SECTION 2

Instructions to Bidders

Table of Clauses

A. General

1. **Scope of Bid**.

1.1 The Employer as defined in the Appendix to ITB invites bids for the "**Development of Aswaklanta Devalaya at North Guwahati**" as described in these documents and referred to as "the works". The name and identification number of the works is provided in the Appendix to ITB. The bidders may submit bids for the works detailed in the table given in the Notice Inviting Tender.

1.2 The successful Bidder will be expected to complete the Works by the Intended Completion Date specified in the Part I General Conditions of Contract.

1.3 Throughout these documents, the terms "bid" and "tender" and their derivatives (bidder/ renderer, bid/ tender, bidding/ tendering, etc.) are synonymous.

2. **Source of Funds**: SCM fund

3. **Eligible Bidders:** Registered contractors of CPWD/APWD class I(A) or equivalent category of any Govt. Department having experience in **Civil Construction involving Electrical and Landscaping/Horticulture works**.

3.1 This Invitation for Bids is open to all bidders as defined in the Appendix to ITB. Bidders shall not be under a declaration of ineligibility for corrupt and fraudulent practices by the Central Government, the State Government or any public undertaking, autonomous body, authority by whatever name called under the Central or the State Government.

4. **Qualification of the Bidder**

4.1 All bidders shall provide in Section 3, Forms of Bid and Qualification Information, a preliminary description of the proposed work method and schedule, including drawings and charts, as necessary.

4.2 All bidders shall include the following information and documents with their bids in Section 3, Qualification Information unless otherwise stated in the Appendix to ITB:

(a) Copies of original documents defining the constitution or legal status, place of registration, and principal place of business; written power of attorney of the signatory of the Bid to commit the Bidder;

(b) Total monetary value of any construction works performed for each of the last five years;

(c) Experience in works of a similar nature and size for each of the last five years, and details of works in progress or contractually committed with certificates from the concerned officer of the rank of Executive Engineer or equivalent;

(d) Evidence of ownership of major items of construction equipment named in Clause 4 (i) of ITB or evidence of arrangement of possessing them on hire/ lease/ buying as defined therein.

(e) Details of the technical personnel proposed to be employed for the Contract having the qualifications defined in Clause 4 (ii) of ITB for the construction.

(f) Reports on the financial standing of the Bidder, such as profit and loss statements and auditor's reports for the past three years;

(g) Evidence of access to line(s) of credit and availability of other financial resources/ facilities (20 percent of the contract value) certified by banker (the certificate being not more than 3 months old.)

(h) Authority to seek references from the Bidder's bankers;

(i) Information regarding any litigation or arbitration during the last five years in which the

Bidder is involved, the parties concerned, the disputed amount, and the matter;

(j) Proposals for subcontracting the components of the Works for construction, aggregating to not more than **20%** of the Contract Price;

(k) The proposed methodology and programme of construction, backed with equipment and material planning and deployment, duly supported with broad calculations and Quality Management Plan proposed to be adopted, justifying their capability of execution and completion of the work as per technical specifications and within the stipulated period of completion.

4.3 Bids from joint venture are not allowed.

4.4 A. To qualify for award of the Contract, each bidder should have in the last three years:

Achieved in any one year a minimum financial turnover volume of construction work of at least **Rs 1042 Lakh**. The turnover will be indexed at the rate of 5% for a year.

Satisfactorily completed similar works as Prime Contractor during last 5 years up to **31.03.2021** in which applications are invited should be either of the following.

I) Three similar completed works costing not less than the amount equal to 40% of the tender value.

II) Two similar completed works costing not less than the amount equal to 50% of the tender value.

III) One similar completed works costing not less than the amount equal to 80% of the tender value.

4.4 B. (a) Each bidder must produce:

(i) An affidavit that the information furnished with the bid documents is correct in all respects; and

(ii) Such other certificates as defined in the Appendix to ITB. Failure to produce the certificates shall make the bid non-responsive.

(b) Each bidder must demonstrate:

(i) Availability machineries & equipments for construction work, either owned, or on lease or on hire, of the key equipment stated in the Appendix to ITB .

(ii) Availability for construction work for this work of technical personnel as stated in the Appendix to ITB.

4.4. C. To qualify for a package of contracts made up of this and other contracts for which bids are invited in the Notice Inviting Tender, the bidder must demonstrate having experience and resources sufficient to meet the aggregate of the qualifying criteria for the individual contracts.

4.5.1 Sub-Contractors' experience and resources shall not be taken into account in determining the bidder's compliance with the qualifying criteria except to the extent stated in 4.4 A above.

4.5.2 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. The available bid capacity will be calculated as under:

Assessed Available Bid capacity = (A*N*M - B) where

A = Maximum value of civil engineering works executed in any one year during the last five years (updated to the price level of the last year at the rate of 8 percent a year) taking into account the completed as well as works in progress.

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

M = 2

B = Value, at the current price level, of existing commitments and on- going works to be completed during the period of completion of the works for which bids are invited.

Note: The statements showing the value of existing commitments and 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.

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

(i) Made misleading or false representations in the forms, statements, affidavits and attachments submitted in proof of the qualification requirements; and/or

(ii) Record of poor performance such as abandoning the works, not properly completing the contract, inordinate delays in completion, litigation history, or financial failures etc.

(iii) Participated in the previous bidding for the same work and had quoted unreasonably high or low bid prices and could not furnish rational justification for it to the Employer.

4.7 Contractors/ Firms having experience in execution of work in the North East region of India will be given preference.

5. **One Bid per Bidder**

5.1 Each Bidder shall submit only one Bid for one work. Bidder who submits more than one Bid will cause the proposals with the Bidder's participation to be disqualified.

6. **Cost of Bidding**

6.1 The Bidder shall bear all costs associated with the preparation and submission of his Bid, and the Employer will, in no case, be responsible or liable for those costs.

7. **Site Visit**

7.1 The Bidder, at his own cost, responsibility and risk, is encouraged to visit, examine and familiarize himself with the Site of Works and its surroundings including source of earth, water, road aggregates etc. and obtain all information that may be necessary for preparing the Bid and entering into a contract for execution of the Works. He/ She may contact the person whose contact details are given in the Appendix to ITB.

7.2 Some demolition work over and above the quantities specified in the BoQ may be required for clearing the site for actual execution. No extra payment will be made for demolition of existing structures, hence bidders are encouraged to visit, examine the site before quoting their rates.

B. Bidding Documents and Evaluation

8. **Content of Bidding Document:**

8.1 The set of bidding documents comprises of the documents listed below and addenda issued in accordance with Clause 10 of ITB.

1. Notice Inviting Tender
2. Instructions to Bidder
3. Qualification Information
4. Conditions of Contract

Part I General Conditions of Contract, and Contract Data
Part II Special Conditions of Contract

5. Specifications
6. Drawings
7. Bill of Quantities

8.2 One copy of each of the volumes will be downloaded from Website by the bidder. Documents to be furnished by the bidder in compliance to section 2 will be prepared by him and furnished as (refer clause 12).

8.3 The bidder is expected to examine carefully all instructions, conditions of contract, contract data, forms, terms and specifications, bill of quantities, forms and drawings in the Bid Document. Failure to comply with the requirements of Bid Documents shall be at the bidder' own risk. Pursuant to clause 25 hereof, bids, which are not substantially responsive to the requirements of the Bid Documents, shall be rejected.

9. **Clarification of Bidding Documents.**

9.1 A Prospective Bidder requiring any clarification of the bidding documents may notify at the Employer's address indicated in the Notice Inviting Bids. The Employer will respond to any request for clarification received earlier than 7 days prior to the deadline for submission of bids. Copies of the Employer' response will be forwarded to all purchasers of the bidding documents, including a description of the inquiry, but without identifying its source

10. **Amendment of Bidding Documents**

10.1 Before the deadline for submission of bids, the Employer may modify the bidding documents by issuing addenda.

10.2 Any addendum thus issued shall be a part of the bidding documents and will be uploaded in https://assamtenders.gov.in portal

10.3 To give prospective bidders reasonable time in which to take an addendum into account in preparing their bids, the Employer shall extend, as necessary, the deadline for submission of bids, in accordance with Clause 20.2 of ITB.

C. Preparation of Bids

11. All documents relating to the Bid shall be in the English Language.

11.1 All documents relating to the Bid shall be in the language specified in the Appendix to ITB.

12. Documents Comprising the Bid

12.1 The Bid submitted by the Bidder shall be in two separate parts:

Part I. This shall be named Technical Bid and shall comprise of:

I. Bid Security in the form specified in Clause 16.
II. Qualification information, supporting documents as specified in Clause 4 of ITB.
III. Certificates, Undertaking, Affidavits as specified in Section 2 & 3.
IV. Any other information/documents required to be completed and submitted by bidders, as specified in the Appendix to ITB,
V. Undertaking that the bid shall remain valid for the period specified in Clause 15.1

Part II. The financial Bid is to be submitted online only. The Financial Bid shall comprise of:

(i) Priced bill of quantities for items specified in Section 9;

12.2 Each part shall be uploaded in separate folder as instructed in clause 19 of ITB

12.3 The following documents, which are not submitted with the bid, will be deemed to be part of the bid.

Section	Particulars
1.	Notice Inviting Bids
2.	Instructions to Bidders
3.	Qualification Information
4.	Conditions of Contract (Part I General Conditions of Contract, and Contract Data; Part II Special Conditions of Contract)
5.	Specifications
6.	Drawings

13. Bid Prices

13.1 The Contract shall be for the whole Works, as described in Clause 1.1 of ITB, based on the priced Bill of Quantities submitted by the Bidder.

13.2 The Bidder shall adopt the Item Rate Method as specified in the Appendix to ITB l; only the same option is allowed to all the Bidders. Item Rate Method requires the bidder to quote rates and prices for all items of the Works described in the Bill of Quantities. The items for 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 other rates and prices in the Bill of Quantities. Corrections, if any, shall be made by crossing out, initialing, dating and rewriting.

13.3 All duties, taxes, royalties and other levies payable by the Contractor under the Contract, or for any other cause, shall be included in the rates, prices, and total Bid price submitted by the Bidder shall be inclusive of GST.

13.4 The rates and prices quoted by the Bidder shall be fixed for the duration of the Contract and shall not be subject to adjustment.

14. Currencies of Bid

14.1 The unit rates and the prices shall be quoted by the bidder entirely in Indian Rupees.

15. Bid Validity

15.1 Bids shall remain valid for a period of 180 days from the date of opening of the Technical Bid. A bid valid for a shorter period shall be rejected by the Employer as non- responsive.

15.2 In exceptional circumstances, prior to expiry of the original time limit, the Employer may request that the bidders may extend the period of validity for a specified additional period. The request and the bidders' responses shall be made in writing or by cable. A bidder may refuse the request without forfeiting his Earnest Money. Bidder agreeing to the request will not be required or permitted to modify his bid, but will be required to extend the validity of his earnest money for a period of the extension, and in compliance with Clause 16 of ITB in all respects.

16. Earnest Money

16.1 The Bidder shall furnish, as part of the Bid, Earnest Money, in the amount specified in the Appendix to ITB.

16.2 The Earnest Money shall, at the Bidder' option, can be deposited through Internet Banking from State Bank of India (SBI) or any other banks listed at SBMOPS on

https://assamtenders.gov.in

16.3 Any bid not accompanied by an acceptable Earnest Money, unless exempted in terms given in the Appendix to ITB, shall be rejected by the Employer as non- responsive.

16.4 The Earnest Money of unsuccessful bidders will be returned within 28 days of the end of the Bid validity period specified in Clause 15.1 of ITB or within 28 days of the award of contract, whichever is earlier.

16.5 The Earnest Money of the successful Bidder will be discharged when the Bidder has signed the Agreement and furnished the required Performance Security.

16.6 **The Earnest Money may be forfeited:**

a. if the Bidder withdraws the Bid after bid opening (technical bid) during the period of Bid validity;

b. in the case of a successful Bidder, if the Bidder fails within the specified time limit to
   i. Sign the Agreement; and/or
   ii. Furnish the required Performance Security.

17. Alternative Proposals by Bidders

17.1 Bidders shall submit offers that comply with the requirements of the bidding documents, including the Bill of Quantities and the basic technical design as indicated in the drawings and specifications. Alternative proposals will be rejected as non-responsive.

18. Format and Signing of Bid

18.1 The Bidder shall submit one set of the bid comprising of the documents as described in Clause 12 of ITB.

18.2 The Bid shall be typed or written in indelible ink and shall be signed by a person or persons duly authorized to sign on behalf of the Bidder, pursuant to Clause 4.2 of ITB. All pages of the Bid shall be signed by the person or persons signing the Bid.

18.3 The Bid shall contain no overwriting, alterations or additions, except those to comply with instructions issued by the Employer, or as necessary to correct errors made by the Bidder, in which case such corrections shall be made by scoring out the cancelled portion, writing the correction and initialing and dating it by the person or persons signing the Bid.

D. Submission of Bids

19. Up Loading of Bids

19.1 The Bidder shall up load their "Technical Bid" and "Price Bid" in separate folder as specified in the portal https://assamtenders.gov.in.

Technical Bid: To be opened on 02/11/2021 at 15:00 hours

Financial Bid: Financial bid of the technically qualified bidders to be opened with the approval of the Employer.

The contents of the Technical and Financial Bids shall be as specified in clause 12.1 of ITB.

19.2 It is mandatory to submit original copy of following documents on or before the opening of Technical Bid in a single envelop.

i) Tender Processing Fee ii) EMD

19.3 Bidders are requested to submit the hard copy of Technical Bid in a sealed envelope before opening of the Technical Bid. However, submission of bid through portal will be only considered for opening.

20. Deadline for Submission of Bids

20.1 Complete Bids including Technical must be received by the Employer at the address specified in the Appendix to ITB not later than the date and time indicated in the Appendix to ITB.

20.2 The Employer may extend the deadline for submission of bids by issuing an amendment in accordance with Clause 10.3 of ITB, in which case all rights and obligations of the Employer and the bidders previously subject to the original deadline will then be subject to the new deadline.

21. Late Bids

21.1 Bid received by the Employer after the deadline prescribed in Clause 20 of ITB will be returned unopened to the Bidder.

E. Bid Opening and Evaluation

22. Bid Opening

22.1 The Employer will open the bids received through portal at the time and date specified in the Appendix to ITB. In the event of the specified date for the submission of bids being declared a holiday for the Employer, the Bids will be opened at the appointed time and location on the next working day.

22.2 The folder containing the technical bid shall be opened. The folder marked "cost of bidding document" will be opened first and if the cost of the bidding documents is not there, or incomplete, the remaining bid documents will not be opened, and bid will be rejected.

22.3 In all other cases, the amount of Earnest Money, forms and validity shall be announced. Thereafter, the bidders' names and such other details as the Employer may consider appropriate, will be announced by the Employer as per provision of portal.

22.4 The Employer will prepare minutes of the Bid opening, including the information disclosed through portal.

22.5 Evaluation of the technical bids with respect to bid security, qualification information and other information furnished in Part I of the bid in pursuant to Clause 12.1 of ITB, shall be taken up and completed within limited working days of the date of bid opening, and a list will be drawn up of the responsive bids whose financial bids are eligible for consideration.

22.6 The Employer shall inform the bidders, whose technical bids are found responsive, date, time and place of opening as stated in the Appendix to ITB. In the event of the specified date being declared a holiday for the Employer, the bids will be opened at the appointed time and location on the next working day through they or their representative, may attend the meeting of opening of financial bids.

22.7 At the time of the opening of the 'Financial Bid', the names of the bidders whose bids were found responsive will be announced through portal. The financial bids of only these bidders will be opened. The remaining bids will be unopened. The responsive bidders 'names, the Bid prices, the total amount of each bid, and such other details as the Employer may consider appropriate will be announced by the Employer at the time of bid opening. Any Bid price which is not read out and recorded, will not be taken into account in Bid Evaluation

22.8 The Employer shall prepare the minutes of the opening of the Financial Bids.

23. Process to be Confidential

23.1 Information relating to the examination, clarification, evaluation, and comparison of bids and recommendations for the award of a contract shall not be disclosed to bidders or any other persons not officially concerned with such process until the award to the successful Bidder has been announced. Any attempt by a Bidder to influence the Employer's processing of bids or award decisions may result in the rejection of his Bid

24. Clarification of Bids and Contacting the Employer

24.1 No Bidder shall contact the Employer on any matter relating to its bid from the time of the bid opening to the time the contract is awarded.

24.2 Any attempt by the bidder to influence the Employer's bid evaluation, bid comparison or contract award decision may result in the rejection of his bid.

25. Examination of Bids and Determination of Responsiveness

25.1 During the detailed evaluation of "Technical Bids", the Employer will determine whether each Bid

(a) meets the eligibility criteria defined in Clauses 3 and 4;

(b) has been properly signed;

(c) is accompanied by the required securities; and

(d) is substantially responsive to the requirements of the bidding documents. During the detailed evaluation of the "Financial Bids", the responsiveness of the bids will be further determined with respect to the remaining bid conditions, i.e., priced bill of quantities, technical specifications and drawings.

25.2 A substantially responsive "Financial Bid" s one which conforms to all the terms, conditions, and specifications of the bidding documents, without material deviation or reservation. A material deviation or reservation is one

(a) which affects in any substantial way the scope, quality, or performance of the Works;

(b) which limits in any substantial way, inconsistent with the bidding documents, the Employer' rights or the Bidder' obligations under the Contract; or

(c) whose rectification would affect unfairly the competitive position of other bidders presenting substantially responsive bids.

25.3 If a "Financial Bid's not substantially responsive, it will be rejected by the Employer, and may not subsequently be made responsive by correction or withdrawal of the nonconforming deviation or reservation.

26. Correction of Errors

26.1 Bids determined to be substantially responsive will be checked by the Employer for any arithmetic errors. Errors will be corrected by the Employer as follows:

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

b. where there is a discrepancy between the unit rate and the line item total resulting from multiplying the unit rate by the quantity, the unit rate as quoted will govern.

26.2 The amount stated in the Bid will be adjusted by the Employer in accordance with the above procedure for the correction of errors and shall be considered as binding upon the Bidder. If the Bidder does not accept the corrected amount, the Bid will be rejected, and the Earnest money shall be forfeited in accordance with Clause 16.6(b) of ITB.

27. Evaluation and Comparison of Bids

27.1 The selection process will be: **<u>Technically Qualified Lowest Evaluated (L1) Bidder</u>**

The bidders must meet the qualifying criteria as per Clause 4.2 of the tender. Any bidder not meeting any of requirements of Clause 4.2 will not be short-listed for the further evaluation. The bidders who meet with our minimum basic criteria viz. **possession of PF no., PAN no., GST no., submission of declarations, turn over & experience** as stated in the tender etc., as

detailed hereunder shall be selected for financial evaluation.

Item No.	Qualification requirement
a	Annual Financial Turnover in any of the last three financial years should be at least **Rs 1042 Lakh**
b	Contractor/ Bidder should have completed similar works as prime Contractor during last 5 years up to 31/03/2021 in either of the following: I) Three similar completed works costing not less than the amount equal to 40% of the tender value II) Two similar completed works costing not less than the amount equal to 50% of the tender value III) One similar completed works costing not less than the amount equal to 80% of the tender value
c	Total Liquid Assets and Credit Facility should be at least **Rs. 260 Lakh**

(*) The minimum value of items at Sl. No. (a) & (c) above shall be considered at 2020-2021 Price Level. Weightage of 5% per year over the previous years will be given on compounding basis.

(#) Similar completed works shall mean Civil Construction involving Electrical and Landscaping/Horticulture works.

Technical Personnel Required:

Qualification	Number	Years of Experience
ME/BE in Civil Engineering	1	10
Diploma in Civil Engineering	2	5
B. Arch	1	10
BE/Diploma in Electrical Engineering	1	10
Horticulturist (B.Sc. Horticulture)	1	5

Key Equipments, tools etc., Required:

Name of Equipment	Quantity in Number
Cube Testing Machine	1
Sieve Analysis (Complete Kit)	1
Concrete Mixer	2
Water Tanker	1
Generator Set	1
Concrete vibrator	4
Concrete Drilling Machine	2
Welding Machine	2
Water Pump	1
Cube Mould	12
Earth Compactor and rammer	1
Excavator	1

Dumper/Tipper	2

Bidders who qualify in the Technical Criteria shall be considered for Financial Evaluation.

Financial Evaluation:

The successful bidder shall be the first ranked bidder (L1) as per the lowest quoted contract value. The second ranked bidder shall be kept in reserve and may be invited for negotiations in case the first ranked bidder withdraws, or fails to comply with the requirements specified hereinabove.

27.2 The Employer will evaluate and compare only the bids determined to be substantially responsive in accordance with Clause 25 of ITB.

27.3 In evaluating the bids, the Employer will determine for each Bid the evaluated Bid price by adjusting the Bid price by making correction, if any, for errors pursuant to Clause 26 of ITB.

27.4 If the Bid of the successful Bidder is seriously unbalanced in relation to the Engineer estimate of the cost of work to be performed under the contract, the Employer may require the Bidder to produce detailed price analysis for any or all items of the Bill of Quantities, to demonstrate the internal consistency of those prices with the construction methods and schedule proposed.

After evaluation of the price analysis, the Employer may require that the amount of the performance security set forth in Clause 32 of ITB be increased at the expense of the successful Bidder to a level sufficient to protect the Employer against financial loss in the event of default of the successful Bidder under the Contract. The amount of the increased performance security shall be decided at the sole discretion of the Employer, which shall be final, binding and conclusive on the bidder.

If the Bid of the successful Bidder is seriously unbalanced in relation to the Engineer's estimate of the cost of routine maintenance of works to be performed for three years under the contract, the Employer may require the Bidder to produce detailed price analyses for routine maintenance. After evaluation, the Employer may require that the amount of the performance security set forth in Clause 32 be increased at the expense of the successful Bidder to a level sufficient to protect the Employer against financial loss in the event of default of the successful Bidder under the Contract. The amount of the increased performance security shall be decided at the sole discretion of the Employer, which shall be final, binding and conclusive on the bidder.

28. Price Preference

28.1 There will be no price preference to any bidder.

F. Award of Contract

29. Award Criteria

29.1 Subject to Clause 31 of ITB, the Employer will award the Contract to the Bidder whose Bid has been determined:

i. to be substantially responsive to the bidding documents and who has secured the L1 position with the lowest quoted contract value, provided that such Bidder has been determined to be (a) eligible in accordance with the provisions of Clause 3 of ITB, and (b) qualified in accordance with the provisions of Clause 4 of ITB; and

30. Employer's Right to Accept any Bid and to Reject any or all Bids

30.1 Notwithstanding Clause 29 above, the Employer reserves the right to accept or reject any Bid, and to cancel the bidding process and reject all bids, at any time prior to the award of Contract, without thereby incurring any liability to the affected Bidder or bidders or any

obligation to inform the affected Bidder or bidders of the grounds for the Employer's action.

31. Notification of Award and Signing of Agreement

31.1 The bidder whose Bid has been accepted will be notified of the award by the Employer prior to expiration of the Bid validity period confirmed by registered letter. This letter (hereinafter and in the Part I General conditions of Contract called the "Letter of Acceptance") will state the sum that the Employer will pay to the Contractor in consideration of the execution and completion of the Works, by the Contractor as prescribed by the Contract (hereinafter and in the Contract called the "Contract Price".

31.2 The notification of award will constitute the formation of the Contract, subject only to the furnishing of a performance security in accordance with the provisions of Clause 32.

31.3 The Agreement will incorporate all agreements between the Employer and the successful Bidder. It will be signed by the Employer and the successful Bidder after the performance security is furnished. Upon the furnishing by the successful Bidder of the Performance Security, the Employer will promptly notify the other Bidders that their Bids have been unsuccessful.

32. Performance Security

32.1 Within 10 (ten) days after receipt of the Letter of Acceptance, the successful Bidder shall deliver to the Employer a Performance Security of five percent of the Contract Price, valid for a period of 45 days from end of Defect Liability Period plus additional security for unbalanced Bids in accordance with Clauses 27.3 of ITB and Clause 46 Part I of General Conditions of Contract and sign the contract.

32.2 The performance security shall be in the form of a Bank Guarantee, in the name of the Employer, from a Scheduled commercial bank.

32.3 Failure of the successful Bidder to comply with the requirements of Clause 32.1 shall constitute sufficient grounds for cancellation of the award and forfeiture of the Earnest Money.

33. Advance payment

33.1 The Employer will not provide Mobilization Advance or Secured Advance.

34. Corrupt or Fraudulent Practices

The Employer requires the bidders/Contractors to strictly observe the laws against fraud and corruption in force in India, namely, Prevention of Corruption Act, 1988.

Appendix to ITB

The Employer should fill out this Appendix to ITB before issuing the bidding documents. The insertions should correspond to the information provided in the Invitation for Bids.

Instructions to Bidders

Clause Reference (1.1)

The Employer is Managing Director, GSCL, Guwahati-6

The Works is: "Development of Aswaklanta Devalaya at North Guwahati"

1. Identification No. of the works is: Not Applicable
2. The State is: Assam.
3. Other certificates required with the bid are:

   (i) The key equipments for Building works

Name of equipment	Qty in No
• Cube Testing Machine	1
• Sieve Analysis (Complete Kit)	1
• Concrete Mixer	2
• Water Tanker	1
• Generator Set	1
• Concrete vibrator	4
• Concrete Drilling Machine	2
• Welding Machine	2
• Water Pump	1
• Cube Mould	12
• Earth Compactor and rammer	1
• Excavator	1
• Dumper/Tipper	2

   (ii) The Number of Technical personnel, Qualifications and Experience will be as follows:

Technical Personnel	Number	Experience in civil Works
A. ME/BE in Civil Engineering	1(one)	10 (Ten) Years
B. Diploma Holder in Civil Engineering	2(two)	5 (Five) Years
C. B.Arch	1(one)	10 (Ten) Year
D. BE/Diploma in Electrical Engineering	1(one)	10 (Ten) Years
E. Horticulturist (B.Sc. Horticulture)	1 (One)	5 (Five) Years

4. The contact person is: Jyotirmoy Sarma
   Designation: Senior Administrative Assistant, GSCL
   Ph. No. (mobile): 9854293301
   Address: GSCL office, Rukmini Gaon, Guwahati-6

6. Deleted
7. Language of the bid is: English
8. Bids may be submitted only in Item Rate Method through portal.

9. The amount of Earnest Money shall be **Rs. 26,04,000 (Rupees Twenty Six Lakh Four Thousand) only**.

10. Bank Guarantee from a Local Branch of any Nationalized Bank must be made in favour of: MD, Guwahati Smart City Limited

11. (A) The deadline for submission of Technical bid shall be:
Time: 15:00 hours
Date: 01/11/2021
(B) The deadline for submission of Financial bid shall be:
Time: 15:00 hours
Date: 01/11/2021

12. The date, time and place for opening of the Technical Bids are

(A) Technical Bid
Time: 15:00 hours
Date: 02/11/2021
Place: Office of Managing Director, GSCL through portal.

(B) Financial Bid (For qualified bidders)
Time: Bidders qualified in Technical Bid will be intimated later on.
Place: GSCL Conference hall.

13. The amount and validity period of the Performance Guarantee is:
Amount: 5.00 percent of the contract price.
Validity Period: Performance Security shall be valid for until a date 45 days after the expiry of defect liability period.

SECTION 3
Qualification Information

Notes on Form of Qualification Information

The information to be filled in by bidders in the following pages will be used for purposes of post-qualification as provided for in Clause 4 of the Instructions to Bidders. This information will not be incorporated in the Contract. Attach additional pages as necessary.

1. Individual Bidders

1.1	Constitution or legal status of Bidder Place of registration:	[attach copy]
1.2	Principal place of business: Power of attorney of signatory of Bid	[attach copy
1.3	Total annual volume of civil engineering construction work executed and payments received in the last five years preceding the year in which bids are invited. (Attach certificate from Chartered Accountant)	[attach copy]
1.3.1	Work performed as prime Contractor (in the same name and style) on construction works of a similar nature (civil engineering works) and volume over the last five years. Attach certificate from the Engineer-in-charge	

Project Name	Name of Employer	Description of Work	Value of Contract	Contract No.	Date of Issue of Work Order	Stipulated date of completion	Actual Date of Completion	Remarks explaining reasons for delay if any

1.3.2 Information on Bid Capacity (works for which bids have been submitted and works which are yet to be completed) as on the date of this bid.

(A) Existing commitments and on-going construction works:

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

* *Enclose certificate(s) from Engineer(s)-in-charge for value of work remaining to be completed.*

(B) Works for which bids already submitted:

Description of Work	Place & State	Name & Address of Employer	Estimated Value of Works (Rs. Lakhs)	Stipulated period of completion	Date when decision is expected	Remarks, if any

1.4 Availability of Major items of Contractor's Equipment proposed for carrying out the Works. List all information requested below. Refer also to Clause 4.2(d) and Clause 4.4 b (b) of the Instructions to Bidders.

Item of Equipment	Description, make, and age (Years), and capacity	Condition (new, good, poor) and number available	Owned, leased (from whom?), or to be purchased

1.5 Qualifications of technical personnel proposed for the Contract. Refer also to Clause 4.32(e) of the Instructions to Bidders and Clause 9.1 of Part-1 General Conditions of Contract.

Position	Name	Qualification	Years of experience

1.6 Proposed sub-contractors and firms involved for construction. Refer to Clause 7 of Part I General Conditions of Contract.

Sections of the Works	Value of Contract	Sub-contractor (name and address)	Experience in similar work

1.7 Financial reports for the last three years: balance sheets, profit and loss statements, auditors' reports, etc. List below and attach copies.

1.8 Information on current litigation in which the Bidder is involved.

Name of Other party(s)	Cause of dispute	Litigation where (Court/arbitration)	Amount involved

1.9 Proposed Programme (work method and schedule). Descriptions, drawings, and charts as necessary, to comply with the requirements of the bidding documents.

SAMPLE FORMAT FOR EVIDENCE OF ACCESS TO OR AVAILABILITY OF CREDIT FACILITIES

BANK CERTIFICATE

This is to certify that M/S ---------- is a reputed company with a good financial standing.

If the contract for the work, namely, _____ is awarded to the above firm, we shall be able to provide overdraft/credit facilities to the extent of Rs. _____ to meet their working capital requirements for executing the above contract.

Signature of Senior Bank Manager _____

Name of the Senior Bank Manager _____

Address of the Bank _____

_____

Stamp of the Bank _____

Note: Certificate should be on the letter head of the bank.

FORM OF BANK GUARANTEE TOWARDS EARNEST MONEY
(ON NON – JUDICIAL PAPER OF APPROPRIATE VALUE IN THE NAME OF THE BANK)

To
Managing Director
GSCL

Name of the work:

_____

_____

Dear Sir/ Ma'am,

1. In consideration of Guwahati Smart City Limited (Hereinafter called GSCL) representing through its Managing Director having the Office at Guwahati, Assam having agreed to exempt M/s……Hereinafter called "the said Contractor (s)" from the demand, under the terms and conditions of tender bid No……dated ……for (name of work)…….(hereinafter called "the said tender) of Earnest money deposit for the due fulfillment by the said Contractor(s) of the terms and conditions contained in the said tender on production of a Bank Guarantee for Rs……only, we ……(hereinafter referred to as the bank) at the request of M/s…….. Contractor(s) do hereby undertake to pay to the GSCL an amount not exceeding Rs…….only against any loss or damage caused to suffered or would be caused to or suffered by the GSCL by reason of any breach by the said Contractor(s) of any of the terms & conditions contained in the said tender.

2. We,……..do hereby undertake to pay the amounts due and payable under this guarantee without any demur, merely on a demand from the GSCL stating that the amount claimed is due by way of loss or damage caused to or would be caused to or suffered by the GSCL by reason of breach by the said contractor(s) of any of the terms & conditions contained in the said tender or by reason of the contractor(s) failure to deposit the security deposit for the work if selected in the tender. Any such demand made on the Bank shall be conclusive (as regards the amount due and payable by the Bank under this Guarantee). However; our liability under this guarantee shall be restricted to an amount not exceeding Rs…….. (Rupees……)only.

3. We, undertake to pay to the GSCL any money so demanded notwithstanding any dispute or dispute raised by the contractor(s)/supplier(s) in any suit or proceeding pending before any court of Tribunal relating thereto our liability under this present being absolute and unequivocal.

   The payment so made by us under this bond shall be a valid discharge of our liability for payment thereunder the contractor(s)/supplier(s)/shall have no claim against us for making such payment.

4. We, _____ (name of the bank) further agree that the guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the said tender and that it shall continue to be enforceable till all the dues of the GSCL under or by virtue of the said Tender have been fully paid and its claims satisfied or discharged or till the Managing Director, GSCL, …….. certified that the terms and conditions of the said tender have fully and properly carried out by the said contractor(s) and accordingly discharges this guarantee is made on us in writing on or

before……., we shall be discharged from all liability under this guarantee thereafter.

5. We, ……(name of the Bank) further agree with the GSCL that the GSCL shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the said tender or to extend time of performance by the said contractor from time to time or to postpone for any time or from time to time any of the powers exercisable by the GSCL against the said contractor(s) and to forbear or enforce any of the terms and conditions relating to the said tender and we shall not be relieved from our liability by reason of any such variation, or extension being granted to the said contractor(s) or for any forbearance, act or omission on the part of the GSCL or any indulgence by the GSCL to the said contractor(s) or any such matter or thing whatsoever which under the law relating to sureties would, but for this provision, have effect of so relieving us.

6. This guarantee will not be discharged due to the change in the constitution of the Bank or the contractor(s) /supplier(s).

7. We, _____ (name of the bank) lastly undertake not to revoke this guarantee during its currency except with the previous consent of the GSCL in writing.

8. Notwithstanding anything contained herein above our liability under this guarantee shall:

   a) be limited to a sum of Rs. _____ only.

   b) stand completely discharged and all your rights under this guarantee shall send extinguished if no claim or demand made upon us in writing on or before _____.

For _____
(indicate the name of bank)

Bank Guarantee No. _____

Date: _____

Section 4
Conditions of Contract
Part –I General Conditions of Contract

These conditions are subject to the variations and additions set out in Part II Special Conditions of Contract

A. General

1. Definitions

1.1. Terms which are defined in the Contract Data are not also defined in the Conditions of Contract but keep their defined meanings. Capital initials are used to identify defined terms.

Bill of Quantities means the priced and completed Bill of Quantities forming part of the Bid.

Compensation Events are those defined in Clause 40 hereunder.

The Completion Date is the date of completion of the Works as certified by the Engineer, in accordance with Clause 48.1.

The Contract is the Contract between the Employer and the Contractor to execute, complete, the Works. It consists of the documents listed in Clause 2.3.

The Contract Data defines the documents and other information which comprise the Contract.
The Contractor is a person or corporate body whose Bid to carry out the Works, including routine maintenance, has been accepted by the Employer.

The Contractor's Bid is the completed bidding document submitted by the Contractor to the Employer.

The Contract Price is the price stated in the Letter of Acceptance and thereafter as adjusted in accordance with the provisions of the Contract.
Days are calendar days; months are calendar months.

A Defect is any part of the Works not completed in accordance with the Contract.

The Defects Liability Certificates is the certificate issued by Engineer, after the Defect Liability Period has ended and upon correction of Defects by the Contractor.

The Defects Liability Period is one year calculated from the Completion Date.

Drawings include all information provided or approved by the Engineer for the execution of the Contract.

The Employer is the party as defined in the Contract Data, who employs the Contractor to carry out the Works. The Employer may delegate any or all functions to a person or body nominated by him for specified functions.

The Engineer is the person named in the Contract Data (or any other competent person appointed by the Employer and notified to the Contractor, to act in replacement of the Engineer) who is responsible for supervising the execution of the Works and administering the Contract.

Equipment is the Contractor's machinery and vehicles brought temporarily to the Site to construct the Works.

The Initial Contract Price is the Contract Price listed in the Employer's Letter of Acceptance.

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 Contract Data. The Intended Completion Date may be revised only by the Engineer by issuing an extension of time.

Materials are all supplies, including consumables, used by the Contractor for incorporation in the Works.

Plant is any integral part of the Works that shall have a mechanical, electrical, electronic, chemical, or biological function.

The **Site** is the area defined as such in the Contract Data.

Site Investigation Reports are those that were included in the bidding documents and are reports about the surface and subsurface conditions at the Site.

Specification means the Specification of the Works included in the Contract and any modification or addition made or approved by the Engineer.

The **Start Date** is given in the Contract Data. It is the date when the Contractor shall commence execution of the Works. It does not necessarily coincide with any of the Site Possession Dates.

A **Sub-Contractor** is a person or corporate body who has a Contract with the Contractor to carry out a part of the construction work in the Contract, which includes work on the Site.

Temporary Works are works designed, constructed, installed, and removed by the Contractor that are needed for construction or installation of the Works.

A **Variation** is an instruction given by the Engineer, which varies the Works.

The **Works, as defined in the Contract Data,** are what the Contract requires the Contractor to construct, install, maintain, and turn over to the Employer.

2. Interpretation

2.1 In interpreting these Conditions of Contract, singular also means plural, male also means female or neuter, and the other way around. Headings have no significance. Words have their normal meaning under the language of the Contract unless specifically defined. The Engineer will provide instructions clarifying queries about these Conditions of Contract.

2.2 If sectional completion is specified in the Contract Data, references in the Conditions of Contract 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:

(1) Agreement,

(2) Notice to Proceed with the Work,

(3) Letter of Acceptance,

(4) Contractor's Bid,

(5) Contract Data,

(6) Special Conditions of Contract Part II,

(7) General Conditions of Contract Part I,

(8) Specifications,

(9) Drawings,

(10) Bill of Quantities, and

(11) Any other document listed in the Contract Data.

3. Language and Law

3.1. The language of the Contract and the law governing the Contract are stated in the Contract Data.

4. Engineer's Decisions

4.1. Except where otherwise specifically stated, the Engineer will decide contractual matters between the Employer and the Contractor in the role representing the Employer. However, if the Engineer 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.

4.2. Except as expressly stated in the Contract, the Engineer shall not have any authority to relieve the Contractor of any of his obligations under the contract.

5. Delegation

5.1. The Engineer, with the approval of the Employer, may delegate any of his duties and responsibilities to other people, after notifying the Contractor, and may cancel any delegation after notifying the Contractor.

5. 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.

6. Subcontracting

7.1. **The Contractor may subcontract part of the construction work** with the approval of the Employer in writing, up to 20 percent of the contract price but will not assign the Contract. Subcontracting shall not alter the Contractor's obligations.

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 named in the Contract;
b. the provision for labour, or labour component.
c. the purchase of Materials which are in accordance with the standards specified in the Contract

7.2. Beyond what has been stated in clauses 7.1 and 7.2, if the Contractor proposes sub-contracting any part of the work during execution of the Works, because of some unforeseen circumstances to enable him to complete the Works as per terms of the Contract, the Employer will consider the following before according approval:

a. The Contractor shall not sub-contract the whole of the Works.
b. The Contractor shall not sub- contract any part of the Work without prior consent of the Employer. Any such consent shall not relieve the Contractor from any liability or obligation

under the Contract and he shall be responsible for the acts, defaults and neglects of any his sub-Contractor, his agents or workmen as fully as if they were the acts, defaults or neglects of the Contractor, his agents and workmen.

7.3. **The Engineer 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 possess 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.

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 Contract Data. The Contractor shall also provide facilities and services for them as described in the Schedule. The Employer may modify the Schedule of Other Contractors, and shall notify the Contractor of any such modification.

8.2. The Contractor should take up the works in convenient reaches as decided by the Engineer to ensure there is least hindrance to the smooth flow of traffic including movement of vehicles and equipment of other Contractors till the completion of the Works.

9. Personnel

9.1. The Contractor shall employ for the construction work the technical personnel named in the Contract Data or other technical persons approved by the Engineer. The Engineer will approve any proposed replacement of technical personnel only if their relevant qualifications and abilities are substantially equal to or better than those of the personnel stated in the Contract Data.

9.2. If the Engineer asks the Contractor to remove a person who is a member of the Contractor's staff or work force, stating the reasons, the Contractor shall ensure that the person leaves the Site within seven days and has no further connection with the Works in the Contract.

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 The Employer is responsible for the excepted risks which are (a) in so far as they directly affect the execution of the Works in the Employer's country, the risks of war, invasion, act of foreign enemies, rebellion, revolution, insurrection or military or usurped power, civil war, riot commotion or disorder (unless restricted to the Contractor' employees), natural calamities and contamination from any nuclear fuel or nuclear waste or radioactive toxic explosive, or (b) a cause due solely to the design of the Works, other than the Contractor's design.

12. Contractor's Risks

All risks of loss of or damage to physical property and of personal injury and death which arise during and in consequence of the performance of the Contract other than the excepted risks, referred to in clause 11.1, are the responsibility of the Contractor.

13. Insurance

13.1 The Contractor at his cost shall provide, in the joint names of the Employer and the Contractor, insurance cover from the Start Date to the date of completion, in the amounts and deductibles stated in the Contract Data for the following events which are due to the

Contractor's risks:

a. loss of or damage to the Works, Plant and Materials;
b. loss of or damage to Equipment;
c. loss of or damage to property (except the Works, Plant, Materials, and Equipment) in connection with the Contract; and
d. Personal injury or death.

13.2. Insurance policies and certificates for insurance shall be delivered by the Contractor to the Engineer for the Engineer's approval before the Start Date. All such insurance shall provide for compensation to be payable in Indian Rupees to rectify the loss or damage incurred.

13.3. (a) The Contractor at his cost shall also provide, in the joint names of the Employer and the Contractor, insurance cover from the date of completion to the end of defect liability period, in the amounts and deductibles stated in the Contract Data for the following events which are due to the Contractor's risks:
(b) Personal injury or death.

13.4. (a)Insurance policies and certificates for insurance shall be delivered by the Contractor to the Engineer for the Engineer's approval before the completion date/ start date. All such insurance shall provide for compensation to be payable in Indian Rupees.

13.5. Alterations to the terms of insurance shall not be made without the approval of the Engineer.

13.6. Both parties shall comply with any conditions of the insurance policies.

14. Site Investigation Reports

14.1. The Contractor, in preparing the Bid, may rely on any Site Investigation Reports referred to in the Contract Data, supplemented by any other information available to him, before submitting the bid.

15. Queries about the Contract Data

15.1. The Engineer will clarify queries on the Contract Data.

16. Contractor to Construct the Works

16.1. The Contractor shall construct, and install and maintain the Works in accordance with the Specifications and Drawings.

17. The Works to Be Completed by the Intended Completion Date

17.1. The Contractor may commence execution of the Works on the Start Date and shall carry out the Works in accordance with the Programme submitted by the Contractor, as updated with the approval of the Engineer, and complete them by the Intended Completion Date.

18. Approval by the Engineer

The Contractor shall submit Specifications and Drawings showing the proposed Temporary Works to the Engineer, who is to approve them.

18.1. The Contractor shall be responsible for design of Temporary Works.

18.2. The Engineer's approval shall not alter the Contractor's responsibility for design of the Temporary Works.

18.3. The Contractor shall obtain approval of third parties to the design of the Temporary Works, where required.

18.4. All Drawings prepared by the Contractor for the execution of the temporary or permanent Works, are subject to prior approval by the Engineer before their use.

18. Safety

19.1. The Contractor shall be responsible for the safety of all activities on the Site.

20. Discoveries

20.1. Anything of historical or archaeological significance or other interest or of significant value unexpectedly discovered on the Site shall be the property of the Employer/ Directorate of Archaeology, Govt. of Assam. The Contractor shall notify the Engineer of such discoveries and carry out the Engineer's instructions for dealing with them.

21. Possession of the Site

21.1. The Employer shall give complete possession of the Site to the Contractor fifteen days in advance of the construction programme.

22. Access to the Site

22.1. The Contractor shall allow 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 to the engineer and any person/persons/agency authorized by:

a. The Engineer

b. The Employer

23. Instructions

The Contractor shall carry out all instructions of the Engineer, which comply with the applicable laws where the Site is located.

24. Dispute Redressal System

Amicable Resolution

a) Save where expressly stated contrary to this terms and conditions and the RFP, any dispute, difference or controversy of whatever nature between the parties, howsoever arising under, out of or in relation to this Agreement (the "Dispute") shall in the first instance be attempted to be resolved amicably in accordance with the procedure set forth below.
b) Either Party may require such Dispute to be referred to the Chairperson, GSCL, and the Chief Executive Officer/Partner of the Contractor for the time being, for amicable settlement. In respect of disputes of a technical nature the Parties may engage an Expert.
c) Upon such reference, the two shall meet at the earliest mutual convenience and in any event within 15 days of such reference to discuss and attempt to amicably resolve the Dispute. If the Dispute is not amicably settled within 15 (fifteen) days of such meeting between the two, either Party may refer the Dispute to arbitration in accordance with the provisions of Article below.

25. Arbitration

In case, a dispute is referred to arbitration, the arbitration shall be under the Arbitration and Conciliation Act 1996 and any statutory modification or re-enactment thereof.

If during the subsistence of this Contract or thereafter, any dispute between the Parties hereto arising out of or in connection with the validity, interpretation, implementation, material breach or any alleged material breach of any provision of this Contract or regarding any question, including as to whether the termination of this Contract by one Party hereto has been legitimate, the Parties hereto shall endeavor to settle such dispute amicably and/or by Conciliation to be governed by the Arbitration and Conciliation Act, 1996 and any statutory modification or re-enactment thereof or as may be agreed to between the Parties. The attempt to bring about an amicable settlement is considered to have failed as soon as one of the Parties hereto, after reasonable attempts; which attempt shall continue for not less than thirty (30) days, gives thirty (30) day notice to refer the dispute to arbitration to the other Party in writing.

The Arbitration proceedings shall be governed by the Arbitration and Conciliation Act (Amendment Act), 1996 and any statutory modification or re-enactment thereof The Arbitration proceedings shall be held in Guwahati in Assam State, India.

The Arbitration proceeding shall be governed by the substantive laws of India. The proceedings of Arbitration shall be in Hindi/English language. Except as otherwise provided elsewhere in the contract if any dispute, difference, question or disagreement arises between the parties hereto or their respective representatives or assignees, at any time in connection with construction, meaning, operation, effect, interpretation or out of the contract or breach thereof the same shall be referred to a Tribunal of three (3) Arbitrators, constituted as per the terms of and under the (Indian) Arbitration and Conciliation Act,. Each party to the contract shall appoint/ nominate one Arbitrator each, the two Arbitrators so appointed/ nominated by the Parties herein shall together choose the third Arbitrator, who shall be the Presiding Arbitrator of the Tribunal. The consortium of the three Arbitrators shall form the Arbitral Tribunal.

In case, a party fails to appoint an arbitrator within 30 days from the receipt of the request to do so by the other party or the two Arbitrators so appointed fail to agree on the appointment of third Arbitrator within 30 days from the date of their appointment upon request of a party, the Chief Justice of the Guwahati High Court or any person or institution designated by him shall appoint the Arbitrator/Presiding Arbitrator upon request of one of the parties.

Any letter, notice or other communications dispatched to contractor relating to either arbitration proceeding or otherwise whether through the post or through a representative on the address last notified to the Authority by Contractor shall be deemed to have been received by Contractor although returned with the remarks, refused 'undelivered' where about not known or words to that effect or for any other reasons whatsoever

If the Arbitrator so appointed dies, resigns, incapacitated or withdraws for any reason from the proceedings, it shall be lawful for the Authority to appoint another person in his place in the same manner as aforesaid. Such person shall proceed with the reference from the stage where his predecessor had left if both parties consent for the same; otherwise, he shall proceed de novo.

It is a term of the contract that the party invoking arbitration shall specify all disputes to be referred to arbitration at the time of invocation of arbitration and not thereafter.

It is also a term of the contract that neither party to the contract shall be entitled for any

interest on the amount of the award. The Arbitrator shall give reasoned award and the same shall be final, conclusive and binding on the parties.

The fees of the arbitrator, costs and other expenses incidental to the arbitration proceedings shall be borne equally by the parties.

B. Time Control

26. Programme of Work

26.1 Within the time stated in the Contract Data, the Contractor shall submit to the Engineer for approval a Programme showing the general methods, arrangements, order, and timing for all the activities in the Works, along with monthly cash flow forecasts for the construction of works.

26.2 An update of the Programme shall be a programme showing the actual progress achieved on each activity and the effect of the progress achieved on the timing of the remaining Works, including any changes to the sequence of the activities.

26.3 The Contractor shall submit to the Engineer for approval an updated Programme at intervals no longer than the period stated in the Contract Data. If the Contractor does not submit an updated Programme within this period, the Engineer may withhold the amount stated in the Contract Data from the next payment certificate and continue to withhold this amount until the next payment after the date on which the overdue Programme has been submitted.

26.4 The Engineer's approval of the Programme shall not alter the Contractor's obligations. The Contractor may revise the Programme and submit it to the Engineer again at any time. A revised Programme shall show the effect of Variations and Compensation Events.

27. Extension of the Intended Completion Date

27.1. The Engineer shall extend the Intended Completion Date if a Compensation Event occurs or a Variation is issued which makes it impossible for Completion to be achieved by the Intended Completion Date without the Contractor taking steps to accelerate the remaining Works, which would cause the Contractor to incur additional cost.

27.2. The Engineer shall decide whether and by how much time to extend the Intended Completion Date within 21 days of the Contractor asking the Engineer for a decision upon the effect of a Compensation Event or Variation and submitting full supporting information. If the Contractor 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.

28. Delays Ordered by the Engineer

28.1. The Engineer may instruct the Contractor to delay the start or progress of any activity within the Works. Delay/delays totaling more than 30 days will require prior written approval of the Employer.

29. Management Meetings

29.1 The Engineer may require the Contractor to attend a management meeting. The business of a management meeting shall be to review the plans for the Works.

29.2 The Engineer shall record the business of management meetings and provide copies of the record to those attending the meeting. The responsibility of the parties for actions to be taken shall be decided by the Engineer either at the management meeting or after the management meeting and stated in writing to all those who attended the meeting.

C. Quality Control

30. Identifying Defects

30.1 The Engineer shall check the Contractor's work and notify the Contractor of any Defects that are found. Such checking shall not affect the Contractor's responsibilities. The Engineer may instruct the Contractor to search for a Defect and to uncover and test any work that the Engineer considers may have a Defect.

31. Tests

31.1. The contractor shall be solely responsible for:

a. Carrying out the mandatory tests prescribed in the BIS codes

b. For the correctness of the test results, whether preformed in his laboratory or elsewhere.

31.2 If the Engineer 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.

32. Correction of Defects noticed during the Defect Liability Period

32.1.1 The Engineer shall give notice to the Contractor of any Defects before the end of the Defects Liability Period, which begins at Completion and ends after one year. The Defects Liability Period shall be extended for as long as Defects remain to be corrected.

32.1.2 Every time notice of Defect/Defects is given, the Contractor shall correct the notified Defect/Defects within the length of time specified by the Engineer’s notice.

33. Uncorrected Defects

33.1 If the Contractor has not corrected a Defect pertaining to the Defect Liability Period under clause 32.1.1 and clause 32.2.2 of these Conditions of Contract, to the satisfaction of the Engineer, within the time specified in the Engineer's notice, the Engineer will assess the cost of having the Defect corrected, and the Contractor will pay this amount, on correction of the Defect.

D. Cost Control

34. Bill of Quantities

34.1 The Bill of Quantities shall contain items for the construction to be done by the Contractor.

34.2 The Bill of Quantities is used to calculate the Contract Price. The Contractor is paid for the quantity of the work done at the rate in the Bill of Quantities for each item for the drainage work.

35. Variations

35.1 The Engineer shall, having regard to the scope of the Works and the sanctioned estimated cost, have power to order, in writing, Variations within the scope of the Works he considers necessary or advisable during the progress of the Works. Such Variations shall form part of the Contract and the Contractor shall carry them out and include them in updated Programmes produced by the Contractor. Oral orders of the Engineer for Variations, unless followed by written confirmation, shall not be taken into account.

36. Payments for Variations

36.1 If rates for Variation items are specified in the Bill of Quantities, the Contractor shall carry out such work at the same rate. This shall apply for Variations only up to the limit prescribed

in the Contract Data. If the Variation exceeds this limit, the rate shall be derived under the provisions of clause 36.3 for quantities (higher or lower) exceeding the deviation limit.

36.2 If the rates for Variation are not specified in the Bill of Quantities, the Engineer shall derive the rate from similar items in the Bill of Quantities.

36.3. If the rate for Variation item cannot be determined in the manner specified in Clause 36.1 or 36.2, the Contractor shall, within 14 days of the issue of order of Variation work, inform the Engineer the rate which he proposes to claim, supported by analysis of the rates. The Engineer shall assess the quotation and determine the rate based on prevailing market rates within one month of the submission of the claim by the Contractor. As far as possible, the rate analysis shall be based on the standard data book and the current schedule of rates of the district public works division. The decision of the Engineer on the rate so determined shall be final and binding on the Contractor.

37. Cash Flow Forecasts

37.1 When the Programme is updated, the Contractor shall provide the Engineer with an updated cash flow forecast.

38. Payment Certificates

38.1 The payment to the contractor will be as follows for construction work:

38.1 (a) The Contractor shall submit to the Engineer fortnightly/ monthly statements of the value of the work executed less the cumulative amount certified previously supported with detailed measurement of the items of work executed.

38.2 (b) The Engineer shall check the Contractor's fortnightly/ monthly statement within 14 days and certify the amount to be paid to the Contractor. The value of each RA Bill should not be less than Rs. 50 Lakhs.

38.3 (c) The value of work executed shall be determined, based on measurements by the Engineer.

38.4 (d) The value of work executed shall comprise the value of the quantities of the items in the Bill of Quantities completed.

38.5 (e) The value of work executed shall also include the valuation of Variations and Compensation Events.

38.6 (f) The Engineer 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.

38.7(g) The final bill shall be submitted by the contractor within one month of the actual date of completion the work; otherwise the Engineer's certificate of the measurement and of the total amount payable for work accordingly shall be final and payment made accordingly within a period of sixty days as far as possible.

38.8 (i) If the bill for a month is not received from the contractor by the 10th day of the succeeding month or/ and if the Engineer has not certified that the contractor has carried out the maintenance work for defects brought to his notice under clause 32 within specified period, no payment will become due to the Contractor for that month.

39. Payments

39.1 Payments shall be adjusted for deductions for advance payments, security deposit, other recoveries in terms of the Contract and taxes at source, as applicable under the law. The Engineer shall pay the Contractor the amounts he had certified within 15 days of the date of each certificate.

39.2 The Employer may appoint another authority, as specified in the Contract Data (or any other competent person appointed by the Employer and notified to the contractor) to make payment certified by the Engineer.

39.3 Items of the Works for which no rate or price has been entered in the Bill of Quantities, will not be paid for by the Employer and shall be deemed covered by other rates and prices in the Contract.

40. Compensation Events

40.1 The following shall be Compensation Events unless they are caused by the Contractor:

a. The Engineer orders a delay or delays exceeding a total of 30 days.

b. The effects on the Contractor of any of the Employer's Risks.

40.2 If a Compensation Event would prevent the Works being completed before the Intended Completion Date, the Intended Completion Date shall be extended. The Engineer shall decide whether and by how much the Intended Completion Date shall be extended.

41. Tax

41.1 The rates quoted by the Contractor shall be deemed to be inclusive of the sales and other levies, duties, royalties, cess, toll, taxes of Central and State Governments, local bodies and authorities 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 as per applicable law.

42. Price Adjustment

42.1 Contract price shall be adjusted for increase or decrease in rates and price of steel and cement in accordance with the following principles and procedures and as per formula given in the contract data:

(a) The price adjustment shall apply for the work done from the start date given in the contract data up to end of the initial intended completion date or extensions granted by the Engineer and shall not apply to the work carried out beyond the stipulated time for reasons attributable to the contractor.

(b) The price adjustment shall be determined during each quarter from the formula given in the contract data.

(c) Following expressions and meanings are assigned to the work done during each quarter.

R= Total value of work done during the quarter. It would include the value of materials on which secured advance has been granted, if any, during the quarter, less the value of materials in respect of which the secured advance has been recovered, if any during the quarter. It will exclude value for works executed under variations for which price adjustment will be worked separately based on the terms mutually agreed.

42.2 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.

43. Security Deposit

43.1 The Employer shall retain security deposit of five percent of the amount from each payment until 45 days after successful completion of Period of Routine Maintenance of 3 years from

date of completion, which shall include maintenance of horticulture, landscape, water treatment plant and electrification works.

44. Liquidated Damages

44.1 The Contractor shall pay liquidated damages to the Employer at the rate per week or part thereof stated in the Contract Data for the period that the Completion Date is later than the Intended Completion Date. Liquidated damages at the same rate shall be withheld if the Contractor fails to achieve the milestones prescribed in the Contract Data. However, in case the Contractor achieves the next milestone the amount of the liquidated damages already withheld shall be restored to the Contractor by adjustment in the next payment certificate. The total amount of liquidated damages shall not exceed the amount defined in the Contract Data. The Employer may deduct liquidated damages from payments due to the Contractor. Payment of liquidated damages shall not affect the Contractor's other liabilities.

44.2 If the Intended Completion Date is extended after liquidated damages have been paid, the Engineer shall correct any overpayment of liquidated damages by the Contractor by adjusting the next payment certificate.

45. Deleted

46. Securities

46.1 The Performance Security equal to five percent of the contract price shall be provided to the Employer no later than the date specified in the Letter of Acceptance and shall be issued in the form given in the Contract Data and by a scheduled commercial bank. The Performance Security shall be valid until a date of 45 days from the date of expiry of Defect Liability Period.

47. Cost of Repairs

47.1 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 his cost if the loss or damage arises from the Contractor's acts or omissions.

E. Finishing the Contract

48. Completion

48.1 The Contractor shall request the Engineer to issue a certificate of Completion of the Works, and the Engineer will do so upon deciding that the Works is completed.

49. Taking Over

49.1 The Employer shall take over the Site and the Works within seven days of the Engineer's issuing a certificate of Completion. The Contractor shall continue to remain responsible for its routine maintenance during the maintenance period.

50. Final Account

50.1 The Contractor shall supply the Engineer with a detailed account of the total amount that the Contractor considers payable under the Contract before the end of the Defects Liability Period. The Engineer shall issue a Defects Liability Certificate and certify any final payment that is due to the Contractor within 42 days of receiving the Contractor's account if it is correct and complete. If it is not, the Engineer shall issue within 42 days a schedule that states the scope of the corrections or additions that are necessary. If the Final Account is still unsatisfactory after it has been resubmitted, the Engineer shall decide on the amount payable to the Contractor and issue a payment certificate within 28 days of receiving the Contractor’s revised account. The payment will be made within 14 days thereafter.

51. Operating and Maintenance Manuals

51.1 The "as built" Drawings and/or operating and maintenance manuals are required, the Contractor shall supply them by the dates stated in the Contract Data.

51.2 If the Contractor does not supply the Drawings and/or manuals by the dates stated in the Contract Data, or they do not receive the Engineer's approval, the Engineer shall withhold the amount stated in the Contract Data from payments due to the Contractor.

52. Termination

52.1 The Employer may terminate the Contract if the Contractor causes a fundamental breach of the Contract.

52.2 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 Programme and the stoppage has not been authorized by the Engineer;

b. The Contractor is declared as bankrupt or goes into liquidation other than for approved reconstruction or amalgamation;

c. The Engineer 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 Engineer;

d. The Contractor does not maintain a Security, which is required;

e. 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 clause 44.1;

f. Contractor fails to provide insurance cover as required under clause 13

g. If the Contractor, in the judgment of the Employer, has engaged in the corrupt or fraudulent practice in competing for or in executing the Contract. For the purpose of this clause, “corrupt practice” means the offering, giving, receiving, or soliciting of any thing of value to influence the action of a public official in the procurement process or in Contract execution. “Fraudulent Practice” means a misrepresentation of acts in order to influence a procurement process or the execution of a contract to the detriment of the Employer and includes collusive practice among Bidders (prior to or after bid submission) designed to establish bid process at artificial non- competitive levels and to deprive the Employer of the benefits of free and open competition.

h. If the Contractor has not completed atleast thirty percent of the value of construction Work required to be completed after half of the completion period has elapsed;

i. If the Contractor fails to set up a field laboratory with the prescribed equipment, within the periods specified in the Contract Data; and

52.2 Notwithstanding the above, the Employer may terminate the Contract for convenience.

52.3 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.

53. Payment upon Termination

53.1 If the Contract is terminated because of a fundamental breach of Contract by the Contractor, the Engineer shall issue a certificate for the value of the work done and Materials ordered less advance payments received up to the date of the issue of the certificate and less the percentage to apply to the value of the work not completed, as indicated in the Contract Data. 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 recovered from the security deposit, and performance security. If any amount is still left un-recovered it will be

a debt.

53.2 If the Contract is terminated at the Employer's convenience, the Engineer shall issue a certificate for the value of the work done, the reasonable cost of removal of Equipment, repatriation of the Contractor's personnel employed solely on the Works, and the Contractor's costs of protecting and securing the Works and less advance payments received up to the date of the certificate, less other recoveries due in terms of the Contract, and less taxes due to be deducted at source as per applicable law.

54. Property

54.1 All Materials on the Site, Plant, Equipment, Temporary Works, and Works shall be deemed to be the property of the Employer for use for completing balance construction work if the Contract is terminated because of the Contractor's default, till the Works is completed after which it will be transferred to the Contractor and credit, if any, given for its use.

55. Release from Performance

55.1 If the Contract is frustrated by the outbreak of war or by any other event entirely outside the control of the Employer or the Contractor, the Engineer 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.

F. Other Conditions of Contract

56. Labour

56.1 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.

56.2 The Contractor shall, if required by the Engineer, deliver to the Engineer a return in detail, in such form and at such intervals as the Engineer may prescribe, showing the staff and the numbers of the several classes of labour from time to time employed by the Contractor on the Site and such other information as the Engineer may require.

57. COMPLIANCE WITH LABOUR REGULATIONS

57.1 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 law (including rules), regulations, bye laws that may be passed or notification that may be issued under any labour law in future either by the State or the Central Government or the local authority. Salient features of some of the major labour laws that are applicable to construction industry are given in Appendix to Part I General Condition of Contract. The Contractor shall keep the Employer indemnified in case any action is taken against the Employer by the competent authority on account of contravention of any of the provisions of any Act or rules made there under, regulations or notifications including amendments. If the Employer is caused to pay or reimburse, such amounts as may be necessary to cause or observe, or for non-observance of the provisions stipulated in the notifications/bye laws/Acts/Rules/regulations including amendments, if any, on the part of the Contractor, the Engineer/Employer shall have the right to deduct any money due to the Contractor including his amount of performance security. he Employer/Engineer shall also have right to recover from the Contractor any sum required or estimated to be required for making good the loss or damage suffered by the Employer. The employees of the Contractor and the Sub-Contractor in no case shall be treated as the employees of the Employer at any point of time.

58. Drawings and Photographs of the Works

58.1 The contractor shall do photography/video photography of the site firstly before the start of the work, secondly mid- way in the execution of different stages of work and lastly after the completion of the work. No separate payment will be made to the contractor for this.

59. The Apprentices Act 1961

59.1 The Contractor shall duly comply with the provisions of the Apprentices Act 1961 (III of 1961), the rules made there under and the orders that may be issued form time to time under the said Act and the said Rules and on his failure or neglect to do so he shall be subject to all liabilities and penalties provided by the said Act and said Rules.

G. Contract Data to General Conditions of Contract.

Except where otherwise indicated, the Employer prior to issuance of the bidding documents should fill in all Contract Data, Schedules and reports to be provided by the Employer should be annexed.

Items marked "N/A" do not apply in this Contract.

1. The Employer is Managing Director, GSCL
Designation: Managing Director, GSCL, Guwahati-6
Address: Guwahati-6
Name of authorized Representative N/A

2. The Engineer is M/s Rajkhowas Aarchi

Designation:
Address: M.D. Road, Chandmari, Guwahati-3 [Cl. 1.1]

3. The Intended Completion Date for the whole of the Work is 12 (twelve) months from the date of issue of Notice to proceed with the work. [Cl. 1.1, 17 &27]

4. The Site is located at Aswaklanta Temple, North Guwahati [Cl. 1.1]

5. The Start Date shall be 10 days after the date of issue of the Notice to proceed with the work. [Cl. 1.1]

6. (a) The name and identification number of the Contract is [Cl. 1.1] N/A
(b) The Works consist of Civil Construction Works [Cl. 1.1].

7. Section completion is [Cl. 2.2] N/A

8. The following documents also form part of the Contract: N/A [Cl. 2.3(11)]

9. (a) The law which applies to the Contract is the law of Union of India. [Cl. 3.1]

(b) The language of the Contract documents is English [Cl. 3.1]

10. The Schedule of Other Contractors is attached [Cl. 10.1] N/A

11. A. The Technical Personnel for construction work are: [Cl. 9.1]

Technical Personnel	Number	Experience in Civil Construction Works
A. ME/BE in Civil Engineering		
A. Diploma Holder in Civil Engineering		
B. B.Arch		
C. BE/Diploma in Electrical Engineering		
D. Horticulturist (B.Sc. Horticulture)		

12. Amount deductible for insurance are: [Cl. 13.1] Rs. 2.00 Lakhs

13. Site investigation report [Cl. 14.1] N/A

14. (a) Competent authorities are: to be named later on mutual agreement. [Cl. 24.1]

15. (a) The period for submission of the programme for approval of Engineer [Cl.26.1] shall be 10 (Ten) days from the issue of Letter of Acceptance.

(b) The updated programme shall be submitted at interval of 45 (Forty-Five) days. [Cl. 26.3]

(d) The amount to be withheld for late submission of an updated [Cl. 26.3] programme shall be Rs. 0.50 lakhs.

16. The percentage of Variation of items of work for which there shall be no increase in rates shall be 25(twenty five)% [Cl 36.1]

17. The authorized person to make payments is M.D., GSCL [Cl.39.2].

18 (a) Milestones to be achieved during the contract period:

(1) 1/8th of the entire contract work up to 1/4th of the period allowed for completion of construction.

(2) 3/8th of the entire contract work up to ½ of the period allowed for completion of construction.

(3) 3/4th of the entire contract work up to ¾th of the period allowed for completion of construction.

19. (a) Amount of liquidated damages for Milestone/ Whole of work delay in completion of works 1 percent of the Initial Contract Price, rounded off to the nearest thousand, per week.

20. (a) Maximum limit of liquidated damages for 5 per cent of the Initial delay in completion of work. Contract Price rounded off to the nearest thousand. [Cl. 44.1]

21. The standard form of Performance Security acceptable to the Employer Shall be an unconditional Bank Guarantee of the type as presented in the Bidding Documents. [Cl. 46.1]

22. The date by which "as-built" drawings (in scale as directed) 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. [Cl. 51.1]

23. The amount to be withheld for failing to supply "as-built" drawings by the date required is Rs. 5.00 (Five) Lakhs. [Cl.51.2]

24. (a) Deleted

(b) The following events shall also be fundamental breach of contract: [Cl.52.2 (j.)]

"The Contractor has contravened Clause 7.1 and Clause 9 of Part I General Conditions of Contract

25.1. The percentage to apply to the value of the work not completed representing the Employer's additional cost for completing the Works shall be 10 (ten percent). [Cl. 53.1]

25.2. Deleted

Section-4

Part II Special Condition of Contract

SALIENT FEATURES OF SOME MAJOR LABOUR LAWS APPLICABLE TO ESTABLISHMENTS ENGAGED IN BUILDING AND OTHER CONSTRUCTION WORK.

a) **Workmen Compensation Act 1923**: - The Act provides for compensation in case of injury by accident 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 the prescribed minimum years (say, five years) of service or more or on death the rate of prescribed minimum days'(ay, 15 days) wages for every completed year of service. The Act is applicable to all establishments employing the prescribed minimum number (say, 10) or more employees.

c) **Employees P.F. and Miscellaneous Provision Act 1952** The Act Provides for monthly contributions by the Employer plus workers at the rate prescribed (say, 10% or 8.33%). he benefits payable under the Act are:

1. Pension or family pension on retirement or death as the case may be.
2. Deposit linked insurance on the death in harness of the worker.
3. Payment of P.F. accumulation on retirement/death etc.

d) **Maternity Benefit Act 1951: -**The Act provides for leave and some other benefits to women employees in case of confinement or miscarriage etc.

e) **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 prescribed minimum (say 20) or more contract labour.

f) **Minimum Wages Act 1948: -** The Employer is 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 is scheduled employment.

g) **Payment of Wages Act 1936:**- It lays down as to by what date the wages are to be paid when it will be paid and what deductions can be made from the wages of the workers.

h) **Equal Remuneration Act 1979** : -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.

i) **Payment of Bonus Act 1965: - The Act is applicable to all establishments employing** prescribed minimum (say, 20) or more workmen. The Act provides for payments of annual bonus within the prescribed range of percentage of wages to employees drawing up to the prescribed amount of wages, calculated in the prescribed manner. The Act does not apply to certain establishments. The newly set- p establishments are exempted for five years in certain circumstances. States may have different number of employment size.

j) **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.

k) **Industrial Employment (Standing Orders) Act 1946: -** It is applicable to all establishments employing prescribed minimum (say, 100, or 50). The Act provides for laying down rules governing the conditions of employment by the Employer on matters provided in the Act and get these certified by the designated Authority.

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** : - he Act prohibits employment of children below 14 years of age in certain occupations and processes and provides for regulations of employment of children in all other occupations and processes. Employment of child labour is prohibited in building and construction industry.

n) **Inter-State Migrant Workmen' (Regulation of Employment & Conditions of Service) Act 1979: -**The Act is applicable to an establishment which employs prescribed minimum (say, five) 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, Travelling expenses from home up to the establishment and back etc.

o) **The Building and Other Construction workers (Regulation of Employment and Conditions of Service) Act 1996 and the Cess Act of 1996: -**All the establishments who carry on any building or other construction work and employs the prescribed minimum (say, 10) or more workers are covered under this Act. All such establishments are required to pay cess at the rate not exceeding 2% of the cost of construction as may be modified 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 factory, 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 the prescribed minimum (say,10) persons or more with aid of power or another prescribed minimum (say, 20) or more persons without the aid of power engaged in manufacturing process.

Section 5
Specifications

1. Earthwork in Excavation

1.1 Scope:

The specification covers the general requirements of Earthwork in excavation in different materials, site grading as shown in the drawings and as directed by the Engineer.

1.2 Applicable Code:

The following I.S. codes unless specified, shall be applicable in all cases latest revision of the codes shall be referred to.

IS: 3764 Safety code for execution work
IS: 3385 Code of practice for measurement of Civil Engineering works
IS: 2720 Determination of moisture content, dry density etc.

1.3 General

The contractor shall carry out survey of the site before excavation and set properly all lines, levels etc. The excavation is to be done to correct levels and lines. This shall also include proper shoring to maintain excavation barricades around excavated area and warning bumps at nights for safety.

1.4 Clearing

The area to be excavated shall be cleared of fences, trees, logs, bushes etc. and other objectionable matter. If any roots or stumps are of trees are met during excavation, they shall be removed.

1.5 Classification

All materials to be excavated shall be classified by the Engineer and shall be paid for at the rates tendered for that particular class of materials.

1.6 Dewatering

All excavation shall be kept free of water. Grading of surface in the vicinity of excavation shall be controlled to prevent surface water running into the excavated area. Contractor shall remove water by pumping as directed by the Engineer.

2. Concrete and Allied Work

All works have to be carried out in accordance to the relevant Standards and code of practice or as directed by the Engineer from time to time.

The following specification, standards and code of practice including latest revisions shall be considered as part of specification.

IS 269- Specification for 33 grade OPC
IS 1489- Specification for PPC
IS 8112- Specification for 43 grade OPC
IS 383- Specification for coarse and fine aggregates from natural source for concrete
IS 432- Specification for mild steel and medium tensile steel bar for concrete reinforcement.
IS 1786- Specification for high strength deformed bars for concrete reinforcement
IS 9103- Specification for admixtures for concrete
IS 4990- Specification for plywood for concrete shuttering work.

IS 12269- Specification for 53 grade OPC
IS 516- Method of Test for strength of concrete

3. Materials:

a. Cement:
Unless otherwise specified in specification or called for by Engineer, Cement shall be OPC conforming to IS 269 (latest edition)
Cement which is not within 90 days from the date of it manufacturer, shall be tested at a laboratory and until the results are not found satisfactory, it shall not be used in any work.

b. Aggregate:
Aggregate shall consist of naturally occurring stones (crushed). These shall conform to IS: 383

c. Water:
Water used for mixing and curing shall conform to IS: 456. Potable water shall be used.

d. Reinforcement:
The reinforcement bars shall be TMT grade Fe 415/500 conforming to BIS. The approved makes of SAIL, TATA steel or any other approved based on performance shall be used. All reinforcement shall be clean, free from oil, grease, rust, dirt etc.

e. Admixtures:
Accelerating, retarding, water reducing admixtures shall be conform to IS: 9103 and integral water proofing admixtures to IS: 2645.

f. Storing of Materials:
All materials shall be stored in a manner so as to prevent it determination and contamination which would preclude its use in works. Requirements of IS 4082 shall be complied with.

4. **Design Mix Concrete:**
For design mix concrete, the mix shall be designed according to IS: 10262 and SP: 23 to provide the grade of concrete having the required workability and characteristic strength.

5. General Note:
Whenever discrepancies regarding specification of materials mentioned aforesaid are found and where no specification numbers are mentioned (pertaining to the materials to be used in works) in all such cases relevant Indian Standard Specifications with all their latest amendments shall be applicable.

6. SHUTTERING WORK
Providing, erecting, fixing in position striking / removing and cleaning steel / timber shuttering & centering for form work in foundation for pile caps, plinth or tie beams, lift pits, cable trenches, electrical pits etc. at all locations for all geometrical shapes in plain, curved surfaces of structural / RCC elements including chamfers, splays, keys, wedges, props, rails, bracings, brackets, cutting holes for pipes etc., providing & applying approved form oil on all surfaces of form work coming in contact with concrete including close hacking of all exposed concrete work after removal of form work, all materials, labour etc. complete as per specifications drawings and as directed by the Engineer-in-charge.

7. MODE OF MEASUREMENT

The measurement of shuttering and formwork shall be carried out in terms of length and width/ height.

Area of form work in contact with concrete shall only be measured for payment and stop boards for construction joints will not be measured for payment.

The rate of form work shall include all type of structural/ RCC elements and geometric shapes including circular and any other curved surfaces.

The calculated quantity shall be worked out nearest up to two decimal places.

The rate shall be for a unit of 1 sqm.

8. STEEL WORK

STEEL WORK IN BUILT UP SECTIONS (RIVETED AND BOLTED)

The steel work in built up section (Riveted and bolted) such as trusses, framed work etc. is specified in this clause.

Laying Out

A figure of the steel structure to be fabricated shall be drawn on a level platform to full scale. This may be done in full or in parts, as shown on drawings or as directed by the Engineer-in-Charge. Steel tape shall be used for measurements.

Fabrication

Fabrication shall generally be done as specified in IS 800. In major works or where so specified, shop drawings giving complete information for the fabrication of the component parts of the structure including the location, type, size, length and details or rivets, bolts or welds, shall be prepared in advance of the actual fabrication and approved by the Engineer-in-charge. The drawings shall indicate the shop and field rivets, bolts and welds. The steel members shall be distinctly marked or stencilled with paint with the identification marks as given in the shop drawings.Great accuracy shall be observed in the fabrication of various members, so that these can beassembled without being unduly packed, strained or forced into position and when built up, shall be true and free from twist, kinks, buckles or open joints.Wooden or metal sheet templates shall be made to correspond to each member, and position ofrivet holes shall be marked accurately on them and holes drilled. The templates shall then be laid on the steel members, and holes for riveting and bolting marked on them. The ends of the steel members shall also be marked for cutting as per required dimensions. The base of steel columns and the positions of anchor bolts shall be carefully set out at the required location.

The steel section shall be straight or to be straightened or flattened by pressure unless required to be of curvilinear form and shall free from twists. These shall be cut square either by shearing or sawing to correct length and measured by steel tape. No tow pieces shall be welded or joined to make up for the required length of member.

Making Holes *:*

Holes through more than one thickness of materials for members,

such as compound stanchion and girder flanges shall, where possible, be drilled after the members are assembled and tightly clamped or bolted together. Punching may be permitted before assembly, provided the holes are punched 3mm less in diameter than the required size and reamed after assembly to the full diameter. The thickness of material punched shall be not greater than 16 mm.

Rivet Holes

The diameter for rivets and black bolts holes shall be taken as the nominal diameter of a rivet/ black bolts plus 1.5 mm for rivets/ bolts of nominal diameter less than or equal to 25 mm" and 2.0 mm for rivets of nominal diameter exceeding 25 mm, unless specified otherwise. Holes for turned and fitted bolts shall be drilled or reamed large by 0.2 to 8 mm depending upon the dia. of bolts. Holes shall have their axis perpendicular to the surface bored through. The drilling or reaming shall be free from burrs, and the holes shall be clean and accurate. Holes for rivets and bolts shall not be formed by gas cutting process. Holes for counter sunk bolts shall be made in such a manner that their heads sit flush with the surface after fixing.

Assembly *:*

Before making holes in individual members, for fabrication and steel work intended to be riveted or bolted together shall be assembled and clamped properly and tightly so as to ensure close abutting, or lapping of the surfaces of the different members. All stiffeners shall be fixed(or placed) tightly both at top and bottom without being drawn or caulked. The abutting joints shall be cut or dressed true and straight, and fitted close together. Web plates of girders, which have no cover flange plates, shall have their ends flush with the tops of angles unless otherwise required. The web plate when spliced, shall have clearance of not more than 5mm. The erection clearance of cleated ends of members connecting steel to steel shall preferably be not greater than 1.5 mm. The erection clearance at the ends of beams without web cleats shall not be more than 3 mm at each end but where for practical reasons, greater clearance is necessary, seating designed suitably shall be provided. Column splices and butt joints of struts and compression members requiring contact for stress transmission shall be accurately, machined and close butted over the whole section. In column caps and bases, the ends of shafts together with the attached gussets, angles, channels etc. after riveting together shall be accurately machined so that the parts connected, butt against each other over the entire surfaces of contact. Connecting angles or channels shall be fabricated and placed in position with great accuracy so that they are not unduly reduced in thickness by machining. The ends of all bearing stiffeners shall be machined or grounded to fit tightly both at top and bottom.

Riveting *:*

Rivets shall be used, where slip under load has to be avoided.

Preliminaries before Riveting:-

Members to be riveted shall have all parts firmly placed and held together before and during riveting, and special care shall be taken in this respect for all single riveted connections. For multiple riveted connections, a service bolt shall be provided in every third or fourth hole.

Process of Riveting

The riveting shall be carried out by using machines of the steady pressure type. However, where such facilities are not available hand riveting may be permitted by the Engineer-in - charge. The rivets shall be heated red hot, care being taken to control the temperature of heating so as not to burn the steel. Rivets of diameter less than10mm may be driven cold. Rivets shall be finished neat with heads full and of equal size. The heads shall be central on shanks and shall grip the assembled members firmly. All loose, burnt, or badly formed rivets with eccentric or deficient heads shall be cut out and replaced In cutting out rivets, care shall be taken so as not to injure the assembled members. Caulking and recapping shall not be permitted. For testing rivets, a hammer weighing approx. 0.25 kg shall be used and both heads of the rivet (Specially the machine head) shall be tapped. When so tested, the rivets shall not give a hollow sound and a jar where so specified, other tests shall be carried out to

ensure the soundness of rivets. All rivets heads shall be painted with approved steel primer paint within a week of their fixing.

Bolting :

The nominal length of the bolt shall be the distance from the underside of the head to the further end of the shank. The nominal diameter of the bolt shall be the diameter at the shank above the screwed threads. Bolts, nuts and washers shall be thoroughly cleaned and dipped in double boiled linseed oil, before use. All bolts heads and nuts shall be hexagonal unless specified otherwise. The screwed threads shall conform to IS 1363 and the threaded surface shall not be tapered. The bolts shall be of such length as to project at least two clear threads beyond the nuts when fixed in position, and these shall fit in the holes without any shake. The nuts shall fit in the threaded ends of bolts properly.

Where necessary, washers shall be tapered or otherwise suitably shaped to give the heads and nuts of bolts a satisfactory bearing. The threaded portion of each bolt shall project through the nut at least two thread. In all cases where the full bearing area of the bolt is to be developed, the bolt shall be provided with a washer of sufficient thickness under the nuts to avoid any threaded portion of the bolt being within the thickness of the parts bolted together. Where there is a risk of the nuts being removed or becoming loose due to vibrations or reversal of stresses, these shall be secured from slackening by the use of lock nut, spring washers as directed by the Engineer-in-charge.

Erection

Steel members shall be hoisted and erected in position carefully, without any damage to itself, other structures and equipment and injury to workmen. The method of hoisting and erection proposed to be adopted by the contractor shall be got approved from the Engineer-in-charge in advance. The contractor however shall be fully responsible for the work being carried out in a safe and proper manner without unduly stressing the various members and proper equipment such as derricks, lifting tackles, winches, ropes etc. shall be used.

The work of erection may be done in suitable units as may be directed by the Engineer-in charge. Fabricated members shall be lifted at such points so as to avoid deformation or excessive stress in members. The structure or part of it placed in position shall be secured against over-turning or collapse by suitable means.

During execution, the steel members shall be securely bolted or otherwise fastened when necessary temporarily braced to provide for all loads including those due to erection equipments and its operation to be carried safely by structure during erection. The steel members shall be placed in proper position as per approved drawing, final riveting or permanent bolting shall be done only after proper alignment has been checked and confirmed.

Trusses shall be lifted only at nodes. The trusses above 10 m in span shall not be lifted by slinging at two mid points of rafters, which shall be temporary braced by a wooden member of a suitable section. After the trusses are placed in position, purlins and wind bracings shall be fixed as soon as possible. The end of the truss which faces the prevailing winds shall be fixed with holding down bolts, and the other end kept free to move. In case of trusses of spans upto 10m the free end of the truss shall be laid on lead sheet or steel plate as per design, and the holes for holding down bolts shall be made in the form of oblong slots

so as to permit the free movements of the truss end. For larger spans the truss shall be provided with proper bearing as per design.

Columns and stanchions shall be erected truly vertical with the necessary cross Bracing etc. and the base shall be properly fixed with the foundation concrete by means of anchor bolts etc. as per drawing.

Anchor bolts to be placed in the concrete foundation should be held in position with a wooden template. At the time of concreting anchor bolt locations shall be provided with suitable timber mould or pipe sleeve to allow for adjustment which shall be removed after initial setting of concrete. The spaces left around anchor bolts shall be linked to a stopping channel in the concrete leading to the side of the pedestal and on the underside of the base plate to allow the spaces being grouted up after the baseplate is fixed in the position along with the column footing. Grouting shall be of cement mortar 1:3 (cement: 3 coarse sand) or as specified.

***Bedding of Column, Stanchions etc*.:-**

Bedding shall not be carried out until the steel Work has been finally levelled, plumbed and connected together. The stanchion shall be supported on steel wedges and adjusted to make the column plumb. For multi-storeyed buildings, the bedding shall not be done until sufficient number of bottom lengths of stanchions have been properly lined, levelled and plumbed and sufficient floor beams are fixed in position. The base plates shall be wedged clear of the bases by M.S. wedges and adjusted where necessary to plumb the columns. The gaps under the base plate may be made upto 25 mm which shall be pressure grouted with cement grouts. With small columns, if permitted by the Engineer-in-charge, the column base shall be floated on a thick cement grout on the concrete pedestal. The anchor bolt holes in the base plate may be made about 10 to 15 mm larger than the bolts. In such cases suitable washers shall be provided.

Measurements

The work as fixed in position shall be measured in running metres correct to a millimeter and their weight calculated on the basis of standard tables correct to the nearest kilogram. The standard weight of steel sections shall conform to IS 808 with tolerance in sizes as per IS 1852. Tolerenace in weight is given in Table 10.3. Steel sections shall be acceptable within tolerance limits. Payment for steel sections shall be made as per actual weight within tolerances. Sections having weight on higher side than permissible tolerance, may be acceptable but payment shall be made on the basis of standard weight only. Steel sections having weight variations lower than permissible variation shall not be acceptable. Unless otherwise specified. Weight of cleats, brackets, packing pieces, bolts nuts, washers, distance pieces, separators diaphragm gussets (taking overall square dimensions) fish plates etc. shall be added to the weight of respective items. No deductions shall be made for skew cuts. In riveted work, allowance is to be made for weight of rivet heads. Unless otherwise specified and addition of 2.5% of the weight of structure shall be made for shop and site rivet heads in riveted steel structures. No deduction shall be made for rivet/ or bolt holes (excluding holes for anchor or holding down bolts).

Materials

Before bringing to the site, all materials shall be approved by the Engineer- in- Charge. All approved samples shall be deposited in the office of the Engineer- in- Charge before placing orders for the materials with suppliers. The materials brought on to the work shall conform in every respect of their approve samples. Fresh samples shall be deposited with the Consultant/ Engineer- in- Charge whenever type or source of any material changes. The contractor shall check fresh consignment of materials as it is brought on to the works to ensure that they conform to the specification and/ or approved samples. The Engineer-in-Charge shall have the option to have any of the materials tested to find whether they are in accordance with specifications at the contractor's expense. All bills vouchers and test certificates which in the opinion of the Engineer- in- Charge are necessary to convince him as to the quality of materials or their suitability shall be produced for his inspection when required. Any materials which have not been found to the specification and not approved by the Engineer- in- Charge shall be rejected forthwith and shall be removed from the site by the Contractor's at his own cost within the time stipulated by the Consultant/ Engineer- in-Charge. The Engineer- in- Charge shall have the powers to cause the contractors to purchase and use materials from any particular source, as many in their opinion be necessary for the proper execution of work.

Cement

Cement shall be provided and stored by the Contractor at his own cost. Cement shall be stored on a raised floor in dry weather proof & dust free but well ventilated shed. Cement bags shall be stacked close together away from external walls and in stacks of not more than ten bags to avoid lumping under pressure. Cement stored during monsoons or cement expected to be in store for more than eight weeks shall be completely enclosed in 700 micron polyethylene sheet so arranged that the flap close on the top stack. The contractor shall ensure that protective polyethylene sheet is not damaged at any time during use. Consignments of cement shall be used in order of delivery. A record shall be kept of the batch numbers of cement deliveries in such a form that the part of the works in which the cement is used can be readily identified, If during delivery or by test, the cement is found to be defective, the same shall be returned back forthwith. The contractor shall be responsible for the storage of cement at the site and no claim will be entertained in the event of any damage occurring to cement due to faulty storage by the contractor or on account of his negligence. Cement stored on site for a period longer than eight weeks shall be tested to the satisfaction of the Consultant / Engineer-in-Charge before it is used in the works. Cement that has failed the tests' conducted shall not be used in the works and shall be remarked from the site immediate by without fail. On the following types of cement as specified shall be used

a) Ordinary Portland Cement 33 grade confirming to IS 269
b) Ordinary Portland Cement 43 grade confirming to IS 8112
c) Ordinary Portland Cement 53 grade confirming to IS 12269
d) Portland Pozzolana Cement conforming to IS 1489 (Part 1 and part 2)

For concrete to be used in all structural elements in load bearing and RCC framed construction, ordinary Portland cement of 43 grade or higher is to be used. In rest of the works all the aforementioned types of cement can be used.

Aggregate

Aggregate shall be stored on a suitable well drained raft of concrete, timber, metal or other approved material. The storage of aggregate on the ground will not be permitted. Each size of aggregate shall be stored separately in such a manner as to prevent spillage and mixing of one aggregate with an adjacent aggregate. The dividing walls of any bins shall be of sufficient height and the aggregate shall be so deposited that a distance of 100 mm shall be left between the top of the division wall and any part of the aggregate stack. When stacking piling, the aggregate shall not form pyramids resulting in segregation of different size particles. The stacks shall be regular and of a height not exceeding two meter

a) Aggregates from natural sources shall be in accordance with IS 383. The contractor shall submit to the Consultant / Engineer - in - Charge certificates of grading and compliance from the suppliers for all consignments of aggregates. In addition at site from time to time, the contractor shall test the aggregates in accordance with IS 2386 parts I, II, III and IV. The contractor shall allow for and provide all necessary apparatus for carrying out each test and for supplying test records to the Consultant.

b) For fair faced concrete, the contractor shall ensure that aggregates are free from iron pyrites, and impurities which may cause discoloration. The fine aggregates shall be river sand, stone dust or other approved sand. It shall be free from clay, loan, and earth or vegetables matter and from salt or other harmful chemical impurities. It shall be clean, sharp, strong angular and composed of hard siliceous material

Fine Aggregate

I.S. Sieve	**Percentage passing for Grading**			
	ZONE I	**ZONE II**	**ZONE III**	**ZONE IV**
10 mm	100	100	100	100
4.75 mm	90-95	90-100	90-100	95-100
2.36 mm	60-95	75-100	85-100	95-100
1.18mm	30-70	55-90	75-100	90-100
600 micron	15-34	35-59	35-60	80-100
300 micron	5-20	8-30	8-30	20-65
150 micron	0-10	0-10	0-10	0-15

The maximum quantity of silt as determined by the method prescribed in IS 2386 Part II shall not exceed 8%. Stone dust shall be within the limits of Grading Zone III given in table -1. When the grading falls outside the percentage limits given for the sieves other than 600 micron and 300 micron (IS) sieves by not more than 5 percent and on 150 micron sieves by not more than 20 percent it shall be regarded as falling within this zone. The 5 percent can be excess summation on one or more services.

Coarse Aggregates

The coarse aggregates shall be crushed stone or broken stone. Coarse aggregate obtained from crushed or broken stone shall be angular, hay, strong, dense, durable clean and free

from soft, friable, thin, flat, elongated flaky pieces. The coarse aggregate should be from the approved source/quarry. Coarse aggregate river shingle or pit gravel shall be rounded, sound hard, clean, non-porous, suitably graded in size with or without broken fragments and free from flat particle of shale, clay, silt, loam and other impurities. Except where it can be shown to the satisfaction of the Consultant than a supply of properly graded aggregate of uniform quality can be maintained over the period of the obtaining the coarse aggregate in different sizes & blending them in correct proportions as and when required. The maximum size of coarse aggregate shall be such that the concrete can be placed without difficulty so as to surround all reinforcement thoroughly and fill the corners of form work.

Water

Water used in the works shall be potable water and free from deleterious materials. Water used for mixing and curing concrete as well as for cooling and / or washing aggregate shall be fresh and clean, free from injurious amounts of oil, salts, acids, alkali, other chemical and organic matter. Water shall be from the source approved by the consultant / Engineer-in-Charge and shall be in accordance with clause 4.3 of IS 456. Before starting any concreting work and whenever the source of water changes the water shall be tested for its chemical and other impurities at ascertain its suitability for use in concrete for approval of the Consultant. No waters shall be used until tested and found satisfactory. Cost of all such tests shall be borne by the Contractor.

Admixtures and Additives

Chemical admixtures are not to be used until permitted by the Consultant / Engineer-in-Charge in case their use is permitted, the type, amount and method of use of any admixture proposed by the contractor shall be submitted to the Consultant for approval. The contractor shall further provide the following information concerning each admixture to the Consultant / Engineer-in-Charge.

(a) Normal dosage and detrimental effects, if any, of under dosage and over dosage.
(b) The chemical names of the main ingredients in the admixture.
(c) The chloride ion content, if any, expressed as a percentage by weight of admixture.
(d) Whether or not the admixture leads to the entrainment of air when used in manufacturer's recommended dosage.
(e) Where two or more admixtures are proposed to be used in any one mix, the manufacturer's written confirmation of their compatibility.

In reinforced concrete, the chloride ion of any admixture as determined in accordance with IS 6925 and the total chloride ion in all admixture used in concrete mix shall not exceed 0.30 percent by weight of cement.

The admixture when used shall conform to IS 9103. The suitability of all admixtures shall be verified by trial mixes. The addition of calcium chloride to concrete containing embedded metal will not permitted under any circumstances. Regarding admixtures when used shall be based on lingo-sulphonates with due consideration to clause 5.2 and 5.30 of IS 7861. Waterproofing admixtures shall comply with IS 2645.

Grades of Concrete

The grade of concrete shall be in accordance with the following table. The grade of concrete to be used in each section of work will be shown in the drawings.

CHARACTERISTIC STRENGTH

Grade of Concrete	Characteristic strength i.e., compressive strength of 15 cm cubes at 28 days (N/mm^2)	Nominal maximum aggregate size (mm)
10	10	25
15	15	25
20	20	20
25	25	20
30	30	20
35	35	20

Unless otherwise specified in the drawings the maximum nominal size of coarse aggregate for different grades of concrete shall as under:

(a) For concreting in very narrow space or in very small thickness 12mm

(b) For all reinforced concrete work except in massive foundations 20mm

(c) For all ordinary plain concrete and massive reinforced foundations 10mm

Water-Cement Ratio

The water cement ratio shall be within 0.45 & 0.70 depending upon the workability.

Workability

The workability of fresh concrete shall be such that the concrete is just suitable for the conditions of handling and placing so that after compaction, it becomes completely consistent and homogeneously surrounds all the reinforcement and completely fills the formwork. The workability of fresh concrete at the place of mixing shall be measured by compacting factor test and at the place of disposition by means of slump test. During thefinalization of trial mixes, the relationship between compacting factor and slump test shall be established for each grade of concrete as well as for various levels for workability. Normally, in the condition of low water cement ratio as well as medium / high workability, the workability shall be achieved by increasing the cement content. In case where the cement content is to be limited to reduce the heat of hydration, and the water cement ratio is also kept low to reduce the permeability or due to other requirements the desired workability may be achieved with the use of limited doses of plasticizer or air entraining agent. In such cases, the method of mixing and dosages of the plasticizer/air entraining agent shall be according to the manufacturer's specification and with the approval of Engineer-in-Charge. Consistency and workability of the concrete shall be checked by measuring the slump of a truncated cone of concrete straight from the mixer under normal working conditions. The conical mould shall be of metal, 300mm high and 100mm and 200mm in diameter at top and bases respectively. Mould shall be prepared by the contractor. The slump range of concrete shall be as per the tabulation given below, as well as standards. Slump test shall be performed as per IS 1881 at intervals established by the Engineer at the contractor's cost in such a way as to check that the degree of consistency established by the Engineer for work in progress is maintained. The table below gives a

general slump range to be followed for various types of construction unless otherwise shown on drawings or instructed by the Engineer.

Various types of Construction	Slump in mm	
	Maximum	Minimum
Reinforced foundation walls and footings	80	35
Plain footings, caissons and structure walls	75	20
Compressor foundations and for heavy mass constructions	50	20
Pumps and other misc. equipment foundations	75	35
Columns, slabs, beams and reinforced walls	100	50

Durability

The durability of concrete, depending on the exposure condition, is to be taken into account while designing the mix. For given aggregates, the cement content should be sufficient to make sufficiently low water/cement ratio and 'Appendix A' of IS 456:2000 shall be taken as guideline for durability considerations.

Primer

Primer coat of approved brand should be applied before painting work or as directed by the competent authority.

Painting

The entire work shall have to be of good quality. The contractor shall use materials of readymade paints of best quality and of approved manufacturers as per specification. The Contractor will not be permitted to carry out any mixing at site except for addition of thinners for thinning the paint.

Rates shall be inclusive of doing plaster patch work (not exceeding 0.1 sq m for each patch) and also making up the broken arise, edge of walls, columns, beams, sills, ceiling, etc. so as to match the existing surface.

Special care shall be taken by providing suitable covers, tarpaulins etc. to prevent dust nuisance.

The contractor has to wash & clean the floors after his work in the area that has been completed.

No further coat shall be applied, till previous coat has completely dried up.

Additional coats shall have to be given without any extra cost, if instructed by the Bank, over and above the number of coats prescribed till the surface presents smooth and uniform finish.

The contractor should include the cost of erecting scaffoldings, ladder, jhulla, etc. required for painting the staircase / building both from inside and outside.

Care should be taken to paint switch boards, electric wiring on batten with paint similar to wall or ceiling as the case may be for which no extra payment will be made.

a. <u>Measurements for Painting</u>:

All measurements shall be in metric units. Length and breadth are to be measured correct to a centimeter.

b. Deductions in measurements to be regulated as follows:

For Acrylic emulsion paint interior/exterior, spirit polish, synthetic enamel paint.

a. No deduction shall be made for opening less than 0.5 sq m and no addition made for jambs, sills reveals therein etc.

b. Openings exceeding 0.5 sq m shall be deducted and jambs, soffits, sills etc. measured.

Co-efficient to be applied to get plain areas of Painting

a. Wooden doors, windows, partitions etc. (Measured flat including frame)

S. No.	Description	Specification Coefficient
1	Paneled doors and windows etc.	1.3 (for each side)
2	Flush Doors	1.2 (for each side)
3	Fully glazed doors and windows etc.	0.8 (for each side)
4	Carved or enriched work	2.0 (for each side)
5	Partly paneled and partly glazed doors, windows and partitions	2.0 (for both sides)
6	Fully venetian or louvered (not with glazing)	1.8 (for each side)
7	Low railing with vertical balustrade and bracing and railing	0.5 (for each side)

b. Steel doors, windows etc. (Measured flat including frame)

S. No.	Description	Specification Coefficient
1	Plain sheet doors and windows	1.1 (for each side)
2	Flush glazed doors and windows	1.5 (for both side)
3	Collapsible gates, steel gates, railings etc.	1.1 (for painting all over)
4	Rolling shutters	1.0 (for each side)
5	Partly glazed and partly paneled/ louvered doors, windows	0.8 (for each side)
6	M. S. Grill/ W.I. Grill and expand metal/ weld mesh/ crimp net mesh	1.0 (for painting all over)

c. General Work

S. No.	Description	Specification Coefficient
1	Expanded metal, grills, gratings, etc.	1.0 (for painting all over)

d. Steel plus wooden doors, windows etc. (Measured flat including frame)

S. No.	Description	Specification Coefficient
1	Paneled doors & windows with MS choukhat (single or double rebate)	1.3 (for each side

2	Flush wooden doors and windows with MS choukhat (single or double rebate)	1.2 (for each side)
3	Glazed window with MS frame (single or double rebate) with grill, etc.	2.5 (for painting all over)
4	MS wire mesh door with grill	2.0 (for painting all over)

Patch Repairing:

The Patch repairs shall generally be carried out as under:

a. Patches should be marked properly on the surface and all loose plaster of the cracked portion shall be removed as directed by the Engineer.
b. The surface to be patch plastered shall be wetted thoroughly and if plain, shall be roughened up by hacking.
c. The plastering shall be done as directed. The finishing coat shall match with the adjoining surface. The rate quoted shall include all types of finishing and no extra payment shall be admissible.
d. The cement mortar used shall be 1:4 (one part cement to four parts of sand by volume) and the work shall be done as directed by the Engineer.
e. The patches thus repaired shall be cured adequately and shall be got approved from the Engineer before proceeding further.
f. Wide cracks in plaster, if any shall be grooved as directed and should be filled by polymer modified cementitious repair mortar such as Roff Plaster coat R 03 & 05 or equivalent make, as per manufacturer specifications. No payment will be made for this operation.
g. Minor cracks in plaster due to separation of brick work from the concrete or wood work or between two masonry panels or diagonal cracks shall be grooved as directed, filled and finished with "SNOW FILLA/ Dr. FIXIT" or mentioned in schedule of quantities specifications. The rates quoted for respective items shall be inclusive of this operation.
h. Measurement: The measurements of the patches exceeding 0.1 sq m in area shall only be recorded. The patching work having 0.1 sq m or less in area shall not be measured and paid for.

Scaffolding

Unless otherwise instructed by the Engineer, single/double bamboo scaffolding (or MS props, if required at site) having two sets of vertical supports shall be provided for repair work. The supports shall be sound and strong, tied together by horizontal members over which scaffolding planks shall be fixed.

The work of scaffolding shall be deemed to be the part of the work of respective items under schedule and no extra payment in this regard under any circumstance shall be admissible. The scaffolding thus erected shall have to be got approved from the Engineer or his representative before commencing the work or actual painting. However, it should be noted that approval from the Engineer shall not relieve the Contractor of his responsibility and any damage to the property or any loss of life due to the negligence on this regard shall be at the Contractor's account.

Painting

The work of painting, colour washing shall be done according to IS: 2395 (1966) and 1477 (1959) and shall be to the entire satisfaction of the Engineer.

Exterior painting

Old paint should be completely removed by scraping manually and using machine hand cutter till the original plastered surface to be exposed. After that, all loose particles should be removed with wire brush. Finally surface should be washed thoroughly with potable water and clean the surface from all impurities. Then the surface should be allowed to dry.

The surface shall be brushed with a soft bristle brush to remove any dust particles 24 hours after the wash. All the cracks shall be properly defined with sharp edge tool, cleaned & filled the same & crevices with Latex caulking crack filler etc. complete generally or as per the manufacturer's specification and as directed.

With Acrylic waterproof exterior emulsion
Apply two coats of exterior emulsion as per manufacturer’s specification and colour/ shade as approved by the Bank after applying a coat of exterior primer.

Acrylic Interior Emulsion

The paint shall be of approved manufacturer and shade.

Preparation of surfaces

Old paint and neeru should be removed as required by scraping manually and using machine hand cutter till the original plastered surface to be exposed. After that, all loose particles should be removed with wire brush. Finally surface should be washed thoroughly with potable water and clean the surface from all impurities. Then the surface should be allowed to dry. Patch plastering should be done wherever it is required.

Application of Wall Care Putty

The plastered surface after scrapping and patch plastering has to be brought to level by applying one coat of JK/Birla putty MF to required thickness (not more than 3mm thickness). If more thickness is required to make the surface level in any areas, then the same has to be done in more than one coat of JK/Birla Putty MF as per manufacturer specifications.

Then make the surface even & smooth with one or two coats of JK/Birla Putty SF to required thickness (not more than 1.5 mm thick). The unevenness on the surface may be removed by gently leveling the surface with very fine water proof emery paper, not less than 500 numbers, to get a glossy white surface. The surface should be brought to proper line and level to such an extent that no undulations could be visible and all the edges and corners should be finished very sharp to look like a narrow hair line.

Preparation of paint

The paint shall be prepared strictly according to the manufacturer's instructions and specifications.

Application of paint

Apply two coats or more of interior emulsion as per manufacturer's specification and colour/ shade as approved by the Bank. Paint shall be applied uniformly by suing soft bristle brush and shall be finished with roller.

Enamel painting
Wood and Plastered Surface

While preparing surface in old wood work, accumulated dirt, grime, mould due to dampness etc. shall be removed and the surface examined for defects. all projections such as glue or whiting spots shall be carefully removed with stopping knife and cleaned after which all knots shall be filled with knotting solution. Resinous or loose knots shall be removed and gaps filled with seasoned timber piece and made level with the rest of the surface.

Surface of previously painted wood work, if it is smooth and in good condition, shall be cleaned with white spirit or other detergent. Rub surfaces with abrasive paper, wash clean, remove with fresh water and allow the surface to dry. Defective and loose putty shall be replaced.

Where old painted surface has become badly blistered and cracked, the paint shall be completely removed either with blow lamp or with an approved quality paint remover.

In case of walls dados required to be painted with enamel paint, if the old paint is white or colour wash, distemper or oil bound distemper, the old coating shall be thoroughly scraped off till the original plaster surface is exposed. If old paint is oil paint and in good condition, surface shall be sand papered and cleaned.

Painting shall be carried out as much as possible in dry and warm weather. Two coats of paint shall be applied to the surface as per schedule of work.

Application of paint

The enamel paint shall be of first quality unless otherwise specified. The painting work shall be carried out as per manufacturer's specification and in coats specified under respective items.

Enamel painting to steel work

The work shall generally be carried out as per I.S. 1477 (1959), wherever applicable and as directed by the Engineer.

The surface shall be thoroughly cleaned of all scale, rust, dirt, old paint, grease and other imperfections by scrapping and brushing with steel wire brushes and if necessary, the surface shall be cleaned by chipping or any other best known methods, such as sand blasting and burning. The surface shall be made thoroughly dry.

Apply a coat of anti-corrosive metal primer of approved make, if required.

Apply a coat of putty to make the surface even and uniform.

Apply first coat of ready mixed enamel paint of approved make, quality and shade. The first coat shall be a tone lighter when compared to the final approved shade.

Apply finishing coat of approved shade as directed.

Painting CI GI Asbestos etc., pipes and fittings

Paints: Paints, unless otherwise specified, shall be first quality enamel paint of approved make and shade. The primer coat shall be red oxide or any approved suitable metallic primer ready mixed and of approved manufacture, if required.

Preparation of surfaces: All rust and scales shall be removed by scraping or by brushing with steel wire brushes. All dust and dirt shall be carefully and thoroughly wiped away. The surface if wet, shall be sun dried.

Application: After preparing the surface, one coat of primer shall be applied. Care shall be taken to ensure that the surface is fully and completely covered, special attention being paid to the joints. When the primer coat has dried up and before any moisture, dirt, dust etc. settles on the surfaces, paint of the desired shade shall be applied to pipes. Application shall be done with brushes and the paint shall be spread evenly. The surface shall be given two or more coats and shall finally present a uniform appearance.

Scaffolding for painting: Unless otherwise instructed by the Engineer, single or double scaffolding having sets of vertical supports of bamboo (or props, if required) shall be provided for repair work and painting. The supports shall be sound and strong, tied together by horizontal members over which scaffolding planks shall be fixed. Suitable double nylon net with a mesh size of 25mm shall be provided at 4 M. height from the ground level around the buildings up to a distance of minimum 3 M. from the edge of the building in all sides to catch any falling objects causing accidents and offer protection to vehicles parked and people around. The work of scaffolding shall be deemed to be the part of the work of respective items under schedule and no extra payment in this regard under any circumstance shall be admissible. The scaffolding thus erected shall have to be got approved from the Engineer or his representative before commencing the work or actual painting.

Water proofing

The surface must be healthy, consistent and free from dust and unstable parts. Remove any cement residue, release agents, dust, grease, detached or friable parts by power washing or sanding. On surfaces that are weak, dusty and powdery, consolidate the substrate

previously. The surfaces must be dry completely and free from rising damp. It is to be verified the substrate moisture beforehand in order to avoid the formation of bubbles. The waterproofing membrane should be applied to completely dry surface.

Liquid should be mixed well by stirring before use. At the edges, angles and expansion joints to be waterproofed, both on the floor or on the wall, apply the non-woven tape. Wait until completely dry, then proceed with the application of the membrane. First coat of the product should be applied using a brush, paint brush, short pile roller, stainless steel spatula or airless spray making sure to cover the entire surface evenly. Have to Wait 24 hours for proper drying of first coat, after that second coat may be applied. It is to be checked the product build up is regular in order to facilitate the correct application of the product. With favourable weather conditions and temperatures during application, have to wait at least 24hours before walking on the new product.

Should not be applied at temperatures below + 5°C or above + 35°C, in the presence of strong wind, rain and under direct sunlight. Should not be applied to frozen, dusty, uneven and inconsistent surfaces. The applied product should be protected from frost, rain and rapid drying for the first 24 hours after application. For applications on bitumen polymer membranes, it is to be verified that the product has undergone an oxidation process of at least 90 days.

Contractor has to prepare the surface accordingly before waterproofing. As the waterproofing can't be done under direct sunlight so proper arrangement should be done by the contractor.

VII. ELECTRICAL WORKS

ELECTRICAL TECHNICAL SPECIFICATIONS :

PART 1 – GENERAL

1. STANDARDS :

660/1100 V grade PVC insulated / cables for working voltage upto and including 1100 volts IS 694 : 1990 MS conduits for electrical installation - General requirements	IS 9537 : Part I 1980
MS conduits for electrical installation – Rigid steel conduit	IS 9537 : Part II 1981
Accessories for rigid steel conduits for electrical wiring	IS 3837 : 1976
Fittings for rigid steel conduit for electrical wiring	IS 2667 : 1988
Flexible (pliable) nonmetallic conduit	IS 9537 (P-5) : 2000
Flexible steel conduits for electrical wiring	IS 3480 : 1966
Rigid nonmetallic conduit for electrical installations fittings for rigid non metallic conduit	IS 2509 : 1973 IS 3419 : 1988
Interlocking switch socket outlets	IS 4160 : 1967
Switch socket outlets	IS 4615 : 1968
3 pin plugs and socket outlets upto 250 volts rated current upto 16 amps	IS 1293 : 1988
Conductors for insulated electric cable and flexible conduit	IS 8130 : 1984
General and safety requirements for luminaries Tubular fluorescent lamp	IS 1913 Part-I : 1978
Switches for domestic and similar purposes	IS 3854 : 1997

Danger notice plates	IS 2551 : 1982
Code of practice for electrical installation fire safety of buildings	IS 1646 : 1997
Code of practice for electrical wiring installations	IS 732 : 1989
General requirements for enclosures for accessories for house hold and similar fixed electrical installations	IS 14772 : 2000
Guide for marking insulated conductor	IS 5578 : 1985
Guide for uniform system of measuring and identification of conductors and apparatus terminals	IS 11353 : 1985
General and safety requirements for fans and regulators for house hold and similar purposes	IS 12155 : 1987
Guide for safety procedure and practices in electrical works : General	IS 5216 Part-I : 1982
Recommendation on safety procedure and practices in electrical works – life saving technique	IS 5216 Part-II : 1982

LT DISTRIBUTION BOARDS

Electrical accessories – circuit breaker for overcurrent protection for house hold and similar installations (Miniature Air Circuit Breakers for AC circuits)	IS 8828 : 1996 and IEC 947
Residual current operated Circuit Breakers	IS 12640 Part-I : 2000
Code of Practice for installation and maintenance of switchgear not exceeding 1000 volts	
• General	IS 10118 Part-I : 1982
• Selection	IS 10118 Part-II : 1982
• Installation	IS 10118 Part-III: 1982
General requirements for switchgear and control gear for voltages not exceeding 1000 volts AC or 1200 volt DC	IS 4237 : 1982 221

WORK DESCRIPTION

2. WIRING DEVICES :

i) The drawings for the lighting and power points indicate approximate positions of all lighting fittings, switches, power outlet points, isolating switch points and the like. The actual positions of all fittings, switches, the wiring details and cable routes shall be co-ordinated with other trades on site and submitted for the approval of the Engineer. All time and cost required adjusting the layout or adjusting the completed installation to Engineer satisfaction and to suit site co-ordination is included in the Contract.

ii) No additional cost will be entertained should the final positions be relocated within the same room or not more than five (5) metres away from the original locations due to any requirement.

iii) For the purpose of this Specification and related Drawings, each lighting and small power point circuits shall in general be coded with a prefix to indicate the corresponding distribution board number; details on the circuit way and phase shall be submitted for the approval of Engineer.

3. LIGHTING POINT INSTALLATION :

i. The drawings for the lighting and power points indicate approximate positions of all lighting fittings

ii. Surface mounted light fitting shall terminate at a junction box having entries appropriate to the run of conduit and shall be complete with porcelain/ PVC connector suitable for the size and number of connections to be made at the point and the wiring required to connect the specified fitting.

iii. At every light fitting an approved type earthing terminal shall be provided for connection of the circuit protective conductor of the final circuit.

iv. Cables used for internal wiring of the lighting fittings shall be of appropriate type and size and number. Conductor shall be of size not less than 1.5 sq.mm. single core or the equivalent. The insulation of the cables shall be able to withstand throughout the life of the fitting the maximum temperature to which it will be subject in normal use without deterioration which could affect the safety of the fitting

v. All lighting fittings and lamps shall be self-supporting complete with the appropriate fixing accessories such as clips, supporting brackets, suspension sets, nuts, washers, screws etc. for the proper installation of the fittings on different types of ceiling panels or walls.Suspension sets shall be of adjustable type suitable to carry the weight of the lighting fittings and unless otherwise stated or indicated on Drawings

vi. Lighting switches, unless otherwise specified, shall be single pole, quick make and slow-break, silent switch action type with solid silver alloy contacts and totally enclosed switch action for flush or surface mounting

vii. Switches for external use shall be of weatherproof construction with IP65 rating, unless otherwise specified.

viii. Samples of all switches, conduit boxes and plaster depth boxes shall be submitted to the Engineer for approval prior to installation

ix. Samples shall be rated for 6 Amps (minimum light switch rating 6A), 16 Amps or 20 Amps as determined by circuit load

x. An earthing terminal, connected to the earth continuity terminal shall be provided and connected to the circuit protective conductor at every lighting switch positions

xi. Switch socket outlets shall be as per BS1363 single pole 6 Amp 3 round pin shuttered outlets, one or two gang for indoor service except otherwise specified and either surface or flush mounting according to location.

xii. All switch socket outlets used shall be of an approved quality

xiii. 16 Amp switch socket outlets shall be 3 pin round type to BS 546 shuttered, of a finished similar to 6 Amp switch socket outlets and flush mounted in galvanised steel conduit boxes to BS 4662 requirements

xiv. The MCB shall be suitable for manual closing and opening and automatic tripping under overload and short circuit. The MCB shall also be trip free type.

xv. Single pole/three pole versions shall be furnished as required.

xvi. The MCB shall be rated for 10 KA fault level.

xvii. The MCB shall be suitable for its housing in the lighting boards and shall be suitable for connection at the outgoing side by tinned cable lugs and for bus-bars connection on the incoming side.

xviii. The terminal of the MCBs and the open and close conditions shall be clearly and indelibly marked.

xix. The MCB shall generally conform to IS: 8828

xx. Residual Current Circuit Breaker or RCCB shall be 2 pole 220 volts / 4 pole 415 volts 50Hz, 30-300mA sensitivity. These shall be of approved make. The rating of the RCCB shall be as required. These shall be suitable for manual closing and opening and automatic tripping under earth fault circuit of 30-300mA as specified in item of work.

xxi. The enclosure of the RCCB shall be moulded from high quality insulating material. The material shall be fire retardant, anti tracking, non-hygroscopic, impact resistant and shall with stand high temperature.

xxii. All parts of switching mechanism shall be non-greasing, self lubricating material so as to provide consistent and trouble free operation.

xxiii. Operation of RCCB shall be independent of mounting position and shall be trip free type.

xxiv. Distribution boards shall be of standard make with MCBs as per approved make given. Distribution boards shall be constructed out of steel sheet all weld enclosure.

xxv. Ample clearance between the conductors of opposite pole, between conductors and sheet steel body shall be maintained in order to obviate any chance of short circuit

xxvi. The MCBs shall be mounted on high grade rigid insulating support and connected by electrolytic copper bus bars.

xxvii. Each incoming MCB/Isolator shall be provided with solder-less cable sockets for crimping.

xxviii. Distribution boards shall be recessed in wall niche or if required mounted on the surface of the wall with necessary clamp bolts etc.

4. WIRES AND CABLES:

WORK DESCRIPTION

i. The design manufacture, testing and supply of single core PVC insulated 1.1 KV grade stranded twisted wires under this specifications shall comply with latest edition of following standards.

ii. IS-3961: Current rating for cables.

iii. IS-5831: PVC insulation and sheath of electric cables.

iv. IS-694: PVC insulated cables for working voltage up to and including 1100 volts.

v. IEC-54 (I): PVC insulated cable.

vi. Copper/Aluminium stranded twisted conductor PVC insulated wires shall be used in conduit as per item of work. Aluminium for power cables and copper for control cables shall be used.

vii. The wires shall be colour coded R Y B, for phases, Black for neutral and Green for earth.

viii. Progressive automatic in line indelible, legible and sequential marking of the length of cable in meters at every one-meter shall be provided on the outer sheath of cable.

ix. The design, manufacture, testing and supply of the cable under this specifications shall comply with latest edition of following standards:

x. IS: 8130: Conductors for insulated electric cables and flexible cords.

xi. IS: 5831: HRPVC/HR PVC insulation and LSZH sheath of electric cables.

xii. IS: 3975: Mild steel wires, strips and tapes for armouring cables.

xiii. IS: 3961: Current rating of cables.

xiv. The routing and the minimum rated current carrying capacity of the LV power cables shall be as indicated on the Drawings. The Contractor shall consider the manufacturer data and engineering the cable sizing to ensure it suit the conditions, viz grouping, ambient temperature etc., and for making any necessary adjustment to the Engineer's approval.

xv. All LV cables for normal power/control circuitries within buildings shall be copper conductor with XLPE insulated and PVC sheathed, denoted as XLPE/PVC cable or copper conductor with PVC insulated, denoted as PVC cable as specified.

xvi. All LV cables for emergency power circuitries serving emergency lightings, Building Management System (BMS), Fire Protection System, Security Systems, emergency communication systems, and sump pump system and fire lifts etc. with back-up from standby generator sets or UPS systems or incoming and outgoing from the Emergency Main Switchboard shall be fire resistant cables as required.

xvii. Cablings in service ducts, open trenches, direct-laid underground in soil shall be by means of armoured cables. Non-armoured cables shall be laid in conduits, trunkings or tray/ladder for mechanical protection.

SPECIFICATIONS :

i. **LV CABLES**

ii. The cables shall be suitable for laying in racks, ducts, trenches conduits and under-ground buried installation with uncontrolled back fill and chances of flooding by water.

iii. They shall be designed to withstand all mechanical, electrical and thermal stresses under steady state and transient operating condition.

iv. The aluminium/copper wires used for manufacturing the cables shall be true circular/sector in shape before stranding and shall be of uniformly good quality, free from defects. The conductor used in manufacture of the cable shall be of H2 grade.

v. The cable should withstand 2.5 KA for 1 Sec. with insulation armour insulated at one end. Bidder shall furnish calculation in support of capability to withstand the earth fault currents. The current carrying capacity of armour and screen (as applicable) shall not be less than the earth fault current values and duration.

vi. The fillers and inner sheath shall be of non-hygroscopic fire retardant materials and shall be suitable for the operating temperature of the cable. Filler and inner sheath shall not stick to insulation and outer sheath.

vii. Progressive automatic in line indelible, legible and sequential marking of the length of the cable in metres at every one metres shall be provided on the outer sheath of all cables and at every 5 metre 'LSZH marking in case of 'LSZH cables.

viii. Strip/Wire armouring following method (b) mentioned in IS: 3975 shall only be acceptable. For single core cable aluminium wire armouring shall be used.

ix. Allowable tolerance on the overall diameter of the cables shall be + 2mm.

x. The normal current rating of all HRPVC/XLPE insulated cables shall be as per IS: 3961.

xi. A distinct inner sheath shall be provided by pressure extrusion process for all multicore armoured and unarmoured cables as per IS: 5831.

xii. Outer sheath shall be provided by extrusion process as per IS: 5031.

xiii. The breaking load of armour joint shall not be less than 95% of that armour wire. Zinc rich paint shall be applied on armoured joint surface.

xiv. In plant repairs to the cables shall not be accepted.

xv. All the cables shall be supplied in non-returnable drums as per IS: 10418.

xvi. In Case of LSZH Cables

xvii. The outer sheath of cables shall have an oxygen index of not less than 29 as per ASIMD : 2863.

xviii. The maximum acid gas generation by weight as per IEC:754 (i) shall not be more than 20% for outer sheath material of all cables. Bidder shall also guarantee the maximum theoretical acid gas generation with 20% by weight of outer sheath.

xix. The cables outer sheath shall meet the requirement of light transmission of 40% (minimum and shall be tested as per ISTMD:2843). In case the test for light transmission is conducted as per ASTME:662. The bidder shall furnish smoke density values as per this standard and shall co-relate the anticipated light transmission when tested as per ASTMD:2843.

xx. The cable shall pass the fire resistance test as per SS:42, 41, 475 (I) and flammability test as per EEE:383.

4.1 Fire Seal System

A. . Cable shall be installed so that separations shown in the table below are observed.

1.	HV Cable (33 KV)	- HV Cable (33 KV)	50 mm
2.	ELV & LV 230 V/433 V	- ELV & LV cable 230 V/433 V	50 mm
3.	HV cables (33 KV)	- ELV & LV cables 230 V/433 V	300 mm
4.	LV cables 433 V	- Telephone/Instrument cable	350 mm

5. All cables- All hot pipe work 200 mm

5. PANEL BOARDS :

STANDARDS

All equipment, material and components shall comply with the requirements of the latest editions of Indian Standards with updated amendments. Standards and Regulations applicable in the area where equipment is to be installed shall also be followed.

The Panel boards shall be engineered and constructed in accordance with the latest revision of the following Indian and British standards:

IS 13947 : A.C. Circuit Breakers
IS 3427 : Metal enclosed Switchgear & Control Gear
BS 162 : Safety Clearances
IS 2705 : Current Transformers
IS 3156 : Voltage Transformers
IS 3202 : Code of Practice for climate proofing of electrical equipment
IS 375 : Marking & Arrangement for Switchgear Bus Bars, main connections and auxiliary wiring.
ARE 722 : A.C. Electric Meters
IS 1248 : Direct acting Electrical Indicating Instruments
IS 3231 : Electrical Relays for Power System Protection
IS 2544 : Epoxy Cast Resin Insulators
IS 5082 : Electrolytic Copper/ Aluminium
IS 5792 : High Voltage HRC fuses
BS 88 : Cartridge fuses for voltages up to and including 1000V AC and 1500V DC.
BS 89 : Direct acting electrical indicating analogue electrical measuring instruments and their accessories.
BS 142 : Electrical protective relays
BS 159 : Busbar and Busbar connection
BS 1433 : Copper for electrical purposes. Rods and bars.
BS EN 60898 : Circuit-breakers for over current protection for household and similar installations.
BS 3938 : Current transformers
BS EN 60947-2 : Low-voltage switchgear and control gear, Part 2 circuit-breakers.
BS 4794 : Control switches (switching devices, Part 1 including contactor relays, for control and auxiliary circuits, for voltages up to and including 1000V AC and 1200V DC). General requirements.
BS 5419 : Air-break switches, air-break disconnectors, and fuse combination units for voltages up to and including 1000V AC and 1200V DC.
BS 5420 : Degrees of protection of enclosures of switch Part I great Part I and control gear for voltages up to and including 1000V AC and 1200V DC.
BS 5424 : Control gear for voltages up to and including 1000V AC and 1200V DC – Part 1 Contactors.
BS 5486 : Low-voltage switchgear and control gear Part 1 assemblies. Part I: Requirement for type tested and partially type tested assemblies.
BS 5685 : Electricity meters – Part I: Class 0.5, 1 and 2 single phase and poly phase, single-rate and multi-rate watt-hour meters.
BS 5992 : Electrical relays
BS 6004 : PVC insulated cables, (nonarmoured), for electric power and lighting.
BS 6231 : PVC insulated cables for switchgear and control gear wiring.

IS 3043/ BS7430 : Earthing
BS/IEC or IS not mentioned above but are applicable to this installation shall also apply.

WORK DESCRIPTION

i. This specification covers the 'General Requirements' for the design, manufacture, supply performance, inspection, testing and commissioning including supply of indoor type low voltage switch boards up to 1000 V including necessary termination, cabling and bus work required for satisfactory operation .

ii. The Panel boards included, distribution boards and control panels shall be built in accordance with IEC 439 "Factory Built Assemblies for Low Voltage" or BS 5486 "Factory-built Assemblies of Switchgear and Control Gear for Voltage up to and including 1000 AC and 1200V DC.

iii. All factory built assemblies subject to rain or wet conditions or located outside electrical switch room shall be weatherproof constructed to IP 65, able to withstand high impact strength of 60 KN/m2 (min.), temperature resistant, flame retardant and corrosion resistant.

iv. Specific requirements shall be in accordance with single line diagram/specification & BOQ.

v. The technical parameters of switchgear equipments, transformers etc. shall be referred.

SPECIFICATIONS :

i. The switch Panel boards shall be cubicle type, suitable for indoor installation, floor mounting and free standing. The design shall be totally enclosed, dust - tight, damp-proof and vermin proof offering degree of protection not less than IP-42.

ii. Separate segregated compartments shall be provided for circuit breakers, bus bars, cable box, voltage transformers, wire ways, relays, and instrument and control devices. Switchgear cubicles/ modules shall be provided with hinged doors in front with facility for padlocking door handles.

iii. Vent openings shall be covered with grills so arranged that hot gases cannot be discharged through them in a manner that can injure the operating personnel. These vent openings shall be vermin proof.

iv. All panels shall be of same height, width and depth. Panels shall be bolted together to form a continuous flush front switch board, suitable for front of board operation.

v. The switchgear cubicles shall be rigid and robust in design and construction, fabricated out of CRCA sheet steel. Cubicles shall be made from rigid welded structural frames made of structural steel sections or of pressed/formed sheet steel of not less than 3mm thickness. The frames shall be enclosed by sheet steel of at least 2mm thickness, smoothly finished, leveled and free from flaws. Stiffeners shall be provided wherever necessary.

vi. All doors, panels, removable covers shall be provided with non deteriorating (neoprene) gaskets all around the perimeter.

vii. All doors shall be removable and supported by concealed type hinges. The hinges shall be strong and braced to ensure freedom from sagging, bending and general distortion of panel or hinged part.

viii. Floor mounted cubicles shall be provided with a 75mm high channel base frame. The total height of the cubicle shall not exceed 2400mm, keeping in view the operating height of top switch should not exceed 1750mm from FFL including base channel

ix. Three phase bus bars shall be of high conductivity electrolytic Aluminium/Copper as stated in B.O.Q.

x. The bus bars shall be air insulated and housed in a separate compartment, segregated from all other compartments.

xi. Bus bars & bus bar connections shall be of uniform cross section shall be suitable for carrying rated current continuously and short circuit current for specified duration without overheating. The bus bars connections shall be adequately supported on insulators to withstand dynamic stresses due to short circuit current specified. Normal operating temperature for bus bars shall be 85 Deg C. Short circuit rating of the bus bars shall be 20 to 50 KA for 1 sec as per BOQ.

xii. All bus bar joints and bus tap joints shall be silver or tin plated. Joints shall be bolted type and shall be insulated. Spring/Lock washers shall be provided to ensure good contact on the joints.

xiii. Direct access to accidental contact with bus bars and primary connections shall be avoided by providing shrouds. All apertures and slots shall be protected by barriers to prevent accidental shorting of bus bars. To provide a tight seal between cubicles, bushings or insulating panels shall be provided for bus bars crossing from one cubicle into another.

xiv. All insulating materials used shall be non-hygroscopic and shall be treated for preventing fungus growth. Surface of insulators shall be highly glazed and treated with silicone compounds to minimize accumulation of dust, condensation and tracking

xv. Current transformers shall be of suitable ratio, burden & class/accuracy as specified in Single Line Diagram.

xvi. Current transformers shall conform to latest edition to relevant standards. The Current transformers shall be epoxy resin cast with bar Primary or ring type.

xvii. The design and construction shall be sufficiently robust to withstand thermal and dynamic stresses due to the maximum short circuit current of the circuit.

xviii. The current transformer shall preferably be capable of being left open circuited on the secondary side with primary carrying rated full load current, without overheating or damage. Short time current rating and rated withstand time shall be same as corresponding C.B.

xix. CT core laminations shall be of high grade silicon steel.

xx. Secondary terminals of CT shall be brought out to a terminal block which will be easily accessible for testing and external connections. Facility shall be provided for short circuiting and earthing of CT secondary leads through a removable and accessible link with provision for attaching test link.

xxi. Rating plate details and terminal markings shall be according to the latest edition of relevant Indian Standard specification.

xxii. Current transformers (core) shall be used for metering and protection.

xxiii. Potential Transformers shall conform to latest edition of relevant standards.

xxiv. Potential transformers shall be dry, cast epoxy resin type. The PTs shall be of single phase construction.

xxv. The PTs shall be capable of operating continuously at 110% of the rated voltage without any damage. When star - star connection is required in non-effectively or ungrounded system, the PTs shall be suitable for continuous operation with a persistent phase to ground fault.

xxvi. Maximum temperature rise of the transformer at rated burden and with rated primary voltage and frequency shall not exceed 40 Dig's above an ambient of 45 Dig's.

xxvii. HRC Fuses shall be provided secondary side. It shall be possible to replace PT fuses easily without having to de-energies the main bus bars. Prospective interrupting current rating of the fuses shall be same as the system fault level.

xxviii. Voltage transformer ratio, output and class shall be as specified in the drawing & BOQ. Name plate as per relevant standards shall be provided on the PT.

xxix. Relays type and numbers shall be in accordance with the protective scheme specified or as per drawings and B.O.Q.

xxx. Relays shall be enclosed in rectangular shaped cases, suitable for flush mounting only, dust tight covers projecting from the front cover panel. The case shall be dust tight, damp proof and tropicalised.

xxxi. Relays shall be accessible for setting from the front. Access to setting devices shall be possible only after removal of front cover.

xxxii. Protective relays shall be draw out type. Where it is not possible to provide protective relays of the draw out pattern, fixed type relays with facilities for plugging in a portable test plug shall be provided. Necessary test plugs shall be furnished along with the relays.

xxxiii. Relays shall be provided with positive action self reset type with indicator. The indicator/s shall be visible from the front.

xxxiv. Relays conform to relevant standards in all respects.

xxxv. Relays shall be provided with minimum two pairs of self or hand reset type contacts as specified. Auxiliary relays shall have the number of NO and NC contacts as specified in data sheet.

6. CIRCUIT BREAKERS:

STANDARDS

All equipment, material and components shall comply with the requirements of the latest editions of Indian Standards with updated amendments. Standards and Regulations applicable in the area where equipment is to be installed shall also be followed.

The equipment offered complying with other standards, these standards shall be equal to or superior to those specified and full details of the differences shall be furnished along with the tender.

The Panel boards shall be engineered and constructed in accordance with the latest revision of the following Indian and British standards:

1. IS/IEC: 60947-2 : Air circuit breaker/moulded case circuit breaker.
2. IS: 3156 : Voltage transformers.
3. IS: 2705 Part-I, II & III 1964 : Current transformers for metering and protection with classification burden and insulation.
4. IS: 9224 : Low voltage fuse and protection.
5. IS: 3231 : Specification for electrical relays for power system protection.
6. IS:8623 : Specification for factory built assemblies of switchgear and control gear for voltage unto and including 1000-V AC/1200 V-DC.
7. IS: 4237 : General requirements for switch gear and control gear for voltage not exceeding gear.
8. IS: 2147 : Degree of protection provided by enclosures for low voltage switch gear and control gear.
9. IS: 1018 : Switchgear and control gear selection/ installation and maintenance.
10. IS: 1248 : Direct acting electrical indicating instruments.
11. IS: 375 : Arrangement for switchgear, bus bars, main connections, auxiliary wiring and marking.
12. IS: 2959 : AC contactors for voltage not exceeding 1000V.
13. IS: 5578 : Guide for marking of insulated conductors.
14. IS: 11050 : Guide for forming system of marking and identification of conductors & apparatus terminal.
15. IS: 1248 : Direct acting indicating analogue electrical measuring instruments and testing accessories.
16. IS: 6005 : Code of practice for phosphating of iron & steel.
    1. BS EN 60898 IEC 898 : Circuit breakers for over current protection for household and similar installations. 2.BS EN 60947-
    2. IEC 947-2 : Low-voltage switchgear and control gear, Part 2 circuit breakers.

3. BS 54193. : Air-break switches, air-break disconnectors, and fuse combination units for voltage up to and including 1000V AC and 1200 VDC.
4. BS 5486 : Low-voltage switchgear and control gear Part 1 assemblies. Part 1 requirement for type tested and partially type tested assemblies.
5. BS 4293 : Residual Current Circuit Breaker

BS/IEC or other National standards not mentioned above but are applicable to this installation shall also apply.

WORK DESCRIPTION

i) Circuit breaker including Moulded Case Circuit Breakers (MCCB), Miniature Circuit Breakers (MCB) and Residual Current Circuit Breakers (RCCB / RCD) shall be provided according to the specification.

ii) All breakers shall be capable of withstanding the electrical, mechanical and thermal stress of the prospective fault level experience. The prospective fault levels of the various breakers shall be verified according to result in short circuit/co-ordination study specified in specification Section 11002.

iii) The drawings, specification and BOQ complement each other and which is shown or called for one shall be interpreted as being called for on both. Material, if any, which may not have been specified but fairly required to make a complete assembly of switch gear as shown on the drawing, specifications shall be construed as being required and no extra charges shall be payable on this account.

SPECIFICATIONS :

i. The MCCB shall comply with IS/IEC 60947-2. The MCCB shall be provided with over current protection by means of thermal and magnetic tripping element.

ii. All MCCB tripping mechanism shall be ambient temperature compensated. MCCB of frame sizes greater than 150 amps shall be equipped with continuously adjustable magnetic pick up setting. MCCBs used for incoming main feeders shall in addition be provided with continuously adjustable rated current settings in the range of 50 to 100% rated current.

iii. The MCCBs shall have quick make and quick break mechanism independent of the operating speed. The tripping mechanism shall be mechanically “trip free” from the handle so that the handle cannot be closed against fault conditions. All MCCBs should have isolation feature and line load reversibility.

iv. The MCCB shall be provided with door interlock handles. All handles shall be large and robust to carry out the switching operation with ease. The handle shall clearly indicate the “ON”, “OFF” and “TRIP” positions. The handle shall be able to be locked in the “ON” or “OFF” positions. When locked in the “ON” position it shall still be possible for the handle to indicate “TRIP” when the MCCB has tripped. An interlock release mechanism shall be provided to enable the door to be opened when the MCCB is locked in the “ON” position.

v. Multi-pole MCCB shall have a common-trip bar so that a fault condition on any one pole of the MCCB will cause all poles to trip simultaneously.

vi. The MCCB interrupting capacity shall be not less than that indicated on the drawings and back up discrimination/ cascading charts should be submitted of the OEM. G. MCCBs of ratings 200A and above shall be of Busbar termination type, adaptable for use with bolts and cable lugs.

vii. Automatic change over MCCBs shall be of the motorised type, fully withdrawable, with both mechanical and electrical interlock. The transfer operation shall be controllable by an adjustable time delay of between 0.1 to 30 sec. The actual transfer time of the MCCBs shall not exceed 2 sec. The motor mechanism shall utilise universal motor with electromagnetic clutch and shall be equipped with full handles to allow manual operation of the MCCB. All automatic change over MCCBs shall have a minimum mechanical life of 10,000 operations.

viii. MCCB when used for motor protection shall have characteristics suitable for the motor starting. Standard range MCCB shall not be substituted for motor protection circuits.

ix. All fully withdrawable MCCB shall have interlocks to prevent withdrawal when the MCCB is "ON".

x. All main moulded case circuit breaker shall be provided with at least 2 pairs N/O and N/C auxiliary contact.

xi. Indicating lamps shall be of the panel mounting, LED type and shall have execution plates marked with its function wherever necessary. The colour of the lamp cover shall be red for 'ON' and green for 'OFF' indicating lamps shall be provided with series resistor.

MINIATURE CIRCUIT BREAKERS (MCB)

i. MCBs shall comply with IEC 898:1995. They shall be of the current limiting type having a sealed ambient temperature independent thermal magnetic tripping mechanism providing overload and short circuit protection. All MCBs shall be of 35mm D/N symmetrical rail mounted type.

ii. The breaking capacity of MCBs shall be at least equal to the prospective fault level at the point installation, unless back-up by a current limiting upstream breaker of the same make.

iii. The MCB operating mechanism shall be mechanically trip free from the operating handle so as to prevent the contacts from being held closed against short circuit and overload conditions. It shall be of the automatic resetting type.

iv. The individual operating mechanism of each pole of a multi-pole MCB shall be directly linked within the MCB casing and not with the operating handles.

v. The operating handle shall betr" of the toggle type with possibility for mounting of padlocking facility.

vi. Each pole shall be provided with bi-metallic thermal element for overload protection and magnetic element for short circuit protection.

vii. It shall be possible to fit on site auxiliaries like shunt-trip coil, under-voltage release, ON/OFF switch or alarm switch.

RESIDUAL CURRENT CIRCUIT BREAKERS (RCCB)

i. The RCCBs shall be manufactured to trip within 0.1 second for 30 mA.

ii. RCCB shall comply with IEC 61008-2-2:1990 and shall be of the current operatetype.

iii. The RCCBs shall be of 2-pole construction for single phase and 4-pole construction for 3 phases.

iv. All RCCBs shall be complete with test buttons.

v. All RCCBs shall be batch tested and bear the appropriate test label of approval to SEB requirement.

vi. All RCCBs shall be of high sensibility type as appropriate and as specified in the drawing. They shall be of surge proof manufacture to prevent nuisance tripping due to

7. CONDUIT SYSTEM, CABLE TRAY, CABLE LADDER

WORKS DESCRIPTION:

i. This section describes the supply and installation of wiring facilities systems include conduits, cable trays, cable ladder and Trunking system, c/w associated fittings and accessories.

ii. All cables run above the suspended false ceiling, concealed in walls, columns, or on surface shall be supported by conduits, cable tray and Trunking or cable ladder system. No free slinging cable is allowed.

iii. The cable routes as shown in the drawings shall be used as a guide only. Prior to the installation, the cable routes shall be coordinated with other services. Uncoordinated and

inaccessible routes after other services are installed, shall be relocated at the expense of the Contractor.

iv. All conduits, trunking, cable trays and cable ladders shall be earthed in accordance to IS: 4043.

SPECIFICATIONS

i. All conduits shall be high impact rigid 2mm thickness PVC heavy duty type
ii. Conduit shall be terminated with adopter/PVC glands as required
iii. All accessories used shall be of standard white or black colour, identical to conduit used.

8. EARTHING SYSTEM

STANDARDS

A. Complete earthing system shall be engineering and constructed in accordance with the latest revision of the following standards and the appropriate BS/IEC: 1.
   1. IS: 3043 : Earthing
   2. BS6651 : Lightning Protection System
   3. IEC 61024-1-2 : Lightning Protection System

B. The detail of the Earthing System shall also conform to the requirements of all relevant local codes, as applicable, together with the additional requirements referred to in this Specification and Drawings, whichever is the more stringent and acceptable to the Engineer.

WORK DESCRIPTION

i. This section specifies the engineering, supply, installation, testing, commissioning and setting to work of the complete earthing network for individual earthing systems, circuit protective conductors and bonding conductors. A complete earthing network comprising cables, copper tapes, electrodes and earth bonding of all relevant necessary non-current carrying metal parts of equipments/ apparatus shall have connected as required.
ii. The system shall have a common earthing system as described in the Specification and as shown on the Drawings. Individual earthing systems shall be provided as follows as per drawing. Earth main MV/LV/Generator Electrical Earthing shall have 2 connection to the earthing system:
iii. MV Electrical Earthing
iv. LV Electrical Earthing
v. Generator Earthing
vi. ELV Earthing
vii. Sufficient numbers of electrodes interconnected by Cooper/ GI (as per BOQ) to form earthing mat so that the overall earth resistance shall be less than 1 ohm for each individual earthing mat.
viii. The number of earth electrodes of the earthing mat are indicated on the drawings as minimum. The Contractor shall test the resistivity of soil at site. Exact number of earth electrodes shall be determined by the Contractor to achieve the earth resistance value subject to Engineer approval. The complete earthing installation include earth plate, earth mat detail to achieve the earth resistance value shall be included in the Contract.
ix. The Contractor shall inform the Engineer or his representative before driving Plate/ pipe earthing into the ground so that he may supervise the operation. Driving shall be carried out only in the presence of the Engineer or the representative and all earthing plates/ pipes shall be submitted for the examination before use.

SPECIFICATIONS :

i. The resistance between earthing system and the general mass of earth shall not be greater than 1 ohm.
ii. The earth loop resistance to any point in the electrical system shall not be in excess of 0.5 ohms in order to ensure satisfactory operation of protective devices.
iii. The resistance to earth shall be measured at the following:-
iv. At each electrical system ground or system neutral ground.
v. At one point on each grounding system used to ground electrical equipment enclosures.
vi. At one point on each grounding system used to ground wiring system enclosures such as metal conduits and cable sheaths or armoured.
vii. All earthing conductors shall be of high conductivity copper/ G.I. as per B.O.Q. and shall protected against mechanical damage. The cross-sectional area of earth conductors shall not be smaller than half that of the largest current carrying conductor. However, the contractor shall use the sizes specified in the bill of quantities of the Tender. Common earth mats of resistivity of less than one (1) ohm, shall be constructed below the lowest floor structure prior to any ground work construction. The earth mats shall comprise the complete earth electrodes, earth strips/grids, earth inspection chambers, earth leads, main earth terminals, earth test link boxes at ground level, etc. Each individual earthing system shall have earth leads connecting its main earth terminal directly to an earth electrode underground as specified.
viii. All earthing products/accessories shall be according to IS standards.
ix. The mating surface of all tapes at joints etc shall be cleaned before clamping and all joints shall be riveted, joint with proper connector or exothermic welded. All connections to electrical apparatus shall be made by a bolted connection in a visible and accessible position

PIPE EARTH ELECTRODE

i. G.I. pipe shall be of medium class 100mm dia and 3m in length.
ii. G.I. Pipe electrode shall be cut tapered at bottom and provided with holes of 12mm dia drilled not less than 7.5cm from each other upto 2m of length from bottom.
iii. The electrode shall be buried in the ground vertically with its top not less than 20cm below ground level.
iv. Clamping of the earth leads to the earth rod shall be made by earth clamp. The clamps shall be capable of providing a high pressure contact between the earth rod and the earth leads to achieve a low contact resistance.
v. When two or more electrodes are driven to form a group, the heads of the electrodes in the group shall be bonded to each other by means of a 25 mm x 3mm GI/ Copper strip, laid at a depth of at least 600 mm in soil.
vi. All earth electrode penetrations through basement water proofing membranes shall be provided with manufacturer's recommended water seal insert sleeve approved by Engineer. The installation of the water seal insert sleeve shall be under the supervision and endorsed by the manufacturer's representative to ensure the installation comply with the manufacturer installation detail.

PLATE EARTH ELECTRODE

i. The plate earth electrode shall consist of copper plate or G.I. plate as per item of work. The plate electrode shall be buried in ground with its faces vertical and top not less than 4.5m below Ground level. The plate shall be filled with charcoal dust and common salt filling, extending 15cm around it's on all sides.
ii. A watering pipe of 50mm dia of medium class G.I pipe shall be provided.
iii. The top of the pipe shall be provided with a funnel and a G.I. mesh screen for watering the earth. In the case of pipe electrode a removable plug shall be provided.

iv. The earthing lead from electrode onwards shall be suitably protected from mechanical injury by a suitable dia medium class G.I. pipe in case of wire and size according to strip size.
v. The overlapping of strips at joints shall done in approved manner
vi. GI strips shall be riveted with rivets/ bolted and welded.
vii. Copper strips shall be riveted with rivets/ bolted brass nuts, bolts and washers and brazed.
viii. The protection pipe within ground shall be buried at least 30 cm deep (to be increased to 60cm in case of road crossing and pavements).
ix. The portion within the building shall be recessed in walls and floors to adequate depth.
x. In the case of plate earth electrode the earthing lead shall be securely bolted to the plate with two bolts, nuts, check nuts and washers.
xi. In case of pipe electrode, it shall be connected by means of a through bolt, nuts and washers and cable socket.
xii. Main earthing conductor is taken from the earth electrode with which the connection is to be made.
xiii. No earth pit shall be fixed within 1.5 M of a wall of foundation. The location of the earth electrode will be such where the soil has reasonable chance of remaining moist. Effort shall be made to locate them in grass lawns or near flower beds or water taps.

EARTH INSPECTION CHAMBER

i. Earth electrode shall be fitted with a heavy-duty pre-cast concrete inspection chamber/pit complete with heavy-duty cover as specified on drawings.
ii. For earth electrodes located outside or on the apron of the building, earth inspection chambers shall extend to a depth of not less than 300 mm below finished ground level and kept free of soil. For earth electrodes located inside building, earth electrodes shall be buried not less than 100 mm below the floor slab structure. Each earth electrode shall be clearly marked 'SAFETY ELECTRICAL EARTH CONNECTION – DO NOT REMOVE.
iii. The chamber and cover shall be heavy duty detail to consider the traffic load at the location of installation. The cover shall be recessed cover to receive the Architectural floor finish at the location of installation.

EARTH STRIP

i. Earth strips/grids shall be of bare GI/ Copper strips of 25 mm x 3 mm as specified.
ii. Earth strips shall be riveted or joint with proper connector to earth electrodes underground below the floor slab structure, and shall be buried not less than 300 mm below the floor slab structure.
iii. In order to minimise the mutual inductance between strips, earth strips shall be positioned at a distance not less than 6m apart unless otherwise specified.

9. LUMINAIRES (LIGHT FITTINGS) AND LAMPS

Scope:

The scope of this section comprises of Supply, erection, testing and commissioning of lighting fixtures for internal lighting & external lighting wherever required, of the specified models.

Without restricting to the generality of the foregoing, this section shall include luminaries, lamps and accessories necessary and required for the installation.

Whether specifically mentioned or not, the luminaries and lamps shall be provided with all fixing devices, terminal blocks, holders etc. as required.

General Requirements:

All the luminaries and lamps shall be LED type of best quality and as per approved makes. Wherever alternative makes are specified the choice of selection shall remain with the Engineer-in-Charge.

The luminaries and lamps shall be fixed in a neat work man like manner, true to level and in accordance with manufacturer's instructions.

The luminaries and lamps shall be provided with such accessories as are required to complete the item in working condition whether specifically mentioned in the specifications, drawings or not.

Luminaries:

1. Luminaries shall comply with relevant IS.
2. Unless otherwise indicated, enclosure of luminaries shall provide a minimum degree of protection of IP20 when located within buildings and IP 44 when located outside buildings, but luminaries mounted externally; and less than 2 M above finished ground or paved level shall be IP 54 unless specified in BOQ. For area where chance of water leakage is there fitting should be of IP65 & IP 66
3. Unless otherwise indicated, luminaries, both with and without built-in ballast or transformers shall be suitable for direct mounting on normally flammable surface.
4. Where specific requirements related to flame propagation and flammability of translucent covers are indicated, certificates of tests shall be submitted to the Engineer-in-Charge. The tests shall comply with relevant IS.
5. Terminal blocks for connection of the supply cables shall be of adequate size for the size of conductors forming the loop in wiring unless separate tails are required. Wherever indicated, the terminal block shall incorporate a fuse of suitable type and rating.
6. Ballasts for tubular fluorescent lamps shall have a maximum value of harmonics complying with the colour headed “without H Marking" in Table VII of BS 288. Power factor correction shall be provided and this shall not be less than 0.85 lagging unless otherwise indicated.
7. Translucent covers and reflective surfaces shall be clean at the completion of the works.

Applicable BIS standards:

The lighting and their associated accessories such as lamps, reflectors, housings, ballasts etc. shall comply with the latest applicable standards, more specifically the following:

General and safety requirements for luminaries:

Tubular fluorescent lamps	IS-1913 (Part–1)
Self- Ballasted LED Lamps for General Lighting Services Part 1 & Part-2 Safety Requirements & Performance Requirements	IS- 16101 : 2012; IS- 16102(Part 1) : 2012; IS- 16102(Part 2) : 2012
Led Modules for General Lighting Part 1 & Part-2 Safety Requirements & Performance Requirements	IS- 16103(Part 1) : 2012; IS- 16103(Part 2) : 2012
Safety of Lamp Control Gear Part 2 Particular Requirements Section 13 d.c. or a.c. Supplied Electronic Controlgear for Led Modules	IS- 15885(Part2/Sec13): 2012
Industrial lighting fittings with metal reflectors	IS – 1977
Decorative lighting outfits	IS – 5077
Bayonet lamp holders	IS – 1258
BI-pin lamp holders for tubular fluorescent Lamps	IS – 3323
Electronic Ballasts for fluorescent lamps –General & safety requirement	IS – 13021 (Part–1)

Electronic ballasts for fluorescent lamps – Performance requirement	IS – 13021 (part – 2)
Ballast for HP MV lamps	IS – 6616
Tubular fluorescent lamps	IS – 2418 (part–1 to 4)
Luminaries – general requirement	IS – 10322 (part – 1)
Luminaries – constructional requirement	IS – 10322 (part – 2)
Luminaries – screw and screw-less Termination	IS – 10322 (part – 3)
Luminaries – methods of tests	IS – 10322 (part – 4)
Particular requirement – general purpose Luminaries	IS – 10322 (part-5 sec-1)
Particular requirement– recessed Luminaries	IS – 10322 (part- 5/sec-2)
Particular requirement – luminaries for Road and street lighting	IS – 10322 (part-5/sec-3)
Particular requirement – portable general Purpose luminaries	IS– 10322 (part-5/sec-4)
Particular requirement – Flood lighting	IS– 10322 (part-5/sec-5)
Particular requirements --- Street light Pole	IS-2629/2633/4759

SPECIFICATIONS :

i. Lamps shall be of the type and ratings as indicated.
ii. All lamps shall be supplied and installed by the contractor unless otherwise directed.
iii. Lamp caps shall be suitable for the lamp holders listed socket by means of a locking ring.

Support and Fixings:

i. Where fluorescent luminaries 1200 mm or more in length are supported directly by the conduit system, they shall be fixed to two circular conduit boxes both of which shall form an integral part of the conduit system.
ii. Where the weight of a luminaire is supported by a conduit box or cable Trunking, the fixing of the conduit box or Trunking shall be adequate for the purpose and approved by Engineer-in-Charge.
iii. Luminaries fitted with tungsten filament lamps and having metal back plates shall not be fixed directly to conduit box in which thermoplastic material is the principal load bearing member.
iv. Where luminaries are supported from the structure other than by the conduit system, the supports shall be adequate for the purpose and approved by Engineer-in-Charge.
v. Luminaries mounted on or recessed into suspended ceilings shall not support luminaries unless specifically shown and approved.
vi. For wall mounted luminaries, the mounting height shall be 1900 mm above finished floor level, measured to the centre of the conduit box, unless otherwise indicated.

Wiring Connections:

i. Where luminaries, are fixed at places other than circular conduit boxes or are supported by pedants or chains, the final circuit wiring shall terminate at a terminal block in the conduit box.
ii. Where luminaries having fluorescent tubes are fixed direct to circular conduit boxes, the final circuit wiring may be terminated within the luminaries unless otherwise indicated. The wiring shall enter each luminary at the conduit entry nearest to the terminal block and

where a loop in wiring system is used, leave by the same entry; wiring shall not pass through a luminaries unless the approval of the Engineer-in-Charge.

iii. Where luminaries are mounted on or recessed into a suspended ceiling, connection shall be by flexible cord from a plug-in ceiling rose unless otherwise indicated. The plug-in ceiling rose shall be located not more than 500 mm from the access in the ceiling and shall be firmly supported, unless otherwise approved by the Engineer-in-Charge.

iv. Cables and flexible cords for final connections to luminaries shall be suitable for the operating temperature of the luminaire.

v. The size of final connection cables or flexible cords shall be as indicated.

vi. Cables and cords passing close to ballast within a luminaire shall be suitable for the operating temperature of the ballast.

vii. A protective conductor shall connect the earthing terminal or earthing contact of each luminaire to an earthing terminal incorporated in the adjacent conduit box. Where the final connection is by flexible cord, the protective conductor shall form part of the core.

10. ELECTRICAL GENERAL PROVISIONS:

WORK DESCRIPTION:

i. The scope of works for all electrical works and systems comprises engineering, supply, delivery, installation, testing and commissioning, handover, training, maintenance and warranty all as described or reasonably implied in the Contract. The Contractor is obliged to provide fully functioning works and systems in conformance with the requirements of the Contract. In the event certain items are not fully described or indicated in the Contract, but deemed essential by the Engineer for the performance of the works and systems then the provision of such items shall form part of the Contractors scope of works at no additional cost to the Owner.

ii. The Contractor shall be responsible to co-ordinate the equipment and services and shall produce properly co-ordinated shop drawings to demonstrate the installation comply with the performance requirement with shop drawing, calculations and details. A. Shop drawings shall take into account actual measurement and setting out dimensions/levels obtained and determined by the Contractor on site, actual equipment/material used, actual routing of services, co-ordination with all installation, and site conditions/constraints. This specification is intended to cover installation, testing and commissioning of LV Panels and associated equipment/ materials, panels, etc

10.1 SCOPE OF WORK :

The electrical and ELV installation shall include the following :

i. Liaison with the local supply Authority to obtain and coordinate provision of incoming electricity supply.

ii. Installation, testing & commissioning of MV system including incoming electricity supply, consumer main MV switchboard, cabling to component MV switchboards, cabling to power transformer, power transformers and associated accessories to SEB requirement and arrange SEB acceptance upon completed.

iii. Supply, installation, testing & commissioning of telephone system including incoming telephone lines, component telephone distribution panel at each level, interconnecting cablings and associated accessories.

iv. To provide telephone cabling as specified on the drawings.

v. Complete central earthing systems for connection with component electrical systems.

vi. Complete LV distribution system including main LV switchboard, automatic power factor correction devices, sub-boards and distribution boards, UPS and associated distribution main and sub-main cabling and associated accessories.
vii. Complete lighting and power installation including all final circuiting work and associated accessories.
viii. Normal and emergency lighting supply and installation and associated accessories.
ix. Complete earthing system.
x. Complete lightning protection system and associated accessories.
xi. Complete telephone cabling system and associated accessories.
xii. Complete wiring work to external/landscape and public area architectural/special lighting and dimming systems and associated accessories.
xiii. Complete cable support system for future structure cabling system and associate works.
xiv. Miscellaneous works like providing and fixing of rubber mats, fire buckets, first aid box, fire extinguishers, etc.
xv. All associated interfacing power supply work to other mechanical installations.
xvi. All interfacing works with the Building Management System for remote control and monitoring.
xvii. All associated interfacing works with other M&E installations.
xviii. Other works as shown on the Drawings and described elsewhere in the Contract documents.

10.2 CODES AND STANDARD :

i. The design, manufacture, inspection, testing and performance shall comply with all the currently applicable statutes, safety codes, relevant Bureau of Indian Standards (BIS), British Standards (BS), International Electro Technical Commission (IEC) publication, NEMA & VDE Standards amended up to date.
ii. The design engineering, manufacturing and the installation shall be in accordance with established codes, sound engineering, practices and specifications. Further, the same shall conform to the statutory regulations applicable in the country. Contractor shall obtain all approvals from statutory authorities, e.g. Electrical inspector, SEB or any other agency as applicable before commissioning of electrical system if required.
iii. Some of the relevant Indian and British Standards are listed below.
iv. Indian Electricity Act.
v. Indian Electricity Rules.
vi. Factory Act.
vii. Any other standard may be followed provided it is equivalent or more stringent than the standards specified above.

11. ACCEPTABLE MAKES OF MATERIALS – ELECTRICALS

S. NO	Details of Materials / Equipment	Manufacturer
1.	MAIN LT PANEL AND MOTOR CONTROL CENTRE	L&T, SIEMENS, C&S, SCHNEIDER (OR FIRMS WITH VALID CPRI TEST CERTIFICATES)
2.	MCCB, MCB, RCCB, ELCB	LEGRAND, LARSEN & TOUBRO, HAGER, SCHNEIDER ELECTRIC (MERLIN GERIN),
3.	DISTRIBUTION BOARD	LEGRAND, LARSEN & TOUBRO, HAGER, SCHNEIDER ELECTRIC (MERLIN GERIN),
4.	POLY CARBONATE MCB DB	L&T,LEGRAND, HENSEL, HAGER OR EQUIVALENT
5.	CHANGE OVER SWITCH	HPL-SOCOMEC, LARSEN& TOUBRO, GE, SIEMENS
6.	METAL CLAD SHEET STEEL ENCLOSURE SOCKET/PLUG BOX	LEGRAND, L&T, HAGER, SIEMENS, SCHNEIDER, HENSEL

S. NO	Details of Materials / Equipment	Manufacturer
7.	SWITCH FUSE UNIT, HRC FUSE	L&T, ABB,GE, SIEMENS
8.	HRC HBC FUSES & BASES	L&T, SIEMENS, LEGRAND, SCHNEIDER
9.	LOAD BREAK SWITCHES	L&T, SIEMENS, GE, SCHNEIDER
10.	MODULAR PLATE SWITCHES AND SOCKETS	LEGRAND, CLIPSAL, CRABTREE, MK
11.	OVERLOAD RELAYS WITH BUILT IN SINGLE PHASE PREVENTER	LARSEN & TOUBRO (ESBEE), SIEMENS, SCHNEIDER ELECTRIC (TELEMECANIQUE-LDR SERIES)
12.	ELECTRONIC DIGITAL METERS (A/V/PF/HZ/KW/KWH) WITH LED DISPLAY	CG SCHLUMBERGER, SECURE, L&T- CONZERV
13.	XLPE ALUMINIUM/COPPER CONDUCTOR ARMOURED MV CABLES UPTO 1100 V GRADE	FINOLEX, RR KABEL, POLYCAB, HAVELLS, CCI
14.	1100 VOLTS GRADE FRLS PVC CONTROL CABLES	FINOLEX, RR KABEL, POLYCAB, HAVELLS, L&T
15.	LT JOINTING KIT / TERMINATION	RAYCHEM, SAFE KIT, M-SEAL
16.	CABLE GLANDS DOUBLE COMPRESSION WITH EARTHING LINKS	COMET, PEECO, GRIPWELL, DOWELLS
17.	BIMETTALIC CABLE LUG	DOWELL'S , LAPP KABEL, COMET
18.	PVC INSULATED COPPER CONDUCTOR STRANDED FLEXIBLE WIRES (FRLS)	POLYCAB, FINOLEX, RR KABEL, HAVELLS, NICCO,
19 .	PVC CONDUIT & ACCESSORIES (ISI APPROVED)	POLYCAB, HARSH, BERLIA, AKG
20.	MS CONDUIT (ISI APPROVED)	BEC, AKG, PRECISION
21	CEILING FAN	CROMPTON GREAVES, POLAR, BAJAJ, HAVELLS,
22.	LIGHT FIXTURES	WIPRO/ PHILIPS/ BAJAJ/EVEREADY/SYSKA OR AS PER BOQ
23.	EXTERNAL LIGHTING FIXTURE, POLES	WIPRO/ PHILIPS/ BAJAJ/ CROMPTON/ AS PER BOQ POLES AS PER BOQ
24.	LAMPS	PHILIPS, HAVELLS, OSRAM,EVEREADY
25.	SELECTOR SWITCH, TOGGLE SWITCH	SALZER (LARSEN & TOUBRO), KAYCEE, SIEMENS
26.	220/24V TRANSFORMERS	VOLSTAT ELECTRONICS, AUTOMATIC ELECTRIC
27.	LIGHTNING PROTECTION	INDELEC, PIORTEH, POUYET
28.	FLEXIBLE CONDUIT	LAPP, HENSEL, JAINSONS
29.	BAKELITE SHEET	HYLAM/FORMICA/GREENLAM

Special Instruction

If any specification/ guideline for application is not given above then CPWD specification for civil work (2009 -vol. I&II) or as per the direction of engineer in charge should be followed.

Samples for Approval

Contractor, before supply of material, should show the samples of all the materials to the bank and get it approved.

However, it should be noted that approval from the Engineer shall not relieve the Contractor of his responsibility and any damage to the property or any loss of life due to the negligence in this regard shall be at the Contractor's account.

Safety Code

The Contractor shall maintain in a readily accessible place first aid appliances including adequate supply of sterilized dressings and cotton wool.

An injured person shall be taken to a public hospital without loss of time, in cases where the injury necessitates hospitalization.

No portable single ladder shall be over 8 metres in length. The width between the side rails shall not be less than 30 cm. Clear and the distance between two adjacent rungs shall not be more than 30 cm. When a ladder is used an extra mazdoor shall be engaged for holding the ladder.

Every opening in the floor of a building or in a working platform shall be provided with suitable means to prevent the fall of persons or materials by providing suitable fencing or railing whose minimum height shall be one metre.

Workers employed on mixing and handling material such as asphalt, cement, mortar shall be provided with protective footwear and rubber hand gloves.

Hoisting machine and tackle used in the works, including their attachments, anchorage and supports shall be in perfect condition.

The Employer reserves the right to instruct the Contractors to take additional safety precautions if found necessary.

All workers shall be provided with helmet, Safety Shoes and Safety belts.

I/We accept to abide by the above scope of work & technical specifications.