

GOVERNMENT OF NAGALAND

NAGALAND HEALTH PROJECT

BID NO: **NHP/PP/2018/004**

NATIONAL COMPETITIVE BIDDING

NAME OF WORK	:Infrastructural Development in 3 District Hospitals (Mon, Wokha & Zunheboto)
PERIOD OF SALE OF BIDDING DOCUMENT	10 th June, 2018 to 9 th July 2018
TIME AND DATE OF PRE-BID CONFERENCE	:DATE: 20 th June, 2018, TIME:11:00 Hours
LAST DATE AND TIME FOR RECEIPT OF BIDS	:DATE: 10 th July 2018, TIME: 11::30 Hours
TIME AND DATE OF OPENING	:DATE: 10 th July 2018,TIME: 12:00 Hours
PLACE OF OPENING OF BIDS	:Conference Hall, Nagaland Health Project Directorate of Health & Family Welfare, Kohima - Nagaland
OFFICER INVITING BIDS	:Project Director, Nagaland Health Project

June 2018

INVITATION FOR BID

(IFB)

GOVERNMENT OF NAGALAND
Nagaland Health Project (NHP)

INVITATIONS FOR BIDS (IFB)

NATIONAL COMPETITIVE BIDDING

Date: 10th June, 2018

Bid No. NHP/PP/2018/004

1. The Government of India has received financing from the World Bank towards the cost of Nagaland Health Project and intends to apply a part of the funds to cover eligible payments under the contracts¹ for construction of works as detailed below.
2. Bidding will be conducted through National Competitive Bidding procedures agreed with the World Bank. Bidding is open to all eligible bidders as defined in the World Bank's Guidelines: Procurement of Goods, Works and Non-Consulting Services under IBRD Loans and IDA Credits & Grants by World Bank Borrowers, January 2011 and Revised in July 2014. Bidders from India should, however, be registered with the Government of Nagaland or other State Governments/Government of India, or State/Central Government Undertakings.
3. Bidders from India, who are not registered as above, on the date of bidding, can also participate provided they get themselves registered by the time of contract signing, if they become successful bidders. **Bidders are advised to note the clauses on eligibility (Section I Clause 4) and minimum qualification criteria (Section III – Evaluation and Qualification Criteria), to qualify for the award of the contract.** In addition, please refer to paragraphs 1.6 and 1.7 of the World Bank's Guidelines setting forth the World Bank's policy on conflict of interest.
4. The Project Director, Nagaland Health Project, Directorate of Health and Family Welfare (DoHFW), Government of Nagaland (GoN), Kohima invites sealed bids for the construction of works detailed below in the table. The bidders may submit bids for any or all of the works indicated therein.
5. Bidding documents should be downloaded from Department website www.nhmnagaland.in. The Non-refundable bid cost of Rs.2000 per lot should be submitted in the form of cheque/Demand Draft in favour of **Nagaland Multisectoral Health Project Under World Bank** to be payable at **State Bank of**

¹ Where Bids are invited concurrently for multiple contracts, add a new para. 5 as 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.

India, Nagaland Secretariate Kohima along with the Bid document (Inside the outer envelope)

6. Further information bidders may contact Project Director, Nagaland Health Project, Directorate of Health & Family Welfare, Government of Nagaland, Kohima.
7. All Bids must be accompanied by a stipulated bid security of the amount specified for the work in the table below, drawn in favour of **Nagaland Multisectoral Health project under World Bank** 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 (**Bid Validity Period Plus 45 days**)
8. Bids must be delivered to **The Project Director, Nagaland Health Project, Directorate of Health & Family Welfare, Kohima** on or **before 11:30 hours on 10th July, 2018** and will be publically opened on the same day at 12 hours, in the presence of the bidders designated representatives who wish to attend. If the office happens to be closed on the date of receipt of the bids as specified, the bids will be received and opened on the next working day at the same time and venue. Late Bids will be rejected.
9. A pre-bid meeting will be held on 20th June 2018 at 11 Hrs. at the office of **The Project Director, Nagaland Health Project, Directorate of Health & Family Welfare, Government of Nagaland, Kohima** 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. Before the prebid, the potential bidders are encouraged to write to the project for seeking desired clarification. If any, received prior to the prebid, the project will provide the clarifications.
10. Other details can be seen in the bidding documents.
11. The address for communication is as under:
 - (a) Name & Designation of Officer: The Project Director, Nagaland Health Project, Directorate of Health & Family Welfare, Government of Nagaland.
 - (b) Official Address: Roof Top, Nagaland Health Project, Directorate of Health & Family Welfare, Government of Nagaland, Kohima, Nagaland.
 - (c) Email: nmhp.wb@gmail.com
 - (d) Telephone: 0370- 2270044

TABLE: DISTRICT WISE DURATION & BID SECURITY

Package No	Name of Work	Bid Security * (Rs.)	Cost of Document (Rs.)	Period of Completion
1	2	3	4	5
Lot 1: Mon district Hospital	Construction of Water supply and Sanitation works including Roof Water Harvesting System, minor Civil works, Bio-Medical Waste Management Construction & Installation, Supply and Commissioning of Solar PV off Grid Plant , Lighting, Pumps and Solar Water Heating system on Turnkey basis on Turnkey basis including 4years of comprehensive warrantee (Parts/Labour/Onsite) for Goods / Equipment used for Works prescribed in BoQ and Operation and maintenance all facilities created after 1 year comprehensive warranty for Goods / Equipment & defects laiability period for Works for Mon District Hospital	2.74 lakhs	2,000	8 Months
Lot 2: Wokha District Hospital	Construction of Water supply and Sanitation works including Roof Water Harvesting System, minor Civil works, Bio-Medical Waste Management Construction & Installation, Supply and Commissioning of Solar PV off Grid Plant , Lighting, Pumps and Solar Water Heating system on Turnkey basis on Turnkey basis including 4years of comprehensive warrantee (Parts/Labour/Onsite) for Goods / Equipment used for Works prescribed in BoQ and Operation and maintenance all facilities created after 1 year comprehensive warranty for Goods / Equipment & defects laiability period for Works for Wokha District Hospital	3.14 lakhs	2,000	8 months

Lot 3: Zunheboto District Hospital	Construction of Water supply and Sanitation works including Roof Water Harvesting System, minor Civil works, Bio-Medical Waste Management Construction & Installation, Supply and Commissioning of Solar PV off Grid Plant , Lighting, Pumps and Solar Water Heating system on Turnkey basis on Turnkey basis including 4years of comprehensive warrantee (Parts/Labour/Onsite) for Goods / Equipment used for Works prescribed in BoQ and Operation and maintenance all facilities created after 1 year comprehensive warranty for Goods / Equipment & defects laiability period for Works for Zunheboto District Hospital	3.41 Lakhs	2,000	8 Months
---	--	------------	-------	----------

PART 1 – Bidding Procedures

Section I. Instructions to Bidders

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

Section 1 - Instructions to Bidders

Table of Contents

INVITATION FOR BID	2
A. General.....	12
1. Scope of Bid.....	12
2. Source of Funds	12
3. Corrupt and Fraudulent Practices.....	12
4. Eligible Bidders	13
5. Eligible Materials, Equipment and Services	16
B. Contents of Bidding Document.....	16
6. Sections of Bidding Document	16
7. Clarification of Bidding Document, Site Visit, Pre-Bid Meeting.....	18
8. Amendment of Bidding Document	19
C. Preparation of Bids.....	19
9. Cost of Bidding	19
10. Language of Bid.....	19
11. Documents Comprising the Bid.....	19
12. Letter of Bid and Schedules	20
13. Alternative Bids	20
14. Bid Prices and Discounts	20
15. Currencies of Bid and Payment	22
16. Documents Comprising the Technical Proposal.....	22
17. Documents Establishing the Qualifications of the Bidder	22
18. Period of Validity of Bids	23
19. Bid Security	23
20. Format and Signing of Bid.....	24
D. Submission and Opening of Bids.....	25
21. Sealing and Marking of Bids	25
22. Deadline for Submission of Bids	26
23. Late Bids	26
24. Withdrawal, Substitution, and Modification of Bids	26
25. Bid Opening	27
E. Evaluation and Comparison of Bids	28

26.	Confidentiality	28
27.	Clarification of Bids.....	29
28.	Deviations, Reservations, and Omissions	29
29.	Determination of Responsiveness.....	29
30.	Nonconformities, Errors, and Omissions.....	30
31.	Correction of Arithmetical Errors	30
32.	Conversion to Single Currency	31
33.	Margin of Preference	31
34.	Sub-contractors	31
35.	Evaluation of Bids.....	31
36.	Comparison of Bids	32
37.	Qualification of the Bidder	32
38.	Employer's Right to Accept Any Bid, and to Reject Any or All Bids	33
F.	Award of Contract	33
39.	Award Criteria	33
40.	Notification of Award	33
41.	Signing of Contract, Publication of award and Recourse to unsuccessful Bidders	33
42.	Performance Security	34
43.	Adjudicator or Dispute Review Expert.....	34
	Section II - Bid Data Sheet (BDS).....	36
	Section III - Evaluation and Qualification Criteria.....	44
	2.1 Eligibility.....	48
	2.2 Historical Contract Non-Performance.....	49
	2.3 Financial Situation and Performance	50
	2.4 Experience	52
	Section IV - Bidding Forms.....	61
	Letter of Bid.....	62
	Bill of Quantities.....	66
	Technical Proposal.....	120
	Financial Situation	136
	Manufacturer's Authorization.....	147
	Section V - Eligible Countries.....	148
	Section VI. Bank Policy - Corrupt and Fraudulent Practices	149
	PART 2 – Works Requirements	151

Section VII - Works Requirements	151
TESTING AND INSTALLATION	248
LIMITED WARRANTY	248
SECTION VI: DRAWINGS	250
Scope of Work and technical specifications (Solar).....	257
PART 3 – Conditions of Contract and Contract Forms	288
Section VIII. General Conditions of Contract	288
Section IXParticular Conditions of Contract.....	320
Appendices.....	331
Appendix 1: Salient Features of Labour & Environment Protection Laws	332
Appendix 2: Tables of Adjustment Data (Not Applicable)	341
Appendix -3Appointment of Adjudicator / Dispute Review Expert	343
Section X - Contract Forms	348

Section I - Instructions to Bidders

A. General

- 1. Scope of Bid**
 - 1.1 The Employer, as **indicated in the BDS**, issues this Bidding Document for the procurement of the Works as specified in Section VII (Work's Requirements) & Invitation for Bids (IFB). The name, identification, and number of contracts of this bidding are **specified in the BDS**.
 - 1.2 Throughout this Bidding Document:
 - (a) the term "in writing" means communicated in written form and delivered against receipt;
 - (b) except where the context requires otherwise, words indicating the singular also include the plural and words indicating the plural also include the singular; and
 - (c) "day" means calendar day.
- 2. Source of Funds**
 - 2.1 The Government of India or the Recipient (hereinafter called "Borrower") **specified in the BDS** has received/applied for financing (hereinafter called "funds") from the International Bank for Reconstruction and Development or the International Development Association (hereinafter called "the Bank") in an amount **specified in the BDS**, towards the cost of the project **specified in the BDS**. The Borrower intends to apply a portion of the funds to eligible payments under the contract(s) for which this Bidding Document is issued.
 - 2.2 Payment by the Bank will be made only at the request of the Borrower and upon approval by the Bank, and will be subject, in all respects, to the terms and conditions of the Loan (or other financing) Agreement. The Loan (or other financing) Agreement prohibits a withdrawal from the Loan (or other financing) account for the purpose of any payment to persons or entities, or for any import of goods, if such payment or import, is prohibited by a decision of the United Nations Security Council taken under Chapter VII of the Charter of the United Nations. No party other than the Borrower shall derive any rights from the Loan (or other financing) Agreement or have any claim to the proceeds of the Loan (or other financing).
- 3. Corrupt and Fraudulent**
 - 3.1 The Bank requires compliance with its policy in regard to corrupt and fraudulent practices as set forth in Section VI.

Practices

3.2 In further pursuance of this policy, Bidders shall permit and shall cause its agents (whether declared or not), sub-contractors, sub-consultants, service providers, or suppliers and any personnel thereof, to permit the Bank to inspect all accounts, records and other documents relating to any prequalification process, bid submission, and contract performance (in the case of award), and to have them audited by auditors appointed by the Bank.

4. Eligible Bidders

4.1.1 A Bidder may be a firm that is a private entity, or a government owned entity subject to ITB 4.5 or any combination of such entities in the form of a joint venture (JV), under an existing agreement, or with the intent to constitute a legally-enforceable joint venture, unless otherwise **specified in the BDS**.

4.1.2 Bids submitted by a joint venture of two or more firms as members when permitted as per BDS ITB Clause 4.1.1 shall comply with the following requirements:

- [a] the bid shall include all the information listed in Bidders Qualification Forms for all the Members. The maximum number of members in the Joint Venture shall be as **specified in the BDS**;
- [b] the bid and, in case of a successful bid, the Agreement, shall be signed so as to be legally binding on all members;
- [c] one of the members shall be nominated as being in charge, and this authorization shall be evidenced by submitting a power of attorney signed by legally authorized signatories of all the members;
- [d] the member in charge shall be authorized to incur liabilities and receive instructions for and on behalf of any and all members of the joint venture and the entire execution of the contract, including payment, shall be done exclusively with the member in charge;
- [e] all members of the joint venture shall be liable jointly and severally for the execution of the contract in accordance with the contract terms, and a statement to this effect shall be included in the authorization mentioned under (c) above, as well as in the bid and in the Agreement [*in case of a successful bid*];
- [f] The joint venture agreement should indicate precisely the role of all members of JV in respect of planning, design, construction equipment, key personnel, work execution, and

financing of the project. All members of JV should have active participation in the execution during the currency of the contract. This should not be varied/modified subsequently without prior approval of the Employer;

- [g] The joint venture agreement should be registered in places **specified in BDS** so as to be legally valid and binding on members; and
- [h] a copy of the Joint Venture Agreement entered into by the members shall be submitted with the bid. 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.

4.2 A Bidder shall not have a conflict of interest. All Bidders found to have a conflict of interest shall be disqualified. A Bidder may be considered to have a conflict of interest for the purpose of this bidding process, if the Bidder:

- (a) directly or indirectly controls, is controlled by or is under common control with another Bidder; or
- (b) receives or has received any direct or indirect subsidy from another Bidder; or
- (c) has the same legal representative as another Bidder; or
- (d) has a relationship with another Bidder, directly or through common third parties, that puts it in a position to influence the bid of another Bidder, or influence the decisions of the Employer regarding this bidding process; or
- (e) participates in more than one bid in this bidding process. Participation by a Bidder in more than one Bid will result in the disqualification of all Bids in which such Bidder is involved. However, this does not limit the inclusion of the same subcontractor in more than one bid; or
- (f) any of its affiliates participated as a consultant in the preparation of the design or technical specifications of the works that are the subject of the bid; or
- (g) any of its affiliates has been hired (or is proposed to be hired) by the Employer or Borrower as Project Manager (Engineer) for the Contract implementation; or
- (h) would be providing goods, works, or non-consulting

services resulting from or directly related to consulting services for the preparation or implementation of the project specified in the BDS ITB 2.1 that it provided or were provided by any affiliate that directly or indirectly controls, is controlled by, or is under common control with that firm; or

- (i) has a close business or family relationship with a professional staff of the Borrower (or of the project implementing agency, or of a recipient of a part of the loan) who: (i) are directly or indirectly involved in the preparation of the bidding documents or specifications of the contract, and/or the bid evaluation process of such contract; or (ii) would be involved in the implementation or supervision of such contract unless the conflict stemming from such relationship has been resolved in a manner acceptable to the Bank throughout the procurement process and execution of the contract.

- 4.3 A Bidder may have the nationality of any country, subject to the restrictions pursuant to ITB 4.7. A Bidder shall be deemed to have the nationality of a country if the Bidder is constituted, incorporated or registered in and operates in conformity with the provisions of the laws of that country, as evidenced by its articles of incorporation (or equivalent documents of constitution or association) and its registration documents, as the case may be. This criterion also shall apply to the determination of the nationality of proposed sub-contractors or sub-consultants for any part of the Contract including related Services.
- 4.4 A Bidder that has been sanctioned by the Bank in accordance with the above ITB 3.1, including in accordance with the Bank's Guidelines on Preventing and Combating Corruption in Projects Financed by IBRD Loans and IDA Credits and Grants ("Anti-Corruption Guidelines"), shall be ineligible to be prequalified for, bid for, or be awarded a Bank-financed contract or benefit from a Bank-financed contract, financially or otherwise, during such period of time as the Bank shall have determined. The list of debarred firms and individuals is available at the electronic address **specified in the BDS**.
- 4.5 Bidders that are Government-owned enterprises or institutions in the Employer's Country may participate only if they can establish that they (i) are legally and financially autonomous (ii) operate under commercial law, and (iii) are not dependent agencies of the Employer. To be eligible, a government-owned enterprise or institution shall establish to the Bank's satisfaction, through all

relevant documents, including its Charter and other information the Bank may request, that it: (i) is a legal entity separate from the government (ii) does not currently receive substantial subsidies or budget support; (iii) operates like any commercial enterprise, and, inter alia, is not obliged to pass on its surplus to the government, can acquire rights and liabilities, borrow funds and be liable for repayment of its debts, and can be declared bankrupt; and (iv) is not bidding for a contract to be awarded by the department or agency of the government which under their applicable laws or regulations is the reporting or supervisory authority of the enterprise or has the ability to exercise influence or control over the enterprise or institution.

4.6 Not used.

4.7 Firms and individuals may be ineligible if so indicated in Section V and (a) as a matter of law or official regulations, the Borrower's country prohibits commercial relations with that country, provided that the Bank is satisfied that such exclusion does not preclude effective competition for the supply of goods or the contracting of works or services required; or (b) by an act of compliance with a decision of the United Nations Security Council taken under Chapter VII of the Charter of the United Nations, the Borrower's country prohibits any import of goods or contracting of works or services from that country, or any payments to any country, person, or entity in that country.

4.8 Bidder shall provide such evidence of eligibility satisfactory to the Employer, as the Employer shall reasonably request

4.9 Not used

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 consist of Parts 1, 2, and3, which include all the Sections indicated below, and should be read in conjunction with any Addenda issued in accordance with ITB 8.

PART 1 Bidding Procedures

Section I - Instructions to Bidders (ITB)

Section II - Bid Data Sheet (BDS)

Section III - Evaluation and Qualification Criteria

Section IV - Bidding Forms

Section V - Eligible Countries

Section VI- Bank Policy-Corrupt and Fraudulent Practices

PART 2 Work's Requirements

Section VII - Works Requirements

PART 3 Conditions of Contract and Contract Forms

Section VIII - General Conditions of Contract (GCC)

Section IX - Particular Conditions of Contract (PCC)

Section X - Contract Forms

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

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

- 7.1 A prospective Bidder requiring any clarification on the Bidding Document shall contact the Employer in writing at the Employer's address **indicated in the BDS** or raise his inquiries during the pre-bid meeting if provided for in accordance with ITB 7.4. The Employer will respond in writing to any request for clarification, provided that such request is received prior to the deadline for submission of bids, within a period **specified in the BDS**. The Employer shall forward copies of its response to all Bidders who have acquired the Bidding Document in accordance with ITB 6.3, including a description of the inquiry but without identifying its source. If so **specified in the BDS**, the Employer shall also promptly publish its response at the web page identified in the BDS. *(where electronic downloading of bid document is permitted, the Employer will upload the addenda on the website and it will be the responsibility of the bidders [who downloaded the bidding documents] to search the website for any addenda)*. Should the clarification result in changes to the essential elements of the Bidding Documents, the Employer shall amend the Bidding Documents following the procedure under ITB 8 and ITB 22.2.
- 7.2 The Bidder is advised to visit and examine the Site of Works and its surroundings and obtain for itself, on its own risk and responsibility, all information that may be necessary for preparing the bid and entering into a contract for construction of the Works. The costs of visiting the Site shall be at the Bidder's own expense.
- 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. 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, including the text of the questions raised, without identifying the source, and the responses given, together with any responses prepared after the meeting, will be transmitted promptly to all Bidders who have acquired the Bidding Documents in accordance with ITB 6.3. Any modification to the Bidding Documents that may become necessary as a result of the pre-bid meeting shall be made by the Employer exclusively through the issue of an addendum pursuant to ITB 8 and not through the minutes of the pre-bid meeting.
- 7.7 Nonattendance at the pre-bid meeting will not be a cause for disqualification of a Bidder.
- 8. Amendment of Bidding Document**
- 8.1 At any time prior to the deadline for submission of bids, the Employer may amend the Bidding Documents by issuing addenda.
- 8.2 Any addendum issued shall be part of the Bidding Document and shall be communicated in writing to all who have obtained the Bidding Document from the Employer in accordance with ITB 6.3. The Employer shall also promptly publish the addendum on the Employer's web page in accordance with ITB 7.1.
- 8.3 To give prospective Bidders reasonable time in which to take an addendum into account in preparing their bids, the Employer may, at its discretion, extend the deadline for the submission of bids, pursuant to ITB 22.2

C. Preparation of Bids

- 9. Cost of Bidding** 9.1 The Bidder shall bear all costs associated with the preparation and submission of its Bid, and the Employer shall in no case be responsible or liable for those costs, regardless of the conduct or outcome of the bidding process.
- 10. Language of Bid** 10.1 The Bid, as well as all correspondence and documents relating to the bid exchanged by the Bidder and the Employer, shall be written in English.
- 11. Documents Comprising the Bid** 11.1 The Bid shall comprise the following:
- (a) Letter of Bid;
 - (b) completed Schedules including priced bill of quantities, in accordance with ITB 12 and 14, as **specified in BDS**;

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

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

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

12. Letter of Bid and Schedules

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

13. Alternative Bids

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

14. Bid Prices and Discounts

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

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

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

- 14.3 The price to be quoted in the Letter of Bid in accordance with ITB 12.1, shall be the total price of the Bid, excluding any discounts offered.
- 14.4 Unconditional discounts, if any, and the methodology for their application shall be quoted in the Letter of Bid, in accordance with ITB 12.1.
- 14.5 Unless otherwise **specified in the BDS** and the Conditions of Contract, the rates and prices quoted by the Bidder shall be fixed
- 14.6 If so indicated in ITB 1.1, bids are invited for individual lots (contracts) or for any combination of lots/contracts (packages). Bidders wishing to offer any price reduction for the award of more than one Contract shall specify in their bid the price reductions applicable to each package, or alternatively, to individual Contracts within the package. Price reductions or discounts shall be submitted in accordance with ITB 14.4, provided the bids for all lots/contracts are submitted and opened at the same time.
- 14.7 All duties, taxes, and other levies payable by the Contractor under the Contract, or for any other cause, as applicable on the deadline for submission of Bids, shall be included in the rates and prices and the total bid price submitted by the Bidder.
- 14.8 Bidders may like to ascertain availability of excise/custom duty exemption benefits available in India to the contracts financed under World Bank loan/credits. 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 documents.

Where the bidder has quoted taking into account such benefits, it must give all information required for issue of certificates in terms of the Government of India Central Excise Notification and Customs Notification as per form stipulated in Section IV. 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 quantity 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 customs/excise 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 customs/excise 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.

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

-
- 17.2 To establish its qualifications to perform the Contract in accordance with Section III (Evaluation and Qualification Criteria) the Bidder shall provide the complete information as requested in the corresponding information sheets included in Section IV (Bidding Forms).
- 18. Period of Validity of Bids**
- 18.1 Bids shall remain valid for 90 days or for a period **specified in the BDS** after the bid submission deadline date prescribed by the Employer in accordance with ITB 22.1. A bid valid for a shorter period shall be rejected by the Employer as nonresponsive.
- 18.2 In exceptional circumstances, prior to the expiration of the bid validity period, the Employer may request Bidders to extend the period of validity of their bids. The request and the responses shall be made in writing. If a bid security is requested in accordance with ITB 19, it shall also be extended for forty five (45) days beyond the deadline of the extended validity period. A Bidder may refuse the request without forfeiting its bid security. A Bidder granting the request shall not be required or permitted to modify its bid.
- 18.3 If the award is delayed by a period exceeding fifty-six (56) days beyond the expiry of the initial bid validity, the Contract price shall be determined as follows:
- (a) In the case of fixed price contracts, the Contract price shall be the bid price adjusted by the factor **specified in the BDS**.
 - (b) In the case of adjustable price contracts, no adjustment shall be made.
 - (c) In any case, bid evaluation shall be based on the bid price without taking into consideration the applicable correction from those indicated above.
- 19. Bid Security**
- 19.1 Unless otherwise **specified in the BDS**, the Bidder shall furnish as part of its bid, in original form, a bid security for the amount **shown in BDS**, for this particular work.
- 19.2 The bid security shall be a demand guarantee, at the Bidder's option, in any of the following forms:
- (a) an unconditional bank guarantee, issued by a Nationalized/Scheduled bank located in India;
 - (b) an irrevocable letter of credit issued by a Nationalized or Scheduled bank located in India;

- (c) a cashier's or certified check; or demand draft from a Nationalized or Scheduled Bank located in India;
- (d) another security **indicated in the BDS.**

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

19.3 If a Bid Security is specified pursuant to ITB 19.1, any bid not accompanied by a substantially responsive Bid Security shall be rejected by the Employer as non-responsive.

19.4 If a bid security is specified pursuant to ITB 19.1, the bid security of unsuccessful Bidders shall be returned as promptly as possible upon the successful Bidder's signing the contract and furnishing of the performance security pursuant to ITB 42.

19.5 If a bid security is specified pursuant to ITB 19.1, the bid security of the successful Bidder shall be returned as promptly as possible once the successful Bidder has signed the Contract and furnished the required performance security.

19.6 The bid security may be forfeited:

- (a) if a Bidder withdraws/modifies/substitutes its bid during the period of bid validity specified by the Bidder on the Letter of Bid, or any extension thereto provided by the Bidder in accordance with ITB 18.2 or
- (b) if the Bidder does not accept the correction of its Bid Price pursuant to ITB 31 or
- (c) if the successful Bidder fails to:
 - (i) sign the Contract in accordance with ITB 41; or
 - (ii) furnish a performance security in accordance with ITB 42.

19.7 The Bid Security of a JV shall be in the name of the JV that submits the bid. If the JV has not been constituted into a legally-enforceable JV, at the time of bidding, the Bid Security shall be in the names of all future members as named in the letter of intent mentioned in ITB 4.1.2 and ITB 11.2.

20. Format and

20.1 The Bidder shall prepare one original of the documents

Signing of Bid

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 The original and all copies of the bid shall be typed or written in indelible ink and shall be signed by a person duly authorized to sign on behalf of the Bidder. This authorization shall consist of a written confirmation as **specified in the BDS** and shall be attached to the bid. The name and position held by each person signing the authorization must be typed or printed below the signature. All pages of the bid where entries or amendments have been made shall be signed or initialed by the person signing the bid.
- 20.3 In case the Bidder is a JV, the Bid shall be signed by an authorized representative of the JV on behalf of the JV, and so as to be legally binding on all the members as evidenced by a power of attorney signed by their legally authorized representatives
- 20.4 Any amendmentssuch as interlineations, erasures, or overwriting shall be valid only if they are signed or initialed by the person signing the bid.
- 20.5 The Bidder shall furnish information as described in the letter of Bid on commissions or gratuities, if any, paid or to be paid to agents relating to this Bid, and to contract execution if the Bidder is awarded the contract.

D. Submission and Opening of Bids

21. Sealing and Marking of Bids

- 21.1 Bidders may always submit their bids by mail or by hand. When so **specified in the BDS**, bidders shall have the option of submitting their bids electronically. Procedures for submission, sealing and marking are as follows:
 - (a) Bidders submitting bids by mail or by hand shall enclose the original and each copy of the Bid including alternatives if permitted in accordance with ITB 13, in separate sealed envelopes, duly marking the envelopes as **“ORIGINAL”**, **“ALTERNATIVE”** and **“COPY.”** These envelopes containing the original and the copies shall then be enclosed in one single envelope. The rest of the procedure shall be in

accordance with ITB sub-Clauses 21.2 and 21.3.

- (b) Bidders submitting bids electronically shall follow the electronic bid submission procedures **specified in the BDS**.

21.2 The inner and outer envelopes shall:

- (a) bear the name and address of the Bidder;
- (b) be addressed to the Employer as provided in the BDS pursuant to ITB 22.1;
- (c) bear the specific identification of this bidding process indicated in accordance with ITB 1.1; and
- (d) bear a warning not to open before the time and date for bid opening.

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

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

22. Deadline for Submission of Bids

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

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

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

23. Late Bids

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

24. Withdrawal, Substitution, and Modification of

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

Bids

authorization in accordance with ITB 20.2, (except that withdrawal notices do not require copies). The corresponding substitution or modification of the bid must accompany the respective written notice. All notices must be:

- (a) prepared and submitted in accordance with ITB 20 and ITB 21 (except that withdrawal notices do not require copies), and in addition, the respective envelopes shall be clearly marked “**WITHDRAWAL**,” “**SUBSTITUTION**,” “**MODIFICATION**,” and
- (b) received by the Employer prior to the deadline prescribed for submission of bids, in accordance with ITB 22.

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

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

25. Bid Opening

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

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

25.2 First, envelopes marked “**WITHDRAWAL**” shall be opened and read out and the envelope with the corresponding bid shall not be opened, but returned to the Bidder. No bid withdrawal shall be permitted unless the corresponding withdrawal notice contains a valid authorization to request the withdrawal and is read out at bid opening. Next, envelopes marked “**SUBSTITUTION**” shall be opened and read out and exchanged with the corresponding bid being substituted, and the substituted bid shall not be opened, but returned to the Bidder. No bid substitution shall be permitted unless the corresponding substitution notice contains a valid authorization to request the substitution and is read out at bid opening. Envelopes marked “**MODIFICATION**” shall be opened

and read out with the corresponding bid. No bid modification shall be permitted unless the corresponding modification notice contains a valid authorization to request the modification and is read out at bid opening. Only envelopes that are opened and read out at bid opening shall be considered further.

- 25.3 All other envelopes shall be opened one at a time, reading out: the name of the Bidder and whether there is a modification, the total Bid Price, per lot (contract) if applicable, including any discounts and alternative bids, the presence or absence of a bid security; and any other details as the Employer may consider appropriate. Only discounts and alternatives and modifications read out at bid opening shall be considered for evaluation. The Letter of Bid and the Bill of Quantities are to be initialed by representatives of the Employer attending bid opening in the manner **specified in the BDS**. The Employer shall neither discuss the merits of any bid nor reject any bid at bid opening (except for late bids, in accordance with ITB 23.1).
- 25.4 The Employer shall prepare a record of the bid opening that shall include, as a minimum: the name of the Bidder and whether there is a withdrawal, substitution, or modification; the Bid Price, per contract if applicable, including any discounts and alternative bids; and the presence or absence of a bid security, if one was required. The Bidders' representatives who are present shall be requested to sign the record. The omission of a Bidder's signature on the record shall not invalidate the contents and effect of the record. A copy of the record shall be distributed to all Bidders.

E. Evaluation and Comparison of Bids

- 26. Confidentiality**
 - 26.1 Information relating to the examination, evaluation, comparison, and post-qualification of bids and recommendation of contract award, shall not be disclosed to Bidders or any other persons not officially concerned with such process until information on Contract award is communicated to all Bidders in accordance with ITB 40.
 - 26.2 Any attempt by a Bidder to influence the Employer in the evaluation of the bids or Contract award decisions may result in the rejection of its bid.
 - 26.3 Notwithstanding ITB 26.2, from the time of bid opening to the time of Contract award, if any Bidder wishes to contact the Employer on any matter related to the bidding process, it may

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 including breakdown of unit rates, giving a reasonable time for response. Any clarification submitted by a Bidder that is not in response to a request by the Employer shall not be considered. The Employer's request for clarification and the response shall be in writing. No change, including any voluntary increase or decrease in the prices or substance of the bid shall be sought, offered, or permitted, except to confirm the correction of arithmetic errors discovered by the Employer in the evaluation of the bids, in accordance with ITB 31.
- 27.2 If a Bidder does not provide clarifications of its bid by the date and time set in the Employer's request for clarification, its bid may be rejected.

28. Deviations, Reservations, and Omissions

- 28.1 During the evaluation of bids, the following definitions apply:
- (a) "Deviation" is a departure from the requirements specified in the Bidding Document;
 - (b) "Reservation" is the setting of limiting conditions or withholding from complete acceptance of the requirements specified in the Bidding Document; and
 - (c) "Omission" is the failure to submit part or all of the information or documentation required in the Bidding Document.

29. Determination of Responsiveness

- 29.1 The Employer's determination of a bid's responsiveness is to be based on the contents of the bid itself, as defined in ITB 11.
- 29.2 A substantially responsive bid is one that meets the requirements of the Bidding Document without material deviation, reservation, or omission. A material deviation, reservation, or omission is one that,
- (a) if accepted, would:
 - (i) affect in any substantial way the scope, quality, or performance of the Works specified in the Contract; or
 - (ii) limit in any substantial way, inconsistent with the Bidding Document, the Employer's rights or the Bidder's obligations under the proposed Contract; or
 - (b) if rectified, would unfairly affect the competitive position of

other Bidders presenting substantially responsive bids.

29.3 The Employer shall examine the technical aspects of the bid submitted in accordance with ITB 16, Technical Proposal, in particular, to confirm that all requirements of Section VII(Work's Requirements) have been met without any material deviation, reservations or omissions.

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

29.5 Not used.

**30. Non
conformities,
Errors, and
Omissions**

30.1 Provided that a bid is substantially responsive, the Employer may waive any non-conformities 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 may be adjusted, for comparison purposes only, to reflect the price of a missing or non-conforming item or component in the manner **specified in the BDS**.

**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 unit price contracts, if there is a discrepancy between the unit price and the total price that is obtained by multiplying the unit price and quantity, the unit price shall prevail and the total price shall be corrected;
- (b) if there is an error in a total corresponding to the addition or subtraction of subtotals, the subtotals shall prevail and the total shall be corrected; and

-
- (c) if there is a discrepancy between words and figures, the amount in words shall prevail, unless the amount expressed in words is related to an arithmetic error, in which case the amount in figures shall prevail subject to (a) and (b) above.
- 31.2 If the Bidder that submitted the lowest evaluated bid does not accept the correction of errors in accordance with ITB 31.1, its bid shall be declared non-responsive and the Bid Security may be forfeited in accordance with ITB Sub-Clause 19.6.
- 32. Conversion to Single Currency** 32.1 Not used.
- 33. Margin of Preference** 33.1 Not used.
- 34. Sub-contractors** 34.1 Unless otherwise **stated in the BDS**, the Employer does not intend to execute any specific elements of the Works by sub-contractors selected in advance by the Employer.
- 34.2 The Employer may permit subcontracting for certain specialized works as indicated in Section III. When subcontracting is permitted by the Employer, the specialized sub-contractor's experience shall be considered for evaluation. Section III describes the qualification criteria for sub-contractors.
- 34.3 Bidders may propose subcontracting upto the percentage of total value of contracts or the volume of works as **specified in the BDS**. Subcontractors proposed by the Bidder shall be fully qualified for their parts of the Works.
- 35. Evaluation of Bids** 35.1 The Employer shall use the criteria and methodologies listed in this Clause. No other evaluation criteria or methodologies shall be permitted.
- 35.2 To evaluate a bid, the Employers shall consider the following:
- (a) the bid price, excluding Provisional Sums and the provision, if any, for contingencies in the Summary Bill of Quantities, but including Daywork items, where priced competitively;
 - (b) price adjustment for correction of arithmetic errors in accordance with ITB 31.1;
 - (c) price adjustment due to discounts offered in accordance with ITB 14.4;
 - (d) Not Used,

(e) price adjustment for nonconformities in accordance with ITB 30.3;

(f) the additional evaluation factors as specified in Section III (Evaluation and Qualification Criteria);

35.3 The estimated effect of the price adjustment provisions of the Conditions of Contract, applied over the period of execution of the Contract, shall not be taken into account in bid evaluation.

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

35.5 If the bid of the successful bidder, which results in the lowest Evaluated Bid Price, is seriously unbalanced, front loaded or substantially below updated estimates in the opinion of the Employer, the Employer may require the Bidder to produce detailed price analyses (with breakdown of unit rates) for any or all items of the Bill of Quantities, to demonstrate the internal consistency and justification of those prices with the construction methods and schedule proposed. After evaluation of the price analyses, taking into consideration the schedule of estimated contract payments, the Employer may require that the amount of the performance security be increased at the expense of the Bidder to a level sufficient to protect the Employer against financial loss in the event of default of the successful Bidder under the Contract.

36. Comparison of Bids

36.1 The Employer shall compare the evaluated prices of all substantially responsive bids established in accordance with ITB 35.2 to determine the lowest evaluated bid.

37. Qualification of the Bidder

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

37.2 The determination shall be based upon an examination of the documentary evidence of the Bidder's qualifications submitted by the Bidder, pursuant to ITB 17.1. The determination shall not take into consideration the qualifications of other firms such as the Bidder's subsidiaries, parent entities, affiliates, subcontractors (other than Specialized Subcontractors if

permitted in the bidding document), or any other firm(s) different from the Bidder.

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

38. Employer's Right to Accept Any Bid, and to Reject Any or All Bids

- 38.1 The Employer reserves the right to accept or reject any bid, and to annul the bidding process and reject all bids at any time prior to contract award, without thereby incurring any liability to Bidders. In case of annulment, all bids submitted and specifically, bid securities, shall be promptly returned to the Bidders.

F. Award of Contract

39. Award Criteria

- 39.1 Subject to ITB 37.1, the Employer shall award the Contract to the Bidder whose offer has been determined to be the lowest evaluated bid and is substantially responsive to the Bidding Document, provided further that the Bidder is determined to be qualified to perform the Contract satisfactorily.

40. Notification of Award

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

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

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

- 41.1 The Contract Agreement shall incorporate all agreements between the Employer and the successful Bidder. It shall be kept ready in the office of the Employer for the signature of the Employer and the successful Bidder, within 21 days following the date of Letter of acceptance. Within 21 days of receipt of Letter of acceptance, the successful Bidder shall sign the Agreement and furnish the performance security in accordance with ITB Clause 42 and revised construction methodology. If the successful bidder is a JV, it shall also furnish the JV agreement duly signed by all the members, if it

had submitted only a letter of intent to execute the JV agreement alongwith the bid.

41.2 The Employer within 3 weeks of issue of notification of award shall publish in a the Employer's website with free access if available, or in the official gazette, the results identifying the bid and lot numbers and the following information: (i) name of each bidder who submitted the bid; (ii) bid prices as read out at bid opening; (iii) name and evaluated prices of each bid that was evaluated; (iv) name of bidders whose bids were rejected and the reasons for their rejection; and (v) name of the winning bidder, and the price it offered, as well as the duration and summary scope of the contract awarded.

41.3 The Employer shall promptly respond in writing to any unsuccessful Bidder who, after publication of contract award, requests the Employer in writing to explain on which grounds its bid was not selected.

42. Performance Security

42.1 Within twenty-one (21) days of the receipt of notification of award from the Employer, the successful Bidder shall furnish the performance security in accordance with the conditions of contract, subject to ITB 35.5, using for that purpose the Performance Security and ESHS Performance Security Forms included in Section X (Contract Forms). The performance security of a Joint Venture shall be in the name of the Joint Venture specifying the names of all members.

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

42.3 Upon the successful Bidder's signing the Agreement and furnishing of the Performance Security pursuant to ITB Clause 42.1, the Employer shall promptly notify the name of the winning bidder to each unsuccessful bidder and shall discharge the Bid Securities of the bidders pursuant to ITB Clause 19.4 and 19.5.

43. Adjudicator or Dispute Review Expert

43.1 The Employer proposes the person **named in the BDS** to be appointed as Adjudicator (or Dispute Review Expert) under the Contract, at the daily rate **specified in the BDS**, plus reimbursable expenses (actual boarding, lodging, travel and

other incidental expenses). If the Bidder disagrees with this proposal, the Bidder should so state in Letter of Bid. If, in the Letter of Acceptance, the Employer does not agree on the appointment of the Adjudicator [or Disputes Review Expert] proposed by the Bidder, the Employer will request the Appointing Authority designated in the Particular Conditions of Contract (PCC) pursuant to Clause 23.1 of the General Conditions of Contract (GCC), to appoint the Adjudicator [or Disputes Review Expert].

Section II - Bid Data Sheet (BDS)

A. Introduction

ITB 1.1	The Employeris: The Project Director, Nagaland Health Project, Directorate of Health & Family Welfare, Government of Nagaland
----------------	--

TB 1.1

The name of the work is: **Infrastructural Development in 3 District Hospitals (Mon, Wokha & Zunheboto)**

The identification number of the work is:

Identification of Lot	Description of Lot
Lot – 1	Construction of Water supply and Sanitation works including Roof Water Harvesting System, minor Civil works, Bio-Medical Waste Management Construction & Installation, Supply and Commissioning of Solar PV off Grid Plant , Lighting, Pumps and Solar Water Heating system on Turnkey basis on Turnkey basis including 4years of comprehensive warrantee (Parts/Labour/Onsite) for Goods / Equipment used for Works prescribed in BoQ and Operation and maintenance all facilities created after 1 year comprehensive warranty for Goods / Equipment & defects laiability period for Works for Mon District Hospital
Lot – 2	Construction of Water supply and Sanitation works including Roof Water Harvesting System, minor Civil works, Bio-Medical Waste Management Construction & Installation, Supply and Commissioning of Solar PV off Grid Plant , Lighting, Pumps and Solar Water Heating system on Turnkey basis on Turnkey basis including 4years of comprehensive warrantee (Parts/Labour/Onsite) for Goods / Equipment used for Works prescribed in BoQ and Operation and maintenance all facilities created after 1 year comprehensive warranty for Goods / Equipment & defects laiability period for Works for Wokha District Hospital
Lot – 3	Construction of Water supply and Sanitation works including Roof Water Harvesting System, minor Civil works, Bio-Medical Waste Management Construction & Installation; Construction of Water supply and Sanitation works including Roof Water Harvesting System, minor Civil works, Bio-Medical Waste Management Construction & Installation, Supply and Commissioning of Solar PV off Grid Plant , Lighting, Pumps and Solar Water Heating system on Turnkey basis on Turnkey basis including 4years of comprehensive warrantee (Parts/Labour/Onsite) for Goods / Equipment used for Works prescribed in BoQ and Operation and maintenance all facilities created after 1 year comprehensive warranty for Goods / Equipment & defects laiability period for Works for Zunheboto District Hospital

ITB 2.1	The Borrower is Government of India. The Sub-Borrower is Government of Nagaland, The Employer is The Project Director, Nagaland Health Project, Directorate of Health & Family Welfare, Government of Nagaland
ITB 2.1	The name of the Project is: <i>Nagaland Health Project (NHP)</i> Loan or Financing Agreement amount: <i>USD 60 million</i>
ITB 4.1.1	Bids from Joint ventures are NOT acceptable.
ITB 4.1.2 (a)	Maximum number of members in the JV shall be: <i>Not Applicable</i>
ITB 4.1.2(g)	Not Applicable
ITB 4.4	A list of debarred firms and individuals is available at the Bank's external website www.worldbank.org/debarr .

B. Contents of Bidding Documents

ITB 7.1	<p>For <u>clarification purposes</u> only, the Employer's address is:</p> <p>Attention: <i>The Project Director</i></p> <p>Nagaland Health Project, Directorate of Health & Family Welfare, Government of Nagaland, Ruziezou, Kohima 790 001 Nagaland</p> <p>Country: <i>INDIA</i></p> <p>Telephone: 0370-2270044</p> <p>Electronic mail address: nmhp.wb@gmail.com</p> <p>Requests for clarification should be received by the Employer no later than <i>7days prior to deadline for submission of bids.</i></p>
ITB 7.1	<p>Web page: http://www.nhmnagaland.in</p>
ITB 7.4	<p>A Pre-Bid meeting will take place, it will be at the following date, time and place</p> <p>Date: 20th June, 2018</p> <p>Time: 11:00 Hours</p> <p>Place: Conference Hall, Nagaland Health Project, Directorate of Health and Family Welfare, Kohima, Nagaland</p>

C. Preparation of Bids

ITB 11.1(b)	<p>The following schedules shall be submitted with the bid: Priced Bill of Quantities</p>
ITB 11.1 (i)	<p>The Bidder shall submit with its bid the following additional documents</p> <p>(i) Contractor Registration certificate as per IFB, if applicable</p> <p>(ii) Comprehensive and concise Environmental, Social, Health and Safety Management Strategies and Implementation Plans including Code of Conduct that will apply to its employees and subcontractors, to ensure compliance with its Environmental, Social, Health and Safety (ESHS) obligations including compliance with applicable Laws/ Rules/ Regulations for protection of environment, public health and safety, and the applicable parts of the Environment Management Plan of the project under the contract².</p>

² If needed, Employer may attach minimum requirements for ESHS Management Strategies and Implementation Plans and ESHS Code of Conduct.

	<p>1. Manufacturer's authorization is: <i>required as per proforma in Section IV.</i></p> <p>a.) Solar PV Panel</p> <p>b.) Storage batteries</p> <p>c.) Charge controller / MPPT units</p> <p>d.) Power Conditioners / Inverters including MPPT and Protectors</p> <p>e.) Solar Water Heater</p> <p>f.) Servo voltage stabilizer</p>								
ITB 13.1	Alternative bids <i>shall not be</i> permitted.								
ITB 14.5	The prices quoted by the Bidder <i>shall not be</i> subject to adjustment during the performance of the Contract. The adjustment of contract price, if provided, will be done in accordance with GCC Clause 45 read with corresponding provisions under SCC and Appendix 2 to SCC.								
ITB 18.1	The bid validity period shall be: 120 days.								
ITB 18.3 (a)	The factor is 4.5% per annum.								
ITB 19.1	<p>The Bidder shall furnish a bid security in the amount of</p> <table border="1"> <thead> <tr> <th>Identification of Lot</th><th>Amount of Bid Security</th></tr> </thead> <tbody> <tr> <td>Lot - 1</td><td>INR 2.74Lakhs</td></tr> <tr> <td>Lot – 2</td><td>INR 3.14Lakhs</td></tr> <tr> <td>Lot – 3</td><td>INR 3.41Lakhs</td></tr> </tbody> </table> <p>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.</p>	Identification of Lot	Amount of Bid Security	Lot - 1	INR 2.74Lakhs	Lot – 2	INR 3.14Lakhs	Lot – 3	INR 3.41Lakhs
Identification of Lot	Amount of Bid Security								
Lot - 1	INR 2.74Lakhs								
Lot – 2	INR 3.14Lakhs								
Lot – 3	INR 3.41Lakhs								
ITB 19.2 (d)	<p>Other types of acceptable securities are:</p> <p>Fixed Deposit certificate issued by a Nationalized or Scheduled Bank located in India for equivalent or higher values are acceptable as bid</p>								

	security provided it is pledged in favour of Nagaland Multisectoral Health project Under World Bank and such pledging has been noted and suitably endorsed by the bank issuing the certificate.
ITB 20.1	In addition to the original of the bid, the number of copies is: Two
ITB 20.2	The written confirmation of authorization to sign on behalf of the Bidder shall consist of: (a) <i>Legally valid Power of Attorney is required to demonstrate the authority of the signatory to sign the Bid; and</i> (b) <i>Deleted</i>

D. Submission and Opening of Bids

ITB 21.1 & 22.1	Electronic bidding is not permitted, bidders shall not have the option of submitting their bids electronically.
ITB 22.1	For <u>bid submission purposes</u> only, the Employer's address is: Attention: The Project Director, Nagaland Health Project, Directorate of Health & Family Welfare, Ruziezou, Kohima 797 001 Nagaland Country: INDIA The deadline for bid submission is: Date: 10 th July 2018 Time: 11:30 Hours
ITB 25.1	The bid opening shall take place at: Conference Hall of Nagaland Health Project, Directorate of Health & Family Welfare City: Kohima Country: India Date: 10 th July, 2018 Time: 12 Noon
ITB 25.1	Electronic bidding is not permitted, bids shall not be opened electronically.

E. Evaluation and Comparison of Bids

ITB 25.3	<p>The Letter of Bid and Priced Bill of Quantities shall be initialled by The Project Director or his authorised representatives of the Employer conducting Bid opening:</p> <p><i>Each Bid shall be numbered, any modification to the unit or total price shall be initialed by the Representative of the Employer</i></p>
ITB 30.3	<p>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.</p>
ITB 34.1	<p><i>At this time the Employer intends to execute certain specific parts of the Works by sub-contractors selected in advance.</i></p> <p><i>Part A of Each Lot: Water Supply and Sanitation, Civil Works, Bio-Medical Waste management Construction & Installation</i></p> <p><i>Part B of Each Lot: Solar PV plant; The sub contractors in this category will be evaluated as Specialised Sub contractor based on the criterion mentioned in the bid document (ITB 34.2)</i></p>
ITB 34.2	<p>The parts of the Works for which the Employer permits Bidders to propose Specialized Subcontractors are designated as follows:</p> <p>a. <u> Solar works (part B of BOQ for each lot)_____</u></p> <p>For the above-designated parts of the Works that may require</p>
ITB 34.3	<p>(a) Contractor's proposed subcontracting: Maximum percentage of subcontracting permitted is: <i>60% of the total contract amount</i></p> <p>(b) Bidders planning to subcontract more than 10% of total volume of work shall specify, in the Bid Submission Form, the activity (ies) or parts of the works to be subcontracted along with complete details of the sub-contractors and their qualification and experience. The qualification and experience of the sub-contractors must meet the minimum criteria for the relevant work to be sub-contracted failing which such sub-contractors will not be permitted to participate.</p> <p>(c) Sub-contractors' qualification and experience will not be considered for evaluation of the Bidder. The Bidder on its own (without taking into account the qualification and experience of the sub-contractor) should meet the qualification criteria.</p> <p>[Note: Work should not be split into small parts and sub-contracted].</p>

ITB 42.1 and 42.2	<p>The successful Bidder shall also be required to submit an Environmental, Social, Health and Safety (ESHS) Performance Security.</p> <p><i>[Note: throughout this bidding document the term 'performance security', unless the context clearly indicates otherwise, means and includes both 'the performance security and the ESHS performance security' to be submitted by the successful bidder in the amounts specified in GCC/ PCC 50]</i></p>
ITB 43.1	<p>The Adjudicator proposed by the Employer is: <u>Er.Abanglangba Ao</u> , Retired Executive Engineer, Govt, of Nagaland with daily professional fee of INR.8800/- (Rupees Eight thousand eight hundred only) exclusive of any GST/Indirect taxes and TA/DA which will be as per the actual bills/ invoice subject to approval by the Project Director, Nagaland Health Project</p> <p><i>[provide relevant information, such as education, experience, age, nationality, and present position; attach additional pages as necessary]</i></p>

Section III - Evaluation and Qualification Criteria

The Bidder shall provide all the information requested in the forms included in Section IV (Bidding Forms).

1. Evaluation

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

1.1 Adequacy of Technical Proposal

Evaluation of the Bidder's Technical Proposal will include:

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

For this purpose the Bidder should also submit:

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

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

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

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

- Experience
- Financial situation
- Current contract commitments,
- Cash flow capacity,
- Equipment to be allocated, and
- Personnel to be fielded.
- Bid Capacity

1.3 Specialised Subcontractors:

If permitted under ITB 33, only the specific experience of sub-contractors for specialized works permitted by the Employer will be considered. The general experience and financial resources of the specialized sub-contractors shall not be added to those of the Bidder for purposes of qualification of the Bidder.

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

For Each Lot:

(a) Financial Capability

The **Specialised** Subcontractor shall furnish documentary evidence that it meets the following financial requirement(s):

The **Specialised** Subcontractor must have average annual turnover of minimum INR 100 lakhs during previous- five financial years (FY 17-18, FY 16-17, FY 15-16 and FY 14-15)

(b) Experience and Technical Capacity

The **Specialised** Subcontractor shall furnish sufficient documentary evidences to demonstrate that it meets the following experience requirement(s):

- 1 The company is registered firm in India and is operational for more than last three years having experience in the domain of supply, installation and commissioning of solar PV power plants and fulfills the terms and conditions of eligibility as an indigenous manufacturer/system integrator of Solar PV True Hybrid Power Plant strictly in accordance with the directions of Ministry of New and Renewable Energy Government of India.

- 1.1 The **Specialised** Subcontractor should possess the experience of having successfully completed in his own name similar works during the previous five Financial years (ending last day of the month previous to the one in which tender are invited) which should be any of the following:

- a. 3 similar completed works each costing not less than the amount equal to INR 50 Lakhs

OR

- b. Two similar completed works each costing not less than amount equal to INR 75 Lakhs

OR

- c. One similar completed work costing not less than the amount equal to INR 100Lakhs
- 1.2 Has experience of assembly, supply, erection and maintenance/after sale services in the field of supply/installation of Stand alone/ Grid connected/Off grid Solar PV systems **of more than 100 Kwp cumulative capacity in the pervious fivefinancial years.** The details must be submitted in the Performa given in Technical- Bid section of tender document.
- 1.3 In case the **Specialised** Subcontractor is a manufacturer, it must have adequate manufacturing/assembly capacity available, to perform the works properly and expeditiously within the time frame specified in the tender document.
- 1.4 In case the **Specialised** Sub contractor is a system integrator, Subcontractor should submit details of completed works along with attested copies of the completion certificates from the owner/client indicating the name of the work, contract agreement no. the description of work done by the Sub contractor, date of start, date of completion (stipulated and actual), performance of agency and final executed quantity of work.
- 1.5 Has established quality assurance systems and organization designed to achieve high level of equipment reliability in assembly/erection/commissioning of the Solar PV True Hybrid Power Plant.
- 1.6 **Has adequate field service setup in North East to provide goods after sale services including necessary repair and maintenance and has provided goods after sale services for the supplies made by during past years.**
- (c) The Bidder shall furnish documentary evidence to demonstrate that the Goods it offers meet the following usage requirement:
 - (a) The Bidder must furnish details of supplies made by him in the last five years in proforma attached in Section VI
 - (b) The bidder has valid Test Reports for installation of Solar PV Power Plant as specified and required in the Technical- Bid of this bid document.

The above stated requirements are compulsory to be fulfilled by the Bidder and Employer may also ask for any additional information as may be deemed necessary in public interest.

2. Qualification

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

2.1 Eligibility

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

2.2 Historical Contract Non-Performance

2.2.1	History of Non-Performing Contracts	Non-performance of a contract did not occur as a result of contractor default since 1 st January 2013	Must meet requirement by itself or as member to past or existing JV	N / A	N / A	N / A	Form CON - 2
2.2.2	Suspension due to withdrawal of the Bid within Bid validity	Not under suspension due to withdrawal of the Bid pursuant ITB 19.6.	Must meet requirement	N / A	N / A	N/A	Letter of Bid
2.2.3	Pending Litigation	Bidder's financial position and prospective long term profitability sound according to criteria established in 2.3.1 below and assuming that all pending litigation will be resolved against the Bidder	Must meet requirement by itself or as member to past or existing JV	N / A	N / A	N / A	Form CON - 2
2.2.4	Litigation History	No consistent history of court/arbitral award decisions against the Bidder since 1 st January 2013]	Must meet requirement by itself or as member to past or existing JV	N / A	N / A	N/A	Form CON - 2
2.2.5	Declaration: Environmental, Social, Health, and Safety (ESHS) past performance	Declare any civil work contracts that have been suspended or terminated and/or performance security called by an employer for reasons related to the non-compliance of any environmental, or social, or health or safety requirements or regulations in the past five years.	Must make the declaration. Where there are Specialized Sub-contractor/s, the Specialized Sub-contractor/s must also make the declaration.	N / A	N / A	N/A	Form CON-3 ESHS Performance Declaration

		current soundness of the Bidder's financial position and indicate its prospective long-term profitability.											
NOTE: <i>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 form 3.1 A</i>													
2.3.2	Annual Construction Turnover	Achieved in at least two financial years (in the last five years) a minimum annual financial turnover ³ in civil engineering construction work of <table border="1"><tr><td>Lot 1: Mon</td><td>INR 275 Lakhs</td></tr><tr><td>Lot 2: Wokha</td><td>INR 300 Lakhs</td></tr><tr><td>Lot 3: Zunheboto</td><td>INR 325 Lakhs</td></tr></table> calculated as total certified payments received for contracts in progress or completed,	Lot 1: Mon	INR 275 Lakhs	Lot 2: Wokha	INR 300 Lakhs	Lot 3: Zunheboto	INR 325 Lakhs	Must meet requirement	N / A	N / A	N / A	Form FIN - 3.2
Lot 1: Mon	INR 275 Lakhs												
Lot 2: Wokha	INR 300 Lakhs												
Lot 3: Zunheboto	INR 325 Lakhs												

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).

³ At 2017-18 .price level. Financial turnover of previous years shall be given weightage @5% per year based on rupees value to bring them to the price level of the financial year in which bids are received.

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

2.4 Experience

2.4.1	General Construction Experience	<p>Experience under construction contracts for similar works such as those pertaining to [Construction of Buildings preferably Hospitals] in the role of contractor, JV member, sub-contractor, or management contractor for at least the last five [5] years prior to the bid submission deadline.</p> <table><tr><td><i>Lot 1: Mon</i></td><td><i>INR225 Lakh</i></td></tr><tr><td><i>Lot 2: Wokha</i></td><td><i>INR250 Lakh</i></td></tr><tr><td><i>Lot 3: Zunheboto</i></td><td><i>INR 275 Lakhs</i></td></tr></table>	<i>Lot 1: Mon</i>	<i>INR225 Lakh</i>	<i>Lot 2: Wokha</i>	<i>INR250 Lakh</i>	<i>Lot 3: Zunheboto</i>	<i>INR 275 Lakhs</i>	Must meet requirement	N/A	N / A	N/A	Form EXP – 4.1
<i>Lot 1: Mon</i>	<i>INR225 Lakh</i>												
<i>Lot 2: Wokha</i>	<i>INR250 Lakh</i>												
<i>Lot 3: Zunheboto</i>	<i>INR 275 Lakhs</i>												

Qualification Criteria			Compliance Requirements				Documentation						
No.	Subject	Requirement	Single Entity	Joint Venture where permitted			Submission Requirements						
				All Parties Combined	Each Member	One Member							
2.4.2 (a)	Specific Construction Experience	<p>Bidder should have successfully completed as a prime contractor, JV member⁴, management contractor or sub-contractor, minimumone (1) contract substantially</p> <table><tr><td><i>Lot 1: Mon</i></td><td><i>INR 100 Lakh</i></td></tr><tr><td><i>Lot 2: Wokha</i></td><td><i>INR 125 Lakh</i></td></tr><tr><td><i>Lot 3: Zunheboto</i></td><td><i>INR 150 Lakh</i></td></tr></table> <p>within the last five (5) years (FY2012-13..to FY 2016-17.....), with a value⁵ of at least _____, which is similar to the proposed works. (Construction of Building Works preferably Hospital .) The similarity shall be based on the physical size, complexity, methods/technology or other characteristics as described in Section VII, Employer’s requirements.</p>	<i>Lot 1: Mon</i>	<i>INR 100 Lakh</i>	<i>Lot 2: Wokha</i>	<i>INR 125 Lakh</i>	<i>Lot 3: Zunheboto</i>	<i>INR 150 Lakh</i>	Must meet requirement	N / A	N / A	N / A	Form EXP 4.2(a). The contractor should have borne responsibility for execution of works to the extent he claims experience. A contractor should not claim experience for the works he has never executed.
<i>Lot 1: Mon</i>	<i>INR 100 Lakh</i>												
<i>Lot 2: Wokha</i>	<i>INR 125 Lakh</i>												
<i>Lot 3: Zunheboto</i>	<i>INR 150 Lakh</i>												
The value of the completed contract for similar works should not be less than 80% of the estimated contract value of the work for which bids are invited. A work where 90% of													

⁴ 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.

⁵ At 2017 – 18 price level. Cost of completed works of previous years shall be given weightage @5% per year based on rupees value to bring them to the price level of the financial year in which bids are received.

Qualification Criteria			Compliance Requirements		Documentation
No.	Subject	Requirement	Single Entity	Joint Venture where permitted	Submission Requirements
<p><i>contract value is paid is considered as completed.</i></p> <p><i>In the case of JV, the value of contracts completed by its members shall not be aggregated to determine whether the requirement of the minimum value of a single contract has been met. Instead, each contract performed by each member shall satisfy the minimum value of a single contract as required for single entity. In determining whether the JV meets the requirement of total number of contracts, only the number of contracts completed by all members each of value equal or more than the minimum value required shall be aggregated</i></p>					

Qualification Criteria			Compliance Requirements				Documentation
No.	Subject	Requirement	Single Entity	Joint Venture where permitted			Submission Requirements
				All Parties Combined	Each Member	One Member	
2.4.2 (b)	Specific Experience	<div>b) For the above or other contracts executed during the period stipulated in 2.4.2(a) above, at least in one year a minimum construction experience in the following key activities:</div> <div><div><div>cement concrete (including RCC and PSC)</div><div>Lot – 1: 15 Cum</div><div>Lot – 2: 15 Cum</div><div>Lot –3: 15 Cum</div></div><div><div>earthwork in both excavation and embankment (combined quantities)</div><div>Lot – 1: 100 Cum</div><div>Lot – 2: 100 Cum</div><div>Lot –3: 100 Cum</div><div>-</div></div></div> <div>Must meet requirements</div> <div>N / A</div> <div>N / A</div> <div>N / A</div> <div>Form EXP-4.2(b)</div>					

		<div>Roof Area of the building</div> <div>Lot – 1: 40 Sq.m</div> <div>Lot – 2: 40 Sq.m</div> <div>Lot –3: 40 Sq.m</div>				
<p><i>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.</i></p> <p><i>* 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 <u>specialist sub-contractors</u>, this could be specified for that activity and bidders may be requested to name the <u>sub-contractors</u> and furnish their qualification and experience.</i></p>						
<p>2.4.2(c) For a bidder (either individually as a single entity or as a Specialised Sub-contract member) to qualify for a group of lots (contracts), he must demonstrate having experience and resources sufficient to meet the aggregate of the qualifying criteria for all the contracts in question.</p>						
<p>2.4.2(d))</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 aswell as works in progress).</p>					

N = Number of years prescribed for completion of the works for which bids are invited (period upto 6 months to be taken as half-year and more than 6 months as one year).

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.

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.

2.4.2
(e)

Even though the bidders may meet the above qualifying criteria, they are subject to be disqualified if they have: -

- made misleading or false representations in the forms, statements, affidavits, and attachments submitted in proof of the qualification requirement;
- record of poor performance such as abandoning the works, not properly completion or financial failures etc.
- consistent history of litigation or arbitration awards against the bidder or any member or the joint venture.
- Participated in the previous bidding (if this is a re-bidding) for the same work and had quoted unreasonably high bid price and could not furnish any rational justification for the same to the Employer.

2.5 Personnel

The Bidder must demonstrate that it will have the personnel for the key positions that meet the following requirements:

S. No.	Designation of Personnel (Position)	Lot 1	Lot 2	Lot 3	Minimum Qualification	Minimum years of experience	Minimum experience in similar works.
1.	Project Manager	1	1	1	B E (Civil) / Diploma (Civil) Engineering	5/8	3/5 Building Construction preferably Hospitals
2.	Site Engineer	1	1	1	B E (Civil) / Diploma (Civil) Engineering	3/5	2/4 Water Supply & Sanitation, Sewerage and drainage system
3.	Electrical Engineer	1	1	1	BE (Electrical/ Mechanical) / Diploma (Electrical Engineering/ Mechanical Engineer)	3/5	2/4 Solar PV Plant for 100KWP including Electrical Works
4	Environment, Health and Safety Engineer	1	1	1	Graduate in Civil or Environmental Engineering with specialization and/or additional qualification in Occupational Health and Safety.	[3]	2years of relevant experience

[Bidder should furnish Curriculum Vitae to confirm their meeting the requirements].

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.

.....
.....
.....

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

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

Note:

The managerial and technical competence of a contractor is largely related to the key personnel on site. The extent to which the Bidder should demonstrate having staff with extensive experience should be limited to those requiring critical operational or technical skills. The criteria should therefore refer to a limited number of such key personnel, for instance, the project or contract manager and others working under the project manager who will be responsible for major components (e.g. specialized in dredging, piling, earthworks, environmental, health and safety, or social aspects, as required for each particular project). Criteria of acceptability should be based on:

- (a) *a minimum number of years of experience in a similar position; and*
- (b) *a minimum number of years of experience and/or number of comparable projects carried out in a specified number of preceding years.*

The requirement of specified education and academic qualifications is normally unnecessary for such positions, as contractors often employ competent staff who have learned their profession "on the job" rather than through academic training. It is appropriate to specify that certain positions are filled by individuals who have held posts of comparable authority for, say, three years with the Bidder, so that key staff in executive site positions have sufficient knowledge of the Bidder's management, policy, procedures, and practices to act with confidence and authority within that framework.

2.6 Equipment

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

No.	Equipment Type and Characteristics	Capacity	Minimum Number required Lot – I	Minimum Number required Lot – II	Minimum Number required Lot – III
1	Concrete Mixer	300 – 350 L	2	2	2
2	Hydraulic Excavator/Back Hoe		<u>1</u>	<u>1</u>	<u>1</u>
3	Dump Truck		<u>1</u>	<u>1</u>	<u>1</u>
4	Concrete Vibrator		<u>1</u>	<u>1</u>	<u>1</u>
5	Solar PV installation Tester		<u>1</u>	<u>1</u>	<u>1</u>
6	IV(Corrent-Voltage) curve Tracer		<u>1</u>	<u>1</u>	<u>1</u>
7	Solar Kits & Irradiance meter		<u>1</u>	<u>1</u>	<u>1</u>
8	Solar PV Tools Kits for MC3/MC4 Solar Connectors with Crimping Stripping Cutting		<u>1</u>	<u>1</u>	<u>1</u>
9	Solar test leads set		<u>1</u>	<u>1</u>	<u>1</u>
10	Digital multimeter		<u>1</u>	<u>1</u>	<u>1</u>
11	Saety belt, helmet, goggles, ear plug ear muff, mask, aprons, gumboots, safety, nets, jacket, hand gloves, suits and accessories				

[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 alongwith the cycle time for each operation for the given production capacity to match the requirements.]

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

Section IV - Bidding Forms

Letter of Bid

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

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

Date: _____

Invitation for Bid No.: NHP/PP/2018/004

To: *(Insert name of the Employer)*

We, the undersigned, declare that:

- (a) We have examined and have no reservations to the Bidding Documents, including Addenda issued in accordance with Instructions to Bidders (ITB8);
- (b) We meet the eligibility requirements and have no conflict of interest in accordance with ITB 4;
- (c) We offer to execute in conformity with the Bidding Documents the following Works:
_____;
- (d) The total price of our Bid, excluding any discounts offered in item (e) below is:

- In case of **only one lot**, total price of the Bid

<u>Lot</u>	<u>total price of each lot in words figures</u>	<u>total price of each lot in words</u>
<u>{Mention the name of the Lot}</u>		

Or

- In case of **Combination of multiple lots**, total price of **each lot**

<u>Lot</u>	<u>total price of each lot in words figures</u>	<u>total price of each lot in words</u>
<u>Lot -1 Mon</u>		
<u>Lot – 2 Wokha</u>		
<u>Lot – 3 Zunheboto</u>		

Or

- In case of multiple lots, total price of **all lots** (sum of all lots)*insert the total price of all lots in words and figures*;

<u>Lot</u>	<u>total price of all lots in words figures</u>	<u>total price of all lots in words</u>
<u>Lot -1 Mon</u>		
<u>Lot – 2 Wokha</u>		
<u>Lot – 3 Zunheboto</u>		
<u>Total for Lot 1; Lot 2 and Lot 3</u>		

- (e) The discounts offered and the methodology for their application are:
- (i) The discounts offered are: *[Specify in detail each discount offered: Lot wise or Total(if submitted for all lots)]*
- (ii) The exact method of calculations to determine the net price after application of discounts is shown below: *[Specify in detail the method that shall be used to apply the discounts]* _____;
- (f) Our bid shall be valid for a period of _____ *[insert validity period as specified in ITB 18.1.]* days from the date fixed for the bid submission deadline in accordance with the Bidding Documents, and it shall remain binding upon us and may be accepted at any time before the expiration of that period;
- (g) We accept the appointment of *[insert name proposed in Bid Data Sheet]* as the Adjudicator/Dispute Review Expert
- [or]*
- We do not accept the appoint of *[insert name proposed in Bid Data Sheet]* as he Adjudicator/Dispute Review Expert, and propose instead that *[insert name]* be appointed⁶ as Adjudicator/Dispute Review Expert, whose daily fees and biographical data are attached;
- (h) If our bid is accepted, we commit to obtain a performance security in accordance with the Bidding Document;
- (i) We are not participating, as a Bidder, in more than one bid in this bidding process in accordance with ITB 4.2,
- (j) Our firm, its affiliates or subsidiaries, including any Subcontractors or Suppliers for any part of the contract, has not been declared ineligible by the Bank, under the Employer's country laws or official regulations or by an act of compliance with a decision of the United Nations Security Council(ITB 4.7);

⁶In case appointment of Adjudicator was proposed from the list provided by an Institution in ITB 4.3, the replacement should also be proposed from the list of same institution.

- (k) We are not a government owned entity / We are a government owned entity but meet the requirements of ITB 4.5⁷;
- (l) We have paid, or will pay the following commissions, gratuities, or fees with respect to the bidding process or execution of the Contract:⁸

Name of Recipient	Address	Reason	Amount
_____	_____	_____	_____

- (m) We hereby certify that we have taken steps to ensure that no person acting for us or on our behalf will engage in any type of fraud and corruption.
- (n) We also undertake that, in competing for (and, if the award is made to us, in executing) the above contract, we will strictly observe the laws against fraud and corruption in force in India on date namely "Prevention of Corruption Act 1988."
- (o) We understand that this bid, together with your written acceptance thereof included in your notification of award, shall constitute a binding contract between us, until a formal contract is prepared and executed;
- (p) We understand that you are not bound to accept the lowest evaluated bid or any other bid that you may receive; and
- (q) If awarded the contract, the person named below shall act as Contractor's Representative:

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

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

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

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

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

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

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

⁷Use one of the two options as appropriate.

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

Bill of Quantities

Lot 1: Mon District Hospital

Sub Group	Description	Amount in Rs	Amount in Words
A1	Water supply system including 1 year defects liability period and comprehensive warranty.		
A2	Sanitation including 1 year defects liability period and comprehensive warranty.		
A3	Misc works including 1 year defects liability period and comprehensive warranty.		
A4	After 1 year defects liability period and comprehensive warranty, Price for 4 Years of Comprehensive warranty (Parts/Labour/Onsite) for Goods Equipment used for works prescribed in the BoQ and operation and maintenance for Works.	Price should be reasonable around 5% to 7% per year; Price should not be zero and included in the A1- A3.	
Part A Total			

PART B	Description	Amount in Rs	Amount in Words
B1	Solar pv power plant including 1 year defects liability period and comprehensive warranty.		
B2	Provision of new internal wiring for solar power load (base lightening and emergency) including 1 year defects liability period and comprehensive warranty.		
B3	Equipment Supplies and Installation including 1 year defects liability period and comprehensive warranty.		
B4	After 1 year defects liability period and comprehensive warranty Price for 4 Years of Comprehensive warranty (Parts/Labour/Onsite) for Goods Equipment used for works prescribed in the BoQ and operation and maintenance for Works.	Price should be reasonable around 5% to 7% per year; Price should not be zero and included in the B1- B3.	
Part B Total			

Note:

-
1. *Item for which no rate or price has been entered in will not be paid for by the Employer when executed and shall be deemed covered by the other rates and prices in the Bill of Quantities (refer:ITB Clause 14.2 and GCC Clause 41.3)*
 2. *Unit rates and prices shall be quoted by the bidder in Indian Rupees [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 as explained in [ITB Clause 31.1(a)].*
 4. *Where there is a discrepancy between the rate in figures and words, the rates in words will govern.[ITB Clause 31.1(c)]*

Note : * All prices should be inclusive of all taxes and transportation cost

**** Any discount offer should be stated clearly to ascertain the final bid price.***

**** Kindly provide spare part list with unit price in case of Solar***

Lot 1: Part A :MON DISTRICT HOSPITAL

Sr. No	Description of item	Quantity	Unit	Rate in figures (INR)	Rate in Words	Amount (INR)
SUB PART – A1 – WATER SUPPLY SYSTEM						
	<p>Ground Service Reservoir / Underground Tank: Designing (aesthetically), and constructing RCC ground service reservoirs / RCC sumps in M-300 mix. of required capacity including excavation in all types of strata, foundation concrete, container walls, bottom slab top RCC roof slab / or dome, 20 mm thick cement plaster with water proofing compound in CM 1:3 proportion. to inside face of the container, including epoxy paint from inside including refilling and disposing of surplus stuff within lead of 50 M, all labour and material charges, for laying and jointing of pipe assembly for inlet, outlet washout, over flow and bye-pass arrangement consisting of HDPE / GI pipes, specials and valves of given diameters, Opening for the Outlet pipe for the Centrifugal Pumps / Submersible pumps. providing and fixing accessories such as M.S. ladder inside and outside, C.I. Manhole frame and cover, at top slab, B.B. masonry chamber for all valves, ventilating shafts, including giving satisfactory hydraulic test and water tightness test as per IS code and providing three coat of cement paints to all expose surface of structure including roof surface etc. complete as per design data, criteria, obligatory requirements and detailed specifications. Anti-termite treatment shall be given for underground portion of the structure.</p> <p>Design and Condition for Construction for RCC Tank</p> <ol style="list-style-type: none"> 1. The designing shall be in accordance with various relevant I.S. specification (I.S. 456/2000, I.S. 875- 1987, I.S. 3370-1965 or revised. 2. Only M.S bars grade I confirming to I.S. 432 Part-I or high yield strength deformed bars confirming to I.S. 1786 or I.S. 1139 shall be used grade II M.S. bars shall not be used 3) Entire structure shall be in M-300 only 4) The job includes designing the structure for uplift pressure and dewatering if require during entire execution and disposal of surplus excavated stuff with in lead of 100 Meters as directed by Engineer-in- charge. 5) Location of Tank shall be decided based on availability of space and in consultation with Health Centre Management Committee or as directed by engineer. <p style="text-align: center;">OR</p> <p>Ground Service Reservoir / Underground Tank: Construction Ferrocement tank of capacity as defined below litres with Earth work excavation for foundation, disposal of soil with all lead and lifts including shoring strutting barricading danger lighting at the site. Leveling course of concrete (1:3:6) shall be provided. Necessary centering and scaffolding shall be made mortar shall be of 0.5:1 or according to the design. The Chicken or woven mesh shall be minimum of 3 layers. The mesh shall be tied to skeletal Steel bars of yield strength 415 Mpa. Manhole cover with frame of Cast Iron shall be provided and fitted with necessary clamps to the top slab of the tank. Proper mounting arrangement shall be made on the top slab shall be made for fixing of the hand pump. Location of Tank shall be decided based on availability of space and in</p>					

Sr. No	Description of item	Quantity	Unit	Rate in figures (INR)	Rate in Words	Amount (INR)
	consultation with Health Centre Management Committee or as directed by engineer. The tank shall be subjected to test for water tightness for 48 hours. The work shall be complete as per the specification and as directed by the Engineer in-charge					
	12500 Liter					
2	Construction of roof water harvesting system: Providing and erecting roof water system, modification, diversion of existing for to collect the rain water falling on the roof from all the sides of the roof, including PVC Drain Pipe of 110mm PN-4, necessary elbows, bends, Tee, couplers, Angular clamps, fasteners etc, PVC down pipes to carry water to storage tank, first flush PVC pipe to drain off first rains with Tee & valve and wall mounted mesh type filter unit to be located suitably on the downpipe leading to elevated water tank. The gutters, filters and necessary specials shall be suitable fastened. The minimum size of down water pipe shall be 110 mm. Inlet screen (#20 wire mesh) to prevent entry of dry leaves and other debris into the down pipe should be fitted. The Work includes providing inlet pipe to convey the water from the catchment area to the existing Ground level tank with all necessary specials such as tee bends elbows fasteners clamps etc complete. The work also includes overflow from tanks to connected with the ground service reservoir of 12500 Liter near Bore well as per Engineer in-charge. The over flow from the existing reservoir tank diverted to ground water recharge tank connecting with the tube well. The works also includes brick masonry / RCC chamber for connecting the overflow pipes at various existing and proposed ground storage tanks. The work shall be carried out as per the direction of Engineer in charge. All pipes shall be of PN-4 class and Specials shall be of PN-6. The ground overflow pipes, Connecting pipes shall be HDPE Pipes of Water Quality.	1	Job			
2.A	CONNECTING PIPES AND INLET OUTLET PIPES FOR TANKS :- Excavation, laying on Ground with Supplying, lowering laying jointing of HDPE Pipe Conforming to ISO 4427 of 1996, manufactured from virgin resin of PE-80 food grade compounded raw material having blue colour only with quality assurance certificate from quality agencies like CIPET(India) / DVGM / KIWA / SPGN / WRC etc. for usage in drinking water system. The cost shall include testing of all materials, labour, all taxes (Central, State and Municipal), inspection charges, transportation to the directed municipal establishment, transit insurance, loading, unloading, stacking etc complete in all respect and as directed by Engineer In-Charge.					
2A.1	90 mm dia. OD pipe PN 10	50	RMT			
2.A. 2	110 mm dia. OD pipe PN 10	20	RMT			
2.A. 3	160 mm dia. OD pipe PN 10	40	RMT			
2.A. 4	250 mm dia. OD pipe PN 10	50	RMT			
2.A. 5	315 mm dia. OD pipe PN 10	80	RMT			
3	Construction of the Ground water Recharge : Design, construction of Ground recharge Tank which includes Boring/drilling bore well of 300 mm dia., for casing /strainer, supply, installation of pipe unplasticized PVC medium well casing	1	Job			

Sr. No	Description of item	Quantity	Unit	Rate in figures (INR)	Rate in Words	Amount (INR)
	(CM) pipe of required dia., conforming to IS 12818. The works also includes Supplying, filling , spreading & levelling stone boulders of size range 5 cm to 20 cm, size range 5 mm to 10 mm and size range 1mm to 2 mm in recharge pit ,in required thickness for all leads & lifts and complete as per direction of engineer and approved drawings. The work also involves design, construction of the RCC tank of 15 Min peak rainfall of capacity of 12500 Liter the recharge tank is providing the depth of tank 2.5 Meter with 0.5 M freeboard the diameter of the tank is 3.5 M diameter connected with the overflow pipe from GSR. The works also includes Supply pea-gravel of approved quality in stacks and then packing the same into the annular space between the tube well assembly and bore hole.					
4	Providing and fixing G. I. pipes complete with G. I. fittings including trenching and refilling and providing and fixing clamps, including cutting and making good the walls etc. etc. Of various sizes for Hospital Plumbing works. The works includes necessary cutting, jointing with existing plumbing, dismantling of existing Piping of GI / PVC/ HDPE etc., The works also includes necessary bib cocks, taps etc., complete as per Directions of the engineer.					
4.1	15 mm dia., Nominal Bore	130	RMT			
4.2	20 mm dia., Nominal Bore	70	RMT			
4.3	25 mm dia., Nominal Bore	50	RMT			
5	Providing and fixing C.I. sluice valves (with cap) complete with bolts, nuts. rubber insertions etc., with flanges pieces etc., including for various sizes connecting the outlets / Overflow of the ground rain water storage tank / ground service reservoirs.	1	Job			
6	Direct Action Hand Pump: Providing and Erection of hand pump(Tara type /equivalent) shall be provided with riser pipe of uPVC 50mm diameter to draw water from ground level tank of maximum 3m depth .Hand pumps should be in accordance with the provisions of IS: 14106-1996 with latest amendment.	1	No			
7	Providing, Supplying, Installation, testing and commissioning of the RO + UF + UV - with water cooler. With all necessary connections and required piping is all inclusive from the Tap point provided - 50 Liters per Hour RO capacity and storage complete. The locations and placing shall be as per the Medical Superintendent of the Hospital.	2	Nos			
8	Excavation, Demolition, making again to actual condition, cutting bores in tanks for the Connection of Pipes, specials, fittings and bib taps etc., and carryout any other necessary work as required for the completion of the work to the satisfaction of the Engineer	1	Job			
SUB PART – A2 – SANITATION						
1	Repair, Modification of existing Indian WC to dual purpose closet suitable for use as squatting pan or European type water closet (Anglo Indian W.C pan) with C.I./M.S. brackets, 15 mm C.P. brass pillar taps, Wash basin size 550x400 mm with a pair of 15 mm C.P.brass taps, with providing fixing superior quality of Rectangular shape mirror of 453x357 mm, Toilet paper holder C.P. Brass, Holding Rails of SS, with Door size of minimum 1.1 M Wide and 2.1 M height and Ventilator of 600 mm X 450 mm of louvered type ,Anti Skid Tiles on floor and upto 1 m height of the wall with all necessary works up to the Inspection Chamber - As per scope of work and specifications - Inside the Patient wards.	4	Nos			

Sr. No	Description of item	Quantity	Unit	Rate in figures (INR)	Rate in Words	Amount (INR)
2	Connecting chamber for pipes before connecting to inlet of ground storage reservoir:- Constructing of masonry Chamber with 75 class designation brick work in cement mortar 1:5 (1 cement :5 fine sand) for sluice valve, with C.I. surface box 100mm top diameter, 160mm bottom diameter and 180mm deep (inside) with chained lid and RCC top slab 1:2:4 mix (1 cement:2 coarse sand: 4 graded stone aggregate 20mm nominal size) necessary excavation foundation concrete 1:5:10 (1 cement: 5 fine sand: 10 graded stone aggregate 40mm nominal size) and inside plastering with cement mortar 1:3 (1 cement: 3 coarse sand) 12mm thick finished with a floating coat of neat cement complete as per standard design.					
2.1	60x60x75 cm. inside	3	Nos			
2.2	120x120x100 cm inside	2	Nos			
3	Excavation, preparation of surface, Providing, laying and jointing Supplying, lowering laying jointing of HDPE pipe conforming to ISO 4427 of 1996, manufactured from virgin resin of PE-80 food grade compounded raw material having blue color only with quality assurance certificate from quality agencies like CIPET(India) / DVGM / KIWA / SPGN / WRC etc. for usage in drinking water system. The cost shall include testing of all materials, labour, all taxes (Central, State and Municipal), inspection charges, transportation to the directed municipal establishment, transit insurance, loading, unloading, stacking etc., complete in all respect and as directed by Engineer In-Charge.					
3.1	90 mm dia. OD pipe PN 10	150	RMT			
3.2	110 mm dia. OD pipe PN 10	60	RMT			
3.3	160 mm dia. OD pipe PN 10	50	RMT			
3.4	250 mm dia. OD pipe PN 10	50	RMT			
3.5	315 mm dia. OD pipe PN 10	30	RMT			
4	Constructing brick masonry manhole in cement mortar 1:4 (1 cement: 4 coarse sand) R.C.C. top slab with 1:2:4 mix (1 cement 2 coarse sand : 4 graded stone aggregate 20mm nominal size), foundation concrete 1:4:8 mix (1 cement : 4 coarse sand: 8 graded stone aggregate 40mm nominal size) inside plastering 12mm thick with cement mortar 1:3 (1 cement : 3 coarse sand) finished with floating coat of neat cement and making channels in cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20mm nominal size) finished with a floating coat of neat cement complete as per standard design:- including C.I. cover with frame (light duty) 455x610mm internal dimensions total weight of cover and frame to be not less than 38kg (weight of cover 23kg and weight of frame 15 kg) - With F.P.S. bricks with class designation 75					
4.1	Inside size 90x80cm and 45cm	12	Nos			
4.2	Inside size 90x80 cm and 60 cm deep	6	Nos			
4.3	Inside size 120x90cm and 90cm deep	3	Nos			
5	Supply, installation, Testing commissioning of FAB / Sq-Mem. Process +UF (Ultra filtration) based ETP plant of 20 KLD/ Cum Day capacity with discharge pipe for treated effluent to nearest drain back of Diagnostic centre. The plant should be complete with making of Bar screen, oil and grease trap, Equalization tank (Air Grid) , Feed Pumps ,Required Media ,tube settler modules\ clari-settler, centrifuge-system , Hypo-dosing tank , Inter connecting	1	Job			

Sr. No	Description of item	Quantity	Unit	Rate in figures (INR)	Rate in Words	Amount (INR)
	pipes , Air Blower Line, Air blowers, Tertiary treatment consisting of Filter feed pumps, Dual Media Filter, Activated carbon filter, Pressure gauges, Air rotameters, Auto-desludging valve, level switches , All electrical as well as Panel compatible with BMS system and all the required accessories/items to complete the plant and make it operational to achieve the outlet parameters of -BOD < 5 , COD < 20 , e-coli - Nil , TSS - Nil , (Including CIVIL WORKS with designing of civil work in scope)					
6	Construction of the 2 Nos of sharps pit and 2 Nos of Bio Medical waste disposal Pit of size 2 M Deep and 1 M diameter and Spaced between 1.5 M from each other by excavating the pit, With Top over Brick work of 6 Inch over pit surface, Supplying and fixing C.I. cover With Frame on brick masonry, Sharps pit to be fitted with RCC NP-2 pipe of 600mm dia and also with GI pipe of 80 mm dia, 0.5 m length for disposal of sharps from top. The Area shall be Covered with the Shed fixed on 4 Nos of the GI Pipes of 4.5 M Pipes embedded 1 M in RCC, with Asbestos cement sheet cover also painting of the same with one coat of anti-corrosive paint and two coats of approved enamel paint. The Area around shall be provided with the concentric fencing and wicket gate opening access for disposal of waste also paver blocks should be laid around the pits for walkways as per direction and attached drawing.	1	Job			
SUB PART A3 – MISC WORKS						
1	Demolishing Cement concrete manually/ by mechanical means and disposal of material within 100 meters lead as per direction of Engineer-in-Charge	18	Cum			
2	Dismantling PVC / C.I. / asbestos / GI / HDPE pipe with fittings and clamps including stacking the material within 100 metres lead and lift etc., complete and as directed by Engineer	200	RMT			
3	Dismantling of flushing cistern of any size including stacking of useful materials near the site and disposal of unserviceable materials within 100 metres lead and lift etc., complete and as directed by Engineer.	5	Nos			
4	Internal walls Paint :- Finishing walls with textured exterior paint "Sandtex Matt" of M/s snowcem India Ltd. Or equivalent of required shade ; Old work (Two or more coats applied @ 3.28 ltr/10 sqm) of the whole hospital	940	Sq.m			
5	Exterior wall:- Finishing walls with textured exterior paint "Sandtex Matt" of M/s snowcem India Ltd. Or equivalent of required shade ; Old work (Two or more coats applied @ 3.28 ltr/10 sqm) of the whole hospital	540	Sq.m			
6	Cement concrete flooring 1:2:4 finished with a floating coat of neat cement including cement slurr, but excluding the cost of nosing of steps etc. complete (Kitchen, Verandah, repair works)	200	Sq.m			
7	Providing and laying Ceramic glazed floor 300x300 mm of 1st quality conforming to IS:13755 of NITCO, ORIENT, SOMANY, KAJARIA, or equivalent make in colours such as White, Ivory laid on 20 mm thick cement mortar 1:4 including pointing the joints with white cement and matching pigment (Wards, Cabins)	550	Sq.m			
8	Providing wood work in frames of doors, windows, clerestory windows and other frames, wrought framed and fixed in position with window panes 4 mm thick	1.4	Cum			

Sr. No	Description of item	Quantity	Unit	Rate in figures (INR)	Rate in Words	Amount (INR)
9	Dismantling of existing roof including ridges, hips valleys and gutters etc. and Providing corrugated G.S. sheet roofing fixed with polymer coated J or L hooks, bolts and nuts 8mm diameter with bitumen and G.I limpet washers or with G.I limpet washers filled with white lead and including a coat of approved steel primer and two coats of approved paint on overlapping of sheets complete excluding the cost of purlin, rafters, trusses. 0.80 mm thick with zinc coating not less than 275gm/m ² and stacking the dismantled material within 50 m lead.	200	Sq.m			
10	Painting of G.S. sheet with synthetic enamel paint of approved brand and manufacture of required colour to give an even shade, two or more coats including coat of approved steel primer	1600	Sq.m			
11	Dismantling of existing ceiling, Providing and fixing insulating board ceiling of approved quality with necessary nails etc. complete. White face insulating board 12mm thick.	800	Sq.m			
12	Repairs to plaster of thickness 12mm to 20 mm in patches of area 2.5 sq m and under including cutting the patch in proper shape and preparing and plastering the surface of the walls complete including disposal of the rubbish to the dumping gourd with 50 m lead. With cement mortar 1:4 (1 cement : 4 fine sand)	600	Sq.m			
13	Proving and fixing Pre-cast drain cover of approved quality in the open drains minimum thickness of 40 mm	1800	Nos			
SUB PART A4 –COMPREHENSIVE Warranty and OPERATION AND MAINTENANCE (Price should be reasonable around 5% to 7% per year; Price should Not be zero and Not to be included in the A1- A3)						
1	Provide adequate and comprehensive training to the staff of District Hospital on operation and maintenance, curative and preventive measures on the entire system of water supply and sanitation facilities.	LS	LS			
2	1st year after One year of DLP /Comprehensive Warranty:- O & M of proposed infrastructure of Rain water harvesting, Water supply pumps, 20 KLD ETP, Sewer Network and Solar Power Supply system inclusive all labor, chemical, spares etc., inclusive of cost. Power supply and water for during the duration of O &M works would be provided by the Hospital.	1	Year			
3	2nd year after One year of DLP /Comprehensive Warranty:- O & M of proposed infrastructure of Rain water harvesting, Water supply pumps, 20 KLD ETP, Sewer Network and Solar Power Supply system inclusive all labor, chemical, spares etc., inclusive of cost. Power supply and water for during the duration of O &M works would be provided by the Hospital.	1	Year			
4	3rd year after One year of DLP /Comprehensive Warranty:- O & M of proposed infrastructure of Rain water harvesting, Water supply pumps, 20 KLD ETP, Sewer Network and Solar Power Supply system inclusive all labor, chemical, spares etc., inclusive of cost. Power supply and water for during the duration of O &M works would be provided by the Hospital.	1	Year			
5	4th year after One year of DLP/Comprehensive Warranty: :- O & M of proposed infrastructure of Rain water harvesting, Water supply pumps, 20 KLD ETP, Sewer Network and Solar Power Supply system inclusive all labor, chemical, spares etc., inclusive of cost. Power supply and water during the duration of O &M works would be provided by the Hospital.	1	Year			
Total Bid Price (in figures)						

Sr. No	Description of item	Quantity	Unit	Rate in figures (INR)	Rate in Words	Amount (INR)
	(in words)					

Lot 1: Part - B: SOLAR PV POWER PLANT-MON DISTRICT HOSPITAL

Sr. No	Description of item	Quantity	Unit	Rate in figures (INR)	Rate in Words	Amount (INR)
SUB PART – B1 – Solar PV Power Plant						
1	Supply, erection, testing and commissioning of Solar PV Hybrid Power Plants of capacity 70 KWp including battery bank of capacity 2000 Ah 240 Volt DC. The battery bank should consist of required numbers of batteries connected in series to form the required battery bank with all complete accessories with necessary training at the site (As per MNRE guidelines)	Kw	70			
2	Supply, Install, Testing and Commissioning of Solar Hot Water System (Evacuated Tube Collector) based on indirect transfer of heat of capacity 1000 LPD (60 Degree Celsius) with PVC cold water tank 1000 ltrs cap along with GI tube hot water insulated line dia 25, 20 & 15 for distribution and cold water GI tubing of line of dia 25 mm including all allied works with complete accessories. (As per MNRE guidelines)	LPD	1000			
3	Supply, Erection, Testing and commissioning of Oil Cool Servo Stabilizer of capacity 150 KVA with complete accessories	Each	1			
4	Supply and install SPV LED based 18 W Solar standalone Street Light with LiFePo4 battery with complete accessories. (As per MNRE guidelines)	Nos	15			
5	Miscellaneous Battery replacement and inverter service of capacity (0.75 KVA to 1.5 KVA) in OT, Emergency, Female Ward, New born care unit (04nos) and repair of portable generator (1 kVA) in OT.	Job	1			
6	Supply and fixing Energy Efficiency LED Bulb 15 Watt for efficient lighting system	Nos	250			
7	Supply and fixing Energy Efficiency LED fitting (T5 type fixture) with Bulb 22 Watt (4 feet) with complete accessories complete for efficient lighting system Power factor > 0.95, Efficiency 90% Working hour 50,000hr. In built power supply Warranty : 2 years 2300 lumens at 22 w tube light module	Nos	150			
8	Supply and fixing Solar surface Pump without battery bank of capacity 1 H.P) DC. (As per MNRE guidelines)	Nos	2			
9	Supply erection & commissioning of a Prefab Building Structure of size 20 X 20 Sq ft with a partition from middle with two doors and a slope roof for Battery bank and store room with an exhaust fan arrangement for ventilation	Job	1			
10	Design, Supply erection & commissioning of Super structure for mounting Solar modules of total area 2000 Sq feet. (Height of the structure above 20 feet from ground). The construction of the	Ton	12			

Sr. No	Description of item	Quantity	Unit	Rate in figures(I NR)	Rate in Words	Amount (INR)
	structure should be discussed with Structural or Civil engineer and should provide the details design and Drawing approved by Engineer in charge					
Sub Part -- B2- Name of work: Proven of new internal wiring for solar power load (base lighting and emergency) at Mon District Hospital						
1	Material and Labour for point wiring, surface type with two run of 1.5 sq mm PVC insulated and unsheathed, multi-stranded copper conductor fire retardant cable 1100 volt grade single core laid in and including PVC casing capping flat pipe of required size (Medium grade) complete with all fittings and accessories fixed to wall/ceiling including PVC board of suitable size for mounting switch/regulator etc and one run if continuous earth wire 1.0 sqmm PVC insulated and unsheathed copper conductor cable and connected to common earth dolly for one light/fan /bell point controlled by one switch.					
	(a) One light /fan/bell point controlled by one 5/6 Amps switch	per point	250			
2	All as per item No-4 here-in-before but 1.5 sqmm copper cable for multi purpose 5/6 Amps socket outlet on independent board.	per point	60			
3	All as per item No-4 here-in-before but 4 sqmm copper cable for multi purpose 5/15 Amps socket outlet on independent board .	Per point	20			
4	Supply and fixing switch piano, flush button single pole one way 5 Amps 240 volts ISI marked complete all as specified and directed.	Each	250			
5	Supply and fixing ceiling rose surface type bakalite 3 terminals complete all as specified and directed.	Each	150			
6	Supply and fixing switch socket combination (ISI marked) 2/3 pin and 5 amps flush type complete.	Each	60			
7	Supply and fixing switch socket combination (ISI marked) 2/3 pin and 15 amps flush type complete.	Each	20			
8	Supply and fixing sheet metal enclosureSPN DB's for mounting MCB of 240 volt, 8 way SPN with 200 Amps rated bus bar in position including copper lugs for cable connection including taking down old one complete all as specified and directed.	Each	12			
9	Supply and fixing sheet metal enclosure TPN DB's for mounting MCB of 240 volt, 16 way TPN with 200 Amps rated bus bar in position including copper lugs for cable connection including taking down old one complete all as specified and directed.	Each	2			
10	Supply and fixing of MCB 6 to 32 Amps SPN, 230 Volt complete all as specified and directed by Engr-in-Charge. Make:Legrand,Cat part No: 603248-54or equivalent	Each	12			
11	Supply and fixing of MCB 6 to 32 amps 230 volt ,SP complete all as specified and directed by Engineer-in-Charge.Make: Legrand,Cat part No:603231-37or equivalent	Each	65			
12	Supply and fixing TPN automatic change over ACCL range of 100 Amps specification as per IEC-60947-6-1. Electric transfer switch that switches the load between Mains,solar and Gen. and limit current at Gen. end with all accessories complete .Make Havells/legrandsor equivalent	Each	1			
13	Material & labour for sub main wiring with two run of PVC insulated multi stranded copper conductor fire retardant cable 4 sqmm size(Nominal area) and one run of PVC insulated unsheathed solid core copper conductor cable 2.5 sqmm size in including PVC casing capping flat pipe of required size complete all as directed.	Rm	450			
14	Material & labour for sub main wiring with two run of PVC insulated multi stranded copper conductor fire retardant cable 6 sqmm size(Nominal area) and one run of PVC insulated unsheathed solid core copper conductor cable 4 sqmm size in including PVC casing	Rm	300			

Sr. No	Description of item	Quantity	Unit	Rate in figures(I NR)	Rate in Words	Amount (INR)
	capping flat pipe of required size complete all as directed.					
15	Material & labour for sub main wiring with two run of PVC insulated multi stranded copper conductor fire retardant cable 10 sqmm size(Nominal area) and one run of PVC insulated unsheathed solid core copper conductor cable 6 sqmm size in including PVC casing capping flat pipe of required size complete all as directed.	Rm	100			
16	Material & labour XLPE insulated heavy duty electric cable with aluminium conductor 1100 volts grade ,cross-sectional area 16 Sqmm, 2 core cable	Rm	200			
17	Material & labour XLPE insulated heavy duty electric cable with aluminium conductor 1100 volts grade ,cross-sectional area 25 Sqmm, 3.5 core cable	Rm	120			
18	Supply and fixing GI Tubes medium Grade 40mm dia with all fitting complete	Rm	30			
19	Supply, install, test and commissioning LT panel board wall mounted/floor mounted suitable size indoor type factory made.Made out of CRCA sheet 16 SWG(1.6 mm) thick, epoxy powdercoated to given a superior finish totally enclosed dust & vermin proof with locking arrangement in separate compartment for each KWH meter with MCBDP Main MCB, bus-bar, copper wiring of suitable size from main MCB to bus -bar, bus-bar to meter, meter to MCBDP to be provided including making connection to existing sub main wiring. The meter(s) metering cabinet should having opening with glass covers for easy visible meter reading including followings. The cabinet should have the cable entry way for incoming/outgoing including writing Bldg/qtr No etc all as specified and directed by Engr- in-charge.. (i) Bus bar chamber with aluminium strip of size 20X5 mm for 3 Phase and neutral - 01 Set. (ii) S & F of MCCB 4 pole 100 Amps, 10KA at 415Volts- 01 Nos (iii)Refixing only temper proof KWH meter single phase 10-40 Amps 2 Nos. (iv) S & F of MCB SP 63 Amps 10 KA "C" series 4 Nos. (v) S & F of existing MCB SP 10 Amps 10 KA" C" series-01	Each	1			
20	Material and Labour for earthing complete with galvanised steel earth plate electrode 60x60x6.3 mm thick, buried directly in ground (earth pit not less then 2.25 metres deep below ground level) with top edge pf the plate not less then 1.5 metres below normal ground level, connected to galvanised earth lead wire 4.0 mm dia by means of bolts, nuts, cheek nuts and washers of galvanised or iron protected by 15 mm bore GI pipe (medium grade) and connected to main switch board as directed including concrete pit in PCC (1:3:6) type C1 precast RCC (1:2:4) type B1 cover slab 40x40 Cm xsCm reinforced with 8 mm dia deformed bar @ 5 cm c/c with one handle for lifting made out of 8 mm dia MS bar, funnel, wire mesh, 20 mm bore GI pipe (medium grade) for watering including charcoal, coke and salt in alternative layers necessary excavation and earth work in any type of soil and testing complete all as shown on electrical plate No-3	Each Set	3			
21	Excavation in trenches in soft/loose soil not exceeding 1.5 mtr deep and not exceeding 1.5 mtr wide and getting out complete all as specified and directed.	Cum	56.25			
22	M & L for sand filling under floors or in foundation including watering and consolidation all as directed by Engr-in-Charge	Cum	20.25			
23	Supply and laying in trenches well burnt bricks, sub class 'B' locally	Each	2172			

Sr. No	Description of item	Quantity	Unit	Rate in figures(I NR)	Rate in Words	Amount (INR)
	available best quality as in cable protection complete all as specified and directed.					
24	Returning and filling in, including spreading, leveling, watering and well ramming in layers not exc 25cm.	Cum	26.07			
25	Removing excavated material n exc 50m and depositing where directed at a level n exc 1.5m above the starting point in rocks.	Cum	30.19			
26	S&F Exhaust fan, noiseless, light weight, sleek, rust proof body and blade of 200 mm sweep, 230V, model : Usha or equivalent including cutting of hole on wall and making good to disturbed surfaces of walls and outer wooden box for fan complete all as specified and directed.	Each	8			
27	Supply and Laying service cable of size 6 sq mm x 2 core stranded conductor ,1100 Volts for light connection of post top lantern complete all as specified and directed .Make-Havells or equivalent of ISI Marked	RM	150			
28	M&L for Post top lantern for garden/Boundary wall suitable for open glass reflector of capacity 1x18 watt pin type with necessary connection & testing complete as directed. Make& model No-160436 BRPTCI 118 Opal‘ D’ type CFL 1 x 18W -Bajaj/phillips or equivalent	Each	25			
29	M&L Post top lantern for main entrance gate light suitable for open glass reflector of capacity 1x MH T 150 watt pin type with necessary connection & testing complete as directed. Make& model No-BJODCI 150 SV Complete ,Cat no-162509 & 162109 MAKE-phillips /Bajaj. (Including MH T 150 Watt Lamp) /or equivalent	EACH	2			
30	M&L for G I Tubing Light grade of size 50 mm dia with all necessary fitting complete as Engr -in -charge .Make-TATA / NTL. or equivalent	RM	25			
31	PCC (1:3:6) type C-2 using 40mm graded aggregate as in foundation for filling in, mass concrete for foundation of pole and repair to paving etc complete all as specified and directed.	Cum	2.50			
32	Supply and fixing Fire Extinguisher 6 Kg Mono Ammonium Phosphate Powder 90, Stored Pressure Type, Pressure Gauge,Gross Weight 9.5 Kg, empty Weight 3.5 Kg, Can Height 486MM, Diameter 160MM, Discharge Time less than 9 Secs, Controllable discharge mechanism, Range minimum 4 Meters, applicable on Class A,B,C and electrically started Fire, A Rating- 21A, B Rating 89B, Can Construction : Deep drawn & CO2 Mig welded, Valve Construction : Forging & Machining, Internal Coating of Can : Epoxy Powder coating, External Coating of Can : Epoxy Polyster Powder coating, Sheet metal thickness : 1.60MM, Helium Leak Detection Tested, ISI and EN Approved, 5 Years Warranty .Make : Ceasefire or equivalent. Note: 1) Warranty Card Handed over the site with installation Report. 2) How to use the extinguisher awareness programme will be give all location	Nos	25.00			
33	Supply & fixing Wall Lights - W 1 x 12 W 230 V Wall spot chrome complete with all accessories.Make :Philips 32047 /or equivalent	Nos	30.00			
34	Supply & fixing Pendant lights Havells Spira Pendant LED with 9 watt lamp complete with all accessories .Make :havells or equivalent	Nos	5.00			
35	Supply & fixing Outdoor Wall lights Up and down light with 12 W	Nos	30.00			

Sr. No	Description of item	Quantity	Unit	Rate in figures(I NR)	Rate in Words	Amount (INR)
	LED lamp complete with all accessories. Make :philips or equivalent					
36	Supply & fixing Ceiling fans -Sweep 1200mm SS390 Ceiling fans - white.Make:Havells or equivalent	Nos	10.00			
37	<p>Supply and installation, foundation, erection, testing and commissioning of the complete lighting system high mast light 15 meters high galvanized Steel mast suitable for 9 lantern symmetrically fitted along with their control gear and having two point suspension systemwith steel wire rope of 6 mm dia and double drum winch complete with all accessories including but not restricted to the following</p> <p>. a) Mast shaft into two section, hot dip galvanised and suitable for wind velocityas per IS 875 part 3.</p> <p>b) Head frame,steel wire rope of min. 6mm dia., double drum winch.</p> <p>c) Galvanised Lantern carriage arrangement suitable for 9 nos. luminaries& its control gearboxes and Lightning finial.</p> <p>d) Integral power tool installedinside base compartment for its operation.</p> <p>e) Supply of foundation bolts manufactured from special steelalong with nuts, washers, anchor plate and templates</p> <p>f) Design, supply and casting of suitable shallow foundationwith M-15 concrete for the High mast considering safe soilbearing capacity at the site.</p> <p>g) Erection/ installation and commissioning of the High Mastsystem comprising of foundation, mast and its accessories, aviation warning lamps, earthing, luminaries, control paneletc. with the help of suitable equipments.</p> <p>h)The luminare and lamp should be make of Philips, Bajaj only</p> <p>Dimension of high mast pole Bottom Dia : 410 mm, Top Dia : 150mm Section- 1 Length : 10500 mm/ Thk- 4 mm Section- 2 Length : 10500 mm/ Thk- 3 mm Base Plate Size : 570 X 25 mm, Supply of Foundation Bolts for the poles. Size : M 24 X 700 mm 10 Nos.(With Template & Anchor plate) Accessories (Broughtout items) for 15.00 Mtr. High Mast : Mast Section with Base Plate, lantern carriage for fixing of Luminaries, foundation.accessories., Head Frame, Double Drum Winch 500 kg Manual Handle , Motor 1.5 HP, SS Wire Rope 6 mm dia, Trailling Cable 5 Core 2.5 sqm, Lighting Arrestor & earthing spikes (MS GI), Control Panel Make : "JJ Deluxe</p>	Each Job	1			
38	Supply and lay, jointing and testing of PVC insulated armoured heavy duty electric cable with aluminum conductor 1100 volt grade cross sectional area 10 sqmm 4 core .	RM	200			
39	Supply and fix LED flood light fitting 150 watt complete with switch gear, control gear unit lamp etc complete with all accessories IP 65 CERTIFIED	Each	9			

Sr. No	Description of item	Quantity	Unit	Rate in figures(INR)	Rate in Words	Amount (INR)
40	Material and labour for LT panel board out door type of size 80 x 45 x 30 cm with two Nos base plates of size 45 x 15 cm and four Nos pedestal made out of 40 x 40 x 5 mm angle iron (3 RM) and locking knobs 2 Nos with two coat of epoxy based paint over one coat of zinc chromate primer , Main switch 63 Amps standard make model FSHF / TPN with HRC fuses -1 No, ML-6 contactor - 01 No, DB TPN 4 way with MCB TPN -01 No MCB SP-12 Nos ,photolytic sensor device - 01 No make L/T , 4 pole terminal - 01 No and toggle switch for by pass connection including internal copper wiring with grouting the unit near FPB/ pole and connecting up electrically , testing and commissioning complete all as directed.	Each Job	1			
41	Supply and fixing trailing cable 6 core 2.5 sqmm copper cable PVC insulated unsheathed cable to connect from junction box to direct light fitting complete testing and commissioning all as specified and directed.	RM	250			
42	M/L earthing complete with galvanised steel earth plate electrode 60x60cmx6.3mm thick buried directly in ground (earth pit not less than 2.25 m deep below ground level) with top edge of the plate not less than 1.5 m below normal ground level connected to galvanised earth lead wire 4mm dia by means of nuts bolts, check nut and washers of galvanised iron protected by 15 mm bore GI pipe (medium grade) and connected to main switch board as directed including concrete pit in PCC (1:3:6) type C1 precast RCC (1:2:4) type B1 cover slab 40x40 Cm x5Cm reinforced with 8 mm dia deformed bar @ 5 cm c/c with one handle for lifting made out of 8 mm dia MS bar, funnel, wire mesh, 20 mm bore GI pipe (medium grade) for watering including charcoal, coke and salt in alternative layers necessary excavation and earth work in any type of soil and testing complete all as shown on electrical plate No-5 Note : 2 for high mast,1 for lighting,1 for power switch.	Each	4			
SUB PART -B3- Equipment supplies and installations						
1	Supply and fixing 1.5 Ton Hybrid Solar Air Conditioner single phase 230 Volts,DC-AC Inverter, Solar Panels & Accessories all complete. Make :Videoconor equivalent Warranty :5 years for Complete System. 25 years for Solar Panels. Performance Specification: Capacity 1.5 Ton, Model No. VSN55.WV2 ,Star Rating - 5, Cooling / Heating BTU/h - 18000, Air Circulation (msq/h) - 900, Refrigerant - R410A, Condenser type - Copper System Specifications: Air Filters Anti Bactria, Vitamin C, Titanium Di-Oxide, Air Flow 4 Way Swing Solar System Specification: Solar Panels 2.5 kW 10 Nos. x 250W, Solar Inverter : 4 kVA Off Grid, Solar Accessories Standard	Job	1			
2	Supply and fixing solar tubular batteries 210 Ah rated @C10 use Tubular Technology and have deep cycle design.Solar batteries to designed with thicker positive plates and 20% more electrolyte to withstand power outage. • Tall Tubular plate battery • 36 Months warranty • Rated Capacity @ C10: 200Ah • Factory charged battery in ready to use condition	Each	4			

Sr. No	Description of item	Quantity	Unit	Rate in figures(I NR)	Rate in Words	Amount (INR)
	• Water level indicators for easy maintenance					
3	Supply and fixing 70 Pint capacity Dehumidifier 5 star rated which Includes Programmable Humidistat, Hose Connector, Auto Shutoff / Restart, Timer, Casters & Washable Air Filter. Dehumidification Rate: 70, CFM Room Circulation: 177 CFM air circulation Safety Certification: UL (SA11089)/CSA (245337) Make :Ivation/Frigidaire or equivalent	Each	4			
4	Supply & fixing Humidity Monitor with Indoor Thermometer, Digital Hygrometer and Humidity Gauge Indicator complete with Indoor thermometer displays temperature in Fahrenheit or Celsius, Humidity gauge shows the comfort level of your home, based on current humidity level, Track conditions throughout the day with the high and low records to ensure a healthy home. Make :AcuRite 00613or equivalent	Each	4			
SUB PART -B4-COMPREHENSIVE Warranty and OPERATION AND MAINTENANCE (Price should be reasonable around 5% to 7% per year; Price should Not be zero and Not to be included in the B1- B3Provide adequate compressive training to the staff of district hospital on operation and maintenance, curatives and preventives measures on the entire system of Solar PV Plant						
1	1st year after One year of DLP /Comprehensive Warranty:- Annual Maintenance Services for Solar PV Hybrid Power Plants ,Solar water heater, Servo stabilizer, Solar surface pump and Solar street light after Defect liability period of 365 days District Hospital , Mon Note: Unit prices should be inclusive of all supply, fixing & Installation and cost of AMC services/labour.		Year			
2	2st year after One year of DLP /Comprehensive Warranty:- Annual Maintenance Services for Solar PV Hybrid Power Plants ,Solar water heater, Servo stabilizer, Solar surface pump and Solar street light after Defect liability period of 365 days District Hospital , Mon Note: Unit prices should be inclusive of all supply, fixing & Installation and cost of AMC services/labour.					
3	3st year after One year of DLP /Comprehensive Warranty:- Annual Maintenance Services for Solar PV Hybrid Power Plants ,Solar water heater, Servo stabilizer, Solar surface pump and Solar street light after Defect liability period of 365 days District Hospital , Mon Note: Unit prices should be inclusive of all supply, fixing & Installation and cost of AMC services/labour.					
4	4st year after One year of DLP /Comprehensive Warranty:- Annual Maintenance Services for Solar PV Hybrid Power Plants ,Solar water heater, Servo stabilizer, Solar surface pump and Solar street light after Defect liability period of 365 days District Hospital , Mon Note: Unit prices should be inclusive of all supply, fixing & Installation and cost of AMC services/labour.					
	Total Bid Price (in figures)					
	(in words)					

Lot 2: Wokha District Hosptial

Sub Group	Description	Amount in Rs	Amount in Words
A1	Water supply system including 1 year defects liability period and comprehensive warranty.		
A2	Sanitation including 1 year defects liability period and comprehensive warranty.		
A3	Misc works including 1 year defects liability period and comprehensive warranty.		
A4	After 1 year defects liability period and comprehensive warranty, Price for 4 Years of Comprehensive warranty (Parts/Labour/Onsite) for Goods Equipment used for works prescribed in the BoQ and operation and maintenance for Works.	Price should be reasonable around 5% to 7% per year; Price should not be zero and included in the A1- A3.	
Part A Total			

PART B	Description	Amount in Rs	Amount in Words
B1	Solar pv power plant including 1 year defects liability period and comprehensive warranty.		
B2	Provision of new internal wiring for solar power load (base lightening and emergency) including 1 year defects liability period and comprehensive warranty.		
B3	Equipment Supplies and Installation including 1 year defects liability period and comprehensive warranty.		
B4	After 1 year defects liability period and comprehensive warranty Price for 4 Years of Comprehensive warranty (Parts/Labour/Onsite) for Goods Equipment used for works prescribed in the BoQ and operation and maintenance for Works.	Price should be reasonable around 5% to 7% per year; Price should not be zero and included in the B1- B3.	
Part B Total			

Note:

1. *Item for which no rate or price has been entered in will not be paid for by the Employer when executed and shall be deemed covered by the other rates and prices in the Bill of Quantities (refer:ITB Clause 14.2 and GCC Clause 41.3)*
2. *Unit rates and prices shall be quoted by the bidder in Indian Rupees [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 as explained in [ITB Clause 31.1(a)].*
4. *Where there is a discrepancy between the rate in figures and words, the rates in words will govern.[ITB Clause 31.1(c)]*

Note : ** All prices should be inclusive of all taxes and transportation cost*

** Any discount offer should be stated clearly to ascertain the final bid price.*

** Kindly provide spare part list with unit price in case of Solar*

Lot 2: Part A :WOKHA DISTRICT HOSPITAL

Sr. No	Description of item	Quantity	Unit	Rate in figures(INR)	Rate in Words	Amount (INR)
SUB PART – A1 – WATER SUPPLY SYSTEM						
1	<p>Ground Service Reservoir / Underground Tank: Designing (aesthetically), and constructing RCC ground service reservoirs / RCC sumps in M-300 mix. of required capacity including excavation in all types of strata, foundation concrete, container walls, bottom slab top RCC roof slab / or dome, 20 mm thick cement plaster with water proofing compound in CM 1:3 proportion. to inside face of the container, including epoxy paint from inside including refilling and disposing of surplus stuff within lead of 50 M, all labour and material charges, for laying and jointing of pipe assembly for inlet, outlet washout, over flow and bye-pass arrangement consisting of HDPE / GI pipes, specials and valves of given diameters, Opening for the Outlet pipe for the Centrifugal Pumps / Submersible pumps. providing and fixing accessories such as M.S. ladder inside and outside, C.I. Manhole frame and cover, at top slab, B.B. masonry chamber for all valves, ventilating shafts, including giving satisfactory hydraulic test and water tightness test as per IS code and providing three coat of cement paints to all expose surface of structure including roof surface etc. complete as per design data, criteria, obligatory requirements and detailed specifications. Anti-termite treatment shall be given for underground portion of the structure.</p> <p>Design and Condition for Construction for RCC Tank</p> <ol style="list-style-type: none"> 1. The designing shall be in accordance with various relevant I.S. specification (I.S. 456/2000, I.S. 875- 1987, I.S. 3370-1965 or revised. 2. Only M.S bars grade I confirming to I.S. 432 Part-I or high yield strength deformed bars confirming to I.S. 1786 or I.S. 1139 shall be used grade II M.S. bars shall not be used 3) Entire structure shall be in M-300 only 4) The job includes designing the structure for uplift pressure and dewatering if require during entire execution and disposal of surplus excavated stuff with in lead of 100 Meters as directed by Engineer-in-charge. 5) Location of Tank shall be decided based on availability of space and in consultation with Health Centre Management Committee or as directed by engineer. <p style="text-align: center;">OR</p> <p>Ground Service Reservoir / Underground Tank: Construction Ferrocement tank of capacity as defined below litres with Earth work excavation for foundation, disposal of soil with all lead and lifts including shoring strutting barricading danger lighting at the site. Leveling course of concrete (1:3:6) shall be provided. Necessary centering and scaffolding shall be made mortar shall be of 0.5:1 or according to the design. The Chicken or woven mesh shall be minimum of 3 layers. The mesh shall be tied to skeletal Steel bars of yield strength 415 Mpa. Manhole cover with frame of Cast Iron shall be provided and fitted with necessary clamps to the top slab of the tank. Proper mounting arrangement shall be made on the top slab shall be made for fixing of the hand pump. Location of Tank shall be decided based on availability of space and in consultation with Health Centre Management Committee or as directed by engineer. The tank shall be subjected to test for water tightness for 48 hours. The work shall be complete as per the specification and as directed by the Engineer in-</p>					

Sr. No	Description of item	Quantity	Unit	Rate in figures(INR)	Rate in Words	Amount (INR)
	charge					
1.1	25000 Liter	1	No			
2	Polyurethane Tank on Buildings: Providing and placing on terrace (at all floor levels) polyethylene water storage tank, ISI: 12701 marked, with cover and suitable locking arrangement and making necessary holes for inlet, outlet and overflow pipes. Minimum of 1:3:6 Grade of concrete shall be provided for leveling course. Masonry foundation shall be provided in Cement mortar of 1:4. The brick masonry plat form shall be built in Cement mortar 1:4. The position and orientation of the tank shall be done on the site condition and in consultation with Health Centre Management Committee. The work shall be carried out complete as per the specification and the direction of Engineer in charge					
	1500 Liter Capacity	3	No			
	500 Liter Capacity on Raised Platform for Solar Water works on OPD Building	1	No			
3	Construction of roof water harvesting system: Providing and erecting roof water system, modification, diversion of existing for to collect the rain water falling on the roof from all the sides of the roof, including PVC Drain Pipe of 110mm PN-4, necessary elbows, bends, Tee, couplers, Angular clamps, fasteners etc, PVC down pipes to carry water to storage tank, first flush PVC pipe to drain off first rains with Tee & valve and wall mounted mesh type filter unit to be located suitably on the downpipe leading to elevated water tank. The gutters, filters and necessary specials shall be suitable fastened. The minimum size of down water pipe shall be 110 mm. Inlet screen (#20 wire mesh) to prevent entry of dry leaves and other debris into the down pipe should be fitted. The Work includes providing inlet pipe to convey the water from the catchment area to the existing Ground level tank with all necessary specials such as tee bends elbows fasteners clamps etc complete. The work also includes overflow from tanks to connected with the ground service reservoir of 25000 Liter near Bore well as per item No -1. The over flow from the 25000 liter diverted to ground water recharge tank connecting with the tube well. The works also includes brick masonry / RCC chamber for connecting the overflow pipes at various existing and proposed ground storage tanks. The work shall be carried out as per the direction of Engineer in charge. All pipes shall be of PN-4 class and Specials shall be of PN-6. The ground overflow pipes, Connecting pipes shall be HDPE Pipes of Water Quality.	1	Job			
3.A	CONNECTING PIPES AND INLET OUTLET PIPES FOR TANKS :- Excavation, laying on Ground with Supplying, lowering laying jointing of HDPE Pipe Conforming to ISO 4427 of 1996, manufactured from virgin resin of PE-80 food grade compounded raw material having blue colour only with quality assurance certificate from quality agencies like CIPET(India) / DVGM / KIWA / SPGN / WRC etc. for usage in drinking water system. The cost shall include testing of all materials, labour, all taxes (Central, State and Municipal), inspection charges, transportation to the directed municipal establishment, transit insurance, loading, unloading, stacking etc complete in all respect and as directed by Engineer In-Charge.					
3.A.1	90 mm dia. OD pipe PN 10	75	RMT			
3.A.2	110 mm dia. OD pipe PN 10	50	RMT			

Sr. No	Description of item	Quantity	Unit	Rate in figures(INR)	Rate in Words	Amount (INR)
3.A.3	160 mm dia. OD pipe PN 10	60	RMT			
3.A.4	250 mm dia. OD pipe PN 10	60	RMT			
3.A.5	315 mm dia. OD pipe PN 10	50	RMT			
4	Construction of the Ground water Recharge : Design, construction of Ground recharge Tank which includes Boring/drilling bore well of 300 mm dia., for casing /strainer, supply, installation of pipe unplasticized PVC medium well casing (CM) pipe of required dia., conforming to IS 12818. The works also includes Supplying , filling , spreading & leveling stone boulders of size range 5 cm to 20 cm, size range 5 mm to 10 mm and size range 1mm to 2 mm in recharge pit ,in required thickness for all leads & lifts and complete as per direction of engineer and approved drawings. The work also involves design, construction of the RCC tank of 15 Min peak rainfall of capacity of 12500 Liter the recharge tank is providing the depth of tank 2.5 Meter with 0.5 M freeboard the diameter of the tank is 2.5 M diameter connected with the overflow pipe from 25000 New GSR. The works also includes Supply pea-gravel of approved quality in stacks and then packing the same into the annular space between the tube well assembly and bore hole.	1	Job			
5	Providing and fixing G. I. pipes complete with G. I. fittings including trenching and refilling and providing and fixing clamps, including cutting and making good the walls etc. etc. Of various sizes from 15 mm to 65 mm for Hospital Plumbing works from Roof top tanks from OPD Building and Admin Building. The works includes necessary cutting, jointing with existing plumbing, dismantling of existing Piping of GI / PVC/ HDPE etc., The works also includes necessary bib cocks, taps etc., complete as per Directions of the engineer.					
5.1	15 mm dia., Nominal Bore	250	RMT			
5.2	20 mm dia., Nominal Bore	80	RMT			
5.3	25 mm dia., Nominal Bore	140	RMT			
5.4	32 mm dia., Nominal Bore	100	RMT			
5.5	40 mm dia., Nominal Bore	75	RMT			
5.6	50 mm dia., Nominal Bore	70	RMT			
5.7	65 mm dia., Nominal Bore	100	RMT			
6	Providing and fixing C.I. sluice valves (with cap) complete with bolts, nuts. rubber insertions etc., with flanges pieces etc., including for various sizes connecting the outlets / Overflow of the ground rain water storage tank / ground service reservoirs.	1	Job			
7	Submersible Pump / Horizontal Split case / Centrifugal Pumps: Providing and erection of Horizontal Submersible Pump set including lowering laying of riser pipe, fixing of Non return Valve on delivery side with required accessories with suitable motor of single phase 240v , 50Hz,2900 rpm, starter and cable including testing etc complete with required accessories The pump duty conditions are 2.8 lps and 14m head. The pump should be installed on the Ground Service Reservoir of 25000 Liter for lifting water to the OPD Building and Admin Building Roof water tanks. The configuration shall be 1 working and 1 Standby. The work includes supply of the control panel / starter panels with required cabling etc., Complete. If submersible pumps are used the pumps shall be provided with the guiderails and lifting chains etc.,	2	No			
8	Direct Action Hand Pump: Providing and Erection of hand pump(Tara type /equivalent) shall be provided with riser pipe of uPVC 50mm	1	No			

Sr. No	Description of item	Quantity	Unit	Rate in figures(INR)	Rate in Words	Amount (INR)
	diameter to draw water from ground level tank of maximum 3m depth .Hand pumps should be in accordance with the provisions of IS: 14106-1996 with latest amendment.					
9	Providing, Supplying, Installation, testing and commissioning of the RO + UF + UV - with water cooler. With all necessary connections and required piping is all inclusive from the Tap point provided - 50 Liters per Hour RO capacity and storage complete. The locations and placing shall be as per the Medical Superintendent of the Hospital.	2	No			
10	Excavation, Demolition, making again to actual condition, cutting bores in tanks for the Connection of Pipes, specials, fittings and bib taps etc., and carryout any other necessary work as required for the completion of the work to the satisfaction of the Engineer	1	Job			
SUB PART – A2 – SANITATION						
1	Construction of new toilet of size of 2.5 X 1. 5 M and 3.2 M high with dual purpose closet suitable for use as squatting pan or European type water closet (Anglo Indian W.C pan) with C.I./M.S. brackets, 15 mm C.P. brass pillar taps, Wash basin size 550x400 mm with a pair of 15 mm C.P.brass taps, with providing fixing superior quality of Rectangular shape mirror of 453x357 mm, Toilet paper holderC.P. Brass, Holding Rails of SS, with ISI marked flush doors shutter Door size of minimum 1.1 M Wide and 2.1 M height and Ventilator of 600 mm X 450 mm of louvered type, Anti Skid Tiles on floor and upto 1 m height of the wall with all necessary works up to the Inspection Chamber- As per scope of work and Specifications and as directed by Engineer	5	Nos			
2	Providing and fixing wash basin with C.I./M.S. brackets, 15 mm C.P. brass pillar traps, Kingston/Gem Techno/Parko, 32mm C.P. brass waste of standard pattern, including painting of fittings and brackets, cutting and making good the walls wherever require: Surgeon type wash basin 660x460 mm with a pair of 15 mm C.P. brass pillar taps with elbow operated levers ISI mark.	4	Nos			
3	Repair, Modification of existing Indian WC to dual purpose closet suitable for use as squatting pan or European type water closet (Anglo Indian W.C pan) with C.I./M.S. brackets, 15 mm C.P. brass pillar taps, Wash basin size 550x400 mm with a pair of 15 mm C.P.brass taps, with providing fixing superior quality of Rectangular shape mirror of 453x357 mm, Toilet paper holderC.P. Brass, Holding Rails of SS, with ISI marked flush Door size of minimum 1.1 M Wide and 2.1 M height and Ventilator of 600 mm X 450 mm of louvered type ,Anti Skid Tiles on floor and upto 1 m height of the wall with all necessary works up to the Inspection Chamber - As per scope of work and specifications - Inside the Patient wards.	4	Nos			
4	Repair, Modification of existing Indian WC for Visitors near OPD building with repair, painting of walls, Laying of Pipes from Urinals to the Nearest Inspection chamber etc., complete - As per scope of work and specifications and as directed by Engineer	2	Nos			
5	Constructing Inspection Chamber of masonry Chamber 50x50x45 cm. inside with 75 class designation brick work in cement mortar 1:5 (1 cement :5 fine sand) including providing fixing of inlet , outlet pipes with RCC top slab 1:2:4 mix (1 cement :2 coarse sand : 4 graded stone aggregate 20mm nominal size) necessary excavation foundation concrete 1:5:10 (1 cement :5 fine sand:10 graded stone aggregate 40 mm nominal size) and inside plastering with cement mortar 1:3 (1 cement :3 coarse sand) 12 mm thick finished with a floating coat of neat					

Sr. No	Description of item	Quantity	Unit	Rate in figures(INR)	Rate in Words	Amount (INR)
	cement complete as per standard design.					
5.1	50x50x45 cm. inside	10	Nos			
6	Excavation, preparation of surface, Providing, laying and jointing Supplying, lowering laying jointing of HDPE / Polyethylene (PE) pipes for non pressure underground drainage and sewerage with smooth internal and corrugated (profiled) external surface with Anti rodent property confirming to ISO-21138-3:2007 with necessary jointing material like mechanical connector i.e. thread/ insert joint/ quick release coupler/compression fitting joint/ or flanged joint with quality assurance certificate from quality agencies like CIPET(India) / DVGW / KIWA / SPGN / WRC etc. for usage in drinking water system. The cost shall include testing of all materials, labour, all taxes (Central, State and Municipal), inspection charges, transportation to the directed municipal establishment, transit insurance, loading, unloading, stacking etc., complete in all respect and as directed by Engineer In-Charge.					
6.1	90 mm dia. OD pipe	150	RMT			
6.2	110 mm dia. OD pipe	100	RMT			
6.3	160 mm dia. OD pipe	100	RMT			
6.4	250 mm dia. OD pipe	75	RMT			
6.5	315 mm dia. OD pipe	50	RMT			
7	Constructing brick masonry manhole in cement mortar 1:4 (1 cement: 4 coarse sand) R.C.C. top slab with 1:2:4 mix (1 cement 2 coarse sand : 4 graded stone aggregate 20mm nominal size), foundation concrete 1:4:8 mix (1 cement : 4 coarse sand: 8 graded stone aggregate 40mm nominal size) inside plastering 12mm thick with cement mortar 1:3 (1 cement : 3 coarse sand) finished with floating coat of neat cement and making channels in cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20mm nominal size) finished with a floating coat of neat cement complete as per standard design:- including C.I. cover with frame (light duty) 455x610mm internal dimensions total weight of cover and frame to be not less than 38kg (weight of cover 23kg and weight of frame 15 kg) - With F.P.S. bricks with class designation 75					
7.1	Inside size 90x80cm and 45cm	10	Nos			
7.2	Inside size 90x80 cm and 60 cm deep	5	Nos			
7.3	Inside size 120x90cm and 90cm deep	2	Nos			
8	Supply ,installation, Testing commissioning of FAB / Sq-Mem. Process +UF (Ultra filtration) based ETP plant of 20 KLD/ Cum Day capacity . The plant should be complete with making of Bar screen, oil and grease trap, Equalization tank (Air Grid) , Feed Pumps ,Required Media ,tube settler modules\ clari-settler, centrifuge-system , Hypo-dosing tank , Inter connecting pipes , Air Blower Line, Air blowers, Tertiary treatment consisting of Filter feed pumps, Dual Media Filter, Activated carbon filter, Pressure gauges, Air rotameters, Auto-desludging valve, level switches , All electricals as well as Panel compatible with BMS system and all the required accessories/items to complete the plant and make it operational to achieve the outlet parameters of -BOD < 5 , COD < 20 , e-coli - Nil , TSS - Nil , (Including CIVIL WORKS with designing of civil work in scope)	1	Job			
9	Construction of the 2 Nos of sharps pit and 2 Nos of Bio Medical waste disposal Pit of size 2 M Deep and 1 M diameter and Spaced between 1.5 M from each other by excavating the pit, With Top over Brick work of 6 Inch over pit surface, Supplying and fixing C.I. cover With Frame on	1	Job			

Sr. No	Description of item	Quantity	Unit	Rate in figures(INR)	Rate in Words	Amount (INR)
	brick masonry, Sharps pit to be fitted with RCC NP-2 pipe of 600mm dia and also with GI pipe of 80 mm dia, 0.5 m length for disposal of sharps from top. The Area shall be Covered with the Shed fixed on 4 Nos of the GI Pipes of 4.5 M Pipes embedded 1 M in RCC, with Asbestos cement sheet cover. The Area of shall be around shall be provided with the concentric fencing and opening for access for disposal of waste also the paver blocks should be laid around the pits for walkways as per direction and attached drawing.					
SUB PART-- A3 – MISC WORKS						
1	Construction of walkway in the hospital 2m wide providing 40 mm thick 20 mm nominal size stone aggregate cement flooring pavement 1:2:4 finished with a floating coat of neat cement also providing and fixing glass strip in joints of cement concrete pavement 40 mm wide and 4 mm thick. Work also includes providing 100 mm thick soiling with approved quality of stone including carriage, watering, ramming and consolidation complete as per the direction of Engineer In charge.	900	Sq.M			
2	Demolishing Cement concrete manually/ by mechanical means and disposal of material within 100 meters lead as per direction of Engineer-in-Charge	27	Cum			
3	Dismantling PVC / C.I. / asbestos / GI / HDPE pipe with fittings and clamps including stacking the material within 100 metres lead and lift etc., complete and as directed by Engineer	200	RMT			
4	Dismantling of flushing cistern of any size including stacking of useful materials near the site and disposal of unserviceable materials within 100 metres lead and lift etc., complete and as directed by Engineer.	5	Nos			
5	Internal walls Paint :- Finishing walls with textured exterior paint "Sandtex Matt" of M/s snowcem India Ltd. Or equivalent of required shade ; Old work (Two or more coats applied @ 3.28 ltr/10 sqm) of the whole hospital	5812	Sq.m			
6	Exterior wall:- Finishing walls with textured exterior paint "Sandtex Matt" of M/s snowcem India Ltd. Or equivalent of required shade ; Old work (Two or more coats applied @ 3.28 ltr/10 sqm) of the whole hospital	3526	Sq.m			
7	Cement concrete flooring 1:2:4 finished with a floating coat of neat cement including cement slurr, but excluding the cost of nosing of steps etc. complete (Kitchen, Verandah, repair works)	590	Sq.m			
8	Providing and laying Ceramic glazed floor 300x300 mm of 1st quality conforming to IS:13755 of NITCO, ORIENT, SOMANY, KAJARIA, or equivalent make in colours such as White, Ivory laid on 20 mm thick cement mortar 1:4 including pointing the joints with white cement and matching pigment (Wards, Cabins)	1053	Sq.m			
9	Providing wood work in frames of doors, windows, clerestory windows and other frames, wrought framed and fixed in position with window panes 4 mm thick	1.4	Cum			
10	Dismantling of existing roof including ridges, hips valleys and gutters etc. and Providing corrugated G.S. sheet roofing fixed with polymer coated J or L hooks, bolts and nuts 8mm diameter with bitumen and G.I limpet washers or with G.I limpet washers filled with white lead and including a coat of approved steel primer and two coats of approved paint on overlapping of sheets complete excluding the cost of purlin, rafters, trusses. 0.80 mm thick with zinc coating not less than 275gm/m2and stacking the dismantled material within 50 m lead.	1281	Sq.m			
11	Dismantling existing ceiling and Providing fixing insulating board	2315	Sq.m			

Sr. No	Description of item	Quantity	Unit	Rate in figures(INR)	Rate in Words	Amount (INR)
	ceiling of approved quality with necessary nails etc. complete. White face insulating board 12mm thick.					
12	Repairs to plaster of thickness 12mm to 20 mm in patches of area 2.5 sq m and under including cutting the patch in proper shape and preparing and plastering the surface of the walls complete including disposal of the rubbish to the dumping gourd with 50 m lead. With cement mortar 1:4 (1 cement : 4 fine sand)	600	Sq.m			
13	Proving and fixing Pre-cast drain cover of approved quality in the open drains dimension 500x400x40 mm (LxBxH)	1800	Nos			
14	Dismantling, demolition of existing ramp in the hospital and disposal of material within 100 m lead as per the direction of Engineer-in -Charge	14	Cum			
15	Construction of RCC Ramp from Emergency to Ward with appropriate elevation with maximum slope of 1:12.	17.5	Cum			
16	Renovation of Existing Kitchen					
17.1	Demolishing Cement concrete manually/ by mechanical means and disposal of material within 50 metres lead as per direction of Engineer-in-Charge	2.80	Cum			
17.2	Construction of Wash Area in Kitchen for Heavy utensils - Raised Platform - Brick work: Providing half brick work in cm 1:4 with well burnt chimney bricks in bulls patent Trench Kiln manufactured by Ghol process, crushing strength not less than 25kg/sqcm and water absorption not more than 20% in super structure.	3.24	Sq.m			
17.3	Cement concrete flooring 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate) finished with a floating coat of neat cement including cement slurry, but excluding the cost of nosing of steps etc. complete.	171.24	Sq.m			
17.4	Construction of Brick Chimney for the Wooden Fire Place	LS				
17.5	Construction of RCC Platform for the Kitchen M-20 Grade - Providing and laying in position machine batched, machine mixed and machine vibrated design mix cement concrete of specified grade for reinforced cement concrete structural elements, excluding the cost of centering, shuttering, finishing and reinforcement. including Admixtures in recommended proportions.(as per IS 9103) to accelerate, retard setting of concrete improve workability without impairing strength and durability as per direction of Engineer-in-charge. - Walls, columns, pillars, posts and struts	13.80	Cum			
17.6	Providing and applying two coat of fire retardant paint FR 881 unthinned on cleaned wood/ ply surface @ 3.5 sqm per litre per coat including preparation of base surface as per recommendation of manufacturer to make the surface fire retardant.	126	Sq.m			
SUB PART--A4 –COMPREHENSIVE Warranty and OPERATION AND MAINTENANCE (Price should Not be Zero and Not to be included in the A1-A3						
1	Provide adequate and comprehensive training to the staff of District Hospital on operation and maintenance, curative and preventive measures on the entire system of water supply and sanitation facilities.	LS	LS			
2	1st year after One year of DLP/Comprehensive Warranty:- O & M of proposed infrastructure of Rain water harvesting, Water supply pumps, 20 KLD ETP, Sewer Network and Solar Power Supply system inclusive all labor, chemical, spares etc., inclusive of cost. Power supply and water for during the duration of O &M works would be provided	1	Year			

Sr. No	Description of item	Quantity	Unit	Rate in figures(INR)	Rate in Words	Amount (INR)
	by the Hospital.					
3	2nd year after One year of DLP/ Comprehensive Warrenty :- O & M of proposed infrastructure of Rain water harvesting, Water supply pumps, 20 KLD ETP, Sewer Network and Solar Power Supply system inclusive all labor, chemical, spares etc., inclusive of cost. Power supply and water for during the duration of O &M works would be provided by the Hospital.	1	Year			
4	3rd year after One year of DLP/ Comprehensive Warrenty :- O & M of proposed infrastructure of Rain water harvesting, Water supply pumps, 20 KLD ETP, Sewer Network and Solar Power Supply system inclusive all labor, chemical, spares etc., inclusive of cost. Power supply and water for during the duration of O &M works would be provided by the Hospital.	1	Year			
5	4th year after One year of DLP/ Comprehensive Warrenty :- O & M of proposed infrastructure of Rain water harvesting, Water supply pumps, 20 KLD ETP, Sewer Network and Solar Power Supply system inclusive all labor, chemical, spares etc., inclusive of cost. Power supply and water during the duration of O &M works would be provided by the Hospital.	1	Year			
	Total Bid Price (in figures)					
	(in words)					

Lot 2: Part - B: SOLAR PV POWER PLANT- WOKHA DISTRICT HOSPITAL

[illegible]

	Material and Labour for point wiring, surface type with two run of 1.5 sq mm PVC insulated and unsheathed, multi-stranded copper conductor fire retardant cable 1100 volt grade single core laid in and including PVC casing capping flat pipe of required size (Medium grade) complete with all fittings and accessories fixed to wall/ceiling including PVC board of suitable size for mounting switch/regulator etc and one run of continuous earth wire 1.0 sqmm PVC insulated and unsheathed copper conductor cable and connected to common earth dolly for one light/fan /bell point controlled by one switch.					
	(a) One light /fan/bell point controlled by one 5/6 Amps switch	per point	300			
2	All as per item No-4 here-in-before but 1.5 sqmm copper cable for multi purpose 5/6 Amps socket outlet on independent board.	per point	90			
3	All as per item No-4 here-in-before but 4 sqmm copper cable for multi purpose 5/15 Amps socket outlet on independent board .	Per point	40			
4	Supply and fixing switch piano, flush button single pole one way 5 Amps 240 volts ISI marked complete all as specified and directed.	Each	300			
5	Supply and fixing ceiling rose surface type bakalite 3 terminals complete all as specified and directed.	Each	150			
6	Supply and fixing switch socket combination (ISI marked) 2/3 pin and 5 amps flush type complete.	Each	90			
7	Supply and fixing switch socket combination (ISI marked) 2/3 pin and 15 amps flush type complete.	Each	40			
8	Supply and fixing sheet metal enclosure SPN DB's for mounting MCB of 240 volt, 8 way SPN with 200 Amps rated bus bar in position including copper lugs for cable connection including taking down old one complete all as specified and directed.	Each	12			
9	Supply and fixing sheet metal enclosure TPN DB's for mounting MCB of 240 volt, 16 way TPN with 200 Amps rated bus bar in position including copper lugs for cable connection including taking down old one complete all as specified and directed.	Each	2			
10	Supply and fixing of MCB 6 to 32 Amps SPN, 230 Volt complete all as specified and directed by Engr-in-Charge. Make:Legrand,Cat part No: 603248-54 or equivalent	Each	12			
11	Supply and fixing of MCB 6 to 32 amps 230 volt ,SP complete all as specified and directed by Engr-in-Charge.Make: Legrand,Cat part No:603231-37 or equivalent	Each	72			
12	Supply and fixing TPN automatic change over ACCL range of 100 Amps specification as per IEC-60947-6-1. Electric transfer switch that switches the load between Mains,solar and Gen. and limit current at Gen. end with all accessories complete .Make Havells/legrand or equivalent	Each	1			
13	Material & labour for sub main wiring with two run of PVC insulated multi stranded copper conductor fire retardant cable 4 sqmm size(Nominal area) and one run of PVC insulated unsheathed solid core copper conductor cable 2.5 sqmm size in including PVC casing capping flat pipe of required size complete all as directed.	Rm	450			
14	Material & labour for sub main wiring with two run of PVC insulated multi stranded copper conductor fire retardant cable 6 sqmm size(Nominal area) and one run of PVC insulated unsheathed solid core copper conductor cable 4 sqmm size in including PVC casing capping flat pipe of required size complete all as directed.	Rm	300			
15	Material & labour for sub main wiring with two run of PVC insulated multi stranded copper conductor fire retardant cable 10 sqmm size(Nominal area) and one run of PVC insulated unsheathed solid core copper conductor cable 6 sqmm size in including PVC casing capping flat pipe of required size complete all as directed.	Rm	100			

16	Material & labour XLPE insulated heavy duty electric cable with aluminum conductor 1100 volts grade ,cross-sectional area 16 Sqmm, 2 core cable	Rm	150			
17	Material & labour XLPE insulated heavy duty electric cable with aluminium conductor 1100 volts grade ,cross-sectional area 25 Sqmm, 3.5 core cable	Rm	120			
18	Supply and fixing GI Tubes medium Grade 40mm dia with all fitting complete	Rm	40			
19	Supply, install, test and commissioning LT panel board wall mounted/floor mounted suitable size indoor type factory made.Made out of CRCA sheet 16 SWG(1.6 mm) thick, epoxy powdercoated to given a superior finish totally enclosed dust & vermin proof with locking arrangement in separate compartment for each KWH meter with MCBDP Main MCB, bus-bar, copper wiring of suitable size from main MCB to bus -bar, bus-bar to meter, meter to MCBDP to be provided including making connection to existing sub main wiring. The meter(s) metering cabinet should having opening with glass covers for easy visible meter reading including followings. The cabinet should have the cable entry way for incoming/outgoing including writing Bldg/qtr No etc all as specified and directed by Engr- in-charge.. (i) Bus bar chamber with aluminum strip of size 20X5 mm for 3 Phase and neutral - 01 Set. (ii) S & F of MCCB 4 pole 100 Amps, 10KA at 415Volts- 01 Nos (iii)Refixing only temper proof KWH meter single phase 10-40 Amps 2 Nos. (iv) S & F of MCB SP 63 Amps 10 KA "C" series 4 Nos. (v) S & F of existing MCB SP 10 Amps 10 KA " C" series-01	Each	1			
20	Material and Labour for earthing complete with galvanised steel earth plate electrode 60x60x6.3 mm thick, buried directly in ground (earth pit not less then 2.25 metres deep below ground level) with top edge of the plate not less then 1.5 metres below normal ground level, connected to galvanised earth lead wire 4.0 mm dia by means of bolts, nuts, cheek nuts and washers of galvanised or iron protected by 15 mm bore GI pipe (medium grade) and connected to main switch board as directed including concrete pit in PCC (1:3:6) type C1 precast RCC (1:2:4) type B1 cover slab 40x40 Cm x5Cm reinforced with 8 mm dia deformed bar @ 5 cm c/c with one handle for lifting made out of 8 mm dia MS bar, funnel, wire mesh, 20 mm bore GI pipe (medium grade) for watering including charcoal, coke and salt in alternative layers necessary excavation and earth work in any type of soil and testing complete all as shown on electrical plate No-3	Each Set	3			
21	Excavation in trenches in soft/loose soil not exceeding 1.5 mtr deep and not exceeding 1.5 mtr wide and getting out complete all as specified and directed.	Cum	56.25			
22	M & L for sand filling under floors or in foundation including watering and consolidation all as directed by Engr-in-Charge	Cum	20.25			
23	Supply and laying in trenches well burnt bricks, sub class 'B' locally available best quality as in cable protection complete all as specified and directed.	Each	2172			
24	Returning and filling in, including spreading, leveling, watering and well ramming in layers not exc 25cm.	Cum	26.07			
25	Removing excavated material n exc 50m and depositing where directed at a level n exc 1.5m above the starting point in rocks.	Cum	30.19			
26	S&F Exhaust fan, noiseless, light weight, sleek, rust proof body and blade of 200 mm sweep, 230V, model : Usha or equivalent including cutting of hole on wall and making good to disturbed surfaces of walls and outer wooden box for fan complete all as specified and directed.	Each	6			

27	Supply and Laying service cable of size 6 sq mm x 2 core stranded conductor ,1100 Volts for light connection of post top lantern complete all as specified and directed .Make-Havells or equivalent of ISI Marked.	RM	150			
28	M&L for Post top lantern for garden/Boundary wall suitable for open glass reflector of capacity 1x18 watt pin type with necessary connection & testing complete as directed. Make& model No- 160436 BRPTCI 118 Opal' D' type CFL 1 x 18W -Bajaj/phillips or equivalent	Each	15			
29	M&L Post top lantern for main entrance gate light suitable for open glass reflector of capacity 1x MH T 150 watt pin type with necessary connection & testing complete as directed. Make& model No-BJODCI 150 SV Complete ,Cat no-162509 & 162109 MAKE-phillips /Bajaj. (Including MH T 150 Watt Lamp)or equivalent	EACH	2			
30	M&L for G I Tubing Light grade of size 50 mm dia with all necessary fitting complete as Engr -in -charge .Make-TATA / NTLor equivalent	RM	15			
31	PCC (1:3:6) type C-2 using 40mm graded aggregate as in foundation for filling in, mass concrete for foundation of pole and repair to paving etc complete all as specified and directed.	Cum	2.00			
32	Supply and fixing Fire Extinguisher 6 Kg Mono Ammonium Phosphate Powder 90, Stored Pressure Type, Pressure Gauge,Gross Weight 9.5 Kg, empty Weight 3.5 Kg, Can Height 486MM, Diameter 160MM, Discharge Time less than 9 Secs, Controllable discharge mechanism, Range minimum 4 Meters, applicable on Class A,B,C and electrically started Fire, A Rating- 21A, B Rating 89B, Can Construction : Deep drawn & CO2 Mig welded, Valve Construction : Forging & Machining, Internal Coating of Can : Epoxy Powder coating, External Coating of Can : Epoxy Polyester Powder coating, Sheet metal thickness : 1.60MM, Helium Leak Detection Tested, ISI and EN Approved, 5 Years Warranty .Make : Ceasefire or equivalent. Note: 1) Warranty Card Handed over the site with installation Report. 2) How to use the extinguisher awareness programme will be give all location	Nos	20.00			
33	Supply & fixing Wall Lights - W 1 x 12 W 230 V Wall spot chrome complete with all accessories.Make :Philips 32047 /or equivalent	Nos	30.00			
34	Supply & fixing Pendant lights Havells Spira Pendant LED with 9 watt lamp complete with all accessories .Make :havells or equivalent	Nos	5.00			
35	Supply & fixing Outdoor Wall lights Up and down light with 12 W LED lamp complete with all accessories. Make :philips or equivalent	Nos	30.00			
36	Supply & fixing Ceiling fans -Sweep 1200mm SS390 Ceiling fans - white.Make:Havells or equivalent	Nos	10.00			

37	<p>Supply and installation, foundation ,erection, testing and commissioning of the complete lighting system high mast light 12 meters high galvanized Steel mast suitable for 9 lantern symmetrically fitted along with their control gear and having two point suspension systemwith steel wire rope of 6 mm dia and double drum winch complete with all accessories including but not restricted to the following</p> <p>. a) Mast shaft into two section, hot dip galvanised and suitable for wind velocity as per IS 875 part 3.</p> <p>b) Head frame, steel wire rope of min. 6mm dia., double drum winch.</p> <p>c) Galvanised Lantern carriage arrangement suitable for 9 nos. luminaries & its control gearboxes and Lightning finial.</p> <p>d) Integral power tool installed inside base compartment for its operation.</p> <p>e) Supply of foundation bolts manufactured from special steel along with nuts, washers, anchor plate and templates</p> <p>f) Design, supply and casting of suitable shallow foundation with M-15 concrete for the High mast considering safe soil bearing capacity at the site.</p> <p>g) Erection/ installation and commissioning of the High Mast system comprising of foundation, mast and its accessories, aviation warning lamps, earthing, luminaries, control panel etc. with the help of suitable equipments.</p> <p>h) The luminaire and lamp should be made of Philips, Bajaj only</p> <p>Dimension of high mast pole</p> <p>Bottom Dia : 410 mm, Top Dia : 150mm</p> <p>Section- 1 Length : 10500 mm/ Thk- 4 mm</p> <p>Section- 2 Length : 10500 mm/ Thk- 3 mm</p> <p>Base Plate Size : 570 X 25 mm,</p> <p>Supply of Foundation Bolts for the poles. Size : M 24 X 700 mm 10 Nos. (With Template & Anchor plate)</p> <p>Accessories (Broughtout items) for 15.00 Mtr. High Mast : Mast Section with Base Plate, lantern carriage for fixing of Luminaries, foundation accessories., Head Frame, Double Drum Winch 500 kg Manual Handle , Motor 1.5 HP, SS Wire Rope 6 mm dia, Trailing Cable 5 Core 2.5 sqm, Lighting Arrestor & earthing spikes (MS GI), Control Panel</p> <p>Make : "JJ Deluxe</p>	Each Job	1			
38	Supply and lay, jointing and testing of PVC insulated armoured heavy duty electric cable with aluminum conductor 1100 volt grade cross sectional area 10 sqmm 4 core .	RM	200			
39	Supply and fix LED flood light fitting 150 watt complete with switch gear, control gear unit lamp etc complete with all accessories IP 65 CERTIFIED	Each	9			
40	Material and labour for LT panel board outdoor type of size 80 x 45 x 30 cm with two Nos base plates of size 45 x 15 cm and four Nos pedestal made out of 40 x 40 x 5 mm angle iron (3 RM) and locking knobs 2 Nos with two coats of epoxy based paint over one coat of zinc chromate primer , Main switch 63 Amps standard make model FSHF / TPN with HRC fuses -1 No, ML-6 contactor - 01 No, DB TPN 4 way with MCB TPN -01 No MCB SP-12 Nos , photolytic sensor device - 01 No make L/T , 4 pole terminal - 01 No and toggle switch for bypass connection including internal copper wiring with grouting the unit near FPB/ pole and connecting up electrically , testing and commissioning complete all as directed.	Each Job	1			

41	Supply and fixing trailing cable 6 core 2.5 sqmm copper cable PVC insulated unsheathed cable to connect from junction box to direct light fitting complete testing and commissioning all as specified and directed.	RM	250			
42	M/L earthing complete with galvanised steel earth plate electrode 60x60cmx6.3mm thick buried directly in ground (earth pit not less than 2.25 m deep below ground level) with top edge of the plate not less than 1.5 m below normal ground level connected to galvanised earth lead wire 4mm dia by means of nuts bolts, check nut and washers of galvanised iron protected by 15 mm bore GI pipe (medium grade) and connected to main switch board as directed including concrete pit in PCC (1:3:6) type C1 precast RCC (1:2:4) type B1 cover slab 40x40 Cm xsCm reinforced with 8 mm dia deformed bar @ 5 cm c/c with one handle for lifting made out of 8 mm dia MS bar, funnel, wire mesh, 20 mm bore GI pipe (medium grade) for watering including charcoal, coke and salt in alternative layers necessary excavation and earth work in any type of soil and testing complete all as shown on electrical plate No-5 Note : 2 for high mast,1 for lighting,1 for power switch	Each	4			
SUB PART - B3- Equipment Supplies and Installation						
1	Supply and fixing 1.5 Ton Hybrid Solar Air Conditioner single phase 230 Volts,DC-AC Inverter, Solar Panels & Accessories all complete. Performance Specification: Capacity 1.5 Ton, ,Star Rating - 5, Cooling / Heating BTU/h - 18000, Air Circulation (msq/h) - 900, Refrigerant - R410A, Condenser type - Copper System Specifications: Air Filters Anti Bactria, Vitamin C, Titanium Di-Oxid, Air Flow 4 Way Swing Solar System Specification: Solar Panels 2.5 kW 10 Nos. x 250W, Solar Inverter : 4 kVA Off Grid, Solar Accessories Standard Warranty :5 years for Complete System. 25 years for Solar Panels. Make : Videocon Model No. VSN55.WV2 or equivalent	Job	1			
2	Supply and fixing solar tubular batteries 200 Ah rated @C10 use Tubular Technology and have deep cycle design.Solar batteries to designed with thicker positive plates and 20% more electrolyte to withstand power outage. • Tall Tubular plate battery • 36 Months warranty • Rated Capacity @ C10: 200Ah • Factory charged battery in ready to use condition • Water level indicators for easy maintenance	Each	4			
3	Supply and fixing 70 Pint capacity Dehumidifier 5 star rated which Includes Programmable Humidistat, Hose Connector, Auto Shutoff / Restart, Timer, Casters & Washable Air Filter. Dehumidification Rate: 70, CFM Room Circulation: 177 CFM air circulation Safety Certification: UL (SA11089)/CSA (245337) Make :Ivation/Frigidaire or equivalent	Each	2			

4	Supply & fixing Humidity Monitor with Indoor Thermometer, Digital Hygrometer and Humidity Gauge Indicator complete with Indoor thermometer displays temperature in Fahrenheit or Celsius, Humidity gauge shows the comfort level of your home, based on current humidity level, Track conditions throughout the day with the high and low records to ensure a healthy home. Make : AcuRite 00613 or equivalent	Each	2			
SUB PART-- B4- COMPREHENSIVE Warrenty and OPERATION AND MAINTENANCE (Price should be reasonable around 5% to 7% per year; Price should not be zero and Not to be include in the B1- B3)						
Provide adequate compressive training to the staff of district hospital on operation and maintenance, curatives and preventives measures on the entire system of Solar PV Plant						
1	1 st year after One year of DLP/ Comprehensive Warrenty:- Annual Maintenance Services for Solar PV Hybrid Power Plants ,Solar water heater, Servo stabilizer, Solar surface pump and Solar street light after Defect liability period of 365 days District Hospital , Wokha Note: Unit prices should be inclusive of all supply, fixing & Installation and cost of AMC services/labour.	4	Year			
2	2 nd year after One year of DLP/ Comprehensive Warrenty:- Annual Maintenance Services for Solar PV Hybrid Power Plants ,Solar water heater, Servo stabilizer, Solar surface pump and Solar street light after Defect liability period of 365 days District Hospital , Wokha Note: Unit prices should be inclusive of all supply, fixing & Installation and cost of AMC services/labour.					
3	3 rd year after One year of DLP/ Comprehensive Warrenty:- Annual Maintenance Services for Solar PV Hybrid Power Plants ,Solar water heater, Servo stabilizer, Solar surface pump and Solar street light after Defect liability period of 365 days District Hospital , Wokha Note: Unit prices should be inclusive of all supply, fixing & Installation and cost of AMC services/labour.					
4	4 th year after One year of DLP/ Comprehensive Warrenty:- Annual Maintenance Services for Solar PV Hybrid Power Plants ,Solar water heater, Servo stabilizer, Solar surface pump and Solar street light after Defect liability period of 365 days District Hospital , Wokha Note: Unit prices should be inclusive of all supply, fixing & Installation and cost of AMC services/labour.					
Total Bid Price (in figures)						
(in words)						

Lot 3: Zunheboto District Hosptial

Sub Group	Description	Amount in Rs	Amount in Words
A1	Water supply systemincluding 1 year defects liability period and comprehensive warranty.		
A2	Sanitationincluding1 year defects liability period and comprehensive warranty.		
A3	Misc worksincluding1 year defects liability period and comprehensive warranty.		
A4	After 1 year defects liability period and comprehensive warranty, Price for 4 Years of Comprehensive warranty (Parts/Labour/Onsite) for Goods Equipment used for works prescribed in the BoQ and operation and maintenance for Works.	Price should be reasonable around 5% to 7% per year; Price should not be zero and included in the A1- A3.	
Part A Total			

PART B	Description	Amount in Rs	Amount in Words
B1	Solar pv power plantincluding1 year defects liability period and comprehensive warranty.		
B2	Provision of new internal wiring for solar power load (base lightening and emergency) including1 year defects liability period and comprehensive warranty.		
B3	Equipment Supplies and Installationincluding1 year defects liability period and comprehensive warranty.		
B4	After 1 year defects liability period and comprehensive warranty Price for 4 Years of Comprehensive warranty (Parts/Labour/Onsite) for Goods Equipment used for works prescribed in the BoQ and operation and maintenance for Works.	Price should be reasonable around 5% to 7% per year; Price should not be zero and included in the B1- B3.	
Part B Total			

Note:

1. *Item for which no rate or price has been entered in will not be paid for by the Employer when executed and shall be deemed covered by the other rates and prices in the Bill of Quantities (refer:ITB Clause 14.2 and GCC Clause 41.3)*
2. *Unit rates and prices shall be quoted by the bidder in Indian Rupees [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 as explained in [ITB Clause 31.1(a)].*
4. *Where there is a discrepancy between the rate in figures and words, the rates in words will govern.[ITB Clause 31.1(c)]*

Note : * *All prices should be inclusive of all taxes and transportation cost*

* *Any discount offer should be stated clearly to ascertain the final bid price.*

* *Kindly provide spare part list with unit price in case of Solar*

LOT 3 :Part A : ZUNHEBOTO DISTRICT HOSPITAL

Sr. No	Description of item	Quantity	Unit	Rate in figures(INR)	Rate in Words	Amount (INR)
SUB PART – A1 – WATER SUPPLY SYSTEM						
1	<p>Ground Service Reservoir / Underground Tank: Designing (aesthetically), and constructing RCC ground service reservoirs / RCC sumps in M-300 mix. of required capacity including excavation in all types of strata, foundation concrete, container walls, bottom slab top RCC roof slab / or dome, 20 mm thick cement plaster with water proofing compound in CM 1:3 proportion. to inside face of the container, including epoxy paint from inside including refilling and disposing of surplus stuff within lead of 50 M, all labour and material charges, for laying and jointing of pipe assembly for inlet, outlet washout, over flow and bye-pass arrangement consisting of HDPE / GI pipes, specials and valves of given diameters, Opening for the Outlet pipe for the Centrifugal Pumps / Submersible pumps. Providing and fixing accessories such as M.S. ladder inside and outside, C.I. Manhole frame and cover, at top slab, B.B. masonry chamber for all valves, ventilating shafts, including giving satisfactory hydraulic test and water tightness test as per IS code and providing three coat of cement paints to all expose surface of structure including roof surface etc. complete as per design data, criteria, obligatory requirements and detailed specifications. Anti-termite treatment shall be given for underground portion of the structure.</p> <p>Design and Condition for Construction for RCC Tank</p> <ol style="list-style-type: none"> 1. The designing shall be in accordance with various relevant I.S. specification (I.S. 456/2000, I.S. 875- 1987, I.S. 3370-1965 or revised. 2. Only M.S bars grade I confirming to I.S. 432 Part-I or high yield strength deformed bars confirming to I.S. 1786 or I.S. 1139 shall be used Grade II M.S. bars shall not be used 3) Entire structure shall be in M-300 only 4) The job includes designing the structure for uplift pressure and dewatering if require during entire execution and disposal of surplus excavated stuff with in lead of 100 Meters as directed by Engineer-in-charge. 5) 6) Location of Tank shall be decided based on availability of space and in consultation with Health Centre Management Committee or as directed by engineer. <p style="text-align: center;">OR</p> <p>Ground Service Reservoir / Underground Tank: Construction Ferrocement tank of capacity as defined below litres with Earth work excavation for foundation, disposal of soil with all lead and lifts including shoring strutting barricading danger lighting at the site. Leveling course of concrete (1:3:6) shall be provided. Necessary centering and scaffolding shall be made mortar shall be of 0.5:1 or according to the design. The Chicken or woven mesh shall be minimum of 3 layers. The mesh shall be tied to skeletal Steel bars of yield strength 415 Mpa. Manhole cover with frame of Cast Iron shall be provided and fitted with necessary clamps to the top slab of the tank. Proper mounting arrangement shall be made on the top slab shall be made for fixing of the hand pump. Location of Tank shall be decided based on availability of space and in consultation with Health Centre Management Committee or as directed by engineer. The tank shall be subjected to test for water tightness for 48 hours. The work shall be complete as per the specification and as directed by the Engineer in-charge</p>					

Sr. No	Description of item	Quantity	Unit	Rate in figures(INR)	Rate in Words	Amount (INR)
1.1	100000 Liter	1	No			
1.2	20000 Liter	1	No			
2	Polyurethane Tank on Buildings: Providing and placing on terrace (at all floor levels) polyethylene water storage tank, ISI : 12701 marked, with cover and suitable locking arrangement and making necessary holes for inlet, outlet and overflow pipes. Minimum of 1:3:6 Grade of concrete shall be provided for leveling course. Masonry foundation shall be provided in Cement mortar of 1:4. The brick masonry plat form shall be built in Cement mortar 1:4. The position and orientation of the tank shall be done on the site condition and in consultation with Health Centre Management Committee. The work shall be carried out complete as per the specification and the direction of Engineer in charge					
	2000 Liter Capacity	1	No			
3	Designing, supplying, installing, testing and commissioning of SPV water pumping system with required accessories as per following – Solar panel with stand, controller, protection, battery based back up, sufficient size and length of cable etc. complete with minimum 2 year warranty- Solar pumps – SPV AC Type Submersible type for pumping water from rain water harvesting tank to elevated tank and from ground reservoir					
	1 HP (900 Wp) – Pumping from Rain water harvesting tank	1	No			
	2 HP (1800 Wp) – Pumping from Ground Service tank	1	No			
4	Construction of roof water harvesting system: Providing and erecting roof water system, modification, diversion of existing for to collect the rain water falling on the roof from all the sides of the roof, including PVC Drain Pipe of 110mm PN-4, necessary elbows, bends, Tee, couplers, Angular clamps, fasteners etc, PVC down pipes to carry water to storage tank, first flush PVC pipe to drain off first rains with Tee & valve and wall mounted mesh type filter unit to be located suitably on the downpipe leading to elevated water tank. The gutters, filters and necessary specials shall be suitable fastened. The minimum size of down water pipe shall be 110 mm. Inlet screen (#20 wire mesh) to prevent entry of dry leaves and other debris into the down pipe should be fitted. The Work includes providing inlet pipe to convey the water from the catchment area to the existing Ground level tank with all necessary specials such as tee bends elbows fasteners clamps etc complete. The over flow from the 100000 liter diverted to ground water recharge tank connecting with the tube well. The works also includes brick masonry / RCC chamber for connecting the overflow pipes at various existing and proposed ground storage tanks. The work shall be carried out as per the direction of Engineer in charge. All pipes shall be of PN-4 class and Specials shall be of PN-6. The ground overflow pipes, Connecting pipes shall be HDPE Pipes of Water Quality.	1	Job			
3.A	CONNECTING PIPES AND INLET OUTLET PIPES FOR TANKS :- Excavation, laying on Ground with Supplying, lowering laying jointing of HDPE Pipe Conforming to ISO 4427 of 1996, manufactured from virgin resin of PE-80 food grade compounded raw material having blue colour only with quality assurance certificate from quality agencies like CIPET(India) / DVGM / KIWA / SPGN / WRC etc. for usage in drinking water system. The cost shall include testing of all materials, labour, all taxes (Central, State and Municipal), inspection charges, transportation to the directed municipal establishment, transit insurance, loading, unloading, stacking etc complete in all respect and as directed by Engineer In-Charge.					
3.A.1	90 mm dia. OD pipe PN 10	75	RMT			
3.A.2	110 mm dia. OD pipe PN 10	50	RMT			

Sr. No	Description of item	Quantity	Unit	Rate in figures(INR)	Rate in Words	Amount (INR)
3.A.3	160 mm dia. OD pipe PN 10	60	RMT			
3.A.4	250 mm dia. OD pipe PN 10	30	RMT			
3.A.5	315 mm dia. OD pipe PN 10	50	RMT			
4	Construction of the Ground water Recharge : Design, construction of Ground recharge Tank which includes Boring/drilling bore well of 300 mm dia., for casing /strainer, supply, installation of pipe unplasticized PVC medium well casing (CM) pipe of required dia., conforming to IS 12818. The works also includes Supplying , filling , spreading & levelling stone boulders of size range 5 cm to 20 cm, size range 5 mm to 10 mm and size range 1mm to 2 mm in recharge pit ,in required thickness for all leads & lifts and complete as per direction of engineer and approved drawings. The work also involves design, construction of the RCC tank of 15 Min peak rainfall of capacity of 12500 Liter the recharge tank is providing the depth of tank 2.5 Meter with 0.5 M freeboard the diameter of the tank is 2.5 M diameter connected with the overflow pipe from 100000 New GSR. The works also includes Supply pea-gravel of approved quality in stacks and then packing the same into the annular space between the tube well assembly and bore hole.	1	Job			
5	Providing and fixing G. I. pipes complete with G. I. fittings including trenching and refilling and providing and fixing clamps, including cutting and making good the walls etc. etc. Of various sizes for Hospital Plumbing works. The works includes necessary cutting, jointing with existing plumbing, dismantling of existing Piping of GI / PVC/ HDPE etc., The works also includes necessary bib cocks, taps etc., complete as per Directions of the engineer.					
5.1	15 mm dia., Nominal Bore	130	RMT			
5.2	20 mm dia., Nominal Bore	70	RMT			
5.3	25 mm dia., Nominal Bore	50	RMT			
6	Providing and fixing C.I. sluice valves (with cap) complete with bolts, nuts. rubber insertions etc., with flanges pieces etc., including for various sizes connecting the outlets / Overflow of the ground rain water storage tank / ground service reservoirs.	1	Job			
7	Direct Action Hand Pump: Providing and Erection of hand pump(Tara type /equivalent) shall be provided with riser pipe of uPVC 50mm diameter to draw water from ground level tank of maximum 3m depth .Hand pumps should be in accordance with the provisions of IS: 14106-1996 with latest amendment.	1	No			
8	Providing, Supplying, Installation, testing and commissioning of the RO + UF + UV - with water cooler. With all necessary connections and required piping is all inclusive from the Tap point provided - 50 Liters per Hour RO capacity and storage complete. The locations and placing shall be as per the Medical Superintendent of the Hospital.	2	Nos			
9	Excavation, Demolition, making again to actual condition, cutting bores in tanks for the Connection of Pipes, specials, fittings and bib taps etc., and carryout any other necessary work as required for the completion of the work to the satisfaction of the Engineer	1	Job			
SUB PART – A2 – SANITATION						
1	Repair, Modification of existing Indian WC to dual purpose closet suitable for use as squatting pan or European type water closet (Anglo Indian W.C pan) with C.I./M.S. brackets, 15 mm C.P. brass pillar taps, Wash basin size 550x400 mm with a pair of 15 mm C.P.brass taps, with providing fixing superior quality of Rectangular shape mirror of 453x357 mm, Toilet paper holderC.P. Brass, Holding Rails of SS, with Door size of minimum 1.1 M	2	Nos			

Sr. No	Description of item	Quantity	Unit	Rate in figures(INR)	Rate in Words	Amount (INR)
	Wide and 2.1 M height and Ventilator of 600 mm X 450 mm of louvered type ,Anti Skid Tiles on floor and upto 1 m height of the wall with all necessary works up to the Inspection Chamber - As per scope of work and specifications - Inside the Patient wards.					
2	Construction of new toilet of size of 2.5 X 1.5 M and 3.2 M high with dual purpose closet suitable for use as squatting pan or European type water closet (Anglo Indian W.C pan) with C.I./M.S. brackets, 15 mm C.P. brass pillar taps, Wash basin size 550x400 mm with a pair of 15 mm C.P.brass taps, with providing fixing superior quality of Rectangular shape mirror of 453x357 mm, Toilet paper holder C.P. Brass, Holding Rails of SS, with ISI marked flush doors shutter Door size of minimum 1.1 M Wide and 2.1 M height and Ventilator of 600 mm X 450 mm of louvered type, Anti Skid Tiles on floor and upto 1 m height of the wall with all necessary works up to the Inspection Chamber- As per scope of work and Specifications and as directed by Engineer	2	Nos			
3	Providing and fixing wash basin with C.I./M.S. brackets, 15 mm C.P. brass pillar traps, Kingston/Gem Techno/Parko, 32mm C.P. brass waste of standard pattern, including painting of fittings and brackets, cutting and making good the walls wherever require: Surgeon type wash basin 660x460 mm with a pair of 15 mm C.P. brass pillar taps with elbow operated levers ISI mark.	4	Nos			
4	Constructing of masonry Chamber 60x60x75 cm. inside with 75 class designation brick work in cement mortar 1:5 (1 cement :5 fine sand) for sluice valve, with C.I. surface box 100mm top diameter, 160mm bottom diameter and 180mm deep (inside) with chained lid and RCC top slab 1:2:4 mix (1 cement:2 coarse sand: 4 graded stone aggregate 20mm nominal size) necessary excavation foundation concrete 1:5:10 (1 cement: 5 fine sand: 10 graded stone aggregate 40mm nominal size) and inside plastering with cement mortar 1:3 (1 cement: 3 coarse sand) 12mm thick finished with a floating coat of neat cement complete as per standard design.					
4.1	60x60x75 cm. inside	2	Nos			
4.2	120x120x100 cm inside	1	No			
5	Excavation, preparation of surface, Providing, laying and jointing Supplying, lowering laying jointing of HDPE / Polyethylene (PE) pipes for non pressure underground drainage and sewerage with smooth internal and corrugated (profiled) external surface with Anti rodent property confirming to ISO-21138-3:2007 with necessary jointing material like mechanical connector i.e. thread/ insert joint/ quick release coupler/compression fitting joint/ or flanged joint with quality assurance certificate from quality agencies like CIPET(India) / DVGM / KIWA / SPGN / WRC etc. for usage in drinking water system. The cost shall include testing of all materials, labour, all taxes (Central, State and Municipal), inspection charges, transportation to the directed municipal establishment, transit insurance, loading, unloading, stacking etc., complete in all respect and as directed by Engineer In-Charge.					
5.1	90 mm dia. OD pipe	150	RMT			
5.2	110 mm dia. OD pipe	100	RMT			
5.3	160 mm dia. OD pipe	100	RMT			
5.4	250 mm dia. OD pipe	75	RMT			
5.5	315 mm dia. OD pipe	50	RMT			
6	Constructing brick masonry manhole in cement mortar 1:4 (1 cement: 4 coarse sand) R.C.C. top slab with 1:2:4 mix (1 cement 2 coarse sand : 4 graded stone aggregate 20mm nominal size), foundation concrete 1:4:8 mix (1 cement : 4 coarse sand: 8 graded stone aggregate 40mm nominal size)					

Sr. No	Description of item	Quantity	Unit	Rate in figures(INR)	Rate in Words	Amount (INR)
	inside plastering 12mm thick with cement mortar 1:3 (1 cement : 3 coarse sand) finished with floating coat of neat cement and making channels in cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20mm nominal size) finished with a floating coat of neat cement complete as per standard design:- including C.I. cover with frame (light duty) 455x610mm internal dimensions total weight of cover and frame to be not less than 38kg (weight of cover 23kg and weight of frame 15 kg) - With F.P.S. bricks with class designation 75					
6.1	Inside size 90x80cm and 45cm	10	Nos			
6.2	Inside size 90x80 cm and 60 cm deep	5	Nos			
6.3	Inside size 120x90cm and 90cm deep	2	Nos			
7	Supply, installation, excavation, testing and commissioning of Plastic/FRP type of Septic Tank for the following facility – Anaerobic PWTS or more					
7.1	OT building – 6000 liter capacity	1	No			
7.2	Labor Room building – 6000 liter capacity	1	No			
7.3	Laboratory building – 3000 liter capacity	1	No			
8	Supply ,installation, Testing commissioning of FAB / Sq-Mem. Process +UF (Ultra filtration) based STP/ ETP plant of 20KLD/ Cu.m Day capacity . The plant should be complete with making of Bar screen, oil and grease trap, Equalization tank (Air Grid) , Feed Pumps ,Required Media ,tube settler modules\ clari-settler, centrifuge-system , Hypo-dosing tank , Inter connecting pipes , Air Blower Line, Air blowers, Tertiary treatment consisting of Filter feed pumps, Dual Media Filter, Activated carbon filter, Pressure gauges, Air rotameters, Auto-desludging valve, level switches , All electricals as well as Panel compatible with BMS system and all the required accessories/items to complete the plant and make it operational to achieve the outlet parameters of -BOD < 5 , COD < 20 , e-coli - Nil , TSS - Nil , (Including CIVIL WORKS with designing of civil work in scope)	1	Job			
9	Construction of the 2 Nos of sharps pit and 2 Nos of Bio Medical waste disposal Pit of size 2 M Deep and 1 M diameter and Spaced between 1.5 M from each other by excavating the pit, With Top over Brick work of 6 Inch over pit surface, Supplying and fixing C.I. cover With Frame on brick masonry, Sharps pit to be fitted with RCC NP-2 pipe of 600mm dia and also with GI pipe of 80 mm dia, 0.5 m length for disposal of sharps from top. The Area shall be Covered with the Shed fixed on 4 Nos of the GI Pipes of 4.5 M Pipes embedded 1 M in RCC, with Asbestos cement sheet cover also painting of the same with one coat of anti-corrosive paint and two coats of approved enamel paint. The Area around shall be provided with the concentric fencing and wicket gate opening access for disposal of waste also paver blocks should be laid around the pits for walkways as per direction and attached drawing.	1	Job			
SUB PART A3 – MISC WORKS						
1	Construction of walkway in the hospital 2m wide providing 40 mm thick 20 mm nominal size stone aggregate cement flooring pavement 1:2:4 finished with a floating coat of neat cement also providing and fixing glass strip in joints of cement concrete pavement 40 mm wide and 4 mm thick. Work also includes providing 100 mm thick soiling with approved quality of stone including carriage, watering, ramming and consolidation complete as per the direction of Engineer In charge.	900	Sq.M			
2	Construction of Brick work (1:4) Cement mortar	30	Sq.M			
3	Demolishing Cement concrete manually/ by mechanical means and disposal	27	Cum			

Sr. No	Description of item	Quantity	Unit	Rate in figures(INR)	Rate in Words	Amount (INR)
	of material within 100 meters lead as per direction of Engineer-in-Charge					
4	Dismantling PVC / C.I. / asbestos / GI / HDPE pipe with fittings and clamps including stacking the material within 100 metres lead and lift etc., complete and as directed by Engineer	200	RMT			
5	Dismantling of Existing Roof structure and GS Sheet in New MS building as directed by Engineer In-charge	80	Sq.M			
6	Dismantling of flushing cistern of any size including stacking of useful materials near the site and disposal of unserviceable materials within 100 metres lead and lift etc., complete and as directed by Engineer.	5	Nos			
7	Providing, fixing and construction of GI barbed wire fencing of height 1.8 m around the sub-station. The fencing to be provided with 2.5 m pole and wicket gate for accessing as per the direction of the Engineer in-charge.	8	Mts			
8	Repair of New OT building by demolition of brick work and fixing of MS structure for supply and erecting of heavy duty exhaust fan 230V AC 50 cycles 450mm, 1400RPM complete as per specification no. FG-FN/EXF also supplying and erecting 22 gauge G.I. sheet metal CAWL sector shaped 25mm x 25mm x 3mm angle iron frame, metal mesh to avoid bird entry with necessary fittings and accessories as per the direction of Engineer In-charge.	10	Nos			
9	Providing, construction and Repair of existing walls in New OT building and MS building:-					
9.1	Cleaning and scrubbing of old paint and putty	1368	Sq.M			
9.2	Epoxy coatings with primer coating	1368	Sq.M			
9.3	External wall painting with waterproof painting	918	Sq.M			
10	Providing and construction of steel work structure in roof for proper ventilation of structure with necessary fittings and accessories in New MS building as per the direction of Engineer In-charge	2192	Kg			
11	Providing and construction of Dyna roofing in New MS building as per the direction of Engineer In-charge	76	Sq.M			
12	Providing and fixing fully openable type side hung M.S. windows or Ventilator as per IS:1038-1983, IS:7452-1990 made out of outer frame weighing 1.42 kg/cm, vertical dividing member weighing 2.28 kg/cm, glazing member weighing 0.88 kg/m, coupling mullion weighing 1.896 kg/m, Guard bar 12 mm square at 125 m c/c, plain / frosted / tinted glass of 4 mm thickness shall be fixed with approved quality putty. Rate should include providing and fixing box hinge MS sliding locking ball, including steel frame fitted with pegs, hinges, stay rods, fastening, holdfasts embedded in cement concrete grade M15, painting with one coat of red oxide zinc chromate primer and two coats of synthetic enamel paint etc. complete as directed by Engineer In Charge.	27	Sq.M			
13	Internal walls Paint :- Finishing walls with textured exterior paint "Sandtex Matt" of M/s snowcem India Ltd. Or equivalent of required shade ; Old work (Two or more coats applied @ 3.28 ltr/10 sqm) of the hospital deducting the above mentioned works	4955	Sq.m			
14	Exterior wall:- Finishing walls with textured exterior paint "Sandtex Matt" of M/s snowcem India Ltd. Or equivalent of required shade ; Old work (Two or more coats applied @ 3.28 ltr/10 sqm) of the hospital deducting the above mentioned works	2820	Sq.m			
15	Cement concrete flooring 1:2:4 finished with a floating coat of neat cement including cement slurry, but excluding the cost of nosing of steps etc. complete (Repair works)	896	Sq.m			
16	Providing and laying Ceramic glazed floor 300x300 mm of 1st quality conforming to IS:13755 of NITCO, ORIENT, SOMANY, KAJARIA, or equivalent make in colours such as White, Ivory laid on 20 mm thick	1053	Sq.m			

Sr. No	Description of item	Quantity	Unit	Rate in figures(INR)	Rate in Words	Amount (INR)
	cement mortar 1:4 including pointing the joints with white cement and matching pigment (Wards, Cabins in old building)					
17	Providing wood work in frames of doors, windows, clerestory windows and other frames, wrought framed and fixed in position with window panes 4 mm thick.	1.4	Cum			
18	Dismantling of existing roof including ridges, hips valleys and gutters etc. and Providing corrugated G.S. sheet roofing fixed with polymer coated J or L hooks, bolts and nuts 8mm diameter with bitumen and G.I limpet washers or with G.I limpet washers filled with white lead and including a coat of approved steel primer and two coats of approved paint on overlapping of sheets complete excluding the cost of purlin, rafters, trusses. 0.80 mm thick with zinc coating not less than 275gm/m ² and stacking the dismantled material within 50 m lead.	960	Sq.m			
19	Painting of G.S. sheet with synthetic enamel paint of approved brand and manufacture of required colour to give an even shade, two or more coats including coat of approved steel primer	2600	Sq.m			
20	Dismantling of existing ceiling, Providing and fixing insulating board ceiling of approved quality with necessary nails etc. complete. White face insulating board 12mm thick.	2760	Sq.m			
21	Repairs to plaster of thickness 12mm to 20 mm in patches of area 2.5 sq m and under including cutting the patch in proper shape and preparing and plastering the surface of the walls complete including disposal of the rubbish to the dumping ground with 50 m lead. With cement mortar 1:4 (1 cement : 4 fine sand)	1200	Sq.m			
22	Providing and fixing Pre-cast drain cover of approved quality in the open drains dimension 500x400x40 mm (LxBxH)	1800	Nos			
23	Renovation of Existing Kitchen					
23.1	Construction of Wash Area in Kitchen for Heavy utensils - Raised Platform - Brick work: Providing half brick work in cm 1:4 with well burnt chimney bricks in bulls patent Trench Kiln manufactured by Ghol process, crushing strength not less than 25kg/sqcm and water absorption not more than 20% in super structure.	3.24	Sq.m			
23.2	Construction of RCC Platform for the Kitchen M-20 Grade - Providing and laying in position machine batched, machine mixed and machine vibrated design mix cement concrete of specified grade for reinforced cement concrete structural elements, excluding the cost of centering, shuttering, finishing and reinforcement. including Admixtures in recommended proportions.(as per IS 9103) to accelerate, retard setting of concrete improve workability without impairing strength and durability as per direction of Engineer-in-charge. - Walls, columns, pillars, posts and struts	3	Cum			
SUB PART -A4 –COMPREHENSIVE Warrenty and OPERATION AND MAINTENANCE (Priced should Not be zero and Not to be included in the A1-A3)						
1	Provide adequate and comprehensive training to the staff of District Hospital on operation and maintenance, curative and preventive measures on the entire system of water supply and sanitation facilities.	LS	LS			
2	1st year after One year of DLP/Comprehensive Warrenty:- O & M of proposed infrastructure of Rain water harvesting, Water supply pumps, 20 KLD ETP, Sewer Network and Solar Power Supply system inclusive all labor, chemical, spares etc., inclusive of cost. Power supply and water for during the duration of O &M works would be provided by the Hospital.	1	Year			
3	2nd year after One year of DLP/Comprehensive Warrenty:- O & M of	1	Year			

Sr. No	Description of item	Quantity	Unit	Rate in figures(INR)	Rate in Words	Amount (INR)
	proposed infrastructure of Rain water harvesting, Water supply pumps, 20 KLD ETP, Sewer Network and Solar Power Supply system inclusive all labor, chemical, spares etc., inclusive of cost. Power supply and water for during the duration of O &M works would be provided by the Hospital.					
4	3rd year after One year of DLP/Comprehensive Warrenty :- O & M of proposed infrastructure of Rain water harvesting, Water supply pumps, 20 KLD ETP, Sewer Network and Solar Power Supply system inclusive all labor, chemical, spares etc., inclusive of cost. Power supply and water for during the duration of O &M works would be provided by the Hospital.	1	Year			
5	4th year after One year of DLP/Comprehensive Warrenty :- O & M of proposed infrastructure of Rain water harvesting, Water supply pumps, 20 KLD ETP, Sewer Network and Solar Power Supply system inclusive all labor, chemical, spares etc., inclusive of cost. Power supply and water during the duration of O &M works would be provided by the Hospital.	1	Year			
	Total Bid Price (in figures)					
	(in words)					

Lot 3: Part - B: SOLAR PV POWER PLANT- ZUNHEBOTO DISTRICT HOSPITAL

Sr. No	Description of item	Quantity	Unit	Rate in figures(INR)	Rate in Words	Amount (INR)
SUB PART -B1- Solar PV Power Plant						
1	Supply, erection, testing and commissioning of Solar PV Hybrid Power Plants of capacity 50 KWp including battery bank of capacity 1500 Ah 240 Volt DC.The battery bank should consists of required numbers of batteries connected in series to form the required battery bank with all complete accessories with necessary training at the site (As per MNRE guidelines)	Kw	50			
2	Supply, Install, Testing and Commissioning of Solar Hot Water System (Evacuated Tube Collector) based on indirect transfer of heat of capacity 500 LPD (60 Degree Celsius) with PVC cold water tank 500 ltrs cap along with GI tube hot water insulated line dia 25,20 & 15 for distribution and cold water GI tubing of line of dia 25 mm including all allied works with complete accessories.(As per MNRE guidelines)	LPD	500			
3	Supply , Erection ,Testing and commissioning of Oil Cool Servo Stabilizer of capacity 100 KVA with complete accessories	Each	1			
4	Supply and install SPV LED based 18 W Solar standalone Street Light with LiFePo4 battery with complete accessories.(As per MNRE guidelines)	Nos	7			
5	Miscellaneous Battery replacement and inverter service of capacity (0.75 KVA to 1.5 KVA) in OT, Emergency, Female Ward, New born care unit (04nos) and repair of portable generator (1 kVA) in OT.	Job	1			
6	Supply and fixing Energy Efficiency LED Bulb 15 Watt for efficient lighting system	Nos	200			
7	Supply and fixing Energy Efficiency LED fitting (T5 type fixture) with Bulb 22 Watt (4 feet) with complete accessories complete for efficient lighting system.Power factor > 0.95, Efficiency90% Working hour 50,000hr. In built power supply Warranty : 2 years 2300 lumens at 22 w tube light module	Nos	100			
8	Supply erection & commissioning of a Prefab Building Structure of size 20 X 20 Sq ft with a partition from middle with two doors and a slope roof for Battery bank and store room with an exhaust fab arrangement for ventilation	Job	1			
9	Design, Supply erection & commissioning of Super structure for mounting Solar modules of total area 2,000 Sq feet.(Height of the structure above 20 feet from ground).The construction of the structure should be discussed with Structural or Civil engineer and should provide all the details ,design and Drawing approved by Engineer in charge	Ton	12			
SUB PART - B2- Name of work: Provision of new internal wiring for solar power load (base lightning and emergency) and old IPD building at Zunheboto District Hospital						
1	Material and Labour for point wiring, surface type with two run of 1.5 sq mm PVC insulated and unsheathed, multi-stranded copper conductor fire retardant cable 1100 volt grade single core laid in and including PVC casing capping flat pipe of required size (Medium grade) complete with all fittings and accessories fixed to wall/ceiling including PVC board of suitable size for mounting switch/regulator etc and one run if continuous earth wire 1.0 sqmm PVC insulated and unsheathed copper conductor cable and connected to common earth dolly for one light/fan /bell point controlled by one switch.					
	(a) One light /fan/bell point controlled by one 5/6 Amps switch	per point	300			
2	All as per item No-4 here-in-before but 1.5 sqmm copper cable for multi purpose 5/6 Amps socket outlet on independent board.	per point	90			

3	All as per item No-4 here-in-before but 4 sqmm copper cable for multi purpose 5/15 Amps socket outlet on independent board .	Per point	40			
4	Supply and fixing switch piano, flush button single pole one way 5 Amps 240 volts ISI marked complete all as specified and directed.	Each	300			
5	Supply and fixing ceiling rose surface type bakalite 3 terminals complete all as specified and directed.	Each	150			
6	Supply and fixing switch socket combination (ISI marked) 2/3 pin and 5 amps flush type complete.	Each	90			
7	Supply and fixing switch socket combination (ISI marked) 2/3 pin and 15 amps flush type complete.	Each	40			
8	Supply and fixing sheet metal enclosureSPN DB's for mounting MCB of 240 volt, 8 way SPN with 200 Amps rated bus bar in position including copper lugs for cable connection including taking down old one complete all as specified and directed.	Each	12			
9	Supply and fixing sheet metal enclosure TPN DB's for mounting MCB of 240 volt, 16 way TPN with 200 Amps rated bus bar in position including copper lugs for cable connection including taking down old one complete all as specified and directed.	Each	2			
10	Supply and fixing of MCB 6 to 32 Amps SPN, 230 Volt complete all as specified and directed by Engr-in-Charge. Make:Legrand,Cat part No: 603248-54 or equivalent	Each	12			
11	Supply and fixing of MCB 6 to 32 amps 230 volt ,SP complete all as specified and directed by Engr-in-Charge.Make: Legrand,Cat part No:603231-37 or equivalent	Each	72			
12	Supply and fixing TPN automatic change over ACCL range of 100 Amps specification as per IEC-60947-6-1. Electric transfer switch that switches the load between Mains,solar and Gen. and limit current at Gen. end with all accessories complete .Make Havells/legrands or equivalent	Each	1			
13	Material & labour for sub main wiring with two run of PVC insulated multi stranded copper conductor fire retardant cable 4 sqmm size(Nominal area) and one run of PVC insulated unsheathed solid core copper conductor cable 2.5 sqmm size in including PVC casing capping flat pipe of required size complete all as directed.	Rm	400			
14	Material & labour for sub main wiring with two run of PVC insulated multi stranded copper conductor fire retardant cable 6 sqmm size(Nominal area) and one run of PVC insulated unsheathed solid core copper conductor cable 4 sqmm size in including PVC casing capping flat pipe of required size complete all as directed.	Rm	250			
15	Material & labour for sub main wiring with two run of PVC insulated multi stranded copper conductor fire retardant cable 10 sqmm size(Nominal area) and one run of PVC insulated unsheathed solid core copper conductor cable 6 sqmm size in including PVC casing capping flat pipe of required size complete all as directed.	Rm	90			
16	Material & labour XLPE insulated heavy duty electric cable with aluminium conductor 1100 volts grade ,cross-sectional area 16 Sqmm, 2 core cable	Rm	120			
17	Material & labour XLPE insulated heavy duty electric cable with aluminium conductor 1100 volts grade ,cross-sectional area 25 Sqmm, 3.5 core cable	Rm	100			
18	Supply and fixing GI Tubes medium Grade 40mm dia with all fitting complete	Rm	20			

19	Supply, install, test and commissioning LT panel board wall mounted/floor mounted suitable size indoor type factory made. Made out of CRCA sheet 16 SWG(1.6 mm) thick, epoxy powdercoated to given a superior finish totally enclosed dust & vermin proof with locking arrangement in separate compartment for each KWH meter with MCBDP Main MCB, bus-bar, copper wiring of suitable size from main MCB to bus -bar, bus-bar to meter, meter to MCBDP to be provided including making connection to existing sub main wiring. The meter(s) metering cabinet should have opening with glass covers for easy visible meter reading including followings. The cabinet should have the cable entry way for incoming/outgoing including writing Bldg/qtr No etc all as specified and directed by Engr- in-charge. (i) Bus bar chamber with aluminium strip of size 20X5 mm for 3 Phase and neutral - 01 Set. (ii) S & F of MCCB 4 pole 100 Amps, 10KA at 415Volts- 01 Nos (iii) Refixing only temper proof KWH meter single phase 10-40 Amps 2 Nos. (iv) S & F of MCB SP 63 Amps 10 KA "C" series 4 Nos. (v) S & F of existing MCB SP 10 Amps 10 KA "C" series-01	Each	1			
20	Material and Labour for earthing complete with galvanised steel earth plate electrode 60x60x6.3 mm thick, buried directly in ground (earth pit not less than 2.25 metres deep below ground level) with top edge of the plate not less than 1.5 metres below normal ground level, connected to galvanised earth lead wire 4.0 mm dia by means of bolts, nuts, cheek nuts and washers of galvanized or iron protected by 15 mm bore GI pipe (medium grade) and connected to main switch board as directed including concrete pit in PCC (1:3:6) type C1 precast RCC (1:2:4) type B1 cover slab 40x40 Cm x 50cm reinforced with 8 mm dia deformed bar @ 5 cm c/c with one handle for lifting made out of 8 mm dia MS bar, funnel, wire mesh, 20 mm bore GI pipe (medium grade) for watering including charcoal, coke and salt in alternative layers necessary excavation and earth work in any type of soil and testing complete all as shown on electrical plate No-3	Each Set	3			
21	Excavation in trenches in soft/loose soil not exceeding 1.5 mtr deep and not exceeding 1.5 mtr wide and getting out complete all as specified and directed.	Cum	56.25			
22	M & L for sand filling under floors or in foundation including watering and consolidation all as directed by Engr-in-Charge	Cum	20.25			
23	Supply and laying in trenches well burnt bricks, sub class 'B' locally available best quality as in cable protection complete all as specified and directed.	Each	2172			
24	Returning and filling in, including spreading, leveling, watering and well ramming in layers not exc 25cm.	Cum	26.07			
25	Removing excavated material n exc 50m and depositing where directed at a level n exc 1.5m above the starting point in rocks.	Cum	30.19			
26	S&F Exhaust fan, noiseless, light weight, sleek, rust proof body and blade of 200 mm sweep, 230V, model : Usha or equivalent including cutting of hole on wall and making good to disturbed surfaces of walls and outer wooden box for fan complete all as specified and directed.	Each	6			
27	Supply and Laying service cable of size 6 sq mm x 2 core stranded conductor ,1100 Volts for light connection of post top lantern complete all as specified and directed .Make-Havells or equivalent of ISI Marked.	RM	120			
28	M&L for Post top lantern for garden/Boundary wall suitable for open glass reflector of capacity 1x18 watt pin type with necessary connection & testing complete as directed. Make& model No- 160436 BRPTCI 118 Opal 'D' type CFL 1 x 18W -Bajaj/phillips . or equivalent	Each	15			

29	M&L Post top lantern for main entrance gate light suitable for open glass reflector of capacity 1x MH T 150 watt pin type with necessary connection & testing complete as directed. Make& model No-BJODCI 150 SV Complete ,Cat no-162509 & 162109 MAKE-phillips /Bajaj. (Including MH T 150 Watt Lamp)or equivalent	EACH	2			
30	M&L for G I Tubing Light grade of size 50 mm dia with all necessary fitting complete as Engr -in -charge .Make-TATA / NTL.or equivalent	RM	15			
31	PCC (1:3:6) type C-2 using 40mm graded aggregate as in foundation for filling in, mass concrete for foundation of pole and repair to paving etc complete all as specified and directed.	Cum	2.00			
32	Supply and fixing Fire Extinguisher 6 Kg Mono Ammonium Phosphate Powder 90, Stored Pressure Type, Pressure Gauge,Gross Weight 9.5 Kg, empty Weight 3.5 Kg, Can Height 486MM, Diameter 160MM, Discharge Time less than 9 Secs, Controllable discharge mechanism, Range minimum 4 Meters, applicable on Class A,B,C and electrically started Fire, A Rating- 21A, B Rating 89B, Can Construction : Deep drawn & CO2 Mig welded, Valve Construction : Forging & Machining, Internal Coating of Can : Epoxy Powder coating, External Coating of Can : Epoxy Polyester Powder coating, Sheet metal thickness : 1.60MM, Helium Leak Detection Tested, ISI and EN Approved, 5 Years Warranty .Make : Ceasefire or equivalent. Note: 1) Warranty Card Handed over the site with installation Report. 2) How to use the extinguisher awareness programme will be give all location	Nos	20.00			
33	Supply & fixing Wall Lights - W 1 x 12 W 230 V Wall spot chrome complete with all accessories .Make :Philips 32047 /or equivalent	Nos	20.00			
34	Supply & fixing Pendant lights - P Havells Spira Pendant LED with 9 watt lamp complete with all accessories .Make :havells or equivalent	Nos	5.00			
35	Supply & fixing Outdoor Wall lights - O Up and down light with 12 W LED lamp complete with all accessories.Make :philips or equivalent	Nos	20.00			
36	Supply & fixing Ceiling fans -Sweep 1200mm SS390 Ceiling fans - white.Make:Havells or equivalent	Nos	10.00			

37	<p>Supply and installation, foundation ,erection, testing and commissioning of the complete lighting system high mast light 12 meters high galvanized Steel mast suitable for 9 lantern symmetrically fitted along with their control gear and having two point suspension systemwith steel wire rope of 6 mm dia and double drum winch complete with all accessories including but not restricted to the following</p> <p>. a) Mast shaft into two section, hot dip galvanised and suitable for wind velocity as per IS 875 part 3.</p> <p>b) Head frame, steel wire rope of min. 6mm dia., double drum winch.</p> <p>c) Galvanised Lantern carriage arrangement suitable for 9 nos. luminaries & its control gearboxes and Lightning finial.</p> <p>d) Integral power tool installed inside base compartment for its operation.</p> <p>e) Supply of foundation bolts manufactured from special steel along with nuts, washers, anchor plate and templates</p> <p>f) Design, supply and casting of suitable shallow foundation with M-15 concrete for the High mast considering safe soil bearing capacity at the site.</p> <p>g) Erection/ installation and commissioning of the High Mast system comprising of foundation, mast and its accessories, aviation warning lamps, earthing, luminaries, control panel etc. with the help of suitable equipments.</p> <p>h) The luminaire and lamp should be made of Philips, Bajaj only</p> <p>Dimension of high mast pole Bottom Dia : 410 mm, Top Dia : 150mm Section- 1 Length : 10500 mm/ Thk- 4 mm Section- 2 Length : 10500 mm/ Thk- 3 mm Base Plate Size : 570 X 25 mm, Supply of Foundation Bolts for the poles. Size : M 24 X 700 mm 10 Nos.(With Template & Anchor plate) Accessories (Brought out items) for 15.00 Mtr. High Mast : Mast Section with Base Plate, lantern carriage for fixing of Luminaries, foundation accessories., Head Frame, Double Drum Winch 500 kg Manual Handle , Motor 1.5 HP, SS Wire Rope 6 mm dia, Trailing Cable 5 Core 2.5 sqm, Lighting Arrestor & earthing spikes (MS GI), Control Panel Make : "JJ Deluxe</p>	Each Job	1			
38	Supply and lay, jointing and testing of PVC insulated armoured heavy duty electric cable with aluminum conductor 1100 volt grade cross sectional area 10 sqmm 4 core .	RM	200			
39	Supply and fix LED flood light fitting 150 watt complete with switch gear, control gear unit lamp etc complete with all accessories IP 65 CERTIFIED	Each	9			
40	Material and labour for LT panel board out door type of size 80 x 45 x 30 cm with two Nos base plates of size 45 x 15 cm and four Nos pedestal made out of 40 x 40 x 5 mm angle iron (3 RM) and locking knobs 2 Nos with two coat of epoxy based paint over one coat of zinc chromate primer , Main switch 63 Amps standard make model FSHF / TPN with HRC fuses -1 No, ML-6 contactor - 01 No, DB TPN 4 way with MCB TPN -01 No MCB SP-12 Nos ,photolytic sensor device - 01 No make L/T , 4 pole terminal - 01 No and toggle switch for by pass connection including internal copper wiring with grouting the unit near FPB/ pole and connecting up electrically , testing and commissioning complete all as directed.	Each Job	1			
41	Supply and fixing trailing cable 6 core 2.5 sqmm copper cable PVC insulated unsheathed cable to connect from junction box to direct light fitting complete testing and commissioning all as specified and directed.	RM	250			

1	1 st year after One year of DLP/Comprehensive Warrenty:- Annual Maintenance Services for Solar PV Hybrid Power Plants ,Solar water heater, Servo stabilizer, Solar surface pump and Solar street light after Defect liability period of 365 days District Hospital ,ZUNHEBOTO Note: Unit prices should be inclusive of all supply, fixing & Installation and cost of AMC services/labour.	4	Year			
2	2 nd year after One year of DLP/Comprehensive Warrenty:- Annual Maintenance Services for Solar PV Hybrid Power Plants ,Solar water heater, Servo stabilizer, Solar surface pump and Solar street light after Defect liability period of 365 days District Hospital ,ZUNHEBOTO Note: Unit prices should be inclusive of all supply, fixing & Installation and cost of AMC services/labour.					
3	3 rd year after One year of DLP/Comprehensive Warrenty:- Annual Maintenance Services for Solar PV Hybrid Power Plants ,Solar water heater, Servo stabilizer, Solar surface pump and Solar street light after Defect liability period of 365 days District Hospital ,ZUNHEBOTO Note: Unit prices should be inclusive of all supply, fixing & Installation and cost of AMC services/labour.					
4	4 th year after One year of DLP/Comprehensive Warrenty:- Annual Maintenance Services for Solar PV Hybrid Power Plants ,Solar water heater, Servo stabilizer, Solar surface pump and Solar street light after Defect liability period of 365 days District Hospital ,ZUNHEBOTO Note: Unit prices should be inclusive of all supply, fixing & Installation and cost of AMC services/labour.					
	Total Bid Price (in figures)					
	(in words)					

Summary of Bill of Quantities (Lot 1, 2 & 3)

District / Name of Lot	Particulars	Price (Including all incidental, Transportation and Taxes if any)		Discount offer (if any)	Total Amount
Lot 1: MON District Hospital	Part A – Water Supply sytem, Sanitation, Misc Works, including 4 years Comprehensive operation & mainten after 1 year comprehensive warranty and defects liability period				
	Part B – Solar PV power plant, Internal wirinf, equipment supplies & installation, ,including 4 years Comprehensive operation & mainten after 1 year comprehensive warranty and defects liability period				
Total Bid Price for Lot 1					
Lot 2: WOKHA District Hospital	Part A – Water Supply sytem, Sanitation, Misc Works, including 4 years Comprehensive operation & mainten after 1 year comprehensive warranty and defects liability period				
	Part B – Solar PV power plant, Internal wirinf, equipment supplies & installation, ,including 4 years Comprehensive operation & mainten after 1 year comprehensive warranty and defects liability period				
Total Bid Price for Lot 2					
Lot 3: Zunheboto District Hospital	Part A – Water Supply sytem, Sanitation, Misc Works, including 4 years Comprehensive operation & mainten after 1 year comprehensive warranty and defects liability period				

	Part B – Solar PV power plant, Internal wirinf, equipment supplies & installation, ,including 4 years Comprehensive operation & maintenanc after 1 year comprehensive warranty and defects liability period				
Total Bid Price for Lot 3					
Final Bid PRICE (Lot 1/ Lot 2 / Lot 3 or all Lots)<i>tick as applicable</i>					

Total Bid Price Rs.....

Indian Rupees in words

Name & Signature of the Prime Bidder:

Address:

Date:

Note :

**Bidders may quote for any one Lot or two Lots or all three Lots.*

** Bidders offering discounts in the quoted price should be clearly mentioned.*

** Kindly provide spare part list with unit price in case of Solar*

Form of Bid Security - Bank Guarantee

[Guarantor letterhead or SWIFT identifier code]

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

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

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

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

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

THE CONDITIONS of this obligation are:

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

or

- (2) If the Bidder having been notified of the acceptance of his bid by the Employer during the period of Bid validity:
 - (a) fails or refuses to execute the Contract Agreement in accordance with the Instructions to Bidders, if required; or
 - (b) fails or refuses to furnish the Performance Security, 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 _____¹¹ days after the deadline for submission of Bids as such deadline is stated in the Instructions to Bidders or as it may be extended by the Employer, notice of which extension(s) to the Bank is hereby waived. Any demand in respect of this guarantee should reach the Bank not later than the above date.

DATE _____ SIGNATURE OF THE BANK _____

⁹In the case of a JV, the bidder should be stated as "a Joint Venture consisting of, and".

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

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

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.

Technical Proposal

Technical Proposal Forms

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

Technical Proposal – Site Organization

[Insert Site Organization information]

Technical Proposal – Method Statement

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

Technical Proposal – Mobilization Schedule

[Insert Mobilization Schedule]

Technical Proposal – Construction Schedule

[Insert Construction Schedule]

Technical Proposal – Specialised Sub Contracting

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

ESHS Management Strategies and Implementation Plans

(ESHS-MSIP)

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

In developing these strategies and plans, the Bidder shall have regard to the ESHS provisions of the contract including those as may be more fully described in the following:

1. *[the Works Requirements described in Section VII];*
2. *[Environmental Impact Assessment (EIA) and the Environmental Management and Monitoring Plan (EMP) either contained in the EIA or prepared separately];*
3. *[Social Impact Assessment (SIA) including Social Impact Management Plan];*
4. *[Environmental and Social Management Plan (ESMP) or Environmental and Social Management Framework (ESMF)];*
5. *[Resettlement Action Plan (RAP)];*
6. *[Consent Conditions (regulatory authority conditions attached to any permits or approvals for the project)]; and*
7. *[specify any other relevant document/s]*

Selection of the Bidder and award of the Contract (of which the ESHS-MSIP will be a part) does not absolve the Contractor any obligation under this Contract to comply with the applicable Laws/ Rules/ Regulations for protection of environment, public health and safety, and the applicable parts of the Environment Management Plan of the project should such compliance be not expressly included in the ESHS-MSIP.

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

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

1. *[the Works Requirements described in Section VII];*
2. *[Environmental and Social Impact Assessment (ESIA)];*
3. *[Environmental and Social Management Plan (ESMP)];*
4. *[Consent Conditions (regulatory authority conditions attached to any permits or approvals for the project)]; and*
5. *[specify any other relevant document/s]*

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

.

Forms for Personnel

Form PER – 1: Proposed Personnel

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

S. No.	Position	Name	Qualification	Years of Experience	Years of Experience in proposed position			
					Building* works	Sanitation Works	Solar Power Plant etc.,	Total

Form PER – 2: Resume of Proposed Personnel

Form for Equipment

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

[illegible]

Form Specialist-Sub-Contracting

SCHEDULE OF SUB-CONTRACTORS

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

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

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

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

Bidder's Qualification

To establish its qualifications to perform the contract in accordance with Section III (Evaluation and Qualification Criteria) the Bidder shall provide the information requested in the corresponding Information Sheets included hereunder

Form-ELI -1.1: Bidder Information FormDate: *[insert day, month, year]*NCB No. and title: Page *[insert page number]* of *[insert total number]* pages

1.1 Bidder Information			
Bidder's legal name			
In case of JV, legal name of each member(Not allowed)			
Bidder's country of constitution			
Bidder's year of constitution			
Bidder's legal address in country of constitution			
Bidder's authorized representative (name, address, telephone numbers, fax numbers, e-mail address)			
<p>Attached are copies of the following original documents.</p> <ol style="list-style-type: none"> 1. In case of single entity, articles of incorporation or constitution of the legal entity names above, in accordance with ITB 4.1.1 and 4.3. 2. Authorization to represent the firm or JV named in above, in accordance with ITB 20.2. 3. In case of JV, letter of intent to form JV or JV agreement: in accordance with ITB 4.1.2 read with BDS 4. In case of government-owned entity, documents establishing legal and financial authority and compliance with the principles of commercial law in accordance with ITB 4.5 read with Sub-clause 2.1.4 of Qualification Criteria. 5. Included are the organizational chart, a list of Board of Directors, and the beneficial ownership. 			

Form-ELI -1.2: Specialist Sub-Contractor Information Form

(Where permitted as per BDS ITB 4.1.1)

Each member of a JV must fill in this form

Date: [insert day, month, year]

NCB No. and title: Page [insert page number] of [insert total number] pages

Specialist Sub-contractor Information			
Bidder's legal name			
Specialist Subcontractor's legal name			
Specialist Subcontractor's country of constitution			
Specialist Subcontractor's year of constitution			
Specialist Subcontractor's legal address in country of constitution			
Specialist Subcontractor's authorized representative information (name, address, telephone numbers, fax numbers, e-mail address)			
<p>Attached are copies of the following original documents.</p> <ol style="list-style-type: none"> 1. Articles of incorporation or constitution of the legal entity named above, in accordance with ITB 4.1.1 read with BDS and ITB 4.1.2. 2. Authorization to represent the firm names above, in accordance with ITB 20.2. 3. In the case of government-owned entity, documents establishing legal and financial autonomy and compliance with commercial law, in accordance with ITB Sub-Clause 4.5 read with Sub-Clause 2.1.4 of Qualification Criteria. 4. Included are the organizational chart, a list of Board of Directors, and the beneficial ownership. 			

DETAILS OF PARTICIPATION IN THE JOINT VENTURE

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

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

Form CON – 2

Historical Contract Non-Performance, Pending Litigation and Litigation History

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

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

Joint Venture Party Name: [insert full name]

NCB No. and title: NHP/PP/2018/004

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

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

Year of dispute	Amount in dispute (Rupees)	Contract Identification	Total Contract Amount (Rupees)
<i>[insert year]</i>	<i>[insert amount]</i>	Contract Identification: <i>[indicate complete contract name, number, and any other identification]</i> Name of Employer: <i>[insert full name]</i> Address of Employer: <i>[insert street/city/country]</i> Matter in dispute: <i>[indicate main issues in dispute]</i> Party who initiated the dispute: <i>[indicate "Employer" or "Contractor"]</i> Status of dispute: <i>[Indicate if it is being treated by the Adjudicator, under Arbitration or being dealt with by the Judiciary]</i>	<i>[insert amount]</i>
<input type="checkbox"/> No pending litigation in accordance with Section III, Qualification Criteria and Requirements, Sub-Factor 2.2.3. <input type="checkbox"/> Pending litigation in accordance with Section III, Qualification Criteria and Requirements, Sub-Factor 2.2.3 as indicated below.			
Year of award	Outcome as percentage of Net Worth	Contract Identification	Total Contract Amount (Rupees)
<i>[insert year]</i>	<i>[insert percentage]</i>	Contract Identification: <i>[indicate complete contract name, number, and any other identification]</i> Name of Employer: <i>[insert full name]</i> Address of Employer: <i>[insert street/city/country]</i> Matter in dispute: <i>[indicate main issues in dispute]</i> Party who initiated the dispute: <i>[indicate "Employer" or "Contractor"]</i> Status of dispute: <i>[Indicate if it is being treated by the Adjudicator, under Arbitration or being dealt with by the Judiciary]</i>	<i>[insert amount]</i>

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

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

Bidder's Name: _____

Date: _____

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

NCB No. and title: NHP/PP/2018/004

Page _____ of _____ pages

Environmental, Social, Health, and Safety Performance Declaration in accordance with Section III, Qualification Criteria, and Requirements			
<input type="checkbox"/> No suspension or termination of contract: An employer has not suspended or terminated a contract and/or called the performance security for a contract for reasons related to Environmental, Social, Health, or Safety (ESHS) performance since the date specified in Section III, Qualification Criteria, and Requirements, Sub-Factor 2.5.			
<input type="checkbox"/> Declaration of suspension or termination of contract: The following contract(s) has/have been suspended or terminated and/or Performance Security called by an employer(s) for reasons related to Environmental, Social, Health, or Safety (ESHS) performance since the date specified in Section III, Qualification Criteria, and Requirements, Sub-Factor 2.5. 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)]</i>	<i>[insert amount]</i>
<i>[insert year]</i>	<i>[insert amount and percentage]</i>	Contract Identification: <i>[indicate complete contract name/ number, and any other identification]</i> Name of Employer: <i>[insert full name]</i> Address of Employer: <i>[insert street/city/country]</i> Reason(s) for suspension or termination: <i>[indicate main reason(s)]</i>	<i>[insert amount]</i>
...	...	<i>[list all applicable contracts]</i>	...

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

Financial Situation

FORMAT 3.1 Historical Financial Performances

The Bidder should also submit these details of for Sub Contractor: Solar along with his/her details

Bidder's Legal Name: _____ Date: _____
 JVMember Legal Name: _____ **Bid No.NHP/PP/2018/004**

To be completed by the Bidder and, if JV, by each member

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

This information should be extracted from the Annual Financial Statements/ Balance sheets, which should be enclosed. Year 1 will be the latest year for which audited financial statements are available. Year 2 shall be the year immediately preceding year 1 and year 3 shall be the year immediately preceding Year 2.

2. Financial documents

The Bidder and its parties shall provide copies of the balance sheets and/or financial statements for *last 3* years pursuant Section III, Qualifications Criteria and Requirements, Sub-factor 2.3.1. The financial statements shall:

- (a) reflect the financial situation of the Bidder or member to a JV, and not sister or parent companies.
- (b) 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 (no statements for partial periods shall be requested or accepted).
- (e) Attached are copies of financial statements (balance sheets, including all related notes, and income statements) for the *[last 3]* years required above; and complying with the requirements (If the most recent set of financial statements is for a period earlier than 12 months from the date of bid, the reason for this should be justified)
- (f) Attached is a copy of certificate given from the commercial bank assuring cash flow (working capital for contraction) in the format attached.

FORM FIN – 3.1(A)

FORMAT FOR EVIDENCE OF ACCESS TO OR AVAILABILITY OF CASH FLOW
[To be given from a Nationalized or Scheduled Bank in India-No substitute other than this will be acceptable)]

Clause 2.3.1(b) of Section II – Qualification Criteria

(1) AVAILABILITY OF CASH FLOW (WORKING CAPITAL)

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

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

-- Sd. --

Name of Bank Manager

Senior Bank Manager

Address of the Bank

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

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

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

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

Form FIN - 3.2
Annual Construction Turnover

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

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

Date: [insert day, month, year]

JV Party Legal Name: [insert full name]

NCB No. and title: NHP/PP/2018/004

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

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

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

JOINT VENTURE (Not Applicable)

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

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

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

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

1. Name and address of Bankers to the Joint Venture

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

Form EXP - 4.1

General Construction Experience

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

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

Date: [insert day, month, year]

JV Party Legal Name: [insert full name]

NCB No. and title: NHP/PP/2018/004

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

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

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

Form EXP - 4.2(a)

Similar Construction Experience

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

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

Date: [insert day, month, year]

JV Party Name: [insert full name]

NCB No. and title: NHP/PP/2018/004

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

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

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

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

Form EXP - 4.2(b)

Construction Experience in Key Activities

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

Nominated Sub-contractor's Legal Name¹³

NCB No. and title: NHP/PP/2018/004

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

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

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

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

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

¹³ If applicable

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

Form for Current Contract Commitments/Works in Progress

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

(A) Existing commitments and on-going works:

Description of Work	Place & State	Contract No. & Date	Name and Address of Employer	Value of Contract (Rupees)	Stipulated period of completion	Value of works* remaining to be completed (Rupees)	Anticipated date of completion
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)

(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 (Rupees)	Stipulated period of completion	Date when decision is expected	Remarks if any
(1)	(2)	(3)	(4)	(5)	(6)	(7)

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

(Name of the Project)

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

(Bidder's Name and Address)

To:

(Name of the Employer & address)

Dear Sir:

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

Certificate for Import/Procurement of Goods/Construction Equipment

1. We confirm that we are solely responsible for obtaining customs/excise 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 Customs Notification No. 85/99.
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] Solar PV Panels						
[b] Cement						
[c] Steel						
Construction Equipment						

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

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

Date: _____

(Signature)_____

Place:_____

(Printed Name)_____

(Designation)_____

(Common Seal) _____

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

**** Modify the above to suit the requirements given in Central Customs Notification as current of date of bidding.***

Manufacturer's Authorization

[Applicable for solar equipment]

*[The Bidder shall require the Manufacturer to fill in this Form in accordance with the instructions indicated. This letter of authorization should be on the letterhead of the Manufacturer and should be signed by a person with the proper authority to sign documents that are legally binding on the Manufacturer. The Bidder shall include it in its bid, if so indicated in the **BDS**.]*

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

NCB No.: *[NHP/PP/2018/004]*

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

To: *[insert complete name of Purchaser]*

WHEREAS

We *[insert complete name of Manufacturer]*, who are official manufacturers of *[insert type of goods manufactured]*, having factories at *[insert full address of Manufacturer's factories]*, do hereby authorize *[insert complete name of Bidder]* to submit a bid the purpose of which is to provide the following Goods, manufactured by us *[insert name and or brief description of the Goods]*, and to subsequently negotiate and sign the Contract against the above IFB.

We hereby extend our full guarantee and warranty in accordance with Clause 28 of the General Conditions of Contract, with respect to the Goods offered by the above firm against this IFB.

No company or firm or individual other than M/s. _____ are authorized to bid, and conclude the contract for the above goods manufactured by us against this specific IFB. *[This para should be deleted for simple items where manufacturers normally sell the product through different stockists].*

Signed: *[insert signature(s) of authorized representative(s) of the Manufacturer]*

Name: *[insert complete name(s) of authorized representative(s) of the Manufacturer]*

Title: *[insert title]*

Duly authorized to sign this Authorization on behalf of: *[insert complete name of Bidder]*

Dated on _____ day of _____, _____ *[insert date of signing]*

Note – Modify this format suitably in cases where manufacturer's warranty and guarantee are not applicable for the items for which bids are invited. If the supply consists of number of items, indicate the specific item (s) for which alone the above authorization is required.

Section V - Eligible Countries

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

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

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

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

Section VI. Bank Policy - Corrupt and Fraudulent Practices

(Section VI shall not be modified)

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

“Fraud and Corruption:

- 1.16 It is the Bank’s policy to require that Borrowers (including beneficiaries of Bank loans), bidders, suppliers, contractors and their agents (whether declared or not), sub-contractors, sub-consultants, service providers or suppliers, and any personnel thereof, observe the highest standard of ethics during the procurement and execution of Bank-financed contracts.¹⁵ In pursuance of this policy, the Bank:
- (a) defines, for the purposes of this provision, the terms set forth below as follows:
 - (i) “corrupt practice” is the offering, giving, receiving, or soliciting, directly or indirectly, of anything of value to influence improperly the actions of another party;¹⁶
 - (ii) “fraudulent practice” is any act or omission, including a misrepresentation, that knowingly or recklessly misleads, or attempts to mislead, a party to obtain a financial or other benefit or to avoid an obligation;¹⁷
 - (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;¹⁸
 - (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;¹⁹
 - (v) “obstructive practice” is
 - (aa) deliberately destroying, falsifying, altering, or concealing of evidence material to the investigation or making false statements to investigators in order to materially impede a Bank investigation into allegations of a corrupt, fraudulent, coercive or collusive practice; and/or threatening, harassing or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation, or
 - (bb) acts intended to materially impede the exercise of the Bank’s inspection and audit rights provided for under paragraph 1.16(e) below.

¹⁵In this context, any action to influence the procurement process or contract execution for undue advantage is improper.

¹⁶For the purpose of this sub-paragraph, “another party” refers to a public official acting in relation to the procurement process or contract execution. In this context, “public official” includes World Bank staff and employees of other organizations taking or reviewing procurement decisions.

¹⁷For the purpose of this sub-paragraph, “party” refers to a public official; the terms “benefit” and “obligation” relate to the procurement process or contract execution; and the “act or omission” is intended to influence the procurement process or contract execution.

¹⁸For the purpose of this sub-paragraph, “parties” refers to participants in the procurement process (including public officials) attempting either themselves, or through another person or entity not participating in the procurement or selection process, to simulate competition or to establish bid prices at artificial, non-competitive levels, or are privy to each other’s bid prices or other conditions.

¹⁹For the purpose of this sub-paragraph, “party” refers to a participant in the procurement process or contract execution.

-
- (b) will reject a proposal for award if it determines that the bidder recommended for award, or any of its personnel, or its agents, or its sub-consultants, sub-contractors, service providers, suppliers and/or their employees, has, directly or indirectly, engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices in competing for the contract in question;
 - (c) will declare misprocurement and cancel the portion of the loan allocated to a contract if it determines at any time that representatives of the Borrower or of a recipient of any part of the proceeds of the loan engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices during the procurement or the implementation of the contract in question, without the Borrower having taken timely and appropriate action satisfactory to the Bank to address such practices when they occur, including by failing to inform the Bank in a timely manner at the time they knew of the practices;
 - (d) will sanction a firm or individual, at any time, in accordance with the prevailing Bank's sanctions procedures,²⁰ including by publicly declaring such firm or individual ineligible, either indefinitely or for a stated period of time: (i) to be awarded a Bank-financed contract; and (ii) to be a nominated²¹;
 - (e) will require that a clause be included in bidding documents and in contracts financed by a Bank loan, requiring bidders, suppliers and contractors, and their sub-contractors, agents, personnel, consultants, service providers, or suppliers, to permit the Bank to inspect all accounts, records, and other documents relating to the submission of bids and contract performance, and to have them audited by auditors appointed by the Bank.”

²⁰ A firm or individual may be declared ineligible to be awarded a Bank financed contract upon: (i) completion of the Bank's sanctions proceedings as per its sanctions procedures, including, inter alia, cross-debarment as agreed with other International Financial Institutions, including Multilateral Development Banks, and through the application the World Bank Group corporate administrative procurement sanctions procedures for fraud and corruption; and (ii) as a result of temporary suspension or early temporary suspension in connection with an ongoing sanctions proceeding. See footnote 14 and paragraph 8 of Appendix 1 of these Guidelines.

²¹ A nominated sub-contractor, consultant, manufacturer or supplier, or service provider (different names are used depending on the particular bidding document) is one which has either been: (i) included by the bidder in its pre-qualification application or bid because it brings specific and critical experience and know-how that allow the bidder to meet the qualification requirements for the particular bid; or (ii) appointed by the Borrower.

PART 2 – Works Requirements

Section VII - Works Requirements

Specifications

SPECIFICATION (Water & Sanitation)

A. Water Supply works and Sanitation works

1.0 Roof water harvesting

B. Particular Specifications for plastic tank with brick masonry

2.0 General

3.0 Site Investigation

4.0 Plastic tank

5.0 Brick masonry

C. Specifications for Ferrocement underground tank

6.0 General

D. Technical specifications-Electromechanical works

7.0 General Information

8.0 Specifications of Hand pump

9.0 Efficiency

10.0 Testing & Inspection

11.0 General

12.0 Technical specifications of Electrical works for the proposed water supply system

E. Construction materials

13.0 General

14.0 Materials

15.0 Precaution during execution

16.0 Bar bending schedule

F. Design of Civil works

17.0 General

18.0 Design considerations

19.0 Materials and standards

20.0 Samples and tests materials

G. Earthwork

21.0 General

22.0 Excavation

23.0 Fill, Backfilling and site grading

24.0 General Site grading

25.0 Fill density

26.0 Timber shoring/Sheet piling

27.0 Dewatering

H. Cement concrete

28.0 General

29.0 Foundation bedding

30.0 Concreting in extreme weather conditions

31.0 Testing concrete structure for leakage

-
- 32.0 Sanitary items
 - 33.0 Process units
 - 34.0 Performed fillers and Joint sealing compound
 - 35.0 Screed concrete
 - 36.0 Rungs/ladder
 - 37.0 Corrosion Protection work
 - 38.0 External surface
 - 39.0 Special requirements
 - 40.0 Structural steel works
 - 41.0 Galvanized iron pipes
 - 42.0 HDPE Pipe
 - 43.0 Specification of water cooler cum water purifier
 - 44.0 Effluent / Sewerage treatment plants for the hospital
 - 45.0 Misc. works – Road works
 - 46.0 Repair and Rehabilitation works
 - 47.0 Specification for Plastic/FRP type Septic tank

- **WATERSUPPLY WORKS AND SANITATION WORKS**

The work is required to be carried as per the NPWD Specifications; the items considered are of NPWD, wherever the items not covered in the NPWD SOR / Specifications. The specifications are provided below for the work.

1.0 Roof Water Harvesting

- (i) This section of specification covers supplying, laying, jointing and testing of Roof Water Harvesting System for Health Care Centre.
- (ii) References

The following Indian Standards shall be applicable for various components relating to construction and testing of Roof Water Harvesting System.

ISCodeNo.	Relatingto
IS: 4985-2000	Code of practice for unplasticized PVC pipes for potable water supply.
IS: 7834	Specifications for Moulded PVC fittings
IS: 10124	Specifications for Fabricated PVC fittings
IS: 12235-1986	Testing and Quality control for PVC pipes
IS 14961 : 2001	Guidelines for Rain Water Harvesting in hilly areas by Roof Water Collection System

1.1 Roof Water Collection System

The Roof top Rainwater Harvesting System comprises following components:

Roof Catchment:

The roof of the health centre is used as the catchment for collecting the rainwater. Roofs made of corrugated iron sheet, asbestos sheet, tiles or concrete can be utilized as such for harvesting rainwater.

Drain Pipes:

The drain pipes of suitable size, made of PVC PN4 Class are provided to collect the roof top water from all sides.

Gutters:

Gutters are channels fixed to the edges of roof all around to collect and transport the rainwater from the roof to the storage tank. Gutters shall be channels made of cut PVC pipes.

Down Pipe

PVC Down pipe of minimum 110 mm dia, PN4 Class is to be provided to carry the rainwater from the gutters to the storage tank. Down pipe is joined with the gutters at one end, whereas the other end is connected to the filter unit leading to the storage tank.

An inlet screen (#20 wire mesh) to prevent entry of dry leaves and other debris into the down pipe should be fitted.

First Flush Pipe

A first flush system can be incorporated in the roof top rainwater harvesting systems to dispose of the 'first flush' water so that it does not enter the tank. A separate vertical pipe is fixed to the down pipe with a valve provided below the 'Tee' junction.

Storage Tank

The Storage Tank shall be Elevated Water Tank (Plastic) of 1000 litres capacity and Underground or Partly Underground Tank constructed of Ferrocement material of required quantity liters capacity.

Filter Unit

These mesh type filters are wall mounted, to be aligned in between the pipes coming from the roof top and pipes moving towards the storage tank.

1.2 PVC Pipes

1.2.1 Scope

- This specification covers the requirements for manufacturing, supplying, laying, jointing and testing of PVC pipes used for water supply and sewerage.

1.2.2 Applicable Codes

- The laying of PVC pipes and fittings/specials shall comply with all currently applicable statutes, regulations, standard and Codes. In particular the following standards, unless otherwise specified herein shall be referred. In all cases, the latest revision of the standards/Codes shall be referred to. If requirements of this Specification conflicts with the requirements of the standards/Codes, this Specification shall govern.

IS: 4985-2000	Code of practice for unplasticized PVC pipes for potable water supply
IS: 7834	Specifications for Moulded PVC fittings
IS: 10124	Specifications for Fabricated PVC fittings
IS: 12235-1986	Testing and Quality control for PVC pipes

- Other IS Codes not specifically mentioned here but pertaining to the use of PVC pipes form part of these Specifications.

1.2.3 Manufacture

- The PVC pipes and fittings shall be of approved brand conforming to IS: 4985-2000, IS: 7834 and IS: 10124 respectively and shall be free from defects.
- Solvent Cement type (Selfit) pipes have one end self socketed and the other end plain, which fits snugly without the use of couplers and joined by solvent cement. The working pressure of pipes shall be 4 kg / cm².
- Rubber Ring jointing type (Ringtite) PVC pipes are available with exclusive built in dual contact rubber sealing ring ensuring leak proof joints.

1.2.4 Specials and fittings

- PVC specials and fittings shall conform to the following IS and shall have working pressure of 6 kg / cm².

IS: 7834	Specifications for Moulded PVC fittings
IS: 10124	Specifications for Fabricated PVC fittings

1.2.5 Dimensions and tolerances

- The dimension of pipes and their tolerances shall conform to the sizes specified in relevant clause of IS: 4985-2000.

1.2.6 Inspection of Pipes

- The pipes and fittings shall be inspected before laying for defects, cracks etc., and any pipe or fitting found unsuitable shall be rejected.
- Laying and jointing of PVC pipes and fittings

- Laying of pipes shall in general be in accordance IS 7634. Specifications given in relevant IS Code shall also be followed as applicable.

1.2.7.2 Jointing

- The PVC pipes and fittings shall be joined by any of the following method:
 - (a) Solvent Cement Joint for Socket and plain end pipes
 - (b) Coupler Joint for Plain ended pipes
 - (c) Rubber Ring Joint for Ringtite pipes
- Jointing shall be done as per the requirement depending on the type of pipes and as per the relevant IS Codes.

1.2.8 Testing

- Mechanical tests during the manufacture of pipes, the Hydrostatic tests at works and the Hydraulic test at site (Pressure and leakage test) shall be carried out under the conditions and pressures specified, as per IS: 4985.

1.2.9 Measurements

- The net length of pipes as laid shall be measured in running metres correct to a cm. Specials shall be excluded and enumerated and paid separately.
- Excavation, refilling, shoring and timbering in trenches, masonry or concrete pillars and thrust blocks wherever provided shall be measured and paid for separately under relevant items of work.
- Joints shall be measured and paid separately.

1.2.10 Rate

- The rate shall include the cost of materials and labour involved in all the operations described above except for the items measured/enumerated separately under clause 'Measurements' which shall be paid separately.

1.2.11 Notes

- If any damage is caused to the pipeline during execution of work or while cleaning/testing the pipeline as specified, contractor shall be held responsible for the same and shall replace the damaged pipeline and retest the same at his own cost to the full satisfaction of Engineer
- Water for testing of pipeline shall be arranged by Contractor at his own cost.

1.3 Chlorinated Poly Vinyl Chloride (CPVC) Pipes

The piping system shall consist of copper pipes confirming to BS 2871, class 1, table X, half hard for domestic plumbing and fittings shall confirm to BS 864 Part-II The piping system shall also consist of CPVC SDR 11.0 piping from 15 mm to 50 mm & Schedule 40 from 65 mm to 150 mm.

The sizes and makes is specified in the Schedule of Quantities.

For any internal works, the CPVC pipes and fittings shall be embedded in the wall chase or

run on the floor/ceiling unless otherwise specified. No unsightly exposed runs shall be permitted.

CPVC Pipes & Fittings

The pipes shall be CPVC (Chlorinated Poly Vinyl Chloride) material for hot & cold water supply piping system with pipes as per CTs SDR -11 at a working pressure of 320 PSI at 23 deg C and 80 PSI at 82 deg.C, using solvent welded CPVC fittings i.e. Tees, Elbows, Couples, Unions, Reducers, Brushing etc. including transition fittings (connection between CPVC & Metal pipes / GI) i.e. Brass adapters (both Male & Female threaded and all conforming to ASTM D-2846 with only CPVC solvent cement conforming to ASTM F-493, with clamps / structural metal supports as required / directed at site including cutting chases & fitting the same with cement concrete / cement mortar as required, including painting of the exposed pipes with one coat of desired shade of enamel paint. All termination points for installation of faucets shall have brass termination fittings. Installation shall be to the satisfaction of Engineer in Charge.

Joining Pipes & Fittings

a. Cutting:

Pipes shall be cut either with a wheel type plastic pipe cutting or hacksaw blade and care shall be taken to make a square cut which provides optimal bonding area within a joint.

b. Deburring / Beveling:

Burrs and fittings should be removed from the outside and inside of pipe with a pocket knife or file otherwise burrs and fittings may prevent proper contact between pipe and fittings during assembly.

c. Fitting preparation:

A clean dry rag/cloth should be used to wipe dirt and moisture from the fitting sockets and tubing end. The tubing should make contact with the socket wall 1/3 or 2/3 of the way into the fitting socket.

d. Solvent Cement Application:

Only CPVC solvent cement confirming to ASTM-F493 should be used for joining pipe with fittings. An even coat of solvent cement should be applied on the pipe end and a thin coat inside the fitting socket, otherwise too much of cement solvent can cause clogged water ways.

e. Assembly:

After applying the solvent cement on both pipe and fitting socket, pipe should be inserted into the fitting socket within 30 seconds, and rotating the pipe ¼ to ½ turn while inserting so as to ensure even distribution of solvent cement with the joint. The assembled system should be held for 10 seconds (approximately) in order to allow the joint to set up.

An even bead of cement should be evident around the joint and if this bead is not continuous remake the joint to avoid potential leaks.

f. Testing

Once an installation is completed and cored as per above mentioned recommendations, the system should be hydrostatically pressure tested at 150 psi (10 Bar) for one hour. During pressure testing, the system should be fitted with water and if a leak is found, the joint should be cut out and replacing the same with new one by using couplers.

Solvent Cement

Only CPVC solvent cement conforming to ASTM F 493 should be used for joining pipe with fittings and valves. Flow guard CPVC cement solvent have a minimum shelf life of 1 year. Aged cement solvent will often change colour or being to thicken and become gelatinous or jelly like and when this happens, the cement should not be used. The cement solvent should be used within 30 days after opening the company's seal and tightly close the seal after using in order to avoid its freezing. The freeze-d cement solvent should be discarded immediately and fresh one should be used

1.4 Quality Control and quality checks

As part of the proposal the Contractor would be required to submit their Quality Plan. The plan would consist of

- (i) Details of how the Contractor would manage the quality of works
- (ii) All the checks to be carried out
- (iii) The stages at which these checks would be done
- (iv) The complete Inspection and Test plans
- (v) Methodology and details of execution of works
- (vi) Formats for inspection
- (vii) Compilation of all mill certificates
- (viii) List of performance test
 - During Commissioning
 - During Operations

The Engineer in Charge Representative involvement should be shown at all major points in the progress of work. At all these points the Contractor will be permitted to proceed only if formal approval is made.

The procedure for this would be that the Contractor would submit the form for inspection to the Engineer in Charge or his representative at least 32 hours before the scheduled inspection. The Engineer in Charge or his representative would then go to the site of inspection at the scheduled time and date. The inspection would be carried out. All tools, materials and documents required carrying out the inspection will be provided for by the Contractor.

The Engineer in Charge or his representative would have full rights to reject or fail the inspection provided a valid reason is given. In such case the Contractor is to correct, replace, redo or remake as the case maybe and arrange for a re-inspection

1.5 As Built Drawings

On Completion of the Inspection and Tests for the various facilities the Contractor would be required to make the "As Built drawings" of the pipeline, appurtenances and all the components and works involved. The drawings would be on long lasting material along with tracings and blueprints. Soft copies of the same are also to be included.

B. PARTICULAR SPECIFICATIONS FOR PLASTIC TANK WITH BRICK MASONRY STAGING

2.0 General

This part covers additional specifications for civil construction works, supplementing the general specifications for material and workmanship.

3.0 Site Investigations

On award of the contract, the bidder shall locate the place and orientation of the water tank. The bidder shall also finalize the staging height (minimum 2.0 m) required to supply water with positive head to the wash basin and the toilets at the centre. Necessary Soil investigation shall be carried out at the Site.

4.0 Plastic Tank

Plastic tank brought from the vendor shall meet the General specifications or Specifications from CPWD.

5.0 Brick Masonry Staging

A Brick masonry platform shall be built of dimension 1.5m x 1.5m with a minimum height of 1.5m. and shall be of brick masonry in CM 1:4. The materials used shall conform to the IS standards and specification. The platform shall be made firm by filling it with boulders and earth compacted properly. The top of the platform shall be provided with PCC in 1:3:6. The plastic tank shall be placed on the firm platform and adhered to it.

C. SPECIFICATIONS FOR FERROCEMENT UNDERGROUND TANK

6.0 General

The design requirements for Construction of Underground or Partly Underground Ferrocement Tank having 20,000 litres capacity is covered under Clause 18.0.

D . TECHNICAL SPECIFICATIONS - ELECTRO-MECHANICAL WORKS

7.0 General Information

The specifications should be read in conjunction with schedule of items, requirements, terms and conditions and finally as per the direction of Engineer to make different unit perfectly operative and successful in all respect.

Any plant, equipment or electro-mechanical works which is found to be unsuitable for specific use under the stipulated conditions shall be dismantled and replaced by proper plant, equipment or electro-mechanical works entirely at the cost of the contractor for successful completion, commissioning and operation of the plant. The contractor shall provide all necessary tools and tackles required for erection works and equipment and instruments for testing and commissioning including all other items necessary for testing and efficient execution of the contract. The contractor will also provide all labour, supervising and administrative staff along with transport arrangement during erection and commissioning period.

The installation work includes supply of all fittings and fixtures, hardware, consumables and sundry items as required for successful installation and commissioning of the plant.

The scope of work shall not be limited to only supply of items as per schedule but also include all other items not specifically mentioned but required for successful installation and commissioning of the plant / equipment and to operate properly as per relevant technical' specification.

All plant and equipment shall be insured against all types of damages, theft etc. during transit, storage, erection and commissioning and insurance coverage will continue till the maintenance period expires and the plant is handed over to Engineer at the cost of the contractor.

The electrical Installation Shall be Carried out in Conformity with the requirements of the Indian Electricity Act, 1910 as amended upto date and the Indian Electricity Rules, 1956 and also with the specifications laid down in the Indian Standard I.S. 2274 – Code of practice (revised) for Electrical Wiring Installations . The wiring shall also be according to the specifications of Local Authority and as per N.E.C.

Electrical Installation work shall be carried out only by Contractor / Contractors holding valid Electrical Supervisor's license issued by the concerned State Government as applicable to the voltage grade and nature of electrical installation work in accordance with Rule 45 of Indian Electricity Rules, 1956 with its latest amendments. The work shall also be carried out under the direct supervision of a person holding a valid certificate of competency and by a person holding valid License/permit issued or recognized by the concerned State Government.

8.0 Specifications of Hand pump Sets

HandpumpsshouldbeinaccordancewiththeprovisionsofIS:14106-1996(specificationfor Direct Action Handpumps)(amendedorreviseduptodate)exceptforthe provisions/specificationsmentionedhereunder.

The following carbon steel assemblies shall be hot dip galvanized according to IS 4759 : 1984 and given chromate conversion coating according to 5.9 of IS 2629 : 1985.

- a) Head
- b) Handle
- c). Stand
- d) Intermediate flange

8.1 General Requirements

- The material and test requirements for unplasticized PVC pipes shall conform to IS 12818 : 1992.
- The number of lengths of uPVC pipe for different components for a particular installation shall depend on the parameters mentioned below:

• a) Lower casing	• Depth of Tank
• b) Well screen	• Nature of Water
• c) Upper casing	• Static water level and • seasonal fluctuations
• d) Rising main	
• e) Pump rod	

- PVC injection moulded fittings shall conform to IS 7834 (Part 1) : 1987.The HDPE parts

shall be moulded from materials conforming to IS 7328 : 1992.

- The solvent cement used shall conform to IS 14182 : 1994. The cement solution shall not contain any material which imparts taste or colour to water or has any toxic effect or faster bacterial growth. Before cementing the joint, the mating surfaces shall be made rough by rubbing with emery paper and cleaned with suitable cleaning fluid.
- The steel plates/sheets and round bar shall conform to Grade A of IS 2062 : 1992. The spring steel wire shall conform to IS 4454 (Part 1) : 1981. The stainless steel components shall conform to grade 04 Cr 18 Ni 10 of IS 6603 : 1972.
- The welding of the mild steel components shall be done in accordance with IS 9595 : 1980. Welding for stainless steel components shall conform to IS 2811: 1987. Alternatively stainless steel components may be welded by manual arc welding using suitable electrodes conforming to IS 5206 :1983. Unless otherwise specified, the minimum specified thickness of the member to be welded shall be the guiding factor for deciding the weld fillet size. It shall normally be not less than the minimum specified thickness of the members to be welded.
- The stainless steel bolts and nuts shall conform to IS 1367 (Part 14) : 1984. The carbon steel bolts and nuts shall conform to IS 1367 (Part 2) : 1979. The washers shall conform to Type A of IS 2016: 1967
- The steel tubes shall conform to IS 1239 (Part 1): 1990. The cast iron castings shall conform to grade FG 150 of IS 210: 1993.
- Some of the dimensions of the components may undergo minor changes after welding. In such cases the dimensions shall be checked before welding.

8.2 Specifications of Centrifugal Pump Sets

- The Centrifugal pumping sets should be in accordance with the provisions of IS: 6595-1993 (specification for Horizontal Centrifugal Pumping Sets for clear, cold water) (amended or revised up to date) except for the provisions/ specifications mentioned hereunder.
- The electric motor is to operate at 3 phase 50 c/s A. C. Supply of 415 + 15 % volts. The preferred speed shall correspond to 2 pole motors [(2900 rpm (synchronous))].
- The Pump sets shall be installed in outdoor condition. The water to be handled by the Pump sets may have Total dissolved Solids 3000 ppm (max), Turbidity 50 ppm (silica scale) Chlorides 500 ppm (max) and PH value between 6.5 to 8.5.
- The material of construction of various components of the pump shall be as under:

Sl.No.	Components	Material
1	Casing	Cast Iron I.S.210 Gr .FG 200
2	Impeller	Cast Iron I.S.210 Gr FG 200 / Phosphor Bronze I.S.318 Gr-LTB2
3	Shaft	Stainless Steel SS410 / Class 3A of I.S.1875
4	Casing Wearing ring	Cast Iron I.S.210 Gr FG 200 / Phosphor Bronze I.S.318 Gr-LTB2
5	Impeller Wearing ring	Cast Iron I.S.210 Gr FG 200 / Phosphor Bronze I.S.318 Gr-LTB2
6	Shaft Sleeve	Phosphor Bronze I.S.318 Gr-LTB2 / Stainless steel grades X04 Cr12, X12 Cr12 or X20 Cr13 of I.S.6603 or I.S.6911

7	Impeller Shaft	Stainless Steel SS410
8	Bush	Nitril Rubber / Cutless Rubber / Bronze Gr LTB2, 3 or 4 of I.S.318
9	Nut bolt and washer	Stainless Steel AISI 410

8.3 Specifications of Submersible Pump Sets

- The Submersible pumping sets should be in accordance with the provisions of IS: 8034-1989 (specification for Submersible Pumping Sets for clear, cold fresh water) (amended or revised up to date) except for the provisions/ specifications mentioned hereunder.
- The electric motor is to operate at 3 phase 50 c/s A. C. Supply of 415 + 15 % volts. The preferred speed shall correspond to 2 pole motors [(2900 rpm (synchronous))].
- The Pump sets shall be installed in bore wells and should be suitable for conditions existing for ground water generally available in the city. The water to be handled by the Pump sets may have Total dissolved Solids 3000 ppm (max), Turbidity 50 ppm (silica scale) Chlorides 1000 ppm (max) and PH value between 6.5 to 8.5.
- The material of construction of various components of the pump shall be as under:

Discharge casing	Cast Iron Grade FG200 of IS:210-1993
Suction casing	Cast Iron Grade FG200 of IS:210
Pump bowl	Cast Iron Grade FG200 of IS:210
Diffuser	Cast Iron Grade FG200 of IS:210-1993 or glass filled polyphenylene oxide (modified PPO) or glass filled poly carbonate of IS:8034-1989
Pump Shaft	Stainless steel 04 Cr13 or 12 Cr13 or 20 Cr 13 Of IS:1570 (Part– 5)–1985
Bearing sleeves	Stainless steel 04 Cr 13 or 12 Cr 13 or 20 Cr 13 Of IS:1570 (Part– 5)–1985
Impeller for radial flow/ mixed flow	Bronze grade LTB_2 to IS 318-1981 or Noryl composite.
Casing wearing (if provided)	Leaded tin bronze grade 4 of IS:318-1981
Bearing bush in discharge & suction	Leaded tin bronze grade 4 of IS:318-1981

9.0 The thickness of impeller vanes shall be not less than 1.5 mm at tips and 3 mm at the base.

- The motor shall conform to IS: 9283 –1995 (amended up to date).
- The stator body should preferably be shrink fitted instead of being only press fitted. The stator body should be tightly welded on the stamping assembly and adequate arrangement should be provided for stopping of rotation or shifting of stampings inside the stator body preferably by providing matching grooves in the stamping assembly and the stator body. Metal rings with rounded fingers should be provided on both ends of stamping.
- Threaded joints in the motor should be avoided to prevent damage due to rusting. Bearing housing should not be threaded but located on spigot and held by suitable bolts.
- The rotor as well as stator should be impregnated under vacuum of air drying and both should be baked repeatedly under controlled conditions to ensure long life of varnish/epoxy and to give a hard finish to the motor surface. The rotor should be dynamically balanced at high speed.
- All the material and components for the motors shall be suitable for application in respect of

corrosion resistance and mechanical performance continuously under water

- The motor shall be suitable for entire working range of pump from + 10% to – 25% of the rated head. Motor rating should be higher or equal to higher of the following:
 1. Consumption at + 10% of the duty head of pump.
 2. Consumption at - 25% of the duty head of pump.
 3. The drive rating of motor shall be 115% of the BKw required at the operating point.
- The thrust bearing should be water lubricated and of hydrodynamic Mitchell type and should be able to take all untoward loads at most un favorable running conditions. It should have swiveling metallic thrust pads.
- The rotating element (as assembled rotors) of pumps should be dynamically balanced at high speed. The impeller shall be dynamically balanced ensuring smooth performance free of vibrations.
- The manufacturer should have facilities for dynamic balancing at high speed, vacuum impregnation/ air drying of rotors and stator, high tension electrical testing and pump performance testing.
- The cable shall be water proof PVC insulated and PVC sheathed, flexible, 3 core flat type having copper conductors. It should be suitable for working voltage upto and including 1100 volts.
- The coupling shall be preferably of mesh type rigid sleeves coupling of stainless steel non slip type with matching groove, collar and key way arrangement.
- The duty point of pumps shall be located near the peak efficiency and there should not be steep fall in Q V/S H, efficiency curve in the head range of + 10% and – 25%. This entire range should be on the stable portion of the curve.

9.0 Efficiency

The pump efficiency without minus tolerance shall be minimum 74% and motor efficiency minimum as 85%. Pump efficiency, Motor efficiency and Overall efficiency should be clearly mentioned in the offer.

10.0 Testing & Inspection

- The prescribed performance at duty point shall be checked and guaranteed at 415 + 15 % Volts. The actual performance shall however also be recorded at the lowest volts by the inspecting agency in the inspection certificate and it shall be ensured that motor does not get overloaded.
- Testing of the pump sets shall be carried out as per relevant IS codes. However, wherever there is variation of specification from IS code the specification mentioned herein shall prevail and any subsequent fall out due to variation in specifications beyond IS code shall also be applicable.
- The marking shall be as per relevant IS code. Purchaser's mark "ERA" & "Year of Supply" shall be mentioned on each pump & motor.

11.0 General

- Minimum size of cable shall be 3-Core (2 x 6 sq mm) suitable for star delta starting or otherwise of higher rating as suggested by manufacturer. Each motor will include cable of suitable size for total length.

12.0 Technical specifications of Electrical Works for the proposed water supply system:

12.1 Scope

This specification is intended to cover complete installation, testing and commissioning of electrical equipments i.e. motor control centres, power control centres, control panels, switch gears, motors, push button starters etc.

12.2 Code and standards

The installation, testing and commissioning of all electrical equipments shall comply with all currently applicable states, regulations, fire insurance and safety codes in the locality where the work will be carried out. Nothing in this specification shall be constructed to relieve vendor of his responsibility.

Unless otherwise specified, the work, material and accessories shall conform to the latest applicable Indian British or IEC standard. All items of switch starter panel shall conform to their relevant specifications as under or its latest revision.

IS: 4237: 1982 General requirements of switch gear and control gear voltage not exceeding 1000 volts.

IS: 2959 : 1982 contactors

IS: 4064 (Part I): Isolators

IS: 3842 (Part- IV) Overload Relay

IS: 8544 Motor Starters

IS: 10118 Code of practice for installation and maintenance of motor starter.

IS: 1248 Indicating installations

IS: 2705 Current transformers

IS: 2147 Degree of protection for starters.

12.3 Detailed requirement of installation

12.3.1 Switch gear, Control panel, etc.

- a) All alignment, leveling, grouting, anchoring, adjustments shall be carried out in accordance with manufacturer's instructions and or as directed by the purchaser.
- b) All connections of fixing of equipments in switch gear control panels etc. shall be completed, checked and adjusted to ensure safety and satisfactory operation of the equipment.
- c) In some cases, minor modifications may have to be carried out at site in the wiring and mounting of the equipment to meet the requirements of the desired control scheme and the Concessionaire shall have to do the same.

12.3.2 Motors

- a) The installation of motors shall be carried out in accordance with manufacturer's instructions and / or as directed by the Purchaser.
- b) Checking and cleaning of bearings and charging / filling of lubricants whatever necessary.
- c) Cleaning of core and winding, varnishing and drying but the windings and measurements of air gap for motor assembly at site if demanded.
- d) Motors shall be run on un-coupled condition for few hours before coupling them with the drive equipment.

-
- e) Motors shall be coupled with drive, adjusted and shall be tested on load.

12.3.3 Miscellaneous Items

- a) The Bidder shall install miscellaneous items such as motors starters, local start / stop push button starters etc.
- b) All supports or brackets needed for installation shall be fabricated and painted by the Bidder.
- c) All welding, cutting, chipping and grinding as and when necessary shall be carried out by the Bidder.

12.3.4 Cable termination

Cable Termination shall include the following

- a) Making necessary holes in bottom / top plates for fixing cable gland / box.
- b) Fixing cable gland / box, connecting armour clamp to cable armour.
- c) Dressing cable, pouring, compound etc. wherever necessary to make termination complete.
- d) Putting cable lugs, crimping them on to cores of cable, taping bare conductors upto lugs, wherever necessary.
- e) Termination to equipment terminals.
- f) Supply and fixing of cable and core identification ferrules.

Wherever purchaser has not provided MS plates for fixing cable tray supports, Bidder shall install approved concrete fasteners for fixing cable tray supports.

12.3.5 Inspection

- a) After completion of the erection / installation, each equipment shall be thoroughly inspected in presence of purchaser for correctness and completeness of installation.
- b) A check list may be furnished by the purchaser wherein all details to be checked and necessary instructions shall be listed. The inspection and checking shall strictly follow the check list.
- c) On completion of the inspection two copies of the check list duly filled in shall be jointly signed by Concessionaire and the purchaser, such endorsement, however, shall not relieve the Concessionaire of his obligation under the contract.

12.3.6 Testing and commissioning

- a) After completion of erection work tests shall be conducted by the Concessionaire on each piece of the equipment as per list be supplied by the purchaser or his authorized representative.
- b) The Bidder shall provide all tools, instruments; materials labour supervisory personnel for carrying out tests on the equipment and materials under his scope of work.
- c) The Bidder shall record the test results on approved Proforma and furnish four copies of the results to the purchaser for his approval within a week from the date of test completed.
- d) Before commissioning of the equipment, the Concessionaire shall set the relays to their recommended values.

-
- e) On successful inspection and testing, the equipment shall be commissioned and put on trial run along with other equipment in a manner mutually agreed upon.

E.CONSTRUCTION MATERIALS

13.0 General

This section deals with civil construction works under the contract.

- i) All the civil & structural works shall be carried out as per latest CPWD specifications with upto date corrections slips issued up to the date of submission of tender unless otherwise specified here in. In case the CPWD specifications are not found applicable or inadequate, then the relevant BIS specifications (latest version) on the date of submission of tender shall be used. Further, in case, any of above two is not applicable, to particular/specialized works, then the manufacturer's specifications or their relevant instructions shall be followed. Specifications mentioned anywhere in the bid document will prevail over CPWD Specifications and BIS specifications as the case may be.
- ii) All raw materials including Cement and reinforcement / structural steel wherever to be used by the bidder shall confirm the latest BIS/CPWD specifications. All mandatory tests as required by BIS/CPWD specifications shall be carried out and test certificates to be submitted to Engineer – in charge. However, the bidder shall be fully responsible for required performances of civil / structural work. Costs of such tests are to be borne by the bidder.
- iii) For testing of all materials, following shall be strictly adhered to-
 - a) All the tests shall be done in laboratories approved by Employer. The bidder is required to take written approval from Engineer-in-charge, in this respect.
 - b) Cement and Steel shall be of a make approved by the Employer as detailed out in respective material sections of this document.

14.0 Materials

14.1 Cement

- i) The Bidder shall procure minimum 43 grade, unless otherwise stated separately confirming to BIS specifications, ordinary Portland cement, as required in the work only, from reputed manufacturers such as Birla Uttam, Grasim, ACC, Gujarat Ambuja, Cement Corporation of India, Vikram, J.P., J.K. etc. of cement having a production capacity of one million tones per annum or more, and as approved by Employer, Ministry of Industry, Government of India and holding license to use BIS certification mark for their product, whose name shall be got approved from Engineer-in-Charge. Supply of cement shall be taken either in silos or in 50 kg. bags bearing manufacturer's name and BIS marking. Samples of cement arranged by the Bidder shall be taken by the Engineer-in-Charge and got tested in accordance with provisions of relevant BIS codes. Number of samples for testing shall be as per provisions in relevant CPWD/BIS codes. Cost of such tests shall be borne by the bidder. In case test results indicate that the cement arranged by bidder does not conform to be relevant BIS codes the same stand rejected and shall be removed from the site by the Bidder at his own cost within one week time of written order

- from the Engineer-in-charge.
- ii) The cement shall be brought at site in bulk supply of approximately 50 tonnes from the manufacturer direct, or as decided and approved by the Engineer-in-charge, as the case may be.
 - iii) A cement godown of sufficient capacity should be constructed by the bidder and at all time it should have a stock of minimum of 2000 bags. The bidder shall facilitate the inspection of the cement godown by the Engineer-in-Charge at any time. Storage of cement shall be as per CPWD specification.
 - iv) Cement brought at site and cement remaining unused after completion of work shall not be removed from site without written permission of the Engineer-in-charge.

14.2 Steel

(a) TOR/TMTSteel&StructuralSteel

- i) The bidder shall procure TOR/ TMT steel reinforcement bars and structural steel conforming to relevant BIS codes (Gr Fe500, BIS code1786-1985) from main producers such as SAIL,TISCO,IISCO or as approved by the Ministry of Steel. The steel reinforcement /structural steel shall be brought to the site in bulk supply of 10 tonnes or more or as decided by the Engineer-in-Charge.For small or occasional quantities of TOR steel reinforcementbars i.e.less than 10MT, the Engineer-in- charge may authorize the bidder to purchase the same from authorized dealers of the approved manufacturers. The bidder shall have to obtain and furnish test certificates to the Engineer-in-Charge in respect of all supplies of steel brought by him to the site of work. Samples shall also be taken and got tested by the Engineer-in-Charge as per the provisions in this regard in relevant CPWD/BIS codes. Cost of such tests shall be borne by the bidder. In case the test results indicate that the steel arranged by the bidder does not conform to CPWD/BIS codes, the same shall stand rejected and shall be removed from the site of work by the Bidder at his cost within a week's time after written orders from the Engineer-in-Charge.
- ii) The steel reinforcement, structural steel shall be stored by the bidder at site of work in such a way as to prevent distortion and corrosion. Bars of different sizes and lengths shall be stored separately.
- iii) For checking nominal mass, tensile strength, band test, re-band- test etc. specimen of sufficient length shall be cut from each size of the baratrandomat frequency not less than that specified below:-

SizeofBar	For consignmentbelow100 tonnes	For consignment over 100 tonnes
Under10mmdia	One sample for each 25 tonnes or part there of	One sample for each 40 tonnes or part there of.
10mm to 16mmdia.	One sample for each 35 tonnes or part there of	One sample for each 45 tonnes or part there of.
Over16mmdia	One sample for each 45 tonnes or part there of	One sample for each 50 tonnes or part there of.

- iv) Steel brought to site and steel remaining unused shall not bere moved from site without the written permission of the Engineer-in-charge.

14.3 Quarry Materials

The Bidder shall be wholly responsible for identifying suitable sources for quarry materials required for the Works, such as earth, sand, stone, murum, etc., and to make his own arrangements for collection and transportation of the materials irrespective of the lead sand lifts required. The quarry thus identified by the Bidder should have proper license from the concerned Government. All materials supplied by the Bidder shall satisfy the requirements set for thin relevant codes, the Specifications and shall be subject to the approval of the Engineer-in-Charge. The Bidder shall take this into account while offering his rates, and no claims whatsoever shall be entertained for extra costs on this account.

15.0 Precautions During Execution

- i) The successful bidder shall comply all instructions in all respects issued by the Employer in respect of road maintenance and interutility code of conduct for excavating trenches across and along various roads and other places. In addition to the penalties imposed as given below, the bidder will be fully responsible for all the legal action which they will be liable to. In case of noncompliance he will be liable to pay penalty for various lapses, however, this does not absolve him from the liabilities as per clause 17 of FIDIC.
- ii) The bidder shall have to provide MS sheet barricading up to a minimum height of 2 meters above ground level all around the site of project as per direction of Engineer-in-Charge. Such barricading must be provided before taking up the excavation work and must remain in position till complete filling back of excavated trenches and resurfacing work, if any. The MS sheets must be painted in with fluorescent paint as per direction of Engineer-in-Charge.
- iii) Proper supporting of all underground services such as water mains, sewers, cables, drains, and water and sewer connections shall be provided by the bidder without any additional cost. If the services/connections are damaged the bidder will be responsible for the restoration of the same to original specifications at his own cost.
- iv) The bidder shall provide necessary red flickering lights (blinkers) at all roads and required places at night for diversion/smooth flow of traffic without any extra cost. He shall also provide necessary sign boards painted and written with luminous paint for traffic diversion as per direction of Engineer-in-Charge. The warning notice boards should be put at least 100 metres before the approach to the area on either sides where the work is going on. In addition proper lighting arrangement will be made for all excavations works.
- v) As a result of excavation of trenches, the underground services (UGS) such as water mains, electric poles/cables/Telephone cable and sewer line etc. may become exposed and unsupported. It will be the responsibility of the bidder to make suitable and necessary arrangement for supporting such UGS to keep them functional. Such arrangement will be done as per direction of the Engineer-in-Charge. No separate payment for supporting the services will be made by the deptt. Any damages caused to the above mentioned underground services due to negligence of the bidder or otherwise shall be made good by the bidder at his own cost. After laying the pipe, the bidder shall have to construct masonry pillars, to support the water lines/U.G.S. before the temporary supports are removed and filling of trenches is done.
- vi) If necessary, the excavation below sub soil water level shall be classified as excavation in saturated soil. The trench shall be kept in dry condition during the laying

- of pipelines and construction of manholes etc.
- vii) Existing drains shall not be blocked by excavated earth or any other materials, the bidder shall ensure that sullage/storm waterflowsuninterruptly.

16.0 BarBendingSchedule

The Bidder will be required to prepare the bar bending schedule prior to taking up all the reinforcement cutting and bending works at site. No reinforcement work will be allowed without the bar bending schedule.

Note: All the data and details as provided are indicative only and bidders are advised to verify them before submission of their offer.No extra payments shall be made against any discrepancy found anywhere in the bid document.

F. DESIGN OF CIVIL WORKS

17.0 GENERAL

This part of the specification covers the design load stobe considered and specifications of material and workmanship for the civil works. Material used and workmanship for the works to be done under the contract will adhere to the provisions laid down in this chapter.

The bidder shall have to get Soil Analysis carried out for determining the Safe Bearing Capacity(SBC)of the soil as per relevant code through are puted firm.The charges for the same shall be included in the offer.The lesser SBC out of the two i.e. one which is given in the tender and other one got carried out by thebidder will befollowed for design of foundation of various structures.Nothing extra shall be paid due to decrease in SBC.

The bidder should ascertain the actual subsoil Water Table at site.Price quoted shall be inclusive of cost of pumping subsoil water/see page water from any other source required for execution of work.No extra payment shall be made due to variation in actual SubSoilWater Level from the level mentioned any where in the tender documents either for design or execution.

For materials for which specifications are not given, the requirements of respective Indian Standards are to be fulfilled.The bidder shall get prior approval of the materials proposed to be use dunder the contract from the Engineer-in-Charge.

18.0 Design Considerations:

18.1 DesignSubmissions

The bidder shall be responsible for the safety of structures, correctness of design and drawings, even after the approval of the same by Engineer-in-Charge. Complete detailed design calculations of foundations and superstructure together with general arrangement drawings and explanatory sketches shall be submitted to the Engineer-in-charge. Separate calculations for foundations or superstructures submitted independent of each other shall be

deemed to be incomplete and will not be accepted by the Engineer-in-charge.

The design considerations described hereunder establish the minimum basic requirements of plain and reinforced concrete structures, masonry structures and structural steel works. However, any particular structure shall be designed for the satisfactory performance of the functions for which the same is being constructed.

18.0 Design Considerations:

18.1 Design Submissions

The bidder shall be responsible for the safety of structures, correctness of design and drawings, even after the approval of the same by Engineer-in-Charge. Complete detailed design calculations of foundations and superstructure together with general arrangement drawings and explanatory sketches shall be submitted to the Engineer-in-charge. Separate calculations for foundations or superstructures submitted independent of each other shall be deemed to be incomplete and will not be accepted by the Engineer-in-charge.

The design considerations described hereunder establish the minimum basic requirements of plain and reinforced concrete structures, masonry structures and structural steel works. However, any particular structure shall be designed for the satisfactory performance of the functions for which the same is being constructed.

18.2 Design Standards

All designs shall be based on the specifications as specified in clause 13.0 of above otherwise mentioned in this tender document.

18.3 Design Loading

18.3.1 General

All buildings and structures shall be designed to resist the worst combination of the following loads/ stresses: dead load, live load, vibration, wind load, seismic load, stresses due to temperature changes, shrinkage and creep in materials dynamic load, vehicular load etc.

i) Dead Load

Dead load shall be as per BIS:875 (Part I to V).

ii) Live Load

Live loads shall be in general as per BIS:875 (Part I to V). However, for various plant buildings, the loads shall be checked against manufacturer's specifications and the more stringent of the a fore mentioned loads shall be used for design.

In the absence of any suitable provisions for live loads in BIS codes or as given above for any particular type of floor of structure, assumptions made must receive the approval of the Department/prior to taking up the design work. Apart from the specified live loads or any other

load due to material stored, any other equipment load or possible over loading during maintenance or erection shall be considered and shall be partial or full whichever causes the most critical condition.

iii) Wind Load

Wind loads shall be as per BIS:875 (Part I to V).

iv) Earthquake Load

Earthquake load shall be computed as per B.I.S. 1893 taking into consideration soil foundation system, importance factor appropriate to the type of structure, basic horizontal seismic coefficient/seismic zone factor & average acceleration coefficient as applicable as per BIS1893 falls under Zone IV.

Importance factor shall be taken as per Table 6 (Clause 6.4.2) of IS1893 (PartI) 2002. The soil foundation system coefficient shall be considered as 1.2.

v) Dynamic Load

Dynamic Loads due to working of machines/equipments such as pumps, blowers, compressors, switch gears, travelling cranes, etc. shall be considered in the design of structures as given by the manufacturers or in BIS code, which ever is more.

vi) Vehicular Load

IRCClass AA (wheeled vehicle) loading shall be considered for design of structures under or by the side of roads.

Design Specifications

18.4 Design Conditions for Underground or Partly Underground Liquid Retaining Structures with Ferrocement

Liquid retaining/conveying structures including the members and covering of the same (such as roof of a chamber, channel etc.) shall be designed by uncracked method of design as per BIS:3370, 6494 and 13356. Relevant Manuals issued by the Government of Indian or Other State Government can be used. Wherever IS codes are not available suitable International codes can also be used, Basement RCwalls and slabs below ground shall also be designed by uncracked method of design as liquid retaining structures. Shear shall be checked by working stress method as per BIS: 456. Minimum temperature and shrinkage reinforcement shall be **0.35%** in each direction.

All underground or partly under ground liquid containing structures shall be designed for the following conditions:

- a) Liquid depth up to full height of wall including free board: no relief due to soil pressure from outside to be considered;
- b) Structure empty (i.e. empty of liquid, any material, etc.): full earth pressure and surcharge pressure wherever applicable, to be considered;
- c) Partition wall between dry sump and wet sump: to be designed for full liquid depth up

-
- to full height of wall; i.e. free board
 - d) Partition wall between two compartments: to be designed as one compartment empty and other full including free board;
 - e) Structures shall be designed for uplift in empty conditions with the water table and due care should be taken for seasonal variation on higher side. Factor of safety against uplift shall be 1.2.
 - f) Walls shall be designed under operating conditions to resist earthquake forces from earth pressure mobilization and dynamic water loads;
 - g) Underground or partially underground structures shall also be checked against stresses developed due to any combination of full and empty compartments with appropriate ground/uplift pressures below base slab. The design shall be such that the minimum gravity weight (empty conditions) exceeds the uplift pressure at least by 20%.
 - h) For design purpose, sub soil water level is to be considered as the higher of follows:
 - one meter below the average natural ground level
 - As per the soil report
 - (i) The structure should also be checked for relevant earthquake loads when the structure is not fully propped.

18.5 Foundations

All the data and details as provided are indicative only and bidders are advised to verify them before submission of their offers. Bearing capacity of soil shall be determined as per BIS:6403. No extra payment shall be made against any discrepancies in the above documents.

Foundation depths and the type of footings shall be appropriately computed from the parameters given in the soil report or obtained during the soil testing by the bidder whichever is stringent, and got reviewed and approved by department.

Earth fill above virgin ground level till formation level shall be taken as a surcharge load and shall be added in the loads coming on foundations appropriately.

In some special cases, where bidder wishes to provide the footing in continuation of the sloping floor and taking the wall footing to the minimum depths as mentioned below is not possible, the short fall in the founding depth shall be made up by PCC fill of grade M-10.

The minimum depth of foundations for all structures, equipments, buildings and frame foundations and load bearing walls shall be as per the recommendation of BIS provided adequate bearing pressure is available at that depth.

Care shall be taken to avoid disturbing the foundations of adjacent buildings or structure foundations, either existing or not with in the scope of this contract. Suitable adjustments in depth, location and sizes may have to be made depending onsite conditions. No extra claims for such adjustments shall be accepted by Employer.

A structure subjected to ground water pressure shall be designed to resist floatation. The dead weight of empty structure shall provide a factor of safety of 1.2 against uplift during construction and service.

Where there is level difference between the natural ground level and the foundations of structure or floor slabs, this difference shall be filled up in the following ways.

In case of non-liquid retaining structures the natural top soil shall be removed, if required, till a firm strata is reached (minimum depth of soil removed shall be 500 mm) and the level difference shall be made up as per specifications. However the thickness of each layer shall not exceed 150 mm. The area of backfilling for floor slabs shall be confined to prevent soil from slipping out during compaction.

In case of liquid retaining structures, the natural top soil shall be removed, if required, as described above and the level difference shall be made up with Plain Cement Concrete of M- 10 grade.

Wherever the plinth level is above the ground level, a curtain wall shall have to be provided from plinth level upto 300 mm below ground level, but not less than 1m in total height.

18.6 Design Requirements

18.6.1 General

The Civil & Structural design shall be carried out in accordance to BIS:456 and BIS:3370 and other relevant Indian Codes. For the seismic forces, the structure should be designed as per IS: 1893 and all the factors as applicable as per BIS.

Special care should be taken for design of base slab of tanks having liquid depth more than 5 meters. Such base slabs should be designed for a settlement of 40 mm before laying the mud mat concrete. In case the soil conditions so require, the area for the base slab should be compacted with coarses and till 90% proctor density is achieved.

The following are the design requirements for all reinforced or plain concrete structures.

- a) All binding and leveling concrete shall be of minimum 100 mm thickness of concrete mix- M10, unless otherwise specified.
- b) Liquid Retaining Structures: The mortar used for construction of Ferrocement tank shall not be less than 0.5:1 or according to relevant IS/International Standards..
- c) Wire netting used or chicken or woven mesh used shall be of relevant IS standard. The mesh shall be corrosion free and shall have suitable tensile strength. Min Three layers of mesh shall be used for construction of tank and shall be approved by engineer incharge.
- d) Any structure or pipeline crossing below roads shall be designed for Class AA of IRC loading or as classified by the respective authority. NP3 RCC pipe (with encasing) shall be used below roads inside the plant.
- e) All pipes and conduits laid below the structural units shall be embedded in reinforced concrete of grade M20 of minimum thickness 150 mm.
- f) Suitable admixtures may be used in concreterwork, with the approval of engineer in charge.

18.6.2 Minimum Thickness

The following minimum thickness shall be used for differentre in forced concrete members, irrespective of design thickness.

(i)	Walls for ferrocement liquid retaining structures	75mm
(ii)	Roof slabs for liquid retaining structures(ferrocement)	75mm
(iii)	Bottom slabs for liquid retaining structures	150mm

19.0 Materials & Standards

The term “materials” shall mean all materials, goods and articles of every kind whether raw, processed or manufactured and equipment and plant of every kind to be supplied by the Bidder for incorporation in the Works.

Except as may be otherwise specified for particular parts of the works the provision of clauses in “Materials and Workmanship” shall apply to materials and workmanship for any part of the works.

All materials shall be new and of the kinds and qualities described in the Contract and shall be at least equal to approved samples.

Materials and workmanship shall comply with the relevant CPWD Specification (with amendments) current as on the date of submission of the tender.

Where the relevant standard provides for the furnishing of a certificate to the Engineer-in-charge, at his request, stating that the materials supplied comply in all respects with the standard, the Bidder shall obtain the certificates and forward it to the Engineer-in-charge.

The specifications, standards and codes listed below are considered to be part of this Bid specification. All standards, specifications, codes of practices referred to herein shall be the latest editions including all applicable official amendments and revisions as on the date of submission of the tender.

In case of discrepancy between two standards the provisions more stringent shall be followed.

BIS No.	Title
4082	: Recommendation on stacking and storage of construction materials at site (first revision)
7969	: Safety code for handling and storage of building materials
1498	: Classification and identification of soils for general engineering Purposes (first revision) (Amendments 2) (Reaffirmed)
2682 : 1984	: Chlordane emulsifiable concentrates (second revision) (Amendment 1) (Reaffirmed 1994)
3764: 1992	: Excavation work - Code of safety (first revision)
6313(Part2)	: Code of practice for anti-termite measures in buildings: Part 2 Pre-constructional chemical treatment measures (Reaffirmed)
875 (Part 1)	: Code of practice for design loads (other than earthquake) for buildings and structures : Part 1 Dead loads -Unit weights of building material and stored materials
875 (Part 2)	: Code of practice for design loads (other than earthquake) for buildings and structures :Part 2 Imposed loads
875 (Part 3)	: Code of practice for design loads (other than earthquake) for buildings and structures :Part 3 Wind loads
875 (Part 4)	: Code of practice for design loads (other than earthquake) for buildings and structures :Part 4 Snow loads

875 (Part 5)	:	Code of practice for design loads (other than earthquake) for buildings and structures :Part 5 Special loads and load combinations
1080 : 1986	:	Code of practice for design and construction of shallow foundations on soils (other than raft, ring and shell)
1904	:	Code of practice for design and construction of foundations in soils: General requirements
2950(Part1)	:	Code of practice for design and construction of raft foundations: Part1 Design
2974(Part1)	:	Code of practice for design and construction of machine foundations: Part 1 Foundations for reciprocating type machines
2974(Part2) : foundations:Part 2 foundations)	:	Code of practice for design and construction of machine Foundations for impact type machines (hammer
2974(Part3)	:	Design and construction of machine foundations- Code of practice:Part3 Foundations for rotary type machines (medium and high frequency)
2974(Part4)	:	Code of practice for design and construction of Machine foundations: Part 4 Foundations for rotary type machines of Low frequency
2974(Part5)	:	Code of practice for design and construction of machine foundations: Part 5 Foundation for impact machines other than hammers (forging and Stamping press, pigbreakers, drop crusher and jolter)
6403	:	Code of practice for determination of bearing capacity of shallow foundations.
8009(Part1)	:	Code of practice for calculation of settlement of foundations : Part 1 Shallow foundations subject to symmetrical static vertical loads
8009(Part2)	:	Code of practice for calculation of settlement of foundations: Part 2 Deep foundations subjected to symmetrical static vertical loading.
11089	:	Code of practice for design and construction of ring foundation
13094	:	Guidelines for selection of ground improvement techniques for foundation in weak soils.
13301	:	Guidelines for vibration isolation for machine foundations
SP36(Part2)	:	Compendium of Indian Standards on soil engineering:Part 2 Field testing 1988
2720 (Parts1to41)	:	Methods of test for soils
6452	:	Specification for high alumina cement for structural use
6909	:	Specification for super sulphated cement
8041	:	Rapid hardening Port land cement
8042	:	White Port land cement
8043	:	Hydrophobic Port land cement
8112	:	43 grade ordinary Port land cement
13330	:	Sulphateresisting Port land Cement
383	:	Coarse and fine aggregates from natural sources for concrete
432 (Part 1&2)	:	Mild steel and medium tensile steel bars and hard-drawn steel wire for Concrete reinforcement
456	:	Code of practice for plain and reinforced concrete
516	:	Method of test for strength of concrete
650	:	Standards and for testing of cement

1199	:	Methods of sampling and analysis of concrete
1343	:	Code of practice for Prestressed concrete
1566	:	Hard-drawn steel wire fabric for concrete reinforcement
1786	:	High strength deformed steel bars and wires for concrete reinforcement
2386(Part 1-8)	:	Methods of for test aggregates for concrete
2502	:	code of practice for bending and fixing of bars for concrete reinforcement
2595	:	Code of practice for radiographic testing
2645	:	Integral cement waterproofing compounds
3025	:	Methods of sampling and test (physical and chemical) for water used in industry
3085	:	Method of test for permeability of cement mortar & concrete
3370(Part 1-4)	:	Code of practice for concrete structures for the storage of liquids
3466	:	Masonry cement
3812	:	Fly ash for use as pozzolana and admixture
4031 (Part 1)	:	Methods of physical tests for hydraulic cement: Part 1 Determination of fineness by drysieving
5816	:	Method of test for splitting tensile strength of concrete cylinders
6452	:	Specification for high alumina cement for structural use
7861 (Part 1)	:	Code of practice for extreme weather concreting :Part 1 Recommended practice for hotweather concreting
7861 (Part 2)	:	Code of practice for extreme weather concreting: Part 2 Recommended practice for coldweather concreting
8142	:	Method of test for determining setting time of concrete by penetration resistance
9012	:	Recommended practice for Concreting
9013	:	Method of making, curing and determining compressive strength of accelerated curedconcrete test specimens
9077	:	Code of practice for corrosion protection of steel reinforcement in RB and RCC construction
9103	:	Admixtures for concrete
9284	:	Method of test for abrasion resistance of concrete
10262	:	Recommended guidelines for concrete mix design
13311 (Part 1):	:	Non-destructive testing of concrete - Methods of test : Part 1 Ultrasonic pulse velocity
13311 (Part 2) :	:	Non-destructive testing of concrete - Methods of test : Part 2 Rebound hammer
SP 20(S&T) :	:	Handbook on masonry design and construction
SP 21(S&T) :	:	Summaries of Indian Standards for building materials
SP 23(S&T) :	:	Handbook on concretemixes (based on Indian Standards)
SP 24(S&T) :	:	Explanatory handbook on Indian Standard Code for plain and reinforced concrete
SP 34 (S & T) :	:	Handbook on concrete reinforcement and detailing
3696 (Part 1) :	:	Safety code of scaffolds and ladders : Part 1 Scaffolds
4014 Part 1 & 2:	:	Code of practice for steel tubular scaffolding
2116	:	Sand form a sonrymortars
2212	:	Code of practice for brick work
2250	:	Code of practice for preparation and use of masonry mortars
SP 25 (S & T) :	:	Handbook on caused and prevention of cracks in building

1123	:	Method of identification of natural building stones
1127	:	Recommendations for dimensions & workmanship of natural building stones for masonrywork
1129	:	Recommendation for dressing of natural building stones
1597 (Part 1)	:	Code of practice for construction of stone masonry : Part 1 Rubble stonemasonry
3622	:	Specification for sandstone (slab and tiles)
4101 (Part 1)	:	Code of practice for external facing and veneers: Part 1 Stone facing
303	:	Plywood for general purposes
4990	:	Plywood for concrete shuttering work
6313 (Part 1)	:	Code of practice for anti-termite measures in buildings : Part 1 Constructional measures
6313 (Part 2)	:	Code of practice for anti-termite measures in buildings : Part 2 Pre- constructional chemical treatment measures(first revision) (Amendments 3)
737	:	Wrought aluminium and aluminum alloy sheet and strip for general engineering purposes
883	:	Design of structural timber in building - Code of practice
1003 (Part 1)	:	Timber panelled and glazed shutters: Part 1 Door shutters
1003 (Part 2)	:	Timber panelled and glazed shutters : Part 2 Window and ventilator shutters
1038	:	Steel doors, windows and ventilators
1081	:	Code of practice for fixing and glazing of metal (steel and aluminium) doors, windows and ventilators
1361	:	Steel windows for industrial buildings, ventilation blinds for windows
1826	:	Venation blinds for windows
1948	:	Aluminum doors, windows and ventilators
1977	:	Structural steel (ordinary quality)
2062	:	Steel for general structural purposes
2191 (Part 1)	:	Wooden flush door shutters (cellular & hollow core type):Part 1 Plywood face panels
2202 (Part 1)	:	Wooden flush door shutters (solid core type) : Part 1 Plywood face panels
2202 (Part 2)	:	Wooden flush door shutters (solid core type): Part 2 Particle board and hard board facepanels
3548	:	Code of practice for glazing in building
3629	:	Specification for structural timber in building (first revision) (Reaffirmed 1991)
4020(Parts1-16):	:	Door shutters, method of test
4021	:	Timber door, window and ventilator frames
4351	:	Specification for steel door frames
4913	:	Code of practice for selection, installation and maintenance of timber doors and windows
4962	:	Specification for wooden side sliding doors
5509	:	Fire retardant plywood
5539	:	Specification for preservative treated plywood
6248	:	Specification for metal rolling shutters and rolling grills
7205	:	Safety code for erection of structural steel work

7452	: Hot-rolled steel sections for doors, windows and ventilators
12896	: Classification of Indian timbers for door and window shutters and frames
2074	: Ready mixed paint, air drying, redoxide-zincchrome, priming
809	: Rubber flooring materials for general purposes
1195	: Bitumenmastic for flooring
1196	: Code of practice for laying bitumenmastic flooring
1197	: Code of practice for laying of rubber floors
1198	: Code of practice for laying, fixing and maintenance of linoleum floor
1237	: Cement concrete flooring tiles
1322	: Bitumen feltsfor waterproofing and damp-proofing
1443	: Code of practice for laying and finishing of cement concrete flooring tiles
1580	: Bituminous compounds for water proofing and caulking purposes
1609	: Code of practice for laying damp-proofing treatment using bitumen felts
1661	: Code of practice for application of cement and cement-lime plaster finishes
2114	: Code of practice for laying in-situ terrazzo floor finish
2571	: Code of practice for laying in-situ cement concrete flooring
3384	: Specification for bitumen primer for use in waterproofing and damp proofing
3414	: Code of practice for design and installation of joints in buildings
3461	: Specification for PVC - asbestos floor tiles
3462	: Specification for unbacked flexible PVC flooring
3478	: Specification for high density wood particle boards
3502	: Steel Chequered plates
3629	: Specification for structural timber in building
3670	: Code of practice for construction of timber floors
4443	: Code of practice for use of resintypechemical resistant mortars
4457	: Ceramicung lazedvit reousacidre sistingtile
4631	: Code of practice for laying of epoxyres in floor toppings
4860	: Acid resistant bricks
4971	: Recommendations for selection of industrial floor finishes
5318	: Code of practice for laying of flexible PVC sheet and tile flooring
5389	: Code of practice for laying of hardwood parquet and wood block floors
5491	: Code of practice for laying of in-situgranolithic concrete flooring topping
9197	: Epoxyresin, hardness and epoxyres incompositions for floor toppings
9472	: Code of practice for laying mosaic parquet flooring
10440	: Code of practice for construction of RB and RBC floors and roofs
459	: Corrugated and semi-corrugated asbestos cement sheets
777	: Glazed earthen ware walltiles
1414	: Code of practice for fixing wall covering
1661	: Code of practice for application of cement and cement-limeplaster finishes
1946	: Code of practice for use of fixing devices in walls, ceilings and floors of
Solid construction	
2095	: Gypsum plaster boards
2098	: Asbestos cement building boards
2402	: Code of practice for external rendered finishes
2441	: Code of practice for fixing ceiling covering
3630	: Code of practice for construction of non-load bearing gypsum block partitions
4671	: Expanded polystyrene for thermalinsulation purposes
5390	: Code of practice for construction of timber ceiling

5509	: Fireretardant plywood
7316	: Decorative plywood using plurality of veneers for decorative faces
1322	: Bitumen felts for waterproofing and damp-proofing
1346	: Code of practice for water proofing of roofs with bitumen felts
1580	: Bituminous compounds for water proofing and caulking purposes
1609	: Code of practice for layingdamp-proofing treatment using bitumenfelts
1834	: Hot applied sealing compound for joint in concrete
2508	: Low density polyethylene films
2527	: Code of practice for fixing rain water gutters and downpipes for roof drainage
2645	: Integral cement waterproofing compounds
3037	: Bitumenmastic for use in water proofing of roofs
3067	: Code of practice for general design details and preparatory work for damp-proofing and water proofing of buildings
3384	: Specification for bitumen primer for use in waterproofing and damp proofing
4365	: Code of practice for application of bitumenmastic for water proofing of roofs
5871	: Bitumenmastic for tanking and damp-proofing
6494	:Code of practice for water proofingofundergroundwaterreservoirsand Swimming pools
7198	: Code of practice for damp-proofing using bitumenmastic
7290	: Recommendations for use of polyethylenefilm for water proofing of roofs
9759	: Guidelines for dewatering during construction
13182	: Waterproofing and damp-proofing of wet areas in building Recommendations
1172	: Code of basic requirements of water supply, drainage and sanitation
1239 (Part 1)	: Mild steel tubes, tubular and other wrought steel fittings : Part 1 Mild steel tubes
1536	: Centrifugally cast (spun) iron pressure pipes for water, gas and sewage
1537	: Vertically cast iron pressure pipes for water, gas and sewage
1592	: Asbestos cement pressure pipes
3114	: Code of practice for laying of cast iron pipes
5822	: Code of practice for welded steel pipes for water supply
12288	: Code of practice for for laying of Ductile Iron Pipes for water supply
9523	: Ductile of iron fittings for pressure for water , gas and sewage
1626 (Part 1)	:Asbestos cement building pipes and pipe fittings, gutters and gutter fittings and roofing fittings Part 1 (Pipe and pipe fittings)
2064	: Selection, installation an maintenance of sanitary appliances - Code of practice
3076	: Low density polyethylene pipes of potable water supplies; sewage and industrial effluents
4984	: Specification for high density polyethylene pipes for potable water supplies; sewage and industrial effluents
4985	: Specification for unplasticised PVC pipes for potable water supplied
7634 (Part 2)	: Code of practice for plastics pipe work for potable water supplies: Part 2 Laying and jointing polyethylene (PE) pipes
7634 (Part 3)	: Code of practice for plastics pipe work for potable water supplies : Part 3 Laying and jointingof UPVC pipes
1916	:Steel cylinder pipes with lining and coating

4127	: Code of practice for laying of salt glazed stoneware pipes
12709	: Glass fibre reinforced plastic pipes, joints and rings for potable water supply
3597	: Concrete pipes-methods of test
7319	: Perforated concrete pipes
NBC	: National Building Code of India
SP 35(S& T)	: Handbook of water supply and drainage with special emphasis on plumbing
277	: Galvanized steel sheet (plain and corrugated)
458	: Precast concrete pipes (with and without reinforcement)
651	: Salt glazed stoneware pipes and fittings
782	: Caulking lead
783	: Code of Practice for laying of concrete pipes
1626 (Part 1)	: Asbestos cement building pipes and pipe fittings, gutters and gutter fittings and roofing fittings : Part 1 (Pipe and pipe fittings)
1742	: Code of Practice for building drainage
3006	: Specification for chemical lyresistant glazed tone ware pipes and fittings
4111(Parts1to5)	: Code of Practice for ancillary structures in sewerage system
4733	: Methods of sampling and test for sewage effluents
12592(Parts1&2)	: Precastmanholecovers & frames
2470 (Parts1&2)	: Code of Practice for installation of septic tank
784	: Prestressed concrete pipes
1893	: Criteria for earthquake resistant design of structures
4326	: Earthquake resistant design and construction of buildings-Code of practice
13920	:Ductile detailing of reinforced concrete structures subjected to seismic forces-Code of practice
13935	: Repair and seismic strengthening of buildings - Guidelines
2190	: Selection, installation and maintenance of first-aid fire extinguishers - Code of practice
3696 (Part 2)	: Safety code of scaffolds and ladders: Part 2 Ladders
4912	: Safety requirements for floor and wall openings, railings and toe boards
10005	: S.I. units and recommendations for use of their multiples and of certain other units
6060	: Code of practice for day lighting of factory buildings
3103	: Code of practice for industrial ventilation
3483	: Code of practice for noise reduction in industrial buildings
2440	: Guide for day lighting of buildings
1200(1to28)	: Method of measurement of Building and Civil Engg.Works
7973	: Code of practice for architectural and building working drawings
962	: Code of practicefor architectural and building drawings
13415	: Code of safety for protective barrier in and around buildings
8969	: Safetycodeforerectionofconcreteframedstructures

In addition to the above-referred codes, CPHEEO manual and other relevant codes shall be applicable as per requirement.

Copies of all relevant codes, reference literature are to be submitted to the Employer.

20.0 Samplesand TestsofMaterials

The Bidder shall submit samples of such materials as may be required by the Engineer-in-charge and shall carry out the specified tests directed by the Engineer-in-charge at the Site, at the supplier's premises or at a laboratory approved by the Engineer-in-charge. Samples shall be submitted and tests carried out sufficiently early to enable further samples to be submitted and tested if required by the Engineer-in-charge.

The cost of such tests and material are to be borne by the bidder and nothing shall be paid on this account.

G. EARTHWORK

21.0 GENERAL

Excavation may be involved in all types of soils including rock, saturated soil, sub-soil water or running sand. It may also include pumping or bailing out of water.

The Bidder shall furnish all tools, plant instruments, qualified supervisory personnel, labour, materials, any temporary works, consumables and anything else necessary, for completion of the work in accordance with the Employer's requirements, whether or not such items are specifically stated herein.

The Bidder shall survey the site before excavation and set out all lines and establish levels for various works such as grading, basement, foundations, plinth filling, roads, drains etc. Such survey shall be carried out by taking accurate cross sections of the area perpendicular to established reference/grid lines at 10 m and 30 m intervals or nearer in case of buildings and roads and pipe lines works respectively.

The excavation shall be carried out to correct lines and levels. This shall also include, where required, proper shoring to maintain excavations and also the furnishing, erecting and maintaining of substantial barricades around excavated areas and warning lamps at night.

Excavated material shall be dumped in regular heaps, bunds, riprap with regular slopes and leveling the same so as to provide natural drainage. Rock/soil excavated shall be stacked properly as approved by the Engineer-in-charge. As a rule, all softer material shall be laid along the centre of heaps, the harder and more weather resisting materials forming the casing on the sides and the top.

Topsoil shall be stockpiled separately for later use.

22.0 Excavation

Excavation for permanent work shall be taken out to such widths, lengths, depths and profiles as are shown on the approved drawings or such other lines and grades as may be agreed with the Engineer-in-charge. Rough excavation shall be carried out to a depth of 150 mm above the final level. The balance shall be excavated with special care. Soft pockets shall be removed below the final level and extra excavation filled up with material as approved by the Engineer-in-charge. The final excavation should be carried out just prior to laying the blinding course.

To facilitate the permanent works the Bidder may excavate, and also backfill later, outside the lines shown on the approved drawings or as agreed with the Engineer-in-charge. Should any excavation be taken below the specified elevations, the Bidder shall fill it up with concrete up to the required elevation at no cost to the department.

Any undulation in ground level, loose pockets or extra excavation done at “wherever necessary due to soft soil or low lying area shall be made good with M10 cement concrete and no extra claim shall be entertained on this account.

All excavations shall be to the minimum dimensions required for safety and ease of working. Prior approval of the Engineer-in-charge shall be obtained by the Bidder in each individual case, for the method proposed for the excavation, including dimensions, side slopes, dewatering, disposal, etc. This approval, shall not in any way relieve the Bidder of his responsibility for any consequent loss or damage. The excavation must be carried out in the most expeditious and efficient manner. Side slopes shall be as steep as will stand safely for the actual soil condition encountered. Every precaution shall be taken to prevent slips. If slips occur, the slipped material shall be removed and the slope shall be dressed to a modified stable slope.

All loose boulders, detached rocks partially and other loose material which might move therewith not directly in the excavation but so close to the area to be excavated as to be liable, in the opinion of Engineer-in-charge, to fall or otherwise endanger the workmen, equipment, or the work shall be stripped off and removed from the area of the excavation. The method used shall be such as not to render unstable or unsafe the portion, which was originally sound and safe.

Any material not requiring removal in order to complete the permanent works, but which, in the opinion of Engineer-in-charge, is likely to become loose or unstable later, shall also be promptly and satisfactorily removed.

23.0 Fill, Back filling and Site Grading

23.1 General

All fill material shall be subject to the Engineer-in-charge's approval. If any material is rejected by Engineer-in-charge, the Bidder shall remove the same forthwith from the site. Surplus fill material shall be deposited/disposed off as directed by Engineer-in-charge after the fill work is completed.

No earth fill shall commence until surface water discharges and streams have been properly intercepted or otherwise dealt with to the approval of the Engineer-in-charge.

23.2 Material

To the extent available, selected surplus soil from excavations shall be used as back fill. Back fill material shall be free from lumps, organic or other foreign material. All lumps of earth shall be broken or removed unless otherwise stated. Where excavated material is mostly rock, the boulders shall be broken into pieces not larger than 150 mm size, mixed with properly graded fine material consisting of murum or earth to fill the voids and the mixture used for filling.

If fill material is required to be imported, the Bidder shall make arrangements to bring such material from outside borrow pits. The material and source shall be subject to the prior approval of the Engineer-in-charge. The approved borrow pit areas shall be cleared of all bushes, roots of trees, plants, rubbish, etc. Top soil containing foreign material shall be removed. The materials so removed shall be disposed of as directed by Engineer-in-charge. The Bidder shall provide the necessary access roads to borrow areas and maintain the same if such roads do not exist.

23.3 Filling in pits and trenches around foundations of structures, walls, etc.

The spaces around the foundations, structures, pits, trenches, etc., shall be cleared of all

debris, and filled with earth in layers not exceeding 15 cm, each layer being watered, rammed and properly consolidated to the satisfaction of Engineer-in-charge. Earth shall be rammed with approved mechanical compaction machines. Usually no manual compaction shall be allowed unless the Engineer-in-Charge is satisfied that in some cases manual compaction by tampers cannot be avoided. The final backfill surface shall be trimmed and leveled to a proper profile to the approval of the Engineer-in-charge.

The filling shall be done after the concrete or masonry is fully set and done in such a manner as not to cause undue thrust on any part of the structure.

23.4 Plinth Filling

Plinthfilling shall be carried out with approved material such as soil, sand or murum as the case may be, in layers not exceeding 15 cm, watered and compacted with mechanical compaction machines. When filling reaches the finished level, the surface shall be flooded with water, unless otherwise directed, for at least 24 hours, allowed to dry and then the surface again compacted as specified above to avoid settlement at a later stage. The finished level of the filling shall be trimmed to the level/slope specified.

Compaction of large areas be carried out by means of 12 ton rollers smooth wheeled, sheep- foot or wobbly wheeled rollers. In case of compaction of granular material such as sands and gravel, vibratory rollers shall be used. A smaller weight roller may be used only if permitted by the Engineer-in-charge. As rolling proceeds, water sprinkling shall be done to assist consolidation. Water shall not be sprinkled in case of sandy fills.

The thickness of each unconsolidated fill layer can be up to a maximum of 300 mm. The Bidder will determine the thickness of the layers in which fill has to be consolidated depending on the fill material and equipment used and the approval of the Engineer-in-charge obtained prior to commencing filling.

The process of filling in the plinth, watering and compaction shall be carried out by the bidder in such a way as not to endanger the foundation columns, plinth walls etc. already built up. Under no circumstances back cotton soil shall be used for plinth in filling.

Rolling shall commence from the outer edge and progress towards the centre and continue until compaction is to the satisfaction of Engineer-in-charge, but in no case less than 10 passes of the roller will be accepted for each layer.

The compacted surface shall be properly shaped, trimmed and consolidated to an even and uniform gradient. All soft spots shall be excavated, then filled and consolidated.

At some locations/ areas, it may not be possible to use rollers because of space restrictions, etc. The Bidder shall then be permitted to use pneumatic tampers, rammers, etc. and he shall ensure proper compaction.

23.5 Sand Filling in Plinth and Other Places

Where back filling is required to be carried out with locals and it shall be clean, medium grained and free from impurities. The filled-in-sand shall be kept flooded with water for 24 hours to ensure maximum consolidation. The surface of the consolidated sand shall be dressed to required level or slope.

24.0 General Site Grading

Site grading shall be carried out as indicated in the approved drawings.

If no compaction is required, the fill may be deposited to the full height in one operation and leveled. If the fill has to be compacted, it shall be placed in layers not exceeding 200 mm and leveled uniformly and compacted before the next layer is deposited.

To ensure that the fill has been compacted as specified, field and laboratory tests shall be carried out by the Bidder.

Field compaction tests shall be carried out in each layer of filling until the fill to the entire height has been completed. The fill will be considered as incomplete if the desired compaction has not been obtained.

The Bidder shall protect the earth fill from being washed away by rain or damaged in any other way. If any slip occurs, the Bidder shall remove the affected material and make good the slip.

25.0 Fill Density

Unless otherwise specified the compaction, where so called for, shall comply with minimum 90% compaction by Standard Proctor at moisture content differing not more than 4% from the optimum moisture content. The Bidder shall demonstrate adequately by field and laboratory tests that the specified density has been obtained.

26.0 Timber Shoring/Sheet Piling

Timber shoring or Sheet piling will be provided where required, or where stipulated by the Engineer in Charge, and shall be as per the provisions of relevant BIS. No extra claim shall be entertained on this account.

27.0 Dewatering

The Bidder shall ensure at his cost that the excavation and the structures are free from water during construction and shall take all necessary precautions and measures to exclude ground/rainwater/seepage water so as to enable the works to be carried out in reasonably dry conditions in accordance with the construction programme. Sumps made for dewatering must be kept clear of the excavations/trenches required for further work. The method of pumping shall be approved by Engineer-in-charge, but in any case, the pumping arrangement shall be such that there shall be no movement of subsoil or blowing in due to differential head of water during pumping. Pumping arrangement shall be adequate to ensure no delays in construction. The dewatering shall be continued for at least (7) seven days after the last pour of the concrete. The Bidder shall, however, ensure that no damage to the structure results on stopping of dewatering.

The Bidder shall study the sub-soil conditions carefully and shall conduct any test necessary at the site with the approval of the Engineer-in-charge to test the permeability and drainage conditions of the sub-soil for excavation, concreting etc., below ground level.

The scheme for dewatering and disposal of water shall be approved by the Engineer-in-charge. The Bidder shall suitably divert the water obtained from dewatering from such areas of site where a build up of water in the opinion of the Engineer-in-charge obstructs the progress of the work, leads to unsanitary conditions by stagnation, retards the speed of construction and is detrimental to the safety of men, materials, structures and equipment.

When there is a continuous inflow of water and the quantum of water to be handled is considered in the opinion of Engineer-in-charge, to be large, a well point system-single stage or multistage, shall be adopted. The Bidder shall submit to the Engineer-in-charge, details of his well point system including the stages, the spacing number and diameter of well points, headers etc., and the number, capacity and location of pumps for approval.

If any foundation pits are filled due to accumulation of surface flow during the progress of work or during rainy season, or due to any other cause, all pumping required for dewatering the pits & removing silt shall be done without extra cost.

H. CEMENT CONCRETE

28.0 GENERAL

Cement used shall be of minimum 43 grade Ordinary Portland Cement.

All plain or reinforced cement concrete shall comply with the following specifications unless specified otherwise:

- a) Lean/binding concrete below foundations shall be in the following minimum thicknesses and grades.

Below wall foundations/rafts unless mentioned otherwise- 100mm(M-10)

- b) Structural concrete shall be of the following grades.

Member	M20
Masonry works	C M 1 : 4
Ferro cement tanks mortar	CM 0.5:1

Minimum cover to main reinforcement shall be provided for ferrocement tanks as per relevant standards

Necessary lapping of the reinforcement shall be done as per BIS codes of practice and tied with GI binding wire of required gauge as per IS codes of practice. Welding of reinforcing bars shall not be done. Welding can be permitted by Engineer-in-Charge in exceptional cases where due care will be exercised as per IS Specifications.

The Engineer-in-Charge shall have the right at all times to inspect all operations including the sources of materials, procurement, layout and storage of materials, the concrete batching and mixing equipment and the quality control system. Such an inspection shall be arranged and the Engineer-in-Charge's approval obtained, prior to starting of concrete work. This shall, however, not relieve the Bidder of any of his responsibilities. All materials which do not conform to the specifications shall be rejected. Volumetric mix concrete will not be allowed.

Materials should be selected so that they can satisfy the design requirements of strength, serviceability, safety, durability and finish with due regards to the functional requirements and the environmental conditions to which the structure will be subjected. Materials complying with codes/standards shall generally be used. Other materials may be used after approval of the Engineer-in-Charge and after establishing their performance suitability based on previous data, experience or tests.

The concrete design mix shall be approved by an institute as per the directions of Engineer in

Charge Whenever, there is a change in any constituent of concrete mix e.g. source of aggregates, cement, admixture etc., the mix shall be redesigned to determine the revised proportions of mix to suit the altered conditions and the same shall be got approved again.. Delay in this regard is not attributable to the department.

For Ferrocement tanks the mortar shall be provided with mortar of ration 0.5:1. This shall be approved by the engineer incharge.

The bidder shall install on-site batching plant of minimum capacity 30 cum/hr. The batch plant shall be fully automated. Proper concrete pumping arrangements shall be provided as per approval of Engineer-in-Charge. Concrete for all the works shall be taken from this plant.

29.0 Foundation Bedding

All earth surfaces upon which or against which concrete is to be placed, shall be well compacted and free from standing water, mud or debris. Soft or spongy areas shall be cleaned out and filled with either soil-cement mixture, lean concrete or clean sand compacted as approved by the Engineer-in-Charge. The surfaces of absorptive soils shall be moistened.

30.0 Concreting in extreme weather conditions

During Hot or cold weather concreting should be done as per the procedure set out in IS 7861 (Part I) or IS 7861 (Part II).

Where directed by the Engineer-in-Charge, the Bidder shall spray non-wax based curing compound on unformed concrete surfaces at no extra costs.

31.0 Testing Concrete Structures for Leakage

The Bidder shall take special care for concrete for liquid retaining structures, underground structures and those others specifically called for to guarantee the finish and water tightness.

The Bidder shall make all arrangements including provision of water for hydro-testing of structure as per BIS: 3370 part I, all arrangements for testing such as temporary bulk heads, pressure gauges, pumps, pipe lines etc.

Any leakage that may occur during the hydro-test or subsequently during the defects liability period shall be effectively stopped either by cement/epoxy pressure grouting, guniting or such other methods as may be approved by the engineer-in-charge. All such rectification shall be done by the bidder to the entire satisfaction of the engineer-in-charge at no extra cost to the department.

Hydrostatic test for water tightness shall be done at full storage level i/c free board as may be directed by the Engineer-in-Charge, as described below:

In the case of structures whose external faces are exposed, the requirements of the test shall be deemed to be satisfied if the external faces show no sign of leakage or sweating and remain completely dry during the period of observation of seven days after allowing a seven day period for absorption after filling with water.

In the case of structures whose external faces are buried and are not accessible for inspection, such as underground tanks, the structures shall be filled with water and after the expiry of seven days after the filling; the level of the surface of the water shall be recorded. The level of water shall be recorded again at subsequent intervals of 24 hrs over a period of seven days.

The total drop in surface level over a period for seven days shall be taken as an indication of water tightness of the structure. The Engineer-in-Charge shall decide on the actual permissible nature of this drop in the surface level, taking into account whether the structures are open or closed and the corresponding effect it has on evaporation losses. Unless specified otherwise, a structure whose top is covered shall be deemed to be water tight if the total drop in the surface level over a period of seven days does not exceed 40mm.

Each compartment/segment of the structure shall be tested individually and then all together. For structures such as pipes, tunnels etc. the hydrostatic test shall be carried out by filling with water, after curing as specified, and subjecting to the specified test pressure for specified period. If during this period the loss of water does not exceed the equivalent of the specified rate, the structure shall be considered to have successfully passed the test.

32 Sanitary Items

32.1 Wash Basins

- a) Wash basins shall be of glazed vitreous china flat back/ Surgeon Type as approved by the Engineer-In-Charge and conforming to BIS 2556.

Type	Size
Flat Back	630 x 450 mm
Flat Back	550 x 400 mm
- b) Wash basins shall be of one piece construction, including a combined overflow. All internal angles shall be designed so as to facilitate cleaning. Each shall have rim sloping inside towards the bowl on all sides except skirting at the back. Basins shall be provided with single or double tap holes as approved. The tap holes shall be square. A suitable tap hole button shall be supplied if one tap hole is not required in installation. Each basin shall have a circular waste hole to which the interior of basin shall drain. The waste hole shall be either rebated or bevelled internally with diameter of 65 mm at top and a depth of 10 mm to suit a waste plug having 64 mm diameter. Each basin shall be provided with nonferrous 32 mm waste fittings. Stud slots to receive the brackets on the underside of the wash basins shall be suitable for a bracket with stud not exceeding 13 mm diameter, 5 mm high and 305 mm from the back of basin to the centre of the stud. The stud slots shall be of depth sufficient to take 5 mm stud. Every basin shall have an integral soap holder recess or recesses which shall fully drain into the bowl. The position of the chain stay-hole shall not be lower than the overflow slot. A slot type of overflow having an area of not less than 5 sq.cm. shall be provided and shall be so designed as to facilitate cleaning of the overflow. The Department's Requirements for waste plug, chain and stay shall be the same as given for sinks.
- c) All the waste fittings shall be chromium plated, Bottle trap shall conform to BIS 5434. The chromium plating shall be of service grade No. 2 conforming to BIS 1068.
- d) Wash Basins shall be provided with Marble/Granite counter 18 mm thick gang saw cut mirror polished, machine cur and shall be laid over 20 mm thick base cement mortar 1:4 with joints treated with white cement.

32.2 Sinks

- a) The sinks shall be of stainless steel as approved by Engineer-In-Charge conforming to IS: 13983. The size shall be as per specifications confirming to IS: 13983.

- b) They shall be of one piece construction, including a combined overflow. The floor of the sink shall gently slope towards the outlet. Each sink shall be provided with a non-ferrous 40 mm dia. waste fitting. The sink shall have overflow of the weir type and the inverts shall be 30 mm below the top edge. Each sink shall be provided with a waste plug, of suitable dia. chain and stay. The plug shall be of rubber or other equally suitable material and shall be water tight when fitted. Plug chains shall be of brass wire chromium plated. It shall have an overall length from the collar to the stay of not less than 300 mm. The waste fittings and plug fittings shall be chromium plated. The chromium plating shall be of service grade No. 2 conforming to BIS. 1068.

32.3 Stop Cock and Bib Cock

A bibcock (bibtap) is a draw off tap with a horizontal inlet and free outlet and stopcock (stoptap) is a valve with a suitable means of connections for insertion in a pipeline for controlling or stopping the flow. They shall be of specified size and shall be of the screw down type. The closing device should work by means of a disc carrying a renewable non-metallic washer, which shuts against water pressure on a seating at right angles to the axis of the threaded spindle which operates it. The handle shall be either crutch or butterfly type securely fixed to the spindle. The cocks shall open in anti-clockwise direction. When the bib cocks and stop cocks are required to be chromium plated, the chromium plating shall be of service Grade No. 2 conforming to IS 1068 in finish and appearance, the plated articles shall be free from plating defects such as blisters, pits, roughness and shall not be stained or discoloured.

These fittings shall be of brass heavy class; chromium plated (C.P.) and of approved manufacture and pattern with screwed or flanged ends as specified. The fittings shall in all respects comply with the requirements of BIS 781. The standard size of brass fittings shall be designated by the nominal bore of the pipe to which the fittings are attached. A sample of each kind of fitting shall be approved by the Employer and all supplies made according to the approved samples.

All cast fittings shall be sound and free from laps, blow holes and fittings, both internal and external surfaces shall be clean, smooth and free from sand etc. Burning, plugging stopping or patching of the casting shall not be permitted. The bodies, bonnets, spindles and other parts shall be truly machined and when assembled the parts shall be axial, parallel and cylindrical with surfaces smoothly finished. The area of the water way of the fittings shall not be less than the area of the nominal bore.

The fittings shall be fully examined and cleared of all foreign matter before being fixed. The fittings shall be fitted in the pipeline in a workman like manner. The joints between fittings and pipes shall be made leak-proof. The joints and fitting shall be leak proof when subjected to a pressure test approved by the Employer's Representative and the defective fittings and joints shall be replaced or redone.

32.4 PVC Soil Waste and Vent Pipes and Fittings

All PVC pipes and fittings shall conform to BIS 13592 Type A.

Pipes shall be fixed to the wall by W.I. or M.S. holder bat clamps, unless projecting ears with fixing holes are provided at socket end of pipe. The clamps shall be fixed to the walls by embedding their hooks in cement concrete blocks (1:2:4) 10 cm x 10 cm making necessary holes in the walls at proper places. All holes and breakages shall be made good. The clamps shall be kept 25 mm clear of the finished face of the walls to facilitate cleaning and painting

of pipes.

32.5 Frame and Covers

Frame and covers for manholes shall be of required type and dimensions as per the relevant drawings prepared by the Bidder. The following information shall be clearly marked on each cover.

- i) Year of Manufacture,
- ii) Identification mark of the purchaser,
- iii) Sewers/ Storm water drainage (SWD)/Water whatever the case may be, a) Steel Fiber Reinforced Concrete (SFRC) Cover. Steel Fiber Reinforced Concrete (S.F.R.C.) cover and frame (heavy duty, HD – 20 grade designation) of suitable size confirming to IS: 12592 shall be provided by the bidder. Cover shall be designed and provided with MS Rims of adequate thickness welded around with provision of lifting hooks welded at appropriate locations. MS rims and cover shall be suitably quoted using corrosion resistant paint. Cover shall be suitably marked on the top surface clearly indicating – Employer's Name/Sewer or SWD or Water/ Grade/Date of Manufacturer/Trade Name etc.

33.0 ProcessUnits

33.1 ConstructionJoints

All construction joints shall be provided as recommended in BIS:3370 and 6494. However, bidder is allowed to reduce the number of construction joints as per international practices with sufficient justification.

The positions of construction joints should be specified by the designer & indicated on the drawings. If there is a need on site to revise any specified position or to have additional joints, the proposed positions should be agreed with the designer.

The surface film of the first placed concrete should preferably be removed whilst the concrete is still green to expose the aggregate and leave a sound irregular surface. Just before concreting is resumed, the roughened joint surface should be thoroughly cleaned and freed from loose matter and then treated with a thin layer of cement grout or with cement/sand mortar in which water/cement & sand/cement ratios doesn't exceed those in the new concrete.

Key joint will be provided for the base slab of panels not more than 4.5 m X 4.5 m. Construction joint in the wall at interval of 1.5 m height with 230 mm. wide 8mm thick PVC water bar should be provided. Sealing compound will be applied along with the construction joint to prevent the leakage. 12-mm. diameter PVC nozzle at the interval of 1.5m along either side of the construction joints will be provided for pressure grouting purpose to fillup the honeycombing, if required.

33.2 OtherJoints

Expansion joints, where required shall be provided as per BIS:3414.

Movement joints such as expansion joints, complete contraction joints, partial contraction joints and sliding joints shall be designed to suit the structure. However contraction joints shall be provided at specified locations spaced not more than 7.5m in both rightangle

directions for walls and rafts.

Expansion joints of suitable gap at suitable intervals not more than 40m shall be provided in walls, floors and roof slabs of liquid retaining structures.

33.3 Water Stops

33.3.1 Material

PVC water stops shall be of approved manufacture. Samples and the test certificate shall be got approved by the Engineer-in-Charge before procurement for incorporation in the works. Water stops shall have following specifications as per IS 15058:2002.

Sl. No	Item	Unit	Specification
a)	Tensile strength	Mpa	13.8 min
b)	Ultimate Elongation	%	285 min.
c)	Hardness (Shore A)		65 min.
d)	Water absorption, percent by mass, Max		0.6
e)	Cold bend temperature at which samples does not crack		-25°C
f)	Accelerated Extractions test	Mpa	10.3 min.
	a) Tensile Strength		
	b) Ultimate Elongation	%	280 min.
g)	Stability Effect of Alkali test:	%	0.25 max.
	a) Weight increase at 7 days, percent by Mass		
	b) Weight decrease at 7 days, percent by mass	%	0.10 max.
	c) Change in hardness at 7 days (Shore A)	Point	±5 max.
	d) Weight increase at 28 days, max	%	0.40 max.
	e) Weight decrease at 28 days, max	%	.30 max.
	f) Dimension change	%	+/-1

PVC water stops shall be either of the bar type, serrated with centre bulb and end grips for use within the concrete elements or of the surface (kicker) type for external use.

If soil and ground water is observed to contain injurious chemicals viz. sulphates, chlorides, etc. then adequate precautions shall be taken as per BIS:456-2000.

33.3.2 Workmanship

Water stops shall be cleaned before placing them in position. Oil or grease shall be removed thoroughly using water and suitable detergents.

Water stops shall be procured in long lengths as manufactured to avoid joints as far as possible. Standard L or T type of intersection pieces shall be procured for use depending on their requirement. Any non-standard junctions shall be made by cutting the pieces to profile for jointing. Lapping of water stops shall not be permitted. All jointing shall be of fusion welded type as per manufacturer's instructions.

Water stops shall be placed at the correct location/level and suitably supported at intervals

with the reinforcement to ensure that it does not deviate from its intended position during concreting and vibrating. Care shall also be taken to ensure that no honey-combing occurs because of the serrations/ end grips, by placing concrete with smaller size aggregates in this region. Projecting portions of the water stops embedded in concrete shall be thoroughly cleaned of all mortar/concrete coating before resuming further concreting operations. The projecting water stops shall also be suitably supported at intervals with the reinforcement to maintain its intended position during concreting so as to ensure that it does not bend leading to formation of pockets. In addition, smaller size aggregates shall be used for concreting in this region also.

34.0 Preformed Fillers and Joint Sealing Compound

Preformed filler for expansion / isolation joints shall be non-extruding and resilient type of bitumen impregnated fibres conforming to BIS: 1838 Part I or BIS 1838 Part 2.

Bitumen coat to concrete/masonry surfaces for fixing the preformed bitumen filler strip shall conform to BIS: 702. Bitumen primer shall conform to BIS: 3384.

Sealing compound for filling the joints above the preformed bitumen filler shall conform to Grade 'A' as per BIS:1834.

Other organic solvents such as poly sulphate based joint sealants to BIS: 1433 Part 1 or BIS 12118 Part 1 may be used with the approval of Engineer-In-Charge.

35.0 Screed Concrete

In any unit used for clarification or fitted with moving parts like scraper or sump/channele tc., the floor slab of the unit shall be finished with 50mm thick M-20 grade screed concrete with neat finish at top surface after hydro testing is completed.

36.0 Rungs/Ladder

PVC capsulated MS rung shall be provided for access to the tanks, pits, sump etc. Ladder shall be provided for to reach the level upto 3mt. height. Catladder with rings as protection beyond 600mm shall be provided for access to a height more than 3 mt.

37.0 Corrosion Protection Work

- i) All the solution preparation tanks shall be provided with 75mm thick acid resistance bricklining.
- ii) All the mild steel structure including part of the equipments shall have 380 microns epoxy paints on sand blasted surface.

38.0 External surface

All the structural steel shall have synthetic enamel paint over primer. All the external faces of the RCC tanks above ground level shall have three coats of cement paints/cement based paint.

39.0 Special Requirements

39.1 Structural

Incase of large tanks, either in base size or in height, special care should be taken for design of the base slab.

Additional soil investigation to be carried out as per specification provided in this document. Pressure release valves will be allowed wherever there is no effect on process design. Before laying the base slab, the entire excavated area up to the desired level shall be compacted up to 90% standard proctor density at an optimum moisture content of 4%. The liquid depth has to be taken up to the top of wall/tie beam.

Temperature variation inside and outside the covered tank shall also be considered as specified in general specifications of civil work.

All the open tanks to be tested hydraulically as per IS: 3370.

All the equipments foundation shall be designed considering the vertical and horizontal force to be transmitted by the equipment to foundation. The design of equipment foundation should fulfill all the requirement of BIS codes. Equipment foundation should be monolithic and should be separated from the building foundation. Necessary anti vibration pads are to be provided to minimize the vibration effect.

39.2 Shuttering

Bidder shall submit and obtain approval of design calculations for centering and shuttering.

No through bolts shall be permitted in the form work for liquid retaining structures. Wall ties with plastic cones as per CPWD specification shall be used.

The surface on the concrete work obtained after removal of shuttering shall be smooth and without honey combing/pin holes, undulations and shall be such that it does not require any plastering. If at all any pin hole/undulations are required to be made good, this shall be done with cement mortar 1:2 using coarse sand and finished smooth with steel trowel or as directed by Engineer-in-Charge.

40. STRUCTURAL STEEL WORKS

40.1 SCOPE

This specification covers supply, fabrication, testing, painting and delivery to site of structural steel works including supply of all consumable stores and rivets, bolts, nuts, washers, electrodes and other materials required for fabrication and field connections of all structural steel work covered under the scope of the contract.

The scope of the works also includes submission of all fabrication, erection and connection design and drawings for approval of the Owner. The contractor should submit the detailed design and drawings for fabrication, erection and for all the connection. No works either fabrication and/or erection shall be taken up without approval of the Owner to design and

drawings submitted by the contractor. The scope of the works shall also include modification to the existing structural steel works wherever necessary.

40.2CODES AND STANDARDS

All work under this specification shall, unless otherwise specified in the contract, conform to the requirements of the latest revision and/or replacements of any relevant Indian Standard specifications and codes of practice. In case any particular aspect of the work is not specifically covered by any Indian Standard specification, any other standard practice as may be specified by the Engineer shall be followed.

40.3.....CONFORMITY WITH DESIGNS

Except where the standard connection details are furnished, the contractor shall design all connections, supply and fabricate all steel work and furnish all connection materials in accordance with the approved drawings and/or as instructed by the Engineer keeping in view the maximum utilization of the available sizes and sections of steel materials. The methods of painting, marking, packing and delivery of all fabricated materials shall be in accordance with the provisions of the contract and/or as approved by the Engineer. Provision of all relevant Indian Standard Specifications and Codes of practice shall be followed unless otherwise specified in the contract.

40.4.....DESIGN AND DRAWINGS

If, the Owner will supply the drawings to the contractor for structural steel works. After receipt of structural drawings for steel works, the contractor shall prepare and submit the detailed design and drawings of connections details, fabrication and erection for execution of the works based on the drawing for structural steel works released by the Owner and submit the same to the Owner's Engineer for approval in duplicate. On receipt of the design and drawings submitted by the contractor, the Owner's Engineer will scrutinize and check the design calculations and drawings submitted by the contractor and return one set of the provisionally approved and/or corrected drawings to the contractor for incorporating the correction in the final drawing, if any. The contractor should submit 6 sets of execution drawings to the Owner after incorporating the necessary corrections in the final drawings to the Owner's Engineer for final approval. After receipt of the final corrected drawings from the contractor, the Owner will issue final approval and the same shall be release for execution. No works either fabrication and/or erection shall be carried out without approval of the Owner to design and drawings submitted by the contractor.

40.5.....MATERIALS TO BE USED

40.5.01.General:

All the materials required for the work will be supplied by the contractor unless otherwise specified in the contract. The materials shall be free from all imperfections, mill scales, slag intrusions, laminations, pitting, rusts etc. that may impair their strength, durability and appearance. All materials shall be of tested quality only unless otherwise permitted by the Engineer and shall conform to the relevant Indian Standard codes.

IS: 1367	Technical supply conditions for threaded fasteners.
IS: 1608	Method for tensile testing of steel products other than sheet strip wire and tube.

40.5.02. Structural Steel:

All the structural steel materials to be used in construction within the purview of this specification shall comply with any of the following Indian Standard Code as may be applicable:

IS: 226	:	Structural Steel (Standard Quality)
IS: 961	:	Structural Steel (High Tensile)
IS: 1977	:	Structural Steel (Ordinary Quality) St- 420
IS: 2062	:	Structural Steel (Fusion Welding Quality)

In case of imported steel materials being used, these shall conform to the specifications equivalent to any of the above as may be applicable.

40.5.03..... Bolts and Nuts:

All bolts and nuts shall conform to the requirements of Indian Standard Specification IS: 1367 - Technical supply conditions for Threaded Fasteners. The materials for Bolts and nuts under the purview of this contract shall comply with any of the following Indian Standard Specifications as may be applicable.

a) Mild Steel

All mild steel for bolts and nuts when tested in accordance with the following Indian Standard specification shall have a tensile strength of not less than 44 Kg./mm² and a minimum elongation of 23 per cent on a gauge length of 5.65 X/A where 'A' is the cross sectional area of the lost specimen. The yield stress shall not be less than 24 Kg/mm².

b) Tensile steel (Structural quality):

The material used for the manufacture of high tensile steel bolts and nuts shall have a minimum tensile strength 50 Kg/mm² other mechanical properties shall conform to grade HT of IS : 961.

c) High Tensile steel (Special Quality):

The material used for the manufacture of special quality high tensile steel bolts and nuts shall have the mechanical properties appropriate to the particular class of steel as set out in IS: 1367 or as approved by the Engineer.

40.5.04..... Washers:

Washers shall be made of steel conforming to Indian Standard specifications as may be applicable under the provisions of the contract.

40.5.05. Paints:

Paints to be used for shop coat of fabricated steel under the purview of this contract shall conform to the Indian Standard specification IS: 2074 - Ready mixed paint. Red Oxide - Zinc Chromates priming.

40.6..... QUALITY CONTROL

The contractor shall establish and maintain quality control procedure for different items of work and materials to the extent he deems necessary to ensure that all work is performed in accordance with this specification. In addition to the contractor's quality control procedures, materials and workmanship at all times shall be subjected to inspection by the Engineer or Engineer's representative. As far as possible, all inspection by the Engineer or Engineer's representative shall be made, at the contractor's fabrication shop whether located at site or elsewhere. The contractor shall co-operate with the Engineer or Engineer's representative in permitting access for inspection to all places where work is being done and in providing free of cost all necessary help in respect of tools and plants, instruments, labour and materials required to carry out the inspection. The inspection shall be so scheduled as to provide the minimum interruption to the work of the contractor. Materials or workmanship not in reasonable conformance with the provisions of this specification may be rejected at any time during the progress of the work.

40.7..... STANDARD DIMENSIONS, FORMS AND WEIGHTS

The dimensions, forms, weights and tolerances of all rolled shapes rivets, bolts, nuts, studs, washers etc. and other members used in the fabrication of any structure shall, wherever applicable conform to the requirements of the latest relevant Indian Standards, wherever they exist, or in the absence of Indian Standards to other equivalent standards.

40.8..... FABRICATION

40.8.01..... General:

All workmanship shall be equal to the best practice in modern structural workshops, and shall conform to the provisions of the Indian Standard IS: 800 - Code of practice for use of structural steel in General building Construction and other relevant Indian Standards or equivalent.

40.8.02.....Straightening of material:

Rolled materials before being laid off or worked, must be clean, free from sharp kinks, bends or twists and straight within the tolerances allowed by the Indian Standard Specifications IS: 1852 - Specification for rolling and cutting tolerance for hot rolled steel products. If straightening is necessary, it may be done by mechanical means or by the application of a limited amount of localized heating.

40.8.03..... Cutting:

Cutting shall be affected by shearing, cropping or sawing. Use of a mechanically controlled gas-cutting torch may be permitted for mild steel only. Gas cutting of high tensile steel may also be permitted provided special care to be taken to leave sufficient metal to be removed by machining, so that all metal that has been hardened by flame is removed. Gas cutting without a mechanically controlled torch may be permitted if special care is taken and done under expert hand, subject to the approval of the Engineer.

To determine the effective size of members cut by gas. Same shall be deducted from each cut edge. Gas cut edges, which will be subjected to substantial stress or which are to have weld metal deposited on them shall be reasonably free from gauges, occasional notches or gauges not more than 4mm. deep will be permitted. Gauges greater than 4mm. reentrant corners shall be shaped notch free to a radius of at least 12mm. shearing cropping and gas cutting shall be clean, reasonably square and free from any distortion.

40.8.04..... Planning of Edges:

Planning or finishing of sheared or cropped edges of plates or shapes or of edges gas cut with a mechanically controlled torch shall not be required, unless specifically required by design and called for on the drawings and included in a stipulation for edge preparation for welding or as may be required after the inspection of the cut surface. Surface cut with hand flame shall generally be ground, unless specifically instructed otherwise by the Engineer.

40.8.05..... Clearance:

The erection clearance for cleated ends of members connecting steel to steel shall preferably be not greater than 2 mm. at each end. The reaction clearance at ends of beams without web cleats shall be not more than 3 mm. at each end, but where for practical reasons, greater clearance is necessary suitably designed cleating shall be provided.

40.9..... WELDED CONSTRUCTIONS

40.9.01..... General:

Welding shall be in accordance with relevant Indian Standards and as supplemented in the specification. Welding shall be done by experienced and good welders, who have been qualified by tests in accordance with, IS: 817.

40.9.02..... Preparation of materials:

Surface to be welded shall be free from loose scale, slag rust, grease, paint and any other foreign material except that mill scale, which withstands vigorous wire brushing, may remain. Joint surfaces shall be free from fins and tears. Preparation of edges by gas cutting shall, wherever practicable, be done by a mechanically guided torch.

40.9.03..... Assembling:

Parts to be filled welded shall be brought in as close contact as practicable and in no event shall be separated by more than 4 mm. If the separation is 1.5 mm. or greater, the size of the filled weld shall be increased by the amount of the separation. The fit of joints at contact surfaces, which are not completely sealed by welds, shall be close enough to exclude water after painting. Abetting parts to be butt-welded shall be carefully aligned. Misalignments greater than 3 mm. shall be corrected and in making the correction the parts shall not be drawn into a sharper slope than two degrees (2 degree).

.....The work shall be positioned for flat welding whenever practicable.

40.9.04..... Welding Technique:

All complete penetration groove welds made by manual welding, except when produced with the aid of backing material not more than 8 mm. thick with root opening not less than one half the thickness of the thinner part joined, shall have the root of the initial layer gouged out on the back side before welding is started from that side and shall be so welded as to secure sound metal and complete fusion throughout the entire cross section. Groove welds made with the use of the backing of the same material, as the base metal shall have the weld metal thoroughly fused with the backing material. Backing strips need not be removed, if required, they may be removed by gouging of gas cutting after welding is completed, provided no injury is done to the base metal and weld metal and the weld metal surface is left flush or slightly convex with full throat thickness.

Groove welds shall be terminated at the ends of a joint in a manner that will ensure their soundness. Where possible, this should be done by use of extension bars or run off plates. Extension bars or run off plates need not be removed upon completion of the weld unless otherwise specified elsewhere in the contract.

The technique of welding employed, the appearance and quality of welds made and the methods of correcting defective work shall all conform to the relevant Indian Standards.

40.10..... SHOP PAINTING**40.10.01.General:**

Unless otherwise specified, steel works, which will be concealed by interior building finish, need not be painted, steel work to be encased in concrete shall not be painted. Unless specifically exempted, all other steel work after surface have been prepared and cleaned thoroughly shall be given one coat of shop paint, applied thoroughly and evenly to dry surfaces by brush, spray, roller coating, flow coating or dipping as may be approved by the Engineer.

After inspection and approval and before leaving the shop, all steel work specified to be painted shall be cleaned by hand wire brushing or by other methods of loose mill scale, loose rust, weld slag or flux deposit, dirt and other foreign matter. Oil and grease deposits shall be removed by solvent. The steel work specified to have no shop paint shall after fabrication be cleaned of oil or grease by solvent cleaners and be cleaned of drift and other foreign material by thorough sweeping with a fiber brush.

40.10.02.Inaccessible Parts:

Surfaces not in contact, but inaccessible after assembly, shall receive two coats of shop paint, positively of different colours to prove application of two coats before assembly. This does not apply to the interior of sealed hollow erections.

40.10.03.Contact surfaces:

Contact surface shall be cleaned in accordance with sub clause 10.01 before assembly.

40.10.04.Finished surfaces:

Machine finished surfaces shall be protected against corrosion by a rust inhabiting coating that can be easily removed prior to erection or which has characteristics that make removal unnecessary prior to erection.

40.10.05.Surfaces adjacent to field welds:

Unless otherwise provided for, surfaces within 50 mm. of any field weld location shall be free of materials that would prevent proper welding or produce objectionable fumes while welding is being done.

40.11..... INSPECTION

Unless specified otherwise, inspection of all work shall be made by the Engineer or Engineer's representative at the place of manufacture prior to delivery. The Engineer or his representative shall have free access at all reasonable times to those parts of the manufacturer's works which are concerned with the fabrication of the steel work under this contract and he shall be afforded all reasonable facilities for satisfying himself that the fabrication is being done in accordance with the provisions of this specification.

The contractor shall provide free of charge, such labour, materials, electricity, fuel, water, stores, tools and plant, apparatus and instruments as may be required by the Engineer to carry out inspection and/or tests in accordance with the contract.

....The contractor shall guarantee compliance with the provisions of this specification.

40.12..... TESTING

40.12.01General:

The contractor shall carry out sampling and testing in accordance with the relevant Indian Standards at his own cost, unless otherwise specified in the contract. The contractor shall get the specimens tested in a laboratory approved by the Engineer and submit to the Engineer the test results in triplicate within 3 (three) days after completion of the test.

40.12.02. Steel:

All steel supplied by the contractor shall conform to the relevant Indian Standards. Except otherwise mentioned in the contract, only tested quality steel having mill test reports shall be used. In case unidentified steel materials are permitted to be used by the Engineer, random samples of materials will be taken from each unidentified lot of 50 M.T. or less of any particular section for tests to conform to relevant Indian Standards. Cost of all tests shall be borne by the contractor.

All material shall be free from all imperfection mill scales also intrusions, laminations, pitting, rusts etc. that may impair their strength, durability and appearance.

40.12.03. Welding:

All electrodes shall be procured from reliable manufacturers with test certificates. The correct grade and size of electrode, which has not deteriorated in storage, shall be used. The inspection and testing of welding shall be performed in accordance with the provisions of the relevant Indian Standards or other equivalents. For every 50 tones of welded fabrication, the Engineer may ask for 1 (one) test destructive or non destructive including X-ray, ultrasonic test or similar, the cost of which shall be borne by the contractor. In the event of further tests as may be desired by the Engineer, the cost of such test shall be borne by the contractor if the results are found to be unsatisfactory, and if the test shows no defect, the cost shall be borne by the owner. In case of the test results showing deficiency, the Engineer shall have option to reject or instruct any remedial measures to be taken free of charge.

40.12.04. Rivets, Bolts, Nuts and Washers:

All rivets, bolts, nuts and washers shall be procured from M/s: Guest Keen Williams Ltd. or equivalent and shall conform to the relevant Indian Standards. If desired by the Engineer, representative samples of these materials may have to be tested in an approved laboratory and in accordance with the procedures described in relevant Indian Standards. Cost of all such testing shall have to be borne by the contractor. In addition to testing the rivets by hammer. 2% (two percent) of the rivets done shall be cut off by chisels to ascertain the fit, quality of material and workmanship. The removal of the cut rivets and re-installing new rivets shall be done by the contractor at his own cost.

40.12.05. Tolerance:

The tolerances on the dimensions of individual rolled steel components shall be as specified in IS: 1852 - Specification for rolling and cutting Tolerances for Hot rolled steel products. The tolerances on straightness, length etc. of various fabricated components (such as beams and girders, columns, crane gantry girder etc.) of the steel structures shall be as specified in IS: 7215 -Tolerances for Fabrication of steel structures.

40.12.06. Shop painting:

The Red oxide zinc chromates primer to be used for shop coat shall be either of the followings or equivalent as approved by the Engineer.

APCOMIN' of Asian Paints

Bison Universal Red Oxide Zinc Chromates primer of British paints

Red Oxide Zinc Chromates primer 3100 of Janson & Nicholson.

Shalimar Synthetic Zinc Chromates primer - Red

40.12.07.Galvanizing:

Wherever indicated, in the schedule the contractor shall provide Hot Dipped Galvanised Articles.

All galvanizing shall be as per recommended practice for hot dipped galvanise as per IS: 2629 and shall be uniform thickness and of standard quality when tested in accordance with IS: 2033 -Methods of Testing weight and in case of Bolts as per IS: 5358.

40.13..... ACCEPTANCE CRITERIA

Should any structure or part of a structure be found not to comply with any of the provisions of this specification, the same shall be liable to rejection. No structure or part of the structure, once rejected, shall be offered again for test, except in cases where the Engineer considers the defects rectifiable. The Engineer may at his discretion; check the test results obtained at the contractor's works by independent tests at an approved laboratory and should the items, so tested, be found to be unsatisfactory, the costs shall be borne by the contractor, and if satisfactory, the costs shall be borne by the owner.

When all tests to be performed in the contractor's shop under the terms of this contract have been successfully carried out, the steel work will be accepted forthwith and the Engineer will issue an acceptance certificate, upon receipt of which, the items will be shop painted, packed and dispatched. No item to be delivered unless an acceptance certificate for the same has been issued. The satisfactory completion of these tests or the issue of the certificates shall not bind the owner to accept the work, should it, on further tests before or after erection, be found not in compliance with the contract.

40.14. DELIVERY OF MATERIALS

The contractor will deliver the fabricate structural steel materials to site with all necessary field connection materials in such sequence as will permit the most efficient and economical performance of the erection work, the owner may prescribed or control the sequence of delivery of materials, at his own discretion.

40.15..... ERECTION OF STRUCTURAL STEEL WORKS

40.15.01.Scope:

This specification also covers the erection of structural steel work including receiving and taking delivery of fabricated structural steel materials arriving at site and/or from owner's Site

Stores or store yard. Installing the same in position, painting and grouting the stanchion bases all-complete as per Drawings, this specification and other provision of the contract.

40.15.02. Work to be provided for by the contractor:

The work to be provided for by the contractor, unless otherwise specified in the contract, shall include but not be limited to the following.

- a) The contractor shall provide all construction and transport equipment, tools, tackle, consumable, materials, labour and supervision required for the erection of the structural steel work.
- b) Receiving, unloading, checking and moving to storage yard at site, including prompt attendance to all insurance matters as necessary for all fabricated steel materials arriving at site. The contractor shall pay all demur rage and/or wharf age charges etc. on account of default on his part.
- c) Transportation of all fabricated structural steel materials from site storage yard handling, assembling, riveting, bolting, welding and satisfactory installation of all fabricated structural steel materials in proper location according to approved erection drawings and/or directed by the Engineer. If necessary suitable temporary approach roads to be built for transportation of fabricated steel structures.
- d) Checking center lines, levels of all foundation blocks including checking line, level, position and plum of all bolts and pockets, any defect observed in the foundation shall be rectified by the contractor. The contractor shall fully satisfy himself regarding the correctness of the foundations before installing the fabricated steel structures on the foundation blocks.
- e) Aligning, plumbing, leveling, riveting, bolting, welding and securely fixing the fabricated steel structures in accordance with the drawings or as directed by the Engineer.
- f) Painting of the erected steel structures if required by the contract.
- g) All minor modifications of the fabricated steel structures as directed by the Engineer including but not limited to the following.
 - i) Removal of bends, kinks, twists etc. for parts damaged during transport and handling.
 - ii) cutting, chipping, filling, grinding etc. if required for preparation and finishing of site connections.
 - iii) Reaming of holes for use of higher size rivet or bolt if required.
 - iv) Welding of connections in place of riveting or bolting for which holes are either not drilled at all or wrongly drilled during fabrication. Welding in place of riveting or bolting will be permitted only at the discretion of the Engineer.

v) Prefabrication of parts damaged beyond repair during transport and handling or Prefabrication of parts which are incorrectly fabricated.

vi) Fabrication of parts omitted during fabrication by error or subsequently found necessary.

vii) Drilling of holes which are either not drilled at all or are drilled in incorrect location during fabrication.

viii) Carry out tests in accordance with this specification if directed.

40.15.03. Work by others:

No work under this specification will be provided for by any agency other than the contractor unless specifically mentioned elsewhere in the contract.

40.15.04. Codes and standards:

All work under this specification shall, unless specified otherwise, conform to the latest revisions and/or replacements of Indian Standard Specification and codes of Practice at equivalent.

40.15.05. Conformity with designs:

The contractor will erect the entire fabricated steel structure, align, tie all members, complete all field connections and grout the foundations all as per the provisions of this specification and the sequence and the design criteria laid down by the Engineer. All works shall conform to the provisions of the relevant Indian Standard Specifications and/or the instructions of the Engineer. The testing and acceptance of the erected structures shall be in accordance with the provisions of this specification and/or the instructions of the Engineer.

40.15.06. Materials to conform to Indian Standards:

All materials required to be supplied by the contractor under this contract shall conform to the relevant Indian Standard Specifications.

40.15.07 Storage of materials:

All material shall be so stored as to prevent deterioration and to ensure the preservation of their quality and fitness for use in the works. Any materials which has been deteriorated or damaged beyond repairs and has become unfit for use shall be removed immediately from the site, failing which, the Engineer shall be at liberty to get the materials removed by agency and the cost incurred thereof shall be realized from the contractor's dues.

40.15.08. Covered Store:

All field connection materials, paints, cement etc. shall be stored on well designed racks and platforms off the ground in a properly covered store building to be built at the cost of the contractor.

40.16. QUALITY CONTROL

The contractor shall establish and maintain quality control procedures for different items of work and materials as may be directed by the Engineer to assure compliance with the provisions

of the contract and shall submit the records of the same to the Engineer. The quality control operation shall include but not be limited to the following items of work.

- | | | | |
|------|----------|---|--|
| i) | Erection | : | Lines, levels, grades, plumbs, joint characteristics including tightness of bolts. |
| | | | |
| iii) | Grouting | : | Cleaning and roughness of foundation, quality of materials used for grouting, admixtures, consistency and strength of grout. |
| | | | |
| ii) | Painting | : | Preparation of surface for painting, quality of primers and paints, thinners, application and uniformity of coats. |

40.17..... WORKMANSHIP

40.17.01.Plant and Equipment:

The suitability and adequacy of all erection tools and plant and equipment prepared to be used shall be efficient, dependable, in good working condition and shall have the approval of the Engineer.

40.17.02.Method and Sequence of Erection:

The method and sequence of erection shall have the prior approval of the Engineer. The Erection shall arrange for most economical method and sequence available to him consistent with the drawings and specifications and such information as may be furnished to him prior to the execution of the contract.

40.17.03.Setting out:

Positioning and leveling of all steel work, plumbing of stanchions and placing of every part of the structure with accuracy shall be in accordance with the approved drawings and to the satisfaction of the Engineer. Concrete foundations, where required shall be made by other agencies. Anchor bolts and other anchor steel shall be embedded by other agencies. The contractor shall check the positions and levels of the anchor bolts, etc. before concreting and get them properly secured against disturbance during pouring operations. He shall remain responsible for correct positioning. The contractor shall set proper screeds reaction. Damages, if occur, shall be made good in accordance with the provisions of this specification. Special

care shall be taken not to injure the skin on galvanized surfaces during transport, handling and its of tolerance allowable under this specification.

No permanent field connections by riveting, bolting or welding shall be carried out until proper alignment and plumbing has been attained.

40.17.04.Field Bolting:

All relevant portions in respect of bolted construction of the specification for fabrication of structural steel work applicable to the project shall also be applicable for field bolting in addition to the following.

Bolts shall be inserted in such way so that they may remain in position under gravity even before fixing the nut. Bolted parts shall fit solidly together when assembled and shall not be separated by gaskets or any other interposed compressible materials. When assembled, all joint surfaces, including those adjacent to the washers shall be free of scales except tight mill scales. They shall be free of dirt, loose scales, burns, and other defects that would prevent solid seating of the parts. Contact surfaces within friction type joints shall be free of oil, paint, lacquer, or galvanizing.

All high tensile bolts shall be tightened to provide, when all fasteners in the joint are tight,

40.17.05.Field welding:

All field assembly and welding shall be carried out in accordance with the requirements of the specification for fabrication work applicable to the project, excepting such provisions therein which manifestly apply to shop conditions only. Where the fabricated structural steel members have been delivered painted, the paint shall be removed before field welding for a distance of at least 50 mm. on either side of the joints.

40.17.06.Tolerance:

Some variation is to be expected in the finished dimensions of structural steel frames. Unless otherwise specified, such variations are deemed to be within the limits of good practice when they are not in excess of the cumulative effect of detailed erection clearances, fabricating tolerances for the finished parts and the rolling tolerance for the profits dimensions permitted under the specifications for fabrication of structural steel work applicable to this project and as specified below:

For building without cranes:

The maximum tolerances line and level of the steel work shall be + 3.0 mm. on any part of the structure. The structure shall not be out of plumb more than 3.5 mm. on each 10M. section of height and not more than 7.0 mm. per 30 M. section.

The tolerances shall apply to all parts of the structure unless the drawings issued for erection purposes state otherwise.

40.18. MODIFICATION TO THE EXISTING STRUCTURAL STEEL WORKS

The scope of the works includes removing existing structure/structural member/s by gas cutting/hand cutting for modification and providing new members to the structure by welding etc. wherever necessary.

The scope of the works also includes provision of all new materials, labour, use of tools, plants, machineries etc. including provision of Anchor/bolts with nuts and washers, including cost for providing temporary supports during execution. The item also include the cost of providing two coats of approved quality paint over a coat of primer as required or as directed by Engineer-in-charge etc. complete.

The above specifications for materials of structural steel works shall also be applicable for the item of modification to the existing structural steel works. All the structural steel materials to be used in execution within the purview of this specification shall comply with any of the Indian Standard Code as may be applicable.

40.19..... PAINTING AFTER ERECTION

Field painting, if required to be done by the contract, shall only be done after the structure is erected, leveled, plumbed aligned and grouted in its final position, tested and accepted by the Engineer. However, touch up painting, making good any damaged shop painting and completing any unfinished portion of the shop coat shall be carried out by the erection contractor free of cost to the owner. The materials and specification for such painting in the field shall be in accordance with the requirements of the specification for fabrication of structural steel work applicable for the project.

Painting shall not be done in frosty or foggy or when humidity is such as to cause condensation on the surfaces to be painted. Before painting of steel, which is delivered unpainted, is commenced, all surfaces to be painted shall be dried and thoroughly cleaned from all loose scale and rust.

All field rivets, bolt, welds and abrasions to the shop coat shall be spot painted with the same paint used for the shop coat. Where specified, surfaces, which will be in contact after site assembling, shall receive a coat of paint (in addition to the shop coat, if any) and shall be brought together while the paint is still wet.

Surface, which will be inaccessible after field assembly, shall receive the full-specified protective treatment before assembly. Bolts and fabricated steel members, which are galvanized or otherwise, treated and steel members to be encased in concrete shall not be painted.

The specification for paint and workmanship shall be in accordance with the requirements of the specification for fabrication of structural steel work applicable to the project. The number of coats and the shades to be used shall be as specified or as directed by the Engineer.

40.20.....FINAL CLEANING UP

Upon completion of erection and before final acceptance of the work by the Engineer, the contractor shall remove free of cost all false work, rubbish and all Temporary works.

40.21..... ACCEPTANCE

Steel Structures and members which have passed the tests and conform to all requirements specified in the foregoing sub clauses and other applicable provisions of this specification and are within the limits of tolerances specified in relevant sub clause and/or otherwise approved

by the Engineer shall be treated as approved and accepted for the purpose of fulfillment of the provisions of this contract.

40.22.....RATES

40.22.01. Fabrication and erection of structural steel works

In general, even though it may not be specifically mentioned in the schedule of items, the rates for items mentioned in the Schedule of items shall include cost of all materials consumed in the or incidental to it including welding, rivets, bolts, nuts, washers and inserts if required, hire charges of tools and plants, cost of labour, insurance, all transport charges including taking delivery of raw steel from owner's site stores and transporting the same in the contractor's fabricating work shop, delivery of finished fabricated materials back to sites and erection at site all taxes, royalties, making approaches, security and safety arrangements, power, fuel, lubricant preparation of all fabrication drawings, material lists, cutting lists, inserts, rivets and bolt lists, field welding schedules, services, supervision, overheads, profits etc. complete in all respects no extra/separate payment shall be made to the contractor whatsoever required for completion of the item under any of the above, unless certain items are specifically excluded and provided for separate payments by the terms and conditions of the contract.

40.22.02.Modification to the existing structural steel works

In general, even though it may not be specifically mentioned in the schedule of items, the rates for items mentioned in the Schedule of items shall include cost of removing existing structural members wherever necessary, cost of all new materials consumed in the or incidental to it including welding, rivets, bolts, nuts, washers and inserts if required, hire charges of tools and plants, cost of labour, insurance, all transport charges including taking delivery of raw steel from owner's site stores and transporting the same in the contractor's fabricating work shop/site, delivery of finished fabricated materials back to sites and erection at site, providing temporary supporting arrangements to the existing works for removing members and all taxes, royalties, making approaches, security and safety arrangements, power, fuel, lubricant preparation of all fabrication drawings, material lists, cutting lists, inserts, rivets and bolt lists, field welding schedules, services, supervision, overheads, profits etc. complete in all respects no extra/separate payment shall be made to the contractor whatsoever required for completion of the item under any of the above, unless certain items are specifically excluded and provided for separate payments by the terms and conditions of the contract. The rate also include cost for depositing the members removed from the existing structure to the Company's Store.

40.23.MEASUREMENTS

40.23.01 Fabrication and erection of structural steel works

The measurements shall be based on actual work fabricated and erected and the weight shall be worked-out as per theoretical sectional weights given in relevant Indian Standard Code. Deduction for boltholes and rivets shall not be made. No measurement shall be made for bolts, nuts, washers, welding etc. required for Fabrication and Erection of Structural Steel Works.

40.23.02 Modification to the existing structural steel works

The measurements shall be based on actual new work fabricated and erected at site for modification of the existing structure and the weight shall be worked-out as per theoretical sectional weights given in relevant Indian Standard Code. Deduction for boltholes and rivets shall not be made. No separate measurement shall be made for bolts, nuts, washers, welding etc. required for Fabrication and Erection of Structural Steel Works.

40.24.....APPLICABLE CODE AND STANDARDS

Unless otherwise specified herein, the design materials, workmanship etc. shall conform to the latest editions of one or as many as applicable of the following standards or their approved equivalents:

1	IS: 226	Structural Steel (Standard Quality)
2	IS: 269	Ordinary and low Heat Port land Cement
3	IS: 383	Coarse and Fine aggregate from Natural Sources for concrete
4	IS: 808	Rolled Steel Beam, Channel Angle Sections
5	IS: 814	Specifications for Covered electrodes for Metal Arc Welding for Mild Steel
6	IS: 1148	Rivet Bars for Structural Purposes
7	IS: 1149	High Tensile Rivet Bars for Structural Purposes
8	IS: 1161	Steel Tubes for structural purposes
9	IS: 1363	Black Hexagonal Bolts, Nuts and Lock Nuts (diameter 6 to 39 mm) and Black Hexagonal Screws (Diameter 6 to 24 mm)
10	IS: 1364	Precision and semi precision Hexagonal Bolts, Screws, Nuts and Lock Nuts (diameter 6 to 39 mm) (diameter 6 to 24 mm)
11	IS: 1367	Technical Supply Conditions for Threaded Fasteners.
12	IS: 1489	Port land Pozzolana Cement
13	IS: 1570	Stainless steel
14	IS: 1852	Specification for Rolling and Cutting Tolerances for Hot Rolled Steel Products.
15	IS: 2016	Plain Washers
16	IS: 2062	Structural Steel (Fusion Welding Quality)
17	IS: 2074	Ready Mixed Paint, Red Oxide Zinc Chromates and Priming
18	IS: 2932	Synthetic Enamel Paint
19	IS: 3613	Acceptance Tests for Wire Flux Combinations for Submerged -Arc Welding
20	IS: 3757	High Tensile Friction Grip Fasteners for Structural Engineering purposes.
21	SP: 6	ISI Hand Book for Structural Engineers
22	BS: 639	Covered Electrodes for the Manual Metal Arc welding of Mild Steel and Medium Tensile Steel
23	BS: 1083	Precision Hexagonal Bolts, Screws and Nuts

		(BSW & BSF Threads)
24	BS: 3139	High Strength & Friction Grip Bolts for Structural Engineering
25	ASTM -A6	General Requirements for Delivery of Rolled steel Plates, Shapes, Sheet Piling and Bars for Structural use.
26	AISI: 304	Stainless steel
27	ASTM : A325	High Strength Steel Bolts for Structural Joints.
28	AWS:A-5-1	Specification for Mild Steel Covered Arc-Welding Electrodes.
29	AWS:A-5.17	Specification for Bare Mild Steel Electrodes and fluxes for submerged Arc Welding.
30	IS: 228	Method of Chemical Analysis of Pig Iron, Cast Iron, and Plain Carbon & Low Alloy Steel
31	IS: 800	Code of Practice for Use of Structural Steel in General Building Construction.
32	IS: 813	Scheme of Symbols for Welding.
33	IS: 816	Code of Practice for Use of Metal Arc Welding for General Construction
34	IS: 817	Code of Practice for Training and Testing of Metal Arc Welders.
35	IS: 823	Code of Procedure for Manual Metal Arc Welding of Mild Steel
36	IS: 875	Code of Practice for Structural Safety of Building Loading Standards
37	IS: 919	Recommendation for Limit and Fits for Engineering
38	IS: 1181	Qualifying Tests for Metal Arc Welders (Engaged in welding Structures other than pipes)
39	IS: 1182	Recommended Practice for Radio-graphic examination of Fusion - Welded Butt joints in Steel Plates
40	IS: 1477	Code of Practice for Painting of Ferrous Metals in Buildings and Allied Finishes
41	IS: 1599	Method of Bend Test for Steel Products other than sheet strip, wire & tubes
42	IS: 1608	Method for Tensile Testing for steel Products
43	IS: 2595	Code of practice for Radiographic Testing
44	IS: 2075	IS specification for Ready Mixed Paint, stoving Red oxide-Zinc Chrome, Priming.
45	IS: 1893	Recommendations for Earth quake Resistant Design of Structures
46	IS: 3658	Code of Practice for Liquid Penetrant Flow Detection
47	IS: 3664	Code of Practice for Ultrasonic Testing by Pulse-Echo Method (Direct Contact)
48	IS: 4000	Code of practice for Assembly of Structural Joints using high tensile friction grip fasteners

49	IS: 4353	Recommendations for Submerged Arc Welding of Mild Steel and low Alloy Steels
50	IS: 5334	Code of practice for Magnetic particle Flow Detection of welds
51	IS: 7205	Safety Code for erection of Structural Steel Work
52	IS: 7215	Tolerances for Fabrication of Steel Structures
53	BS: 449	The use of Structural Steel in Building
54	BS: 3294	The Use of High Strength Friction Grip Bolts in Structural Steel work
55	ASTM E- 94	Recommended Practice for Radio- graphic Testing.
56	ASTM E-109	Dry Powder Magnetic Particle Inspection
57	ASTM E-138	Wet Magnetic Particle Inspection
58	ASTM E-165	Liquid Penetrant Inspection

40.25. PROVIDING AND FIXING OF M.S. CLAMPS

40.25.1. SCOPE

The items provides for all materials, labour, use of tools, plants, machineries etc. for providing and fixing clamps in position fabricated out of M.S. flats/ M.S. bars, M.S. Anchor bolts with nuts and washers, including cost for making pockets in concrete/masonry during execution, necessary centering, shuttering, providing, fixing and grouting in position Anchor bolts in C.M. 1:1 providing rubber sheet packing below the clamps, tightening the clamps as specified in the item. The item also include the cost of providing two coat of approved quality paint over a coat of primer as directed by Engineer-in-charge etc. complete.

40.25.2. MATERIALS

All the materials used for clamps shall as per relevant I.S. specification and or as directed by Engineer-in-charge. The contractor shall provide all the materials required for clamps.

40.25.3. RATES

In general, even though it may not be specifically mentioned in the schedule of items, the rates for items mentioned in the Schedule shall include cost of all materials consumed in the or incidental to it including all taxes, royalties, preparation of all fabrication drawings, supervision, overheads, profits etc. complete in all respects. No extra shall be paid, whatsoever required for completion of the item such as clamps, Anchor bolts, pockets grouting, rubber sheets etc. unless certain items are specifically excluded and provided for the payment separately by the terms and conditions of the contract.

MEASUREMENT

The measurements shall be based on weight of clamps actually provided by contractor in position and cover all costs for satisfactory completion of the item.

40.26 PROVIDING AND FIXING ANCHOR BOLTS AND NUTS

40.26.1. SCOPE

The scope of the works under the specification covers supplying, providing and fixing of M.S. Anchor Bolts for channels and nuts and bolts for clamps as per specification to hold the pipes in positions including grouting.

40.26.2. MATERIALS

The above specification of materials for structural Steel Works shall also be applicable for the item of supplying, providing and fixing of M.S. Anchor Bolts for channels and nuts and bolts for clamps including grouting.

All bolts and nuts shall conform to the requirements of Indian Standard Specification IS: 1367 - Technical supply conditions for Threaded Fasteners. The materials for Bolts and nuts under the purview of this contract shall comply with Indian Standard Specifications as may be applicable.

40.26.3. RATE

The rate for this item include the cost of necessary anchor bolts, nuts, galvanizing / painting and grouting etc. complete, unless certain items are specifically excluded and provided for the payment separately by the terms and conditions of the contract.

40.26.4. MEASUREMENT

The measurement will be on the basis of the theoretical weight of anchor bolt, nuts, etc. actually provided. No extra / separate payment shall be made to the contractor whatsoever required under the item of grouting unless the separate payment is specifically provided by the terms and conditions of contract.

41.GALVANIZEDIRON PIPES

41.1. General Requirements

41.1.1 Construction & Material:

The pipes(tubes) shall be galvanized mild steel hot finished seamless(HFS) or welded (ERW) HRIW or HFW screwed and socketed conforming to the requirements of IS1239 Part-I formedium grade. They shall be of the diameter (nominal bore) specified in the description of the item, the sockets shall be designated by the respective nominal bores of the pipes for whichthey are intended.

41.1.2GalvanizingshallconformtoIS4736:

The zinc coating shall be uniform adherent, reasonably smooth and free from such imperfections as flux,ash and dross inclusions,bare batches,blackspots,pimples,lumpingruns, ruststains,bulky white deposits and blisters. The pipes and sockets shall be cleanly finished,well galvanized in and out and free from cracks, surface flaws laminations and other defects.All screw threads shall be clean and well cut. The ends shall be cut cleanly and square with the axis of the tube.

41.1.3GeneralRequirements

All screwed tubes and sockets shall have pipe threads conforming to the requirements of

IS554. Screwed tubes shall have taper threads while the sockets shall have parallel threads. All tubes shall withstand a test pressure of 50Kg/sq.cm without showing defects of any kind.

The fittings shall be of mild steel tubular or wrought steel fittings conforming to IS1239(Part-2) or as specified. The fittings shall be designated by the respective nominal bore size for which they are intended.

41.1.4 Dimensions & weight:

The dimensions and weights of pipes (Medium Grade & Heavy Grade) and sockets and tolerances shall be as given as below (As per IS1239 (Part1)2004):

Table 41.1 Particulars for Medium Grade GI Pipes

Nominal bore	Dimension of pipes			Weight of pipe	
	Outside diameter		Thickness	Plain end	Screwed end socket
	Max.	Min.			
(mm)	(mm)	(mm)	(mm)	Kg/m	Kg/m
6	10.6	9.8	2.0	0.404	0.407
8	14.0	13.2	2.3	0.641	0.645
10	17.5	16.7	2.3	0.839	0.845
15	21.8	21.0	2.6	1.21	1.22
20	27.3	26.5	2.6	1.56	1.57
25	34.2	33.3	3.2	2.41	2.43
32	42.9	42.0	3.2	3.10	3.13
40	48.8	47.9	3.2	3.56	3.60
50	60.8	59.7	3.6	5.03	5.10
65	76.6	75.3	3.6	6.42	6.54
80	89.5	88.0	4.0	8.36	8.53
100	115.0	113.1	4.5	12.2	12.50
125	140.8	138.5	4.8	15.90	16.40
150	166.5	163.9	4.8	18.90	19.50

Table 41.2: Particulars for Heavy Grade GI Pipes

Nominal Bore	Outside Diameter		Thickness	Mass of Tube	
	Maximum	Minimum		Plain End	Screwed and Socketed
mm	mm	mm	mm	kg/m	kg/m
(1)	(2)	(3)	(4)	(5)	(6)
6	10.5	9.8	2.6	0.487	0.490
8	14.0	13.2	2.9	0.765	0.769
10	17.5	16.7	2.9	1.02	1.03
15	21.8	21.0	3.2	1.44	1.45
20	27.3	26.5	3.2	1.87	1.88
25	34.2	33.3	4.0	2.93	2.95
32	42.9	42.0	4.0	3.79	3.82
40	48.8	47.9	4.0	4.37	4.41
50	60.8	59.7	4.5	6.19	6.26
65	76.6	75.3	4.5	7.93	8.05
80	89.5	88.0	4.8	9.90	10.1
100	115.0	113.1	5.4	14.5	14.8
125	140.8	138.5	5.4	17.9	18.4
150	166.5	163.9	5.4	21.3	21.9

41.2. Laying&jointingof GIPipes&Fittings

41.2.1Unloading:

Unloading (exceptwheremechanicalhandlingfacilitiesareavailable):

Pipes weighing up to 60kg shall be handled by two persons by handpassing.Heavier pipes shall be unloaded from the lorry or wagon by holding the minloops,formed with ropes and sliding over planks set not steeper than 45degree. The planks shall be sufficiently rigid and two ropes shall always be used to roll the pipes down the planks. The ropes should be tied on the side opposite the unloading. Only one pipe shall be unloaded at a time.

Under no circumstances shall the pipes be thrown down from the carriers or bed ragged or rolled along hard surfaces.

The pipes shall be checked for any visible damage (such as broken edges,cracking or spallingof pipe)while unloading and shall be sorted out for reclamation.Any pipe which shows sufficient damage to preclude it from being used shall be discarded.

41.2.2 Storing:

The pipes and specials shall be handled with sufficient care to avoid damage to them.These shall be lined upon one side of the alignment of the trench, socket facing upgrade when line runs uphill and upstream when line runs on level ground.

Each stack shall contain pipes of same class and size, consignment orbatch number and particulars ofsuppliers,wherever possible,shall bemarked on thestack.

Storage shall bed one on firm, level and clean ground. Wedges shall be provided at the bottom layer to keep the stack stable.

41.2.3Cutting:

Cutting of pipes may be necessary when pipes are to be laid in lengths shorter than the lengths

supplied, such as while replacing accessories like tees, bends, etc. at fixed position in the pipelines. A line shall be marked around the pipe with a chalk piece at the point where it is to be cut. The line shall be so marked that the cut is truly at right angle to the longitudinal axis of the pipe. The pipe shall be rigidly held on two parallel supports so that the portion cut does not overhang and the cut mark is between the two supports. The pipe shall be neatly cut at the chalk mark with carpenter's saw or hacksaw having a long blade, by slowly rotating the pipe around its longitudinal axis so as to have the uncut portion on top for cutting. Cutting of the pipe at the overhang should, as far as possible, be avoided, as an overhang is liable to tear off due to its weight before the cutting is complete. Where the pipes have to be cut or rethreaded, the ends shall be carefully filed out so that no obstruction to bore is offered. The end of the pipes shall then be carefully threaded conforming to the requirements of IS 554 with pipe, i.e., sand tapes in such a manner as will not result in slackness of joints when the two pieces are screwed together. The taps and dies shall be used only for straightening screw threads which have become bent or damaged and shall not be used for turning of the threads so as to make them slack, as the later procedure may not result in a water tight joint. The screw threads of pipes and fittings shall be protected from damage until they are fitted.

41.2.4 Trenching For Pipe laying:

The trenches shall be so dug that the pipes may be laid to the required alignment and at required depth. Cover shall be measured from top of pipe to the surface of the ground. The bed of the trench, if in soft or made up earth, shall be well watered and rammed before laying the pipes and the depressions, if any, shall be properly filled with earth and consolidated in 20cm layers.

The galvanized iron pipes and fittings shall be laid in trenches. The width and depths of the trenches for different diameters of the pipes are given in the table 41.3

Dia. of Pipe (mm)	Depth of trench (cm)	Width of trench (cm)
15 to 50	30	60
65 to 100	45	75

At joints the trench width shall be widened where necessary. The work of excavation and refilling shall be done true to line and gradient in accordance with general specifications for earth work in trenches. When excavation is done in rock, it shall be cut deep enough to permit the pipes to be laid on a cushion of sand minimum 7.5cm deep. If the trench bottom is extremely hard or rocky or loose stony soil, the trench shall be excavated at least 150mm below the trench grade. Rocks, stone or other hard substances from the bottom of the trench shall be removed and the trench brought back to the required grade by filling with selected fine earth or sand (or fine morum if fine soil or sand is not available locally) and compacted so as to provide a smooth bedding for the pipe. Where excavation requires blasting operation, it shall be ensured that no pipes have been stacked in the

vicinity and completed pipeline in the vicinity has already been covered before starting of blasting operations; this is necessary to prevent damage to the exposed pipes in the vicinity by falling stones as are sult of blasting. After the excavation of the trench is completed, hollows shall be cut at the required position to receive the socket of the pipes and the sehollows shall be of sufficient depth to ensure that the barrels of the pipes shall rest through out their entire length on the solid ground and that sufficient spaces left for jointing the under side of the pipe joint. These socket holes shall be refilled with sand after jointing the pipe. Root softrees within a distance of about 0.5 meter from the side of the pipeline shall be removed or killed. The excavated materials shall not be placed within 1 metre or half of the depth of the trench, whichever is greater, from the edge of the trench. The materials excavated shall be separated and stacked so that in refilling they maybe re-laid and compacted in the same order to the satisfaction of the Engineer-in-Charge. The trench shall be kept free from water. Shoring and timbering shall be provided wherever required. Excavation below water table shall be done after dewatering the trenches.

Where the pipe line or drain crosses an existing road, the road crossing shall be excavated half at a time, the 2nd half being commenced after the pipes have been laid in the first half and the trench refilled. Necessary safety measures for traffic as directed shall be adopted. All types, water mains cables, etc. met within the course of excavation shall be carefully protected and supported. Care shall be taken not to disturb the electrical and communication cable met with during course of excavation, removal of which, if necessary, shall be arranged by the Engineer-in-Charge.

41.2.5 Pipelaying:

The pipes shall be lowered into the trench by means of suitable pulley blocks, sheerlegs chains ropes etc. In no case the pipes shall be rolled and dropped into the trench. One end of each rope may be tied to a wooden or steel peg driven into the ground and the other end held by men which when slowly released will lower the pipe into the trench. After lowering, the pipes shall be arranged so that the spigot of one pipe is carefully centered into the socket of the next pipe, and pushed to the full distance that it can go. The pipeline shall be laid to the levels required. Specials shall also be laid in their proper position as stated above.

Where so directed, the pipes and specials may be laid on masonry or concrete pillars. The pipe laid on the level ground, shall be laid with socket facing the direction of flow of water.

The pipes shall rest continuously on the bottom of the trench. The pipes shall not rest on lumps of earth or on the joints. Four meter long wooden templates may be used to check the level of the bed.

Clearance of approximately 100mm in depth and width equal to length of the collar plus 30 mm on both sides shall be provided at the joint which shall be refilled from sides after the joint is made.

In unstable soils, such as soft soils and dry lumpy soils it shall be checked whether the soils can support the pipelines and if required suitable special foundation shall be provided.

Some clayey soils (for example black cotton soil) are drastically affected by extremes of saturation and dryness. In changing from saturated to a dry condition, these soils are subjected to extraordinary shrinkage which is usually seen in the form of wide and deep cracks in the earth surface and may result in damages to underground structures, including pipe materials. The clay forms a tight gripping bond with the pipe, subjecting it to excessive stresses as the clay shrinks. It is recommended that in such cases an envelope of a minimum 100mm of tamped sand shall be made around the pipeline to avoid any bonding.

In places where rock is encountered, cushion of fine earth or sand shall be provided for a depth

of 150 mm by excavating extra depth of the trench, if necessary, and the pipes laid over the cushion. Where the gradient of the bed slopes is more than 30 degree it may be necessary to anchor a few pipes against sliding downwards.

41.2.6 Jointing:

The pipes shall be cleaned and cleared of all foreign matter before being laid. In jointing the pipes, the inside of the socket and the screwed end of the pipes shall be oiled and rubbed over. **Teflon Tape** should be used on threads instead of 'Dhaaga/Safeda'. The end shall then be screwed in the socket, Tee etc. With the pipe wrench. Care shall be taken that all pipes and fittings are properly jointed so as to make the joints completely water tight and pipes are kept at all times free from dust and dirt during fixing. Burr from the joint shall be removed after screwing. After laying, the open ends of the pipes shall be temporarily plugged to prevent access of water, soil or any other foreign matter.

41.2.7 Thrust Blocks:

In case of bigger diameter pipes where the pressure is very high, thrust blocks of cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate of 20mm nominal size) of adequate size and shape shall be provided on all bends to transmit the hydraulic thrust to the ground, spreading it over a sufficient area, depending upon the type of soil met with.

41.2.8 Painting:

The pipe shall be painted with two coats of anti corrosive bitumastic paint of approved quality.

41.3. Backfilling & Tamping:

Back filling shall follow pipe installation as closely as possible to protect pipe from falling boulders, eliminating possibility of lifting of the pipe due to flooding of open trench and shifting pipe out of line by caving in soil. The pipes shall be laid on a layer of 7.5 cms and filled up to 15 cm above the pipes. The remaining portion of the trench shall then be filled with excavated earth. The surplus earth shall be disposed off as directed. The soil under the pipe and coupling shall be solidly tamped to provide firm and continuous support for the pipeline. Tamping shall be done either by tamping bars or by using water to consolidate the backfill materials. The initial back fill material used shall be free of large stones and dry lumps. In stony areas as the material for initial back fill can be shaved from the sides of the trenches. In bogs and marshes, the excavated material is usually little more than vegetable matter and this should not be used for bedding purposes. In such cases, gravel or crushed stone shall be hauled in. The initial backfill shall be placed evenly in a layer of about 100 mm thick. This shall be properly consolidated and this shall be continued till there is a cushion of at least 300 mm of cover over the pipe. If it is desired to observe the joint or coupling during the testing of mains they shall be left exposed. Sufficient backfill shall be placed on the pipe to resist the movement due to pressure while testing. Balance of the backfill need not be so carefully selected as the initial material. However, care shall be taken to avoid back filling with large stones which might damage the pipe when spaded in to the trench. Pipe in trench on a slope shall have extra attention to make certain that then evenly placed back fill will not become a blind drain in effect because until back fill becomes completely consolidated the tendency for ground or surface water to move along this looser soil results in a loss of support to the pipe. In such cases, the back fill shall be tamped with extra care and the tamping continued in 100 mm layer straight up to the ground level.

41.4. TESTING

41.4.1 Hydrostatic testing of GI Pipes:

After an ewpipe has been laid, jointed and back filled (or any valved section thereof), it shall be subjected to the following two tests:

- i. Pressure test at a pressure of at least 1.5 times the maximum working pressure-pipe and joints shall be absolutely water tight under the test.
- ii. Leakage test (to be conducted after the satisfactory completion of the pressure test) at a pressure to be specified by the authority for duration of two hours.

The pipe and fitting after they are laid and jointed shall be tested to hydraulic pressure of 6 Kg/sq. cm (60 meter). The pipes shall be slowly and carefully charged with water allowing all air to escape and avoiding all shock or water hammer. The draw off taps and stop cock shall then be closed and specified hydraulic pressure shall be applied gradually. Pressure gauge must be accurate and preferably should have been recalibrated before the test. The test pump having been stopped, the test pressure should be maintained without loss for at least half an hour. The pipes and fittings shall be tested in sections as the work of laying proceeds, having the joints exposed for inspection during the testing. Pipes or fittings which are found leaking shall be replaced and joints found leaking shall be redone, without extra payment.

The portions of the line shall be tested by subjecting to pressure test as the laying progresses before the entire line is completed. In this way any error of workmanship will be found immediately and can be corrected at a minimum cost. Usually the length of the section to be tested shall not exceed 500 m.

Where any section of a main is provided with concrete thrust blocks or anchorages, the pressure test shall not be made until at least five days have elapsed after the concrete is cast. If rapid hardening cement has been used in the blocks or anchorages, test shall not be made until at least two days have elapsed. Prior to testing, enough back fill shall be placed over the pipe line to resist upward thrust. All thrust blocks for any part of the finished line shall have been sufficiently cured and no temporary bracing shall be used. The open end of the section shall be sealed temporarily with an end cap having an outlet which can serve as an air relief vent for filling the line, as may be required. The blind face of the end cap shall be properly braced during testing by screw jacks and wooden planks or steel plate. The section of the line to be tested shall be filled with water manually or by low pressure pump. Air shall be vented from all high spots in the pipe line before making the pressure strength test because entrapped air gets compressed and causes difficulty in raising the required pressure for the pressure strength test. The test pressure shall be gradually raised at the rate of approximately one Kg./sq.cm./min. The duration of the test period if not specified shall be sufficient to make a careful check on pipeline section.

41.5. Measurements:

The lengths shall be measured in running meter correct to a cm for the finished work, which shall include G.I. pipe and G.I. fittings such as bends, tees, elbows, reducers, crosses, plugs, sockets, nipples and nuts, but excluded brass or gun metal taps (cocks), valves, unions, lead connection pipes and shower rose. All pipes and fittings shall be classified according to their diameters, method of jointing and fixing substance quality and finish. In case of fittings of an equal bore the pipe shall be described as including all cutting and wastage. In case of fittings of unequal bore the largest bore shall be measured.

Note: G.I. unions shall be paid for separately in external work as well as in internal work

Digging and refill in go ftrenc hesshall either be measured separately as specified in the appropriate clauses of excavation and earth work or clubbed with mainitem.

41.6. Rate:

The rate shall include the cost of labour and material involved in all the operations described above. The rate shall not include excavation intrenches, painting of pipes and sand filling all round the pipes, unless other wise specified.

42. HDPEPIPES

42.1. General

The pipes will be High Density Polyethylene Pipes (HDPE) for drinking water. The pipe shall generally meet the specifications as per IS 4984 except mentioned otherwise.

42.2. Designation

Pipes shall be designated as per IS 4984/relevant ISO with latest amendments, according to the grade of material, followed by pressure rating and nominal diameter, for example, PE 80 PN 6 DN 110 indicates a pipe pertaining to material grade 80 having a pressure rating 0.6 MPa and outside nominal diameter 110 mm.

42.3. Colour

The colour of the pipe shall be black.

42.4. Materials

The material used for the manufacturer of pipes should not constitute toxic hazard, should not support microbial growth, should not give rise to unpleasant taste or odour, cloudiness or discoloration of water. Pipe manufacturers shall obtain a certificate to this effect from the manufacturers of raw material by any internationally reputed organization as per the satisfaction of the engineer.

42.5. Rawmaterial

a. Raw material used to manufacture the HDPE pipes shall be 100% virgin PE compound or Natural black PE resin confirming to IS: 4984, IS: 7328 and ISO: 4427 for this a certification has to be given by the resin manufacturer as per clause 3.2.3 of IS: 4984. The resin proposed to be used for manufacturing of the pipes should also comply with the following norms as per ISO 9080

b. The specified base density shall be between 940.0 kg/ m³ and 958.4 kg/ m³ (both inclusive) when determined at 27°C according to procedure prescribed in IS 7328 The value of the density shall also not differ from the nominal value by more than 3 kg/ m³ as per 5.2.1.1 of IS 7328. The MFR of the material shall be between 0.2g/10 min to 1.10g/10 min (both inclusive) when tested at 190°C with nominal load of 5 kgf as determined by method prescribed in IS 2530. The MFR of the material shall also be within ± 20 percent of the value declared by the manufacturer.

c. The resin shall be compounded with carbon black. The carbon black content in the material shall be within $2.5 \pm 0.5\%$ and the dispersion of carbon black shall be satisfactory when tested as per IS 2530.

42.6. Anti-oxidant

The percentage of anti-oxidant used shall not be more than 0.3 percent by mass of finished resin. The anti-oxidant used shall be physiologically harm less and shall be selected from the list given in IS 10141

42.7. Reworkedmaterial

No addition of Reworked/ Recycled Material from the manufacturer's own rework material resulting from the manufacture of pipes is permissible and the vendor is required to use only 100% virgin resin compound.

42.8. Maximumovalityofpipe

The outside diameter of pipes, tolerance on the same and ovality of pipe shall be as given in table 2 of IS 4984. Ovality shall be measured as the difference between maximum outside diameter and minimum outside diameter measured at the same cross section of the pipe, at 300 mm away from the cut end. For pipes to be coiled the ovality shall be measured prior to coiling. For coiled pipes, however, re-rounding of pipes shall be carried out prior to the measurement of ovality.

42.9. Detectability

HDPE Pipes should be detectable when buried underground, by providing a copper wire of 1.20mm+/-0.2mm dia. co extruded or firmly secured by self adhesive tapes along the entire length of the pipes duly ISI marked or any other equivalent method enabling measurement/detectability from the top of ground including supply of 3 sets of such instrument to the MCGM

Copper wire shall have PE (Polyethylene) insulation, if laid separately and secured by self adhesive tapes on the pipe. The insulation shall be free from voids and shall be strong enough to withstand mechanical and thermal stress of underground buried conditions. The thickness of the PE insulation shall not be less than 1.25mm or more, if specified in the relevant BIS Standards.

The pipe shall generally meet the specifications as per IS 4984/ relevant ISO with latest amendments.

The engineer-in-charge reserves the right to witness all tests and the contractor shall provide all facilities, to the engineer in charge in this regard and shall inform sufficiently in advance to enable the engineer in charge to depute his representative to witness the same. HDPE pipes should preferably to with co- extruded copper wire.

42.10. Wallthickness

The minimum & maximum wall thickness of pipe for the three grades of materials, namely PE63, PE80, and PE100 shall be as given in clause 6.2 of IS: 4984.

42.11. Length of straight pipeline

The length of straight pipe used shall be more than 6 m or as agreed by engineer.

42.12. Coiling

The pipes supplied in coils shall be coiled on drums of minimum diameter of 25 times the nominal diameter of the pipe ensuring that kinking of pipe is prevented. Pipes supplied in straight length should not be less than 6m.

42.13. Visual appearance

The internal and external surface of pipe shall be smooth, clean and free from grooving and other defects. The ends of the pipes shall be cleanly cut square with the axis to within the tolerance given below and free from deformity.

Nominal Diameter DN (mm)	Minimum out of square of pipe end (mm)
16 to 75	2
90 to 125	3
140 to 180	4
200 to 208	5
Above 280	7

42.14. Performance requirements

The performance requirements of the pipe shall meet the provisions given in clause 8 of IS: 4984.

42.15. Handling, transportation, storage and lowering of pipes

During handling, transportation, storage and lowering, all sections shall be handled by such means and in such a manner that no distortion or damage is done to the section or to the pipes as a whole.

The following procedures should be followed so as to eliminate potential damage to pipes and fittings and to maintain maximum safety during unloading, lifting and lowering.

- Pipes must not be stored or transported where they are exposed to heat sources likely to exceed 60°C.
- Pipes shall be stored such that they are not in contact with direct sunlight, lubricating or hydraulic oils, petrol, solvents and other aggressive materials.
- Scores or scratches to a depth of greater than 10% or more of wall thickness are not permissible; any pipes having such defects should be strictly rejected.
- HDPE pipes should not be subjected to rough handling during loading and unloading operations. Rollers shall be used to move, drag the pipes across any surface.
- Only polyester webbing slings should be used to lift heavy PE (>315mm) pipes by crane.
- Under no circumstances, chains, wire ropes and hooks be used on HDPE pipes.
- Pipes shall not be dropped to avoid impact or bump. If any time during handling or

during installation, any damage, such as gouge, crack or fracture occurs, the pipe shall be repaired if so permitted by the competent authority before installation.

- During coiling care should be taken to maintain the coil diameter at or above the specified minimum to prevent kinks. Coiling shall be done when the pipe attains the ambient temperature from the extruder. In uncoiling or recoiling care should be taken that sharp objects do not scour the pipe.
- When releasing coils, it must be remembered that the coil is under tension and must be released in a controlled manner. The end of the coil should be retained at all times, then the straps released steadily, one at a time. If the coil has bands at different layers of the coil, then they should be released sequentially starting from the outer layers. The amount of the energy locked up in the coil will depend on the size of the pipe, the SDR of the pipe, and the size of the coil.
- Straight lengths should be stored on horizontal racks giving continuous support to prevent the pipe taking on a permanent set
- Bare coils shall be wrapped with hessian cloth for long distance (> 300Kms) transportation.
- The truck used for transportation of the HDPE pipes shall be exclusively used of HDPE pipes only with no other material loaded – especially no metallic, glass and wooden items. The truck shall not have sharp edges that can damage the Pipe.
- Pipes manufactured at factory are to be carried to the site of work directly or stacked suitably and neatly along the alignment/road side/elsewhere near by the work site or as directed by the Engineer.
- Damages during transit, handling, storage will be to the Contractor's account and replacement for such pipes has to be made by the contractor as directed by the Engineer.

42.16. Lowering, laying of pipe

- Each pipe shall be thoroughly checked for any damages before laying and only the pipes which are approved by the Engineer shall be laid.
- While installing the pipes in trenches, the bed of the trench should be level and free from sharp edged stones. In most cases, the bedding is not required, as long as the sharp and protruding stones are removed, by sieving the dug earth, before using the same a backfill material. While laying in rocky areas suitable bedding should be provided as per the specification for bedding.
- As HDPE pipes are flexible, long lengths of fusion-jointed pipes having joints made above ground can be rolled or snaked into narrow trenches. Such trenches can be excavated by narrow buckets.
- During the pipe laying of continuous fusion jointed systems, due care and allowance should be made for the movements likely to occur due to the thermal expansion/contraction of the material. This effect is most pronounced at end connections to fixed positions (such as valves etc) and at branch connections. Care should be taken in fixing by finishing the connections at a time the length of the pipe is minimal (lower temperature times of the day.)

For summer time installations with two fixed connection points, a slightly longer length of PE pipe may be required to compensate for contraction of the pipe in the cooler trench

bottom.

- The final tie-in connections should be deferred until the thermal stability of the pipeline is achieved.
- The flexibility of polyethylene pipes allows the pipe to be cold bend. The fusion jointed PE pipe is also flexible as the plain Pipe. Thus the total system enables directional changes within the trench without recourse to the provision of special bends or anchor blocks. However, the pipe should not be cold bend to a radius less than 25 times the OD of the pipe.
- The Installation of flanged fittings such as connections to sluice/air/gate valves and hydrant tees etc., requires the use of stub ends (collars/flange adaptors complete with backing rings and gaskets. Care should be taken when tightening these flanges to provide even and balance torque.
- Provision should be made at all heavy fittings installation points for supports (such as anchoring of the flange in the soil) for the flange joint to avoid the transfer of valve wheel turning torque on to the PE flange joint.
- PE pipe is lighter than water. Hence care should be taken for normal installations where there could be a possibility of flooding of the trench thus the trench shall be kept free of water till the jointing has been properly done
- When flooded, some soils may lose cohesiveness, which may allow the PE pipe to float out of the ground. Several design checks are necessary to see if groundwater flotation may be a concern. Obviously, if the pipeline typically runs full or nearly full of liquid, or if groundwater is always below the pipe, flotation may not be a significant concern.
- However, weights by way of concrete blocks (anchors) are to be provided so that the PE pipe does not float when suddenly the trench is flooded and the soil surrounding the pipe is washed away. Thus site conditions study is necessary to ensure the avoidance of flotation.

42.17. Jointing of pipes

- Below 90 mm diameter: Push type compression joints.
- Equal and Above 90 mm diameter: Butt-fusion / Electro-fusion (Heat Fusion Process)

42.18. Fittings & specials

All HDPE fittings/ specials shall be fabricated in accordance with IS: 8360 (Part I & III)/relevant ISO with latest amendments. PE Injection moulded fittings shall be as per IS: 8008 (Part I to IX)/relevant ISO with latest amendments. All fittings/specials shall be fabricated or injection moulded at factory only. No fabrication or moulding will be allowed at site, unless specifically permitted by the Engineer. Fittings will be butt welded on to the pipes or other fittings by use of heat fusion.

42.19. Bends

HDPE bends shall be plain square ended conforming to IS: 8360 Part I & III/relevant ISO with latest amendments Specifications. Bends may be fabricated by jointing several small sections of pipes to reach the required angle.

42.20. Tees

HDPE Tees shall be plain square ended conforming to IS: 8360 Part I & II/relevant ISO with latest amendments Specifications. Tees may be equal tees or reduced take off tees. Tees may be moulded or fabricated from pipes elements.

42.21. Reducers

HDPE Reducers shall be plain square ended conforming to IS: 8008 Part I & VII/relevant ISO with latest amendments Specifications. Reducer must be moulded.

42.22. Flanged HDPE Pipe Ends

HDPE Stub ends shall be square ended conforming to IS: 8008 Part I & VII/relevant ISO with latest amendments Specifications. Stub ends will be welded on the pipe. Flange will be of slip on flange type as described below.

42.23. MSSlip-OnFlanges

Slip-on flanges shall be Mild Steel flanges covered by epoxy coating or plastic powder coating. Slip-on-flanges shall be conforming to standard mating relevant flange of valves, pipes etc. Nominal pressure rating of flanges will be PN16. The flanges should confirm to ANSI B 16.5. The following table provide the general dimension of the flanges.

Sr No.	Pipe OD (mm)	External diameter of flange (mm)	PCD (mm)	Number of holes	Diameter of hole	Bolt Size	Length of bolts	Thickness of flange
1	110	229 x 1.0	191 x 1.0	8	19	M16	70mm	18
2	160	279 x 1.5	242 x 1.5	8	22	M18	100mm	20
3	200	343 x 1.5	299 x 1.5	8	22	M18	120mm	20
4	250	406 x 1.5	362 x 1.5	12	25	M22	150mm	22

42.24. Welding Procedure

Jointing between HDPE pipes and specials shall be done as per the latest IS: 7634 part II. Method of jointing between the pipes to pipes and pipes to specials shall be with butt fusion welding using automatic, hydraulically operated, superior quality butt fusion machines which will ensure good quality butt fusion welding of HDPE pipes.

42.25. Tests to establish portability of work

Pipe specimen shall be subjected to tests specified below in order to establish the suitability of these pipes for use in carrying potable water:

- Smell of the extract
- Clarity of the colour of the extract
- Acidity and alkalinity
- Global migration UV absorbing material Heavy metals
- Un-reacted monomers (styrene) and Biological tests

42.26. Site fabrication PE fittings

Two or more PE specials coming at one place (like PE Tee, Reducer, Flanged end etc.,) shall be jointed at contractor's workshop and transported to the site of works for final installation with proposed PE pipelines. In no case, jointing of three or more welds in one place, at site will be allowed.

42.27. But Fusion Welding Machine

Butt fusion welding machine should be automatic, hydraulically operated.

General Data

Welding Range : 63mm – 250mm
Voltage : 230V, 50Hz (Standard)

Machine Composition

- Butt fusion welding machine should be automatic, hydraulically operated
- The butt fusion machines can be connected to a data logger (computer system) that can print the weld parameters.
- Basic Machine composed by four clamp dia 250mm and complete with heating mirror disconnecting device.
- Removable PTFE coated heating mirror with electronic thermostat and separate thermometer.
- Removable electric facing tool with safety micro switch.
- Mirror & facing tool support with LDU pre set
- Electro hydraulic unit complete with pressure regulator, by pass and accumulator.
- Reducing ring for pipes and fittings dia 63, 75, 90, 110, 125, 140, 160, 180, 200 and 225mm.
- Stub End device 63- 250mm.
- Transport box (100X104X77) cm.

42.28. Procedure for joining by Electro-fusion

- Cut pipe square and remove burrs.
- Arrange pipes to be joined so that they are approximately in line and with the ends touching.
- Without removing the protective wrap, place the coupler along side with the pipe ends with the centre line of the fitting with the ends.
- Using a felt tip pen or similar, place a mark on each pipe approximately 20mm out side the extremity of each end of the coupler.
- Place the fitting to one side and thoroughly scrape the outer surfaces of each pipe or thermo weld fitting from the mark to the pipe end, to completely remove the surface layer.
- When using a hand scraper, the operation is simplified by rotating the pipe and scrapping from above. Where rotation is not possible scrapping should start from the under side.
- In the case of mechanical surface preparation tools the instruction supplied by the manufacturers should be followed.
- After preparing the surfaces of both pipes care should be taken to prevent the

surfaces from becoming contaminated by grease or other dirt. This can be conveniently achieved by placing a plastic bag over each pipe end.

- Remove the electro fusion fitting from the protective wrapping and fit it on to one of the pipes to which it is to be joined until contact is made with the pipe centre stop. Mark the pipe to show the extremity of the fitting. Then insert the other pipe into the fitting until it reaches the pipe stop and mark that in a similar manner.
- Care should be taken to prevent movement of the assembly during the fusion process. The use of welding clamps will minimize the risk of accidental movement and also assist in aligning pipes.
- Remove the terminal protectors and connect the control unit lead to the terminals on the fitting.
- Switch on the control unit. Key in the number of seconds required for jointing. Check the digital display for confirmation that the correct time has been keyed in. Press the start button. The digital display will progressively reduce as the jointing time elapses.
- Completion of the cycle will be indicated on the control panel. Material should also have raised up the fusion indicator hole adjacent to the terminal shroud, also indicating successful fusion.

42.29. Electro-fusion Welding Machine

Parameter:

- Input Power Supply Frequency 45-65 Hz
- Voltage 170 - 270V or 310 - 450V

Quality

- Work - temperature -15 +50
- Storage - temperature -40 +70
- Control Mode Constant Voltage, Current or Power
- Protection Over current, Overvoltage, Under voltage
- Weight About 18Kg
- Dimensions 350mm*200mm*230mm

42.30. Field Hydraulic Test

- a. The Sectional Hydraulic Test shall be carried out after the pipeline section to be tested has been laid jointed and backfilled to a depth sufficient to prevent floatation, but leaving the joints exposed which are to be tested. The sections to be tested shall have to the approval of the Engineer and shall not be longer than 2000 m when either the pipeline is laid adjacent to or underneath the carriageway or when section includes an air valve chamber. The joints between each tested section shall be left exposed until the pipeline has passed the test on completion.
- b. Each length of the pipeline to be tested shall be capped or blanked off at each end and securely strutted or restrained to withstand the forces which will be

exerted when the test pressure is applied. Air valves already fitted shall be permitted to function during the test.

c. Proposals for testing where thrusts on structures are involved, even where thrust flanges on the piping are installed, shall be with the prior approval of the Engineer.

d. The method of filling the pipeline with water shall be approved by the Engineer. The length under test shall be filled making through appropriate mechanism as approved by the Engineer. The test length shall then remain under constant moderate pressure, 10 to 20m head of water, for a period of several hours until the pressure can be maintained without additional pumping. The cost of water shall be borne by the contractor.

e. The pressure shall then be slowly increased at a maximum rate of 1 bar per minute to the full test pressure and pumping discontinued for 3 hours or until the pressure has dropped by 10m, whichever occurs earlier. Thereafter pumping shall be resumed and continued until the test pressure has been restored. The quantity of water pumped to restore the pressure, which is called make up water, shall be the measure of thermal expansion or leakage from discontinuation of pumping until its resumption. The makeup water shall be as below:

OD of Pipeline (mm)	Liters per 1000m of the pipe length tested		
	One hour test	Two hour test	Three hour test
63	9	14	24
110	16	31	50
160	37	74	112
200	50	87	124
315	136	285	422
400	174	347	521

f. The maximum allowable test pressure shall be 1.5 times the system design pressure or pipe rating whichever is higher.

g. Notwithstanding the satisfactory completion of the hydraulic test, if there is any discernible leakage of water from any pipe or joint, the Contractor shall, at his own cost, replace the pipe, repair the pipe or re-make the joint and repeat the hydraulic test with cost including the cost of water. Water used for hydrostatic test shall be clean and potable.

h. Pipelines shall be tested as above except where the Engineer issues such instructions as are necessary for testing parts of the Works that have been designed for stresses limited by considerations other than those applying to the pipeline systems.

i. Test pressures are to be measured in kg/cm^2 at the centre of the blank flange situated at

the lowest end of the pipeline under test.

42.31. Commissioning

After satisfactory installation and testing of the entire pipelines including fittings shall be disinfected as the relevant IS/ISO standard before commissioning of pipeline and fittings for operation and to be certified by the Engineer in charge.

42.32. Store

The Contractor has to establish his own store at sites for stacking the material/machine as per the relevant IS/ISO standards.

42.33. Training

The Contractor shall provide on-site training on HDPE pipe laying, jointing, testing and maintenance etc., to department staff and new O&M staff.

43. SPECIFICATION OF WATER – COOLER -CUM – WATER PURIFIER

43.1 Basic Requirement: A Water – Cooler along with Water Purifier (Combined Unit) is required for providing safe and hygienic drinking water in District Hospitals in the Nagaland with O & M for 2 Years. It shall have the following broad specifications.

43.2. WATER COOLER: FEATURES

Sr. No.	Features	Requirements
1.	Water Cooling Capacity.	50 Liters / Hr. Quantity as per indent
2.	Water Flow Rate	Not less than 0.6 LPM
3.	Instant Cooling	No storage tank required; Instant cooling with start – up time of not more than 5 minutes
4.	Compressor	Energy efficient Hermetically Sealed Compressor with suction gas cooled, equipped with Over Load Protector, Relay and other
5.	Refrigerant	Non – CFC, Non – Toxic, Non - Inflammable
6.	Input Power Supply	230 Volts+ 10%, 50Hz, Single Phase AC supply with 5 amps 3 Pin Plug top and proper earth connection.
7.	Voltage Stabilizer	Built – in Voltage Stabilizer shall be provided which can take of voltage fluctuation between 180 to 260 Volt, 50Hz, AC
8.	Option	Switch option for selection between chilled and room temperature water

43.2.2. WATER PURIFIER: FEATURES.

The Water Purifier shall be connected to the Water Cooler. It must have advanced 3 stage purification processes, deploying last point purification process to ensure delivery of 100%

safe drinking water. Other specifications shall be as follows:

Sl. No.	Features	Requirements
1.	Safety Mechanism	Built – in Electronic Monitoring System to ensure complete purification of water before allowing the flow
2.	Purification Process	3 stage Purification Process comprising of sediment filter candle, activated carbon and ultra violet column capable of effectively removing all particulate, chlorine, organic impurities and water born bacterial and viral

43.2.3. OTHER REQUIREMENT & CONDITIONS:

43.2.3.1. MAKE: The Water Cooler – cum – Purifier shall be of Blue Star/ Voltas/ Eureka Forbes/ Kent/ Usha/ Equivalent.

43.2.3.2. WARRANTY: The complete Water Cooler and Water Purifier shall be covered under warranty for a period of 12 months from the date of installation.

43.2.3.3. ANNUAL MAINTENANCE CONTRACT:

The party participating in the tender will have to undertake the comprehensive Annual maintenance (parts / labour / onsite) of the supplied equipment for a period of Four years. For a period of one year after installation, the units will be covered under warranty, hence only charges of consumables shall be payable. The subsequent four years shall be under AMC and the cost shall be quote separately.

The charges shall be payable after every six month intervals on successful completion of the work. The AMC will comprise of following.

*Scheduled Preventive Maintenance: This is to be carried out every six months intervals. In this time the activated carbon block and sediment filter is to be replaced, the refrigeration circuit is to be serviced.

*Breakdown Maintenance: The breakdowns of the complete equipment (Water Cooler & Water Purifier) are to be attended throughout the year. All the material required for repair/replacement of any of the component / system shall be arranged by the party. All the parts to be used shall be sourced from OEM only.

If any inconsistencies between the conditions prescribed in Specifications with the GCC & Particular Conditions, the GCC & Particular Conditions and other section of the bid prevail.

44. EFFULENT / SEWERAGE TREATMENT PLANTS FOR THE HOSPITAL

The work is to design, construction, testing and commissioning of the packaged treatment plant for the Hospital. The designed capacity of the plant is 20 KLD. The following specifications govern the design, construction of the 20 KLD ETP.

The location of work is to be discussed with Engineer in-charge and the Hospital Management Authority. The work is to divert the flow from septic tanks of the hospital buildings to proposed ETP. The design considerations and the scope of work includes:-

- Basic engineering such as preparation of general layout, hydraulic flow diagram, P & I diagram, and GA drawings.
- Detailed engineering such as preparation of Equipment, plant layout drawings, SLD & control schemes and bill of material.
- Supply of Mechanical & Bought-out Equipment, Electrical, Instruments and Piping material (as per details in Table 3.0-Equipment Schedule)
- Installation of ETP equipment with interconnecting piping, electrical and instrumentation works as per instructions and directions given by NHP.
- Commissioning of the ETP and O & M for 12 months
- Insurance for above supplied equipment
- Unloading for above supplied equipment and moving it to the stores or desired location.
- All Civil Works, with design and drawings and completion as per scope of work for installation of ETP
- RCC designs & Structural drawings for all units including Sheds/Drain Channels etc.
- Hand railing including toe guards, Access Platforms, Structures etc. for all tanks
- Supply of Bio-Sludge, Dosing Chemicals/Consumables etc.
- Spare Parts for all bought out equipment's
- Routine, Preventive & Breakdown Maintenance of Units and Equipment's
- Packing & Disposal of hazardous and non-hazardous sludge
- Incoming cable and earth in grid connection from substation to ETP MCC
- Piping upto inlet battery limits and disposal piping from outlet battery limits of ETP
- Street Lighting, Equipment/unit area lighting and indoor lighting system with fan points
- Sanitary facilities, MCC, Operator rooms etc.
- Land/Site Leveling, PCCL leveling, Paver Blocks, Internal Roads, Gardening, landscaping etc.
- Incoming Raw Water and Treated Water distribution
- Storm water drains & Drainage system
- Ventilation for basement installation
- Plans/Drawings approval from local authority and architectural drawings for approval purpose
- Service waterline, fire-fighting system, Utility lines like acid/alkali etc.
- Water and Electricity required during execution of ETP, start up and commissioning of the

plant

- Security of the equipment, materials after delivery at site
- Manpower for trial runs, commissioning and operation of ETP

1.0 Design Data & Performance projection

Parameter	Unit	Inlet Effluent	Final treated water
Flow	m ³ /day	5	5
pH	----	4.5–6.0	6.5–9.0
COD	mg/l	800-1000	< 250
BOD	mg/l	300-400	< 30
O & G	mg/l	20- 30	< 10
TSS	mg/l	400-600	< 100

Note: Plant design for above all parameters.

2.0 Treatment Scheme

Please refer the PFD attached. The effluent shall be treated in three stages:

2.1 Primary treatment:

The system will be designed to treat 5m³/day of waste water. Effluent will be collected through pipe lines from the hospital area to screen chamber, where coarse screen is placed to prevent coarse solids and debris from entering the tank and prevent clogging of pipes and equipment. Solids like Plastic bags, bottles, Bottle Cap etc. are trapped and removed manually. From Screen chamber effluent will overflow to Oil & Grease trap where floating oil & grease is removed from surface manually. The overflow from Oil and Grease trap enters the Collection cum Equalization Tank. From Oil & grease trap the effluent flows to equalization tank in batch wise operation. The equalization tank is provided with acid & alkalizing arrangement for pH neutralization & coarse bubble diffusers will be provided to mix the waste water. This effluent will be pumped to Flash mixer where alum is dosed for coagulation & polyis dosed for better flocculation. Flash mixer effluent will overflow to primary settling tank; hopper bottom settling tank provided. Suspended solids get settled at the bottom of settling tank & sludge which is pumped to sludge dewatering unit and clear supernatant will overflow to flash mixer followed by bioreactor.

2.2 Secondary treatment:

The system will be designed to treat 5m³/day of waste water. The secondary Treatment is based on the principle of aerobic biological oxidation. Considering the BOD concentration, a single stage biological oxidation is offered. Bio-reactors contain biological mass kept in suspension. The mixing and oxygen transfer within the bio-reactors shall be done by diffusing air from air blowers through high efficiency fine bubble diffusers. The Mixed Liquor from the Bio-Reactor shall overflow to secondary settling tank for settling. Settled bio-mass shall be recycled back to bio-reactor to maintain the MLSS concentration and excess bio-mass will be pumped to sludge dewatering unit. The clear overflow of Secondary Settling tank will overflow to intermediate tank for tertiary treatment.

2.3 Tertiary treatment:

The system will be designed to treat $5\text{m}^3/\text{day}$ of waste water. The clear effluent from intermediate tank shall be pumped through a pressure and filter (PSF) for removing any fine solids escaping the secondary Settling tank & then from Activated Carbon filter for removal of color & odor. Hypodosing system is connected inline for disinfection of bacteria. The final treated water shall be collected in the final treated water tank.

2.4 Sludge Dewatering Unit

The sludge generated from the Primary Settling tank and secondary Settling tanks is pumped in sludge dewatering unit. The wet sludge obtained from the sludge dewatering unit will be sent for disposal to Common Hazardous Waste Treatment Storage Disposal Facility and the filtrate will be sent back to Equalization cum Neutralization Tank.

3.0 Equipment Schedule

Sr. No.	Description	Capacity/Size	Qty. (Nos.)	MOC
A)	Civil List (Client Scope)			
1.	Equalization cum Neutralization Tank – A/B	2.5m^3	2	RCC
2.	Final Treated Water Tank	5m^3	2	RCC
3.	Chemical Room	Suitable	1	RCC
4.	Equipment & Pump Foundations	As required	Lot	RCC
5.	ETP shed	Suitable	1	MS-GI

Sr. No.	Description	Capacity/Size	Qty. (Nos.)	MOC
B)	MS Fabricated,BoughtoutMechanicalEquipment(K&CScope)			
1.	CoarseBarScreen	10- 15mmbarspacing	1	SS304
2.	BarScreenChamber	0.02 m ³	1	MS-Epoxy
3.	Oil &GreaseTrap	0.3 m ³	1	MS-Epoxy
4.	CoarseBubblediffuserwith retrievablepipingarrangement	90mmODx 1.6mlong	1	PVC
5.	Acid DosingTank	50lit	1	HDPE
6.	Caustic DosingTank	50lit	1	HDPE
7.	AgitatorforCausticDosingTank	Suitable	1	SS316
8.	FlashMixerFeedPump	0.3 m ³ /hr@10mhead	1	CI
9.	FlashMixer	0.1 m ³	1	MS-Epoxy
10.	FlashMixerAgitator	0.5HP	1	SS316
11.	AlumDosingTank	50lit	1	HDPE
12.	AgitatorforAlumDosingTank	0.5HP	1	SS316
13.	AlumDosingPump	0-5LPH	1	PP
14.	PolyDosingTank	50lit	1	HDPE
15.	Agitatorfor PolyDosingTank	0.5HP	1	SS316
16.	PolyDosingPump	0-5LPH	1	PP
17.	Primary Settlingtank	1 m ³	1	MS-Epoxy
18.	Bio-reactor	3 m ³	1	MS-Epoxy
19.	FineBubbleDiffuserwith Retrievablepipingarrangement	63mmODx 0.5mlong	1	EPDM
20.	AirBlower	11m ³ /hr@ 0.45KSC	1	CI
21.	SecondarySettlingtank	1 m ³	1	MS-Epoxy
22.	Sludgerecirculation Pump	0.3 m ³ /hr@ 10mhead	1	CI
23.	IntermediateTank	500lit	1	HDPE
24.	PSFFeed& BackwashPump	0.3 m ³ /hr@ 15mhead	1	CI
25.	HypoDosingPump	0-5LPH	2	PP
26.	HypoDosingTank	50lit	1	HDPE
27.	PressureSandFilter (PSF)with Sandmedia&multiportvalve	0.2m diax 1.2m height	1	MS-Epoxy
28.	ActivatedCarbonFilter (ACF)with Carbonmedia&multiportvalve	0.2m diax 1.2m height	1	MS-Epoxy
29.	Sludgedewateringunit withfilter Clotharrangementsystem	Tosludgeon9.3kg/dayonwet cake basis	1	MS-Epoxy

Sr. No.	Description	Capacity/Size	Qty. (Nos.)	MOC
C)	InstrumentationList (K&CScope)			
1.	PressureGauge	2.5" dialsize,suitable rating	Lot	suitable
2.	Levelswitch	Suitable	2	Float:SS
3.	AirRotameter	Suitableairrange	1	MS-Glass
4.	Flow Meter	Suitableflow range	2	Suitable
D)	Piping &Electrical(K&CScope)			
1.	ElectricalincludingMCC,Power Cables,ControlCables,motor canopy &support structures, etc.	As perbelow Notes	Lot	Suitable
2.	Interconnectingpipe&fittings Materialswithvalves&etc.	As perbelow Notes	Lot	HDPE/ MS

Note-1:

1. Motor Control Centre shall be as per standard design, **Non-Compartmental type** IP-52 enclosure, in door mounting with MPCB & contactors of adequate rating for each Feeder. The panel shall be provided with ammeter, energy meter and volt meter. DOL starter shall be provided for motors upto 10 HP and for motors above 10 HP Star-Delta starters shall be provided. No LPBS shall be provided for remote ON/OFF of each motor. Power cables shall be of adequate size as per feeder rating. Control cables shall be 1.5mm² 3C YWY. MCC is skid/floor/wall mounted. Spare feeders are not considered.
2. MCC shall be at Maximum 2.0m distance from all motors.
3. Cables shall be best and armoured PVC insulated type.
4. All the motors shall be 415V AC, 50HZ, IE2 & NFLP.
5. All Inter Connecting Piping Shall be in UPVC. The selection of type of valves for particular application will be done as per standards. Air piping will be in MS 'C' ERW. Frontal piping for pressure vessels shall be in MS 'C' ERW.
6. The pipes will be placed on MS-Epoxy supports with 'U' Clamps. Horizontal & Vertical supports for overhead Cables and pipes will be in MS- Epoxy.
7. The pipe sizing & MO Candel ectrical cable, Tray sizing & MOC etc. will be as submitted for approval with design calculations and supporting.
8. The nut-bolts will be G.I.
9. Hand Railing for the Bio reactors walk way and other stair case hand railings and Toeguards is shall be for B class pipe and Equalization tank hand railing comes under the scope of Civil Work.
10. The differential heads for pumps indicated in above schedule are only indicative. The actual heads will be as per the processed sign calculations submitted by the contractor
11. The layout will be decided by contractor after discussion with project consultant/owner / NHP.
12. The final treated water tank will be at max. 4.0m distance from the Pressure Sand Filtration

pumps. All the units & Equipment's will be placed in compact way and adjacent to each other. The distance between each unit in series will be 0.5m max.

15. The effluent will be collected in the collection Tank. From the collection tank the effluent will be pumped by the feed pump to the system. The collection Tank will be located at a max. 4.0m distance from the first feed point. The sludge dewatering unit/system will be placed at max. 2.0 m distance from the sludge transfer pumps. The piping is considered accordingly. Any extra length of piping other than that considered above will be charged extra at mutually agreed rates.
16. Pressure Gauges shall be without siphon tube and isolation valve.
17. FRP motor covers shall be provided.
18. The plant shall be operated in 3 shifts.

Following Instrumentation shall be considered:

1. All the motors On /OFF/TRIP will be indicated on the Panel
2. Pressure gauges shall be before pump discharge line
3. Level switch shall be for collection cum Equalization tank
4. Flow meters shall be for flash Mixer feed Pump discharge line & PSF feed Pump discharge Line.
5. Air Rotameter shall be considered for Bio-reactor.

Makes of Major Components

Air Blower	TMVT/Greenfield/Equivalent
Centrifugal Pump	Kirloskar/Crompton/ Equivalent
Fine Bubble Diffusers	Rehau /Equivalent
Coarse Bubble Diffusers	Southern Cogen/Equivalent
Fabricated Items	K&C
Dosing Pump	E Doze/IDOze/Equivalent
Dosing/Storage Tanks (HDPE)	Sintex/Infra/Sarita
Agitator	K&C
Sludge Dewatering Unit	K&C
PSF & ACF	Pentair/Equivalent
Electric Motors	ABB/Crompton Greaves/Siemens.
Level Switch	Dag Process/Equivalent

PressureGauges	Avion/Equivalent
AirRotaMeter	TansaEquipment/Equivalent
Flow meter	Reputed
UPVC pipes& Fittings	Supreme/Prince/Equivalent
MSPipe&Fittings	Bhushan/Equivalent
ElectricalLTSwitchgear	L& T/Siemens /Equivalent
ElectricalCables	Polycab/ Equivalent

45. Misc. Works- Road Works

45.1 Paving Tiles:

45.1.1 Materials: Pre cast concrete paving tiles with or with out perforation shall be manufactured and tested in accordance with IS:13801, except as described here below, to the approval of the Engineer. Pre-cast concrete paving tiles shall be manufactured to the dimensions, patterns, and colours indicated in the drawings. The tiles are to be either 250 mm or 300 mm x 100 mm rectangular or any other size and/or shape as shown in the drawings or instructed by the Engineer and shall be hydraulically pressed using a coloured concrete to paving not less than 8mm thickness. The pre-cast concrete paving tiles shall have a minimum thickness of 38 mm and shall be laid to the pattern as approved by the Engineer.

The tiles shall be manufactured using a minimum of 350 Kg. Cement per Cubic Metre of Mix.

All tiles shall be free from segregation, (honey-combing, broken or damaged corners and imperfect plane surface). Correction of any defects by a method of polishing or grouting will not be allowed.

45.2 PaverBlock for Pedestrian Ways & Footpaths: The interlocking paver block of 60 mm thickness to be used for pedestrian ways and footpaths. The average tensile splitting strength shall not be less than 2.8 MPa with a provision that no individual block shall have a strength less than 2.6 MPa.

The laying procedure and the sampling and testing procedure for the paver blocks shall be as given in Clause No.4.

45.3 Measurements for Payment: The unit of measurement for the paver block surfacing shall be Sq. M. of area covered by the paver block including and bedding for the specified thickness shown on the drawing.

45.3.2 Rate: The contract unit rate payable for paver block pavement shall be payment in full for carrying out the required operations including full compensation for all labour, materials (paver blocks, sand and concrete for confinement) and equipment, transport, placing, compacting, finishing, curing, testing and incidentals to complete the work as per specifications, all royalties, fees, storage and drains where necessary and all leads and lifts.

45.4 PaverBlocks/ Interlocking Concrete Block Pavement:

45.4.1 The concrete pavers should have perpendiculars after release from the mould and the same should be retained until the laying. The surface should be of anti-skid and anti-glare type. The paver should have uniform chamfer to facilitate easy drainage of surface run off. The pavers should have uniform interlocking space of 2mm to 3mm to ensure compaction and filling after vibration on the paver surface.

45.4.2 The concrete mix design should be followed for each batch of materials separately and automatic batching plant is to be used to achieve uniformity in strength and quality.

45.4.3 The pavers shall be manufactured in single layer only.

45.4.3.1 Skilled labour should be employed for laying blocks to ensure line and level for laying, desired shape of the surface and adequate compaction of the sand in the joints.

45.4.3.2 The pavers are to be skirted all round with kerbing using solid concrete blocks of size 100mm x 200mm x 400mm or as directed by the Engineer. The kerbing should be bedded for 100 mm depth. The concrete used for kerbing shall be cured properly for 7 days minimum.

45.4.3.3 **Bedding Sand Course:** The bedding shall consist of a clean well graded sand passing through 4.75 mm sieve and suitable for concrete. The bedding should be from either a single source or blended to achieve the following grading.

Table 45.1 Bedding Sand Requirement

In Sieve Size	% Passed
9.52mm	100
4.75mm	95-100
2.36mm	80-100
1.18mm	60-100
600 Microns	25-60
300 Microns	10-30
150 Microns	5-15
75 Microns	0-10

Contractor shall be responsible to ensure that's in gap-sized, gap-graded and sor sands containing an excessive amount of fine sor plastic fine sand are not used. The sand particles should preferably be sharp not rounded as sharps and possess higher strength and resist migration of sand from under the block to less frequently areas even though sharps and are

relatively more difficult to compact than rounded sands, the use of sharps and is preferred for the more heavily trafficked drive ways. The sand used for bedding shall be free of any deleterious soluble salts or other contaminants likely to cause efflorescence.

The sand shall be of uniform moisture content and within 4%-8% when spread and shall be protected against rain when stock piled prior to spreading. Saturated sand shall not be used. The bedding shall be spread loose in a uniform layer as per drawing. The compacted uniform thickness shall be of 45mm and within +/-5mm thickness variation shall not be used to correct irregularities in the base course surface.

The spreads shall be carefully maintained in a loose dry condition and protected against pre-compaction both prior to and following screeding. Any pre-compacted sand or screeds and left overnight shall be loosened before further laying of paving blocks take place.

Sand shall be slightly screeded in a loose condition to the pre determined depth only slightly ahead of the laying of paving unit.

Any depressions in the screeds and exceeding 5mm shall be loosened, raked and rescreeded before laying of paving blocks. Sampling and Testing Procedures for Paver Blocks:

45.4.4 **Sample Size:** Following are the sample sizes:

a) **Internal:** Average of minimum 3 samples per 5000 blocks-for paver block manufacturers

b) **External:** Minimum 9 Blocks per 5000 Blocks. Average of minimum 9 Blocks per site: for captioned contractors.

45.4.4.1 Sampling for Testing: Sampling for testing of paver blocks shall be done in accordance with clause No.440.5, 440.6 and 440.7

45.4.4.2 Compressive Strength: Testing for compressive strength shall be undertaken in accordance with clause 440.7. The average compressive strength of the 80mm thick paver blocks tested shall be 45N/Sq. mm. and average compressive strength of the 60mm to 50mm thick paver blocks shall be 35N/Sq. mm.

45.4.4.3 Water Absorption: Testing for water absorption shall be in accordance with IS:2185:1979:Part I (Specifications for Concrete Masonry Blocks) Appendix C.

45.4.4.4 Incase of failure of test sample: In case of failure of test sample for above test, the contractor should replace the entire lot of paver blocks representing samples are taken. The samples of replaced lots shall be tested. However, 25% of the payment of the measurement of the lot will be recovered as penalty.

45.4.4.5 Tensile Splitting Test: (for blocks subject to vehicular traffic)-The mean tensile strength of 8 blocks shall be not less than 3.9MPa and no individual block shall have tensile strength less than 3.6MPa when tested as per Annex E of BS 6717:2001

45.4.4.6 Abrasion Resistance (blocks subject to vehicular traffic): Set of 3 blocks tested as per Annex F of BS 6717:2001 shall be more than 23 mm.

45.4.5 Method for the determination of Water Absorption:

4.5.1 The test specimens shall be completely immersed in water at room temperature for 24 hours.

4.5.2 The specimens shall then be weighed, while suspended by a metal wire and completely submerged in water.

4.5.3 They shall be removed from the water and allowed to drain for one minute

4.5.4 Visible surface water being removed with a damp cloth, and immediately weighed.

4.5.5 Subsequent to saturation, all specimens shall be dried in a ventilated oven at 100 to 115°C for not less than 24 hours and until two successive weightings at intervals of 2 hours show an increment of loss not greater than 0.2 percent of the last previously determined mass of the specimen.

4.5.6 Calculate the absorption as follows:

$$\text{Absorption, Kg/m}^3 = \frac{A-B}{A-C} \times 100$$

$$\text{Absorption, Kg/m}^3 = \frac{A-B}{B} \times 100$$

Absorption, Percent

Where

A = wet mass of unit in Kg.

B = dry mass of unit in Kg. and

C = suspended immersed mass of unit in Kg.

45.4.6 Sampling of Paver Blocks:

45.4.6.1 Method of Sampling: Before laying paver blocks, each designated section comprising not more than 50000 blocks, shall be divided into ten approximately equal groups. Nine blocks shall be drawn from each group.

45.4.6.2 Marking and Identification: All samples shall be clearly marked at the time of sampling in such away that the designated section part the reof and the consignment represented by the sample, are clearly defined. The sampled shall bed is patched to the approve test laboratory taking precaution to avoid damage to the paving intransit. Protect the paving from damage and contamination until they have been tested. The samples shall bestored in water at $20^{\circ}\text{C} + 5^{\circ}\text{C}$ for 24 hours prior to testing.

45.4.7 Procedure for Testing of Compressive Strength for Paver Blocks:

45.4.7.1 Testing Machine: The testing machines shall be of suitable capacity for the test and capable of applying the load at the rate specified. It shall comply, as regards repeatability and accuracy with the requirements of relevant IS specification.

45.4.7.2 Procedure: The sample specimens shall be tested in wet condition after being stored for atleast 24 hours, in water maintained at a temperature of $20^{\circ}\text{C} + 5^{\circ}\text{C}$, before the specimens are submerged in water, the necessary area shall be determined.

The plates of the testing machine shall be wiped clean and any loose grit or other material removed from the contact faces of the specimen. Plywood nominally 4 mm thick, shall be used as packing between the upper and lower faces of the specimen and the machine plates, and these boards shall be larger than the specimen by amarg in of atleast 5mm at all points. Fresh packing shall be used for each specimenested. The specimen shall be placed in the machine with the wearing surface in a horizontal plane and in such away that the axes of the specimen are aligned with those of the machine plates. The load shall be applied with out shock and increased continuously at the rate of Approximately 15N/Sq. mm per minute until no greater load can be sustained. The maximum load applied to the specimen shall be recorded.

45.4.7.3 Calculation of Corrected Strength: The compressive strength of each block specimen shall be calculated by dividing the maximum load by full crosssection area and multiplying by an appropriate factors.

Table 45.2 Thickness and Chamfer Correction Factors for Compressive Strength

Work Size Thickness in mm	Correction Factors	
	Plain Block	Chamfered Block
60	1.00.	1.06
80	1.12	1.18
100	1.18	1.24

45.4.7.4 Compressive Strength Calculation: The average corrected compressive strength for the designed block section shall be calculated.

45.4.8 Laying of Interlocking Paver Blocks:

Paver blocks shall be laid in herring bone laying pattern through out the pavement. Once

the laying pattern has been established, it shall continue without interruption over the entire pavement surface. Cutting of blocks, the use of in fill concrete or discontinuities in laying pattern is not be permitted in other than approved locations.

Paver blocks shall be laid on the uncompacted screeded sand bed to the nominated laying pattern, care being taken to maintain the specified bond throughout the job. The first row shall be located next to an edge restraint. Specially manufactured edge paving blocks are permitted or edge blocks may be cut using a power saw, a mechanical or hydraulic guillotine, blower or other approved cutting machine.

Paver blocks shall be placed to achieve gaps nominally 2 to 3 mm wide between adjacent paving joints. No joint shall be less 1.5 mm not more than 4 mm. Frequent use of stringlines shall be used to check alignment. In this regard, the "laying face" shall be checked at least every two metres as the face proceeds. Should the face be out of alignment, it must be corrected prior to initial compaction and before further laying job is proceeded with.

In each row, all full blocks shall be laid first. Closure blocks shall be cut and fitted subsequently. Such closure blocks shall consist of not less than 25% of a full block.

To in fill spaced between 25 mm and 50 mm wide concrete having screened sand, coarse aggregate mix and strength of 45 N/Sq.Mm shall be used. With in such mix the nominal aggregate size shall not exceed one-third the smallest dimension of the in fill space. For smaller spaces dry packed mortar shall be used.

Except where it is necessary to correct any minor variation so occurring in the laying bond, the paver blocks shall not be hammered into position. Where adjustment of paver blocks necessary care shall be taken to avoid premature compaction of the sand bedding.

45.4.9 Initial Compaction:

After laying the paver blocks, they shall be compacted to achieve consolidation of the sand bedding and brought to design level sand profiles by not less than Two (2) passes of a suitable plate compactor. The compactor shall be a high-frequency, low amplitude mechanical flatplate vibrator having plate area sufficient to cover a minimum of twelve paving blocks. Prior to compaction all debris shall be removed from the surface.

Compaction shall proceed as closely as possible following laying and prior to any traffic. Compaction shall not, however, be attempted within one metre of the laying face. Compaction shall continue until lipping has been eliminated between adjoining blocks. Joints shall then be filled and recompact as directed.

All work further than one metre from the laying face shall be left fully compacted at the completion of each day's laying.

Any blocks that are structurally damaged prior to or during compaction shall be immediately removed and replaced.

Sufficient plate compactors shall be maintained at the paving site for both bedding compaction and joint filling.

45.4.10 Joint Filling and Final Compaction:

As soon as possible after compaction and in any case prior to the termination of work

on that day and prior to the acceptance of vehicular traffic, sand for joint filling shall be spread over the pavement.

Joints shall pass a 2.36mm(No.8) sieve and shall be free of soluble salts or contaminants likely to cause florescence. The same shall comply with the following grading limits.

Table 45.3 Jointing Sand Requirement

IS Sieve Size	% Passing
2.36mm	100
1.18mm	90-100
600 Microns	60-90
300 Microns	30-60
150 Microns	15-30
75 Microns	10-20

The Contractor shall supply a sample of the jointing sand to be used in the contract prior to delivering any such material to site for incorporation into the works. Certificates of test results issued by a recognized testing laboratory confirming that the samples conform to the requirements of these specifications shall accompany the sample.

The jointing sand shall be broom to fill the joints. Excess sand shall then be removed from the pavement surface and the jointing sand shall be compacted with not less than one (1) Pass by the plate vibrator and joints refilled with sand to full depth. This procedure shall be repeated until all joints are completely filled with sand. No traffic shall be permitted to use the pavement until all joints have been completely filled with sand and compacted.

Both the sand and paver blocks shall be dry when sand is spread and broom in to the joints to prevent premature setting of the sand.

The difference in level (lapping) between adjacent blocks shall not exceed 3 mm with not more than 1% in any 3m x 3m area exceeding 2mm. Pavement which is deformed beyond above limits after final compaction shall be taken out and reconstructed to the satisfaction of the Engineer.

45.4.11 Edge Restraint:

Edge restraints need to be sufficiently robust to withstand over ride by the anticipated traffic, to withstand thermal expansion and to prevent loss of the laying course material from beneath the surface course. The edge restraint should present a vertical face down to the level of the under side of the laying course.

The surface course should not be vibrated until the edge restraint, together with any bedding or concrete haunching, has gained sufficient strength. It is essential that edge restraints are adequately secured.

45.4.12 Measurements for Payment:

The unit of measurement for the paver block surfacing shall be Sq. M.

45.4.13 Rate:

The contract unit rate payable for paver block pavement shall be payment in full for carrying out the required operations including full compensation for all labour, materials(paver blocks, sand and concrete for confinement) and equipment, transport, placing, compacting, finishing, curing, testing and incidentals to complete the work as per specifications, all royalties, fees, storage and drains where necessary and all leads and lifts.

46. REPAIR AND REHABILITATION WORKS

The Works shall be carried as per CPWD Handbook for Repair and Rehabilitation of the RCC Buildings

46.1 CHIPPING OF PLASTER

46.1.1 Materials and T&P:

Hand-tools like chisels, hammer.

46.1.2 Procedure:

Step-1 Scaffolding, if necessary for the exterior members, shall be done for working upon the area.

Step-2 Working Platforms for interior members, if necessary, shall be erected suitably or provided as mobile.

Step-3 Provide Protective Screen, if necessary

Step-4 Mark off the area to be repaired using straight lines between corners.

Step-5 Cut shall be made along the marked boundary, normal-to-the surface.

46.1.3 Tolerance:

Chiselling Hand Tools are typically applicable for plaster removal for smaller, moderate and areas of limited access. Removal should begin at the interior of the repair area and progress toward the boundaries, using suitable hammer.

Rounded and Feathered Edges should be hand cut to form normal-to-the-surface boundaries. All the edges and cavities shall be square shouldered.

Step-6 cleaning of debris and dust shall be carried out from within the chiselled/chipped area and its disposal as per direction of the Engineer-in-Charge.

46.1.4 Measurements:

The dimensions of the area chipped off shall be measured separately. Unit of measurement will be Sq.M.

46.1.5 Rates:

The rates shall cover cost of all materials, labour and T&P involved in all the operations described above

46.2 CHIPPING OF UNSOUND/WEAK CONCRETE MATERIAL

46.2.1 Materials and T&P:

Power or pneumatically driven chisel, chipping tools complete with accessories, hand-tools like chisels, hammer, pH indicator (0.2% phenolphthalein solution) with pH range at least up to 10.5 and clinical injection syringe.

46.2.2 Procedure:

Step-1 Prop and support to relieve the structural member of stress and strains.

- Step-2 Scaffolding, if necessary for the exterior members, shall be done for working upon the area.
- Step-3 Working Platforms for interior members, if necessary, shall be erected suitably or provided as mobile.
- Step-4 Provide Protective Screen, if necessary
- Step-5 Mark off the area to be repaired using straight lines between corners. The marked area shall have 90° corners with the sides parallel or normal to the direction of the reinforcement. The marked boundaries for the repair area should be a minimum of 50 mm outside the perimeter of the spall. For a single spall, the repair area should have a minimum width of 100mm in any direction. If a number of spalls are closely located to each other, these spalls should be included in a single area marked for repair
- Step-6 Cut shall be made along the marked boundary, normal-to-the surface. It should be made with a diamond cutter blade. However, when diamond cutting is not practical, the normal cut can be made with a power driven chisel. Minimum depth of cut shall be 10 mm. In situations where the diamond saw could cut into the reinforcing steel due to inadequate concrete cover, the boundary edge should be formed manually by means of chisel and impact hammers. A cover meter could be used to estimate the depth of cover.
- Step-7 Chipping to remove all the unsound and weak concrete material shall be done carefully from the damaged portions of structural members by adopting mechanical or manual means up to the required depth to produce sound concrete surface to a near uniform depth for the repair area.

46.2.3 Tolerance:

The chipping tolerances shall be ± 5 mm

Chiselling Hand Tools are typically applicable for concrete removal for smaller, moderate and areas of limited access. Removal should begin at the interior of the repair area and progress toward the boundaries, using suitable hammer.

Power Driven Chisels/Hammers are normally applicable for chiseling smaller thicknesses up to about 50 mm.

Pneumatic Hammers are normally applicable for chiselling larger thicknesses in excess of 50 mm

Mechanical Milling(single drum, rotary cutter head with Tungsten-carbidebits) is applicable for large areas where the concrete cover is to be removed. Care must be taken to avoid contact with the reinforcing steel as both the reinforcement and the cutter drum could be damaged.

Rounded and Feathered Edges should be hand cut to form normal-to-the-surface boundaries. All the edges and cavities shall be square shouldered.

- Step-8 Test for carbonation shall be carried out at embedded or exposed reinforcement locations, by spraying phenolphthalein indicator on concrete in contact and in the immediate vicinity of reinforcement *soon after its chipping*. As otherwise, chipped concrete surface in contact with air is likely to get carbonated soon after its coming in contact with atmospheric carbon-dioxide.
- Step-9 A full-depth chiselling and removal of concrete all round reinforcement shall be carried out, in case the concrete in contact and in immediate vicinity of the reinforcement is carbonated
- Step-10 Inspection and soundness testing after concrete removal & cleaning, for weaknesses and de-lamination of exposed surfaces shall be visually carried out. If required, additional removal will be done.
- Step-11 Cleaning of debris and dust shall be carried out from within the chiselled/chipped area and its disposal as per direction of the Engineer-in-Charge.

46.2.4 Removing Concrete All around Reinforcement Including from It's Backside**Materials and T&P:**

Power or pneumatically driven chiselling, abrading, chipping tools complete with accessories, hand-tools like chisels, hammer, pH indicator i.e. 0.2% solution of phenolphthalein indicator for pH range preferably up to 11.5 or at least up to 10.5, clinical injection syringe.

46.2.5 Procedure:

Step-1 Prop and support if not done already, to relieve the structural member of stress and strains.

Step-2 Scaffolding & working platforms for the exterior members if not already done and if necessary shall be erected for working upon the area.

Step-3 Working Platforms for interior members, if not already done and if necessary, shall be erected suitably or provided as mobile.

Step-4 Provide Protective Screen if not already done and if necessary.

Step-5 Test for carbonation shall be carried out at embedded or exposed reinforcement locations, by spraying phenolphthalein indicator on freshly chipped concrete in contact and in the immediate vicinity of reinforcement.

Step-6A full-depth chiselling and removal of concrete all round reinforcement shall be carried out, if the concrete in contact and in immediate vicinity of the reinforcement is carbonated.

The concrete around reinforcement shall be removed so as to have a near uniform air gap of about 5 mm plus the nominal size of coarse aggregate to be used in repair concrete/mortar. However, the air gap shall not be less than 15mm in any case.

Power/pneumatic driven tools/chisels shall be used for such portions of carbonated concrete around reinforcement, which could not be removed manually, to achieve a near uniform required air gap all around including behind the reinforcement.

Power Driven Chisels/Hammers are normally applicable for chiselling smaller depths up to about 50 mm. Pneumatic Hammers are normally applicable for chiselling larger depth in excess of 50 mm

Step-7 Cleaning of debris and dust shall be carried out from within the chiselled /chipped area and its disposal as per direction of the Engineer-in-Charge.

46.2.6 Measurements:

The dimensions of the area chipped off for RCC slabs, beams and columns shall be measured separately. The average thickness shall be determined by taking an average of five thickness readings recorded with one reading each at corner and at the point of intersection of wires stretched diagonally from corner points of the rectangular area chipped. The extra/less thickness than specified for slabs, beams and columns shall be recorded in millimeters. Corresponding areas of slab, beam and columns shall be separately worked out in square meters correct to second place of decimal.

Unit of measurement will be Sq.M.

46.2.7 Rates:

The rates shall cover cost of all materials, labour and T&P involved in all the operations described above

46.3 PLASTERING**20 mm thick:**

Providing and applying 20 mm thick external sand faced plaster in double coat as per detailed specification in 1 : 3 cement sand mortar with waterproofing plasticizer

PLASTAID including all required all material, labour, scaffolding finishing the surface by taking out the grains curing etc. Complete.

46.3.1 Indian standards followed shall be as under:-

1. All relevant standards specified in section 2, 3 and 4.
2. IS 1542 - 1977 specification for sand for plaster.
3. IS 2394 - 1965 code of practice for application lime plaster finish.
4. IS 1661 -1972 code of practice application of cement lime plaster finishes.
5. IS 2402 - 1963 code of practice for external rendered finishes.
6. IS 1635 - 1975 code of practice for field slaking of preparation of putty.
7. IS 2645 - 1964 specification for integral water proofing compound.

46.3.2. MATERIAL

- 2.1 Cement, aggregate, lime, surkhi, water shall conform to respective specifications of Section 2.
- 2.2 Sand shall be as approved by E.I.C. and in accordance with IS 1542 specification for sand for plaster.
- 2.3 Marble dust obtained from crushing of hard marble stone shall not contain more than 8% of silt determined by field test.
Fineness modulus shall be greater than 1.0
- 2.4 Integral water proofing compound wall shall conform to IS 264 (specification for integral water proofing compound).
- 2.5 Neeru shall be obtained by mixing lime putty, sand in equal proportion and chopped jute @ 4 kg/ cum or mortar and ground to fine paste in the chemical grinder to give fine butter like paste.

46.3.3. PLASTERING

WORKMANSHIP

- 3.1 Surfaces to be plastered must be clean and free from all dust, loose material, oil, grease, mortar droppings, sticking of foreign matter or traces, algae etc. Point is that there should not be any chance of plaster getting de-bonded due to presence of material harmful for bonding.
- 3.2 Raking out of joint is expected to be carried out along with masonry but it should be checked and made sure to receive good key. This shall avoid cracking and crazing.
- 3.3 Wall should be sufficiently damp prior to plaster. Point to be borne in mind that water from plastering mortar is not absorbed by masonry.
Hence for wetting of wall prior to plaster, the contractor should discuss and satisfy E.I.C.
- 3.4 Any unavoidable projections in masonry, concrete surfaces shall be chiselled back. Care shall be taken that surrounding surfaces are not damaged.
- 3.5 Thickness of one coat should not be more than 12mm and less than 8mm for single coat finished plaster.
- 3.6 In case of multi coat plaster sufficient time shall be allowed to get under coat hardened (cure, dry and shrink properly) before subsequent coats are applied.

- 3.7 Under coats shall be scratched or roughened before it is fully hardened to form a mechanical key.
- 3.8 Method of application is also important and hence it is allowable to throw mix on surface rather than apply with trowel. This increased the adhesion.
- 3.9 Scaffolding should be rigid, allowing free and safe movement on platform and it should be at sufficient distance or height from working point of view. Scaffolding with railing gives more confidence to workers and increase quality of work.
- 3.10 Plaster work would follow following steps rigidly and after approval of E.I.C. actual plaster shall proceed.
- Surface is cleaned
 - Plaster area is provided with level dabs. i.e. dhada or spots allowing working and checking with 2-3 M straight edge. Depth of plaster shall not be less than 58mm at any point.
 - Required concealing services are completed and tested.
 - No further cutting of masonry required, is checked.
 - Repairs carried out to masonry or concealing work is cured and dry.
 - Surface is sufficiently damp
 - Plaster dab are checked for plumb and level by E.I.C.
 - Stone chips gravel joined with mortar in gap between masonry/ col. Beam.
- 3.11 Corners, external or internal shall be finished along with finished coat. It is advisable to have rounded corners.
- 3.12 Plaster shall be cured for 14 days by wet curing except in neeru finish plaster.
- 3.13 Plaster shall be levelled and lined by Aluminum hollow section of 2-3m long. (This will give even and levelled surface)
There shall not be more than 2mm difference in level when checked with 3m straight edge.

46.4 WATER PROOF PLASTER

The waterproofing compound shall be mixed with dry cement in the proportion by weight as specified or recommended by approved manufacturer of water proofing compound. Mixing should be thoroughly well integrated with cement. Addition of water shall not allow any slips of mixed cement. Mix 'in general used shall be CM 1:3 and balance application, curing procedure remains same as detailed above.

Measurement: In Sq. M

47 Specification for Plastic/FRP type Septic tank

GENERAL

- Quality Assurance
- Acceptable Manufacturers:

Approved makes or equivalent – Sintex make, Everest or equivalent

- Governing Standards, as applicable:
 - Tank manufacturer shall be in the business of manufacturing tanks.
 - Tank manufacturer shall be in the business of manufacturing tanks with materials conforming to the requirements of ANSI/AWWA / BIS (Thermosetting Fiberglass-Reinforced Plastic Tanks).

- Tank manufacturer must have supplied and installed at least 10 number of FRP septic tank and the tanks shall be in operation.
- Tank manufacturer shall guarantee the product for at least for 5 years.
- Submittals
 - Contractor shall submit to engineer copies of shop drawings for each tank and copies of manufacturer's literature (including installation instructions).

Products

- Single-Wall Fiberglass Underground Tanks
- Product-Storage Requirements:
 - All primary tanks must be vented. Tanks are designed for operation at atmospheric pressure only.
 - Tanks shall be capable of storing non-potable water not to exceed 140°F at the tank interior surface.
 - Tank shall be capable of storing products identified in the manufacturer's current limited warranty.
- Loading Conditions - Tanks shall meet the following design criteria:
 - External hydrostatic pressure: Buried in ground with 1.2 M of overburden over the top of the tank, the hole fully flooded and a safety factor of 5:1 against general buckling.
 - Surface Loads: When installed according to manufacturer's current installation instructions, tanks will withstand surface Class A road condition load.
 - Internal Load: Tanks shall withstand 5 bar (3 bar for 12' tank) air pressure test with 5:1 safety factor.
 - Tanks shall be designed to support accessory equipment such as submersible pumps, ladders, drop/fill tubes, etc. when installed according to manufacturer's recommendations and limitations.

Materials:

- The tank shall be manufactured as a matrix of premium resin, glass fibers and silane-treated silica that together result in a composite providing improved corrosion protection.
- Tank inner wall shall be fabricated against a mold to produce a non-air inhibited and high gloss laminate to provide fully cured inner surface without the need of wax coats, a low coefficient of friction and a natural resistance to the build-up of algae or other contamination on the surface. Wax and wax resin coatings cannot be used to achieve full surface cure on tank shells and endcaps.
- Tank Dimensions and Capacity: - As defined in the BoQ
 Inside tank diameter shall be ____.
 Tank length shall be ____.
 Nominal tank capacity shall be ____.

Accessories

- Optional Anchor Straps:
- Straps shall be standard as supplied by tank manufacturer.

- Provide glass fiber reinforced plastic anchor straps for each tank shown.
- Number and location of straps shall be as specified by manufacturer.

Access Collar:

- The standard access collar is 24", which is supplied by the manufacturer. (30" and 36" collars are optional)
- All access collars will be furnished complete with exterior adhesive channel.
- Manufacturer supplied adhesive kit shall be used for watertight collar/riser connection.
- Location(s) shall be indicated on tank drawings.
- Optional access riser shall be FRP with lockable composite lid.
- Optional Ladders: Ladders shall be supplied by the tank manufacturer – if depth of tank is more than 1 m
- Optional Pump Platform:
- Pump platforms shall be FRP as supplied by the tank manufacturer.
- Contact tank manufacturer with pump details, such as dimensions, mounting configuration and weight.
- Optional Fittings:
- All standard threaded fittings are carbon steel NPT half couplings. Reducers can be used for smaller sizes where specified and provided by the contractor.
- All standard threaded fittings to the primary tank are 4" in diameter.
- All optional inlet/outlet stub outs shall be FRP or PVC.
- Flexible connectors must be used on all piping connections. Piping must be free to move independent of the tank.

TESTING AND INSTALLATION

- Testing and Installation
- Testing - Tank shall be tested and installed according to the manufacturers standard Installation Instructions in effect at time of installation.
- Installation - Tank shall be installed according to the manufacturers standard Installation Instructions in effect at time of installation. Contractor shall be trained by the tank manufacturer, state, or other approved agency. The installing contractor must complete the tank installation checklist provided with the tank and return the completed checklist to the Engineer in charge or designated officer by NHP upon completion of the installation. The signed checklist, and applicable written approvals from manufacturer.

LIMITED WARRANTY

Limited Warranty

- Warranty shall be minimum 5 years from date of commissioning of the tank at site.

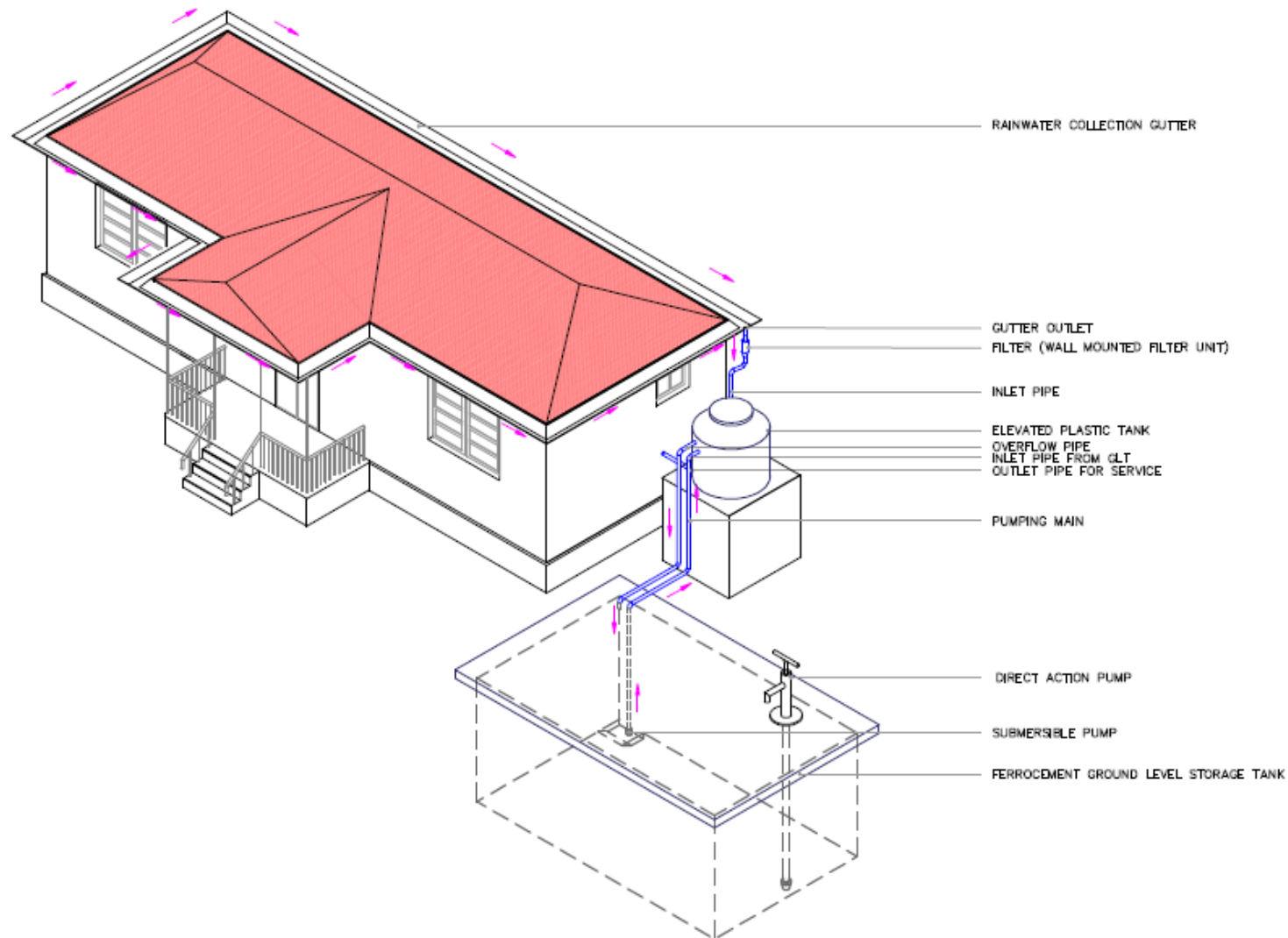
48. Construction of Cement concrete pavement

SCOPE OF WORK:

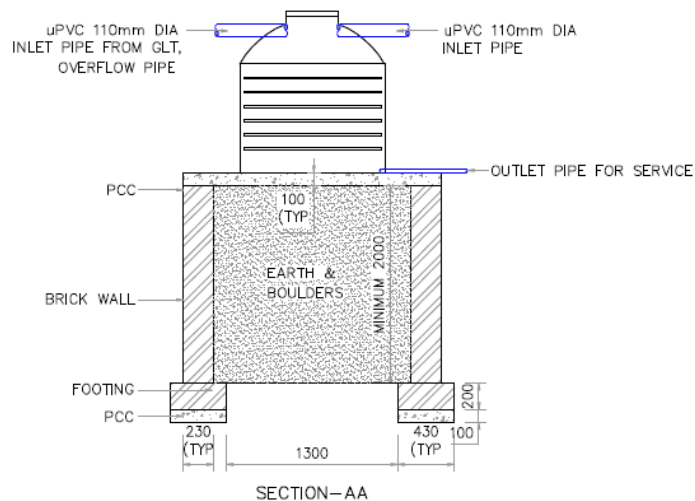
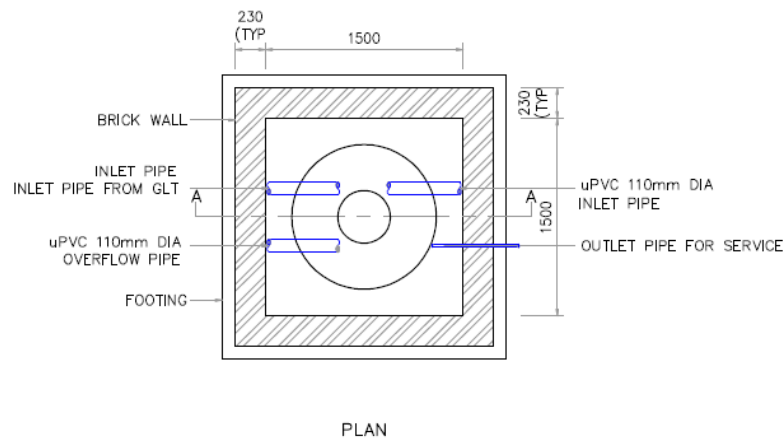
The work shall consist of a pavement of Portland cement concrete, with or without reinforcement as shown on the plans, constructed on a prepared subgrade, and in conformity with the lines, grades, thickness, and typical cross sections as shown on the plans for streets, alleys, and/or as specified. The concrete shall consist of a mixture of cement, fine aggregate, coarse aggregate, and water proportioned and mixed in accordance with the specifications.

1. A course of fairly rigid material, sometimes cement- or asphalt-treated, that is placed on the sub base to provide a stable platform for the concrete pavement slab. A course of material is placed on the sub grade to provide drainage and stability. — Generally, cut material can be used as embankment fill. First the site is graded to cut high points and fill low areas to the desired roadway profile elevations. Site Preparation Before construction begins, the construction site must be carefully prepared, This includes preparing the grade or road base, sub grade and sub base-
2. After 24hrs, form work displaced next length of road. The depth of wooden block must be same as level of slab thick. To placing the concrete in appropriate depth used 2.5-5cm thick and 3mtr long wooden sheeting before using form work, it should free from all type material like as dust ,cement. Construction Process After site preparation, Construction process consists of various steps, which are described below- FORM WORK Wooden sheets, battens, plywood, fibre hard board, steel plates, angles, rope etc are generally use for form work.
3. Watering of base If the base of the road is dry or construction is taken place during summer seasons Then watering is done using the sprinkling process, after this concrete should be Placed. Construction of Joints • There are three basic joint types used in concrete pavement: contraction, construction and isolation. • Except for some isolation joints, all joints provide a means to mechanically connect slabs. The connection helps to spread a load applied on one slab onto slabs along its perimeter. • Where it is necessary to provide transverse and Longitudinal joints; there wedge of woods, metals fix on level of concrete. • After setting of concrete it should be pull out.
4. Batch mixer to be used for mixing of concrete.
5. PLACING OF CONCRETE : Continuous bay method- Construct one side of road regularly, and after construction of some part of first side than construct other side, this method have fast process without no obstruction of traffic
6. After this, Floating, Belting, Screeding or strike off, Bull floating and Brooming is done as per requirement for the finishing purpose of concrete pavement to smoothen the top surface. CURING After completion of the finishing operations, the surface of the pavement shall be entirely covered with wet hessian cloth, burlap or jute mats Curing is the process of increasing the hydration of cement, after setting the concrete curing process done till 14-28days.COMPACTION OF CONCRETE Purpose of compaction is that to pull out air from void and make concrete harden. Compaction done by- 1.Mechanically surface vibrator 2. Manually hand tempers
7. OPENING OF THE TRAFFIC Use rapid hardening cement and generally after 7 days the road should be open to traffic. Advantages of Concrete Road • Durability and maintenance free life • Vehicles consume less fuel • Resistant to automobile fuel spillage and extreme weather • Greener process • Saving of natural resources • Eco friendly process

SECTION VI: DRAWINGS



6.1-CONCEPT LAYOUT FOR ROOF WATER HARVESTING SYSTEM



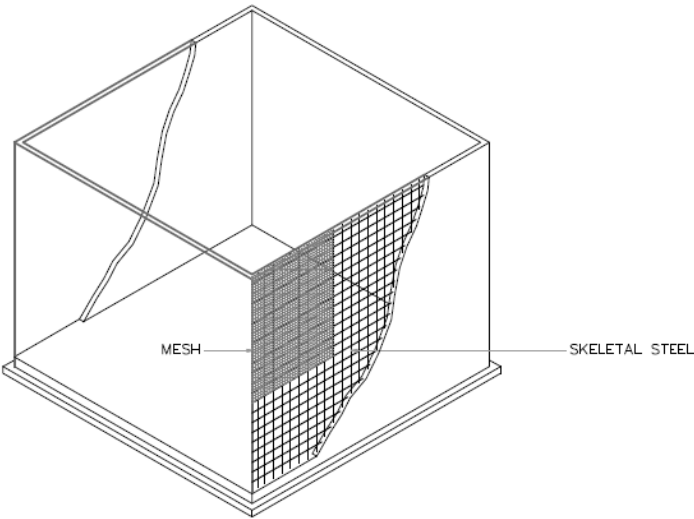
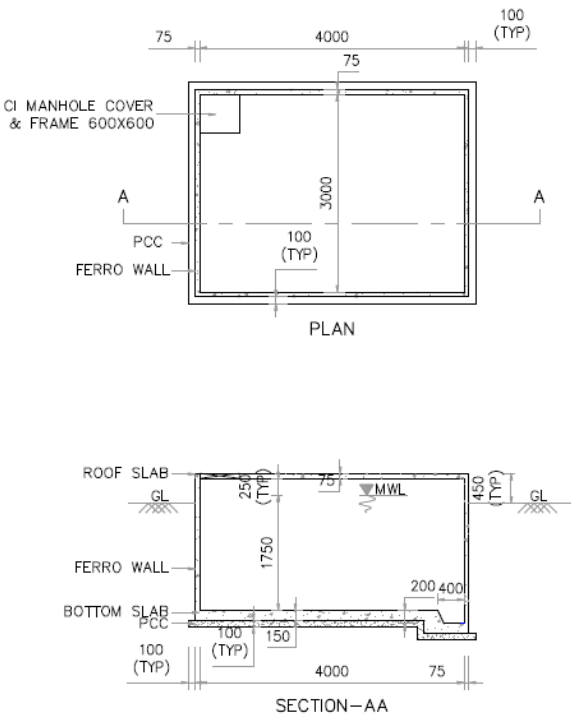
NOTE :

1. All dimensions shown are in millimetres
2. The section are based on the type design and are for representation purpose only.
3. These drawings are not construction drawings. They are for representation purpose only
4. Contractor during the time of execution should prepare the detailed design & drawings to suit site condition and land availability.
The design and drawings shall be vetted and approved by the Health Centre Management Committee.
5. The entire roof catchment area shall be utilized for roof water harvesting
6. The gutter used for roof water collection shall be of approved quality as per the specification
7. Water filter to be provided on the common down pipe leading to Ground level tank
8. The capacity of the Elevated plastic tank
9. Minimum staging height of the platform shall be 2.0m
10. The location and orientation of the structures shall be finalized in consultation with Health Centre Management Committee.

ABBREVIATIONS

PCC- Plain Cement Concrete
uPVC- Poly Vinyl Chloride

6.2-TYPE DRAWING FOR ELEVATED PLASTIC TANK

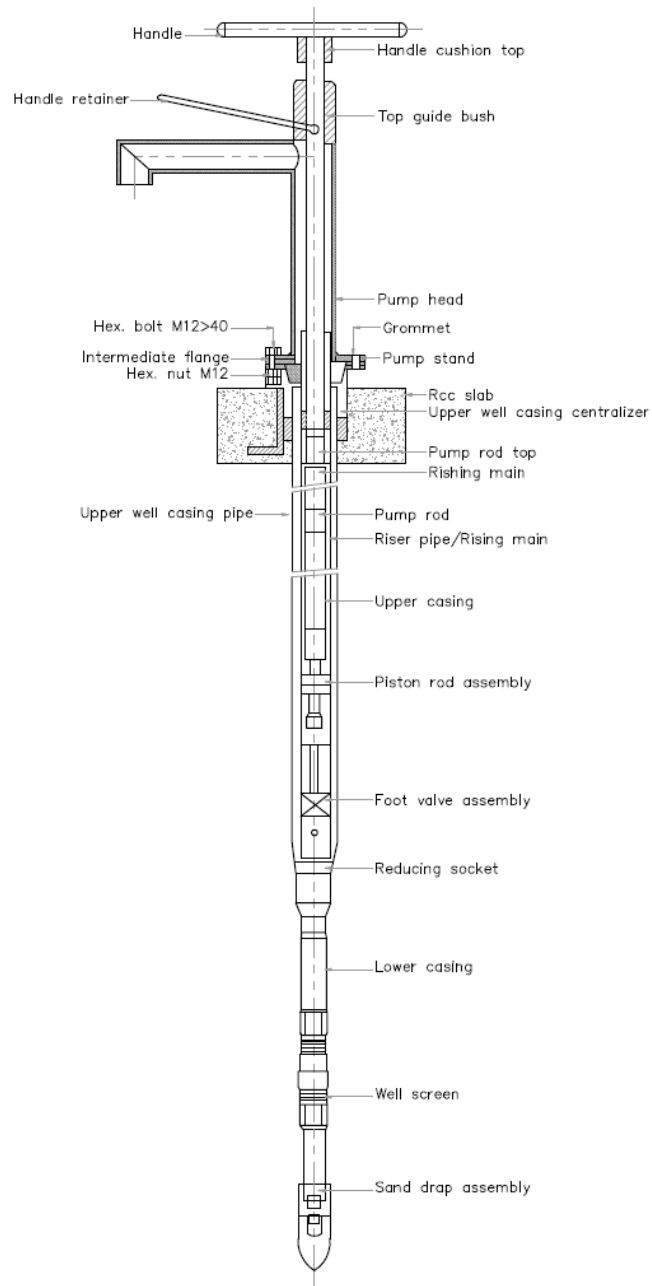


- NOTE :
- 1. All dimensions shown are in millimetres
 - 2. The section are based on the type design and are for representation purpose only.
 - 3. Contractor during the time of execution should prepare the detailed design & drawings to suit site condition and land availability. The design and drawings shall be vetted and approved by the Health Centre Management Committee.
 - 4. The ground level tank shall be of Ferrocement.
 - 5. The location and orientation of the structures shall be finalized in construction with Health Centre Management Committee.
 - 6. Necessary Engineering Survey and Geotechnical Investigation has to be carried out before the execution of the project

ABBREVIATIONS

- PCC- Plain Cement Concrete
MWL- Maximum Water Level
GL- Ground Level
uPVC- Poly Vinyl Chloride

6.3-TYPE DRAWING FOR FERROCEMENT TANK

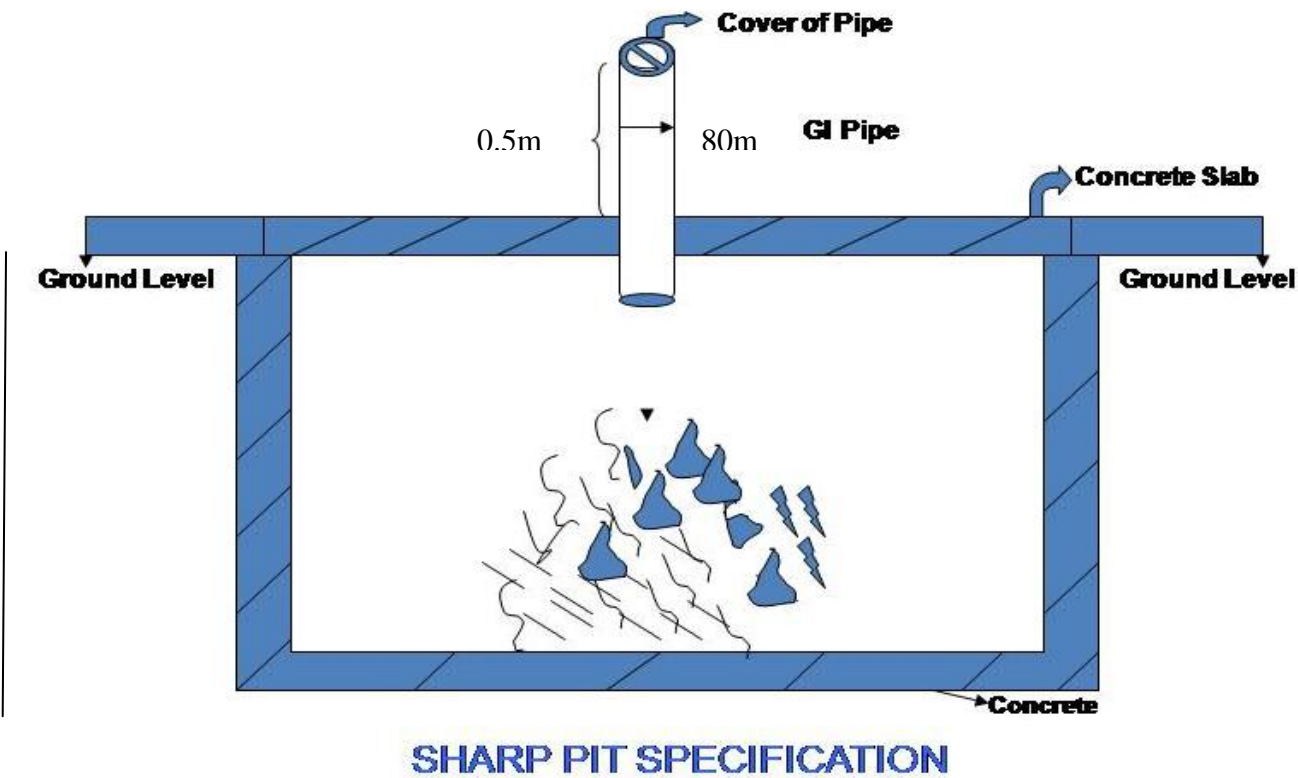
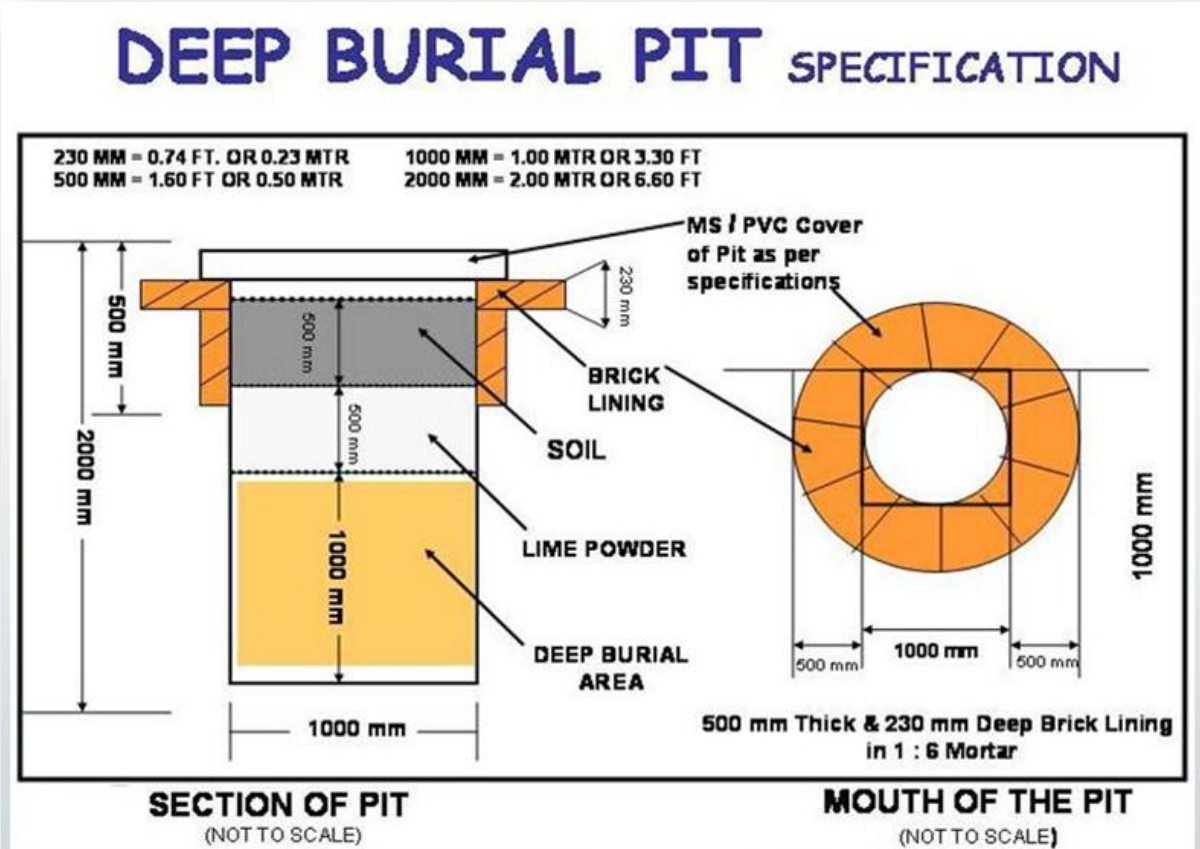


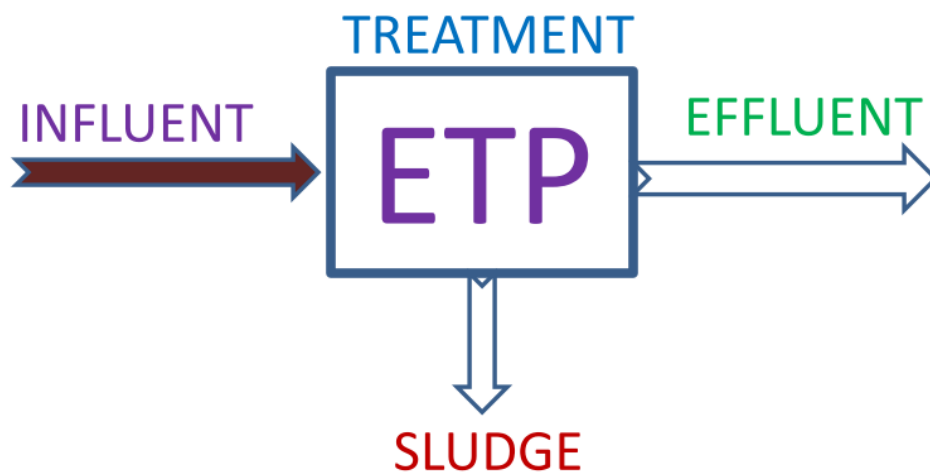
NOTE :

1. The drawings are based on the type design.
2. These drawings are not construction drawings. They are for representation purpose only
3. The specification are based on IS-14106:1996-Direct Action pump

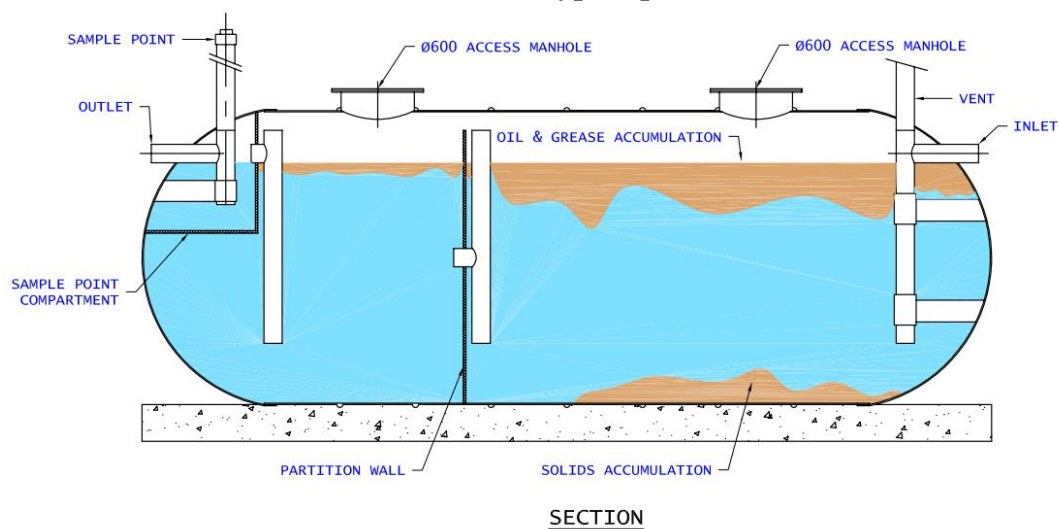
6.4-TYPE DRAWING FOR DIRECTION ACTION HAND PUMP

Proposed deep burial pit and sharp pit for construction in health facility





Plastic/FRP type septic tank



Scope of Work and technical specifications (Solar)

A. Scope of Work:

The general scope under this contract

1. Design, Manufacture, Fabrication, Assembly, Erection, Installation, Testing and Commissioning, performance testing at project site on turnkey basis & handing over ownership with all the equipment installed for SPV Hybrid Power Plant, Solar Water Heater, Servo Stabilizer , Solar Street light ,Solar Surface/submersible pump at designated 03 District health centers in Nagaland.
2. Undertake Energy Efficiency measures such as efficient lighting system to minimize the installed capacity requirement at District health centers
3. Operation and maintenance of the installed and handed over Solar PV hybrid Power Plants ,Solar Water Heater, Servo Stabilizer , Solar Street light ,Solar Surface pump for five years from the date of handing over to demonstrate the guaranteed performance.
4. Providing **Training to designated persons** from Purchaser for trouble free operation and both scheduled preventive and break down maintenance including electrical fault diagnosis techniques.

Detailed scope of work

1. All works required for proper installation of Solar PV Hybrid Power Plant including necessary civil works for mounting structures of solar module, shall be done by the contractor. The entire work shall be performed on turnkey basis. All the works related to the proper installation and functioning of the systems shall have to be carried out by the contractor in the prices offered by him.
2. The generated electricity from the Hybrid Power Plant will be utilized in place of grid power shutdown. Necessary electric cable/connection shall be supplied by the Bidder as per the requirement at site
3. All the electrical wiring work required to energize the proposed load shall have to be done by the contractor including supply of all required materials. The wiring shall have to be done in PVC casing capping. **Note :-**Necessary electric cable/ AC DBs connection from PCU of Solar PV hybrid Power plant to independent DBs Sub circuit (*lightning & Emergency load*) shall be supplied by the Bidder as per the requirement at site
4. Supply and fixing of electrical wiring work including any up gradation to the existing electrical network necessary for incorporating the solar hybrid installation shall be supplied by the Bidder as per the requirement at site **Note :-** Separate 3 Phase connection for heavy Machine (MRI,X ray and autoclave etc) to be powered by Grid supply
5. All necessary electrical wiring from existing electrical distribution box up to PCU of Solar PV Hybrid Power Plant and back from PCU to distribution box shall have to be done by the contractor including supply of all required materials.
6. Necessary arrangements for storage of batteries of Solar PV Hybrid Power Plant as per requirement for their proper protection shall have to be done by the contractor. The capacity of the battery banks will not be less than 1500 AH for each site.
7. Appropriate **Cabinets for battery banks, with the provision of racks for batteries** shall have to be done by the contractor. Control Room of the adequate size with proper ventilation shall have to be prepared according to the direction of engineer in charge at site.
8. Providing pedestals required for mounting of the PCU'S ,batteries and control panels

9. All structural drawings for mounting structures of solar module must be approved by structural Engineer required as per site conditions .
10. After completion of the proposed works, clearances of all temporary works/ materials shall be the sole responsibility of the contractor and this shall be removed immediate after the requirement of such temporary work is completed.
11. General Aesthetics & cleanliness in regard to the installation of various systems shall have to be maintained in accordance with the aesthetics of the site.
12. Arrangement of proper **Earthing mechanism and lightening arresters** should be done at site as per the requirements of the Solar Hybrid Power Plant.
13. The contractor should supply/ install the necessary tools/instruments/Spares required for proper operation of the plant and to measure PV array Voltage, Current, Power and solar radiation.
14. Supply and Installation of Display board of 6' X 4' size showing all technical information of SPV plant shall be done by the contractor. The selected contractor shall provide detailed Operation & Maintenance Manual booklet in English language for all the systems. The matter written on these boards shall be finalized with Purchaser.
15. The complete Solar PV Hybrid Power Plant , Solar Water Heater, Servo Stabilizer , Solar Street light ,Solar Surface pump shall be warranted and maintained by the contractor against any manufacturing/ design/ installation defects for a minimum period of 5 years from the date of installation or date of acceptance whichever is earlier.
16. Warranty, operation and Maintenance period will include rectification /replacement of all the defective and consumable components/items including batteries. However all the non functional parts/ materials/ items replaced during the Warranty, operation and Maintenance period shall be the property of the contractor
17. After commissioning of the plant, the contractor will conduct proper **on-site training** of the Purchaser's personnel regarding assembly, start-up, operation, maintenance and repairs of the Solar PV Hybrid Power Plant, Solar Water Heater, Servo Stabilizer, Solar Street light , Solar Surface pump.
18. During 5 years Warranty, operation & maintenance period, the contractor will have to make all necessary arrangements including placement of required manpower at site for satisfactory operation, maintenance and performance of the Hybrid Power Plant, Solar Water Heater, Servo Stabilizer , Solar Street light ,Solar Submersible and surface pump.
19. Rectification of all the defects developed in the Solar PV Hybrid Power Plant, Solar Water Heater, Servo Stabilizer , Solar Street light ,Solar Submersible and surface pump during Warranty, operation and Maintenance period shall have to be done by the contractor promptly, at the most **within 48 hours** from the date of defect developed.
20. The Power Conditioning Unit (PCU) / Inverter size should be 20-25% greater than total load (watts) of appliances.
21. Any additional works not covered above, but necessary for the functioning of the system and required as per specification incorporated. The items of minor nature, which are not mentioned, shall be incorporated by the contractor.
22. During warranty, operation and Maintenance period, the contractor shall have to submit annual performance & functionality report to the Purchaser.
23. During the warranty, operation and Maintenance period, **Purchaser or its representative /Nagaland RE nodal state agency/MNRE** will have all the rights to cross check the performance of the Solar PV Hybrid Power Plant , Solar Water Heater, Servo Stabilizer ,

Solar Street light ,Solar Surface pump. Purchaser or its representative may randomly pick up its components to get them tested at **Govt. / MNRE approved any test center**. If during such tests any part is not found as per the specified technical parameters, Purchaser will take the necessary action to recover the losses and **to black list the firm** and the same may be communicated to MNRE and other nodal agencies. The decision of Purchaser in this regard will be final and binding on the Bidder.

B. Technical Details:

In reference to the identified sites (ITB-1), the health center site details are indicated at www.nhmnagaland.in including photographs of the sites, details of the equipments present at the each health centers, location details, etc. Please note that the vendor is expected to evaluate the usage pattern in the health centers and thereby design the system. Further, the vendor will need to undertake measures such as energy efficiency such that the installed capacity can be minimized at each health center.

Based on the details available for the site, bidders are required to provide technical details (including but not limited to) for Battery Bank Capacity, Solar Installed Capacity and other equipments required to meet the energy requirements for each site based on 8 hours of battery backup for DH. Further, **technical design for each site is to be provided along with specifications in separate sheets as below:**

S.No.	District	Name of health facility	Type of facility
1	Wokha	District Hospital Wokha	DH
2	Mon	District Hospital Mon	DH
3	Zunheboto	District Hospital Zunheboto	DH

Following are the required technical details for the proposed health centers for installation of Solar Photovoltaic hybrid Power Plants for which bids are invited. The following are indicated details for bidder's guidelines.

	Details regarding	Proposed by tenderer
	Solar PV module	
1	Name of the manufacturer & Make of Solar Module	
2	Type of Solar Cell	
3	Offered Module (Wp)	
4	Solar PV Modules (Electrical Features)	Enclose supporting documents
5	Sola PV Modules (Mechanical Features)	Enclose supporting documents
6	Datasheet of Solar PV Modules	Enclose supporting documents
7	Module Mounting Structures	Enclose supporting documents
8	Proposed Number of Modules	
9	Proposed array (Wp)	
10	Proposed Array max Voltage (V)	
11	Proposed Array max DC current (I)	
12	Cover and provide all details as given	

	Details regarding	Proposed by tenderer
	under part-4 General Technical Specification of this tender document	
13	Junction Boxes	Enclose supporting documents
14	General arrangement drawings for proposed module, structure, arrays, DC side SLD, etc	Enclose supporting drawings
	Power Conditioning Unit	
15	Name of the manufacturer ,Capacity& Make of Power Conditioning Unit / Inverter	Enclose supporting document, specification and general arrangement drawings
16	Name of the manufacturer, Capacity & Make of Charge Controller/ MPPT Units	Enclose supporting document, specification and general arrangement drawings
17	Cover and provide all details as given under part-4 General Technical Specification of this tender document	
	Battery	
18	Name of the manufacturer & Make of Battery	Enclose supporting document, specification and general arrangement drawings
19	Model Type	
20	Ampere Hour each cell	
21	Ampere Hour battery bank	
22	DC voltage of the battery bank	
23	Number of the batteries	
24	Dimensions of Battery (size)/Weight	
25	Cover and provide all details as given under part-4 General Technical Specification of this tender document	
	BOS Item / System	
26	Cable and Installation accessories	Enclose supporting document, specification
27	Junction Boxes /Enclosures for Inverters/Charge Controllers/ Luminaries	Enclose supporting document, specification
28	Earthing & Protection	Enclose supporting document, specification and general arrangement drawings
29	Spare Parts offered list	Enclose supporting document
30	Tests	Provide test results of offered equipment
31	Installation & Commission	Provide schedule of activity and time line
32	Support/Training	Provide methodology and persons to be deployed

Further, the bid should include the technical design with details of parameters as mentioned in Table below:For each site separately

Location								
Proposed Installed Solar PV capacity (kWp)								
Solar Power generation System proposed designed size								
Solar PV module and array details required								
Module Rating (Wp)								
Total modules (Nos)								
Module Voc (V)								
Module Isc (A)								
Module Vmax (V)								
Module Efficiency (%)								
Nominal Operating Cell Temp. (°C)								
Length (m)								
Width (m)								
Thickness mm								
Weight (kg)								
Power conditioning Unit								
Inverter output capacity (kVA)								
Output wave form								
MPPT based Solar Charge Controller								
Controlling system/Switching device								
MPPT Max voltage (V)								
MPPT Max current(A)								
MPPT efficiency								
Inverter								
Total harmonic distortion								
Voltage THD								
Inverter Output Voltage (V AC)& Frequency								
Inverter power factor								
Inverter efficiency								
Idle Current								
Regulation								
Overload Features								
Cooling								
Operating temperature								
Relative Humidity								
LED/LCD Display								
Data monitor and display controls								
Protections								
Special Protection								
Enclosure Protection								

Safety								
Acoustic Noise								
Battery charger								
AC Input								
Charging Voltage								
Battery Charging Current								
Over load								
Battery								
Cell Voltage (V)								
Preferred Battery Voltage (V)								
Preferred Battery Bank capacity in AH								
Preferred Number of cells								
Total Energy to be stored (kWh)								
DOD								

- The Bidders are to offer module configurations to arrive at the proposed installed Solar PV capacity in kWp subject to optimum utilization of roof top and/or land area at each site. Further, bidders are required to configure PCU and Battery Bank as per their design.
- The BIDDER must clearly indicate the name of the manufacturer, the types and model & make of each principal item of equipment proposed to be supplied. The tender may also contain details of specifications and other comprehensive descriptive materials in support of technical specifications.
- **The above information must be provided by the Bidder in the form of separate sheets, specifications, catalogues etc.**
- Any tender not containing sufficient descriptive material to describe the proposed equipment may be treated as incomplete and hence may be rejected. Such descriptive materials and specifications submitted by the Bidder will be retained by Purchaser. Any deviations from these will not be permitted during the execution of contract, without specific written permission of the Purchaser.

The above can be provided based on the equipments and usage details, instruction to bidders, DPR provided at www.nhmnagaland.in.

Technical Details:

SPV Modules

1. Modules of Hybrid Power Plant shall be made of poly crystalline Silicon Solar Cells.
2. Each module shall have low iron tempered glass in front for strength and superior light transmission. It shall have back sheet for environment protection against moisture and high voltage electrical insulation.
3. The module frame shall be made of aluminum or corrosion resistant material, which shall be electrically compatible with the structural material used for mounting the modules.

4. Solar module shall be laminated using lamination technology using established polymer (EVA) and Tedlar/Polyester laminate. The solar module shall have suitable encapsulation and sealing arrangements to protect the silicon cells from the environment. The arrangement and the material of encapsulation shall be compatible with the thermal expansion properties of the Silicon Cell and the module framing arrangement/material. The encapsulation arrangement shall ensure complete moisture proofing during life of solar modules.
5. Individual Solar Module rating shall not be less than 200W at standard test conditions. Test reports of the modules should be submitted with the technical bid.
6. Power output Guarantee offered for the SPV Module shall not be less than 25 years.
7. The modules would be warranted for output wattage not less than 90% at the end of 10 years and 80% at the end of 25 years.
8. SPV module conversion efficiency should be greater than 14%.
9. Peak Power Point Voltage and Peak Power Point Current of any supplied module and /or any module string (series connected module) shall not be more than 3% from the respective arithmetic means for the entire module and/or for all module strings, as the case may be.
10. Module rating is considered under standard test conditions, however Solar Modules shall be designed to operate and perform relative humidity up to 100% with temperature between 0° C and +50° C and with gust up to 150km/hr from backside of the panel. the geological data for each health centre location of Nagaland from standard source can be referred for design to get optimum generation.
11. Sample modules and production processes employed in the manufacture of the offered module shall be in accordance with the requirements of IEC 61215/ IS14286 and IEC61730 Part-I & Part-II with appropriate certificate. IEC / equivalent BIS Equivalent IS Standards
12. PV modules to be used in a highly corrosive atmosphere (coastal areas, etc.) must qualify Salt Mist Corrosion Testing as per IEC 61701 / IS 61701.
13. Solar PV module design shall conform to following mechanical requirements.
 - a. Toughened & Low iron content
 - b. Front glass with high transmissibility
 - c. Anodized Aluminum Frame
 - d. Ethyl Vinyl Acetate (EVA) encapsulated
 - e. Silicon edge sealant around laminate
 - f. Tedlar/Polyester tri-laminate back surface
 - g. Weatherproof DC rated MC Connector and a lead cable coming out as a part of the module,
 - h. making connection easier and secure, not allowing for any loose connections
 - i. Resistant to water, abrasion, hail impact, humidity & other environment factor for the worst situation at site.
14. The fill factor of modules shall not be less than 0.70 (typical)
15. I-V curve of each PV module with SI Nos. should be submitted along with modules meeting the IEC specifications.
16. Solar PV Modules shall conform to CE and IEC specifications and certified by ETDC/CPRI /ERTC laboratories. Documentary evidence towards certification shall be submitted with the bid. Minimum following parameters should be provided in the bid documents:

Maximum Power	Pmax	
Minimum Power	Pmin	
Open Circuit Voltage	Voc	
Short Circuit Current	Isc	
Voltage at Max Power	Vmp	
Current at Max Power	Imp	
Fill Factor	FF	
Efficiency of Cell	Ef, c	
Efficiency of Module	Ef, m	

I. IDENTIFICATION AND TRACEABILITY

Each **PV module must use a RF identification tag (RFID)**, which must contain the following information:

- (i) Name of the manufacturer of PV Module
- (ii) Name of the Manufacturer of Solar cells
- (iii) Month and year of the manufacture (separately for solar cells and module)
- (iv) Country of origin (separately for solar cells and module)
- (v) I-V curve for the module
- (vi) Peak Wattage, Im, Vm and FF for the module
- (vii) Unique Serial No and Model No of the module
- (viii) Date and year of obtaining IEC PV module qualification certificate
- (ix) Name of the test lab issuing IEC certificate
- (x) Other relevant information on traceability of solar cells and module as per ISO 9000 series

RFID shall be placed inside the module laminate.

VALIDITY :Manufactures are advised to get their samples tested as per the new format/procedure before 31st March 2013, whose validity shall be for five years.

AUTHORIZED TESTING LABORATORIES/ CENTERS

PV modules must qualify (enclose test reports/ certificate from IEC/NABL accredited laboratory) as per relevant IEC standard. Additionally the performance of PV modules at STC conditions must be tested and approved by one of the IEC / NABL Accredited Testing Laboratories including Solar Energy Centre of MNRE. For small capacity PV modules upto 50 Wp capacity STC performance as above will be sufficient. However, qualification certificate from IEC/NABL accredited laboratory as per relevant standard for any of the higher wattage regular module should be accompanied with the STC report/ certificate. Details of Test Labs shall be given separately.

II. PV Array Configuration

The solar array shall be configured in multiple no. of sub arrays, providing optimum DC Power to Suitable no. of sub-arrays. The Bidder submitted their own design indicating configuration of PCU and respective sub arrays.

III. Module Mounting Structure

1. The module mounting structure shall be designed for holding required number of modules. The frames and leg assembly of the array structures shall be made of suitable sections of hot-dip galvanized MS angles, channels, tubes or any other sections conforming to IS: 2062 for steel structure conforming to design criteria. The array structure shall be designed in such a way so that it will occupy minimum space. The structure will be fixed type and the tilt angles for the modules will be 22° and all modules will be facing 'South'. Bidder can propose also with Aluminum structure members as well with satisfactory load test analysis.
2. The mounting structures would be design to sustain wind loading of up to 150 km/hr and shall be protected by using Eco friendly anticorrosion on structure confirm to RDSO standard of POR-15. The entire structure including array will be earthed to an independent pit with redundant paths. Presently, mounting structures with fixed tilt has been proposed. The module mounting hardware to be of aluminum.
3. The structure design shall be appropriate and innovative and must follow the existing structure and profile.
4. Design drawings with material selected shall be submitted for prior approval of Engineer In- Charge.
5. The structure shall be designed to allow easy replacement of any module.
6. The structure shall be designed for simple mechanical and electrical installation. It shall support SPV modules at given orientation, absorb and transfer the mechanical loads to roof properly wherever roof top installation is required.
7. The array structure shall be so designed that it will occupy minimum space without sacrificing the output from SPV Panels at the same time.
8. Nut & Bolts supporting structure including Module Mounting Structures shall have to be adequately protected with atmosphere and weather prevailing in the area: Fasteners/Nut Bolts should be especially in Stainless Steel material.
9. ***The Bidder/manufacturer shall specify installation details of the PV modules and the support structures with appropriate diagrams and drawings.***
10. The drawings along with detailed design shall be submitted in four sets to Engineer In-Charge for the approval before starting the execution work. The work will be carried out as per designs approved by Engineer In-Charge.

IV. An intelligent hybrid inverter OR power conditioning unit (PCU)

The PCU should be an intelligent hybrid inverter or smart grid inverter such that it can be used in:

1. Off grid mode (without network) with the possibility of linking to a generator if available at site. Connected to a battery bank. Use in on-grid or grid-tie (connected to the network) with the possibility of selling energy or excess energy. There is a need to have the norm compliance of protection and decoupling (DIN VDE 0126.1).
2. Use in hybrid mode the inverter functions with a battery bank, but also connected to the grid. This dual functionality is the highlight of hybrid inverters that hence enable energy management (smart grid).
3. Use in Back-up mode, or storage mode prevents black outs by switching from on-grid mode to off-grid mode at the moment of electric outage, thereby eliminates network cuts.
4. Power Conditioning Unit (PCU) will be critical equipment in Grid Connect SPV Hybrid Power Plant. This equipment will convert DC power generated by SPV array,

-
- into single phase/three phase medium voltage AC to be connected to Grid. Therefore it must provide necessary protections for Grid Synchronization and Data Logging/Monitoring. The DC energy, thus produced has to be utilized to maximum and supplied to the DC bus for inverting to AC voltage with the help of Power Conditioning Unit using its MPPT (The efficiency of MPPT shall not be less than 94% & shall be designed to meet the Solar PV Array capacity control) to extract maximum energy from solar array and provides 415V AC, 3-Ph 50 HZ synchronize with local grid.
5. The PCU shall have protection features such as 1. Input over voltage, under voltage with auto recovery; 2. Output Under & Over Voltage; 3. Output Short Circuit; 4. Overload protection; 5. Over Temperature; 6. DC disconnect device; 7. DC reverse polarity; 8. Over Charge Batteries; 9. DC Over Voltage, 10. Anti Islanding Protection as per the standard, etc.
 6. The PCU shall be of very high quality having high efficiency (>92%) and shall be capable of running in isolated mode.
 7. The PCU should be designed to be completely compatible with the SPV array voltage and grid supply voltage.
 8. The PCU shall be designed for continuous, reliable power supply as per specifications.
 9. The dimension, weight, foundation details etc. of the PCU shall be clearly indicated in the detailed technical specification.
 10. It should have user friendly LCD display for programming and view on line parameters such as DC power input, DC input voltage, DC current, AC power output, AC voltage and AC current and Power factor.
 11. The PCU shall have arrangement for adjusting DC input current and should trip against sustainable fault downstream and shall not start till the fault is rectified.
 12. The PCU shall have latest technological advances to provide highly reliable and efficient energy conversion from DC to AC. The PCU incorporates a new system design which uses multiple power stacks which work in tandem. The PCU should be three phase/single phase static solid state type power conditioning units suitably connected & synchronized to give three phase/single phase supply output as per location and proposed capacity.
 13. Both AC & DC lines shall have suitable fuses/ MCB's and contractors to allow safe start up and shut down of the system. Fuses /MCB's used in the DC circuit should be DC rated. The PCU shall have provision for galvanic input & output isolation. Each solid-state electronic device shall have to be protected to ensure long life of the inverter as well as smooth functioning of the inverter
 14. All the PCUs should have Negative grounding arrangement to counter Potential Induced Degradation (PID).
 15. *Inverter output shall have several settings so that it can be set at a particular KVA rating beyond which the inverter shall trip. The inverter shall not start under fault condition and shall trip in case of severe unbalanced load condition.*
 16. *Computer Aided Data Acquisition Unit*
Computer aided data acquisition unit shall be provided for monitoring & recording various parameters of different system and sub-system. Computer aided data acquisition unit shall be comprising of different transducer to read different variable parameters, A/D converter, multiplexure, demultiplexure, interfacing hardware and software with

industrial type Desk/Lab Top Computer. The Computer shall have following minimum specification:

- a. CPU: Intel Core2 Duo Processor 2.8 GHz .
 - b. MEMORY: 4GB 800MHz DDR2 SDRAM
 - c. HARD DRIVE: 1Tb SATA drive.
 - d. VIDEO: 512Mb PCI express video card with DVI.
 - e. MONITOR: 22" monitor with DVI and VGA inputs.
 - f. OPTICAL DRIVE: 16X Max DVD+/-RW Combination Drive with double layer write capability.
 - g. OTHER FEATURES: Built in ethernet, sound and as many USB ports as possible with at least two on the front panel for easy access.
 - h. OPERATING SYSTEM: Windows7
17. The data acquisition system shall measure and continuously record the following:

- a) Ambient Air Temperature near Array Field
- b) Battery Temperature
- c) Battery Room Temperature
- d) Control Room Temperature
- e) Module Back Surface Temperature
- f) Wind Speed at the level of Array Plane
- g) Solar Radiation incidental to Array Plane
- h) Battery Bank Voltages during charging & discharging
- i) Battery Currents during charging & Discharging
- j) Inverters Output
- k) System Frequency
- l) Battery Charging & Discharging AH.

V. The BOS items / components of the SPV Hybrid Power Plants/ systems

1. All item of supply, design and installation must conform to the latest edition of IEC/Equivalent BIS Standards/ MNRE specifications as specified below:

	Applicable BIS /Equivalent IEC Standard Or MNRE Specifications	
BOS Item / System	Standard Description	Standard Number
Charge Controller/MPPT Units	Environmental Testing	IEC 60068-2 (1,2,14,30) / Equivalent BIS Std.
Power Conditioners/ Inverters** including MPPT and Protections	Efficiency Measurements Environmental Testing	IEC 61683 / IS 61683 IEC 60068-2 (1, 2, 14, 30) / Equivalent BIS Std.
Storage Batteries	General Requirements & Methods of Testing Tubular Lead Acid / VRLA / GEL /Ni Cd Capacity Test Charge/Discharge Efficiency	As per draft IS-6497 or relevant BIS Std.

	Self-Discharge	
Cables	General Test and Measuring Method PVC insulated cables for working voltage up to and including 1100 V and UV resistant for outdoor installation	IEC 60227 / IS 694 IEC 60502 / IS 1554 (Pt. I & II)
Switches/Circuit Breakers /Connectors	General Requirements Connectors –safety A.C. /D.C.	IEC 60947 part I,II, III / IS 60947 Part I,II,III EN 50521
Junction Boxes /Enclosures for Inverters/Charge Controllers/ Luminaries	General Requirements	IP 54(for outdoor)/ IP 21(for indoor) as per IEC 529

**Supply, Erection, Testing & Commissioning
of
Solar Water Heater for District Hospital**

Specifications : SWH System	
1. Design:-	
	Capacity: 500 /1000 LPD x 1 No.
	Output Temp. : 60 deg C
	Collector Type : Evacuated Glass Type
	No. of Tubes: 60 – 90 (depending upon the diameter)
	System Type : Non-Pressurized
	Application : Hospital works/ Preheated water for sterilization / newborn care unit
	Circulation : Thermo syphon
	Electric Back Up : 1 KW(Optional)
2. Tank Specifications:-	
	Inner Tank : SS 304
	Insulation : CFC free PUF (32-42Kg/cum) /
	Rock Wool(48Kg/cum)
	Outer Cladding : GI Pre Coated
	End Caps : Al Powder Coated
3. Collector Specifications:-	
	Type : Glass tubes 3 layered
	Size : 1800 mm: Inner diameter – 48 mm : Outer diameter – 56mm
	Absorptivity : > 0.95
	Emissivity : < 0.2
	Transmitivity : > 0.85 :
	Insulation : Rock Wool
	Hardware : SS 304
	Collector Frame : Extruded Al
	Bottom Insulation : Rock Wool (40mm)
	Side Insulation : Rock Wool (20mm)
	Certification : BIS-IS 12933
4. Pplings:-	
	Type : G I “B” Class
	Insulation : Rock Wool (48Kg/cum x 50mm)
	Cladding : Al (22 gauge)
5. Miscellaneous Items	
	Overhead Tank – 500 liters (Inclusive)
	Piping – From overhead tank to Solar water heater and from solar water heater to single point outlet till 20 feet

**Supply, Erection, Testing & Commissioning
of
SPV LED based Solar Street Lights**

Specifications:

LIGHT SOURCE - (9 W – 12 W)

- White led type.
- Single lamp
- Range - 5500k–6500k.
- LEDS which emitultraviolet light is not permitted.
- The light output from the white led light source should be constant throughout the duty cycle.
- The lamps should be housed in an assembly with IP65 or IP66 rating.

BATTERY – (75 AH – 100 AH)

- Lead Acid
- Tubular Positive Plate Flooded
- Tubular GEL / AGM VRLA
- LiFePo4

Battery should conform to latest BIS standards. In view of non-availability of adequate test facilities for testing as per BIS standard in the country, existing facilities of battery manufacturers will be utilized by way of periodic quality audit by MNRE/BIS or their representative to ensure conformance of BIS standards.

ELECTRONICS

- Electronic efficiency should be at least 85%.
- Electronics should operate at 12 V
- Light output should remain constant with variations in the battery voltages.

PV MODULE (75 W – 100 W)

- Mono/ Multi-crystalline silicon or thin film solar cells
- IEC 61215 specifications or equivalent National or International Standards whereas in case of thin film Solar Cell module it is required to have certificate for the supplied PV module as per IEC 61646 specifications or equivalent National or International Standards.

**Supply, Erection, Testing & Commissioning
of
SERVO STABILIZER (100-150 KW) for District Hospital**

Servo Stabilizer Capacity		100 KVA	
Input Voltage Range*	A) Range 1 : 295 V-465 V	B) Range 2 : 340 V-480 V	
C) Range 3 : 360 V-460 V		D) Other ranges as per customer requirements	
Output Voltage		380/400/415 V +1% Set	
Input Frequency		47-53 Hz	
Control Type		Digital-Micro controller based	
Correction Speed*		70 V per second	
Reset		Manual / Auto Reset with time delay and programmable	
PROTECTIONS:			
A) Electronic over & under voltage trip with time delay for input & output			
B) Electronic overload protection and short circuit protection up to 30 KVA through MCB and the Manual bypass is built in. Above 30 KVA MCB/MCCB is an optional.			
C) Surge Arrester/RF suppressor (OPTIONAL)			
D) Phase reversal protection and cut off			
E) Single phase prevention and cut off			
F) Neutral failure protection			
G) Frequency cut off protection			
H) Earth neutral voltage cut off protection			
Metering Digital Type (Class 1 Accuracy With Full Scale ± 1)	A) Input phase to neutral		B) Input phase to phase
C) Output phase to neutral		D) Output phase to phase	
E) Load Current in all the phases		F) Frequency	
Audio Alarm		For tripping conditions	
Nature Of Cooling		ONAN	
Effect Of Power Factor		Nil	
Waveform Distortion		Nil	
Annunciation Panel		Non Latching LED indications with dual color for Overload Latching Conditions	
Efficiency		> 98%	
Cabinet Color		Siemens Grey	
Provision Of Cabling		Input and Output terminations with provisions for fixing cable glands	
Servo Motor Drive		Rugged AC step synchronous motor	
Operating Temperature		0-45° C	

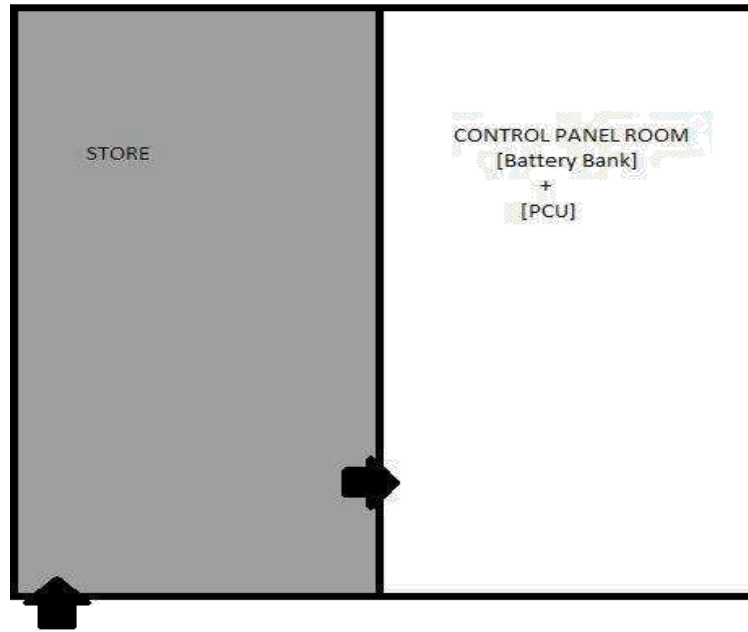
Pre-Fabricated Building for battery room

Specifications:

Supply Erection commissioning of a Prefab Building Structure of size 20*20 sq. feet with a partition from middle with two doors and a slope roof.

- ☐ Main entry will be through Store Room
- ☐ Control Panel room entry will be through Store but will have ventilation or an exhaust fan ,lighting arrangement

📏 Store Size – 20*10 (Sq. Feet) 📏 Control Panel room size – 20*10 (Sq. Feet)



PROPERTIES OF PUF

PHYSICAL PROPERTIES	AVG MEASURED VALUE
Density	40 ± 2kg/M ²
Comprehensive Strength At 10% Deformation	2.0 2.6 Kg/Cm ²
Adhesion Strength (Foam To Steel)	2.9kg / Cm ²
Dimensional Variation (48)	2%
Closed Cell Content	90-95%
Temperature Range	-50 °c To 110 °c
Thermal Conductivity	0.019 0.22 W / M°c
Fire Resistance	0.3
Air Flow (Cfm)	10
Compressive Strength	-
Water Absorption After 24 Hrs.	Self-Extinguishing
Flexural Strength	10
Technical Specification for H Beam	
Web Height	200-2000mm
Web Thickness	6-40mm
Web length	4000-15000mm
Flange Width	200-800 mm
Flange thickness	6-40mm
Flange Length	4000-15000
Technical Specification For Z Purlin	
Material - Cold Rolled Coil, Hot Rolled Coil, Galvanized Coil	
Thickness	1.0-3.0mm
Width	100-300 Mm
Flange	30-80mm
Lip	10-20mm
Technical Specification For C Purlin	
Material	Cold Rolled Coil, Hot Rolled Coil, Galvanized Coil
Thickness	1.0-3.0mm
Width	80-300 mm
Flange	30-80mm
Lip	10-20mm

Mounting Structure for SPV Modules

Specifications:

Design, Supply Erection commissioning of Super structure for mounting of Solar Modules of height 20 feet above ground of total area of 2000 sq. feet. The construction of the structure should be approved with Structural or civil engineer and should be done under the guidance.

Note* Design, drawing and specification to be provided by the bidder in a separate sheet.

C- SECTION STEEL SECTIONAL SIZE							
C SECTION	H	B	b	G	t	Standard material Surface Finish	Material Grade
C80	40	40	40	15	1.2-3.0	Red Oxide/Gray Oxide (Primer) or Bare	
C100	50	50	50	20	1.2-3.0		IS2062/10748 Gr2
C120	50	50	50	20	1.2-3.0		IS 5986/Fe510
C140	50	50	50	20	1.2-3.0		OR Equivalent
C150	60	60	60	20	1.2-3.0	Pre - Galvanized	ASTM A653
C160	60	60	60	20	1.2-3.0		Grade SS37/50 CI I
C180	60	60	60	20	1.2-3.0		OR Equivalent
C200	60	60	60	20	1.2-3.0		
C250	70	70	70	70	1.2-3.0		
C SECTION STEEL SECTIONAL SIZE							
C SECTION	H	B	b	G	t	Standard material Surface Finish	Material Grade
Z120	120	55	50	20	1.2-3.0	Red Oxide/Gray Oxide (Primer) or Bare	
Z140	140	55	50	20	1.2-3.0		IS2062/10748 Gr2
Z150	150	67	61	18	1.2-3.0		IS 5986/Fe510
Z160	160	67	61	20	1.2-3.0		OR Equivalent
Z180	180	67	61	20	1.2-3.0	Pre - Galvanized	ASTM A653
Z200	200	67	61	20	1.2-3.0		Grade SS37/50 CI I
Z250	250	78	72	20	1.2-3.0		OR Equivalent
Z280	280	78	72	20	1.2-3.0		

- ☐ Weight of the Steel which would be required for the total fabrication – 12 tonnes.

WARRANTY:-

The mechanical structures, electrical works including power conditioners/inverters/charge controllers/ maximum power point tracker units/distribution boards/digital meters/ switchgear/ storage batteries, etc. and overall workmanship of the SPV Hybrid Power Plants/ systems must be warranted against any manufacturing/ design/ installation defects for a minimum period of 5 years.

VI. Earthing System

1. The 415V equipments and parts shall be earthed as required as per provisions of IS.
2. The earthing installation shall be done in accordance with the earthing drawings specifications and the standard drawings of reference. The entire earthing system shall fully comply with the Indian Electricity Act and Rules framed there under. The contractor shall carry out any changes desired by the Electrical Inspector or the owner, in order to make the installation conform to the Electricity rules at no extra cost. The exact location of earth conductors, earth electrodes and earthing points on the equipment shall be determined in field, in consultation with the Engineer-in-charge or his authorized representative. Any changes in the methods, routing, size etc. Owner /Engineer-in-charge approval shall be obtained before execution.
3. Excavation and refilling of earth, necessary for laying underground earth loops shall be the responsibility of the contractor.
4. The earth loop impedance to any point in the electrical system shall have a value which will ensure satisfactory operation of protective devices.
5. The main earth loop shall be laid at a depth of 1000 mm below grade level. Whenever cable trenches are available, the earth lead shall be laid in the trenches. The earthing strip shall be protected against mechanical damage.
6. In process unit areas, the earthing cable/strip shall be run along cable trays wherever specified in the layout drawings. The earthing cable/strip shall be suitably cleaved and electrically bonded to the cable tray at regular intervals.
7. Joints and tapping in the main earth loop shall be made in such a way that reliable and good electrical connections are permanently ensured. All joints below grade shall be welded and suitably protected by giving two coats of bitumen and covering with Hessian tape. All joints above ground shall be made by means of connectors/lugs as far as practicable. Tee connectors shall be used for tapping earth leads from the main earth loop wherever it is installed above ground. Earthing plates shall be provided for earthing of two or more equipment at a place from earth grid.
8. Where aluminum cable risers are to be connected to the underground MS earth bus, the aluminum cable riser shall be taken to the nearest earth pit and terminated through a bolted joint. If this is not practicable, then a MS rider shall be brought above ground and a bolted joint shall be made between this MS riser and the aluminum cable riser just above ground. aluminum lugs shall be used for cable termination. This MS riser shall be protected by applying two coats of bituminous paint/bitumen on the exposed portion.
9. Conduits in which cable have been installed shall be effectively bonded and earthed. Cable armours shall be earthed at both ends. HV and LV earthing system shall not be mixed and to kept separately.

10. *Earth electrodes*: Earth pipe electrodes shall be installed in accordance with the standard drawings of reference and IS: 3043. Their location shall be marked to enable accurate location by permanent markers.
11. *Lightning Arrestor*: The surge arrestors (SAs) shall conform in general to IEC 60099-4 or IS:3070 extent to the extent explicitly modified in specification. Arresters shall be of hermetically sealed units, self supporting construction, suitable for mounting on lattice type support structures. Bidder shall furnish the technical particulars of surge arrester.
12. *Isolators*: The isolators and accessories shall conform in general to IEC 62271-102 (or equivalent Indian standard) except to the extent explicitly modified in specification.

VII. Quality assurance and codes

13. Codes and standards

All equipment and material shall be conforming to relevant and applicable latest IS standards except where there are modification or supplemented specifications are suggested in this tender documents.\

14. The electrical design, supplies and installations shall meet the requirements of Indian Electricity Rule and GRID Code with latest amendments. The L.T. installation shall generally be carried out in conformity with the requirements of the Indian Electricity Act as amended upto date and the Indian Electricity Rules, 1956 as amended upto date framed there under, the relevant regulations of the Electric Supply Authority concerned, and also with the specifications laid down in the Indian Standard I.S. 732-1963 Code of Practice (revised) for Electrical Wiring Installations (System voltage not exceeding 650 volts) and I.S. 2309-1969 Code of Practice for the protection of Buildings and Allied Structures against lightning.

15. Other applicable standards to be followed as and when required:

Sl No	Type	Standard
1	Balance of system-design qualification	IEC 6993 UL 6141
2	Solar inverter-efficiency test	IEC 61683
3	Solar inverter-Island prevention	IEC 62116
4	Solar inverter-Data Sheet	EN 50524
5	PV cables	IEC 60228 Class V, TUV 2Pg 1169 & UL 4703
6	PV cable life cycle	IEC 620216
7	PV cable UV resistance test	HD605/A1
8	PV power plant grid interface	IEC 61727
9	Over voltage protection	IEC 61173
10	Pyranometer	WMO class I & II
11	Pyranometer calibration	ISO 9847
12	Daily solar profiles	IEC 61725
13	PV power plant performance monitoring	IEC 61724, IS/ IEC 61724
14	PV power plant remote controlling	IEC 60870
15	Communication net work and automation	IEC 61850 – 7

16	PV Power plant documentation, commissioning, test and inspection	IEC 62446
17	PV devices – cells	IEC 60904-2, Amendment 1 (1998)
18	PV devices – modules	IEC 60904-6, Amendment 1 (1994)
19	Characteristic parameters of stand-alone photovoltaic (PV) systems	IEC 61194:1992
20	Crystalline silicon photovoltaic (PV) array - On-site measurement of I-V characteristics	IEC 61829:1995

16. In addition to the standards all works shall also conform to the requirements of the following rules & regulations:

- Indian Electricity act and rules framed there under.
- Fire insurance regulations.
- Regulations laid by Chief Electrical Inspector of State, State Electricity Board.
- Regulations laid by Chief Electrical Inspector of Explosives.
- Regulations laid by the Factory Inspector of State.
- Any other regulations as may laid down by the Central/Local authorities.

17. Guarantee clause:-

Expected electrical energy generation:- The Capacity Utilization Factor (CUF) of the Solar PV Hybrid Power Plant shall be not less than 15-19%. The Bidder has to submit an undertaking regarding minimum expected electrical energy generation is not less than 1000 KWh//Year/hour. The Bidder may indicate the guaranteed electrical energy generation from their system after making proper assessment.

1. Drawings

The Bidding Documents should includes technical drawings and designs of solar module, Super Mounting Structure to be provided by the bidders for 03 selected sites

2. Inspections and Tests

The following inspections and tests shall be performed:

- Purchaser or its duly authorized representatives shall have the right to inspect and /or to test the goods to confirm their quality according to the contract and shall have access to the contractor's works premises and the power to inspect and examine the materials and workmanship of the Solar PV True Hybrid Power Plant at all reasonable times during their manufacture.
- The contractor shall inform Purchaser through a written notice regarding any material being ready for testing at least 7 days in advance. The conditions of contract and/or the technical specifications shall specify what inspections and tests shall be conducted

by Purchaser. All the arrangements of necessary equipments and expenses for such tests shall be on the contractor's account excluding the expenses of the inspector.

- Purchaser's Inspector, unless the witnessing of the tests is virtually waived off, will inspect and attend such test within 7 days from the date on which the equipments are notified as being ready for test /inspection. MNRE officer may also be present at the time of such testing.
 - Purchaser shall within 7 days, give written notice to the contractor, about any objection regarding the quality of the system. The contractor shall either make the necessary modifications to remove the cause of such objection or shall clarify the objections in writing if modifications are not necessary to comply with the contract.
 - After satisfactory testing of the systems during inspection, Purchaser's Inspector shall issue of dispatch clearance for the supply of material at site.
 - The inspection by Purchaser and issue of dispatch instruction there on shall in no way limit the liabilities and responsibilities of the contractor in respect of the agreed and specified quality. Nothing in clause 8 shall in any way relieve the contractor from any Warranty or other obligations under this contract.
3. In case any time the system is not found in accordance with the required technical specifications, the work order(s) shall be canceled and all the payments made by Purchaser to the contractor shall be recovered. Such contractor shall also be blacklisted from participating in any tender with the Purchaser in future. MNRE and other State Nodal Agencies of MNRE shall also be informed for the necessary action against such contractor.

4. Warranty Card To Be Supplied With Solar Hybrid Power Plant

1	Name & Address of the Manufacturer/Supplier	
2	Name & Address of the Purchasing Agency	
3	Date of Erection of system	
4.	PV Module a) Make b) Model c) Serial No (List Enclosed) d) Wattage under STC e) Warranty valid up to	
5	Battery a) Make b) Model c) Batch/SI. No (List Enclosed) d) Rated Voltage at C/10 d) Rated AH capacity at C/10 e) Warranty valid up to	
6	Electronics & Inverter a) Make b) Model c) Serial No	

	d) Warranty valid up to	
7	Other BOS and etc a) Make b) Model c) Serial No d) Warranty valid up to	
8	Designation & Address of the person to be contacted for claiming Warranty obligations	

Comprehensive Annual maintenance Details

Sno	Description of activities	Frequency	Remarks
1	Thorough check up of plant after commissioning to identify faults and defects if missed during revival and rectifying of the same	One time after 30 days from commissioning of the plant	
2	Cleaning of solar PV panels	Once in 3 months	
3	Maintenance of PV modules, cables connections, junction boxes, safety equipments and other associated electrical items	Once in 2 months for first year. Every month after one year.	
4	Visual inspection to check any damage to the system and rectification of the defects	Immediate after storm, cyclone	Replacement of damaged module and structure is not in contractor's scope. But contractor shall report and suggest any such requirement for normal operation of the plant
5	Checking of battery health & PCU functioning and reporting in case of any malfunction	Once in 1 months	Checking and reporting of any malfunction observed or defect identified
6	Unplanned defect rectification of the system	On call	Contractor's service personnel has to attend the problem within 1 day – Severe problem (viz complete shutdown, safety hazard etc.) 3 days – Moderate problem

Place:

Date:

(Signature)

Name

Designation

Name & Address of the
Manufacturer /Supplier

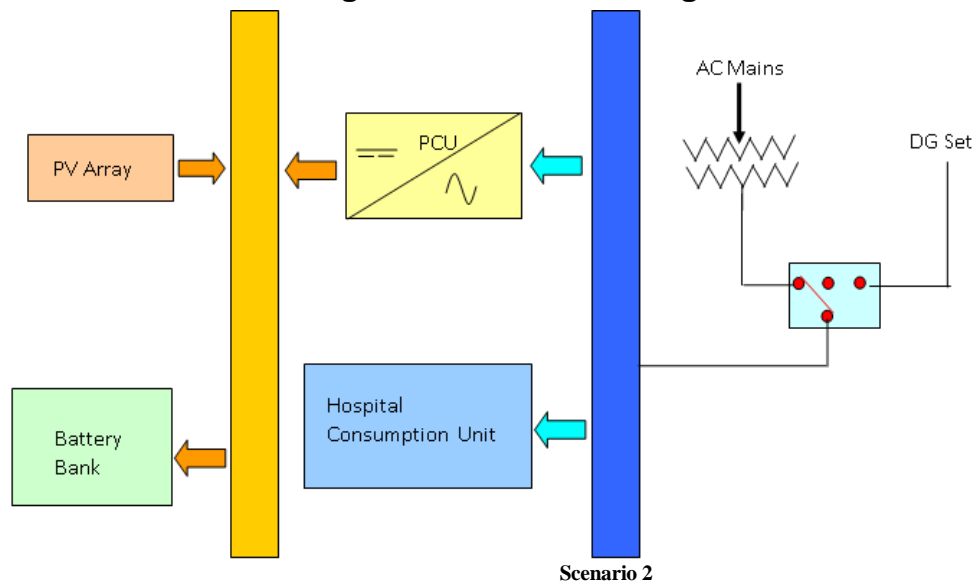
(SEAL)

Drawings

PV Hybrid Solar power Solution Scenario 1

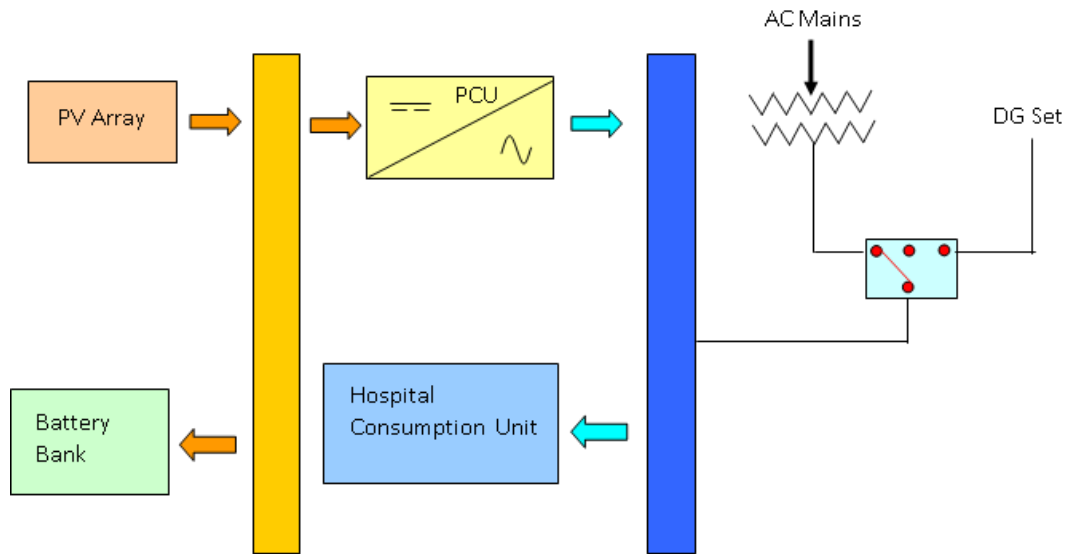
- SPV present
- Mains available
- Battery charged through (MPPT charger + Mains)
- Load supplied through Mains.

Figure 1: Technical Design- Scenario 1



- SPV available
- Battery charged
- Mains available surplus power utilized for grid connected loads.

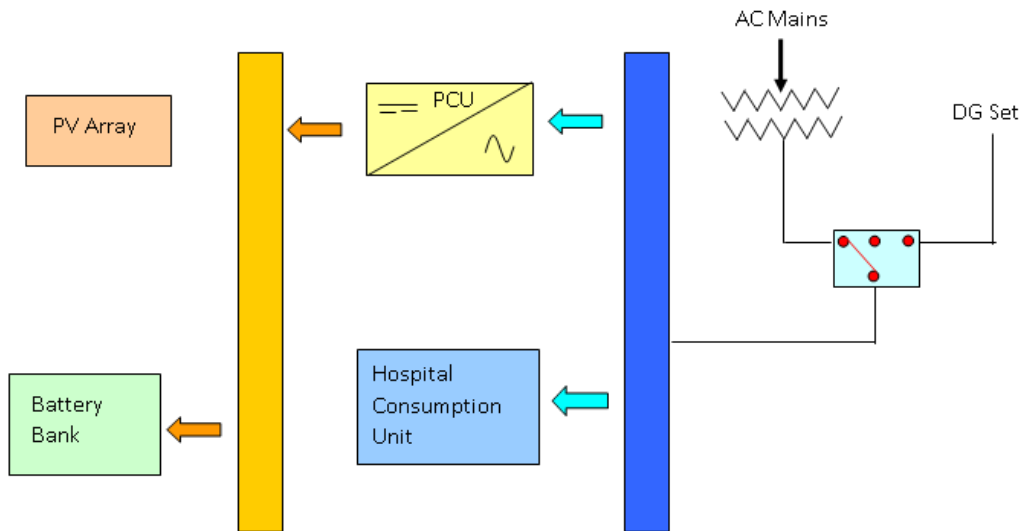
Figure 2: Technical Design- Scenario 2



Scenario 3

- SPV not available
- Mains available
- Battery charging through mains.

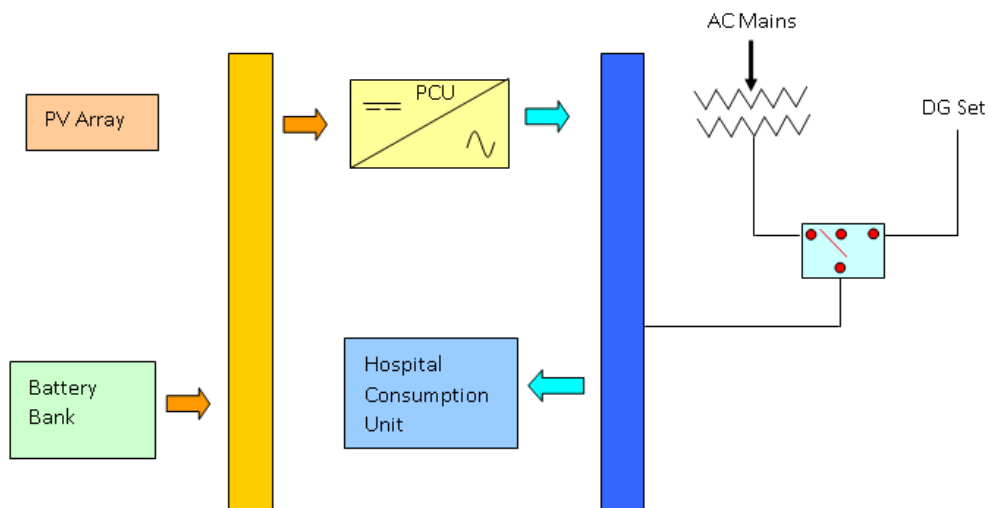
Figure 3: Technical Design- Scenario 3



Scenario 4

- SPV not available
- Mains OFF
- Inverter supplying power to grid connected loads through Battery

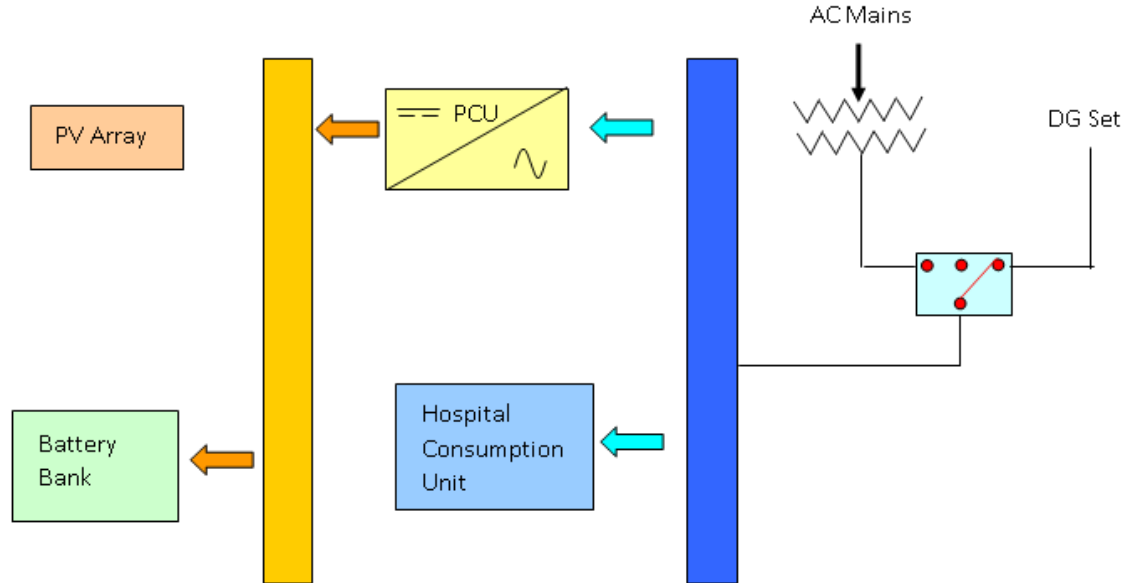
Figure4: Technical Design- Scenario 4



Scenario 5

- SPV & Mains not available Battery discharged

- Start DG command
- Battery charging through DG, & Load through DG

Figure5: Technical Design- Scenario 5**Anexure 1****Table 1: Type of base lighting and Equipment load to be Considered for Calculating Solar PV Supported Emergency Electrical System**

**Note : Only District Hospital to be considered*

District Hospital	CHC	PHC	Sub Centres
Base Load:			
Emergency lighting load (about 40% of total lighting load)	Emergency lighting load 36 (about 35% of total lighting load)	Emergency lighting load 8 No's 36 W CFL	3 No's 22 W CFL
Administrative load (80% of total load including Teaching)	Comp+Xerox+FAX+TV	Administrative load (Refrigerator, Computer, Modem)	Mobile charger 7 DTH
Pump and auxiliaries	One small pump of ½ HP (0.375+overload of 30%)	Pump 200W & 50 W auxiliary)	Pump 200W
Critical Load Level 1:			
Blood bank, DF, ILR, Refrigerator & AC	Blood bank DF large Refrigerator 200L	& Blood bank DF large Refrigerator	& Small Refrigerator
OPD (only emergency load)			
Slit Lamp	Suction	Syringe Needle Destroyer	
Distant Vision Charts		Otoscope	

Dental Chair motorized			
Air Rotor			
Compressor oil free medical grade (noise-free)			
Needle cutter/Hub cutter			
Dental X-ray IOP/OPG X-ray viewer			
DH Type I & Type II	CHC Type I & Type II	PHC Type I & Type II	Sub Centres Cat-A Cat-B
with LED light.			
Labour room (Normal delivery)			
Pulse Oxymeter baby & adult	Incubator	Water Heater (immersion)	small immersion water heater
Baby Incubators	Shadow less lamps for labour room	Suction machine	
Radiant Warmer	Resuscitator	Oxygen generator	
Vacuum extractor metal	Laproscope	Resuscitator	
Suction Machine	Infant radiant warmer-2	Infant radiant warmer-1	
Cardiopulmonary Equipment			
ECG machine computerized	ECG	ECG machine ordinary	
ECG machine ordinary	ECG machine ordinary		
12 Channel stress ECG test equipment Tread Mill*	Cardiac Monitor with defibrillator 1		
Echocardiography Machine	Infusion pump 1		
Cardiac Monitor	Water Heater (immersion)		
Cardiac Monitor with defibrillator	Diathermy machine		
Ventilators (Adult)			
Ventilators (Pediatrics)			
Pulse Oximeter			
Pulse Oximeter with NIB.P*			
Infusion pump			
Incinerator and mortuary waste management including			
Critical Load Level 2:			
USG			
Color Doppler Ultrasound machine with 4 probes: Abdomen, Pediatric, So. Parts and Intra-Cavitary Ultra Sonogram	Incubators	Incubators	Infant warmer (Only in Cat-A)
Portable ultrasound			
Incubators			
OT			
Anesthesia Equipment	Anesthesia	Surgical cutter	
Auto Clave HP Horizontal	Lamps shadow less	Shadow less lamps for labour room	
Operation Table Hydraulic Major	Sterilizer	Anesthesia	

Shadow less lamp ceiling type major*	Suction pump		
Sterilizer (Big instruments)			
Computer+printer+UPS+TV, etc	Computer, printer, communication system	Two Computer, printer, Fax	Computer, printer
Critical Load Level 3:			
Labour & SNCU ward advanced equipment			

Page | 19

DH Type I & Type II				CHC Type I & Type II	PHC Type I & Type II	Sub Centres Cat-A Cat-B
Double Sided Blue Light				Water Heater (immersion)	Photo therapy Unit	
Phototherapy						
Pulse Oxymeter baby & adult					Lamp for new born baby	
Infusion pump or syringe pump						
Cardiac monitor baby & adult						
CFL Phototherapy						
Phototherapy Unit						
Cardio Toco Graphy Monitor						
Nebulizer baby						
Newborn Care Equipment						
Suction Machine						
Infantometer						
Servo-controlled Radiant Warmer						
Operation additional						
Auto Clave HP Vertical (2 bin)				Drum, sterilizing cylindrical - 275 mm Dia x 132 mm		
Autoclave vertical single bin						
Shadow less lamp ceiling type minor*						
Sterilizer (Small instruments)						
Bowl Sterilizer Medium						
Diathermy Machine (Electric Cautery)						
Suction Apparatus - Electrical						
Dehumidifier*						
Ultrasonic cutting and coagulation device						
Laboratory						
Electric microscope				Bath, water, serological, with racks, cover, thermostat, 240 V		
Lab Incubator				Microscope, binocular		
Electric centrifuge, table top-3				Illuminator		
Blood gas analyser				Microscope		Microscope (Only in Cat-A)
Electrolyte Analyser				Hematology		
Laboratory Autoclaves				Pathology		

automatic blood gas analyzer-2	Serology		
Blender	Biochemistry		
Hot Air oven	Binocular Microscope with oil Immersion		
	Table top centrifuge	Table top centrifuge	
Portable X -ray 60 mA			
High Mast Lighting (Area lighting)			
Post Top lantern (Garden lighting)			

*****Note : Drawing are given along with specifications***

Supplementary Information

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.

General Conditions of Contract

A. General

1. Definitions

1.1 Boldface type is used to identify defined terms.

- (a) The Accepted Contract Amount means the amount accepted in the Letter of Acceptance for the execution and completion of the Works and the remedying of any defects.
- (b) Not used.
- (c) The Adjudicator or Dispute Review Expert is the person appointed jointly by the Employer and the Contractor to resolve disputes in the first instance, as provided for in GCC 23.
- (d) Bank means the financing institution **named in the PCC**.
- (e) Bill of Quantities means the priced and completed Bill of Quantities forming part of the Bid.
- (f) Compensation Events are those defined in GCC Clause 42 hereunder.
- (g) The Completion Date is the date of completion of the Works as certified by the Project Manager, in accordance with GCC Sub-Clause 53.1.
- (h) The Contract is the Contract between the Employer and the Contractor to execute, complete, and maintain the Works. It consists of the documents listed in GCC Sub-Clause 2.3 below.
- (i) The Contractor is the party whose Bid to carry out the Works has been accepted by the Employer.
- (j) The Contractor's Bid is the completed bidding document submitted by the Contractor to the Employer.
- (k) The Contract Price is the Accepted Contract Amount stated in the Letter of Acceptance and thereafter as adjusted in accordance with the Contract.
- (l) Days are calendar days; months are calendar months.
- (m) Not used.
- (n) A Defect is any part of the Works not completed in accordance with the Contract.
- (o) The Defects Liability Certificate is the certificate issued

- by Project Manager upon correction of defects by the Contractor.
- (p) The Defects Liability Period is the period named in the PCC pursuant to Sub-Clause 34.3 and calculated from the Completion Date.
 - (q) Drawings means the drawings of the Works, as included in the Contract, and any additional and modified drawings issued by (or on behalf of) the Employer in accordance with the Contract, include calculations and other information provided or approved by the Project Manager for the execution of the Contract.
 - (r) The Employer is the party who employs the Contractor to carry out the Works, as **specified in the PCC**.
 - (s) Equipment is the Contractor's machinery and vehicles brought temporarily to the Site to construct the Works.
 - (t) "In writing" or "written" means hand-written, type-written, printed or electronically made, and resulting in a permanent record;
 - (u) The Initial Contract Price is the Contract Price listed in the Employer's Letter of Acceptance.
 - (v) The Intended Completion Date is the date on which it is intended that the Contractor shall complete the Works. The Intended Completion Date is **specified in the PCC**. The Intended Completion Date may be revised only by the Project Manager by issuing an extension of time or an acceleration order.
 - (w) Materials are all supplies, including consumables, used by the Contractor for incorporation in the Works.
 - (x) Plant is any integral part of the Works that shall have a mechanical, electrical, chemical, or biological function.
 - (y) The Project Manager is the person **named in the PCC** (or any other competent person appointed by the Employer and notified to the Contractor, to act in replacement of the Project Manager) who is responsible for supervising the execution of the Works and administering the Contract.
 - (z) PCC means Particular Conditions of Contract
 - (aa) The Site is the area **defined as such in the PCC**.
 - (bb) Site Investigation Reports are those that were included in

the bidding documents and are factual and interpretative reports about the surface and subsurface conditions at the Site.

- (cc) Specification means the Specification of the Works included in the Contract and any modification or addition made or approved by the Project Manager.
- (dd) The Start Date is **given in the PCC**. It is the latest date when the Contractor shall commence execution of the Works. It does not necessarily coincide with any of the Site Possession Dates.
- (ee) A Subcontractor is a person or corporate body who has a Contract with the Contractor to carry out a part of the work in the Contract, which includes work on the Site.
- (ff) Temporary Works are works designed, constructed, installed, and removed by the Contractor that are needed for construction or installation of the Works.
- (gg) A Variation is an instruction given by the Project Manager which varies the Works.
- (hh) The Works are what the Contract requires the Contractor to construct, install, and turn over to the Employer, **as defined in the PCC**.

2. Interpretation

- 2.1 In interpreting these GCC, words indicating one gender include all genders. Words indicating the singular also include the plural and words indicating the plural also include the singular. Headings have no significance. Words have their normal meaning under the language of the Contract unless specifically defined. The Project Manager shall provide instructions clarifying queries about these GCC.
- 2.2 If sectional completion is **specified in the PCC**, references in the GCC to the Works, the Completion Date, and the Intended Completion Date apply to any Section of the Works (other than references to the Completion Date and Intended Completion Date for the whole of the Works).
- 2.3 The documents forming the Contract shall be interpreted in the following order of priority:
 - (a) Agreement,
 - (b) Letter of Acceptance,
 - (c) Contractor's Bid & Priced Bill of Quantities,

- (d) Particular Conditions of Contract,
- (e) General Conditions of Contract including Appendices,
- (f) Specifications,
- (g) Drawings, and
- (h) Joint Venture Agreement [Not applicable]
- (i) any other document **listed in the PCC** as forming part of the Contract.

3. Language and Law

- 3.1 The language of the Contract and the law governing the Contract are **stated in the PCC**.

Salient features of major labour and other laws that are applicable to construction industry in India are given as Appendix 1 to these General Conditions of Contract.

- 3.2 Throughout the execution of the Contract, the Contractor shall comply with the import of goods and services prohibitions in the India when

(a) as a matter of law or official regulations, India prohibits commercial relations with that country; or

(b) by an act of compliance with a decision of the United Nations Security Council taken under Chapter VII of the Charter of the United Nations, India prohibits any import of goods from that country or any payments to any country, person, or entity in that country.

4. Project Manager's Decisions

- 4.1 Except where otherwise specifically stated, the Project Manager shall decide contractual matters between the Employer and the Contractor in the role representing the Employer.

However, if the Project Manager is required, under the rules and regulations and orders of the Employer, to obtain approval of some other authorities for specific actions, he will so obtain the approval. Provided further that any requisite approval shall be deemed to have been given by the Employer for any such authority exercised by the Project Manager.

5. Delegation

- 5.1 Unless otherwise **specified in the PCC**, the Project Manager may delegate any of his duties and responsibilities to other people, except to the Adjudicator/Dispute Review Expert, 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. All oral instructions shall be confirmed in writing in seven working days.
- 7. Subcontracting** 7.1 The Contractor may subcontract with the approval of the Project Manager upto a ceiling **specified in PCC**, but may not assign the Contract without the approval of the Employer in writing. Subcontracting shall not alter the Contractor's obligations.
- 7.2 The Project Manager should satisfy himself before recommending to the Employer whether:
- a) the circumstances warrant such sub-contracting; and,
 - b) the sub-Contractor so proposed for the Work possesses the experience, qualifications and equipment necessary for the job proposed to be entrusted to him in proportion to the quantum of Works to be sub-contracted.
- 7.3 If payments are proposed to be made directly to that sub-contractor, this should be subject to specific authorization by the prime contractor so that his arrangement does not alter the contractor's liability or obligations under the contract.
- 7.4 The Contractor shall not be required to obtain any consent from the Employer for:
- (a) the sub-contracting of any part of the Works for which the Sub-Contractor is already named in the contract;
 - (b) the provision for labour, or labour component, and,
 - (c) the purchase of materials which are in accordance with the standards specified in the contract.

(Note: 1. All bidders are expected to indicate clearly in the bid, if they proposed sub-contracting elements of the works amounting to more than 10 percent of the Bid Price. For each such proposal the qualification and the experience of the identified sub-contractor in the relevant field should be furnished alongwith the bid to enable the Employer to satisfy himself about their qualifications before agreeing for such sub-contracting and include it in the contract. In view of the above, normally no additional sub-contracting should arise during execution of the contract.

2. However, [a] sub-contracting for certain specialized elements of the work is not unusual and acceptable for carrying out the works more effectively; but vertical splitting of the works for sub-contracting is not acceptable. [b] in any case, proposal for sub-contracting in addition to what was specified in bid and stated in contract agreement will not be acceptable if the value of such additional sub-contracting exceeds 25% of value of work which was to

be executed by Contractor without sub-contracting.

3. Assignment of the contract may be acceptable only under exceptional circumstances such as insolvencies/liquidation or merger of companies etc.)

**8. Other
Contractors**

8.1 The Contractor shall cooperate and share the Site with other contractors, public authorities, utilities, and the Employer between the dates given in the Schedule of Other Contractors, as **referred to in the PCC**. The Contractor shall also provide facilities and services for them as described in the Schedule. The Employer may modify the Schedule of Other Contractors, and shall notify the Contractor of any such modification.

9. Personnel and Equipment

- 9.1 The Contractor shall employ the key personnel and use the equipment identified in its Bid and **referred to in the PCC**, to carry out the Works or other personnel and equipment approved by the Project Manager. The Project Manager shall approve any proposed replacement of key personnel and equipment only if their relevant qualifications or characteristics are substantially equal to or better than those proposed in the Bid.
- 9.2 The Project Manager may require the Contractor to remove from the Site of Works, a member of the Contractor's staff or his work force, who:
 - (a) persists in any misconduct or lack of care,
 - (b) carries out duties incompetently or negligently,
 - (c) fails to conform with any provisions of the Contract, or
 - (d) persists in any conduct which is prejudicial to safety, health, or the protection of the environment.
- 9.3 If the Employer, Project Manager or Contractor determines, that any employee of the Contractor be determined to have engaged in corrupt, fraudulent, collusive, coercive, or obstructive practice during the execution of the Works, then that employee shall be removed in accordance with Clause 9.2 above
- 9.4 In all the above cases, the contractor shall ensure that the person leaves the site within seven days and has no further connection with the work in the contract. The Contractor shall appoint a suitable replacement within 28 days or earlier as may be agreed to between the Project manager and the Contractor.
- 9.5 The Contractor shall not employ any retired Gazetted officer who has either not completed two years after the date of retirement or has not obtained permission from the Government authorities for employment with the Contractor²².
- 9.6 The Contractor shall, unless otherwise provided in the Contract, make his own arrangements for the engagement of all staff and labour, local or other, and for their payment, housing, feeding and transport. The Contractor shall, if required by the Project Manager, deliver to the Project Manager a return in detail, in such form and at such intervals as the Project Manager may prescribe, showing the staff and the numbers of the several

²²Based on Government Directives.

classes of labour from time to time employed by the Contractor on the Site and such other information as the Project Manager may require.

Compliance with Labour Regulations

- 9.7 During continuance of the Contract, the Contractor and his Sub-Contractors shall abide at all times by all existing labour enactments and rules made there under, regulations, notifications and bye laws of the State or Central Government or local authority and any other labour laws (including rules), regulations, bye laws that may be passed or notification that may be issued under any labour law prevailing on the Base Date either by the State or the Central Government or the local authority. The Contractor shall keep the Employer indemnified in case any action is taken against the Employer by the competent authority on account of contraventions including amendments. If the Employer is caused to pay or reimburse, such amounts as may be necessary to cause or observe, or for non-observance of the provisions stipulated in the notifications/bye laws/Acts/Rules/regulations including amendments, if any, on the part of the Contractor, the Project Manager/ Employer shall have the right to deduct any money due to the Contractor including his amount of performance security. The Employer/ Project Manager shall also have right to recover from the Contractor any sum required or estimated to be required for making good the loss or damage suffered by the Employer.
- 9.8 The employees of the Contractor and the Sub-Contractor in no case shall be treated as the employees of the Employer at any point of time.
- 9.9 The Contractor shall duly comply with the provisions of the Apprentices Act 1961 (III of 1961) and the rules made there under, and comply, failure or neglect to shall be subject to all liabilities and penalties provided in the said Act and Rules.

10. Employer's and Contractor's Risks

- 10.1 The Employer carries the risks which this Contract states are Employer's risks, and the Contractor carries the risks which this Contract states are Contractor's risks.

11. Employer's Risks

- 11.1 From the Start Date until the Defects Liability Certificate has been issued, the following are Employer's risks:
- (a) The risk of personal injury, death, or loss of or damage to property (excluding the Works, Plant, Materials, and Equipment), which are due to
 - (i) use or occupation of the Site by the Works or for the

purpose of the Works, which is the unavoidable result of the Works or

- (ii) negligence, breach of statutory duty, or interference with any legal right by the Employer or by any person employed by or contracted to him except the Contractor.

- (b) The risk of damage to the Works, Plant, Materials, and Equipment to the extent that it is due to a fault of the Employer or in the Employer's design, or due to war or radioactive contamination directly affecting the country where the Works are to be executed.

11.2 From the Completion Date until the Defects Liability Certificate has been issued, the risk of loss of or damage to the Works, Plant, and Materials is an Employer's risk except loss or damage due to

- (a) a Defect which existed on the Completion Date,
- (b) an event occurring before the Completion Date, which was not itself an Employer's risk, or
- (c) the activities of the Contractor on the Site after the Completion Date.

12. Contractor's Risks

12.1 From the Starting Date until the Defects Liability Certificate has been issued, the risks of personal injury, death, and loss of or damage to property (including, without limitation, the Works, Plant, Materials, and Equipment) which are not Employer's risks are Contractor's risks.

13. Insurance

13.1 The Contractor shall provide, in the joint names of the Employer and the Contractor, insurance cover from the Start Date to the end of the Defects Liability Period, in the amounts and deductibles **stated in the PCC** for the following events which are due to the Contractor's risks:

- (a) loss of or damage to the Works, Plant, and Materials [which are incorporated in works];
- (b) loss of or damage to Construction Equipment;
- (c) loss of or damage to property (except the Works, Plant, Materials, and Equipment) in connection with the Contract; and
- (d) personal injury or death.

13.2 Policies and certificates for insurance shall be delivered by the Contractor to the Project Manager for the Project Manager's approval before the Start Date. All such insurance shall provide for compensation to be payable in the types and proportions of currencies required to rectify the loss or damage incurred.

13.3 If the Contractor does not provide any of the policies and certificates required, the Employer may effect the insurance which the Contractor should have provided and recover the premiums the Employer has paid from payments otherwise due to the Contractor or, if no payment is due, the payment of the premiums shall be a debt due.

13.4 Alterations to the terms of insurance shall not be made without the approval of the Project Manager.

13.5 Both parties shall comply with any conditions of the insurance policies.

14. Site Data

14.1 The Contractor shall be deemed to have examined any Site Data **referred to in the PCC**, supplemented by any information available to the Contractor.

15. Contractor to Construct the Works including protection of environment, and assurance of public health and

15.1 The Contractor shall construct and install the Works in accordance with the Specifications and Drawings and as per instructions of Project Manager.

15.2.1 The Contractor shall take all reasonable steps to protect the environment on and off the Site and to avoid damage or nuisance to persons or to property of the public or others resulting from pollution, noise or other cause arising as a consequence of his methods of operation.

safety	15.2.2 During continuance of the contract, the contractor and his sub-contractors shall abide at all times by all existing enactments on environmental protection and rules made thereunder, regulations, notifications and by-laws of the State or Central Government, or local authorities and other law, bye-law, regulations that may be passed or notification that may be issued in this respect in future by the State or Central Government or the local authority. Salient features of the major laws are given in Appendix 1 to the General Conditions of Contract.
16 The Works to Be Completed by the Intended Completion Date	16.1 The Contractor may commence execution of the Works on the Start Date and shall carry out the Works in accordance with the Program submitted by the Contractor, as updated with the approval of the Project Manager, and complete them by the Intended Completion Date.
17 Approval by the Project Manager	<p>17.1 The Contractor shall submit Specifications and Drawings showing the proposed Temporary Works to the Project Manager, for his approval.</p> <p>17.2 The Contractor shall be responsible for design of Temporary Works.</p> <p>17.3 The Project Manager's approval shall not alter the Contractor's responsibility for design of the Temporary Works.</p> <p>17.4 The Contractor shall obtain approval of third parties to the design of the Temporary Works, where required.</p> <p>17.5 All Drawings prepared by the Contractor for the execution of the temporary or permanent Works, are subject to prior approval by the Project Manager before this use.</p>
18 Safety	18.1 The Contractor shall be responsible for the safety of all activities on the Site.
19 Discoveries	19.1 Anything of historical or other interest or of significant value unexpectedly discovered on the Site shall be the property of the Employer. The Contractor shall notify the Project Manager of such discoveries and carry out the Project Manager's instructions for dealing with them.
20 Possession of the Site	20.1 The Employer shall give possession of all parts of the Site to the Contractor. If possession of a part is not given by the date stated in the PCC , the Employer shall be deemed to have delayed the start of the relevant activities, and this shall be a Compensation Event.

-
- | | |
|---|--|
| 21 Access to the Site | 21.1 The Contractor shall allow the Project Manager and any person authorized by the Project Manager access to the Site and to any place where work in connection with the Contract is being carried out or is intended to be carried out. |
| 22 Instructions, Inspections and Audits | <p>22.1 The Contractor shall carry out all instructions of the Project Manager which comply with the applicable laws where the Site is located.</p> <p>22.2 The Contractor shall keep, and shall make all reasonable efforts to cause its Subcontractors and sub-consultants to keep, accurate and systematic accounts and records in respect of the Works in such form and details as will clearly identify relevant time changes and costs.</p> <p>22.3 The Contractor shall permit and shall cause its Subcontractors and sub-consultants to permit, the Bank and/or persons appointed by the Bank to inspect the Site and/or the accounts and records relating to the performance of the Contract and the submission of the bid, and to have such accounts and records audited by auditors appointed by the Bank if requested by the Bank. The Contractor's and its Subcontractors' and sub-consultants' attention is drawn to Sub-Clause 25.1 which provides, inter alia, that acts intended to materially impede the exercise of the Bank's inspection and audit rights provided for under Sub-Clause 22.2 constitute a prohibited practice subject to contract termination (as well as to a determination of ineligibility pursuant to the Bank's prevailing sanctions procedures).</p> |
| 23 Appointment of the Adjudicator or Dispute Review Expert | <p>23.1 The Adjudicator/Dispute Review Expert [DRE] named in PCC shall be appointed jointly by the Employer and the Contractor, at the time of the Employer's issuance of the Letter of Acceptance. If, in the Letter of Acceptance, the Employer does not agree on the appointment of the Adjudicator/DRE, the Employer will request the Appointing Authority designated in the PCC, to appoint the Adjudicator/DRE within 14 days of receipt of such request.</p> <p>23.1.1 The Adjudicator/DRE should be in position before "notice to proceed with work" is issued to the Contractor and an agreement should be signed with the Adjudicator/DRE jointly by the Employer and the Contractor in the form attached – Appendix 3.</p> <p>23.2 Should the Adjudicator/DRE resign or die, or should the Employer and the Contractor agree that the Adjudicator/DRE is not functioning in accordance with the provisions of the</p> |

Contract; a new Adjudicator/DRE 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/DRE 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/DRE within 14 days of the notification of the Project Manager's decision.
- 24.2 The Adjudicator/DRE shall give a decision in writing within 28 days of receipt of a notification of a dispute.
- 24.3 The Adjudicator/DRE shall be paid daily at the rate **specified in the PCC**, together with reimbursable expenses of the types **specified in the PCC**, and the cost shall be divided equally between the Employer and the Contractor. Whatever decision is reached by the Adjudicator/DRE, either party may refer that decision to an Arbitrator within 28 days of the Adjudicator's /DRE's written decision. If neither party refers the dispute to arbitration within the above 28 days, the Adjudicator's /DRE's decision shall be final and binding.
- 24.4 The arbitration shall be conducted in accordance with the arbitration procedures published by the institution named and in the place **specified in the PCC**.

The Arbitrator(s) shall give a decision in writing within 120 days of start of the proceedings unless otherwise agreed to by the Parties. The Arbitrators shall entertain only those issues which have been earlier referred to the Adjudicator/Dispute Review Expert and either party is dissatisfied with the decision given by the Adjudicator/Dispute Review Expert.

25. Corrupt And Fraudulent Practices

- 25.1 The Bank requires compliance with its policy in regard to corrupt and fraudulent practices as set forth in Appendix to the GCC.
- 25.2 The Employer requires the Contractor to disclose any commissions or fees that may have been paid or are to be paid to agents or any other party with respect to the bidding process or execution of the Contract. The information shall be disclosed as and when such payments are made or agreed to, and compliance with the disclosure requirement shall be furnished, while submitting each monthly statement for payments; such

disclosure must include at least the name and address of the agent or other party, the amount and currency, and the purpose of the commission, gratuity or fee.

B. Time Control

26. Program

- 26.1 Within the time **stated in the PCC**, after the date of the Letter of Acceptance, the Contractor shall submit to the Project Manager for approval a revised Program (revising the program given alongwith the bid) including Environmental Management Plan(to comply with the applicable Laws/ Rules/ Regulations for protection of environment, public health and safety, and the applicable parts of the Environment Management Planof the project) showing the general methods, arrangements, order, and timing for all the activities in the Works alongwith monthly cash flow forecasts.
- 26.2 An update of the Program shall be a program showing the actual progress achieved on each activity and the effect of the progress achieved on the timing of the remaining work, including any changes to the sequence of the activities.
- 26.3 The Contractor shall submit to the Project Manager for approval an updated Program at intervals no longer than the period **stated in the PCC**. If the Contractor does not submit an updated Program within this period, the Project Manager may withhold the amount **stated in the PCC** from the next payment certificate and continue to withhold this amount until the next payment after the date on which the overdue Program has been submitted.
- 26.4 The Project Manager's approval of the Program shall not alter the Contractor's obligations. The Contractor may revise the Program and submit it to the Project Manager again at any time. A revised Program shall show the effect of Variations and Compensation Events.
- 26.5 The Contractor shall furnish monthly progress reports as directed by the Project Manager by 7th of the succeeding month. The report shall include charts and detailed descriptions of the progress of identified activities, photographs showing status of progress at site, records of Contractor's personnel and equipment, Quality Assurance documents, comparison of actual and planned progress as per program. This report will also include progress on the ESHS Management Strategies and Implementation Plans (ESHS-MSIP), and compliance to the applicable Laws/ Rules/ Regulations for protection of environment, public health and safety, and the

		applicable parts of the Environment Management Plan of the project.
27. Extension of the Intended Completion Date	27.1	The Project Manager shall extend the Intended Completion Date including milestones if a Compensation Event occurs or a Variation is issued which makes it impossible for Completion to be achieved by the Intended Completion Date as per agreed milestones without the Contractor taking steps to accelerate the remaining work, which would cause the Contractor to incur additional cost.
	27.2	The Project Manager shall decide whether and by how much to extend the Intended Completion Date/milestones within 21 days of the Contractor asking the Project Manager for a decision upon the effect of a Compensation Event or Variation and submitting full supporting information. If the Contractor has failed to give early warning of a delay or has failed to cooperate in dealing with a delay, the delay by this failure shall not be considered in assessing the new Intended Completion Date/milestones.
28. Acceleration	28.1	When the Employer wants the Contractor to finish before the Intended Completion Date, the Project Manager shall obtain priced proposals for achieving the necessary acceleration from the Contractor. If the Employer accepts these proposals, the Intended Completion Date shall be adjusted accordingly and confirmed by both the Employer and the Contractor.
	28.2	If the Contractor's priced proposals for acceleration are accepted by the Employer, they are incorporated in the Contract Price and treated as a Variation.
29. Delays Ordered by the Project Manager	29.1	The Project Manager may instruct the Contractor to delay the start or progress of any activity within the Works.
30. Management Meetings	30.1	Either the Project Manager or the Contractor may require the other to attend a management meeting. (Which will be held at the place indicated in PCC . The periodicity to be fixed by Project Manager / Contractor jointly). The business of a management meeting shall be to review the progress of construction with reference to the construction program given in accordance with GCC 26.1, the plans for remaining work and to deal with matters raised in accordance with the early warning procedure.
	30.2	The Project Manager shall record the business of management meetings and provide copies of the record to those attending

the meeting and to the Employer. The responsibility of the parties for actions to be taken shall be decided by the Project Manager either at the management meeting or after the management meeting and stated in writing to all who attended the meeting.

- 31. Early Warning** 31.1 The Contractor shall warn the Project Manager at the earliest opportunity of specific likely future events or circumstances that may adversely affect the quality of the work, increase the Contract Price, or delay the execution of the Works. The Project Manager may require the Contractor to provide an estimate of the expected effect of the future event or circumstance on the Contract Price and Completion Date. The estimate shall be provided by the Contractor as soon as reasonably possible.
- 31.2 The Contractor shall cooperate with the Project Manager in making and considering proposals for how the effect of such an event or circumstance can be avoided or reduced by anyone involved in the work and in carrying out any resulting instruction of the Project Manager.

C. Quality Control

- 32. Quality Assurance** 32.1 The Contractor shall institute Quality Assurance (QA) and Quality Control (QC) systems in accordance with Quality Assurance Plan to demonstrate compliance with the requirements of the Contract as approved by the Project Manager.
- 32.2 Compliance with the QA/QC systems shall not relieve the Contractor of any of his duties obligations or responsibilities under the Contract.
- 33. Tests** 33.1 The Contractor shall provide all apparatus, assistance, documents and other information, electricity, equipment, fuel, consumables, instruments, labour, materials, and suitably qualified and experienced staff, as are necessary to carry out the specified tests efficiently.
- 33.2 If the Project Manager instructs the Contractor to carry out a test not specified in the Specification to check whether any work has a Defect and the test shows that it does, the Contractor shall pay for the test and any samples. If there is no Defect, the test shall be a Compensation Event.
- 34. Identifying and Correction of** 34.1. The Project Manager shall check the Contractor's work and notify the Contractor of any defects that are found specifying a

Defects

time by which it should be corrected. Such checking shall not affect the Contractor's responsibilities. The Project Manager may instruct the Contractor to search for a Defect and to uncover and test any work that the Project Manager considers may have a Defect.

34.2 The contractor shall permit the Employer's Technical auditor to check the contractor's work and notify the Project Manager and Contractor of any defects that are found. Such a check shall not affect the Contractor's or the Project Manager's responsibility as defined in the Contract Agreement

34.3 The Project Manager shall give notice to the Contractor of any Defects [specifying a time limit by which it should be corrected] before the end of the Defects Liability Period, which begins at Completion, and is **defined in the PCC**. The Defects Liability Period shall be extended for as long as Defects remain to be corrected.

34.4 Every time notice of a Defect is given, the Contractor shall correct the notified Defect within the length of time specified by the Project Manager's notice.

35. Uncorrected Defects

35.1 If the Contractor has not corrected a Defect within the time specified in the Project Manager's notice, the Project Manager shall assess the cost of having the Defect corrected and the Contractor shall pay this amount.

Note: 1. Where in certain cases, the technical specifications provide for acceptance of works within specified tolerance limits at reduced rates, Project Manager will certify payments to Contractor accordingly.

2. Where the failure to correct a particular defect within the specified time is considered as a fundamental breach of contract a notice should be given to the contractor as stated in GCC 57.2(e).

D. Cost Control

36. Contract Price

36.1 The Bill of Quantities shall contain priced items for the Works to be performed by the Contractor. The Bill of Quantities is used to calculate the Contract Price. The Contractor will be paid for the quantity of the work accomplished at the rate in the Bill of Quantities for each item.

37. Changes in the Contract Price

37.1 If the final quantity of the work done differs from the quantity in the Bill of Quantities for the particular item by more than 25

percent, provided the change exceeds 1 percent of the Initial Contract Price, the Project Manager shall adjust the rate to allow for the change.

- (a) If the quantity of work executed exceeds the quantity of the item in BOQ beyond the higher specified limit the Project Manager shall fix the rate to be applied for the additional quantity of the work executed.
- (b) If the quantity of work executed less than the quantity of the item in BOQ lesser than the lower specified limit, the Project Manager shall fix the rate to be applied for whole of the quantity of the work so executed.

37.2. The Project Manager shall not adjust rates from changes in quantities if thereby the Initial Contract Price is exceeded by more than 15 percent, except with the prior approval of the Employer.

37.3 If requested by the Project Manager, the Contractor shall provide the Project Manager with a detailed cost breakdown of any rate in the Bill of Quantities.

38. Variations

38.1 All Variations shall be included in updated Programs, produced by the Contractor.

38.2 The Contractor shall provide the Project Manager with a quotation (with breakdown of unit rates) for carrying out the Variation when requested to do so by the Project Manager. The Project Manager shall assess the quotation, which shall be given within seven (7) days of the request or within any longer period stated by the Project Manager and before the Variation is ordered.

38.3 If the work in the Variation corresponds to an item description in the Bill of Quantities and if, in the opinion of the Project Manager, the quantity of work above the limit stated in Sub-Clause 37.1 or the timing of its execution do not cause the cost per unit of quantity to change, the rate in the Bill of Quantities shall be used to calculate the value of the Variation. If the cost per unit of quantity changes, or if the nature or timing of the work in the Variation does not correspond with items in the Bill of Quantities, the quotation by the Contractor shall be in the form of new rates for the relevant items of work.

38.4 If the Contractor's quotation is unreasonable, [*or if contractor fails to provide the Project Manager with a quotation within a reasonable time specified by Project Manager in accordance with GCC38.2*] the Project Manager may order the Variation

and make a change to the Contract Price, which shall be based on the Project Manager's own forecast of the effects of the Variation on the Contractor's costs

38.5 If the Project Manager decides that the urgency of varying the work would prevent a quotation being given and considered without delaying the work, no quotation shall be given and the Variation shall be treated as a Compensation Event.

38.6 The Contractor shall not be entitled to additional payment for costs that could have been avoided by giving early warning.

39. Cash Flow Forecasts

39.1 When the Program, is updated, the Contractor shall provide the Project Manager with an updated cash flow forecast. The cash flow forecast shall be in Indian Rupees.

40. Payment Certificates

40.1 The Contractor shall submit to the Project Manager monthly statements of the estimated value of the work executed less the cumulative amount certified previously alongwith details of measurement of the quantity of works executed in a tabular form approved by the Project Manager.

40.2 The Project Manager shall check the details given in the Contractor's monthly statement and within 14 days certify the amounts to be paid to the Contractor after taking into account any credit or debit for the month in question in respect of materials for the works in the relevant amount and under conditions set forth in GCC Sub-Clause 49.4 [*Secured Advance*]

40.3 The value of work executed shall be determined by the Project Manager after due check measurement of the quantities claimed as executed by the contractor

40.4 The value of work executed shall comprise of the value of the quantities of work in the Bill of Quantities that have been completed;

40.5 The value of work executed shall include the valuation of Variations and Compensation Events.

40.6 The Project Manager may exclude any item certified in a previous certificate or reduce the proportion of any item previously certified in any certificate in the light of later information.

41. Payments

41.1 Payments shall be adjusted for deductions for advance

payments, retention, other recoveries in terms of contract & taxes to be deducted at source [TDS] as per applicable law. The Employer shall pay the Contractor the amounts certified by the Project Manager within 28 days of the date of each certificate. If the Employer makes a late payment, the Contractor shall be paid interest on the late payment in the next payment. Interest shall be calculated from the date by which the payment should have been made upto the date when the late payment is made at the rate **stated in the PCC**.

- 41.2 If an amount certified is increased in a later certificate or as a result of an award by the Adjudicator/DRE or an Arbitrator, the Contractor shall be paid interest upon the delayed payment as set out in this clause. Interest shall be calculated at the rate stated in GCC 41.1 above, from the date upon which the increased amount would have been certified in the absence of dispute.
- 41.3 Items of the Works for which no rate or price has been entered in shall not be paid for by the Employer and shall be deemed covered by other rates and prices in the Contract.

42. Compensation Events

- 42.1 The following shall be Compensation Events:
 - (a) The Employer does not give access to a part of the Site by the Site Possession Date pursuant to GCC Sub-Clause 20.1.
 - (b) The Employer modifies the Schedule of Other Contractors in a way that affects the work of the Contractor under the Contract.
 - (c) The Project Manager orders a delay or does not issue Drawings, Specifications, or instructions required for execution of the Works on time.
 - (d) The Project Manager instructs the Contractor to uncover or to carry out additional tests upon work, which is then found to have no Defects.
 - (e) The Project Manager unreasonably does not approve a subcontract to be let.
 - (f) Ground conditions are substantially more adverse than could reasonably have been assumed before issuance of the Letter of Acceptance from the information issued to bidders (including the Site Investigation Reports), from information

available publicly and from a visual inspection of the Site.

- (g) The Project Manager gives an instruction for dealing with an unforeseen condition, caused by the Employer, or additional work required for safety or other reasons.
- (h) Other contractors, public authorities, utilities, or the Employer does not work within the dates and other constraints stated in the Contract, and they cause delay or extra cost to the Contractor.
- (i) The advance payment is delayed.
- (j) The effects on the Contractor of any of the Employer's Risks.
- (k) The Project Manager unreasonably delays issuing a Certificate of Completion.

42.2 If a Compensation Event would cause additional cost or would prevent the work being completed before the Intended Completion Date, the Contract Price shall be increased and/or the Intended Completion Date shall be extended. The Project Manager shall decide whether and by how much the Contract Price shall be increased and whether and by how much the Intended Completion Date shall be extended.

42.3 As soon as information demonstrating the effect of each Compensation Event upon the Contractor's forecast cost has been provided by the Contractor, it shall be assessed by the Project Manager, and the Contract Price shall be adjusted accordingly. If the Contractor's forecast is deemed unreasonable, the Project Manager shall adjust the Contract Price based on the Project Manager's own forecast. The Project Manager shall assume that the Contractor shall react competently and promptly to the event.

42.4 The Contractor shall not be entitled to compensation to the extent that the Employer's interests are adversely affected by the Contractor's not having given early warning or not having cooperated with the Project Manager.

43. Tax

43.1 The rates quoted by the Contractor shall be deemed to be inclusive of the VAT, Sales and other taxes that the Contractor will have to pay for the performance of this Contract. The Employer will perform such duties in regard to the deduction of such taxes at source [TDS] as per applicable law.

- 43.2 The Project Manager shall adjust the Contract Price if taxes, duties, and other levies are changed between the deadline for the submission of bids for the Contract and the date of the last Completion certificate. The adjustment shall be the change in the amount of tax payable by the Contractor, provided such changes are not already reflected in the Contract Price.

44. Currencies

- 44.1 All payments shall be made in Indian Rupees.

45. Price Adjustment

- 45.1 Contract price shall be adjusted for increase or decrease in rates and price of labour, materials, fuels and lubricants and other inputs to the works in accordance with the principles and procedures outlined below. A table of adjustment data is **included in the PCC** which indicates the coefficients of various inputs and the sources of indices for various schedules of BOQ. If the PCC does not include a table of adjustment data this sub clause shall not apply and there shall be no price adjustment.

- (a) The price adjustment according to sub para (d) below, shall apply for the work done from the start date given in the PCC upto the end of the Intended Completion Date. If there is delay in completion beyond such date for reasons attributable to the contractor, the Price Adjustment for the work carried out during such period, for reasons attributable to the Contractor, shall be regulated by sub-para (g) below.
- (b) The Contract Price shall be adjusted to take account of any increase or decrease in cost after the base date, which affect the Contractor in performance of obligations under the Contract.
- (c) The total value (R) of the work done during the specified period [GCC 40.1] shall be as under:

$$R = \text{SUM} (R_{S1} + R_{S2} + R_{S3} + \dots R_{Sn}),$$

Where,

‘ R_{sn} ’ is the value of work done during the specified period to which the price adjustment shall be applied for the relevant schedule of Bill of Quantities (BOQ) specified in P.C.C during the specified period, and represented as under:

$R_{sn} = (V_{sn} + S_{sn})$ minus (amount of secured advance recovered in the same period + value of works executed under variations for which price adjustments will be

worked separately based on terms mutually agreed between the Project Manager and the Contractor)

where,

V_{sn} is the total value of work done during the specified period for the respective schedule of BOQ, and

S_{sn} is the secured advance paid during the specified period for the respective schedule of BOQ,

- (d) The adjustment to be applied to the amount otherwise payable to the Contractor, as valued in accordance with the appropriate schedule of BOQ and certified in Payment Certificates, shall be determined from formulae which shall be of the following general type:

$$P_n = a + b L_n/L_o + c E_n/E_o + d M_n/M_o + \dots\dots\dots$$

where,

“ P_n ” is the adjustment multiplier to be applied to the value of the work done during the period “n”, this period being a month unless otherwise stated in the PCC.

“a” is a fixed coefficient, stated in the relevant table of adjustment data, representing the non-adjustable portion in contractual payments;

“b”, “c”, “d”,... are coefficients representing the estimated proportion of each cost element related to the execution of the Works, as stated in the relevant table of adjustment data; such tabulated cost elements may be indicative of resources such as labour, equipment and materials;

“ L_n ” [*Labour*], “ E_n ” [*Equipment*], “ M_n ” [*Material*], are the current cost indices or reference prices for period “n”, each of which is applicable to the relevant tabulated cost element [*Labour, Equipment, Steel, Cement, Fuel/Lubricants, Bitumen, others*] on the date, specified in the Table-2 of Adjustment Data, prior to the last day of the period (to which the particular Payment Certificate relates); and

“ L_o ”, “ E_o ”, “ M_o ”, are the base cost indices or reference prices, expressed in the relevant currency of payment, each of which is applicable to the relevant

tabulated cost element on the Base Date.

- (e) The cost indices or reference prices stated in the tables of adjustment data given in PCC shall be used. The base date shall be the deadline for the submission of bids.
- (f) If the Contractor fails to complete the Works within the Intended Completion date, adjustment of prices thereafter shall be made using either:
 - (i) index or price applicable for each cost element tabulated in the tables of adjustment data on the specified date prior to the expiry of the Intended Completion Date, or
 - (ii) the current index or price applicable for the period in question whichever is more favourable to the Employer.
- (g) The weightings (coefficients) for each of the factors of cost stated in the table(s) of adjustment data shall only be varied by the Project Manager if they have been rendered unreasonable, unbalanced or inapplicable, as a result of Variations.
- (h) Unless otherwise **stated in the P.C.C.**, the Price adjustment shall be done in each monthly Interim Payment Certificate [IPC]. The coefficients and indices are given in the Tables of Adjustment Data in Contract data.

To the extent that full compensation for any rise or fall in costs to the contractor is not covered by the provisions of this or other clauses in the contract, the unit rates and prices included in the contract shall be deemed to include amounts to cover the contingency of such other rise or fall in costs

46. Retention

- 46.1 The Employer shall retain from each payment due to the Contractor the proportion **stated in the PCC** until Completion of the whole of the Works
- 46.2 Upon the issue of a Certificate of Completion of the Works by the Project Manager, in accordance with GCC 53.1, half the total amount retained shall be repaid to the Contractor and half when the Defects Liability Period has passed and the Project Manager has certified that all Defects notified by the Project

Manager to the Contractor before the end of this period have been corrected. On completion of the whole works the Contractor may substitute the balance retention money with an “on demand” Bank guarantee.

47. Liquidated Damages

- 47.1 The Contractor shall pay liquidated damages to the Employer at the rate per day **stated in the PCC** for each day that the Completion Date is later than the Intended Completion Date (for the whole of the works or the milestones as stated in the PCC). The total amount of liquidated damages shall not exceed the amount **defined in the PCC**. The Employer may deduct liquidated damages from payments due to the Contractor. Payment of liquidated damages shall not affect the Contractor’s liabilities.

Time is the essence of the contract and payment or deduction of liquidated damages shall not relieve the contractor from his obligation to complete the work as per agreed construction program and milestones, or from any of the Contractor’s other obligations and liabilities under the contract.

- 47.2 If the Intended Completion Date including milestones is extended after liquidated damages have been paid, the Project Manager shall correct any overpayment of liquidated damages by the Contractor by adjusting the next payment certificate. The Contractor shall be paid interest on the overpayment, calculated from the date of payment to the date of repayment, at the rates specified in GCC Sub-Clause 41.1.

48. Bonus

- 48.1 Not used.

49. Advance Payment

- 49.1 The Employer shall make advance payment to the Contractor of the amounts **stated in the PCC** by the date **stated in the PCC**, against provision by the Contractor of an Unconditional Bank Guarantee in a form and by a bank acceptable to the Employer in amounts in Indian Rupees equal to the advance payment. The Guarantee shall remain effective until the advance payment has been repaid, but the amount of the Guarantee shall be progressively (*each instalment not less than Rs. 500,000*) reduced by the amounts repaid by the Contractor. Interest shall not be charged on the advance payment.
- 49.2 The Contractor is to use the advance payment only to pay for Equipment, Plant, Materials, and mobilization expenses required specifically for execution of the Contract. The Contractor shall demonstrate that advance payment has been used in this way by supplying copies of invoices or other

documents to the Project Manager.

- | | | |
|----------------------------|------|--|
| | 49.3 | The advance payment shall be repaid by deducting proportionate amounts from payments otherwise due to the Contractor, following the schedule of completed percentages of the Works on a payment basis. No account shall be taken of the advance payment or its repayment in assessing valuations of work done, Variations, price adjustments, Compensation Events, Liquidated Damages. |
| Secured Advances | 49.4 | The Project Manager shall make advance payment in respect of materials intended for but not yet incorporated in the Works in accordance with conditions stipulated in the PCC . |
| 50. Securities | 50.1 | The Performance Security 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 Nationalized or Schedule bank in India, and denominated. The Bank Guarantee for Performance Security and additional security for unbalanced bids shall be valid until a date 28days from the date of issue of the Certificate of Completion. |
| 51. Dayworks | 51.1 | Not used. |
| 52. Cost of Repairs | 52.1 | Loss or damage to the Works or Materials to be incorporated in the Works between the Start Date and the end of the Defects Correction periods shall be remedied by the Contractor at the Contractor's cost if the loss or damage arises from the Contractor's acts or omissions. |

E. Finishing the Contract

- | | | |
|--------------------------|------|--|
| 53. Completion | 53.1 | The Contractor shall request the Project Manager to issue a Certificate of Completion of the Works, and the Project Manager shall do so upon deciding that the whole of the Works is completed. |
| 54. Taking Over | 54.1 | The Employer shall take over the Site and the Works within seven days of the Project Manager's issuing a certificate of Completion. |
| 55. Final Account | 55.1 | The Contractor shall supply the Project Manager with a detailed account of the total amount that the Contractor considers payable under the Contract at the end of the Defects Liability Period. The Project Manager shall issue a Defects Liability Certificate and certify any final payment that is due to the Contractor within 56 days of receiving the Contractor's account if it is correct and complete. If it is not, the Project Manager |

shall issue within 56 days a schedule that states the scope of the corrections or additions that are necessary including corrections and additions to comply with the applicable Laws/ Rules/ Regulations for protection of environment, public health and safety, and the applicable parts of the Environment Management Plan of the project. If the Final Account is still unsatisfactory after it has been resubmitted, the Project Manager shall decide on the amount payable to the Contractor and issue a payment certificate within 56 days of receiving the contractor's revised account.

56. Operating and Maintenance Manuals

- 56.1 If "as built" Drawings [including a compact disk containing digitized drawings] and/or operating and maintenance manuals are required, the Contractor shall supply them by the dates **stated in the PCC**.
- 56.2 If the Contractor does not supply the Drawings [including a compact disk containing digitized drawings] and/or manuals by the dates **stated in the PCC** pursuant to GCC Sub-Clause 56.1, or they do not receive the Project Manager's approval, the Project Manager shall withhold the amount **stated in the PCC** from payments due to the Contractor.

57. Termination

- 57.1 The Employer or the Contractor may terminate the Contract if the other party causes a fundamental breach of the Contract after giving fourteen (14) days written notice.
- 57.2 Fundamental breaches of Contract shall include, but shall not be limited to, the following:
- (a) the Contractor stops work for 28 days when no stoppage of work is shown on the current Program and the stoppage has not been authorized by the Project Manager;
 - (b) the Project Manager instructs the Contractor to delay the progress of the Works, and the instruction is not withdrawn within 28 days;
 - (c) the Employer or the Contractor is made bankrupt or goes into liquidation other than for a reconstruction or amalgamation;
 - (d) a payment certified by the Project Manager is not paid by the Employer to the Contractor within 84 days of the date of the Project Manager's certificate;
 - (e) the Project Manager gives Notice that failure to correct a particular Defect is a fundamental breach of Contract and the Contractor fails to correct it within a reasonable period of

time determined by the Project Manager;

- (f) the Contractor does not maintain a Security, which is required;
- (g) the Contractor has delayed the completion of the Works by the number of days for which the maximum amount of liquidated damages can be paid, as **defined in the PCC**; or
- (h) if the Contractor, in the judgment of the Employer, has engaged in corrupt or fraudulent practices in competing for or in executing the Contract, pursuant to GCC Clause 25.1, then the Employer may, after giving fourteen (14) days written notice to the Contractor, terminate the Contract and expel him from the Site.
- (i) The contractor has contravened Clauses 7 and 9 of GCC.
- (j) The contractor does not adhere to the agreed construction program and agreed environmental management plan [Clause 26 of GCC] and also fails to take satisfactory remedial action as per agreements reached in the management meetings [Clause 30 of GCC] for a period of 60 days.
- (k) The contractor fails to carry out of the instructions of the Project Manager within a reasonable time determined by the Project Manager in accordance with GCC Clause 15.1 and 22.
- (l) The contractor (in case of Joint Venture) has modified the composition of the joint venture and/or the responsibility of each member of the joint venture from what is stated in joint venture agreement without the prior approval of the Employer.

57.3 When either party to the Contract gives notice of a breach of Contract to the Project Manager for a cause other than those listed under GCC Sub-Clause 57.2 above, the Project Manager shall decide whether the breach is fundamental or not.

57.4 Notwithstanding the above, the Employer may terminate the Contract for convenience.

57.5 If the Contract is terminated, the Contractor shall stop work immediately, make the Site safe and secure, and leave the Site as soon as reasonably possible.

58.Payment upon Termination

58.1 If the Contract is terminated because of a fundamental breach of Contract by the Contractor, the Project Manager shall issue a

certificate for the value of the work done and Materials ordered less advance payments received upto the date of the issue of the certificate less other recoveries due in terms of contract, less taxes to be deducted at source [TDS] as per applicable law, and less the percentage to apply to the value of the work not completed, as **indicated in the PCC**. Additional Liquidated Damages shall not apply. If the total amount due to the Employer exceeds any payment due to the Contractor, the difference shall be a debt payable to the Employer.

- 58.2 If the Contract is terminated for the Employer's convenience or because of a fundamental breach of Contract by the Employer, the Project Manager shall issue a certificate for the value of the work done, Materials ordered, the reasonable cost of removal of Equipment, repatriation of the Contractor's personnel employed solely on the Works, and the Contractor's costs of protecting and securing the Works, and less advance payments received upto the date of the certificate less other recoveries due in terms of the contract and less taxes due to be deducted at source [TDS] as per applicable law.

59.Property

- 59.1 All Materials on the Site, Plant, Equipment, Temporary Works, and Works shall be deemed to be the property of the Employer if the Contract is terminated because of the Contractor's default.

60.Release from Performance

- 60.1 If the Contract is frustrated by the outbreak of war or by any other event entirely outside the control of either the Employer or the Contractor, the Project Manager shall certify that the Contract has been frustrated. The Contractor shall make the Site safe and stop work as quickly as possible after receiving this certificate and shall be paid for all work carried out before receiving it and for any work carried out afterwards to which a commitment was made.

61.Suspension of Bank Loan or Credit

- 61.1 In the event that the Bank suspends the Loan or Credit to the Employer, from which part of the payments to the Contractor are being made:
- (a) The Employer is obligated to notify the Contractor of such suspension within 7 days of having received the Bank's suspension notice.
 - (b) If the Contractor has not received sums due it within the 28 days for payment provided for in Sub-Clause 40.1, the Contractor may immediately issue a 14-day termination notice.

APPENDIX TO GENERAL CONDITIONS

Bank's Policy- Corrupt and Fraudulent Practices

(Text in this Appendix shall not be modified)

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

“Fraud and Corruption:

1.16 It is the Bank's policy to require that Borrowers (including beneficiaries of Bank loans), bidders, suppliers, contractors and their agents (whether declared or not), sub-contractors, sub-consultants, service providers or suppliers, and any personnel thereof, observe the highest standard of ethics during the procurement and execution of Bank-financed contracts.²³ In pursuance of this policy, the Bank:

- (a) defines, for the purposes of this provision, the terms set forth below as follows:
 - (i) “corrupt practice” is the offering, giving, receiving, or soliciting, directly or indirectly, of anything of value to influence improperly the actions of another party;²⁴
 - (ii) “fraudulent practice” is any act or omission, including a misrepresentation, that knowingly or recklessly misleads, or attempts to mislead, a party to obtain a financial or other benefit or to avoid an obligation;²⁵
 - (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;²⁶
 - (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;²⁷
 - (v) “obstructive practice” is

²³In this context, any action to influence the procurement process or contract execution for undue advantage is improper.

²⁴ For the purpose of this sub-paragraph, “another party” refers to a public official acting in relation to the procurement process or contract execution. In this context, “public official” includes World Bank staff and employees of other organizations taking or reviewing procurement decisions.

²⁵ For the purpose of this sub-paragraph, “party” refers to a public official; the terms “benefit” and “obligation” relate to the procurement process or contract execution; and the “act or omission” is intended to influence the procurement process or contract execution.

²⁶ For the purpose of this sub-paragraph, “parties” refers to participants in the procurement process (including public officials) attempting either themselves, or through another person or entity not participating in the procurement or selection process, to simulate competition or to establish bid prices at artificial, non-competitive levels, or are privy to each other's bid prices or other conditions.

²⁷ For the purpose of this sub-paragraph, “party” refers to a participant in the procurement process or contract execution.

- (aa) deliberately destroying, falsifying, altering, or concealing of evidence material to the investigation or making false statements to investigators in order to materially impede a Bank investigation into allegations of a corrupt, fraudulent, coercive or collusive practice; and/or threatening, harassing or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation, or
 - (bb) acts intended to materially impede the exercise of the Bank's inspection and audit rights provided for under paragraph 1.16(e) below.
- (b) will reject a proposal for award if it determines that the bidder recommended for award, or any of its personnel, or its agents, or its sub-consultants, sub-contractors, service providers, suppliers and/or their employees, has, directly or indirectly, engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices in competing for the contract in question;
- (c) will declare misprocurement and cancel the portion of the loan allocated to a contract if it determines at any time that representatives of the Borrower or of a recipient of any part of the proceeds of the loan engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices during the procurement or the implementation of the contract in question, without the Borrower having taken timely and appropriate action satisfactory to the Bank to address such practices when they occur, including by failing to inform the Bank in a timely manner at the time they knew of the practices;
- (d) will sanction a firm or individual, at any time, in accordance with the prevailing Bank's sanctions procedures,²⁸ including by publicly declaring such firm or individual ineligible, either indefinitely or for a stated period of time: (i) to be awarded a Bank-financed contract; and (ii) to be a nominated²⁹;
- (e) will require that a clause be included in bidding documents and in contracts financed by a Bank loan, requiring bidders, suppliers and contractors, and their sub-contractors, agents, personnel, consultants, service providers, or suppliers, to permit the Bank to inspect all accounts, records, and other documents relating to the submission of bids and contract performance, and to have them audited by auditors appointed by the Bank."

²⁸ A firm or individual may be declared ineligible to be awarded a Bank financed contract upon: (i) completion of the Bank's sanctions proceedings as per its sanctions procedures, including, inter alia, cross-debarment as agreed with other International Financial Institutions, including Multilateral Development Banks, and through the application the World Bank Group corporate administrative procurement sanctions procedures for fraud and corruption; and (ii) as a result of temporary suspension or early temporary suspension in connection with an ongoing sanctions proceeding. See footnote 14 and paragraph 8 of Appendix 1 of these Guidelines.

²⁹ A nominated sub-contractor, consultant, manufacturer or supplier, or service provider (different names are used depending on the particular bidding document) is one which has either been: (i) included by the bidder in its pre-qualification application or bid because it brings specific and critical experience and know-how that allow the bidder to meet the qualification requirements for the particular bid; or (ii) appointed by the Borrower.

Section IX Particular Conditions of Contract

Except where otherwise indicated, all PCC should be filled in by the Employer prior to issuance of the Bidding Documents. Schedules and reports to be provided by the Employer should be annexed.

A. General			
GCC 1.1 (d)	The financing institution is: International Development Association		
GCC 1.1 (r)	The Employer is The Project Director, Nagaland Health Project, Directorate of Health and Family Welfare , Ruziezou, Kohima		
GCC 1.1 (v)	The Intended Completion Date for the whole of the Works shall be <i>[Eight (08) Months]</i>		
GCC 1.1 (y)	The Project Manager is The Project Director, Nagaland Health Project, Directorate of Health and Family Welfare , Ruziezou, Kohima authorised representative].		
GCC 1.1 (aa)	The Site is located at <i>Lot 1- Mon District Hospitals</i> <i>Lot - 2 Wokha District Hospital</i> Lot – 3 Zunheboto District Hosptial		
GCC 1.1 (dd)	The Start Date shall be one week after the date of issue of notice to proceed with works to the contractor.		
GCC 1.1 (hh)	The Works consist of Water Supply, Sanitation, Roof water harvesting system, Solar PV (off Grid) Power plant, Solar Pumps (Surface and Submersible), Solar Streetlights, Civil works related to Biomedical Equipment, and Miscellaneous Civil Works Identification number of Contract : Bid No.NHP/PP/007		
GCC 2.2	Not Applicable		
GCC 2.3(i)	The following documents also form part of the Contract:		
	S.No.	Document	Description of the document

	1.	Construction Methodology	Construction methodology given in bid amended as per comments of Employer given in letter of acceptance.
	2.	Quality control	Quality control procedures and assurance plans given in the bid and amended as per comments of Employer given in letter of acceptance.
	3.	Environmental, Social, Health and Safety	(i) ESHS Management Strategies and Implementation Plans; (ii) Labor Influx and Worker's Camp Management Plan including the process for mitigating construction related impacts on local community; and (iii) Code of Conduct that will apply to its employees and subcontractors, to ensure compliance with its Environmental, Social, Health and Safety (ESHS) obligations under the contract.
GCC 3.1	<p>The language of the contract is <i>English</i>.</p> <p>The law that applies to the Contract is the laws of Union of India.</p>		
GCC 5.1	The Project manager may delegate any of his duties and responsibilities.		
GCC 7.1	The ceiling for sub-contractor is 15% [<i>This is addition to what was stated in bid and incorporated in contract agreement.</i>]		
GCC 8.1	Not Applicable		
GCC 9.1	<p>Key Personnel and equipment:</p> <p>GCC 9.1 is replaced with the following:</p> <p>9.1 Key Personnel are the Contractor's personnel named in this GCC 9.1 of the Particular Conditions of Contract. 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.</p> <p><i>[insert the name/s of each Key Personnel agreed by the Employer prior to Contract signature, Schedule of Key Personnel and equipment as indicated in accepted bid & construction methodology].</i></p>		
GCC 13.1	The minimum insurance amounts and deductibles shall be:		

	/			
	S.No.	Description	Minimum cover for Insurance	Maximum deductible for Insurance
	(i)	Works and Plant and Materials which are incorporated in works	Lot 1: INR 147 Lakh Lot 2: INR 155 Lakh Lot 3: INR 140 Lakhs	
	(ii)	Loss or damage to Construction Equipment	Lot 1: INR 20 Lakh Lot 2: INR 20 Lakh Lot 3: INR 20 Lakhs	
	(iii)	Other Property	INR 25 Lakhs	
	(iv)	Personal injury or death insurance: a) for other people;	INR 5 Lakhs	
		b) for Contractor's Employees	In accordance with the statutory requirements applicable in India	
GCC 14.1	Site Data are: Lot 1: Mon DH <i>Lot 2: Wokha DH</i> <i>Lot 3: Zunheboto DH</i>			
GCC 15.2	[Insert after GCC 15.2.2 the following] 15.2.2 (b): The Contractor shall implement all mitigation measures for which responsibility is assigned to him as stipulated in the Environmental Management <i>Plan</i> , and the conditions stipulated in Section VII-Work Requirements of this Bidding Document, even if not explicitly covered under the ESHS-MSIP submitted by the bidder and made part of the Contract			

	Document.
GCC 20.1	<p>The Site Possession Date(s) shall be: Within 10 days from the issuance of notice to proceed with the Work</p> <p>The Site Possession Dates shall be:</p> <p>Lot1 __Mon District Hospital_____</p> <p>Lot 2__Wokha District Hosptital _____</p> <p>Lot 3 __Zunheboto District Hosptital _____</p>
GCC 23.1 & GCC 23.2	<p>Name of the agreed Adjudicator is Er.Abanglangba Ao , Retired Executive Engineer, Govt, of Nagaland with daily professional fee of INR.8800/- (Rupees Eight thousand eight hundred only) excluding TA/DA which will be as per the actual bills/ invoice subject to approval by the Project Directotr, Nagaland Health Project.</p>
GCC 24.3	<p>Daily rate and types of reimbursable expenses to be paid to the Adjudicator/Dispute Review Expert: Fee <i>and reimbursable expenses – boarding/lodging/travel.</i></p> <p><i>Daily rate as per Nagaland Health Project.</i></p>
GCC 24.4	<p>The procedure for adhoc arbitration will be as follows:</p> <p>(a) In case of Dispute or difference arising between the Employer and an Indian Contractor relating to any matter arising out of or connected with this agreement, such disputes or difference shall be settled in 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). For the purposes of this Sub-Clause, the term “Indian Contractor” means a contractor who is registered in India and is a juridic person created under Indian law as well as a joint venture between such a contractor and a Foreign</p>

Contractor.

Note: *[Sub-para (b) is applicable in case of contract award to foreign contractors].*

- (b) In the case of dispute with a Foreign Contractor the dispute shall be settled in accordance with provisions of UNCITRAL Arbitration Rules. The Arbitral Tribunal shall consist of three 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 a 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, 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).For the purposes of this Clause, the term “Foreign Contractor” means a contractor who is not registered in India and is not a juridical person created under Indian Law.
- (c) If one of the parties fails to appoint its Arbitrator in pursuance of sub-clause (a) and (b) 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.
- (d) 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/ Dispute Review Expert shall not be altered by reason of the arbitration being conducted during the progress of the Works.
- (e) Arbitration proceedings shall be held at Kohima, India, and the language of the arbitration proceedings and that of all documents and communications between the parties shall be English.
- (f) 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.

	<p>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>(g) 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> <p>(h) The Arbitrator should give final award within 120 days of starting of the proceedings [<i>indicate the days</i>]</p> <p>(i) 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>Alternatively</i></p> <p><i>[Note: this may be used only in cases of contract awards to Indian contractors]</i></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>
--	--

	The arbitral tribunal shall consist of 3 Arbitrators, arbitration proceedings shall be held at_Kohima , 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> .
B. Time Control	
GCC 26.1	The Contractor shall submit a revised Program including Environmental Management Plan and ESHS-MSIP for the Works (in such form and detail as the Project Manager shall reasonably prescribe) within 14 days of delivery of the Letter of Acceptance.
GCC 26.3	The period between Program updates is 30 days. The amount to be withheld for late submission of an updated Program is Rs 5,00,000/-
GCC 26.6	The following is inserted as a new sub clause 26.6: “26.6 The contractor will submit a brief Labor Influx and Worker’s Camp Management Plan including the process for mitigating construction related impacts on local community within 30 days of signing the contract. The plan shall be updated and a revised plan shall be submitted, if required.”
GCC 30	Venue of management meeting will be Office of the PD, NHP, Kohima or at the office of the District hospitals for respective lot
C. Quality Control	
GCC 34.3	The Defects Liability Period is: 365 days.
D. Cost Control	
GCC 40	The completion certificate for each year of Comprehensive Maintenance will be certified by the site engineer and the Project Director. The contractor should maintain less than 5% of the down time for all Solar and associated equipment & Lighting facility and attend all service calls within 24 hours of reporting.
GCC 41	The amount quoted for each year for comprehensive maintenance will be

	paid after successful completion respective period of maintenance.									
GCC 41.1	Interest rate for Delayed payment is 13.4.% per annum									
GCC 43.1	GST 18% Inclusive [as per GST council-GOI, 9% SGST + 9% CGST applicable on civil construction (Sno. 183, Chapter/ Heading/Sub heading/Tariff item6808 to 6902, 7304, 05) Reference : http://www.cbec.gov.in/resources/htdocs-cbec/gst/CGST%20rates%20for%20Goods%20under%20different%20Notifications%20%20as%20amended%20from%20time%20to%20time.pdf									
GCC 45.1	Price Adjustment: The contract <i>is not</i> subject to price adjustment in accordance with G.C.C. Clause 45									
GCC 46.1	The proportion of payments retained (Retention Money) shall be 6% from each bill subject to the maximum of 5% of final contract price.									
GCC 47.1	<p>The liquidated damages for the whole of the Works are 0.05% per day. The maximum amount of liquidated damages for the whole of the Works is 10% of the final Contract Price.</p> <table><tr><td>For milestone 1 _____per day</td><td>Rs. _Lot 1: 3,000; Lot 2: 3,000; Lot 3: 3,000</td></tr><tr><td>For milestone 2 _____per day</td><td>Rs. Lot 1: 3,000; Lot 2: 3,000; Lot 3: 3,000</td></tr><tr><td>All works _____per day</td><td>Lot 1: 6,000; Lot 2: 6,000; Lot 3: 6,000</td></tr></table>	For milestone 1 _____per day	Rs. _Lot 1: 3,000; Lot 2: 3,000; Lot 3: 3,000	For milestone 2 _____per day	Rs. Lot 1: 3,000; Lot 2: 3,000; Lot 3: 3,000	All works _____per day	Lot 1: 6,000; Lot 2: 6,000; Lot 3: 6,000			
For milestone 1 _____per day	Rs. _Lot 1: 3,000; Lot 2: 3,000; Lot 3: 3,000									
For milestone 2 _____per day	Rs. Lot 1: 3,000; Lot 2: 3,000; Lot 3: 3,000									
All works _____per day	Lot 1: 6,000; Lot 2: 6,000; Lot 3: 6,000									
GCC 49.1	<p>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. Mobilization</td><td>5% of the Contract price</td><td>On submission of un-conditional Bank Guarantee. <i>(to be drawn before end of 20% of Contract period)</i></td></tr><tr><td>2. Equipment</td><td>90% for new and 50% of depreciated value</td><td>After equipment is brought to site as per</td></tr></table>	<u>Nature of Advance</u>	<u>Amount (Rs.)</u>	<u>Conditions to be fulfilled</u>	1. Mobilization	5% of the Contract price	On submission of un-conditional Bank Guarantee. <i>(to be drawn before end of 20% of Contract period)</i>	2. Equipment	90% for new and 50% of depreciated value	After equipment is brought to site as per
<u>Nature of Advance</u>	<u>Amount (Rs.)</u>	<u>Conditions to be fulfilled</u>								
1. Mobilization	5% of the Contract price	On submission of un-conditional Bank Guarantee. <i>(to be drawn before end of 20% of Contract period)</i>								
2. Equipment	90% for new and 50% of depreciated value	After equipment is brought to site as per								

	<p><i>(This advance is not applicable for equipment already owned or hired/leased by the contractor.)</i></p>	<p>for old equipment. Total amount will be subject to a maximum of 10% of the Contract price.</p>	<p>agreed construction program (<i>provided the Project Manager is satisfied that the equipment is required for performance of the contract</i>) and on submission of unconditional Bank Guarantee for amount of advance.</p>
	<p>3. Secured advance for non-perishable materials brought to site [<i>Solar Panels</i>]</p>	<p>60% of Invoice value or Market value – lower of the two.</p>	<p>a) The materials are in-accordance with the specification for Works;</p> <p>b) Such materials have been delivered to site, and are properly stored and protected against damage or deterioration to the satisfaction of the Project Manager.</p> <p>c) the Contractor's records of the requirements, orders, receipt and use of materials are kept in a form approved by the Project Manager and such records shall be available for inspection by the Project Manager;</p> <p>d) The contractor has submitted with his monthly statement the estimated value of the materials on site together with such documents as may be required by the Project Manager for the</p>

	<p>Purpose of valuation for material and providing evidence of ownership and payment thereof;</p> <p>e) Ownership of such materials shall be deemed to vest in the Employer for which the Contractor has submitted an Indemnity Bond in an acceptable format; and</p> <p>f) The quantity of materials are not excessive and shall be used within a reasonable time as determined by the Project Manager.</p> <p>(The advance 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 _____months from the date of payment of first instalment of advance, whichever period concludes earlier, and shall be made at the rate of 7.5% @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 <i>[for which advance was previously paid pursuant to Clause 49 of GCC and 49.1(3) of PCC.]</i> have been incorporated into the Works.</p> <p><i>@ Stipulate appropriately, namely 30% for 20% advance, 25% for 15% advance, 15% for 10% advance and 7.5% for 5% advance respectively.</i></p>
--	---

GCC 50.1	<p>“GCC 50.1 is replaced with the following</p> <p>The Performance Security and an Environmental, Social, Safety and Health (ESHS) Performance Security shall be provided to the Employer no later than the date specified in the Letter of Acceptance and shall be issued in the amounts specified in the PCC (for GCC 50.1), and shall be issued by a Nationalized or Scheduled bank in India. The Performance Security and the ESHS Performance Security, shall be valid until a date 28 days from the date of issue of the Certificate of Completion.”</p>
GCC 50.1	<p>The Performance Security amount is Five percent of contract price plus Rs.5% of the Unbalanced amount as additional security for unbalanced bids [<i>in terms of ITB Clause 35.5</i>], and Environmental, Social, Safety and Health (ESHS) Performance Security amount is <i>One</i> percent of Contract Amount. The performance security is valid upto 4 years of the operation and maintenance period after expiry of the defect liability period.</p> <p>The standard form of Performance Security acceptable to the Employer shall be <u>unconditional</u> Bank Guarantees from a Scheduled or Nationalized banks in India of the types as presented in Section X of the Bidding Documents.</p> <p><i>[Notes: The Bank Guarantees shall be unconditional (on demand) (see Section X, Contract Forms).. The sum of the total “demand guarantees” (Performance Security including ESHS Performance Security) shall normally not exceed 10% of the Accepted Contract Amount.</i></p> <p><i>Throughout this bidding document the term ‘performance security’, unless the context clearly indicates otherwise, means and includes both ‘the performance security and the ESHS performance security’ to be submitted by the successful bidder in the amounts specified above].</i></p>
E. Finishing the Contract	
GCC 56.1	<p>* The date by which operating and maintenance manuals are required is within 28 days of issue of certificate of completion of whole or section of work, as the case may be[insert date]</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[insert date].</p>
GCC 56.2	The amount to be withheld for failing to produce “as built” drawings and/or operating and maintenance manuals *by the date required in G.C.C. 56.1 is Rs500,000
GCC 57.2 (g)	The maximum number of days is: 200 days

GCC 58.1	The percentage to apply to the value of the work not completed, representing the Employer's additional cost for completing the Works, is 20%.
-----------------	---

Appendices

Appendix 1: Salient Features of Labour & Environment Protection Laws³⁰

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.

³⁰This 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.

- (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.
- (i) Equal Remuneration Act 1976: The Act provides for payment of equal wages for work of equal nature to male and female workers and for not making discrimination against Female employees in the matters of transfers, training and promotions etc.
- (j) Payment of Bonus Act 1965: The Act is applicable to all establishments employing 20 or more employees. Some of the State Governments have reduced this requirement from 20 to 10. The Act provides for payments of annual bonus subject to a minimum of 8.33% of the wages drawn in the relevant year. It applies to skilled or unskilled manual, supervisory, managerial, administrative, technical or clerical work for hire or reward to employees who draw a salary of Rs. 10,000/- per month or less. To be eligible for bonus, the employee should have worked in the establishment for not less than 30 working days in the relevant year. The Act does not apply to certain establishments.
- (k) Industrial Disputes Act 1947: the Act lays down the machinery and procedure for resolution of Industrial disputes, in what situations, a strike or lock-out becomes illegal and what are the requirements for laying off or retrenching the employees or closing down the establishment.
- (l) Trade Unions Act 1926: The Act lays down the procedure for registration of trade unions of workmen and employers. The Trade Unions registered under the Act have been given certain immunities from civil and criminal liabilities.
- (m) Child Labour (Prohibition & Regulation) Act 1986: The Act prohibits employment of children below 14 years of age in certain occupations and processes and provides for regulation of employment of children in all other occupations and processes. Employment of Child Labour is prohibited in the Building and Construction Industry.
- (n) Inter-State Migrant workmen's (Regulation of Employment & Conditions of Service) Act 1979: The Act is applicable to an establishment which employs 5 or more inter-state migrant workmen through an intermediary (who has recruited workmen in one state for employment in the establishment situated in another state). The Inter-State migrant workmen, in an establishment to which this Act becomes applicable, are required to be provided certain facilities such as housing, medical aid, traveling expenses from home upto the establishment and back, etc.

- (o) The Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act 1996 and the Building and Other Construction Workers Welfare Cess Act, 1996 (BOCWW Cess Act): All the establishments who carry on any building or other construction work and employ 10 or more workers are covered under these Acts. All such establishments are required to pay cess at the rate not exceeding 2% of the cost of construction as may be notified by the Government. The Employer of the establishment is required to provide safety measures at the building or construction work and other welfare measures, such as Canteens, First –Aid facilities, Ambulance, Housing accommodations for workers near the work place etc. The Employer to whom the Act applies has to obtain a registration certificate from the Registering Officer appointed by the Government.
- (p) Factories Act 1948: the Act lays down the procedure for approval of plans before setting up a factory engaged in manufacturing processes, health and safety provisions, welfare provisions, working hours, annual earned leave and rendering information regarding accidents or dangerous occurrences to designated authorities. It is applicable to premises employing 10 persons or more with aid of power or 20 or more persons without the aid of power.
- (q) Weekly Holidays Act -1942
- (r) Bonded Labour System (Abolition) Act, 1976: The Act provides for the abolition of bonded labour system with a view to preventing the economic and physical exploitation of weaker sections of society. Bonded labour covers all forms of forced labour, including that arising out of a loan, debt or advance.
- (s) Employer's Liability Act, 1938: This Act protects workmen who bring suits for damages against employers in case of injuries endured in the course of employment. Such injuries could be on account of negligence on the part of the employer or persons employed by them in maintenance of all machinery, equipment etc. in healthy and sound condition.
- (t) Employees State Insurance Act 1948: The Act provides for certain benefits to insured employees and their families in case of sickness, maternity and disablement arising out of an employment injury. The Act applies to all employees in factories (as defined) or establishments which may be so notified by the appropriate Government. The Act provides for the setting up of an Employees' State Insurance Fund, which is to be administered by the Employees State Insurance Corporation. Contributions to the Fund are paid by the employer and the employee at rates as prescribed by the Central Government. The Act also provides for benefits to dependents of insured persons in case of death as a result of an employment injury.
- (u) The Personal Injuries (Compensation Insurance) Act, 1963: This Act provides for

the employer's liability and responsibility to pay compensation to employees where workmen sustain personal injuries in the course of employment.

- (v) Industrial Employment (Standing Order) Act 1946: It is applicable to all establishments employing 100 or more workmen (employment size reduced by some of the States and Central Government to 50). The Act provides for laying down rules governing the conditions of employment by the Employer on matters provided in the Act and get the same certified by the designated Authority.

SALIENT FEATURES OF SOME OF THE MAJOR LAWS THAT ARE APPLICABLE FOR PROTECTION OF ENVIRONMENT.

1. The Environment (Protection) Act, 1986 and as amended: This provides for the protection and improvement of environment and for matters connected therewith, and the prevention of hazards to human beings, other living creatures, plants and property. 'Environment' includes water, air and land and the inter-relationship which exists among and between water, air and land, and human beings, other living creatures, plants, micro-organism and property.
2. The Forest Conservation Act, 1980, as amended, and Forest (Conservation) Rules, 1981 as amended: These provides for protection of forests by restricting conversion of forested areas into non- forested areas and prevention of deforestation, and stipulates the procedures for cutting any trees that might be required by the applicable rules. Permissions under the Act also stipulates the norms and compliance requirements of the employer and any contractor on behalf of the employer.
3. State Tree Preservation Acts as may be in force: These provide for protection of trees of important species. Contractors will be required to obtain prior permission for full or partial cutting, uprooting, or pruning of any such trees.
4. The Wildlife (Protection) Act, 1972, and as amended: This provides for protection of wildlife through notifying National Parks and Sanctuaries and buffer areas around these zones; and to protect individuals of nationally important species listed in the Annex of the Act.
5. The Biological Diversity Act, 2002: This provides for conservation of biological diversity, sustainable use of components of biological diversity, and fair and equitable sharing of the benefits arising out of the use of biological resources, knowledge and for matters connected therewith or incidental thereto.
6. The Public Liability Insurance Act, 1991 as amended and The Public Liability Insurance Rules, 1991 as amended: These provide for public liability insurance for the purpose of providing immediate relief to the persons affected by accident occurring while handling hazardous substances and for matters connected herewith or incidental thereto. Hazardous substance means any substance or preparation which is defined as hazardous substance under the Environment (Protection) Act 1986, and exceeding such quantity as may be specified by notification by the Central Government.
7. The Ancient Monuments and Archaeological Sites and Remains Act, 1958 and the Ancient Monuments and Archaeological Sites and Remains (Amendment and Validation) Act, 2010, the Ancient Monuments and Archaeological Sites and Remains Rules, 1959 amended 2011, the National Monuments Authority Rules, 2011 and the similar State Acts: These provide for conservation of cultural and historical remains found in India. Accordingly, area within the radii of 100m and 300m from the "protected property" are designated as "protected area" and "controlled area" respectively. No development activity (including building, mining,

excavating, blasting) is permitted in the “protected area” and development activities likely to damage the protected property is not permitted in the “controlled area” without prior permission of the Archaeological Survey of India (ASI) or the State Departments of Art and Culture or Archaeology as applicable.

8. The Environmental Impact Assessment Notification, 2006 and as amended: This provides for prior environmental clearance for new, modernization and expansion projects listed in Schedule 1 of the Notification. Contractors will be required to ensure that no work starts until applicable clearances under the Notification is not available. Contractors will be responsible for implementation of any environmental management plan stipulated as per the permission under this Notification; and will be required to prepare and submit to the employer and compliance report stipulated in the permission under the Notification.
9. The Water (Prevention and Control of Pollution) Act, 1974 as amended, and the Water (Prevention and Control of Pollution) Rules, 1975 as amended: These provide for the prevention and control of water pollution and the maintaining and restoring of wholesomeness of water. ‘Pollution’ means such contamination of water or such alteration of the physical, chemical or biological properties of water or such discharge of any sewage or trade effluent or of any other liquid, gaseous or solid substance into water (whether directly or indirectly) as may, or is likely to, create a nuisance or render such water harmful or injurious to public health or safety, or to domestic, commercial, industrial, agricultural or other legitimate uses, or to the life and health of animals or plants or of aquatic organisms. Contractors will need to obtain consent for establishment and consent for operation of any item of work or installation of equipment that generates waste water, and observe the required standards of establishment and operation of these items of work or installations; as well as install and operate all required waste water treatment facilities.
10. The Water (Prevention and Control of Pollution) Cess Act, 1977 and The Water (Prevention and Control of Pollution) Cess Rules, 1978: These provide for the levy and collection of a cess on water consumed by persons carrying on certain industries and by local authorities, with a view to augment the resources of the Central Board and the State Boards for the prevention and control of water pollution under the Water (Prevention and Control of Pollution) Act, 1974.
11. The Air (Prevention and Control of Pollution) Act, 1981 as amended, and the Air (Prevention and Control of Pollution) Rules, 1982: These provides for prevention, control and abatement of air pollution. ‘Air Pollution’ means the presence in the atmosphere of any ‘air pollutant’, which means any solid, liquid or gaseous substance (including noise) present in the atmosphere in such concentration as may be or tend to be injurious to human beings or other living creatures or plants or property or environment. Contractors will need to obtain consent for establishment and consent for operation of any item of work or installation of equipment that generates air pollution such as batching plants, hot mix plants, power generators, backup power generation, material handling processes, and observe the required standards of establishment and operation of these items of work or installations.
12. Noise Pollution (Control and Regulation) Rules, 2000, and as amended: This provides for

standards for noise for day and night for various land uses and specifies special standards in and around sensitive receptors of noise such as schools and hospitals. Contractors will need to ensure compliance to the applicable standards, and install and operate all required noise control devices as may be required for all plants and work processes.

13. Chemical Accidents (Emergency Planning, Preparedness and Response) Rules, 1996: This provides for Requirement of preparation of on-site and off-site Disaster Management Plans for accident-prone areas.
14. The Explosives Act 1884 and the Explosives Rules, 2008: These provide for safe manufacture, possession, sale, use, transportation and import of explosive materials such as diesel, Oil and lubricants etc.; and also for regulating the use of any explosives used in blasting and/or demolition. All applicable provisions will need compliance by the contractors.
15. The Petroleum Rules, 2002: This provides for safe use and storage of petroleum products, and will need to be complied by the contractors.
16. The Gas Cylinder Rules 2004 and amendments: This provides for regulations related to storage of gas, and possession of gas cylinder more than the exempted quantity. Contractors should comply with all the requirements of this Rule.
17. Manufacture, Storage and Import of Hazardous Chemical Rules of 1989 and as amended: These provide for use and storage of hazardous material such as highly inflammable liquids like HSD/LPG. Contractors will need to ensure compliance to the Rules; and in the event where the storage quantity exceeds the regulated threshold limit, the contractors will be responsible for regular safety audits and other reporting requirements as prescribed in the Rules.
18. Hazardous & Other Wastes (Management and Transboundary Movement) Rules, 2016: These provide for protection of general public from improper handling storage and disposal of hazardous waste. The rules prescribe the management requirement of hazardous wastes from its generation to final disposal. Contractors will need to obtain permission from the State Pollution Control Boards and other designated authorities for storage and handling of any hazardous material; and will to ensure full compliance to these rules and any conditions imposed in the permit.
19. The Bio Medical Waste Management Rules, 2016: This provides for control, storage, transportation and disposal of bio-medical wastes. As and where the contractor has any first aid facility and dispensaries, established in either temporary or permanent manner, compliance to these Rules are mandatory.
20. Construction and Demolition Waste Management Rules, 2016: This provides for management of construction and demolition waste (such as building materials possible to be reused, rubble and debris or the like); and applies to all those waste resulting from construction, re-modelling, repair or demolition of any civil structure. Contractor will need to prepare a waste disposal plan and obtain required approval from local authorities, if waste

generation is more than 20 tons in any day or 300 tons in any month during the contract period; and ensure full compliance to these rules and any conditions imposed in the regulatory approval.

21. The E-Waste (Management) Rules, 2016: This provides for management of E-wastes (but not covering lead acid batteries and radio-active wastes) aiming to enable the recovery and/or reuse of useful material from e-waste, thereby reducing the hazardous wastes destined for disposal and to ensure the environmentally sound management of all types of waste of electrical and electronic equipment. This Rule applies to every manufacturer, producer, consumer, bulk consumer, collection centers, dealers, e-retailer, refurbisher, dismantler and recycler involved in manufacture, sale, transfer, purchase, collection, storage and processing of e-waste or electrical and electronic equipment listed in Schedule I, including their components, consumables, parts and spares which make the product operational.
22. Plastic waste Management Rules, 2016: This provides for control and management of the plastic waste generated from any activity. Contractors will ensure compliance to this Rule.
23. The Batteries (Management and Handling) Rules 2001: This provides for ensuring safe disposal and recycling of discarded lead acid batteries likely to be used in any equipment during construction and operation stage. Rules require proper control and record keeping on the sale or import of lead acid batteries and recollection of the used batteries by registered recyclers to ensure environmentally sound recycling of used batteries. Contractors will ensure compliance to this Rule.
24. The Ozone Depleting Substances (Regulation and Control) Rules, 2000 and as amended: This provides for regulation of production and consumption of ozone depleting substances in the country, and specifically prohibits export to or import from countries not specified in the Rules, and prohibits unless specifically permitted, any use of ozone depleting substance.
25. The Coastal Regulation Zone Notifications, 1991 and as amended: This provides for regulation of development activities within the 500m of high tide line in coastal zone and 100m of stretches of rivers and estuaries influenced by tides. Contractors will be required to ensure that no work starts until applicable clearances under the Notification is not available. Contractors will be responsible for implementation of any plan stipulated as per the permission under this Notification; and will be required to prepare and submit to the employer and compliance report stipulated in the permission under the Notification.
26. The Motor Vehicle Act 1988 as amended (and State Motor Vehicle Acts as may be in force) and the Motor Vehicle Rules, 1989, and as amended (and State Motor Vehicle Rules as may be in force): To minimize the road accidents, penalizing the guilty, provision of compensation to victim and family and check vehicular air and noise pollution. Contractors will be required to ensure full compliance to these rules.
27. Easement Act, 1882: This provides for the rights of landowners on groundwater. Contractors will need to ensure that other landowners' rights under the Act is not affected by any groundwater abstraction by the contractors.

28. State Groundwater Acts and Rules as may be in force and the Guidelines for Groundwater Abstraction for drinking and domestic purposes in Notified Areas and Industry/Infrastructure project proposals in Non-Notified areas, 2012: These provide for regulating extraction of ground water for construction/industrial and drinking and domestic purposes. Contractors will need to obtain permission from Central/State Groundwater Boards prior to groundwater abstraction through digging any bore well or through any other means; and will to ensure full compliance to these rules and any conditions imposed in the permit.
29. The Mines Act, 1952 as amended; the Minor Mineral and concession Rules as amended; and the State Mineral (Rights and Taxation) Acts as may be in force: These provide for for safe and sound mining activity. The contractors will procure aggregates and other building materials from quarries and borrow areas approved under such Acts. In the event the contractors open any new quarry and/or borrow areas, appropriate prior permission from the State Departments of Minerals and Geology will need to be obtained. Contractors will also need to ensure full compliance to these rules and any conditions imposed in the permit.
30. The Insecticides Act, 1968 and Insecticides Rules, 1971 and as amended: These provide for regulates the manufacture, sale, transport, distribution, export, import and use of pesticides to prevent risk to human beings or animals, and for matters connected therewith. No one should import or manufacture; sell, stock or exhibit foe sale; distribute, transport, use: (i) any misbranded insecticides, (ii) any insecticide the sale, distribution or use of which is for the time being prohibited under the Act; and (iii) any insecticide except in accordance with the condition on which it was registered under the Act.
31. National Building Codes of India, 2005 and as amended: This provides guidelines for regulating the building construction activities in India. The code mainly contains administrative regulations, development control rules and general building requirements; stipulations regarding materials, structural design and construction; and building and plumbing services. Contractors will be required to comply with all Bureau of Indian Standards Codes dealing with: (i) use and disposal of asbestos containing materials in construction; (ii) paints containing lead; (iii) permanent and temporary ventilations in workplace; (iv) safety, and hygiene at the workplace; (v) prevention of fire; (vi) prevention of accidents from faulty electrical gadgets, equipment and accessories; and all other such codes incidental to the Contract.

Appendix 2: Tables of Adjustment Data (Not Applicable)

(Cl. 45 of GCC)

Table 1: Coefficients governing the adjustment for changes in cost.

S. No.	Coefficients Name	Symbol	Schedules (Reference Number)								
			<i>[Description of each schedule is given below]</i>								
			S ₁	S ₂	S ₃	S ₄	S ₅	S ₆	S ₇	S ₈	S ₉
1.	Fixed	a	15	15	15	15	15	15	15	15	15
2.	Labour [L]	b									
3.	Steel [S]	c									
4.	Cement [C]	d									
5.	Plant & Equipment spares [E]	e									
6.	Diesel and Petroleum products [D]	f									
7.	Bitumen [B]	g									
8.	Others [O]	0									
	Total		100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %

[Fixed element is normally 15%]

BOQ SCHEDULES

[The following Schedules are for example only. The schedules may be modified and specified as appropriate for each work]

Schedule 1: Earth Work in Formation
Schedule 2: Civil Engineering Work (Bridge)
Schedule 3: Civil Engineering Work Building,
Schedule 4: Steel Fabrication Works
Schedule 5: Road Works –WBM
Schedule 6: Road BTM
Schedule 7:

Table 2: Cost Indices and Reference Prices (applicable for specific items) for adjustment in contract prices [as per GCC 45].

WPI with base 2004-2005 = 100 on the Base Date

Base Date = Deadline for submission of bids

S. No.	Cost Element	Sym bol	Indices or Cost on the Base Date	Index for adjustment	Sources of Index
[1]	[2]	[3]	[4]	[5]	[6]
1.	Fixed	a			
2.	Labour	b	L _o - all India average Consumer Price Index(CPI) Number for Industrial Workers for centre ³¹ (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	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 ³²	f	Do-Unit Cost from the identified depot on the base date	Dn-Unit Cost for on the first day of the month to which the IPC relates	From the Depot
7.	Bitumen ³³	g	Bo-Unit Cost from the identified refinery on the base date	Bn- Cost per unit quantity on the first day of the month in which the material is brought to site or two months prior to the date to which IPC is related	From Refinery
8.	Others	h	Oo- All India Wholesale Price Index(WPI) for all commodities	On- All India WPI for all commodities for the month to which IPC is related	Economic Advisor, Ministry of Commerce and Industry, Government of India

IPC – Interim Payment Certificate

³¹ The Centre to be specified should be the relevant one for which CPI is published by the Labour Bureau.

³² The PCC specifies the identified depot for the rate of diesel for the base date and the applicable date for price adjustment.

³³ The PCC specifies the identified refinery for the rate of Bitumen for the base date and the applicable date price adjustment.

Appendix -3³⁴ Appointment of Adjudicator / Dispute Review Expert

Suggested Draft of Letter of Appointment of Adjudicators in civil works contracts

Sub: _____ (Name of the Contract)

To

Name and address of the Adjudicator / Dispute Review Expert

We hereby confirm your appointment as Adjudicator/ Dispute Review Expert for the above contract to carry out the assignment specified in this Letter of Appointment.

For administrative purpose _____ (*name of the officer representing the Employer*) has been assigned to administer the assignment and to provide the Adjudicator / Dispute Review Expert with all relevant information needed to carry out the assignment on behalf of both the Employer and the contractor. The services will be required during the period of contract for the work of (Name of the Contract) _____.

The Adjudicator / Dispute Review Expert shall visit the worksite once in 3 (three) months till the completion of the work indicated above or as specifically requested by Employer/ Contractor for the period upto the end of defects liability period with prior intimation to the Employer and the contractor. The duration of each visit shall ordinarily be for one day only. These durations are approximate and (*Name of the Employer and Name of the Contractor*) may find it necessary to postpone or cancel the assignment and/or shorten or extend the duration.

The appointment will become effective upon confirmation of letter by you. The appointment of Adjudicator/ Dispute Review Expert shall be liable for termination under a 30 (thirty) days written notice from the date of issue of the notice, if both Employer and the Contractor so desire. Also the appointment shall automatically stand terminated 14 days after the defect notice / correction period as stated in Clauses 23 and 24 of the Conditions of Contract is over.

The Adjudicator/ Dispute Review Expert will be paid a fee of Rs. _____ (Rupees _____ only) per each day of visit at the worksite. The actual expenses for boarding and traveling in connection with the assignment will be reimbursed to the Adjudicator/ Dispute Review Expert. The Adjudicator/ Dispute Review Expert will submit a pre-receipted bill in triplicate to the Employer indicating the date of the visit, fees for the visit and a proof in support of the actual expenditure [only for items valued above Rs. 200 each] incurred by him against boarding, lodging and traveling expenses after performing the visit

³⁴ If ITB 43 makes provision of an Adjudicator from list provided by an institution, kindly modify Appendix 3 to state that the fee and reimbursable payable to the adjudicator shall be as per the rules of the Institution.

on each occasion. The Employer will make the admissible payment(both the Employer's and the Contractor's share) to the Adjudicator/ Dispute Review Expert 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/ Dispute Review Expert 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/ Dispute Review Expert 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/ Dispute Review Expert 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/ Dispute Review Expert is described in the contract of _____(name of the contract) between the Employer and the contractor vide clause no.24 of the General Conditions of Contract. Your recommendation should be given in the format attached, within 28 days of receipt of a notification of dispute.

The Adjudicator/ Dispute Review Expert 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 / Dispute Review Expert will discuss the matter with the Employer and if necessary with the Contractor before arriving at any decision.

The Adjudicator/ Dispute Review Expert 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/ Dispute Review Expert 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/ Dispute Review Expert
Signature

Place:

Date:

Name of Employer

Signature of authorized representative of Employer

Name of the Contractor

Signature of authorized representative of Contractor

Attachment: Copy of contract document between the Employer and contractor and format for recommendation.

SUMMARY OF ADJUDICATOR'S RESPONSIBILITIES

The Adjudicator has the following principal responsibilities:

1. Visit the site periodically.
2. Keep abreast of job activities and developments.
3. Encourage the resolution of disputes by the parties.
4. When a dispute is referred to it, conduct a hearing (no legal presentation), complete its deliberations, and prepare a recommendations in a professional and timely manner(as per sample format)

[IN THIS AND THE NEXT FORM, USE THE TERM ADJUDICATOR, OR DISPUTE REVIEW EXPERT AS SPECIFIED IN THE REST OF THE BIDDING DOCUMENT.]

Sample Format of Adjudicator's Recommendation

[Project Name] Recommendation of Adjudicator

Dispute No. XX [NAME OF DISPUTE]

Hearing Date: _____

Dispute

Description of dispute. A one or two sentence summation of the dispute.

Contractor's Position

A short summation of the contractor's position as understood by the Adjudicator.

Employer's Position

A short summation of the Employer's position as understood by the Adjudicator.

Recommendation

The Adjudicator's specific recommendation for settlement of the dispute. (*The recommended course is consistent with the explanation*).

Explanation

(*This section could also be called Considerations, Rationale, Findings, Discussion, and so on.*)

The Adjudicator's description of how each recommendation was reached.

Respectfully submitted,

Date : _____

Date : _____

Date : _____

Section X - Contract Forms

This Section contains forms which, once completed, will form part of the Contract. The forms for Performance Security and Advance Payment Security, when required, shall only be completed by the successful Bidder after contract award.

Letter of Acceptance

[letterhead paper of the Employer]

[The Letter of Acceptance shall be the basis for formation of the Contract as described in ITB Clause 40. This Standard Form of Letter of Acceptance shall be filled in and sent to the successful Bidder only after evaluation of bids has been completed, subject to any review by the World Bank required under the Loan Agreement.]

[insert date]

Identification No and Title of Contract: *[insert identification number and title of the Contract]*

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

This is to notify you that your Bid dated *[insert date]* for execution of the *[insert name of the Contract and identification number, as given in the PCC]* for the Contract Price *[insert amount in numbers and words]* as corrected and modified³⁵ in accordance with the Instructions to Bidders is hereby accepted by our Agency.

[insert one of the following (a) or (b) options]

- (a) We accept that *[insert name proposed by bidder]* be appointed as the Adjudicator/Dispute Review Expert [DRE].³⁶
- (b) We do not accept that *[insert name proposed by bidder]* be appointed as Adjudicator/DRE, and by sending a copy of this Letter of Acceptance to *[insert name of the Appointing Authority]*, we are hereby requesting *[insert name]*, the Appointing Authority, to appoint the Adjudicator/DRE in accordance with GCC 23.³⁷

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

³⁵ Delete "corrected and" or "and modified" if not applicable. See Notes on Standard Form of Agreement, next page.

³⁶ To be used only if the Contractor disagrees in the Bid with the Adjudicator proposed by the Employer in the Instructions to Bidders, and has accordingly offered another candidate.

³⁷ To be used only if the Contractor disagrees in the Bid with the Adjudicator proposed by the Employer in the ITB, has accordingly offered another candidate, and the Employer does not accept the counterproposal.

[Delete whatever is inapplicable]

You are hereby requested to furnish Performance Security, plus additional security for unbalanced bids in terms of ITB clause 35.5, in the form detailed in ITB Clause 42 for amounts³⁸ of Rs. ____ and Rs. ____ within 21 days of the receipt of this letter of acceptance, and visit this office to sign the contract, failing which action as stated in ITB Clause 42.2 will be taken. The securities shall be valid upto 28 days from the date of completion i.e. upto and shall be as per the Performance Security Form and the ESHS Performance Security Form, included in Section X - Contract Forms, of the bidding document.

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 environmental management plan as per Clause 26 of General Conditions of Contract within 14 days of receipt of this letter of acceptance.

Yours faithfully,

Authorized Signature.....

Name and Title of Signatory.....

Name of Agency.....

³⁸Insert amounts for (i) Performance Security, plus additional security for unbalanced bids; and (ii) ESHS Performance Security respectively.

Issue of Notice to proceed with the work

(letterhead of the Employer)

_____ (date)

To

_____ (name and address of the Contractor)

Dear Sirs:

Pursuant to your furnishing the requisite securities as stipulated in ITB clause 42.1, insurance policy as per GCC 13, construction methodology as stated in letter of acceptance and signing of the contract agreement for the construction of _____ @ a Bid Price of Rs. _____, you are hereby instructed to proceed with the execution of the said works in accordance with the contract documents.

Yours faithfully,

(Signature, name and title of
signatory authorized to sign on
behalf of Employer)

Attachment: Contract Agreement

Contract Agreement

THIS AGREEMENT made theday of,, between
[*name of the Employer*]. (hereinafter “the Employer”), of the one part, and
[*name of the Contractor*]. . . . (hereinafter “the Contractor”), of the other part:

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

The Employer and the Contractor agree as follows:

1. In this Agreement words and expressions shall have the same meanings as are respectively assigned to them in the Contract documents referred to.
2. The following documents shall be deemed to form and be read and construed as part of this Agreement. This Agreement shall prevail over all other Contract documents.
 - (a) this Agreement
 - (b) the Letter of Acceptance
 - (c) the Contractor’s Bid including completed schedules and priced bill of quantities,
 - (d) the Addenda No’s. . . . [*insert addenda numbers if any*]. . . .
 - (e) the Particular Conditions of contract
 - (f) the General Conditions of contract;
 - (g) the Specifications
 - (h) the Drawings; and
 - (i) Construction Program, Methodology, Quality Assurance Program and Environmental Management Plan
 - (j) Joint Venture Agreement [for JVs only]
 - (k) Any other document listed in PCC as forming part of the Contract
3. In consideration of the payments to be made by the Employer to the Contractor as indicated in this Agreement, the Contractor hereby covenants with the Employer to execute the Works and to remedy defects therein in conformity in all respects with the provisions of the Contract.
4. The Employer hereby covenants to pay the Contractor in consideration of the execution and completion of the Works and the remedying of defects therein, the Contract

Price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.

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

Signed by: _____

for and on behalf of the Employer

Signed by: _____

for and on behalf the Contractor

in the
presence of: _____

Witness, Name, Signature, Address, Date

in the
presence of: _____

Witness, Name, Signature, Address, Date

Performance Security - Bank Guarantee
[including Additional Performance Security for unbalanced bids]
[Guarantor letterhead or SWIFT identifier code]

Performance Guarantee No.....*[insert guarantee reference number]*
Date.....*[insert date of issue of the guarantee]*

To: _____ *[name of Employer]*
_____ *[address of Employer]*

WHEREAS _____ *[name and address of Contractor³⁹]*
(hereinafter called "the Contractor") has undertaken, in pursuance of Contract No. _____
dated _____ to execute _____ *[name of Contract and*
brief description of Works] (hereinafter called "the Contract");

AND WHEREAS it has been stipulated by you in the said Contract that the Contractor shall furnish you with a Bank Guarantee by a recognized bank for the sum specified therein as security for compliance with his obligations in accordance with the Contract;

AND WHEREAS we have agreed to give the Contractor such a Bank Guarantee;

NOW THEREFORE we hereby affirm that we are the Guarantor and responsible to you, on behalf of the Contractor, up to a total of _____ *[amount of guarantee⁴⁰]* _____ *[in words]*, such sum being payable in the types and proportions of currencies in which the Contract Price is payable, and we undertake to pay you, upon your first written demand and without cavil or argument, any sum or sums within the limits of _____ *[amount of guarantee]* as aforesaid without your needing to prove or to show grounds or reasons for your demand for the sum specified therein.

We hereby waive the necessity of your demanding the said debt from the Contractor before presenting us with the demand.

We further agree that no change or addition to or other modification of the terms of the Contract or of the Works to be performed thereunder or of any of the Contract documents which may be made between you and the Contractor shall in any way release us from any liability under this guarantee, and we hereby waive notice of any such change, addition or modification.

³⁹*In the case of a JV, insert the name of the Joint Venture*

⁴⁰*An amount shall be inserted by the Guarantor, representing the percentage of the Contract Price specified in the Contract less provisional sum if any, plus additional performance security for unbalanced bids if any, and denominated in Indian Rupees.*

This guarantee shall be valid until (i.e.) 4(Four) years from the date of expiry of the Defects Liability Period, 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.

Environmental, Social, Health and Safety (ESHS)
Performance Security - Bank Guarantee
[Guarantor letterhead or SWIFT identifier code]

ESHS Performance Guarantee No.....*[insert guarantee reference number]*
Date.....*[insert date of issue of the guarantee]*

To: _____ *[name of Employer]*
_____ *[address of Employer]*

WHEREAS _____ *[name and address of Contractor⁴¹]*
(hereinafter called "the Contractor") has undertaken, in pursuance of Contract No. _____
dated _____ to execute _____ *[name of Contract and*
brief description of Works] (hereinafter called "the Contract");

AND WHEREAS it has been stipulated by you in the said Contract that the Contractor shall furnish you with a Bank Guarantee by a recognized bank for the sum specified therein as security for compliance with Environmental, Social, Health and/or Safety (ESHS) obligations in accordance with the Contract;

AND WHEREAS we have agreed to give the Contractor such a Bank Guarantee;

NOW THEREFORE we hereby affirm that we are the Guarantor and responsible to you, on behalf of the Contractor, up to a total of _____ *[amount of guarantee⁴²]* _____ *[in words]*, such sum being payable in the types and proportions of currencies in which the Contract Price is payable, and we undertake to pay you, upon your first written demand and without cavil or argument, any sum or sums within the limits of _____ *[amount of guarantee]* as aforesaid without your needing to prove or to show grounds or reasons for your demand for the sum specified therein.

We hereby waive the necessity of your demanding the said debt from the Contractor before presenting us with the demand.

We further agree that no change or addition to or other modification of the terms of the Contract or of the Works to be performed thereunder or of any of the Contract documents which may be made between you and the Contractor shall in any way release us from any liability under this guarantee, and we hereby waive notice of any such change, addition or modification.

⁴¹*In the case of a JV, insert the name of the Joint Venture*

⁴²*An amount shall be inserted by the Guarantor, representing the percentage of the Contract Price specified in the Contract less provisional sum if any, and denominated in Indian Rupees.*

This guarantee shall be valid until (i.e.) 28 days from the date of expiry of the Defects Liability Period, 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.

Advance Payment Security

Demand Guarantee

[Guarantor letterhead or SWIFT identifier code]

Advance Payment Guarantee No.....*[insert guarantee reference number]*

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

To: _____ *[name of Employer]*
_____ *[address of Employer]*
_____ *[name of Contract]*

Gentlemen:

In accordance with the provisions of the Conditions of Contract, Sub-clause 49.1 ("Advance Payment") of the above-mentioned Contract, _____ *[name and address of Contractor⁴³]* (hereinafter called "the Contractor") shall deposit with _____ *[name of Employer]* a bank guarantee to guarantee his proper and faithful performance under the said Clause of the Contract in an amount of _____ *[amount of guarantee⁴⁴]* _____ *[in words]*.

We, the _____ *[bank or financial institution]*, as instructed by the Contractor, agree unconditionally and irrevocably to guarantee as primary obligator and not as Surety merely, the payment to _____ *[name of Employer]* on his first demand without whatsoever right of objection on our part and without his first claim to the Contractor, in the amount not exceeding _____ *[amount of guarantee]* _____ *[in words]*.

We further agree that no change or addition to or other modification of the terms of the Contract or of Works to be performed thereunder or of any of the Contract documents which may be made between _____ *[name of Employer]* and the Contractor, shall in any way release us from any liability under this guarantee, and we hereby waive notice of any such change, addition or modification.

This guarantee shall remain valid and in full effect from the date of the advance payment under the Contract until _____ *[name of Employer]* receives full repayment of the same amount from the Contractor. Consequently any demand for payment under this guarantee must be received by us at this office on or before that date.

⁴³In the case of a JV, insert the name of the Joint Venture

⁴⁴An amount shall be inserted by the bank representing the amount of the Advance Payment, and denominated in Indian Rupees.

Yours truly,

Signature and seal: _____

Name of Bank: _____

Address: _____

Date: _____

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

Retention Money Security

Demand Guarantee

[Guarantor letterhead or SWIFT identifier code]

_____ *[Bank's name and address of issuing branch or office]*

Beneficiary: _____ *[Name and Address of Employer]*

Date: _____

RETENTION MONEY GUARANTEE NO.: _____

We have been informed that _____ *[name of contractor⁴⁵]* (hereinafter called "the Contractor") has entered into Contract No. _____ *[reference number of the contract]* dated _____ with you, for the execution of _____ *[name of contract and brief description of Works]* (hereinafter called "the Contract").

Furthermore, we understand that, according to the conditions of the Contract, when the Taking-Over Certificate has been issued for the Works and the first half of the Retention Money has been certified for payment, payment of _____ *[insert the second half of the Retention Money]* is to be made against a Retention Money guarantee.

At the request of the contractor, we _____ *[name of Bank]* hereby irrevocably undertake to pay you the sum or sums not exceeding in total an amount of _____ *[amount in Rupees]* (_____) *[amount in words⁴⁶]* upon receipt by us of your first demand in writing accompanied by a written statement stating that the Contractor is in breach of its obligation under the Contract without cavil or argument.

It is a condition for any claim and payment under this guarantee to be made that the payment of the second half of the Retention Money referred to above must have been received by the Contractor on its account number _____ at _____ *[name and address of Bank]*.

This guarantee shall expire, at the latest, 21 days after the date when the Employer has received a copy of the Defects Liability Certificate issued by the Project Manager. 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.

⁴⁵In the case of a JV, insert the name of the Joint Venture

⁴⁶The Guarantor shall insert an amount representing the amount of the second half of the Retention Money.