701 – 1982, the thickness of the embankment layer shall not exceed 25 centimeters (loose layer) before compaction and it should be spread over the full width of the embankment and compaction shall be done by tampers or crawler tractors or vibrating rollers. If the compaction is performed by Treads of crawler type tractor, surface vibrators or similar equipment

the thickness of the layer before compaction shall not be more than 40 centimeters. If compaction is performed by internal vibrators the thickness of the layer shall not be more than the penetrating depth of the Vibrator.

As envisaged in clause 6.6.3.1 of I.S. 4701 – 1982 the relative density of the compacted materials shall not be less than 70%. When tested in accordance with I.S. 2720 Part – XIV 1983 Indian code of practice for determination of density index (relative density) of cohesion-less soils.

d. Strengthening of Bunds

The earthwork required for bringing the existing bund sections to the designed sections shall be laid only after cutting suitable benches on the downstream slopes as well as on the upstream slopes, if required (Typical drawing for “Raising and Strengthening Tank Bunds” is given in page 106). Additional earth fill shall also be placed, as required, for achieving full compaction as per clause 4.1.2 (b) & (c). Deployment of the type of compaction equipment shall depend upon the extent of space available for compaction. It may include: 8 – 10 T standard power roller / vibratory power roller or short width (± 0.90 m drum width) power roller / vibratory power roller or fuel – operated / elect – operated vibratory plate compactors of different plate sizes and compaction capacities. A combination of various equipment may be deployed depending upon the site situations. It shall be ensured that full designed section of the bund is compacted and the slopes are also well consolidated to effectively resist erosion and any formation of gullies / rain cuts.

Hydraulic Excavators with suitable steel plate attachments to their booms may also be used for compacting / consolidating the side slopes of bunds. In view of the fact that the earthwork involved is for raising & strengthening the existing deficient tank bunds and is not a new construction of bunds, field compaction density tests shall be taken at a frequency of one test per 300cu.m of earth fill and at least one test for every layer in case the quantity is less than 300cu.m in a layer.” Heavy duty soil Compacting Equipment of 130 H.P / 140 H.P comprising a smooth steel roller in front and rubber tyred wheels at the rear capable of negotiation steep slopes of 2 (H):1 (V) can also be used for the consolidation of earth fill on the side slopes of the tank bunds. Such roller goes up and down the slopes, thereby, effectively compacting the earth fill speedily.

e. Compacting Cohesionless Materials Containing Some Clay & Silt.

The sub paragraph applies only to Cohesionless materials and not to cohesive materials. Cohesionless materials containing clay and silt are not to be free draining. When compaction of Cohesionless materials containing clay and silt is required, the materials shall be compacted to a dry density in accordance with either sub-paragraph (1) and (2) below, using whichever test/that result in higher dry density of the compacted material in the placement.

1. Dry density determined using procedure enunciated in I.S. 2720 (Part – VII) – 1980 – (Indian Code of practice of determination of moisture content dry density relation using light compaction) Prior to and during compaction operation the materials shall possess optimum moisture content as determined in accordance with clause 6.4.1 of I.S. 4701 – 1982 and the moisture content shall be uniform throughout each layer. Provided that the moisture content is ensured as required in clause 6.6.4 of I.S. 4701 – 1982 the dry density of the soil portion in the compacted material shall not be less

than 95% of the laboratory maximum soil dry density compacted. The field dry density shall be determined in accordance with I.S. 2720 Part XXVIII – 1974 or I.S. 2720 Part XXIX – 1975.

2. Dry density using the relative test as described in I.S. 2720 Part XIV – 1983 Indian code of practice for determination of density Index (relative density) of Cohesionless soils:- The relative density of the compacted material obtained shall be not less than 70% determined in accordance with clause 6.6.3 of I.S. 4701 – 1982, the moisture content shall be maintained as per clause 6.6.4 of I.S. 4701 – 1987.

f. Rollers and other Compacting Equipment

As shown in Appendix C of I.S. 4701 – 1982, the following earth compacting equipment may be used for compacting the soils shown against them as detailed below:

Major Division	Sub – Group	Suitable Type of Compacting Equipment
Coarse Grained	Well Grained gravel	Smooth wheel roller Diesel road rollers.
Soils	Gravels and mixture little or no fines	Of 8 to 10 tons capacity pneumatictyred roller vibrating smooth wheel roller, power roller.
	Well graded gravel sand mixtures with excellent clay binder	--do--
	Uniform gravel with little or no fines	--do--
	Poorly graded gravel and Gravel sand mixture little or no fines	--do--
	Gravel with fines, silty gravel, clayed gravel, poorly graded gravel sand clay mixtures.	--do--
Coarse Grained Soils, Sands & Sandy	1. Well graded sand and Gravelly sands, with little or no fines.	Heavy Vibrating, Plate and Frog, rammer, power roller.
	2. Well graded sand with excellent clay binder	--do--
	3. Uniform sand with little or no fines	--do--
	4. Sands with fines, salty sands clayed sands, poorly graded sand clay mixtures.	--do--
Fine Grained Soils : Soil having low Compressibility	1. Silts (inorganic) and very fine sands, rock flour, fine sands with slight plasticity.	Smooth wheel roller, diesel road rollers of 8 to 10 tones pneumatic tyred roller, power roller.
	2. Clayey silts inorganic	--do--
Soils having medium Compressibility	1. Organic silts of low plasticity	Sheep foot roller

	2. Salty & Sandy clays (inorganic) of medium plasticity.	Frog rammer, Power rammer.
	3. Clays (inorganic) of medium plasticity	--do--
	4. Organic clays of medium plasticity	--do--
Soils having Higher compressibility	1. Micaceous or diatomaceous fine sandy & salty soils elastic silts.	Smooth wheel roller, Diesel road rollers 8 to 10 tones capacity pneumatic tyred roller, power rollers.
	2. Clays (Inorganic) of High Plasticity, fat clays	--do--
	3. Organic, clay of high plasticity	--do--

The compacting equipment shall conform to relevant Indian specification below :

1. Smooth wheeled roller should conform to I.S. 5502 – 1969
2. Sheep Foot roller should conform to I.S. 4616 – 1968
3. Pneumatic tyred roller should conform to I.S. 5501 – 1969
4. Vibratory Plate compactor should conform to I.S. 5889 – 1970.
5. Vibratory roller should conform to I.S. 500 – 1977.

The methods of compaction shall conform to clauses 7.2, 7.2.2, 7.2.3 of I.S. 4701 – 1982.

Tamping

Rollers will not be permitted to operate within one meter of concrete and masonry structures. In the following locations where compaction of the earth fill materials by means of roller is impracticable or undesirable the earth fill shall be specially compacted as specified further below.

1. Portions of the earth fill in embankment adjacent to masonry structures and embankment foundations designated on the drawing as specially compacted earth fill.
2. Earth fills in embankment adjacent to steep abutments.
3. Earth fills at specially designated locations.

Canal embankments where canal section is less than 3 meters and no space is available for movement.

Earth fill shall be spread in layers of not more than 10 (ten) cms in thickness when loose and shall be moistened to have the required moisture, as specified. When each layer of materials has been conditioned to have the required moisture content, it shall be compacted to the specified density by special roller, pneumatic/hand tampers or by other approved methods/The moisture control and compaction shall be equivalent to that obtained in the earth fill actually placed in the embankment in accordance with the specifications. Hard tampers shall normally be not allowed in exceptional circumstances with the approval of Engineer-in-Charge.

g. Costs

The costs of the compacting earth materials as described in this paragraph shall be included in the price bid in the bill of quantities for earth work excavation involving works of compacting embankment, placing and for other items of work, where earth materials are required to be compacted under these specifications.

4.1.3. Turfing

a. Principles underlying the use of grass on earth slope. Surface stabilization of slopes and the prevention of soil erosion and weathering may be accomplished by the establishment of grass or other herbages. The living grass roots mechanically reinforce the soil, and decaying organic matter improves soil structure. The grass leaves, living or dead, protect the surface against rain and wind. The combination of improved soil structure and protection gives stability against erosion.

Virgin clays and other sub soils are usually deficient in those bacterial organisms which promote healthy growth. The application of top soil to any new slope is usually a pre-requisite for the successful establishment of grass.

b. Top soiling: - The depth of top soil required will vary according to the nature of the sub soil and a depth of about 15 cm. of good quality soil overlying the sub soil is usually sufficient to sustain plant growth.

c. Sodding: - The sods used shall be cut in rectangular shape 8 to 10cm. thick and laid so that their edges are in close contact and then welded by being gently rammed till they form a level and compact mat. When old surfaces are to be turfed, they shall be picked up to a depth of about 4 cm to give a hold to the sods. For sodding any grass which forms a thick short turf shall be used.

d. Turfing: - It is difficult to generalize on the type of grass to be used since each particular soil type requires a specific grass. To ensure a satisfactory award it is desirable to consult agriculture department, who would make any necessary analysis of the soil before specifying the type of grass, It would also be a help to study the grasses growing in the neighborhoods and to include the varieties that appear to be most suitable, this of course, largely depend on the top soil being obtained from the same vicinity

4.2 Excavation

4.2.1 Classification of Excavation

Except as otherwise provide in these specifications materials excavated will be measured in excavation to the lines shown on the drawings or as provided in these specification and all materials as required to be excavated will be paid for at the applicable price bid in the schedule for excavation. No additional allowance above the price bid in the schedule will be made on account of any of the material being wet. Bidders and the contractors must assume all responsibility for deducing and concluding as to the nature of the materials to be excavated and the difficulties of making and maintaining the required excavation. The Government does not represent that, the excavation can be performed or maintained at the pay lines described in these specifications or shown on the drawings.

4.2.2 Excavation for Structures

a. General

Excavation for the foundation of structures shall be to the elevation shown on the drawings or as directed by the Engineer-in-Charge. In so far as practicable the materials removed in excavation for structures shall be used for backfill and embankment.

b. Foundations for Structures

All trenches in soil other than rock or hard compact soil more than 1.5m deep, into which men enter shall be securely shored and strutted. Personal Protection Equipment (PPE) should be provided to the workers as per ESHS norms.

All trenches in soil or fissured rock or hard soil exceeding 2m in depth, into which men enter shall be securely shored and timbered.

Notwithstanding anything said above, it shall be understood that the need for shoring shall receive careful and frequent consideration even in trenches of less than 1.5 or 2m in depth (as the case may be). When there is doubt as to the safety of the work without shoring, no further excavation or other work shall be continued until adequate shoring is provided.

Where the sides of trenches are sloped but not to within 1.5m of the bottom, the vertical sides shall be shored and the shoring shall extend at least 30 cm above the vertical sides. When open spaced sheathing is used a toe board shall be provided to prevent material rolling down the slope and falling into the part of the trench with vertical walls.

Shoring and timbering shall be carried along with the opening of the trench but when conditions permit protection work such as sheet piling may be done before the excavation commences.

All loose stones, projecting clumps of earth, pockets of unsuitable material which might come down on the workers in the trench or any condition which is a hazard, shall be either removed or the excavated sides adequately braced and the trench suitably guarded. On the steep slopes workmen shall not be permitted to work one above the other.

The contractor shall prepare the foundations at structure sites by methods which will provide firm foundation for the structures. The bottom and side slopes of common excavation upon or against which the structure is to be placed shall be finished to the prescribed dimensions and the surfaces so prepared shall be moistened and tamped with suitable tools to form firm foundation upon or against which to place the structure. The contractor shall prepare the foundation for the structures as shown on respective drawings. The natural foundation material beneath the required excavation shall be moistened if required and compacted in place.

If the Engineer-in-Charge considers it necessary to consolidate the foundation strata by grouting cement slurry, the drilling and grouting or any other foundation treatment shall be done by the contractor as directed by the Engineer-in-Charge and the payment will be as per the general contract document in respect of extra items.

Densities of the compacted foundation materials and the testing thereof shall be in accordance with paragraph 4.1.2.

Separate payment will not be made to the contractor for moistening and compacting the foundation of structures. The contractor shall include cost thereof in the prices bid per cubic meter of the item of the bill of quantities for preparation of foundations.

When unsuitable material is encountered in the foundation for structure the Engineer-in-Charge will direct additional excavation to remove the unsuitable material. The additional excavation shall be refilled as follows. In excavation in soils, the over excavation shall be filled on by selected bedding material and compacted. In excavation in rock it shall be filled by cement concrete 1:5:10 (one cement, five sand and ten aggregate of maximum size 40 mm by volume). No separate payment for excavation backfill will be made.

c. Over Excavation

Should remain of old building be met with the material shall be removed with wedges and levers. Blasting will not be allowed, without the permission in writing of the Engineer-in-Charge.

If bad ground or loose soil is met with, the contractor will be responsible for reporting the fact to the Engineer-in-Charge who will issue such orders as may be necessary. For extra excavation, concrete and masonry arising from bad ground, the contractors shall be paid treating this as additional quantity as per the contract data of contract documents.

All excavated earth, which is unfit or surplus to requirements for filling shall be spread in low lying areas nearby as instructed by the Engineer-in-Charge at the contractor's expense. Excavated earth not to be used for backfilling or levelling should be disposed within 3 days of excavation. That which will be reused should be stacked safely at designated site. If at any points in common excavation the foundation material is excavated beyond the lines required to receive the structure or is at any point in common excavation the natural foundation material is disturbed or loosened during the excavation process, it shall be compacted in places or where directed, it shall be removed and replaced as follows. In excavation in soils and in rock it shall be filled by cement concrete 1:5:10 (one cement five sand and ten aggregate of 40mm size by volume). Any and all excess excavation or over excavation performed by the contractor for any purpose or reason except for additional excavation as may be prescribed by the Engineer-in-Charge and whether or not due to the fault of the contractor shall be at the expense of the contractor. Filling for such excess excavation or over excavation shall be at the expense of the contractor.

d. Measurement for Payment

Excavation for structure will be measured for payment, for box cutting with vertical sides of foundation dimensions. The contractor will have to make his own arrangements for shoring; strutting provision of adequate slopes for the sides to prevent slips etc. and no separate charge will be paid for any incidental charges arising either excavation of foundation or construction of the structure.

The quantity for payment of excavation in soils and rock will be arrived at by taking pre levels and finished levels of respective strata. Block levels will be taken at one meter or less intervals. The levels will be plotted on a graph sheet and average levels arrived at for purpose of determining the quantity of excavation. The contractor's signature in token of his acceptance has to be recorded in the cross section sheets. Final payment will be based on levels only. The contractor shall expose the surface of the strata for the inspection of Engineer-in-charge for taking levels whenever the classification in strata gets changed.

e. Payment

Payment for excavation for structures will be made at the unit price per cubic meter bid therefore in the bill of quantities for excavation for structures shall include the cost of all labour and materials for coffer dam and other temporary construction, of all pumping and dewatering of all other work necessary to maintain the excavation in good order during construction, of removing such temporary construction where required shall include the cost of disposal of the excavated material in low lying areas nearby as instructed by the Engineer-in-Charge except that required overhaul will be paid for as provided in paragraph.at the contractor's expense.

4.2.3 Overhaul : (Leads & Lifts)

Payment for overhaul will be made only for excavated materials required for canal embankment only and no payment for the excavated material for the temporary and permanent embankment for roadways and road crossings and other excavated materials directed to be wasted beyond the limit of free haul (initial lead of 10 metres and lift of 2 metres). The entire costs of hauling of the above described materials any distance upto the free haul limit from the original position shall be included in the price bid in the schedule for excavation of the materials.

Unless otherwise specifically provided no overhaul payment will be made for haul of materials paid for as backfill around structures, revetment, gravel bedding for revetment or for selected bedding material used in preparing foundation for concrete canal lining.

a. Measurement and Payment

Upto 100m meters leads and 9 meters depth of canal excavation the payment for overhaul shall be on Head leads and as shown in the bill of quantities.

Head Leads

Where materials is taken from canal or borrow area excavation and deposited in canal embankment or disposal of on stock piles or waste banks, the lead will be measured as horizontal distance between the vertical central line of the pit cross section and the bank which is formed with excavation earth.

A 10 (ten) meter head lead is defined as one unit of excavated material hauled to a distance of 10 (ten) meters length or part thereof in excess of free haul limit of initial 10 (ten) meter and is considered as one extra lead.

The length of head will be measured in station units of 10 (ten) meter. The excavated material will be measured in one cubic meter units for excavation in rock and one cubic meter units for excavation in all soils. Payment for head leads will be made at the unit price for extra lead bid there for in the bill quantities.

Head Lifts

“Lift” will be the vertical distance obtained by adding up

- a. Half the depth of pit actually excavated.
- b. Half the maximum height of the formed with the excavated earth over existing ground or bank; and
- c. The difference between the top level of pit actually excavated and the level above which (b) is reckoned. One-meter head lift is defined as one unit of excavated material halted from one-meter height or part thereof in excess of free haul limit of initial 2 (two) meters lift.

The head lift will be measured in station units of one meter for soils and rocks. The excavated material will be measured in one cubic meter unit for excavation in rock and one cubic meter unit for excavation in all soils. Payment for head lifts will be made at the unit price for extra lifts bid there for in the bill of quantities.

b. Beyond 100 meters head lead and depth of excavation in canals exceeding 9 meters the payment for overhaul will be made as follows:

Measurement and payment for overhaul will be made as detailed below regardless of the methods and types of equipment used in excavation and hauling.

Where material is taken from canal excavation and deposited in canal embankment, the length of haul will be measured along the centre line of the canal from the centre of the material as found in excavation, to the centre of material as deposited regardless of haul routes actually traveled. The above length of haul will be distance measured along the centre line between the centre of the excavation as projected on the centre line and the centre of the deposit as projected on the centre line.

Where material is excavated from the canal or drainage canal and is deposited in embankment other than the embankment of canal from which excavated, the length of haul will be measured along a Straight – line distance as determined by the Engineer-in-Charge, from the centre of the material as deposited.

In measuring quantities of overhaul for payment, the volume of the overhauled material will be measured in cubic metre units in rock and for excavation in soils. The length of a haul will be measured as stated above in kilometers. Payment for overhaul will be made at the unit price bid for kilometer extra lead therefore in bill of quantities.

4.2.4 Disposal of Materials

a. General

All suitable material removed in excavation or as much thereof as may be needed as determined by the Engineer-in-Charge shall be used in the construction of canal embankment, roadway embankments and for selected bedding material or for backfill around structure. If there is an excess of material in the excavation for any reach, it shall be used to strengthen the embankment on either side of the canal, deposited in low areas uphill of the canal to eliminate trapped drainage or otherwise wasted by dumping in left out barrow pits nearby as directed by the Engineer-in-Charge. as directed by the Engineer-in-Charge. The disposal of excavated material shall be in accordance with clauses 8.1 and 8.2 of I.S. 4701 – 1982.

When directed by the Engineer-in-Charge excess material shall also be placed in low areas that may occur adjacent to bridge sites between the O & M Road ramps and the canal bank.

Material removed in excavation and not suitable or required for embankment, backfill or other required earthwork, shall be deposited in waste banks on right of way owned by or controlled by the Government as directed by the Engineer-in-Charge and any overhaul necessary shall be in accordance with Para 4.2.3.

The spoil obtained from canal cutting which is considered useful by the Engineer-in-Charge shall be fully utilized for the formation of both the banks of the canal to required profiles as shown in the drawings simultaneously with the excavation of the canal and without involving any remanding of the earth. The spoil not useful for the banks, has to be thrown parallel to the bank and away from it as may be directed by the Engineer-in-Charge during excavation to form the spoil bank. In case of deep cutting the spoil shall be so disposed off as not to result in unsightly heaps and shall be leveled and properly dressed. The top of both the finished banks shall slope away from the inner edge with the suitable gradient.

The useful rock obtained from the canal cutting shall not be mixed with other soils and shall be deposited on the outer slopes of the canal spoil bank. If the rock and the soil are mixed up while depositing at the spoil banks suitable deduction for the agreement rate as decided by the Engineer-in-Charge will be made which is binding on to contractor.

b. Cost

Except as specially provided in these specifications for payment for hauling or placing of individual items of excavated materials the cost of all work described in the paragraph shall be included in the unit price per cubic metre bid in the bill of quantities for excavation.

4.3 Back Fill

4.3.1 Backfill around Structures

a. General

The item of the schedule for backfill around structures including pipe portions structures includes all backfill required to be placed under these specifications.

b. Materials

The type of material used for backfill the amount thereof and the manner of depositing the material shall be subject to approval of Engineer-in-Charge. As far as practicable backfill material shall be obtained from material removed in required excavations for structures. But when sufficient suitable material is not available for this source of from adjacent excavation, additional material shall be obtained from approved borrow areas. The borrow pit excavation shall be in accordance with clauses 9.1 to 9.3 of I.S. 4701 – 1992.

Where sand filling is specified, the sand shall be clean, free from admixture of foreign material and approved by the Engineer-in-Charge before filling is commenced. Should there be a necessity to fill in a basement with sea sand prior written approval of the Engineer-in-Charge shall be obtained. Sand filling should be saturated with water before the construction is allowed to proceed.

Filling around structures shall have optimum moisture contents and well consolidated in layers of 15cm by ramming with Pneumatic tampers. approved rammers. Only in exceptional circumstances shall iron rammers be allowed with the approval of Engineer-in-Charge. When filling reaches to finished level the surface shall be saturated with water for at least 24 hours, allowed to dry and then rammed and consolidated to desired density in order to avoid any settlement at a later stage.

Except as otherwise provided below, backfill material to be compacted shall contain no stones large than 75 millimeters in diameter and if not to be compacted shall contain no stones larger than 130 millimeters in diameter. If the excavation for the foundations of the structure is in swelling soils, a layer of cohesive non-swelling soil conforming to I.S. 9451 – 1985 and paragraph 6.2.1 (b) should be interposed between the swelling soil and the structure and compacted to at least 95% standard proctors density.

c. Placing Backfill

Backfill shall be placed to the lines and grades shown on the drawings as prescribed in this paragraph or as directed by the Engineer-in-Charge.

The surface to receive the filling shall be first cleared free from all roots, vegetation or spoil and wetted.

All backfill shall be placed carefully and spread in uniform layers so that all spaces about rocks and clods will be filled. Backfill shall be brought up as uniformly as practicable on both sides of walls and all sides of structure to prevent unequal loading. Backfill shall be placed to about the same elevation on both sides of the pipe positions of the structures to prevent unequal loading and displacement of the pipe. The contractor shall at his cost provide at least 60 (sixty) centimeter thick earth cover over the top of pipe to prevent damage for construction equipment loads. If a

haul road is built over a pipe all backfill about and over the pipe shall be placed to a uniform surface and no humps or depressions will be permitted at the pipe crossing.

Backfill required to be compacted shall be compacted in accordance with paragraph 4.3.2.

d. Structures on Fill

Where the original ground surface is below the base of a structure or below the bottom of pipe all fill required for the structure foundation and all fill upto the bottom of the pipe shall be placed as compacted embankment. The embankment over the natural ground upto pipe bottom and over the pipe shall be laid in accordance with clause 9.2.4, 9.2.5 and 9.2.6 of I.S. 783 Indian code of practice for laying of concrete pipes. Clauses 9.2.5 and 9.2.6 incorporated specify that the compacted backfill shall be placed in horizontal layers not exceeding 15 centimeters after compaction. Heavy stones shall neither be dropped on top of the pipe nor shall be allowed to roll down the side of the embankment against the pipe.

e. Measurement and Payment:

The unit price bid there for in the bid of quantities for excavation of foundation of structure shall include cost of back-filling around the structure upto ground level. No separate payment will be made for backfill of foundation.

Refill of excavation performed outside the established pay lines for excavation for structures shall be placed in the same manner as specified for the adjacent backfill and such refill shall be placed at the expenses of the contractor. The cost of backfill shall be included in the applicable price bid in the bill of quantities of contract for excavation of foundation of the structure for which backfill is required.

4.3.2 Compacting Backfill around Structure

a. General

Unless otherwise shown on the drawings backfill around structures shall be compacted as prescribed in 4.1.2. The compacting equipment shall be so selected as to give maximum safety to the structure. The compaction of backfill under and over the pipes shall be in accordance with clauses 9.2.4, 9.2.5 and 9.2.6 of I.S. 783. In the case of very high embankments, the embankments shall be built to an elevation above the top of the pipe equal to the external diameter of the pipe which a trench shall be excavated and the pipe laid. When the backfill is placed above the pipe, the vertical surfaces of the trench above the top of the pipe shall not be more than 20 centimeters beyond the outside diameter of the pipe. After the pipe has been laid suitable backfill material shall be placed around the pipe and carefully completed in layers, not more than 15 centimeters after compaction upto the top of the pipe. Thereafter a loose fill of a depth equal to external diameter, of the pipe shall be placed before further layers are added and compacted.

Compacted backfill shall be placed in horizontal layers not exceeding 15 (fifteen) centimeters after compaction.

Heavy stones shall neither be dropped on top of the pipe nor shall be allowed to roll down the side of the embankment against the pipe.

b. Material and Compaction

The material used for backfill to be compacted shall be selected material containing no stones larger than 75 millimeters and as approved by the Engineer-in-Charge and obtained from required excavation or approved borrow pit. To prevent unequal loading and displacement of a pipe, the backfill shall be placed and compacted in layers having essentially the same top elevation on each side of the barrel. All materials in backfill are to be compacted as provided in paragraph 4.1.2.

c. Measurement and Payment

Payment for compacting backfill around structures will not be made as separate item and the unit price per Cubic meter bid therefore, in the bill of quantities for the excavation of foundation for structures is to include for compacting the backfill around the structure. The unit price bid in the bill of quantities for excavation of foundation of structure shall include the costs of furnished water and moistening the material also.

4.4.1. Dewatering

The area where excavation for foundation is to be done may require dewatering before and during excavation. The area is to be bounded by a coffer dam. This will facilitate diverting the fair weather flow in the river. The contractor may utilize this coffer dam to the best advantage and shall carryout any repairs required to them, further construct any new coffer dams, maintain all these coffer dams and such other temporary diversion and protective works as may be necessary for the execution of the work at his cost. The contractor shall furnish, install, maintained operate all necessary pumping and other equipment's required for dewatering the various parts of work free from water so as to keep up the schedule programme of work. No separate payment shall be made towards dewatering and the quoted rates for various items of works shall be inclusive of this component. Dewatering shall include removal of surface water as well as seepage water collected over the entire excavation area by use of pumps, it shall also include:

1. Pumping out water from the pool initially existing in the area where excavation is to be done to expose the river bed for taking up excavation.
2. Pumping out seepage water during the course of excavation and till completion.
3. Pumping out seepage water during the course of laying of foundation concrete, construction of stone masonry and other constructions below and above ground level.
4. The Contractor shall provide, install, maintain and operate all required pumps and equipment's of adequate capacity along with pipelines, temporary structures and materials required for dewatering the excavation area to keep it reasonably free from water to facilitate excavation, inspection and safety of the items of works with regard to excavation and for any other reasons as deemed fit by the Engineer. Adequate number of standby pumps with adequate capacity shall be installed at site to dewater the excavation area without impairing the progress of the works.

5. The pipes shall be laid suitably so that other works are not hindered and approach roads are not spoiled and in such a manner that the disposal of water is made to the final spot without repeat dewatering and that it does not cause, erosion, pollution or nuisance.
6. During the working season if the excavation area gets filled up with water due to unseasonable rains or floods additional dewatering shall have to be done by the Contractor for which adequate stand by capacity pump and equipment's shall be provided. The Contractor shall take abundant care to safe guard pumps and all other accessories involved in dewatering and no compensation whatsoever shall be paid for any claim likely to occur in such a case. If any damage to his own work is caused due to failure of dewatering arrangement, the Contractor shall have to set right such damage without any claim. If the works are damaged on account of failure of dewatering arrangement, the contractor shall make good all such losses to the Employer arising due to this separate payment will not be made towards dewatering.

CHAPTER V

MATERIALS

5.1 Materials

5.1.1 Stone for Masonry

a. General

The stones used for stone masonry shall conform to the relevant specification of clause 4.1 of I.S. 1597 (Part-I) 1967 and I.S. 1123 – 1975 code of practice for construction of stone masonry Part – I Rubble Stone Masonry. The stone shall not contain crystalline to crystalline silica or chest mica or any other deleterious materials like iron oxide, organic impurities etc. Where considered necessary the stone shall be examined spectrographically in accordance with I.S. 1123 – 1975.

Stone Masonry Using Granite: The stone of the required shall be obtained from the quarries specified in the lead chart appended to the bill of quantities. The common types of natural stones which are generally used are Granite and other igneous rocks, and shall be free from defects like decay, cavities, cracks, flaws, sand, holes, soft seams, veins, patches of soft or loose materials or any other deleterious materials like Iron Oxide, Organic impurities etc. They should be free from rounded, worn or weathered surface or skin or coating which prevents the adherence of mortar. All stones used shall be clean of uniform colour and texture, strong, hard and durable.

The stone shall be sound, free from cracks and decay and supplied from the specified quarry and shall have abrasion value of 45% and specific gravity of about 2.6. For the size of stone refer section 5.3.2.

The crushing strengths of the stones shall be determined in accordance with I.S. 1121 – 1974 (Part I to a). The strength shall be as detailed below in Table. 5 (A).

Table – 5 (A)

S.No.	Types of Stones	Minimum Crushing Strength
1.	Granite	1000Kgs./Sq.Cm.

The percentage of water absorption by the stones when immersed in water for 1 or 24 hours shall not exceed 5% of their dry weight as determined in accordance with L.S. 1124 – 1974.

Samples of the stones collected from the stone stacks by the contractor will be tested for the standards specified above and other relevant Indian Standards and stone stacks not conforming to the standards will be rejected and their cost shall be borne by the contractor. The contractor shall obtain these stones from the approved portions of the approved quarries only.

b. Cost

The cost of collecting the stones for masonry will not be paid separately and their cost including the cost of quarrying, transporting, stacking, royalties charges shall be included in the unit price per cubic meter bid therefore in the relevant item in the bill of quantities.

5.1.2 Sand for Masonry

General

The term sand is used to designate fine aggregate with maximum size of particle 4.75mm. The sand shall be of coarse category conforming to the Indian Standard Specification I.S. 2116 – 1980. “Sand for masonry mortars” as revised from time to time.

Where sand from different sources are being used at one mixer at the same time, these shall be blended to ensure uniform grading in successive batches.

Variations in the grading of sand being obtained from the same source shall be controlled by means of the fineness modulus test.

The following control limits shall be used.

- a. Controlled to limits of plus and minus 0.25 of running average of ten consecutive test samples.
- b. For natural sand, fineness modulus shall be greater than 2.30 and less than 3.10

For manufactured sand, the specifications should be the same as in relevant section under specifications for concrete.

Quality of Sand : The sand shall consist of natural sand, crushed stone or crushed gravel sand, or a combination of any of these. Sand shall be tested for its gradation, specific gravity, water absorption, fineness modules, soundness Petrography analysis, deleterious constituents and alkali aggregate reactivity.

The sand shall be hard, durable, clean and free from adherent coatings and organic matter and shall not contain more than permissible limit of clay balls or pellets as specified further below.

The sand shall not contain any harmful impurities, such as iron pyrites, alkalis, salts, coal, mica shale or similar laminated or other materials in such form or in such quantities as to affect adversely the hardening the strength, the durability or the appearance of the mortar applied or to attack any reinforcement used in the masonry work.

Unless found satisfactory, as a result of further test as may be specified by the Engineer in charge of the work, or unless evidence of such performance is offered which is satisfactory to him, the maximum quantities of clay, fine silt, fine dust and organic impurities in the sand shall not exceed the following limits.

- a. Clay, fine silt and fine dust more than 5 percent by weight (determined in accordance with Appendix C of I.S. 383 – 1963 and also I.S. 2386 (Part II) 1963.
- b. Organic impurities (Determined in accordance with I.S. 2386 (Part II) 1963) below that indicated by comparison with the standard solution specified in 6.2.2./ of 2386(part-II) 1963.

Sand shall generally conform to specifications given paragraph 7.1.6 except that the sand for mortar shall conform to the grading of sand given in clauses 4 of I.S.2116-1980 as detailed below in Table 5 (B)

Grading of Sand for use in Masonry Mortars

L.S.	Sieve Designation	Percentage passing by Mass
	1.	2.
	4.7mm	100
	2.36mm	90 to 100
	1.18mm	70 to 100
	600 Micron	40 to 100
	300 Micron	5 to 70
	150 Micron	0 to 15

A sand whose grading falls out-side the specified limits due to excess or deficiency of coarse or fine particles may be processed to comply with the standard by screening through suitably sized sieves and / or blending with required quantities of suitable sized sand particles.

Gradation of sand shall be so controlled that the fineness modulus of at least 9 out of 10 consecutive test samples of finished sand shall not vary by more than 0.10 from the average of 10 test samples. Sand having any deviation from the specified range of gradation and fineness modulus shall not be permitted to be used in work without the written permission of the Engineer-in-Charge.

If the sand brought to site is not clean, it must be washed clean in water. Fine dirt sand, or sea sand, or sand containing saline impurities shall on no account be used.

“The contractor shall get the representative samples of fine aggregate tested at regular intervals to exclude the potential alkali aggregate reactivity risk”.

b. Cost

The cost of sand for masonry will not be measured and paid separately and the cost of sand including the cost of stripping and transporting and storing and royalty charges shall be included in the unit price per cubic meter bid therefore in the relevant item of work in the bill of quantities for which this sand is required.

5.1.3 Cement

The contractor has to make his own arrangement for procurement of cement of required specifications. The specifications and conditions specified for supply of cement is given in paragraph 7.1.3 shall be applicable here also.

Ordinary Portland cement conforming to I.S. 269 – 1989 shall be used for Masonry work, Portland, Pozzolana Cement conforming to I.S. 1489 – 1991 may also be used for masonry work, in the event of non-availability of ordinary Portland cement with the approval of Engineer-in-Charge.

5.1.4 Water

The specifications and conditions specified for procuring water in paragraph 7.1.5 shall be applicable here also. If the GW levels in the block of the district fall in unsafe zone, the water for construction should not be sourced from ground in that block.

5.2 Mortar

5.2.1 Preparation of Mortar: Unless otherwise specified the cement mortar used in masonry works shall be cement mortar mix 1:4 (one cement four sand by volume).

Cement mortar for use in masonry shall invariably be produced in mechanical mixer and by weigh batching. In exceptional circumstance under specific orders from Engineer-in-Charge volumetric batching may be resorted to Hand mixing will not be permitted, except in exceptional circumstances such as mechanical breakdown of mixer or unless total requirement of mortar on a day, is so small in quantity for use on a particular day that mechanical mixing by the smallest available mixer will produce mortar in quantity larger than the total requirement, thereby causing wastage of mortar. Hand mixing (to be permitted in exceptional circumstances and when the quantity of work is very small) shall be done on a smooth water tight platform large enough to allow efficient turning over of the ingredients before and after adding water, sand after washing shall be stored in stock piles with a free draining base for at least 3 days to ensure that the material delivered for batching has a reasonably uniform moisture content. The surface moisture in sand shall be determined in accordance with the method prescribed in I.S. 2386 Part III 1963 as revised from time to time.

Water shall be added gradually and wet mixing continued at least for 2 minutes. Water should not be more than that required for bringing the mortar to the required working consistency of 90 to 130 millimeters as required in clause 9.1.1 of I.S. 2250 – 1981. The mix shall be clean and free from injurious kind of soil, organic matter or deleterious substances.

5.2.2 Time of use of Cement Mortar

Cement mortar shall be used as soon as possible after mixing before it has begun to set within 30 minutes after the water is added to the dry mixture.

Mortar unused for more than 30 minute should not be used and shall be removed from the site of work. The cost of such wasted mortar shall be borne by contractor. The use of re-tempered mortar will not be permitted to be used for the masonry.

5.2.3 Tests of Mortar

Mortar test cubes shall be cast for the mortar used on the work and shall be tested in accordance with Appendix – A of I.S. 2250 – 1965 code of practice for preparation and use of masonry mortars. Such cubes shall develop a compressive strength of at least 50 kgs/ Sq.cm for cement mortar mix 1:5 and 75 Kgs./Sq.cm for mortar mix 1:4 for mortar 1:3, 100 Kgs/Sq.cm for 28 days. Mortar not conforming to the specification will be rejected and the cost of such wasted mortar shall be borne by the contractor.

A minimum of three test specimens shall be made for each class of mortar. There shall be at least three test specimens of mortar for each day of masonry work even if only a few cubic meters of the particular mortar is manufactured in a day. The test shall satisfy the following criteria:

- i. The average strength of any 3 consecutive sample strength shall be greater than the specified strength;
- ii. The overall co-efficient of variation for any ten consecutive sample strengths shall be less than 15% (0.15)
- iii. Not more than 10% of the specimen strength shall be less than 35% of the specified strength Additional tests shall be carried out as and when directed.

5.2.4. Measurement and Payment

Cement mortar will not be measured and paid separately and its cost including cost of materials, mixing, transporting and placing shall be included in the unit price per cubic meter bid therefore in the bill of quantities of the contract for the relevant finished item of work for which cement mortar mix mentioned in the above paragraph is required.

5.3 Stone Masonry

5.3.1 General

Stone masonry in General shall conform to the requirement of I.S. 1597 : (Part –I) :1992 code of practice for construction of stone masonry and I.S. 1905 – 1987 for rubble stone masonry, Ashlar Masonry I.S. 1805 – 1973 specification for dressing natural building stones.

In the absence of further definitions cut stone masonry shall be executed with a fine dressing for the face.

By fine tooled dressing or fine dressing is meant the finest surface that can be given to a stone with a chisel and without rubbing.

- a. **Mortar :** Should the mortar perish i.e., become dry, white or powdery through neglect of watering the work shall be pulled down and rebuilt at the contractor's expense or should the contractor fail to cure the work to the satisfaction of the officer in charge of the work, the later may get the work done at the risk and cost of the contractor.

All masonry shall be washed clean on completion and all stains due to lime or other materials shall be removed from the face.

- b. **Air Entraining Admixtures:** The quantity of air entraining admixture to be added shall be as per directions of the Engineer-in-Charge from time to time in order to improve the workability of cement mortar. The percentage air entrained shall be tested and it shall normally be 8 to 12% of the cement mortar.

Moving Stone after it has been placed upon the Mortar Bed

If it is necessary to move a stone after it has been placed on the mortar bed, it should be lifted clear and reset. Attempt must never be made to slide it over stone already laid. Care must be taken not to disturb joints already laid when handling or moving stone.

Bed Plates

Bed plates shall be laid in all cases under the ends of beams, girders, roof trusses, etc. The bed plates shall be of sizes specified or ordered by the Engineer-in-Charge. In all important cases cut stone or reinforced concrete blocks will be used and the size and the quantity detailed and included under the relevant item of work in all other cases where cut stone or reinforced concrete bed plates are not demanded the contractor shall supply large stone of size and dressing as ordered by the Engineer-in-Charge and he will not be paid any extra-rate above the contract rate for the wall masonry for such bed plates.

5.3.2 Size of Stones

The length of the stones shall not exceed three times the height nor shall the stones be less than twice as long as height plus one joint. No stones shall be less in breadth than height and the breadth on the base shall not be greater than $\frac{3}{4}$ th thickness of the wall nor less than 20 centimeters.

5.3.3 Dressing of the Stone for coursed Ruble Masonry

The stones to be used for the faces of the masonry shall be hammer dressed. A hammer dressed stone also known as hammer faced stone shall have no short and irregular corners and shall have a comparatively even surface so as to fit well in the masonry. Unless otherwise specified the bushing on the face shall not be more than 40 millimeters on the exposed face.

Other stone surfaces like rock faced stone surface, or punched stone surface, or closed pitched stone surface, are to be brought out in dressing as directed by the Engineer-in-Charge.

5.3.4 Laying of Stones for Coursed Rubble Masonry

The masonry shall be laid to lines, levels, curves, shapes shown in the drawings.

Stones in the hearting shall be laid on their broadest face.

Stratified stones must be laid on their natural beds. All bed joints shall be normal to the line of pressure upon them.

In battered walls, the beds of the stones and the planes of course should be at right angles to the batter.

The courses of the Masonry shall ordinarily be pre-determined. Where there is to be variation in the depth of courses, larger stones shall be placed in the lower courses, the thickness of course decreasing gradually towards the top of the wall. The variation in depth of courses shall be adopted after the approval of the Engineer-in-Charge.

The stones shall thoroughly be wetted before placing in position in the masonry and before covering with mortar to prevent absorption of water from mortar. The bed which is to receive the stones shall be cleaned wetted and covered with a layer of fresh mortar to a smaller length so that stones can be laid before the mortar has set. All stones shall be bedded full in mortar and the vertical joints filled with mortar. The stones so set in the mortar should be settled carefully in place with a wooden mallet immediately on placement and solidly bedding in mortar before it has set. Clean chips and spalls shall be wedged into the mortar joints wherever necessary. Such wedging should not disturb face stones. No dry or hollow space shall be left anywhere in the masonry and each stone shall have all the embedded faces completely covered with mortar. Pouring of water to the mortar laid on the joints and stones is prohibited.

Face work and hearting shall be brought up evenly but the top of each course shall not be leveled up by use of flat chips.

In case of any stone already set in mortar is disturbed, or the joints broken the stone shall be taken out without disturbing the adjoining stones and joints, the mortar thoroughly cleaned from the joints and the stone reset in fresh mortar. Attempts shall never be made to shade over another already laid.

Shaping and dressing shall be done before the stone is laid in the work, No dressing and hammering which will loosen the masonry will be permitted after it is once placed.

The face stones shall be squared on all joints with beds horizontal and unless otherwise ordered by the Engineer-in-Charge they shall be set in regular courses of uniform thickness from bottom to top throughout. No face stone shall be less than 200 millimeters for 450mm thick walls and 250mm for 600mm thick walls. More than half the quantity of stones shall each have a volume of more than 1/70 cubic meter 1/50 cubic meter and 1/35 cubic meter being used in for walls of 400mm, 450mm and 600mm thickness respectively. The bed and vertical joints of the stone shall be hammer dressed square with the face for a width of not less than 75mm and 40mm onwards from the face respectively. Bushing shall not project more than 40mm in faces.

Unless otherwise ordered by Engineer-in-Charge the height of each course shall be the height of the stone used in the course. Stones of different depths should not be used. Height of each course shall not exceed breadth at face nor thickness inwards.

The face stone shall be laid alternately in headers and stretchers, so as to break joints by at least 75mm. Headers shall project at least 100mm beyond the stretchers. The joints should not exceed 12mm in thickness.

In walls upto a width of 600mm bond stones running through the wall shall be provided at intervals of 1.8 mts clear in every course. For walls thicker than 600mm a line of headers each header overlapping the other by 150mm or more shall be provided from front to back at 1.8 mts, intervals in every course. Care shall be taken not to place the bond stones of successive courses over each other. The positions of bond stones shall be marked with paint on both the faces for identification and verification.

All connected masonry in a structure shall be carried up neatly at one uniform level throughout but when breaks are unavoidable, the masonry shall be raked in sufficiently long steps for facilitating joining of old and new work. The stepping of the ranking shall not be more than 45 degrees with the horizontal.

For masonry hearting, all stones, chips, spells etc., shall be washed clean with water before use to ensure a good bond between the stone and the mortar. The interior of the masonry shall be filled in with good flat bedding stones set as close as possible and well covered with mortar. Chips and spells of stone should be covered with mortar around, should be wedged in the mortar joints wherever necessary such that there are no hollow spaces, anywhere in the masonry joints nor the mortar joints are thicker than specified. After the day's work the face and top of masonry shall be cleaned well with brushes or broom sticks to remove all the dead mortar on the stones.

Green work shall be protected from rain by suitable covering. During hot weather all finished and partly completed work shall be covered or wetted in such a manner as to prevent rapid drying. The racking of joints where necessary shall be done at the end of days work when mortar is green.

5.3.5 Dressing of Stones for random Rubble Masonry

The face stone shall be hammer dressed in the face, sides and the beds to enable it to come into close proximity with the neighbouring stone. The bushing in the face shall not project more than 40mm on an exposed face and 13mm on a face to be plastered. Stones with round surface shall not be used in construction.

5.3.6 Laying of Stones for Random Rubble Masonry

The laying of stones for Random Rubble Masonry is same as described in paragraph 5.3.4 except that the stones to be used for face shall be stones as described in paragraph.

5.3.7 Course Rubble Masonry

The course rubble masonry second sort shall conform to the standard specification for Random Rubble Masonry and bond with the face stones duly dressed being carried out continuously with face work paid for as coursed rubble for a certain thickness and the balance as random rubble.

5.3.8 The face stone shall be chisel dressed with face and all the four sides of the face for 8 cm which to enable it to come into close proximity with the neighbouring stone. The bushing in the face shall not project more than that allowed for the various lines of dressing as detailed below.

One line dressed	6mm
Two line dressed	4mm
Three line dressed	2mm

5.4 Curing

(a) All masonry surfaces shall be treated as specified to prevent loss of moisture from mortar until the required curing period is elapsed or until prior to placement of other masonry or concrete or back fill against surfaces. The contractor shall make his own arrangements to procure and convey water for curing.

All masonry built with cement mortar shall be kept watered continuously for a minimum period of two weeks from the date of construction. Watering shall be done carefully so as not to wash out the mortar joints or disturb the masonry in any manner.

If the contractor fails to do curing to the satisfaction of the officer-in-charge of the work, the latter will either make arrangement to cure the masonry at the risk and cost of the contractor or order the masonry to be pulled down. The masonry so pulled down should be rebuilt by the contractor at his own cost.

b. Payment

Payment for coursed rubble masonry in cement mortar mix 1:3 shall be made at the unit prices bid there for in the bill of quantities which unit price shall include cost with conveyance of all materials, dressing charges, cost of mixing mortar, laying the masonry and curing and all incidental charges there for required for satisfactory construction of the coursed rubble masonry.

Payment for Random Rubble masonry in cement mortar mix 1:4 shall be made at the unit prices bid there for in the bill of quantities which unit price shall include cost with conveyance of all materials, dressing charges, cost of mixing mortar, laying the masonry and curing and all incidental charges there for required for satisfactory construction of the coursed rubble masonry.

5.4.C. Dismantling the Masonry and concrete in cement mortar of the damaged

Structures defined in the schedule for rehabilitation shall be dismantled down to ground level or bottom of foundation or the posts iron works etc. Which are specified shall be dug upto or below ground level as may specify in the schedule item. All the materials obtained from dismantling shall be the property of the Government. The stone obtained during dismantling, shall be separated out and stacked or stored properly as directed by the Engineer-in-charge and should be accounted for. If the stone obtained found fit for construction shall be reused in the work or shall be disposed of by public auction.

Special care shall be taken that the materials are not damaged in the process of dismantling. The value of materials broken or damaged shall be recovered from the contractor. When dismantling is done for a portion of the structure remaining part of the structure should not be damaged. If damaged the dismantling and reconstruction will be done at the cost of the contractor.

All serviceable materials shall be removed and stacked or disposal off as specified.
For dismantling of structure blasting operation should not be resorted to Weather Conditions

Weather Conditions

Masonry work shall be temporarily suspended during extremely hot or rainy weather, when conditions are such that the masonry cannot be properly placed and cured.

5.5 Measurement and Payment

a. Measurement

The measurement for coursed rubble masonry shall be to the lines shown in the drawings, 400mm thickness from face will be measured as coursed Rubble Masonry in cement.

CHAPTER VI

CANAL LINING WITH CONCRETE

6.1 CANAL LINING WITH CONCRETE

6.1.1 PREPARING SUBGRADE FOR LINING

a. GENERAL

The provisions of this paragraph apply, to the preparation of all foundation upon which concrete lining is to be placed. The concrete lining may be cast in place or precast as shown in the drawing / or as directed by the Engineer in charge.

The items of schedule for preparing foundations for concrete lining includes all excavation below the underside of the concrete lining required for placing selected bedding material wetting the surfaces, furnishing or procuring, excavating from stock piles, hauling, placing, moistening and compacting the selected bedding material and trimming the entire canal. this item also includes excavation, and preparing of foundation for providing under drainage facilities and pressure relief arrangements and placing test sections to verify that the procedures result in acceptable results.

The trimming operation shall be carried out immediately prior to laying of the lining. the time involved will not exceed 24 hours but in exceptional cases 2 days may be permitted by the Engineer in charge

In all, the preparation of sub grade for concrete lining shall conform to clauses of I.S.3873-1993 (Indian Code of Practice for laying in situ cement concrete /Stone slab Lining on canal.)

b. PREPARATION OF SUB GRADE FOR EXCAVATION.

As specified in clause 4.2 of I.S. 3873 1993 the sub grade in rock shall be excavated to the required cross section. Over excavation in rock shall be minimized by using wedging and barring methods for final dressing. The excavation shall conform to para 4.2.1 & 4.2.2

I The aspects to be considered shall be as follows

- 1) The bed and side slopes of the canal excavation profile over which the bedding material, under drainage and pressure relief arrangements are to be placed and overlaid with lining, shall be finished accurately true to the dimensions shown in the drawings.
- 2) Removal of surface irregularities to the acceptable tolerance level - 6.25 mm on slopes and about 12.5 mm on the bed; consolidation of sub-grade; checking the density of sub-grade at regular intervals; introduction of under-drainage arrangement, as per drawing; moistening of sub-grade with fine spray of water through a nozzle.
- 3) Immediately prior to placing the 1st lift of selected bedding material the surfaces of the excavation both in bed and slopes receive the materials shall be thoroughly wetted to a depth of 15cm or to impermeable material, whichever is less as approved by the Engineer – in charge.

- 4) After the canal prism has been shaped to a reasonably true and even surface as described above, selected bedding material shall be placed on thoroughly wetted surfaces in layer of 15 centimeter maximum thickness to bring the bedding material to a height where it can be trimmed to form a true and even surfaces upon which to place the concrete lining or random rubble masonry lining.
- 5) In bed of the canal profile each layer of bedding material shall be placed and if required moistened and compacted in accordance with 4.3.6 of I.S. 3873- 1993.
- 6) Compaction of sub grade in bed should be done at OMC in layers of not more than 15cm thickness to obtain dry bulk density of not less than 95% of the density at Optimum Moisture Content. Consolidation of sides should be done by manual labourer to obtain the dry bulk density of not less than 90% of the density at OMC.
- 7) Before commencement of placement it shall be ensured that the sub grade has been properly prepared and is hard, uniformly well compacted and free of any loose pockets and that it is smooth and without any objectionable protractions. Prior to placement, it shall be moistened thoroughly so that moisture will not be withdrawn from freshly placed concrete. Moistening shall be done through fine spray nozzles of water so that moisture penetrates about 15 cm into the sub grade. The spray is to be such that no muddy conditions are created.
- 8) Preparation of Sub grade for laying of Precast slab.
Wherever precast concrete slabs are used for side lining it should not be directly placed on the sub-grade. Instead, over the finished sub-grade, a layer of 1: 5 cement mortar 15mm thick may be spread and water cured for 24 hours. Over this cement plaster and before commencement of slab laying, a layer of 6 mm thick 1:3 cement mortar may be applied. The PCC slabs may then be laid over the green mortar followed by raking, brushing, wetting and pointing of joints in CM 1:3

II Selection of Bedding Material

Rocks:

The selected bedding material in bed and sides of the canal in rock reaches shall be CC 1:5:10 (one cement five sand ten aggregate of maximum 40 mm size by volume) if the depth of filling is less than 15 (fifteen) cms and RR masonry with mortar 1:5 (one cement, five sand by volume) if the depth is more than 15 cm (fifteen) cms.

Ordinary Soils:

Selected bedding material in the case bed and sides profile in normal soils shall be semi pervious material with sub grade materials and thoroughly compacted.

Expansive soils:

In expansive soils, cohesive non swelling soil will be used. The thickness of CNS layer shall be designed to swelling pressure of soil or as directed by the Engineer in-charge.

The bedding material shall conform broadly to gradation and index properties as below:

	<i>Percent</i>
Clay (less than 2 microns)	15 to 20%
Silt (0.06 mm - 0.002 mm)	30 to 40%
Sand (2 mm - 0.06 mm)	30 to 40%
Gravel (greater than 2 mm)	0 to 10%
Liquid limit	greater than 30% but less than 55%
Plasticity Index	greater than 15% but less than 30%

The thickness of CNS layer given in table 1 of IS 9451-1994 (reproduced below)

Swelling pressure of soil	Min thickness of CNS material
KN/ M2	Millimeters
50 to 150	750
150 to 300	850
300 to 500	1000

The CNS layer shall be compacted to 95% proctor density. Compaction may be by power rollers. In large canals a horizontal width of about 2.25 m in a slope of 1:5:1 is required for compaction of power rollers of 8 to 10 T. this may be done in the form of terraces as shown in picture No. 2 . The extra width is to be trimmed to the required profile.

C. PREPARATION OF SUB GRADE FOR EMBANKMENTS.

I The aspects to be considered shall be as follows

- 1) The bottom and side slopes, including the surfaces of compacted embankment, compacted selected bedding materials and compacted back fill over which concrete lining is to be placed shall be furnished accurately to true and even surfaces to the dimensions shown on the drawings.
- 2) Removal of surface irregularities to the acceptable tolerance level - 6.25 mm on slopes and about 12.5 mm on the bed; consolidation of sub-grade; checking the density of sub-grade at regular intervals; introduction of under-drainage arrangement, as per drawing; moistening of sub-grade with fine spray of water through a nozzle.
- 3) Where placing and compacting selected bedding materials on a sloping foundation the layers may be placed parallel to the surface of the foundation. If at any point the foundation materials disturbed or loosened during excavation process or otherwise it shall be moistened if required and thoroughly compacted by tamping, rolling or other approved methods to form firm foundations upon which to place the concrete lining.
- 4) Immediately prior to placing the first lift of selected bedding materials the surfaces of the canal profile to receive the materials shall be thoroughly wetted to a depth of 15cm or to impermeable material whichever is less as approved by the Engineer in charge
- 5) After the canal prism has been shaped to a reasonably true and even surface as described above selected bedding materials shall be placed on thoroughly wetted surfaces in layers of 150mm maximum thickness to bring the bedding

material to a height where it can be trimmed to form a true and even surface upon which to place the concrete lining. Each layer of the bedding material shall be moistened in accordance with paragraph 4.3.6 of I.S. 3873 1993 and thoroughly compacted.

- 6) Compaction of sub grade in bed should be done at OMC in layers of not more than 15cm thickness to obtain dry bulk density of not less than 95% of the density at Optimum Moisture Content. Consolidation of sides should be done by manual labourer to obtain the dry bulk density of not less than 90% of the density at OMC.
- 7) The moisture content of the bedding material at the time of compaction procedures used shall be the same as those used in the demonstration section. Before commencement of placement it shall be ensured that the sub grade has been properly prepared and is hard, uniformly well compacted and free of any loose pockets and that it is smooth and without any objectionable protractions. Prior to placement, it shall be moistured thoroughly so that moisture will not be withdrawn from freshly placed concrete. Moisture shall be done through fine spray nozzles of water so that moisture penetrates about 15 cm into the sub grade. The spray is to be such that no muddy conditions are created

D TESTING

The contractor shall place test profiles at times and places designated by the Engineer – in-charge to show the accuracy of his construction procedures for placing and compacting in the bedding material.

The test profiles shall be checked conforming to clause 4.3.2 of IS 3873 -1993.

The bedding material shall be placed to sufficient thickness in the test sections to allow practical density testing of the compacted material. The dimensions and densities of the compacted bedding materials in the test section and the testing thereof shall be in accordance with I.S. Modification shall be made to procedures until it is demonstrated that acceptable densities are being consistently obtained. The procedures shall there be used to compact the selected bedding material on the remainder of the work.

At the end panels of the existing lining against which lining is to be placed under these specifications all loose material shall be removed and all voids beneath the existing lining shall be refilled and thoroughly compacted.

Suitable material trimmed from canal shall be used to complete canal embankments to construct road embankments for back fill about structures or for selected bedding materials. Where materials suitable for selected bedding material determined by the Engineer – in –charge if encountered during trimming operations and cannot be placed in one continuous operation such material shall be stockpiled along the right of way were designated by the Engineer – in –charge. All material required for preparing foundation shall be furnished by the contractor.

6.1.2 SECTION OF CANAL

1. Side Slope

In 10430 – 2000 has prescribed standards for side slopes. The same may be followed for lining works wherever possible.

However, in all IAMWARM works it is suggested to provide minimum side slope of 1:5:1 (i.e. 1.5 horizontal and 1.0 vertical) for lined canals in natural soil other than rock. This stable slope is for cutting and embankment portion of the lined canal.

2. Free board

Free board may be in accordance with clause 8.2. of I.S. 10430-2000

Discharge in cumecs	Free Board in meters
>10	0.75
3 to 10	0.60
1 to 3	0.50
<1	0.30
Less than 0.1(w.c)	0.15

3. Thickness of concrete lining

It is more appropriate to have same thickness of concrete lining for bed and sides. The following may be the thickness of lining. As recommended in table 1 of clause 5.2 of IS 3873 1993

Canal discharge mm)	Depth of Water (in m)	Thickness of lining (in mm)
(M3/sec)		
0 -5	0-1	50-60
5 -50	1-2.5	60-75
50-200	2.5-4.5	75-100
200-300	4.5-6.5	90-100
300-700	6.5-9.0	120-150

4. As a measure of protection against high velocities at transitions the thickness of lining may be doubled for a distance of say about 6 to 10m on both sides of any structure depending on the type of structure.

Alternatively, if so desired by the Engineer in charge of work masonry lining may be provided by sides as per standards.

5. Junction of bed and side lining

The lining shall be laid continuously at the junction on bed and side as per IS 5517. However, at the junction of bed and side, in order to provide smooth corners, the portion may be rounded with curvature or about 200 mm radius. To make up this transition, fillet material of PCC 1:2:4 may be provided as shown in the sketch – 3(a)

6. Keys or coping

At the top where lining is terminated, keys / coping may be provided for a width of not less than 300 mm and thickness not exceeding 100mm using same grade of lining material.

7. Banks

Bank widths may generally confirm to practical standards. However based on safety considerations the minimum top width may be as per IS specifications (IS 10430 – 2000). The top width of the inspection bank (Motorable) should not be less than 4.00 meter.

The slopes of the bank may be decided based on stability considerations depending on the type of soil for embankment. However minimum slope of 1.5:1 may be provided in the front.

8. Dowels

Both sides of the canal lining, should be prevented from rain water seeping beneath the lining for which dowels / parapet may be provided on service road side on spoil bank side reverse slope may be provided. The collected storm water may be disposed off by providing catch drains of suitable size.

6.1.3 CONCRETE PRODUCTION & PLACEMENT:

Proportioning of ingredients of concrete mix shall be weight only. Concrete mix shall be prepared in a batching mixing plant and transported to the placement. Sites in mobile transit mixers. Alternatively, the contractor may deploy mobile self-loading weigh batching mixing and transporting mixers (Say about 2 cum drum capacity) for preparing concrete mix and transporting to the placement sites. He may also deploy a number of mechanical concrete mixtures and requisite weigh batching arrangements (for proportioning of concrete mix by weight) at a number of fronts to place in – situ concrete lining on bed and sides of canal.

The water cement ratio normally be not more than 0.60 and the slump may range as recommended by clause 5.1 may be adopted. In general slump values ranging from 50mm to 70 mm for better workability and good finishing is recommended . Air entraining agents approved – by the Engineer -in –charge, shall be added in the concrete mix for canal lining for durability and better workability.

P.C.C in situ lining is proposed for the channel bed and sides in M15 concrete using 20mm machine crushed hard granite metal conforming to IS 383 standards.

Special attention shall be paid while placing the concrete on side slopes and suitable templates shall be provided. The concrete as placed shall be free of any segregation or honey combing and towards this end adequate workability and consistency of concrete mix shall be ensured and also more importantly, the concrete on slopes shall be efficiently and timely finished to a smooth finish. Water cement ratio and slump shall need to be adequately controlled. Water cement ratio be restricted to about 0.55. A slump of 60 to 70mm should generally be allowed. For heavier longitudinally operating slip form machines, a slump of 50mm at the laying point should be used. The slump can be appropriately modified (as directed by the Engineer in charge) as per site conditions to ensure efficient placement on side slopes. The contractor may use acrow type form work for side lining if he so desired

Manual placement

Adoption of manual placement for small section channels is usually done

In manual placement of concrete, the following procedure shall be adopted

Placement of concrete for lining either directly from the Concrete Mixer parked on either end of canal and delivery of concrete for lining by chutes or transporting concrete in Transit Mixers from the Batching & Mixing plant and delivery of concrete to the placement site of lining through chutes.

- i. Laying of in situ concrete for bed should be done for in alternate panels.
- ii. The panel width should vary from 2 to 3m and shall not exceed 3m.
- iii. Succeeding panel should be laid at an interval of 1 day.

Compaction of manually placed concrete lining with 'plate compactors' (vibrator hooked on to a steel plate fixed with a handle on either side); avoiding use of needle vibrators as these would puncture the sub-grade.

Mechanized placement

Mechanized placement with 'slip form steel gantry' in small section channels in case of lining in fairly long reach / reaches may be adopted.

Mechanized placement with Concrete Pavers in case of big size canal sections in long reaches to ensure better quality

6.1.4 CONTRACTION JOINTS IN LINING

The joints shall be made along straight line, to the detailed dimensions shown in the drawings and shall be maintained to the required shape and dimensions during any subsequent finishing operation until the concrete has hardened.

Transverse contraction joints to be provided in lined section at a spacing of not more than 36 x lining thickness. No longitudinal contraction joints to be provided in small section channels, where the wetted perimeter is less than about 12 m.

All contraction joints to be thoroughly cleaned of sand, soil, set grout / concrete and restored to the specified design shape, Air-water gun to be used for final clearance; filling of the contraction joints with approved sealing compound.

The grooves for the joint shall be as below.

<u>Lining thickness</u>	<u>Depth of groove</u>	<u>Width of groove</u>	
		<u>at bottom</u>	<u>at top</u>
65 – 70 mm	27 mm	9 mm	12mm
75 – 100 mm	35 mm	11 mm	14 mm
More than 100 mm	lining thickness / 3	11 mm	14 mm

Specification for preparation and application of sealant in the contraction joint is as follows:

- i. The sealant shall be prepared from the following materials.
Bitumen (Grade 85/25) conforming to IS 702-1961: 55%
Sand (Fines Modulus 1.0 to 1.5): 43%
Asbestos powder (white): 2%
- ii. Heat bitumen and sand in separate containers to 375° Fahrenheit. Mix the heated sand with two-third quantity of heated bitumen first and then add asbestos powder. Add the remaining one-third quantity of bitumen to this mix and stir it thoroughly.
- iii. After curing period is over, clean the groove, apply primer (conforming to IS 3384-1986 Table 1) and then pour hot sealant in the groove and finish it with trowel.

To facilitate special condition at structure and where concrete lining placing operations are stopped for the day, interrupted because of break down, or delayed by other causes, transverse construction joints may be placed at spacing that vary from the spacing's shown on the drawings. The spacing's shall not be less than one half of the spacing shown on the drawings.

The specification for application of sealant for construction joint is the same as for contraction joint

In case the contractor wishes to deploy the concrete paver the contraction joints shall be appropriately provided through netting groovier as per specifications at a spacing specified or as directed by the Engineer in charge.

Concrete sleepers below the joints may be provided as specified in clause 5.9.2 of IS 3873 – 1993

Expansion/ contraction joints should be provided at intersection of every cross masonry structures along the length of the canal and at locations specified in the drawing

6.1.5 POROUS CONCRETE PANELS/ POROUS PLUG

Porous concrete plugs with filter arrangement shall be provided at intervals in the bed and sides of the lining as per the drawings.

The gravel to be used for filter should be non-cohesive type. During execution the properties of sub soil should be ascertained at close intervals for suggesting suitable treatment if any needed.

No fine concrete used for the porous concrete plug shall be composed of 1 part of cement, four part of aggregate of not more than 20 mm size or specified shall be provided at intervals shown in the drawing or as directed by the Engineer – in – charge. The fines in the aggregates may be permitted up to 10 % of total weight of aggregate

The porous plug shall be so inserted into the lining that their porosity is not lost or reduced when the concrete for the lining is vibrated.

Water curing of plugs should be done for at least 21 days of the porosity of plugs shall be checked.

When precast slab side lining is adopted, the plugs along the slope may be substituted by precast slabs of same size of slab with no fine concrete as specified in the above with filter material at the back of the slab. The porous concrete slabs may be placed directly over the sub grade with filter beneath. The thickness of the porous slabs may be increased by about 18mm so as to be in conforming with overall thickness of lining and base preparation in other areas. This will also increase the structural strength of the no fines concrete slabs.

The tendered unit price bid for these items of schedule shall be inclusive of the manufacture, handling and installation in position complete and shall be inclusive of all these operations as well as those defined in the nomenclature of the item

6.1.6 MODEL SECTIONS OR TEMPLATES

Model sections or templates shall be constructed upto the of the lining and the templates be of size as shown in drawing or as directed by Engineer in charge at 15 meters' intervals in straight reaches and at 7.50 meters' intervals in curves as directed by the Engineer – in – charge as to achieve a smooth curved surface free from unsightly units and depressions. the model sections in bed and sides shall be constructed in random rubble masonry in CM1:4(one cement four sand by volume) and top plastered with cement mortar 1:4 (one cement four sand by volume) and in cement concrete with cement level of 250 Kg /cu.m using aggregate of 20 mm size in the case of canal lining. The top level of template will be the top level of lining.

6.1.7. FINISHING OF LINING

The surface of finished lining shall conform to clause 5.6 of I.S. 3873- 1993

6.1.8. CURING

Curing of concrete for canal lining both bed and sides either by paver finisher or suitable gantry or by conventional methods has to be carried out by water curing only by providing suitable pipe lines and connected equipment's.

Also curing of concrete for protective lining at structures and foundation concrete of structures has to be carried by water curing only.

Curing of Lining for bed & side: Bed lining to be cured through building small height earth bunds and ponding water; double layer of hessian cloth rolls to be placed on the side slopes & kept continuously saturated with water for 28 days.

Water curing for bed & side lining concrete lining to follow strictly according to 5.7 of I.S. 3873- 1993 specification as per clause 13.5 of IS 456 – 2000. The contractor shall also provide Hessian cloth rolls to cover the sides slopes of lined portions and sprinkle water over them to ensure full proof curing. For curing of bed lining he shall construct small earth bunds and impound water.

6.1.9. CORE TESTS

SECURING AND PREPARING TEST SPECIMEN FROM HARDENED CONCRETE

As specified in clause 4.1. of I.S. 1119 – 1959 (Indian Standard Methods of sampling and analysis of concrete). Cores shall be taken at random so as to ascertain segregation / honey combing of concrete; thickness of lining and compressive strength of concrete. In no case shall fewer than 3 cores shall be taken at a section. The contractor shall allow all facilities and cooperation towards collection of cores. The testing cores shall be carried out at the testing laboratories set up at the site by the contractor at his cost or at any other laboratory that the Engineer in-charge may so decide (cost of testing to be borne by the contractor) and the results given there by shall be considered correct and authentic by the contractor.

Final payment shall be made only after 28 days core test results are acceptable to the Engineer in charge as per section 17.4.3 of IS 456 – 2000. Concrete in the member represented by a core test shall be considered acceptable if the average equivalent cube strength of the core is equal to at least 85% of the cube strength of the grade of concrete is specified for the corresponding age, and no individual core has a strength less than 75%. In case the concrete does not conform to the acceptance criteria for strength. The Engineer-in charge reserves the right to reject the work or accept the same at a reduced rate, which will be in proportion to the percentage reduction in strength subject to a maximum of 5% provided it does not affect the structural integrity.

6.1.10. TOLERANCES

The intent of this paragraph is to establish tolerance that are consistent with modern construction practice. Yet governed by the effect that permissible deviations will have upon the structural action or operational function of the structure. Deviations from the established line, grades and dimensions shall be permitted to the extent set forth herein, the tolerance set forth herein if such tolerance impair the structural action or operational function of the lining. Concrete forms shall be set so as to ensure completed work within the tolerance limits specified herein.

The permissible tolerance for the canal lining shall be as under

a. Departure from established alignment : 50 mm on tangents, 100mm on curves.

b. Departure from established profile grade: 25 mm

c. Reduction in thickness of lining : 10 % of specified thickness, provided that average thickness is maintained as determined by daily batch, volumes

d. Variation from specified width of sections of any height : $\frac{1}{4}$ of 1 percent of specified width plus 25mm

e. Variation from established height of lining : $\frac{1}{2}$ of 1 percent of specified height plus 25 mm

Abrupt departure from the alignment and grade shall not be permitted.

6.1.11 APPLICABILITY OF SPECIFICATION

These specifications along with the accompanying drawings, schedule and other general specifications covering the lining in the reaches specified in the tender schedule and shall be carried out in accordance with or authorised deviations to the Tamilnadu standard specification reprint of 1983 and the relevant Indian Standard specification covering each item of work are also indicated in the bill of quantities and shall be read in conjunction with the special specifications.

6.1.12 MEASUREMENTS AND PAYMENTS.

For preparation of sub grade

1. Measurements for payment for the following items of preparation of foundation for concrete lining will be made.
2. Excavation in slushy soils and silt in canal bed.
3. Excavation up to underside of concrete lining for seating to lining
4. Preparation of sub-grade up to underside of concrete lining filter material duly compacted with power roller in the canal bed.
5. Preparation of sub-grade up to underside of concrete lining in sides and bed curvature with filter material duly watering and tamping.
6. Preparation of sub grade underside concrete lining in bed consisting of rock with rock spells and chips compacted with power roller.
7. Laying no fine concrete panels in concrete lining.

The payment of the above items will be made at the unit price bid therefore for relevant items in the bill of quantities.

No separate payment will be made for performing the test sections.

For concrete lining

Measurement and payment for concrete in lining will be in the units of square metres for the specified thickness of lining. The payment will be made on the relevant unit price per 1 sqm. bid in the bill of quantities for lining concrete item of the work. The unit price shall include the cost of furnishing all materials and performing all works required for concrete construction

GENERAL NOTES GIVEN BY THE DESIGN WING

1. The proposed rehabilitation / modernization works are based on IS 10430/1982, 10646/1991, 3873/1993 and 4558/1995.
2. The design has been formulated based on the particulars furnished by the Executive Engineer, River Conservancy Division, Trichy vide Lr.No. F.IAMWARM / 2016 dated: 19.10.16.
3. The proposed free board of the channel are as per recommendations stipulated in clause 8.2 in IS 10430-2000.
4. Necessary transitions have to be made by providing a splay of 3:1 on the U/S side and 5:1 on the D/S side to negotiate the bed width where change in bed width occur.

PLASTERING AND POINTING

6.2 Materials

6.2.1 Sand for Mortar for Plastering and Pointing

a. **General :** Sand shall generally conform to specification given in paragraph.

7.1.6 except that the sand for preparation of Mortar for plastering and pointing shall conform to the following graduation, shown in Table 6 (A) as per I.S. 1661 – 1972 (Reaffirmed in 2017).

Table 6(A) Requirement of Grading for Sands for External Plastering and Rendering

I.S.	Sieve Designation	Percentage by weight passing
	1:	I.S. Sieve 2.
	10.00 mm	100
	4.75 mm	95 to 100
	2.36 mm	95 to 100
	1.10 mm	90 to 100
	600 microns	80 to 100
	300 microns	20 to 65
	150 microns	0 to 50

The procurement of sand for mortar for plastering and pointing shall conform to the specification given in paragraph.

6.2.1.b Cost

The cost of sand for mortar for plastering and pointing will not be measured and paid separately and the cost of sand including the cost of stripping and transporting and storing and royalty charges shall be included in the unit price per cum bid therefore in the relevant item of work in the bill of quantities for which this sand is required.

6.2.2 Cement

The specification and conditions specified for supply of cement in paragraph 7.1.3 shall be applicable here also.

Ordinary Portland cement conforming to I.S. 269 – 2015 shall be used for preparation of mortar for plastering pointing and for masonry work.

6.2.3 Water

The specification and condition specified for procurement of water in paragraph 7.1.5 shall be applicable here also.

6.2.3.1 Mortar

6.2.3.1 (a). Preparation of Mortar for Plastering Work

Unless otherwise specified the cement mortar used in plastering work shall be in cement mortar 1:4, 20mm thick over R.R. masonry works as specified in bill of quantities. The other specifications and conditions enunciated in paragraph 5.2.1 shall apply for this mortar for plastering work also.

6.2.3.1 (b) Preparation of Mortar for Pointing

The cement mortar used in pointing work shall be cement mortar mix 1:3 (one cement three sand by volume). For masonry on the upstream side raised pointing and for the masonry on the downstream side simultaneous flush pointing as specified in the bill of quantities.

The other specifications and conditions enunciated in paragraph 5.2.1 shall apply for this mortar for pointing work also.

6.2.3.2 Plastering with Cement Mortar 1:4 (by volume) – 20mm thick

6.2.3.2 (a) Preparation of surface

The roughening of the background improved the bond of plaster. All joints shall be thoroughly raked. After roughening the surface, care shall be taken to moisten the surface sufficiently before plastering as otherwise freshly exposed surface may tend to absorb considerable amount of water from the plaster. The surfaces shall be wetted evenly before applying the plaster. Care shall be taken to see that the surface is not too dry as this may caused lack of adhesion or excessive suction of water from the plaster. A fog spray may be used for this work. As far as possible, the plaster work shall not be down under hot sun.

6.2.3.2 (b) Laying of Plastering with cement mortar 1:4 20mm thick.

The mortar used for plastering shall be stiff enough to cling and hold when laid. To ensure even thickness and true surface, plaster shall be applied in patches of 150mm x 150mm of the required 12mm/20mm thickness at not more than 2 meters intervals horizontally and vertically over the entire surface to serve as guides. The surface of these guides shall be truly in the plane of the to be finish plaster surface and truly plump. The mortar shall then be applied to the surface to be plastered between the guides with a trowel. Each trowel full of mortar shall overlap and sufficient pressure shall be used to force it into thorough contact with the surface. On relatively smooth surfaces, the mortar shall be dashed on with the trowel to ensure adequate bond. The mortar shall be applied to a thickness slightly more than that specified, using a string, stretched out between the guides. This shall then be brought to a true surface by working with a long wooden float small-motion. The surface shall be periodically checked with a string stretched across it. Finally the surface shall be rendered smooth with a small wooden float, over working shall be avoided. All corners arise, and junctions shall be brought truly to a line with the necessary rounding or chamfering. If it is necessary to suspend the work at the end of the day it shall be left in a clean horizontal or vertical line not nearer than 150mm from any corner or arises or on parapet ops or on copings etc. When recommencing the work, the edges of the old work shall be scraped clean and treated with cement slurry before the new plaster is laid adjacent to it. After the first coat is done it shall be kept undisturbed for the next 24 hours and thereafter kept moist and not to be permitted to dry until the final rendering is applied.

After the plaster has sufficiently hardened cement slurry with cream like consistency shall be applied as thinly and evenly and rubbed to a fine condition. The finished surface shall be cured with water for a minimum period of 14 days.

Should the mortar crack or perish, the work shall be removed and redone at the contractors expense or should contractor fails to cure the work to the satisfaction of the Engineer-in-charge the latter may cure the work at the risk and cost of the contractor. All portions which sound hallow when tapped of found to be soft or otherwise defective shall be cut out in regular shape and redone as directed by the Engineer-in-Charge.

6.2.4 Pointing to R.R. Masonry Cement Mortar Mix 1:3

6.2.4.1 Preparation of Surface : The joints in the masonry shall be raked out to a depth not less than the width of the joint or as directed when the mortar is green. Joints shall be brushed clean of dust and loose particles with a stiff brush. The area shall then be washed and the joint thoroughly wetted before pointing is commenced.

6.2.4.2 Flush pointing with cement mortar mix 1:3 for Random Rubble Masonry

The pointing to be done shall be flush pointing with cement mortar 1:4 (one cement, four sand by volume). The mortar shall be pressed into the raked out joints according to the type of pointing required. The mortar shall not be spread over the corners, edges or surface of the masonry. The pointing shall then be finished as detailed below. The mortar shall be finished off flush and level with the edges of the stones, so as to give a smooth appearance. The edges shall be neatly trimmed with a trowel and a straight edge. When finished the mortar pointing shall be restricted to the width of the joints and all superfluous mortar shall be removed with a trowel. The work shall be executed as rapidly as possible (and not again touched after it has begun to set) and kept wet for a minimum period of 14 days thereafter. The pointing shall also be cured for 14 days thereafter. The pointing shall also be cured for 14 days.

6.2.5 Measurement and payment

A. Plastering : The measurement of plastering will be in units of square meters and it shall be paid at the relevant unit prices bid per one square meters of plastering in the bill of quantities which unit price shall include the cost of materials, the conveyance, charges for preparation of mortar including mixing charges and charges for performing the plastering work as illustrated in this division including curing.

B. Pointing : Unless specified in the contract documents, no separate payment will be made for pointing random rubble masonry and coursed rubble masonry and the unit prices for the rubble masonry in the bill quantities, shall include the cost of materials, their conveyance, charges for preparation of mortar including mixing charges and charges for performing the pointing work as illustrated in this division, including curing.

CHAPTER VII

7.1 General Concrete Requirements

7.1.1 Composition

a. General :

The I.S. 456 – 2000 code of practice for plain and reinforced concrete shall be followed.

For mass concrete IS 457 is to be followed.

Concrete shall be composed of cement, sand coarse aggregate, water and admixtures (if any) as specified and all well mixed in batching plant / mechanical concrete mixers by weight and brought to the proper consistency. Batching if used plant shall conform to I.S. Code No. 4925 – 2000. Proportioning of ingredients of concrete mix shall be by weight only. In exceptional circumstances and that too for a short period when quantity is very small the Engineer-in-charge may allow batching by volume for the restricted quantity. For works in which water tightness is required the specification in I.S. 3370 (Part I and Part II) 1965 Para 1 to 10 shall be applied.

Mixing:

Concrete shall be mixed in a mechanical mixer and shall be as dense as possible, plastic enough to consolidate well and stiff enough to stay in place on the slopes.

Mixing shall be continued until there is a uniform mixing of the materials and the concrete is uniform in colour and consistency. The time of mixing shall be as shown in table 1 of I.S. 457 – 1957/reproduced below:

Capacity Mixer	Minimum Time of Mixing	
	Natural Aggregate	Manufactured Aggregate
3m ³ or larger All mixer	2 minutes	2½ minutes
2m ³	1½ minutes	2 minutes
1m ³ or smaller	1¼ minutes	½ minutes

Concrete Classification

It is related to the specified 28 days compressive strength and shall conform to the requirements set out in the Table below:-

Classification of Concrete (IS 456 – 2000 and IS 457)	Max Size Aggregates	Characteristic Compressive Strength N/ mm ² for 15cm Cube at 28 days
1. M – 10	40	10
2. M – 15	80/40/20	15
3. M – 20	40/20	20
4. M – 7.5	40	7.5
5. M-30	20	30
6. M-25	40/20	25

The acceptance criteria shall conform to Para 15 of 456 – 2000. The values of standard deviation be determined from test results or may be obtained as per Table 8 of I.S. 456 – 2000.

Note : The mix shall be designed to produce the grade of concrete having the required workability and characteristic strength not less than appropriate values given in above table. In case the quantity concrete is small, the Engineer may allow the use of nominal mix concrete as per Table 9 of I.S. 456 – 2000.

b. Nominal maximum size of aggregates :

For sizes of aggregates I.S. 383 – 1970 shall apply. The coarse aggregate to be used in concrete shall be as large as practicable, consistent with required strength, starting of reinforcement and embedding items, and placement thickness. The size of the coarse aggregate to be used will be determined by the Engineer-in-charge and may vary incrementally according to the conditions encountered in each concrete placement. Nominal maximum size of aggregate for concrete in structures shall be as indicated in the relevant drawings appended to the contract documents smaller coarse aggregate than specified shall be used where the opinion of the Engineer-in-charge that proper placement of concrete is impracticable with the size of the aggregate specified in the drawings. Refer Para 5.6.3 (Page 5.87) 5.6.3.1. Dry mix concrete the aggregate shall be properly graded and grading of both the coarse and fine aggregate shall be checked as properly as possible to ensure that specified grading is maintained.

c. Mix Proportions

In proportioning concrete, the quantity of both cement and aggregate should be determined by mass. Water shall be either measured by volume in calibrated tanks or weighed. Batching plant shall conform to I.S. 4925 – 2000. (Indian Standard Specification for batching and mixing plant). In case the concrete mixers are used proper weigh batcher shall be deployed for proportioning the concrete mix. All measuring equipment shall be maintained in a clean serviceable condition and their accuracy periodically checked. Adjustments shall be made as directed to obtain concrete having suitable workability, impermeability, density strength and durability without the use of excessive cement. The acceptance or rejection of concrete shall be as per the acceptance criteria laid down in clause 15 of I.S. 456 – 2000. The net water cement ratio exclusive of water absorbed by the aggregate shall be sufficiently low to provide adequate durability in concrete. The water cement ratio for various grades of concrete shall be as determined and ordered by the Engineer-in-Charge.

Admixtures of Pozzolana, if ordered, shall conform to the requirements specified in I.S. 9103 – 1979 (Indian Standard Specification for admixtures for concrete).

Test strength of samples : The test of sample shall be the average of the strength of three specimens. The individual variation should not be more than 15% of the average.

Standard Deviation (i) Standard deviation based on test result

- (a) Number of test results:- The total number of the results required to constitute an acceptable regard for the calculation of standard deviation shall be not less than 30 attempts shall be made to obtain the 30 test results, as early as possible, when mix's used for the first time.
- (b) Standard deviation (i) to be brought upto date. The calculation of the standard deviation shall be brought up-to-date after every change of mix design and at least once a month.
 - ii. Determination of standard deviation :-

- (a) Concrete of each grade and shall be analysed separately to determine its standard deviation.
- (b) The standard deviation of concrete of a given grade shall be calculated using the following formula from the results of individual tests of concrete of that grade.

$$\text{ESTIMATED STANDARD DEVIATION } (S) = \sqrt{\frac{\sum \triangle^2}{n-1}}$$

Where \triangle = deviation of the individual test strength from the average
 n = number of sample test results.

Where sufficient test results for a particular grade of concrete are not available the value of standard deviation given in the following table may be assumed.

(As per Table 8 of IS 456:2000)

Grade of Concrete	Assumed standard Deviation – (N/mm ²)
M 7.5	
M10.....	3.5
M15.....	3.5
M20.....	4.0
M25.....	4.0
M30.....	5.0

Acceptance Criteria; It shall conform to section 15 of I.S. 456 – 2000/IS 457 as applicable.

CEMENT LEVELS

The cement content in different concrete mixes will be as per concrete mix design.

For mass concrete the placement temperatures and cooling arrangements required (pre-cooling of coarse aggregates, mixing of ice etc.) will be as per temperature control studies to be carried out as per IS 14591.

The cement content in mass concrete is to be optimized based on concrete mix design with trial mixes.

d. Consistencies

The slump of concrete at the placement shall be as follows :

1. Reinforced Cement Concrete

S.No.	Place Condition/	Degree of workability	Value of workability
1.	Concreting of lightly reinforced sections without Vibration or heavily reinforced sections with vibrations	Medium	25mm to 75mm slump
2.	Concreting of heavily reinforced sections without vibration	High	75mm to 125mm slump

- II. For plain concrete work slump requirements mentioned in item above are applicable. If the specified slump is exceeded at the placement, the concrete is unacceptable. The Engineer-in-Charge reserves the right to require lesser slump whenever concrete of such lesser slump can be consolidated readily into place by means of vibration specified by the Engineer-in-charge. The use of any equipment which will not readily handle and place concrete of the specified slump will not be permitted.

To maintain concrete at proper consistency, the amount of water and sand batched for concrete shall be adjusted to compensate for any variation in the moisture content or grading of the aggregates as they enter the mixture. Addition of water to compensate for stiffening of the concrete after mixing but before placing will not be permitted. Uniformity in concrete consistency from batch to batch will be required.

The contractor shall transport concrete from the mixer to the placement site as rapidly as possible/practicable by methods that will prevent segregation or loss of ingredients or slump loss in excess of 25 mm and / or a loss in air content of more than 1% before the concrete is placed in the works. Whenever the length of travel from the mixing plant to the place of deposit is such that the concrete unduly compacts or segregates, suitable agitators shall be installed by the contractor with conveying system.

7.1.2. Concrete Quality Control Measures and Concrete Quality Assurance Test Program me

- Concrete Quality Control Measures: The contractor shall be responsible for providing quality concrete to ensure compliance of the contract requirements.
- Making and curing concrete test specimens in the files will conform to I.S. 516 – 1959.
- Capping cylindrical concrete specimens will conform to I.S. 516 – 1959.
- Compressive strength of concrete specimens will conform to I.S. 516 – 1959 and Para 16.1, 16.2 & 16.3 of I.S. 456 – 2000 core testing.

- e. The Engineer shall introduce OK cards and prescribe the format there of the contractor / his authorized representative should be required to fill up the first sets of columns and thereafter, present the OK card to the construction Supervision Engineer (authorized by the Engineer/quality control Engineer). For checking the concerned items of works for final clearance / OK any defects pointed out by the construction supervision staff shall be promptly rectified by the contractor and the fact of doing so duly recorded on the OK card.
- f. The contractor shall carry out tests on materials, concrete, Masonry, Mortar, Sub grade (of canal lining) etc., The frequency of testing shall be in terms of relevant Indian standards / Tamil Nadu standards as directed by the Engineer.

Temperature of concrete and weather conditions

Clause no. 7.1.11 may be referred to. Concrete operations shall be temporarily suspended during excessively hot weather when the air temperature inside the forms exceeds 45 C or when conditions are such that the concrete cannot be placed at the required temperature. Whenever necessary exposed surfaces of fresh or green concrete shall be adequately shaded from the direct rays of the sun and protected against pre-mature setting or drying by curing under continuous fine spray of water. The grading of coarse and fine aggregate shall be checked as frequently as possible; the frequency being determined by the Engineer-in-Charge to ensure that the specified grading is maintained.

It is important to maintain the water cement ratio constant at its correct value. To this end determination of water contents in both fine and coarse aggregates shall be made as frequently as possible the frequency being determined by the Engineer-in-charge.

- a. Sampling Procedure and Frequency: A random sampling procedure shall be adopted to ensure that each concrete batch has a reasonable chance of being tested. i.e. the sampling should be spread over the entire period of concreting and should cover all mixing units.
- b. frequency: The maximum frequency of sampling of concrete of each grade shall be in accordance with the following:

Quantity of concrete m ³	Number of Samples
1 to 5	1
6 to 15	2
16 to 30	3
31 to 50	4
51 and above	4 plus one additional sample for each additional 50m ³ or part thereof.

Note: At least one sample shall be taken during each shift.

Test Facilities

The contractor shall erect and maintain a site laboratory with necessary equipments and accessories for testing the materials during execution of works at his own cost. The samples shall be collected and the tests conducted in the presence of the engineer or his authorized representatives. Alternatively, the contractor may test the materials during execution of works at the laboratories approved by the Engineer at the contractors own cost provided that the samples are collected and given proper identification marks in the presence of the engineer or his authorized representative.

7.1.3. Cement

a. General

Cement shall conform to clause .5.1 of I.S. 456 – 2000/ as applicable for the purpose of specifications. Cement used shall be any of the following with prior approval of the Engineer-in-Charge.

1. Ordinary or low heat 33 grade Portland cement conforming to I.S. 269 – 2015 (I.S. Specification for ordinary Portland cement)
2. Portland Pozzolana cement (fly ash based) conforming to I.S. 1489(Part 1)
3. Portland Slag cement conforming to IS 455
4. 43 Grade Ordinary Portland Cement conforming to IS 8112
5. 53 Grade Ordinary Portland Cement conforming to IS 12269

The provisions of this paragraph apply to cement for use in works under this package including works requiring for grout and mortar and for other items is provided for in the applicable paragraphs of these specification covering the items for which such Portland cement required. The Contractor shall make his own arrangements for the procurement of cement of required specifications required for the works. Transportation from the place of supplying to the batching plant shall be in weather tight trucks, and other means which will protect the cement completely from exposure to moisture. However, the intervals between required cleaning will normally be not less than 6 months. Each consignment of bagged cement shall be stored separately so that it may readily be distinguished from other consignment and shall be stored in a dry enclosed area protected from mixture. Storage of materials shall be as described in I.S. 4082 – 1977 (I.S. recommendation stacking and storage of construction materials at site). To prevent undue ageing of bagged met after delivery, the Contractor shall use bags of cement in the chronological order in which they were delivered to the job site. All storage facilities shall be subject to approval of the Engineer-in-Charge and shall be constructed to prevent easy access for inspection and anticipation.

b. Acceptance of Cement

Tested cement will be supplied by the contractor according to Clause 10.1 of I.S. 269 – 1976. I.S. 1489 – 1976. The Engineer-in-Charge shall and, whenever required get the cement samples tested in the laboratory.

- c. Recovery of Cost of Cement in wasted Concrete etc. The cost of cement used in wasted concrete in replacement of damaged or defective concrete, in extra concrete required as a result of over excavation and in concrete placed by the Contractor in excavations intentionally performed to facilitate the contractor's operation shall be borne by the Contractor himself. No extra payment will be made to contractors for such additional quantity.

7.1.4. Admixtures

The contractor shall use Air Entraining admixtures or other admixtures (mineral or chemical admixtures) as directed by the Engineer-in-Charge. Admixtures shall be of uniform consistency and quality and shall be maintained at the job site at uniform strength of solution. Admixtures shall be batched separately in liquid form in containers capable of measuring at one time the full quantity of each admixture required for each batch. Chemical admixture which harm the quality and strength of concrete shall not be used in the concrete.

Admixtures to be used in concrete shall confirm to I.S. 9103 – 1979 Indian Standard Specifications for Admixtures for concrete.

7.1.5 Water

The water used in making and curing of concrete, mortar and grout shall be free from objectionable quantities of silt, organic matter injurious amounts of oils, acids, salts and other impurities etc. as per I.S. Specification No. 456 – 2000.

The Engineer-in-charge will determine whether or not such quantities of impurities are objectionable.

Such determination will usually be made by comparison of compressive strength water requirement, time of set and other properties of concrete made with distilled or very clean water concrete made with the water proposed for use. Permissible limits for solids when tested in accordance with I.S. 3025 – 1964 shall be as tabulated below.

PERMISSIBLE LIMITS FOR SOLIDS IN WATER

1. Organic	Maximum permissible limit 200 mg/litre
2. Inorganic	3000 mg/litre
3. Sulphate (as SO ₃)	400 mg/litre
4. Chlorides (as CL)	2000mg/litre for plain concrete work and 500mg/litre for RCC work.
5. Suspended matter	2000mg/litre

The PH value of water shall generally be not less than 6

If any water to be used in concrete, mortar, or grout is suspected by the Engineer-in-charge of exceeding the permissible limits for solids, samples of water will be obtained and tested by the Engineer-in-Charge in accordance with I.S. 3025 – 1964.

7.1.6 Sand (Fine Aggregate)

a. General

The term sand is used to designate aggregate most of which passes 4.75 millimeter I.S. Sieve and contains only so much coarser material as permitted in Clause 4.3 of I.S. 383 – 1970. Sand shall preferably, be predominantly natural sand which may be supplemented with crushed sand to make up deficiencies in the natural sand grading. In the event of non availability of natural Sand, manufactured sand (M Sand) may also be used upon approval of the Engineer.

All sands shall be furnished by the contractor from any approved sources specified in the contract. Sand as delivered to the batching plant shall have uniform and stable

moisture content. Determination of moisture content shall be made as frequently as possible, the frequency for a given job being determined by the Engineer-in-Charge according to weather conditions (I.S. 456 – 2000).

b. Quality

The sand shall consist of clean, dense, durable, uncoated rock fragments as per I.S. 383 – 1979.

Sand may be rejected if it fails to meet any of the following quality requirements.

Organic Impurities in Sand

Colour no darker than the specified standard in clause 6.2.2 of I.S. 2386 Part II 1963. (Indian Standard method of test for aggregates for concrete Part – II estimation of deleterious materials and organic impurities)

Sand shall be tested with 3% solution of caustic soda or sodium hydroxide, called colour test. A colour less liquid indicate clean said free from organic matter. A straw coloured liquid indicates some organic matter but not enough to be seriously objectionable, but a dark colour liquid shall mean that the sand contains injurious amount of organic impurities and not fit for use unless it is washed and a retest shows that it is satisfactory.

Sand shall be screened before use. If sand brought to site is not clean it must be washed clean in water. Fine drift sand or sea sand or sand containing saline impurities shall on no account to be used.

Sodium Sulphate Test for Soundness : The sand to be used shall pass a sodium or magnesium Sulphate accelerated test as specified in I.S. 2386 (Part – v) 1963 for limiting loss of weight.

Specific Gravity may range between 2.5 -2.6

Deleterious Substances

The amounts of deleterious substances in sand shall not exceed the maximum permissible limits prescribed in table 1 clause 3.2.1 of I.S. 383 – 1970 (Indian Standards Specification for coarse and fine aggregates from natural source for concrete) when tested in accordance with I.S. 2386 – 1963.

c. Grading

The sand as batched shall be well graded and when tested by means of standard sieves shall conform to the limits given in table – 4 of I.S. 383 – 1970 and shall be described as fine aggregates, grading zones – I, II, III and IV. Sand complying with the requirements of any of the four grading zones is suitable for concrete. But, sand conforming to the requirements of grading zone – IV shall not be used for reinforced cement concrete work.

IS Sieve designation	Percentage passing for			
	Grading Zone I	Grading Zone II	Grading Zone III	Grading Zone IV
10 mm	100	100	100	100
4.75 mm	90-100	90-100	90-100	95-100
2.36mm	60-95	75-100	85-100	95-100
1.18mm	30-70	55-90	75-100	90-100
600 micron	15-34	35-59	60-79	80-100
300 micron	5-20	8-30	12-40	15-50
150 micron	0-10	0-10	0-10	0-15

7.1.7 Coarse Aggregate

A. General

For the purpose of these specifications the term “Coarse Aggregate” designate clean well graded aggregate most of which is retained on 4.75 mm I.S. Sieve and containing only so such finer material as permitted for various types described under cause 2.2 of I.S. 383 – 1970. Coarse Aggregate for concrete shall consist of uncrushed stone, or crushed stone and partially uncrushed and crushed stone.

Coarse Aggregate for concrete shall be furnished by the contractor from the approved quarries specified in the contract documents. The contractor shall, unless otherwise specified in the tender notice and subsequently on this basis in contract, be responsible for payment of seigniorage, quarry fess etc., on all materials.

Coarse Aggregate as delivered to the batching plant shall generally have uniform and stable moisture content. In case of variations, clause 9.2.3 of I.S. 456 – 2000 shall govern during batching.

b. Quality

The coarse aggregate shall consist of naturally occurring (crushed or uncrushed) stones, and shall be hard, strong, durable clear and free from veins and adherent coating, and free from injurious amount of disintegrated pieces, alkali, vegetable matter and other deleterious materials. Coarse aggregate will be rejected if it fails to meet any of the following requirements.

1. Los-Angles Abrasion Test

The abrasion value of Aggregate when tested in accordance with the method specified in I.S. 2386(Part – IV) using Los-Angles machine shall not exceed 30% for Aggregate to be used in concrete for wearing surface and 50% for aggregate to be used in other concrete.

2. Aggregate Crushed Strength Test

Aggregate crushing value, when determined in accordance with I.D. 2386 (Part – IV) 1963 shall not exceed 45% for aggregate used for concrete other than wearing surface and 30% for wearing surfaces. As an alternative to the crushing strength test, aggregate impact value will be determined with the method specified in I.S. 2386 (Part – IV) 1963. The aggregate impact value shall not exceed 45% by weight

for aggregate used for concrete for other than wearing surface, and 30% by weight for concrete for wearing surfaces and 30% by weight for concrete for wearing surfaces such as runways, roads and pavements.

3. Soundness Test

The coarse aggregate to be used for all concrete works shall pass a sodium or magnesium sulphate accelerated soundness test specified in I.S. 2386 (Part – V) 1963 and the average loss of weight after 5 cycles shall not exceed the limits specified in clause 3.6 of I.S. 383 – 1970.

4. Specific Gravity: Should be 2.60 Minimum

5. Deleterious Material

The maximum quantity of deleterious materials in coarse aggregates shall not exceed the limits specified in Table I of I.S. 383 – 1970 when tested in accordance with I.S. 2386 – 1963.

Note: The aggregate shall be periodically got tested to exclude any “Potential aggregate reactivity “(Alkali Aggregate Reaction)

c. Separation

The coarse aggregate shall be separated into nominal sizes during production of the aggregate. Just prior to batching, the coarse aggregate shall be pressure spray and finish screened on multitask vibrating screen capable of simultaneously removing undersized and oversized aggregate from each of the nominal aggregates entering the batches occur during intermittent batching then a dewatering screen will be required after the finish screens to remove the excess free moisture. Finish screens shall be mounted over the batching plant or on the ground adjacent to the batching plant. Finish screens shall be so mounted that the vibration of the screens will not be transmitted to the batching bins or scales and will not alter the accuracy of the weighing equipment in any other manner.

The method and rate of feed for finish screening shall be such that the screens will not be over-loaded and will result in a finished product which meets the grading requirements of these specifications. Coarse aggregate shall be fed to the finish screens in a combination of alternations of nominal sizes which will not cause noticeable accumulation of poorly graded coarse aggregates in any bin. The finish screened aggregate shall pass directly to the individual batching bin in such a manner as to minimize breakage. Below 2.36mm materials passing through the finish screens shall be wasted unless it is routed back through a sand classifier in a manner which causes uniform blending with the natural sand being processed. Water from finish screening shall be drained in such a manner as to prevent aggregate wash water from entering the batching bins and weighing hoppers. Washing and finish screening requirements shall be subject to approved by the Engineer-in-Charge.

Coarse aggregate for concrete shall be separated into various nominal maximum sizes specified in the relevant drawings. Separation of the coarse aggregate into the specified sizes after finish screening shall conform to the grading requirements specified in Table – 2 of I.S. 383 – 1970, when tested in accordance with I.S. 2386 –

(Part – I) 1963 (Method of test for aggregates for concrete Part – I) particle size and shape.

Coarse aggregate for mass concrete may be separated as previously herein specified. Separation of the coarse aggregate into the various sizes shall be such that when tested in accordance with I.S. 2386 (Part – I) 1963 shall conform to the requirements specified in Table – 3 of I.S. 460 (Part) 2000 (Specification for test sieves Part – I wire cloth test sieves). The Petrography examination and potential reactivity of coarse aggregate shall be tested as per I.S. 2386 – 1963 part VIII and Part VII respectively.

7.1.8 Production of Sand and Coarse Aggregate

a. General

Sand and coarse aggregate for concrete, and sand for mortar and grout, may be obtained by the Contractor from the approved source shown in the contract documents. The approval of deposits by the Engineer-in-charge shall not be constructed as constituting the approval of all or any specified materials taken from the deposits, and the contractor will be responsible for the specified quality for all such materials used in the work.

Tests performed on samples of sand and coarse aggregate obtained from the approved sources mentioned in the contract documents indicated that they are generally suitable. Well on advance of their usage on the works, the Contractor shall have his own testing of materials and satisfy himself that they conform to the specification mentioned herein for use in the works.

No separate payment will be made for such tests. If sand and coarse aggregate are to be obtained from a deposit not previously tested and approved by the Engineer-in-Charge, the Contractor shall submit representative samples for pre-construction test and approval, not less than 60 days before the sand coarse aggregates are required for use. Each, sample shall approximately consist of 100 Kg. of material. In addition to preconstruction tests, the approval of deposits, the Engineer-in-Charge may test the aggregates for their suitability during their processing. The Contractor shall provide such facilities as may be necessary for procuring representative samples free of cost at the aggregate processing plant at the batch plant. Final acceptance of aggregate will be based on the samples taken from the batch plant or mixing platform.

But use and development of any such deposit shall be subject to the approval by the Engineer-in-Charge. Any royalties (seigniorage or other charges) required for materials taken from deposits not owned by the State Government and controlled by the Department of Mines and Geology, Government of India shall be paid by the Contractors.

The contractor shall at regular intervals, get representative sample of coarse and fine aggregates tested for the alkali-aggregate reactivity potential.

b. Developing Aggregate deposits

If the Deposit is owned by the State Government and controlled by the Department of Mines and Geology, the portion of the deposit used shall be located and operated so as to detract the usefulness of the deposit or any other property of the Government, and so as to preserve, in so far as practicable, the future usefulness on value of the deposit. The Contractor shall carefully clear the area of deposit, from which the aggregates are to be produced, of trees, roots, bush sod, solid, unsuitable sand and gravel and other objectionable matter. Materials including stripping, removed from deposits owned by the Government and controlled by the Director of Mines and Geology, Government of India and not used in the work covered by these specifications shall be deposited off as directed.

Due to the overall construction programme, it is quite likely that more than one contractor may elect to use one of the sources named in the contract document. The Contractor shall be responsible for co-coordinating his work such that it does not interfere with the operations of other Contractors who are also using any given source.

c. Processing Raw Materials

Processing of the raw materials shall include screening and washing as necessary to produce sand and coarse aggregate conforming to the requirements of paragraphs 7.1.1 and 7.1.7 Processing of aggregates produced from any source owned by the State Government and controlled by the Department of Mines and Geology shall be done at an approved site. Water used for washing aggregate shall be free from objectionable quantities of salts, organic matter and other impurities. Oversize metal may be crushed to correct aggregate particle size, and excess material in individual coarse aggregate size fractions may be crushed to give the largest practical yield of usable concrete aggregate.

Suitable types of crushers shall be used with the prior approval of the Engineer-in-Charge for producing coarse aggregates. Crusher fines produced in the manufacture of coarse aggregates may be used in sand upon approval from the Engineer. Crushed stone, sand, crushed gravels and crusher fines if used shall be predominantly cubical in shape and shall be blended uniformly with natural sand by routing them together through sand classifier. Crusher coarse aggregate shall be blended uniformly with natural coarse aggregate by routing both together through the classifying screens.

In the process of developing and producing aggregates from approved sources for work under these specifications, the provisions of Environmental quality protection shall apply.

d. Cost

This shall be included in the applicable prices bid in the schedule for concrete filler road works in which the aggregates are used, which prices shall include the cost of stripping and transporting and storing materials. The contractor shall not be entitled to any additional compensation for materials wasted from a deposit, including crushed fines, excess materials of any of the sizes into which the aggregates are required to be separated by the Contractor, and materials which have been described by the reasons of being above the maximum sizes specified for use.

7.1.9 Batching

a. General

The Contractor shall notify the Engineer-in-Charge 24 hours before batching concrete. Unless inspection is waived in each case, batching shall be performed only in the presence of an Engineer authorised by Engineer-in-Charge.

The Contractor shall provide, maintain and operate the equipment as required to accurately determine and control the prescribed amounts of the various materials entering the concrete mixers. The quantities of cement, sand and each size of coarse aggregate entering each batch of concrete shall be determined by individual weight measurement. Cement has to be weighed separately from the aggregates. Sand and coarse aggregate may be weighed with separate scales and hoppers.

The grading of aggregates will be controlled by obtaining the coarse aggregate in different sizes and blending them in the right proportions, the different sizes being stocked in separate stock piles. The grading of coarse and fine aggregates will be checked as frequently as directed by the Engineer-in-Charge. Water shall be added by weight or measured by volume in calibrated tanks. The amount of added water shall be adjusted to compensate for any observed variations in the moisture contents. Determinations of moisture content in the aggregate shall be in accordance with I.S. 2386 (Part – III) Indian Standard Method of test for aggregate for concrete Part – II specific gravity, test. The amount of surface water carried by aggregate will be estimated in accordance with Table – 1 of I.S. 456 – 2000.

When cement and aggregates are hauled from a central batching plant to the mixtures, each batch shall be protected during transit to prevent loss and to limit the prehydration of cement. Separate compartments with suitable covers shall be provided to protect the cement or they shall be completely enfolded in and covered by the aggregates to prevent wind loss. If cements enfolded in moist aggregates or otherwise exposed to moisture and delays occur between batching and mixing, extra cement will be added to each batch. The extent of such extra cement will be so as to attain the required quality. No separate payment for this addition of extra cement.

b. Equipment

1. The batching plant to be used shall conform to the requirements of I.S. 4925 – 1968 (I.S. specifications for concrete batching and mixing plant). Tests for accuracy of measuring equipment shall be made in the presence of Engineer-in-Charge or his authorised Engineer and shall be subject to his approval. In addition to monthly tests the contractor shall perform additional tests as and when requested by the Engineer-in-Charge. The Contractor shall make such adjustments, repairs or replacement as may be necessary to meet the specified requirements for accuracy of measurement. All measuring equipment shall be maintained in a clean serviceable condition.
2. Each weighing unit shall be spring less and shall visibly register the actual weights during the weighing operation and not just indicate when a prescribed weight has been obtained. Each batch weight indicator and volumetric dispenser shall be in full view of the operator. Batching controls shall be interlocked so that a new batch cannot be started until the weighing hoppers have been completely emptied of the last batch and the scales register zero weight.

3. Equipment for conveying batched materials from weighing hoppers into the mixer shall be constructed maintained and operated so as to prevent spillage of the batched materials and overlap of batches.
4. Equipment for handling cement on the batching plant shall be constructed and operated so as to prevent noticeable dust during the measuring and discharging of such each batch of materials . Aggregate batch bins shall be so constructed as to be self cleaning during draw down. Coarse aggregate shall be deposited in the batch bins directly over the discharge gates. Convenient facilities shall be provided for readily and safely obtained representative samples of cements, sand and each size of coarse aggregate from the discharge stream between batch bins and the weighing hoppers or between the batch hopper and mixer.
5. The water batching device shall be constructed so that the water will discharge quickly and freely into the mixer without the objectionable dribble from the end of the discharge pipe and such that leakage will not occur when the valve are closed. In addition, equipment shall be capable of adjusting batch water by a litter as possible and there shall be a means of accurately introducing small increments of water into wash mixer after batching for occasional final tempering of the concrete.
6. The equipment shall be capable of adjusting to compensate for the varying moisture content of the sand and coarse aggregate and to adjust the mix proportions as needed.
7. The Contractor shall inform a batch plant supervisor prior to and after changes and adjustments in batching equipment and control instrumentations.

7.1.10 Mixing

a. General

The Concrete ingredients shall be thoroughly mixed in a mechanical mixer designed to positively ensure uniform distribution of all component materials through out the concrete at the end of the mixing period. Mixing shall be done as per clause 9.3 of I.S. 456 – 2000/IS 457 as applicable. The mixer should comply with I.S. 1791 – 1985 (I.S. Specifications for batch type concrete mixers).

.The concrete as discharged from the mixer, shall be uniform in composition and consistent from batch to batch. Workability shall be checked at frequent intervals as per I.S. 1199 – 1959. Mixers will be examined regularly by the Engineer-in-Charge for mortar or to wear of blades. The mixing shall be continued until there is a uniform distribution of the materials so that the mass is uniform in colour and consistency and to the satisfaction of the Engineer-in-Charge. If there is segregation after unloading the concrete should be remixed.

Any mixer that at any time produces unsatisfactory mix, shall not be used until repaired. If repair attempts are unsuccessful, a defective mixer shall be replaced. Batch size shall be at least 10% of but not in excess of the rated capacity of the mixer unless otherwise authorised by the Engineer-in-Charge.

B. Central Mixers :

Water shall be admitted prior to and during charging of the mixer for not less than the time specified by the Engineer-in-Charge. The minimum mixing time shall be 2 minutes and as per Para 6.3.1 (a). The minimum mixing time as required by the observations of the mix delivered from mixer.

Excessive over mixing which require addition of water to maintain the required concrete consistency will not be permitted.

In addition to I.S. 1971 – 1968, the mixing equipment shall conform to the following further requirements.

1. Plant configuration shall be such that the mixing of each mixer can be observed from a safe location which can be easily reached from the control station. Provisions shall also be made so that the operator can observe the concrete in the receiving hopper or bucket as it is being dumped from the mixers.
2. Each mixer shall be controlled with a timing device which will indicate the mixing period and assure compliance of the required period of mixing.
3. The batch plant shall be equipped with an interlocking mechanism which will prevent concrete batches from mixers which are not empty.
4. Truck Mixtures. Each truck mixer shall be equipped with accurate water meter located between the supply tank and mixture and having a dial or digital indicator and a reliable revolution counter, located near the water meter, which can be readily reset to zero for indicating there total number of revolutions of the drum from each batch. Each mixer shall have affixed thereto a metal plate in which the drum operations in terms of volume for both mixing and agitating and the maximum and minimum speeds of rotations of the drum are plainly marked.

Mixing shall be continued for the minimum period specified, and may be increased and No. of revolutions, speed of the drum may be such that the mix as delivered from the mixer has uniform distribution of materials and the mass is uniform in colour and consistency to the satisfaction of Engineer-in-Charge. In no case, shall the design water content be exceeded.

Concrete shall be discharged within half an hour after introducing of the mix water and cement into the mixer. Each batch of concrete, when delivered at the job site from commercial ready mix plants, shall be accompanied by a written certificate of batch weights and time of batching.

7.1.11 Temperature of Concrete

Concrete operations shall be temporarily suspended during excessively hot, cold, or inclement weather, or whenever conditions are such that the concrete cannot be properly placed and cured.

During freezing weather, all aggregates shall be free from ice, snow, heavy frost and frozen lumps. Whenever the temperature is likely to fall below -7°C (or 20°F) within the subsequent 48 hours, concreting operations shall be suspended unless provision has been made to protect the concrete from freezing. Under such circumstances,

the water used for mixing shall be heated and the temperature of concrete shall be kept at not less than 10°C (or 50°F) for at least 72 hours after placement.

During hot weather no concrete shall be deposited when the temperature within the forms is more than 50°C (or 120°F). Whenever necessary, exposed surfaces of fresh or green concrete shall be shaded from the direct rays of the sun and protected against premature setting or drying by being cured under continuous fine spray of water

During continued rainy weather or heavy downpours, all freshly placed concrete shall be covered and protected against surface wash. Special precautions shall be taken to prevent the formation of lean seams or sand streaks.

Mortar coats for bonding construction joints as specified shall not be placed or left exposed if the rain is tending to increase the water-cement ratio of the mortar. Under no conditions shall concrete be placed in a pool or a sheet of water. The top of all badly washed or streaked surfaces shall be removed and wasted before depositing the next course.

For mass concrete the thickness of concrete lifts should not be more than 1.5m .The time interval of 3 to 5 Days shall be kept between consecutive lifts. Placement temperatures and cooling arrangements required (pre-cooling of coarse aggregates, mixing of ice etc.) will be as per temperature control studies to be carried out as per IS 14591. Either Low heat cement or Portland Pozzulana cement or Portland Slag cement may be used in mass concrete. The cement content is to be optimized during concrete mix design.

7.1.11 A: CONCRETE MIX:

The Concrete mix shall either be the design mix or nominal concrete mix as per the directions of the Engineer. Design mix is preferred to the nominal mix. If design mix concrete cannot be used for any reason on the work for grades of M20 or lower, nominal mixes (as per Table 9 of ISS 456:2000) may be used with the approval of the Engineer.

The Engineer may allow “volumetric batching” of concrete mix in special cases where weigh-batching is not practical, provided accurate bulk densities of materials to be used in the concrete mix are determined before hand. The mass-volume relationship should, then, be checked as frequently as possible.

7.1.11 B: WATER CEMENT RATIO:

It is very important to maintain the water-cement ratio as is specified in the design mix concrete. The water-cement ratio should not be allowed to exceed 0.55-0.60 range. Wherever considered necessary, plasticizers/super –plasticizer should be used with the approval of the Engineer to restrict the water-cement ratio.

7.1.11 C: COMPACTION, FINISHING and CURING of CONCRETE:

Adequate compaction should be ensured by providing suitable workability and by employing suitable vibrators. Full compaction is particularly important in the vicinity of construction joints and reinforcement. Good finishing of concrete should be ensured for its durability. Any honey-combed patches in the hardened concrete (after removal of formworks) should be properly treated. Applying any plaster over

the honey-combed concrete to hide such defect be strictly forbidden. The concrete should be adequately cured to enhance durability.

Exposed surfaces of concrete should be kept continuingly in a days or wet condition by water curing or by covering with hessian cloth rolls and kept continuously wet for at least 14 days. Approved curing compounds may be used in lieu of water curing with the approval of the Engineer. Such curing is known as “Membrane Curing”.

7.1.11 D: **ACCEPTANCE CRITERIA OF CONCRETE:**

The Concrete shall be deemed to comply with the strength requirements when both the following conditions are met.

- a) The mean strength determined from any group of four non –overlapping consecutive test results complies with the appropriate limits in column 2 of Table 11 of IS 456:2000, as outlined below: and
- b) (b) Any individual test result complies with the appropriate limits in Col.3 of Table 11 of IS 456:2000, as outlined below.

Specified Grade	Mean of the group of 4 Non-overlapping consecutive Test Results in N/mm ²	Individual Test Results in N/mm ²
M15	$\geq F_{ck} + 0.825 \times \text{standard Deviation}$ or $F_{ck} + 3N/\text{mm}^2$, whichever is greater	$\geq F_{ck} - 3N/\text{mm}^2$
M20 (or) above	$\geq F_{ck} + 0.825 \times \text{Standard Deviation}$ or $F_{ck} + 4N/\text{mm}^2$, whichever is greater	$\geq F_{ck} - 4N/\text{mm}^2$

Note: F_{ck} for M15 mix is 15 N/mm² and for M20 is 20 N/mm²

7.1.12 Forms

a. **General**

Form shall be used wherever necessary, to confine the concrete and shaping it to the required lines. If a type of form does not consistency perform in an acceptable manner, as determined by the Engineer-in-Chief charge, the type of form shall be changed and method of creation shall be modified by the contractor subject to approval of the Engineer-in-Charge.

Plum and string lines shall be installed before, and maintained during concrete placement. Such lines shall be used by the contractor's personnel and by the Engineer in charge and shall be in sufficient number and properly installed as determined by the Engineer-in-charge. During concrete placement, the contractor shall continuously monitor plumb and string lines, form positions and immediately correct deficiencies.

Forms shall have sufficient strength to with stand the pressure resulting from placement and vibration of the concrete and shall be maintained rigidly in position. Where form vibrators are to be used, forms shall be sufficiently rigid to effectively transmit energy from the form vibrators to be concrete, while not damaging or altering the positions of forms. Forms shall be sufficiently tight to prevent loss of mortar from the concrete. Chamfer strips shall be placed in the corners of forms and

at the top of wall placement to produce beveled edges on permanently exposed concrete surfaces. Interior angle of inter-seating concrete surfaces and edges of construction joints shall not be beveled except where indicated on the drawings.

Suitable struts or stiffeners or ties shall be used for the form work wherever necessary. All supports shall be braced and cross braced into two directions. All splices and braces shall be secured by bolting unless specially intended otherwise. All struts shall be firmly supported against settlement and slipping by suitable means as directed. All supports shall be cut square at both ends and firmly supported against settlement and slipping. When the form work is supported on soils, planks, sleepers etc., shall be used to properly disperse the loads. In case, the supports rest on already completed beam or slab, suitable props shall be provided under the latter.

The joints between the form work and existing concrete shall also be "grant tight". Forms shall overlap the hardened concrete in the lift previously placed by not more than 75mm and shall be tightened against hardened concrete so that when concrete placement is resumed the forms will not allow loss of mortar at the construction joint.

- b. The form work shall be of well seasoned timber or steel. When timber forms are used they shall be lined with M.S. Sheet or other suitable smooth faced non-absorbent materials as specified. Support may be of timber or steel. Suitable wedges in pairs to facilitate adjustment and subsequent releasing of forms shall be provided preferably at the upper end of the supports. The details of the proposed form work and supports shall be submitted to the Engineer-in-Charge and got approved before erection.

Cleaning and Treatment of Forms : At the time concrete is placed in the forms, the surface of the forms shall be free from encrustations of mortar, grout or other foreign materials. Before concrete is placed, the surfaces of the forms designated to produce F1, F2 and F4 finishes shall be oiled with commercial form oil that will effectively prevent sticking and will not stain the concrete surfaces. For timber forms, form oil should consist of pure refined pale paraffin mineral oil or other approved form oil. For steel forms, form oil shall consist of refined mineral oil suitably compounded with one or more ingredient which are appropriate for the purpose.

- c. In case of columns, retaining walls or deep vertical component the height of the column shall facilitate any placement and compaction of concrete and suitable arrangement may be made for securing the form to the already poured concrete for placing the subsequent lifts. No steel ties or wires used for securing this form work shall be left exposed on the face of the finished work.
- d. Suitable insets for blackouts for electrical and other service fixtures where necessary shall be provided in the required locations as specified.
- e. Cleaning and oiling of forms at the time the concrete is placed in forms, the surfaces of the forms shall be free from encrustations of mortar, grout or other foreign material. Before concrete is placed, the surface of the forms shall be oiled with commercial forms of oil.

- f. **Removal of Forms :** The stripping of form work shall conform to clause 10.3 of I.S. 456 – 1978. The contractor shall be liable for damage and injury caused by removing forms before the concrete has gained sufficient strength. Forms on upper sloping faces of concrete such as forms on the water sides of warped transitions, shall be removed as soon as the concrete has attained sufficient stiffness to prevent sagging. Any needed repairs or treatment required on such sloping surfaces shall be performed at once and be followed immediately by the specified curing. To avoid excessive stresses in concrete that might result from swelling of forms, wood forms for, wall openings shall be loosened as soon as the loosening can be accomplished without damages to the concrete. Forms for the openings shall be constructed so as to facilitate such loosening. Forms shall be removed with care so as to avoid injury to concrete and any concrete so damaged shall be repaired in accordance with paragraph 7.1.26.
- g. **Cost :** The cost of furnishing all materials and performing all work for constructing forms, including any necessary treatment or coating of forms are to be included at applicable prices bid in the schedule under the relevant form works under bill of quantities.

7.1.15 PLACING REINFORCEMENT BARS

The following tolerance shall apply for placing of reinforcement bars.

1. Variation of protective covering with 50 mm cover 6 mm
with 75 mm cover 12 mm
2. Variation from indicated spacing Provided that number of bars
25mm required by spacing is not varied.

7.1.17 REINFORCING BARS

a. General

Reinforcing bars shall be placed in the concrete as shown in the drawing or as directed. For anchoring the concrete to the Hard rock provision of Anchor rods is made in the Drawing and the Contractor shall place these anchor rods to the spacing and depth shown in the drawings.

b. Materials

Unless shown otherwise on the drawings the reinforcement to be used shall be High yield strength deformed (H.Y.S.D) bars of grade F.E. 415 conforming to I.S. 1786 – 1985 (I.S. Specification for high yield strength deformed steel bars and wires for concrete reinforcement).

c. Placing

Reinforcement shall be bent and fixed in accordance with the procedure specified in I.S. 2506 – 1963 (code of practice for bending and fixing of bars for concrete reinforcement. All reinforcement shall be placed and maintained in the position shown in the drawings splices shall be located where shown in the drawings provided that the location of the splices may be altered subject to the written approval of the Engineer-in-charge.

Subject to the written approval of the Engineer-in-Charge, the contractor may for his convenience, splice bars at additional locations other than those shown on the drawings. All additional splices allowed shall be at the expense of the contractor. In order to meet design and space limitation on splicing some bent bars may exceed usual clearance cutting and bending of such bars from select lengths may be required at the site.

Unless otherwise prescribed, placement dimensions shall be to the centre lines of the bars. Reinforcement will be inspected for compliance with requirements as to size, shape, length, splicing, position, and amount after it has been placed, but before being laid with concrete. Before reinforcement is embedded in concrete the surface of the bars and the surfaces shall be cleaned of heavy flaky rust, loose mill scale, dirt, grease or other foreign substances which in the opinion of the Engineer-in-Charge are objectionable. Heavy flaky rust that can be removed by firm rubbing with burlap, or equivalent treatment is considered objectionable.

As specified in clause 12.3.1 of I.S 456 – 2000, unless otherwise specified by the Engineer-in-Charge, reinforcement shall be placed with the following tolerances.

a. For effective depth 200 mm or less = ± 10 mm

b. For effective depth more than 200 mm = ± 15 mm Tolerance for cover:
Unless specified otherwise, actual concrete cover should not deviate from the required nominal cover by +10mm and -0mm

c. Spacers, chairs or suitable supports should be used to strictly maintain the nominal cover specified in the drawings. Spacers or Chairs should be placed at a maximum spacing of 1m and the spacing may be reduced if considered necessary. Spacers, cover blocks should be of concrete of same strength.

Reinforcement shall be securely held in position so that it will not be displaced during the placing of the concrete and special care shall be exercised to prevent any disturbances of the reinforcement in concrete that has already been placed. Welding of bars shall be done as directed by the Engineer-in-Charge and in conformity with the requirements of clause 11.4 of I.S. 456 – 2000. Chairs, hangers, spacers and other supports for reinforcement shall be of concrete, metal or other approved materials. Concrete cover shall be as shown on the drawings.

In respect of the construction of reinforced concrete structures, care shall be taken to protect the reinforcement from exposure to saline atmosphere during storage, fabrication and use. It may be achieved by treating the surface of the reinforcement with cement-water slurry wash.

The “Clear Cover” to the reinforcement bars is one of the most important factors governing the corrosion resistance capability and the longevity of the reinforced concrete structures. It is, thus, of paramount importance to maintain the specified cover. In order to ensure this essential requirement, Engineer-in-charge may deploy “Logging Cover Meter” as a measure to ensure that the contractor strictly maintains the specified cover. In case, Logging cover meter detects any concrete with deficient cover to steel as against the specified cover, the contractor may be required to dismantle that concrete and re-do the job at his own expense.

d. Reinforcement Drawings

The Engineer-in-Charge will supply drawings of reinforcement details and bar bending schedules for adoption.

e. Measurement and Payment

Measurement for payment of reinforcement bars will be based on the weight of the bars placed in the concrete in accordance with the drawings supplied by the Engineer-in-charge in conformation with those specified drawings has been determined at the time of embodiment. Except as otherwise provided below payment for furnishing and placing reinforcing bars will be made at the unit price per one quintal bid in the bill of quantities for furnishing and placing reinforcing bars, which unit price shall include the cost of reinforcing bars, attaching, wire ties or other approved supports and of cutting, bending, cleaning, securing and maintaining in position reinforcing bars as shown on the drawings.

The total weight of bars placed as reinforcement in concrete shall be arrived at by adding the products of lengths of each size and mass per meter (vide Table 1 and Para 6.2.1 of I.S. 1786 – 1985) of that size of rod.

f. Contraction Joints

Contraction joints are to be provided in mass concrete as per drawings. Water stops are to be provided at contraction joints as per drawings to be supplied during execution.

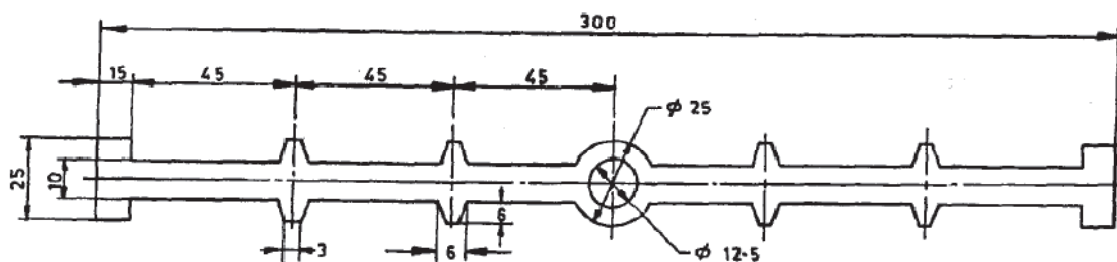
PVC (POLYVINYL CHLORIDE) WATER STOPS

Material

The water-stop should be fabricated from a plastic compound, the basic resin of which shall be polyvinyl chloride. The compound shall contain additional resins, plasticizers, inhibitors or other materials such that when the material is compounded, it shall meet the requirements given in IS 15058:2001.

Shape and Dimensions

The typical shape and dimensions of PVC water stops are given in Fig. 1. However, the section of PVC water-stop will vary depending on head and site requirements.



All dimensions in millimetres.

FIG. 1 TYPICAL CROSS-SECTION OF PVC WATER-STOP



**Slip Form Steel Gantry fitted with Vibrators
For
Placement of Cement Concrete lining on side slopes
(single rail track)**

7.1.20 Placement of concrete

General

The contractor shall notify the Engineer-in-Charge before batching begins for placement of concrete. Placing shall be performed only in the presence of an authorised Engineer's representative. Placement shall not begin until after preparations are complete and the concrete placement check out card been signed by the contractor or his representative and the authorised of the Engineer-in-Charge substantiating completion of all preparation for that placement.

All surface upon or against which concrete is to be placed shall be prepared in accordance with paragraph 7.1.19.

Any concrete which has become so stiff that proper placing cannot be assured will not be allowed to be placed .

Concrete shall not be placed in standing water except with written permission of the Engineer-in-Charge and the method of placing shall be subject to approval. Concrete shall not be placed in running water and shall not be subjected to running water until after the concrete has hardened.

Concrete shall be deposited as nearly as practical in its final position and shall not be allowed to flow in such a manner that the movement will cause segregation of the coarse aggregate from the concrete mass. Methods and equipment employed in depositing concrete in-forms shall minimize clusters of coarse aggregate clusters that occur shall be scattered before the concrete is vibrated.

Forms shall be constantly monitored and their position adjusted as necessary during concrete placement in accordance with paragraph 7.1.12.

All concrete shall be placed in approximately horizontal layers. All construction joints which interest exposed concrete surface shall be made straight and level to plumb except as shown otherwise on the drawings.

The placing of concrete shall be in accordance with clause 12.2 of I.S. 456 – 2000 and IS 457 as applicable. If concrete is placed monolithically around openings having vertical dimension greater than 60 cm or if concrete in decks, floor slabs, or other similar parts of structures is placed monolithically with supporting concrete, the following requirements shall be strictly observed.

1. Concrete shall be placed up to the top of the formed openings at which point further placement will be delayed to accommodate settlement of fresh concrete. If levels and specified beneath nearly horizontal structural members such as decks, floor slabs, beams and girders each levels being between the nearly horizontal members and the vertical supporting concrete below, concrete shall be placed to the bottom of the bevels before delay of placement.

2. The last 60 cm or more of concrete placed below horizontal members or bevels shall be placed with a 50 mm or less slumps and shall be thoroughly consolidated.

A cold joint is an unplanned joint resulting when a concrete surface hardens before the next batch is placed against it. Cold joints would be allowed only in the event of equipment break down or other unavoidable prolonged interruption of continuous placing. If such unavoidable delays in placing occur which make it appear that unconsolidated concrete may harden to the extent that later vibration will not fully consolidate it. The contractor shall immediately consolidate such concrete to a stable and uniform slope. If delay of placement is the short enough to permit penetration of the under lying concrete placement shall resume with particular care being taken to thoroughly penetrated and re-vibrate the concrete surface placed before the delay. If concrete cannot be penetrated with vibrator the cold joint shall be then treated as a construction joint and the construction joint must be prepared properly to the inspection of Engineer-in-Charge.

Care shall be taken to prevent cold joints when placing concrete in any part of the work. The concrete placing rate shall ensure concrete is placed with the previously placed concrete in plastic so that the concrete can be made monolithic by normal use of vibrators \ tamping.

Concrete shall not be placed in rain sufficiently heavy or prolonged to wash mortar from concrete. A cold joint may necessarily result from prolonged heavy rainfall.

The Contractor shall not be entitled to any additional payment, over the unit prices bid in the schedule for concrete, by reason of any limitation in the placing of concrete, required under the provisions of this paragraph.

b. Compaction

The compaction of concrete shall conform to clause 12.3 to I.S. 456 – 2000.

Concrete shall be consolidated by vibrators \ tampers. The vibrations shall be sufficient to removal all undesirable air voids from the concrete, including the air voids trapped against the forms. After consolidation, the concrete shall be free of rock pockets and honeycomb areas and shall be closed tightly against all surfaces of forms and embedded materials. All concrete shall be properly consolidated before it hardens.

Except as herein after provided, consolidation of all concrete shall be by immersion-type vibrators. Immersion type vibrators shall be operated in nearly vertical position and the vibrating head shall penetrate and re-vibrate the concrete in the upper portion of the underlying layer. Care shall be exercised to avoid contact of the vibrating head with embedded items and with formed surfaces which will later be exposed to view. Concrete shall not be placed upon either plastic concrete until the previously placed concrete has been thoroughly consolidated. The mechanical vibrators shall comply with I.S. 2505 – 1968. I.S. 2506 – 1964 and I.S. 4656 – 1968.

7.1.21 Finishes and Finishing of Concrete Surface.

Allowed deviations from plumb or level and from the alignment, profile grades and dimensions shown on the drawings are defined as "tolerance" and are to be distinguished from the irregularities in finish as described herein, The tolerance in concrete construction are specified in the particular section.

- i. The classes of finish requirements of concrete surface shall be as shown on the drawing or as hereinafter specified. In the event of finishing not being definitely specified herein or on the drawings, the finish to be used shall be as directed. Finishing of concrete surfaces shall be performed only by skilled workman. Concrete surface will be tested where necessary to determine whether surface irregularities are within the limits hereinafter specified.
- ii. Surface irregularities are classified as "abrupt" or "gradual". Offset caused by displaced or misplaced from sheathing or lining or form sections or by loose knots or otherwise defective form timber will be considered as abrupt irregularities; and will be tested by different measurements. All other irregularities will be considered as gradual irregularities and will be tested by use of template, consisting of a straight edge or the equivalent thereof for curved surfaces. The length of the template will be one and a half metres for testing of formed surfaces and three metres for testing unformed surfaces.
- iii. The classes of finish for formed concrete surfaces are designated by one of the symbols F1, F2, F3 & F4. Bag rubbing or sand blasting will not be required on formed surfaces. Grinding will not be required on formed surfaces other than that necessary for the repair of surface imperfections. Unless otherwise specified or indicated on the drawings, the classes of finish which will apply are as follows:
 - a. **Finish F1**
This finish applies to surfaces where roughness is not objectionable, such as those upon or against which fill material masonry or concrete will be placed, the upstream face of the dam that will permanently under water or surfaces that will otherwise be permanently concealed. The surface treatment shall be repair of defective concrete, correction of surface depressions deeper than 25 mm and filling of tie rod holes. Form sheathing shall not leak mortar when the concrete is vibrated. Forms may be built with aluminum of requirement.
 - b. **Finish F2**
The finish is required on all permanently exposed surfaces for which other finishes are not specified, such as in outlet works and open spillways, bridges and retaining walls not prominently exposed to public view and in the galleried and admits in the dam, except where F1 finishers are permitted. Forms shall be built in a workmanlike manner to the required dimensions and alignment, without conspicuous offset of bulge surface irregularities shall not exceed 5 mm for abrupt irregularities and 10 mm for gradual irregularities measured from a 1.5 m template.
 - c. **Finish F3**
This finish is designated for surfaces of structures prominently exposed to public view where appearance is of special importance. This shall include parapets, railings and decorative features on the dam and the bridge. To meet the requirements for the F3 finish, forms shall be built in a skillful, workmanlike manner, accurately to

dimensions. There shall be no visible offsets, bulges or misalignment of the concrete. At construction joints the forms shall be tightly set and securely anchored close to the joint. Surface irregularities shall not exceed 3 mm for abrupt irregularities and 5 mm for gradual irregularities measured from a 1.5 m template.

- 7.1.23** Unformed surfaces which nominally level shall be sloped for drainage as shown on the drawings or as directed. Unless the use of other slopes or level surface is indicated on the drawings, narrow, surface such as tops of parapets, tops of walls and kerbs shall be stopped approximately one cm per 30 cm of width broader surface such as roadways, platform and decks, shall be stopped approximately half centimeter per 30 cm of width.

7.1.24 PROTECTION

The contractor shall protect all concrete against damage until final acceptance by the Engineer-in-Charge. The contractor shall provide protection to prevent erosion to fresh concrete whenever precipitation either periodic or sustaining is imminent or occurring.

When precipitation appears imminent, the contractor shall immediately make ready at the placement site all materials which may be required for protection of fresh concrete. The Engineer-in-Charge may delay placement of concrete until adequate provisions for protection against weather are made.

All fresh concrete surfaces shall be protected from contamination and from foot traffic until the concrete has hardened. Hardened concrete surfaces which have to receive finish shall be protected against damage from foot traffic and other construction activity by covering with protective mats plywood or by other effective means. Methods of protection shall be subject to approval by the Engineer-in-Charge.

7.1.25 Curing

a. General

The contractor shall furnish all materials and perform all work required for curing concrete. Moistening refer Para 12.5 of I.S. 456 – 2000. All concrete surfaces shall be treated as specified to prevent loss of moisture from the concrete until the required curing period elapsed or until immediately prior to placement of other concrete or backfill against those surfaces. Only sufficient time to prepare construction joint surfaces and to bring them to a surface dry condition shall be allowed between discontinuance of curing and placement of adjacent concrete.

Forms shall be removed with 24 hours after the concrete has hardened sufficiently conforming to clause 110.3 of I.S. 456 – 2000 to prevent structural collapse of other damage by careful form removal. Where required, repair of all minor surface imperfections shall be made immediately after form removal and prior to curing. Minor surface repair shall be completed with 2 hours after form removal and shall be immediately followed by the initiation of curing by the applicable method specified herein. Concrete surfaces shall be kept continuously moist after form removal until initiation of curing.

b. Material

Concrete cured with water shall be kept wet for at least 28 days from the time the concrete has attained sufficient set to prevent detrimental effect to the concrete surfaces. The concrete surfaces to be cured shall be kept wet by covering them with water-saturated material by using a system of perforated pipes mechanical sprinklers or porous hose, or by other methods which will keep all surface continuously (not periodically) wet. All curing methods are subject to approval of Engineer-in-Charge.

c. Cost

The cost of furnished all material and performing all work for curing concrete shall be included in the price bid in the bill of quantities for the concrete on which the particular curing methods are required.

7.1.30 Measurement of Concrete

Measurement for payment of concrete required to be placed directly upon or against surfaces of excavation will be made to the lines for which payment for excavation is made.

Measurement for payment of concrete in canal lining will be made to the lines shown on the drawing. The unit of measurement will be in square metres to the thickness shown in the drawing. Measurement for payment of all other concrete will be made to the neat lines of structures, unless otherwise specifically shown on the drawings prescribed in this specification. The unit measurement will be cubic metre.

In measuring concrete for payment, the volume of all openings, arises, embedded pipes and metal work, each of which is large than 0.1 square metre in cross section will be deducted

7.1.31 Payment for Concrete

Payment for concrete in the various parts of the work will be made at the applicable unit prices therefore in the bill of quantities, under unit price shall include the cost of furnishing all materials and performing all works required for the concrete construction, except than payment for form works, furnishing and placing reinforcing bars will be made at the respective unit price's bid therefore in the schedule.

CHAPTER VIII

GRAVEL, CLAY & FILTER ARRANGEMENTS

8.1 Gravel shall be composed of large, coarse, siliceous, grains, shape and gritty to the touch and free from dirt and impurities. It shall not contain any lumps of stones larger than 20mm gauge. A small admixture of clay upto 10 percent is not objectionable. All in size shall contain a sufficient proportion of fine material to fill all interstices and to ensure binding when consolidated.

a) GRADING

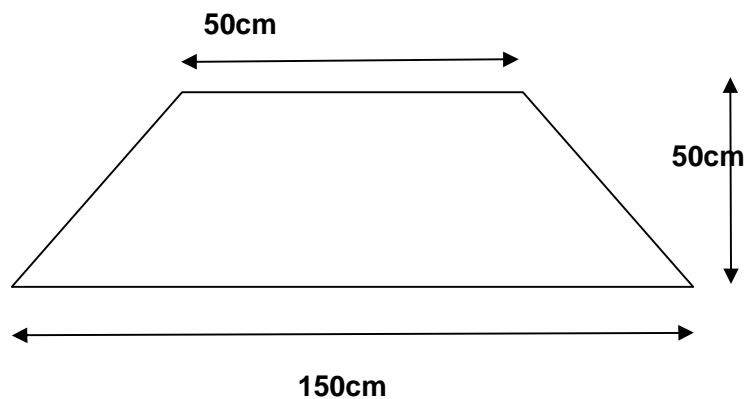
The material shall be well graded from coarse to fine particles when a sample of material is rolled and sequenced in the hand, the following characteristic shall be noted.

- a) The material is extremely gritty.
- b) It can be formed into definite shapes that retain in their forms even when dried.
- c) If the clay is alone adheres to the hands it shall only be enough to discolour them slightly.
- d) If more than enough soil to discolour the hand adheres, it must contain both sand and clay instead of clay alone and.
- e) When the wetted sample is patted in the palm of the hand, it will compact into dense cake that cannot be penetrated readily with a blunt stick, the size of lead pencil.

Note :The grittiness of samples indicates the presence of sufficient granular materials. Development of some strength in drying indicates a sufficient amount of binder soil. Resistance to penetration of a pencil or stick even when sample is thoroughly wetted indicates a desirable interlocking of the grains. Too much sand would cause the sample to fall apart when dried. Too much clay would leave the hand muddy after the wet sample was squeezed and would cause the sample after being patted, to offer little resistance to penetration of the stick.

B) STACKING

Stacking of gravel shall be carried out in regular stacks of the sizes given below.



The materials shall be stacked on the side. Stacks shall be uniformly distributed along in proportion of estimated quantities required for construction so that no rehandling is involved. The collection of materials shall be completed for the entire work for a complete stretch as directed by the Engineer –in- charge of works. Aggregates shall not be stacked unless they have been screened to gauge and freed from all earth rubbish etc., or any other rejection materials. The rejection materials shall be removed from the site immediately. Measurement shall not be taken until sufficient materials have been collected and all rejected stuff has been removed. The contractor shall provide suitable template so as ensure sizes of stacks.

Materials shall be brought to the site sufficiently in advance of their use. Collection and utilization of materials shall not be carried out simultaneously in one and the same stretch of bank formation (usually with in 1 km). before starting the operation involved with utilization it shall be ensure that fully estimated quantity of materials have been stacked along the road formation in the specified stretch (usually with in 1 km) in which it is proposed to start the operation.

8.2 Clay should be composed of free from dirt and impurities without any lumps and it should contain the following properties

	Impervious core (clay)
Cohesion(KN/m ²)	20
Angle of internal friction	18 to 22
Density(KN/m ³)	20
Saturated Density(KN/m ³)	22

The core has to formed with the above material. It should be layed inclined in layers and consolidated such that all in size shall contain a sufficient proportion to fill all interstices and to ensure binding when consolidated. The core clay has to surrounded by pervious shell of sand and gravel.

8.3 Filter arrangements

8.3.1 The filter arrangements in the earthen bund portion to be provided by cutting the downstream face to a minimum extent possible to a slope of 2:1 till ground level without punching the existing body of dam. The surface has to levelled and prepared for laying filter arrangements. The Inclined filter has to be laid over it which has to be connected to horizontal filter arrangements and then to end up with toe drain.

8.3.2 Both Inclined and Horizontal filter arrangements has to be 1.20m thick and in 5 layers, from bottom to top it consists of 0.20m thick fine sand, 0.25m thick coarse sand, 0.30m thick HBGS stone of various size of 10 to 80mm, 0.25m thick coarse sand and 0.20m thick fine sand.

8.3.3 Both Inclined and Horizontal filter arrangements has to be laid simultaneously on the prepared surface, layer by layer to the thickness shown in the approved drawings and as per directions of engineer in charge.

8.3.4 After laying both Inclined and Horizontal filter arrangements, it has to covered with suitable earth of minimum cover of 1m thick and it should to formed as per specification No 4.1.2.

8.4 Filter arrangement for canal lining:

8.4.1 For the sub soil being non swelling type and semi pervious in nature, the following filter and drainage arrangements shall be proposed for the bed and porous plug for the bed and side slope channels.

8.4.2 Filter for the bed shall be 10cm thick of graded gravel below the lining in the bed followed by a layer of 10 cm thick of coarse sand. Porous plug for the bed and sides shall be provided in the specified spacing.

8.4.3 The above arrangements are proposed as the water table lies between the bed and full supply level of the channel and the sub grade is freely draining. The gravel to be used for filter should be of non-cohesive type as specified in IS Code.

CHAPTER IX

STEEL AND IRON WORK

9.1 General :

This specification will include governing clauses on the supply and delivery fabrication and erection at site, of all materials covered by cast iron, Wrought iron, and steel, employed for structural purposes, shown on the relevant drawings and described in the supplementary specifications and schedules.

9.2 All materials must strictly conform to relevant specifications, and proof thereof is to be furnished if so required to the Engineer-in-Charge.

9.3 The work includes all bolts, nuts, washers and field rivets required for complete erection at site together with an allowance for waste etc., upto 10 percent (unless otherwise specified in the schedule) on net-number of bolts, nuts, washers and field rivets required.

In addition to the above, the contractor is to supply all service bolts and nuts and ordinary plates, washers necessary for erecting the work at site.

9.4 For design of steel sections, Part VI Section 6 of N.B, Code and I.S. 800/2007 shall apply.

9.5 Quality :- (1) Regarding quality relevant I.S. shall apply
Especially I.S. 800/2007 and N.B. code Part VI – Section 6.

9.5.1 As regards “Tests” relevant I.S. shall apply 9.5.2 Tensile strength of rivet bars :
Regarding the Tensile strength of rivet bars paragraph 9.1 to 9.2.1 in I.S. 1148 – 1964 shall apply.

9.9.7 Regarding measurement of steel work and iron work-relevant I.S. 1200 (Part VIII) 1967 shall apply Extract from I.S. 226-1969

Specification for Structural Steel

9.10 Tensile Test

9.10.1 Number of Tensile Tests

9.10.1.1 Plates, Sections (Angles, Tees, Beams, channels and flats etc.):

One tensile test shall be made from finished steel for every 40 tones or Part thereof from each cast a separate test being made for each class of steel product (namely plates, sections and flats) rolled from a cast).

9.10.1.1.2. Where plates; sections, or flats of more than one thickness are rolled from the same cast, one additional tensile test shall be made from the material in each class of product for each variation in thickness of 6 mm above or below the thickness of the test piece first selected in such a class.

9.10.1.2 Bars (round, square, and hexagonal) : one tensile test shall be made from finished steel for every 40 tones or part thereof from each cast and for every class of product. When more than one diameter or thickness of the bar is specified, one additional tensile test shall be made for each diameter or thickness of the bar ordered if so desired by the purchases.

9.10.2 Tensile test pieces : The tensile strength, yield stress and percentage elongation of steel shall be determined from standard test pieces cut length wise or cross wise from plates and length wise from sections, flats and bars. The tests shall be carried out on Indian Standard test pieces prepared in accordance with I.S. 1603 – 1960.

9.10.3 Tensile Test the Tensile strength yield stress and percentage elongation, when determined in accordance with I.S. 1608 – 1960 shall be as given in Table 1.

Table 1. Mechanical Properties of Structural steel
(Standard Quality)
(Clause – 10 – 3)

Class of Steel Product	Nominal thickness Diameter in mm	Tensile strength Kgf/mm ²	Yield stress Min	Percentage elongation Min gauge
Plates, Sections (for example, truss, angles beams, channels, etc) and flats	Below 6	Bend test only shall be Required		
	6 upto and including 20	42 to 54	26.0	23
	Over 20 upto and including 40	42 to 54	23.0	23
	Over 40	42 to 54	23.0	23
Bar (round, square and hexagonal)	Below 10	*Bend test only shall be required		
	10 upto and including 20	42 to 54	26.0	23
	Over 20	42 of 54	24.0	23

9.10.3.1 In case of sections, the thickness of which is not uniform throughout the profile, the limits shall be applied according to the actual maximum thickness of the piece selected for test.

9.10.3.2 Should a tensile test piece break outside the middle half of its gauge length (see I.S. 1608 – 1960) and the percentage elongation obtained is less than that specified the test may be discarded at the manufactures option, and another test made form the same plate, section, flat or bar.

Note : Gauge lengths more than 5.65/S may also be used, in which case the elongation shall be read form I.S. 3803 – 1967. "Methods for elongation conversions for steel".

* Incase of the plates, sections and flats below 6 mm, the yield stress shall be assumed to be at least the same as that for the thickness between 6 and 20mm.

+ In case of bars below 10mm diameter, the yield stress shall be assumed to be at least the same as or bars of diameter between 10 to 20 mm.

9.11 Bend Test :

Bend Test shall be conducted accordance with I.S. 1599 – 1960.

9.11.1 For bend test except in the case of round bars 25mm in diameter and under, the test piece when cold shall without fracture be doubled over, either by pressure or by blows from the hammer, until the internal diameter is not greater than three times the thickness of the piece, and the sides are parallel.

9.11.2 In the case of round bars 25 mm in diameter and under the internal diameter of the bend shall be not greater than twice the diameter of the bar.

EXTRACT FROM I.S. 1148 – 1968

Specifications for rivet bars for structural purposes.

9.12 Tensile Test :-

9.12.1 One Tensile test shall be made from the finished steel for every 10.00Kg of caps iron or part thereof.

9.17.4 All loose, burned or otherwise defective rivets shall be cut out and replaced before the structure is loaded and special care shall be taken to inspect all single riveted connections.

9.17.5 Special care shall be taken in elating and drilling long rivets.

Welding

9.18.1 Welding shall be in accordance with any of the following standards as appropriate.

I.S. 816 – 1956 – Code of Practice for use of metal in welding for light assemblies in mild steel.

I.S. 819 – 1957 – Code of Practice for resistance spot welding for light assemblies in mild steel

I.S. 820 – Code or Practice for use of welding in tubular construction.

I.S. 821 – Code of Practice for use of welding in Pipelines.

I.S. 822 – Code of Practice for inspection of welds.

I.S. 823 – Procedure code for metal are welding of mild steel.

I.S. 1024 – Code of Practice for welding of structures subject to dynamic loading

9.22.5 Dimensions unless otherwise stated all work shall be measured not in deemed system, as fixed in is place as given in 22.5.1 to 22.5.3.

9.22.5.1 Dimensions excepting cross sections and thickness of plate shall be measured to nearest 0.001m in except for reinforcement which shall be measured to nearest 0.005 m.

9.22.5.2 Areas excluding cross – sectional measurements shall be worked out to nearest 0.001m.

9.22.5.3 Weights shall be worked out to nearest 1 Kg.

9.22.6 Mill tolerance shall be ignored when the weight is determined by calculation.

9.22.7 The printing cost shall be described and included in item of fabrication.

9.23 Steel Work

9.23.1 Various items of steel work shall be classified and measured separately under following categories work in each classification shall be described. Bolted, riveted and welded structures shall be described as such and measured separately.

- (a) Rolled sections (hoist, channels, angles or tee) fixed independently without connecting plates.
- (b) Rolled sections fixed with connecting plate or angle cleats as in main and cross-beams hip and jack, rafters, purlins connected to common rafters and the like.

IS : 12169 - 1987

TABLE 1 GENERAL GUIDELINES FOR EMBANKMENT SECTIONS
(Clause 5.1.2.3)

Sl. No.	DESCRIPTION	HEIGHT UP TO 5 m		HEIGHT ABOVE 5 m AND UP TO 10 m		HEIGHT ABOVE 10 m AND UP TO 15 m	
		Homogeneous section/Modified homogeneous section		Zoned section/Modified homogeneous section/Homogeneous section		Zoned section/Modified homogeneous section/Homogeneous section	
i)	Type of section						
	ii) Slopes	Upstream	Downstream	Upstream	Downstream	Upstream	Downstream
	a) Coarse grained soil (GW, GP, SW, SP)	Not suitable		Not suitable		Not suitable for core Suitable for casing zone	
	b) Coarse grained soil (GC, GM, SC, SM)	(H) (V) 2 : 1	(H) (V) 2 : 1	(H) (V) 2 : 1	(H) (V) 2 : 1	Section to be decided based upon the stability analysis in accordance with IS : 7894-1975	
	c) Fine grained soil (CL, ML, CI, MI)	(H) (V) 2 : 1	(H) (V) 2 : 1	(H) (V) 2.5 : 1	(H) (V) 2.25 : 1	do	
ii)	d) Fine grained soil (CH, MH)	(H) (V) 2 : 1	(H) (V) 2 : 1	(H) (V) 3.75 : 1	(H) (V) 2.5 : 1	do	
	iii) Hearting zone	Not required		May be provided		Necessary	
	a) Top width	—		3 m		3 m	
	b) Top level	—		0.5 m above MWL		0.5 m above MWL	
	iv) Rock toe height	Not necessary up to 3 m. Above 3 m height, 1 m height of rock toe may be provided		Necessary $H/5$, where H is the height of embankment		Necessary $H/5$, where H is the height of embankment	
v)	Berms	Not necessary		Not necessary		The berm may be provided as per design. The minimum berm width shall be 3 m. The berm may be provided also on the downstream slope for facilities during maintenance.	

TABLE 2 AVERAGE PROPERTIES FOR DIFFERENT TYPES OF SOILS
(Clause 5.1.2.3)

Sl. No.	ENGINEERING CLASSIFICATION OF SOIL (as IS : 1498-1970*)	AVERAGE PROPERTIES OF SOIL				SOIL CONSTANTS FOR RECOMMENDED SLOPES			
		MDD kg/m ³	OMC percent	Cohesion kg/m ²	Tan ϕ	MDD kg/m ³	OMC percent	Cohesion kg/m ²	Tan ϕ
i)	GC	> 1 840	< 15	NA	> 0.60				
ii)	GM	> 1 830	< 15	NA	> 0.67				
iii)	SM	1 830 \pm 16	15 \pm 0.4	500 \pm 500	0.58 \pm 0.07	1 800	15	1 100	0.60
iv)	SC	1 840 \pm 16	15 \pm 0.4	1 100 \pm 600	0.6 \pm 0.07				
v)	ML	1 650 \pm 16	19 \pm 0.7	900 \pm NA	0.62 \pm 0.04				
vi)	CL	1 730 \pm 16	17 \pm 0.03	1 200 \pm 200	0.54 \pm 0.04	1 650	19	900	0.55
vii)	CH	1 510 \pm 32	25 \pm 1.2	1 300 \pm 600	0.35 \pm 0.09				
viii)	MH	1 310 \pm 64	36 \pm 3.2	2 000 \pm 900	0.47 \pm 0.05	1 300	35	1 300	0.35

*Classification and identification of soils for general engineering purposes (first revision).

Chapter X - Environmental and Social Requirements

[The Employer's team preparing the ES requirements should include a suitably qualified Environmental and Social specialist/s.]

In preparing detailed specifications for ES requirements the Borrower should refer to and consider the applicable environmental and social standards in the ESF including the specific requirements set out in the Environmental and Social Commitment Plan (ESCP), ESIA/ESA/ESMP, EHSGs and other GIIP as well as SEA and SH prevention and management obligations.

The ES requirements should be prepared in manner that does not conflict with the relevant General Conditions of Contract (and the corresponding Particular Conditions of Contract if any), and other parts of the Specifications.

Generic Environmental and Social Management Plan (ESMP) as specified in the Environmental and Social Assessment Report for TN-IAMWARM-2 Project prepared by the Consultant M/s WAPCOS:

Possible Environment and Social risks to be addressed

The possible risks involved in the proposed interventions during the implementation cycle of the project components/activities cycle for irrigation are provided as guidance in following Table.

Sub – Projects / Activity	Potential Risks & Impacts
Tanks <ul style="list-style-type: none"> ▪ Strengthening of tank bunds ▪ Removal of vegetation and invasive species from, bund slopes, surrounding areas ▪ Wage and labour opportunities ▪ Movement of heavy vehicles ▪ 	<ul style="list-style-type: none"> ▪ Silt/sand deposition on agricultural fields, low lying seasonal wetlands, choking of natural draining/water courses ▪ Distribution and use of toxic silt due to non-point pollution sources ▪ Disposal of construction debris on farmland, water courses etc. resulting in blocking natural drainage ▪ Lowering of water quality due to disposal of wastes from fish seed farms, oil from machinery, dumping of construction waste etc. ▪ Impact on ambient air quality due to dust during rehabilitation and noise ▪ Breach of tank bund, overspill due to excess rain etc. ▪ Tree cutting, unauthorized removal of native species along with invasive species ▪ Local vulnerable and poor labour left out from work opportunities ▪ Accidents/disease incidents for workers and in labour camps and lack of amenities

	<ul style="list-style-type: none"> ▪ Possibility of engagement of child labour, unequal wages to women workers ▪ Soil compaction on fields/farms due to movement and parking of heavy machinery ▪ Pollution of tanks due to unregulated dumping of domestic sewage ▪ Incidence of local water logging and stagnation of water leading to increased mosquito breeding and spread of vector borne disease.
<i>Silt removal from supply channel and canal lining</i>	<ul style="list-style-type: none"> ▪ Risk of disposal of polluted silt on farmlands ▪ Storage of construction material on farmlands adjacent to canal ▪ Non-working of canal during repair works particularly when irrigation is required as contractual delays can result in extension of contract period. ▪ Pollution due to domestic sewage inlet.
<i>Reconstruction and Repair of sluices and weirs</i>	<ul style="list-style-type: none"> ▪ Dumping of Iron and concrete debris within canal and/or near banks ▪ Sewage and solid waste generation due to congregation of labour population ▪ Air pollution and noise pollution due to increased vehicular movement and construction equipment

Code of Conduct (ESHS)

1. The Contractor shall prepare and include Debris Disposal Plan, Silt Disposal Plan and Environmental Management Plan (EMP) in Contract Document, endorsed by the Engineer and follow Environment Management Framework, and follow Environmental Code of Practices as per Indian legislation the World Bank guidelines agreed in the project.
2. The Contractor shall be responsible for preparing and submitting the Debris Disposal Plan, Silt Disposal Plan and Environmental Management Plan as part of the Contract works execution document at the start of Works.
3. The Engineer shall be responsible for reviewing and approving the Debris Disposal Plan, Silt Disposal Plan and Environmental Management Plan submitted by the Contractor before start of Works.
4. The Contractor shall be responsible for providing the list and permits for all heavy equipment and machinery to be deployed on site to the Engineer before start of Works. It shall be the responsibility of the Contractor to ensure that the permits are not expired for the entire duration of the Contract.

Compliance with Labour Regulations:

During continuance of the contract, the Contractor and his sub-contractors shall abide at all times by all existing labour enactments and rules made thereunder, regulations, notifications and bye laws of the State or Central Government or local authority and any other labour law (including rules), regulations, bye laws that may be passed or notification that may be issued under any labour law in future 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 contravention of any of the provisions of any Act or rules made thereunder, regulations or notifications 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 Engineer/Employer shall have the right to deduct any money due to the Contractor including his amount of performance security. The Employer/Engineer 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. 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. In addition to the compliance of labour laws in force, the Contractor shall also be responsible for ensuring that the applicable code of conduct for workers is followed at working place and camps.

Code of Conduct for Labour Population

- *There should not be any adverse interaction of the labour with the local community.*
- *Labour population shall not extract any resources from the village without the concurrence of the community, outside the project area.*
- *Project area shall be completely and effectively demarcated.*
- *It shall be ensured that no labour, other than people from local community, are allowed to enter the villages, if objected to by the villagers, outside the project area by any means unless he/she is permitted by the competent authority designated by the project for this purpose.*
- *No such permission shall be granted unless the person is proceeding on bonafide work relating to the project activities or essential living functions.*
- *Essential interaction with the local population will take place only with the consultation of local administration, panchayat leaders and such movements regulated.*
- *All workers / officers shall be provided with the identity card.*
- *Strict action shall be taken against the worker not adhering the norms and regulations.*
- *Contractor shall be responsible for the implementation of the aforesaid policy.*
- *A committee with participant of local leaders / prominent person shall be constituted to deal with the problems arising due to any illegal activities by the workers.*

Protection of Environment:

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 causes arising as a consequence of his methods of operation, including adopting working practices that prevent or minimize the transfer of any pollutant off-site; maintaining the access roads in good repair; using appropriate dust suppressant methods; restricting trucking and loud machinery and equipment use to daylight hours; using mufflers, silencers and other appropriate methods to minimize the noise of the construction; using "silt fencing", hay bales, silt traps or other methods to minimize soil erosion and prevent the contamination of surface water and the transportation of soil and sediment off-site onto adjacent properties; and maintaining clean sites that are free of garbage and debris, except the disposal area. The Contractor shall, at all times during the Contract, ensure that the Environment Management Framework and /or Environmental Management Plan is followed.*
2. *The Contractor shall ensure that execution of the Contract does not cause loss or degradation of natural habitats, forests, wetlands, wildlife or protected areas.*
3. *The Contractor shall use borrow pits identified/approved by the Engineer. The Contractor shall be responsible for the rehabilitation of the borrow area. Debris resulting from the works undertaken under the Contract shall be disposed at sites identified by the Engineer in the Environmental Screening Format and Schedule 1.*
4. *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 there under, regulations, notifications and bye-laws of the State or Central Government, or local authorities and any 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.*

Some of the applicable major laws are given below:

- *The Water (Prevention and Control of Pollution) Act, 1974*
- *The Air (Prevention and Control of Pollution) Act, 1981*
- *The Environment (Protection) Act, 1986*
- *The Public Liability Insurance Act, 1991*
- *The Forest Conservation Act, 1980*
- *Wildlife (Protection) Act, 1972*
- *Wet land (Conservation and Management) Rules 2010*

Disposal of silt:

In cases of large scale silt disposal, the Contractor shall be responsible for submitting Silt Disposal Plan. The Silt Disposal Plan shall include, but not limited to, the section details of earthwork for every kilometer of earthwork; quantities of earthwork in cut, fill and disposal; schedule for testing and disposal of dredged silt; ensure that in no way the eco-sensitive zone is disturbed if the Works are in such a zone; and follow ECoPs.

In case of wet river dredging, The Contractor shall ensure that: The Contractor shall ensure that: (i) Dredgings are not deposited on different inland water or deposit dredgings from any

other waters so as to prevent spread of contaminations or invasive non-native species. (ii) Dredgings that are of hazardous waste are not deposited on any inland waters. (iii) Dredgings are treated other than by screening or removing water. (iv) Not more than 50 cubic meter of silt is treated or deposited for each meter length of land on which waste is deposited. (v) The silt shall be disposed on sites as close as possible to the dredging site. The dredgings must be removed from the waterway and deposited mechanically on one operation. The dredgings shall not be deposited on the bank then moved further to disposal sites.

Safety :

The Contractor shall be responsible for the health and safety of its employees and subcontractors working on the Site. During the Contract Period, the Contractor shall develop and implement a comprehensive occupational health and safety program for the protection of the Contractor's Personnel and all other persons who may attend at the project areas in guidance with, but not limited to, ECoPs. The program shall include a description of how the Contractor will:

- a. carry out all occupational health and safety responsibilities in respect of the Project as required under the Applicable Law and the World Bank Group's Health & Safety standards;
- b. develop and manage all required occupational health and safety reporting procedures; and
- c. manage all occupational health and safety claims.

Any accidents or deaths on the site need to be reported to the Engineer along with the incident report within 24 hours. The victims shall be provided immediate medical care and compensation as per the applicable labor laws.

Environmental, social, health and safety requirements

A. Health and Safety

The Health, Safety and Environment (HSE) management system is an effective means of ensuring that proper attention is paid to the health and safety of individuals working in the project site as well as the protection of the environment from the environmental impacts associated with proposed construction activities. This system should be adequately documented within a HSE Manual and should be effective in implementing the aims and objectives of the HSE Policy.

The system should cover the following:

- Incorporate measures to demonstrate that all workers/labourers are medically fit and competent to perform their tasks safely;
- Ensure that all personnel are conversant with the working conditions at the worksite, the rules and standards related to the working environment and the HSE hazards and risks associated with the work programme.
- Provide means whereby hazards have been identified, assessed and eliminated where possible, or are being controlled / mitigated through formal planning methods and procedures.
- Allow for periodic review triggered by site or system changes that may affect the HSE risk of the work programme.

- *Ensure that all contractors understand the principles and requirements of the system.*
- *Require contractors to have an equivalent HSE standard.*
- *Contain a written HSE plan*

Contractor should make all personnel fully aware that they are empowered, and expected, to bring all health, safety and environmental risks which they believe not to be under adequate control to the immediate notice of their Supervisor so that prompt action may be taken to prevent injuries or other losses and provide a safe and healthy workplace.

1. Safety practices during construction phase

The Contractor is required to comply with all the precautions as far as possible for safety of the workers. The contractor shall comply with all regulation regarding, working platforms, excavations, trenches and safe means of entry and egress.

In order to guarantee construction safety, efficient lighting and safety signs shall be installed on temporary roads during construction and adequate traffic regulations shall be adopted and implemented for temporary roads.

The following aspects to be implemented:

- *Provision of personal protective equipment to the labourers.*
- *The contractor shall provide, if required, erect and maintain necessary (temporary) living accommodation and ancillary facilities during the progress of work for labour to standards and scales approved by the Engineer- in-charge.*
- *Contractor shall follow all relevant provisions of the Factories Act, 1948 and the Building & other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 for construction & maintenance of labour camp.*
- *Construction camps shall not be proposed within 1000 m or sufficiently away from nearest habitation to avoid conflicts and stress over the infrastructure facilities, with the local community. The location, layout and basic facility provision of each labour camp shall be submitted to Engineer prior to their construction.*
- *Sanitation facility should be provided in the labour camp. Uncontaminated water shall be supplied to the construction workers at labour camps.*
- *The contractor shall arrange for a readily available first aid unit including an adequate supply of sterilized dressing materials and appliances as per the Factories Rules in every work zone, availability of suitable transport at all times to take injured or sick person(s) to the nearest hospital*
- *Always maintain a fully equipped first aid box in the construction camp.*

The important safety sign boards to be displayed at construction site are as follows:



2. Fire protection in labour camp

It should be planned that all facilities to be constructed shall be fully equipped with the fire protection equipments as per IS standards. The analysis of fire hazard in the construction of labour camps, colonies and other facilities along with management measures is summarized in the following table:

Analysis of fire hazards in the construction of labour camps and other facilities

Stage	Potential hazard	Remedial Measures
Construction of Camp/colony	<ul style="list-style-type: none"> Fire prevention and firefighting not considered in design Inadequate fire protection measures during construction 	<ul style="list-style-type: none"> Clear terms of reference should be given to contractor at tendering stage for incorporating fire code as per IS Standard. Firefighting equipment should be placed at all common places

During construction, there should be an environmental officer who may be nominated by WRD/Line Departments and shall be responsible to take care of the adequacy of Fire Safety measures set up in all facilities created either by WRD/Line Departments or any of its Contractors.

B. Sustainable Construction Practices

During the construction phase, to avoid and minimize the negative impacts from the proposed activities, following guidelines are to be followed;

- Strict restrictions shall be imposed on the workers at project sites to ensure that they do not harvest any species/produce from the vegetation in the area forests and cause any danger or harm to the animals and birds in the wild.*
- Fuel wood to the labourers shall be provided by the project proponents so that there is no pressure for cutting of trees to meet fuel wood requirements.*
- Interference of human population should be kept to a minimum in the adjacent forest areas and it should be ensured that the contractors do not set up labour colonies/camps in the vicinity of forests and wilderness areas.*
- Only well maintained/new equipment that produce lesser noise should be installed at the work sites.*
- Best way to control the noise is at source. Certain equipment that needs to be placed permanently at one place like generators, etc. would be housed in enclosed structures to cut off the noise.*
- The heavy equipment like rotating or impacting machines will be mounted on anti-vibration mountings.*
- Wherever combustion engines are required they will be fitted with silencers.*
- The traffic (trucks, etc.) used by the project works will be managed to produce a smooth flow instead of a noise producing stop and start flow. Necessary training/orientation will be provided to the traffic operators/drivers. Sounding of loud horns, etc. in the forested areas should be banned.*
- Project authorities will use water sprinklers on the road to avoid the dust from construction activities.*

1. Traffic management during construction phase

Detailed Traffic Control Plans shall be prepared for traffic diversion. The traffic control plans shall contain details of temporary diversions, traffic arrangement after cessation of every day's work and safety measures for transport of hazardous material.

The Contractor should ensure that the diversion is always maintained in working condition, particularly during the monsoons to avoid disruption to traffic flow. Local community should be informed of the changes to traffic routes, conditions and pedestrian access arrangements. The temporary traffic diversions should be kept free of dust by frequent application of water.

2. Control of Emissions

Minor air quality impacts will be caused by emissions from construction vehicles, equipment and DG sets, and emissions from transportation traffic. Frequent truck trips will be required during the construction period for removal of excavated material and delivery of select concrete and other equipment and materials. The following measures are recommended to control air pollution:

- *The contractor shall be responsible for maintaining properly functioning construction equipments to minimize exhaust.*
- *Construction equipment and vehicles will be turned off when not used for extended periods of time.*
- *Unnecessary idling of construction vehicles to be prohibited.*
- *Effective traffic management to be undertaken to avoid significant delays in and around the project area.*
- *Road damage caused by sub-project activities will be promptly attended to with proper road repair and maintenance work.*

3. Dust Control

To minimize issues related to the generation of dust during the construction phase of the project, the following measures should be implemented:

- *When practical, excavated spoils will be removed as the contractor proceeds along the length of the activity.*
- *When necessary, stockpiling of excavated material will be covered or staged offsite location with muck being delivered as needed during the course of construction.*
- *Excessive soil on paved areas will be sprayed (wet) and/or swept and unpaved areas will be sprayed and/or mulched. The use of petroleum products or similar products for such activities will be strictly prohibited.*
- *Contractor shall be required to cover stockpiled soils and trucks hauling soil, sand, and other loose materials.*
- *Contractor shall ensure that there is effective traffic management at site. The number of trucks/vehicles to move at various construction sites to be fixed.*
- *The construction area and vicinity (access roads, and working areas) shall be swept with water sweepers on a daily basis or as necessary to ensure there is no visible dust.*

4. Noise control from construction equipment

The contractor should be required to maintain properly functioning equipment which shall cover the following aspects:

- The construction equipment shall be required to be fitted with noise suppression devices and properly maintained mufflers.*
- Staging of construction equipment and unnecessary idling of equipment within noise sensitive areas to be avoided whenever possible.*

5. Identification of borrow pits and quarry area

- The Borrow pits for earth should be selected away from residential area, sensitive location, and local roads. Before selection of borrow area, the contractor should take written consent from the environmental officer of WRD/Line Departments. Selection of sand, stone and other quarry materials should be from only government approved sites.*
- Borrow areas shall be atleast 500m from schools and village access roads*
- Planning of haul roads for accessing borrow materials shall be undertaken during this stage. The haul roads shall be routed to avoid agricultural areas. In case agricultural land is disturbed, the contractor shall rehabilitate as approved by the WRD/Line Departments and pay compensation for loss of cultivation to the users as per terms and conditions.*
- Operation and Rehabilitation of borrow area as per the Madras Detailed Standard Specification and Environmental Code of Practices*
- Arrangement for locating the source of supply of material for embankment and sub-grade as well as compliance to environmental requirements, as applicable shall be the sole responsibility of the contractor. The environmental personnel attached to environmental cell shall be required to inspect every borrow area location prior to approval.*
- Such measures shall include, but not limited to, frequent sprinkling of water, repairing of the road, road safety provisions and ensuring covering of loaded vehicles by waterproof tarpaulin; consultation with public and special precautions are required when measures are implemented near schools, health centers and settlement areas.*
- All borrow areas whether in private, community or government land shall be restored either to the original condition or as approved by WRD/Line Departments.*

C. Disposal of Construction Wastes

The disposal of construction wastes shall be in accordance with the Construction and Demolition Waste Management Rules, 2016 by MoEF&CC. While planning or executing excavation the contractor shall take all adequate precautions against soil erosion, water pollution etc and take appropriate drainage measures to keep the site free of water, through use of mulches, grasses, slope drains and other devices. The contractor shall take adequate protective measures to see that excavation operations do not affect or damage adjoining structures, agricultural areas and water bodies.

The recommended measures are as below:

- Ensure unobstructed natural drainage through proper drainage channels/ structures.*
- Dispose surplus excavated earth at identified sites and ensure minimum hindrance to locals.*
- All excavations will be done in such a manner that the suitable materials available from excavation are satisfactorily utilized as decided upon beforehand. The excavations shall conform to the lines, grades, side slopes and levels as per the drawing.*

Management Strategies and Implementation Plans (MSIP) to manage the (ES) risks

The Bidder shall submit Management Strategies and Implementation Plans (MSIPs) to manage the following key Environmental and Social (ES) risks:-

- Traffic Management Plan to ensure safety of local communities from construction traffic*
- Water Resource Protection Plan to prevent contamination of drinking water*
- Boundary Marking and Protection Strategy for mobilization and construction to prevent offsite adverse impacts*
- Strategy for obtaining Consents/Permits prior to the start of relevant works such as opening a quarry or borrow pit*
- Sexual Exploitation, and Abuse (SEA) prevention and response action plan*
- Health and safety plan*
- Debris disposal plan*
- Labour Management Plan*

The following is a non-exhaustive list of Sub-Clauses of the Conditions of Contract that make reference to ES matters stated in the Specifications.]

Sub-Clause/Clause No.	Sub-Clause/Clause	Remarks
8.2	<i>Other Contractors</i>	<i>Indicate specific aspects (if any) that require contractor's cooperation such as to conduct environmental and social assessment.</i>
9.4.1, 9.4.2, 9.4.7, 9.4.8	<i>labor</i>	<i>State applicable requirements in accordance with the labor management procedure.</i>
9.4.6	<i>Facilities for Staff and Labor</i>	<i>-Indicate if access to or provision of services that accommodate physical, social and cultural needs of Contractor's Personnel is required.</i>
9.4.20	<i>Training of Contractor's Personnel</i>	<i>As set out in the ESCP, specify, details of any training to relevant Contractor's Personnel to be provided by the Employer's Personnel on environmental and social aspects. (whom, what, when, where, how long etc.)</i>
15.2	<i>Contractor to Construct the Works</i>	<p><i>If the Contract specifies that the Contractor shall design any part of the Permanent Works, state any applicable technical standards and requirements including to address:</i></p> <ul style="list-style-type: none"> <i>• climate change considerations,</i> <i>• universal access,</i> <i>• risks of the public's potential exposure to operational accidents or natural hazards, including extreme weather events, applicable certification or approval requirements</i> <p><i>[Refer to ESS4 on requirements for design]</i></p>
18.2	<i>Health and Safety Obligations</i>	<i>Indicate any additional requirements for the health and safety manual</i>

Sub-Clause/Clause No.	Sub-Clause/Clause	Remarks
18.3	<i>Protection of the Environment</i>	<i>Specify any values for emissions, surface discharges, effluent and any other pollutants from the Contractor's activities that shall not be exceeded.</i>
19.1	<i>Archeological and Geological Findings</i>	<i>Specify other requirements if any in accordance with the ESF – ESS8</i>
29.1	<i>Security of the Site</i>	<i>State any additional requirements for the security arrangements (ESS4 of the ESF states the principles of proportionality, GIIP and applicable laws. Include any other requirement set out in the ESCP.</i>

In addition to provisions in the above table, the Employer shall specify the following as applicable.

Management and Safety of Hazardous Materials

As applicable, specify requirements for the management and safety of hazardous materials (see ESF - ESS4 para. 17 and 18 and relevant guidance notes).

Resource Efficiency and Pollution Prevention and Management

As applicable specify Resource Efficiency and Pollution Prevention and Management measures (see ESF -ESS3 and relevant guidance notes).

- **Resource efficiency**

The Employer shall specify, as applicable, measures for improving efficient consumption of energy, water and raw materials, as well as other resources.

- **Energy:** *When the Works have been assessed to involve a potentially significant use of energy, specify any applicable measures to optimize energy usage.*
- **Water:** *When the Works have been assessed to involve a potentially significant use of water or will have potentially significant impacts on water quality, specify any applicable measures that avoid or minimize water usage so that the Works' water use does not have significant adverse impacts on communities, other users and the environment.*
- **Raw material:** *When the Works have been assessed to involve a potentially significant use of raw materials, specify any applicable measures to support efficient use of raw materials.*

- **Pollution prevention and management**

- **Management of air pollution:** *specify any measure to avoid or minimize Works related air pollution. See also GCC Sub-Clause 18.3 and the table above on Conditions of Contract that make reference to ES matters in the Specification.*

- **Management of hazardous and nonhazardous wastes:** specify any applicable measures to minimize the generation of waste, and reuse, recycle and recover waste in a manner that is safe for human health and the environment including storage, transportation and disposal of hazardous wastes. See also GCC Sub-Clauses 18.2 and 18.3 and the table aboveon Conditions of Contract that make reference to ES matters in the Specification.
- **Management of chemicals and hazardous materials:** specify any applicable measures to minimize and control the release and use of hazardous materials for Works activities including the production, transportation, handling, and storage of the materials. See also GCC Sub-Clauses 18.2 and 18.3 and the table aboveon Conditions of Contract that make reference to ES matters in the Specification.
- **Biodiversity Conservation and Sustainable Management of Living Natural Resources**

The Employer shall specify, as applicable, Biodiversity Conservation and Sustainable Management of Living Natural Resources (see ESF - ESS6 and relevant guidance notes). This includes, as applicable:

- *invasive alien species: managing the risk of invasive alien species during the execution of the Works;*
- *sustainable management of living natural resources; and*
- *certification and verification requirements for the supply of natural resource materials where there is a risk of significant conversion or significant degradation of natural or critical habitats.*

See also GCC Sub-Clause 18.3 and the table aboveon Conditions of Contract that make reference to ES matters in the Specification.

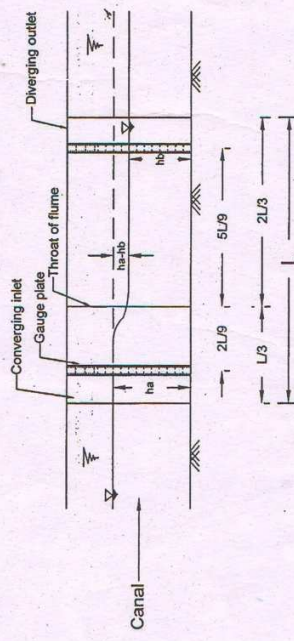
- **Road Safety**
- State any specific traffic and road safety requirement, as applicable. See also Sub-Clause 9.3 of the General Conditions of Contract. For details, refer to the Guidance Note on Road safety.

PAYMENT FOR ES REQUIREMENTS

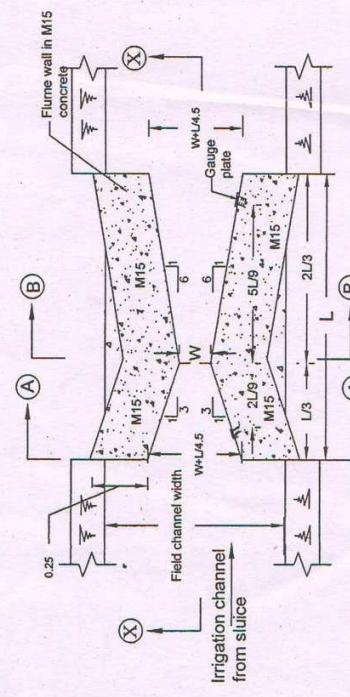
The Employer's ES and procurement specialists should consider how the Contractor will cost the delivery of the ES requirements. In the majority of cases, the payment for the delivery of ES requirements shall be a subsidiary obligation of the Contractor covered under the prices quoted for other Bill of Quantity items or activities. For example, normally the cost of implementing workplace safe systems of work, including the measures necessary for ensuring traffic and road safety, shall be covered by the Bidder's rates for the relevant works. Alternatively, provisional sums could be set aside for discrete activities for example for HIV counselling service, and, GBV/SEA awareness and sensitization or to encourage the contractor to deliver additional ES outcomes beyond the requirement of the Contract.

Drawings

Insert here a list of Drawings. The actual Drawings, including site plans, should be attached to this section or annexed in a separate folder.

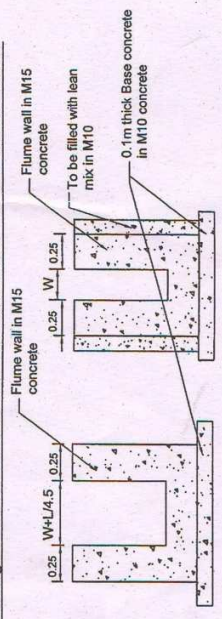


Sectional elevation @ X-X



Plan

Typical drawing for Flow measurement structures - Cut Throat Flume



Section at entry A-A

Section at throat B-B

Maximum discharge in channel	Size of flume W x L (cm)
1 cusecs	10 x 90
2 cusecs	20 x 90
3 cusecs	20 x 90
4 cusecs	30 x 90
5 cusecs	30 x 90
6 cusecs	30 x 90

Flume size W x L (cm)	10x90	20x90	30x90
Total length of flume (L)	90	90	90
Width of throat (W)	10	20	30
Converging inlet (L/3)	30	30	30
Diverging outlet (2L/3)	60	60	60
Gauge position @ us from throat position (2L/9)	20	20	20
Gauge position @ dis from throat position (5L/9)	50	50	50
Width of flume u/s and d/s sides (W/4 + 5)	30	40	50

Note:

This drawing should be read along with the dig no: 216/2016 to dig no: 211/2016.

Government of Tamilnadu Public Works Department Office of the Superintending Engineer, Designs Circle, WRD, Chennai - 600 005.		SHEET NO: 1/2
Designed & Drawn by Er.B.Sangeetha, AEE-1	Name of work IAMWARM-II-TYPICAL DRAWING FOR FLOW MEASUREMENT STRUCTURES-CUT THROAT FLUME	PLAN AND CROSS SECTION OF CUT THROAT FLUME Approved by (M) and Sent in. S/figure no: 108 2016/1/16/2016 Scale: 1 in
Checked by Er. Annelia Balraj, EE (SDD)		
Verified by Er. V. Rajakumar, Dy SE (D)		
Recommended by Er. K. Balaya, SE (D)		
Approved by Er. S. Thirukumar, CE (PF)		
Drg. No: 216/2016		

- The flume should be aligned straight with the channel and should be level longitudinally and laterally.
- The flume should be located in a straight section of the channel, placed with horizontal level in the canal.
- The flume can be located conveniently near the point of diversion or regulating gate, if conditions of operation require frequent conveniently near the point of diversion or regulating gate, if conditions of operation require frequent convenient discharge.
- The flow of the channel should be turbulent free and uniform.

The procedure to follow for installing a cutthroat flume to operate under free flow and submerged conditions is listed below.

1. Determination of the geometry of the Cut Throat Flume
 - a. The Maximum Flow Discharge(Q) to be measured shall be ascertained.
 - b. At the site selected for installing the flume, locate the high water line on the canal bank and determine the maximum depth of flow.
 - c. Table 1 shall be referred wherein suitable size of cut throat flumes for channels with various discharges and depth of flow are given.
 - d. The dimensions given in the Table 1 have to be followed for the flume that has been selected for installation.

The water depth, both upstream and downstream of the flume, may be measured by the use of painted gauges or stilling wells set at the specified locations.

Calculation of Discharge:

Construction of Cut Throat flumes:

spirit level is placed at different points so as to remove the high and low spots in order to level the ground. Then the flume is to be constructed. The bottom and top of flumes have to be ensured for horizontality.

- A Cut Throat Flume can be generally constructed using steel, fibre glass or concrete.
- But it is suggested to construct the flume in concrete when it is having considerable throat width.
- If a particular throat width is desired for a Cut throat flume to be constructed with concrete, a steel angle could be placed at the throat cross-section which would be embedded in the concrete.
- Ensure smooth finish inside the flume walls.
- Once the flume is installed, the sides should be connected with the channel bank and sealed with proper material which will be intact with bund and flume.
- Necessary gauges (scale) for measuring the depths of flow at both the upstream and downstream of throat section may be painted as shown in the Drawing.

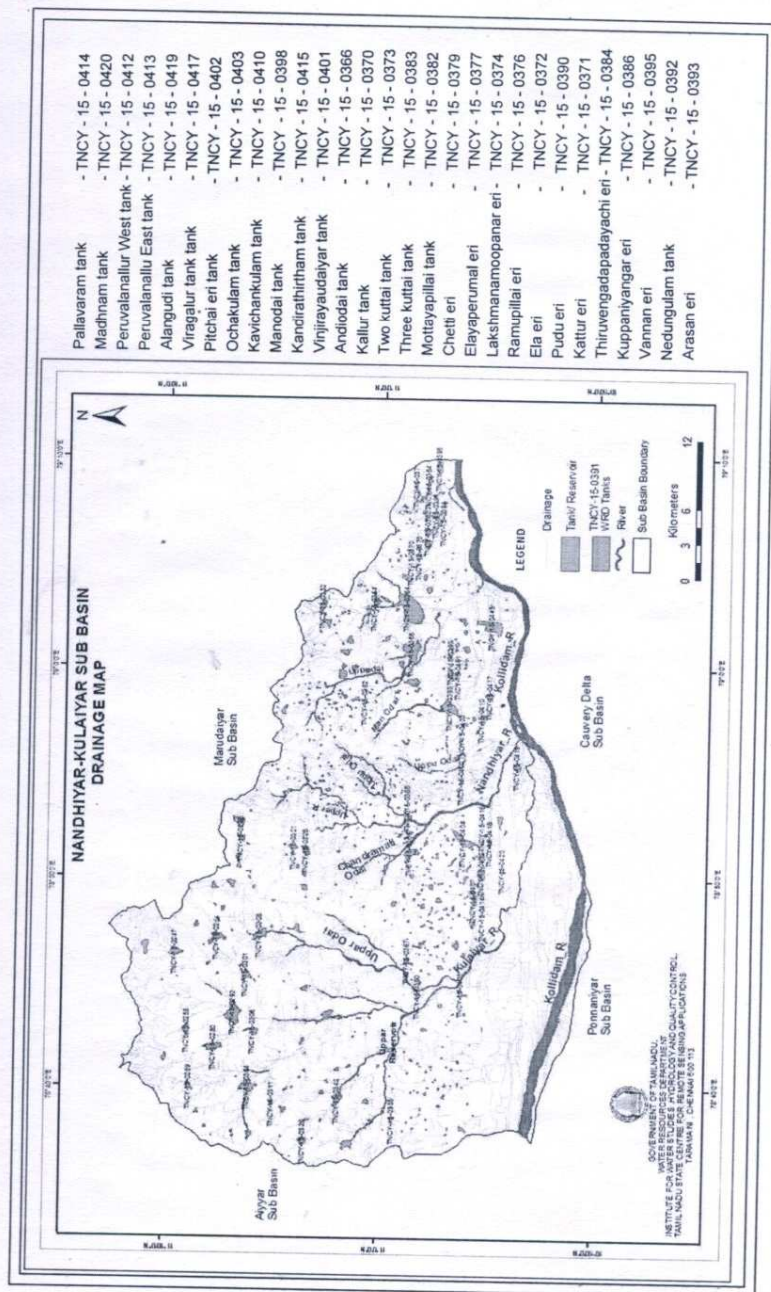
▲ Once proper installation has been assured, periodic maintenance will ensure continued satisfactory operation.

- Any moss which may have collected on the flume walls should be removed. Any debris which may collect on the flume floor should be removed.
- Flume walls may become encrusted and the encrustation should be removed with a steel-wire brush.

- After a few months-of operation, and at the end of the season or year, it is wise to check the flume bottom to be sure it is still level.
 - Flumes may "settle" or tilt sideways due to improper installation or flume operation.
 - When the settling is minor, the discharge can still be estimated with fair accuracy.
 - The usual places for settlement to occur is the exit section because of the channel erosion which occurs immediately downstream from the flume caused by the jelling action of the water.
 - The greater the settlement, the greater the discrepancy between
 - it has to be corrected then and there by raising lowered end.
 - The flume is to be checked for the tilting sideways. If so, the adjustment is made by taking the average of the depths of flow measured on each side of the flume for use in the rating tables or calibration curves.
- Points to be considered:**
- Generally, the flume bottom should be placed as high in the canal as grade and other conditions permit, to ensure free flow.
 - There is no established rule for proportions between "W" (Throat Width of flume) and "L" (Length of the flume) or "W" and "ha". However, it is recommended that the range of proportions which have been laboratory tested and are given in Table 1 may be adopted.
 - The staff gauges must be carefully referenced to the elevation of the flume bottom
 - When the flume is used, a staff gauge should be set vertically at the specified location for ha (depth of flow at upstream of throat) and hb (depth of flow at downstream of throat) along the converging or diverging wall.
 - Stilling wells have the advantage of providing a calm water surface compared with the fluctuation or "bounce" of the water surface that may exist within the flume. Stilling wells are also necessary if continuous recording instruments are to be used.
 - A separate register containing readings and calibrations shall be maintained with date and time.

Note: This Steel should be read along with the dog No: 276/2016 to 277/2016.

<p style="text-align: right;">SHEET NO : 22</p>	<table border="1"> <tr> <td> <p>Government of Tamilnadu Public Works Department Office of the Superintending Engineer, Designs Circle, WRD, Chennai - 600 005.</p> </td> <td> <p>Designed & Drawn by Er.B.Sangeetha, AEE (C)</p> <p>Checked by Er.Amelia Balraj, EE (SDD)</p> <p>Verified by Er.V.Rajkumar, Dy SE (D)</p> <p>Recommended by Er.K.Balaia, SE (D)</p> <p>Approved by Er.S.Thinalakann, CE (PF)</p> </td> <td> <p>Name of work: IAMWARMA-II-TYPICAL DRAWING FOR FLOW MEASUREMENT STRUCTURES-CUT THROAT FLUME</p> </td> <td> <p><u>GENERAL NOTES</u></p> <p>Approved by: <i>[Signature]</i> & Seal: <i>[Seal]</i> on <i>25/04/2016</i></p> </td> </tr> </table>	<p>Government of Tamilnadu Public Works Department Office of the Superintending Engineer, Designs Circle, WRD, Chennai - 600 005.</p>	<p>Designed & Drawn by Er.B.Sangeetha, AEE (C)</p> <p>Checked by Er.Amelia Balraj, EE (SDD)</p> <p>Verified by Er.V.Rajkumar, Dy SE (D)</p> <p>Recommended by Er.K.Balaia, SE (D)</p> <p>Approved by Er.S.Thinalakann, CE (PF)</p>	<p>Name of work: IAMWARMA-II-TYPICAL DRAWING FOR FLOW MEASUREMENT STRUCTURES-CUT THROAT FLUME</p>	<p><u>GENERAL NOTES</u></p> <p>Approved by: <i>[Signature]</i> & Seal: <i>[Seal]</i> on <i>25/04/2016</i></p>
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**Proposed Filed Channel in Tank Sluice Channel of
Nandhiyaru and Kulaiyaru Sub Basin – Package No. 2**

Sl. No	Name of Tank	Length in M				
		Sluice No.1	Sluice No.2	Sluice No.3	Sluice No.4	Sluice No.6
1	Peruvalanallur West Tank	85	85	85		
2	Peruvalanallur East Tank	90				
3	Pitchai Eri	85				
4	Ochakulam	70				
5	Kavichankulam	65			65	
6	Vinjiraya udaiyar Eri	80				
7	Viragalur Tank	115				
8	Kandirathitham Tank					150
9	Two Kuttai Tank	50	150			
10	Three Kuttai Tank	50				
11	Elayaperumal Eri	50				
12	Ezha Eri	50				
13	Lakshmana Moopanar Eri	50				
14	Ramu Pillai Eri	50				
15	Pudhu Eri	50				
16	Kuppan Ayyangar Eri	50				
17	Vannan Eri	50				
18	Nedungulam Eri	50				
19	Arasan Eri	30	30			

PART 3 – Conditions of Contract and Contract Forms

Section VIII - General Conditions of Contract

These General Conditions of Contract (GCC), read in conjunction with the Particular Conditions of Contract (PCC) and other documents listed therein, should be a complete document expressing fairly the rights and obligations of both parties.

These General Conditions of Contract have been developed on the basis of considerable international experience in the drafting and management of contracts, bearing in mind a trend in the construction industry towards simpler, more straightforward language.

The GCC can be used for both smaller measurements contracts and lump sum contracts.

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) The **Activity Schedule** is a schedule of the activities comprising the construction, installation, testing, and commissioning of the Works in a lump-sum contract. It includes a lump-sum price for each activity, which is used for valuations and for assessing the effects of Variations and Compensation Events
 - (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 46 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 57.1.
 - (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) **Dayworks** are varied work inputs subject to payment on a time basis for the Contractor's employees and Equipment, in addition to payments for associated Materials and Plant
 - (n) A Defect is any part of the Works not completed in accordance with the Contract

- (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 38.1 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 document 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**.
- (ii) **“Contractor’s Personnel”** refers to all personnel whom the Contractor utilizes on the Site or other places where the Works are carried out, including the staff, labor and other employees of each Subcontractor
- (jj) **“Key Personnel”** means the positions (if any) of the Contractor’s personnel that are stated in the Specification
- (kk) **“ES”** means Environmental and Social (including Sexual Exploitation and Abuse (SEA), and Sexual Harassment (SH).
- (ll) **“Sexual Exploitation and Abuse” “(SEA)”** means the following:
Sexual Exploitation is defined as any actual or attempted abuse of position of vulnerability, differential power or trust, for sexual purposes, including, but not limited to, profiting monetarily, socially or politically from the sexual exploitation of another;
Sexual Abuse is defined as the actual or threatened physical intrusion of a sexual nature, whether by force or under unequal or coercive conditions
- (mm) **“Sexual Harassment” “(SH)”** is defined as unwelcome sexual advances, requests for sexual favors, and other verbal or physical conduct of a sexual nature by the Contractor’s Personnel with other Contractor’s or Employer’s Personnel; and

- (nn) “**Employer’s Personnel**” refers to the Project Manager and all other staff, labor and other employees (if any) of the Project Manager and of the Employer engaged in fulfilling the Employer’s obligations under the Contract; and any other personnel identified as Employer’s Personnel, by a notice from the Employer or the Project Manager to the Contractor.

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,
 - (d) Particular Conditions of Contract,
 - (e) General Conditions of Contract, including Appendices,
 - (f) Specifications,
 - (g) Drawings,
 - (h) Bill of Quantities,⁹ 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**.
- 3.2 Throughout the execution of the Contract, the Contractor shall comply with the import of goods and services prohibitions in the Employer’s country when
- (a) as a matter of law or official regulations, the Borrower’s country 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, the Borrower’s Country prohibits any import of goods from that country or any payments to any country, person, or entity in that country.

⁹ In lump-sum contracts, delete “Bill of Quantities” and replace with “Activity Schedule.”

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.
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. Communications	6.1	Communications between parties that are referred to in the Conditions shall be effective only when in writing. A notice shall be effective only when it is delivered.
7. Contracting	Sub 7.1	The Contractor may subcontract with the approval of the Project Manager, but may not assign the Contract without the approval of the Employer in writing. Subcontracting shall not alter the Contractor's obligations. The Contractor shall require that its Subcontractors execute the Works in accordance with the Contract, including complying with the relevant ES requirements and the obligations set out in Sub-Clause 28.1.
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.
	8.2	The Contractor shall also, as stated in the Specifications or as instructed by the Project Manager, cooperate with and allow appropriate opportunities for the Employer's or any other personnel, notified to the Contractor by the Employer or Project Manager, to conduct any environmental and social assessment
9. Personnel and Equipment	9.1	The Contractor shall employ the Key Personnel and use the Equipment identified in its Bid, 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 (or cause to be removed) any person employed on the Site or Works, including the Key Personnel (if any), who:

- (a) persists in any misconduct or lack of care,
- (b) carries out duties incompetently or negligently,
- (c) fails to comply with any provisions of the Contract,
- (d) persists in any conduct which is prejudicial to safety, health, or the protection of the environment.
- (e) Based on reasonable evidence, is determined to have engaged in Fraud and Corruption during the execution of works
- (f) has been recruited from the Employer's Personnel
- (g) undertakes behavior which breaches the Code of Conduct for contractor's Personnel (ES)

If appropriate, the Contractor shall then promptly appoint (or cause to be appointed) a suitable replacement with equivalent skills and experience.

Notwithstanding any requirement from the Project Manager to remove or cause to remove any person, the Contractor shall take immediate action as appropriate in response to any violation of (a) through (g) above. Such immediate action shall include removing (or causing to be removed) from the Site or other places where the Works are being carried out, any Contractor's Personnel who engages in (a), (b), (c), (d), (e) or (g) above or has been recruited as stated in (f) above

9.3 The Contractor shall take all necessary safety measures to avoid the occurrence of incidents and injuries to any third party associated with the use of, if any, Equipment on public roads or other public infrastructure. The Contractor shall monitor road safety incidents and accidents to identify negative safety issues, and establish and implement necessary measures to resolve them.

9.4 Labor

9.4.1 *Engagement of Staff and Labor.* The Contractor shall provide and employ on the Site for the execution of the Works such skilled, semi-skilled and unskilled labor as is necessary for the proper and timely execution of the Contract. The Contractor is encouraged, to the extent practicable and reasonable, to employ staff and labor with appropriate

qualifications and experience from sources within the Country.

Unless otherwise provided in the Contract, the Contractor shall be responsible for the recruitment, transportation, accommodation and welfare facilities in accordance with GCC Sub-Clause 9.4.6, of the Contractor's Personnel, and for all payments in connection therewith.

The Contractor shall provide the Contractor's Personnel information and documentation that are clear and understandable regarding their terms and conditions of employment. The information and documentation shall set out their rights under relevant labor laws applicable to the Contractor's Personnel (which will include any applicable collective agreements), including their rights related to hours of work, wages, overtime, compensation and benefits, as well as those arising from any requirements in the Specifications. The Contractor's Personnel shall be informed when any material changes to their terms or conditions of employment occur

9.4.2 *Conditions of Labor.* The Contractor shall inform the Contractor's Personnel about:

- (a) any deduction to their payment and the conditions of such deductions in accordance with the applicable laws or as stated in the Specifications; and
- (b) their liability to pay personal income taxes in the Country in respect of such of their salaries, wages, allowances and any benefits as are subject to tax under the laws of the Country for the time being in force.

The Contractor shall perform such duties in regard to such deductions thereof as may be imposed on him by such laws. Where required by applicable laws or as stated in the Specifications, the Contractor shall provide the Contractor's Personnel written notice of termination of employment and details of severance payments in a timely manner. The Contractor shall have paid the Contractor's Personnel (either directly or where appropriate for their benefit) all due wages and entitlements including, as applicable, social security benefits and pension contributions, on or before the end of their engagement/ employment

9.4.3 *The Contractor may bring into the Country any foreign personnel who are necessary for the execution of the Works to the extent allowed by the applicable Laws. The Contractor shall ensure that these personnel are provided with the required residence visas and work permits. The Employer will, if requested by the Contractor, use its best endeavors in a timely and expeditious manner to assist the Contractor in obtaining any local, state, national, or government permission required for bringing in the Contractor's personnel*

- 9.4.4 *The Contractor shall at its own expense provide the means of repatriation to and the Contractor's Personnel employed on the Contract at the Site to their various home countries. It shall also provide suitable temporary maintenance of all such persons from the cessation of their employment on the Contract to the date programmed for their departure. In the event that the Contractor defaults in providing such means of transportation and temporary maintenance, the Employer may provide the same to such personnel and recover the cost of doing so from the Contractor*
- 9.4.5 *Disorderly conduct. The Contractor shall at all times during the progress of the Contract use its best endeavors to prevent any unlawful, riotous or disorderly conduct or behavior by or amongst the Contractor's Personnel*
- 9.4.6 *Facilities for Staff and Labor. Except as otherwise stated in the Specification, the Contractor shall provide and maintain all necessary accommodation and welfare facilities for the Contractor's Personnel. If stated in the Specification, the Contractor shall give access to or provide services that accommodate the physical, social and cultural needs of the Contractor's Personnel. The Contractor shall also provide similar facilities for the Employer's Personnel if stated in the Specifications*
- 9.4.7 *The Contractor shall, in all dealings with the Contractor's Personnel, pay due regard to all recognized festivals, official holidays, religious or other customs and all local laws and regulations pertaining to the employment of labor. The Contractor shall provide the Contractor's Personnel annual holiday and sick, maternity and family leave, as required by applicable laws or as stated in the Specifications*
- 9.4.8 *Supply of Foodstuffs. The Contractor shall arrange for the provision of a sufficient supply of suitable food as may be stated in the Specification at reasonable prices for the Contractor's Personnel for the purposes of or in connection with the Contract*
- 9.4.9 *Supply of Water. The Contractor shall, having regard to local conditions, provide on the Site an adequate supply of drinking and other water for the use of the Contractor's Personnel*
- 9.4.10 *Measures against Insect and Pest Nuisance. The Contractor shall at all times take the necessary precautions to protect the Contractor's Personnel employed on the Site from insect and pest nuisance, and to reduce the danger to their health. The Contractor shall comply with all the regulations of the local health authorities, including use of appropriate insecticide*

- 9.4.11 *Alcoholic Liquor or Drugs.* The Contractor shall not, otherwise than in accordance with the laws of the Country, import, sell, give, barter or otherwise dispose of any alcoholic liquor or drugs, or permit or allow importation, sale, gift, barter or disposal thereto by Contractor's Personnel
- 9.4.12 *Arms and Ammunition.* The Contractor shall not give, barter, or otherwise dispose of, to any person, any arms or ammunition of any kind, or allow Contractor's Personnel to do so
- 9.4.13 *Funeral Arrangements.* The Contractor shall be responsible, to the extent required by local regulations, for making any funeral arrangements for any of its local employees who may die while engaged upon the Works
- 9.4.14 *Forced Labor.* The Contractor, including its Subcontractors, shall not employ or engage forced labor. Forced labor consists of any work or service, not voluntarily performed, that is exacted from an individual under threat of force or penalty, and includes any kind of involuntary or compulsory labor, such as indentured labor, bonded labor or similar labor-contracting arrangements.
No persons shall be employed or engaged who have been subject to trafficking. Trafficking in persons is defined as the recruitment, transportation, transfer, harboring or receipt of persons by means of the threat or use of force or other forms of coercion, abduction, fraud, deception, abuse of power, or of a position of vulnerability, or of the giving or receiving of payments or benefits to achieve the consent of a person having control over another person, for the purposes of exploitation
- 9.4.15 *Child Labor.* The Contractor, including its Subcontractors, shall not employ or engage a child under the age of 14 unless the national law specifies a higher age (the minimum age).
The Contractor, including its Subcontractors, shall not employ or engage a child between the minimum age and the age of 18 in a manner that is likely to be hazardous, or to interfere with, the child's education, or to be harmful to the child's health or physical, mental, spiritual, moral, or social development.
The Contractor including its Subcontractors, shall only employ or engage children between the minimum age and the age of 18 after an appropriate risk assessment has been conducted by the Contractor with the Project Manager's approval. The Contractor shall be subject to regular monitoring by the Project Manager that includes monitoring of health, working conditions and hours of work.
Work considered hazardous for children is work that, by its nature or the circumstances in which it is carried out, is likely

to jeopardize the health, safety, or morals of children. Such work activities prohibited for children include work:

- (a) with exposure to physical, psychological or sexual abuse;*
- (b) underground, underwater, working at heights or in confined spaces;*
- (c) with dangerous machinery, equipment or tools, or involving handling or*
- (d) transport of heavy loads;*
- (e) in unhealthy environments exposing children to hazardous substances, agents, or processes, or to temperatures, noise or vibration damaging to health; or under difficult conditions such as work for long hours, during the night or in confinement on the premises of the employer*

9.4.16 *Employment Records of Workers. The Contractor shall keep complete and accurate records of the employment of labor at the Site. The records shall include the names, ages, genders, hours worked, and wages paid to all workers. These records shall be summarized on a monthly basis and submitted to the project Manager*

9.4.17 *Workers' Organizations. In countries where the relevant labor laws recognize workers' rights to form and to join workers' organizations of their choosing and to bargain collectively without interference, the Contractor shall comply with such laws. In such circumstances, the role of legally established workers' organizations and legitimate workers' representatives will be respected, and they will be provided with information needed for meaningful negotiation in a timely manner. Where the relevant labor laws substantially restrict workers' organizations, the Contractor shall enable alternative means for the Contractor's Personnel to express their grievances and protect their rights regarding working conditions and terms of employment. The Contractor shall not seek to influence or control these alternative means. The Contractor shall not discriminate or retaliate against the Contractor's Personnel who participate, or seek to participate, in such organizations and collective bargaining or alternative mechanisms. Workers' organizations are expected to fairly represent the workers in the workforce*

9.4.18 *Non-Discrimination and Equal Opportunity. The Contractor shall not make decisions relating to the employment or treatment of Contractor's Personnel on the basis of personal characteristics unrelated to inherent job requirements. The Contractor shall base the employment of Contractor's Personnel on the principle of equal opportunity and fair treatment, and shall not discriminate with respect to any aspects of the employment relationship, including recruitment and hiring, compensation (including wages and benefits), working conditions and terms of employment, access to training, job assignment, promotion, termination of*

employment or retirement, and disciplinary practices. Special measures of protection or assistance to remedy past discrimination or selection for a particular job based on the inherent requirements of the job shall not be deemed discrimination. The Contractor shall provide protection and assistance as necessary to ensure non-discrimination and equal opportunity, including for specific groups such as women, people with disabilities, migrant workers and children (of working age in accordance with GCC Sub-Clause 9.4.15)

- 9.4.19 *Contractor's Personnel Grievance Mechanism. The Contractor shall have a grievance mechanism for Contractor's Personnel, and where relevant the workers' organizations stated in GCC Sub-Clause 9.4.17, to raise workplace concerns. The grievance mechanism shall be proportionate to the nature, scale, risks and impacts of the Contract. The mechanism shall address concerns promptly, using an understandable and transparent process that provides timely feedback to those concerned in a language they understand, without any retribution, and shall operate in an independent and objective manner.*

The Contractor's Personnel shall be informed of the grievance mechanism at the time of engagement for the Contract, and the measures put in place to protect them against any reprisal for its use. Measures will be put in place to make the grievance mechanism easily accessible to all Contractor's Personnel.

The grievance mechanism shall not impede access to other judicial or administrative remedies that might be available, or substitute for grievance mechanisms provided through collective agreements.

The grievance mechanism may utilize existing grievance mechanisms, providing that they are properly designed and implemented, address concerns promptly, and are readily accessible to Contractor's Personnel. Existing grievance mechanisms may be supplemented as needed with Contract-specific arrangements

- 9.4.20 *Training of Contractor's Personnel. The Contractor shall provide appropriate training to relevant Contractor's Personnel on ES aspects of the Contract, including appropriate sensitization on prohibition of SEA and SH, and health and safety training referred to in GCC Sub-Clause 18.2.*

As stated in the Specifications or as instructed by the Project Manager, the Contractor shall also allow appropriate opportunities for the relevant Contractor's Personnel to be trained on ES aspects of the Contract by the Employer's Personnel.

The Contractor shall provide training on SEA and SH, including its prevention, to any of its personnel who has a role to supervise other Contractor's Personnel

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|--|------|---|
| 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 | <p>From the Start Date until the Defects Liability Certificate has been issued, the following are Employer's risks.</p> <ul style="list-style-type: none"> (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 <ul style="list-style-type: none"> (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 | <p>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</p> <ul style="list-style-type: none"> (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
 - (b) loss of or damage to 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 an 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 Date**
- 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**
- 15.1 The Contractor shall construct and install the Works in accordance with the Specifications and Drawings
- 15.2 If the Contract specifies that the Contractor shall design any part of the permanent Works, the Contractor shall take into account the Employer's requirements which may include, if stated in the Specifications:
- (a) designing structural elements of the Works taking into account climate change considerations;
 - (b) applying the concept of universal access (the concept of universal access means unimpeded access for people of all ages and abilities in different situations and under various circumstances; and
 - (c) considering the incremental risks of the public's potential exposure to operational accidents or natural hazards, including extreme weather events.

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.
	16.2	<p>The Contractor shall not carry out mobilization to the Site unless the Project Manager gives approval, an approval that shall not be unreasonably delayed, to the measures the Contractor proposes to address environmental and social risks and impacts, which at a minimum shall include applying the Management Strategies and Implementation Plans (MSIPs) and Code of Conduct for Contractor's Personnel submitted as part of the Bid and agreed as part of the Contract.</p> <p>The Contractor shall submit, to the Project Manager for its approval any additional MSIPs as are necessary to manage the ES risks and impacts of ongoing Works. These MSIPs collectively comprise the Contractor's Environmental and Social Management Plan (C-ESMP). The Contractor shall review the C-ESMP, periodically (but not less than every six (6) months), and update it as required to ensure that it contains measures appropriate to the Works. The updated C-ESMP shall be submitted to the Project Manager for its approval.</p>
17. Approval by the Project Manager	17.1	The Contractor shall submit Specifications and Drawings showing the proposed Temporary Works to the Project Manager, for his approval.
	17.2	The Contractor shall be responsible for design of Temporary Works.
	17.3	The Project Manager's approval shall not alter the Contractor's responsibility for design of the Temporary Works.
	17.4	The Contractor shall obtain approval of third parties to the design of the Temporary Works, where required.
	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.
18. Health, Safety and Protection of the Environment	18.1	The Contractor shall be responsible for the safety of all activities on the Site.
	18.2	<p>The Contractor shall:</p> <ul style="list-style-type: none"> (a) comply with all applicable health and safety regulations and Laws; (b) comply with all applicable health and safety obligations specified in the Contract; (c) take care for the health and safety of all persons entitled to be on the Site and other places, if any,

- where the Works are being executed;
- (d) keep the Site and Works clear of unnecessary obstruction so as to avoid danger to these persons;
 - (e) provide fencing, lighting, safe access, guarding and watching of the Works until the issue of the Contract Completion Certificate;
 - (f) provide any Temporary Works (including roadways, footways, guards and fences) which may be necessary, because of the execution of the Works, for the use and protection of the public and of owners and occupiers of adjacent land;
 - (g) provide health and safety training of Contractor's Personnel as appropriate and maintain training records;
 - (h) actively engage the Contractor's Personnel in promoting understanding, and methods for, implementation of health and safety requirements, as well as in providing information to Contractor's Personnel, training on occupational safety and health, and provision of personal protective equipment without expense to the Contractor's Personnel;
 - (i) put in place workplace processes for Contractor's Personnel to report work situations that they believe are not safe or healthy, and to remove themselves from a work situation which they have reasonable justification to believe presents an imminent and serious danger to their life or health.
 - (j) Contractor's Personnel who remove themselves from such work situations shall not be required to return to work until necessary remedial action to correct the situation has been taken. Contractor's Personnel shall not be retaliated against or otherwise subject to reprisal or negative action for such reporting or removal;
 - (k) where the Employer's Personnel, any other contractors employed by the Employer, and/or personnel of any legally constituted public authorities and private utility companies are employed in carrying out, on or near the site, of any work not included in the Contract, collaborate in applying the health and safety requirements, without prejudice to the responsibility of the relevant entities for the health and safety of their own personnel; and
 - (l) establish and implement a system for regular (not less than six-monthly) review of health and safety performance and the working environment.

Subject to GCC Sub-Clause 16.2, the Contractor shall submit to the Project Manager for its approval a health and safety manual which has been specifically prepared for the Works, the Site and other places (if any) where the Contractor intends to execute the Works.

The health and safety manual shall be in addition to any other similar document required under applicable health and safety regulations and laws.

The health and safety manual shall set out all the health and safety requirements under the Contract,

(a) which shall include at a minimum:

- (i) the procedures to establish and maintain a safe working environment without risk to health at all workplaces, machinery, equipment and processes under the control of the Contractor, including control measures for chemical, physical and biological substances and agents;
- (ii) details of the training to be provided, records to be kept;
- (iii) the procedures for prevention, preparedness and response activities to be implemented in the case of an emergency event (i.e. an unanticipated incident, arising from both natural and man-made hazards, typically in the form of fire, explosions, leaks or spills, which may occur for a variety of different reasons including failure to implement operating procedures that are designed to prevent their occurrence, extreme weather or lack of early warning);
- (iv) remedies for adverse impacts such as occupational injuries, deaths, disability and disease;
- (v) the measures to be taken to avoid or minimize the potential for community exposure to water-borne, water-based, water-related, and vector-borne diseases,
- (vi) the measures to be implemented to avoid or minimize the spread of communicable diseases (including transfer of Sexually Transmitted Diseases or Infections (STDs), such as HIV virus) and non-communicable diseases associated with the execution of the Works, taking into consideration differentiated exposure to and higher sensitivity of vulnerable groups. This includes taking measures to avoid or minimize the transmission of communicable diseases that may be associated with the influx of temporary or permanent Contract-

- related labor;
- (vii) the policies and procedures on the management and quality of accommodation and welfare facilities if such accommodation and welfare facilities are provided by the Contractor in accordance with GCC Sub-Clause 9.4.6; and

(b) any other requirements stated in the Specification

18.3 Protection of the environment

The Contractor shall take all necessary measures to

18.3.1 protect the environment (both on and off the Site); and

18.3.2 limit damage and nuisance to people and property resulting from pollution, noise and other results of the Contractor's operations and/ or activities.

The Contractor shall ensure that emissions, surface discharges, effluent and any other pollutants from the Contractor's activities shall exceed neither the values indicated in the Specifications, nor those prescribed by applicable laws.

In the event of damage to the environment, property and/ or nuisance to people, on or off Site as a result of the Contractor's operations, the Contractor shall agree with the Project Manager the appropriate actions and time scale to remedy, as practicable, the damaged environment to its former condition. The Contractor shall implement such remedies at its cost to the satisfaction of the Project Manager

19. Archaeological and Geological Findings

19.1 All fossils, coins, articles of value or antiquity, structures, groups of structures, and other remains or items of geological, archaeological, paleontological, historical, architectural or religious interest found on the Site shall be placed under the care and custody of the Employer. The Contractor shall:

- (a) take all reasonable precautions, including fencing-off the area or site of the finding, to avoid further disturbance and prevent Contractor's Personnel or other persons from removing or damaging any of these findings;
- (b) train relevant Contractor's Personnel on appropriate actions to be taken in the event of such findings; and
- (c) implement any other action consistent with the requirements of the Specifications and relevant laws.

The Contractor shall, as soon as practicable after discovery of any such finding, 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.
21. Access to the Site	21.1	The Contractor shall allow the Project Manager and any person authorized by the Project Manager (including the Bank staff or consultants acting on the Bank's behalf, stakeholders and third parties, such as independent experts, local communities, or non-governmental organizations), including to carry out environmental and social audit, as appropriate, 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	22.1	The Contractor shall carry out all instructions of the Project Manager which comply with the applicable laws where the Site is located.
	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.
	22.3	Inspections & Audit by the Bank Pursuant to paragraph 2.2 e. of Appendix A to the GCC-Fraud and Corruption, the Contractor shall permit and shall cause its agents (where declared or not), subcontractors, subconsultants, service providers, suppliers, and personnel, to permit, the Bank and/or persons appointed by the Bank to inspect the site and/or the accounts, records and other documents relating to the procurement process, selection and/or contract execution, and to have such accounts, records and other documents audited by auditors appointed by the Bank. The Contractor's and its Subcontractors' and subconsultants' attention is drawn to GCC Sub-Clause 25.1 (Fraud and Corruption) which provides, inter alia, that acts intended to materially impede the exercise of the Bank's inspection and audit rights constitute a prohibited practice subject to contract termination (as well as to a determination of ineligibility pursuant to the Bank's prevailing sanctions procedures)..

23. Appointment of the Adjudicator	23.1	The Adjudicator 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.
	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 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 by the hour 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 a decision of the Adjudicator 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 .
25. Fraud and Corruption	25.1	The Bank requires compliance with the Bank's Anti-Corruption Guidelines and its prevailing sanctions policies and procedures as set forth in the WBG's Sanctions Framework, 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 disclosed 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.
- 26. Stakeholder Engagement** 26.1 The Contractor shall provide relevant contract- related information, as the Employer and/or Project Manager may reasonably request to conduct Stakeholder engagements. “Stakeholder” refers to individuals or groups who:
- (i) are affected or likely to be affected by the Contract; and
 - (ii) may have an interest in the Contract.
- The Contractor may also directly participate in Stakeholder engagements, as the Employer and/or Project Manager may reasonably request
- 27. Suppliers (other than Sub contractors)** 27.1 **Forced Labor:** The Contractor shall take measures to require its suppliers (other than Subcontractors) not to employ or engage forced labor including trafficked persons as described in GCC Sub-Clause 9.4.14. If forced labor/trafficking cases are identified, the Contractor shall take measures to require the suppliers to take appropriate steps to remedy them. Where the supplier does not remedy the situation, the Contractor shall within a reasonable period substitute the supplier with a supplier that is able to manage such risks
- 27.2 **Child Labor:** The Contractor shall take measures to require its suppliers (other than Subcontractors) not to employ or engage child labor as described in GCC Sub-Clause 9.4.15. If child labor cases are identified, the Contractor shall take measures to require the suppliers to take appropriate steps to remedy them. Where the supplier does not remedy the situation, the Contractor shall within a reasonable period substitute the supplier with a supplier that is able to manage such risks
- 27.3 **Serious Safety Issues:** The Contractor, including its Subcontractors, shall comply with all applicable safety obligations, including as stated in GCC Sub-Clause 18.2. The Contractor shall also take measures to require its suppliers (other than Subcontractors) to adopt procedures and mitigation measures adequate to address safety issues related to their personnel. If serious safety issues are identified, the Contractor shall take measures to require the suppliers to take appropriate steps to remedy them. Where the supplier does not remedy the situation, the Contractor shall within a reasonable period substitute the supplier with a supplier that is able to manage such risks

- 27.4 *Obtaining natural resource materials in relation to supplier:*
The Contractor shall obtain natural resource *materials* from suppliers that can demonstrate, through compliance with the applicable verification and/ or certification requirements, that obtaining such materials is not contributing to the risk of significant conversion or significant degradation of natural or critical habitats such as unsustainably harvested wood products, gravel or sand extraction from river beds or beaches.
If a supplier cannot continue to demonstrate that obtaining such materials is not contributing to the risk of significant conversion or significant degradation of natural or critical habitats, the Contractor shall within a reasonable period substitute the supplier with a supplier that is able to demonstrate that they are not significantly adversely impacting the habitats

28. Code of Conduct of 28.1

The Contractor shall have a Code of Conduct for the Contractor's Personnel.
The Contractor shall take all necessary measures to ensure that each Contractor's Personnel is made aware of the Code of Conduct including specific behaviors that are prohibited, and understands the consequences of engaging in such prohibited behaviors.
These measures include providing instructions and documentation that can be understood by the Contractor's Personnel and seeking to obtain that person's signature acknowledging receipt of such instructions and/or documentation, as appropriate.
The Contractor shall also ensure that the Code of Conduct is visibly displayed in multiple locations on the Site and any other place where the Works will be carried out, as well as in areas outside the Site accessible to the local community and project affected people. The posted Code of Conduct shall be provided in languages comprehensible to Contractor's Personnel, Employer's Personnel and the local community.
The Contractor's Management Strategy and Implementation Plans shall include appropriate processes for the Contractor to verify compliance with these obligations

29. Security of the Site

29.1 The Contractor shall be responsible for the security of the Site, and:

- (a) for keeping unauthorized persons off the Site;
- (b) authorized persons shall be limited to the Contractor's Personnel, the Employer's Personnel, and to any other personnel identified as authorized personnel (including the Employer's other contractors on the Site), by a notice from the Employer or the Project Manager to the Contractor.

Subject to GCC Sub-Clause 16.2, the Contractor shall submit for the Project Manager's No-objection a security management plan that sets out the security arrangements for the Site

The Contractor shall (i) conduct appropriate background checks on any personnel retained to provide security; (ii) train the security personnel adequately (or determine that they are properly trained) in the use of force (and where applicable, firearms), and appropriate conduct towards Contractor's Personnel, Employer's Personnel and affected communities; and (iii) require the security personnel to act within the applicable Laws and any requirements set out in the Specifications.

The Contractor shall not permit any use of force by security personnel in providing security except when used for preventive and defensive purposes in proportion to the nature and extent of the threat.

In making security arrangements, the Contractor shall also comply with any additional requirements stated in the Specification.

B. Time Control

30. Program

30.1 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 Program showing the general methods, arrangements, order, and timing for all the activities in the Works. In the case of a lump-sum contract, the activities in the Program shall be consistent with those in the Activity Schedule. 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.

30.2 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.

- 30.3 The Contractor shall monitor progress of the Works and submit to the Project manager progress report and any updated Program showing the actual progress achieved and the effect of the progress achieved on the timing of the remaining Works, including any changes to the sequence of the activities, 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. In the case of lump-sum Contract, the Contractor shall provide an updated Activity Schedule within 14 days of being instructed to by the Project Manager.
- 30.4 Unless otherwise stated in the Specifications, each progress report shall include the Environmental and Social (ES) metrics set out in Appendix B.
- 30.5 In addition to the progress reports, the Contractor shall inform the Project Manager immediately of any allegation, incident or accident in the Site, which has or is likely to have a significant adverse effect on the environment, the affected communities, the public, Employer's Personnel, Project Manager's personnel or Contractor's Personnel. This includes, but is not limited to, any incident or accident causing fatality or serious injury; significant adverse effects or damage to private property; or any allegation of SEA and/or SH. In case of SEA and/or SH, while maintaining confidentiality as appropriate, the type of allegation (sexual exploitation, sexual abuse or sexual harassment), gender and age of the person who experienced the alleged incident should be included in the information.
- The Contractor, upon becoming aware of the allegation, incident or accident, shall also immediately inform the Project Manager of any such incident or accident on the Subcontractors' or suppliers' premises relating to the Works which has or is likely to have a significant adverse effect on the environment, the affected communities, the public, Employer's Personnel, or Contractor's, its Subcontractors' and suppliers' personnel. The notification shall provide sufficient detail regarding such incidents or accidents. The Contractor shall provide full details of such incidents or accidents to the Project Manager within the timeframe agreed with the Project Manager.
- The Contractor shall require its Subcontractors and suppliers (other than Subcontractors) to immediately notify the Contractor of any incidents or accidents referred to in this Sub clause

31. Extension of the Intended Completion Date	31.1	The Project Manager shall extend the Intended Completion Date if a Compensation Event occurs or a Variation is issued which makes it impossible for Completion to be achieved by the Intended Completion Date without the Contractor taking steps to accelerate the remaining work, which would cause the Contractor to incur additional cost.
	31.2	The Project Manager shall decide whether and by how much to extend the Intended Completion Date 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
32. Acceleration	32.1	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.
	32.2	If the Contractor's priced proposals for an acceleration are accepted by the Employer, they are incorporated in the Contract Price and treated as a Variation.
33. Delays Ordered by the Project Manager	33.1	The Project Manager may instruct the Contractor to delay the start or progress of any activity within the Works.
34. Management Meetings	34.1	Either the Project Manager or the Contractor may require the other to attend a management meeting. The business of a management meeting shall be to review the plans for remaining work and to deal with matters raised in accordance with the early warning procedure.
	34.2	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.

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| 35. Early Warning | 35.1 | 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. |
| | 35.2 | 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 instruction of the Project Manager. |

C. Quality Control

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| 36. Identifying Defects | 36.1 | The Project Manager shall check the Contractor's work and notify the Contractor of any Defects that are found. 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. |
| 37. Tests | 37.1 | If the Project Manager instructs the Contractor to carry out a test not specified in the Specifications 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. |
| 38. Correction of Defects | 38.1 | The Project Manager shall give notice to the Contractor of any Defects 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. |
| | 38.2 | 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. |
| 39. 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. |

D. Cost Control

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| 40. Contract Price¹⁰ | 40.1 | 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. |
| 41. Changes in the Contract Price¹¹ | 41.1 | 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. 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 |
| | 41.2 | 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. |
| 42. Variations | 42.1 | All Variations shall be included in updated Programs ¹² produced by the Contractor. |
| | 42.2 | The Contractor shall provide the Project Manager with a quotation for carrying out the Variation when requested to do so by the Project Manager. The Contractor shall also provide information of any ES risks and impacts of the Variation. 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. |

¹⁰ In lump-sum contracts, replace GCC Sub-Clauses 40.1 as follows:

40.1 The Contractor shall provide updated Activity Schedules within 14 days of being instructed to by the Project Manager. The Activity Schedule shall contain the priced activities for the Works to be performed by the Contractor. The Activity Schedule is used to monitor and control the performance of activities on which basis the Contractor will be paid. If payment for materials on site shall be made separately, the Contractor shall show delivery of Materials to the Site separately on the Activity Schedule.

¹¹ In lump-sum contracts, replace entire GCC Clause 41 with new GCC Sub-Clause 41.1, as follows:

41.1 The Activity Schedule shall be amended by the Contractor to accommodate changes of Program or method of working made at the Contractor's own discretion. Prices in the Activity Schedule shall not be altered when the Contractor makes such changes to the Activity Schedule.

¹² In lump sum contracts, add "and Activity Schedules.

- 42.3 If the Contractor's quotation is unreasonable, 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.
- 42.4 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.
- 42.5 The Contractor shall not be entitled to additional payment for costs that could have been avoided by giving early warning.
- 42.6 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 GCC Sub-Clause 41.1 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.¹³
- 42.7 Value Engineering: The Contractor may prepare, at its own cost, a value engineering proposal at any time during the performance of the contract. The value engineering proposal shall, at a minimum, include the following;
- (a) the proposed change(s), and a description of the difference to the existing contract requirements;
 - (b) a full cost/benefit analysis of the proposed change(s) including a description and estimate of costs (including life cycle cost) the Employer may incur in implementing the value engineering proposal;
 - (c) a description of any effect(s) of the change on performance/functionality; and
 - (d) a description of the proposed work to be performed, a program for its execution and sufficient ES information to enable an evaluation of ES risks and impacts.

The Employer may accept the value engineering proposal if the proposal demonstrates benefits that:

¹³ In lump-sum contracts, delete this paragraph.

- (a) accelerates the contract completion period; or
- (b) reduces the Contract Price or the life cycle costs to the Employer; or
- (c) improves the quality, efficiency, safety or sustainability of the Facilities; or
- (d) yields any other benefits to the Employer,

without compromising the functionality of the Works.

If the value engineering proposal is approved by the Employer and results in:

- (a) a reduction of the Contract Price; the amount to be paid to the Contractor shall be the **percentage specified in the PCC** of the reduction in the Contract Price; or

an increase in the Contract Price; but results in a reduction in life cycle costs due to any benefit described in (a) to (d) above, the amount to be paid to the Contractor shall be the full increase in the Contract Price.

43. Cash Flow Forecasts

- 43.1 When the Program,¹⁴ is updated, the Contractor shall provide the Project Manager with an updated cash flow forecast. The cash flow forecast shall include different currencies, as defined in the Contract, converted as necessary using the Contract exchange rates.

44. Payment Certificates

- 44.1 The Contractor shall submit to the Project Manager monthly statements of the estimated value of the work executed less the cumulative amount certified previously.
- 44.2 The Project Manager shall check the Contractor's monthly statement and certify the amount to be paid to the Contractor.
- 44.3 The value of work executed shall be determined by the Project Manager
- 44.4 The value of work executed shall comprise the value of the quantities of work in the Bill of Quantities that have been completed.¹⁵
- 44.5 The value of work executed shall include the valuation of Variations and Compensation Events.

¹⁴ In lump-sum contracts, add "or Activity Schedule" after "Program."

¹⁵ In lump-sum contracts, replace this paragraph with the following: "The value of work executed shall comprise the value of completed activities in the Activity Schedule."

44.6 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.

44.7 If the Contractor was, or is, failing to perform any ES 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:

(a) failure to comply with any ES 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;

(b) failure to regularly review C-ESMP and/or update it in a timely manner to address emerging ES issues, or anticipated risks or impacts;

(c) failure to implement the C-ESMP e.g. failure to provide required training or sensitization;

(d) failing to have appropriate consents/permits prior to undertaking Works or related activities;

(e) failure to submit ES report/s (as described in Appendix B), or failure to submit such reports in a timely manner;

failure to implement remediation as instructed by the Project Manager within the specified timeframe (e.g. remediation addressing non-compliance/s).

45. Payments

45.1 Payments shall be adjusted for deductions for advance payments and retention. 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 up to the date when the late payment is made at the prevailing rate of interest for commercial borrowing for each of the currencies in which payments are made.

- 45.2 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 from the date upon which the increased amount would have been certified in the absence of dispute.
- 45.3 Unless otherwise stated, all payments and deductions shall be paid or charged in the proportions of currencies comprising the Contract Price.
- 45.4 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.

**46. Compensation
Events**

- 46.1 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.
- 46.2 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.
- 46.3 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.
- 46.4 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.
- 47. Tax**
- 47.1 The Project Manager shall adjust the Contract Price if taxes, duties, and other levies are changed between the date 28 days before 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 or are a result of GCC Clause 49
- 48. Currencies**
- 48.1 Where payments are made in currencies other than the currency of the Employer's country **specified in the PCC**, the exchange rates used for calculating the amounts to be paid shall be the exchange rates stated in the Contractor's Bid.
- 49. Price Adjustment**
- 49.1 Prices shall be adjusted for fluctuations in the cost of inputs only if **provided for in the PCC**. If so provided, the amounts certified in each payment certificate, before deducting for Advance Payment, shall be adjusted by applying the respective price adjustment factor to the payment amounts due in each currency. A separate formula of the type specified below applies to each Contract currency:

$$P_c = A_c + B_c \text{ Imc/loc}$$
where:
 P_c is the adjustment factor for the portion of the Contract Price payable in a specific currency "c."

A_c and B_c are coefficients¹⁶ **specified in the PCC**, representing the nonadjustable and adjustable portions, respectively, of the Contract Price payable in that specific currency “c,” and

I_{mc} is the index prevailing at the end of the month being invoiced and I_{oc} is the index prevailing 28 days before Bid opening for inputs payable; both in the specific currency “c.”

- 49.2 If the value of the index is changed after it has been used in a calculation, the calculation shall be corrected and an adjustment made in the next payment certificate. The index value shall be deemed to take account of all changes in cost due to fluctuations in costs.

50. Retention

- 50.1 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.
- 50.2 Upon the issue of a Certificate of Completion of the Works by the Project Manager, in accordance with GCC Sub-Clause 57.1, 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. The Contractor may substitute retention money with an “on demand” Bank guarantee.

51. Liquidated Damages

- 51.1 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. 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
- 51.2 If the Intended Completion Date 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 45.1.

¹⁶ The sum of the two coefficients A_c and B_c should be 1 (one) in the formula for each currency. Normally, both coefficients shall be the same in the formulae for all currencies, since coefficient A, for the nonadjustable portion of the payments, is a very approximate figure (usually 0.15) to take account of fixed cost elements or other nonadjustable components. The sum of the adjustments for each currency are added to the Contract Price.

- 52. Bonus**
- 52.1 The Contractor shall be paid a Bonus calculated at the rate per calendar day **stated in the PCC** for each day (less any days for which the Contractor is paid for acceleration) that the Completion is earlier than the Intended Completion Date. The Project Manager shall certify that the Works are complete, although they may not be due to be complete.
- 53. Advance Payment**
- 53.1 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 and currencies 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 reduced by the amounts repaid by the Contractor. Interest shall not be charged on the advance payment
- 53.2 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.
- 53.3 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, Bonuses, or Liquidated Damages.
- 54. Securities**
- 54.1 The Performance Security shall be provided to the Employer no later than the date specified in the Letter of Acceptance and shall be issued in an amount **specified in the PCC**, by a bank or surety acceptable to the Employer, and denominated in the types and proportions of the currencies in which the Contract Price is payable. The Performance Security shall be valid until a date 28 days from the date of issue of the Certificate of Completion in the case of a Bank Guarantee, and until one year from the date of issue of the Certificate of Completion in the case of a Performance Bond
- 55. Day Works**
- 55.1 If applicable, the Dayworks rates in the Contractor's Bid shall be used only when the Project Manager has given written instructions in advance for additional work to be paid for in that way
- 55.2 All work to be paid for as Dayworks shall be recorded by the Contractor on forms approved by the Project Manager. Each completed form shall be verified and signed by the Project Manager within two days of the work being done

	55.3	The Contractor shall be paid for Dayworks subject to obtaining signed Dayworks forms
56. Cost of Repairs	56.1	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		
57. Completion	57.1	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.
58. Taking Over	58.1	The Employer shall take over the Site and the Works within seven days of the Project Manager's issuing a certificate of Completion.
59. Final Account	59.1	The Contractor shall supply the Project Manager with a detailed account of the total amount that the Contractor considers payable under the Contract before 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.
60. Operating and Maintenance Manuals.	60.1	If "as built" Drawings and/or operating and maintenance manuals are required, the Contractor shall supply them by the dates stated in the PCC
	60.2	If the Contractor does not supply the Drawings and/or manuals by the dates stated in the PCC pursuant to GCC Sub-Clause 60.1, 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
61. Termination	61.1	The Employer or the Contractor may terminate the Contract if the other party causes a fundamental breach of the Contract.
	61.2	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 Fraud and Corruption, as defined in paragraph 2.2 a of the Appendix A to the GCC, in competing for or in executing the Contract, then the Employer may, after giving fourteen (14) days written notice to the Contractor, terminate the Contract and expel him from the Site.

61.3 Notwithstanding the above, the Employer may terminate the Contract for convenience.

61.4 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.

61.5 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 61.2 above, the Project Manager shall decide whether the breach is fundamental or not.

62. Payment upon Termination

62.1 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 up to the date of the issue of the certificate and less the percentage to apply to the value of the work not completed, as **specified 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.

- 62.2 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 up to the date of the certificate
- 63. Property** 63.1 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.
- 64. Release from Performance** 64.1 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.
- 65. Suspension of Bank Loan or Credit** 65.1 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 to it within the 28 days for payment provided for in GCC Sub-Clause 45.1, the Contractor may immediately issue a 14-day termination notice.

APPENDIX A TO GENERAL CONDITIONS

Fraud and Corruption ***(Text in this Appendix shall not be modified)***

1. Purpose

1.1 The Bank's Anti-Corruption Guidelines and this annex apply with respect to procurement under Bank Investment Project Financing operations.

2. Requirements

2.1 The Bank requires that Borrowers (including beneficiaries of Bank financing); bidders (applicants/proposers), consultants, contractors and suppliers; any sub-contractors, sub-consultants, service providers or suppliers; any agents (whether declared or not); and any of their personnel, observe the highest standard of ethics during the procurement process, selection and contract execution of Bank-financed contracts, and refrain from Fraud and Corruption.

2.2 To this end, 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;
- ii. "fraudulent practice" is any act or omission, including misrepresentation, that knowingly or recklessly misleads, or attempts to mislead, a party to obtain financial or other benefit or to avoid an obligation;
- 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;
- 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;
- v. "obstructive practice" is:
 - (a) deliberately destroying, falsifying, altering, or concealing of evidence material to the investigation or making false statements to investigators in order to materially impede a Bank investigation into allegations of a corrupt, fraudulent, coercive, or collusive practice; and/or threatening, harassing, or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation; or
 - (b) acts intended to materially impede the exercise of the Bank's inspection and audit rights provided for under paragraph 2.2 e. below.

- b. Rejects a proposal for award if the Bank determines that the firm or individual recommended for award, 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. In addition to the legal remedies set out in the relevant Legal Agreement, may take other appropriate actions, including declaring misprocurement, if the Bank 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 process, selection and/or execution 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. Pursuant to the Bank's Anti- Corruption Guidelines and in accordance with the Bank's prevailing sanctions policies and procedures, may sanction a firm or individual, either indefinitely or for a stated period of time, including by publicly declaring such firm or individual ineligible (i) to be awarded or otherwise benefit from a Bank-financed contract, financially or in any other manner¹⁷ (ii) to be a nominated¹⁸ sub-contractor, consultant, manufacturer or supplier, or service provider of an otherwise eligible firm being awarded a Bank-financed contract; and (iii) to receive the proceeds of any loan made by the Bank or otherwise to participate further in the preparation or implementation of any Bank-financed project;
- e. Requires that a clause be included in bidding/request for proposals documents and in contracts financed by a Bank loan, requiring (i) bidders (applicants/proposers), consultants, contractors, and suppliers, and their sub-contractors, sub-consultants, service providers, suppliers, agents personnel, permit the Bank to inspect¹⁹ all accounts, records and other documents relating to the procurement process, selection and/ or contract execution, and to have them audited by auditors appointed by the Bank.

¹⁷ For the avoidance of doubt, a sanctioned party's ineligibility to be awarded a contract shall include, without limitation, (i) applying for pre-qualification, expressing interest in a consultancy, and bidding, either directly or as a nominated sub-contractor, nominated consultant, nominated manufacturer or supplier, or nominated service provider, in respect of such contract, and (ii) entering into an addendum or amendment introducing a material modification to any existing contract

¹⁸ A nominated sub-contractor, nominated consultant, nominated manufacturer or supplier, or nominated service provider (different names are used depending on the particular bidding document) is one which has been: (i) included by the bidder in its pre-qualification application or bid because it brings specific and critical experience and know-how that allow the bidder to meet the qualification requirements for the particular bid; or (ii) appointed by the Borrower

¹⁹ Inspections in this context usually are investigative (i.e., forensic) in nature. They involve fact-finding activities undertaken by the Bank or persons appointed by the Bank to address specific matters related to investigations/audits, such as evaluating the veracity of an allegation of possible Fraud and Corruption, through the appropriate mechanisms. Such activity includes but is not limited to: accessing and examining a firm's or individual's financial records and information, and making copies thereof as relevant; accessing and examining any other documents, data and information (whether in hard copy or electronic format) deemed relevant for the investigation/audit, and making copies thereof as relevant; interviewing staff and other relevant individuals; performing physical inspections and site visits; and obtaining third party verification of information

APPENDIX B

Environmental, Social, Health and Safety (ESHS)

Metrics for Progress Reports

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:*
 - iii. *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: Once in six months*
 - 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: Once in a month*
 - 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.
- 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: Once in a month

- 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): Quartely

- i. dust: number of working bowzers, number of watering /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: Quartely

- 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

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 specified, all Particular Conditions of Contract should be filled in by the Employer prior to issuance of the bidding document. Schedules and reports to be provided by the Employer should be annexed.

A. General																				
GCC 1.1 (d)	The financing institution is: The World Bank																			
GCC 1.1 (r)	The Employer is Er. R. Thiruvettaisellam, M.Tech., MBA, <i>The Superintending Engineer, WRD, Middle Cauvery Basin Circle, Tiruchirapalli – 620 020.</i>																			
GCC 1.1 (v)	The Intended Completion Date for the whole of the Works shall be 24.08.2023																			
GCC 1.1 (y)	The Project Manager is <i>The Executive Engineer, WRD, River Conservancy Division, Trichy, Tamil Nadu</i>																			
GCC 1.1 (aa)	The Site is located <i>at Annexure – I and is defined in drawings Attached.</i>																			
GCC 1.1 (dd)	The Start Date shall be 25.08.2022																			
GCC 1.1 (hh)	The Works consist of <i>On Farm Development (OFD) works for the work of Rehabilitation and Modernisation of Pullambady Main Canal, 5 Tanks and 1 Anicut in Lalgudy Block and Taluk, 5 Tanks and Pullambady Main Canal Distributory No.1,2,3 in Pullambady Block of Lalgudy Taluk in Trichy District and 19 Tanks in Thirumanur Block of Ariyalur Taluk and District in Nandhiyaru and Kulaiyaru Sub Basin..</i> <i>.Identification number of Contract is Package No. 02 / TN IAMP / WRD / NKR / OFD Works / Phase - II / 2022 -23</i>																			
GCC 1.1 (jj)	GCC 1.1 (jj) is replaced with the following: “Key Personnel are the Contractor’s personnel named in GCC 9.1 of the Particular Conditions of Contract.”																			
GCC 2.2	Sectional Completions are: <i>Not Applicable</i>																			
GCC 2.3(i)	The following documents also form part of the Contract: <table><tr><th>S. No.</th><th>Document</th><th>Description of the document</th></tr><tr><td>1.</td><td>Construction Methodology</td><td>Construction methodology given in bid amended as per comments of employer given in letter of acceptance.</td></tr><tr><td>2.</td><td>Quality control</td><td>Quality control procedures and assurance plans given in the bid and amended as per comments of Employer given in letter of acceptance.</td></tr><tr><td>3.</td><td>Fraud and Corruption</td><td>Appendix A – Fraud and Corruption</td></tr><tr><td>4.</td><td>Environmental and Social</td><td>Appendix B - Environmental and Social (ES) Metrics for Progress Reports</td></tr><tr><td>5</td><td>JV Agreement</td><td>Joint Venture Agreement (for JVs only)</td></tr></table>		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.	Fraud and Corruption	Appendix A – Fraud and Corruption	4.	Environmental and Social	Appendix B - Environmental and Social (ES) Metrics for Progress Reports	5	JV Agreement	Joint Venture Agreement (for JVs only)
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3.	Fraud and Corruption	Appendix A – Fraud and Corruption																		
4.	Environmental and Social	Appendix B - Environmental and Social (ES) Metrics for Progress Reports																		
5	JV Agreement	Joint Venture Agreement (for JVs only)																		

GCC 3.1	<p>The following is inserted as a sub-clause at the end of GCC 3.1:</p> <p>“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.”</p> <p>The language of the contract is <i>English</i>.</p> <p>The law that applies to the Contract are the laws of Union of India.</p>
GCC 4.1	<p>The following is inserted as a sub-paragraph at the end of GCC 4.1:</p> <p>“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.”</p>
GCC 5.1	The Project manager <i>may</i> delegate any of his duties and responsibilities.
GCC 6.1	<p>The following is inserted at the end of GCC 6.1:</p> <p>“All oral instructions shall be confirmed in writing in seven working days.”</p>
GCC 7	<p>The first sentence of GCC 7. 1 is modified as:</p> <p>“The Contractor may subcontract with the approval of the Project Manager up to a ceiling specified in PCC, but may not assign the Contract without the approval of the Employer in writing.”</p> <p>The following sub-clauses are inserted at the end of GCC 7.1:</p> <p>“7.2 The Project Manager should satisfy himself before recommending to the Employer whether:</p> <ul style="list-style-type: none"> 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 <p>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.</p> <p>7.4 The Contractor shall not be required to obtain any consent from the Employer for:</p> <ul style="list-style-type: none"> (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,

	<p>(c) the purchase of materials which are in accordance with the standards specified in the contract.</p> <p><i>(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 along with 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.</i></p> <p><i>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.</i></p> <p><i>3. Assignment of the contract may be acceptable only under exceptional circumstances such as insolvencies/liquidation or merger of companies etc.)”</i></p>
GCC 7.1	The ceiling for sub-contractor is Not Applicable Hiding information about any sub-contracting not authorized by the Employer shall be treated as violation of Appendix A to General Conditions (Fraud and Corruption).
GCC 8.1	Schedule of other contractors : Not Applicable
GCC 9	<p>The following is inserted as a sub-clause at the end of GCC 9.2:</p> <p>“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.”</p> <p>The following sentence is deleted from first paragraph of GCC 9.4.1:</p> <p>“The Contractor is encouraged, to the extent practicable and reasonable, to employ staff and labor with appropriate qualifications and experience from sources within the Country.”</p> <p>GCC 9.4.3 and GCC 9.4.4 are deleted.</p> <p>The following sub-clauses are inserted at the end of GCC 9.4:</p> <p>“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</p>

	<p>permission from the Government authorities for employment with the Contractor²⁰.</p> <p>9.6 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 and Social (ES) 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.</p> <p>9.7 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.</p> <p>9.8 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.”</p>																			
GCC 13.1	<p>The minimum insurance amounts and deductibles shall be:</p> <table><tr><th>S.No.</th><th>Description</th><th>Minimum cover for Insurance</th><th>Maximum deductible for Insurance</th></tr><tr><td>(i)</td><td>Works and Plant and Materials</td><td rowspan="2">Rs.142.64 Lakhs</td><td rowspan="5">As per “Contractors” All Risks (CAR) Insurance policy” condition connected with the category of damages</td></tr><tr><td>(ii)</td><td>Loss or damage to Equipment</td></tr><tr><td>(iii)</td><td>Other Property (except the works, Plant, Materials and Equipment)</td><td>Rs. 10.00 Lakhs</td></tr><tr><td>(iv)</td><td>Personal injury or death insurance: a) for other people;</td><td>Rs. 10.00 Lakhs</td></tr><tr><td></td><td>b) for Contractor’s Employees</td><td>In accordance with the statutory requirements applicable in India</td></tr></table>	S.No.	Description	Minimum cover for Insurance	Maximum deductible for Insurance	(i)	Works and Plant and Materials	Rs.142.64 Lakhs	As per “Contractors” All Risks (CAR) Insurance policy” condition connected with the category of damages	(ii)	Loss or damage to Equipment	(iii)	Other Property (except the works, Plant, Materials and Equipment)	Rs. 10.00 Lakhs	(iv)	Personal injury or death insurance: a) for other people;	Rs. 10.00 Lakhs		b) for Contractor’s Employees	In accordance with the statutory requirements applicable in India
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²⁰Based on Government Directives.

GCC 14.1	Site Data are: <i>Annexure A</i>
GCC 15.1	GCC 15.1 is replaced with the following: “The Contractor shall construct and install the Works in accordance with the Specifications and Drawings and as per instructions of Project Manager.”
GCC 18 (add new 18.3.3)	The following is inserted as a new sub-clause 18.3.3: “ 18.3.3 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 there under, 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.”. ”
GCC 20.1	The Site Possession Date(s) shall be: The Site Possession Dates shall be: <i>25.08.2022</i> Section 1 _____ Section 2 _____ Section 3 _____
GCC 23	The following is inserted as a new sub-clause 23.1.1: “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.”
GCC 23.1 & GCC 23.2	Name of the agreed Adjudicator Er. M. Mohamed Salim Babu, B.E. Superintending Engineer, WRD (Retired) Special Project Circle, Vellore. Appointing Authority for the Adjudicator: Er. R. Thiruvettasellam, M.Tech, MBA, Superintending Engineer, WRD, Middle Cauvery Basin Circle, Trichy
GCC 24	In the first sentence in GCC 24.3, the words “The Adjudicator shall be paid by the hour at the rate” are replaced by the words “The Adjudicator shall be paid daily at the rate”
GCC 24.3	Daily rate and types of reimbursable expenses to be paid to the Adjudicator: Rs. 10,000 per day.
GCC 24.4	The procedure for adhoc arbitration will be as follows: (a) In case of Dispute or difference arising between the Employer and a Contractor relating to any matter arising out of or connected with this agreement, such disputes or difference shall be settled in

	<p>accordance with the Arbitration and Conciliation Act, 1996. The arbitral tribunal shall consist of 3 Arbitrators one each to be appointed by the Employer and the Contractor. The third Arbitrator shall be chosen by the two Arbitrators so appointed by the Parties and shall act as Presiding Arbitrator. In case of failure of the two Arbitrators appointed by the parties to reach upon a consensus within a period of 30 days from the appointment of the Arbitrator appointed subsequently, the Presiding Arbitrator shall be appointed by the* Indian Council of Arbitration/ President of the Institution of Engineers (India)/The International Centre for Alternative Disputes Resolution (India).</p> <p>(b) If one of the parties fails to appoint its Arbitrator in pursuance of sub-clause (a) above within 30 days after receipt of the notice of the appointment of its Arbitrator by the other party, then the *Indian Council of Arbitration/President of the Institution of Engineers (India)/The International Centre for Alternative Disputes Resolution (India), both in cases of Foreign Contractor as well as Indian Contractor, shall appoint the Arbitrator. A certified copy of the order of the* Indian Council of Arbitration/President of the Institution of Engineers (India)/The International Centre for Alternative Disputes Resolution (India), making such an appointment shall be furnished to each of the parties.</p> <p>(c) Arbitration may be commenced prior to or after completion of the Works, provided that the obligations of the Employer, the Project Manager, the Contractor and the Adjudicator shall not be altered by reason of the arbitration being conducted during the progress of the Works.</p> <p>(d) Arbitration proceedings shall be held at Tiruchirappalli, and the language of the arbitration proceedings and that of all documents and communications between the parties shall be English.</p> <p>(e) The decision of the majority of Arbitrators shall be final and binding upon both parties. The cost and expenses of Arbitration proceedings will be paid as determined by the arbitral tribunal. However, the expenses incurred by each party in connection with the preparation, presentation, etc. of its proceedings as also the fees and expenses paid to the Arbitrator appointed by such party or on its behalf shall be borne by each party itself.</p> <p>(f) Where the value of the contract is Rs. 50 million and below, the disputes or differences arising shall be referred to the Sole Arbitrator. The Sole Arbitrator should be appointed by agreement between the parties; failing such agreement, by the appointing authority, namely the * Indian Council of Arbitration/President of the Institution of Engineers (India)/The International Centre for Alternative Disputes Resolution (India).</p>
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	<p>(g) The Arbitrator should give final award within 150 days of starting of the proceedings</p> <p>(h) Performance under the contract shall continue during the arbitration proceedings and payments due to the contractor by the Employer shall not be withheld, unless they are the subject matter of the arbitration proceedings.</p> <p><i>* Choose one alternative. Insert Chairman of the Executive Committee of the Indian Roads Congress (for highway project) or any other appropriate institution (for other types of works).</i></p> <p>Alternatively</p> <p><i>[Apart from the adhoc arbitration services obtained through mutually agreed Arbitrator(s) as above, Institutional arbitration services are also available in India. Institutional arbitration (and mediation) dispute resolution mechanisms can be gainfully used, preferably for relatively larger contracts. Following clause may be included, if it is decided to use Institutional Services for arbitration for resolution of disputes, and in such a case other clauses related to Arbitration/ Arbitrator would be deleted. In the sample clause below, substitute the reference to 'Rules of Domestic Commercial Arbitration of the Indian Council of Arbitration' by the specific institution that is sought to be engaged e.g. The International Centre for Alternative Dispute Resolution (ICADR), The Indian Institute of Arbitration and Mediation (IIAM), Indian Chamber's Council of Arbitration, Delhi International Arbitration Centre (DAC), Construction Industry Arbitration Council (CIAC), Council for National and International Commercial Arbitration, London Court of International Arbitration (India Centre) or the like.]</i></p> <p>"Any dispute or difference whatsoever arising between the parties out of or relating to the construction, meaning, scope, operation or effect of this contract or the validity or the breach thereof shall be settled by arbitration in accordance with the Rules of Domestic Commercial Arbitration of the Indian Council of Arbitration and the award made in pursuance thereof shall be binding on the parties.</p> <p>The arbitral tribunal shall consist of 3 Arbitrators, arbitration proceedings shall be held at Chennai, India and the language of the arbitration proceedings and that of all documents and communications between the parties shall be English". <i>[ICA rules provide for arbitration tribunal of 3 arbitrators if the value of claim is over Rs. 1 crore unless the parties have agreed otherwise for a sole arbitrator].</i></p>
B. Time Control	
GCC 30.1	<p>The Contractor shall submit for approval a Program for the Works within 14 days of delivery of the Letter of Acceptance.</p> <p>Any revision in Program should only be agreed in writing.</p> <p><i>[This program should be in adequate detail and generally conform to the</i></p>

	<i>program submitted along with bid. Deviations, if any from that should be clearly explained and should be satisfactory to the Project Manager]</i>
GCC 30.3	<p>The period between Program updates is 30 days</p> <p>The amount to be withheld for late submission of an updated Program is Rs. 5,00,000 The period for submission of progress reports is 15 days</p>
GCC 31	<p>GCC 31.1 is replaced with the following:</p> <p>“31.1 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 the agreed milestones without the Contractor taking steps to accelerate the remaining work, which would cause the Contractor to incur additional cost.”</p> <p>In GCC 31.2, replace the words “Intended Completion Date” at the first occurrence by the words “Intended Completion Date/ Milestones”; and at the second occurrence by the words “Intended Completion Date/ Milestone”.</p>
GCC 34	<p>GCC 34.1 is replaced with the following:</p> <p>“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 shall 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 30.1, the plans for remaining work and to deal with matters raised in accordance with the early warning procedure.”</p>
GCC 34.1	<p>Venue of management meeting will be Office of The Superintending Engineer, WRD, Middle Cauvery Basin Circle, Subramaniyapuram, Pudukkottai Road, Tiruchirappalli – 620 020, Tiruchirappalli District, Tamil Nadu</p> <p>Venue of management meeting will be Office of The Executive Engineer, WRD, River Conservancy Division, Trichy – 620020, Tiruchirappalli District, Tamil Nadu</p> <p>The management meetings shall be held at intervals of Three months at circle level and one month at Division level</p>
C. Quality Control	
GCC 36	<p>The following sub-clause is inserted at the end of GCC 36.1:</p> <p>“36.2 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.”</p>

GCC 37	<p>The following sub-clauses are inserted before GCC 37.1, and GCC 37.1 is re-numbered as GCC 37.3:</p> <p>“GCC 37.1 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. Compliance with the QA/QC systems shall not relieve the Contractor of any of his duties obligations or responsibilities under the Contract.</p> <p>GCC 37.2 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.”</p>
GCC 38.1	The Defects Liability Period is : 365 days
GCC 39.1	<p>The following notes are added at the end of GCC 39.1:</p> <p><i>“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.</i></p> <p><i>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 61.2(e).”</i></p>
D. Cost Control	
GCC 41	<p>GCC 41.1 is replaced with the following, and existing GCC 41.2 is re-numbered as GCC 41.3:</p> <p>“41.1 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.</p> <p style="padding-left: 40px;">(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.</p> <p style="padding-left: 40px;">(b) If the quantity of work executed is less than the quantity of the item in BOQ and is 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</p> <p>41.2 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.”</p>

GCC 42	<p>In GCC 42.2, the first sentence is modified as follows:</p> <p>“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 Contractor shall also provide a description of the varied work performed or to be performed, including details of the resources and methods adopted or to be adopted by the Contractor.”</p> <p>In the first sentence in GCC 42.3, after the words ‘If the Contractor’s quotation is unreasonable’, the following is added:</p> <p><i>“[or if contractor fails to provide the Project Manager with a quotation within a reasonable time specified by Project Manager in accordance with GCC 42.2]”</i></p>
GCC 42.7	Provisions related to Value Engineering do not apply.
GCC 43.1	<p>The second sentence in GCC 43.1 is replaced with the following:</p> <p>“The cash flow forecast shall be in Indian Rupees.”</p>
GCC 44	<p>At the end of GCC 44.1 after the word ‘previously’, the following words are added:</p> <p>“alongwith details of measurement of the quantity of works executed in a tabular form approved by the Project Manager”</p> <p>At the end of GCC 44.2 after the words ‘the Contractor’, the following words are added:</p> <p>“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 53.1 (Secured Advance)”</p>
GCC 45	<p>GCC 45.1 is replaced with the following:</p> <p>“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 up to the date when the late payment is made at the rate stated in the PCC.”</p> <p>A new sub-clause 45.5 is added after sub-clause 45.4:</p> <p>“45.5 The Contractor shall open an Escrow Account with his bank for the purpose of receiving all the payments as well as incurring expenditure under this Contract. The Account shall be open to verification and audit at any time by the Employer or designee of the Employer. This account will be controlled solely by the Contractor’s Project Officers (Project Manager and/or Finance Manager or equivalent designate). No other Contractor employees or associates will have access to the Project Account or the</p>

	funds therein. The Contractor shall report monthly on the status of this account including actual bank account statements. The Contractor shall provide all Account statements as requested by the Employer.”
GCC 45.1	Interest rate for Delayed payment is 8% per annum (<i>insert the number corresponding to the State Bank of India prime lending rate</i>).
GCC 45.3	All payments (and deductions) shall be paid or charged in Indian Rupees.
GCC 45.5	Deleted
GCC 47	<p>The following sub-clause is inserted before GCC 47.1, and GCC 47.1 is re-numbered as GCC 47.2:</p> <p>“47.1 The rates quoted by the Contractor shall be deemed to be inclusive of the GST, 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.”</p> <p>In first line of the re-numbered GCC 47.2, replace the words ‘the date 28 days before’ with the words ‘the deadline for’.</p>
GCC 48	All payments shall be made in Indian Rupees
GCC 49	<p>GCC 49.1 is replaced with the following:</p> <p>“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.</p> <p>(a) The price adjustment according to sub para (d) below, shall apply for the work done from the start date given in the PCC up to 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.</p> <p>(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.</p> <p>(c) The total value (R) of the work done during the specified period [GCC 44.1] shall be as under:</p> $R = \text{SUM } (R_{S1} + R_{S2} + R_{S3} + \dots R_{Sn}),$

	<p>Where,</p> <p>'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:</p> <p>$R_{sn} = (V_{sn} + S_{sn})$ 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)</p> <p>where,</p> <p>V_{sn} is the total value of work done during the specified period for the respective schedule of BOQ, and</p> <p>S_{sn} is the secured advance paid during the specified period for the respective schedule of BOQ,</p> <p>(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> <p>$P_n = a + b L_n/L_o + c E_n/E_o + d M_n/M_o + \dots$</p> <p>where,</p> <p>"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.</p> <p>"a" is a fixed coefficient, stated in the relevant table of adjustment data, representing the non-adjustable portion in contractual payments;</p> <p>"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;</p> <p>"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</p> <p>"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.</p> <p>(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</p>
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	<p>submission of bids.</p> <p>(f) If the Contractor fails to complete the Works within the Intended Completion date, adjustment of prices thereafter shall be made using either:</p> <p>(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</p> <p>(ii) the current index or price applicable for the period in question whichever is more favourable to the Employer.</p> <p>(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.</p> <p>(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.</p> <p>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."</p>
GCC 49.1	<p>Price Adjustment :</p> <p>The contract is subject to price adjustment in accordance with G.C.C. Clause 49 and following information regarding coefficients does apply</p> <p>The Price Adjustment shall be done in accordance with Tables 1&2 of Adjustment Data given in Appendix 2. The base and current price of the following items shall be based on the source indicated below:</p> <p>(i) Diesel: Selling price of IOC depot at Trichy In case the work extends over long stretches or different sections specify separate identified depot...</p> <p>(ii) Bitumen : Selling Price of Bitumen from the IOC refinery at Chennai</p> <p>The Price Adjustment will be done Quarterly</p>
GCC 50.1	<p>The proportion of payments retained (Retention Money) shall be 6% from each bill subject to the maximum of 5% of final contract price.</p> <p>The Retention Money is inclusive of GST amount for every bill. Refer Attachment –1 to PCC.</p>
GCC 50.2	<p>The last line of GCC 50.2 is replaced with the following:</p> <p>"On completion of the whole works the Contractor may substitute the balance retention money with an "on demand" Bank guarantee."</p>

GCC 51	<p>In the first sentence of GCC 51.1, the following words are inserted after the words ‘Intended Completion Date’: “(for the whole of the works or the milestones as stated in the PCC)” The following is inserted as a sub-paragraph at the end of GCC 51.1: “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.” In the first sentence in GCC 51.2 the following words are inserted after the words ‘Intended Completion Date’: “including milestones”</p>									
GCC 51.1	<p>The liquidated damages for the whole of the works are 0.1% per day. The maximum amount of liquidated damages for the whole of the works is 10% of the final Contract Price.</p> <p>For milestone 1 Rs. 3184.00 per day For milestone 2 Rs. 3184.00 per day</p> <p>Note :</p> <p>Water shall released from 1st of August to 28th January every year, as per water regulation rules, so the milestones are changed in one year consist of 1 milestone only. The total agreement period is 1 year are 2 milestones. Hence there is no work carried out in this water regulation period (These milestones are Tentative only) Water regulation period for the year 2022-23 1st of August 2022 to 28th January 2023</p>									
GCC 52.1	Bonus for the whole of the Works is do not apply									
GCC 53	<p>The following is inserted as a new sub-clause 53.4:</p> <p>“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.”</p>									
GCC 53.1	<p>Advance Payments shall be made in Indian Rupees only. The amount of the Advance Payments 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. Mobilization²¹</td><td>5% of the Contract price</td><td>On submission of un-conditional Bank Guarantee. (to be drawn before end of 20% of Contract period)</td></tr><tr><td>2. Equipment</td><td>Not applicable</td><td>Not applicable</td></tr></table>	<u>Nature of Advance</u>	<u>Amount (Rs.)</u>	<u>Conditions to be fulfilled</u>	1. Mobilization ²¹	5% of the Contract price	On submission of un-conditional Bank Guarantee. (to be drawn before end of 20% of Contract period)	2. Equipment	Not applicable	Not applicable
<u>Nature of Advance</u>	<u>Amount (Rs.)</u>	<u>Conditions to be fulfilled</u>								
1. Mobilization ²¹	5% of the Contract price	On submission of un-conditional Bank Guarantee. (to be drawn before end of 20% of Contract period)								
2. Equipment	Not applicable	Not applicable								

²¹The amount of mobilization advance could be increased or decreased based on nature of the work. Also, the advance could be released in single or multiple installments.

	<p>(The advance payment will be paid to the Contractor no later than 15 days after fulfilment of the above conditions).</p> <p>Repayment of advance payment for mobilization and equipment:</p> <p>The advance shall be repaid with percentage deductions from the interim payments certified by the Project Manager 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 1 months from the date of payment of first installment of advance, whichever period concludes earlier, and shall be made at the rate of 15% @ percent 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> <p>Repayment of secured advance:</p> <p>The advance shall be repaid from each succeeding monthly payments to the extent materials have been incorporated into the Works. <i>Not applicable</i></p> <p>The amount of the Guarantee may be progressively reduced by the amounts repaid by the Contractor, each installment not less than Rs. 500,000.</p>
GCC 54	<p>GCC 54.1 is replaced with the following:</p> <p>"The Performance Security and an Environmental and Social (ES) 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, and shall be issued by a Nationalized or Scheduled bank in India. The Performance Security including additional security for unbalanced bids, and the ES Performance Security, shall be valid until a date 28 days from the date of issue of the Certificate of Completion."</p>
GCC 54.1	<p>The Performance Security amount is 5 percent of the Accepted Contract Amount plus Rs.1% as additional security for unbalanced bids [<i>in terms of ITB Clause 38.2</i>], and Environmental and Social (ES) Performance Security amount is percent of the Accepted Contract Amount</p> <p>The standard forms of Performance Security and if applicable ES Security acceptable to the Employer shall be <u>unconditional</u> Bank Guarantees from Scheduled or Nationalized banks in India of the types as presented in Section X of the Bidding Document.</p> <p>Throughout this bidding document the term 'performance security', unless the context clearly indicates otherwise, means and includes both 'the performance security and the ES performance security' to be submitted by the successful bidder in the amounts specified above.</p>
E. Finishing the Contract	
GCC 59.1	<p>The following is added after the words 'issue a payment certificate' at the end of GCC 59.1:</p>

	"within 56 days of receiving the contractor's revised account"
GCC 60.1	<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 01.11.2023</p> <p>The date by which "as built" drawings (in scale...) including a compact disc containing digitized drawings in 2 sets are required, is within 28 days of issue of certificate of completion of whole or section of the work, as the case may be 01.11.2023</p>
GCC 60.2	The amount to be withheld for failing to produce "as built" drawings and/or operating and maintenance manuals by the date required in GCC 60.1 is Rs. 1.00 Lakh
GCC 61	<p>The following sub-clauses are added after GCC 61.2 (h):</p> <p>"(i) The contractor has contravened Clauses 7 and 9 of GCC.</p> <p>(j) The contractor does not adhere to the agreed construction program, agreed ES-MSIP [Clause 30 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.</p> <p>(k) The contractor fails to carry out the instructions of the Project Manager within a reasonable time determined by the Project Manager in accordance with GCC Clause 15.1 and 22.</p> <p>(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."</p>
GCC 61.2 (g)	The maximum number of days is : 100
GCC 61.2 (l)	Hiding any information regarding changes in roles and responsibilities of JV members, which is not authorized by the Employer, shall also be treated as violation of Appendix A to General Conditions (Fraud and Corruption)
GCC 62	<p>The following is added after the words 'issue of the certificate' in the first sentence of GCC 62.1;</p> <p>"less other recoveries due in terms of contract, less taxes to be deducted at source [TDS] as per applicable law,"</p> <p>The following is added after the words 'date of the certificate' at the end of GCC 62.2:</p> <p>"less other recoveries due in terms of contract, less taxes to be deducted at source [TDS] as per applicable law"</p>
GCC 62.1	The percentage to apply to the value of the work not completed, representing the Employer's additional cost for completing the Works, is 20%.

Annexure – I

Nandhiyar and Kulaiyar Sub Basin – Package No - 2

Sl.No	Name of Tank	Village	Block	Taluk	District
1	Peruvalanallur West Tank	Peruvalanallur	Lalgudi	Lalgudi	Trichy
2	Peruvalanallur East Tank	Peruvalanallur	Lalgudi	Lalgudi	Trichy
3	Pitchai Eri	Pullambadi	Pullambadi	Lalgudi	Trichy
4	Ochakulam	Kovandakuruchi	Pullambadi	Lalgudi	Trichy
5	Kavichankulam	Alambakam	Pullambadi	Lalgudi	Trichy
6	Vinjiraya udaiyar Eri	Vilagam	Thirumanur	Lalgudi	Trichy
7	Viragalur Tank	Viragalur	Lalgudi	Lalgudi	Trichy
8	Kandirathitham Tank	Kandirathitham	Thirumanur	Ariyalur	Ariyalur
9	Two Kuttai Tank	Vetriyur	Thirumanur	Ariyalur	Ariyalur
10	Three Kuttai Tank	Vetriyur	Thirumanur	Ariyalur	Ariyalur
11	Elayaperumal Eri	Keelakulathur	Thirumanur	Ariyalur	Ariyalur
12	Ezha Eri	Sullangudi	Thirumanur	Ariyalur	Ariyalur
13	Lakshmana Moopanar Eri	Vadugapalayam	Thirumanur	Ariyalur	Ariyalur
14	Ramu Pillai Eri	Sullangudi	Thirumanur	Ariyalur	Ariyalur
15	Pudhu Eri	Sullangudi	Thirumanur	Ariyalur	Ariyalur
16	Kuppan Ayyangar Eri	Sullangudi	Thirumanur	Ariyalur	Ariyalur
17	Vannan Eri	Elakurichi	Thirumanur	Ariyalur	Ariyalur
18	Nedungulam Eri	Elakurichi	Thirumanur	Ariyalur	Ariyalur
19	Arasan Eri	Kamarasavalli	Thirumanur	Ariyalur	Ariyalur

Annexure – II

Nandhiyaru and Kulaiyaru Sub Basin– Package No - 2

KEY PERSONNEL

Item No.	Position/ specialization	Relevant academic qualifications	Minimum years of relevant work experience
1	Site Engineer	B.E. (Civil) - 2 Nos	3 Years
2	Technical Assistant	DCE – 6 Nos.	3 Years
Suitable experts in the following specializations			
3	Environment, Health and Safety Officer	B.E. in Civil Engineering / Environmental Engineering	1 Year in similar work environment and Occupational Health and Safety (OHS)
4	Social Development Officer	B.Sc. / B.A. (Social Science, Social work, humanities)	Two Years of monitoring and managing social impacts and risks related to labor, GBV/ SEA

EQUIPMENT

Sl. No.	Equipment Type and Characteristics		Minimum Number required
1	Hydraulic Excavator	-	3 Nos.
2	Vibrator	-	4 Nos.
3	Tipper / Lorry	-	5 Nos.
4	Water Lorry	-	4 Nos.
5	Concrete Mixer Machine	-	8 Nos.

The contractor shall produce related “vehicle under emission check” certificates under Motor vehicles act for all the machineries listed above before start of works and for the entire duration of the contract/works.

[NOTE:

Based on the studies, carried out by the Project Manager the minimum suggested major equipment to attain the completion of works in accordance with the prescribed construction schedule is shown in the above list. The bidders should, however, undertake their own studies and furnish with their bid, a detailed construction planning and methodology supported with layout and necessary drawings and calculations (detailed) as stated in Section IV to allow the employee to review their proposals. The numbers, types and capacities of each plant/equipment shall be shown in the proposals along with the cycle time for each operation for the given production capacity to match the requirements.]

PHYSICAL PROGRAMME

S. No	Description	Units	1st Mile Stone	2nd Mile Stone
1	HGS SS.20.B. Earth work excavating and depositing on bank with initial lead of 10 m & initial lift of 2m	1 Cum	949.93	949.93
2	Providing and placing in position Plain Cement Concrete M10 grade coarse aggregate of size 40mm	1 Cum	181.80	181.80
3	Providing and placing in position Plain cement concrete M 15 grade coarse aggregate of size 20mm	1 Cum	460.99	460.99
4	Supplying and fixing of Gauge plate	1 No.	25.00	25.00

Note:

Water shall be released from 1St of August to 28th January every year, as per water regulation rules. so the milestones are changed in one year consist of 1 milestone only. The total agreement period is 2 years are 2 milestones. Hence there is no work carried out in this water regulation period (These milestones are Tentative only).

Appendices

Appendix 1

Salient Features of Labour & Environment Protection Laws²²

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 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.

²²This 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.

- (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 up to 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 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 for 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. 49 of GCC)

NAME OF WORK :

On Farm Development (OFD) works for the work of Rehabilitation and Modernisation of Pullambady Main Canal, 5 Tanks and 1 Anicut in Lalgudy Block and Taluk, 5 Tanks and Pullambady Main Canal Distributory No.1,2,3 in Pullambady Block of Lalgudy Taluk in Trichy District and 19 Tanks in Thirumanur Block of Ariyalur Taluk and District in Nandhiyaru and Kulaiyaru Sub Basin (Package No. 02 / TN IAMP / WRD / NKR / OFD Works / Phase - II / 2022 -23)

Table 1: Coefficients governing the adjustment for changes in cost

S. No.	Coefficients Name	Symbol	Schedules (Reference Number) [Description of each schedule is given below]						
			S ₁	S ₂	S ₃	S ₄	S ₅	S ₆	S ₇
1.	Fixed	a							
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								

Note: (a) Fixed element is normally 15%; (b) Employer to fill-up above Table. (It will be filled in the Agreement)

BOQ SCHEDULES

Schedule I : Earth Work In Formation
Schedule II : Steel fabrication Works
Schedule III : Plain Cement Concrete without Centering
Schedule IV : Plain Cement Concrete with Centering
Schedule V : Masonry Works
Schedule VI : Screw Gearing Shutter
Schedule VII : Road Works -WMM

Table 2: Cost Indices and Reference Prices (applicable for specific items) for adjustment in contract prices [as per GCC 49].

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 ²³ (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 & Equipment spares ²⁴	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 ²⁴	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 IOCDepot at Trichy
7.	Bitumen ²⁵	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 IOC, Refinery at Chennai.
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

²³ The Centre to be specified should be the relevant one for which CPI is published by the Labour Bureau.

²⁴ The PCC specifies the identified depot for the rate of diesel for the base date and the applicable date for price adjustment.

²⁵ The PCC specifies the identified refinery for the rate of Bitumen for the base date and the applicable date price adjustment.

Appendix - 3²⁶
Appointment of Adjudicator

Suggested Draft of **Letter of Appointment of Adjudicators** in civil works contracts

Sub: On Farm Development (OFD) works for the work of Rehabilitation and Modernisation of Pullambady Main Canal, 5 Tanks and 1 Anicut in Lalgudy Block and Taluk, 5 Tanks and Pullambady Main Canal Distributory No.1,2,3 in Pullambady Block of Lalgudy Taluk in Trichy District and 19 Tanks in Thirumanur Block of Ariyalur Taluk and District in Nandhiyar and Kulaiyar Sub Basin (Package No. 02 / TN IAMP / WRD / NKR / OFD Works / Phase - II / 2022 -23).

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 Er. R. Thiruvettaisellam, M.Tech, MBA, Superintending Engineer, WRD, Middle Cauvery Basin Circle, Tiruchirappalli – 620 020 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) **On Farm Development (OFD) works for the work of Rehabilitation and Modernisation of Pullambady Main Canal, 5 Tanks and 1 Anicut in Lalgudy Block and Taluk, 5 Tanks and Pullambady Main Canal Distributory No.1,2,3 in Pullambady Block of Lalgudy Taluk in Trichy District and 19 Tanks in Thirumanur Block of Ariyalur Taluk and District in Nandhiyar and Kulaiyar Sub Basin (Package No. 02 / TN IAMP / WRD / NKR / OFD Works / Phase - II / 2022 -23).**

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 up to 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.

²⁶ If ITB 49 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.

The Adjudicator will be paid a fee of Rs. 10000/- (Rupees Ten Thousand 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. 500 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 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 On Farm Development (OFD) works for the work of Rehabilitation and Modernisation of Pullambady Main Canal, 5 Tanks and 1 Anicut in Lalgudy Block and Taluk, 5 Tanks and Pullambady Main Canal Distributory No.1,2,3 in Pullambady Block of Lalgudy Taluk in Trichy District and 19 Tanks in Thirumanur Block of Ariyalur Taluk and District in Nandhiyaru and Kulaiyaru Sub Basin (Package No. 02 / TN IAMP / WRD / NKR / OFD Works / Phase - II / 2022 -23) 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 Er. R. Thiruvettasellam, M.Tech, MBA Superintending Engineer, WRD,
Middle Cauvery Basin Circle, Tiruchirappalli – 620 020

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

**TN IAMP PHASE - III[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 : _____

Section X - Contract Forms

This Section contains forms which, once completed, will form part of the Contract. The forms for Performance Security, ES performance security if applicable, and Advance Payment Security, when required, shall only be completed by the successful Bidder after contract award.

NOTIFICATION OF AWARD

Letter of Acceptance [on letterhead paper of the Employer]

[The Letter of Acceptance shall be the basis for formation of the Contract as described in ITB Clause 45. 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.]

..... **[date]**

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

Subject: Package No. 02 / TN IAMP / WRD / NKR / OFD Works / Phase - II / 2022 -23. and On Farm Development (OFD) works for the work of Rehabilitation and Modernisation of Pullambady Main Canal, 5 Tanks and 1 Anicut in Lalgudy Block and Taluk, 5 Tanks and Pullambady Main Canal Distributory No.1,2,3 in Pullambady Block of Lalgudy Taluk in Trichy District and 19 Tanks in Thirumanur Block of Ariyalur Taluk and District in Nandhiyar and Kulaiyar Sub Basin..**[Notification of Award Contract No]**.

This is to notify you that your Bid dated **[insert date]** for execution of the On Farm Development (OFD) works for the work of Rehabilitation and Modernisation of Pullambady Main Canal, 5 Tanks and 1 Anicut in Lalgudy Block and Taluk, 5 Tanks and Pullambady Main Canal Distributory No.1,2,3 in Pullambady Block of Lalgudy Taluk in Trichy District and 19 Tanks in Thirumanur Block of Ariyalur Taluk and District in Nandhiyar and Kulaiyar Sub Basin (Package No. 02 / TN IAMP / WRD / NKR / OFD Works / Phase - II / 2022 -23) . . **[insert name of the contract and identification number, as given in the PCC]** for the Accepted Contract Amount of **[insert amount in numbers and words]**, as corrected and modified²⁷ in accordance with the Instructions to Bidders is hereby accepted by our Agency.

You are requested to furnish the Performance Security, plus additional security for unbalanced bids in terms of ITB Clause 38, and ES Performance Security **[Delete ES Performance Security if it is not required under the contract]** in the form detailed in ITB Clause 48 for amounts²⁸ of Rs. and Rs. specified therein, 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 48.2 will be taken in accordance with the Conditions of Contract. The securities shall be valid up to 28 days from the date of completion i.e. up to 02.12.2023 and shall be as per the Performance Security Form and the ES Performance Security Form **[Delete reference to the ES Performance Security Form if it is not required under the contract]**, included in Section X - Contract Forms, of the bidding document.

²⁷Delete "corrected and" or "and modified" if not applicable. See Notes on Standard Form of Agreement, next page.

²⁸Insert amounts for (i) Performance Security, plus additional security for unbalanced bids in terms of ITB Clause 38; and (ii) ES Performance Security respectively.

[Choose one of the following statements:]

We accept that _____ **[insert the name of Adjudicator proposed by the Bidder]** be appointed as the Adjudicator²⁹.

[or]

We do not accept that _____ **[insert the name of the Adjudicator proposed by the Bidder]** be appointed as the Adjudicator, and by sending a copy of this Letter of Acceptance to _____ **[insert name of the Appointing Authority]**, the Appointing Authority, we are hereby requesting such Authority to appoint the Adjudicator in accordance with ITB 49.1 and GCC 23.1³⁰.

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

We have reviewed the construction methodology submitted by you along with 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 ES requirements as per Clause 30 of General Conditions of Contract within 14 days of receipt of this letter of acceptance.

Authorized Signature:

Name and Title of Signatory: **Er. R. Thiruvettaisellam, M.Tech, MBA**, Superintending Engineer, WRD, Middle Cauvery Basin Circle, Tiruchirappalli – 620 020.

Name of Agency: Water Resources Department

²⁹To 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.

³⁰To 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.

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 48.1, insurance policy as per GCC 13, construction methodology as stated in letter of acceptance and signing of the contract agreement for the construction of On Farm Development (OFD) works for the work of Rehabilitation and Modernisation of Pullambady Main Canal, 5 Tanks and 1 Anicut in Lalgudy Block and Taluk, 5 Tanks and Pullambady Main Canal Distributory No.1,2,3 in Pullambady Block of Lalgudy Taluk in Trichy District and 19 Tanks in Thirumanur Block of Ariyalur Taluk and District in Nandhiyaru and Kulaiyaru Sub Basin (Package No. 02 / TN IAMP / WRD / NKR / OFD Works / Phase - II / 2022 -23) @ 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 theday of,, between The Superintending Engineer, WRD, Middle Cauvery Basin Circle, Tiruchirappalli – 620 020, Tiruchirappalli District, Tamil Nadu. (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 On Farm Development (OFD) works for the work of Rehabilitation and Modernisation of Pullambady Main Canal, 5 Tanks and 1 Anicut in Lalgudy Block and Taluk, 5 Tanks and Pullambady Main Canal Distributory No.1,2,3 in Pullambady Block of Lalgudy Taluk in Trichy District and 19 Tanks in Thirumanur Block of Ariyalur Taluk and District in Nandhiyaru and Kulaiyaru Sub Basin (Package No. 02 / TN IAMP / WRD / NKR / OFD Works / Phase - II / 2022 - 23) should be executed by the Contractor, and has accepted a Bid by the Contractor for the execution and completion of these Works and the remedying of any defects therein,

The Employer and the Contractor agree as follows:

1. In this Agreement words and expressions shall have the same meanings as are respectively assigned to them in the Contract documents referred to.
2. The following documents shall be deemed to form and be read and construed as part of this Agreement. This Agreement shall prevail over all other Contract documents.
 - (i) This Agreement
 - (ii) the Letter of Acceptance
 - (iii) the Contractor's Bid including completed schedules and priced bill of quantities,
 - (iv) the addenda Nos _____(if any)
 - (v) the Particular Conditions
 - (vi) the General Conditions of Contract, including appendix;
 - (vii) the Specification
 - (viii) the Drawings
 - (ix) Construction Program, Methodology, Quality Assurance Program, the ES Management Strategies and Implementation Plans, and Code of Conduct for Contractor's Personnel (ES)
 - (x) Joint Venture Agreement [for JVs only];and
 - (xi) any other document **listed in the PCC** as forming part of the Contract.
3. In consideration of the payments to be made by the Employer to the Contractor as specified in this Agreement, the Contractor hereby covenants with the Employer to

execute the Works and to remedy defects therein in conformity in all respects with the provisions of the Contract.

4. The Employer hereby covenants to pay the Contractor in consideration of the execution and completion of the Works and the remedying of defects therein, the Contract Price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.

IN WITNESS whereof the parties hereto have caused this Agreement to be executed in accordance with the laws of India on the day, month and year specified 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 Contractor³¹]*
(hereinafter called "the Applicant") has undertaken, in pursuance of Contract No. Package No. 02 / TN IAMP / WRD / NKR / OFD Works / Phase - II / 2022 -23 dated _____ to execute On Farm Development (OFD) works for the work of Rehabilitation and Modernisation of Pullambady Main Canal, 5 Tanks and 1 Anicut in Lalgudy Block and Taluk, 5 Tanks and Pullambady Main Canal Distributory No.1,2,3 in Pullambady Block of Lalgudy Taluk in Trichy District and 19 Tanks in Thirumanur Block of Ariyalur Taluk and District in Nandhiyaru and Kulaiyaru Sub Basin.

AND WHEREAS it has been stipulated by you in the said Contract that the Applicant 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 Applicant such a Bank Guarantee;

NOW THEREFORE we hereby affirm that we are the Guarantor and responsible to you, on behalf of the Applicant, up to a total of _____ *[amount of guarantee³²]* _____ *[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 Applicant 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 there under or of any of the Contract documents which may be made between you and the Applicant shall in any way release us

³¹*In the case of a JV, insert the name of the Joint Venture*

³²*An amount shall be inserted by the Guarantor, representing the percentage of the Contract Price specified in the Contract less provisional sums, if any, plus additional performance security for unbalanced bids if any, and denominated in Indian Rupees.*

from any liability under this guarantee, and we hereby waive notice of any such change, addition or modification.

This guarantee shall be valid until³³, 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.

³³*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 and Social (ES) Performance Security
ES – Bank Guarantee

[Guarantor letterhead or SWIFT identifier code]

ES 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 Contractor³⁴]*
(hereinafter called "the Applicant") has undertaken, in pursuance of Contract No. Package No. 02 / TN IAMP / WRD / NKR / OFD Works / Phase - II / 2022 -23 dated _____ to execute On Farm Development (OFD) works for the work of Rehabilitation and Modernisation of Pullambady Main Canal, 5 Tanks and 1 Anicut in Lalgudy Block and Taluk, 5 Tanks and Pullambady Main Canal Distributory No.1,2,3 in Pullambady Block of Lalgudy Taluk in Trichy District and 19 Tanks in Thirumanur Block of Ariyalur Taluk and District in Nandhiyaru and Kulaiyaru Sub Basin.

AND WHEREAS it has been stipulated by you in the said Contract that the Applicant shall furnish you with a Bank Guarantee by a recognized bank for the sum specified therein as security for compliance with his Environmental and/or Social (ES) obligations in accordance with the Contract;

AND WHEREAS we have agreed to give the Applicant such a Bank Guarantee;

NOW THEREFORE we hereby affirm that we are the Guarantor and responsible to you, on behalf of the Applicant, up to a total of _____ *[amount of guarantee³⁵]* _____ *[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 Applicant 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 there under or of any of the Contract documents which may be made between you and the Applicant shall in any way release us

³⁴*In the case of a JV, insert the name of the Joint Venture*

³⁵*An amount shall be inserted by the Guarantor, representing the percentage of the Contract Price specified in the Contract less provisional sums, if any, and denominated in Indian Rupees.*

from any liability under this guarantee, and we hereby waive notice of any such change, addition or modification.

This guarantee shall be valid until³⁶, 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.

³⁶*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: The Executive Engineer, WRD,
River Conservancy Division,
Tiruchirappalli.

Ref : On Farm Development (OFD) works for the work of Rehabilitation and Modernisation of Pullambady Main Canal, 5 Tanks and 1 Anicut in Lalgudy Block and Taluk, 5 Tanks and Pullambady Main Canal Distributory No.1,2,3 in Pullambady Block of Lalgudy Taluk in Trichy District and 19 Tanks in Thirumanur Block of Ariyalur Taluk and District in Nandhiyaru and Kulaiyaru Sub Basin (Package No. 02 / TN IAMP / WRD / NKR / OFD Works / Phase - II / 2022 -23).

Gentlemen:

In accordance with the provisions of the Conditions of Contract, Sub clause 53.1 ("Advance Payment") of the above-mentioned Contract, _____ *[name and address of Contractor³⁷]* (hereinafter called "the Applicant") shall deposit with The Executive Engineer, WRD, River Conservancy Division, Trichy a bank guarantee to guarantee his proper and faithful performance under the said Clause of the Contract in an amount of _____ *[amount of guarantee³⁸]* _____ *[in words]*.

We, the _____ *[bank or financial institution]*, as instructed by the Applicant, agree unconditionally and irrevocably to guarantee as primary obligator and not as Surety merely, the payment to The Executive Engineer, WRD, River Conservancy Division, Trichy on his first demand without whatsoever right of objection on our part and without his first claim to the Applicant, 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 there under or of any of the Contract documents which may be made between The Executive Engineer, River Conservancy Division, Trichy and the Applicant, shall in any way release us from any liability under this guarantee, and we hereby waive notice of any such change, addition or modification.

³⁷In the case of a JV, insert the name of the Joint Venture

³⁸An amount shall be inserted by the bank representing the amount of the Advance Payment, and denominated in Indian Rupees.

This guarantee shall remain valid and in full effect from the date of the advance payment under the Contract until The Executive Engineer, WRD, River Conservancy Division, Trichy receives full repayment of the same amount from the Applicant. 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: The Executive Engineer, PWD, WRD, *[Name and Address of Employer]*

Date: _____

RETENTION MONEY GUARANTEE NO.: _____

We have been informed that _____ *[name of contractor³⁹]* (hereinafter called "the Applicant") has entered into Contract No. Package No. 02 / TN IAMP / WRD / NKR / OFD Works / Phase - II / 2022 -23 dated _____ with you, for the execution of On Farm Development (OFD) works for the work of Rehabilitation and Modernisation of Pullambady Main Canal, 5 Tanks and 1 Anicut in Lalgudy Block and Taluk, 5 Tanks and Pullambady Main Canal Distributory No.1,2,3 in Pullambady Block of Lalgudy Taluk in Trichy District and 19 Tanks in Thirumanur Block of Ariyalur Taluk and District in Nandhiyaru and Kulaiyaru Sub Basin.

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 Applicant, 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 words⁴⁰]* upon receipt by us of your first demand in writing accompanied by a written statement stating that the Applicant is in breach of its obligation under the Contract without cavil or argument.

³⁹*In the case of a JV, insert the name of the Joint Venture*

⁴⁰*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.*

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 Applicant 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. 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.

SPECIAL CONDITIONS FOR GST ON WORKS CONTRACT

I) GST – AN INTRODUCTION

Goods and Services Tax (GST) is an Indirect Tax which was introduced in India on 1st July 2017 and was applicable throughout India which replaced multiple cascading taxes levied by the central and state governments. It was introduced as “The Constitution (One Hundred and First Amendment) Act 2017”, following the passage of Constitution 122nd Amendment Act Bill. The GST is governed by a GST Council and its Chairman is the Finance Minister of India. Under GST, all goods and services transacted in India are classified under the HSN code system or SAC Code system. Goods are classified under HSN Code and services are classified under SAC Code.

II) TENDER (BID) EVALUATION - GST ACT

The GST Laws required that all invoices should show the value of supply and GST separately. Act says taxes should be separated out in all invoices

TAMIL NADU TRANSPARENCY IN TENDERS ACT, 1998

Rule 14 (7) of the Tamil Nadu Transparency in Tender (TNTIT) Rules, 2000 requires that financial bid quoted should be inclusive of taxes and duties. Tamil Nadu Tender Transparency Act, 1998 amended in G.O.Ms.No.215, dated 13.07.17 stated that the evaluation of tender(bid) has to be made inclusive of GST (i.e. base Rate with GST). The above two Acts has to be adhered by the Government Departments in finalising all Govt. Contracts.

III) NEW TENDER (BID) CONDITIONS UNDER IMPLEMENTATION OF GST

1) GST RATES AT 12% FOR WORKS CONTRACT

a) Government of India has notified vide Notification No. 20 / 2017 Central Tax (Rate), dated 22nd August, 2017 and Notification No.24 / 2017 – Central Tax (Rate), dated 21st September, 2017, the concessional rate of the Goods and Services Tax (GST) at 12% [CGST at 6% + SGST at 6%] is leviable for any Government Contract, whether Civil or Electrical, irrespective of the Goods and Services Tax (GST) rate applicable on purchase of goods used in the execution of Government Contract.

b) And the GST amount will be calculated at 12% from the sum of total tendered value quoted by the tenderer (bidder) for construction cost (excluding GST) specified in the BOQ, Subject to GST rate applicable from time to time as recommended by the GST Council

2. INPUT TAX CREDIT (ITC)

- a)** As per Notification 202, dated 29.06.2017 and as per sub-section (2) of Section 7 of the Tamil Nadu Goods and Services Act, 2017, (Tamil Nadu Act 19 of 2017), activities or transactions undertaken by State Government shall be treated neither as supply of goods nor a supply of service
 - b)** As per Chapter IX (Section 41) of the Tamil Nadu Goods and Services Act, 2017, every registered persons may be entitled to take the credit of eligible input tax, as self-assessed, in his return and such amount shall be credited on a provisional basis to his electronic credit ledger.
 - c)** As per PWD Revised SoR (2017-18), dated 21.10.2017, under General Note, 8 (ix), the Contractor (bidder) is eligible to get refund of excess tax paid over or liable to pay tax for this Contract Work.
- 3) The Tenderer (bidder) should furnish the Copy of Goods and Services Tax (GST) Registration No. while submitting tender schedule.
- 4) **QUOTING RATES BY TENDERER EXCLUDING GST**
- i) The Tenderer (bidder) shall quote the rates and prices (both in figures and words) for all the items of the Works described in the Bill of Quantities excluding GST along with sum of the quoted tender(bid) value excluding GST at the end (both in figures and words).
 - ii) All duties, taxes, and other levies except GST, payable by the contractor (bidder) under the contract, or for any other cause shall be included in the rates, prices and total Bid Price submitted by the Bidder”.

5) TOTAL TENDER PRICE

The total tender price will be the cumulative of value quoted for construction
(Total Basic Rate + GST).

6) BID SECURITY

The amount of bid security is fixed at 2% of the contract value of work put to tender (including the GST Amount)

7) PERFORMANCE SECURITY

The successful Bidder shall furnish a Performance Security for an amount equivalent to 5% of the contract value including the GST Amount.

The successful Bidder shall also furnish a ESHS Performance Security for an amount equivalent to 1% of the contract value including the GST Amount.

8) RETENTION MONEY

In addition to the aforesaid security deposit, retention amount shall be deducted from the running account bills (including the Goods and Services Tax (GST) Amount for all the running account bill) as retention money.

9) SCHEDULE OF RATES AND APPROXIMATE QUANTITIES:

The quantities given here are those upon which the lump sum tender cost of the work is based, but they are subject to alternations, omissions, deductions or addition as provided for in the conditions of this contract and do not necessarily show the actual quantities of work to be done. The unit rates excluding GST Amount, quoted below are those governing payment for extras or deductions or omissions according to the condition of the contract, as set forth in the Preliminary specification of the standard specifications for roads and bridges with the MORTH specifications and other condition of specifications of the contract. It is to be expressly understood that the measured work is to be taken net (Not withstanding any custom or practice to the contrary) according to the actual quantities. When in places and finished according to the drawings, or as may be ordered from time to time by the Collector and the cost calculated by measurement or weight at the respective prices, without any additional charge for any necessary or contingent works concerned therewith. The rates quoted excluding GST Amount are for the finished works in situ and complete in every respect. The Bidders should quote their rates excluding GST for the quantity and units specified under metric units under Schedule shall be substituted.

10) BILL OF QUANTITIES, PREAMBLE,

The rates and prices tendered in the priced Bill of Quantities shall, except in so far as it is otherwise provided under the Contract, include all constructional plant, labour,

supervision, materials, erection, maintenance, insurance, profit, taxes and duties (except GST), together with all general risks, liabilities and obligations set out in the Contract. The GST amount will be calculated at 12% of sum of the Bid value (excluding GST) quoted by the bidder for construction Cost specified in the BoQ. The BoQ should include GST (Goods and Services Tax) Amount”.

11) GOODS AND SERVICES TAX (GST) REGISTRATION AND ADDITION OF GST IN BILLS:

The Contractor should be required to indicate their GST registration number under the Goods and Services Tax (GST) Act 2017 in the tender form. The Central Goods and Services (CGST) Act 2017, the Integrated Goods and Services (IGST) Act 2017 and the Tamil Nadu Goods and Services (TNGST) Act 2017 have been enacted and enforced from 01.07.2017. Under the new tax regime, GST (comprising CGST, SGST and IGST) on works contracts for Government work was finally notified at 12 percent. As per the Tamil Nadu Goods and Services (TNGST) Act 2017, with effect from 01.07.2017.

12) AWARD OF CONTRACT

“The bid to be substantially responsive to the bidding documents and who has offered the lowest evaluated total tender price (Total Quoted Value including the Goods and Services Tax (GST) Amount)

13) PAYMENT

a) Part or complete Payment will be made only on satisfactory completion of work in full / part thereof and value of work executed shall be determined, based on the measurements and check measurements by the Engineer in the Measurement Book. For every Bill, 12% of GST will be paid to the contractor based on the value of work done for Construction by the Employer. After the payment including 12% of GST, the Contractor should pay the GST Amount to Government through his GST Registration No. Also the contractor needs to submit the Material purchase bill mentioning the name of the work/s in the package and GST No. to the Employer.

b) First Bill Payment:

At the time of payment for first running account bill, the contractor should produce the GST paid details on goods (Materials) to the Employer for ITC.

c) Intermediate Bill Payment:

At the time of payment for next running account bills, the contractor should produce the GST paid details of services upto previous bill payment (i.e. GST paid detail for the previous work bill) along with Input Tax Credit (ITC) availed at the time of payment of intermediate bill to the employer.

d) Final Bill Payment:

The contractor should produce the GST paid details for all the materials used for construction work and GST paid details of services for the upto previous payment (i.e. GST paid detail for the upto previous work bill) to the Employer along with Input Tax Credit (ITC) availed at the time of payment of final bill to the employer.

e) Submission of GST paid details of Final Bill:

The GST paid details for the final work bill payment of construction work to be submitted by the contractor to the employer in few days after getting payment.