SCHOOL OF PLANNING AND ARCHITECTURE, BHOPAL

(An institution of national importance, Ministry of HRD, Govt. of India)

Neelbad Road, Bhauri, Bhopal - 462030

TENDER DOCUMENT

Name of work: Permanent H.T. Connection of 600 KVA H.T. Power on 33 KV side for School of planning & Architecture at Bhouri, Bhopal(M.P.)

Issued to: ----------

Issued by:

Institute Works Department (IWD)

SPA Bhopal

SCHOOL OF PLANNING AND ARCHITECTURE, BHOPAL

(An institution of national importance, Ministry of HRD, Govt. of India)
Neelbad Road, Bhauri, Bhopal - 462030

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Name of work: **Permanent H.T. Connection of 600 KVA H.T. Power on 33 KV side for School of planning & Architecture at Bhouri, Bhopal(M.P.)**

SECTION 1

Tender Form

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SCHOOL OF PLANNING AND ARCHITECTURE, BHOPAL

(Founded by MHRD, Government of India)

Bhauri, Bhopal

Tender Form

Name of work: **PERMANENT H.T.CONNECTION OF 600 KVA H.T.POWER ON 33 KV SIDE FOR SCHOOL OF PLANNING AND ARCHITECTURE BHOPAL AT BHAURI BHOPAL.**

Project Number	Advt/2015-16/RGO…….....
Probable amount of Contract: Rs.	11.35 Lacs (Approx.)……...……
Cost of Tender Form: Rs.	2500 /-……...……....
Paid vide Reciept No.	…… Dated …….....
Time allowed for Completion:	45 days……..
Issued to:	…… (Name of contractor/firm)
Address of the firm:	…….
	…….
Date of Issue:	…27-11-2015 (Date)
Submission date:	To be submitted by **17:00 hours** on 11-12-2015 (Date)
Opening date:	To be opened at 10:00 hours on 14-12-2015. (Date)
Place of Submission and Opening:	Office of the **Dean (P&D), SPA, Bhauri, Bhopal**

Dean (P&D),

Dean (P&D),

School of Planning and Architecture (SPA), Bhopal

SCHOOL OF PLANNING AND ARCHITECTURE, BHOPAL

(Founded by MHRD, Government of India)

Bhauri, Bhopal

List of Important Dates of Bids

1. Name of Work: **PERMANENT H.T.CONNECTION OF 600 KVA H.T.POWER ON 33 KV SIDE FOR SCHOOL OF PLANNING AND ARCHITECTURE BHOPAL AT BHAURI BHOPAL.**

2.1. Completion Period for construction/up gradation: 45 DAYS

2.2. Maintenance Period is five years after construction

3. Date of Issue of Notice Inviting Bid Date27 Month 11 Year 2015

4. Download Bidding Documents - From Date 27 Month 11 Year 2015
To Date 11 Month 12 Year 2015

5. Deadline for Receiving Bid	Date 11 Month 12 Year 2015 Time 17:00 Hours
6. Time and Date for opening Technical Bid/Bids	Date14 Month 12 Year 2015 Time 10:00 Hours
7. Time and Date of opening Financial Bids	Date15 Month 12 Year 2015 Time 10:00 Hours
8. Place of opening bids Address is:	As given in NIT
9. Last Date of Bid Validity	As indicated in NIT
10. Officer inviting Bids Designation:	Director, SPA Bhopal

Dean (P&D),
School of Planning and Architecture (SPA), Bhopal

SCHOOL OF PLANNING AND ARCHITECTURE, BHOPAL

(Founded by MHRD, Government of India)

Bhauri, Bhopal

Notice Inviting Tenders

SPA Bhopal, invites sealed Item rate tenders in three envelope systems from Contractors registered in appropriate class with CPWD or Contractors of equivalent categories registered with other States/Central Government department, institutions, undertakings and authorities for the following work:

Description of Works	Estimated cost	EMD	Period of completion
PERMANENT H.T.CONNECTION OF 600 KVA H.T.POWER ON 33 KV SIDE FOR SCHOOL OF PLANNING AND ARCHITECTURE BHOPAL AT BHAURI BHOPAL.	11.35 Lacs	2%	45 days

1. The amount of earnest money is 2 %.
2. The site for the work is available.
3. Bid documents consisting of qualification information and eligibility criterion of bidders, plans, specifications, drawings, the schedule of quantities of the various classes of work to be done and the set of terms & conditions of contract to be complied with by the Contractor can be seen in the office of the Dean (P&D), SPA,Bhauri Bhopal on any working day during office hours upto 17:00 hours……..
4. Tender document can be downloaded from the internet www.spabhopal.ac.in. In such cases cost of tender document should be submitted as indicated in Para 12.1 Part I (1) (ITB) of Tender Document.
5. Receipt of applications for issue of tender forms by post will be stopped from 16:00 hrs. Four days before the date fixed for opening of tenders.
6. Bidding documents must be delivered **to Dean (P&D), SPA, Bhauri Bhopal on or before 11-12-2015 up to 5:00 P.M.** If the office happens to be closed on the date of receipt of the bids as specified, the bids will be received on the next working day at the same time and venue.
7. Bidding documents can also be delivered at the following places at the assigned date and time.

   To,

   The Director,

   SPA,Bhauri Bhopal

8. Technical bids will be opened at 10:00 A.M. on 14-12-2015 in the office of concerned Dean (P&D), SPA Bhopal, If the office happens to be closed on the date of opening of the bids as specified, the bids will be opened on the next working day at the same time and venue.
9. Financial bids shall be opened on 15-12-2015 at 10 :00 A.M., at office of the Dean (P&D), SPA Bhopal
10. To qualify for award of the Contract, each bidder should have in the last Seven years :

    At least one single similar completed work should be more than Rs 9.27 lacs.

    OR

    Two separate similar completed works more than of Rs 6.95 Lacs.

    OR

    Three separate similar completed works costing not less than the amount equal to 4.6 lacs.

    AND

    One completed work of any nature costing not less than the amount equal to 40% of the estimated cost put to tender with some Central Government Department/State Government Department/ Central Autonomous Body/ State Autonomous Body/ Central Public Sector Undertaking/ State Public Sector Undertaking/City Development Authority/Municipal Corporation of City formed under any Act by Central/ State Government and published in Central/State Gazette.

    Turn over : Annul financial turn over should be at least Rs.**11.35 lacs** during the immediate last 3 consecutive financial year.

11. Bids must be accompanied by the earnest money of the amount specified for the work in the table. The earnest money will have to be in any one of the forms as specified in the Bidding documents.
12. The bid for the work shall remain open for acceptance for a period of Thirty days from the date of opening of bids. If any bidder/ tenderer withdraws his bid/ tender before the said period or makes any modifications in the terms and conditions of the bid, the said earnest money shall stand forfeited.
13. No Engineer of gazette rank or other Gazetted officer employed in Engineering or Administrative duties in an Engineering Department of the State Government is allowed to work as a Contractor for a period of two years after his retirement from Government service, without Government permission. This contract is liable to be cancelled if either the Contractor or any of his employees is found any time to be such a person who had not obtained the permission of the Government as aforesaid before submission of the tender or engagement in the Contractor's service.
14. Other details can be seen in the bidding documents.

Dean (P&D),

Institute Works Department, SPA BHOPAL

Section 2:
Instructions to Bidders

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Section 2
INSTRUCTIONS TO BIDDERS
Clause "A"- General

1. Scope of Bid

1.1 The Employer as defined in the tender document invites bids for the "Supply, Erection and of 33kv line (feeder)" as described in these documents and referred to as "the works". The name and identification number of the works is provided in the NIT. The bidders may submit bids for all of the works detailed in the table given in the Notice Inviting Tender.

1.2 The successful Bidder will be expected to complete the work by the Intended Completion Date specified in the Part I General Conditions of Contract and do the routine maintenance of 33KV line (feeder) for five years from the date of completion & charging .

1.3 The estimated cost of the work is **Rs 11.35 lacs.**

1.4 The successful bidder will be expected to complete the works within 60 days period, from the date of issue of 'Notice to Commence the Work / Acceptance letter.

1.5 The execution of the above works is proposed to be on "Item Rate Contract basis". The approximate quantities for all items of works to be executed are furnished in the Bill of Quantities - Section- 6 of the bidding document.

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

2. Source of Funds

2.1 The Government of India has allocated and allotted the fund for the development of the Institute to Employer. The Institute has decided to undertake the work of construction of major 33kv line (feeder) of the campus through funds received under capital expenditure from the Government of India, Ministry of Human Resource and Development (MHRD).

3. Eligible Bidders

3.1 This Invitation for Bids is open to all bidders found qualified for award of the contract, the Bidder shall provide evidence to the Employer of their capability and adequacy of resources to carry out the contract effectively.

3.2 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 5, Forms of Bid and Qualification information, a preliminary description of the proposed work method and schedule, including drawings and charts, as necessary.

4.2 Bids shall include the following documentation and information on the following particulars in the relevant forms as given in the section-5 (Forms of Bid) of bid document.

(a) Copies of original documents defining the constitution or legal status, place of registration and principal places of business; written power of attorney of the signatory of the Bid to commit the bidder; (See Performa- 3 para 1.1 Section-5 Forms of Bid)

(b) Total annual turnover in the electrical works erection business expressed as total of payment certificates for work performed in each for the last five years; (See Performa- 3 para 1.2 Section-5 Forms of Bid)

(c) Performance as Contractor, on works of a similar nature and complexity over the last five years and details of other work on hand and contractual commitments; (See Performa- 3 para 1.3,1.4,1.5 Section-5 Forms of Bid)

(d) Evidence of ownership of major items of construction equipment named in (See Performa- 3 para 1.6Section-5 Forms of Bid) of Tender Document 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 (See Performa- 3 para 1.7 Section-5 Forms of Bid) of ITB for the erection work.

(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) An undertaking that the bidder will be able to invest a minimum of cash up to the percentage (defined in the Tender Document) of the contract price of works, during the implementation of the works;

(h) Evidence of access to line(s) of credit and availability of other financial resources / facilities (10 % of the contract value) certified by banker. (See Performa- 5, 6 Section-5 Forms of Bid)

(i) Authority to seek references from the Bidder's bankers; (Performa- 4 Section-5 Forms of Bid)

(j) 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; (See Performa-3 para 1.12 Section-5 Forms of Bid)

(k) Proposals for subcontracting the components of the work aggregating to not more than **25** percent of the Contract Price;

(l) The proposed methodology and programme of supply erection & commissioning testing , 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 seven years:

At least one single similar completed work should be more than Rs 9.27 lacs.
OR
Two separate similar completed works more than of Rs 6.95 Lacs.
OR
Three separate similar completed works costing not less than the amount equal to 4.6 lacs.
AND
One completed work of any nature costing not less than the amount equal to 40% of the estimated cost put to tender with some Central Government Department/State Government Department/ Central Autonomous Body/ State Autonomous Body/ Central Public Sector Undertaking/ State Public Sector Undertaking/City Development Authority/Municipal Corporation of City formed under any Act by Central/ State Government andpublished in Central/State Gazette.

Turn over : Annul financial turn over should be at least Rs.**11.59 lacs** during the immediate last 3 consecutive financial year.

4.4 B (a) Each bidder must produce:

(i) The current income-tax clearance certificate;

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

(iii) 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 for erection work, either owned, or on lease or on hire, of the key equipment stated in the Appendix to ITB including equipments required for establishing field laboratory to perform mandatory tests, and those stated in the Appendix to ITB;

(ii) Availability for supply & erection work of technical personnel as stated in the Appendix to ITB.

(iii) Liquid assets and/or credit facilities, net of other contractual commitments and exclusive of any advance payments which may be made under the Contract, of not less than the amount specified in the Appendix to ITB;

(c) The bidder must not have in his employment:

(i) The near relations (defined as first blood relations, and their spouses, of the bidder or the bidder's spouse) of persons listed in the Appendix to ITB.

(ii) Without Government permission, any person who retired as gazetted officer within the last two years of the rank and from the departments listed in the Appendix to ITB.

4.4. C To qualify for the contract for which bid is 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 contract.

4.5 Sub-Contractors' experience and resources shall not be taken into account in determining the bidder's compliance with the qualifying criteria. Main contractor has to fulfill all qualifying criteria.

4.6 DELETED

4.7 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.

4.8 Bidders shall not be under a declaration of ineligibility or blacklisted for corrupt and fraudulent practices or poor quality/ delayed implementation of any work by the Government of India (GoI), Government of Madhya Pradesh (GoMP), other State Governments or any other agencies and/ or Statutory Authorities.

5. One Bid per Bidder

5.1 Each Bidder shall submit only one Bid for one work. A Bidder who submits more than one Bid will cause all 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 construction of the Works. The costs of visiting the Site shall be at the Bidder's own expense. He may contact the person whose contact details are given in the Tender Document.

Clause "B" -Bidding Documents

8. Content of Bidding Documents

8.1 The set of bidding documents comprises the documents listed below

1 Notice Inviting Tender
2. Instructions to Bidders
3 Conditions of Contract (Part I General Conditions of Contract)
4 Appendix
5 Forms of Bid
6 Bill of Quantities
7 Technical Specifications
8 Drawings

8.2 One set of the bidding documents will be issued to the bidder against the payment.

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's own risk. Pursuant to clause 25 of ITB, bids, which are not substantially responsive to the requirements of the Bid Documents, shall be rejected.

9. Clarification of Bidding Documents and Pre-bid Meeting

9.1 A prospective Bidder requiring any clarification of the bidding documents may notify the Employer in writing or by cable ("cable" includes telex and facsimile) at the Employer's address indicated in the Notice Inviting Tenders. The Employer will respond to any request for clarification received earlier than 10 days prior to the deadline for submission of bids. Copies of the Employer's response will be forwarded to all purchasers of the bidding documents, including a description of the inquiry, but without identifying its source.

9.2.1 If a pre-bid meeting is to be held, the bidder or his authorized representative is invited to attend it. Its date, time and address are given in the NIT.

9.2.2 The purpose of the meeting will be to clarify issues and to answer questions on any matter that may be raised at that stage.

9.2.3 The bidder is requested to submit any questions in writing or by cable so as to reach the Employer not later than 3 days before the meeting.

9.2.4 Minutes of the meeting, including the text of the questions raised (without identifying the source of the enquiry) and the responses given will be transmitted without delay to all purchasers of the bidding documents. Any modifications of the bidding documents listed in Clause 8.1 of ITB, which may become necessary as a result of the pre-bid meeting shall be made by the Employer exclusively through the issue of an Addendum pursuant to Clause 10 of ITB and not through the minutes of the pre-bid meeting.

9.2.5 Non-attendance at the pre-bid meeting will not be a cause for disqualification of a bidder.

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 part of the bidding documents and shall be communicated in writing by registered post or by cable to all purchasers of the bidding documents. Prospective bidders shall acknowledge receipt of each addendum by cable to the Employer.

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. Language of Bid

11.1 All documents relating to the Bid shall be in the language specified in the 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. For bidding documents downloaded from the website, the demand draft for the cost of the bidding documents placed in a separate cover, marked "cost of bidding document downloaded from the internet";

II. Earnest Money in a separate cover marked 'Earnest Money';

III. Authorized address and contact details of the Bidder having the following information;

Address of communication:

Telephone No. (s) : Office : (FAX) No. :

Mobile No. : Electronic Mail Identification (E-mail ID):

IV. Qualification information, supporting documents, affidavit and undertaking as specified in Clause 4 of ITB. (*Form 3.Bidder Information*)

V. Undertaking that the bid shall remain valid for the period specified in clause 15.1 OF ITB. (*Form 4.Declaration Statement*)

VI any other information/documents required to be completed and submitted by bidders, as specified in the Tender Document, and

VII. An affidavit affirming that information he has furnished in the bidding document is correct to the best of his knowledge and belief. (*Form 13. Affidavit by contractor*)

Part II. It shall be named Financial Bid and shall comprise of:

(i) Form of Bid as specified in Section 5 (form 8. Letter of financial bid)

(ii) Priced bill of quantities for items specified in Section 6;

12. 2 Each part shall be separately sealed and marked in accordance with Sealing and Marking instructions in clause 19 of ITB.

12.3 The following documents will be deemed to be part of the bid.

1 Notice inviting Tender

2 Instruction to the bidders

3. Conditions of Contract
4. Contract Data
5. Specifications
6. Drawings

13. Bid Prices

13.1 The Contract shall be for the whole Work, 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 Tender Document; only the same option is allowed to all the Bidders. Percentage Rate Method requires the bidder to quote a percentage above / below / at par of the schedule of rates specified in the Tender Document.

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.

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 Thirty days after the deadline date for bid submission specified in Clause 20 of ITB. 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. A 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 NIT.

16.2 The Earnest Money shall, at the Bidder's option, be in the form of Fixed Deposit Receipt of a scheduled commercial bank, issued in favor of the **Director, SPA Bhopal**, payable at Bhopal. The Fixed Deposit Receipt shall be valid for six months or more after the last date of receipt of

bids. Other forms of Earnest Money acceptable to the Employer are stated in the Tender Document.

16.3 Any bid not accompanied by an acceptable Earnest Money, unless exempted in terms given in the Tender Document, 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.

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 4.1(a) 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.

Clause "D" -Submission of Bids

19. Sealing and Marking of Bids

19.1 The Bidder shall place the three separate envelopes (called inner envelopes) marked "EMD", "Technical Bid" and "Financial Bid" in one outer envelope. The inner envelopes will have markings as follows:

- EMD
- Technical Bid: To be opened on _14.12.2015____ (opening as per clause 22.1 of ITB.)
- Financial Bid: Not to be opened except with the approval of the Employer.
- The contents of the Technical and Financial Bids shall be as specified in clause 12.1of ITB.

19.2 The inner and outer envelopes containing the EMD, Technical and Financial Bids shall

(a) Be addressed to the Employer at the address provided in the Tender Document;

(b) Bear the name and identification number of the Contract as defined in clause 1.1 of ITB; and

(c) Provide a warning not to open before the specified time and date for Bid opening as defined in clause 22.1 of ITB.

19.3 In addition to the identification required in Clause 19.2, each of the envelopes shall indicate the name and address of the Bidder to enable the Bid to be returned unopened in case it is declared late, pursuant to Clause 21 of ITB, or is declared non-responsive pursuant to Clause 22 of ITB.

20. Deadline for Submission of Bids

20.1 Complete Bids (Technical and Financial) must be received by the Employer at the address specified in the Tender Document not later than the date and time indicated in the Tender Document. In the event of the specified date for the submission of bids being declared a holiday for the Employer, the Bids will be received up to the specified time on the next working day.

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 Any 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 (except those received late) in the presence of the bidders/bidders' representatives who choose to attend at the time, date and place specified in the Tender Document. 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 envelope containing the technical bid shall be opened. The inner envelope marked "cost of bidding document downloaded from the internet" 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. In case of tender document downloaded from the Internet, bidder will have to sign/seal on the authentic copy of tender document which shall be submitted by the bidder. In case of any difference in the conditions of the two documents conditions given in the authentic copy of the document will prevail.

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 at the opening.

22.4 The Employer will prepare minutes of the Bid opening, including the information disclosed to those present in accordance with Clause 22.3 of ITB.

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 a list of the responsive bids whose financial bids are eligible for consideration will be prepared.

22.6. The Employer shall inform, by telegram or facsimile, the bidders, whose technical bids are found responsive, date, time and place of opening as stated in the Appendix 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 opening of the 'Financial Bid', the names of the bidders whose bids were found responsive in accordance with clause 22.5 of ITB will be announced. The financial bids of only these bidders will be opened. The remaining bids will be returned unopened to the bidders. 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 of ITB; (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" is 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's rights or the Bidder's 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" is 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 Employer will evaluate and compare only the bids determined to be substantially responsive in accordance with Clause 25 of ITB.

27.2 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.

27.3 If the Bid of the successful Bidder is seriously unbalanced in relation to the Engineer's estimate of the cost of work to be performed under the contract, the Employer may require the Bidder to produce detailed price analyses 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 analyses, 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.

27.4 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 five years under the contract, the Employer may require the Bidder to produce detailed price analyses for routine

maintenance. After its 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 offered the lowest evaluated Bid price, 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

ii. To be within the available bid capacity adjusted to account for his bid price which is evaluated the lowest in any of the packages opened earlier than the one under consideration.

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 by cable, telex or facsimile 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, completion and maintenance of the Works, and the routine maintenance of the works for five years, 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.

31.4 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, for the period of five years and the time for completion of works plus additional security for unbalanced Bids in accordance with Clauses 27.3 and 27.4 of ITB and Clause 46 Part I General Conditions of Contract and sign the contract.

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

If the Performance Security is in the form of Bank Guarantee, it should be valid until a date 60 days from the date of expiry of defect liability period. Bank Guarantee valid for a lesser period (not less than 1 year) may be initially accepted, but the bidder/contractor would get this Bank Guarantee extended in such a way that an amount equal to 5% of the contract price is always available with Employer until 60 days after the lapse of Defect Liability Period. If the bidder/contractor fails to maintain above Performance security, the Employer would recover the same from any dues payable to the contractor". Bank Guarantee should be from a scheduled Commercial Bank (other than Co-Operative Bank).

32.3 Failure of the successful Bidder to comply with the requirements of Clause 32.1.shall constitutes sufficient grounds for cancellation of the award and forfeiture of the Earnest Money. He will also be debarred from participating in other bids of Employer for one year.

33. Advances

33.1 The Employer will provide Mobilization Advance and Advance against the security of equipment as provided in Part I General Conditions of Contract.

34. Corrupt or Fraudulent Practices

34.1 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.

S.N.	Particulars	Clause no.
01	**The Employer is :** School of Planning and Architecture, Bhauri Bhopal. **Phone: 9685092821** Name of Authorised Representative : **Director**	1.1
02	**The name of the Contract/ Work is :** **Permanent H.T. Connection of 600 KVA H.T. Power on 33 KV side FOR SCHOOL OF PLANNING AND ARCHITECTURE BHOPAL AT BHAURI BHOPAL.**	1.1
03	Identification No. of the works is: As indicated in NIT.	1.1
04	The State is Madhya Pradesh.	1.1
05	Eligible Bidders are: Those will fulfill criteria as mentioned in NIT.	3.1
06	The information required from bidders in Clause 4.2 is modified as follows: **None**	4.2
07	The percentage is 20% of contract price.	4.2 (g)
08	Other certificates required with the bid are: None.	(4.4 **B**) (a) (iii)

S.N.	**Name of the Equipment**	**Quantity**
01	5 KV Megger	01
02	Earth register instrument	01
03	Multimeter	02
04	Tong Tester	02
05	Truck	01
06	Tractor	01

Note: This is subject to review with reference to size of package and actual requirement for completing the work in given time.

11. The Number of Technical personnel, Qualifications and Experience as per clause (4.4 B) (b) (ii) will be as follows:

A. Technical Personnel required:

Position	Minimum qualification	Number		Minimum Experience
		For work costing Upto Rs.5 crores	For work costing more than Rs.5 cr	In similar position
Project Engineer	B.E. Electrical	01	01	03
Assistant Project	B.E. Electrical	01	01	03

Engineer				
Material Engineer	B.E. Electrical	01	01	03
Lab technician	Diploma Or equivalent	01	02	03
Field Engineer	Diploma in Electrical Engineering	01	01	02

Note: For work less than Rs. 2.00 crores one Assistant Project Engineer and one Material Engineer or Lab Technician will be required Field Engineer as above.

B. Field testing laboratory (each package) shall consist following personnel:

Technical Personnel	Number	Experience in Lab Works
Lab Technician	1	Minimum 5 years
Lab Assistants	2	Minimum 2 years

Note: For package less than Rs. 5 crores one lab technician and one lab assistant will be required.

S.N.	Particulars	Clause no.
12	The minimum amount of liquid assets and/or credit facilities net of other contractual commitments of the successful Bidder shall be 15% of contract amount. *[Note: Usually the equivalent of estimated payments flow over 2 months at the average (straight line distribution) construction rate.]*	(4.4) (b) (iii)
13	The bidder must produce an affidavit stating that the near relations of the following departmental officers are not in his employment: **Note:** The term near relative means wife, husband, parents and son, grandson, Brother, sister, brother-in-law, father-in-law and mother-in-law.	(4.4 **B**) (c) (i)
14	The bidder must produce an affidavit stating the names of retired gazette officer (if any) in his employment who retired within the last two years with the following ranks from the departments listed below: AE, EE, SE and CE from CPWD, RES and MPKVVCL. In case there is no such person in his employment, his affidavit should clearly state this fact.	(4.4 **B**) (c) (ii)
15	M = 2	4.6
16	The contact person is: Dean (P & D) SPA Bhopal Ph:	(7.1)
S.N.	**Particulars**	**Clause no.**
17	Place, Time and Date for pre-bid meeting are: Place As given in NIT Time: Date:	(9. 2.1)
18	Language of the bid is: English	(11.1)
19	The other documents required are: ……	(12.1) Part I (v)

20	Bids may be submitted only in : **item Rate Method**	(13.2)
21	The Schedule of Rate applicable for Percentage Rate Method is- As per NIT.	(13.2)
22	The amount of Earnest Money shall be Rs. 2% of estimated cost as indicated in NIT.	(16.1)
23	Fixed Deposit Receipt must be drawn: In favour of: **Director, SPA Bhopal**	(16.2)
24	Exemption from Earnest Money is granted to: None.	(16.3)
25	The Employer's address for the purpose of Bid submission is - As indicated in NIT.	(20.1)
26	The deadline for submission of bids shall be: Time _____ As indicated in NIT. Date _____ As indicated in NIT.	(20.1)
27	**(A) Technical Bid** Date Time - As indicated in NIT. Place: **(B) Financial Bid (For qualified bidder as)** Date: Time:- As indicated in NIT. Place:	(22.1) & (22.6)
28	The amount and validity period of the performance guarantee is: Amount: 5 percent of the contract price Validity Period: (i) Performance security shall be valid until a date 60 days after the expiry of Defect Liability Period. (ii) Additional Performance Security for unbalanced Bid shall be valid for 45 days plus intended completion period. (iii) Additional Performance Security for unbalanced Bid for routine maintenance shall be valid until a date 60 days after the expiry of Defect Liability Period.	(32.1)

Dean (P & D),

Institute Works Department,

School of Planning and Architecture, Bhopal

Section 3
General Conditions of Contract

Table of Clauses

Section- 3
General Conditions of Contract- Part I

Notes on Conditions of Contract

The Conditions of Contract, read in conjunction with Part II Special Conditions of Contract and the Contract Data and other documents listed therein, should be a complete document expressing fairly the rights and obligations of both parties.

The form of Conditions of Contract that follows has been developed for smaller admeasurements contracts for construction on the basis of international practice and the practice of the Government of India, Ministry of 33kv line (feeder) work considerable experience in different States in India in the drafting and management of contracts, bearing in mind a trend in the construction industry towards simpler, more straightforward language. The Conditions of Contract also incorporate the concept of performance-based payments for routine maintenance of 33kv Line (feeder).

A. General

1. Definitions

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.

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

1.2 **Compensation Events** are those defined in Clause 40 hereunder.

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

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

1.5 **The Contract Data** defines the documents and other information which comprise the Contract.

1.6 **The Contractor** is a person or corporate body whose Bid to carry out the Works, including routine maintenance, has been accepted by the Employer.

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

1.8 **The Contract Price** is the price stated in the Letter of Acceptance and thereafter as adjusted in accordance with the provisions of the Contract.

1.9 **Days** are calendar days; months are calendar months.

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

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

1.12 **The Defects Liability Period** is five years calculated from the Completion Date.

1.13 **Drawings** include calculations and other information provided or approved by the Engineer for the execution of the Contract.

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

1.15 **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.

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

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

1.17 **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.

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

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

1.20 **Routine Maintenance** is the maintenance of 33kv line (feeder) for five years as specified in the Contract Data.

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

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

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

1.24 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.

1.25 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.

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

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

1.28 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. Routine maintenance is defined separately.

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:

i. Agreement,
ii. Notice to Proceed with the Work,
iii. Letter of Acceptance,
iv. Contractor's Bid,
v. Contract Data,
vi. Special Conditions of Contract Part II,
vii. General Conditions of Contract Part I,
viii. Specifications,
ix. Drawings,
x. Bill of Quantities, and
xi. 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 /Dean (P & D)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/Dean (P & D) 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.

6. Communications

6.1 All certificates, notice or instruction to be given to the Contractor by Employer/Engineer shall be sent on the address or contact details given by the Contractor in Section – 5 Form of Bid.

The address and contract details for communication with the Employer/Engineer shall be as per the details given in Contract Data to GCC. Communication between parties that

are referred to in the conditions shall be in writing. The Notice sent by facsimile (fax) or other electronic means shall be effective on confirmation of the transmission. The Notice sent by Registered post or Speed post shall be effective on delivery or at the expiry of the normal delivery period as undertaken by the postal service.

7. Subcontracting

7.1 The Contractor may subcontract part of the construction work with the approval of the SPA Bhopal in writing, up to 25 percent of the contract price but will not assign the Contract. Subcontracting shall not alter the Contractor's obligations.

7.2 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.

7.3 Beyond what has been stated in clauses 7.1 and 7.2 of GCC 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.

7.4 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 subcontracted.

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 and routine maintenance 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. If contractor fails to deploy required no. of technical staff with requisite qualifications recovery at the rate of Rs. 20,000/- per person/month will be made from the contractor. If contractor fails to deploy staff continuously for 3 months, this will be a cause for the termination of the contract.

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.

9.3 The Contractor shall not employ any retired Gazetted officer who has worked in the Engineering Department of the State Government and has either not completed two years after the date of retirement or has not obtained State Government's permission to employment with the Contractor.

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's 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

12.1 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 of GCC, 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:

a. Personal injury or death.

13.3 (b) 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.

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

13.5 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.

16.2 The contractor shall construct the works with intermediate technology, i.e. by manual means with medium input of machinery required to ensure the quality of woks as per specifications. The contractor shall deploy the equipment and machinery as given in Contract Data.

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

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

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

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

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

18.5 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.

19. 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 other interest or of significant value unexpectedly discovered on the Site shall be the property of the Employer. 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 handover complete or part possession of the site to the Contractor 7 days in advance of construction programme. At the start of the work, the Employer shall handover the possession of atleast 75% of the site.

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

23.1 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

If any dispute or difference of any kind what-so-ever shall arises in connection with or arising out of this Contract or the execution of Works or maintenance of the Works there under, whether before its commencement or during the progress of Works or after the termination, abandonment or breach of the Contract, it shall, in the first instance, be referred for settlement to the competent authority, described along with their powers in the Contract Data, above the rank of the Engineer. The competent authority shall, within a period of forty-five days after being requested in writing by the Contractor to do so, convey his decision to the Contractor. Such decision in respect of every matter so referred shall, subject to review as hereinafter provided, be final and binding upon the Contractor. In case the Works is already in progress, the Contractor shall proceed with the execution of the Works, including maintenance thereof, pending receipt of the decision of the competent authority as aforesaid, with all due diligence.

25. Arbitration

Either party will have the right of appeal against the decision of the competent authority, nominated under Clause 24, to the Madhya Pradesh Arbitration Tribunal constituted under Madhya Pradesh Madhyastham Adhikaran Adhiniyam 1983 provided the amount of claim is more than Rs. 50,000/-.

B. Time Control

26. Programme

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 The contractor shall submit the list of equipment and machinery being brought to site, the list of key personnel being deployed, the list of machinery/equipments being placed in field laboratory and the location of field laboratory along with the Programme. The Engineer shall cause these details to be verified at each appropriate stage of the programme.

26.3 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.

26.4 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.

26.5 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. If defects notified by the Engineer are not attended to by the contractor within 15 days from the date of notice, penalty of Rs 10000/- per day, subject to a maximum of Rs. 100000/- will be imposed by the Engineer till defect are rectified by the contractor. Non compliance of the notice may lead to termination of contract also.

31. Tests

31.1 For carrying out mandatory tests as prescribed in the specifications AS per CPWD, the contractor shall establish field laboratory at the location decided by Engineer. The field laboratory will have minimum equipments as specified in the Contract Data. The contractor shall be solely responsible for:

a. Carrying out the mandatory tests prescribed in specifications, and
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/ CPWD Manual 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 and Routine Maintenance of 33 kv line (feeder) for five years

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 five 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 duration of time specified by the Engineer's notice.

32.2.1 The Contractor shall do the routine maintenance of 33KV line (Feeder) to the required standards and in the manner as defined in clause 1.1 of GCC and keep the entire feeder and structure in Defect free condition during the entire maintenance period which begins at Completion and ends after five years.

32.2.2 The routine maintenance standards shall meet the following minimum requirements:-.

i. Insulator checks not bust to be maintained in proper condition to replace.

ii. Any other maintenance operation required to keep the 33kv line (feeder) at all time during the maintenance period.

32.2.3 To fulfill the objectives laid down in sub clauses 32.2.1 and 32.2.2 above, the Contractor shall undertake detailed inspection of the 33KV line at least once in a month. The Engineer can reduce this frequency in case of emergency. The Contractor shall forward to the Engineer the record of inspection and rectification each month. The Contractor shall pay particular attention on those 33kv line sections which are likely to be damaged or inundated during rainy season.

32.2.4 The Engineer may issue notice to the Contractor to carry out maintenance of defects, if any, noticed in his inspection, or brought to his notice. The Contractor shall remove the defects within the period specified in the notice and submit to the Engineer a compliance report.

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 GCC, to the satisfaction of the Engineer, within the time specified in the Engineer's notice, the Institute Architect 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, installation, testing, and commissioning, maintaining works, and lump sum figures for yearly routine maintenance for each of the five years separately, 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 erection of 33 kv H.T.line (feeder). The payment to the Contractor is performance based for routine maintenance of feeder.

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/ DSR/ SOR, 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 of GCC for quantities (higher or lower) exceeding the deviation limit.

36.2 If the rates for Variation are not specified in the Bill of Quantities/DSR/ SOR, 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** 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:

(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.

(b) The Engineer shall check the Contractor's fortnightly/monthly statement within 14 days and certify the amount to be paid to the Contractor.

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

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

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

(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.

(g) The payment of final bill shall be governed by the provisions of clause 50 of GCC.

38.2 The payment to the contractor will be as follows for routine maintenance of the works:

(a) The Contractor shall submit to the Engineer a bill every month for the routine maintenance of the 33 kv line (feeder) from the date the maintenance period starts i.e. from completion date as defined in Clause 1.1, it will be supported with a copy of the record of contractor's monthly inspection and other instructions received from the Engineer if maintenance is included in the scope of work.

(b) The payment will be made six-monthly for the monthly bills received during the previous six-months.

(c) 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 32.2.4 of GCC within specified period, no payment will become due to the Contractor for that month.

(d) If the Contractor has failed to carry out the maintenance with in the period specified by the Engineer, no payment of any kind will be 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.

39.4 Deleted

40. Compensation Events

40.2 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. Currencies

All payments will be made in Indian Rupees.

43. Security Deposit/Retention and Release of Performance Security and Security Deposit/Retention.

43.1 The Engineer shall retain security deposit of 5% of the amount from each payment due to the Contractor until completion of the whole of the construction work. No security deposit/ retention shall be retained from the payments for Routine Maintenance of works.

43.2 "On the satisfactory completion of the whole of the construction work half the total amount retained as security deposit is repaid to the contractor, one-fourth of the total amount retained as security deposit is repaid to the contractor at the end of 2nd year after completion of the construction work and balance of the amount retained as security deposit is repaid to the contractor at the end of 3rd year after completion of the construction work subject to condition that the Engineer has certified that all defects notified by the Engineer to the contractor before the end of period prescribed for repayment have been corrected".

43.3 The additional performance security for unbalanced bids as detailed in Clause 51 of GCC is repaid to the contractor when the construction work is complete.

43.4 The performance security equal to the five percent of the contract price and additional performance security for Routine Maintenance as detailed in Clause 51 of GCC of Conditions of Contract is repaid to the contractor when the period of five years fixed for Routine Maintenance is over and the Engineer has certified that the contractor has satisfactorily carried out the Routine Maintenance of the works. If the Routine Maintenance part of the contract is not carried out by the Contractor as per this contract, the Employer will be free to carry out Routine Maintenance work and the amount required for this work will be recovered from the amount of Performance Security available with the Employer and/or from any amounts of the Contractor whatever is due.

43.5 If the contractor so desires then the Security Deposit can be converted into any interest bearing security of scheduled commercial bank in the name of the Employer or National Saving Certificates duly pledged in favour of the Employer for Defect Liability Period.

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. The delay in departmental assistance ingrained in the contract will be taken duly into account while recovering any compensation for the delay. The decision of the Director Employer shall be final.

45. Advance Payment

45.1. The Employer will make the following advance payment to the Contractor against provision by the Contractor of an Unconditional Bank Guarantee in a form and by a Scheduled Commercial Bank acceptable to the Employer in amounts equal to the advance payment:

a. Mobilization advance up to 5 percent of the contract price excluding the contract price for routine maintenance

b. Equipment Advance up to ninety percent of the cost of the new equipment brought to the site, subjects to a maximum of ten percent of the contract price excluding the contract price for routine maintenance

The guarantee shall remain effective until the advance payment has been repaid, but the amount of the guarantee shall be progressively reduced by the amounts repaid by the Contractor. Interest will not be charged on the advance payment.

45.2 The Contractor is to use the advance payment only to pay for Equipment, plant and Mobilization expenses required specifically for execution of the Works. The Contractor shall demonstrate the advance payment has been used in this way by supplying copies of invoices or other documents to the Engineer.

45.3 The advances shall be recovered in 10 installments from the running payments and entire amount of advance shall be recovered one month before the stipulated date of completion whichever is earlier.

46. Securities

46.1 The Performance Security equal to five percent of the contract price and additional security for unbalanced bids 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 and additional performance security for routine maintenance shall be valid until a date 60 days from the date of expiry of Defect Liability Period and the additional security for unbalanced bids shall be valid until a date 45 days from the date of issue of the certificate of completion. If the Performance Security is in the form of Bank Guarantee, it should be valid until a date 60 days from the date of expiry of defect liability period. Bank Guarantee valid for a lesser period (not less than 1 year) may be initially accepted, but the contractor would get this Bank Guarantee extended in such a way that an amount equal to 5% of the contract price is always available with Employer until 60 days after the lapse of Defect Liability Period. If the contractor fails to maintain above Performance security, the Employer would recover the same from any dues payable to the contractor".

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.

48.2 The contractor shall request the Engineer to issue the certificate of completion of the Routine Maintenance and the Engineer will do so upon deciding that the Routine Maintenance 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.

49.2 The Employer shall take over the maintained 33 kv line (feeder) within 7 days of the Engineer issuing a certificate of completion of the Routine Maintenance.

50. Final Account

50.1 The Contractor shall supply the Engineer with a detailed account of the total amount that the Contractor considers payable for works under the Contract within 21 days of issue of certificate of completion of construction of works. The Engineer shall issue a Defects Liability Certificate and certify any payment that is due to the Contractor within 42 days of receiving the Contractor's account if it is correct and complete. If the account is not correct or complete, the Engineer shall issue within 42 days a schedule that states the scope of the corrections or additions that are necessary. If the 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 of final bill for erection works will be made within 14 days thereafter.

50.2 In case the account is not received within 21 days of issue of Certificate of Completion as provided in clause 50.1 above, the Engineer shall proceed to finalise the account and issue a payment certificate within 28 days. The payment of final bill for construction of works will be made within 14 days thereafter.

50.3 The Contractor shall supply the Engineer with a detailed account of the total amount that the Contractor considers payable under the contract 21 days before the end of the Routine Maintenance Period. The Engineer shall issue a Routine Maintenance Completion 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 Contractors revised account. The payment of final bills for routine maintenance will be made within 14 days thereafter.

50.4 In case the account is not received within 21 days of issue of Certificate of Completion as provided in clause 50.3 above the Engineer shall proceed to finalise the account and issue a payment certificate within 28 days. The payment of final bill for routine maintenance will be made within 14 days thereafter.

51. Operating and Maintenance Manuals As per CPWD

51.1 If "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 of GCC;

f) The Contractor fails to provide insurance cover as required under clause 13 of GCC;

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 facts 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 at least thirty percent of the value of erection 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 period specified in the Contract Data; and

j) Any other fundamental breaches as specified in the Contract Data.

k) If the Contractor fails to deploy machinery and equipment or personnel as specified in the Contract Data at the appropriate time.

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

52.4 If the Contract is terminated, the Contractor shall stop work immediately, make the Site safe and secure, and leave the Site as soon as reasonably possible.

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 value of the work done and materials ordered less liquidated damages, if any, 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. 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 payable to the Employer.

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 erection 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.

The Employer/Engineer shall also have right to recover from the Contractor any sum required or estimated to be required for making good the loss or damage suffered by the SPA Bhopal. 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.

58.2 The Contractor shall not disclose details of Drawings furnished to him and works on which he is engaged without the prior approval of the Engineer in writing. No photograph of the works or any part thereof or plant employed thereon, expect those permitted under clause 58.1 of GCC, shall be taken or permitted by the Contractor to be taken by any of his employees or any employees of his sub-Contractors without the prior approval of the

Engineer in writing. No photographs/ Video photography shall be published or otherwise circulated without the approval of the Engineer in writing.

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 from 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.

60. Jurisdiction

60.1 This contract has been entered into the State of Madhya Pradesh and its validity, erection, interpretation and legal effect shall be subjected to the exclusive jurisdiction of the courts in Bhopal or of the courts at the place where this agreement is entered into. No other jurisdiction shall be applicable.

Contract Data to General Conditions of Contract-Part-1

S.N.	Particular	Clause no.
01	**The Employer is :** School of Planning and Architecture, Bhauri,Bhopal **Phone : 09685092821**	1.1
02	**Engineer is :** Institute Architect, Institute Works Department (IWD) School of Planning and Architecture, Bhauri, Bhopal **Phone : 09685092821**	1.1
03	The name of the Contract is : **Permanent HT Connection of 600 KVA H.T.Power on 33 KV Side FOR SCHOOL OF PLANNING AND ARCHITECTURE BHOPAL AT BHAURI BHOPAL.**	1.1
04	The Start Date shall be the date of issue of Acceptance letter / Notice-to-Proceed by the Contractor for the Works	1.1
05	Intended Completion Date: **45 days** from the Date of Commencement as indicated in the Notice to Proceed with the Works / Acceptance letter.	1.1, 17&27
06	The Site is located at km …… As per Enclosure I	1.1
07	The Works consist of 33KV feeder line supply & erection; include the following, as specified or as directed. **(A) 33KV Works:** **Permanent HT Connection of 600 KVA H.T.Power on 33 KV Side FOR SCHOOL OF PLANNING AND ARCHITECTURE BHOPAL AT BHAURI BHOPAL.**	
S.N.	**Particular**	**Clause**
08	The following documents also form part of the Contract : (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,	2.3(11)

	(10) Bill of Quantities, and (11) Any other document as may be specified at the time of issue of acceptance letter and work order.	
09	The language of the Contract Document is **English**	3.1
10	The law which applies to the Contract is the **law of Union of India**	3.1
11	The currency of the contract is **Indian Rupees**.	
12	Retention money: - In IPC's @ 5 % of value of each bill will be withheld and with- held amount will be refunded to the Contractor along with the Final Bill / Taking over certificate.	
13	Amount and deductible for insurance are: - As per rules.	13.1
14	Site investigation report	14.1
15	The Contractor Shall submit a Detailed Work program including Construction Program, Work Methodology, Quality Control and Assurance Plan, for the Works (in such form and detail as the engineer shall reasonably prescribe) within 15 days of delivery of the Letter of Intent or as may be instructed by Engineer from time to time. The Program should have adequate details and conform to this contract provisions, the program submitted along with the Bid, to the extent relevant and instructions of Engineer.	26.1
16	The key equipments/for erection of works shall be : As per contract data of ITB para 44B (b) (I)	
17	Competent authority is:**Director, SPA Bhopal**	24.1
18	(a) The period for submission of the programme for approval of Engineer shall be 7 days from the issue of Letter of Acceptance. (b) The updated programme shall be submitted at interval of 15 days. (c) The amount to be withheld for late submission of an updated programme shall be **Rs. 2.00 lakhs.**	26.1 26.3 26.3
S.N.	**Particular**	**Clause**
19	The percentage of Variation of items of work for which there shall be no increase in rates shall be **– 25% of the total contract amount.**	36.1
20	The authorized person to make payments is Director, SPA Bhopal	39.2
21	(a) Milestones to be achieved during the contract period (1) 1/8th of the value of entire contract work up to 1/4th of the period allowed for completion of construction (2) 3/8th of the value of entire contract work up to 1/2 of the period allowed for completion of construction (3) 3/4th of the value of entire contract work up to 3/4 th of the period allowed for completion of construction	44.1

	(b) Amount of liquidated damages for for Whole of work delay in completion of works 1 percent of the Initial Contract Price, rounded off to the nearest thousand, per week. (c) Maximum limit of liquidated damages for 10 per cent of the Initial delay in completion of work. Contract Price rounded off to the nearest thousand.	
22	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.	46.1
23	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.	46.1
24	(a) The Schedule of Operating and Maintenance Manuals as per CPWD. (b) 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.	51.1
25	The amount to be withheld for failing to supply "as-built" drawings by the date required is 1% of contract amount.	51.2
26	(a) The inspection & test report of all electrical equipment before dispatch of all materials and inspected by consultant of SPA Bhopal, bhauri, Bhopal. (b) After materials received at site and physically inspected in presence of MPMKVVCL, SPA, Bhopal & SPA consultant and report submit to SPA Bhopal any material damage return with time period. (c) Before starting the work submits Erection work Plan and intimate to Electrical Inspector Bhopal, MPMKVVCL, SPA, Bhopal & SPA consultant. Time to time inspected by above authorities and weekly work done measurement sign by above authorizes. (d) If contractor fails to give proportionate progress due to slow execution/stoppage of work (e) If contractor or his personnels misbehave with the departmental or consultancy staff. (f) If contractor is not maintaining required no. of technical personnel and machinery.	52.2 (i) 52.2 (j)

Section 3 A
GENERAL CONSTRUCTION PRACTICES

Table of Clauses

Volume –I

GENERAL CONSTRUCTION PRACTICES

A. CONSTURCTIONAL PRACTICES FOR SUB-STATION SPA BHOPAL

1.0 DETAILED SURVEY

Successful bidder shall carry out detailed survey and prepare the detailed route of, 33 KV, location of Parwalia sadak feeder, neelbad road Bhauri Bhopal S/s, HT consumer on Survey of India map or as specified in Employers requirement, Sec 2, of this bid document The bidder shall make his own arrangements for obtaining the survey of India / topographical maps from the concerned agencies, the final route map of 33 KV shall be prepared and submitted by the bidder showing the proposed pole position, ground clearance, conductor sag and various crossings i.e. railway lines, communication lines, EHT lines, rivers, road and stream crossings on the map to a scale of 1:50000.

1.1 Check Survey of Pole Locations

The detailed survey shall be conducted to locate and peg mark the pole positions on ground conforming to the approved profile and pole schedule. In the process, it is necessary to have the pit centers marked according to the excavation marking charts. The levels up or down of each pit center with respect to the center of the pole locations shall be noted and recorded for determining the amount of earthwork required to meet the approved design parameters.

Changes, if required, after detailed survey in the preliminary pole schedule shall be carried out by the Contractor and he shall thereafter submit a final pole schedule for the approval of employer. The pole schedule shall show position of all Poles, type of Poles, span length, type of foundation for each pole and the deviation at all angles as set out with other details.

(i) Details En-route: All topographical permanent features, such as trees, telecommunication lines, buildings etc, 5.5 meter on either side of the alignment shall be detailed on the route plan.

(ii) Clearance from ground building, trees etc.: Clearance from ground buildings, trees and telephones lines shall be provided in conformity with the Electricity Act, 2003, as amended up to date. The bidder shall select the height of the poles such that all the electrical clearances are maintained.

(iii) The minimum planting depth of poles shall be governed by IS: 1678, However, if due to the ground conditions e.g. water logged area etc. depth of planting of poles shall be suitably increased, with appropriate extension arrangement in order to maintain the required clearances the vendor will submit the details of the same on case to case basis.

(iv) Appropriate Guarding arrangement shall be used for crossings of electric line / telecom line / road / drain / canal crossing and at all points as per statutory requirements. The bidder shall provide install anti climbing devise and danger plates on all poles and DT stations.

1.2 Survey shall be carried out of the existing and proposed 33 KV lines from Parwalia sadak feeder and SPA Bhopal HT consumers. The survey shall be GPS based. It will cover mapping of 33 KV lines poles, location of 33/11 kV Substation, HT lines poles. The survey shall be carried out existing 33 KV feeder wise i.e. all the 33/11 kV sub/station and SPA Bhopal HT consumer connected to it.

1.3 Preparation of single line diagram through suitable GPS indicating the location of each 33 KV lines poles, PTRs, size of the conductors and locations.

For Existing Line

1.4 Survey should also indicate the numbers of existing poles which are leaning and are required to be straightened. It should also indicate whether proper ground clearance is available. In case it is necessary to provide guarding for the 33 KV line crossing the road, it should be indicated.

For new line work

1.5 Based on the aforesaid survey tapping point of 33 KV lines is to be proposed giving the location of proposed new line.

1.6 The survey shall clearly indicate the locations where road crossing guarding of telephone line is required.

1.7 Bill of Quantity (BOQ) for the proposed infrastructure as per the survey for each village is to be prepared and to be submitted to the person designated by the Employer for its approval before commencing work.

1.8 The detail of survey which include pole location, distance between poles, reference point, size of conductor and other details as per above shall be provided to the Employer in Excel format or text format along with the data field name.

2.0 CLEARANCES - GENERAL

For the purpose of computing the vertical clearance of an over-head line, the maximum sag of any conductor shall be calculated on the basis of the maximum sag in still air and at the maximum temperature, as per REC specifications. Similarly, for the purpose of computing any horizontal clearance of an over-head line, the maximum deflection of any conductor shall be calculated on the basis of the wind pressure, as per REC specifications.

Following clearances shall be maintained by the contractor while executing the work, in conformation to the Indian Electricity Rules 1956:-

2.1 Clearance above Ground of the Lowest Conductor

1 No conductor of an over-head line, including service lines, erected across a street shall at any part thereof be at a height less than

(a) For low and medium voltage lines 5.8 meters
(b) For high voltage lines 6.1 meters

2 No conductor of an over-head line, including service lines, erected along any street shall at any part thereof be at a height less than

(a) For low and medium voltage lines 5.5 meters
(b) For high voltage lines 5.8 meters

3 No conductor of an over-head line including service lines, erected elsewhere than along or across any street shall be at a height less than.

(a) For low, medium and high voltage lines up to And including 11,000 volts, if bare

(b) For low, medium and high voltage lines Up to and including 11,000 volts, if insulated

(c) For high voltage lines above 11,000 volts 5.2 meters

4 For extra-high voltage lines the clearance above ground shall not be less than 5.2 meters plus 0.3 meter for every 33,000 volts or part thereof by which the voltage of the line exceeds 33,000 volts: Provided that the minimum clearance along or across any street shall not be less than 6.1 meters.

2.2 Clearance from Buildings of Low and Medium Voltage Lines and Service Lines

Where a low or medium voltage over-head line passes above or adjacent to or terminates on any building, the following minimum clearances from any accessible point, on the basis of maximum sag, shall be observed:-

a. For any flat roof, open balcony, verandah roof and lean-to-roof

(i) When the line passes above the building a vertical clearance of 2.5 meters from the highest point; and
(ii) When he line passes adjacent to the building a horizontal clearance of 1.2 meters from the nearest point, and

b. For pitched roof

(i) When the line passes above the building a vertical clearance of 2.5 meters immediately under the lines, and
(ii) When the line passes adjacent to the building a horizontal clearance of 1.2 meters.

The horizontal clearance shall be measured when the line is at a maximum deflection from the vertical due to wind pressure.

2.3 Clearance from Buildings of High and Extra-High Voltage Lines

i. Where a high or extra-high voltage over-head line passes above or adjacent to any building or part of building it shall have on the basis of maximum sag a vertical clearance above the highest part of a building immediately under such line, of not less than

(a)	For High Voltage Lines up to and including 33,000 volts	3.7 meters
(b)	For Extra High Voltage Lines	3.7 meters plus 0.3 meters for every additional 33,000 volts or part thereof.

ii. The horizontal clearance between the nearest conductor and any part of such building shall, on the basis of maximum deflection due to wind pressure, be not less than:-

(a)	For high voltage lines up to and including 11,000 volts	1.2 meters
(b)	For high voltage lines above 11,000 volts and up to and including 33,000 volts	2.0 meters
(c)	For extra-high voltage lines	2.0 meters plus 0.3 meters for every additional 33,000 volts or part thereof.

3.0 CONSTRUCTION

The construction of over head-lines may be divided into the following parts:-

a) Pit marking, pit digging.
b) Erection of supports and concreting.
c) Providing of guys to supports.
d) Mounting cross-arms, pin and insulators,
e) Paying and stringing of the conductor.
f) Sagging and Tensioning of Conductors and pin binding.
g) Crossings.
h) Guarding.
i) Earthing.
j) Testing and Commissioning.

3.1 Maximum Intervals between Supports

All conductors shall be attached to supports at intervals not exceeding the safe limits based on the ultimate tensile strength of the conductors and the factor of safety prescribed.

Provided that in the case of over-head lines carrying low or medium voltage conductors, when erected in, over, along or across any street, the interval shall not without the consent in writing of the Engineer in Charge, exceed 65 meters. Average span of HT & LT lines with proposed conductors is given in the table below: -

Sr. No.	Line class	Support (height mtrs/KG)	Conductor type	Nominal conductor size in sq mm	Max span between two pole in mtrs
1	33 KV, 3 ph	H Beam	AAAC	100	50

The following types of poles shall be used at respective locations given below: -

a. SP (single pole support) - 00-600 deviation.

b. DP (double pole support) - 100-600 déviation.

c. FP (Four pole support) or TP (Three pole support) - 600-900 deviation.

3.2 Pit Marking and Digging Procedure

After surveying, the pole location should be marked with the peg. The pits should not be too large than necessary, as otherwise, after erection of the pole and filling there remains a possibility of tilting of poles. For marking the pits, the dimensions of the pit and the centre to centre distance of pits are required. Pits having a dimension of about 1.2 mtr x 0.6 m should be excavated with its longer axis in the direction of the line or circular pit of size 0.6 mtr dia. The planting depth should be about 1/6 length of support i.e. 1.5 mtr in case of 9.1 mtr long PCC pole. the Excavation in generally done by using pickaxe crow bars, and shovel, very hard or rocky soil may require blasting of rock by small charges of gun power, etc. For hard rock location pit size of pole shall be excavated depth of 1 meter and dia is 1.2 times of bottom dimension of pole i.e. appox 350mm.

3.3 Erection of Poles and Concreting

After excavation of pits is completed, the supports / poles to be erected may be brought to the pit location by manual labor or by cart. Then the pole may be erected inside the pit.

Before starting Cement pole erection activities, requisite quantities of construction materials like boulders etc must be brought by the contractor near the pit. Issuance of Permit to Work (PTW) may be governed on inspection of construction materials in requisite quantities at site.

Before erection the pole in the pit, base-pad of stone block/ RCC base plate of size 450x450x75mm shall be provided for the uniform distribution of the loads of the support on the soil.

Erection of poles can be done by using Bipod / Wooden horse made of 5 cm G.I. pipe and 6 m long. The spread of the legs should be 10 m. The tie wire for attachment of bipod to the pole is about 6 m long and is made of 7/10 SWG. Stay wire and this wire should be attached to the pole at 8 m. The pole is slid along the line route. The pole is tied with 3 ropes. The rope at the bottom prevents the pole from being dragged in the direction of the pull. To prevent the support from moving side in rising, two guy ropes are fixed on both sides and attached to temporary anchor.

For smooth sliding and perfect placement of pole in the pit, an inclined trench having 15.2 cm(6 in.) width and 10.2 cm (4 in.) length may be dug adjacent to the pit. A piece of M.S. channel may be placed in the inclined position at the other end of the pit for enabling the pole to slip smooth inside the pit. The trench would facilitate the pole to skid smoothly into the pit with jerks.

The bipod is placed in position and attached to the pole by means of tie wire. The pull for lifting the poles is provided by rope pulley. When the pole has reached at an angle of 10.7 m to 12.2 m (35' to 40',) the bottom holding rope is slowly released. When the pole assumed the vertical position, the holding ropes should be tightened.

It should be ensured that the time of erection, four men are at the ropes and the supervisor should be at a distance for guiding correct position so that in the event of breaking of rope, if pole falls, it will not result into an accident.

Having lifted the pole the same should be kept in vertical position with the help of manila rope of 20/25 mm dia. using the rope as a temporary anchor. As the poles are being erected say from an anchor point to the next angle point, the alignment of the poles should be checked and set right by visual check. The verticality of the poles are to be checked with a spirit level. After the pole erection has been completed, and having satisfied that the verticality and alignments are all right, bolder filling and ramming is to be done. In case of PCC pole back filling by bolder shall be done.

In swamp and special locations, before earth filling, the poles are to be concreted up to the ground level of the pit.

In existing tilted pole location of line, pole shall require to make vertical by using extra bolder filling & ramming. Guy supports are to be provided wherever found missing or additionally required.

After poles have been set, the temporary anchors are to be removed.

3.4 Earthing

Earthing shall generally be carried out in accordance with the requirements of Indian Electricity Rules, 1956 and the relevant regulations of the Electricity Supply Authority concerned and as indicated below:

(a) All metallic supports shall be earthed.

(b) For PCC poles the metal cross-arms and insulator pins shall be bonded and earthed at every pole for HT lines.

(c) All special structures on which switches, transformers, fuses, etc., are mounted / likely to mount should be earthed.

(d) The supports on either side of the road, railway or river crossing should be earthed.

(e) All supports (Steel & PCC) HT lines passing through inhabited areas, road crossings and along such other places, where Earthing of all poles is considered desirable from safety considerations should be earthed.

In special locations and special structures, road crossings etc., pipe/rod Earthing should be done on either side of the construction.

At other locations the coil earthing may be adopted. The coil earthing consists of 10 m length of 8 SWG. G.I. wire compressed into a coil 450 mm length and 50 mm dia and buried 1500 mm deep as per REC standard J-1.

Following shall be the earthing requirements:

Sl No	Description	Type of Earthing
1	Single Pole PCC / H beam	1 No. Coil Earthing at each SP
2	Double Pole PCC PCC / H beam	2 Nos. Coil Earthing at each DP
3	Road Crossing	GI Pipe earthing on either side one each
4	Telephone Line Crossing	GI Pipe earthing on either side one each
5	DP with Isolating Switch	Coil earthing 2 Nos. and GI Pipe earthing 1 No

3.5 ERECTION OF DP STRUCTURE FOR ANGLE LOCATIONS

For angles of deviations 10 degrees to 60 degrees, DP structure may be erected. The pit digging should be done along the bisection of angle of deviation.

After the poles are erected, the horizontal/cross bracings should be fitted and the supports held in a vertical position with the help of temporary guys of Manila rope 20/25 mm dia.

Ensuring that the poles are held in vertical position (by spirit level) or using plumb the concreting of poles with 1:3:6 @ 0.5 Cmt. per pole for PCC may be done from bottom of the support to the ground level. Before erection the pole in the pit, concrete base- padding (0.05 cmt) of not less than 75 mm thickness shall be done for the uniform distribution of the loads of the support on the soil. At least 48 hours should be allowed for setting of base padding concrete before placing the pole on it.

3.6 CONCRETING

The concreting mixture of one Cmt. 1:3:6 ratios would mean 1 part cement, 3 parts Coarse sand and 6 part 40 mm aggregate size stones. It may be noted that while preparing the concrete mixture, large quantities of water should not be used as this would wash away cement and sand.

3.7 PROVIDING OF GUYS TO SUPPORTS

In spite of careful planning and alignment of line route, certain situations arise where the conductor tries to tilt the pole from its normal position due to abnormal wind pressure and deviation of alignment, etc. When these cases of strain arise, the pole is strengthened and kept in position by guys. One or more guys will have to be provided for all supports where there is unbalanced strain acting on the support, which may result in tilting/uprooting or breaking of the support.

Guys are braces fastened to the pole. In this work anchor type guy sets are to be used. These guys are provided at (i) angle locations (ii) dead end locations (iii) T - off points (iv) Steep gradient locations and (v) where the wind pressure is more than 50 kg / Sq.mtrs.

The fixing of guys stays will involve (i) pit digging and fixing stay rod (ii) fastening guy wire to the support (iii) Tightening guy wire and fastening to the anchor. The marking of guy pit, digging and setting of anchor rod must be carefully carried out. The stay rod should be placed in a position so that the angle of rod with the vertical face of the pit is 30º/45º as the case may be Before start of erection of Stay sets, required concreting materials like Cement, Sand, Stone Chips and Construction water need to be made available near the pit.

For double pole structure (DP), four stays along the line, two in each direction and two stays along the bisection of the angle of deviation or as required depending on the angle of deviation are to be provided.

After concreting of 0.3 cmt per stay, back filling and ramming must be done well and appropriate time / days shall be allowed for proper setting. Stone block/ RCC base anchor plate of size 450x450x75mm as per drawing attached with bid document. The number of RCC base pad/ stone block shall be 3 nos. per stay for 11kV line and 2 nos. per stay for LT line.

The concreting @0.3cmt per stay shall only be done for line DP, tapping DP, four pole structure and for distribution transformer substation only.

The free end of the guy wire/stay wire is passed through the eye of the anchor rod, bent back parallel to the main portion of the stay/guy and bound after inserting the G.I. thimble, where it bears on the anchor rod. If the guy wire proves to be hazardous, it should be protected with suitable asbestos pipe filled with concrete of about 2 m length above the ground level, painted with white and black strips so that, it may be visible at night. The turn buckle shall be mounted at the pole end of the stay and guy wire so fixed that the turns buckle is half way in the working position, thus giving the maximum movement for tightening or loosening.

3.8 Guy Stay Insulators

Guy insulators are placed to prevent the lower part of the Guy from becoming electrically energized by a contact of the upper part of the guy when the conductor snaps and falls on them or due to leakage. No guy insulator shall be located less than 2.6 m from the ground. Guy insulators are to be used in stay wires only. When continuous earth wire is used guy insulator may not be required.

3.9 Fixing of Cross-Arms

After the erection of supports and providing guys, the cross-arms are to be mounted on the support with necessary clamps, bolts and nuts. The practice of fixing the cross arms before the pole erection is also there. In case, the cross-arm is to be mounted after the pole is erected, the lineman should climb the pole with necessary tools. The cross-arm is then tied to a hand line and pulled up by the ground man through a pulley, till the cross-arm reaches the line man. The ground man should station himself on one side, so that if any material drops from the top of the

pole, it may not strike him. All the materials should be lifted or lowered through the hand line, and should not be dropped.

3.10 Insulators and Bindings

Line conductors are electrically insulated from each other as well as from the pole or structure by 'Insulators'. Following two types of insulators shall be used for the line insulation:

(1) Pin type
(2) Strain type

The pin type insulators will be used for straight stretch of line. The strain insulators are used at terminal locations or dead end locations and where the angle of deviation of line is more than 10º.

The pins for insulators are fixed in the holes provided in the, cross-arms and the pole top brackets. The insulators are mounted in their places over the pins and tightened. In the case of strain or angle supports, where strain fittings are provided for this purpose, one strap of the strain fittings is placed over the cross-arm before placing the bolt in the hole of cross-arms. The nut of the straps is so tightened that the strap can move freely in horizontal direction.

3.11 Tying of Conductor on Pin Insulators

Conductors should occupy such a position on the insulator as will produce minimum strain on the tie wire. The function of the wire is only to hold the conductor in place, on the insulator, leaving the insulator and pin to take the strain of the conductor.

In straight line, the best practice is to use a top groove insulator. These insulators will carry grooves on the side as well. When the conductor is placed on the top groove, the tie wire serves only to keep the conductor from slipping out.

On corners and angles (below 5 degree deviations) the conductors should be placed on the outside of the insulators. On the far side of the pole, this pulls the conductor against the insulator instead of away from the insulator.

3.12 Kind and Size of Tie Wire to Be Used

Aluminum tie wire should be used with aluminum line conductor. The tie should always be made of soft annealed wire so that it may not be brittle and injure the line conductor. A tie wire should never be used for second time. Good practice is to use no. "6" tie wires for line conductor. The length of the wire varies from 1 m for simple tie of a small insulator (11 kV Pin insulators).

3.13 Rules of Good Tying Practice:

(i) Use only fully annealed tie wire.

(ii) Use suitable size of tie wire which can be readily handled yet one which will provide adequate strength.

(iii) Use length of tie wire sufficient for making the complete tie, including an allowance for gripping with the hands. The extra length should be cut from each end if the tie is completed.

(iv) A good tie should;

Provide a secure binding between line wire insulator and tie wire.

(b) Have positive contacts between the line wire and the tie wire so as to avoid any chattering of the contacts.

(c) Re-enforce line wire in the vicinity of insulator.

(v) Tying to be done without use of pliers.
(vi) Do not use the wire which has been previously used.
(vii) Do not use hard drawn wires for tying.

3.14 Conductor Erection

Conductor erection is the most important phase in construction. The main operations are:-

(a) Transportation of Conductor to works site. (b) Paying and Stringing of Conductor
(c) Jointing of Conductor
(d) Tensioning and Sagging of Conductor

The conductor drums are transported to the tension location. While transporting precautions are to be taken so that the conductor does not get damaged / injured. The drum could be mounted on cable drum support, which generally is made from crow-bar and wooden slippers for small size conductor drums. The direction of rotation of the drum has to be according to the mark in the drum so that the conductor could be drawn. While drawing the conductor, it should not rub causing damage. The conductor could be passed over poles on wooden or aluminum snatch block mounted on the poles for this purpose.

The mid span jointing is done through compressions or if helical fittings are used the jointing could be done manually. After completing the jointing, tensioning operation could be commenced. The conductor is pulled through come-along clamps to stringing the conductor between the tension locations. Sagging of conductor has to be in accordance to the Sag Tension chart. In order to achieve it, it is preferred to pull the conductor to a tension a little above the theoretical value so that while transferring it from the snatch blocks to the pit insulators and to take care of temperature variation. Proper sag could achieve. Sagging for 11 KV line is mostly done by “Sighting”. A horizontal strip of wood is fixed below the cross-arm on the pole at the required sag. The lineman sees from other end and the sag is adjusted by increasing or decreasing the tension. The tension clamps could then be finally fixed and conductor be fixed on pin-insulators. All fittings, accessories like guys, cross- arms, etc., could be checked as they should not have deform.

The maximum permissible spans for all the lines of 11/0.4 KV are prescribed according to the design of the supports. Sag-tension charts for these conductors are to be followed.

3.15 Anti-Climbing Devices

In order to prevent unauthorized persons from climbing any of the supports of HT & LT lines without the aid of a ladder or special appliance, anti-climbing devices are provided to the supports. Two methods generally adopted are (i) barbed wire binding, for a distance of 30 to 40 cm at a height of 3.5 to 4 m from ground level, (ii) clamps with protruding spikes at a height of 3 to 4 m.

3.16 Testing and Commissioning

When the line is ready for charging, it should be thoroughly inspected in respect of the following:-

(i) Poles-Proper alignment, concerting and muffing.
(ii) Cross-arms – Proper alignment.
(iii) Binding, clamps and jumpers – To check whether these are in reach.
(iv) Conductor and ground wire – Proper sag to check whether there are no any cuts, proper clamping of conductor by use of hydraulic crapping tools and use tested equipment etc.
(v) Guys: To check whether the Guy wire is tight and whether the Guy insulators are in-tact.
(vi) Earthing System: To check whether the earthing connections of supports and fittings are intact. Measure earth resistance with earth tester.

After the visual inspection is over and satisfied, the conductor is tested for continuity/ground, by means of megger. At the time of testing through megger person should not climb on the pole or touch the guarding, conductor, guy wire etc.

(1) Before charging any new line, it should be ensured that the required inspection fee for the new line is paid to the Electrical Inspector and approval obtained from him for charging the line and in presence of authorized MPMKVVCL officers.

(2) The line should be energized before the officer who has been authorized by the MPMKVVCL Company in this regard.

(3) Before energizing any new line, the officer-in-charge of the line shall notify to the workmen that the line is being energized and that it will no longer be safe to work on line. Acknowledgement of all the workmen in writing should be taken in token of having intimated them.

(4) Wide publicity, by issuing notice in the local news paper should be arranged, in all the localities through which the line, that is to be energized passes,
intimating the time and date of energizing and warning public against the risk in meddling with the line.

(5) The Officer-in-charge of the line shall personally satisfy himself that the same is in a fit state to be energized.

3.17 Special Crossings

(A) In case the lines cross-over the other lines or buildings, safe minimum clearances are to be maintained as per I E Regulations. These clearances should be maintained. The crossings could be for

1. Telephone / telegraph lines
2. Buildings
3. Lines of other voltages
4. Roads, Streets, Other than Roads/Streets. Extra steel structures and GI wire, if needed shall be provided by the agency.

(B) River Crossing: Data for the highest flood-level should be obtained for previous years. For medium voltage minimum clearance of 3 m is kept over the highest floor level. Double pole or 4 pole structure would be required to be specially designed, depending upon the span and conductor size for the river crossing. The structures should be located at such places that they could be approached under flood condition also. The foundation of structures should be sound so that it may not get eroded or damaged due to rain water.

3.18 Guarding

Guarding is an arrangement provide for the lines, by which a live conductor, when accidentally broken, is prevented to come in contact with other electric lines, telephone or telegraph lines, railway lines, roads, and persons or animals and carriages moving along the railway line or road, by providing a sort of cradle below the main electric line. Immediately after a live conductor breaks, it first touches this cradle guard of G.I. Wires before going down further, this in turn, trips the circuit breakers or H.T. /L.T. fuses provided for the protection purposes, and the electric power in the conductor or the line is cut off, and danger to any living object is averted.

Guarding is not required for crossings of 66 KV and higher voltage lines where the transmission line is protected by fast acting relay operated circuit breaker of modern design with a tripping time of the order of 0.25 sec. from occurrence of fault to its clearance. For all other crossings, guarding is essential for Railway Telecommunication lines and major road crossing.

The minimum height between any guard wire and live crossing conductor shall not be less than 1.5 m in case of a railway crossing.

The guarding consists of 2 G.I., bearer wires strung between the two line supports, and G.I. Cross-lacings connecting two-bearer wires at definite intervals. The bearer fixed to the guarding cross-arms on the line supports by means of threaded eyebolts for proper tightening.

4.0 DESIGN PARAMETERS As per CPWD Norms.

(i) Factor of safety 2.0 in normal conditions for 2.5 for 33 KV Lines & HT lines PCC supports.
(ii) Wind pressure on pole & conductor – 75 kg/m2 for 33 KV & HT lines.
(iii) In addition to wind load on cross arm insulators guy-wire etc shall be considered.
(iv) Wind load on full projected area of conductors and poles is to be considered for design.
(v) Ground clearance shall be minimum 5.2m for 33 KV Lines & HT line for bare conductor at locations other than road crossings.
(vi) The live metal clearance shall be as per Is: 5613
(vii) Pole accessories like danger plates phase plates and number plates shall be provided.

5.0 STRINGING OF CONDUTOR / AB Cable

i) The works include spreading of conductors or LT cables without any damages and stringing with proper tension without any kinks / damages including binding of conductor at pin points, jumper at cut points etc, The ground and line clearances at road crossings along roads. LT crossing and others shall be as per the relevant I.E. rules.

ii) While transporting conductors drums to site precautions are to be taken so that the conductor does not get damaged. The drum shall be mounted on cable drum support, The direction of rotation o the drum shall be according to the mark in the drum so that the conductor could be drawn, While drawing the conductor, it shall not rub causing damage, the conductor shall be passed over poles on wooden or aluminium snatch block (pulley) mounted on the poles for this purpose.

iii) The conductor shall be pulled through come-along clamps to stringing the conductor between the tension locations.

iv) Conductor splices shall not crack or otherwise be susceptible to damage in the stringing operation. The contractor shall be used only such equipment/ methods during conductor stringing which ensures complete compliance in this regard. All the joints including mid span joints on the conductor and earth wire shall be of the compression type in accordance with the recommendations of the manufacturer,

for which all necessary tools and equipment like compressors dies, etc, shall be obtained by the contractor, each part of the joint shall be cleaned by wire brush till it is free of rust or dirt, etc, and be properly greased with anti corrosive compound, before the final compression is carried out with the compressors. After completing the jointing, tensioning operation shall be commenced.

v) All the joints or splices shall be made at least 15 meters away form the pole No. joints of splices shall be made in spans crossing over main roads, railways and small rivers, spans. Not more than one joint per sub conductor span shall be allowed. The compression type fittings shall be of the self centering type. After compressing the joint the aluminium sleeve shall have all corners rounded; burrs and sharp edges removed and smoothened.

vi) During stringing of conductor to avoid any damages to the joint the contractor shall use a suitable protector for mid span compression joints in case they are to be passed over pulley blocks / aerial rollers. The pulley groove size shall be such that the joint along with protection can be passed over it smoothly.

6.0 PERMITTED EXTRA CONSUMPTION OF CONTRACTOR SUPPLIED MATERIALS

The quantities of conductor, insulator, earth wire, hardware fitting, conductor and earth wire accessories indicated in BPS are tentative and actual quantity will depend upon final survey. The payment for contractor supplied line materials shall be made for the quantities incorporated in the works plus permitted extra quantities as mentioned below:

Contractor shall make every effort to minimize the breakage, losses and wastage of the line material during erection. However the contractor shall be permitted the extra consumption up to the limit as specified in the table below and shall be permitted to dispose of the scrap, if any.

Sr. No.	Item	% of permitted extra consumption
1	Conductor	1
2	HT & LT Cable	1
3	Cable (Power & Service Wire)	1

In case of conductor the permitted extra consumption limit of 1% is inclusive of sag, jumper, damage, losses and wastage.

The contractor shall not be required to return to the purchaser, empty conductor / Earth wire left over drums and shall dispose of the same at his cost.

7.0 TENSIONING AND SAGGING OPERATIONS

(i) The tensioning and sagging shall be done in accordance with the approved stringing charts or sag tables. The “initial” stringing chart shall be sued for the conductor and “final” stringing chart for the earth wire. The conductors shall be pulled up to the desired sag and left in running blocks for at least one hour after which the sag shall be re-checked and adjusted, if necessary before transferring the conductor from the running blocks to the suspension clamps. The conductor shall be clamped within 36 hours of sagging in.

(ii) The sag will be checked in the first and the last section span for sections up to eight spans and in one additional intermediate span for sections with more than eight spans.

The sag shall also be checked when the conductors have been drawn up and transferred from running blocks to the insulator clamps.

(iii) At sharp vertical angles, conductor and earth wire sags and tensions shall be checked for equality on both sides of the angel and running block. The suspension insulator assemblies will normally assume verticality when the conductor is clamped. Tensioning and sagging operations shall be carried out in calm whether when rapid changes in temperature are not likely to occur.

7.1 Clipping in

Clipping of the conductors in to position shall be done in accordance with the manufacturer's recommendations, jumpers at section and angle towers shall be formed to parabolic shape to ensure maximum clearance requirements, Fasteners in all fittings and accessories shall be secured in position. The security clip shall be properly opened and sprung into position.

7.2 Fixing of conductor and earth wire accessories

Conductor and earth wire accessories supplied by the contactor shall be installed by contractor as per the design requirements and manufacturer's instruction within 24 hours, of the conductor / earth wire clamping. While installing the conductor and earth wire accessories, proper case shall be taken to ensure that the surfaces are clean and smooth and that no damage occurs to any part of the accessories or of the conductors.

7.3 Replacement

If any replacements are to be effected after stringing and tensioning or during maintenance e.g. replacement of cross arms, the conductor shall be suitably tied to the pole at tension points or transferred to suitable roller pulleys at suspension points.

8.0 TAPPING ARRANGEMENT FROM EXISTING 33 KV HT LINE as per CPWD Norms.

Tapping of existing 33 kV line shall be taken by providing a horizontal cross arm below the existing V cross arm of the pole and mounting disc insulators on it. The tapping conductors may be guided by providing pin insulators as required.

A new two pole structure shall be erected within 10-15 meters of this tapping pole & the new line will emerge from this two pole structure with disc insulators. The Tapping pole to the double pole conductor tension should be such that it avoids looseness & sag to the extent possible & it should avoid extra tension on the tapping pole.

Alternately, tapping of existing 33 Kv line can be done by erecting one pole with 'V' Cross arms & top clamps, just below the line, as such forming a Double Pole Structure. The Horizontal cross arm shall be provided below the 'V' cross arms on both poles and disc insulators are mounted on it. The tapping conductors may be guided by providing pin insulators as required.

Wherever the proposed spur line length is more than two km after the tapping an AB Switch arrangement shall be provided at the double pole for isolation of the line.

9.0 FINAL CHECKING, TESTING AND COMMISSIONING

After completion of the works, final checking of the line shall be carried out by the Contractor to ensure that all foundation works, pole erecting and stringing have been done strictly according to the specifications and as approved by the Owner. All the works shall be thoroughly inspected in order to ensure that:

1 Sufficient backfilled earth covers each foundation pit and is adequately compacted.

2 All poles are used strictly according to final approved drawing and are free of any defect or damage whatsoever.

3 The stringing of the conductors have been done as per the desired clearances.

4 All conductor accessories are properly installed.

5 All other requirements for completion of works such as fixing of danger plate and anti-climbing device have been fulfilled.

6 The insulation of the line as a whole is tested by the Contractor through provision of his own equipment, labor, etc. to the satisfaction of the purchaser.

7 All poles are properly grounded.

8 The line is tested satisfactorily for commissioning purpose.

10.0 ELECTRICAL SYSTEM DATA

Sr. No.	Description of the Parameter	33 kV System
1	System Operating Voltage	33 kV
2	Maximum operating voltageof the systems (rms)	33 kV
3	Rated frequency	50 Hz
4	No. of phases	3
5	Rated Insulation levels	
	(i) Full wave impulse withstand voltage (1.2/50 micro-sec.) (ii) One minute power frequency dry and wet withstand voltage (rms)	170 kVp 80 KV
6	Min. creepage distance	25 mm/KV (900 mm)
7	Min. clearance	
	(i) Phase to earth (ii) Phase to phase (iii) Sectional	320 mm 320 mm
8	Rated short circuit current	25 KA for 1 sec.

11.0 REPAIRS TO CONDUCTORS

The conductor shall be continuously observed for loose or broken strands or any other damage during the running out operations. Repair to conductors, if necessary, shall be carried out with repair sleeves. Repairing of the conductor surface shall be carried out only in case of minor damage, scuff marks, etc. The final conductor surface shall be clean, smooth and free from projections, sharp points, cuts, abrasions, etc. The Contractor shall be entirely responsible for any damage to the poles during stringing.

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Appendix

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Appendix-1

Labour Statutory Requirements

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'(say, 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%). The benefits payable under the Act are:

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

d) **Maternity Benefit Act 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 are 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-up 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**: - The 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's (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 a 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.

Appendix-2

CONTRACTOR'S LABOUR REGULATIONS

1.0 SHORT TITLE

These regulations may be called the Contractor "Labour Regulations".

2.0 DEFINITIONS

2.1 "Workman" means any person employed by the SPA BHOPAL or its Contractor directly or indirectly through a sub-contractor, with or without the knowledge, of the SPA BHOPAL to do any skilled, semi-skilled, un- skilled, manual, supervisory, technical or clerical work for hire or reward, whether, the terms of employment are expressed or implied but does not include any person-

a) Who is employed mainly in a managerial or administrative capacity; or

b) Who being employed in a supervisory capacity draws wages exceeding Rupees Two thousand Five hundred per person or exercises either by the nature of the duties attached to the office or by reason of powers vested to him, functions mainly of managerial nature.

c) Who is an out worker, that is to say, a person to whom any articles or materials are given out by or on behalf of the principal employer to be made up cleaned, washed, altered, ornamental finished, repaired, adopted or otherwise processed for sale for the purpose of the trade or business of the principal employer and the process is to be carried out either in the home of the out worker or in some other premises, not being premises under the control and management of the principal employer.

2.2 "Fair Wages" means wages whether for time or piece work fixed and notified under the provisions of the minimum Wages Act from time to time.

2.3 "Contractor" shall include every person who undertake to produce a given result other than a mere supply of goods or articles of manufacture through labour or who supplies labour for any work and includes a sub-contractor.

2.4 "Wages" shall have the same meaning as defined in the Payment of Wages Act.

2.4.1 Normally working hours of an adult employee should not exceed 9 hours a day. The working day shall be so arranged that inclusive of interval for rest, if any, it shall not spread over more than 12 hours on any day.

2.4.2 When an adult worker is made to work for more than 9 hours on any day or for more than 48 hours in any week he shall be paid overtime for the extra hours put in by him at double the ordinary rate of wages.

2.4.3.1 Every worker shall be given a weekly holiday on a Sunday, in accordance with the provisions of the Minimum Wages (Central) Rules 1960 as amended from time to time, irrespective of whether such worker is governed by the Minimum Wages Act or not.

2.4.3.2 Whether the Minimum Wages prescribed by the Government under the Minimum Wages Act are not inclusive of the wages for the weekly day of rest, the worker shall be entitled to rest day wages at the rate applicable to the next preceding day, provided he has worked under the same contractor for a continuous period of not less than 6 days.

2.4.3.3 here a contractor is permitted by the Engineer-in-Charge to allow a worker to work on a normal weekly holiday, he shall grant a substitute holiday to him for the whole day on one of the five days immediately before or after the normal weekly holidays and pay wages to such worker for the work performed on the normal weekly holiday at overtime rate.

3.0 DISPLAY OF NOTICE REGARDING-WAGES, ETC.

The contractor shall before he commences his work on contract, display and correctly maintain and continue to display and correctly maintain in a clean and legible condition in conspicuous places on the work, notices in English and in the local Indian languages spoken by the majority of the workers, giving the minimum rates of wages fixed under the Minimum Wages Act, the actual wages being paid, the hours of work for which such wages are earned, wage period, dates of payment of wages and other relevant information as per Appendix 'A'.

4.0 PAYMENT OF WAGES

4.1 The contractor shall fix wage periods in respect of which wages shall be payable.

4.2 No wage period shall exceed one month.

4.3 The wages of every person employed as labour in an establishment or by a contractor where less than one thousand, such persons are employed shall be paid before the expiry of the seventh day and in other cases before the expiry of tenth day after the last day of the wage period in respect of which the wages are payable.

4.4 Where the employment of any worker is terminated by or on behalf of the contractor the wages earned by him shall be paid before the expiry of the second working day from the date on which his employment is terminated.

4.5 All payments of wages shall be made on a working day at the work premises and during the working time and on a date notified in advance and in case the work is completed before the expiry of the wage period, final payment shall be made within 48 hours of the last working day.

4.6 Wages due to every worker shall be paid to him direct or to other person authorized by him in this behalf.

4.7 All wages shall be paid in current coin or currency or in both.

4.8 Wages shall be paid without any deductions of any kind except those specified by the Central Government by general or special order in this behalf or permissible under the Payment of Wages Act 1956.

4.9 A notice showing the wage period and the place and time of disbursement of wages shall be displayed at the place of work and a copy sent by the contractor to the Engineer-in-Charge under acknowledgment.

4.10 It shall be the duty of the contractor to ensure the disbursement of wages in the presence of the Engineer or any other authorized representatives of the Engineer-in-Charge who will be required to be present at the place and time of disbursement of wages by the contractor to workmen.

4.11 The contractor shall obtain from the Engineer or any other authorized representative of the Engineer-in-Charge as the case may be, a certificate under his signature at the end of the entries in the "Register of Wages" or the "Wage-cum-Muster Roll" as the case may be in the following form :

"Certified that the amount shown in column No…..... has been paid to the workmen concerned in my presence on…..... at …....."

5.0 FINES AND DEDUCTIONS, WHICH MAY BE MADE FROM WAGES

5.1 The wages of a worker shall be paid to him without any deduction of any kind except the following–

a) Fines

b) Deductions for absence from duty i.e. from the place or the places where by the terms of his employment he is required to work. The amount of deduction shall be in proportion to the period for which he was absent.

c) Deduction for damage to or loss of goods expressly entrusted to the employed persons for custody, or from loss of money or any other deduction which he is required to account where such damage or loss is directly attributable to his neglect or default.

d) Deduction for recovery of advances or for adjustment of over payment of wages, advances granted shall be entered in a register.

e) Any other deduction, which the Central Government may from time to time allow.

5.2 No fines should be imposed on any worker save in respect of such acts and omissions on his part as have been approved by the Chief Labour Commissioner.

NOTE: An approved list of Acts and Omissions for which fines can be imposed is enclosed at Appendix-I.

5.3 No fine shall be imposed on a worker and no deduction for damage or loss shall be made from his wages until the worker has been given an opportunity of showing cause against such fines or deductions.

5.4 The total amount of fine which may be imposed in any one wage period on a worker shall not exceed an amount equal to three paise in Rupees of the total wages, payable to him in respect of that wage period.

5.5 No fine imposed on any worker shall be recovered from him in instalment, or after the expiry of sixty days from the date on which it was imposed.

5.6 Every fine shall be deemed to have been imposed on the day of the act or omission in respect of which it was imposed.

6.0 LABOUR RECORDS

6.1 The contractor shall maintain a "Register of persons employed" on work on contract in form XIII of the CL (R&A) Central Rules 1971 (Appendix-B).

6.2 The contractor shall maintain a "Muster Roll" register in respect of all workmen employed by him on the work under contract in from XVI of the CL (R&A) Rules 1971 (Appendix-C).

6.3 The contractor shall maintain a "Wage Register" in respect of all workmen employed by him on the work in form (Appendix-D).

6.4 Register of accidents – The contractor shall maintain a register of accidents in such form as may be convenient at the work place but the same shall include the following particulars:

a) Full particulars of the labourers who met with accident.

b) Rate of wages

c) Sex

d) Age

e) Nature of accident and cause of accident.

f) Time and date of accident.

g) Date and time when he/she admitted in Hospital

h) Date of discharge from the Hospital

i) Period of treatment and result of treatment

j) Percentage of loss of earning capacity and disability as assessed by Medical Officer.

k) Claim required to be paid under Workmen's Compensation Act.

l) Date of payment of compensation.

m) Amount paid with details of the person to whom the same was paid.

n) Authority by whom the compensation was assessed.

o) Remarks.

6.5 Register of Fines – The contractor shall maintain a "Register of Fines" in the form (Appendix-H).

The contractor shall display in a good condition and in a conspicuous place of work the approved list of Acts and Omission for which fines can be imposed (Appendix-I).

6.6 Register of Deductions-The contractor shall maintain a "Register of Deductions" for damage or loss in form (Appendix-J).

6.7 Register of Advances-The contractor shall maintain a "Register of Advances" in form (Appendix-K).

6.8 Register of Over time-The contractor shall maintain a "Register of Over time" in form (Appendix-L).

7.0 ATTENDANCE CARD-CUM WAGE SLIP:

7.1 The contractor shall issue an attendance card-cum-wage slip to each workman employed by him in the specimen form at (Appendix-E).

7.2 The card shall be valid for each wage period.

7.3 The contractor shall mark the attendance of each workman on the card twice each day, once at the commencement of the day and again after the rest interval, before he actually starts work.

7.4 The card shall remain in possession of the worker during the wage period under reference.

7.5 The contractor shall complete the wage slip portion on the reverse of the card at least a day prior to the disbursement of wages in respect of the wage period under reference.

7.6 The contractor shall obtain the signature or thump impression of the worker on the wage slip at the time of disbursement of wages and retain the card with himself.

8.0 EMPLOYMENT CARD

The contractor shall issue an Employment Card in form to each worker within three days of the employment of the worker (Appendix-F).

9.0 SERVICE CERTIFICATE

On termination of employment for any reason whatsoever the contractor shall issue to the workman whose services have been terminated, a service certificate in from Appendix-G.

10.0 PRESERVATION OF LABOUR RECORDS

All records required to be maintained under Regulations Nos. 6 and 7 shall be preserved in original for a period of three years from the date of last entries made in them and shall be made available for inspection by the Engineer-in-Charge, Labour Officer.

11.0 POWER OF LABOUR OFFICERS TO MAKE INVESTIGATIONS INQUIRY

The Labour Officer or any other person authorized by SPA BHOPAL on its behalf shall have power to make inquires with a view to ascertaining and enforcing due and proper observance

of the Fair Wage Clauses and the Provisions of Regulations. He shall investigate into any complaint regarding the default made by the contractor or sub-contractor in regard to such provision.

12.0 INSPECTION OF BOOK AND SLIPS

The contractor shall allow inspection of all the prescribed labour records to any of his workers or to his agent at a convenient time and place after due notice is received or to the Labour officer or any other person, authorized by the Central Government on his behalf.

13.0 SUBMISSION OF RETURNS

The contractor shall submit periodical returns as may be specified from time to time.

14.0 AMENDMENTS

The SPA BHOPAL may from to time, add or amend the regulations and on any question as to the application, interpretation or effect of these regulations the decision of the Director SPA Bhopal shall be final.

Appendix-3

Safety Measures

I Contractor's Liability

The contractor shall be absolutely and solely responsible for any and all kinds of injuries or damages to person and property of any description whatever may be caused by or result from the execution of the works, whether these may have been carried out skillfully and carefully and strictly in conformity with the provisions of the specifications or not.

II Responsibility for Accidents, Damages etc.

The care of the whole of the permanent works shall remain with the contractor who shall be responsible for all accidents or damages from whatever cause arising and chargeable for anything that may be stolen, removed destroyed or damaged to whomsoever belonging and also for making good all defects and damages to the said works or to any property adjoining or any cause whatever whether such damage or defects were occasioned by the negligence of the contractor or not or may be or might have been discovered during the progress of the works or in consequences thereof, or shall appear to be known after the completion whereof or whether payment may wholly or partially have been made or the works approved as supposed to have been properly done and no certificate of approval of any works by any officers or SPA Bhopal shall affect or prejudice the right of SPA Bhopal against the contractor or be considered or held as at all conclusive as to the sufficiency of any works or materials.

III Contractor to be responsible for all Trespasses and Damages

In the event of accidents to any person including employees of SPA BHOPAL on duty, damages to property, trespass on land, injury to cattle, horses, or other animals or damage injury of any description to any person or thing arising out of the execution of the works, the contractor shall be held responsible for and make good the same and shall indemnify SPA BHOPAL from all claims or expenses on account thereof and if SPA BHOPAL has to pay any money in respect thereof the sum so paid and the costs incurred by SPA BHOPAL shall be charged to the contractor as so much money paid to him on account of his contract and the contractor shall not be at liberty to dispute or question the right of SPA BHOPAL to make such payment for him or on his account notwithstanding the same may have been made without his consent of authority and decision or determination in law or otherwise to the contrary notwithstanding. SPA BHOPAL shall not be liable to, or for in respect of any damages or compensation or claim there for, under any Act for the time being in force or common law because or by reason or in consequences of any accident or injuries to workmen or others in the employment of the contractor or any subcontractor or of any person acting under him or on his behalf or the staff / persons employed by SPA BHOPAL for supervision of the work under his contract and the contractor shall save SPA BHOPAL harmless and indemnify in respect thereof and of any all costs and expenses incidental there to or consequent thereon.

IV Safety Measures

1. All the works to be carried out in and around the work site, it must be under the contractors supervision with their supervisor, at their own risk and cost
2. The contractor should possess rubber gloves, gum safety boots, helmet, face mask, torch light, emergency light etc. as safety equipments in good condition
3. Each and every employee of the contractor should have insurance cover under workmen compensation act.
4. The Contractor has to carry out any activity of the construction work only after informing and getting concurrence of SPA BHOPAL / Engineer in charge

V Safety Equipments & Loose Tools:

The Contractor will be responsible to make available the safety equipment and loose tools as listed below If the Contractor fails to keep the safety equipment and loose tools and consumable items as listed the above will be procured by SPA BHOPAL and the cost will be deducted immediately from the bill payable to the contractor with a penalty of Rs. 2,000/-

VI Safety Measures to be adhered

1. Only experienced, skilled people have to be employed by the contractor
2. All personnel should be covered by insurance under workmen compensation act.

3. All labour act provisions has to be met with

4. Rubber gloves, gum safety boots, helmet, face mask, torch light, emergency light etc are need to be provided by the contractor.

5. Exhibit labels of "Safety First"

VII List of Safety equipments to be provided by contractor

S No	Name of Equipment
1	Face Mask
2	Shock proof hand gloves
3	Disposable hand gloves
4	Gum boot / Safety shoes
5	First Aid Box
6	Emergency light
7	Helmet / hard hat
8	Safety cones
9	Traffic barriers
10	Warning lights
11	Red flags
12	Caution boards

Note: The above is only an illustrative minimum list. The contractor must note that it is their responsibility to ensure the lives and safety of the workers employed by them. Towards this end, all the equipments of appropriate specifications should be procured and made available to the workers in usable conditions throughout the period of contract. Responsibility for any health problem or death will solely rest with contractor.

Appendix- 4

LABOUR SAFETY PROVISIONS

1.0 Suitable scaffolds should be provided for workmen for all works that cannot safely be done from the ground, or from solid construction except such short period work as can be done safely from ladders. When a ladder is used an extra mazdoor shall be engaged for holding the ladder and if the ladder is used for carrying materials as well, suitable footholds and hand holds shall be provided on the ladder and the ladder shall be given an inclination not steeper than 1/4 to 1 (1/4 horizontal and 1 vertical).

2.0 Scaffolding or staging more than 3.6m (12 feet) above the ground or floor, swung or suspended from an overhead support or erected with stationery support shall have a guard rail properly attached or bolted, braced and otherwise secured at least 90 cm. (3 feet) high above the floor or platform of such scaffolding or staging and extending along the entire length of the outside and ends thereof with only such opening as may be necessary for the delivery of materials. Such scaffolding or staging shall be so fastened as to prevent it from swaying from the building or structure.

3.0 Working platforms, gangways, and stairways should be so constructed that they stairway is more than 3.6m (12 feet) above ground level or floor level, they should be closely boarded, should have adequate width & should be suitable fastened as described in (2.0) above.

4.0 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 90 cm (3 feet).

5.0 Safe means of access shall be provided to all working platforms and other working places. Every ladder shall be securely fixed. No portable single ladder shall be over 9m. (30 feet) in length while the width between side rails in rung ladder shall in no case be less than 29 cm. for ladder upto and including 3m (10 feet) in length. For longer ladders this width should be increased at least 1/4" for each additional 30 cm (1 ft.) of length. Uniform step spacing shall not exceed 30 cm (12"). Adequate precautions shall be taken to prevent danger from electrical equipment. No materials on any of the sites of the work shall be so stacked or placed as to cause danger or inconvenience to any person or the public. The contractor shall provide all necessary fencing and lights to protect the public from accident, and shall be bound to bear the expenses of defence of every suit, action or other proceeding at law that may be brought by an person for injury sustained owing to neglect of the above precautions and to pay any damages and cost which may be awarded in any such suit, action or proceedings to any such person or which may, with the consent of the Contractor, be paid to compensate any claim by any such person.

6.0 EXCAVATION AND TRENCHING

All trenches 1.2mts. (Four feet) or more in depth, shall at all times be supplied with at least one ladder for each 30m. (100 feet) in length or fraction thereof, Ladder shall be extended from bottom of the trench to at least 90 cm (3feet) above the surface of the ground. The side of the trenches, which are 1.5m. (5feet) or more in depth shall be stepped back to give suitable slope or securely held by timber bracing, so as to avoid the danger or sides to collapsing. The

excavated materials shall not be placed within 1.5m (5 feet) of the edges of the trench or half of the depth of the trench whichever is more. Cutting shall be done from top to bottom. Under no circumstances undermining or undercutting shall be done.

7.0 Demolition - Before any demolition work is commenced and also during the progress of the work:

7.1 All roads and open areas adjacent to the work site shall either be closed or suitably protected.

7.2 No electric cable or apparatus which is likely to be a source of danger or a cable or apparatus used by the operator shall remain electrically charged.

7.3 All practical steps shall be taken to prevent danger to persons employed from risk or fire or explosion or flooding. No floor, roof or other part of the building shall be overloaded with debris or materials as to render it unsafe.

8.0 All necessary personal safety equipments as considered adequate by the Engineer-in-charge should be kept available for the use of persons employed on the site and maintained in a condition suitable for immediate use, and the contractor should take adequate step to ensure proper use of equipment by those concerned- The following safety equipment shall be invariably provided.

8.1 Workers employed on mixing asphaltic materials, cement and lime mortars shall be provided with protective footwear and protective goggles.

8.2 Those engaged in white washing and mixing or stacking of cement bags or any materials which are injurious to the eye shall be provided with protective goggles.

8.3 Those engaged in welding works shall be provided with welders protective eye shields.

8.4 Stone breakers shall be provided with protective goggles and protective clothing and seated at sufficiently safe interval.

8.5 When workers are employed in sewers and manholes, which are in active use, the Contractors shall ensure that the manhole covers are opened and ventilated at-least for an hour before the workers are allowed to get into the manholes, and the manholes so opened shall be cordoned off with suitable railing and provided with warning signals or boards to prevent accident the public. In addition, the contractor shall ensure that the following safety measures are adhered to:

a. Entry for workers into the line shall not be allowed except under supervision of the JE or any other higher officer.

b. At least 5 to 6 manholes upstream and downstream should be kept open for atleast 2 to 3 hours before any man is allowed to enter into the manholes for working inside.

c. Before entry, presence of Toxic gases should be tested by inserting wet lead acetate paper which changes colour in the presence of such gases and gives indication of their presence.

d. Presence of Oxygen should be verified by lowering a detector lamp into the manhole. In case, no Oxygen is found inside the sewer line, workers should be sent only with Oxygen kit.

e. Safety belt with rope should be provided to the workers. While working inside the manholes such rope should be handled by two men standing outside to enable him to be pulled out during emergency.

f. The area should be barricaded or cordoned of by suitable means to avoid mishaps of any kind. Proper warning signs should be displayed for the safety of the public whenever cleaning works are undertaken during night or day.

g. No smoking or open flames shall be allowed near the blocked manhole being cleaned.

h. The malba obtained on account of cleaning of blocked manholes and sewer lines should be immediately removed to avoid accidents on account of slippery nature of the malba.

i. Workers should not be allowed to work inside the manhole continuously. He should be given rest intermittently. The Engineer In-charge may decide the time up to which a worker may be allowed to work continuously inside the manhole.

j. Gas masks with Oxygen Cylinder should be kept at site for use in emergency.

k. Air-blowers should be used for flow of fresh air through the manholes. Whenever called for, portable air-blowers are recommended for ventilating the manholes. The Motors for these shall be vapour proof and of totally enclosed type. Non sparking gas engines also could be used but they should be placed at-least 2 metres away from the opening and on the leeward side protected from wind so that they will not be a source of friction on any inflammable gas that might be present.

l. The workers engaged for cleaning the manholes/ sewers should be properly trained before allowing working in the manhole.

m. The workers shall be provided with Gumboots or non sparking shoes, bump helmets and gloves non sparking tools, safety lights and gas masks and portable air blowers (when necessary). They must be supplied with barrier cream for anointing the limbs before working inside the sewer lines.

n. Workmen descending a manhole shall try each ladder step or rung carefully before putting his full weight on it to guard against insecure fastening due to corrosion of the rung fixed to manhole well.

o. If a man has received a physical injury, he should be brought out of the sewer immediately and adequate medical aid should be provided to him.

p. The extent to which these precautions are to be taken depend on individual situation but the decision of the Engineer Incharge regarding the steps to be taken in this regard in an individual case will be final.

8.6 The Contractor shall not employ men and women below the age of 18 years on the work of painting with products containing lead in any form Wherever men above the age of 18 are employed on the work of lead painting the following precautions should be taken.

8.6.1 No paint containing lead or lead products shall be used except in the form of paste or readymade paint.

8.6.2 Suitable face masks should be supplied for use by the workers when paint is applied in the form of spray or a surface having lead paint is dry rubbed and scrapped.

8.6.3 Overalls shall be supplied by the Contractor to the workmen and adequate facilities shall be provided to enable the working painters to wash during the cessation of work.

8.6.4.1 (a) White lead, sulphate or lead work products containing those pigments shall not be used in painting operation except in the form of paste or of paints ready for use.

b. Measures shall be taken whenever required in order to prevent danger arising from the application of paint in the form of spray.

c. Measures shall be taken, whenever practicable to prevent danger arising out of dust caused by dry rubbing down and scrapping.

8.6.4.2 (a) Adequate facilities shall be provided to enable working painter to wash during and on cessation of work.

(b) Suitable arrangements shall be made to prevent clothing put off during working hours being spoiled by painting materials.

8.6.4.3 (a) Cases of lead poisoning and of suspected lead poisoning shall be notified and shall be subsequently verified by a medical man appointed by the competent authorities of the Consultant.

b) The SPA BHOPAL may require when necessary a medical examination of workers.

c) Instructions with regard to the special hygienic precautions to be taken in the painting trade shall be distributed to working painters.

9.0 When the work is done near any place where there is risk of drowning, all necessary equipments should be provided and kept ready for use and all necessary steps taken for prompt rescue of any person in danger and adequate provisions should be made for prompt first aid treatment of all injuries likely to be obtained during the course of the work.

10.0 Use of hoisting machines and tackle including their attachment encourage and supports shall conform to the following standard of conditions.

10.1 (a) These shall be of good mechanical construction, sound material and adequate strength and free from patent, defects and shall be kept required in good working order.

b) Every rope used in hoisting or lowering materials or as a means of suspension shall be of durable quality and adequate strength, and free from patent defects.

10.2 Every crane driver or hoisting appliance operator shall be properly qualified and no person under the age of 21 years should be in-charge of any hoisting machine including any scaffolding, winch or giving signals to operator.

10.3 In case of every hoisting machine and of every chain ring hook, shackle swivel and pulley block used in hoisting or as means of suspension the safe working load shall be ascertained by adequate means. Every hoisting machine and all gear referred to above shall be plainly marked with the safe working load. In case of a hoisting machine having a variable safe working load,

each safe working load and the conditions under which it is applicable shall be clearly indicated. No part of any machine or any gear referred to above in this paragraph shall be loaded beyond the safe working load except for the purpose of testing.

10.4 In case of SPA BHOPAL machines, the safe working load shall be notified by the Engineer-in-Charge. As regards Contractor's machines the Contractor shall notify the safe working load of the machine to the Engineer-in-charge whenever he brings any machinery to site of work and get verified by the Engineer-in-Charge.

11.0 Motors gearing, transmission electric wiring and other dangerous parts of hoisting appliances should be provided with efficient safeguard, hosting appliances should be provided with such means as will reduce to the minimum the risk of accidental descent of the load. Adequate precautions should be taken to reduce the minimum risk of any part of a suspended load becoming accidentally displaced. When workers are employed on electrical installations, which are already energized, insulating mats, wearing apparel, such as gloves sleeves and boots as may be necessary be provided. The worker should not wear any rings, watches and carry keys or other materials, which are good conductors of electricity.

12.0 All scaffold, ladders, and other safety devices mentioned or described herein shall be maintained in safe condition and no scaffold ladder or equipment shall be altered or removed while it is in use. Adequate washing facilities should be provided at or near places of work.

13.0 These safety provisions should be brought to the notice of all concerned by display on a notice board at a prominent place of work spot. The person responsible for compliance of the safety codes shall be named therein by the contractor.

14.0 To ensure effective enforcement of the rules and regulations relating to safety precautions the arrangements made by the Contractor shall be open to inspection by the or their representatives.

15.0 Notwithstanding the above Clauses 1 to 14 there is nothing in these to exempt the contractor from the operations of any other Act or Rule in force in the Republic of India.

Appendix-5

MODEL RULES FOR THE PROTECTION OF HEALTH AND SANITARY ARRANGEMENTS FOR WORKERS

1.0 APPLICATION

These rules shall apply to all building and construction works in which 20 (twenty) or more workers are ordinarily employed or are proposed to be employed in any day during the period during which the contractor work is in progress.

2.0 DEFINITION

Work place means a place where twenty or more workers are ordinarily employed or are proposed to be employed in connection with construction work on any day during the period during which the contractor work is in progress.

3.0 FIRST-AID FACILITIES

3.1 At every work place first aid facilities shall be provided and maintained, so as to be easily accessible during working hours, First-Aid boxes at the rate of not less than one box per 150 contract labour or part thereof ordinarily employed.

3.2 The First-Aid box shall be distinctly marked with a red cross on white ground and shall contain the following equipments:-

3.2.1 a) For work places in which number of contract labour employed does not exceed 50, Each First-Aid box shall contain the following equipments:

i) 6 small sterilized dressings.

ii) 3 medium size sterilized dressings.

iii) Large size sterilized dressings.

iv) 3 large sterilized burn dressings.

v) 1 (30 ml) bottle containing a two percent alcoholic solution of iodine.

vi) 1(30 ml) bottle containing salvolatile having the dose and mode of administration indicated on the label.

vii) 1 snake-bite lancet.

viii) 1 (30 gms) bottle of potassium permanganate crystals.

ix) 1 pair of scissors.

x) 1 copy of the First-Aid leaf-let issued by the Director General, Factory Advise Service & Labour Institutes, Government of India.

xi) 1 bottle containing 100 tablets (each of 5 grams) of aspirin.

xii) Ointment for burns.

xiii) A bottle of suitable surgical antiseptic solution.

3.2.2 For work places in which the number of contract labour exceed 50. Each First-Aid box shall contain the following equipments:

i) 12 small sterilized dressings.

ii) 6 medium size sterilized dressings.

iii) 6 large size sterilized dressings.

iv) 6 large size sterilized burn dressings.

v) 6 (15 gms) packet sterilized cotton wool.

vi) 1 (60 ml.) bottle containing a two percent iodine alcoholic solution.

vii) 1 (60 ml.) bottle containing salvolatile having the dose and mode of administration indicated on the label.

viii) 1 rolls of adhesive plaster.

ix) 1 snake – bite lancet.

x) 1 (30 gms.) Bottle of potassium permanganate crystals

xi) 1 pair of scissors.

xii) 1 copy of the First-Aid leaf-let issued by the Director General, Factory Advice Service and Labour Institutes, Government of India.

xiii) A bottle containing 100 tablets (each of 5 grams) of aspirin.

xiv) Ointment for burns & a bottle of suitable surgical antiseptic solution.

3.3 Adequate arrangements shall be made for immediate recoupment of the equipment when necessary.

3.4 Nothing except the prescribed contents shall be kept in the First Aid box.

3.5 The First Aid box shall be kept in charge of a responsible person who shall always be readily available during the working hours of the work place.

3.6 A person in charge of the First-Aid box shall be a person trained in First-Aid treatment, in work places where the number of labour employed is 150 or more.

3.7 In work places where the number of labour employed is 500 or more and hospital facilities are not available within easy distance of the works, first-Aid Posts shall be established and run by a trained Compounder. The Compounder shall be on duty and shall be available at all hours when the workers are at work.

3.8 Where work places are situated in places, which are not towns of cities, a suitable motor transport shall be kept readily available to carry injured person or persons suddenly taken ill to the nearest hospital.

4.0 DRINKING WATER

4.1 In every work place, there shall be provided and maintained at suitable places, easily accessible to labour, a sufficient supply of cold water fit for drinking.

4.2 Where drinking water is obtained from an intermittent public water supply, each work place shall be provided with storage where such drinking water shall be stored.

4.3 Every water supply of storage shall be at a distance of not less than 50 feet from any latrines drain or other source of pollution, Where water has to be drawn from an existing well which is within such proximity of latrine, drain or any other source of pollution, the well shall be properly chlorinated before water is drawn from it for drinking. All such wells shall be entirely closed in and be provided with a trap-door which shall be dust and water-proof.

4.4 A reliable pump shall be fitted to each covered well, trap-door shall be kept locked and opened only for cleaning or inspection which shall be done at least once a month.

5.0 WASHING FACILITIES

5.1 In every work place adequate and suitable facilities for washing shall be provided and maintained for the use of labour employed herein.

5.2 Separate and adequate screening facilities shall be provided for the use of male and female workers.

5.3 Such facilities shall be conveniently accessible and shall be kept clean and hygienic condition.

6.0 LATRINES AND URINALS

6.1 Latrines shall be provided in every work place on the following scale, namely:

a) Where females are employed there shall be at least one latrine for every 25 females. b) Where males are employed, there shall be at least one latrine for every 25 males. Provided that where the number of males or females exceeds 100, it shall be sufficient if there is one latrine for 25 males or females, as the case may be, upto the first 100, and one for every 50 thereafter.

6.2 Every latrine shall be under cover and so partitioned off as to secure privacy, and shall has a proper door and fastenings.

6.3 Construction of Latrines: The inside walls shall be constructed of masonry or some suitable heat resisting non-absorbent materials and shall be cement washed inside and outside at least once a year. Latrine shall not be a standard lower than bore-hole system.

6.4(a) Where workers of both sexes are employed, there shall be displayed outside each block of latrine and urinal, a notice in the language understood by the majority of the workers “For Men only” or “For Women only” as the case may be.

(b) The notice shall also bear the figure of man or of women, as the case may be.

6.5 There shall be at least one urinal for male workers up to 50and one for female workers upto 50 employed at a time. Provided that where the number of male or female workmen, as the case may be, exceeds 500, it shall be sufficient if there is one urinal for every 50 males or females upto the first 500 and one for every 100 or part thereof, thereafter.

6.6 (a) The latrines and urinals shall be adequately lighted and shall be maintained in a clean and sanitary condition at all times.

b) Latrines and urinals other than those connected with a flush sewerage system shall comply with the requirements of the Public Health Authorities.

6.7 Water shall be provided by means of a tap or otherwise so as to be conveniently accessible in or near the latrines and urinals.

6.8 DISPOSAL OF EXCRETA

Unless otherwise arranged for by the local sanitary authority arrangements for proper disposal of excreta by incineration at the work place shall be made by means of a suitable incinerator. Alternatively excreta may be disposed off by putting a layer of night soil at the bottom of a pucca tank prepared for the purpose and covering it with a 15 cm layer of waste or for refuse and then covering it with a layer of earth for fortnight (when it will turn into manure).

6.9 The Contractor shall, at his own expense, carry out all instruction issued to him by the Engineer- in-Charge to effect proper disposal of night soil and other conservancy work in respect of the Contractor's workmen or employees on the site. The Contractor shall be responsible for payment of any charges which may be levied by Municipal or Cantonment Authority for execution of such work on his behalf.

7.0 PROVISION OF SHELTER DURING REST

At every place there shall be provided, free of cost four suitable sheds, and two for males and the other two for rest separately for the use of man and women labour. The height of each shelter shall not be less than 3 meters from the floor level to the lowest part of the roof. These shall be kept clean and the space provided shall be on the basis of 0.6 sqm. Per head. Provided that the Engineer-in-Charges may permit, subject to his satisfaction, a portion of the building under construction or other alternative accommodation to be used for the purpose.

8.0 CRECHES

8.1 A every work place, at which 20 or more women workers are ordinarily employed, there shall be provided two rooms of reasonable dimensions for the use of their children under the age of six years. One room shall be used as a play room for the children and the other as their bedrooms. The rooms shall be constructed on standard not lower than the following:

i) Thatched roof

ii) Mud floor and walls.

iii) Planks spread over the mud floor and covered with matting

8.2 The rooms shall be provided with suitable and sufficient openings for light and ventilation. There shall be adequate provision of sweepers to keep the places clean.

8.3 The Contractor shall supply adequate number of toys and games in the playroom and sufficient number of cots and beddings in the bed-room.

8.4 The Contractor shall provide one Ayaa to look after the children in the creche when the number of women workers does not exceed 50 and two when the number of women workers exceeds 50.

8.5 The use of the rooms/earmarked as ealize shall be restricted to children, their attendant and mother of the children.

9.0 CANTEENS

9.1 In every work place where the work regarding the employment of contract labour is likely to continue for six months and wherein contract labour numbering one hundred or more are ordinarily employed, an adequate canteen shall be provided by the Contractor for the use of such labour.

9.2 The canteen shall be maintained by the Contractor in an efficient manner.

9.3 The canteen shall consist of at least a dining hall, kitchen, and storeroom, pantry and washing places separately for workers and utensils.

9.4 The canteen shall be sufficiently lighted at all times when any person has access to it.

9.5 The floor shall be made of smooth and impervious material and inside walls shall be lime washed or colour washed at least once in each year. Provided that the inside walls of the kitchen shall be lime-washed every four months.

9.6 The premises of the canteen shall be maintained in a clean and sanitary condition.

9.7 Waste Water shall be carried away in suitable covered drains and shall not be allowed to accumulate so as to cause a nuisance.

9.8 Suitable arrangements shall be made for the collection and disposal of garbage.

9.9 The dining hall shall accommodate at a time 30 persons of the labour working at time.

9.10 The floor area of the dining hall, excluding the area occupied by the service counter and any furniture except tables and chair shall not be less than one square metre per dinner to be accommodated.

9.11(a) A portion of the dining hall, and service counter shall be partitioned off and reserved for women workers in proportion to their number.

b) Washing places for women shall be separate and screened to secure privacy.

9.12 Sufficient tables, stool, chairs or benches shall be available for the number of dinners to be accommodated.

9.13.1 a) There shall be provided and maintained sufficient utensils, crockery, furniture and any other equipment necessary for the efficient running of the canteen.

b) The furniture, utensils and other equipment shall be maintained in a clean and hygienic condition.

9.13.2 a) Suitable clean clothes for the employees serving in the canteen shall be provided and maintained.

b) A service counter, if provided, shall have top of smooth and impervious material.

c) Suitable facilities including an adequate supply of hot water shall be provided for the cleaning of utensils and equipment.

9.14 The food stuffs and other items to be served in the canteen shall be in conformity with the normal habits of the labour.

9.15 The charge for food stuffs, beverages and any other items served in the canteen shall be based on 'No profit No loss' and shall be conspicuously displayed in the canteen.

9.16 In arriving at price of food stuffs, and other articles served in the canteen, the following items shall not be taken into consideration as expenditure, namely:

a) The rent of land building.

b) The depreciation and maintenance charges for the building and equipment provided for the canteen.

c) The cost of purchase, repair and replacement of equipment including furniture, crockery, cutlery and utensils:

d) The water charges and other charges incurred for lighting and ventilation:

e) The interest and amounts spent on the provision and maintenance and equipment provided for in the canteen.

9.17 The accounts pertaining to the canteen shall be audited once every 12 months by registered accountants and auditors.

10.0 ANTI MALARIAL PRECAUTIONS

The Contractor shall at his own expense, conform to all anti-malarial instructions given to him by the Engineer-in-Charge including the filling up of any borrows pits which may have been dug by him.

11.0 AMENDMENTS

SPA BHOPAL may from time to time, add to or amend these rules and issue such directions as it may consider necessary for the purpose of removing any difficulty which may arise in the administration hereof.

Appendix-6

SPECIAL CONDITIONS/ CLAUSES

1.0 **Dean (P & D)** shall, except as otherwise provided, ascertain and determine by measurement the value of work done in accordance with the contract. All measurements of all items having financial value shall be entered by the contractor and compiled in the shape of the Computerized Measurement Book having pages of A-4 size as per the format of the department so that a complete record is obtained of all the items of works performed under the contract.

2.0 All such measurements and levels recorded by the contractor or his authorized representative from time to time, during the progress of the work, shall be got checked by the contractor from **Dean (P & D**) or his authorized representative as per interval or program fixed in consultation with the **Dean (P & D)** or his authorized representative. After the necessary corrections made by the **Dean (P & D)**, the measurement sheets shall be returned to the contractor for incorporating the corrections and for resubmission to the Dean (P & D) for the dated signatures by the **Dean (P & D)** and the contractor or their representatives in token of their acceptance.

3.0 Whenever bill is due for payment, the contractor would initially submit draft computerized measurement sheets and these measurements would be got checked / test checked from the **Dean(P &D**) and / or his authorized representative. The contractor will, thereafter, incorporate such changes as may be done during these checks/ test checks in his draft computerized measurements, and submit to the department a computerized measurement book duly bound and with its pages machine numbered. The Dean (P & D) and/ or his authorized representative would there after check this MB, and record the necessary certificates for their checks/ test checks.

4.0 The final, fair, computerized measurement book given by the contractor, duly bound, with its pages machine numbered, should be 100% correct, and no cutting or overwriting in the measurements would there after be allowed. If at all any error is noticed, the contractor shall have to submit a fresh computerized MB with its pages duly machine numbered and bound, after getting the earlier MB cancelled by the department. There after, the MB shall be taken in the divisional office records, and allotted a number as per the register of Computerized MB's. This should be done before the corresponding bill is submitted to the division office for payment. The contractor shall submit two spare copies of such computerized MB's for the purpose of reference and record by the various offices of the department.

5.0 The contractor shall also submit to the department separately his computerized Abstract of Cost and the bill based on these measurements, duly bound, and its pages machine numbered along with two spare copies of the "bill". Thereafter, this bill will be processed by the Division office and allotted a number as per the computerized record in the same way as done for the measurement book meant for the measurements. The contractor shall, without extra charge, provide all assistance with every appliance, labour and other things necessary for checking of measurements/levels by the **Dean (P & D)** or his representative.

6.0 Except where any general or detailed description of the work expressly shows the contrary, measurements shall be taken in accordance with the procedure set forth in the specifications

not with standing any provision in the relevant Standard Method of measurement or any general or local custom. In the case of items which are not covered by the specifications, measurements shall be taken in accordance with the relevant standard method of measurement issued by the Bureau of Indian standards and if for any item no such standard is available then a mutually agreed method shall be followed.

7.0 The contractor shall give not less than seven days notice to the Dean (P & D) or his authorize representative in charge of the work before covering up or otherwise placing beyond the reach of checking and/ or test checking the measurement of any work in order that the same may be checked and/ or test checked and correct dimensions thereof be taken before the same is covered up or placed beyond the reach of checking and / or test checking measurement and shall not cover up and place beyond reach of measurement any work without the consent in writing of the Dean (P & D) or his authorized representative in charge of the work who shall within the aforesaid period of seven days inspect the work, and if any work shall be covered up or placed beyond the reach of checking and /or test checking measurements without such notice having been given or the Dean (P & D)'s consent being obtained in writing the same shall be uncovered at the contractor's expense or in default thereof no payment or allowance shall be made for such work or the materials with which the same was executed.

8.0 **Dean (P & D)** or his authorized representative may cause either themselves or through another officer of the department to check the measurements recorded by the contractor and all the provisions stipulated herein shall be applicable to such checking of measurements or levels.

9.0 It is also a term of the contract that checking and / or test checking the measurements of any item of the work in the measurement book and /or its payment in the interim, on account of final bill shall not be considered as conclusive evidence as to the sufficiency of any work or material to which it relates nor shall it relieve the contractor from liabilities from any over measurement or defects noticed till completion of the defects in the liability period.

10. The contractor shall be fully responsible to coordinate the **MPMKVVCL Bhopal** before supply & Erection testing charging of PERMANENT 33KV H.T. line (feeder).

11. Regarding erection of pole, if any obstruction the contractor shall be deal.

12.The contractor shall be fully responsible before commencing the work doing GPS Survey in presence of **MPMKVVCL Engineer**, DPR Preparation, charging of line.

Dean (P & D)
Institute Works Department
SPA Bhopal

Section -5
Forms of Bid & Forms of Securities

1. Letter of Application

(Letterhead paper of the Bidder)

[Including full postal address, telephone, fax, cable and telex addresses]

[Date]

To:

The Director,

School of Planning and Architecture,

Neelbad Road Bhauri Bhopal-462030

.

Phone: 9685092821

Subject: Application to issue Tender form

Sir,

1. Being duly authorised to represent and act on behalf of…….. *(*Hereinafter "the bidder"), and having reviewed and fully understood all the bid information provided, the undersigned hereby apply to be qualified by your agency as a bidder for the contract of the ***". PERMANENT H.T.CONNECTION OF 600 KVA H.T.POWER ON 33 KV SIDE FOR SCHOOL OF PLANNING AND ARCHITECTURE BHOPAL AT BHAURI BHOPAL."***

2. SPA Bhopal and its associates/ representatives are hereby authorized to conduct any inquiries or investigations to verify the statements, documents, and information submitted in connection with this application, and to seek clarification from our bankers and clients regarding any financial and technical aspects. This Letter of Application will also serve as authorization to any individual or authorized representative of any institution, to provide such information deemed necessary to verify statements and information provided in this application or with regard to the resources, experience, and competence of the Bidder.

3. This application is made in the full understanding that:

(a) SPA Bhopal reserves the right, to reject or accept any application, cancel the bidding process and reject all applications; and

(b) SPA Bhopal shall not be liable for any such actions and shall be under no obligation to inform the Bidder of the grounds for them.

4. The undersigned declared that the statements made and the information provided in the duly completed application are complete, true, and correct in every detail.

Authorised Signature

Name and Title of Signatory

2. Letter of Submission of Bid

(Letterhead paper of the Bidder)

To:

The Director,

School of Planning and Architecture,

Neelbad Road Bhauri Bhopal-462030

.

Phone: 9685092821

Subject: Application to submission of Tender form

Sir,

I/We have read and examined notice inviting tender, specifications applicable, Drawings & Design, Instructions to bidders, General Conditions of Contract, appendix, Special conditions, Schedule of Rate & other documents and Rules referred to in the Conditions of Contract and all other contents in the tender document for the work.

I/We hereby tender for the execution of the work specified for School of Planning and Architecture, Bhopal within the time specified in contract data as per schedule of quantities and in accordance in all respects with the specifications, designs, drawings and instructions in writing referred to General Conditions of the contract and with such materials as are provided for, by and in respect in accordance with, such conditions so far as applicable.

I/We agree to keep the tender open for **45 days** from the due date of submission thereof and not to make any modifications in its terms and conditions. If I/We withdraw my/our tender before the said period or issue of letter of acceptance/intent, whichever is earlier, or, makes any modifications in the terms and conditions of the tender which are not acceptable to the SPA Bhopal, then the SPA Bhopal shall, without prejudice to any other right or remedy, be at liberty to forfeit 50% of the said earnest money as aforesaid.

A sum of Rs ……/-(……..) has been deposited in prescribed manner as earnest money. If I/We fail to commence the work specified I/We agree that the said SPA Bhopal shall without prejudice to any other right or remedy, be at liberty to forfeit the said earnest money absolutely otherwise said earnest money shall be retained by competent authority on behalf of the SPA Bhopal towards Security Deposit to execute all the works referred to in the tender documents upon the terms and conditions contained or referred to therein and carry out such deviations as may be ordered, upto maximum of the percentage mentioned in contract data.

I/We hereby intimate that for receiving payments I/we have an account in _____ Bank with account No. _____ Where the ECS / EFT facility of e-payment is available.

I/We hereby declare that I/We shall treat the tender documents drawings and other records connected with the work as secret/confidential documents and shall not communicate information derived there-from to any person other than a person to whom I/We am/are authorized to communicate the same or use the information in any manner prejudicial to the safety of the State.

I/We agree that should I/We fail to commence the work specified in the above memorandum, an amount equal to the amount of the earnest money mentioned in the form of invitation of tender shall be absolutely forfeited to the SPA Bhopal and the same may at the option of the competent authority on behalf of the SPA Bhopal be recovered without prejudice to any right or remedy available in law out of the deposit in so far as the same may extend in terms of the said bond and in the event of deficiency out of any other money due to me/us under this contract or otherwise.
I/We agree that this contract is subject to jurisdiction of court at Bhopal, M.P. only.

Dated…….

Witness: ( )
Address: Signature of Contractor
Occupation: Postal Address: -

****

ACCEPTANCE

The above tender (as modified by you (Contractor) and as provided in the letters mentioned hereunder) is accepted by me for and on behalf of the SPA Bhopal for a sum of Rs._____ (Rupees_____ _____) the letters referred to below shall form part of this Contract Agreement:-

(a)

(b)

(c)

Dean (P& D)
Institute Works Department
SPA Bhopal

3. Bidder, Qualification and other 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: (Attach copy)

(a) Place of registration:

(b) Principal place of business:

(c) Power of attorney of signatory of Bid

1.2 Total annual volume of ELECTRICAL Engineering Construction work executed and payments received in the last five years proceeding the year in which bids are invited.

(Attach certificate from Chartered Accountant)

S.N.	Financial Year	Amount (In Lakhs)
01	2014-15	
02	2014-13	
03	2013-12	
04	2012-11	
05	2011-10	

1.3 Work performed as prime Contractor (in the same name and style) on construction works of a similar nature and volume over the last five years. *(Attach certificate from the Engineer-in-charge)*

S.N.		Project-1	Project-2	Project-3	Project-4
01	Project Name				
02	Name of Employer				
03	Description of work order				
04	Value of contract				
05	Contract No.				
06	Date of Issue of Work				
07	Stipulated Date of Completion				
08	Actual Date of Completion				
09	Remarks for Delay, if any				

1.3.1 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.

1.4 Existing commitments and on-going construction works:

S.N.		Project-1	Project-2	Project-3	Project-4
01	Description of Work				
02	Place & State				
03	Contract No & Date				
04	Name & Address of Employer				
05	Value of Contract (Rs. In lakhs)				
06	Stipulated period of completion				
07	Value of works remaining to be completed (Rs. Lakhs)*				
08	Anticipated Date of completion				
09	Remarks for Delay, if any				

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

1.5 Works for which bids already submitted:

S.N.		Project-1	Project-2	Project-3	Project-4
01	Description of Work				
02	Place & State				
03	Name & Address of Employer				
04	Value of work (Rs. In lakhs)				
05	Stipulated period of completion				
06	Date when decision is expected				
07	Remarks for Delay, if any				

1.6 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.

S.N.	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
01				
02				
03				
04				
05				

06				
07				

1.7 Qualifications of technical personnel proposed for the Contract. Refer also to Clause 4.2(e) of the Instructions to Bidders and Clause 9.1 of Part-1 General Conditions of Contract.

S.N.	Name of employee	Post held	Qualification	Experience	
				Road works	Building works
01					
02					
03					

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

S.N.	Sections of the Works	Value of subcontract	Sub-contractor(name and address)	Experience in similar work
01				
02				

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

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

(A)

(B)

1.10 Evidence of access to financial resources to meet the qualification requirements: cash in hand, lines of credit, etc. List below and attach copies of support documents. (Sample format attached).

(A)

(B)

1.11 Name, address, and telephone, telex, and facsimile numbers of banks that may provide references if contacted by the Employer.

(A)

(B)

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

S.N.	Name of Other party(s)	Cause of dispute	Litigation where (Court/arbitration)	Amount involved
01				
02				

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

4. Declaration Statement

(Letterhead paper of the Bidder)

[date]

To

The Director,
School of Planning and Architecture,
Neelbad Road Bhauri Bhopal-462030
.

Phone: 9685092821

Dear Sir:

1. I, the undersigned, do hereby certify that all the statements made in the application and attachments thereto are true and correct.
2. The undersigned also hereby certifies that neither our firms M/s……. nor any of its constituent partners have abandoned any work awarded to us by any Agency in India nor any contract awarded to us for such works has been rescinded, during last five years prior to the date of this application.
3. The undersigned also furnish undertaking that we are not declared by any court of law as proclaimed offenders also that we are not convicted under any law for the offences punishable under Indian Penal Code, Negotiable Instrument Act of any Labour/ employee beneficial legislations.
4. The undersigned hereby authorize(s) and request(s) any bank, person, firm or corporation to furnish pertinent information deemed necessary and requested by to verify this statement or regarding my (our) competence and general reputation.
5. The undersigned understands and agrees that further qualifying information may be requested, and agrees to furnish any such information at the request of the SPA Bhopal

Signed by an Authorized Officer of the Firm

Title of Officer

Name of Firm

Date:

5. SPECIMEN FORMAT FROM BIDDER TO BANKERS AUTHORISING THEM TO PROVIDE INFORMATION TO SPA BHOPAL / ITS REPRESENTATIVES

(Letterhead paper of the bidder)

To
Name of Bank/ Address/ city

Dear Sir:
We have recently submitted a Bid Proposals to the School of Planning and Architecture (SPA), Bhopal for implementing its project for
_____.
We hereby authorise you to provide all information/ data readily about us and our credit status, as may be desired by SPA Bhopal and you need not seek any clearance/ opinion from us for providing the information/ data to SPA Bhopal.

Sincerely,
Authorized Signatory

6. Financial Capability-1

(Letterhead paper of the Bidder)

Name of Bidder:-

Bidder should provide financial information to demonstrate that they meet the requirements stated in the Instructions to Bidders. Each Bidder shall complete this form. If necessary, use separate sheets to provide complete banker information. A copy of the audited balance sheets should be attached. Autonomous construction subdivisions of parent conglomerate business shall submit financial information related only to the particular activities of the subdivision.

1. Name of Banker
2. Address of Banker
3. Telephone Contract name and title
4. Tax E-mail

Summarize actual assets and liabilities for the previous five years.

S.N.	**Financial Information in Indian Rupees**	**Actual: Previous Five years.**				
		5	4	3	2	1
01	Total assets					
02	Current assets					
03	Total Liabilities					
04	Net Worth					
05	Working Capital					
06	Current Liabilities					
07	Profits before taxes					
08	Profits after taxes					

Specify proposed sources of financing such as liquid assets, unencumbered real estates, lines of credit and other financial means, net of current commitments, available to meet the total construction cash flow demands of the subject contract or contracts as indicated in Instructions to Bidders _____.

S.N.	*Source of finance*	*Amount*

Attach audited financial statements for the last five years (for the individual Bidder or each partner of a joint venture).

Note: (1) For previous five year, year 1= 2011-2012, year 2= 2010-2011 etc.

7. Financial Capability-2

(Letterhead paper of the Bidder)

Name of Bidder:-

Bidder should provide financial information to demonstrate that they meet the requirements stated in the Instructions to Bidders. Each Bidder shall complete this form. If necessary, use separate sheets to provide complete banker information. A copy of the audited balance sheets should be attached. Autonomous construction subdivisions of parent conglomerate business shall submit financial information related only to the particular activities of the subdivision.

1. Name of Banker
2. Address of Banker
3. Telephone Contract name and title
4. Tax E-mail

** If more than one banker is proposing to finance the project(s), the details in the above format may be appendix on all bidders*

The Details of financial capability (as indicated in Clause 5.1 of Instructions to Bidders) is as under

S.N.	*Source of finance*	*Amount*
01	Net working capital	
02	Lines of credit from Banks (Bank Certificate enclosed)	
03	Other financial means	
04	Own Resources	
05	Available money guarantees (name and address of banks given)	
A	**Total of A**	
01	Liability during next 3 years	
03	Financial Commitments for ongoing civil works	
03	Other commitments	
B	**Total of B**	

Note: All the above items shall be supported by specific details/list of items/certified balance sheet

8. Letter of financial bid

(Letterhead of the Bidder)

Ref. no. *[date]*

To,
The Director
School of Planning and Architecture,
Neelbad Road Bhauri Bhopal -462030
Phone: 9685902821

Subject: PERMANENT H.T.CONNECTION OF 600 KVA H.T.POWER ON 33 KV SIDE FOR SCHOOL OF PLANNING AND ARCHITECTURE BHOPAL AT BHAURI BHOPAL.

Dear Sir:

1.0 Having examined the Bid Document including Notice Inviting Bids, Instructions to Bidders, General Conditions of Contract, Special Conditions of Contract, Technical Specifications, Bill of Quantities, Drawings, Schedules and Annexure for the execution of the above named works, we, the undersigned, offer to execute and complete such works and remedy any defects therein in conformity with the said Bid Document at the prices indicated in Schedule 1 to this letter.

2.0 Our financial bid for the execution of the above said project as per bill of quantity, drawings and specifications attached herewith will be ` _____ (In words:_____ _____ for carrying out entire works including all taxes applicable and maintenance of the works for five years. (Item rates are also furnished in Bill of Quantity attached herewith)

3.0 We undertake, if our Bid is accepted, to commence the works within fourteen (14) days of receipt of the Engineer's order to commence, and to complete and deliver the sections and whole of the works comprised in the Contract within the prescribed period. We also undertake to furnish Performance Security (ie) in the form of a Bank Guarantee in accordance with the Conditions of Contract.

4.0 We agree to abide by this Bid for the period of ninety (20 days) from the date of Bid opening and it shall remain binding upon us and may be accepted at any time before the expiry of that period.

5.0 We confirm our agreement to treat the Bid Document, Drawings and other records connected with the works as secret and confidential document and shall not communicate information contained therein to any other person other than the person authorized by Employer or use such information in any manner prejudicial to the safety and integrity of the works.

6.0 We undertake that, in completing for (and, if the award is made to us, in executing) the above Contract, we will observe the laws against fraud and corruption in force in India namely "Prevention of Corruption Act 1988". We confirm that our firm has valid VAT/PAN registrations along with EPF, ESI codes as stipulated.

7.0 We hereby confirm that this Bid complies with the Eligibility, Bid validity and Bid security required as stated in the Bidding documents.

Yours faithfully,
Name of Bidder with official seal Authorised Signature:
Address: Name and Title of Signatory:

9. Letter of Intent

No. Date

To,

_____ (Name of contractor)

_____ (Address of contractor)

This is to notify you that the Employer, namely, School of Planning and Architecture, Bhopal has accepted your Bid dated……for execution of the…… [Name of the Contract and identification number, as given in the Contract work `..... (In words: _____

_____ for carrying out entire works including all taxes applicable and maintenance of the works for five years.

You are hereby requested to furnish Performance Security, (and additional security for unbalanced bids in terms of ITB Clause 27.3 and clause 27.4,) [where applicable} in the form detailed in Cl. 32 of ITB for an amount of Rs.———— within 10 days of the receipt of this letter of acceptance valid up to 45 days from the date of expiry of Defects Liability Period i.e. up to ..... and sign the contract, failing which action as stated in Cl. 32.3 of ITB will be taken.

Yours faithfully,

Authorized Signature:

Name and Title of Signatory:

Name of Agency:

10. Declaration

(Letterhead of the Bidder)

Ref. no. *[date]*

To,

The Director, SPA BHOPAL,

Neelbad Road, Bhauri, Bhopal (M.P.) – 462030

Phone: 9685092821

Subject: "PERMANENT H.T.CONNECTION OF 600 KVA H.T.POWER ON 33 KV SIDE FOR SCHOOL OF PLANNING AND ARCHITECTURE BHOPAL AT BHAURI BHOPAL.".

Dear Sir:

It is to certify that:-

1) I / we have submitted the tenders in the Proforma as downloaded directly from the website. &there is no change in formatting, number of pages etc.
2) I / We have submitted tender documents which are same / identical as available in the Website.
3) I / we have not made any corrections / additions / alteration / omission etc in the tender documents downloaded from web by me / us.
4) I / We have checked that no page is missing and all pages as per the index are available & that all pages of Tender document submitted by us are clear & legible.
5) I / we have signed (with stamp) all the pages of the tender document before submitting the same.
6) I / we have sealed the tender documents properly before submitting the same.
7) I / We have submitted the cost of tender along with the EMD.
8) I / we have read carefully & understood the important instructions to the tenderers who have down loaded the tenders from the web.
9) In case at any later stage, it is found that there is difference in our downloaded tender documents from the Original, SPA, Bhopal shall have the absolute right to take any action as deemed fit without any prior intimation to Me / Us.
10) In case at any later stage, it is found that there is difference in our downloaded tender documents from the Original, the tender / work will be cancelled and Earnest Money / Security Deposit will be forfeited at any stage whenever it is so noticed. The department will not pay any damages to me / us on this account.
11) In case at any later stage, it is found there is difference in our downloaded tender documents from the Original, I / We may also be debarred for further participation in the tenders for SPA. Bhopal & would also render me / us liable to be removed from the approved list of contractors of the Department.

Yours faithfully,

Name of Bidder with official seal
Address:

Authorised Signature:
Name and Title of Signatory:

11. Confirmation Letter

(Letterhead of the Bidder)

Ref. no. *[Date]*

To,
The Director,
School of Planning and Architecture,
Neelbad Road Bhauri Bhopal-462030
.

Phone: 9685092821

Subject: PERMANENT H.T.CONNECTION OF 600 KVA H.T.POWER ON 33 KV SIDE FOR SCHOOL OF PLANNING AND ARCHITECTURE BHOPAL AT BHAURI BHOPAL.

DEAR SIR,

We acknowledge receipt of your letter of Intent, ref…….. Dated…… and unconditionally accept the offer to take up above captioned works at the price indicated in the letter of intent.

We also confirm our acceptance to all the corrections and modifications made by the Employer in respect of our bid.

We undertake to provide you unconditional bank guarantee towards performance security and additional security for unbalanced bid as per the agreed format within the prescribed data as per the Instructions to Bidder and Conditions of Contract.

Yours faithfully,
Authorized Signature:
Name and Title of Signatory:
Name of Agency:

12. PROFORMA FOR AGREEMENT

(ON NON-JUDICIAL STAMP PAPER OF APPROPRIATE VALUE)

CONTRACT AGREEMENT FOR THE WORK OF ----------DATED--------

Between M/s---------- (refer note) in the town of _____hereinafter called the contractor (which term shall unless excluded by or repugnant to be subject or context include its successors and permitted assigns) of the one part and the School of Planning and Architecture, Bhopal hereinafter called the SPA Bhopal (which term shall unless excluded by or repugnant to the subject or context include its successes and assigns) of the other part.

WHEREAS

a. The SPA Bhopal is desirous that the construction of _____ _____ at _____ should be executed as mentioned, enumerated or referred to in the tender including Press Notice Inviting Tender, General Conditions of the Contract, Special Conditions of the Contract, Specifications, Drawings, Plans, Time Schedule of completion of jobs, Schedule of Quantities and Rates, Agreed Variations, other documents, has called for Tender.

b. The contractor has inspected the site and surroundings of the work specified in the tender documents and has satisfied himself by carefully examination before submitting his tender as to the nature of the surface, strata, soil, sub-soil and grounds, the form and nature of the site and local conditions the quantities, nature and magnitude of the work the availability of labour and materials necessary for the execution of work, the means of access to site, the supply of power and water thereto and the accommodation he may require and has made local and independent enquiries and obtained complete information as to the matters and things referred to or implied in the tender documents or having any connection therewith, and has considered the nature and extent of all the probable and possible situations, delays, hindrances or interferences to or with the execution and completion of the work to be carried out under the contract, and has examined and considered all other matters, conditions and things and probable and possible contingencies, and generally all matters incidental thereto and ancillary thereof affecting the execution and completion of the work and which might have influenced him in making his tender.

c. The tender documents including the SPA BHOPAL's Press Notice Inviting Tender, General conditions of contract, Special Conditions of Contract, Schedule of Quantities and rates, General obligations, Specifications, Drawings, plan, time schedule for completi0n of work. Letter of Acceptance of tender and any statement of agreed variations with its enclosures copies of which are hereto annexed form part of this contract though separately set out herein and are included in the expression Contract wherever herein used.

AND WHEREAS

The SPA Bhopal accepted the tender of M/s ---------- (refer note--------) (Contractor) for the construction of ---------- at ---------- and conveyed vide letter No.----------dated ----------at the rates stated in the Schedule of quantities for the work and accepted by the SPA BHOPAL (hereinafter called the Schedule of Rates) upon the terms and subject to the conditions of the contract.

NOW THIS AGREEMENT WITNESSTH & IT IS HEREBY AGREED AND DECLARED AS FOLLOWS.

1. In consideration of the payment to be made to the contract for the work to be executed by him, the contractor hereby convenient with the SPA BHOPAL that the contractor shall and will duly provide, execute, complete and maintain the said work and shall do and perform all other acts and things in the contract mentioned or described or which are to be implied and there-from or may be reasonably necessary for the completion of the said works and at the said times and in the manner and subject to the terms and conditions or stipulations mentioned in the contract, AND

2. In consideration of the due provisions execution, completion and maintenance of the said work, the SPA BHOPAL does hereby agree with the contractor that the SPA BHOPAL will pay to contractor the respective amounts for the work actually done by him and approved by the SPA BHOPAL at the Schedule or Rates and such other sum payable to the contractor under provision of the contract, such payment to be made at such time in such manner as prescribed for in the contract.

3. The contract is subjected to jurisdiction of court at Madhya Pradesh only. It is specifically and distinctly understood and agreed between the SPA BHOPAL and the contractor that the contractor shall have no right, title or interest in the site made available by the SPA BHOPAL for execution of the works or in the building, structures or works executed on the said site by the contractor or in the goods, articles, materials, etc. brought on the said site (unless the same specifically belongs to the contractor) and the contractor shall not have or deemed to have any lien whatsoever charge for unpaid bills will not be entitled to assume or retain possession or control of the site or structures and the SPA BHOPAL shall have an absolute and unfettered right to take full possession of site and to remove the contractor, their servants, agents and materials belonging to the contractor and lying on the site.

In Witness whereof the parties hereto have here-into set their respective hands and seals in the day and the year first above written.

Signed and delivered for and on behalf of	Signature and delivered for and on behalf of the contractor
SPA BHOPAL	
OFFICIAL ADDRESS	
	(Contractor)
Date	*Date*
Place	*Place*

IN PRESENCE OF TWO WITNESSES

SIGNATURE	SIGNATURE
NAME	NAME
SIGNATURE	SIGNATURE
NAME	NAME

For Proprietary Concern

Shri…….s/o……r/o……..carrying on business under the name and style of……at……. (Hereinafter called the said Contractor which expression shall unless the context requires otherwise include his heirs, executors, administrators and legal representatives).

For Partnership Concern

M/s …….a partnership firm having its registered office at ……..(hereinafter called the said Contractor which expression shall unless the context requires otherwise include his heirs, executors, administrators and legal representatives). The partners of the firms are:

i) Shri …….s/o……, And

i) Shri ……..s/o……..etc.

For Companies

M/s ……a company duly incorporated under the Indian Companies Act, 1956 and having its registered office at ……..in the state of …….(hereinafter called the said Contractor which expression shall unless the context requires otherwise include its successors and assign).

13. AFFIDAVIT

I/We have submitted a bank guarantee for the work_____ _____(Name of Work), Agreement No. _____ Dated:_____from _____ (Name of the Division) with a view to seek exemption from payment of performance guarantee in cash. This Bank guarantee expires on _____

I/ We undertake to keep the validity of the bank guarantee intact by getting it extended from time to time at my/our own initiative upto a period of _____ months after the recorded date of completion of the work or as directed by the Engineer in charge. I/We also indemnify the School of Planning and Architecture, Bhopal against any losses arising out of non encashment of the bank guarantee if any.

(Deponent)

Signature of Contractor

Note: The affidavit is to be given by the Executants before a first class Magistrate.

14. FORM OF PERFORMANCE SECURITY

BANK GUARANTEE BOND

1. In consideration of the SPA BHOPAL (hereinafter called "the SPA BHOPAL") having agreed under the terms and conditions of agreement No._____ Dated_____made between _____ and _____ (hereinafter called "the said contractor(s)") for the _____work (hereinafter called "the said agreement") for compliance of his obligation in accordance with the terms and conditions in the said agreement.

We _____ (indicate the name of the Bank) (hereinafter referred to as "as Bank) hereby undertake to pay to the SPA BHOPAL and amount not exceeding Rs._____(Rupees _____only) on demand by the SPA BHOPAL.

2. We_____(Indicate the name of the Bank) do hereby undertake to pay the amount due and payable under this Guarantee without any demure, merely on a demand from the SPA BHOPAL stating that the amount claimed is required to meet the recoveries due or likely to be due from the said contractor(s). 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 SPA BHOPAL any money so demanded notwithstanding any dispute or disputes raised by the contractor (s) in any suit or proceeding pending before any court or Tribunal relating thereto our liability under this present being absolute and unequivocal. The payment made by us under this bond shall be valid discharge of our liability for payment to there-under and the contractor(s) shall have no claim against us making such payment.

4. We _____(Indicate the name of 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 agreement and that it shall continue to be enforceable till all the dues of the SPA BHOPAL under or by virtue of the said agreement have been fully paid and it is claims satisfied or discharged or till Engineer-in-charge on behalf of the SPA BHOPAL certifies that the terms and conditions of the said Agreement have been fully and properly carried out be the said contractor(s) accordingly discharges this guarantee.

5. We _____(indicate the name of Bank) further agree with the SPA BHOPAL that the SPA BHOPAL shall have the fullest liberty without our consent and without affecting any manner our obligations hereunder to vary any of the terms and conditions of the said agreement or to extend time of performance by the said contractor(s) from time to time or to postpone for any time to time any of the powers exercisable by the SPA BHOPAL against the said contractor(s) and to forebear or enforce any of the terms and conditions relating to the said agreement shall not be relieved from our

liability by reasons of any such variation or extension being granted to the said contractor(s) or for any forbearance act of omission on that part of the SPA BHOPAL or any indulgence by the SPA BHOPAL to the said contractor(s) or by any such matter or thing whatsoever which under the law relating to sureties would, but for this provision, have effected or so relieving us.

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

7. We _____(indicate the name of Bank) lastly undertake not to revoke this guarantee except with the previous consent of the SPA BHOPAL in writing.

8. This guarantee shall be valid upto_____unless extended on demand by SPA BHOPAL. Notwithstanding any thing mentioned above our liability against this Guarantee is restricted to Rs._____ (Rs._____only) and unless a claim in writing is lodged with us within six months of the date of expiry or the extended date of expiry of this guarantee, all our liabilities under the Guarantee shall stand discharged.

Date the_____ date of_____

For _____

(Indicate the name of Bank)

Section-6

Bill of Quantities for works (BOQ)

A. Preamble

1. The Bill of Quantities shall be read in conjunction with the Instruction to Bidders, General and Special Conditions of Contract, Technical Specifications and Drawings.
2. The quantities given in the Bill of Quantities are approximate and provisional, which are given to provide a common basis for making payment for works. Actual quantities of work are likely to increase or decrease as per the requirement at site. Hence there is no claim for any additional or less quantities than the specified in the BOQ.
3. The rates in the Bill of Quantities shall, except insofar as it is otherwise provided under the Contract, include all construction plant, labour, supervision, materials, erection, transportation, maintenance, insurance, administrative overheads, profit, taxes and duties, together with all general risks, liabilities and obligations set out or implied in the Contract.
4. The Bidder shall indicate the unit rate and line total on the Total Estimate Bid Amount, which shall be applicable on each item of the Bill of Quantities, whether quantities are stated or not.
5. General directions and description of work and materials are not necessarily repeated nor summarized in the Bill of Quantities. The whole cost of complying with the provisions of the Contract shall be included in the items provided in the Bill of Quantities. References to the relevant sections of the contract documentation shall be made before entering prices against each item in the Bill of Quantities.
6. The method of measurement of completed work for payment shall be in accordance with relevant best practices IRC/IS/ BIS /AASHTO or as per codal provisions/specifications as may be decided by the

Dean (P&D)
SPA Bhopal,

NAME OF WORK : - PERMANENT HT CONNECTION OF 600 KVA HT POWER ON 33KVSIDE FOR SCHOOL OF PLANNING AND ARCHITECTURE BHOPAL AT BHAURI BHOPAL..

Sl. No.	Description of Items	Quantity	Unit	Rates		Amounts
				Figure	Words	
1.	A) SUPPORTS : (H BEAMS / RAIL POLES) (34.6 Kg/Mt.Wt.)					
1.1	Supplying and erection of the following single length flat bottom support complete with aligning and keeping it in truly vertical position including painting of pole with bitumen paint in bottom and one coat of red oxide and two coat of aluminium paint etc complete as per specification..The depth of foundation shall be 1/6 of the length of the pole.and as per approved material. (Excluding Erection). a) H Beam 13 Mtr Long 152x152 or 150x150 mm 37.1 Kg/Mtr. Weight	19	Each			
1.2	B. ERECTION OF POLE :					
1.2.1	Erection of metallic Pole of following length in cement concrete 1: 3: 6 (1 cement : 3 coarse sand : 6 graded stone aggregate 40 mm nominal size) foundation including excavation and refilling etc as required . a). Above 10 meter	19	Each			
1.3	C. COLLER OF POLE :					
1.3.1	providing and making steel pole coller with cement concrete 1: 3: 6 (1 cement : 3 coarse sand : 6 graded stone 20 mm) of 0.45 mtr. dia. from ground level to 0.45 mtr. high with 20 cm. thick base foundation and shape including farm work, plastering if required, curing etc as required. (Volume of pole /	19	Each			

	pipe not to be deducted)					
2	**33 kV LIGHTNING ARRESTER :**					
2.1	Supplying, installation, testing and commissioning of 30 to 37 KV station class, thyrite magne valve, 0.10 W/KV watt loss polymer lightning arrester with earthing neutral system. (Set of three numbers for 3 phases system).	1	Set			
3	**33 kV DISC INSULATOR (POLYMER)**					
3.1	Supplying and erection of 33kV (45 KN) Polymer disc insulators for 33KV overhead lines with galvanized insulator fittings, ball and socket type, and complete with galvanized strain clamp, bolts, nuts, washers etc. as required.	27	Each			
4	**33 kV PIN INSULATOR (POLYMER)**					
4.1	Supplying and erection of 33 kV (10 KN) Polymer pin insulator complete with long steel head G.I. pin, nut, washer etc. as required	54	Each			
5	**STEEL :**					
5.1	Supply, fabrication and erection of Angle/Chanel/Flat iron fitting for over head line & sub-station etc such as 'D' bracket, cross arms, top clamp, 'V' cross arms, Back/Support clamps or other similar work etc. including nut bolts of required size, making holes, fabrication, welding, cutting, etc. and painting with one coat of red oxide paint & two coat of aluminium paint as required as per specification.	1600	Kg			
6	**AAAC CONDUCTOR :**					
6.1	Supplying and drawing AAAC conductor of approved make with stringing making off complete with binding at existing insulator, jointing, jumpering, teeing off connecting etc. as required and clearing of obstacles (if any).					

	a. AAAC Dog Conductor 0.10 sq inch (100 sq mm Al eq.)	2.17	Km			
7	**33 kV A.B. SWITCH (Polymer) :**					
7.1	Supplying, Fixing, Testing and Commissioning of 33 KV 600 Amps polymer Gang operated Air Break off load disconnecting switch complete with self aligning type spring loaded fixed contact and knife type moving contact made of hard drawn electrolytic copper, GI phase coupling shaft, GI operating rod with handle, post insulator, contact gun, GI base channel, 7/8mm dia GI rod for arching horn etc. having verticle break and horizontal mounting type complete as required. (set of three number for 3 phases system)	1	Set			
8	**STAY SET :**					
8.1	Supplying & erection of galvaiesed stay set for 33 Kv overhead line complete with 19/20mm. Dia x 1.8 mtrs long stay rod, anchor plate of size 45 cm x 45 cm x 7.5 mm thick, thimble , stay clamps, turn buckle (20 mm x 600 mm) , 7/4.0 mm dia G.I.stay wire and 33 KV strain insulator etc. in cement concrete 1 : 3 : 6 (1 cement : 3 coarse sand : 6 Grade Stone aggregate 40 mm nominal size) foundation including excavation and refilling etc. as required.	2	Each			
9	**33 KV Cross bracing :**					
9.1	Supplying and erection of a set of cross bracing fame work for 33 KV over head line double pole struture having four members fabricated out of 65mm x 65mm x 6mm angle iron to form of rectangle of minimum size 2400mm width x 288mm height complete with 50mm x 6mm M.S. flat iron clamps, bolts and nuts i/c drilling holes for	8	Each			

	insulator pins, bolts and nuts etc and painting with primer and finish paint as reqd.					
10	**HT DANGER NOTICE PLATE :**					
10.1	Providing and fixing H.T. danger notice plate of 250 mm X 200 mm, made of mild steel, at least 2 mm thick, and vitreous enameled white on both sides, and with inscription in single red colour on front side as required.	15	Each			
11	**ANTI CLIMBING DEVICES :**					
11.1	Supplying and fixing of anti climbing devices made of GI barbed wire containing to IS 2/6/1060having 4 points barbs 12 kg/100 mtrs size wrapped helically on the existing pole for a height of minimum 1600 mm pitch with suitable clamps at ends as required.	6	Each			
12	**COIL EARTHING :**					
12.1	Providing and fixing earthing arrangement for HT/LT poles with 8SWG GI lead of 115 turns of 50 mm dia. connection with pole / cross arm / control junction box on pole with 4 mm dia. GI lead through 20 mm dia A class GI protection pipe of 2.5 m length duly bend, packing of charcoal powder and salt as per specification including excavation of pit in all type of soil / rock, refilling of pit by black cotton soil etc. complete.	13	Each			
13	**EARTHING STRIP :**					
13.1	Supplying and laying 25 mm X 5 mm G.I strip at 0.50 metre below ground as strip earth electrode, including connection/ terminating with G.I. nut, bolt, spring, washer etc. as required. (Jointing shall be done by overlapping and with 2 sets of G.I. nut bolt & spring washer spaced at 50 mm)	150	RM			
14	Providing & fixing 6 SWG dia G. I. wire on surface or in recess for loop earth as required.	400	Mtr.			

15	**G.I. PIPE EARTHING :**					
15.1	Earthing with G.I. earth pipe 4.5 metre long, 40 mm dia including accessories, and providing masonry enclosure with cover plate having locking arrangement and watering pipe etc. with charcoal/ coke and salt as required.	10	Each			
16	**GENERAL WORK :**					
16.1	Preparation of drawing for approval, inspection of site of the licencing authority / supplying authority, getting approval from all departments as required, charging of the line / transformer, sanctioning of the load and other related work etc if required as required complete as req.	1	Each			
	Total Rs. in figures					
	Total Rs. in Words					

Signature & Seal of Contractor

Section-7:
Technical Specifications

Volume -III

TECHNICAL SPECIFICATION

Part I : General

1.1 It is not the intent to specify herein complete details of design and construction of the plant/equipment/material. The plant offered shall conform to the relevant standards and shall be of high quality, sturdy, robust and of good design and workmanship complete in all respects and capable to perform continuous and satisfactory operations in the actual service conditions at site and shall have sufficiently long life in service. The dimensional drawings attached with the Technical Specification in Volume I are generally of illustrative nature. In actual practice, not withstanding any anomalies, discrepancies, omissions, incompleteness, etc. in these specifications and attached drawings, the design and constructional aspects, including materials and dimensions, will be subject to good engineering practice in conformity with the required quality of the product and to such tolerances, allowances and requirements for clearances etc. as are necessary by virtue of various stipulation in that respect in the relevant Indian Standards, IEC standards, I.E. Rules and other statutory provisions.

1.2 The plant/equipment/material offered shall be complete with all parts necessary for their effective and trouble free operation. Such parts will be deemed to be within the scope irrespective of whether they are specifically indicated in the Bid documents or not.
Quality Assurance Programme:

1.3 Bidder must establish that a proper quality assurance program is being followed by them for manufacture of plant/equipment. Quality Assurance Program must have a structure as detailed in following paragraphs.

a) Quality assurance and failure prevention starts with careful study and scrutiny of our technical specifications and requirements. Bidder/manufacturer shall carefully study all the technical parameters and other particulars and the Bidder/manufacturer shall categorically give his confirmation that these requirements shall be met in a satisfactory manner.

b) Bidder/manufacturer shall furnish the checks exercised in design calculations. The salient features of design shall be made available to the Employer.

c) Bidder/manufacturer shall indicate the various sources of the items being procured. Type of checks, quantum of checks and acceptance norms shall be intimated and random test and check results should be made available for inspection whenever so desired.

d) The Bidders shall invariably furnish following information.

1. Statement giving list of important raw materials, names if sub-Bidder/manufacturers for the raw material, list of standards according to which the raw material is purchased and copies of test certificates thereof.

2. Information and copies of test certificates as in (i) above in respect of bought out items.

3. List of machines and manufacturing facilities available.

4. Levels of automation achieved and list of areas where manual processing exists.

5. List of areas in manufacturing process, where stage inspections are normally carried out for quality control and details of such tests and inspections.

6. List of testing equipment available with the Bidder for final testing of materials specified and test plant limitation, if any, vis-à-vis type, special, acceptance and routine

tests specified in the relevant standards. These limitations shall be very clearly brought out in schedule of deviations from specified test equipments.

Pre Dispatch Inspection:

1.4 The Employer's representative may carry out stage inspection of the plant/equipment during manufacturing/ assembling stage. The Employer shall have absolute right to reject the raw material/ component/ sub assemblies or complete equipment not found to be conforming to the specification or being of poor quality/ workmanship. The stage inspection will particularly include tests specified for any particular plant or equipment in the technical specification, general routine tests and physical measurements to be conducted during manufacturing stages as per manufacturer's standard practice.

1.5 The Bidder/manufacturer shall give fifteen (15) days advance notice to enable the Employer to arrange for inspection. Inspection and testing shall be conducted at the place of manufacture. Inspection and testing of any material under this specification by the Employer shall not relieve the Bidder/manufacturer of his obligation to supply the plant/equipment in accordance with the specification and shall not prevent subsequent rejection if it is found to be defective.

1.6 The Bidder/manufacturer shall afford the Employer's representative all reasonable facilities, without charge, to satisfy him that the plant/ equipment is being manufactured in accordance with the specifications. The Bidders/manufacturer must have adequate set of instruments for conducting tests as per ISS specification. Instruments shall be duly calibrated and calibration certificate should not be older than one year on the date of inspection. Calibration shall be done by NABL accredited laboratories. A comprehensive list of testing equipment/ instruments indicating make, Sr.No., type, class of accuracy, calibrating agency, calibration date etc. should be furnished, as and when desired. Calibrated instruments shall be duly sealed by calibrating agency to avoid any tampering with calibration and the details thereof shall be clearly mentioned in the calibration certificate(s).

Defect Liability:

1.7 The defect liability period of plants/ equipments shall be as indicated in GCC 32 of the bid

document

Type Test:

1.8 The type test certificates for all the items shall be required to be submitted within twenty eight (7) days of the date of Notification of Award to the successful bidder. Failure to submit the type tests shall constitute sufficient grounds for the annulment of contract.

The type test of any item shall not be more than three (3) years old from the date of submission of Bid.

The Employer may get the Type test or routine tests of any equipment done at Accredited Laboratory by NABL in the country. The type test may be done even after receipt of materials at Contractor's site store but not after the guarantee period for the equipment as described elsewhere. The results of such tests will be decided on pass fail basis. In case the equipment fails to pass the Type test, the cost of such test shall be borne by the Contractor.

1.9 The Bidder/manufacturing programme shall not be interrupted merely because the plant/equipment has been offered for inspection.

1.10 Specification for individual plant /equipment is subject to the conditions mentioned above.

PART B

1.0 DELETED

2.0 TECHNICAL SPECIFICATION OF STEEL STRUCTURES AND SUPPORTS

2.1 SCOPE:

2.1.1 This specification calls for manufacture, stage testing, inspection and testing before dispatch, packing and delivery of R.S. Joists, 175x85mm and 150x80mm.

2.1.2 The materials shall conform, in all respect, to the high standard of design and workmanship and shall be capable of performing duties specified herein. Materials offered shall be complete in all respect.

2.2 STANDARDS:

Materials shall conform to the latest applicable Indian standards. In case bidders offer Steel Section and supports conforming to any other international specifications which shall be equivalent or better than IS, the same is also acceptable.

2.3 ACCEPTANCE OF OTHER AUTHORITATIVE STANDARDS:

In the paragraph 2.2 above relevant Indian standards specification have been mentioned. However, the material meeting any other authoritative international standards, which ensures equal or better quality than the standards, mentioned shall also be acceptable. Material for which Indian Standards are not available, the relevant British standards and IEC recommendations will be applicable. Please attach photocopy of all such standards according to which the materials have been offered.

2.4 SERVICE CONDITIONS:

2.5 CLIMATIC CONDITIONS:

The Steel Sections to be supplied against this specification shall be suitable for satisfactory continuous operation under the following tropical conditions:-

1	Location	
2	Max. ambient air temperature	50°C
3	Min. ambient air temperature	1°C
4	Max. daily average ambient air temperature	40°C
5	Max. yearly weighted average temperature	32°C
6	Max. Relative Humidity	
7	Max. altitude above mean sea level	1000
8	Average Annual rainfall	125 c
9	Max wind pressure	150 K
10	Isoceraunic level (Average Number of thunderstorm days per year)	50
11	Seismic level (Horizontal acceleration)	0.3g

2.6 LENGTH:-

The materials to be supplied shall be in the following lengths:

(i)	R.S. Joists 175x85 mm	9 meters to 11 meters
(ii)	R.S. Joists 150x80 mm	1.5 meters

Any tolerance on negative or positive side shall not be accepted.

2.7 CHEMICAL COMPOSITION AND PHYSICAL PROPERTIES OF R.S. JOISTS, CONFORMING TO BE: 2062/84

CHEMICAL COMPOSITION

CHEMICAL COMPOSITION			FOR Fe 410 WA GRADE	
1	C	--	0.23%	MAX.
2	Mn	--	1.5%	MAX.
3	S	--	0.050%	MAX.
4	P	--	0.050%	MAX.
5	SI	--	0.40%	MAX.
6 (Carbon Equivalent)	CE			

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2.8 (a) MECHANICAL PROPERTIES

1. Tensile strength (min.) – 42 Kgf/mm^2 or 410 N/mm^2
2. Yield stress Min. for thickness/diameter

< 20 mm	- 26 kgf/mm^2 OR 250 N/mm^2
20 – 40 mm	- 24 kgf/mm^2 OR 240 N/mm^2
> 40 mm	- 23 kgf/mm^2 OR 230 N/mm^2

3. Elongation %(min.) - 23% Bend test (internal Dia) - Min-3 t (t – is the thickness of the material)

2.8. (b) MARKING:-

It is desirable that the manufacture should put his identification marks on the finished materials.

The mark shall be in legible English letters given with marking dies of minimum 18 mm size at the Interval of 3 meter mentioned as “SPA Bhopal & MPMKVVCL Bhopal”..

2.9. INSPECTION AND TEST CERTIFICATE:

The materials to be supplied will be subject to inspection and approval by the representative of Employer. The Bidder is required to offer the finished material for inspection well in advance to the Employer.

The BILLETS/INGOTS from which materials shall be re-rolled and supplied to us shall be of tested quality as per IS: 2830/6914 (Latest revision) respectively and shall be arranged from their own source. The chemical composition and physical properties of the finished materials shall be as per relevant specification indicated in Schedule-III enclosed.

The materials shall be tested in ISI approved Laboratory of the approved Manufacturer having all facilities available for conducting all the tests as prescribed in relevant ISS. The Employer

may get the material tested in the accredited laboratory by NABL. The testing charges whatsoever shall be to the Bidder's account.

The Bidder is required to specifically indicate that the approved manufacturer:- (i) Holds valid

ISI License against respective ISS.

(ii) That the materials offered shall bear ISI certification marks.

(iii) Is required to submit a copy of the valid ISI License clearly indicating size and range of rollable product against respective ISS.

2.10 GUARANTEED TECHNICAL PARTICULARS OF R.S Joists

	Sr.No.	Technical Particulars	Particulars
	1	Name of Manufacturer & address	
	2	Chemical composition	
	3	Tensile strength	
	4	Yield stress	
	5	Elongation	
	6	Length in Meters	
	7	Dimension of cross section	

3.0 GALVANIZED MILD STEEL CHANNEL, ANGLE AND FLAT

This specification covers the manufacture, testing at works and supply of various sizes of mild steel channels, angles & flats. The size of the channel, angle and flat normally used for Distribution transformers structures, 11 KV line structures and LT line structures are as follows;

i) Channel a) 100x50 mm (Heavy Section)

b) 75x40 mm (Heavy Section)

ii) Angle a) 50x50x6 mm (Heavy Section)

b) 65x65x6 mm (Heavy Section)

iii) Flat a) 65x8 mm (Heavy Section)

The above list is merely indicative and not comprehensive.

3.1 APPLICABLE STANDADS

The materials shall conform, in all respect, to the high standard of design and workmanship and shall be capable of performing duties specified herein. Materials offered shall be complete in all respect.

3.1.1 STANDARDS: Materials shall conform to the latest applicable Indian standards. In case bidders offer Steel Section and supports conforming to any other international specifications which shall be equivalent or better than IS, the same is also acceptable.

S No	Standard No.	Title

1	IS:2062 Grade 'A' Quality	Specification for M.S. Angles, M.S. Channel and M.S.
2	IS:2062-1969	Chemical and Physical composition of material
3	IS:1852-1985	Rolling and Cutting Tolerances for Hot Rolled Steel

3.1.2 **ACCEPTANCE OF OTHER AUTHORITATIVE STANDARDS**: All relevant Indian standards specifications have been mentioned. However, the material meeting any other authoritative international standards, which ensures equal or better quality than the standards, mentioned shall also be acceptable. Material for which Indian Standards are not available, the relevant British standards and IEC recommendations will be applicable. Please attach photocopy of all such standards according to which the materials have been offered.

3.2 **RAW MATERIAL**: The Steel Sections shall be re-rolled from the BILLETS/INGOTS of tested quality as per latest version of IS:2830 or to any equivalent International Standard and shall be arranged by the contractor from their own sources. The Chemical composition and Physical properties of the finished materials shall be as per the relevant standards.

3.3 **TEST**: Steel Sections shall be tested in IS approved Laboratory or standard Laboratory of the Bidder country having all facilities available for conducting all the tests as prescribed in relevant IS or IEC or to any equivalent International Standard or from any recognized and reputable International laboratory or Institutions.

The manufacture is required to specifically indicate that;

(i) They hold valid IS (or equivalent IEC) License.
(ii) Steel Sections offered are bearing requisite IS certification or equivalent IEC marks.

The contractor are required to submit a copy of the valid IS (or equivalent IEC) License clearly indicating size and range of product against respective ISS or any equivalent International Standards along with their offer.

3.4 **CHEMICAL COMPOSITION AND PHYSICAL PROPERTIES OF M.S. ANGLES, M.S. CHANNELS AND M.S. FLAT CONFORMING TO IS:2062-84**

The mild steel shall conform to be: 2062 grade 'a' modified up to date or equivalent international standard for steel materials, documents for which shall be made available at the time of inspection to the board's representative.

3.5 **GENERAL REQUIREMENTS**

The steel sections have chemical compositions and mechanical & properties confirming to IS:2062-1969 (latest revision).

3.6 All fabricated items shall be **hot dipped galvanized** as per IS: 2629-1985. The mass of zinc coating and uniformity in thickness shall be determined as per relevant standards IS: 6745-
1972 and IS: 2633-1986.

3.7 **TOLERANCE**: Variation in ordered quantity for any destination and over-all ordered quantity shall be only to the extent of ± 2%. Rolling and weight tolerances shall be as per latest version of IS:1852 or to any equivalent International Standard.

3.8 **MARKING**: It is desirable that the manufacture should put his identification marks on the finished materials. The mark shall be in "legible English letters" given with marking dies of minimum 18 mm size.

3.9 **INSPECTION AND TEST CERTIFICATES**: The materials to be supplied will be subject to

inspection and approval by the Employer's representative before dispatch. Inspection before dispatch shall not, however, relieve the bidder of his responsibility to supply the steel structures strictly in accordance with the specification.

3.10 QUALITY ASSURANCE PLAN:

3.11 He Bidders must establish that the approved manufacturer is following a proper quality assurance program for manufacture of steel sections.

3.12 All the fabricated structures shall be hot dipped galvanized. The galvanizing is to be done as per relevant IS specification. The galvanizing is to be done in such a way that it leaves smooth surface.

STEEL SECTION

NO.	PARAMETERS	UNIT	VALUES		
			Angle	Channel	Flat
1	Name and address of				
2	Chemical composition	FOR Fe 410 WA GRADE (Max)			
1	C	0.23% MAX.			
2	Mn	1.5% MAX.			
3	S	0.050% MAX.			
4	P	0.050% MAX.			

NO.	PARAMETERS	UNIT	VALUES		
			Angle	Channel	Flat
5	SI	0.40% MAX.			
6	CE (Carbon Equivalent)	0.42% MAX.			
3	Tensile strength		42.5 Kgf/mm² or 410 N/mm²		
4	Yield stress (For Thickness/Diameter)				
A	Less than 20 mm	26 kgf/mm² OR 250 N/mm²			
B	Between 20 to 40 mm	24 kgf/mm² OR 240 N/mm²			
C	More than 40 mm	23 kgf/mm² OR 230 N/mm²			
5	Elongation %	23%			
6	Length in meters		7 to 13 meters	5.5 to 13 meters	5.5 to 13 meters
7	Dimension of cross section	A	65x65x6 mm	100x50mm	65x8 mm
8	Bend Test (Internal Dia)	Min-3t (t – is the thickness of the material)			

4 HOT DIP GALVANISED MS STRANDED WIRE

The hot dip galvanized MS Stranded wire of sizes 7/4 mm, and 7/3.15 mm diameters shall conform to the relevant ISS specification as detailed below:

4.1 MATERIAL

MS Wire used for each strand shall have the chemical composition (maximum) Sulfur & Phosphorus – 0.055%, Carbon 0.25%.

Zinc shall conform to grade Zen 98 specified ARE 209-1966 & ARE 2141-1968, 1979 with up to date amendments.

4.2 ZINC COATING

Zinc coating shall be in accordance with IS: 4826-1979 (heavily coated hard quality Grade-4 as per table-1) with up to date amendments.

4.3 GALVANISING

Hot dip galvanizing shall be as per IS 2629-1966, IS 4826-1979 with up to date amendments.

4.4 UNIFORMITY OF ZINC COATING

Uniformity of Zinc coating shall be as per IS 2633-1972 (Col.4.2.1 to 4.2.3) with up to date amendments.

4.5 TENSILE PROPERTIES

Tensile properties of each strand ensuring MS Wire mechanical properties as per IS 280-1972 (Cl.8.1 to 8.3) and after galvanizing each wire shall be of tensile strength minimum 700N/mm2 (71 Kgs/mm2).

Tensile strength, bending load, lay & elongation of each wire and full strand shall conform to IS: 2141-1968, IS: 2141-1972 in the tensile grade given above).

4.6 CONSTRUCTION

Construction shall be as per IS: 2141-1979 (Cl.5.3.1 to 5.3.3)

4.7 FREEDOM FROM DEFECTS

Freedom from defects be ensured as per IS: 2141-1979 (clause 4.1.6 respectively).

4.8 TESTS ON WIRE BEFORE MENUFACTURE

As per IS-2141-1979 (Col.7.1 to 7.2.2) shall be done.

4.9 PACKING

Each coil shall be between 50-100 Kgs. Packed as per IS: 2141-1968 (Cl.9.1) 6594-1979 & 2141-1979 (Col.11).

4.10 MARKING

As per IS: 2141-1968 (Cl.8.1 to 8.1.1) and IS: 2141-1979 (Cl.10 & 10.1) is required.

5.0 STAY SETS (20 MM DIA) GALVANISED:

20 MM DIA STAYS SETS FOR 33 (GALVANIZED)

THE STAY SET (LINE GUY SET) WILL CONSIST OF THE FOLLOWING COMPONENTS:

5.1 ANCHOR ROD WITH ONE WASHER AND NUT: Overall length of Rod should be 1800mm to be made out of 20mm dia GS Rod, one end threaded upto 40mm length with a pitch of a threads per cm. And provided with one square G.S. Washer of Size 50x50x1.6mm and one GS Hexagonal nut conforming to IS:1367:1967 & IS:1363:1967. Both washer & nut to suit the threaded rod of 20mm. The other end of the rod to be made into a round eye having an inner dia of 40mm with best quality welding. Dimensional and other details are indicated and submitted by bidders for owner's approval before start of manufacturing.

5.2 ANCHOR PLATE: Size 300x300x8mm: To be made out of G.S. Plate of8mm thickness. The anchor plate to have at its centre 22mm dia hole.

5.3 TURN BUCKLE, EYE BOLT WITH 2 NUTS: To be made of 20mm dia G.S. Rod having an

overall length of 450 mm. One end of the rod to be threaded upto 300mm length with a pitch of 4 threads per cm. The 20mm dia bolt so made shall be provided with two G.S. Hexagonal nuts of suitable size conforming to IS:1637/1967 & IS:1363/1967.

The other end of the rod shall be rounded into a circular eye of 40mm inner dia with proper and good quality of welding. Welding details are to be indicated by the bidder separately for approval.

5.4 BOW WITH WELDED CHANNEL: To be made out of 20mm dia G.S. Rod. The finished bow shall have and overall length of 995 mm ad height of 450 mm. The apex or top of the bow shall be bent at an angle of 10R. The other end shall be welded with proper and good quality welding to a G.S. Channel 200mm long having a dimension of 100x50x4.7 mm. The Channel shall have 2 holes of 18 mm dia and 22 dia hole at its centre as per drawing No.3 enclosed herewith.

5.5. THIMBLE 2 Nos.: To be made of 1.5mm thick G.S. sheet into a size of 75x22x40mm and shape as per standard.

Galvanizing: The complete assembly shall be hot dip galvanized.

5.6 WELDING: The minimum strength of welding provided on various components of 20mm dia stay sets shall be 4900 kg. Minimum 6mm filet weld or its equivalent weld area should be deposited in all positions of the job i.e. at any point of the weld length. The welding shall be conforming to relevant IS: 823/1964 or its latest amendment.

5.7 THREADING: The threads on the Anchor Rods, Eye Bolts and Nuts shall be as per specification IS: 4218:1967 (ISO Metric Screw Threads). The Nuts shall be conforming to the requirements of IS: 1367:1967 and have dimension as per IS
1363:1967. The mechanical property requirement of fasteners shall confirm to the properly clause 4.6 each for anchor rods and Eye bolt and property clause 4 for nuts as per IS: 1367:1967.

5.8 THREADING: The threads on the Anchor Rods, Eye Bolts and Nuts shall be as per specification IS: 4218:1967 (ISO Metric Screw Threads). The Nuts shall be conforming to the requirements of IS: 1367:1967 and have dimension as per IS
1363:1967. The mechanical property requirement of fastener shall confirm to the properly clause 4.6 each for anchor rods and Eye bolt and property clause 4 for nuts as per IS: 1367:1967.

5.9 AVERAGE WEIGHT OF FINISHED 20MM STAYS SET: 14.523 KG. (MIN.) (EXCLUDING NUTS THIMBLE & WASHER): 15.569 KG. (MAX.)

5.10 TEST CERTIFICATE: The contractor shall be required to conduct testing of materials at Govt./Recognized testing laboratory during pre – dispatch inspection for Tensile Load of 3100 Kg/4900 Kg. applied for one minute on the welding & maintained for one minute for 16 mm and 20 mm dia stay sets respectively.

5.11 IDENTIFICATION MARK: All stay sets should carry the identification mark of word APDRP and size of the stay set. This should be engraved on the stay plate and on stay rods to ensure proper identification of the materials.

The nuts should be of a size compatible with threaded portion of rods and there should be no play or slippage of nuts.

Welding wherever required should be perfect and should not give way after erection.

5.12 TOLERANCES: The tolerances for various components of the stay sets are indicated below subject to the condition that the average weight of finished stay sets of 16mm dia excluding nuts, thimbles and washers shall not be less than the weight specified above :-

No.	Item	Section Tolerances	Fabrication Tolerances	Material

1	Anchor Plate	6mm thick + 12.5% - 5%	200x200mm + 1%	GS plate 6mm thick
		8mm thick + 12.5% - 5%	300x300mm + 1%	GS plate 8mm thick
2	Anchor Rod	16mm dia + 5% - 3%	Length 1800mm + 0.5%	GS Round 16mm dia
			Rounded Eye 40 mm inside dia + 3%. Threading 40mm+11% - 5	GS Round 16mm dia
		20mm dia + 3% - 2%	Length 1800mm + 0.5%	GS Round 20mm dia
			Round Eye 40mm inside dia + 3%. Threading 40mm +11% -5%	GS Found 20mm dia
3	Turn Buckle Bow	20 mm dia + 5% - 3%	Length 995mm + 1% 16mm dia	GS Round 20 mm dia
			Length 180mm + 1% 50x50x6mm	GS Angle
			Channel length 200mm + 1%	GS Channel 100x50x4.7mm
4	Eye Bolt	16mm dia + 5%	Length 450mm + 1%	GS Round 16mm
	Rod	- 3%	Threading 300mm + 1% Round Eye 40mm inside dia + 3%	dia
		20mm dia + 3% - 2%	Length 450mm + 1% Threading 300mm + 1% Round Eye 40mm inside dia + 3%	GS Round 20mm dia

6.0 33 kV Polymer Pin Insulators

TECHNICAL SPECIFICATION FOR COMPOSITE POLYMER PIN INSULATORS FOR USE IN 33KV

6.1 SCOPE::

This specification covers design, manufacture, testing and supply of Composite Polymer Pin Insulators for use in the 33KV overhead transmission lines. The Composite Pin Insulators shall be of the following type:-

i) Long rod type Pin Insulators intended to be mounted rigidly on a supporting structure to support following size of conductor:-

(a) For 33KV AAAC Dog

6.2 APPLICABLE STANDARDS::

Standards:-

Following Indian/International Standards, which shall mean latest revision, with amendments/changes adopted and published, unless specifically stated otherwise in the Specification, shall be referred while accessing conformity of Insulators with these specifications.

In the event of supply of Insulators conforming to standards other than specified, the Bidder shall confirm in his bid that these standards are equivalent or better to those specified. In case of award, salient features of comparison between the standards proposed by the Bidder and those specified in this document will be provided by the Supplier to establish equivalence.

Sl. No.	Indian Standard Standard	Title	International Standard
1		Definition, test methods and acceptance criteria for composite	IEC:61109
2	IS: 731	Porcelain insulators for overhead power lines with a nominal voltage	IEC: 60383
3	IS:2071	Methods of High Voltage Testing.	IEC:60060-1

4	IS:2486	Specification for Insulator fittings for overhead power lines with a nominal voltage greater than 1000V General Requirements	IEC:60120 IEC:60372
5	-	Thermal Mechanical performance test and mechanical performance	IEC:60575
6	IS:	Guide for the selection of insulators in respect of polluted	IEC: 60815
7	-	Characteristics of string insulator units of the long rod type.	IEC: 60433
8	-	Hydrophobicity Classification Guide.	STRI guide
9	-	Radio interference characteristics of overhead power lines and high	CISPR 18.2 Part 2
10	IS:8263	Methods of RI Test of HV Insulators.	IEC:60437
11		Standard for Insulators- Composite- Distribution Dead-end	ANSI C 29.13-
12	IS:4759	Hot dip zinc coatings on structural steel & other allied products.	ISO:1459
13	IS:2629	Recommended practice for Hot Dip galvanization for iron	ISO:1461(E)
14	IS:6745	Determination of weight of zinc coating on zinc coated Iron and steel	ISO:1460
15	IS:3203	Methods of testing of local thickness of electroplated	ISO:2178
16	IS:2633	Testing of Uniformity of coating of zinc coated articles.	
17	-	Standard specification for glass fiber standards.	ASTM D 578-05
18	-	Standard specification for compositional analysis by Thermo-	ASTM D 578-05
19	IS:4699	Specification for refined secondary zinc	

6.3 **Technical Description of Composite Insulators::**

6.3.1 Service condition:-
The polymer Insulators to be supplied shall be suitable for satisfactory continuous operation under
condition s as specified below:

(i)	Maximum temperature of air in shed	45oC
(ii)	Minimum temperature of air in shed	4oC
(iii)	Maximum relative humidity	95% (The humidity some time
(iv)	Minimum relative humidity	10 %
(v)	Average number of dust-storm days per annum	40 days
(vi)	Average number of rainy days per annum	90 days
(vii)	Number of months of tropical monsoon conditions per	3 months
(viii)	Average annual rainfall	1250 mm
(ix)	Maximum wind pressure	150 Kg / Sq. mm
(x)	Altitude not exceeding	1000 metres
(The limit of ambient temperature shall be 45oC peak and 35oC average over a period of 24		

6.3.2 Composite Insulators long rod type to support conductor on 33KV Over head Power Lines:-

6.3.3 The Insulators shall be suitable for 3 Φ, 50 Hz, effectively earthed 33kV O/H distribution system in a moderately polluted atmosphere.

6.3.4 Bidder must be an indigenous manufacturer and supplier of composite Insulators of rating
11KV or above OR must have developed proven in house technology and manufacturing process for
composite Insulators of above rating OR possess technical collaboration/ association with a manufacturer of composite Insulators of rating 11KV or above. The Bidder shall furnish necessary evidence in support of the above along with the bid, which can be in the form of certification from the utilities concerned, or any other documents to the satisfaction of the owner.

6.3.5 Insulators shall have sheds with good self-cleaning properties. Insulator shed profile, spacing, projection etc, and selection in respect of polluted conditions shall be generally in accordance with the recommendation of IEC-60815/IS: 13134.

6.3.6 The size of Composite insulator, minimum creep age distance and mechanical strength along with hardware fittings shall be as follows:

SN	Type of composite Insulator	Nominal system voltage kV (rms)	Highest system voltage kV (rms)	Visible discharge test voltage kV(rms)	Wet power frequency withstand	Impulse withstand voltage kV (rms)	Minimum creepage distance (mm)	Min. failing load KN
i.	33KV Pin Insulator	33	36	27	75	170	900	10

Note: Creepage distances have been considered in line with IS-13134 (which specifies 20mm/ kV for moderately polluted environment and 25mm/KV for heavily polluted area)

Dimensional Tolerance of Composite Insulators:-

The tolerances on all dimensions e.g. diameter, length and creepage distance shall be allowed as follows in line with IEC 61109:
± {0.04d+1.5) mm when d<300 mm,
± (0.025d+6J mm when d>300 mm.

Where, d being the dimensions in millimeters for diameter, length or creepage distance as the case may be, However, no negative tolerance shall be applicable to creep age distance.

6.3.7 Corona and Rl Performance:-

All surfaces shall be clean, smooth, without cuts, abrasions or projections. No part shall be subjected to excessive localized pressure. The insulator and metal parts shall be so designed and manufactured that it shall avoid local corona formation and not generate any radio interference beyond specified limit under the operating conditions.

6.4 BASIC FEATURES::

6.4.1 Design and construction:-

The Composite Pin Insulator shall have a core, housing & weather shed of insulating material and
Steel/aluminum alloy hardware components for attaching it to the support/conductor.

6.4.2 Core:-

It shall be a glass-fiber reinforced epoxy resin rod of high strength (FRP rod). Glass fibers and resin shall be optimized in the FRP rod. Glass fibers shall be Boron free Electrically corrosion resistant (ECR) glass fiber or Boron free E-Glass and shall exhibit both high electrical integrity and high resistance to acid corrosion. The matrix of the FRP rod shall be Hydrolysis resistant. The FRP rod shall be manufactured through Pultrusion process. The FRP rod shall be void free.

6.4.3 Housing (Sheath):-

The FRP rod shall be covered by a seamless sheath of a silicone elastomeric compound or silicone alloy compound of a thickness of 3mm minimum. It shall be one-piece housing using Injection Molding Principle to cover the core. The elastomer housing shall be designed to provide the necessary creepage distance and protection against environmental influences. Housing shall conform to the requirements of IEC 61109/92-93 with latest amendments.

Weather sheds:-

The composite polymer weather sheds made of a silicone elastomeric compound or silicone alloy compound shall be firmly bonded to the sheath, vulcanized to the sheath or molded as part of the sheath and shall be free from imperfections It should protect the FRP rod against environmental influences, external pollution and humidity. The weather sheds should have silicon

content of minimum
30% by weight. The strength of the weather shed to sheath interface shall be greater than the tearing strength of the polymer. The interface, if any, between sheds and sheath (housing) shall be free from voids.

6.4.4 End Fittings:- End fittings transmit the mechanical load to the core. They shall be made of spheroidal graphite cast Iron, malleable cast iron or forged steel or aluminum alloy. They shall be connected to the rod by means of a controlled compression technique. The material used in fittings shall be corrosion resistant. As the main duty of the end fittings is the transfer of mechanical loads to the core the fittings should be properly attached to the core by a coaxial or hexagonal compression process & should not damage the individual fibers or crack the core. The gap between fitting and sheath shall be sealed by a flexible silicone electrometric compound or silicone alloy compound sealant. System of attachment of end fitting to the rod shall provide superior sealing performance between housing, i.e. Seamless sheath and metal connection. The sealing must be moisture proof.

The dimensions of end fittings of Insulators has been shown in the drawing (33KV both separately). Since we are purchasing these items for the first time, the drawing given is for indicative purpose. The details of end fittings for fixing the same with V-Cross Arms and top clamps are given below:-

Sl. No.	Item	Length of end fittings to	Min. threaded portion of	Dia of rod
i.	33KV	150 mm	100 mm	24 mm

Upper end fittings shall be suitable to hold AAAC Dog for 33KV. The size of the fittings shall be in such a way that conductor could be bound firmly so that it may not slip from the groove while in service even under adverse conditions.

6.5 Workmanship::

6.5.1 All the materials shall be of latest design and conform to the best engineering practices adopted in the high voltage field. Bidders shall offer only such Insulators as are guaranteed by them to be satisfactory and suitable for continued good service in power transmission lines.

6.5.2 The design, manufacturing process and material control at various stages shall be such as to give maximum working load, highest mobility, best resistance to corrosion, good finish and elimination of sharp edges and corners.

6.5.3 The design of the Insulators shall be such that stresses due to expansion and contraction in any part of the insulator shall not lead to deterioration.

6.5.4 The core shall be sound and free of cracks and voids that may adversely affect the Insulators.

6.5.5 Weather sheds shall be uniform in quality. They shall be clean, sound, smooth and shall be free from defects and excessive flashing at parting lines.

6.5.6 End fittings shall be free from cracks, seams, shrinks, air holes and rough edges. End fittings should be effectively sealed to prevent moisture ingress; effectiveness of sealing system must be supported by test documents. All surfaces of the metal parts shall be perfectly smooth without projecting points or irregularities, which may cause corona. All load bearing surfaces shall be smooth and uniform so as to distribute the loading stresses uniformly.

6.5.7 All ferrous parts shall be hot dip galvanized to give a minimum average coating of zinc equivalent to 610 gm/Sq.m, or 87µ m thickness and shall be in accordance with the requirement of IS: 4759, The zinc used for galvanizing shall be of purity 99.5% as per IS: 4699. The zinc coating shall be Uniform, adherent, smooth, reasonably bright continuous and free from imperfections such as flux, ash rust stains, bulky white deposits and blisters. The galvanized metal parts shall be guaranteed to withstand at least four successive dips each lasting for one H) minute duration under the standard precede test. The galvanizing shall be carried out only after any

machining.

6.6 Equipment Marking::

6.6.1 Each insulator unit shall be legibly and indelibly marked with the following details as per IEC- 61109: Month &Year of manufacture

(b) Min. failing toad/guaranteed mechanical strength in kilo Newton followed by the word 'KN' to facilitate easy identification.
(c) Manufacturer's name/Trade mark

6.7 Bid Drawings::

6.7.1 The Bidder shall furnish full description and illustration of the material offered.

6.7.2 The Bidder shall furnish along with the bid the outline drawing (3 copies) of each insulator unit including a cross sectional view of the long rod insulator unit. The drawing shall include but not be limited to the following information:

(a) Long rod diameter with manufacturing tolerances
(b) Minimum Creepage distance with positive tolerance
(c) Protected creepage distance
(d) Eccentricity of the long rod unit
  (i) Axial run out
  (ii) Radial run out
(e) Unit mechanical and electrical characteristics
(f) Weight of composite long rod unit.
(g) Materials
  (i) Identification mark
  (ii) Manufacturer's catalogue number

6.7.3 After placement of award, the Supplier shall submit three sets of full dimensioned manufacturing insulator drawings containing all the details to The Institute Architect IWD ,then Submit to MPMKVVCL, Bhopal.

6.7.4 After placement of award the Supplier shall also submit fully dimensioned insulator crate drawing for different type of Insulators for approval of the owner.

6.8 Tests and Standards::

Insulators offered shall be manufactured with the same configuration & raw materials as used in the Insulators for which design & type test reports are submitted. The manufacturer shall submit a certificate for the same. The design & type test reports submitted shall not be more than 05 years old.

6.8.1 Design Tests:-

For polymeric insulators it is essential to carry out design test as per clause 4.1 of IEC 61109 / 92-93 with latest amendments. The design tests are intended to verify the suitability of the design, materials and method of manufacture (technology). When a composite insulator is subjected to the design tests, the result shall be considered valid for the whole class of insulators, which are represented by the one tested and having the following characteristics:

- Same materials for the core, and sheds and same manufacturing method;
- Same material of the fittings, the same design, the same method of attachment;
- Same or greater layer thickness of the shed material over the core (including a
- Sheath where used);
- Same or smaller ratio of the highest system voltage to insulation length;
- Same or smaller ratio of all mechanical loads to the smallest core diameter between fittings
- Same or greater diameter of the core.

The tested composite insulators shall be identified by a drawing giving all the dimensions with the manufacturing tolerances.

Manufacturer should submit test reports for Design Tests as per IEC-61109 (clause- 5) along with the bid. Additionally following tests shall be carried out or reports for the tests shall be submitted after award of contract: UV test: the test shall be carried out in line with clause 7.2 of ANSI C29.13.

6.8.2 Type Tests:-

The tenderer shall furnish detailed type test reports of the offered composite Insulators as per clause 8.2 of the Technical Specifications at the NABL approved laboratories to prove that the composite Insulators offered meet the requirements of the specification. These Type Tests should have been carried out within five years prior to the date of opening of this tender. The following type tests shall be conducted on a suitable number of individual insulator units, components & materials and the test report should invariably be submitted with the bid:-

SN	Description of type test	Ten procedure/standard
1.	Dry lightning impulse withstand voltage test	As per IEC 61109 (clause 6.1)
2.	Wet power frequency test	As per IEC 61 109 (clause 6,2)
3.	Mechanical failing load test	As per IS:731 (Clause- 10.8.2)
4.	Radio interference test	As per IEC 61109 (clause 6.4)
5.	Recovery of Hydrophobicity test	Annexure-A This test may be repealed every 3 yrs by the manufacturer
6.	Chemical composition test for silicon content	Annexure-A Or any other test method acceptable
7.	Brittle fracture resistance test	Annexure - A

Note:- The purchase may like to conduct any other test(s) in addition to above tests at bidder's cost to establish the performance of material as per system requirement.

6.8.3 It shall be the option of the owner to accept the Insulators based on type test reports submitted by the manufacturer. The owner shall be free to repeat the type test & may witness the same.

Note: The owner, for the purpose of facilitating the type tests, may ask the bidders to quote test charges separately

6.8.4 All the type test given in Clause No. 8.2 in addition to routine & acceptance test shall be carried out on Pin Insulators wherever required.

6.8.5 Acceptance (sample) Tests

a.	Verification of dimensions	Clause 7.2 IEC: 61109
b.	Verification of the locking system (if applicable)	Clause 7.3 IEC: 61 109
c.	Galvanizing test	IS:2633/IS:6745
c.	Verification of tightness of the interface between end fittings	Clause 7.4 IEC:61109 amendment 1
d.	Verification of the specified mechanical load	Clause 7.4 IEC: 611 09 /

The test samples after having withstood the routine test shall be subjected to the following acceptance tests:-

Routine Tests:-

SN	Description	Standard
1.	Identification of marking	As per IEC: 61 109 Clause 8.1
2.	Visual Inspection	As per IEC 61 109 Clause 8.2
3.	Mechanical routine test	As per IEC:61109 / IS:731

6.9 Tests during Manufacture

Following tests shall also be carried out on all components as applicable:-

a)	Chemical analysis of zinc used for galvanizing
b)	Chemical analysis, mechanical, metallographic test and magnetic particle inspection for
c)	Chemical analysis, hardness tests and magnetic particle inspection for forgings

a) Chemical analysis of zinc used for galvanizing

b) Chemical analysis, mechanical, metallographic test and magnetic particle inspection for malleable castings.

c) Chemical analysis, hardness tests and magnetic particle inspection for forgings.

6.9.1 Additional Tests:-

6.9.2 The Owner reserves the right at his own expenses, for carrying out any other test(s) of reasonable nature carried out at Supplier's premises, at site, or in any other place in addition to the aforesaid type, acceptance and routine tests to satisfy himself that the material comply with the Specifications.

6.9.3 The Owner also reserves the right to conduct all the tests mentioned in this specification at his own expense on the samples drawn from the site at Supplier's premises or at any other test center. In case of evidence of non compliance, it shall be binding on the part of the Supplier to prove the compliance of the items to the technical specifications by repeat tests or correction of deficiencies or replacement of defective items, all without any extra cost to the Owner,

6.10 Quality assurance plan:-

6.10.1 The successful bidder shall submit following information to the owner:

6.10.2 Test certificates of the raw materials and bought out accessories.

6.10.3 Statement giving list of important raw materials, their grades along with names of sub-suppliers for raw materials, fist of standards according to which the raw materials are tested. List of tests normally carried out on raw materials in presence of bidder's representative.

6.10.4 List of manufacturing facilities available.

6.10.5 Level of automation achieved and lists of areas where manual processing exists.

6.10.6 List of areas in manufacturing process, where stage inspections are normally carried out for quality control and details of such tests and inspections.

6.10.7 List of testing equipments available with the bidder for final testing of equipment along with valid calibration reports.

6.10.8 The manufacturer shall submit Manufacturing Quality Plan (MQP) for approval & the same shall be followed during manufacture and testing,

6.10.9 The successful bidder shall submit the routine test certificates of bought out raw materials /accessories and central excise passes for raw material at the time of inspection.

6.11 Guarantee:-

The Supplier of Insulators shall guarantee overall satisfactory performance of the Insulators for the period of 18 months from the date of supply.

6.11.1 Inspection::

6.11.2 The owner's representative shall at all times be entitled to have access to the works and all places ofmanufacture, where insulator, and its component parts shall be manufactured and

the representatives shall have full facilities for unrestricted inspection of the Supplier's and sub-Supplier's works, raw materials, manufacture of the material and for conducting necessary test as detailed herein.

6.11.3 The material for final inspection shall be offered by the Supplier only under packed condition. The owner shall select samples at random from the packed lot for carrying out acceptance tests. The lot offered for inspection shall be homogeneous and shall contain Insulators manufactured in 3-4 consecutive weeks.

6.11.4 The Supplier shall keep the Owner informed in advance of the time of starting and the progress of manufacture of material in their various stages so that arrangements could be made for inspection.

6.11.5 No material shall be dispatched from its point of manufacture before it has been satisfactorily inspected and tested unless the inspection is waived off by the owner in writing. In the later case also the material shall be dispatched only after satisfactory testing specified herein has been completed.

6.11.6 The acceptance of any quantity of material shall in no way relieve the Supplier of his responsibility for meeting all the requirements of the specification and shall not prevent subsequent rejection, if such materials are later found to be defective.

6.12 Packing::

6.12.1 All Insulators shall be packed in strong corrugated box of min, 7 ply duly paletted or wooden crates. The gross weight of the crates along with the material shall not normally exceed 100 Kg to avoid
handling problem. The crates shall be suitable for outdoor storage under wet climate during rainy season.

6.12.2 The packing shall be of sufficient strength to withstand rough handling during transit, storage at site and subsequent handling in the field.

6.12.3 Suitable cushioning, protective padding, or dunnage or spacers shall be provided to prevent damage or deformation during transit and handling.

6.12.4 All packing cases shall be marked legibly and correctly so as to ensure safe arrival at their destination and to avoid the possibility of goods being lost or wrongly dispatched on account of faulty packing and faulty or illegible markings. Each wooden case/crate/corrugated box shall have all the markings stenciled on it in indelible ink.

6.12.5 The bidder shall provide instructions regarding handling and storage precautions to be taken at site.

Tests on Insulator Units

Annexure-A

1 RIV Test (Dry):-

The insulator string along with complete hardware fittings shall have a radio interference voltage level
below 100 micro volts at one MHz when subjected to 50 Hz AC voltage of 10 kV& 30 kV for 11 kV& 33 kV class insulators respectively under dry condition. The test procedure shall be in accordance with IS:326B/IEC : 437/CISPfi 18-2.

2 Brittle Fracture Resistance Test:-

Brittle fracture test shall be carried out on naked rod along with end fittings by applying "1 n HNO3 acid" (63 g cone, HN03 added to 937 g water) to the rod. The rod should be held at 80% of SML for the duration of the test. The rod should not fail within the 96 hour test duration. Test arrangement should ensure continuous wetting of the rod with Nitric acid.

3 Recovery of Hydrophobicity & Corona test:-

The test shall be carried out on 4mm thick samples of 5cm x 7cm

The surface of selected samples shall be cleaned with isopropyl alcohol. Allow the surface to dry and spray with water Record the Hydrophobicity classification in line with STRI guide for Hydrophobicity classification.. Dry the sample surface.

ii) The sample shall be subjected to mechanical stress by bending the sample over a ground electrode. Corona is continuously generated by applying 12 kV to a needle like electrode placed 1mm above the sample surface. The test shall be done for 100 hrs.

iii) Immediately after the corona treatment, spray the surface with water and record the HC classification. Dry the surface and repeat the corona treatment as at clause 7 above. Note HC classification. Repeat the cycle for 1000 hrs. or until an HC of 6 or 7 is obtained. Dry the sample surface.

iv) Allow the sample to recover and repeat hydrophobiticiy measurement at several lime intervals. Silicone rubber should recover to HC 1 - HC 2 within 24 to 48 hours, depending on the material and the intensity of the corona treatment.

4 Chemical composition test for Silicon content

The content of silicon in the composite polymer shall be evaluated by EDX (Energy Dispersion X-ray) Analysis or Thermo-gravimetric analysis. The test may be carried out at CPRI or any other NABL accredited laboratory.

Annexure-B
Guaranteed Technical Particulars OF 33 KV Composite Polymer PIN Insulators
(To be filled and kept in envelopes containing Technical Offer)

Sl. No.	Description	33KV
1.	Name of Manufacturer	
2.	Address:	
	(a) registered Office	
	(b) Factory	
3.	Type of Insulators	
4.	Standard specification to which the Insulators manufactured and tested	
5.	Name of material used in manufacture of the Insulator (with class / grade)	
(a)	Material of core rod	
(b)	Material of Housing & weather sheds (silicon content by weight)	
(c)	Material of end fittings : tongue/clevis	
(d)	Sealing compound for end fitting	
6.	Colour Glaze of Insulator	
7.	Electrical Characteristics:	
(a)	Nominal system Voltage (KV rms)	
(b)	Highest System Voltage (KV rms)	
(c)	Dry power frequency withstand (KV rms)	
(d)	Wet power frequency withstand (KV rms)	
(e)	Dry flash over voltage (KV rms)	
(f)	Wet flash over voltage (KV rms)	
(g)	Dry lighting impulse withstand voltage	
	(a) Positive	

	(b) Negative	
(h)	Dry lighting impulse flashover voltage	
	(a) Positive (KV peak)	
	(b) Negative (KV peak)	
(i)	RIV at 1 MHz when energized at 10kV/30kV (rms) under dry condition (microvolt)	
(j)	Creepage distance (min) mm	
8.	Mechanical Characteristics:	
	Minimum failing load (KN)	
9.	Dimensions of Insulator:	
i.	Weight (Kg.)	
ii.	Dia of FRP rod (mm)	
iii.	Length of ERP rod (mm)	
iv.	Dia of weather sheds (mm)	
v.	Thickness of housing (mm)	
vi.	Dry arc distance (mm)	
10.	Dimensioned drawings of Insulator (including weight with tolerances in weight)	
11.	Method of fixing of sheds to housing specify):- single mould or modular	
12.	No. of weather sheds	
13.	Type of sheds	
	(i) Aerodynamic	
	(ii) With under ribs	
14.	Packing details	
	(a) Type of packing.	
	(b) No. of Insulators in each pack	
	(c) Gross weight of package	
15.	Any other particulars which the bidder may like to give.	

7.0 TECHNICAL SPECIFICATION FOR COMPOSITE INSULATORS FOR USE IN 33kV SYSTEM (Disc Insulators)

7.1 SCOPE::

This specification covers design, manufacture, testing and supply of composite Insulators for use in the 33 KV overhead transmission lines and substations. The composite Insulators shall be of the following type:

i) Long rod Insulators for conductors in tension application at angle/cut points. The Insulators shall be **of tongue & Clevis type.**

7.2 APPLICABLE STANDARDS::

7.2.1 **Standards:-**

Following Indian/International Standards, which shall mean latest revision, with amendments/changes adopted and published, unless specifically stated otherwise in the Specification, shall be referred while accessing conformity of Insulators with these specifications.

7.2.2 In the event of supply of Insulators conforming to standards other than specified, the Bidder shall confirm in his bid that these standards are equivalent or better to those specified. In case of award, salient features of comparison between the standards proposed by the Bidder and those specified in this document will be provided by the Supplier to establish equivalence.

Sr. No.	Indian Standard Standard	Title	International Standard
1		Definition, test methods and acceptance criteria for composite Insulators for A.C. overhead lines above	IEC:1109
2	IS:2071	Methods of High Voltage Testing.	IEC:60060-1
3	IS:2486	Specification for Insulator fittings for overhead power lines with a nominal voltage greater than 1000V General Requirements and Tests Dimensional Requirements locking devices.	IEC:60120 IEC:60374
4		Thermal Mechanical performance test and mechanical performance test on string Insulators units	IEC:60575
5		Characteristics of string Insulator units of the long rod type.	IEC:60433
6		Hydrophobicity Clarification Guide.	STRI guide 1.92/1
7		Radio interference characteristics of overhead power lines and high voltage equipment.	CISPRl18-2 Part 2
8	IS:8263	Methods of RI Test of HV Insulators	IEC:60437
9		Standard for Insulators – Composite-Distribution Dead - end type.	ANSI-C29.132-2000
10	IS:4759	Hot dip zinc coatings on structural steel & other allied products.	ISO:1459
11	IS:2629	Recommended practice for Hot Dip galvanization for iron and steel	ISO:1461(E)
12	IS:6745	Determination of weight of zinc coating on zinc coated Iron and steel articles.	ISO:1460

Sr. No.	Indian Standard Standard	Title	International Standard
13	IS:3203	Methods of testing of local thickness of electroplated Coatings.	ISO:2178
14	IS:2633	Testing of Uniformity of coating of zinc coated articles.	
15		Standard specification for glass fiber standards.	ASTM D 578-05
16		Standard specification for compositional analysis by Thermo gravimetry.	ASTM D 578-05
17	IS:4699	Specification for refined secondary zinc	

7.3 TECHNICAL DESCRIPTION OF COMPOSITE INSULATORS::

7.3.1 Service condition:-

The polymer Insulators to be supplied shall be suitable for satisfactory continuous operation under condition s as specified below:

(i)	Maximum temperature of air in shed	45°C
(ii)	Minimum temperature of air in shed	4°C
(iii)	Maximum relative humidity	95% (The humidity some time approaches saturation point)
(iv)	Minimum relative humidity	10 %

(v)	Average number of dust-storm days per annum	40 days
(vi)	Average number of rainy days per annum	90 days
(vii)	Number of months of tropical monsoon conditions per annum	3 months
(viii)	Average annual rainfall	1250 mm
(ix)	Maximum wind pressure	150 Kg / Sq. mm
(x)	Altitude not exceeding	1000 metres
(The limit of ambient temperature shall be 45°C peak and 35°C average over a period of 24 hours)		

7.3.2 Composite Insulators long rod type for tension locations:-

7.3.2.1 The Insulators shall be suitable for 3 Φ, 50 Hz, effectively earthed 33kV O/H distribution system in a moderately polluted atmosphere. Long rod Insulators shall be of tongue & clevis type.

7.3.2.2 Bidder must be an indigenous manufacturer and supplier of composite Insulators of rating 33kV or above OR must have developed proven in house technology and manufacturing process for composite Insulators of above rating OR possess technical collaboration/ association with a manufacturer of composite Insulators of rating 33 kV or above. The Bidder shall furnish necessary evidence in support of the above along with the bid, which can be in the form of certification from the utilities concerned, or any other documents to the satisfaction of the owner.

7.3.2.3 Insulators shall have sheds with good self-cleaning properties. Insulator shed profile, spacing, projection etc, and selection in respect of polluted conditions shall be generally in accordance with the recommendation of IEC-60815/IS: 13134.

7.3.2.4 The size of Composite insulator, minimum creepage distance and mechanical strength along with hardware fittings shall be as follows:

SN	Type of composite Insulator	Nominal system voltage kV (rms)	Highest system voltage kV (rms)	Visible discharge test voltage kV(rms)	Wet power frequency withstand voltage kV (rms)	Impulse withstand voltage kV (rms)	Minimum creepage distance (mm)	Min. failing load KN	Pin ball shank dia meter (mm)
i.	Long Rod Insulators	33	36	27	75	170	720	45	16

Note: Creepage distances have been considered in line with IS-13134 (which specifies **20mm/ kV for moderately polluted environment).**

7.3.3 Dimensional Tolerance of Composite Insulators :-

The tolerances on all dimensions e.g. diameter, length and creepage distance shall be allowed as follows in line with-lEC 61109:
± {0,04d+1.5) mm when d<300 mm,
± (0.025d-r-6J mm when d>3GQ mm.

Where, d being the dimensions in millimeters for diameter, length or creepage distance as the case may be, However, no negative to f era nee shall be applicable to creepage distance.

7.3.4 **Interchangeably:-**
The composite Insulators including the end fitting connection shall be of standard design suitable for use with the hardware fittings of any make conforming to relevant IEC/IS standards.

7.3.5 **Corona and Rl Performance:-**
All surfaces shall be clean, smooth, without cuts, abrasions or projections. No part shall be subjected to excessive localized pressure. The insulator and metal parts shall be so designed and manufactured that it shall avoid local corona formation and not generate any radio interference be end specified limit under the operating conditions.

7.3.6 **Maintenance:-**

7.3.6.1 The composite Insulators offered shall be suitable for use of hot line maintenance technique so that usual hot line operation can be carried out with ease, speed and safety.

7.4. BASIC FEATURES::

7.4.1 **Design and construction:-**

The composite insulator shall have a core, housing & weather shed of insulating material and steel/aluminum alloy hardware components for attaching it to the support/conductor.

7.4.1.1 **Core:-**

It shall be a glass-fiber reinforced epoxy resin rod of high strength (FRP rod). Glass fibers and resin shall be optimized in the FRP rod. Glass fibers shall be Boron free
electrically corrosion resistant (ECR) glass fiber or Boron free E-Glass and shall exhibit both high electrical integrity and high resistance to acid corrosion. The matrix of the FRP rod shall be Hydrolysis resistant. The FRP rod shall be manufactured through Pollution process. The FRP rod shall be void free.

7.4.1.2 **Housing (Sheath):-**

The FRP rod shall be covered by a seamless sheath of a silicone electrometric compound
or silicone alloy compound of a thickness of 3mm minimum.

It should protect the FRP rod against environmental influences, external pollution and humidity. It shall be extruded or directly molded on the core and shall have chemical bonding with the FRP rod. The strength of the bond shall be greater than the tearing strength of the polymer. Sheath material in the bulk as well as in the sealing/bonding shall be free from voids.

7.4.1.3 **Weather sheds:-**
The composite polymer weather sheds made of silicone electrometric compound or silicon alloy shall be firmly bonded to the sheath, vulcanized to the sheath or molded as part of the sheath and shall be free from imperfections. The weather sheds should have silicon content of minimum 30% by weight. The strength of the weather shed to sheath interface shall be greater than the tearing strength of the polymer. The interface, if any, between sheds and sheath (housing] shall be free from voids.

7.4.1.4 **End Fittings:-**

End fittings transmit the mechanical load to the core. They shall be made of spheroidal graphite cast Iron, malleable cast iron or forged steel or aluminum alloy. They shall be connected to the rod by means of a controlled compression technique. The gap between fitting and sheath shall be sealed by a flexible silicone electrometric compound or silicone alloy compound sealant. System of attachment of end fitting to the rod shall provide superior sealing performance between housing, i.e. seamless sheath and metal connection. The sealing must be moisture proof.

The dimensions of end fittings of Insulators shall be in accordance with the standard dimensions stated in IS: 2486 / IEC: 60120.

7.5. WORKMANSHIP::

7.5.1 All the materials shall be of latest design and conform to the best engineering practices adopted in the high voltage field. Bidders shall offer only such Insulators as are guaranteed by them to be satisfactory and suitable for continued good service in power transmission lines.

7.5.2 The design, manufacturing process and material control at various stages shall be such as to give maximum working load, highest mobility, best resistance to corrosion, good finish and elimination of sharp edges and corners.

7.5.3 The design of the Insulators shall be such that stresses due to expansion and contraction in any part of the insulator shall not lead to deterioration.

7.5.4 The core shall be sound and free of cracks and voids that may adversely affect the Insulators.

7.5.5 Weather sheds shall be uniform in quality. They shall be clean, sound, smooth and shall be free from defects and excessive flashing at parting lines.

7.5.6 End fittings shall be free from cracks, seams, shrinks, air holes and rough edges. End fittings should be effectively sealed to prevent moisture ingress; effectiveness of sealing system must be supported by test documents. All surfaces of the metal parts shall be perfectly smooth without projecting points or irregularities, which may cause corona. All load bearing surfaces shall be smooth and uniform so as to distribute the loading stresses uniformly.

7.5.7 All ferrous parts shall be hot dip galvanized to give a minimum average coating of zinc equivalent to 610 gm/Sq.m, or 87µ m thickness and shall be in accordance with the requirement of IS: 4759, The zinc used for galvanizing shall be of purity 99.5% as per IS: 4699, The zinc coating shall be uniform, adherent, smooth, reasonably bright continuous and free from imperfections such as flux, ash rust stains, bulky white deposits and blisters. The galvanized metal parts shall be guaranteed to withstand at least four successive dips each lasting for one H) minute duration under the standard preece test. The galvanizing shall be carried out only after any machining.

7.6. EQUIPMENT MARKING::

7.6.1 Each insulator unit shall be legibly and indelibly marked with the following details as per IEC-61109:

(a) Month &Year of manufacture
(b) Min. failing toad /guaranteed mechanical strength in kilo Newton followed by the word 'KN' to facilitate easy identification.

(c) Manufacturer's name/Trade mark

7.6.2 One 10mm thick ring or 20 mm thick spot of suitable quality of paint shall be marked on the end fitting of each composite long rod of particular strength in case of 33 kV Insulators for easy identification in case both types of Insulators are procured by the utility. The paint shall not have any deteriorating effect on the insulator performance. Following codes shall be used as identification mark:

For 45 kN long rod unit : Blue
For 70 kN long rod unit : Red (Not applicable)

7.7. BID DRAWINGS::

7.7.1 The Bidder shall furnish full description and illustration of the material offered.

7.7.2 The Bidder shall furnish along with the bid the outline drawing (3 copies) of each insulator unit including a cross sectional view of the long rod insulator unit. The drawing shall include but not be limited to the following information:

(a) Long rod diameter with manufacturing tolerances
(b) Minimum Creepage distance with positive tolerance
(c) Protected creepage distance
(d) Eccentricity of the long rod unit
(i) Axial run out
(ii) Radial run out
(e) Unit mechanical and electrical characteristics
(f) Size and weight tongue & clevis
(g) Weight of composite long rod unit. (h) Materials
(i) Identification mark
(ii) Manufacturer's catalogue number

7.7.3 The bidder shall submit full dimensioned manufacturing insulator drawings containing all the details in four (4) copies along with copies of all the type tests.

7.7.4 After placement of award the Supplier shall also submit fully dimensioned insulator crate drawing for different type of Insulators for approval of the owner.

7.8. TESTS AND STANDARDS::

Insulators offered shall be manufactured with the same configuration & raw materials as used in the Insulators for which design & type test reports are submitted. The manufacturer shall submit a certificate for the same. The design & type test reports submitted shall not be more than 05 years old.

7.8.1 Design tests:-

Manufacturer should submit test reports for Design Tests as per IEC - 61109 (clause - 5) along with the bid. Additionally following tests shall be carried out or reports for the tests shall be submitted after award of contract:
+ UV test: The test shall be carried out in line with clause 7.2 of ANSI C29.13

7.8.2 Type Tests:-

The following type tests shall be conducted on a suitable number of individual insulator units, components, materials or complete strings:

The bidder shall submit type test reports as per IEC 61109 along with the bid. Additional type tests as required below shall be carried out by the manufacturer, after award of contract for

which no additional charges shall be payable. In case, the tests have already been carried out, the manufacturer shall submit reports for the same.

SN	Description of type test	Ten procedure/standard
1.	Dry lightning impulse withstand voltage test	As per IEC 61109 (clause 6.1)
2.	Wet power frequency test	Ai per IEC 61 109 (clause 6,2)
3.	Mechanical load-time test	As per IEC 61 109 (clause 6 4)
4.	Radio interference test	As per IEC 61109 (clause 6.4)
5.	Recovery of Hydrophobicity test	Annexure-A This test may be repealed every 3 yrs by the manufacturer
6.	Chemical composition test for silicon content	Annexure-A Or any other rest method acceptable to the owner
7.	Brittle fracture resistance test	Annexure - A

7.8.2.2 **It shall be the option of the owner to accept the Insulators based on type test reports submitted by the manufacturer. The owner shall be free to repeat the type test & may witness the same.**

Note: The owner, for the purpose of facilitating the type tests, may ask the bidders to quote test charges separately

7.8.2.3 All the type test given in Clause No. 8.2 in addition to routine & acceptance test shall be carried out on insulator along with hardware fittings wherever required.

7.8.3 **Acceptance (sample) Tests**
7.8.3.1 **For Composite Insulators**

(a) Verification of dimensions : Clause 7.2 IEC: 61109,
(b) Verification of the locking system applicable): Clause 7.3 IEC: 61 109
(c) Galvanizing test : IS:2633/IS:6745
(d) Verification of the specified mechanical load :

7.8.4.1 Routine Tests:-

sn	Description	Standard
1	Identification of marking	As per IEC: 61 109 Clause 8.1
2	Visual Inspection	As per IEC 61 109 Clause 8.2
3	Mechanical routine test	As per IEC: 61 109 Clause 8.3

7.8.5 **Tests During Manufacture**

Following tests shall also be carried out on all components as applicable

a) Chemical analysis of zinc used for galvanizing
b) Chemical analysis, mechanical, metallographic test and magnetic particle inspection for malleable castings.
c) Chemical analysis, hardness tests and magnetic particle inspection for forgings.

7.8.6 **Sample Batch for Type Testing**

7.8.6.1 The bidder shall offer material for sample selection for type testing only after getting

Quality Assurance Programme approved by the Owner, The bidder shall offer at least three times the quantity of materials required for conducting all the type tests for sample selection. The sample foe type testing will be manufactured strictly in accordance with the Quality Assurance Programme approved by the Owner.

7.8.7 **Additional Tests:-**

7.8.7.1 The Owner reserves the right at his own expenses, for carrying out any other test(s) of reasonable nature carried out at Supplier's premises, at site, to in any other place in addition to the aforesaid type, acceptance and routine tests to satisfy himself that the material comply with the Specifications.

7.8.7.2 The Owner also reserves the right to conduct all the tests mentioned in this specification at his own expense on the samples drawn from the site at Supplier's premises or at any other test center. In case of evidence of non compliance, it shall be binding on the part of the Supplier to prove the compliance of the items to the technical specifications by repeat tests or correction of deficiencies or replacement of defective items, all without any extra cost to the Owner,

7.8.8 **Co-ordination for Testing:-**

7.8.8.1 The Supplier shall have to co-ordinate testing of Insulators with hardware fittings to be supplied by other Supplier and shall have to guarantee overall satisfactory performance of the Insulators with the hardware fittings.

7.8.9 **Quality assurance plan:-**

7.8.9.1 The successful bidder shall submit following information to the owner:

7.8.9.1.1 Test certificates of the raw materials and bought out accessories.

7.8.9.1.2 Statement giving list of important raw materials, their grades along with names of sub-suppliers for raw materials, fist of standards according to which the raw materials are tested. List of tests normally carried out on raw materials in presence of bidder's representative.

7.8.9.1.3 List of manufacturing facilities available.

7.8.9.1.4 Level of automation achieved and lists of areas where manual processing exists.

7.8.9.1.5 List of areas in manufacturing process, where stage inspections are normally carried out for quality control and details of such tests and inspections.

7.8.9.1.6 List of testing equipments available with the bidder for final testing of equipment along with valid calibration reports.

7.8.9.1.7 The manufacturer shall submit Manufacturing Quality Plan (MQP) for approval & the same shall be followed during manufacture and testing,

7.8.9.2 The successful bidder shall submit the routine test certificates of bought out raw materials / accessories and central excise passes for raw material at the time of inspection.

7.8.10 Guarantee:-

The Supplier of Insulators shall guarantee overall satisfactory performance of the Insulators for the period of 18 months from the date of supply.

7.8.11 Test **Reports:-**

7.8.11.1 At least three copies of type test reports shall be furnished. One copy shall be returned duly certified by the owner, only after which the commercial production of the concerned material shall start

7.8.11.2 Copies of accepts nee test reports shall be furnished in at least three [3) copies. One copy shall be returned duly certified by the Owner, only after which the material shall be dispatched.

7.8.11.3 Record of routine test reports shall be maintained by the Supplier at hi^
works for periodic inspection by the Owner's representative.

7.8.11.4 Test certificates of test during manufacture shall be maintained by the Supplier. These shall be produced for verification as and when desired by the Owner.

7.9 **INSPECTION::**

7.9.1 The Owner's representative shall at all times be entitled to have access to the works and all places of manufacture, where insulator, and its component parts shall be manufactured and the representatives shall have full facilities for unrestricted inspection of the Supplier's and sub-Supplier's works, raw materials, manufacture of the material and for conducting necessary test as detailed herein.

7.9.2. The material for final inspection shall be offered by the Supplier only under packed condition. The Owner shall select samples at random from the packed lot for carrying out acceptance tests. The lot offered for inspection shall be homogeneous and shall contain Insulators manufactured in 3-4 consecutive weeks.

7.9.3 The Supplier shall keep the Owner informed in advance of the time of starting and the progress of manufacture of material in their various stages so that arrangements could be made for inspection.

7.9. 4 No material shall be dispatched from its point of manufacture before it has been satisfactorily inspected and tested unless the inspection is waived off by the owner in writing. In the later case also the material shall be dispatched only after satisfactory testing specified herein has been completed.

7.9.5 The acceptance of any quantity of material shall in no way relieve the Supplier of his responsibility for meeting all the requirements of the specification and shall not prevent subsequent rejection, if such materials are later found to be defective.

7.10 **PACKING::**

7.10.1 Al I Insulators shall be packed in strong corrugated box of min, 7 ply duly paletted or wooden crates. The gross weight of the crates along with the material shall not normally exceed 100 Kg to avoid handling problem. The crates shall be suitable for outdoor storage under wet climate during rainy season.

7.10.2 The packing shall be of sufficient strength to withstand rough handling during transit, storage at site and subsequent handling in the field.

7.10.3 Suitable cushioning, protective padding, or dunnage or spacers shall be provided to prevent damage or deformation during transit and handling.

7.10.4 All packing cases shall be marked legibly and correctly so as to ensure safe arrival at their destination and to avoid the possibility of goods being lost or wrongly dispatched on account of faulty packing and faulty or illegible markings. Each wooden case/crate/corrugated box shall have all the markings stenciled on it in indelible ink.

7.10.5 The bidder shall provide instructions regarding handling and storage precautions to be taken at site.

Tests on Insulator UnitsAnnexure-A

1 RIV Test (Dry):-

The insulator string along with complete hardware fittings shall have a radio interference voltage level below 100 micro volts at one MHz when subjected to 50 Hz AC voltage of 30 kV for 33 kV class insulators respectively under dry condition. The test procedure shall be in accordance with IS:326B /I EC : 437/CISPfi 18-2.

2 Brittle Fracture Resistance Test:-

Brittle fracture test shall be carried out on naked rod along with end fittings by applying "1 n HNO3 acid" (63 g cone, HN03 added to 937 g water) to the rod. The rod should be held at 80% of SML for the duration of the test. The rod should not fail within the 96 hour test duration. Test arrangement should ensure continuous wetting of the rod with Nitric acid.

3 Recovery of Hydrophobicity & Corona test:-

The test shall be carried out on 4mm thick samples of 5cm x 7cm

i) The surface of selected samples shall be cleaned with isopropyl alcohol. Allow the surface to dry and spray with water Record the Hydrophobicity classification in line with STRI guide for Hydrophobicity classification.. Dry the sample surface.

ii) The sample shah subjected to mechanical stress by bending the sample over a ground electrode. Corona is continuously generated by applying 12 kV to a needle like electrode placed 1mm above the sample surface. The test shall be done for 100 hrs.

iii) Immediately after the corona treatment, spray the surface with water and record the HC classification. Dry the surface and repeat the corona treatment as at clause 7 above. Note HC classification. Repeat the cycle for 1000 hrs. or until an HC of 6 or 7 is obtained. Dry the sample surface.

iv) Allow the sample to recover and repeat hydrophobiticiy measurement at several lime intervals. Silicone rubber should recover to HC 1 - HC 2 within 24 to 48 hours, depending on the material and the intensity of the corona treatment.

4 Chemical composition test for Silicon content

The content of silicon in the composite polymer shall be evaluated by EDX (Energy Dispersion X-ray) Analysis or Thermo-gravimetric analysis. The test may be carried out at CPRI or any other NABL accredited laboratory.

8.0 TECHNICAL SPECIFICATION FOR H-Beams 3 7 . 1 KG/MTR. (13 METER LONG)

8.1 SCOPE:-

8.0.1 This specification calls for manufacture, stage testing, inspection and testing before dispatch, packing and delivery of following Steel sections in M.P. MADHYA Kshetra Vidyut Vitaran Co. Ltd., Bhopal:-

Sl. No.	Name of Material
i.	**H-Beams 152 X 152 mm., 37.1 Kg./13Mtr**

8.0.2 The materials shall conform, in all respect, to the high standard of design and workmanship and shall be capable of performing duties specified herein. Materials offered shall be complete in all respect.

8.1 STANDARDS:

8.2 Materials shall conform to the latest applicable Indian standards. In case bidders offer Steel Section and supports conforming to any other international specifications which shall be equivalent or better than IS, the same is also acceptable.

Sl. No.	Standard No.	Title
1	IS:2062 Grade `A' Quality	Specification for rail pole.
2	IS:2062	Chemical and physical composition of material
3	IS:1852	Rolling and cutting tolerances for Hot rolled steel products

8.3 ACCEPTANCE OF OTHER AUTHORITATIVE STANDARDS:

In the paragraph 2.1 above relevant Indian standards specification have been mentioned. However, the material meeting any other authoritative international standards, which ensures equal or better quality than the standards, mentioned shall also be acceptable. Material for which Indian Standards are not available, the relevant British standards and IEC recommendations will be applicable. Please attach photocopy of all such standards according to which the materials have been offered.

8.4 SERVICE CONDITIONS:

8.4.1 CLIMATIC CONDITIONS:-

The Steel Sections to be supplied against this specification shall be suitable for satisfactory continuous operation under the following tropical conditions:-

1	Location At	
2	Max. ambient air temperature	500C
3	Min. ambient air temperature	10C
4	Max. daily average ambient air temperature	400C
5	Max. yearly weighted average temperature	320C
6	Max. Relative Humidity	95% (Sometimes approaches saturation point)
7	Max. altitude above mean sea level	1000 Meters
8	Average Annual rainfall	125 cm
9	Max wind pressure	150 Kg/sq. meter
10	Isoceraunic level (Average Number	

	of thunderstorm days per year)	50
11	Seismic level (Horizontal acceleration)	0.3g

22.4.1 LENGTH:-

The materials to be supplied shall be in the following lengths:-

(i) H-Beams 152 X 152 mm., 37.1 Kg./13Mtr.

Please ensure that material is supplied in all length covered in the specified range.

Any tolerance on negative or positive side shall not be accepted.

8.4.2 WEIGHMENT:-

The weighment of Steel Sections shall be witnessed by the consignee at the time of taking delivery.The weight recorded in the material receipt certificate issued by the consignees shall be final.

8.5. CHEMICAL COMPOSITION AND PHYSICAL PROPERTIES OF H-BEAMS, CONFORMING TO IS: 2062/84 (with latest amendments)

C H E M I C A L C O M P O S I T I O N

	CHEMICAL COMPOSITION		FOR Fe 410 WA GRADE	
1	C	--	0.23%	MAX.
2	Mn	--	1.5%	MAX.
3	S	--	0.050%	MAX.
4	P	--	0.050%	MAX.
5	SI	--	0.40%	MAX.
6	CE (Carbon Equivalent)	--	0.42%	MAX.

M E C H A N I C A L P R O P E R T I E S

1. Tensile strength (min.) – 42 Kgf/mm2 or 410 N/mm2
2. Yield stress Min. for thickness/diameter

< 20 mm	-	26 kgf/mm2 OR 250 N/mm2
20 – 40 mm	-	24 kgf/mm2 OR 240 N/mm2
> 40 mm	-	23 kgf/mm2 OR 230 N/mm2

3. Elongation %(min.) - 23% Bend test (internal Dia) - Min-3 t (t – is the thickness of the material)

8.6. TOLERANCE IN QUANTITY:-

Variation in ordered quantity for any destination and over-all ordered quantity shall be only to the extent of ± 2%. Rolling and weight tolerances shall be as per latest version of IS: 1852 or to any equivalent International Standard. Any claim of quantity Supplied in excess of above limits shall not be admitted.

8.7. MARKING:-

It is desirable that the Bidder should put his identification marks on the finished materials. The mark shall be in “legible English letters” given with marking dies of minimum 18 mm size.

8.8. INSPECTION AND TEST CERTIFICATE:-

The materials to be supplied will be subject to inspection and approval by the representative of MPMKVVCL Bhopal in case of Re-rollers. The firm is required to offer the finished material for inspection well in advance to this office. The finished materials shall be delivered to our consignees only after the same are inspected and approved for delivery by our Inspecting Officer/this office.

The BILLETS/INGOTS from which materials shall be re-rolled and supplied to us shall be of tested quality as per IS: 2830/6914 (Latest revision) respectively and shall be arranged from their own source. The Chemical Composition and Physical properties of the finished materials shall be as per relevant specification indicated in Schedule-III enclosed.

The materials shall be tested in ISI approved Laboratory of the tenderer having all facilities available for conducting all the tests as prescribed in relevant ISS. The materials shall be tested either in their ISI approved Laboratory or in any Govt. approved laboratory. The testing charges whatsoever shall be to the tenderer's account. It may be mentioned here that the Discom-EZ reserves right to get the materials tested at its discretion or any Laboratory at the cost of the tenderer.

The tenderers are required to specifically indicate that:-

(i) They hold valid ISI License against respective ISS.

(ii) That the materials offered against this tender are bearing ISI certification marks.

(iii) The tenderers are required to submit a copy of the valid ISI License clearly indicating size and range of roll-able product against respective ISS along with their
offer. It is to be noted that in case any of the two conditions as mentioned above i.e. (i) holding of valid ISI License and (ii) finished materials bearing ISI certification marks, are not fulfilled, THE TNEDER SHALL NOT BE ACCEPTED / CONSIDERED.ATTESTED PHOTOSTAT COPIES OF THESE LISENSES ISSUED IN FAVOUR OF THE TENDERER SHOULD BE SUBMITTED ALONGWITH THE TENDER.

8.9. TRANSPORTATION AND HANDLING CHARGES:-

The road transportation charges including loading of materials into TRUCK/TRAILOR at tenderers works and transportation from the works to the specified destinations shall be indicated in the break-up of F.O.R. destination prices mentioned in Schedule-I. The transportation charges are on 'FIRM' price basis and, therefore, no price variation on transportation charges, on any account whatsoever, shall be permitted. The responsibility of transportation of material up to various destinations shall rest on the tenderer. However, please note that no transshipment of dispatched material shall be allowed. The unloading of material from TRUCK/TRAILOR at our Stores/Workshop will be arranged by the consignees.

8.10. GUARANTEE PERIOD:-

The performance guarantee for the materials shall be for a period of six months from the date of receipt of last consignment.

Following conditions shall also be applicable against the contract:-

(i) In case any defect in the materials is found within guarantee period, the same shall be replaced by the tenderer, on free of cost basis. The replacement will have to be organized expeditiously and preferably within one month's time.

(ii) In case, for the purpose of arranging replacement, the defective/failed/rejected material is required to be dispatched to tenderer works, all charges towards transportation/insurance/ packing etc. shall be borne by the tenderer for to and fro dispatches.

(iii) In case the material develops any defect either in workmanship or in quality within guarantee period after installation at site, for the purpose of replacement,

the same will be dismantled and taken out by us. In such case, actual cost of dismantling and replacement of the material shall also be recoverable from the tenderer.

(iv) In case it is observed that replacement of material is not being provided within reasonable period or proper response is not being received from the tenderer, then apart from operating clause of penalty (which provides for imposition of penalty / liquidated damages, risk purchase at tenderer's cost and cancellation of contract) the Discom may also take suitable penal action against the tenderer, which may interalia include black listing for further business from the Discom.

8.11. IMPOPRTANT NOTE:-

(i) The tenderer should quote the rates for those items which they are rolling.

(ii) They should also indicate the source of supply for the item which they are not rolling and are rolled by their conversion agent.

(iii) The tenderer should quote the rates in the prescribed price scheudle-i only, otherwise the offer is liable for rejection. The bifurcation of each element as asked for may also be indicated.

(iv) The discom-ez-ez reserves the right to accept or reject any or All the offers in part of fully without assigning any reasons whatsoever and also to increase / reduce / delete the quantity of the material.

(v) The technical particulars as asked in Schedule-III should be filled in carefully. The offers wherein any deviations/short-comings found in G.T.P. are liable for rejection.

(vi) The quantity of various items as mentioned in Schedule-I is subjected to change, therefore, in case, any rebate is offered for quantity on order, the same shall specifically be mentioned.

SCHEDULE III

GUARANTEED TECHNICAL PARTICULARS OF H-BEAM.

Sr. No.	Technical Particulars	H-Beams size 152x152 mm, 37.1 Kg per Mtr.

1	Name of Manufacturer & address						
2	Chemical composition (in Max. %)	C	Mn	S	P	SI	CE
3	Tensile strength						
4	Yield stress						
5	Elongation						
6	Length in Meters						
7	Dimension of cross section						

SCHEUDLE-VI

SOURCE OF MATERIAL AND PLACES OF MANUFACTURE, TESTINTG & INSPECTION

S. No.	Name of manufacturer	Place of manufacture	Place of testing & inspection	Source of Material

9. GENERAL PARTICULARS AND TECHNICAL PARTICULARS FOR AAA CONDUCTOR

SCOPE:- This specification provides for the manufacture, testing before despatch, supply and delivery of **ISI Marked All Aluminium Alloy (AAA) conductors**.

9.1 STANDARD:-

The conductor shall strictly comply with the Indian Standard Specification IS:398 (Part-IV)1994 with latest amendments unless otherwise stipulated in this specification, or any other International Standards which ensure equal or higher quality material and workmanship.

9.2 MATERIAL:-

9.2.1 The conductors offered shall be of best quality and workmanship.

9.2..2 The wires shall be smooth and free from all imperfections such as spills and splits and rolling and wire drawing defects etc. resulting in reduction in cross-sectional area over the entire length.

9.3. TOLERANCE:-

The following tolerances shall be permitted:

(i) Tolerance on nominal diameter wires ± 1% (plus minus one percent).

9.4. MODULUS OF ELASTICITY AND COEFFICIENT OF LINER EXPANSION:

The values of the final modulus of elasticity and co-efficient of liner expansion for AAA Dog Conductor shall be as given here under:

Item	No. of	Final modulus of Elasticity GN/Sq.mm (practical)	Coefficient of Linear expansion per ^{o}C	Density at Temp. of 20 ^{o}C
AAAC		$0.6324x10^{+6}$ Kg/cm^2	$23.0x10^{-6}$ (Alu. Alloy)	2.7 Kg/dm^3 (Alu. Alloy)

The wires of Aluminium alloy conductor shall be of heat treated Aluminium, magnesium, silicon alloy having composition appropriate to the technical and electrical properties as specified in Table-I of IS:398(Pt-IV)/1994.

9.5. JOINTS IN WIRES:-

In AAA Dog Conductors there shall be no joint in any wire of stranded conductor containing wires except those made in the base rod or wire before final drawing.

9.6. STRANDING:

9.6.1 The wires used in manufacture of a stranded conductor before stranding, satisfy all requirements of IS: 398 (Part-IV/1994 with its latest amendments. The lay ratio of the layer shall be within the limit given under class-8 below.

9.6.2 In all constructions, the successive layers shall have opposite directions of lay. The outer-most layer being right handed, the wires in each layer shall be evenly and closely stranded.

9.7 LAY RATIO:-

The lay ratio (Ratio of the axial length of a complete turn of the helix formed by an individual wire in a stranded conductor to the external diameter of the helix) shall be within the limits given below :-

Item	No. of wires			Ratio of Alu. wire dia to steel wire dia	Lay ratio of Al. wire	
	Outer Alu.	Central Alu.	Total		Max.	Min.
AAA Dog Conductor	6	1	7	NA	14	10

9.8 PACKING AND MARKING:

(A) The conductor shall be wound in non-returnable reels or drums conforming to IS:1778 – 1961 (Specification for Reels and Drums for bare wire) or the latest version thereof. The drums shall be marked with the following details:-

(a) Manufacturer's name.
(b) Trade mark, if any.
(c) Drum number & identification number.
(d) Size of conductor.
(e) Number and lengths of pieces of conductor in each drum.
(f) Gross mass of the packing.
(g) Net mass of conductor
(h) ISI or relevant International standard specification mark, if any.
(i) Name and address of the consignees

9.9. PACKING CONDITION:-

9.9.1 The reels/drums shall be of such constructions as to assure delivery of conductors free from displacement and damage and should be able to withstand all stresses due to handling and the stringing operation so that conductor surface is not dented, scratched or

damaged in any way during manufacturer, transport and erection. The conductor shall be properly lagged on the drums.

9.9.2 The conductor drum should be suitable for wheel mounting. Before reeling, the cardboard or other suitable material shall be secured to the drum and inside flanges of the drums. After reeling the conductor, the exposed surface should be wrapped with suitable soft material e.g. polythene sheet etc. across the flanges to protect the conductor from dirt, grit and damage during transportation and handling and also prevent ingress of rain water during storage/transport.

9.9.3 All wooden components shall be manufactured out of seasoned wood of good quality free from defect that may materially weaken the component parts of the drums. Preservatives treatment for anti-termite/anti-fungus shall be applied to the entire drum with preservatives of a quality which is not harmful to the conductor.

9.10. STANDARD LENGTH AND GROSS WEIGHT OF CONDUCTOR:-

The gross weight of each package shall not exceed the following limits, subject to a tolerance of + 10% (ten percent).

(i) For Aluminium alloy conductors of sizes 22 mm2 & 34 mm2 (Squirrel & Weasel) : 1000 Kg

(ii) For Aluminium alloy conductors of sizes 55 mm2, 80 mm2 & 100 mm2 (Rabbit, Raccoon & Dog respectively: 2400 Kg

(iii)The standard length of AAA conductor shall be as under:-

SNo	AAA Conductor of size	Code Word	Standard length
1.	100 mm^2	Dog	1.200 Kms

Longer lengths shall be acceptable. Short lengths of not less than 50% of the standard lengths, as indicated above, shall be acceptable to the maximum extent of 10% of the quantity ordered for each size.

9.11. VARITION IN THE ORDERED QUANTITY:

Supply to each destination can vary plus/minus 3% (three percent) of the quantity as indicated in Despatch Instructions. However, variation in the total quantity supplied shall be limited to within plus minus 1% (one percent) of the ordered quantity in each size.

9.12. TESTS:-

912.1 Samples of individual, Aluminium Alloy wires for tests shall be taken before stranding from not less than 10% of the spools/coils. If samples are taken after stranding, they shall be obtained by cutting 1.2 meters from the outer end of the finished conductor from not more than 10% of the reels.

9.12.2 The mechanical tests shall be carried out on single wires only and not on complete conductor.

9.12.3 The following tests shall be carried on Aluminium Alloy wires as per detailed procedure given in IS:398(Part-IV)/1994:-

(a) Measurement of lay ratio of conductor
(b) Nominal size of individual wire
(c) Breaking load test
(d) Elongation test
(e) Resistance test.

9.12.4 The rejection and re-test procedure shall be followed as stipulated in IS:398(Part- IV)/ 1994.

9.13. CHECKING AND VERIFICATION OF LENGTH OF CONDUCTORS:

9.13.1 END SEALING:- Both the ends of each length of the conductor should be properly sealed with epoxy compound/metal crimp with embossing/punching of suppliers identification (Trade Mark) and Drum Identification number on the seal.

9.13.2 The supplier/manufacturer of Conductor should arrange for the inspection by the representative of purchaser specially authorized for this purpose. At least 5% of the total number of drums of conductors taken at random should be checked to ascertain the lengths of conductor adopting either of the following two methods:-

(a) The drum along with the conductor should be weighed and six empty drums along with protective laggings & studs etc. normally used for winding the conductor should also be weighed. Net weight of the conductor should be calculated by subtracting the average weight of the six empty drums from the gross weight of the conductor and drums. Having known the weight of the conductor, the length of the conductor can be computed.

In case of empty conductor drums, a check weighment of every one in ten empty drums shall also be done before the conductors are wound on the drums.

(b) Arrangements should be made available in the works of the manufacturer for transferring the conductor from one reel to another at the same time measuring the length of the conductor so transferred by means of a meter. Percentage shortage if any in the length thus obtained and as declared by the supplier in the packing list shall be applied to all the drums.

9.14 CHECK MEASUREMENT:

Where length of conductor is verified by weighment basis the determining factor will be length /weight ratio of the sample drums verified at the firm's premises of the lot of which the drum under measurement at the consignee's end forms a part:

i. Wherever at the end of the consignee, length measurement machines are available conductors shall be accepted by verification of length only and where the length measurement machines are not available, conductor shall be accepted on weighment basis.

ii In case, where the recorded weight on the drum tallies with the measured weight at consignee end, then the conductor length shall be accepted as recorded on the drum. In other cases, the determining factor will be weight/ length ratio of the sample(s) inspected at the firm's premises of the lot of which the drum under measurement at the consignee's end forms a part. The factors of weight/length ratio shall however be made available to the consignees in the dispatch instructions itself. If such factors are not available due to some reasons, actual measurement of diameter shall be made and weight/length ratio shall be obtained for the purpose of computing length.

TABL E – I

(A) SIZE AND PROPERTIES OF AAA CONDUCTORS

Sr. No.	Actual	Stranding & wire dia	Approximate overall dia	Approximate mass	Calculated maximum resistance at 20o	Approximate calculated breaking load
	mm2	mm	mm	Kg/Km	Ohm/km	KN
1.	100	7/4.26	12.78	272.86	0.3390	29.26

(B) PROPERTIES OF ALUIMINIUM ALLOY WIRES USED IN THE CONSTRUCTION OF AAA CONDUCTORS

Size (Code-Word)	Diameter			Gross Sectional Area of nominal dia wire	Mass	Resistance 20oC	Breaking load (Min.)	
	Nominal	Min.	Max.				Before stranding	After stranding
1	2	3	4	5	6	7	8	9
100 (Dog)	4.26	4.22	4.30	14.250	38.48	2.345	4.40	4.18

SCHEUDLE-E

GUARANTEED TECHNICAL PARTICULARS OF CONDUCTORS

The information regarding GTP in respect of AAA Conductors be furnished in separate sheets.

1.	Code Word Actual Sectional Area	Rabbit 100 Sqmm
2.	Maker's name, address and country	
(a)	Aluminum Alloy Wires	
(b)	Complete conductor (All Al. alloy) Stranding and wire dia	
3.	Stranded and wire dia	
(a)	Aluminium Alloy	
4.	Nominal Aluminum Area (Sq.mm)	
5.	Cross Sectional Area of Nominal Diameter wire (Sqmm)	
6.	Overall Diameter of conductor (mm)	
7.	Breaking load of conductor in KN	
8.	Minimum breaking load in KIN for	
(a)	Before stranding	
(b)	After stranding	
9.	Mass (Kg. per Km)	
(a)	Aluminum Ally Wire	
(b)	Conductor (AAAC) (Note:-No tolerance will be given on nominal wire diameter).	
10.	Resistance in Ohms per Km at 20oC	
1.	Code Word Actual Sectional Area	Rabbit
11(	Continuous maximum current rating of conductor (Amps in still air at 45oC	
(b)	Temperature rise for the above current oC.	
12.	Purity13. of Aluminum Alloy	

13.	Maximum working tension for complete conductor KN	
14.	Modulus of Elasticity (GN/mm2) of	
(a)	Aluminium	
(b)	Conductor	
15.	Co-efficient of linear expansion per degree centigrade	
(a)	Aluminum alloy	
(b)	Conductor	
16.	Standard length of each piece in Km	
17.	Tolerance, if any, on standard length.	
18.	No. of standard lengths in one reel.	
19.	Complete dominions of the reel in cms. & weight (Kg.).	
20.	Mass of conductor in one reel in Kg	
(a)	Minimum	
(b)	Maximum	
21.	Mass of the reel in Kg with protective laggings etc.	
22.	Gross Mass of the reel including mass of conductor with	
23.	Standard according to which the conductor and drum will	
(i)	Conductor	
(ii)	Drum	
24.	Other particulars, if any	

10.0 DANGER BOARD:

As per provisions of IE Rules 1956, danger notice plates in Hindi with the signs of skull and bones is required to be provided on power line supports and other installations. This specification covers danger notice plates to be displayed in accordance with Rule No.35 of Indian Electricity Rules, 1956. Unless otherwise modified in this specification, the Danger Notice Plates shall comply with IS 2551-1982 or the latest version thereof.

DIMENSIONS:

Two No of Danger Notice Plates as follows are to be installed at each substation: For display at 33 KV installations - 250 x 200 mm The thickness of sheet (plate) should not be less than 2.0mm Corners of the plate shall be rounded off. All lettering shall be centrally spaced. The dimensions of the letters, figures and their respective position shall be as shown in figs. 1 to 4. The size of letters in the words in each language and spacing between them shall be so chosen that these are uniformly written in the space earmarked for them. Type and size of lettering to be done in Hindi is indicated in the specimen danger notice plates and those in English are shown in REC specification. Adequate space has been provided in the specimen danger notice plates for having the lettering in local language for the equivalent of 'Danger'. '33000' and 'Volts'.

PROPERTY OF MATERIAL:

The plate shall be made from Mild steel sheet of atleast 1.6 mm thick or Hot Press Compression Moulded sheets made out of Sheet Moulding Compound confirming to IS 13410 & shall be min. 2.0 mm thick and of white colour. Material should confirm Heat Deflection Temperature min.170oC as per IS 13411, Exposure to flame Self Extinguishing as per IS 4249 & Melting Point as per IS 13360.

PRINTING:

In case of MS Sheet it should be vitreous enameled white with letters, figures and conventional skull and cross bones in signal red color IS 5-1978 on the front side. The rear side of the plate should also be enamled, however for SMC material screen Print with letters, figures and the conventional skull and cross-bones in signal red colour (refer IS:5-

1978) on the front side requires. The front side of the plate shall be suitably coated with transparent coating.

TESTS:

The following tests shall be carried out:
1. Visual examination as per IS: 2551-1982
2. Dimensional check as per IS:2551-1982 with tolerance of this specs
3. Test for resistance to ageing as per cl.12 IS 14772 & resistance to rusting as per cl.16 IS 14772

All the tests are to be considered for Type Testing where as for Acceptance Tests as well as Routine Test only. Test no. i & ii are to be performed during inspection.

SAMPLING:

1 no from 1st lot for Type test and 10 nos. per 10,000 nos. for acceptance test of each lot offered for inspection

MARKING:

Maker's name and trade mark and the purchaser's name shall be marked in such a manner and position on the plates that it does not interfere with the other information.

11.0 HELICALLY FORMED FITTINGS:

11.1 Pin Insulator ties:

Helically formed insulator ties shall be suitable for specified conductor size. Helically formed ties used for holding the conductor on the pin insulator shall be made of aluminum alloy or aluminized steel or aluminum-clad steel wire and shall conform to the requirement of IS:12048-
1987.

The ties shall be suitably for pin insulator dimensions and conductor sizes to be specified by the Employer. Elastomer pad for insulator shall be used with the ties to avoid abrasion of the conductor coming into direct contact with the insulator.

Tests: The ties shall be subjected to the tests specified in IS:12048-1987.

11.2 Fittings for Strain Insulators:

The Fittings shall consist of the following components:

- Cross arm strap conforming to IS:2486 (Part-II) – 1989.
- Aluminum alloy die cast thimble – clevis for attaching to the tongue of Strain insulator at one end and for accommodating the loop of the helically formed dead-end fitting at the other end in its smooth internal contour. The thimble shall be suitable for all sizes of conductors ranging from 7/2.11mm to 7/3.35mm AAAC. The thimble clevis shall be attached to the insulator by a steel cutter pin used with a non-ferrous split pin of brass or stainless steel. The thimble shall have clevis dimensions as per IS:2486 (Part – II)-1989.
- Helically formed dead-end grip having a prefabricated loop to fit into the grooved contour of the thimble on one end for application over the conductor at the other end. The formed fitting shall conform to the requirement of IS:12048-1987.

Tests: The helically formed fittings for Strain insulators shall be subjected to tests as per IS:12048-1987. The other hardware fittings shall be tested as per IS:2486 (Part-I).

12.0 GALVANISED MILD STEEL HEXAGONAL HEAD BOLTS AND NUTS

12.1 All bolts and nuts shall conform to IS: 6639-1972 and shall be galvanized as per IS:1367 (Part 13) & IS: 2629-1985. All bolts and nuts shall have hexagonal heads, the heads being forged out of solid truly concentric, and square with the shank, which must be perfectly straight.

12.2 Bolts up to M16 and having length up to 10 times the diameter of the bolt should be manufactured by cold forging and thread rolling process to obtain good and reliable mechanical properties and effective dimensional control. Shear strength of bolt for 5.6 grade should be 310 MPA minimum as per IS:12427. Bolts should be provided with washer face in accordance with IS: 1363 (Part – I) to ensure proper bearing.

12.3 Nuts should be double chamfered as per the requirement of IS:1363 (Part – III)- 1984. The Bidder/manufacturer should ensure that nuts should not be over tapped beyond 0.4 mm oversize on effective diameter for size up to M16.

12.4 Fully threaded bolts shall not be used. The length of the bolt shall be such that the threaded portion shall not extend into the place of contact of the component parts.

12.5 All bolts shall be threaded to take the full depth of the nuts and threaded enough to permit the firm gripping of the component parts but no further. It shall be ensured that the threaded portion of the bolt protruded not less than 3 mm and not more than 8 mm when fully tightened.

12.6 All nuts shall fit and tight to the point where shank of the bolt connects to the head. Flat washers and spring washers shall be provided wherever necessary and shall be of positive lock type. Spring washers shall be electro-galvanized. Thickness of washers shall conform to IS:
2016-1967.

12.7 The Bidder shall furnish bolt schedules giving thickness of components connected the nut and the washer and the length of shank and the threaded portion of bolts and size of holes and any other special details of this nature.

12.8 To obviate bending stress in bolt, it shall not connect aggregate thickness more than three time its diameter. Bolts at the joints shall be so staggered that nuts may be tightened with spanners without fouling.

12.9 To ensure effective in-process quality control it is essential that the manufacturer should have all the testing facilities for tests like weight of zinc coating, shear strength, other testing facilities etc, in-house. The agency should also have proper Quality Assurance system which should be in line with the requirement of this specification and IS –14000 services Quality System standard.

Fasteners of grade higher than 8.8 are not to be used.

12.10 RAW MATERIALS

MS round 16mm / 12mm used shall be tested for quality as per IS:2062 Gr. “A”.

i. SPECIFICATION OF FINISHED PRODUCTS:

Bolts & Nuts shall be ISI Marked Mild Steel of galvanized Grade "B" and shall be round with hexagonal head.

Bolts and Nuts shall be manufactured by Hot/Cold forging process neatly and cleanly finished and shall have metric threads as per IS:4218-1967 with its latest amendments.

Dimensions of the bolts & nuts and tolerances should conform to IS:1363 with their latest amendments in all respect. The eccentricity and angular errors of various elements shall be within specified limits as per IS:1367-1967 with its latest amendments. The bolts & nuts shall be free from forging and threading defects such as cuts, splits, burns, bulging, taper, eccentricity, loose fill etc. which may affect their serviceability.

Bolt head and nut shall be chamfered on one face only and other face shall be machined made.

Mechanical property requirement of tester shall conform to IS:1367 (Part-III)-1979 property class 4.6 for bolts & property class-5 for nuts as per IS:1367 (Part VI) – 1980.

Bolts & nuts shall be supplied in well-cleaned conditions and suitably protected against corrosion in individual bags of 50 kgs.

ii. ACCEPTANCE TESTS

The Bidder/manufacturer shall furnish test certificate from his own/recognized Govt. Laboratory giving the results of tests as per IS:1367 (Part-III) –1979 & IS:1367 (Part-VI) - 1980 witnessed by the Employer's representative for each lot under inspection. The test certificate shall be in respect of the following for all sizes of both bolts & nuts as applicable given below:-

Dimensional particulars (Sampling in accordance with IS:2614 for both bolts & nuts (tolerance as per drawing).

Tensile strength test on full size (for bolts min. 400 N/ Sq.mm and for Nuts. Proof Stress (Min 610 N/Sq. mm).

Power load test on full size bolts and M-12-51400 N for 15 Sec. (with Head soundness tests for bolts (no fracture).

Brielle hardness tests or Rockwell Hardness or Vickers's Hardness tests for bolts min-114 & max. 209 or min. 67 & max. 95 or min. 120 & max. 220 respectively. For nuts Vicker's Hardness min. 130 & max. 302.
Galvanizing test- mass of zinc

12.11 PRE-DESPATCH INSPECTION AND TEST

The contactor shall arrange to carryout acceptance tests in presence of Board's inspecting officer in his own laboratory. In case testing facilities are not available at his works he will make necessary arrangements for carrying out these tests at a Govt. recognized lab at his own expense(s) and will provide all testing arrangement for Board's representative to witness the tests.

iii. MARKINGS

On the bolt head, there shall be identification marking of the manufacturer as well as property class "4.6". If possible property class "5" shall be marked on Nuts also.

GUARANTEED TECHNICAL PARTICULARS of Nut & Bolt

No	Particulars	16 mm dia						17 mm dia		
		200 mm	160 mm	140 mm	90 mm	65 mm	40 mm	140 mm	120 mm	100 mm
I	Tenderer Name									
Ii	Tenderer Address									
Iii	Dimensional particulars with reference to the enclosed drawing. These should conform to the ISS: 1363 Part-1,2,3-1984 with latest amendment & sampling in accordance with the IS:2614-1969									
	D	To be indicated by the Bidder/manufacturer								
	M	To be indicated by the Bidder/manufacturer								
	E	To be indicated by the Bidder/manufacturer								
	S	To be indicated by the Bidder/manufacturer								
	B	To be indicated by the Bidder/manufacturer								
	K	To be indicated by the Bidder/manufacturer								
	Pitch of thread Tolerance of nominal length	To be indicated by the Bidder/manufacturer								
Iv	a) Tensile strength of bolts (in N/mm. Sq.)	----------400/N mm^2----------								
	b) Tensile strength of Nuts (in N/mm.Sq.)	----------Not applicable ----------								
V	a) Result of proof load test on bolt	Min 35300 N						Min 19000 N		
	b) Result of proof load test on nut	Min 95800 N						Min 51400 N		
Vi	Result of head soundness test	No fracture								
Vii	Confirm that threads are as per IS:4218 1967 (metric threads)	To be indicated by the Bidder/manufacturer								
Viii	Results of Brinell/Rockwell/Vicker's/hardness test for bolts	Min – 114 & Max. 209, Min 67- Max 95, Min. – 120 & Max. 220 (respectively)								
Ix	Result of Vickers's hardness test for nuts	Min 130 Max 302								
X	Results of yield stress test for Bolts	To be indicated by the Bidder/manufacturer								
Xi	Percentage elongation after fracture	To be indicated by the Bidder/manufacturer								
Xii	Confirm that Bolts and Nuts are ISI marked	To be indicated by the Bidder/manufacturer								

DIMENSIONAL PARTICULARS OF BOLTS & NUTS AS PER IS: 1363 (PART – 1,2 & 3) OF IS 1984 (Drawing Not to Scale)

Sl.	Symbol
1	D (Bolt shank diameter)
2	M (Nut thickness)
3	E (Width across concerns)
4	S (Width across flats)
5	B (Length of thread)
6	F (Thickness of bolt head)

Size of Bolts & Nuts	D			M			E*	S*			B			K			
	Nom	Max.	Min.	Nom	Max.	Min.	Min.	Nom	Max.	Min.	B_1	B_2	B_3	Nom	Max.	Min.	Pitch thread
16mm dia	16	16.7	15.3	15	15.9	14.1	26.17	24	24	23.16	38	44	57	10	10.75	9.25	2.00
12mm dia	12	12.7	11.3	11.3	12.2	10.4	19.85	18	18	17.57	30	36	49	7.5	7.95	7.05	1.75

*for Bolts & Nuts both E, S & Pitch are same

NOMINAL LENGTH TOLERANCE
20 - 90 mm - ± 2.0 mm Use B_1 for < 125 mm i.e. for length upto 125mm
91 - 200 mm - ± 3.0 mm Thread B_2 for > 125 mm i.e. for 200 mm i.e. for length between 126 to 200mm
Length B_3 for > 200 mm i.e. for length above 200 mm

13.0 EARTHING COIL

Earthing Coils shall be fabricated from soft GI Wire Hot Dip Galvanized. The Hot Dip galvanized wire shall have clean surface and shall be free FROM paint enamel or any other poor conducting material. The coil shall be made as per REC constructions standard J-1 (drawing enclosed). The Hot Dip galvanizing shall conform to IS:2629-1985, IS: 2633-1986 and IS: 4826-1979 with latest amendments. Galvanizing should be heavily coated and should stand for the following tests.

13.1 Galvanizing Tests

i) Minimum Mass of Zinc
   a) ON GI Wire used 280 gm/m^2
   b) After Coiling – 266 gm/m^2. The certificate from recognized laboratory shall be submitted towards mass of zinc.

ii) Dip Test
Shall stand 3 dips of 1 minute and one dip of ½ minute before coiling and 43 dips of 1 minute after coiling as per IS:4826-1979.

13.2 THE DIMENSIONAL REQUIREMENT SHALL BE AS FOLLOWS

a) Nominal dia of GI Wire 4 mm (Tolerance + 2.5%)
b) Minimum no. of turns – 115 Nos.
c) External dia of Coil (Min) – 50 mm
d) Length of Coil (Min) – 460 mm
e) Free length of GI Wire at one end coil (Min.) – 2500 mm

The turns should be closely bound. Weight of one finished Earthing Coils (min.) – 1.850 Kg. Adhesion test – As per IS: 4826 – 1979.

HOT DIP GALVANIZED EARTHING COILS OF MIELD STEEL WIRE 4 MM DIA

S. NO.	PARTICULAR	REQIURED	To be categorically specified
1	Manufacturer Name & Address		
2	Standard according to which Earthing coil shall be manufactured and tested	IS-2062/1984 IS-2629/1996 IS-2633/1972 IS-4826/1979 with latest amendment	
3	Tolerance in dimensions (if any)	To be indicated by Bidder/manufacturer	
4	Dia		
A	Dia of GI wire (mm)	4mm + 2.5%	
B	Minimum no. of turns	115 Nos.	
C	External dia of coil	50 mm	
D	Length of coil (Min)	460 mm	
E	Free length of GI Wire @ end of the coil.	2500 mm	
5	Weight of Earthing Coil (Min)	1.850 Kg	

14.0 ANTI-CLIMBING DEVICES

In order to prevent unauthorized persons from climbing any of the supports of HT & LT lines without the aid of a ladder or special appliance, certain anti-climbing devices are provided to the supports. Barbed wire binding is to be adopted for this purpose at a distance of 30 to 40 cm at a height of 3.5 to 4 m from ground level. The barbed wire shall conform to IS: 278 (Grade A1). The barbed wired shall be given chromating dip as

per procedure laid down in IS:1340. **At least 3.5 kgs barbed wire is to be used per pole for the purpose.**

15.0 HOT DIP GALVANISED GS SOLID WIRE

The hot dip galvanized MS Solid wire of sizes 5 mm, 4 mm and 3.15 mm diameters shall conform to the relevant ISS specification, briefed here below: -

15.1 MATERIAL

The Mild Steel wire shall have the chemical composition maximum sulphur - .055%, Phosphorus – 0.055%, Carbon 0.25%.

Zinc shall conform to grade Zen 98 specified in IS:209-1966 & IS: 4826-1979 with up to date amendments.

15.2 ZINC COATING

Zinc coating shall be in accordance with IS: 4826-1979 (Cl.4.2.1) for heavily coated hard quality.

15.3 GALVANIZING

Galvanizing shall be as per IS:2629-1985 and IS:4826-1979 with up to date amendments.

15.4 UNIFORMITY OF ZINC COATING

Uniformity of Zinc coating shall be determined as per IS:2633-1972 with up to date amendments.

15.5 TENSILE PROPERTIES

The tensile strength of the wire after, galvanizing shall be between 55-95 Kg/Sq.mm (heavily coated Hard as per IS:4826-1979 Tables-1) ensuring MS wire Mechanical properties as per IS:28-1972 8.1 to 8.3.

15.6 FREEDOM FROM DEFECTS

To be ensured as per IS: 2629-1985 (Cl. 6.1) & IS:4826-1979 (Cl. 4.3) & with up to date amendments.

15.7 TESTS

During the process of manufacture/ fabrication and finish all tests for chemical, mechanical, galvanizing as per IS:280-1979, IS:1521-1972, IS:1755-1961, IS:6745-1972 & IS:4826-1979 be carried out. Test certificate towards, chemical composition (as per above) shall be submitted for each lot offered for inspection.

The following tests shall be conducted in presence of owner's representative.

1. Visual Physical inspection and measurement of specified dimensions.
2. Coating test as per IS:1755-1961, IS:2629-1966, IS:2633-1972, IS:4826-1979 & IS: 6745-1972.
3. Adhesion test as per IS:1755-1961, IS:2629-1966, IS:2633-1972, IS:4826-1969 & 1979 – IS:6745-1972.
4. Tensile strength and breaking load and elongation determined as per IS:1521-1972

with up to date amendments.

15.8 PACKING

Packing shall be as per IS:280-1979 (Cl.3.1) and each coil shall be between 50-100 Kg.

15.9 MARKING

As per IS:280-1972 (Cl.14.1 & 14.1.1) is required.

GTP of GALVANIZED SOLID WIRE 5 mm

S. No.	Particulars	Requirement	To be categorically specified
1	Nominal Diameter of Wire	**5 mm**	
2	Tolerance in diameter	+ 2.5%	
3	Sectional Area Sq. mm.	19.625	
4	Tensile Strength		
	a) Min. Kgf/mm^2	55	
	b) Max. Kfg/mm^2	95	
5	Minimum breaking load (Kgf)	10/9.5	
6	Type of coating Heavy / Medium / Light	HEAVY	
7	Variety Hard/Soft	HARD	
8	Weight of Zinc Coating (Gms/Sq. Mtr.) Min.	275	
9	No. of dips the coating is able to withstand as 18 ± 20ºC	3 DIPS OF 1 MIN & 1 DIP OF ½ MINUTE	
10	Adhesion Test (Wrap Test at 1 turn per second coiling while stress not exceeding % nominal tensile strength		
	a) Min. complete turn of wrap	10	
	b) Dia of mandrel on which wrapped	16 TIME OF DI 30 MM	
11	Bend Test		
	a) Angle	90	
	b) Dia Round a formet to be bent	10 MM	
12	Freedom from defect		
13	Chemical composition the MS Wire used shall not exceed		
	Sulphur 0.055%	To be indicated	
	Phosphorous 0.055%		
	Carbon 0.25 %		

GTP of GALVANIZED SOLID WIRE 4 mm

S. No.	Particulars	Requirement	To be categorically specified by the tenderer
1	Nominal Diameter of Wire	**4 mm**	
2	Tolerance in diameter	+ 2.5%	
3	Sectional Area Sq. mm.	12.56	
4	Tensile Strength		
	a) Min. Kgf/mm^2	55	
	b) Max. Kfg/mm^2	95	
5	Minimum breaking load (Kgf)	690.8	
6	Type of coating Heavy / Medium / Light	HEAVY	
7	Variety Hard/Soft	HARD	
8	Weight of Zinc Coating (Gms/Sq. Mtr.) Min.	260	
9	No. of dips the coating is able to withstand as 18 ± 20ºC	3 DIPS OF 1 MIN EACH	

10	Adhesion Test (Wrap Test at 1 turn per second coiling while stress not exceeding % nominal tensile strength		
	a) Min. complete turn of wrap	10	
	b) Dia of mandrel on which wrapped	24MM	

S. No.	Particulars		Requirement	To be categorically specified by the tenderer
11	Bend Test			
	a) Angle		NA	
	b) Dia Round a formet to be bent		NA	
12	Freedom from defect			
13	Chemical composition the MS Wire used shall not exceed			
	Sulphur 0.055%	amendments if any I.S. 226	To be indicated	
	Phosphorous 0.055%			
	Carbon 0.25 %			

GTP of GALVANIZED SOLID WIRE 3.15 mm

S. No.	Particulars		Requirement	To be categorically specified
1	Nominal Diameter of Wire		3.15 mm	
2	Tolerance in diameter		+ 2.5%	
3	Sectional Area Sq. mm.		7.789	
4	Tensile Strength			
	a) Min. Kgf/mm^2		55	
	b) Max. Kfg/mm^2		95	
5	Minimum breaking load (Kgf)		428.4	
6	Type of coating Heavy / Medium / Light		HEAVY	
7	Variety Hard/Soft		HARD	
8	Weight of Zinc Coating (Gms/Sq. Mtr.) Min.		240	
9	No. of dips the coating is able to withstand as 18 ± 20ºC		3 DIPS OF 1 MIN EACH	
10	Adhesion Test (Wrap Test at 1 turn per second coiling while stress not exceeding % nominal tensile strength			
	a) Min. complete turn of wrap		10	
	b) Dia of mandrel on which wrapped		14 TIME OF DI 12.6 MM	
11	Bend Test			
	a) Angle		NA	
	b) Dia Round a formet to be bent		NA	
12	Freedom from defect			
13	Chemical composition the MS Wire used shall not exceed			
	Sulphur 0.055%		To be indicated	
	Phosphorous 0.055%			
	Carbon 0.25 %			

b	Material	Hard drawn electrolytic copper alloy	
c	Surface Treatment & Thickness of Silver Coating	Silver plated of thickness of 5 micron	
d	Contact Pressure	25 KG	
9	Continuous Current Rating, Amps	400 amps	
10	Short Time Current Rating KA (rms) min. for 1 sec	16 KA	
11	Rated Peak Short Circuit Current (KA Peak)	25 KA	
12	No. of operations which the switch can withstand without deterioration of contacts	2000	
13	Type of Mounting	Horizontal up right mounting	
14	Type & Material used in connector	Brass/ Bronze strips	

15	Location and Type of Bushing	Bush bearing at rotating insulator	
16	Particulars of Post Insulators		
i	Make(ISI make)	To be indicated	
ii	Type	11 KV Post insulator type	
iii	Strength	10 KN	
iv	Weight	5 Kg (approx.) / unit	
v	No. of units per stack	One	
vi	Height of stack mm	254 mm	
viii	Creepage distance mm	320 mm	
ix	One Minute Power Frequency Dry withstand voltage KV (rms)	65 KV	
x	Power Frequency Flashover voltage KV (rms)	70 KV	
xi	Impulse flashover voltage KV (Peak)	85 KV	
xii	Impulse withstand voltage KV (Peak)	80 KV (peak)	
xiii	Puncture voltage (KV)	105 KV	

16.0 NUMBER PLATE:

Separate number plate is not required. Numbers are to be written on poles/supports itself.

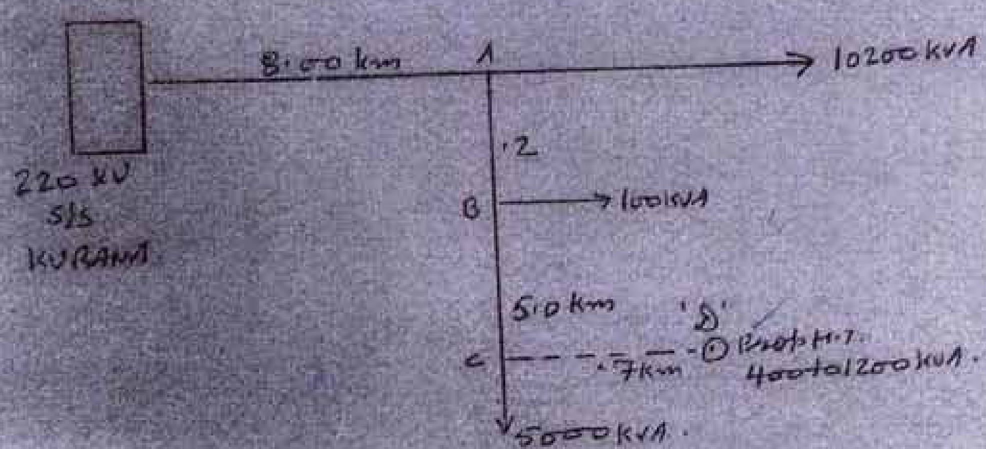
Section-8
Drawings

(Strictly for Tender Purpose Only)

List of Drawings

SINGLE LINE DIAGRAME & VR CALCULATION
FOR PROP 33 KV H.T. To S.P.A. TOMAURL
BHOPAL

33 KV PARWALIYA SADAK FEEDER



% V.R. at the point of supply.

S/S to A – 16500 x 8.00 = 132000
A to B – 6300 x 0.2 = 1260
B to C – 6200 x 5.0 = 31000
C to D – 1200 x 0.70 = 840
Total = 165100

$$\% \text{ V.R} = \frac{\text{km-kVA} \times \text{PF}}{\text{D.F.} \times \text{Cond Const.} \times 100}$$

$$= \frac{165100\ 0.9}{27175 \times 100}$$

$$= \frac{148590}{35000} = 4.24\%$$

A.E.
B. GARH. SUB-DIV (R)