Bhopal Smart City Development Corporation Limited

"Design, Construction, Testing, Commissioning of 33/0.433kV Substation works for Government buildings under Smart City Area Based Development including operation & maintenance of project for 5 years on Engineering, Procurement & Construction (EPC) Basis".

REQUEST FOR PROPOSAL

INDEX

VOLUME – I

SECTION-1

NOTICE INVITING TENDER

Bhopal Smart City Development Corporation Limited

NOTICE INVITING e-TENDER (NIT)

BSCDCL invites online percentage rate /item rate tender as per schedule as under:

Tendering Document No.	:	MPBSCDCL/TENDER NO-92
Name of the Work	:	**Design, Construction, Testing, Commissioning of 33/0.433kV Substation works for Government buildings under Smart City Area Based Development including operation & maintenance of project for 5 years on Engineering, Procurement & Construction (EPC) Basis**
Brief Scope of Work	:	Design, Construction, Testing, Commissioning of 33/0.433kV Substation works for Government buildings under Smart City Project.
Estimated Cost	:	Rs. 3.96 Cr.
Period of Completion	:	(06 Months including raining season for construction) and (60 Months for O&M after commissioning of Project)
Earnest Money Deposit	:	Rs.3,96,000/- (Three lakhs Ninety six Thousand rupees only)
Non-refundable cost of e- Tender Document	:	Rs. 20,000/- (Twenty Thousand rupees only)
Document Download / Sale Start Date	:	22/07/2019 10:00 Hrs
Bid Submission Start Date	:	24/07/2019 09:00 Hrs
Period during which hard copy of the documents as per NIT shall be submitted.(With all technical credentials)	:	19/08/2019 12:00 Hrs
Bid Submission Closing Date	:	16/08/2019 17:30 Hrs
Bid Opening Date*	:	19/08/2019 15:00 Hrs
Validity of offer		180 days from the date of Submission of price bid
Pre-Tender Meeting & Venue		29/07/2019 at 12.00 Hrs. At BSCDCL, Bhopal Office

The tender document can be downloaded from www.mptenders.gov.in **"Corrigendum, if any, would appear only on the** www.mptenders.gov.in **web site and not to be published in any News Paper".** TheBidder if required may submit queries in writing on E-mail Id. tenderqueries@smartbhopal.city before 28/07/2019 **up to 23:59 Hrs**.

ELIGIBILITY CRITERIA FOR BIDDER:

To qualify for award of the contract, bidders are advised to note the minimum qualification criteria specified below;.

1. **Registration:** The bidder shall be registered with any Government/Semi government /PSU department, Should have valid electrical A class license from MP Electrical safety department and registered with MPMKVVCL in appropriate class.
2. **Similar nature of Work:** The Bidder in their own name should have satisfactorily completed the work of similar nature in Semi Govt. / Govt. & Public / Private Sector Organizations in India, during last 7 years ending last day of month previous to the one in which bids are invited as a prime Contractor.(In case of private work bidder should submit TDS certificate for the same).

Three works of similar nature each costing not less than 40% of the estimated cost

OR

Two works of similar nature each costing not less than 50% of the estimated cost.

OR

One work of similar nature of costing not less than 80 % of the estimated cost.

Note:

a) The value of completed works shall be brought to current costing level by enhancing the actual value of work at compound rate of 10 % per annum; calculated from the date of completion to last date of receipt of applications for tenders.

Similar works means: 33/0.433kV and above Substation, 33KV HT Cabling, HT/LT panel installation, Bus duct works along with its associated equipments and auxiliary systems including civil works on EPC/ DBO Basis**, as main contractor.**

b) The Bidder should demonstrate through submission of experience certificates along with work order copy of respective work from concern department for collective experience (That may be verified from issuing authority at any time).

c) Bidder should submit Client/Users Certificate of satisfaction for the work they have executed. The certificate for experience & performance report must be issued by the Power Utilities or User Agencies.

3. **Turnover:** The average annual financial turnover during the last 3 years ending 2018-19 should not be less than 30% of the estimated cost. To ascertain this, Bidder(s) shall furnish the financial statement (Audited balance sheet) duly certified by Chartered Accountant.

4. **Bid Capacity:** The bid capacity of the bidder is required to be more than or equal to estimated cost of the work.

The bid capacity of the prospective bidders will be calculated as under:

Assessed Available Bid Capacity = (A* N* 2 - B)

Where,

A = Maximum value of Engineering works executed in any one year (year means Financial year) during the last seven years (updated to the price level of the Financial year in which bids are received at a rate of 10% per year) taking into account the completed as well as works in progress.

N = Number of years prescribed for completion of the Project/Works,

B = Value of existing commitments (only allotted works) on the last date of submission of bids as per bidding document and on-going works to be completed during the period of completion of the Project/Works for which these bids are being invited.

Note: The statement showing the value of existing commitments and on-going works as well as the stipulated period of completion remaining for each of the works listed should be attached along with certificates duly signed by the Engineer- in- Charge, not below the rank of an Executive Engineer or CA Certified.

Even though the bidders meet the above qualifying criteria, they are subject to be disqualified if they have: made misleading or false representation in the forms, statements and attachments submitted in proof of the qualification requirements; and/or Record for poor performance such as abandoning the works, not properly completing the contract, inordinate delays in completion, litigation history, or financial failures etc.

Financial Year	**Turnover/ Cost of Executed work**	**Effective cost of executed work at previous completed financial year's price level**
2012-2013	G	1.77 x G
2013-2014	F	1.61 x F
2014-2015	E	1.46 x E
2015-2016	D	1.33 x D

2016-2017	C	1.21 x C
2017-2018	B	1.10 x B
2018-2019	A	1.00 x A

5. **Net worth:** The Bidder(s) net worth should be positive in the last year (2018-19).

6. **Physical Criteria:** The Bidder should have completed and commissioned project in last five years and the same should be satisfactory operational

a) The bidder must have completed one project of "Design & Construction of 33/0.433kV sub-station of minimum capacity of 1500 KVA" or above for Central govt/state govt/PSU/Industrial Township/Industries or Similar type project.

7. Bidder shall have valid registration in GST registration, EPF Registration Certificate, ESIC Registration & PAN Card.

8. The bidder should not got black listed by any government organization (Central/State/PSU), bidder should submit affidavit signed by Director of the company.

Note to eligibility criteria: -

I. The bidder should necessarily submit completion certificate of the Qualifying works from the client/user/ duly signed by an officer not below the rank of Executive Engineer or equivalent of the concerned organization.

II. The Bidder shall submit the audited balance sheets / CA certified turnover for last 3 years (2016-17, 2017-18, and 2018-19).

III. For the purpose of determination of turnover of the bidder, only turnover from construction/Engineering work projects shall be considered. This shall be backed by a certificate from the Statutory Auditors of the company/Chartered Accountant.

IV. For the purpose of determining the relationship of the Bidder with their group companies, only the following documents such as the Annual Report, Balance Sheet or the Auditor Certificate, shall be considered.

V. Net worth shall be calculated as the sum of share capital and free reserves and surplus.

VI. Accumulated losses if not adjusted in reserves and surplus and shown separate in the balance sheet shall be deducted from the sum of share capital and free reserves and surplus. Reserves on account of revaluation of fixed assets shall be excluded.

VII. BSCDCL shall have the authority to make enquiries with the bidder's bankers and auditors.

VIII. The bidders shall indicate information regarding any litigation or arbitration resulting from contracts executed by the bidder in the last five years. The information shall include the name of the parties concerned, disputed amount, cause of litigation & matter in dispute.

INSTRUCTION TO BIDDER:

The invitation for bids is open to all Companies/ Firms, Government owned Enterprises except those Firms, who have been debarred for business with MPSEB and its six successor companies. Bids are invited from reputed parties only having adequate tools & plants, financial and technical resources and infrastructure to execute erection work of Sub-stations properly and expeditiously within specified time frame. Evidence shall consist of written details of capacities and present commitments (excluding work under this specification) of Bidder. Bidder shall furnish full details of his head-office and field service organization for erection and management services required to successfully execute work as envisaged in this tender specification and meeting following criteria;

1. Joint Ventures/Consortium is not allowed.
2. The bidder shall have in house design facility for substation and power distribution system design and preparing design drawings etc.
3. Equipment Capabilities:

   The Bidder(s) shall have minimum equipment in full working order, as listed below, and must demonstrate that based on known commitments, they will be available for timely use in the proposed contract. The bidder should, undertake their own studies and furnish with their bid, a detailed construction planning and methodology supported with assessment study of requirements of equipment/plants & machineries to allow the employer to review their proposal. The bidder will ensure his commitment to make the arrangements of the required equipment on the day of commencement or with respect to the progress of the work in phases, as per the instructions of site in charge on an undertaking on Rs. 100 stamp paper or of value as approved by Client to be submitted along with the Bid.

   The quantity mentioned is the minimum requirement; however, it is in the obligation of the Contractor to deploy/hire additional equipment and machinery as per requirement of work.

Sl. No	**Description of Equipment**	**Minimum Requirements**
1	Ammeter, Voltmeter, Multifunction meter	1 (each)
2	Megger (200 MΩ), (0-500V)	1
3	5 kV Megger	1
4	Mega Ohm meter (>200MΩ)	1
5	PI meter	1
6	Clamp on meter (AC & DC both) Digital	1
7	HV Generator set (12kV)	1

8	Breaker Analyzer (open/close/trip time & pole discrepancy measurement)	1
9	Variac (0-415V)	1
10	Micro ohm meter Phase angle meter/ Phase sequence meter	1
11	Digital timer & frequency meter	1
12	Battery (5V)	1
13	Ferrite marking machine	1
14	Cable termination & clamping machine hydraulic	1
15	Vibration meter (connection testing loose/tight	1
16	Mercury meter/ Water level meter (For surface plainness measurement)	1

4. Personnel Capability

Contractor must produce documentary evident having the following staff on their establishment at least six months prior to submission of bid and during the duration of contract and should submit undertaking stating that this staff or equivalent will be deployed on site after award of contract as per necessity and instruction of Engineer in Charge. Key personnel should have experience in similar type of work i.e in 33/0.433kV Substation works.

S. No.	Position	Nos.	Experience In Similar Works [years]
1	Project Manager –Multidisciplinary (Graduate Engineer)	1	15-20
2	Design Manager (Graduate Engineer)	1	15-20
3	Design Engineer (Electrical Graduate Engineer)	1	10-15
4	Electrical Engineer (Graduate Electrical Engineer)	2	10
5	Safety Engineer (Graduate Engineer)	1	10
6	Chemical Engineer (Graduate Chemical Engineer)	1	05
7	Mechanical Engineer (Graduate Mechanical Engineer)	1	10

5. Eligible Plant, Equipment and Services

It is desired that the successful bidder selects a manufacturer for supply of equipment from the list of preferred experienced manufacturers given in approved make list and clause in section 7 of the bid document.

DOCUMENTS COMRISING THE BID :

The Bidders should additionally submit the following details in their Bid along with documents mentioned in instruction to bidder and eligibility criteria for bidder but not limited to the same:

1. An Organization Chart of administration and execution of the contract showing the deployment of key personnel at Site with individual tasks
2. Copies of original documents defining the constitution or legal status, place of registration and principal place of business; written Power of Attorney authorizing the signatory of the bid to commit and bind the Bidder, details of arbitrations and litigations.
3. A letter of authority to seek references from the bidders' bankers and previous / existing Employer's.
4. Proposed general programme (Proposed Schedule and cash flow estimate in percentage form only) / method statements / Quality Plan / Site Management Plan in sufficient detail to demonstrate the adequacy of the bidder's proposals to meet the technical specifications and the completion time referred to in bid document.
5. All the document in support for meeting the Qualification Criteria
6. Signed copy of Pre-Bid Meeting held, if any.
7. Copies of all schedules, Technical Specifications and Deviations, if any, drawings, literature, brochures.
8. Proposed Safety plan and procedures that shall be followed during the execution of the Works
9. List of equipment / plant and machinery proposed to be deployed for executing the Contract in line with proposed general program/method statement . Availability (either owned or leased or by procurement) of key and critical equipment for the Works list of equipment to be enclosed with the bid.
10. Experience in handling Similar Projects to be supported by WO/PO Copies, Project Completion certificate , Project Status Report (duly certified by respective authority) and Performance Certificates from clients.

Even though the bidders meet the above qualifying criteria, they are liable to be disqualified if they have;

(a) Made misleading or false representations in the forms, statements and attachments submitted by them which comes to the knowledge of Employer; and/ or;

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

Evaluation Criteria:

The lowest evaluated rates including O&M for five years will be considered at the time of evaluation.

Annexure-I

MEMORANDUM

Sl. No.	Description	Cl. No. of NIT/ITT/Clauses of Contract (CC)	Values/Description to be Applicable for Relevant Clause (S)
1)	Name of Work		**Design, Construction, Testing, Commissioning of 33/0.433kV Substation works for Government buildings under Smart City Area Based Development including operation & maintenance of project for 5 years on Engineering, Procurement & Construction (EPC) Basis**
2)	Client/Owner		Bhopal Smart City Development Corporation Ltd.
3)	Type of Tender		Engineering, Procurement & Construction (EPC) Basis /Item rate
4)	Earnest Money Deposit		Rs.3,96,000/- (Three lakhs Ninety six Thousand rupees only)
5)	Estimated Cost		Rs. 3.96 Cr. (Three Crore Ninety Six Lakhs only)
6)	Time allowed for Completion of Work		(06 Months including raining season for construction) and (60 Months for O&M After commissioning of project)
7)	Mobilization Advance		**10%** of contract value
8)	Interest Rate of Mobilization Advance		Simple Interest Rate of 10 % Percent only) (Per Annum)
9)	Schedule of rates applicable		DSR E & M 2018, DSR 2016 for Civil items and NON SOR Items.
10)	Validity of Tender		180 days from the date of Submission of price bid

11)	Performance Guarantee		5.00 % (Five Percent Only) of contract value within 30 days from the issue of Letter of Intent	
12)	Security Deposit/Retention Money		5.00% (Five Percent Only) of the gross value of each running bill.	
13)	Time allowed for starting the work		The date of start of contract shall be reckoned from 10 days after the date of agreement.	
14)	Deviation limit beyond as per tender document except foundation.		Building work as per requirement.	Annual repair & maintenance of buildings as per requirement.
			Note: -The Deviation Limit of Building Work shall also apply for combined works (Building).	
15)	Deviation limit beyond as per tender document shall apply for Foundation		Building work as per requirement	Annual repair & maintenance of buildings as per requirement
			Note: -The Deviation Limit of Building Work shall also apply for combined works	
16)	Escalation		All rates as per Bill of Quantities (BOQ) quoted by contractor shall be firm and fixed for entire contract period as well as extended period for completion of the works. **No escalation shall be applicable on this contract.**	
17	Operation and Maintenance Period		**Five (5) years after successful commissioning of all Tendered works**	
17)	Defects Liability Period		**Five (5) years after successful commissioning of all works**	

The intending tenderer must read the terms and conditions of BSCDCL carefully. He should only submit his tender if he considers himself eligible and he is in possession of all the documents required.

Information and Instructions for Tenderers posted on Website(s) shall form part of tender Document.

The Tender Document as uploaded can be viewed and downloaded free of cost by anyone including intending tenderer. But the tender can only be submitted after uploading the mandatory scanned documents.

The Bidder shall submit the Technical BID & Financial Bid online through e-procurement portal www.mptenders.gov.in in comprising of the following documents along with supporting documents as appropriate:

Checklist for Online Submission: Envelope (A, B and C)

(a) Envelope-A will contain:

1. Proof of e-payment towards cost of tender document/ Acknowledgement towards cost of tender fee submission
2. Proof of online payment through e-portal www.mptenders.gov.in / or Bank Guarantee of any Nationalized or Commercial Scheduled Bank against EMD in favor CEO, BSCDCL shall be as per Notice Inviting e- tender.

(b) Envelope-B will contain:

1. Scanned copy of all approved/authenticated "Eligibility Criteria for Bidder" documents as per Para of this RFP.
2. Letter of Acceptance of tender condition unconditional as per format enclosed
3. Certificate of Financial Turnover duly certified by CA as indicated above.
4. GST registration number, EPF registration, PAN No.
5. All pages of the entire Corrigendum (if any) duly signed by the authorized person.
6. Affidavit as per "Appendix-O" of tender document.
7. Acceptance letter and Affidavit/Undertaking for Blacklisting/ Debar.
8. Should submit the list of tools plant and machinery.
9. Any other documents as asked in RFP document.

(c) Envelope-C will contain:

The Financial Bids shall be uploaded online only strictly in the prescribed format.

If any condition or conditional rebate is offered by the tenderer, their tender shall summarily be rejected.

The tenderers are required to quote strictly as per terms and conditions, specifications, standards given in the tender documents and not to stipulate any deviations.

After submission of the tender the tenderer can re-submit revised tender any number of times but before last time and date of submission of tender as notified.

When it is desired by BSCDCL to submit revised financial tender then it shall be mandatory to submit revised financial tender. If not submitted, then the tender submitted earlier shall become invalid. On opening date, the tenderer can login and see the tender opening process. Contractor can upload documents in the form of JPG format and PDF format.

If the contractor is found ineligible after opening of tenders, his tender shall become invalid and cost of tender document and processing fee shall not be refunded.

If any discrepancy is noticed between the documents as uploaded at the time of submission of tender and hard copies as submitted physically by the contractor the tender shall become invalid and cost of tender document and processing fee shall not be refunded.

Notwithstanding anything stated above, BSCDCL reserves the right to assess the capabilities and capacity of the tenderer to perform the contract, in the overall interest of BSCDCL. In case, tenderer's capabilities and capacities are not found satisfactory, BSCDCL reserves the right to reject the tender.

Examination of Technical Bids and Determination of Responsiveness:

1. **Prior to detailed evaluation of Technical Bids, the Employer will determine whether each Bid**
   (a) meets the eligibility criteria defined in Clause
   (b) has been properly signed by an authorized signatory (accredited representative) holding power of Attorney in his favour.
   (c) is accompanied by the required Bid security and;
   (d) is responsive to the requirements of the Bidding documents.

2. **A substantially responsive Technical Bid is one which conforms to all the terms, conditions and specification 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, the Employer's rights or the Bidder's obligations under the Contract; or
3. **If a Technical 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 non-conforming deviation or reservation.**

Instructions for financial bid submission-

In case of Percentage Rate Tender, Contractor must ensure to quote single percentage rate in attached financial bid format. Quote should be in percentage higher or below on the SOR Rates the same is to quoted in the form of decimal only. For example if contractor wants to quote 5 percent higher then he have to quote 1.05 and if he wants to quote 5 [percent below he have to quote 0.95 in given column of financial bid sheet.

In case of Item Rate Tender, price shall be entered against each item in the Bill of Quantities / Schedule of Quantities. The cost of item against which the contractor has failed to enter a rate or price shall be deemed to be covered by rates and prices of other items in Bill of Quantities / Schedule of Quantities and no payment shall be made for the quantities executed for items against which rate has not been quoted by the contractor.

In addition to this, while selecting any of the cells a warning appears that if any cell is left blank the same shall be treated as “0”. Therefore, if any cell is left blank and no rate is quoted by the tenderer, rate of such item shall be treated as “0” (ZERO).

i. Financial Bid format is uploaded in Excel Format in www.mptenders.gov.in . At the time of financial bidding, bidder is requested to download the file, and update the same.
ii. For SOR items bidder need to quote 1 plus percentage higher of below the quoted rate for example if bidder wants to quote 5% higher the SOR price then he has to quote1.05 and similarly if he wants to quote 5% below the SOR price then he has to quote0.95.
iii. For Non SOR items bidder can quote for individual item rates in respective financial bid sheet.
iv. Bidders are requested to check final figure in all the totals of all sheets. BSCDCL is not responsible for errors in the financial bid document.
v. Bidders are required to upload the updated financial bid in the prescribed excel format in the www.mptenders.gov.in at the time of final financial bid submission.

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SECTION-2

INSTRUCTIONS TO BIDDER

Instruction to Tenderer (ITT)

A. GENERAL INSTRUCTIONS:

2.1. General terms of Bidding-

2.1.1 No Bidder shall submit more than one BID for the Project.

2.1.2 The Feasibility Report / Preliminary Project Report of the Project has been assessed however the Bidders are expected to carry out their own surveys, investigations and other Preliminary examination of the Project before submitting their Bids. Nothing contained in the attached drawings/BOQ shall be binding on the BSCDCL nor confer any right on the Bidders, and the BSCDCL shall have no liability whatsoever in relation to or arising out of any or all contents of TENDER.

2.1.3 Notwithstanding anything to the contrary contained in this RFP, the Preliminary terms specified in the draft Agreement shall have overriding effect; provided, however, that any conditions or obligations imposed on the Bidder hereunder shall continue to have effect in addition to its obligations under the Agreement.

2.1.4 The BID shall be furnished in the financial bid format attached separately in the Excel format

1. BID to be quote 1 plus % above or below (for Example. If want to quote 5% above then write 1.05 and if want to quote 5% below then write 0.95) for the SOR sheets.
2. BID shall be quoted item wise in the given excel sheet for the NON SOR items.

2.1.5 The Bidder shall deposit a BID Security (EMD) of (Rs. 10,05,000/- (Ten lakhs Five Thousand rupees only) in accordance with the provisions of this RFP. The Bidder has to provide the BID Security (EMD) through online payment or in the form of a Bank Guarantee acceptable to the BSCDCL, as per format.

Company Name: Bhopal Smart City Development Corporation Ltd.
Bank Name: Allahabad Bank.

Branch Address: Arera Colony, Bhopal

A/C no. : 50327343809

IFSC Code: ALLA0210197

PAN No. : AAGCB6537N

TIN No. : 23889236926

Service Tax No. : AAGCB6537NSD001

GST no: 23AAGCB6537N1ZE.

2.1.6 The validity period of the Bank Guarantee, shall not be less than 180 (one hundred and eighty) days from the BID Due Date, inclusive of a claim period of 60 (Sixty)

days, and may be extended as may be mutually agreed between the BSCDCL and the Bidder.

2.1.7 The BID shall be summarily rejected if it is not accompanied by the BID Security. The BID Security shall be refundable no later than 150 (one hundred and fifty) days from the BID Due Date except in the case of the Selected Bidder whose BID Security shall be retained till it has provided a Performance Security under the Agreement.

2.1.8 The Bidder should submit a Power of Attorney as per the format, authorizing the signatory of the BID to commit the Bidder.

2.1.9 Any condition or qualification or any other stipulation contained in the BID shall render the BID liable to rejection as a non-responsive BID.

2.1.10 The BID and all communications in relation to or concerning the Bidding Documents and the BID shall be in English language.

2.1.11 The documents including this RFP and all attached documents, provided by the BSCDCL are and shall remain or become the property of the BSCDCL and are Transmitted to the Bidders solely for the purpose of preparation and the submission of a BID in accordance herewith. Bidders are to treat all information as strictly confidential and shall not use it for any purpose other than for preparation and submission of their BID.

2.1.12 The provisions of this Clause shall also apply mutatis mutandis to BIDs and all other documents submitted by the Bidders, and the BSCDCL will not return to the Bidders any BID, document or any information provided along therewith.

2.1.13 This RFP is not transferable.

2.1.14 Any award of Project pursuant to this RFP shall be subject to the terms of Bidding Documents and also fulfilling the criterion as mentioned in tender document.

2.1.15 While bidding is open to persons from any country, the following provisions shall apply then the Eligibility of such Bidder shall be subject to approval of the BSCDCL from national security and public interest perspective. The decision of the BSCDCL in this behalf shall be final and conclusive and binding on the Bidder. The holding or acquisition of equity or control, as above, shall include direct or indirect holding/ acquisition, including by transfer, of the direct or indirect legal or beneficial ownership or control, by persons acting for themselves or in concert and in determining such holding or acquisition, the BSCDCL shall be guided by the principles, precedents and definitions contained in the Securities and Exchange Board of India (Substantial Acquisition of Shares and Takeovers) Regulations,1997, or any substitute thereof, as inforce on the date of such acquisition. The Bidder shall promptly inform the BSCDCL of any change in the shareholding, as above, and failure to do so shall render the Bidder liable for disqualification from the Bidding Process.

2.1.17 Notwithstanding anything to the contrary contained herein, in the event that the Bid Due Date falls within three months of the closing of the latest financial year of a Bidder, it shall ignore such financial year for the purposes of its Bid and furnish all its information and certification with reference to the 5 (five) years or 1 (one) year, as the case may be, preceding its latest financial year. For the avoidance of doubt, financial year shall, for the Purposes of a Bid hereunder, mean the accounting year

followed by the Bidder in the course of its normal business. Latest Financial Year will be (2018-2019)

2.1.18 Any entity which has been barred by GOI or Govt. of Madhya Pradesh for the works of expressways, National highways, and the bar subsists as on the Bid Due Date, would not be eligible to submit the BID, bidder need to submit Affidavit regarding the same.

2.1.19 The BSCDCL reserves the right to reject an otherwise eligible bidder on the basis of the information provided in tender document. The decision of the BSCDCL in this case shall be final.

2.2 Eligibility and qualification requirements of Bidder

2.2.1 For determining the eligibility of Bidder the following shall apply:

(a) An Bidder shall not have a conflict of interest (the "Conflict of Interest") that affects the Bidding Process. Any Bidder found to have a Conflict of Interest shall be disqualified and liable for forfeiture of the BID Security or Performance Security as the case may be. A Bidder shall be deemed to have a Conflict of Interest affecting the Bidding Process, if:

(b) A Bidder shall be liable for disqualification and forfeiture of BID Security, if any legal, financial or technical adviser of the BSCDCL in relation to the Project is engaged by the Bidder, its Member or any Associate thereof, as the case may be, in any manner formatters related to or incidental to such Project during the Bidding Process or subsequent to the (i) issue of the LOA or (ii) execution of the Agreement. In the even though such adviser is engaged by the selected Bidder or Contractor, as the case may be, after issue of the LOA or execution of the Agreement for matters related or incident alto the project, then notwithstanding anything to the contrary contained herein or in the LOA or the Agreement and without Prejudice to any other right or remedy or the BSCDCL, including the forfeiture and appropriation of the BID Security or Performance Security, as the case may be, which the BSCDCL may have there under or otherwise, the LOA or the Agreement, as the case may be, shall be liable to be terminated without the BSCDCL being liable in any manner whatsoever to the Selected Bidder or Contractor for the same. For the avoidance or doubt, this disqualification shall not apply where such adviser was engaged by the Bidder, its Member or Associate in the past but its assignment expired or was terminated 6 (six) months prior to the date of issue of this RFP. Nor will this disqualification apply where such adviser is engaged after a period of 3 (three) years from the date of commercial operation of the Project.

Other Instructions-

On line percentage rate tenders on behalf of Owner/Client are invited for the work. The pre-qualification / enlistment of the contractors should be valid on the last date of submission of tenders. In case the last date of submission of tender is extended, the pre-qualification of contractor should be valid on the original date of submission of tenders.

The work is estimated to _____ however, is given merely as a rough guide.
The tender document as uploaded can be seen on website www.mptenders.gov.in and can be downloaded free of cost.
Mode of Submission: **Earnest Money Deposit** Earnest Money Deposit of amount as mentioned in "NIT/ Memorandum (Annexure-I)" required to be submitted along with the tender shall be payable online through E-tendering portal www.mptenders.gov.in through NEFT/RTGS. The EMD shall be valid for minimum period of 180 (One Hundred Eighty) days from last day of submission of Tender.
The EMD of all unsuccessful tenderers will be returned within thirty (30) days of the Award of the contract to successful tenderer through online portal.
Financial Bidding can be done through the excel sheet uploaded on www.mptenders.gov.in , which contains four sheets: 1. SOR 2. NON SOR *BID to be quote 1 plus % above or below (for Example. If want to quote 5% above then write 1.05 and if want to quote 5% below then write 0.95) for SOR items. *Rates for NON SOR item can be filled in the NON SOR sheet *Rates can be quoted in the yellow highlighted cell of the financial bid * Bidder should fill there company/organization name in the space provided (yellow section)
Interested Bidder who wish to participate in the tender has also to make following payments through online payment e-proc portal only. Cost of Tender Document –Rs. 20,000/- To be submit online only/- e-Tender Processing Fee – As applicable for MPEPROC portal, Cost of Tender Document and, e-Tender Processing Fee online payment shall be payee online Copy of pre-qualification/enlistment letter and certificate of work experience (if required) and other documents as specified in the tender shall be scanned and uploaded to the e-Tendering website within the period of tender submission.

Online technical tender documents submitted by intending tenderers shall be opened only of those tenderers, whose Earnest Money Deposit, Cost of Tender Document and e-Tender Processing Fee and other.
The tender submitted shall become invalid if: the tenderer is found ineligible. The tenderer does not upload all the documents (including GST registration) as stipulated in the tender document. If any discrepancy is noticed between the documents as uploaded at the time of submission of tender and hard copies as submitted physically in the office of tender opening authority.
VALIDITY OF TENDER The tender for the works shall remain open for acceptance for a period of One Eighty (180) days from the date of bid submission date. If any tenderer withdraws his tender before the said period or issue of letter of acceptance, whichever is earlier, or makes any modifications in the terms and conditions of the tender which are not acceptable to the BSCDCL, then the BSCDCL shall, without prejudice to any other right or remedy, be at liberty to forfeit the said earnest money as aforesaid. Further the tenderers shall not be allowed to participate in the retendering process of work.
ACCEPTANCE OF TENDER BSCDCL reserves the right to reject any or all the tenders in part or full without assigning any reason whatsoever. BSCDCL does not bind itself to accept the lowest tender.
The tenders shall be strictly as per the conditions of contract. Tenders with any additional condition(s)/modifications shall be rejected.
The witnesses to the Tender/Contract Agreement shall be other than the tenderer/ tenderers competing for this work and must indicate full name, address, and status/occupation with dated signatures.
The acceptance of tender will rest with the BSCDCL who does not bind itself to accept the lowest tender and reserves to itself the right to reject any or all the tenders received without assigning any reason thereof. Tenders in which, any of the prescribed conditions are not fulfilled or found incomplete in any respect are liable to be rejected.
On acceptance of tender, the name of the accredited representative(s) of the contractor who would be responsible for taking instructions from Engineer-in-Charge or its authorized representative shall be intimated by the contractor within 07 days of issue date of Letter of Intents by BSCDCL.

The tenderer shall not be permitted to tender for works if his near relative is posted in the project office or concerned Office of the BSCDCL. The contractor shall also intimate the names of persons who are working with him in any capacity or are subsequently employed by him and who are near relatives to any of the officers in BSCDCL. Any breach of this condition by the tenderer would render him liable to the withdrawal of the work awarded to him and forfeiture of Earnest Money and Security Deposit. This may also debar the contractor from tendering for future works under BSCDCL.

For the purpose of operation of this clause a near relative shall mean wife, husband, parents, grandparents, children, grandchildren, brothers, sisters, uncles, aunts, cousins and their corresponding in-laws.

The time of completion of the entire work, as contained in contract shall be as mentioned in “Memorandum - Annexure-I”, which shall be reckoned from the 10th day after issue of the Letter of Intent by the BSCDCL.

Canvassing whether directly or indirectly, in connection with tenderers is strictly prohibited and the tenders submitted by the contractors who resort to canvassing will be liable for rejection.

The tender award, execution and completion of work shall be governed by tender documents consisting of (but not limited to) Letter of Intent/Letter of work order, Bill of Quantities, Special Conditions of Contract, General Conditions of Contract, Specifications, Drawings. The tenderers shall be deemed to have gone through the various conditions including sub-soil water conditions, topography of the land, drainage and accessibility etc. or any other condition which in the opinion of contractor will affect his price/rates before quoting their rates. No claim whatsoever against the foregoing shall be entertained.

The drawings with the tender documents are Tender Drawing and are indicative only.

ADDENDA/CORRIGENDA

Addenda/Corrigenda to the tender documents may be issued prior to the date of submission of the tender to clarify or effect modification in specification and/or contract terms included in various tender documents. The tenderer shall suitably take into consideration such Addenda/Corrigenda while submitting his tender. The tenderer shall return such Addenda/ Corrigenda duly signed and stamped as confirmation of its receipt & acceptance and submit along with the tender document. All addenda/ Corrigenda shall be signed and stamped on each page by the tenderer and shall become part of the tender and contract documents.

SITE VISIT AND COLLECTING LOCAL INFORMATION

Before tendering, the tenderers are advised to visit the site, its surroundings to assess and satisfy themselves about the local conditions such as the working and other constraints at site, approach roads to the site, availability of water & power supply, application of taxes, duties and levies as applicable & any other relevant information required by them to execute complete scope of work. The tenderer may obtain all necessary information as to risks, weather conditions, contingencies & other circumstances (insurgencies etc.) which

may influence or affect their tender prices. Tenderer shall be deemed to have considered site conditions whether he has inspected it or not and to have satisfied himself in all respect before quoting his rates and no claim or extra charges whatsoever in this regard shall be entertained / payable by the BSCDCL at a later date.

ACCESS BY ROAD

Contractor, if necessary, shall build temporary access roads to the actual site of construction for the works at his own cost to make the site accessible. The Contractor shall maintain the same in motorable condition at all the times as directed by Engineer-in-Charge at his own cost. The contractor shall be required to permit the use of any roads so constructed by him for vehicles of BSCDCL or any other agencies/ contractors who may be engaged on the project site, free of cost.
Non-availability of access roads or approach to site, for the use of the contractor shall in no case condone any delay in the execution of work nor be the cause for any claim for compensation.

HANDING OVER & CLEARING OF SITE

The Contractor should note that area for construction may be made available in phases as per availability and in conjunction with pace of actual progress of work at site. The work may be required to be carried out in constrained situations. The work is to be carried out in such a way that the traffic, people movement, if any, is kept operative and nothing extra shall be payable to the contractor due to this phasing / sequencing of the work. The contractor is required to arrange the resources to complete the entire project within total stipulated time. Traffic diversion, if required, is to be done and maintained as per requirement of local traffic police or/and as per specification, by the contractor at his own cost and the contractor shall not be entitled for any extra payment, whatsoever, in this regard.

The efforts will be made by the BSCDCL to handover the site to the Contractor free of encumbrances. However, in case of any delay in handing over of the site to the Contractor, the BSCDCL shall only consider suitable extension of time for the execution of the work. It should be clearly understood that the BSCDCL shall not consider any revision in contract price or any other compensation whatsoever viz. towards idleness of contractor's labour, equipment etc. Old structures on the proposed site, if required, shall be demolished by the contractor properly at his own cost unless and otherwise mentioned elsewhere in the tender document. The useful material obtained from demolition of structures & services shall be the property of the owner/BSCDCL and these materials shall be stacked in workmanship like at the place specified by the Engineer-in-charge.
Necessary arrangement including its maintenance is to be made by the contractor for temporary diversion of flow of existing drain and road, as the case may be. The existing drain, road would be demolished, wherever required, with the progress of work under the scope of proposed project. The existing Road and Drain which are not in the alignment of the said project but are affected and/ or need to demolished during execution for smooth progress of the project, shall be rehabilitated to its original status and condition (including black topping) by the contractor at his own cost. The cost to be incurred by contractor in

this regards shall be deemed to be included in the quoted rates of the bill of quantity items and contractor shall not be entitled for any extra payment whatsoever in this regard.

The information about the public utilities (whether over ground or underground) like electrical/ telephone/ water supply lines, OFC Cables, open drain etc. is the responsibility of contractor to ascertain the utilities that are to be affected by the works through the site investigation.

The contractor shall be responsible to obtain necessary approval from the respective authorities for shifting/ re-alignment of existing public utilities. BSCDCL shall only assist the contractor for visioning in obtaining the approval from the concerned authorities.

Any services affected by the works must be temporarily supported by the contractor who must also take all measures reasonably required by the various bodies to protect their services and property during the progress of works. It shall be deemed to be the part of the contract and no extra payment shall be made to the contractor for the same.

SCOPE OF WORK

The scope of work covered in this tender shall be as per the Bill of Quantities, specifications, drawings, instructions, orders issued to the contractor from time to time during the pendency of work. The drawings for this work, which may be referred for tendering, provide general idea only about the work to be performed under the scope of this contract. The Work Shall be executed on Engineering, Procurement & Construction (EPC) Basis. Details and drawings given in Tender document is for information purpose only and successful bidder shall undertake confirmatory survey for accuracy and completeness of data. It is in scope of successful Bidder to undertake all Site surveys, Geotechnical investigations, obtaining all required approvals from the relevant authorities, Carry out Shop Drawings, Further detailing of Architectural, Structural works, MEP works …etc as per Employers requirement and submit the same to client for review and approval, Prepare Good for Construction Drawings, submit maintenance manual to client for approval before start of Maintenance period. The successful bidder shall have to prepare and submit 'As Built Drawings' depicting the exact construction carried out on site, in soft and hard copy format.

Statutory and other charges for getting various required approvals shall be in scope of Successful bidder

The quantities of various items as entered in the "BILL OF QUANTITIES" are indicative only and may vary depending upon the actual requirement. The contractor shall be bound to carry out and complete the stipulated work irrespective of the variation in individual items specified in the bill of quantities. The variation of quantities will be governed as per conditions of contract. Also refer section 7 for detailed Scope of work.

APPROVAL OF TEMPORARY / ENABLING WORKS

The setting and nature of all offices, huts, access road to the work areas and all other temporary works as may be required for the proper execution of the works shall be subject to the approval of the Engineer- in-charge. All the equipment's, labour, material including cement, reinforcement and the structural steel required for the enabling/ temporary works associated with the entire Contract-shall have to be arranged by the Contractor only. Nothing extra shall be paid to the Contractor on this account.

CLARIFICATION AFTER TENDER SUBMISSION

Tenderer's attention is drawn to the fact that during the period, the tenders are under consideration, the tenderers are advised to refrain from contacting by any means, the BSCDCL and/or his employees/ representatives on matters related to the tender under consideration and that if necessary, BSCDCL will obtain clarifications in writing or as may be necessary. The tender evaluation and process of award of works is done by duly authorized Tender Scrutiny Committee and this committee is authorized to discuss and get clarification from the tenderers.

ORDER OF PRECEDENCE OF DOCUMENTS

In case of difference, contradiction, discrepancy, with regard to conditions of contract, Specifications, Drawings, Bill of quantities etc. forming part of the contract, the following shall prevail in order of precedence.

Letter of Intent, along with statement of agreed variations and its enclosures, if any.

Description of Bill of Quantity / Schedule of Quantities.

Special Condition of Contract.

Technical specifications (General, Additional and Technical Specification) as given in Tender documents.

General Conditions of Contract.

Drawings

CPWD/ UADD specifications (as specified in Technical Specification of the Tender) update with correction slips issued up to last date of receipt of tenders.

Relevant B.I.S. Codes

Financial Bid

Online tender filled in either percentage plus or minus Bid to be quoted 1 plus % above or below (for example: If want to quote 5% above the write 1.05 and if want to quote 5% below then write 0.95) in the given uploaded Excel Sheet format

For NON SOR item sheet individual rates has to be quoted for each item in the given uploaded excel sheet

(If entered '0' it will be treated as 'at par'. By default, the value is zero only).

Note: In case of rebate/premium of 15% and above as quoted by the Bidder, the rate analysis of major items shall be submitted by L1 and L2 bidder after demand notification by e-mail to bidders by concerned EIC.

BID SECURITY OR EMD

The Bidder shall furnish, as part of the Bid, Bid Security/EMD, in the amount specified in the Bid Data Sheet. This bid security shall be in favour of the authority mentioned in the Bid Data Sheet and shall be valid till the validityy of the bid.

Any bid not accompanied by an acceptable Bid Security and not secured as indicated in sub- clause mentioned above, shall be rejected by the Employer as non-responsive.

The Bid Security of the successful Bidder will be discharged when the Bidder has signed the

Agreement and furnished the required Security Deposits.

The Bid Security may be forfeited:

a) if the Bidder withdraws the Bid after bid opening (opening of technical qualification part of the 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 Security Deposits.

No rejections and forfeiture shall be done in case of curable defects, For non-curable defects the 10% of EMD shall be forfeited and bid will be liable for rejection.

Failure of the bidder to submit the documents will lead to rejection of Bid.

ACCEPTANCE OF TENDER CONDITIONS

From: (On the letter head of the company by the authorized officer having power of attorney)

BSCDCL Limited,

_____

_____

Sub: Name of the work & NIT No.:

Sir,

This has reference to above referred tender. I/We are pleased to submit our tender for the above work and I/We hereby unconditionally accept the tender conditions and tender documents in its entirety for the above work. I/we are eligible to submit the tender for the subject tender and I/We are in possession of all the documents required. I/We have viewed and read the terms and conditions of this GCC/SCC carefully. I/We have downloaded the following documents forming part of the tender document:

a) Notice Inviting e-Tender. (pg- to pg-)
b) Quoting Sheet for Tenderer (pg- to pg-)

c) Instructions to Tenderers & General Conditions of Contract (Vol- I/2013) :(pg- to pg)

d) Technical Specifications (Vol-II) (pg- to pg-)

e) Bill of Quantities (Vol-III) (pg- to pg-)

f) Tender Drawing (pg- to pg-)

Acceptance of Tender Conditions (Annexure II)

g) Corrigendum, if any (pg- to pg-)

I/we have uploaded the mandatory scanned documents such as cost of tender document, EMD, e-Tender Processing Fee and other documents as per Notice Inviting e-tender AND I/We agree to pay the cost of tender document, EMD, e-Tender Processing Fee (only receipt/proof of online payment) and other documents in the form and manner as described in NIT/ITT .Should this tender be accepted, I/We agree to abide by and fulfill all terms and conditions referred to above and as contained in tender documents elsewhere and in default thereof, to forfeit and pay BSCDCL, or its successors or its authorized nominees such sums of money as are stipulated in the notice inviting tenders and tender documents. If I/we fail to commence the work within 10 days of the date of issue of Letter of

Intent and/or I/we fail to sign the agreement as per Clauses of Contract and/or I/we fail to submit performance guarantee as per Clauses of Contract, I/we agree that BSCDCL shall, without prejudice to any other right or remedy, be at liberty to cancel the Letter of Intent and to forfeit the said earnest money as specified above.

Dated:_____ Yours faithfully,

(Signature of the tenderer with rubber stamp)

SECTION-3

GENERAL CONDITIONS OF CONTRACT (GCC)

CLAUSES OF CONTRACT (CC)

DEFINITIONS

The Contract means the documents forming the tender and acceptance thereof and the formal agreement executed between the competent authority on behalf of BSCDCL and the contractor, together with the documents referred to therein including these conditions, the specifications, Designs, drawings and instructions issued from time to time by the Engineer-in-Charge and all these documents taken together, shall be deemed to form one contract and shall be complementary to one another. Bhopal Smart City Development Corporation Limited, hereinafter called 'BSCDCL' proposes to get the works executed as mentioned in the Contract on behalf of Owner/ Client as Implementing agency/Executing Agency.

3.1 In the contract, the following expressions shall, unless the context otherwise

requires, have the meanings, hereby respectively assigned to them: -

APPROVAL means approved in writing including subsequent written confirmation of previous verbal approval.

BILL OF QUANTITIES or SCHEDULE OF QUANTITIES means the priced and completed Bill of Quantities or Schedule of Quantities forming part of the tender.

CONTRACTOR shall mean the individual, firm**,** LLP or company, whether in corporate or not, undertaking the works and shall include the legal personal representative of such individual or the persons composing such firm or LLP or company, or the successors of such firm or company and the permitted assignees of such individual, firm or company.

CONTRACT VALUE means the sum for which the tender is accepted as per the Letter of Intent.

DRAWINGS mean the drawings referred to in the contract document including modifications if any and such other drawings as may from time to time be furnished and/ or approved by BSCDCL.

DATE OF COMMENCEMENT OF WORK: The date of start of contract shall be reckoned from 10 days after the date of issue of Letter of Intent.

ENGINEER-IN-CHARGE means the Engineer of BSCDCL who shall supervise and be in-charge of the work.

LANGUAGE: All documents and correspondence in respect of this contract shall be in English Language.

"LETTER OF INTENT" shall mean BSCDCL's letter or notification conveying its

acceptance of the tender subject to such conditions as may have been stated There in.

MONTH means English Calendar month 'Day' means a Calendar day of 24 Hr **BSCDCL** shall means Bhopal Smart City Development Corporation Limited, a company registered under the Indian Company Act, with its registered office at Near Tatpar Petrol Pump, Sector A, Berkheda, Bhopal, Madhya Pradesh 462023 or its Administrative officers or its engineer or other employees authorized to deal with any matter with which these persons are concerned on its behalf.

OWNER/ CLIENT means the Government, Organization, Ministry, Department, Society, Cooperative, etc. who has awarded the work/ project to BSCDCL and/ or appointed BSCDCL as Implementing / Executing Agency/ Project Manager and/ or for whom BSCDCL is acting as an agent and on whose behalf BSCDCL is entering into the contract and getting the work executed.

SCHEDULE(s) referred to in these conditions shall mean the standard schedule of rates of the government mentioned in the Memorandum (Annexure-I) with the amendments thereto issued up to the date of receipt of the tender.

SITE means the lands and other places on, under, in or through Which the works are to be executed or carried out and any other lands or places provided by BSCDCL/client/owner or used for the purpose of the contract.

TENDER means the Contractor's priced offer to BSCDCL for the execution and completion of the work and the remedying of any defects therein in accordance with the provisions of the Contract, as accepted by the Letter of Intent or Award letter. The word TENDER is synonymous with Tender and the Word TENDER DOCUMENTS with "Tendering Documents" or "offer documents".

WRITING means any manuscript typed written or printed statement under or over signature and/or seal as the case may be.

Works or Work shall unless there be something either in the subject or context repugnant to such construction, be construed and taken to mean the works by or by virtue of the contract contracted to be executed whether temporary or permanent, and whether original, altered, substituted or additional.

The headings in the clauses/ conditions of tender documents are for convenience only and shall not be used for interpretation of the clause/ condition.

Words imparting the singular meaning only also include the plurals and vice versa where the context requires. Words importing persons or parties shall include firms and corporations and organizations having legal capacities.

Excepted Risk are risks due to riots (other than those on account of contractor's employees), war (whether declared or not) invasion, act of foreign enemies, hostilities, civil war, rebellion revolution, insurrection, military or usurped power, any acts of Government, damages from aircraft, acts of God, such as earthquake, lightening and unprecedented floods, and other causes over which the contractor has no control and accepted as such by the BSCDCL or causes solely due to use or occupation by Government of the part of the works in

respect of which a certificate of completion has been issued or a cause solely due to BSCDCL's faulty design of works.

Market Rate shall be the rate as decided by the Engineer-in-Charge on the basis of the prevailing cost of materials and labour at the site where the work is to be executed plus the percentage mentioned elsewhere in the tender document to cover, all overheads and profits.

PERFORMANCE GUARANTEE:

"Within 30 (Thirty) days from the date of issue of Letter of Intent or within such extended time as may be granted by BSCDCL in writing, the contractor shall submit to BSCDCL an irrevocable performance bank guarantee in the form appended, from any Nationalized Bank or all Commercial schedule bank equivalent to 5% (five per cent only) of the contract value for the due and proper execution of the Contract. The Performance Guarantee shall be initially valid up to the stipulated date of completion plus 60 days beyond that. In case the time for completion of works gets extended, the contractor shall get the validity of Performance Guarantee extended to cover such extended time for completion of work.

BSCDCL reserve the right of forfeiture of the performance guarantee in the event of the contractor's failure to fulfill any of the contractual obligations or in the event of termination of contract as per terms and conditions of contract.

Performance guarantee shall be returned after successful completion / testing / commissioning and handing over the project to the client up to the entire satisfaction of BSCDCL / Client.

In case the contractor fails to submit the performance guarantee of the requisite amount within the stipulated period or extended period, Letter of Intent automatically will stand withdrawn and EMD of the contractor shall be forfeited.

SECURITY DEPOSIT/ RETENTION MONEY

The Security deposit or the retention money shall be deducted from each running bill of the contractor @ 5% (five per cent only) of the gross value of the Running Account bill. Earnest money shall be adjusted first in the security deposit and further recovery of security deposit shall commence only when the upto date amount of security deposit exceeds the earnest money deductible under this clause. No Interest shall be paid on amount so deducted.
Security deposit will be released after completion of defect liability period.
In lieu of security deposit /retention money BG can be submitted which shall be released after completion of defect liability period.

The release/refund of security deposit of the contractor shall be subject to the observance/compliance of the conditions as under and whichever is later:

a) Expiry of the defect liability period in conformity with provisions contained in clause (Defect liability clause). The expiry of defect liability period shall be extended from time to time depending upon extension of time granted by BSCDCL.

The contractor produces a clearance certificate from the labour office. As soon as the work is virtually completed, the contractor shall apply for the labour clearance certificate to the Labour Officer under intimation to the Engineer-in-Charge. The Engineer-in-Charge, on receipt of the said communication, shall write to the Labour Officer to intimate if any complaint is pending against the contractor in respect of the work. If no complaint is pending, on record till after 3 months after completion of the work and/or no communication is received from the Labour Officer to this effect till six months after the date of completion, it will be deemed to have received the clearance certificate.

3.2 BSCDCL reserves the right of part or full forfeiture of security deposit in addition to other claims in the event of contractor's failure to fulfill any of the contractual obligations or in the event of termination of contract as per terms and conditions of contract.

MOBILIZATION ADVANCE

Mobilization advance up to maximum of amount as mentioned in the

"Memorandum (Annexure-I)" shall be paid to the contractor, if requested by him, on submission of irrevocable Bank Guarantee valid for contract period of an amount 1.2 times of the mobilization advance to take care of advance and interest at prescribed rate from a nationalized bank or all Commercial scheduled bank in the enclosed Performa. The Mobilization advance shall be interest bearing @ as mentioned in the "Memorandum (Annexure-I)".

This advance shall be paid in three installments as follows:

First Installment of fifty percent of total mobilization advance shall be paid after the agreement is signed and upon submission of performance guarantee for full amount as specified.

2nd installment of twenty five percent of total mobilization advance will be paid after the setting up of site office and site laboratory, complete mobilization of plant and machinery, scaffolding & shuttering materials etc.

The Balance twenty five percent of total mobilization advance shall be paid on completion of 10% of work in terms of cost and after the contractor has fully mobilized the work at site.

The mobilization advance bear simple interest at the rate as mentioned in the Memorandum (Annexure-I) and shall be calculated from the date of payment to the date of recovery (365 days in a year) both days inclusive, on the outstanding amount of advance. Recovery of such mobilization advanced including interest shall be made by the deduction from the contractor's bills commencing after first ten percent of the gross value of the work is executed and paid, on pro-rata percentage basis to the gross value of the work billed beyond 10% in such a way that the entire advance is recovered either by the time eighty percent of the gross value of the contract is executed and paid, together with interest due on the entire outstanding amount up to the date of recovery of the installment or on expiry of eighty percent of contract period (i.e. time allowed for completion of work in terms of Memorandum-Annexure-I) whichever is earlier.

The bank guarantee submitted by contractor against mobilization advance shall initially be made for the full amount as mentioned in para 4.1 above

and valid for the contract period and be kept renewed from time to time to cover the balance amount and likely period of completion of recovery together with interest. However, the contractor can submit part bank guarantees against the mobilization advance in as many numbers as per proposed number of recovery instalments equivalent to the amount of each instalment.

Notwithstanding what is contained above, no mobilization advance whatsoever shall be payable, if payment of mobilization advance is not mentioned in the Memorandum (Annexure-I).

SECURED ADVANCE AGAINST NON-PERISHABLE MATERIALS

Interest free secured advance up-to a maximum of 75 % (seventy five percent) of the Market Value of the Materials or the 75 % (seventy five percent) cost of materials as derived from the tendered item rate of the contractor, whichever is less, required for incorporation in the permanent works and brought to site and duly certified by BSCDCL site Engineer shall be paid to the Contractor for all non-perishable items as per UADD/MPPWD/CPWD norms. The advance will be paid only on submission of Indemnity Bond in the prescribed pro-forma. The advance shall be recovered in full from next Running Account bill and fresh advance shall be paid for the balance quantities of materials. The contractor shall construct suitable go-down at the site of work for safe storage of the materials against any possible damages due to sun, rain, dampness, fire, theft etc. at his own cost. He shall also employ necessary watch & ward establishment for the purpose at his costs and risks.

Such secured advance shall also be payable on other items of perishable nature, fragile and combustible with the approval of the Engineer-in-Charge provided the contractor provides a comprehensive insurance cover for the full cost of such materials. The decision of the Engineer-in-Charge shall be final and binding on the contractor in this matter. No secured advance shall however, be paid on high risk materials such as ordinary glass, sand, petrol, diesel etc.

DEVIATIONS / VARIATIONS EXTENT AND PRICING

The Engineer-in-Charge shall have power (i) to make any alterations in, omissions from, additions to or substitutions for, the original specifications, drawings, designs and instructions that may appear to him to be necessary during the progress of the work, (ii) to omit part of the works in case of non-availability of a portion of the site or for any other reasons and the contractor shall be bound to carry out the works in accordance with any instructions given to him in writing signed by the Engineer-in-Charge and such alterations, omissions, additions, or substitutions shall form part of the contract as if originally provided therein and any altered, additions or substituted works which the contractor may be directed to do in the manner specified above as part of the work, shall be carried out by the contractor on the same conditions in all respects including price on which he agreed to do the main work except as hereunder provided:

The time for the completion of the work shall, in the event of any deviations resulting in additional cost over the tendered value sum being ordered be extended, if requested by the contractor, as follows:

in the proportion which the additional cost of the altered, additional or substituted work bears to the original tendered value plus 25% of the time calculated in (i) above or such further additional time as may be considered reasonable by the Engineer-in-Charge.

If the extra items includes any work for which no rate is specified in the contract, then such work shall be carried out at the rates entered in the schedule of rates (as mentioned in Memorandum (Annexure-I)) for Civil Works minus/plus the percentage which the tendered amount of scheduled items bears with the estimated amount of schedule items based on the Schedule of Rates (as mentioned in Memorandum (Annexure-I) for Civil/ Sanitary Works). The scheduled item means the items appearing in the Schedule of Rates (as mentioned in Memorandum (Annexure-I)for Civil/ Sanitary Works) which shall be applicable in this clause. This clause will apply mutates mutandis to electrical work except that Electrical Schedule of Rates as mentioned in Memorandum (Annexure-I) will be considered in place of Civil works Schedule of rates as mentioned in Memorandum (Annexure-I)

However, In the case of extra item(s), (items that are completely new, and are in addition to the items contained in the contract, and not included in the schedule of rates (as mentioned in Memorandum (Annexure-I)), the contractor may within fifteen days of receipt of order or occurrence of the item(s) claim rates, supported by proper analysis, for the work and the engineer-in-charge shall within one month of the receipt of the claims supported by analysis, after giving consideration to the analysis of the rates submitted by the contractor, determine the rates on the basis of the market rates and the contractor shall be paid in accordance with the rates so determined.

In the case of substituted items (items that are taken up with partial substitution or in lieu of items of work in the contract), the rate for the agreement item (to be substituted) and substituted item shall also be determined in the manner as mentioned in the following para:

If the market rate for the substituted item so determined is more than the market rate of agreement item (to be substituted), the rate payable to the contractor for the substituted item shall be the rate for the agreement item (to be substituted) so increased to the extent of the difference between the market rates of substituted item and the agreement item (to be substituted).

If the market rate for the substituted item so determined is less than the market rate of the agreement (to be substituted), the rate payable to the contractor for the substituted item shall be the rate for the agreement item (to be substituted) so decreased to the extent of the difference between the market rates of substituted item and the agreement item (to be substituted)

In the case of contract item(s), substituted item(s), contract cum substituted items, which exceed the limits laid down in Memorandum (Annexure-I), the contractor shall within fifteen days of receipt of order of occurrence of the excess, claim revision of the rates, supported by proper analysis for the work in excess of the above mentioned limits, provided that if the rates so claimed are in excess of the rates specified in the scheduled of quantities, the Engineer-in-Charge shall within one month of receipt of the claims supported by analysis, after giving consideration to the analysis of the rates submitted by the Contractor, determine

the rates on the basis of the market rates and the contractor shall be paid in accordance with the rates so determined.

The provisions of the preceding paragraph shall also apply to the decrease in the rates of items for the work in excess of the limits laid down in Memorandum (Annexure-I), and the Engineer-in-charge shall after giving notice of the contractor within one month of occurrence of the excess and after taking into consideration any reply received from him within fifteen days of the receipt of the notice revise the rates for the work in question within one month of the expiry of the said period of fifteen days having regard to the market rates.

3.3 The contractor shall send to the Engineer-in-Charge once every three months,an up to date account giving complete details of all claims for additional payments to which the contractor may consider himself entitled and of all additional work ordered by the Engineer-in-Charge which he has executed during the preceding quarter failing which the contractor shall be deemed to have waived his right. However, the Engineer-in-charge may authorize consideration of such claims on merits.

For the purpose of operation of Memorandum (Annexure-I), the following works shall be treated as works relating to foundation unless and otherwise defined in the Contract:

For Buildings: All works up to 1.2 meters above ground level or up to floor 1 level whichever is lower.

For abutments, piers and well staining: All works upto 1.2m above the bed level.

For walls, compound walls, and other elevated structures: All works upto 1.2 metres above the ground level.all items of excavation and filling including treatment of sub base.

Any operation incidental to or necessarily has to be in contemplation of tenderer while filling, tender or necessary for proper execution of the item

included in the Schedule of quantities or in the schedule of rates mentioned above, whether or not specifically indicated in the description of the item and the relevant specifications shall be deemed to be included in the rates quoted by the tenderer or the rate given in the said schedule or rates as the case may be Nothing extra shall be admissible for such operations.
Market Rates to be determined as per various sub-clauses given in tender document shall be on the basis of Prevailing rates of Material (unless mentioned otherwise), Relevant Labour authority rate for Labour, market rates of T&P etc. plus 15% towards Contractors' Profits and Overheads.
The following factors may be considered in the justification of rates on which Contractor's overhead & profit shall not be applicable:
Buildings and Other Construction Worker Cess as applicable in the state of work place
EPF (Employer Contribution) component, as per EPF act on the portion of labour's wages, on works contract / WCT, as per composite scheme in the State of work place, if applicable GST

ESCALATION

No claim on account of any escalation on whatsoever ground shall be entertained at any stage of works. All rates as per Bill of Quantities (BOQ) quoted by contractor shall be firm and fixed for entire contract period as well as extended period for completion of the works. No escalation shall be applicable on this contract.

COMPENSATION FOR DELAY

If the contractor fails to maintain the required progress in terms of clause or relevant clause of GCC & Special Conditions of Contract, to complete the work and clear the site on or before the contract or extended date of completion, he shall, without prejudice to any other right or remedy available under the law to the BSCDCL on account of such breach, pay as agreed compensation the amount calculated at the rates stipulated below as the Engineer in charge (whose decision in writing shall be final and binding) may decide on the amount of tendered value of the work for every completed day / week (as applicable) that the progress remains below that specified in Clause
or the relevant clause in GCC & Special Conditions of Contract or that the work remains incomplete.

This will also apply to items or group of items for which a separate period of completion has been specified

i) Compensation for delay of work @ 1.5% per month delay to be computed on daily basis.

Provided always that the total amount of compensation for delay to be paid under this Condition shall not exceed 10% of the Tendered Value of work or of the Tendered Value of the item or group of items of work for which a separate period of completion is originally given. The amount of compensation may be adjusted or set-off against any sum payable to the Contractor under this or any other contract with BSCDCL.

In case, the contractor does not achieve a particular milestone mentioned elsewhere in the tender document, or the re-scheduled milestone(s) the amount shown against that milestone shall be withheld, to be adjusted against the compensation levied at the final grant of Extension of Time. With-holding of this amount or failure to achieve a milestone, shall be automatic without any notice to the Contractor. However, if the contractor catches up with the progress of work on the subsequent milestone(s), the withheld amount shall be released. In case the contractor fails to make up for the delay in subsequent milestone(s), amount mentioned against each milestone missed subsequently also shall be withheld. However, no interest, whatsoever, shall be payable on such withheld amount.

ACTION IN CASE WORK NOT DONE AS PER SPECIFICATIONS

All works under or in course of execution or executed in pursuance of the contract, shall at all times be open and accessible to the inspection and supervision of the Engineer-in-charge, his authorized subordinates in charge of the work and all the superior officers, officer of the Quality Assurance Unit of the BSCDCL or any organization engaged by the BSCDCL for Quality Assurance and the contractor shall, at all times, during the usual working hours and at all other times at which reasonable notice of the visit of such officers has been given to the contractor, either himself be present to receive orders and instructions or have a responsible

agent duly accredited in writing, present for that purpose. Orders given to the Contractor's agent shall be considered to have the same force as if they had been given to the contractor himself. If it shall appear to the Engineer-in-charge or his authorized subordinates in-charge of the work or to the officer of Quality Assurance or his subordinate officers or the officers of the organization engaged by the BSCDCL for Quality Assurance or his subordinate officers, that any work has been executed with unsound, imperfect, or unskillful workmanship, or with materials or articles provided by him for the execution of the work which are unsound or of a quality inferior to that contracted or otherwise not in accordance with the contract, the contractor shall, on demand in writing which shall be made within twelve months of the completion of the work from the Engineer-in-Charge specifying the work, materials or articles complained of notwithstanding that the same may have been passed, certified and paid for forthwith rectify, or remove and reconstruct the work so specified in whole or in part, as the case may require or as the case may be, remove the materials or articles so specified and provide other proper and suitable materials or articles at his own charge and cost. In the event of the failing to do so within a period specified by the Engineer-in-Charge in his demand aforesaid, then the contractor shall be liable to pay compensation at the same rate as per conditions of contract (for non-completion of the work in time) for this default. In such case the Engineer-in-Charge may not accept the item of work at the rates applicable under the contract but may accept such items at reduced rates as the Engineer in charge may consider reasonable during the preparation of on account bills or final bill if the item is so acceptable without detriment to the safety and utility of the item and the structure or he may reject the work outright without any payment and/or get it and other connected and incidental items rectified, or removed and re-executed at the risk and cost of the contractor. Decision of the Engineer-in-Charge to be conveyed in writing in respect of the same will be final and binding on the contractor.

ACTION IN CASE OF BAD WORK

If it shall appear to the Engineer-in-Charge or his authorized representative in charge of the work or to the Chief Technical Examiner or to any other inspecting agency of Government/ State Government/ Owner where the work is being executed, that any work has been executed with unsound, imperfect, or unskillful workmanship or with materials of any inferior description, or that any materials or articles provided by him for the execution of the work are unsound or of a quality inferior to that contracted for or otherwise not in accordance with the contract, the contractor shall on demand in writing which shall be made within twelve months of the completion of the work from the Engineer-in-Charge specifying the work, materials or articles complained of notwithstanding that the same may have been passed, Certified and paid for forthwith rectify, or remove and reconstruct the work so specified in whole or in part as the case may require or as the case may be, remove the materials or articles so specified and provide other proper and suitable materials or articles at his own proper charge and cost, and in the event of his failing to do so within a period to be specified by the Engineer-in-Charge in his demand aforesaid while the contractor failure to do so shall continue, the Engineer-in-Charge may rectify or remove and re-execute the work or remove and replace with others, the material or articles complained of as the case may be at the risk and expense in all respects of the contractor.

CANCELLATION/DETERMINATION OF CONTRACT IN FULL OR PART

Subject to other provisions contained in this clause the Engineer-in-Charge may, without prejudice to his any other rights or remedy against the contractor in respect of any delay, inferior workmanship, any claims for damages and / or any other provisions of this contract or otherwise, and whether the date of completion has or has not elapsed, by notice in writing absolutely determine the contract in any of the following cases:

If the contractor having been given by the Engineer-in-Charge a notice in writing to rectify, reconstruct or replace any defective work or that the work is being performed in an inefficient or otherwise improper or un-workmanlike manner shall omit to comply with the requirement of such notice for a period of seven days thereafter; or

If the contractor has, without reasonable cause, suspended the progress of the work or has failed to proceed with the work with due diligence so that in the opinion of the Engineer-in-Charge (which shall be final and binding) he will be unable to secure completion of the work by the date for completion and continues to do so after a notice in writing of seven days from the Engineer-in-Charge; or

If the contractor fails to complete the work within the stipulated date or items of work with individual date of completion, if any stipulated, on or before such date(s) of completion and does not complete them within the period specified in a notice given in writing in that behalf by the Engineer-in-Charge; or

If the contractor persistently neglects to carry out his obligations under the contract and / or commits default in complying with any of the terms and conditions of the contract and does not remedy it or take effective steps to remedy it within 7 days after a notice in writing is given to him in that behalf by the Engineer-in-Charge; or

If the contractor shall offer or give or agree to give to any person in BSCDCL service or to any other person on his behalf any gift or consideration of any kind as an inducement or reward for doing or forbearing to do or for having done or forborne to do any action relation to the obtaining or execution of this or any other contract for BSCDCL; or

If the contractor shall enter into a contract with BSCDCL in connection with which commission has been paid or agreed to be paid by him or to his knowledge, unless the particulars of any such commission and the terms of payment thereof have been previously disclosed in writing to the Engineer-in-Charge; or

If the contractor shall obtain a contract with BSCDCL as a result of wrong tendering or other non-bona-fide methods of competitive tendering or commits breach of Integrity Pact; or If the contractor being an individual, or if a firm, any partner thereof shall at any time be adjudged insolvent or have a receiving order or order for administration of his estate made against him or shall take any proceedings for liquidation or composition (other than a voluntary liquidation for the purpose of amalgamation or reconstruction) under any Insolvency Act for the time being in force or make any conveyance or assignment of his effects or composition or arrangement for the benefit of his creditors or purport so to do, or if any application be made under any Insolvency Act for the time being in force for the sequestration of his estate or if a trust deed be executed by him for benefit of his creditors; or If the contractor being a company, shall pass a resolution or the Court shall make an order for the winding up of the company, or a receiver or manager on behalf of the debenture holders or otherwise shall be appointed or circumstances shall arise which entitle the Court or debenture holders to appoint a receiver or manager; or If the contractor shall suffer an execution being levied on

his goods and allow it to be continued for a period of 21 days, or. If the contractor assigns, transfers, sublets (engagement of labour on a piece-work basis or of the labour with materials not to be incorporated in the work, shall not be deemed to be subletting) or otherwise parts with or attempts to assign, transfer sublet or otherwise parts with the entire works or any portion thereof without and prior written approval of the Engineer-in-Charge.

When the contractor has made himself liable for action under any of the cases aforesaid, the Engineer-in-Charge may without prejudice to any other right or remedy which shall have accrued or shall accrue hereafter to BSCDCL, by a notice in writing to cancel the contract as whole or only such items of work in default from the Contract, the Engineer-in-charge shall have powers:
Take possession of site and any materials, constructional plant, implements, stores, etc. thereon; and/ or Carry out the incomplete work by any means at the risk and cost of the contractor; and/ or

The Engineer-in-charge shall determine the amount, if any, is recoverable from the contractor for completion of the part work/part incomplete work of any item(s) taken out of his hands and execute at the risk and cost of the contractor, the liability of contractor on account of loss or
damage suffered by BSCDCL because of action under this clause shall not exceed 10% of the tendered value of the work.

To determine or rescind the contract as aforesaid (of which termination or rescission notice in writing to the contractor under the hand of the Engineer-in-Charge shall be conclusive evidence). Upon such determination or rescission, the full security deposit recoverable under the contract and performance guarantee shall be liable to be forfeited and un-used materials, construction plants, implements, temporary buildings, etc. shall be taken over and shall be absolutely at the disposal of the BSCDCL. If any portion of the Security Deposit has not been paid or received it would be called for and forfeited; and/ or

To employ labour paid by the BSCDCL and to supply materials to carry out the work or any part of the work debiting the contractor with the cost of the labour and the price of the materials of the amount of which cost and price certified by the Engineer-in-Charge shall be final and conclusive) against the contractor and crediting him with the value of the work done in all respects in the same manner and at the same rates as if it had been carried out by the contractor under the terms of his contract. The certificate of the Engineer-in- Charge as to the value of the work done shall be final and conclusive against the contractor provided always that action under the sub-clause shall only be taken after giving notice in writing to the contractor. If the expenses incurred by the BSCDCL are less than the amount payable to the contractor at his agreement rates, the difference shall not be paid to the contractor; and/ or

After giving notice to the contractor to measure up the work of the contractor and to take such whole, or the balance or part thereof as shall be un-executed or delayed with reference to the General Conditions of Contract / or relevant clause of Condition Special of Contract, out of his hands and to give it to another contractor to complete in which case any expenses which may be incurred in excess of the sum which would have been paid to the original contractor if the whole work had been executed by him (of the amount of which excess the certificate in writing of the Engineer-in-Charge shall be final and conclusive) shall be borne and paid by the original contractor and may be deducted from any money

due to him by BSCDCL under his contract or on any other account whatsoever or from his security deposit or the proceeds of sales of unused materials, construction plants, implements temporary buildings etc. thereof or a sufficient part thereof as the case may be. If the expenses incurred by the BSCDCL are less than the amount payable to the contractor at his agreement rates, the difference shall not be paid to the contractor; and/or

By a notice in writing to withdraw from the contractor any items or items of work as the Engineer-in-charge may determine in his absolute discretion and get the same executed at the risk and cost of the contractor.

Any excess expenditure incurred or to be incurred by BSCDCL in completing the works or part of the works or the excess loss or damages suffered or

may be suffered by BSCDCL as aforesaid after allowing such credit shall without prejudice to any other right or remedy available to BSCDCL in law be recovered from any moneys due to the contractor on any account, and if such moneys are not sufficient the contractor shall be called upon in writing and shall be liable to pay the same within 30 days.

If the contractor shall fail to pay the required sum within the aforesaid period of 30 days, the Engineer-in-Charge shall have the right to sell any or all of the contractors unused materials, constructional plant, implements, temporary buildings, etc. and apply the proceeds of sale thereof towards the satisfaction of any sums due from the contractor under the contract and if thereafter there be any balance outstanding from the contractor, it shall be recovered in accordance with the provisions of the contract and law.

Any sums in excess of the amounts due to BSCDCL and unsold materials, constructional plant etc. shall be returned to the contractor, provided always that if cost or anticipated cost of completion by BSCDCL of the works or part of the works is less than the amount which the contractor would have been paid had he completed the works or part of the works, such benefit shall not accrue to the contractor.

In the event of anyone or more of the above courses being adopted by the Engineer-in-Charge the contractor shall have no claim to compensation for any loss sustained by him by reasons of his having purchased or procured any materials or entered into any engagements or made any advances on account or with a view to the execution of the work or the performance of the contract. And in case action is taken under any of the provision aforesaid the contractor shall not be entitled to recover or be paid any sum for any work thereof or actually performed under this contract unless and until the Engineer-in-Charge has certified in writing the performance of such work and the value payable in respect thereof and he shall only be entitled to be paid the value so certified.

Provided further that if any of the recoveries to be made, while taking action as above, are in excess of the security deposit forfeited, these shall be

Limited to the amount by which the excess cost incurred by the BSCDCL exceeds the security deposit so forfeited.

CONTRACTOR LIABLE TO PAY COMPENSATION EVEN IF ACTION NOT TAKEN

In any case in which any of the powers conferred upon the Engineer-in-Charge by relevant clause thereof, shall have become exercisable and the same are not exercised, the non-exercise thereof shall not constitute a waiver of any of the conditions hereof and such powers shall notwithstanding be exercisable in the event of any future case of default by the contractor and the liability of the contractor for compensation shall remain unaffected. In the event of the Engineer-in-Charge putting in force all or any of the powers vested in him under any clause he may, if he so desires after giving a notice in writing to the contractor, take possession of (or at the sole discretion of the Engineer-in-Charge which shall be final and binding on the contractor) use as on hire (the amount of the hire money being also in the final determination of the Engineer-in-Charge) all or any tools, plant, materials and stores, in or upon the works, or the site thereof belonging to the contractor, or procured by the contractor and intended to the used for the execution of the work/or any part thereof, paying or allowing for the same in account at the contract rates, or in the case of these not being applicable, at current market rates to be certified by the Engineer-in-Charge, whose certificate thereof shall be final and binding on the contractor and/or direct the contractor, clerk of the works, foreman or other authorized agent to remove such tools, plant, materials, or stores from the premises (within a time to be specified in such notice) in the event of the contractor failing to comply with any such requisition, the Engineer-in-Charge may remove them at the contractor's expense or sell them by auction or private sale on account of the contractor and his risk in all respects and the certificate of the Engineer-in-Charge as to the expenses of any such removal and the amount of the proceeds and expenses of any such sale shall be final and conclusive against the contractor.

CARRYING OUT PART WORK AT RISK & COST OF CONTRACTOR

If contractor:

At any time makes default during currency of work or does not execute any part of the work with due diligence and continues to do so even after a notice in writing of 7 days in this respect from the Engineer-in-Charge;

or

Commits default in complying with any of the terms and conditions of the contract and does not remedy it or takes effective steps to remedy it within 7 days even after a notice in writing is given in that behalf by the Engineer-in-Charge;

or

Fails to complete the work(s) or items of work with individual dates of completion, on or before the date(s) so determined and does not complete them within the period specified in the notice given in writing in that behalf by the Engineer-in-Charge.

The Engineer-in-Charge without invoking action under conditions of contract may, without prejudice to any other right or remedy against the contractor which have either accrued or accrue thereafter to BSCDCL, by a notice in writing to take the part work/part incomplete work of any item(s) out of his hands and shall have powers to:

Take possession of the site and any materials, constructional plant, implements, stores, etc., thereon; and/or Carry out the part work / part incomplete work of any item(s) by any means at the risk and cost of the contractor.

The Engineer-in-Charge shall determine the amount, if any, is recoverable from the contractor for completion of the part work/ part incomplete work of any item(s) taken out of his hands and execute at the risk and cost of the contractor, the liability of contractor on account of loss or damage suffered by BSCDCL because of action under this clause shall not exceed 10% of the tendered value of the work.

In determining the amount, credit shall be given to the contractor with the value of work done in all respect in the same manner and at the same rate as if it had been carried out by the original contractor under the terms of his contract, the value of contractor's materials taken over and incorporated in the work and use of plant and machinery belonging to the contractor. The certificate of the Engineer-in-Charge as to the value of work done shall be final and conclusive against the contractor provided always that action under this clause shall only be taken after giving notice in writing to the contractor. Provided also that if the expenses incurred by the department are less than the amount payable to the contractor at his agreement rates, the difference shall not be payable to the contractor.

Any excess expenditure incurred or to be incurred by BSCDCL in completing the part work/ part incomplete work of any item(s) or the excess loss of damages suffered or may be suffered by BSCDCL as aforesaid after allowing such credit shall without prejudice to any other right or remedy available to BSCDCL in law or per as agreement be recovered from any money due to the contractor on any account, and if such money is insufficient, the contractor shall be called upon in writing and shall be liable to pay the same within 30 days.

If the contractor fails to pay the required sum within the aforesaid period of 30 days, the Engineer-in-Charge shall have the right to sell any or all of the contractors' unused materials, constructional plant, implements, temporary building at site etc. and adjust the proceeds of sale thereof towards the dues recoverable from the contractor under the contract and if thereafter there remains any balance outstanding, it shall be recovered in accordance with the provisions of the contract. In the event of above course being adopted by the Engineer-in-Charge, the contractor shall have no claim to compensation for any loss sustained by him by reason of his having purchased or procured any materials or entered into any engagements or made any advance on any account or with a view to the execution of the work or the performance of the contract.

SUSPENSION OF WORKS

The contractor shall, on receipt of the order in writing of the Engineer-in-charge, suspend the progress of the works or any part thereof for such time and in such manner as the Engineer-in-charge may consider necessary for any of the following reasons:

On account of any default on part of the contractor, or For proper execution of the works or part thereof for reason other than the default of the contractor, or For safety of the works or part thereof.

The contractor shall, during such suspension, properly protect and secure the works to the extent necessary and carry out the instructions given in that behalf by the Engineer-in-charge.

(b) If the suspension is ordered for reasons (ii) and (iii) in sub-para (a) above.

i) The contractor shall be entitled to an extension of the time equal to the period of every such suspension plus 25% for completion period. No adjustment in contract price will be allowed for reasons of such suspension.

ii) In the event of the Contractor treating the suspension as an abandonment of the Contract by BSCDCL, he shall have no claim to payment of any compensation on account of any profit or advantage which he may have derived from the execution of the work in full.

TERMINATION OF CONTRACT ON DEATH OF CONTRACTOR

Without prejudice to any of the right or remedies under this contract if the contractor dies, the Engineer in-charge shall have the option of terminating the contract without compensation to the contractor.

TIME ESSENCE OF CONTRACT & EXTENSION FOR DELAY

The time allowed for execution of the Works as specified in the Memorandum (Annexure-I) or the extended time in accordance with these conditions shall be the essence of the contract. The execution of the works shall commence from such time period as mentioned in MEMORANDUM (ANNEXURE – I) or the date on which the Engineer-in-Charge issues written orders to commence the work. If the Contractor commits default in commencing the execution of the work as aforesaid, the BSCDCL shall without prejudice to any other right or remedy available in law, be at liberty to forfeit the earnest money & performance guarantee absolutely.

3.4 Within 10 (Ten) days of Letter of Intent, the Contractor shall submit a time and Progress Chart (CPM/ PERT/ Quantified Bar Chart) and get it approved by the Engineer-in-Charge. The Chart shall be prepared in direct relation to the time stated in the contract documents for completion of items of the works. It shall indicate the forecast (mile-stones) of the dates of commencement and completion of various items, trades, sections of the work and may be amended as necessary by agreement between the Engineer-in-Charge and the Contractor within the limitations of time stipulated in the Contract documents and further to ensure good progress during the execution of the work, the contractor shall in all cases in which the time allowed for any work exceeds one month (save for special jobs for which a separate program has been agreed upon) complete 1/8th of the whole of work before 1/4th of the whole time allowed in the contract has elapsed, 3/8th of the work before one half of such time has elapsed and 3/4th of the work before 3/4th of such time has elapsed. The physical progress report including photographs shall be submitted by the contractor on the prescribed format & the intervals (not exceeding one month)as decided by the Engineer in Charge. The compensation for delay as per tender document shall be enviable at intermediate stages also, in case the required progress is not achieved to meet the above time deadlines of the completion period and/ or milestones of time and progress chart, provided always that the total amount of Compensation for delay to be paid under this condition shall not exceed 10% of the tendered value of work".

If the work(s) be delayed by:

1. force-majeure or

2. Abnormally bad weather, or

3. Serious loss or damage by fire, or

4. Civil commotion, local commotion of workmen, strike or lockout, affecting any or the trades

employed on the work, or

5. Delay on the part of other contractors or tradesmen engaged by Engineer-in-Charge in

Executing work not forming part of the Contract, or

6. Non-availability of stores, which are responsibility of the BSCDCL or,

7. Non-availability or break down of tools and plant to be supplied or supplied by BSCDCL or,

8. Any other cause which, in the absolute discretion of the BSCDCL, is beyond the

Contractor's control, then upon the happening of any such event causing delay, the

Contractor shall immediately give notice thereof in writing to the Engineer-in-Charge within 07 days but shall nevertheless use constantly his best endeavor to prevent or make good the delay and shall do all that may be reasonably required to the satisfaction of the Engineer-in-Charge to proceed with the works.

3.5 Request for extension of time, to be eligible for consideration, shall be made by the Contractor in writing within fourteen days of the happening of the event causing delay in the prescribed form. The Contractor may also, if practicable, indicate in such a request the period for which extension is desired. In any such case BSCDCL may give a fair and reasonable extension of time for completion of work. Such extension shall be communicated to the Contractor by the Engineer-in-Charge in writing within a reasonable time from the receipt of such request. Non application by the contractor for extension of time shall not be a bar for giving a fair and reasonable extension by the Engineer-in-Charge and the extension of time so given by the Engineer-in-Charge shall be binding on the contractor.

TIME SCHEDULE & PROGRESS

3.6 Time allowed for carrying out all the works as entered in the tender shall be as mentioned in the "Memorandum (Annexure-I)" which shall be reckoned from the 10th day from the date on which the Letter of Intent is issued to the Contractor. Time shall be the essence of the contract and contractor shall ensure the completion of the entire work within the stipulated time of completion.

The contractor shall also furnish within 10 days of date of issue of Letter of Intent a CPM network/ PERT chart/ Bar Chart for completion of work within stipulated time. This will be duly got approved from BSCDCL. This approved Network/ PERT Chart shall form a part of the agreement. Achievement of milestones as well as total completion has to be within the time period allowed.

Contractor shall mobilize and employ sufficient resources for completion of all the works as indicated in the agreed BAR CHART/PERT Network. No additional payment will

be made to the contractor for any multiple shift work or other incentive methods contemplated by him in his work schedule even though the time schedule is approved by the Engineer-in-Charge.

During the currency of the work the contractor is expected to adhere to the time schedule on mile stone and total completion and this adherence will be a part of Contractor's performance under the contract. During the time schedule on mile stone and total completion and this adherence will be a part of Contractor's performance under the contract. During the execution of the work contractor is expected to participate in the review and updating of the Network/BAR CHART undertaken by the BSCDCL. These reviews may be undertaken at the discretion of Engineer-in-charge either as a periodical appraisal measure or when the quantum of work order on the contractor is substantially changed through deviation orders or amendments. The review shall be held at site or any of the offices of BSCDCL/owner /consultant at the sole discretion of BSCDCL. The contractor will adhere to the revised schedule thereafter. The approval to the revised schedule resulting in a completion date beyond the stipulated date of completion shall not automatically amount to a grant of extension of time to the contractor.

Contractor shall submit (as directed by Engineer-in-Charge) progress reports on a computer based program (program and software to be approved by Engineer-in-Charge) highlighting status of various activities and physical completion of work. The contractor shall send completion report with as built drawings to the office of Engineer-in-Charge, of BSCDCL in writing within a period of 30 days of completion of work.

The photographs of the project taken on last day of every month indicating progress of work (in soft copies) shall be attached along with the physical progress reports to be submitted to Engineer-in-charge.

TAXES AND DUTIES

3.7 Except as otherwise specifically provided in the contract, the contract or shall be liable and responsible for the payment, of all taxes, such as GST (State and Central) & any other applicable tax(es), duty(ies), levy, cess if any, in the state concerned which may be specified by local/state/ central government from time to time on all material articles which may be used for this work. The rates quoted by him in the tender in bill of quantities shall be inclusive of all taxes and GST.

In the event of nonpayment/default in payment of any of the above taxes, BSCDCL reserves the right to with-hold the dues/payments of contractor and make payment to local/state/Central Government authorities or to labourers as may be applicable.

The imposition of any new and/or increase in the aforesaid taxes, duties levies (including fresh imposition of any other Tax) is imposed by Statute, after the last stipulated date for the receipt of tender including extensions if any and the contractor thereupon necessarily and properly pays such taxes/levies/cess, the contractor shall be reimbursed the amount so paid, provided such payments, if any, is not, in the opinion of Engineering-in charge attributable to delay in execution of work within the control of contractor. The contractor shall, within a period of 30 days of the imposition of any such further tax or levy or cess, give a written notice thereof to the Engineering-in-charge that the same is given pursuant to this condition, together with all necessary information relating thereto.

The rate quoted by the contractor shall be deemed to be inclusive of all taxes and GST as given in tender document Tax deductions at source shall be made as per laws prevalent in the State as applicable for the work.

The stamp duty and registration charges, if any, on the contract agreement levied by the Government or any other statutory body, shall be paid by the contractor as applicable in the state of work.

It will be incumbent upon the Contractor to obtain a registration certificate as a dealer under the GST Act and necessary evidence to this effect shall be furnished by the Contractor to BSCDCL.

The Bidder shall quote his rates inclusive of GST in conjunction with other terms and conditions. In case, the GST on Works contract on execution of works is waived off by the State Govt. at later stage for this project, the equivalent amount from the date of waiver of such tax (as per prevailing rate as on the date of waiver of all type of Taxes and GST Works Contract) shall be deducted from the amount payable to the contractor from subsequent RA bills.

In the event of decrease / relaxation and / or waiver of any of the existing / prevailing tax(es), duties, levies, cess by Central / state Govt. Or any other statutory body (ies), after the last stipulated date for the receipt of tender including extension (if any), and the contractor thereupon has been paid or has raised claims of such tax(es), duties, levies, cess; such sums shall be recovered / deducted (from claims raised but which has not been paid) effective from the date as reckoned in the relevant statutory order / law / ordnance etc. The contractor, shall, within a period of 30 days of any such waiver/relaxation/decrease in tax(es), duties, levies, cess, give a written notice thereof to Engineer-in-charge stating the statutory change with Documentary proof thereto. Provided always that Engineer-in-charge shall have full powers to effect recovery/deduction on account of any such statutory change even if contractor has not intimated in the event when any such statutory action comes to his notice.

INCOME TAX DEDUCTION (TDS)

Income tax deductions shall be made from all payments made to the contractor including advances against work done, as per the rules and regulations in force, in accordance with the Income Tax act prevailing from time to time.

GOODS AND SERVICES TAX (GST)

The Bidder shall quote rates **inclusive of all type of tax and GST nothing extra shall be paid.** The contractor must have **GST registration number** and will provide copy of Registration to BSCDCL before release of any payment by the Corporation. The contractor will submit regular Invoice / Bill fulfilling `all conditions of Goods and Service Tax (GST) Rules.

ROYALTY ON MATERIALS:

The contractor shall deposit royalty and obtain necessary permit for supply of bajri, stone, kankar, sand and other materials etc. from the local authorities and quoted rates shall be inclusive of royalty.
The contractor shall be deemed to have inspected the site, its surrounding and acquainted itself with the nature of the ground, accessibility of the site and full extent and nature of all operations necessary for the full and proper execution of the contract, space for storage of materials, constructional plant, temporary works,

restrictions on the plying of heavy vehicles in area, supply and use of labour materials, plant, equipment and laws, rules and regulations, if any, imposed by the local authorities.

The rates and prices to be tendered in the bill of quantities are for completed and finished items of works and complete in all respects. It will be deemed to include all constructional plant, labour, supervision materials, transport, all temporary works, erection, maintenance, contractor's profit and establishment/overheads, together with preparation of designs & drawings pertaining to casting yard, shop drawing, fabrication drawing (if required), staging form work, stacking yard, etc. all general risk, all taxes, royalty, duties, cess,octroi and other levies, insurance liabilities and obligations set out or implied in the tender documents and contract .

If any temporary/ permanent structure is encountered or safety of such structure in the vicinity is endangered due to execution of the project, the contractor has to protect the structures by any means as per direction of Engineer-in–Charge. If any damage is caused to any temporary or permanent structure(s) in the vicinity due to execution of the project, the contractor has to make good the same by any means as per direction of Engineer-in–Charge. The contractor should inspect the site of work from this point of view. The cost to be incurred in this regard shall be deemed to be included in his quoted rates of BOQ items and the contractor shall not be entitled for any extra payment in this regard.

INSURANCE OF WORKS ETC

Contractor is required to take contractor's all risk policy or erection all risk policy (as the case may be) from an approved insurance company in the joint name with BSCDCL and bear all costs towards the same for the full period of execution of works including the defect liability period for the full amount of contract against all loss of damage from whatever cause arising other than **excepted risks** for which he is responsible under the terms of the contract and in such manner that the BSCDCL and the contractor are covered during the period of construction of works and/or also covered during the period of defect liability for loss or damage. The work and the temporary works to the full value of such works.

The materials, constructional plant, centering, shuttering and scaffolding materials and other things brought to the site for their full value.Whenever required by BSCDCL, the contractor shall produce the policy or the policies of insurance and the receipts for payment of the current premium.

INSURANCE UNDER WORKMEN COMPENSATION ACT

Contractor is required to take insurance cover under the Workman Compensation Act, 1923 amended from time to time from an approved insurance company and pay premium charges thereof. Wherever required by BSCDCL the contractor shall produce the policy or the policies of Insurance and the receipt of payment of the current premiums.

THIRD PARTY INSURANCE

Contractor is required to take third party insurance cover for an amount of 5%(five percent) of contract value from an approved insurance company for insurance against any damage, injury or loss which may occur to any person or property including that of BSCDCL / owner / client, arising out of the execution of the works or temporary works. Wherever required by BSCDCL the contractor shall produce the policy or the policies of Insurance and the receipt of payment of the current premiums.

In case of failure of the contractor to obtain contractors all risk policy, insurance under workman compensation act and third party insurance as described above within one month from the date of commencement of work, running account payments of the contractor shall be withheld till such time the aforesaid insurance covers are obtained by the contractor.

If the Contractor could not effect a comprehensive insurance cover against risks which he may be required to effect under the terms of the contract, then he shall give his attention to get the best insurance cover available and even in case of effecting a wider insurance cover than the one which the subsidiary of the General Insurance Company could offer, such an insurance is ought to be done after the BSCDCL's approval, by or through the subsidiary of the General Insurance Company.

The contractor shall at all times indemnify BSCDCL and Owner against all claims, damages or compensation under the provision of Payment of wages act-1936, Minimum Wages Act-1948, Employer's liability Act-1938, the workmen's compensation Act-1947, Industrial Disputes Act-1947 and Maternity Benefit Act-1961 or any modifications thereof or any other law in force or as consequence of any accident or injury to any workman or other persons in or about the works, whether in the employment of the contractor or not, against all costs, charges and expenses of any suit, action or proceedings arising out of such incident or injury and against all sum or sums which may with the consent of the contractor be paid to compromise or compound any such claim. Without limiting his obligations and liabilities as above provided, the contractor shall insure against all claims, damages or compensation payable under the Workmen's Compensation Act 1923 or any modification thereof or any other law relating thereto.

PAYMENTS

All running payments shall be regarded as payments by way of advance against the final payment only and not as payments for work actually done and completed and/or accepted by BSCDCL and shall not preclude the recovery for bad, unsound and imperfect or unskilled work to be removed and taken away and reconstructed or re-erected or be considered as an admission of the due performance of the Contract, or any part thereof, in this respect, or the accruing of any claim, nor shall it conclude, determine or affect in any way the powers of the BSCDCL under these conditions or any of them as to the final settlement and adjustments of the accounts or otherwise, or in any other way vary/ affect the contract. The final bill shall be submitted by the contractor within three months of the completion of work, otherwise BSCDCL's certificate of the measurement and of the total amount payable for the work accordingly shall be final and binding on contractor. Each Running Bills should be accompanied by two sets of at-least 20 (twenty) photographs as per direction of Engineer-in-charge taken from various points depicting status of work as on Report/ Bill date and Monthly Progress Report for the concerned month in the pro-forma to be given/ approved by Engineer-in-Charge. Intermittent progress Photographs as and when required shall also be provided by the Contractor at his own cost as per direction of Engineer-in-Charge. No payment of running account bill shall be released unless it is accompanied by photographs and Monthly Progress Report as above.

It is clearly agreed and understood by the Contractor that notwithstanding anything to the contrary that may be stated in the agreement between BSCDCL and the

contractor; the contractor shall become entitled to payment only after BSCDCL has received the corresponding payment(s) from the client/ Owner for the work done by the contractor. Any delay in the release of payment by the client/ Owner to BSCDCL leading to a delay in the release the corresponding payment by BSCDCL to the contractor shall not entitle the Contractor to any compensation/ interest from BSCDCL.

All payments shall be released by way of e-transfer through RTGS/NEFT in India directly at their Bank account by BSCDCL.

MEASUREMENTS OF WORKS

Engineer-in-charge shall, except as otherwise provided, ascertain and determine by measurement, the value of work done in accordance with the contract.
Except where any general or detailed description of the work expressly shows to the contrary, measurement shall be taken in accordance with the

Procedure set forth in the UADD Specification. In the case of items which are not covered by specifications, mode of measurement as specified in the Technical Specifications of the contract and if for any item no such technical specification is available, then a relevant standard method of measurement issued by the Bureau of Indian Standard shall be followed.

Provided further that, In case of Cancellation/Determination of Contract in Full or in Part in accordance with clause of tender document (and its sub-clauses), following methodology shall be adopted in respect of measurements in addition to what has been mentioned in foregoing:-

All measurements and levels shall be taken jointly by the Engineer-in-Charge or his authorized representative and by the contractor or his authorized representative from time to time during the progress of the work and such measurements shall be signed and dated by the Engineer-in-Charge and the contractor or their representatives in token of their acceptance. If the contractor objects to any of the measurements recorded, a note shall be made to that effect with reason and signed by both the parties.

If for any reason the contractor or his authorized representative is not available and the work of recording measurements is suspended by the Engineer-in-Charge or his representative, the Engineer-in-Charge and BSCDCL shall not entertain any claim from contractor for any loss or damages on this account. If the contractor or his authorized representative does not remain present at the time of such measurements after the contractor or his authorized representative has been given a notice in writing three (3) days in advance or fails to countersign or to record objection within a week from the date of the measurement, then such measurements recorded in his absence by the Engineer-in-Charge or his representative shall be deemed to be accepted by the Contractor. The contractor shall, without extra charge, provide all assistance with every appliance, labour and other things necessary for measurements and recording levels.

COMPUTERISED MEASUREMENT BOOKS

Engineer-in-Charge 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 as per the format of BSCDCL so that a complete record is obtained of all the items of works performed under the contract. 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 the Engineer-in-Charge or his authorized representative as per interval or program fixed in consultation with Engineer-in-Charge or his authorized representative.

After the necessary corrections made by the Engineer-in-Charge, the measurement sheets shall be returned to the contractor for incorporating the corrections and for resubmission to the Engineer-in- Charge for the dated signatures by the Engineer-in-Charge and the contractor or their representatives in token of their acceptance.

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 Engineer-in-Charge 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 BSCDCL a computerized measurement book, duly bound, and with its pages machine numbered. The Engineer-in-Charge and/or his authorized representative would thereafter check this MB, and record the necessary certificates for their checks/test checks.

The final, fair, computerized measurement book given by the contractor, duly bound, with its pages numbered, should be 100% correct, and no cutting or over-writing in the measurements would thereafter be allowed. If at all any error is noticed, the contractor shall have to submit a fresh computerized MB with its pages duly numbered and bound, after getting the earlier MB cancelled by the BSCDCL. The contractor shall submit two spare copies of such computerized MB's for the purpose of reference and record by the various officers of the BSCDCL.

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 numbered along with two spare copies of the "bill.

The contractor shall, without extra charge, provide all assistance with every appliance, labour and other things necessary for checking of measurements /levels by the Engineer-in-Charge or his representative.

The contractor shall give not less than seven days' notice to the Engineer-in-Charge or his authorized 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 consent in writing of the Engineer-in-Charge 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 Engineer-in-Charge'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.

Engineer-in-Charge or his authorized representative may cause either themselves or through another officer of the BSCDCL to check the measurements recorded by contractor and all provisions stipulated herein above or anywhere in the tender document shall be applicable to such checking of measurements or levels.

It is also a term of this contract that checking and/or test checking the measurements of any item of 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 liability period.

WITHHOLDING AND LIEN IN RESPECT OF SUMS DUE FROM CONTRACTOR

Whenever any claim or claims for payment of a sum of money arises out of or under the contract or against the contractor, BSCDCL shall be entitled to withhold and also have a lien to retain such sum or sums in whole or in part from the security, if any, deposited by the contractor and for the purpose aforesaid, BSCDCL shall be entitled to withhold the security deposit, if any, furnished as the case may be and also have a lien over the same pending finalization or adjudication of any such claim. In the event of the security being insufficient to cover the claimed amount or amounts or if no security has been taken from the contractor, BSCDCL shall be entitled to withhold and have a lien to retain to the extent of such claimed amount or amounts referred to above, from any sum or sums found payable or which may at any time thereafter become payable to the contractor under the same contract or any other contract pending finalization of adjudication of any such claim.

It is an agreed term of the contract that the sum of money or moneys so withheld or retained under the lien referred to above by the Engineer-in-Charge or BSCDCL will be kept withheld or retained as such by the Engineer-in-Charge or BSCDCL till the claim arising out of or under the contract is determined by the competent court and that the contractor will have no claim for interest or damages whatsoever on any account in respect of such withholding or retention under the lien referred to above and duly notified as such to the contractor. For the purpose of this clause, where the contractor is a partnership firm or a limited company, the Engineer-in-Charge or the BSCDCL shall be entitled to withhold and also have a lien to retain towards such claimed amount or amounts in whole or in part from any sum found payable to any partner/limited company, as the case may whether in his individual capacity or otherwise. BSCDCL shall have the right to cause an audit and technical examination of the works and the final bills of the contractor including all supporting vouchers, abstract, etc, to be made after payment of the final bill and if as a result of such audit and technical examination any sum is found to have been overpaid in respect of any work done by the contractor under the contract or any work claimed to have been done by him under the contract and found not to have been executed, the contractor shall be liable to refund the amount of over-payment and it shall be lawful for BSCDCL to recover the same from him in the manner prescribed in tender document of this clause or in any other manner legally permissible; and if it is found that the contractor was paid less than what was due to him under the contract in respect of any work

executed by him under it, the amount of such under payment shall be duly paid by BSCDCL to the contractor, without any interest thereon whatsoever.

LIEN IN RESPECT OF CLAIMS IN OTHER CONTRACTS

Any sum of money due and payable to the contractor (including the security deposit returnable to him) under the contract may be withheld or retained by way of lien by the Engineer-in-Charge or by BSCDCL against any claim of the Engineer-in-Charge or BSCDCL in respect of payment of a sum of money arising out of or under any other contract made by the contractor with the Engineer-in-Charge or the BSCDCL. It is an agreed term of the contract that the sum of money so withheld or retained under this clause by the Engineer-in-Charge or the BSCDCL will be kept withheld or retained as such by the Engineer-in-Charge or the BSCDCL or till his claim arising out of the same contract or any other contract is either mutually settled or determined by the competent court, as the case may be, and that the contractor shall have no claim for interest or damages whatsoever on this account or on any other ground in respect of any sum of money withheld or retained under this clause and duly notified as such to the contractor.

WORK TO BE EXECUTED IN ACCORDANCE WITH SPECIFICATIONS, DRAWINGS AND ORDERS ETC.

All items of work in the bill of quantities/ schedule of quantities shall be carried out as per the UADD (as the case may be) specifications, drawings and instructions of the Engineer-in-Charge of BSCDCL and the rates shall include for supply of required materials including proper storage, consumables, skilled & unskilled labour, supervision and tools, tackles, plant & machinery complete as called for in the detailed specifications and conditions of the contract. Latest updated UADD specification shall be followed for execution of work.
The contractor shall execute the whole and every part of the work in the most substantial and workman like manner both as regards materials and otherwise in every respect in strict accordance with the specifications.

The contractor shall also conform exactly, fully and faithfully to the design, drawings and instructions in writing in respect of the work assigned by the Engineer-in-Charge.

The contractor shall comply with the provisions of the contract and execute the works with care and diligence and maintain the works and provide all labour and materials, tools and plants including for measurements and supervision of all works, structural plans and other things of temporary or permanent nature required for such execution and maintenance in so far as the necessity for providing these, is specified or is reasonably inferred from the contract. The contractor shall take full responsibility for adequacy, suitability and safety of all the works and methods of construction.

MATERIALS TO BE PROVIDED BY THE CONTRACTOR

The contractor shall, at his own expense, provide all materials, required including Cement & Steel for the works. The contractor shall at his own expense and without delay; supply to the Engineer-in-Charge samples of materials to be used on the work and shall get the same approved in advance. All such materials to be provided by the Contractor shall be in conformity with the specifications laid down or referred to in the contract.

The contractor shall, if requested by the Engineer-in-Charge furnish proof, to the satisfaction of the Engineer-in-Charge that the materials so comply.

The contractor shall at his risk and cost, submit the samples of materials to be tested or analyzed and bear all charges and cost of testing unless specifically provided for otherwise elsewhere in the contract or specifications. The Engineer-in-Charge or his authorized representative shall at all times have access to the works and to all workshops and places where work is being prepared or from where materials, manufactured articles or machinery are being obtained for the works and the contractor shall afford every facility and every assistance and cost in obtaining the right and visit to such access. The Engineer-in-Charge shall have full powers to require the removal from the premises of all materials which in his opinion are not in accordance with the specifications and in case of default, the Engineer-in-Charge shall be at liberty to employ at the expense of the contractor, other persons to remove the same without being answerable or accountable for any loss or damage that may happen or arise to such materials. The Engineer-in-Charge shall also have full power to require other proper materials to be substituted thereof and in case of default, the Engineer-in-Charge may cause the same to the supplies and all costs which may require such removal and substitution shall be borne by the contractor

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MATERIALS AND SAMPLES

The materials/products used on the works shall be one of the approved make/ brands out of list of manufacturers / brands /makes given in the tender documents. The contractor shall submit samples/ specimens out of approved makes of materials/ products to the Engineer-in-Charge for prior approval. In exceptional circumstances Engineer-in-Charge may allow alternate equivalent makes/brands of products/ materials at his sole discretion. The final choice of brand / make shall remain with the Engineer- in-Charge, whose decision in this matter shall be final and binding and nothing extra on this account shall be payable to the Contractor. In case single brand/ make are mentioned, other equivalent makes/ brands may be considered by the Engineer-in-Charge. In case of variance in UADD Specifications from approved products/makes specification, the specification of approved product/make shall prevail for which nothing shall be paid extra to the Contractor. In case no make or brand of any materials, articles, fittings and accessories etc. is specified, the same shall comply with the relevant Indian Standard Specifications and shall bear the ISI/BIS mark. The Engineer of BSCDCL and the owner shall have the discretion to check quality of materials and equipment's to be incorporated in the work, at source of supply or site of work and even after incorporation in the work. They shall also have the discretion to check the workmanship of various items of work to be executed in this work. The contractor shall provide the necessary facilities and assistance for this purpose.

The above provisions shall not absolve the contractor from the quality of final product and in getting the material and workmanship quality checked and approved from the Engineer-in-Charge of BSCDCL.

The contractor shall well in advance, produce samples of all materials, articles, fittings, accessories etc. that he proposes to use and get them approved in writing by BSCDCL. The materials articles etc. as approved shall be *LABELLED* as such and shall be signed by BSCDCL and the Contractor's representative.

The approved samples shall be kept in the custody of the Engineer-in- Charge of BSCDCL till completion of the work. Thereafter the samples except those destroyed during testing shall be returned to the contractor No payment will be made to the contractor for the samples or samples destroyed in testing.

The brands of all materials, articles fittings etc. approved together with the names of the manufacturers and firms from which supplies have been arranged shall be recorded in the site order book.

The contractor shall set up and maintain at his cost, a field testing laboratory for all day to day tests at his own cost to the satisfaction of the Engineer-in-Charge. This field testing laboratory shall be provided with equipment and facilities to carry out all mandatory field tests as per UADD (as the case may be) specifications. The laboratory building shall be constructed and installed with the appropriate facilities, Temperature and humidity controls shall be available wherever necessary during testing of samples. All equipment's shall be provided by the Contractor so as to be compatible with the testing requirements specified. The Contractor shall maintain all the equipment's in good working condition for the duration of the contract. The Contractor shall provide approved qualified personnel to run the laboratory for the duration of the Contract. The number of staff and equipment available must at all times be sufficient to keep pace with the sampling and testing programmer as required by the Engineer-in-charge. The Contractor shall fully service the site laboratory and shall supply everything necessary for its proper functioning, including all transport needed to move equipment and samples to and from sampling points on the site, etc. The Contractor shall re-calibrate all measuring devices whenever so required by the Engineer-in-charge and shall submit the results of such calibration without delay. All field test shall be carried out in the presence of BSCDCL's representative. All costs towards samples, materials, collection, transport, manpower, testing etc. shall be borne by the Contractor and are deemed to be included in the rates quoted by him in the bill of quantities.
The contractor(s) shall display the calibration certificate of each equipment at the location of equipment & shall get recalibrated at least one week before its expiry date.

MATERIALS PROCURED WITH THE ASSISTANCE OF BSCDCL

If any material for the execution of this contract is procured with the assistance of BSCDCL either by issue from its stores or purchase made under orders or permits or licenses obtained by BSCDCL, the contractor shall hold and use the said materials economically and solely for the purpose of this contract and shall not dispose them without the permission of Engineer-in-charge. The contractor, if required by the BSCDCL, shall return all such surplus or unserviceable materials that may be left with him after the completion of the contract or at its termination on whatsoever reason, on being paid or credited such price as the Engineer-in-charge shall determine having due regard to the conditions of materials. The price allowed to the contractor, however, shall not exceed the amount charged to him excluding the element of storage charges which shall be 10% of the cost charged to contractor. The decision of the Engineer-in-charge shall be final and conclusive.

Contractor(s) has / have to deploy security personnel for safeguarding of materials procured at site.

CONTRACTOR TO SUPPLY TOOLS & PLANTS

The contractor shall provide at his own cost all materials, machinery, tools & plants as require for completion of work. In addition to this, appliances, implements, other plants, ladders, cordage, tackle, scaffolding and temporary works required for the proper execution of the work, whether original, altered or substituted and whether included in the specifications or other documents forming part of the contract or referred to in these conditions or not, or which may be necessary for the purpose of

satisfying or complying with the requirements of the Engineer-in-Charge as to any matter as to which under these conditions he is entitled to be satisfied, or which he is entitled to require together with carriage therefore to and from the work. The contractor shall also supply without charge the requisite number of persons with the means and materials, necessary for the purpose of setting out works, and counting, weighing and assisting the measurement or examination at any time and from time to time of the work or materials. Failing his so doing, the same may be provided by the Engineer-in-Charge at the expense of the contractor and the expenses may be deducted, from any money due to the contractor, under this contract or otherwise and/or from his security deposit or the proceeds of sale thereof, or of a sufficient portions thereof.

MOBILIZATION OF MEN, MATERIALS AND MACHINERY:

All expenses towards mobilization at site and de-mobilization including bringing in equipment, work force, materials, dismantling the equipment's, clearing the site etc. shall be deemed to be included in prices quoted and no separate payment on account of such expenses shall be entertained.

It shall be entirely the Contractor's responsibility to provide, operate and maintain all necessary construction equipment's, scaffoldings and safety, gadget, lifting tackles, tools and appliances to perform the work in a workman like and efficient manner and complete all jobs as per the specifications and within the schedule time of completion of work. Further, contractor shall also be responsible for obtaining temporary electric and water connection for all purposes. The contractor shall also make standby arrangement for water & electricity to ensure un-interrupted supply.

It shall be the responsibility of the contractor to obtain the approval for any revision and/or modification desired by him from BSCDCL before implementation.

The procurement and supply in sequence and at the appropriate time of all materials and consumable shall be entirely the contractor's responsibilities and his rates for execution of work shall be inclusive of supply of all these items.

It is mandatory for the contractor to provide safety equipment's and gadgets to his all workers, supervisory and Technical staff engaged in the execution of the work while working. The minimum requirement (but not limited to) shall be gum boots, safety helmets, Rubber hand gloves, face masks, safety nets, safety belts, goggles etc. as per work requirements. Sufficient nos. of these equipment's and gadgets shall also be provided to BSCDCL by the contractor at his own cost for use of BSCDCL Officials and/ or workforce while working/supervision of work at site. No staff/ worker shall be allowed to enter the site without these equipment's/ gadgets.

The cost of the above equipment's/ gadgets are deemed to be included in the rates quoted by the contractor for the items & works as per Bill of Quantities and contractor shall not be entitled for any extra payment in these regard. The above norm is to be strictly complied with at site. In case the contractor is found to be deficient in providing Safety Equipment's/ Gadgets in the opinion of Engineer-in-charge, the Engineer-in-charge at his option can procure the same at the risk & cost of contractor and provide the same for the use of worksite and shall make the recoveries from the bills of the contractor for the same. The contractor shall abide by all rules & regulations pertaining to Health, Safety and Environment.

It shall be the duty and responsibility of the contractor to bring to the notice of the BSCDCL in writing as to any variation, discrepancy or any other changes required and to obtain revised drawings and designs and / or approval of the BSCDCL in writing for the same.

All materials, construction plants and equipment's etc. once brought by the contractor within the project area, will not be allowed to be removed from the premises without the written permission of the Engineer-in-charge. Similarly all enabling works built by the contractor for the main construction undertaken by him, shall not be dismantled and removed without the written authority of the BSCDCL.

Contractor shall have to prepare the Bar Bending Schedule, shop and fabrication drawings free of cost, if required for any of the items of work.

Five copies of these drawings each including for revision will be submitted to BSCDCL for approval. Before executing the item, shop drawings and bar bending schedule should be approved by BSCDCL.

BSCDCL shall supply Work Force in the various categories to assist the contractor in execution of the works on recoverable basis as per provision mentioned elsewhere in the contract.

All contractors' plant, machinery and equipment shall be kept in perfect condition during currency of the contract.

QUALITY ASSURANCE PROGRAMME

To ensure that the services under the scope of this contract are in accordance with the specifications, the Contractor shall adopt Quality Assurance Programme to control such activities at the necessary points:
The contractor shall prepare and finalize such Quality Assurance Programme within 15 days from date of issue Letter of Intent. BSCDCL shall also carryout quality audit and quality surveillance of systems and procedures of Contractor's quality control activities. A Quality Assurance Programmer of Contractor shall generally cover the following:

His organization structure for the management and implementation of the proposed Quality Assurance Program.

- Documentation control system.
- The procedure for purpose of materials and source inspection.
- System for site controls including process controls.
- Control of non-conforming items and systems for corrective actions.
- Inspection and test procedure for site activities.
- System for indication and appraisal of inspection status.
- System for maintenance of records.
- System for handling, storage and delivery.

A quality plan detailing out quality practices and procedures, relevant standards and acceptance levels for all types of work under the scope of this contract.

All the quality reports shall be submitted by the Contractors in the formats appended hereto. Checklist enclosed here in this document shall be followed while carrying out

Construction activities (items). If any item is not covered by the Checklist/ Formats appended hereto, the Format for the same may be developed and submitted to Engineer-in-Charge for approval and the same shall be adopted. These filled in formats shall be prepared in two copies and duly signed by representatives of contractor and BSCDCL. All the costs associate with Printing of Formats and testing of materials required as per technical specifications or by Engineer-in-charge shall be included in the Contractor's quoted rates in the Schedule/ Bill of quantities.

CONTRACT COORDINATION PROCEDURES, COORDINATION

MEETINGS AND PROGRESS REPORTING

The Contractor shall prepare and finalize in consultation with BSCDCL, a detailed contract coordination procedure within 15 days from the date of issue of Letter of Intent for the purpose of execution of the Contract. The Contractor shall have to attend all the meetings at any place in India at his own cost with BSCDCL, Owners/ Clients or Consultants of BSCDCL/ Owner/ Client during the currency of the Contract, as and when required and fully cooperate with such personal and agencies involved during these discussions. The Contractor shall not deal in any way directly with the Clients/ Owners or Consultants of BSCDCL/Owner/ Clients and any dealing/correspondence if required at any time with Clients/ Owners/ Consultants shall be through BSCDCL only. During the execution of the work, Contractor shall submit at his own cost a detailed Monthly progress & programme report to the Engineer-in-charge of BSCDCL by 5th of every month. The format of monthly progress & programme report shall be as approved by Engineer-in-Charge of BSCDCL.

COMPLETION CERTIFICATE AND COMPLETION PLANS

Within ten days of the completion of the work, the contractor shall give notice of such completion to the Engineer-in-Charge and within thirty days of the receipt of such notice, the Engineer-in-Charge shall inspect the work and if there is no defect in the work, shall furnish the contractor with a final certificate of completion, otherwise a provisional certificate of physical completion indicating defects (a) to be rectified by the contractor and/or (b) for which payment will be made at reduced rates, shall be issued. But no final certificate of completion shall be issued, nor shall the work be considered to be complete until the contractor shall have removed from the premises on which the work shall be executed all scaffolding, surplus materials, rubbish and all huts and sanitary arrangements required for his/their work people on the site in connection with the execution of the works as shall have been erected or constructed by the contractor(s) and cleaned off the dirt from all wood work, doors, windows, walls, floor or other parts of the building, in, upon, or about which the work is to be executed or of which he may have had possession for the purpose of the execution; thereof, and not until the work shall have been measured by the Engineer-in-Charge. If the contractor shall fail to comply with the requirements of this Clause as to removal of scaffolding, surplus materials and rubbish and all huts and sanitary arrangements as aforesaid and cleaning off dirt on or before the date fixed for the completion of work, the Engineer-in-Charge may at the expense of the contractor remove such scaffolding, surplus materials and rubbish etc., and dispose of the same as he thinks fit and clean off such dirt as aforesaid, and the contractor shall have no claim in respect of scaffolding or surplus materials as aforesaid except for any sum actually realized by the sale thereof less actual cost incurred on removal of materials / debris / malba etc.

The contractor shall submit completion plan as required vide General Specifications for Electrical works as applicable within thirty days of the completion of the work. In case, the contractor fails to submit the completion plan as aforesaid, he shall be liable

to pay a sum equivalent to 2.5% of the value of the work subject to a ceiling of Rs.5,00,000 (Rs. Five Lakhs only) as may be fixed by the Engineer-in-charge concerned and in this respect the decision of the Engineer-in-charge shall be final and binding on the contractor.

PROHIBITION OF UNAUTHORISED CONSTRUCTION & OCCUPATION

No unauthorized buildings, construction of structures should be put up by the contractor anywhere on the project site, neither any building built by him shall be occupied in un-authorized manner by him or his staff.

It shall be the responsibility of the contractor to see that the building under construction is not occupied by anybody in un-authorized manner during construction, and is handed over to the Engineer-in-Charge with vacant possession of complete building. If such building though completed is occupied illegally, then the Engineer-in-Charge shall have the option to refuse to accept the said building/buildings in that position. Any delay in acceptance on this account will be treated as the delay in completion and for such delay, a levy of compensation upto 5% of tendered value of work may be imposed by the Engineer-in-Charge whose decision shall be final both with regard to the justification and quantum and shall be binding on the contractor.

However, the Engineer-in-Charge, through a notice, may require the contractor to remove the illegal occupation any time on or before construction and delivery.

FORECLOSURE OF CONTRACT BY BSCDCL/OWNER

If at any time after the commencement of the work the BSCDCL shall for any reason whatsoever is required to abandon the work or is not require the whole work thereof as specified in the tender to be carried out, the Engineer-in-Charge shall give notice in writing of the fact to the contractor, who shall have no claim to any payment of compensation whatsoever on account of any profit or advantage which he might have derived from the execution of the work in full, but which he did not derive in consequence of the foreclosure of the whole or part of the works.

DEFECTS LIABILITY PERIOD

The contractor shall be responsible for the rectification of defects in the works for a period 5 years from the date of taking over of the works by the BSCDCL or clients whichever is later. Any defects discovered and brought to the notice of the contractor forthwith shall be attended to and rectified by him at his own cost and expense. In case the contractor fails to carry out these rectifications, the same may without prejudice to any other right or remedy available, be got rectified by BSCDCL at the cost and expense of the contractor.

The Contractor is expected to carry out the construction work in Workmen like manner so as to meet the requirement and specification for the project. It is expected that the Workmanship and materials will be reasonably fit for the purpose for which they are required.

Defects or defective work is where standard and quality of workmanship and materials as specified in the contract is deficient. Defect is defined as a failure of the completed project to satisfy the express or implied quality or quantity

obligations of the construction contract. Defective construction works are as the works which fail short of complying with the express descriptions or requirements of the contract, especially any drawings or specifications with any implied terms and conditions as to its quality, workmanship, durability, aesthetic, performance or design. Defects in construction projects are attributable to various reasons.

Some of the defects are structural defects results in cracks or collapse of faulty defective plumbing, inadequate or faulty drainage system, inadequate or faulty ventilation, cooling or heating systems, inadequate fire systems etc. The defects could be various on accounts of different reasons for variety of the projects.

The Engineering In charge/Project Officer shall issue the practical completion certificate for the project. During the Defect Liability Period which commences on completion of the work, the Engineering In charge shall inform or the contractor is expected to be informed of any defective works by the Employer's representative of the defects and make good at contractor's cost with an intention of giving opportunity to the contractor of making good the defects appeared during that period. It is the contractor's obligation under the contract to rectify the defects that appear during Defect Liability Period and the contractor shall within a reasonable time after receipt of such instructions comply with the same at his own cost. The Engineering In charge/Project Officer shall issue a certificate to that effect and completion of making good defects shall be deemed for all the purpose of this contract to have taken place on the day named in such defect liability certificate.

If defective work or workmanship or design have been knowingly covered-up or conceived so as to constitute fraud, commencement of the Defect Liability Period may be delayed. The decided period may be delayed until **discover** actually occurs on at least the defect could have been discovered with reasonable diligence, whichever is earlier.

Also, in case of defect, the Engineer shall give notice to the Contractor of any Defects before the end of the Defects Liability Period, which begins at. The Defects Liability Period shall be extended for as long as Defects remain to be corrected. 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. The Engineer may issue notice to the Contractor to carry out removal of defects or deficiencies, if any, noticed in his inspection, or brought to his notice. The Contractor shall remove the defects and deficiencies within the period specified in the notice and submit to the Engineer a compliance report.

It is the Completion Stage when the contractor has completed all of the works and fixed all of the defects that were on the list of issue by Engineer-in-charge. When this happens, the engineer must issue a 'Certificate of Completion'. On the issue of 'Certificate of Completion', the 'Defect Liability Period 'starts. The contractor also must issue a 'Certificate statement' as an acknowledgment to the engineer not later than 14 days after the 'Certificate of Completion' has been issued. During the 'Defect Liability Period',

the contractor has to obey all written instructions from the engineer to carryout repairs and fix any defects which appear in the Permanent Works. If the contractor does not ,due to his own faults finish the repair works or fix the defects by the end of 'Defect Liability Period', the 'Defect Liability Period' will continue until all works instructed by engineer is done.

RESTRICTION ON SUBLETTING

The contractor shall not sublet or assign the whole or part of the works except where otherwise provided, by the contract. The provision of labour on piece work basis shall not be deemed to be a subletting under this clause.

The contractor may entrust specialist items of works like MEP services, Water Proofing, interiors, landscaping etc. to the agencies specialized in the specific trade. The contractor shall give the names and details of such firm whom it is going to employ for approval of BSCDCL. These details shall include the expertise, financial status, technical manpower, equipment, resources and list of works executed and on hand of the specialist agency. Further, prior written approval is required from BSCDCL to deploy such agency / sub-contractor.

FORCE MAJEURE

Any delay in or failure to perform of either party, shall not constitute default so as to give rise to any claim for damages, to the extent such delay or failure to perform is caused by an act of God, or by fire, explosion, flood or other natural catastrophe, governmental legislation, orders or regulation etc. Failure of the client / owner to hand over the entire site and / or release funds for the project, to BSCDCL, shall also constitute force majeure. The time for performance of the obligation by the parties shall be deemed to be extended for a period equal to the duration of the force majeure event. Both parties shall make their best efforts to minimize the delay caused by the force majeure event. If the failure / delay of the client /owner in handing over the entire site and / or in releasing the funds continues even on the expiry of the stipulated date of completion, BSCDCL, may, at the request of the contractor, foreclose the contract without any liability to either party. In the event of such foreclosure, the contractor shall not be entitled to any compensation whatsoever. If prior to such foreclosure the contractor has brought any materials to the site, the Engineer-in-Charge shall always have the option of taking over of all such materials at their purchase price or at the local current rates, whichever is lower.

NO COMPENSATION CLAUSE

The contractor shall have no claim whatsoever for compensation or idle charges against BSCDCL on any ground or for any reason, whatsoever.

DIRECTION FOR WORKS

All works under the contract shall be executed under the direction and subject to approval in all respect of the Engineer-in-Charge of BSCDCL who shall be entitled to direct at whatever point or points and in whatever manner works are to be commenced and executed.

The Engineer-in-Charge and his representative shall communicate or confirm their instructions to the contractor in respect of the execution of work during their site inspection in a 'Works Site Order Book' maintained at the site office of Engineer-in-

Charge. The contractor or his authorized representative shall confirm receipt of such instructions by signing against the relevant orders in the book.

WORK IN MONSOON AND RAIN

The execution of the work may entail working in the monsoon also. The contractor must maintain labour force as may be required for the job and plan and execute the construction and erection according to the prescribed schedule. No special/ extra rate will be considered for such work in monsoon. The contractors' rate shall be considered inclusive of cost of dewatering due to rains required if any and no extra rate shall be payable on this account. The stipulated period for completion of project includes the monsoon period, holidays & festivals.

WORK ON SUNDAYS, HOLIDAYS AND DURING NIGHT

For carrying out work on Sunday and Holidays or during night, the contractor will approach the Engineer-in-Charge or his representative at least two days in advance and obtain his permission. The Engineer-in- Charge at his discretion can refuse such permission. The contractor shall have no claim on this account whatsoever. If work demand, the contractor shall make arrangements to carry out the work on Sundays, Holidays and in two, three shifts with the approval of Engineer-in-Charge at no extra cost to BSCDCL.

WATER AND ELECTRICITY

The contractor shall make his own arrangement for Water & Electrical power for construction and other purposes at his own cost and pay requisite electricity and water charges. The contractor shall also make standby arrangement for water & electricity to ensure un-interrupted supply.

LAND FOR LABOUR HUTS/SITE OFFICE & STORAGE ACCOMMODATION

The contractor shall arrange the land for temporary office, storage accommodation and labour huts at his own cost and get the clearance of local authorities for setting up/construction of labour camp and same is deemed to be included in the rates quoted by the contractor for the works. The contractor shall ensure that the area of labour huts is kept clean and sanitary conditions are maintained as laid down by the local authorities controlling the area. The labour huts shall be so placed that it does not hinder the progress of work or access to the worksite. The vacant possession of the land used, for the purpose shall be given back by contractor after completion of the work.

The security deposit of the contractor shall be released only after contractor demolishes all structures including foundations and gives back clear vacant possession of this land In the event the contractor has to shift his labour campus at any time during execution of the work on the instructions of local authorities or as per the requirement of the work progress or as may be required by BSCDCL, he shall comply with such instructions at his cost and risk and no claim whatsoever shall be entertained on this account.

WATCH, WARD AND LIGHTING OF WORK PLACE

The contractor shall at his own cost take all precautions to ensure safety of life and property by providing necessary barriers, OBSTRUCTIONS, lights, watchmen etc. during the progress of work as directed by Engineer-in- charge.

SCHEDULE OF QUANTITIES / BILL OF QUANTITIES

The quantities shown against the various items of work are only approximate quantities which may vary as per the actual requirement at site. No item which is not covered in the bill of quantities shall be executed by the Contractor without the approval of the BSCDCL. In case any Extra/Substituted item is carried out without specific-approval, the same will not be paid.

WATER PROOF TREATMENT

3.8 The water proof treatment shall be of type and specifications as given in the schedule of quantities.

The water-proofing of basement, roofs, water retaining areas shall be and remain fully effective for a period of not less than 10(Ten) years to be reckoned from the date of expiring of the Defect Liability period, prescribed in the contract. At any time during the said guarantee period if BSCDCL finds any defects in the said treatment or any evidence of re-infestation, dampness, leakage in any part of buildings or structure and notifies the contractor of the same, the contractor shall be liable to rectify the defect or give re-treatment and shall commence the work or such rectification or re-treatment within seven days from the date of issue of such letter to him. If the contractor fails to commence such work within the stipulated period, the BSCDCL may get the same done by another agency at the Contractor's cost and risk and the decision of the Engineer-in-Charge of BSCDCL for the cost payable by the contractor shall be final and binding upon him.

Re-treatment if required shall be attended to and carried out by the Contractor within seven days of the notice from Engineer-in-Charge of BSCDCL.

The BSCDCL reserves the right to get the quality of treatment checked in accordance with recognized test methods and in case it is found that the **c**hemicals with the required concentration and rate of application have not been applied, or the water proofing treatment is not done as per specifications, the contractor will be required to do the re-treatment in accordance with the required concentration & specifications at no extra cost failing which no payment for such work will be made. The extent of work thus rejected shall be determined by BSCDCL. Water proofing shall be got done through approved / specialized agencies only with prior approval of Engineer-in-Charge.

The contractor shall make such arrangement as may be necessary to safe guard the workers and residents of the building against any poisonous effect of the chemicals used during the execution of the work.

During the execution of work, if any damage shall occur to the treatment already done, either due to rain or any other circumstances, the same shall be rectified and made good to the entire satisfaction of Engineer-In-Charge by the contractor at his cost and risk.

The contractor shall make his own arrangement for all equipment's required for the execution of the job. The contractor whose tender is accepted shall execute Guarantee Bond in the prescribed form as appended for guaranteeing the water proofing treatment.

INDIAN STANDARDS

Wherever any reference is made to any IS in any particular specifications, drawings or bill of quantities, it means the Indian Standards editions with up to date amendments issued till last date of receipt of tender documents.

CENTERING & SHUTTERING

Marine plywood or steel plates or any material mentioned elsewhere in the tender document or as approved by Engineer-in-Charge shall be used for formwork. The shuttering plates shall be cleaned and oiled before every repetition and shall be used only after obtaining approval of BSCDCL's Engineers at site. The number of repetitions allowed for plywood and steel shuttering shall be at the discretion of Engineer-in-Charge of BSCDCL depending upon the condition of shuttering surface after each use and the decision of Engineer-in-Charge in this regard shall be final and binding on the contractor. No claim whatsoever on this account shall be admissible.

RECORDS OF CONSUMPTION OF CEMENT & STEEL

For the purpose of keeping a record of cement and steel received at site and consumed in works, the contractor shall maintain a properly bound register in the form approved by the BSCDCL, showing columns like quantity received and used in work and balance in hand etc. This register shall be signed daily by the contractor's representative and BSCDCL's representative.

The register of cement & steel shall be kept at site in the safe custody of BSCDCL's Engineer during progress of the work. This provision will not, however, absolve the contractor from the quality of the final product.

In case cement or steel quantity consumed is lesser as compared to the

theoretical requirement of the same as per MORTH/UADD/MPPWD/CPWD (as the case may be) specifications/ norms, the work will be devalued and/ or a penal rate (i.e. double the rate at which cement/ steel purchased last) recovery for lesser consumption of cement/ steel shall be made in the item rates of the work done subject to the condition that the tests results fall within the acceptable criteria as per MORTH/UADD/MPPWD/CPWD (as the case may be) specifications otherwise the work shall have to be dismantled and redone by the contractor at no extra cost. In case of cement, if actual consumption is less than 98% of the theoretical consumption, a recovery shall be effected from the contractors bills at the penal rate for the actual quantity which is lower than 98% of theoretical consumption.

TESTS AND INSPECTION

The contractor shall carry out the various mandatory tests as per specifications and the technical documents that will be furnished to him during the performance of the work. All the tests on materials, as recommended by UADD/MPPWD/CPWD, MORTH and relevant Indian Standard Codes or other standard specifications (including all amendments current at the last date of submission of tender documents) shall be got carried out by the contractor at the field testing laboratory or any other recognized institution/ laboratory, at the direction of the BSCDCL. All testing charges, expenses

etc. shall be borne by the contractor. All the tests, either on the field or outside laboratories concerning the execution of the work and supply of materials shall be got carried out by the contractor or BSCDCL at the cost of the Contractor.

WORKS TO BE OPEN TO INSPECTION

All works executed or under the course of execution in pursuance of this contract shall at all times be open to inspection and supervision of the BSCDCL. The work during its progress or after its completion may also be inspected, by Chief Technical Examiner of Government of India (CTE) and/or an inspecting authority of State Government of State in which work is executed and/or by third party checks by owner/lients. The compliance of observations/improvements as suggested by the inspecting officers of BSCDCL/CTE/ State authorities/ Owners shall be obligatory on the part of the Contractor at the cost of contractor.

BORROW AREAS

The contractor shall make his own arrangements for borrow pits and borrow disposal areas including their approaches and space for movement of man, machinery, other equipment's as required for carrying out the works. The contractor shall be responsible for taking all safety measures, getting approval, making payment of royalties, charges etc. and nothing extra shall be paid to the contractor on this account and unit rates quoted by the contractor for various items of bill of quantities shall deemed to include the same.

3.9 CARE OF WORKS

From the commencement to the completion of works and handing over, the contractor shall take full responsibility for care thereof all the works and in case of any damage/loss to the works or to any part thereof or to any temporary works due to lack of precautions or due to negligence on part of Contractor, the same shall be made good by the Contractor.

CO-ORDINATION WITH OTHER AGENCIES

Work shall be carried out in such a manner that the work of other Agencies operating at the site is not hampered due to any action of the Contractor. Proper Co-ordination with other Agencies will be Contractor's responsibility. In case of any dispute, the decision of BSCDCL shall be final and binding on the contractor. No claim whatsoever shall be admissible on this account.

SETTING OUT OF THE WORKS

The contractor shall be responsible for the true and proper setting out of the works and for the correctness of the position, levels, dimensions and alignment of all parts of the works. If at any time during the progress of works, shall any error appear or arise in the position, levels, dimensions or alignment of any part of the works, the contractor shall at his own expenses rectify such error to the satisfaction of Engineer-in-charge. The checking of any setting out or of any line or level by the engineers of BSCDCL shall not in any way relieve the contractor of his responsibility for the correctness.

NOTICE BEFORE COVERING UP THE WORK

The contractor shall give not less than seven days' notice before covering up or otherwise placing beyond the reach of measurement

any work, to the Engineer-in-charge in order that the same may be inspected and measured. If any work is covered up or placed beyond the reach of inspection/measurement without such notice or his consent being obtained the same shall be uncovered at the contractor expenses and he shall have to make it good at his own expenses.

SITE CLEARANCE

The contractor shall ensure that the working site is kept clean and free of obstructions for easy access to job site and also from safety point of view. Before handing over the work to the BSCDCL the contractor shall remove all temporary structures like the site offices, cement go-down, stores, labour hutments etc., scaffolding rubbish, debris etc. left over materials tools and plants, equipment's etc., clean the site to the entire satisfaction of the Engineer-in-charge. If this is not done the same will be got done by BSCDCL at his risk and cost.

The contractor shall clean all floors, remove cement/ lime/ paint drops and deposits, clean joinery, glass panes etc., touching all painter's works and carry out all other necessary items of works to make the premises clean and tidy before handing over the building, and the rates quoted by the contractor shall be deemed to have included the same.

SET-OFF OF CONTRACTOR'S LIABILITIES

BSCDCL shall have the right to deduct or set off the expenses incurred or likely to be incurred by it in rectifying the defects and/or any claim under this agreement against the Contractor from any or against any amount payable to the contractor under this agreement including security deposit and proceeds of performance guarantee.

POSSESSION PRIOR TO COMPLETION

BSCDCL shall have the right to take possession of or use any completed or partially completed work or part of the work. Such possession or use shall not be deemed to be any acceptance of any work not completed in accordance with the contract agreement. If such prior possession or use by BSCDCL delays the progress of work an equitable adjustment in the time of completion will be made and the contract agreement shall be deemed to be modified accordingly. The decision of BSCDCL in such case shall be final binding and conclusive.

When the whole of the works or the items or the groups of items of work have been completed the contractor will give a notice to that effect to the Engineer in writing. The Engineer shall within 7 days of the date of receipt of such notice inspect the works and give instructions in writing to the contractor specifying the balance items of work which are required to be done by the contractor and shall also notify the contractor of any defect in the works affecting completion.

3.10 The contractor shall during the course of execution prepare and keep updated a complete set of 'as built' drawings to show each and every change from the contract drawings, changes recorded shall be countersigned by the Engineer-in-Charge and the contractor. Four copies of 'as built' drawings shall be supplied to BSCDCL by the contractor within 30 days of the completion. All costs incurred in this respect shall be borne by the contractor.

EMPLOYMENT OF PERSONNEL

The contractor shall employ only Indian Nationals as his representatives, servants and workmen after verifying their antecedents and loyalty. He shall ensure that no personnel of doubtful antecedents and any other nationality in any way is associated with the works.

In case BSCDCL observed misconduct negligence or incompetence etc. on the part of any representative, agent, servant and workmen or employees etc. of the contractor, the BSCDCL shall have full power and without giving any reason to the contractor, instruct the contractor to remove such engineer / staff / worker from site and provide suitable replacements. The decision of the Engineer-in-charge shall be final and binding on the contractor. The contractor shall not be allowed any compensation on this account.

TECHNICAL STAFF FOR WORK

The contractor shall employ at his cost the adequate number of technical staff during the execution of this work depending upon the requirement of work. For this purpose the numbers to be deployed, their qualification, experience as decided by BSCDCL shall be final and binding on contractor. The contractor shall not be entitled for any extra payment in this regard.

The technical staff should be available at site, whenever required by BSCDCL to take instructions.

Within 15 days of Letter of Intent, the contractor shall submit a site organizational chart and resume including details of experience of the Project-in-Charge and other staff proposed to be deputed by him and the technical team shall be deputed by them on the Project after getting approval from Engineer-in-Charge. If desired by the contractor at later date, the Project-in-Charge and other staff whose resume is approved by BSCDCL can be replaced with prior written approval of BSCDCL and replacement shall be with equivalent or superior candidate only. Decision of Engineer-in-Charge shall be final and binding on the contractor.

Even after approving the site organizational chart, the Engineer-in-Charge due to technical reasons and exigency of work can direct the contractor to depute such additional staff as in view of Engineer-in-Charge is necessary and having qualification and experience as approved by the Engineer-in-Charge. The removal of such additional staff from the site shall only be with the prior written approval of Engineer-in-Charge. The contractor shall not be paid anything extra whatsoever on account of deployment of additional staff and decision of the Engineer-in-Charge shall be final and binding on the contractor.

In case the contractor fails to employ the staff as aforesaid he shall be liable to pay a reasonable amount not exceeding a sum of Rs. 50,000 (Rupees Fifty Thousand only) for each month of default in the case of each person. The decision of the Engineer-in-charge as to number of Technical Staff to be adequate for the project and the period for which the desired strength of technical staff was not employed by the contractor and as to the reasonableness of the amount to be deducted on this account shall be final and binding on the contractor as to the amount and the contractor's liability to pay the said amount.

VALUABLE ARTICLES FOUND AT SITE

All gold, silver and other minerals of any description and all precious stones, coins, treasure, relics, antiques and all other similar things which shall be found in, under or upon the site, shall be the property of the owner/ BSCDCL.

MATERIALS OBTAINED FROM DISMANTLEMENT TO BE OWNER'S

PROPERTY

All materials like stone, boulders and other materials obtained during the work of dismantling, excavation etc. will be considered BSCDCL/owner property and such materials shall be disposed off to the best advantage of BSCDCL/owner according to the instructions in writing issued by the Engineer-in-charge.

FURNISHED OFFICE ACCOMMODATION & MOBILITY COMMUNICATION TO BE ARRANGED BY CONTRACTOR

On acceptance of tender, the contractor at his own cost will construct a suitably equipped office at site with basic facilities such as telephone(s), fax, internet, photocopier, computer(s) and printer(s) along with operator(s), regular electric & drinking water supply and and e-vehicles for the BSCDCL's staff / Engineer in Charge (EIC) with driver, fuel and maintenance etc. as per the requirement of the project. The contractor shall maintain the aforesaid facilities intact/operational during the tenancy of the contract or maximum up to 6 months beyond the stipulated contractual completion date if the work is delayed due to any reasons. Operation and maintenance cost of all such materials, equipment's / services shall be borne by the contractor.

The contractor shall also make sufficient arrangement for photography/video-graphy so that photographs video can be taken of any specific activity at any point of time. The contractor shall also make arrangement of software like MS Project etc. for the purpose of preparing progress report etc.

The contractor shall make all arrangements for ground breaking ceremony/inaugural function etc. for the project as required and the cost towards it deemed to be included in his rates/offer. Any expenditure already incurred/to be incurred by BSCDCL, shall be recovered from the contractor.

LABOUR LAWS
LABOUR LAWS TO BE COMPLIED BY THE CONTRACTOR

The contractor shall obtain a valid license under the contract labour (Regulation & Abolition) Act 1970 and the contract labour Act (Regulation &Abolition) Central Rules 1971 and amended from time to time, and continue to have a valid license until the completion of the work including defect liability period. The contractor shall also adhere by the provision of the child labour (Prohibition and Regulation) Act. 1986 and as amended from time to time.

The contractor shall also comply with the provisions of the building and other Construction Workers (Regulation of Employment & Conditions of Service) Act, 1996 and the building and other Construction Workers Welfare Cess Act, 1996.

Any failure to fulfill above requirement shall attract the penal provisions of this contract arising out the resultant for non-execution of the work before the commencement of work. No labour below the age of 18 years shall be employed on the work.

Payment of wages:

The contractor shall pay to labour employed by him either directly or through subcontractors, wages not less than fair wages as defined in the BSCDCL Contractor's Labour Regulations or as per the provisions of the Contract Labour (Regulation and Abolition) Act, 1970 and the contract Labour (Regulation and Abolition) Central Rules, 1971, wherever applicable.

The contractor shall, notwithstanding the provisions of any contract to the contrary, cause to be paid fair wage to labour indirectly engaged on the work, including any labour engaged by his sub-contractors in connection with the said work, as if the labour had been immediately employed by him.

In respect of all labour directly or indirectly employed in the works for performance of the contractor's part of this contract, the contractor shall comply with or cause to be complied with the BSCDCL contractor's Labour Regulations in regard to payment of wages, wage period, deductions from wages recovery of wages not paid and deductions unauthorized made, maintenance of wage books or wage slips, publication of scale of wages and other terms of employment, inspection and submission of periodical returns and all other matters of the like nature or as per the provisions of the Contract Labour (Regulation and Abolition) Act, 1970, and the Contract Labour (Regulation and Abolition) Central Rules, 1971, wherever applicable.

(a) The Engineer-in-Charge concerned shall have the right to deduct from the moneys due to the contractor any sum required or estimated to be required for making good the loss suffered by a worker or workers by reason of non-fulfilment of the conditions of the contract for the benefit of the workers, non-payment of wages or of deductions made from his or their wages which are not justified by their terms of the contract or non-observance of the Regulations.

(b) Under the provision of Minimum Wages (Central) Rules, 1950, the contractor is bound to allow to the labours directly or indirectly employed in the works one day rest for 6 days continuous work and pay wages at the same rate as for duty. In the event of default, the Engineer-in-Charge shall have the right to deduct the sum or sums not paid on account of wages for weekly holidays to any labours and pay the same to the persons entitled thereto from any money due to the contractor by the Engineer-in-Charge concerned

The contractor shall comply with the provisions of the Payment of Wages Act, 1936, Minimum Wages Act, 1948, Employees Liability Act, 1938, Workmen's Compensation Act, 1923, Industrial Disputes Act, 1947, Maternity Benefits Act, 1961, and the Contractor's Labour (Regulation and Abolition) Act 1970, or the modifications thereof or any other laws relating thereto and the rules made there under from time to time.

The contractor shall indemnify and keep indemnified BSCDCL against payments to be made under and for the observance of the laws aforesaid and the BSCDCL

Contractor's Labour Regulations without prejudice to his right to claim indemnity from his sub-contractors.

The laws aforesaid shall be deemed to be a part of this contract and any breach thereof shall be deemed to be a breach of this contract.

LABOUR SAFETY PROVISION

The contractor shall be fully responsible to observe the labour safety provisions:

The contractor shall at his own cost take all precautions to ensure safety of life and property by providing necessary barriers, lights, watchmen etc. during the progress of work as directed by Engineer-in- charge

In case of all labour directly or indirectly employed in work for the performance on the contractor's part of this contract, the contractor shall comply with all rules framed by Govt. from time to time for the protection of health and sanitary arrangements for workers.

OBSERVANCE OF LABOUR LAWS

The contractor shall be fully responsible for observance of all labour laws applicable including local laws and other laws applicable in this matter and shall indemnify and keep indemnified BSCDCL against effect or non observance of any such laws. The contractor shall be liable to make payment to all its employees, workers and sub-contractors and make compliance with labour laws. If BSCDCL or the client/ owner is held liable as "Principal Employer" to pay contributions etc. under legislation of Government or Court decision in respect of the employees of the contractor, then the contractor would reimburse the amount of such payments, contribution etc. to BSCDCL and/ or same shall be deducted from the payments, security deposit etc. of the contractor.

The Contractor shall submit proof of having valid EPF registration certificate. He shall within 7 days of the close of every month, submit to BSCDCL a statement showing the recoveries of contributions in respect of each employee employed by or through him and shall furnish to BSCDCL such information as the BSCDCL is required to furnish under the provisions of para 36 B of the EPF scheme 1952 to the EPF authorities and other information required by EPFO authorities from time to time. He shall also submit a copy of challan every month in token of proof of having deposited the subscription and contribution of workers engaged on the project.

In case, the contractor is not complying the above provision BSCDCL shall withhold payment to the extent of 4.70% (Four point Seven Zero percent) of the value of the Running Account bill and shall release only after the submission of above mentioned details. If it is incumbent upon BSCDCL to deposit withhold amount with EPF authorities, the withhold amount shall be deposited by BSCDCL with EPF authorities. In such a case BSCDCL shall not refund this withheld amount to the contractor even after the production of EPF registration certificate.

MINIMUM WAGES ACT

The contractor shall comply with all the provisions of the minimum wages Act, 1948, contract labour Act (Regulation & Abolition) 1970, and rules framed there under and other labour laws/local laws affecting contract labour that may be brought into force from time to time.

LABOUR CESS

The rates of the contractor shall be inclusive of labour cess. BSCDCL shall make a recovery @ 1% on account of labour cess from each RA bill of the contractor and labour cess so recovered/deducted shall be deposited with the Labour Board of the concerned state. In case the Labour Board is not established in the state, recovery made by BSCDCL on account of labour cess shall be retained under suspense account and will be deposited with the Labour Board at later date as & when the Labour Board is constituted in the state.
Every contractor, sub-contractor, affiliates, their legal assigns or heirs as the case may, shall be responsible for registration of every Building worker who has completed eighteen years of age but has not completed sixty years of age and who has been engaged in any Building or Other Construction Work for not less than Ninety Days during the preceding twelve months; with the Board / Funds as applicable under various sections of "THE BUILDINGS AND OTHER Construction workers (regulation of employment and conditions of service) act, 1996 and the building and other Construction workers' welfare cess act, 1996.

The contractor shall also be responsible for maintaining register of beneficiaries i.e. the workers in such form as may be prescribed by the competent authority & the same shall be kept open at all reasonable times for inspection of relevant authority and officials of client / BSCDCL.

The contractor shall be further responsible for maintaining such register & records; giving such particulars of Building workers employed by him, the work performed by them, the number of hours of work which shall constitute a normal working day, the wages paid to them, the receipts given by them and, such other particulars in such form as may be prescribed by the authority or BSCDCL.

In the event of contractor failing to comply with the above clause(s) in part or in full, BSCDCL, without prejudice to any other rights or remedy available under law or any other clause(s) of contract, shall be at absolute liberty to forfeit any sum or sums that are payable or could become payable on account of execution of contract work and decision of Engineer-in-charge shall be final & binding in this regard on the contractor.

RECOVERY OF COMPENSATION PAID TO WORKMEN

In every case in which by virtue of the provisions sub-section (1) of Section 12, of the Workmen's Compensation Act, 1923, BSCDCL is obliged to pay compensation to a workman employed by the contractor, in execution of the works, BSCDCL will recover from the contractor, the amount of the compensation so paid; and, without prejudice to the rights of the BSCDCL under sub-section (2) of Section 12, of the said Act, BSCDCL shall be at liberty to recover such amount or any part thereof by deducting it from the security deposit or from any sum due to the contractor whether under this contract or otherwise. BSCDCL shall not be bound to contest any claim made against it under sub-section (1) of Section 12, of the said Act, except on the written request of the contractor and upon his giving to BSCDCL full security for all costs for which BSCDCL might become liable in consequence of contesting such claim.

ENSURING PAYMENT AND AMENITIES TO WORKERS IF CONTRACTOR FAILS

In every case in which by virtue of the provisions of the Contract Labour (Regulation and Abolition) Act, 1970, and of the Contract Labour (Regulation and Abolition) Central Rules, 1971, BSCDCL is obliged to pay any amounts of wages to a workman employed by the contractor in execution of the works, or to incur any expenditure in providing welfare and health amenities required to be provided under the above said Act or under the BSCDCL Contractor's Labour Regulations, or under the Rules framed by Government from time to time for the protection of health and sanitary arrangements for workers employed by BSCDCL's Contractors, BSCDCL will recover from the contractor, the amount of wages so paid or the amount of expenditure so incurred; and without prejudice to any other right or remedy available under this contract, BSCDCL shall be at liberty to recover such amount or any part thereof by deducting it from the security deposit or from any sum due by BSCDCL to the contractor whether under this contract or otherwise BSCDCL shall not be bound to contest any claim made against it under sub-section (1) of Section 20, sub-section (4) of Section 21, of the said Act, except on the written request of the contractor and upon his giving to the BSCDCL full security for all costs for which BSCDCL might become liable in contesting such claim.

CHANGE IN FIRM'S CONSTITUTION TO BE INTIMATED

Where the contractor is a partnership firm, the prior approval in writing of the Engineer-in-Charge shall be obtained before any change is made in the constitution of the firm. Where the contractor is an individual or a Hindu undivided family business concern such approval as aforesaid shall likewise be obtained before the contractor enters into any partnership agreement where under the partnership firm would have the right to carry out the works hereby undertaken by the contractor. If prior approval as aforesaid is not obtained, the contract shall be deemed to have been assigned in contravention as per conditions of tender document hereof and the same action may be taken, and the same consequences shall ensue as provided in the said conditions of contract.

INDEMNITY AGAINST PATENT RIGHTS

The contractor shall fully indemnify the BSCDCL from and against all claims and proceedings for or on account of any infringement of any patent rights, design, trademark or name or other protected rights in respect of any construction plant, machine, work or material used for in connection with the works or temporary works.

LAW COVERING THE CONTRACT

This contract shall be governed by the Indian laws for the time being in force.

LAWS, BYE-LAWS RELATING TO THE WORK

The contractor shall strictly adhere by the provisions, for the time being in force, of law relating to works or any regulations and bylaws made by any local authority or any water & lighting agencies or any undertakings within the limits of the jurisdiction of which the work is proposed to be executed. The contractor shall be bound to give to the authorities concerned such notices and take all approvals as may be provided in the law, regulations or bylaws as aforesaid, and to pay all fees and taxes payable to such authorities in respect thereof.

CONTRACT AGREEMENT

The Contractor shall enter into a Contract Agreement with the BSCDCL within 10 (TEN) days from the date of Letter of Intent or within such extended time, as may be granted by the BSCDCL failing which no payment shall be released to the contractor. The cost of stamp papers, stamp duty, registration, if applicable on the contract, shall be borne by the Contractor. In case, the contractor does not sign the agreement as above or start the work within 10 (Ten) days of the issue of Letter of Intent, his earnest money is liable to be forfeited and Letter of Intent consequently will stand withdrawn.

MANNER OF EXECUTION OF AGREEMENT

The agreement as per prescribed Performa as enclosed shall be signed at the office of the BSCDCL within 10(TEN days) days from the date of issue of Letter of Intent. The Contractor shall provide for signing of the Contract, appropriate Power of Attorney and the requisite documents/ materials. Unless and until a formal contract is prepared and executed, the Letter of Intent read in conjunction with the Tendering Documents will constitute a binding contract.

The agreement will be signed in five originals and the Contractor shall be provided with one signed original and the other four originals will be retained by the BSCDCL

The Contractor shall provide free of cost to the BSCDCL all the Engineering data, drawings and descriptive materials submitted along with the tender, in at least three (3) copies to form an integral part of the Agreement within seven 7 days after issuing of Letter of Intent.

Subsequent to signing of the Agreement, the Contractor at his own cost shall provide to the BSCDCL with at least five (5) true hard bound copies of Agreement within thirty (30) days of its signing.

JURISDICTION

The agreement shall be executed at BHOPAL on non-judicial stamp paper purchased in BHOPAL and the courts in BHOPAL alone will have jurisdiction to deal with matters arising there from, to the exclusion of all other courts.

ARBITRATION

1. Arbitration Procedure:

If the efforts, to resolve all or any of the disputes through conciliation fail, then such a dispute shall be referred within 30 days from conclusion of conciliation process to a Sole Arbitrator who would be nominated by Executive Director Bhopal Smart City Development Corporation Limited, Bhopal. The arbitration and conciliation act 1996 as amended from time to time will be applicable. The venue of such arbitration shall be at Bhopal. The award of the sole Arbitrator shall be binding on all parties. The cost of Arbitration shall be borne by the respective parties. There will be no objections if the sole arbitrator nominated or appointed is an employee of BSCDCL.

2. The place of arbitration shall be Bhopal, M.P.

3. English Language

The request for arbitration, the answer to the request, the terms of reference, any written submissions, any orders and awards shall be in

English and, if oral hearings take place, English shall be the language to be used in the hearings. The award shall be made in writing.

4. Enforcement of Award
The Parties agree that the decision or award, which shall be a speaking order, resulting from arbitration shall be final and binding upon the Parties and shall be enforceable in accordance with
the provision of the Arbitration and Conciliation Act 1996 subject to the rights of the aggrieved parties to secure relief from any higher forum.

5. Performance during Arbitration
The Arbitration Proceedings shall be governed by Indian Arbitration and Conciliation Act 1996, as amended from time to time including provisions in force at the time the reference is made. Pending the submission of and/or decision on a Dispute and until the arbitral award is published; the Parties shall continue to perform their respective obligations under this Agreement without prejudice to a final adjustment in accordance with such award. The courts at Bhopal shall have the sole exclusive jurisdiction to try all the cases arising out of this agreement.

6. Notices
That any notice under the terms of this License shall be in writing by registered post or delivered personally and signed by the party or his/its duly authorized representative giving such notice. All activities including day to day management, billing, termination etc. will be carried out from the office of the CEO, Smart City Development Corporation Limited Bhopal or by his duly authorized representative. Notice shall be addressed as follows:

Chief Executive Officer

SECTION-4

LABOUR SAFETY, HEALTH

AND

REGULATIONS INCLUDING FORMS

LABOUR SAFETY PROVISIONS

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 ¼ to 1 (1/4 horizontal and 1 vertical).

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.

Working platforms, gangways, and stairways should be so constructed that they should not sag unduly or unequally, and if the height of the platform or the gangway or the stairway is more that 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.
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).

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. (11.5”) for ladder up to 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 defense of every suit, action or other proceeding at law that may be brought by any 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.

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 90cm (3feet) above the surface of the ground. The side of the trenches, which are 1.5 m. (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.

Demolition - Before any demolition work is commenced and also during the progress of the work following precautions shall be observed:

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

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.

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.

All necessary personal safety equipment's 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.

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

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.

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

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

When workers are employed for works 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:

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

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

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

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.

The area should be barricaded or cordoned off 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.

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

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.

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.

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

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.

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

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.

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.

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.

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

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.

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

4.1.2 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.

4.1.3 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.

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

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

b) Adequate facilities shall be provided to enable working painter to wash during and on cessation of work.
c) Suitable arrangements shall be made to prevent clothing put off during working hours being spoiled by painting materials.

4.1.4.2 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 BSCDCL.

The BSCDCL may require when necessary a medical examination of workers.

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

When the work is done near any place where there is risk of drowning, all necessary equipment's 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 for all injuries likely to be sustained during the course of the work.

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

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

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.

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 clause shall be loaded beyond the safe working load except for the purpose of testing.

In case of BSCDCL 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.

Motors gearing, transmission electric wiring and other dangerous parts of hoisting appliances should be provided with efficient safeguard. Hoisting 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 the 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.

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.

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.

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 BSCDCL Official or their representatives.

Notwithstanding the above Clauses from (i) to (xiv) 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.

SECTION-5

FORMS AND FORMATS

Appendix - 'N'

PROFORMAS:

PROFORMA- I

The list of similar works as stated in the Minimum Qualification requirement for Bidders and Similar Works – Clause I

PROFORMA- I					
Sr.No.	Name of the Project	Name of the employer	Stipulated date of completion	Actual date of completion	Actual Cos of work done
1	2	3	4	5	6

NOTE:

Scanned Attested copies of completion/performance certificates from the Engineer-in- Charge for each work should be annexed in the support of information furnished in the above proforma.

Works shall be grouped financial year-wise.

PROFORMA- II

Yearly turnover of Construction Works during the last three years.

PROFORMA- II					
Sr.No.	Financial year	Annual Turnover of Civil Engineering Works	Updated value to current year	Average of last 3years	Page No.
1					
2					
3					
Total					

NOTE: The above figures shall tally with the audited balance sheets uploaded by the Bidders duly certified by Chartered Accountant.

FORM XXV

DETAILS OF THE BALANCE WORK IN HAND AS ON_____

(UPTO THE PRECEDING MONTH OF SUBMISSION OF BID) WITH BSCDCL

(To be submitted in Envelop-1)

S. No	Name of the Unit/Zone/SBG/RGB	Contract Value	Date of start as per LOI/ Contract	Date of completion as per LOI /Contract	Work done up to the preceding month of submission of bid	Balance value of work

Note: The bidder shall also include the value of all such works which are awarded tobidder but yet not started up to the preceding month of submission of bid.

Appendix - 'O'

FORM XXVI

AFFIDAVIT

(To be submitted by bidder on non-judicial stamp paper of Rs. 100/- (Rupees Hundred only) duly attached by Notary Public)

(To be submitted in Envelop-1)

Affidavit of Mr. .....S/o .....

R/o .....

I, the deponent above named do hereby solemnly affirm and declare as under:

That I am the Proprietor/Authorized signatory of M/s …….

Having its Head Office/Regd. Office at ……..

That the information/documents/Experience certificates submitted by M/s……. along with the tender for …… *(NAME OF WORK*)……

To BSCDCL Ltd. are genuine and true and nothing has been concealed.

I shall have no objection in case BSCDCL verifies them from issuing authority (ies). I shall also have no objection in providing the original copy of the document(s), in case BSCDCL demand so for verification.

I hereby confirm that in case, any document, information & / or certificate submitted by me found to be incorrect / false / fabricated, BSCDCL at its discretion may disqualify / reject / terminate the bid/contract and also forfeit the EMD / All dues.

I shall have no objection in case BSCDCL verifies any or all Bank Guarantee(s) under any of the clause(s) of Contract including those issued towards EMD and Performance Guarantee from the Zonal Branch

/office issuing Bank and I/We shall have no right or claim on my submitted EMD before BSCDCL receives said verification.

That the Bank Guarantee issued against the EMD issued by (name and address of the Bank) is genuine and if found at any stage to be incorrect / false / fabricated, BSCDCL shall reject my bid, cancel pre-qualification and debar me from participating in any future tender for three years.

I, ..., the Proprietor / Authorised signatory of M/s..... do hereby confirm that the contents of the above Affidavit are true to my knowledge and nothing has been concealed there from..... and that no part of it is false.

Verified at ..... this..... day of .....

DEPONENT

ATTESTED BY (NOTARY PUBLIC)

APPLICATION FOR EXTENSION OF TIME

(To be completed by the Contractor)

P A R T –I

Name of Contractor

Name of the work as given in the Agreement

Agreement No.

Estimated amount put to tender

Date of commencement work as per agreement

Period allowed for completion of work as per agreement

Date of completion stipulated as per agreement

Period for which extension of time has been give previously

Extension granted

First extension vide Engineer-in-charge letter No… ……date	Months	Days
2nd extension vide Engineer-in-charge letter No…… date	Months	Days
3rd extension vide Engineer-in-charge letter No……. date	Months	Days

4th extension vide engineer-in-charge letter No……. date Months Days

Total extension previously given

Reasons for which extension have been previously given (copies of the previous application should be attached)

Period for which extension is applied for:

Hindrances on account of which extension is applied for with dates on which hindrances occurred, and the period for which these are likely to last.

Serial No.

Nature of hindrance

Date of Occurrence

Period for which it is likely to last

Period for which extension required for this particular hindrance.

Over lapping period, if any, with reference to item

Net extension applied for

Remarks, if any

Total period for which extension is now applied for on account of hindrances mentioned above ……. Month/ days.

Extension of time required for extra work.

Details of extra work and on the amount involved:

Total value of extra work

Proportionate period of extension of time based on estimated amount put to tender on account of extra work.

Total extension of time required for 11 & 12

Submitted to the Engineer-in-Charges office.

SIGNATURE OF CONTRACTOR

DATE

APPLICATION FOR EXTENSION OF TIME

(PART – II)

Date of receipt of application from Contractor for the work in the Engineer-in-charge office.

Acknowledgement issued by Engineer-in-charge vide his letter No.dated

Engineer-in-charge remarks regarding hindrances mentioned by the Contractor.

Serial No.

Nature of hindrance

Date of occurrence of hindrance

Period for which hindrance, is likely to last

Extension of time period applied for by the contractor

Over lapping period, if any, giving reference to items which over lap

Net period for which extension is recommended.

Remarks as to why the hindrance occurred and justification for extension recommended.

Engineer-in-charge recommendations.

The present progress of the work should be stated and whether the work is likely to be completed by the date up to which extension has been applied for. If extension of time is not recommended, what compensation is proposed to be levied under the agreement.

SIGNATURTE OF ENGINEER-IN-CHARGE

PROFORMA FOR EXTENSION OF TIME

P A R T –III

To

NAME

ADDRESS OF THE CONTRACTOR

SUBJECT:

Dear Sir(s)

Reference your letter No _____ dated _____ , in connection with the grant of extension of time for completion of the work…..

The date of completion for the above-mentioned work, is …… as stipulated in the agreement, dated ……

Extension of time for completion of the above mentioned work is granted upto_____, without prejudice to the right of the BSCDCL to recover compensation for delay in accordance with the provision made in Clause of the said agreement dated the ___/ ___/ ___. It is also clearly understood that the BSCDCL shall not consider any revision in contract price or any other compensation whatsoever due to grant of this extension.

Provided that notwithstanding the extension hereby granted, time is and shall still continue to be the essence of the said agreement.

Yours faithfully,

FOR Bhopal Smart City Development Corporation Ltd.

PROFORMA OF BANK GUARANTEEIN LIEU OF EMD (TENDER BOND)

(Judicial Stamp paper of appropriate value as per stamp Act-of respective state)

Bhopal Smart City Development Corporation Ltd.

Near Tatpar Petrol Pump, Sector A, Berkheda,

Bhopal, Madhya Pradesh 462023

In consideration of Bhopal Smart City Development Corporation Limited, having its Registered Office at, Near Tatpar Petrol Pump Sector A, Berkheda (hereinafter called "BSCDCL" which expression shall unless repugnant to the subject or context include its successors and assigns) having issued Notice Inviting Tender No..... and M/s..... having its Registered Head Office at..... (hereinafter called the "TENDERER") is to participate in the said tender for.....

Whereas BSCDCL, as a special case, has agreed to accept an irrevocable and unconditional Tender Bond Guarantee for an amount of Rs..... valid upto.....from the tenderer in lieu of Cash Deposit of Rs..... required to be made by the tenderer, as a condition precedent for participation in the said tender.

We the ..... (hereinafter called the "BANK") having its Registered, Office at..... and branch office at..... do hereby unconditionally and irrevocably undertake to pay immediately on demand in writing and without demur/protest any amount but not exceeding Rs ..... Any such demand made by BSCDCL shall be conclusive and binding on us irrespective of any dispute or differences that may be raised by the tenderer. Any change in the constitution of the tenderer or the Bank shall not discharge our liability under the guarantee.

We, the..... Bank, lastly undertake not to revoke this guarantee during its currency without the prior consent of BSCDCL in writing and this guarantee shall remain valid upto.....Unless a claim is made within three months from the date of expiry i.e.

..... (three months after the date of expiry), we shall be relieved of our liability

under this guarantee thereafter.

FOR AND ON BEHALF OF BANK

PLACE :

DATED :

WITNESS.

1.

2

PROFORMA OF BANK GUARANTEE (PERFORMANCE)

(Judicial Stamp paper of appropriate value as per stamp Act-of respective state)

Bhopal Smart City Development Corporation Ltd.

Near Tatpar Petrol Pump, Sector A, Berkheda,

Bhopal, Madhya Pradesh 462023

Whereas the Bhopal Smart City Development Corporation Limited, having its Registered Office at BSCDCL Near Tatpar Petrol Pump Sector A, Berkheda, Bhopal (hereinafter called "BSCDCL" which expression shall include its successors and assigns) having awarded a work order/contract / supply order No. dated (hereinafter called the contract) to M/s. .... (hereinafter called the contractor / supplier) at a total price of Rs..... subject to the terms and conditions contained in the contract.

WHEREAS, the terms and conditions of the contract require the contractor to furnish a bank guarantee for Rs..... ..... (Rupees..... .....) being ..... % of the total value of the contract for proper execution and due fulfillment of the terms and conditions contained in the contract.

We, the Bank, (hereinafter called the "Bank") do hereby unconditionally and irrevocably undertake to pay to BSCDCL immediately on demand in writing and without protest/or demur all moneys payable by the contractor/supplier to BSCDCL in connection with the execution/supply of and performance of the works/equipment, inclusive of any loss, damages, charges, expenses and costs caused to or suffered by or which would be caused to or suffered by BSCDCL by reason of any breach by the contractor/supplier of any of the terms and conditions contained in the contract as specified in the notice of demand made by BSCDCL to the

bank. Any such demand made by BSCDCL on the bank shall be conclusive evidence of the amount due and payable by the bank under this guarantee. However, the Bank's liability under this guarantee, shall be limited to Rs..... in the aggregate and the bank hereby agrees to the following terms and conditions: -

(i) This guarantee shall be a continuing guarantee and irrevocable for all claims of BSCDCL as specified above and shall be valid during the period specified for the performance of the contract including the period of maintenance/warranty i.e. up to.....

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

This guarantee/undertaking shall be in addition to any other guarantee or security whatsoever BSCDCL may now or at any time have in relation to the performance of the works/equipment and the company shall have full re-course to or enforce this security in performance to any other security or guarantee which the BSCDCL may have or obtained and there shall be no forbearance on the part of the company in enforcing or requiring enforcement of any other security which shall have the effect of releasing the Bank from its full liability. It shall not be necessary for BSCDCL to proceed against the said contractor/supplier before proceeding against the Bank.

This guarantee/ undertaking shall not be determined or affected by the liquidation or winding up, dissolution or change of constitution or

insolvency of the supplier/ contractor but shall in all respects and for all purposes be binding and operative until payment of all moneys payable to BSCDCL in terms thereof are paid by the Bank.

The Bank hereby waives all rights at any time inconsistent with the terms of this Guarantee and the obligations of the bank in terms hereof, shall not be otherwise effected or suspended by reasons of any dispute or disputes having been raised by the supplier/contractor (whether or not pending before any Arbitrator, Tribunal or Court) or any denial of liability by the supplier/contractor stopping or preventing or purporting to stop or prevent any payment by the Bank to BSCDCL in terms hereof.

We, the said Bank, lastly undertake not to revoke this guarantee during its currency except with the previous consent of BSCDCL in writing. Unless a claim is made in writing

within three months from the date of expiry of this guarantee i.e.....

(three months after the date of expiry) we shall be relieved from all liabilities under

this guarantee thereafter.

Signed this ..... day of ..... at……

For and on behalf of Bank

WITNESS.

1._____

___

2._____

PROFORMA OF BANK GUARANTEE

(FOR MOBILIZATION ADVANCE)

(Judicial Stamp paper of appropriate value as per stamp Act-of respective state)

Bhopal Smart City Development Corporation Limited,

Near Tatpar Petrol Pump, Sector A, Berkheda,

Bhopal, Madhya Pradesh 462023

1.0 In consideration of the Bhopal Smart City Development Corporation Limited, having its Registered Office at BSCDCL, Near Tatpar Petrol Pump, Sector A, Berkheda, Bhopal (hereinafter called "BSCDCL" which expression shall unless repugnant to the subject or context include his successor and assigns) having agreed under the terms and conditions of Contract No..... dated..... made between..... and BSCDCL in connection with..... (hereinafter called "the said contract") to make at the request of the Contractor a Mobilization Advance of Rs..... for utilizing it for the purpose of the Contract on his furnishing a guarantee acceptable to BSCDCL, we the ..... Bank Ltd., (hereinafter referred to the "the said Bank") and having our registered office at..... do hereby guarantee the due recovery by BSCDCL of the said advance as provided according to the terms and conditions of the Contract. We..... do hereby undertake to pay the amount due and payable under this Guarantee without any demur, merely on a demand from BSCDCL stating that the amount claimed is due to BSCDCL under the said Agreement. Any such demand made on the..... shall be conclusive as regards the amount due and payable by the..... under this guarantee and..... agree that the liability of the ..... to pay BSCDCL the amount so demanded shall be absolute and unconditional notwithstanding any dispute or disputes raised by the Contractor and notwithstanding any legal proceeding pending in any court or Tribunal relating thereto. However, our liability under this Guarantee shall be restricted to an amount not exceeding Rs..... We ……. Bank further agree that BSCDCL shall be the sole judge of and as to whether the amount claimed has fallen due to BSCDCL under the said agreement or whether the said Contractor has not utilized the said advance or any part thereof for the purpose of the Contract and the extent of loss or damage caused to or suffered by BSCDCL on account of the said advance together with interest not being recovered in full and the decision of BSCDCL that the amount has fallen due from contractor or the said Contractor has not utilized the said advance or any part thereto for the purpose of the contract and as to the amount or amounts of loss or damage caused to or suffered by BSCDCL shall be final and binding on us.

We, the said Bank, further agree that the Guarantee herein contained shall remain in full force and effect till the said advance has been fully recovered and its claims satisfied or discharged and till BSCDCL certify that the said advance has been fully recovered from the said Contractor, and accordingly discharges this Guarantee subject, however, that BSCDCL shall have no claims under this Guarantee after the said advance has been fully recovered, unless a notice of the claims under this Guarantee has been served on the Bank before the expiry of the said Bank Guarantee in which case the same shall be enforceable against the Bank.

BSCDCL shall have the fullest liberty without affecting in any way the liability of the Bank under this Guarantee or indemnity from time to time to vary any of the terms and conditions of the said Contract or the advance or to extend time of performance by the said Contractor or to postpone for any time and from time to time of the powers exercisable by it against the said Contractor and either to enforce or forbear from enforcing any of terms and conditions governing

the said Contract or the advance or securities available to BSCDCL and the said Bank shall not be released from its liability under these presents by any exercise by BSCDCL of the liberty with reference to the matters aforesaid or by reasons of time being given to the said Contractor or any other forbearance, act or omission on the part of BSCDCL or any indulgence by BSCDCL to the said Contractor or of any other matter or thing

whatsoever which under the law relating to sureties would but for this provision have the effect of so releasing the bank from its such liability. 5.0 It shall not be necessary for BSCDCL to proceed against the Contractor before proceeding against the Bank and the Guarantee herein contained shall be enforceable against the Bank notwithstanding any security which BSCDCL may have obtained or obtain from the Contractor or shall at the time when proceedings are taken against the Bank hereunder be outstanding or unrealized.

We, the said Bank, lastly undertake not to revoke this Guarantee during its currency except with the previous consent of BSCDCL in writing and agree that any change in the constitution of the said Contractor or the said Bank shall not discharge our liability hereunder.

Dated this .....day of.....

Dated For and on behalf of Bank

(NAME AND DESIGNATION)

PROFORMA OF BANK GUARANTEE

(IN LIEU OF SECURITY DEPOSIT)

(Judicial Stamp paper of appropriate value as per stamp Act-of respective state)

Bhopal Smart City Development Corporation Ltd.,

Near Tatpar Petrol Pump, Sector A, Berkheda, Bhopal

In consideration of the Bhopal Smart City Development Corporation Ltd., having its

Registered Office at Near Tatpar Petrol Pump Sector A, Berkheda(hereinafter called "BSCDCL") which expression shall include its successors and assigns having awarded to M/s..... (hereinafter called "the Supplier/Contractor") which expression shall wherever the subject or context so permits includes its successors and assigns) a Contract in terms inter-alia of BSCDCL's letter No..... dated..... and the Contract/Purchase Conditions of BSCDCL and upon the condition of the Supplier/Contractor furnishing Security for the

performance of the Supplier's obligations and /or discharge of the contractor's/supplier's liability under and/or in connection with the said supply contract upto a sum of Rs..... (Rupees..... only)

We,..... ((hereinafter called "The Bank") which expression shall include its successors and assigns) hereby undertake and guarantee payment to BSCDCL forthwith on the same day on demand in writing and without protest or demur of any and all moneys payable by the supplier/contractor to BSCDCL under, in respect or in connection with the said contract inclusive of all the losses, damages, costs, charges and expenses and other moneys payable in respect of the above as specified in any notice of demand made by BSCDCL to the Bank with reference to this guarantee up to

and aggregate limit of Rs…....(Rupees.....only) and the bank hereby

agree with BSCDCL that:

This Guarantee shall be continuing guarantee and shall …… remain valid and irrevocable for all claims of BSCDCL and liabilities of Supplier/Contractor arising upto and until midnight of.....

This Guarantee shall be in addition to any other Guarantee or Security whatsoever that BSCDCL now or at any time have in relation to the Supplier's obligations/liabilities under and/or in connection with the said supply/contract, and BSCDCL shall have full authority to take recourse or to enforce this Security in preference to any other Guarantee or Security which BSCDCL may have or obtain and no forbearance on the part of BSCDCL in enforcing or requiring enforcement of any other Security shall have the effect of releasing the Bank from its liability hereunder.

BSCDCL shall be at liberty without reference to the Bank and without affecting the full liability of the Bank hereunder to take any other security in respect of the Supplier's/Contractor's obligations and/ or liabilities under or in connection with the said supply/contract or to grant time and / or indulgence to the supplier / contractor or to increase or otherwise vary the prices or the total contract value or to release or to forbear from enforcement of all or any of the conditions under the said supply / contract and / or the remedies of BSCDCL under any other security/securities now or hereafter held by BSCDCL and no such dealings, increase(s) or other indulgence(s) or arrangement(s) with the supplier / contractor or releasing or forbearance whatsoever shall have the effect of releasing the Bank from its full liability to BSCDCL hereunder or prejudicing rights of BSCDCL against the Bank. This Guarantee shall not be determined or affected by the liquidation or winding up, dissolution or change of constitution or insolvency of the supplier / contractor but shall in all respects and for all purposes be binding and operative until payment of all moneys payable to BSCDCL in terms thereof.

5. The Bank hereby waives all rights at any time inconsistent with the terms of this Guarantee and the obligations of the Bank in terms hereof shall not be otherwise affected or suspended by reason of any dispute or disputes having been raised by the supplier /contractor (whether or not pending before any Arbitrator, Tribunal or Court) or any denial or liability by the supplier/ contractor stopping/ preventing or purporting to stop or prevent any payment by the Bank to BSCDCL in terms thereof.

The amount stated in any notice of demand addressed by BSCDCL to the Guarantor as liable to be paid to BSCDCL by the supplier/contractor or as suffered or incurred by BSCDCL on account of any losses or damages, costs, charges and / or expenses shall as between the Bank and BSCDCL be conclusive of the amount so liable to be paid to BSCDCL or suffered or incurred by BSCDCL as the case may be and payable by the Guarantor to BSCDCL in terms hereof subject to a maximum of Rs ..... (Rupees ..... only),

Unless demand or claim under this Guarantee is made on the Guarantor in writing within three months form the date of expiry of the Guarantee i.e upto ..... the Guarantor shall be discharged from all liabilities under this Guarantee there under.

Notwithstanding anything contained herein before our liability under this guarantee is restricted to Rs . ..... (Rupees .....only). This guarantee will expire on..... Any claim under this Guarantee must be received by us within three months from the date of expiry i.e. ..... (date, three months after the expiry date) and if no such claim has been received by us by that date all your rights under this guarantee will cease.

For and on behalf of the Bank

Place

Date

WITNESS:

1. 2.

PROFORMA OF BANK GUARANTEE

(FOR MOBILIZATION ADVANCE WITH INTEREST BEARING)

(Judicial Stamp per Stamp Act - paper of appropriate value as respective state)

Bhopal Smart City Development Corporation Limited,

Bhopal, Pin- 462023

In consideration of the Bhopal Smart City Development Corporation Limited., having its Registered Office at Bhopal -462023 (hereinafter called "BSCDCL" which expression shall unless repugnant to the subject: or context Include his successor and assigns) having agreed under the terms and conditions of Contract No. dated made between (name of the contractor) and BSCDCL in connection with (name of work) (hereinafter called "the said contract") to make at the request of the Contractor a Mobilization Advance of Rs. _____ carrying interest @ … % p.a. for utilizing it for the purpose of the Contract on his furnishing a guarantee acceptable to BSCDCL, we the Bank (hereinafter referred to the "the said Bank") and having our registered office at do hereby guarantee the due recovery by BSCDCL of the said advance alongwith interest as provided according to the terms and conditions of the contract. We ...

do hereby undertake to pay the amount due and payable under this Guarantee without any demur, merely, on a demand from BSCDCL stating that the amount claimed is due to BSCDCL under the said Agreement. Any such demand made on the said bank shall be conclusive as regards the amount due and payable by the said contractor under this guarantee and agree that the liability of the said bank to pay BSCDCL the amount so demanded shall be absolute and unconditional notwithstanding any dispute or disputes raised by the Contractor and notwithstanding any legal proceeding pending in any court or Tribunal relating thereto. However, our liability under this Guarantee shall be restricted to an amount not exceeding Rs … inclusive of interest @ …….% p.a.

We the said bank further agree that BSCDCL shall be the sole judge of and as to whether the amount claimed has fallen due to BSCDCL under the said agreement or whether the said Contractor has not utilized the said advance or any part thereof for the purpose of the Contract and the

extent of loss or damage caused to or suffered by BSCDCL on account of the said advance together with interest not being recovered in full and the decision of BSCDCL that the amount has fallen due from' contractor or the said Contractor has not utilized the said advance or any part thereto for the purpose of the contract and as to the amount or amounts of loss or damage caused to or suffered by BSCDCL shall be final and binding on us.

We, the said Bank, further agree that the Guarantee herein contained shall remain

in full force and effect till the said advance has been fully recovered and its claims satisfied or discharged and till BSCDCL certify Contractor, and accordingly discharges this Guarantee subject, however, that BSCDCL shall have no claims under this Guarantee unless a notice of the claims under this Guarantee has been served on the Bank before the expiry of the said Bank Guarantee in which case the same shall be enforceable against the Bank.

BSCDCL shall have the fullest liberty without affecting in any way the liability of the Bank under this Guarantee or indemnity from time to time to vary any of the terms and conditions of the said Contract or the advance or to extend time of performance by the said Contractor or to postpone for any time and from time to time of the powers exercisable by it against the said Contractor and either to enforce or forbear from enforcing any of terms and conditions governing the said Contract or the advance or securities available to BSCDCL and the said Bank shall not be released from its liability under these presents by any exercise by BSCDCL of the liberty with reference to the matters aforesaid or by reasons of time being given to the said Contractor or any other forbearance, act or omission on the part of BSCDCL or any indulgence by BSCDCL to the said Contractor or of any other matter or thing whatsoever which under the law relating to sureties would but for this provision have the effect of so releasing the bank from its such liability.

It shall not be necessary for BSCDCL to proceed against the Contractor before proceeding against the Bank and Guarantee herein contained shall be enforceable against the Bank notwithstanding any security which BSCDCL may have obtained or obtain from the Contractor or shall at the time when proceedings are taken against the Bank hereunder be outstanding or unrealized.

We, the said Bank, lastly undertake not to revoke this Guarantee during its currency except with the previous consent of BSCDCL in writing and agree that any change in the constitution of the said Contractor or the said Bank shall not discharge our liability hereunder.

Dated this…..…. day of…….....

Place:

Date:

Witness:

FORM FOR GUARANTEE BOND

FOR ANTI-TERMITE TREATMENT

THIS AGREEMENT made this____ day of Two thousand _____ between M/s_____ (hereinafter called the guarantor of the one part and M/s Bhopal Smart City Development Corporation Limited, hereinafter called the BSCDCL hereinafter called the OWNER of the other part.

Whereas this agreement is supplementary to the contract hereinafter called the contract dated_____ made between the guarantor of the one part and National Buildings Construction Corporation Ltd., of the other part whereby the contractor inter-alia, understood to render the buildings and structures in the said contract recited, completed, termite proof. And whereas the guarantor agreed to give a guarantee to the effect that the said structure will remain termite proof for TEN YEARS to be so reckoned from the date after the maintenance period prescribed in the contract expires.

During this period of guarantee the guarantor shall make good all defects and for that matter shall replace at his risk and cost such wooden member as may be damaged by termite and in case of any other defect being found, he shall render the building termite proof at his cost to the satisfaction of the Engineer-in-charge and shall commence the works of such rectification within seven days from date of issuing notice from the Engineer-in-Charge calling upon him to rectify the defects falling which the work shall be got done by BSCDCL/ OWNER by some other contractor at the guarantor's cost and risk and in the later case the decision of the Engineer-in-charge as to the cost recoverable from the guarantor shall be final and binding.

That if the Guarantor fails to execute the Anti-Termite treatment or commits breaches hereunder then the Guarantor will indemnify BSCDCL against all losses damages, cost expenses or otherwise which may be incurred by him by reasons of any default on the part of the guarantor in performance and observance of this supplemental Agreement. As to the amount of loss and or damage and/or cost incurred by BSCDCL/ OWNER decision of the Engineer-in-charge will be final and binding on the parties.

In witness where of these presents have been executed by the Guarantor_____ and by_____ for and on behalf of BSCDCL on the day of month and year first above written.

Signed sealed and delivered by (Guarantor)

IN THE PRESENCE OF:
1.

2.

Signed for and on behalf of BSCDCL by/ in presence of:

1.

2.

GUARANTEE TO BE EXECUTED BY CONTRACTOR FOR REMOVAL OF DEFECTS AFTER COMPLETION IN RESPECT OF WATER PROOFING WORKS

The agreement made this …….. day of …….. Two thousand One and …….. between …… (hereinafter called Guarantor of the one part) and the BSCDCL (hereinafter called the Execution Agency of the other part).

WHEREAS this agreement is supplementary to a contract(hereinafter called the Contract), dated …… and made between the GUARANTOR OF THE ONE part and the BSCDCL of the other part, whereby the Contractor, inter-alia, undertook to render the buildings and structures in the said contract recited completely water and leak proof.

AND WHEREAS the Guarantor agreed to give a guarantee to the effect that the said structures will remain water and leak proof for ten years from the date of handing over o the structure of water proofing treatment.

NOW THE GUARANTOR hereby guarantees that water proofing treatment given by him will render the structures completely leak proof and the minimum life of such water proofing treatment shall be ten years to be reckoned from the date after the maintenance period prescribed in the contract.

Provided that the Guarantor will not be responsible for leakage caused by earthquake or structural defects or misuse of roof or alteration and for such purpose.

Misuse of roof shall mean any operation, which will damage proofing treatment, like chopping of fire wood and things of the same nature which might cause damage to the roof.

Alternation shall mean construction of an additional storey or a part of the roof or construction adjoining to existing roof whereby proofing treatment is removed in parts

The decision of the Engineer-in-Charge with regard to cause of leakage shall be final

During this period of guarantee, the Guarantor shall make good all defects and in case of any defect being found render the building water proof to the satisfaction of the Engineer-in-Charge at his cost and shall commence the work for such rectification within seven

days from the date of issue of notice from the Engineer-in-Charge calling upon him to rectify the defects failing which the work shall be got done by the BSCDCL by some other Contractor at the guarantor's cost and risk. The decision of Engineer-in-Charge as to the cost, payable by the Guarantor shall be final and binding.

That if the Guarantor fails to execute the water proofing or commits breach there-under, then the Guarantor will indemnify the principal and his successors against all laws damage, cost, expense or otherwise which may be incurred by him by reason of any default on the part of the GUARANTOR in performance and observance of this supplementary agreement. As to the amount of loss and / or damage and/ or cost incurred by the BSCDCL, the decision of the Engineer-in-Charge will final and binding on the parties.

IN WITNESS WHEREOF these presents have been executed by the Obligator,,,,…..and by ……. And for and on behalf of the BSCDCL on the day, month and year first above written.

Signed, sealed and delivered by Obligator in the presence of-

1.

2.

Signed for and on behalf of the BSCDCL by _____

In presence of:

1.

2.

PROFORMA OF

INDENTURE FOR SECURED ADVANCE OR CREDIT

THIS INDENTURE made this day of _____ Between _____

(hereinafter called the contractor) which expression shall where the Context as admits or implies be deemed to include his executor/administrators and assign of the one part and National Buildings Construction Corporation Ltd., having its Registered Office at BSCDCL, Bhopal (hereinafter called the Engineer) which expression shall where the context so admits or implies be deemed to include its successors and assign of the other part.

Whereas by an agreement dated (hereinafter called the said agreement). The

Contractor has agreed to construct.....

And whereas the Contractor has applied to the Engineer that he may be or be given credited for materials brought by him to the site of the work subject to the said agreement for use in construction of the work.

NOW THIS INDENTURE WITNESSETH that in pursuance of the said agreement and in consideration of the sum of Rs._____ (Rupees _____ only) paid to the contractor by the Engineer. The receipt where the Contractor hereby acknowledges and of such advance or credited (if any) as may be made to him as aforesaid the Contractor hereby covenants and agrees with The Engineer and declares as follows:

That all sums given as advance or credit by The Engineer to the Contractor as aforesaid shall be employed by the Constructor in or toward the execution of the said works and for no other purpose whatsoever.

That the material for which the advance or credit is given are offered to and accepted by The Engineer as security and are absolutely the Contractor's own property and free from encumbrances of any kind the Contractor will not make any application for or receives further advance or credit on the security or material which are not absolutely his own property and free from encumbrances of any kind and the Contractor shall indemnify The Engineer against any claims to any material in respect of which advance or credit has been made to him as aforesaid.

That the said material and all other material on the security of which any further advance or advances or credit may be given as aforesaid (hereinafter called the said materials) shall be used by the Contractor s solely in the execution of the said works in accordance with the direction of the Engineer and in terms of said agreement.

That the Contractor shall make at his own cost all necessary and adequate arrangement for the proper safe custody and protection against all risks of the said material and that until used in the construction as aforesaid the material shall remain at the site of the said works in Contractor's custody and on his responsibility and shall at all times be open to inspection by The Engineer. In the events of the materials or any part thereof being stolen, destroyed or damaged or becoming deteriorated in greater degree than in due to reasonable use and wear thereof the Contractor will replace the same with other materials of like quality of repair and make good the same as required by The Engineer.

That said material shall not on any account be removed from the site of work expect with the written permission of The Engineer.

That the advance shall be repayable in full when or before Contractor receives payment from The Engineer of the price payable to him for the said work under the term and provisions of the said agreement. Provided that if any intermediate payments are made to the Contractor on account of work done then on the occasion of each payment The Engineer will be at liberty to make a recovery from the Contractor's bill from such payments by deducting there from the value of the said materials than actually used in the contraction and in respect of which recovery has not been made previously. The value of this purpose being determined in respect of each description of materials at the rates at which the amounts of the advance as made under these presents was calculated.

That if the Contractor shall at any time make at any default in the performance of observance in respect of any of the terms and provisions of the said agreement or of that provisions the total amount of the advance or advances that may still be owing to The Engineer, shall immediately on the happening of such default be repayable by the Contractor to The Engineer together with interest thereon at 12% p.a. from the date of respective dated to such advance or advances to the date of payment and with all costs. Damages and expenses incurred by The Engineer in or for recovery hereof or the Contractor hereby covenants and agrees with The Engineer to repay and pay the same respective to him accordingly

That the Contractor hereby charges all the said materials with the repayment to The Engineer of all sums advances or credit as aforesaid and all costs. Charges, damages and expenses payable under these presents PROVIDED ALWAYS it is hereby agreed and declared that notwithstanding anything in the said agreement and without prejudice to the powers contained therein if and wherever the covenant for payment and repayment herein before contained shall be become enforceable and the money owing shall not be paid in accordance therewith. The Engineer may at any time thereafter adopt all or any of the following courses he may deem best:

Seize the utilize the said material or any part thereof in the completion of the said works in accordance with the provision in that behalf contained in the said agreement debating the Contractor with the actual cost of effecting such completion and the amount due in respect of advance or credit under these presents and crediting the Contractor with value of work done as if he has carried it out in accordance with the said agreement and the rates thereby provided if the balance is against the Contractor is to pay the same to the engineer on demand.

Remove and sell by public action the seized materials or any part thereof and out of the money arising from the sale repay the engineer under these presents and pay over the surplus (if any) to the Contractor.

Deduct all or any part of the moneys owing from any sums due to the contractor under said agreement.

Expect in the event of such default on the part of contractor as aforesaid,interest or the said advance shall not be payable.

That in the event of conflict between the provisions of these presents and the said agreements, the provision of these presents shall prevail and in the event of any dispute or difference arising over the construction or effect of these presents, the settlement of which has not been hereinbefore expressly provided for the same shall so far as is lawful be subject to jurisdiction of BHOPAL courts only.

IN WITNESS whereof the said the engineer and the contractor hereunto set their respective hands and seals the day year first above written.

Signed Sealed and delivered by

Contractor The Engineers

AGREEMENT FORM

This agreement made this day of (Month) (Year), between the **Bhopal Smart City Development Corporation Limited (BSCDCL),** a company incorporated under the Companies Act, 1956 having its Registered Office at BSCDCL, Bhopal 462023 (hereinafter referred to as the "BSCDCL" which expression shall include its administrators, successors, executors and assigns) of the one part and **M/s(NAME OF CONTRACTOR)** (hereinafter referred to as the 'Contractor' which expression shall unless the context requires otherwise include its administrators, successors, executors and permitted assigns) of the other part.

WHEREAS, BSCDCL, has desirous of construction of **(NAME OF WORK)** (hereinafter referred to as the "PROJECT") on behalf of the **(NAME OF OWNER/MINISTRY)** (hereinafter referred to as "OWNER"), had invited tenders as per Tender documents vide NIT No. _____.

AND WHEREAS **(NAME OF CONTRACTOR)** had participated in the above referred tender vide their tender dated _____ and BSCDCL has accepted their aforesaid tender and award the contract for (NAME OF PROJECT) on the terms and conditions contained in its Letter of Intent No. _____ and the documents referred to therein, which have been unequivocally accepted by **(NAME OF CONTRACTOR)** vide their acceptance letter dated _____ resulting into a contract.

NOW THEREFORE THIS DEED WITNESSETH AS UNDER:

ARTICLE 1.0 – AWARD OF CONTRACT

SCOPE OF WORK

BSCDCL has awarded the contract to **(NAME OF CONTRACTOR)** for the work of **(NAME OF WORK)** on the terms and conditions in its letter of intent No.

_____ dated _____ and the documents referred to therein. The award has taken effect from **(DATE)** i.e. the date of issue of aforesaid letter of intent. The terms and expressions used in this agreement shall have the same meanings as are assigned to them in the "Contract Documents" referred to in the succeeding Article.

ARTICLE 2.0 – CONTRACT DOCUMENTS

The contract shall be performed strictly as per the terms and conditions stipulated herein and in the following documents attached herewith (hereinafter referred to as "Contract Documents").

BSCDCL Notice Inviting Tender vide No. _____ date _____and BSCDCL's tender documents consisting of:

General Conditions of Contract (GCC) along with amendments/errata to GCC (if any) issued (Volume-I).

Special Conditions of Contract including Appendices & Annexures, Volume-II.

Bill of Quantities along with amendments/corrigendum of schedule items, if any (Volume-II).

_____
_
_____

(NAME OF CONTRACTOR) letter proposal dated _____ and their subsequent communication:

Letter of Acceptance of Tender Conditions dated _____

_____
_____

_____
_____

BSCDCL's detailed Letter of Intent No. _____ dated ____ including Bill of Quantities. Agreed time schedule, Contractor's Organization Chart and list of Plant and Equipment's submitted by Contractor.

All the aforesaid contract documents referred to in Para 2.1 and 2.2 above shall form an integral part of this Agreement, in so far as the same or any part thereof column, to the tender documents and what has been specifically agreed to by BSCDCL in its Letter of Intent. Any matter inconsistent therewith, contrary or repugnant thereto or deviations taken by the Contractor in its "TENDER" but not agreed to specifically by BSCDCL in its Letter of Intent, shall be deemed to have been withdrawn by the Contractor without any cost implication to BSCDCL. For the sake of brevity, this Agreement along with its aforesaid contract documents and Letter of Intent shall be referred to as the "Contract".

ARTICLE 3.0 – CONDITIONS & CONVENANTS

The scope of Contract, Consideration, terms of payments, advance, security deposits, taxes wherever applicable, insurance, agreed time schedule, compensation for delay and all other terms and conditions contained in BSCDCL's Letter of Intent No. _____

dated _____ are to be read in conjunction with other aforesaid contract documents. The contract shall be duly performed by the contractor strictly and faithfully in accordance with the terms of this contract.

The scope of work shall also include all such items which are not specifically mentioned in the Contract Documents but which are reasonably implied for the satisfactory completion of the entire scope of work envisaged under this contract unless otherwise specifically excluded from the scope of work in the Letter of Intent.

Contractor shall adhere to all requirements stipulated in the Contract documents.

Time is the essence of the Contract and it shall be strictly adhered to. The progress of work shall conform to agreed works schedule/contract documents and Letter of Intent.

This agreement constitutes full and complete understanding between the parties and terms of the presents. It shall supersede all prior correspondence to the extent of inconsistency or repugnancy to the terms and conditions contained in Agreement. Any modification of the Agreement shall be effected only by a written instrument signed by the authorized representative of both the parties.

The total contract price for the entire scope of this contract as detailed in Letter of Intent is Rs. _____ (Rupees_____ only), which shall be governed by the stipulations of the contract documents.

ARTICLE 4.0 – NO WAIVER OF RIGHTS

Neither the inspection by BSCDCL or the Engineer-in-Charge or Owner or any of their officials, employees or agents nor order by BSCDCL or the Engineer-in-Charge for payment of money or any payment for or acceptance of, the whole or any part of the work by BSCDCL or the Engineer-in-Charge nor any extension of time nor any possession taken by the Engineer-in-Charge shall operate as waiver of any provisions of the contract, or of any power herein reserved to BSCDCL, or any right to damage herein provided, nor shall any waiver of any breach in the contract be held to be a waiver or any other or subsequent breach.

ARTICLE 5.0 – GOVERNING LAW AND JURISDICTION

The Laws applicable to this contract shall be the laws in force in India and jurisdiction of BHOPAL Court (s) only.

Notice of Default

Notice of default given by either party to the other party under the Agreement shall be in writing and shall be deemed to have been duly and properly served upon the parties hereto, if delivered against acknowledgment due or by FAX or by registered mail duly addressed to the signatories at the address mentioned herein above.

IN WITNESS WHEREOF, the parties through their duly authorized representatives have executed these presents (execution whereof has been approved by the Competent Authorities of both the parties) on the day, month and year first above mentioned at BHOPAL.

For and on behalf of:	For and on behalf of:
(NAME OF CONTRACTOR)	(M/s Bhopal Smart City Development Corporation)
WITNESS:	WITNESS:
1.	1.

FORM 7 - FORM OF POWER OF ATTORNEY FOR SIGNING THE BID DOCUMENTS

(On a Stamp Paper of relevant value)

Know all men by these presents, we, ... (name of Contractor and address of the registered office) do hereby irrevocably constitute, nominate, appoint and authorize Mr / Ms..... son/daughter/wife of ..... and presently residing at ....., who is presently employed with us and holding the position of ..... as our true and lawful attorney (hereinafter referred to as the "Attorney") to do in our name and on our behalf, all such acts, deeds and things as are necessary or required in connection with or incidental to submission of bid for the for **"Design, Construction, Testing, Commissioning of 33/0.433kV Substation works for Government buildings under Smart City Area Based Development including operation & maintenance of project for 5 years on Engineering, Procurement & Construction (EPC) Basis"** being developed by the BSCDCL including but not limited to signing and submission of all applications, proposals/bids and other documents and writings, participating in pre-bid and other conferences and providing information/ responses to BSCDCL, representing

us in all matters before BSCDCL, signing and execution of all contracts and undertakings consequent to acceptance of our proposal and generally dealing with BSCDCL in all matters in connection with or relating to or arising out of our Proposal for the said work and/or upon award thereof to us till the entering into of the agreement with BSCDCL.

AND GENERALLY to act as our Attorney or agent on behalf of us in relation to the bid for **"Design, Construction, Testing, Commissioning of 33/0.433kV Substation works for Government buildings under Smart City Area Based Development including operation & maintenance of project for 5 years on Engineering, Procurement & Construction (EPC) Basis"** (and to execute and do all instruments, acts, deeds, matters and things in relation to the said Proposal or any incidental or ancillary activity, as fully and effectually in all respects as we could do if personally present.

AND We hereby agree to ratify and confirm and agree to ratify and confirm all acts, deeds and things whatsoever lawfully done or caused to be done by our said Attorney and that all acts, deeds and things done by our said Attorney in exercise of the powers hereby conferred shall and shall always be deemed to have been done by us.

IN WITNESS WHEREOF WE, ... THE ABOVE NAMED PRINCIPAL HAVE EXECUTED THIS POWER OF ATTORNEY ON THIS ..... DAY OF ....., 2018

For

.....

(Signature, name, designation and address)

Witness

1.

2.

Notarized

Accepted

(Signature, name, designation and address of the Attorney)

AFFIDAVIT *(Black listing)

1. I, the undersigned, do hereby certify that all the statements made in the Tender document are true and correct.

2. The undersigned also hereby certifies that neither our firm M/s. _____ nor any of its constituent partners are blacklisted by any of the Govt./Semi Govt. institutions and not have abandoned any work of buildings / Infrastructures works in India nor any contract awarded to us for such works have been rescinded, during last five years prior to the date of this application.

_____

Signed by an Authorized Officer of the Firm

_____

Title of Officer

_____

Name of Firm

_____

Date

SECTION-6

SPECIAL CONDITION OF CONTRACT (SCC)

SPECIAL CONDITIONS OF CONTRACT (SCC)

GENERAL-

6.1 The following special conditions shall be read in conjunction with General conditions of contract. If there are any provisions in these Special Conditions, which are at variance with the provisions of General Conditions of Contract, the provisions in the Special Conditions shall take precedence.

6.2 Where any portion of Special Conditions of Contract is repugnant to or at variance with any provision of the instructions to Tenderer and General Conditions of Contract and / or the other documents forming part of the contract then unless a different intention appears the provision of the Special Conditions of Contract shall be deemed to override the provisions of the general conditions of contract and / or the other documents forming part of the contract only to the extent such repugnant/various in the special conditions of contract as are not possible of being reconciled with the provisions in the special conditions of contract as are not possible of being reconciled with the provision with instructions to Tenderer or General Conditions of contract and / or the other documents from part of the contract.

6.3 Items mentioned in the BOQ may vary or any changes are needed then it should bring to the attention of BSCDCL.

6.4 Working drawings are given by BSCDCL in tender document; if any deviations found and correction required then it should be brought to BSCDCL for rectification.

6.5 The items which are missing or not defined in the given BOQ in this Tender Document, then the contractor has to submit the items for approval to BSCDCL.

6.6 The contractor has to submit sample of the items defined in BOQ the same to be Approved by BSCDCL, before use.

6.7 It is percentage rate tender/EPC Tender. For Civil works, bidder should quote percentage above or below of PAC.

8.0 Additional Conditions;

1.1 Excavated good earth declared surplus or otherwise shall be disposed of at designated locations as per the directions of BSCDCL, which shall be different from the disposal site for disintegrated rock etc.

1.2 For soil required for re-filling, if sufficient space is not available for stacking at site of excavation, the Contractor shall make his own arrangements for transporting and stacking the earth elsewhere and then bring it back for re-filling. Nothing extra shall be paid on this account for to and fro carriage.

1.3 Disposal of surplus excavated earth including mud, liquid mud, dismantled RCC, dismantled brick work etc. shall be made only in the dumping yard approved by local authority. It will be the responsibility of the contractor to get the permission for dumping yard from local authority as required. If any royalty /fees is payable to local authority, such royalty / fees shall also be borne by the contractor. Disposal shall be carried out strictly as per the regulations of local authority. However, the above materials shall not be removed out of owner's premises without prior written authorization of BSCDCL.

1.4 All the Charges required for vetting of the designs done by The Contractor by IIT or any other reputable agency approved by BSCDCL etc. shall be deemed to have been included in the quoted rates.

1.5 The Contractor shall, at his own expense and without extra charges, make provision for all pumping, dewatering, dredging or bailing out water, if necessary, irrespective of the source of water. The water so pumped out shall be discharged as per local byelaws and as approved by the Engineer-in-charge. The Contractor shall also take all necessary precautions in diverting channels and in discharging the drained water as not to cause damage to the works, crops or any other property within/outside the plot. Excavated area for the basement/ foundation trenches shall be kept free from water while all the works below Ground level are in progress. Nothing extra shall be paid on this account in terms of time and cost.

1.6 Further contractor shall take all necessary precautions to protect and safe guard the foundation of the adjacent building / Structure / Overhead/Underground utilities. Nothing extra shall be payable on this account.

2.0 Construction Power, Water and other facilities

2.1 BSCDCL may provide construction power for office purpose only, at one point, on chargeable basis. Client shall not provide power for any other purpose and the Contractor shall be exclusively responsible to make his own arrangements for supply of power for his use including area illumination, construction activities, fabrication, without any extra cost to Client.

2.2 BSCDCL shall provide water for construction purpose at one point, the vicinity of the site of work. Contractor shall make all arrangements for distribution, storage, use and drainage of the same at his own cost.

2.3 BSCDCL shall endeavour to provide land out of available land to the Contractor, for the sole purpose of field office using Contractor's own container (porta cabin). No land shall be provided for accommodation of workers/labour.

2.4 The Contractor shall remove all temporary buildings / facilities etc. before leaving the site after completion of works in all respect. In the event that Contractor fails to clear the site within 3 weeks after receiving intimation from BSCDCL to do so, BSCDCL shall be free to engage the services of any third party to clear the site at Contractors risk and cost. All expenses incurred on this account shall be recovered from the Contractor.

2.5 If BSCDCL provides water and electricity, the cost for such facility will be borne by the contractor at the prevailing rates of local Government bodies as per actuals.

3.0 TAXES, DUTIES, ROYALTY, PRICES

3.1 Royalty

3.1.1 All royalties etc., as may be required for any Borrow Areas, including right of way etc. to be arranged by Contractor shall be deemed to have been included in the quoted prices.

3.1.2 Contractor's quoted rates should include the royalty on different applicable items as per the prevailing State Government rates.

4.0 Underground and overhead structures

4.1 The Contractor will familiarise himself with and obtain information and details from BSCDCL in respect of all existing structures, overhead lines, existing pipelines and utilities existing at the job site before commencing work. The Contractor shall execute the work in such a manner that the said structures, utilities, pipelines etc. are not disturbed or damaged, and shall indemnify and keep indemnified BSCDCL from and against any destruction thereof or damages thereto.

5.0 Electrical Contractor's License

5.1 The CONTRACTOR or its nominated Sub-Contractor(s), as the case may be, shall have a valid electrical contractor's license for working in the State in which the job site is located. The CONTRACTOR shall furnish a copy of the same to Engineer-in-charge before commencement of any electrical work or work pertaining to Electrical System.

6.0 Project Review Meetings

6.1 The contractor, immediately on award of work shall submit details of his key personnel to be engaged for the work at site. In addition, he shall furnish the Engineer-in-Charge detailed organogram of his staff involved with the work.

6.2 The Contractor shall present the programme and status at various review meetings as required.

6.3 Weekly Review Meetings: Shall be attended by Local Team headed by Project -in-Charge.

Agenda	a) Weekly programme v/s actual achieved in the past week and programme for next week. b) Remedial Actions and hold up analysis. c) Client query approval.

6.4 Monthly Review Meetings: Shall be attended by Project-in-Charge and the Management Representative who can take independent decisions

Agenda	a) Progress Status/Statistics. b) Completion Outlook. c) Major hold ups / slippages. d) Assistance required. e) Critical issues. f) Client query/approval. g) Anticipated cash flow requirement for next two months

7.0 PROJECT OFFICE ACCOMMODATION

7.1 The contractor shall provide, erect and maintain at his own cost separate temporary water tight, Puff insulated air-conditioned office accommodation in the form of two (02) Nos. Porta Cabins each of size 20' X 10' or Quantity and Size of Porta cabin as approved by BSCDCL at designated locations for the use by BSCDCL with the following minimum facilities in each cabin. These shall be available till handing over of the project.

- **7.1.1** Toilet facility - 1 No. portable for each cabin
- **7.1.2** Modular Work Stations - 3 Nos. in each cabin
- **7.1.3** Executive Chairs - 3 Nos. shoulder rest
- **7.1.4** Visitors Chairs - 6 Nos.
- **7.1.5** Overhead Storage Racks - All along the walls
- **7.1.6** Adequate Number of Power plugs –
- **7.1.7** White Board with Markers - 1 No. in each cabin
- **7.1.8** Pin-Up Display board of size as required
- **7.1.9** Free Drinking water, stabilised power and lighting as required for the duration of the Project.
- **7.1.10** Janitorial and Housekeeping services

7.2 The contractor has to relocate the Porta Cabins if required as per the exigencies of the work and as directed by BSCDCL without any extra cost. After completion of the Project the Contractor shall take away this material and the site shall be cleaned free from all construction debris.

8.0 RECOMMENDED MAKES OF MATERIALS

8.1 A list of recommended makes of materials is as per Tender document

8.2 The order of preference amongst the various products/materials shall be as follows:

- **8.2.1** The products / materials shall be as per the Brand specified in the Tender document
- **8.2.2** If the Brand is not specified, then the products/material shall be ISI marked and the same shall be got approved by the Engineer-in-Charge before execution.
- **8.2.3** If ISI marked product/material is not available, the same shall be as approved by the Engineer-in-Charge before execution.

8.3 In case of natural products such as Kota stone, Marble, Granite etc.,

8.3.1 the stones used shall be of **premium** grade and they shall be homogenous in colour with consistency in pattern, texture, tone, marking and colour. No discolouration, spots, fissures or cracks and pocked surfaces shall be allowed.

8.3.2 Where it is difficult to guarantee uniformity in colour and other properties, contractor shall make all efforts to match the colour, shade, texture of the product with the approved sample. If in the opinion of the BSCDCL there is significant variation in properties, BSCDCL shall direct the contractor to remove the same from the site immediately and replace with products matching with the approved sample within reasonable period. The decision of BSCDCL shall be final and binding.

9.0 COMPLETION CERTIFICATES/ NOC FROM LOCAL STATUTORY BODIES

9.1 Contractor has to arrange at his own cost building/ work completion certificates or NOCs if required to be obtained, from the local statutory bodies of central and state govt. such as Municipal Corporation, electrical, safety, Fire authority, Chief Controller of Explosives (CCOE) etc. Any fees required for obtaining such NOCs shall be paid by BSCDCL on production of relevant depository challans/ receipts from such Govt. authorities. Initial building approval drawings shall be made available by BSCDCL

9.2 The application on behalf of BSCDCL for submission to relevant authorities along with copies of required certificates complete in all respects shall be prepared and submitted by the Contractor well ahead of time so that the actual construction / commissioning of the work is not delayed for want of the approval / inspection by concerned authorities.

9.3 The inspection of the works by the authorities shall be arranged by the Contractor and necessary co-ordination and liaison work in this respect shall be the responsibility of the Contractor.

10.0 TOOLS, PLANTS AND MACHINERY

10.1 The Contractor shall provide and install at site adequate T&P for construction of the Project Works. The deployment of T&P shall be planned as per work requirement to suit the nature, quantum and speed of the work for lifting/hoisting construction materials/equipment etc.

10.2 The T&P shall be maintained in good working condition throughout the progress of work.

10.3 All adequate precaution regarding formal upkeep of valid Statutory/Safety credentials of major construction equipment as directed by BSCDCL, their installation, operation, maintenance, materials etc., shall be taken care of.

10.4 The operating staff to be deployed shall be properly qualified and adequately trained and experienced. All safety precautions shall be taken during the project duration, against possible accident. The Contractor shall deploy his representative to effectively enforce the safety rules and regulations in this regard.

10.5 The list of T&P is as follows:

Sl. No	**Description of Equipment**	**Minimum Requirements**
1	Ammeter, Voltmeter, Multifunction	1 (each)
2	Megger (200 MΩ), (0-500V)	1
3	5 kV Megger	1
4	Mega Ohm meter (>200MΩ)	1
5	PI meter	1
6	Clamp on meter (AC & DC both) Digital	1
7	HV Generator set (12kV)	1
8	Breaker Analyzer (open/close/trip time	1
9	Variac (0-415V)	1
10	Micro ohm meter Phase angle meter/	1

11	Digital timer & frequency meter	1
12	Battery (5V)	1
13	Ferrite marking machine	1
14	Cable termination & clamping machine hydraulic	1
15	Vibration meter (connection testing loose/tight	1
16	Mercury meter/ Water level meter (For surface plainness measurement)	1

11.0 Construction Equipment & Mechanisation of Construction Activities

11.1 The above list is only minimal and indicative. The contractor shall deploy all necessary tools and plants as per the requirement of the work.

11.2 The Contractor shall without prejudice to his overall responsibility to execute and complete the work as per specifications and Time Schedule, progressively deploy adequate equipment, and tools & tackles and augment the same as decided by Engineer-in-Charge depending on the exigencies of the work so as to suit the construction schedule.

16.0 CENTRING AND SHUTTERING FOR R.C.C WORK: -

16.1 The work is to be completed within 24 months, hence the contractor shall adopt a suitable system complying with BIS standards regarding stripping time, with requisite number of sets of centring and shuttering. The slab cycle for each of the structures has to be designed for completing the construction within the stipulated completion time of the respective building, and the same shall be got approved by BSCDCL.

17.0 INTERFERENCE WITH TRAFFIC AND ADJOINING PROPERTIES/ BUILDINGS

17.1 In case any operation connected with the Works requires temporary diversion of the traffic, or obstruction or closure of any road, or any other 'right of way', the approval of BSCDCL and the respective competent authorities shall be obtained at least one week in advance.

17.2 The Contractor shall at all times during execution of the Works, ensure an uninterrupted flow of traffic around the plot so as not to cause any nuisance to the general public.

17.3 If in order to avoid undue interference with the traffic and adjoining properties, BSCDCL instructs the Contractor to take special precautions or work within restricted time periods; the Contractor shall carry out the Works during such time and in such manner as directed by BSCDCL.

18.0 LIGHTING & WATCH AND WARD:

18.1 The contractor shall at his own cost take all precautions to ensure safety of life and property by providing necessary barriers, area lighting at the construction site and approaches, watchmen, necessary watch towers etc. during progress of work at all hours including night hours, if required, as directed by the Engineer-in-charge.

18.2 The Contractor shall be responsible for the watch and ward of the all construction premises and buildings, safety of all fittings and fixtures including sanitary and water supply fittings and fixtures provided by him against pilferage and breakage during the period of installation till handing over of all the works to BSCDCL.

19.0 Monthly Bills of Contractor

Contractor shall submit Monthly bills for the work Executed. Minimum amount of such bills shall not be less than 5 % of Contract value.

20.0 Payment Schedule:

Following payment schedule shall be adopted for MEP Works:

S. No.	Activity	Payment (%) (against Supply and Installation cost)
1.	On Supply & Delivery of Material. Prior to commencement of work, the contractor shall get approved, the procurement schedule from the Engineer-in-Charge. Quantity to be procured shall be as approved by Engineer-in-charge. Payment shall be strictly done only after approval from Engineer-in-charge	70% payment
2.	On Installation and Testing	20% payment
3.	On satisfactory Commissioning after approval from Engineer-in Charge	10% payment

21.0 Time period of the Project

Entire project should be completed and delivered within Six Months of time from the date of award of contract that includes Monsoon.

The time allowed for carrying out the work as entered in the Tender shall be strictly observed by the Contractor and shall be reckoned from the date on which the Letter of Acceptance is given to the Contractor. The work shall throughout the stipulated period of the Contract be proceeded with all due diligence as time being deemed to be the essence of the contract on the part of the Contractor.

The Contractor should complete the physical work as far as possible as per phase given below :

¼ of the work in time	..	¼ of the
½ of the work in time	..	½ of the
¾ of the work in time	..	¾ of the
Full of the work in	..	Full of the time

Full work will be completed in Twenty Four months including Monsoon.

However, deviations if any from above phasing will be got duly approved by the engineer in charge.

The program for completion of work shall be a part of the Contract Document in the form of Bar Chart / GANTT Chart. The Contractor is supposed to carry out the work and keep the progress as per Bar Chart/GANTT Chart. The Contractor shall complete the work as per the Schedule given in the Contract and the program submitted by the Contractor.

22.0 Contract Execution

All required documents for execution of the contract shall be submitted within 30 days from the date of issue of letter of acceptance. If the documents are not submitted within the stipulated time a penalty of Rs 5000/- per day will be applicable to the contractor. All contract documents need to be duly affixed with stamp duty properly signed along with evidence/proof of payment of security/contract deposit/ within 30 days from the date of letter of acceptance received by him

If the amount of the Contract Deposit to be paid above is not paid within 30 days from the date of issue of Letter of Acceptance, the Tender / Contractor already accepted shall be considered as cancelled and legal steps be taken against the

contractor for recovery of the amounts.

The amount of Security Deposit retained by the BSCDCL shall be released after expiry of period up to which the contractor has agreed to maintain the work in good order is over. In the event of the contractor failing or neglecting to complete the rectification work within the period up to which the contractor has agreed to maintain the work in good order, the amount of security deposit retained by BSCDCL shall be adjusted towards the excess cost incurred by the Department on rectification work.

23.0 Action when whole of security deposit / Retention Money is forfeited:

In any case in which under any Clause of this contract, the contractor shall have rendered himself liable to pay compensation amounting to the whole of this security deposit whether paid in one sum or deducted by instalments or in the case of abandonment of the work owning to serious illness or death of the contractor or any other cause, the Engineer-in-Charge shall have power to adopt any of the following process, as he may deem best suited to the interest of BSCDCL -

(a) To rescind the contract (for which recession notice in writing to the contractor shall be conclusive evidence) and in that case, the security deposit of the contract shall stand forfeited and be absolutely at the disposal of BSCDCL.

(b) To carry out the work or any part of the work departmentally debiting the contractor with the cost of the work, expenditure incurred on tools and plant, and charges on additional supervisory staff including the cost of work-charged establishment employed for getting the un-executed part of the work completed and crediting him with the value of the work done departmentally in all respects in the same manner and at the same rates as if it had been carried out by the contractor under the terms of his contract. The certificate of the Engineer-in-Charge as to the costs and other allied expenses so incurred and as to the value of the work so done departmentally shall be final and conclusive against the contractor.

(c) To order that the work of the contractor be measured up and to take such part thereof as shall be un-executed out of his hands, and to give it to another contractor to complete, in which case all expenses incurred on advertisement for fixing a new contracting agency, additional supervisory staff including the cost of work charged establishment and the cost of the work executed by the new contract agency will be debited to the contractor and the value of the work done or executed through the new contractor shall be credited to the contractor in all respects and in the same manner and at the same rates as if it had been carried out by the contractor under the terms of his contract. The certificate of the Executive Engineer as to all the cost of the work and other expenses incurred as aforesaid for or in getting the un-executed work done by the new contractor and as to the value of the work so done shall be final and conclusive against the contractor.

In case the contract shall be rescinded under Clause (a) above, the contractor

shall not be entitled to recover or be paid any sum for any work there for actually performed by him under this contract unless and until the Executive Engineer shall have certified in writing the performance of such work and the amount payable to him in respect thereof and he shall only be entitled to be paid the amount so certified. In the event of either of the courses referred to in Clause (b) or (c) being adopted and the cost of the work executed departmentally or through a new contractor and other allied expenses exceeding the value of such work credited to the contractors amount of excess shall be deducted from any money due to the contractor, by BSCDCL under the contract or otherwise, howsoever, or from his security deposit or the sale proceeds thereof provided, however, the contractor shall have no claim against BSCDCL even if the certified value of the work done departmentally or through a new contractor exceeds the certified cost of such work and allied expenses, provided always that whichever of the three courses mentioned in clauses (a), (b) or (c) is adopted by the Executive Engineer, the contractor shall have no claim to compensation for any loss sustained by him by reason of his having purchase or procured any materials or entered in to any engagements or made any advance on account of or with a view to the execution of the work or the performance of the contract.

Contract may be rescinded, and security deposit forfeited for bribing a public officer or if contractor becomes insolvent

If the contractor assigns or sublets his contracts or attempt so to do, or become insolvent or commence any proceeding to get himself adjudicated and insolvent or make any composition with his creditors, or attempt so to do or if bribe, gratuity, gift, loan, perquisite, reward or advantage, pecuniary or otherwise, shall either directly or indirectly be given promised or offered by the contractor or any of his servants or agents through any public officer, or person in the employ of BSCDCL /Govt. in any way relating to his office or employment, or if any such officer or person shall become in any way directly or indirectly interested in the contract the Engineer In-charge may thereupon, by notice in writing rescind the contract and the Security Deposit of the Contractor shall thereupon stand forfeited and be absolutely at the disposal of BSCDCL and the same consequences shall ensure as if the contract had been rescinded under above clause J hereof; and in addition the contractor shall not be entitled to recover or be paid for any work therefore actually performed.

SECTION-7

SCOPE OF WORK,

EMPLOYER'S REQUIREMENT

AND

TECHNICAL SPECIFICATIONS

TABLE OF CONTENTS

PART-A

(SCOPE OF WORK & DESIGN CRITERIA)

1.0 SCOPE OF WORK FOR GOVERNMENT BUILDINGS:

1.1 The scope consists of design, engineering and manufacturing; testing at Manufacturer's works, packing, forwarding and delivery to site; unloading and handling at site (shifting from unloading point to the storage area, storage and shifting from the place of storage to the place of installation), assembly, erection, cleaning & touch up painting; testing & commissioning at site for Electrical system of **Government Building phase-I (Plot No. 22 & 23)** as given below;

1.1.1 List of Equipment and system

(a) Metering equipments as per MPERC Net Metering / CERC regulation.

(b) 33kV HT Panels

(c) 33/0.433kV Distribution Transformer with no load compensation capacitor bank

(d) 3 Phase, 415 Volts, 50 Hz LT PCC Panels

(e) 3 Phase, 415 Volts, 50 Hz, Automatic Power Factor Control (APFC) Panel

(f) LT Bus duct

(g) HT and LT cables and associated cable laying and interconnection system, cable tray

(h) Earthing System for substation equipments

(i) Other necessary works requisite for completion of work such as embedment, chipping, punching, making holes, openings in walls, pipe sleeves, fire/ water proof sealing, concealed conduiting etc.

(j) DC control voltage for HT switchgear shall be provided at 24 or 30 V DC with 1 Hr back up.

1.1.2 Measurement of soil resistivity at site by Wenner's four electrode method as per IS: 3043 – 1987 and its latest amendments, at minimum two (2) locations per plot. The measurements shall be carried in the presence of the PURCHASER and the results/ report shall be certified by Govt. Authorized Laboratories or agencies.

1.1.3 All mounting, foundation supports and hardware accessories for the electrical equipment/system installations.

1.1.4 All civil works associated with equipment/system electrical installations like embedment, chipping, punching, making holes, openings in walls, pipe sleeves, fire/ water proof sealing, concealed conduiting etc.

1.1.5 Equipments furnished shall be complete in every respect with all mountings, fittings, fixtures, and standard accessories normally provided with such equipment and / or needed for erection, completion and safe operation of the equipment as required by applicable codes though they may not have been specifically detailed in the tender unless included in the list of exclusions.

1.1.6 Take necessary statutory approvals for the electrical systems installed. The bidder shall take necessary steps for getting new connection from DISCOM.

1.1.7 Contractor has to give provision for the use of solar power for common area load as per the metering philosophy as decided by BSCDCL.

1.1.8 Co-ordination Works- the Contractor must do co-ordination with existing contractors for substation building and trench construction.

1.1.9 Order of Preference- 1) Schedule of quantities 2) Technical specification 3) single line diagram.

2.0 DESIGN BASIS-ELECTRICAL SYSTEM

2.1 General

The proposed Electrical Power Distribution and Lighting System shall be designed to provide:

(a) Electrical supply to equipment and machinery within the design operating limits.

(b) Safety to Personnel and equipment during both operation and maintenance.

(c) Reliability & Continuity of Service.

(d) Minimal fire risk with fail safe feature.

(e) Ease & flexibility of maintenance and operation.

(f) Adequate provision for future expansion and modification.

(g) Maximum inter-changeability of equipment.

(h) Suitability for applicable environmental factors.

(i) Service Condition

All the components of the electrical system shall be sized to suit the maximum load under the most severe operating conditions. Accordingly, the maximum simultaneous consumption of power, required by continuously operating loads shall be considered and an additional margin shall be taken into account for intermittent service loads, if any. The amount of electrical power consumed by each area shall be calculated for its operation at the design capacity.

The equipment shall be designed and manufactured in accordance with the best engineering practices and shall be suitable for the intended purpose.

2.2 Applicable Codes and Standard

The design, material, construction, manufacture, inspection, installation, testing and performance of electrical equipments & systems should conform to the latest applicable Central Electrical Authority (CEA) guidelines, all currently applicable IS, IEC and IEEE standards, Central PWD (CPWD) Specifications, National Building Code, National and International codes of practice, statutes, regulations and safety codes in the locality where the equipment will be installed.

2.3 System Design Parameter:

The electrical system shall be designed as per relevant standards and local regulations with the stringent of the two regulations being the governing parameter.

Following System Parameter shall be adopted for designing the electrical system:

Nominal (Rated) System Voltage	33kV	0.415kV
Highest System Voltage	36kV	1.1kV
Lightning Impulse Withstand Voltage (1.2/ 50 microsecond)	170 kVp	-
Power Frequency Withstand Voltage for 1 minute	70 kV rms	3 kV rms
System Neutral Earthing	Solidly Earthed	Solidly Earthed
Fault Level of System	25kA for 1sec.	Bidder to calculate
Frequency	50 Hz	50 Hz
Dynamic Short Circuit Current Rating	62.5 kA peak	As calculated

Service Condition:

(j) Design Ambient Temperature (Reference Ambient temperature for temperature rise consideration) – 50 ºC.

(k) Relative Humidity – Maximum - 100%

2.4 System Design Criteria:

The system shall be designed taking in to consideration the following system variation:

Voltage: +10% to -10%

Frequency: +3% to -3%

Combined voltage and frequency variation: +10% to -10%

The load distribution should be such that the load unbalances does not exceed 5% at the point of commencement of supply.

The system power factor shall be at least greater than 0.9.

In normal operating condition, cumulative voltage drop from PMCC to the last equipment in the topmost floor shall not exceed 5% (measured at load end).

Voltage dip at the Motor terminals during motor starting of the highest rating motor with regular base load shall not exceed 15%.

Fault level for HT shall be considered as 25kA for 1 sec or actual calculated during detailed design stage by the Contractor, the stringent being applicable.

The fault level for LT system at transformer terminal shall be calculated based on the transformer rating and its impedance as per relevant IS 2026 / 1180 and based on IS 1180 for transformer losses limitation. However, minimum short circuit rating of switchgear and cable withstanding capacity shall be considered 50kA for 1 sec for ACB/MCCB and bus bar at PCCs for Plot 22, 23

For Lighting, Air conditioning and other Miscellaneous Power outlets following shall be the parameters to be considered:

Nominal Voltage	240V
Phases	1
Frequency	50Hz
Connection	3 wires(Phase, Neutral & Earth)

2.5 Estimation of Load/ Max Demand (Government Housing):

The following considerations are to be followed to arrive at the maximum electrical demand.

(a) Demand for each Flat/ Dwelling unit of 2 BHK and 3 BHK shall be calculated based on the Madhya Pradesh Supply Code 2013. The criteria shall be implemented on the Built up Area (BUA) of each unit rather than Plot.

(b) 3 kW demand load for 3 BHK, 2.5kW demand load for 2 BHK flat unit are considered for transformer sizing.

(c) Load Factor

(i)	Motors (Fire Hydrant system)	:	0.1
(ii)	Auxiliary load (Elevator, Crane/ Hoist, etc.)	:	0.5
(iii)	Lighting load	:	1.0
(iv)	Watering Pump	:	0.5
(v)	Ventilation System	:	0.7

(d) Utilization Factor

(i) Utilization of an individual system shall be considered based on the no of working and stand-by equipments – 50% for one working and one stand-by.

(ii) Utilization for Lifts shall be considered as 50%.

(iii) Utilization for garbage Chute control panel shall be considered based on the loading estimated at peak usage time.

(iv) Utilization of Miscellaneous power outlets shall be considered as 30%.

(e) Power factor of Motors : As per the Manufacturer's Data sheets

(f) Efficiency of IE2 motors : As per the Manufacturer's Data sheets

(g) Overall Diversity for final Demand calculation shall be considered as 1.1.

(h) A design margin of 10% shall be considered.

(i) The improved factor shall be considered as 0.95.

Considering the above assumptions, the load requirement for Government housing has

been estimated.

INPUT DATA FOR LOAD DEMAND WILL BE GIVEN BY CONTRACTOR WHO IS RESPONSIBLE FOR INTERNAL ELECTRICAL WORKS.

2.6 Electrical Power Supply:

2.6.1 Independent power for the Government building phase-I shall be provided by state Distribution company Madhya Pradesh Kshetra Vidyut Vitaran Company Ltd. (MPMKVVCL) or a private Distribution Franchisee company as may be decided by BSCDCL, at 33kV through underground laid HV cables till the plot Substation.

2.6.2 The temporary Source of this power shall be from the nearest existing Substation (Ram Mandir or Bhadbhada substation) of MPMKVVCL or as may be decided by the service provider. Permanent power shall be provided from the EHV GIS substation as per the power distribution plan of the ABD area. The power supply to the plots shall be loop in and looped out of the 33kV Rings.

2.6.3 According to existing power supply code prescribed by MP Electricity Regulatory Commission (MPERC) following are the norms adopted for the selection of the power supply voltage level.

- Upto 150kVA - 415V LT Supply
- Above 50kVA & up to 300kVA - 11kV power Supply
- Above 100kVA & up to 10000kVA - 33kV power Supply

2.6.4 Since the total load requirement are 2927kVA for 22 & 23, as per MPERC regulation, the supply shall be provided at Medium Voltage (33kV) level.

2.6.5 **Building 22 & 23-**The power within each plot substation shall be stepped down to 433 V by 2 nos. of 2000kVA, 33/0.433kV oil type transformers and distributed to the six towers (22 building) & eight towers (23 building) and other utility areas and facilities from Main Power Control Centre (PCC) located in the Substation building. Refer drawing no TCE.10339A-EL-4002-AU-40002 & TCE.10339A-EL-4002-AU-40003 for plot no. 22 & 23 for the electrical single line diagram for power distribution schematic.

2.6.6 Each Flat/ Dwelling units within each tower shall be provided with independent 415 V, 3 Ph tariff meter mounted on Metering Panels located in the electrical shaft at each floor of the respective tower. The common utility loads and other facilities like Club House, Shopping complex, Play Area and Lawns within the plot shall be supplied from Common utility Panels (CUP). CUPs shall be powered through 415 V, 3 Ph tariff net meters. All tariff meters shall be as per power supply company specifications. CUP panels shall have incoming power supply from Main PCC.CUP panel shall also have provision for solar power supply and DG emergency power.

2.6.7 Bus Ducts shall be provided from Distribution Transformers to main PCC panel.

2.7 The tariff meters (Net meter, solar meter) shall be installed as per MPERC or CERC guidelines amended as on date. The Bidder shall take necessary approval from DISCOM after installation of the meters.

2.8 33/0.433kV Distribution Transformer

The 33/0.433kV transformer shall be oil type, ONAN, Dyn11 with On load tap changer (OLTC) complying with IS 2026, IS1180 and other relevant standards as amended till date.

The transformer shall be sized taking into the following consideration:

a) Connected loads

b) Load factor, Diversity factor as indicated above in clause 2.5.

c) 10% contingency factor over cumulative maximum demand

d) Ensure 80% loading of the transformer

e) Voltage dip at the largest motor terminal during its starting on base load condition. The voltage dip shall be less than 15% taking into consideration motor starting method.

f) Power factor improvement to 0.95.

g) The fire pumps motor, if be the largest motor, shall not be considered to ensure the above voltage dip. The next higher size motor shall be considered. The same has been considered since during the event of fire all loads except ventilation, escape and emergency lighting shall be turned off. Hence, the base loading for starting the fire pumps shall not be the same.

2.9 Fault Level

Fault level at transformer secondary and at 415V LT panels shall be calculated based on the transformer rating and impedances of transformer and cables.

a) 33 kV system : 25kA for 1s

b) 415 V system : 50kA for 1s for Building 22 & 23 (will be decided as per actual fault level calculation)

2.10 Power Factor Improvement

For Residential Projects, Power factor improvement shall be provided for large lump loads like motor loads, common services load etc.

The required capacitor rating shall be calculated based on the system power factor requirement of achieving 0.99 power factor, i.e., 0.85 or actual (whichever is lesser) to be corrected for 0.99.

APFC Panel shall be selected considering following design criteria:

a) Optimum no of steps to ensure proper regulation with minimum two (2) nos. of spare steps subject to a maximum of 12 steps

b) Minimum steps of 5 kVAR and 10 kVAR bank in adequate nos. for fine regulation of power factor at low loads shall be considered. Balance capacity can be considered with 25 kVAR, 50 kVAR or 100 kVAR capacitor bank.

c) Capacitor banks shall be All Poly Propylene (APP), double layer type.

d) Rating of APFC panel shall be based on the required running load for each bus section & not on the total connected load basis. Number of stages / steps in a particular APFC panel shall be decided by the CONTRACTOR such that minimum two spare steps are provided.

e) Capacitor shall be provided separately at the PCC panel for no load compensation of transformer.

Selection of capacitor for transformer no-load compensation	
KVA Rating of the Transformer	**Kvar Required for compensation**
Up to and including 315 KVA	5% of KVA Transformer Rating
315 to 1000 KVA	6% of KVA Transformer Rating
Above 1000 KVA	8% of KVA Transformer Rating

2.11 LT Panels

All Panels shall be indoor / outdoor type having incoming sectionalisation and outgoing switchgears as specified. The design shall be cubical type. The degree of enclosure protection shall be IP 52 for indoor and IP55 for outdoor as per IS: 13947 (Part-I). PCC

shall conform to FORM 4B as per IS 61439. The LT Panels shall be as per the standards IEC 61439.

PMCC shall be of internal arc type tested with Internal Arc withstands level at rated fault level or 50kA, higher value, for 0.3s.

Busbar: All panels shall be provided with Aluminum busbar. Distribution boards with incomers below and including 63A shall be provided with tinned copper bus bars.

The bus-bars shall be sized considering the following criteria:

a) Sleeves made of insulating material on all bus bars.

b) Design ambient temperature 50ºC.

c) Final temperature of the bus-bars complying with requirements of relevant standards.

d) Bus bars being inside the panel; De- ration for enclosure and ventilation.

e) Bus bar suitability for carrying rated current continuously. The current density (A/mm^2) of the bus bar shall not exceed 0.8 for Aluminium bus and 1.6 for Copper bus.

f) Configuration of bus bars and Proximity effect.

g) The main bus shall be designed based on the load rating as well as the actual fault level for specified duration at the location of the panel with 10% positive tolerance.

h) Earth bus of the panel shall be sized suitable for the above fault level for the same duration.

Switchgear Sizing/ Selection:

Switchgear shall be sized/ selected considering the following:

a) Rating suitable for carrying full load current of the equipment / feeder.

b) Suitability for Short Circuit Rating for specified duration.

c) Switchgear for motors shall be suitable for motor duty application with Type – 2 co-ordinations.

d) In panel de-ration of minimum 20% or as provided in Manufacturer’s catalogue, whichever is higher shall be considered.

e) Switchgear rating for APFC Panel incomer & individual capacitor bank shall be sized at 1.5 times the rated current rating.

f) Appropriate Electro-Mechanical Interlock (EMI) shall be provided between two transformer incomers & DG breaker for future provision.

g) ACBs shall be considered for switchgear ratings above 630A and MCCB shall be considered up to 630A. All ACBs and MCCBs shall be rated for Bus fault level with Ics=Icu=Icw=100% for ACB and and Ics=Icu=100% for MCCBs.

h) Miniature Circuit Breaker (MCB) shall be considered where fault level is below 10kA.

i) All Panel incomers shall be provided with Microprocessor based overload (O/L), Short circuit (SC) and Earth fault (E/F) release and Microprocessor based overload (O/L), Short circuit (SC) for outgoing feeders.

j) Multi-function meter for measuring current, voltage, power, frequency, active and reactive power, and harmonics shall be provided for all the incomers (Transformer as well as DG), Multi-function meter for measuring current, voltage, power, frequency, active and reactive power for outgoing power / tie feeders. Ammeter shall be provided for other load feeder such as motor feeder, lighting feeder, etc.

k) In case the fault level at transformer LT side increases to more than 10kA, cascading of breakers so as to accommodate MCBs in the PMCC shall be adopted. This shall ensure cost saving.

l) 20% spare capacity shall be considered on each panel for future.

m) Surge Protection Device (SPD) shall be provided at incoming power panels and sub- distribution boards. SPDs shall be selected to meet the requirements of relevant LPZs. Lifts, escalators and fire panels shall be protected with SPD in control panels. All electrical and control panels related to safety and security of building shall be protected with appropriate SPDs. All SPDs should have status indication to show their healthy state for discharging the lightning current.

2.12 Cabling System

HT cables shall be 33kV earthed grade, multi-core, stranded and compacted aluminium contractor, extruded XLPE insulated (dry cured), extruded semi conducting compound screen with a layer of non-magnetic metallic tape screen, extruded PVC inner sheath (Type ST-2), armoured and extruded overall sheath with Fire Retardant Low Smoke (FRLS) PVC compound (Type ST-2). The cables shall conform to IS-7098 Part -II.

LT Cables shall be 1100V earthed grade, single/multi-core, stranded and compacted aluminium conductor, extruded XLPE insulated, extruded PVC inner sheath (Type ST-2), armoured and extruded overall sheath with Fire Retardant Low Smoke (FRLS) PVC compound (Type ST-2). The cables shall conform to IS-7098 Part -I.

Cables up to & including 6 mm² shall be Copper multi-stranded conductor with PVC insulation galvanized steel round wire armoured & cables beyond 6 mm² shall be Aluminium multi-stranded conductor with XLPE insulation & galvanized steel flat strip armoured.

All LT cable shall be conforming to IS 7098 Part I for XLPE cables and IS 1544 – Part I for PVC cables.

All control cables shall be 650 V grade copper conductors FRLS PVC insulted cables conforming to IS 1544- Part I. For cables above 7 cores, minimum two spare cores shall be considered.

All the cabling and rising mains to the individual floors shall be laid through the electrical ducts provided in the building core with access window on each floor/ staircase landing.

The following main aspects shall also be considered while deciding the size of the cables/ wires:

n) Supply voltage and frequency.

o) Corresponding full load current under site conditions, i.e, necessary de-rating considerations.

p) Route length and method of laying of cables.

q) Maximum allowable temperature rise under normal full load condition based on the material of cable insulation (XLPE/ PVC).

r) Maximum short circuit current duration (fault clearing time) and final temperature of cable during short circuit current flowing through the cable.

s) Following shall be the fault clearing time consideration:

t) For the HT incomer cables (metering kiosk to GOD, GOD/ RMU to HT switchgear/ transformer, as the case may be) minimum fault clearing time shall be considered as 1 sec.

(i) From HT breaker to Transformer Primary shall be 0.16s.

(ii) From transformer secondary to Power Control Centre (PCC) incomer shall be 1s.

(iii) From ACB outgoing of the PCC shall be considered as 0.16s (for Tie feeders if any it shall be 0.5s).

CONTRACTOR to note that, the above fault clearing times are minimum to be considered. Actual fault clearing time shall be considered as per actual relay co-ordination.

u) Appropriate de-rating factors as per cable manufacturer's catalogue and enlisted below shall be considered for sizing the cable:

(i) Ambient Air Temperature (minimum 50ºC).

(ii) Ambient ground temperature (minimum 40ºC to be considered).

(iii) Method of cable laying.

(iv) Depth of cable burial (minimum 750 mm for LT and 1050 mm for 33kV HT).

(v) Thermal Resistivity of Soil (minimum 150ºC Cm/ W to be considered).

(vi) No. of cables in a group

(vii) No. of cable trays in tier.

(viii) Any other de-ration factors as applicable & as per Manufacturer's catalogue.

Cable trench with support angles shall be considered for laying cables in substation building. Prefabricated GI perforated cable trays shall be provided for laying cables from common service panel to individual panels and sub main wiring shall be provided from floor metering panel to individual flat DBs. Bends and Tees shall be prefabricated and shall not be fabricated at site.

Separate trays shall be provided for HV, LV, Control and ICT cables laid with a gap of minimum 300mm between tray bottom / edge to tray bottom/ edge of the adjacent tray

Bending radius of 12D and 15D shall be provided for LT & Control Cables and HT cables respectively where D is the outer diameter of the cable.

RCC pipes shall be provided where cables need to cross the roads, drive ways. For HT cables, one cable shall be laid in one pipe section of minimum 150mm internal diameter. LT, control and ICT cables shall be laid in separate pipes.

2.13 Earthing system

The earthing system shall comprise one or more earth electrodes, earthing network, mesh or a combination of these in order to obtain grid resistance of less than 1Ω.

Latest version of following standards and codes shall be referred to for designing the Earthing and Lightning protection system:

a)	IS 3043- 1987,	:	Code of practice for Safety Earthing

	(Reaffirmed in 2006)		
b)	IS/ IEC 62305- 2013	:	Code of Practice for the protection of buildings and allied structures against lightning.
c)	CEA guidelines 2010	:	Measures related to safety & electric supply.
d)	IEEE 80-2000-2013		IEEE Guide for Safety in AC Substation
e)	CPWD Specifications - 2013		General Specifications for Electrical Works Part I - Internal

Soil Resistivity: The earthing system shall be designed by considering measured soil resistivity during detailed engineering and the earthing calculation shall be done.
Size of Earthing Conductors: The earthing conductor sizes shall be calculated as per IS 3043.
Following factors will be considered for sizing the earthing conductor:

Design Ambient Temperature	50°C
Allowable temperature rise	500°C
For steel welded joints Fault clearing time	1.0 s
Overall earthing resistance of the grid	Less than 1Ω

The maximum values of earth fault current for the design of the earthing system will be considered based on system requirement.

Equipment Earthing

GI pipe electrode as specified in IS 3043 or as per local electricity board, CEIG, CPWD requirements, whichever is stringent, shall be provided for the earthing of non-current carrying parts and enclosures of all electrical equipment such as transformers tank, LT panels, cable trays, steel structural supports, transformer yard fences etc.

2 nos. dedicated copper plate electrode shall be provided for neutral grounding of each transformer.

A grid earthing network shall be provided, laid buried 600mm deep in the ground at a distance of 1500mm from the building connecting all the dedicated Earth electrodes for all equipments and systems.

Materials used for earth electrodes shall be designed to suit the ground conditions and shall be galvanized.

Earthing network shall also be connected / formed through the cable trays. Double run GI strips shall be laid on the cable tray depending upon whether it will be connected to the earth network ahead. The strips shall be welded to the cable tray at every 10m interval. For multi tier trays, the strip can be laid in one tray and connected to all at 10 M interval.

Earth pits & earthing conductor shall be laid around the building with a minimum clear distance of 300mm with respect to the other utilities and at least 1500mm from the building plinth.

PART-B

(TECHNICAL SPECIFICATIONS)

Table of Contents

POWER SUPPLY SYSTEM

1 INTRODUCTION

The general requirement include design, manufacture, testing at works, supply and delivery at site, unloading and storing the equipment at site, installation, testing and commissioning of the equipment at site of all electrical equipments are covered under this section of this Specification**.**

Contractor shall supply the equipment in accordance with the specification, data sheets.

For uniformity of appearance, all switchgear and control panels shall have a common appearance and colour.

In order to reduce the spares holding to a minimum electrical, control and instrumentation components of a similar type and purpose used throughout the Works shall, unless it can be shown by the Contractor to be impractical, be of the same Manufacturer and type / series.

2 CPWD SPECIFICATIONS

The Electrical works shall also conform to following standards as amended up to date wherever relevant and applicable;

- CPWD General Specification for Electrical Works Part I-Internal (2013).
- CPWD General Specification for Electrical Works Part II-External (1994).
- CPWD General Specification for Electrical Works Part IV-Substation (2013).

3 HV PANEL

The scope of this specification design, manufacture, testing at manufacturer's works, supply, packing, forwarding and delivery from place of storage/ manufacturer's works to erection site including transit insurance, assistance for testing, installation, commissioning and performance demonstration at site of indoor type 33 kV VCB and its accessories with short time current rating of not less than 25kA for 1sec.

System Particulars

- Nominal System Voltage: 33 kV

- Highest System Voltage: 36 kV
- Frequency: 50Hz ±3%
- No. of Phases: 3 Phase
- Neutral Grounding: Solidly Grounded
- Fault level 25kA for 1 sec
- Internal Arc Tested As per IEC 61641 for 1s
- Max Ambient Temperature for design and temperature rise shall be 50ºC.
- Bus rating: 630A
- Bus bar material: EC grade Copper
- Breaker type: VCB
- Breaker rating: 25 kA for 1 sec
- Protection relay: µP based IDMT relay with 2OC (10%-200%) and 1 EF (10%-40%).

The switchgear shall be metal enclosed, indoor type with vacuum circuit breakers fully draw out type. Design and construction shall be such as to allow extension at either end. Metal enclosed switchgear and control gear cubicles shall be divided into following separate compartments with metal enclosures intended to be earthed (metal clad):

(a) Busbar compartment

(b) Circuit breaker compartment

(c) Cable compartment

(d) LV/Metering compartment

All the HV design must ensure conformity to IEC-60298 and must be Type tested for Internal Arc Test for 1 sec with AFLR category.

1. Auxiliary relays for multiplication of contacts for following transformer protections shall be provided for oil type Transformer feeders:

a) Buchholz protection Alarm & Trip

b)	Winding temperature (For both side windings)	Alarm & Trip
c)	Oil temperature	Alarm & Trip
d)	Pressure relief device	Trip
e)	Oil level gauge(MOG)	Alarm

Multi Function Meter shall micro-processor based electronic meter and shall have facility for on line monitoring, reading display of each parameter and shall be provided with RS-485 communication port.

The cable glands shall be of double compression type brass glands. Gland plate shall be of 3mm minimum thickness. For Single core cables the Gland plate shall be of Al material.

Gaskets shall be EPDM TYPE. Hardware shall be stainless steel. Paint shall be two epoxy coats over 2 coats of primer. Epoxy painting may be powder epoxy coated or spray painted epoxy.

20% spare terminals and contacts to be provided for each terminal strip for each panel for future interconnection and interlocks.

Aluminium etched 33 kV Caution boards written in three languages (English, Hindi) shall be riveted on the panel as well as on the Doors of the HT compartment. Stickers are not acceptable.

Current Transformer

They shall satisfy following requirements:

a) Current transformers for metering & protection shall be cast resin (class of insulation B or better) suitable for operation on 33 kV, 50 Hz system. The CT ratios/protection class shall be as shown in 'Single Line Diagram'.
b) Rated VA burden for metering/protection CTs shall not be less than 15VA or 120% of total VA burden whichever is higher.
c) The accuracy class for metering CT shall be 0.2s or as per distribution company requirement/ statutory requirements whichever is more stringent.
d) It shall be responsibility of CONTRACTOR to ensure that CTs are suitable for correct and satisfactory operation of the instruments/relays connected across them.
e) Short time current rating and momentary withstand rating of CTs shall be as per breaker SC withstanding capacity.
f) All CTs shall have secondary rating of 1A.

Potential Transformer

They shall satisfy following requirements:

a) Potential transformers for metering/protection shall be suitable for operation on 33 kV kV, 50 Hz system.
b) Rated VA burden for metering/protection PTs shall not be less than 50VA or 120% of total VA burden whichever is higher.
c) The accuracy class for metering PT shall be 0.2 or as per distribution company requirement / statutory requirements whichever is more stringent.
d) It shall be responsibility of CONTRACTOR to ensure that PTs are suitable for correct and satisfactory operation of the instruments connected across them.
e) MPCB on primary side shall have rupturing capacity equal to the switchgear rating.
f) For PT's MCB shall be provided on secondary. MCB trip contact to be wired up for annunciation

CODES AND STANDARDS

1. The design, material, construction, manufacture, inspection, testing and performance of Metal Clad VCB shall comply with all currently applicable standards, statutes, regulations and safety codes in the locality where the Equipment will be installed. The Equipment shall comply with the latest editions of the Codes and Standards.

2. The HV Switchgear, Instrument Transformers and other associated accessories shall conform to the latest revisions and amendments thereof, but not limited to, the following standards.

   (a) IEC 62 271-200 - General requirement for Metal Enclosed Switchgear.

   (b) IEC62271-102 - Alternating current dis-connector (Load break isolators) and earthing switch.

   (c) IEC 62 271-100 - Specification for alternating current circuit breakers.

   (d) IEC 62 271-1/IEC 60694 - Panel design, SF6/Vacuum Circuit Breakers.

   (e) IEC 60044-1/ IS 2705:1992 - Current Transformer

   (f) IEC 60265 - High voltage switches.

   (g) IEC 376 - Filling of SF6 gas in RMU.

   (h) IEC 60273/IS :2099 - Characteristics of Indoor & Outdoor post insulators

   (i) IEC 60529/IS 13947(Part-1) - Degree of protection provided by enclosures

3. All codes and standards referred to in this specification shall be understood to be the latest version on the date of offer made by the Bidder unless otherwise indicated.

4 OIL TYPE DISTRIBUTION TRANSFORMERS

This specification covers the requirements and tests including standard loss levels of mineral oil immersed, natural air-cooled, outdoor type, and double wound distribution transformers up to and including 2500 kVA, 33kV and accessory equipment.

The equipment shall be complete with all necessary accessories and components as required as per IS standard and CPWD requirements for trouble free installation & operation.

The BIDDER shall demonstrate the performance of the equipment as specified in the CPWD specification and losses as specified in IS 1180.

All Warranty and testing of the equipment and component shall be carried out as per IS/ CPWD requirements.

The CTs and PT tapings for the tariff meter shall be provided in the transformer secondary terminal box as per the latest DISCOM specifications and requirements. The cables (min 2.5sqmm, CU conductor, PVC insulated), in metallic conduit, shall be laid from the transformer secondary terminal box till the meter enclosure inside the CSS enclosure.

System conditions are similar to those specified for VCB above.

Equipment Particulars:

S.N.	Particulars	Government housing 22,23	
1.	Quantity	2	
2.	KVA	2000	
3.	Type of installation	Outdoor	
4.	Voltage Ratio	33/0.433kV	

5.	Cooling	ONAN	
6.	Vector Group	DYn11	
7.	Tap Changer	+5% to -15% in steps of 2.5%	
8.	Type of tap Changer	OLTC	
9.	Temperature Rise of top Oil (above ambient temperature measured with thermometer)	As per IS 1180: 2014	
10.	Temperature Rise of winding (above ambient temperature measured by resistance method)	As per IS 1180: 2014	
11.	No load current	1.5% of full load current	
12.	Max flux density	1.55T	
13.	Current density	Max 2.8A/sq mm	
14.	Losses	As per IS 1180, star-1, EE Level-2	
15.	Impedance @75ºC (As per IS 1180/2026)	6 % +/-10% Tolerance	
16.	Constructional requirements	As per CPWD requirements.	
17.	Clearances	As per relevant standards IS2026, IS1180, CBIP,	
18.	Transformer Oil	As per IS 335 requirements.	
19.	Current density of the HV & LV windings	not be more than 1.4A / sq mm.	

20.	Noise level	as per NEMA standard

TARIFF METER:

a) All such meters along with its enclosure, CT, terminal, etc. shall be as per latest DISCOM requirements.

b) The tariff meter shall be located inside the substation building.

c) Presently no separate earthing arrangement (electrodes) has been considered in the present scope. However, BIDDER shall confirm the need for separate earth system, if required by DISCOM, in the BID.

d) All required support & structure required for mounting of the above meter enclosure is included in the scope.

GENERAL CONSTRUCTIONAL FEATURES

All material used shall be of best quality and of the class, most suitable for working-under the conditions specified and shall withstand the variations of temperature and atmospheric conditions, overloads, over-excitation, short-circuits as per specified standards, without distortion or deterioration or the setting up of undue stresses in any part, and also without affecting the strength and suitability of the various parts for the work which they have to perform.

The transformer construction shall be suitable for seismic data as per IS.

TANKS

The exterior of tank and other steel surfaces exposed to the weather shall be thoroughly cleaned and have a priming coat of zinc chromate applied. The second coat shall be of an oil and weather-resistant nature, preferably of distinct colour from the prime and finish coats. The final coat shall be of a flossy, oil and weather resisting non-fading paint of specified shade. The interior of the tank shall be cleaned by shot blasting and painted with two coats of heat resistant and oil insoluble paint.

(a)Steel bolts and nuts exposed to the atmosphere shall be galvanised.

VACUUM AND PRESSURE TEST

Various Vacuum & Pressure Tests for tank, conservator, radiator, pipes etc. shall be as per IS specified.
The tank cover shall be suitably sloped so that it does not retain rain water.
The material used for gaskets shall be cork neoprene or approved equivalent.

CORE

The magnetic circuit shall be constructed from high grade cold-rolled non-ageing grain oriented silicon steel laminations and shall be of 'core' type.
The insulation structure for the core to bolts and core to clamp plates shall be such as to withstand BIL & Lightning Impulse Voltage.

WINDING

a. Windings shall be of electrolytic Copper of 99.99% purity unless specifically approved by the PURCHASER.

b. Winding shall be subjected to a shrinking and seasoning process, so that no further shrinkage occurs during service.

c. The completed core and coil assembly shall be dried in vacuum and shall be immediately impregnated with oil after the drying process to ensure elimination of air and moisture within the insulation.

INTERNAL EARTHING

The framework and clamping arrangement of core and coil shall be securely earthed inside the tank by Copper strap connection to the tank.

TERMINATION

Transformers shall be fitted either with bushing insulators or air insulated cable box with air insulated disconnecting chambers, as specified in Data Sheet.

The neutral of the star-connected winding shall be brought out to a separate bushing terminal. The neutral bushing shall be provided on the tank side to facilitate lead of the earth conductor down to the ground level. For transformers 1000 kVA and above, tank mounted Epoxy resin cast insulators shall be provided for supporting the neutral earthing bar of specified section, along its run from the neutral bushing to ground-level. Neutral shall also be extended to cable box /bus duct flange as applicable.

BUS DUCT TERMINATION

When bus-duct termination is specified in Data Sheet / BoQ, a flanged bushing connection shall be provided to suit the PURCHASER'S bus-duct. The winding terminations shall be brought out on outdoor type of bushings.

BUSHINGS

a. Bushings shall be designed and tested to comply with the applicable standards. If type test certificates are not available, these tests shall also be carried out in addition to the routine tests.

b. Bushing rated for 400A and above shall have non-ferrous flanges and hardware.

c. Fittings made of steel or malleable iron shall be galvanized.

d. Whenever specified in Data Sheet, bushings shall be supplied with terminal connector clamp suitable for connecting the bushing terminal to the PURCHASER's specified conductor/cable.

BUSHING CURRENT TRANSFORMERS

a. Whenever specified in Data Sheet, bushing shall be supplied with current transformers.

b. Secondary leads, including tappings, shall be brought to a weatherproof terminal box near the bushing.

c. Bushing C.T. nameplate shall be mounted on the tank adjacent to the terminal box.

CABLE BOXES AND DISCONNECTING CHAMBER

(b) When specified in Data Sheet, cable boxes shall be supplied to suit the PURCHASER'S specified cables.

(c) When specified in Data Sheet , disconnecting chamber shall be provided to enable the transformer to be removed without unsealing the cables. The disconnecting chamber shall be air insulated and complete with seal-off bushings, removable flexible connectors/links and removable covers.

(d) Phase to phase and phase to ground clearances within the chamber shall be such as to enable either the transformer or cable to be subjected separately to Basic Insulation Level (BIL). Clearances shall be subject to the PURCHASER's approval.

MARSHALLING BOX

(e) Whenever optional fittings as per clause 7.0 (e.g. temperature indicators with auxiliary contacts, Buchholz relay) and bushing CT are specified in Data Sheet-A, the VENDOR shall provide a marshalling box and marshal to it all the

contacts/terminals of electrical devices mounted on the transformer. It shall be in the VENDOR'S scope to provide:

(a) The interconnection cabling between the marshalling box and the accessory devices by either PVC insulated FR wires in GI conduits or PVC insulated inner extruded PVC, Outer sheath PVC FR armoured cable and

(b) Necessary compression type, brass cable glands (at easily accessible location) the marshalling box for the above mentioned cables.

(f) The marshalling box shall be tank mounted, outdoor type, IP55 protected, weather-proof, sheet-steel (2 mm thick) enclosed, with hinged door having padlocking facility. Colour finish shall be epoxy paint, powder coated with minimum thickness of 50 Microns and dark gray shade RAL 632 as per IS 5. All doors, covers and plates shall be fitted with neoprene gaskets. Bottom shall be at least 600 mm from floor level and provided with gland plate and cable glands as required. Top surface shall be sloped.

(g) All contacts for alarm, trip and indication circuits shall each be potential free, wired for auxiliary D.C. supply as specified and brought out to separate terminals at the terminal blocks in the marshalling-box. Terminals shall be rated for 10A. Wiring shall be with multistranded, copper conductors of sizes not smaller than 1.5 sq.mm for control and 2.5 mm for C.T.circuits. C.T. terminals shall be provided with shorting & earthing facility.

(h) The marshalling box shall be provided with glass window so as to make the WTI and the OTI dials visible from the outside without opening the door.

(i) The marshalling box shall house the winding temperature indicator (WTI, 150 mm dial 240 degree scale), the oil temperature indicator (OTI, 150 mm dial 240 degree scale), terminal block, 60W anti-condensation heater, 5/15A industrial type five pin socket and a 10W CFL with fixture, suitable for operating on 230 V AC. Contacts of Buchholz relay, WTI, OTI, magnetic level gauge, PRD, RPR shall be wired up to the terminal block.

ELECTRICAL AND PERFORMANCE REQUIREMENTS

a. Transformers shall operate without injurious heating at the rated kVA at any voltage within + 10 percent of the rated voltage of that particular tap.

b. Transformers shall be designed for 110% continuous overfluxing withstand capability.

c. Overloads shall be allowed within the conditions defined in the loading guide of the applicable standard. Under these conditions, no limitations by terminal bushings, tap/changers or other auxiliary equipment shall apply.

d. Noise level of transformers shall be as per latest NEMA standard.

e. Neutral of low voltage side shall be rated as per % mentioned in data sheet.

OIL

Transformers shall be supplied complete with transformer oil, It shall be ‘’PCB free and polycyclic Aromatic Hydrocarbons free mineral oil’’ OR Synthetic ester Oil as per IS / IEC specified in Data Sheet.

FITTINGS AND ACCESSORIES

The following standard fittings shall be provided:

a) Two earthing terminals with the earthing symbol

b) Oil level gauge indicating oil level at minimum, 300C and maximum operating temperature

c) Air release device (for non sealed type transformer)

d) Rating and terminal marking plate

e) Plain breathing device for non-sealed type transformer which would not permit ingress of rain water and insects up to 200kVA transformers. Above 200kVA transformers dehydrating breather shall be provided

f) Drain cum-sampling valve (3/4’ nominal size thread) preferably steel with plug for three phase transformer.

g) Thermometer pocket with cap

h) Oil filling holes having (1 1/4’ nominal size thread) with cover (for sealed type transformers without conservator)

i) An extended pipe connection on upper end with welded cover for sealed type transformers. The pipe should be suitably threaded over a sufficient length to enable use of a refilling/siphon connection after removing the welded cover or any other similar arrangement capable of reuse

j) Lifting lugs for the complete transformer as well as for core and winding assembly

k) Nitrogen /air filling device / pipe with welded cover capable of reuse (for sealed type transformer)

l) Pressure relief device or explosion vent above 200kVA

m) One filter valve on the upper side of the tank(for transformers above 200kVA)

n) Unidirectional flat rollers(for transformers above 200kVA)

o) Inspection hole(for transformers above 200kVA)

p) Pressure gauge for sealed transformers with radiators and nitrogen cushion(for transformers above 200kVA)

q) HV Side neutral grounding strip(Where one of the HV bushing terminal is connected to earth)

r) LV earthing arrangement for single phase transformers

s) Buchholz relay for transformers above 1000kVA

OPTIONAL FITTINGS

The following shall be available as additional fittings at the option of the user whenever specified:

(a) Dehydrating breather in lieu of plain breathing device for transformer up to 200kVA

(b) Filter valve (1 1/4' nominal size thread) for transformers up to 200kVA

(c) Arcing horns or suitable rating lightning arrestors for HT side – 3 Nos. For transformers up to 200 kVA

(d) Bird guard

(e) Terminal connectors

(f) Oil temperature indicator and winding temperature indicators for transformers above 200kVA

(g) Jacking pads (for transformer above 1600kVA)

(h) Buchholz relay (for transformers above 200kVA)

(i) Magnetic oil level gauge (for transformer above 1600kVA) with low oil level alarm contact

(j) Non return valve (for conducting pressure test)

(k) Pressure relief device or explosion vent (up to 200kVA)

(l) Protection relay for sealed type transformers for internal parameters that is pressure, temperature, oil level and gas detection (above 1000kVA)

(m) 4 Nos anti-theft stainless steel fasteners with breakaway nut shall be provided at top cover(up to 200kVA)

TESTS

(j) ROUTINE TESTS

(a) Measurement of winding resistance

(b) Measurement of voltage ratio and check of phase displacement

(c) Measurement of short circuit impedance (principal tapping, when applicable) and load loss at 50 percent & 100 percent load

(d) Measurement of no load loss and current

(e) Measurement of insulation resistance

(f) Induced over voltage withstand test

(g) Separate source voltage withstand test

(h) Pressure test

(i) Oil leakage test

(k) TYPE TEST

Bidder shall quote extra unit prices for carrying out the following type tests:

(a) Lightning impulse test

(b) Temperature rise test

(c) Short-circuit withstand test

(d) Pressure test

(l) SPECIAL TESTS

The following shall constitute the special tests which shall be carried out by mutual agreement between the user and the supplier.

a) Determination of sound levels

b) Short-circuit withstand test above 200kVA

c) No load current at 112.5 percent voltage

d) Paint adhesion tests. The test is performed as per ASTM D3359 (Standard Test Methods for measuring adhesion by Tape test)

e) BDV and moisture content of oil in the transformer

LOSSES

(m) Transformer losses and impedance values shall be as specified in IS 1180/2026.

(n)For the purpose of evaluation of bids, the quoted load losses and iron losses shall be increased to take into consideration tolerance as permitted by applicable standard.

(o)Should the losses as measured on the transformer after manufacture be found in excess of the values of the guaranteed losses with plus tolerance indicated in the proposal, VENDOR shall pay penalty to the PURCHASER based on the charges indicated in Data Sheet-A.

REJECTION

PURCHASER may reject any transformer if during tests or service any of the following conditions arise:

a) No Load loss exceeds the guaranteed value by 15% or more.

b) Load loss exceeds the guaranteed value by 10% or more.

c) Total losses exceed the guaranteed value by 10% or more.

d) Impedance value differs the guaranteed value by ± 10% or more.

e) Oil or winding temperature rise exceeds the specified value by 5oC.

f) Transformer fails on impulse test.

g) Transformer fails on power frequency voltage withstand test.

h) Transformer is proved to have been manufactured not in accordance with the agreed specification.

i) The PURCHASER reserves the right to retain the rejected transformer and take it into service until the VENDOR replaces, at no extra cost to PURCHASER, the defective transformer by a new acceptable transformer.

j) Alternatively the VENDOR shall repair or replace the transformer within a reasonable period to the PURCHASER's satisfaction at no extra cost to the PURCHASER.

SPARES

The BIDDER shall quote item wise prices for the spares recommended for 2 years trouble free operation as specified in Data Sheet.

QUALITY ASSURANCE PLAN (QAP)

QAP shall list and define in sequential order all process control activities, inspection and tests proposed to be performed on the equipment/ material starting from component procurement and from testing stages to product dispatch. The QAP shall indicate and identify the applicable standards, detailed description with diagram the procedure, acceptance criteria, extent of check and record to be generated. Transformer Vendor has to get approval for QAP, from Purchaser / Consultant.

TRAINING OF PERSONNEL

Training of Purchaser's personnel (at least 2 Nos.) shall be free of cost to enable them to operate, troubleshoot and maintain the offered equipment/ components. The general guidelines for the training requirement, description of type of training required and the duration of training shall be indicated by the Bidder to fulfil the above objective.

STORAGE OF EQUIPMENT

Vendor shall indicate the specific requirements, if any for proper storage of the equipment supplied at site.

In general, while shipping the equipment to site, Vendor shall ensure that each assembly or component shall be crated, boxed or otherwise suitably protected against damage or loss during shipment and to facilitate site storage. All openings shall be effectively sealed with temporary closures to prevent entry of dust, dirt, moisture and other foreign matter.

DOCUMENTATION

Both hard and soft copies (AutoCAD) of all Vendor drawings shall be furnished right from approval stage.

The Vendor shall plan his manufacturing schedule so as to allow at least two weeks time for approval of the drawings after their receipt by the Purchaser.

Upon completion of the installation, the Vendor shall furnish a complete set of drawings on reproducible tracing film if requested by the Purchaser and soft copies in CDs.

Drawings prepared by the Vendor and approved by the Purchaser shall be considered as a part of the Contract Specification. However, examination and approval of the drawings by the Purchaser shall not relieve the Vendor of his responsibility for engineering, design, workmanship, materials and construction under the Contract.

The Purchaser shall reserve the right to comment on drawings and documents under information category and inform the Vendor to treat these drawings and documents as approval category.

Following Documents are to be submitted along with the bid document-

(a) Tentative GA of the transformer.
(b) Data sheets as asked for in the Specifications.
(c) List of makes for all components including bought out items.
(d) Type test certificates as asked for transformer.
(e) Type test reports of OLTC (if applicable)

5 BATTERY

5.1 SCOPE

This specification covers requirements of Value Regulated Lead Acid Battery (VRLA) complete with battery racks, inter-cell and inter-tier connectors and all other accessories.

5.2 CODES AND STANDARDS

1.	General requirement and method of tests for Valve regulated battery		IEC : 60896-2
2.	Water for Storage Battery		IS : 1069
3.	Sulphuric Acid		IS : 266
4.	Synthetic separator for Lead Acid Batteries		IS : 6071
5.	Recommended practice for sizing Lead acid batteries for stationary applications		IEEE : 485
6.	Containers & Vent Plugs		UL : 924

7.	Battery Enclosures		UL : 1778
8.	Rubber and plastic containers for lead acid storage battery		IS: 1146

5.3 FEATURES OF CONSTRUCTION

The VRLA batteries shall be starved electrolyte type to allow recombining of generated oxygen internally. The battery shall be completely explosion resistant, shall tolerate freezing and shall not allow gases to escape during normal charging conditions. The battery shall not require any topping and be maintenance free.

Connectors and Terminal Posts

Inter-cell and inter-tier connectors and terminal posts shall be of low resistance corrosion resistant alloy/copper. Terminal posts shall be suitably designed to accommodate external bolted/threaded connection conveniently and positively. The junction between terminal posts and cover and between cover and container shall be so sealed as to prevent any seepage of electrolyte. All terminals shall be provided with FRLS insulated covers/shrouds.

At the take off points for the purchaser's cable connection a suitable arrangement shall be made to suit termination of purchaser's cables. The termination points shall be shrouded with transparent covers in order to avoid any accidental contact.
All inter cell, inter modules and inter stack connectors shall be covered with heat shrunk FR/FRLS sleeves.
The shrouds for Battery terminal shall be of FRLS (anti static type).

Containers

Containers, cell lids, safety vents, separators, connectors, electrolyte, shall conform to the relevant IS/IEC and safety standards. The cell containers shall conform to the safety requirements of UL 94 HB or equivalent safety standard. The safety vent shall be self resealing pressure regulating with flame arrestor. In case the batteries are proposed to be housed in a sheet metal or polymeric enclosure, the same is deemed to be included in the scope of the bidder. The enclosure for battery shall conform to the safety provisions of UL 1778 or equivalent standard.

Container should have adequate Mechanical strength to prevent bulging, cracking etc. during the life span of battery when operating under expected temperature range and due to action of static and dynamic loads and the action of electrolyte.

THERMAL RUNAWAY

In order to prevent thermal runaway an air flow distance of 10 mm shall be provided between the cells.

ACCESSORIES

The battery shall be complete with accessories and devices, including but not limited to the following:

i) Battery racks

ii) Set of intercell, inter- module and inter stack connectors as required for the complete installation.

iii) Accessories for testing and maintenance.

(a)	One	± 3 Volts DC Voltmeter with built in discharging resistor and suitable leads for measuring cell voltage
(b)	Two	PVC aprons
(c)	One set	Terminals and cable boxes with glands for connecting cable as required. Spare connectors Spare nuts and bolts Suitable set of Insulated spanners
(d)	One set	Torque Wrench
(h)	Two	Cell lifting straps

BATTERY LAYOUT

The bidder shall review the battery room dimensions/ Layout drawings included with the tender specifications and suggest suitable battery layout, providing dimensioned drawings.

BATTERY RACKS

Battery racks shall be constructed from steel. Metallic stands shall be designed to withstand the seismic forces, if specified in Data sheet, suitable for the seismic zone specified. Metallic stands shall be painted with acid resistant paint after 2 coats of primer. The construction of the racks shall be suitable for fixing to a flat concrete floor. The racks shall be rigid, mechanically strong, free standing type and free from warp and twist. The completed racks shall be suitable for being bolted end to end to form continuous row. Insulators shall be provided below the legs of the stands

The racks shall be of single tier/ two tier construction depending on the final layout based on space availability and as per standards on distance and safety. The number of tiers shall be subject to Purchaser’s approval

VENTILATION

The BIDDERS shall indicate in the tender, requirements of ventilation in the battery room.

BATTERY SIZING

The BIDDER shall guarantee the performance of the battery for the duty requirements indicated over the entire range of temperature including design ambient temperature as indicated in Data Sheet. The procedure for sizing the battery shall be as detailed in IEEE 485.

Design margin on battery size and voltage drop between the battery & the DC distribution board for calculating no of cells shall be considered as specified in Data Sheet.

BIDDER shall demonstrate the performance of the battery at the specified duty cycle during pre-dispatch inspection, by conducting test on a randomly selected cell, if requested.

CHARGING

The proposed method of charging the battery is indicated in the Data sheet. The charger shall be constant voltage, current limiting type.

5.4 LIFE

BIDDER shall quote in his offer the guaranteed life of the battery when operating under the conditions specified.

5.5 TESTS

All tests shall be conducted as per the relevant standards .Tests shall include following Type & Acceptance tests.

i)	Type Tests	**:**	Performed at MANUFACTURER'S works
ii)	Acceptance Tests	**:**	Performed at site after installation and commissioning of the battery.

Details of tests to be performed are given below.

TYPE TESTS

Type tests shall comprise of the following:

i) Verification of constructional requirements.

ii) Verification of marking

iii) Verification of dimensions.

iv) Test for capacity

v) Test for suitability of float operation

vi) Endurance test.

vii) Charge retention test

viii) Short circuit current and internal resistance measurement test

In application where the first momentary discharge stated in Data Sheet is high and, lasts for several minutes a high discharge test shall be conducted, in addition to the above tests.

Type test report on an identical type and capacity of the battery shall be submitted for purchaser's review. If type tests reports are not available then these Type tests shall be conducted on a minimum of one sample cell typical and identical with the cells forming the complete battery offered (Free of cost to owner). However, the test cell shall not be one of the cells offered in the battery offered.

ACCEPTANCE TESTS

Acceptance tests shall be conducted at site on completion of installation and commissioning and immediately prior to putting the battery in service. These tests shall comprise of:

i) Visual inspection

ii) Dimensional check

iii) Capacity test

iv) Test for voltage during discharge

v) Storage test

vi) Internal resistance

Vendor shall carry out the capacity test for the following conditions:-

i) For the load cycle specified.

ii) For 10 Hr discharge.

The battery voltage at the end of the cycle time shall not be less than the values specified in Data sheet.

The vendor shall ensure that instruments and gauges to be used for testing and inspection of critical parameters as identified in the specification have valid calibration and the accuracy can be traced to National/International standards.

TEST REPORTS

A copy of routine and type test results shall be submitted for approval before the dispatch of batteries. Specified number of bound copies of complete test results shall be furnished with the batteries.

5.6 IDENTIFICATION

Each cell shall be marked in a permanent manner in accordance with relevant standard. In addition, each cell shall be legibly numbered serially to identify the cell during manufacture, testing, installation and operation of battery after having assembled into battery bank in battery racks. A set of loose stickers shall be provided to mark the cells position in the assembled battery bank.

5.7 CO-ORDINATION WITH BATTERY CHARGER VENDOR

When battery charger is procured separately, the VENDOR shall co-ordinate with battery charger VENDOR with regard to layout, connections, charging voltage requirements etc.,

Battery health monitoring system if specified in Datasheet-A1, shall be preferably from Battery Vendor. If BHMS is supplied through Battery Charger vendor, Battery vendor shall coordinate with battery charger Vendor and ensure the performance of the system. BHMS make shall be clearly brought out in Bid which is subjected to Purchaser approval. BHMS controller shall be preferably located as part of the Battery charger panel.

5.8 TRANSPORT

The battery shall be transported in sealed & fully charged condition.

5.9 WARRANTY

VENDOR shall indicate additional terms and conditions, if any, for providing no of years warranty as specified in Data sheet for sealed lead acid battery.

5.10 BATTERY HEALTH MONITORING SYSTEM (BHMS)

Battery health Monitoring system shall be provided.

The Battery health Monitoring System (BHMS) shall be microcontroller based embedded equipment with hardware & software which will continuously monitor and check the trend of individual cell of a battery bank on-line on 24x7 basis.

The BHMS shall be capable of monitoring, recording and displaying of following values:

(a) Individual cell voltage

(b) Total battery bank voltage

(c) Battery string current

(d) Individual battery charging and discharging currents

(e) Cell and Room Temperature

BHMS shall have the following features

(a) Manual & auto scan from remote location. Potential free contact shall be provided for remote alarm / control. Remote communication via Modbus protocol with RS485 port shall be possible. In addition one additional port shall be provided for local laptop/PC connection. 6 Nos of Digital input and 2 Nos of Analog input modules shall be provided for receiving Purchaser signals.

(b) Scan for weak cell (if any) in the battery bank and indicate well advance before the cell gets damaged. Weak cell detection algorithm should be intelligent enough to detect a weak cell in trickle charging / discharging mode.

(c) Audio-visual alarm / annunciation for cell weakness, battery bank under voltage/voltage condition.

5.11 SOFTWARE

Necessary software for communication between Battery health Monitoring System and remote end DCS/PLC/SCADA and for graphical trends for analysis of stored data shall be provided with the system.

Logging of cell/battery parameters (voltage, current and temperature) and alarm conditions as well as event log of all activities affecting the battery bank shall be possible with date/time stamp. Logged data shall be possible to be exported in MS Excel/MS Word format.

5.12 TECHNICAL DATA SHEET

SL. NO.	ITEM	UNIT	
A	**GENERAL**		
1.	Application		33/0.433kV Substation building
2.	Type of battery		SSMF VRLA
3.	Nominal Voltage	V	24
4.	Battery Capacity	AH	As per BoQ
5.	Number of battery banks required	No.	
6.	Number of cells (approximate)	No.	12
7.	Temperature		
8.	Min.Temp.	^{0}C	
9.	Design ambient temperature	^{0}C	50 Deg

SL. NO.	ITEM	UNIT	
B	**RATING**		
10.	Design margin	%	10%
11.	Ageing factor		
12.	DC System Voltage at DC bus of the Switchboard.		
a.	Normal	V	24
b.	Maximum	V	24+10%
c.	Minimum	V	24-10%
13.	End Cell Voltage (Volts/Cell)	(V/Cell)	10 hour rate of discharge to end voltage of 1.85 volts**.**
C	**DISCHARGE DUTY**		
14.	Ampere Hour Capacity of Battery at min. temperature, 10 hour rate to give final end cell voltage	C10	
15.	Sketch no. showing Load Duty Cycle Diagram		
D	**LAYOUT AND CONSTRUCTION**		
16.	Tentative size of cables to connect battery to external circuit		Bidder to estimate
a.	Type		
b.	Size	mm^2	
17.	Available area in battery room (L x B)	mm x mm	Bidder to estimate
18.	Layout drg. No. (if any)		No
19.	Mounting arrangement		
20.	Whether Metallic stands to be designed for Seismic force	Yes/No	Yes
a.	If Yes, Seismic Zone		II
21.	Type of battery cell container		
22.	BMS to be supplied	Yes/No	Yes
E	**MISCELLANEOUS**		
23.	Tapped Cell arrangement for float cum boost charging arrangement.	Required / Not Required	

SL. NO.	ITEM	UNIT	
24.	Dropper Diode arrangement for float cum boost charging arrangement.	Required / Not Required	
25.	**Spares**		Bidder to consider for 05 years operation & maintenance.
a.	Inter-cell / Inter-row/ Inter-bank / connectors	Nos.	
b.	Nuts, bolts, washers etc	Nos.	

6 BATTERY CHARGER

6.1 SCOPE

This specification covers requirements of Battery Charger equipment, comprising of

(a) Float cum boost charger units

(b) Float charger unit

6.2 CODES AND STANDARDS

The design, manufacture and performance of equipment shall comply with all currently applicable statutory regulations and safety codes in the locality where the equipment shall be installed. Nothing in this specification shall be construed to relieve the VENDOR of this responsibility.

Unless otherwise specified, equipment shall conform to the latest applicable standards as mentioned Below. Nothing in this specification shall be construed to relieve the VENDOR of his responsibility.

Other National / International Standards are acceptable if same are established to be equal to or superior to the listed ones. In all such cases, copies of English translation of such National Standards shall be enclosed with the bid. Bids not complying with this requirement are liable to be rejected.

In the event of conflict between codes and standards referred to elsewhere in the specification and the requirements of this specification, the requirements of this specification shall govern.

List of Standards for Battery Charger

S.NO.	Description	Standard

1.	ENVIRONMENTAL TESTS FOR ELECTRONIC AND ELECTRICAL EQUIPMENT	IS 9000
2.	ENVIRONMENTAL REQUIREMENTS FOR SEMICONDUCTOR DEVICES AND INTEGRATED CIRCUITS	IS 6553
3.	FACTORY BUILT ASSEMBLIES OF SWITCHGEAR AND CONTROLGEAR FOR VOLTAGES UPTO AND INCLUDING 1000V A.C. AND 1200VD.C.	IS 8623/ IEC 61439
4.	DEGREE OF PROTECTION	IEC 60529
5.	SEMI-CONDUCTORS CONVERTERS	IEC 60146
6.	SEMICONDUCTOR RECTIFIER EQUIPMENT SAFETY CODE	IS 6619

6.3 GENERAL REQUIREMENTS

The float and boost battery charger shall be static type composed of silicon controlled rectifiers (SCRs) and diodes connected in three phase full wave bridge circuit along with electronic controllers or SMPS (Switch Mode Power Supply) modular type.

The rectifier transformers for float and boost chargers shall be indoor dry type, double wound with star-delta / delta-delta connections. The BIDDER shall ascertain if taps are required and provide adequate number of primary and secondary taps, if necessary.

In case of SMPS modules, the number of modules shall be paralleled with active current sharing to facilitate at least partial availability of the system in case of one or two rectifier module failure. The charger shall comprise of N+2 modules. N refers to number of SMPS modules. The current rating of each module shall be considered as output current of the SMPS module and shall not be less than 10 % of the rated capacity of the charger

The chargers shall be provided with battery discharge test facility with regeneration feature if specified in Data Sheet. In the regeneration feature, the battery acts as a source and DC supply is inverted and fed back to the 415 V AC supply.

The chargers shall be provided with battery discharge test facility with regeneration feature if specified in Data Sheet. In the regeneration feature, the battery acts as a source and DC supply is inverted and fed back to the 415 V AC supply.

6.4 RATING

The float charger shall be designed for supplying:

(a) The D.C. loads specified in Data Sheet; i.e. continuous load.

(b) The float charging current of the battery.

(c) Largest D.C motor running current

(d) 25% margin over the above loads

The boost charger shall be designed for supplying the boost charging current of the battery.

The rating of the float cum boost charger shall be based on the boost charger rating or the float charger rating whichever is higher and suitable to meet the battery requirements in float, boost and equivalising charge mode

The float cum boost chargers shall be designed for 415V, 3 phases, 3 wires, 50 Hz input supply unless otherwise specified in Data Sheet.

If the battery and charger are to be supplied by separate Vendors, the charger Vendor shall coordinate with the battery Vendor regarding the float/trickle and boost charging current and voltages required by the battery.

6.5 PERFORMANCE

Float Charging Mode

The D.C. output voltage during float charging shall be stabilised within + 1% of the set DC bus voltage for AC input voltage variation of +10%, frequency variation of + 5% and DC load variation from 0 - 100%. The voltage regulation shall be achieved by a constant voltage regulator having fast response SCR control or with high frequency SMPS with intelligent control. The ripple content shall be within 1% of D.C. output nominal voltage with battery disconnected. Also in any mode of operation, the maximum harmonics (THD) in the charger input shall not exceed 5% and input power factor shall be better than 0.85.

The setting of the output D.C. bus voltage shall be adjustable between + 10% of nominal rated voltage.

There shall be provision for manual control if auto mode fails.

The current limiting feature of the float charger should be designed to take care of the loads connected. The chargers shall have load limiters which shall cause, when the voltage control is in automatic mode, a gradual lowering of the output voltage when the DC load current exceeds the load limiter setting of the Charger. The load limiter characteristic shall be such that any sustained overload or short circuit in DC system shall neither damage the Charger nor shall it cause blowing of any of the charger fuses.

Line surge suppressers shall be provided.

Boost Charging Mode

For boost charging the discharged battery after a mains failure, the rectifier shall charge the battery at high rate limited to the maximum boost charging voltage.

In auto control, the DC output current shall be stabilised within +2% for AC input voltage & frequency variation of + 10% and + 5% respectively. There shall be provision for manual control if auto-mode fails.

The boost charge voltage and current settings shall be adjustable between 70 to 100% of maximum boost charge voltage and between 30 to 100% of maximum boost charging current. It shall have a provision for initial charging. Preferably AH input to the battery shall be measurable to facilitate accurate first charging.

During boost charging following emergency measures shall be provided:

(a) If the AC mains supply fails, an arrangement shall be made to automatically connect the battery directly across the load in case of 2x100% float cum boost chargers are provided.

(b) In case of Float cum boost charger and standby float charger scheme with one battery, If the standby float charger supplying D.C. load fails and tap cell diode arrangement if specified in Datasheet, the load shall be fed from the point of connection at the tapping of the battery via adequately rated blocking diodes. Two blocking diodes in series shall be provided to take care of short circuit of any one diode.

Line surge suppressers shall be provided.

6.6 CONSTRUCTION DETAILS – CHARGER CUBICLE

Charger cubicles shall be sheet steel enclosed and shall be dust, weather and vermin proof. Sheet Steel used shall be cold rolled and at least 2.0mm thick and properly braced to prevent wobbling. The components shall be housed in a well ventilated sheet metal cubicle complete with input and output terminals.

All sheet steel work shall be degreased, pickled, phosphated and then applied with two coats of zinc chromate primer and two coats of finishing epoxy paint, both inside and outside, of colour as specified in Data Sheet.

In case of SMPS, Electronic equipment shall be of modular design consisting of plug in modules in standard metallic racks with metallic card guides. Card to card wiring shall be through motherboard. The modules shall be hot-swappable to reduce MTTR (Mean Time to Repair).

Indications, controls and output voltage setting adjustments shall be on front panel.

Louvers shall be provided for ventilation backed up by fine wire mesh so that the degree of protection shall be equal to or better than IP-42.

All printed circuit cards shall be plug-in type, interlocked to prevent insertion in a wrong slot. Each card shall have LED indication on its front plate to indicate normal condition and readily marked test pins.

All components shall be accessible to the maintenance technician for easy disassembly and replacement. Access to parts of equipment shall be with minimum danger from all hazards.

All components and modules shall be clearly and unambiguously marked and all wiring colour coded and tagged.

All power & control wiring within the cubicle shall be done with stranded copper wires. The power wiring shall be adequately sized for the required rating. The minimum sizes for control wiring shall be 1.5 mm^2 and for power wiring shall be 4 mm2.

The charger panels shall have fully rated ground bus with two ground terminals, one at each end. Each terminal shall comprise two bolt drilling with suitable bolts and nuts to receive ground connection of GI/Copper flat of appropriate size
Ground terminals with isolating links shall be provided.

Cable glands and tinned copper crimping type lugs shall be provided to suit the PURCHASER's incoming and outgoing cables.

Busbars shall be insulated and of Industrial grade copper and shall have adequate cross-section to carry the required continuous currents such that the operating temperature of the busbars does not exceed 85 DegC. Bi-metallic strips/washers shall be provided for terminations of aluminum conductors with copper busbars.

At least 20% spare terminals shall be provided for control circuits. The insulation of all circuits, except the low voltage electronic circuits shall withstand test voltage of 2 kV AC for one minute

The layout of Charger components shall be such that their heat losses do not give rise to excessive temperature within the Charger panel surface. Location of the electronic modules will be such that temperature rise of the location, in no case, will exceed 10°C over ambient air temperature outside the Charger.

COMPONENTS/ACCESSORIES

Following main items are listed. However, additional items required for completeness or to meet the specified performance & operational requirements of the charger, shall be deemed to be included in the VENDOR's scope. Float charger unit and float cum boost charger shall essentially comprise of following as applicable:

i) Three phase full wave, bridge rectifier circuit comprising silicon controlled rectifiers and silicon diodes complete with resistor/capacitor network for surge protection. The diodes/SCRs shall be individually protected by fuses and fuse fail indication. The fuses shall be of fast acting semiconductor type. For SMPS based rectifier, each module shall be provided with MCB /MCCB at the input for isolation.

ii) Double wound, dry type, three phase suitably rated mains transformer with fuse/MCB protection and with one set of power factor correction capacitors to maintain a power factor of 0.85 (lag).

iii) Suitable rated series inductor in case of boost charger to reduce the ripple contain in the output DC.

iv) Suitable rated control transformers for electronic controller.

v) Electronic controller comprising of power supply card, soft start cum current limit card, auto trickle mode card with facility for setting trickle charge current and monitoring battery current, error amplifier cards and pulse generating cards for achieving the DC output voltage stabilisation of +1% and also for achieving current limiting feature. The electronic controller shall be provided with boost current stabilisation and boost charge current limiter. The electronic controller shall have protection features with indications for under-voltage, over-voltage, earth fault, set output voltage and phase failure or voltage unbalance.

vi) Adequately sized necessary built-in accessories shall be provided such that on failure of the controller in auto mode the voltage can be effectively controlled manually.

vii) Filter circuit comprising of smoothing choke and condensers complete with HRC fuse with trip indication for filter condenser circuit.

viii) One (1) Auto / Manual selector switch for selecting the mode of operation of the controller.

ix) One (1) front panel mounted potentiometer for set point adjustment of output voltage in auto /manual mode. In case of float cum boost charger, the potentiometer for set point adjustment of output voltage for auto and manual operation shall be sized to take care of maximum boost voltage.

x) One (1) set of MCCB / ACB for AC input with suitable ratings and with trip indication for each of the charger units.

xi) One (1) AC contactor with suitably rated coil with three main contacts and 2 NO + 2 NC auxiliary contacts, suitably rated thermal overload relay and ON/OFF control switch.

xii) One (1) set of MCCB/ACB complete with fuse fittings for the DC output and with trip indication.

xiii) One (1) Double pole DC ON/OFF rotary switch for each of the charger outputs

xiv) One no. make before break type selector switch for charging mode.

xv) DC contactor of suitable rating for disconnection of load during boost charging. When one charger is feeding the battery then other should feed the load. If only one charger is operating then that should operate in float mode only & shall supply the DC load along with the trickle charging current. If AC mains supply fails the full battery gets connected across the load through contacts of the DC contactor.

xvi) One (1) battery under voltage relay to annunciate fully discharged condition of the battery.

xvii) Two (2) nos. blocking diodes in series to block back feed from battery to float charger. Blocking diode shall also be provided in case of SMPS based rectifier.

xviii) One (1) cubicle space heater suitable for 240 V AC 50 Hz, single phase shall be provided.

xix) One (1) 240 V AC lamp for cubicle internal lighting shall be provided.

xx) Two (2) - ON/OFF switches with MCB for space heater and internal lighting shall be provided.

xxi) Tap cell – blocking diode/dropper diode as per the requirement as specified in Datasheet.

xxii) A separate wall mounted isolation switch shall be provided for emergency battery isolation. It shall carry the rated current in both direction of current flow. It shall be enclosed in sheet steel enclosure of at least 2mm having IP 54 degree of protection. The isolation switch box shall be wall mounted type located in battery room.

xxiii) Switch shall not trip on fault, only upstream battery charger MCCB/ACP shall be tripped. Switch ON/OFF status indicators shall be provided. Potential free contacts for remote indication of close/open status of the switch shall also be provided.

6.7 BATTERY CHARGER MONITORING SYSTEM

Battery charger shall be provided with MMI unit to monitor & annunciate the charger parameters.

There shall be a LCD display (4X20) which all the parameters like faults; AC/DC voltage & current can be seen. The micro controller shall have fault history (events with Date & Time) logging & retrieval facility. Controller shall have one RS485 port facility to monitor all the parameters indicated below from remote location. Controller shall have facility to change the alarm set points at site (password protected)

Following annunciation shall be provided as minimum

(a) Mains AC failure

(b) Charger over load

(c) DC output breaker tripped

(d) AC input breaker tripped

(e) Battery fully discharged

(f) Battery on boost

(g) DC system earth fault

(h) DC under voltage

(i) DC Over voltage

(j) Float/Boost charger rectifier fuse blown

(k) Float/Boost charger filter condenser fuse blown.

(l) Charger current limited protection operated

(m) AVR Defective

(n) SMPS module failure

(o) Battery breaker tripped

(p) Battery on boost

(q) Boost charge changeover alarm (When battery reaches min voltage limit , alarm to change it to Boost mode)

The following analog/digital meters shall be provided for each charger to read the following measurement parameters.

(a) AC input voltage and current

(b) Charger input current.

(c) DC Output current of Float/Boost Charger

(d) DC Output voltage of Float/Boost Charger

(e) Load voltage and current

(f) Battery voltage

(g) Battery current

(h) Charge/discharge currents of the battery

Following LED status indications shall be provided

(a) AC Input R, Y B ON

(b) Float Charger ON

(c) Boost Charger ON

(d) Battery ON

6.8 POWER ELECTRONIC COMPONENTS

Thyristors shall be of monocrystalline type silicon, capable of providing continuous output at specified voltages. It shall have high power efficiency.

If many Thyristor assemblies are connected in parallel, care shall be taken to ensure that each rectifier or thyristor operates within its rating and shares the load uniformly and the same is also applicable for parallel SMPS based rectifier with active current sharing.

Each thyristor built in a multi-built assembly shall be provided with a short circuit protection to avoid complete shut-down of the equipment because of a fault on single unit. Suitable fuses shall be provided for such protection.

Necessary spare capacity shall be built in the equipment to continuously supply full load even with one unit out of circuit.

The thyristor banks shall be natural air cooled.

The thyristors shall be protected against overvoltage due to chopping surges with the aid of snubbers (i.e resistor-capacitor combination and Metal oxide variator).

6.9 CO-ORDINATION WITH BATTERY VENDOR

When battery is procured separately, the VENDOR shall coordinate with battery VENDOR with regard to layout, connections, charging voltage requirements, etc.

If Battery heath monitoring system is supplied through Battery charger vendor, Battery charger vendor shall coordinate with battery vendor and ensure the performance of the system. BHMS make shall be clearly brought out in the Bid which is subjected to Purchaser approval.

BHMS controller shall be preferably located as part of the Battery charger panel.

6.10 TESTS

The following routine tests shall be conducted on completely assembled equipment at manufacturer’s works in presence of Purchaser at no extra cost.

(i) Visual checks for dimensions and general arrangement.

(ii) Wiring checks

(iii) Light load and Functional checks

(iv) Voltage regulation test.

(v) Load test to show the charger can serve the rated duty without the current limiter device operating.

(vi) Calibration of potentiometer vis-a-vis the DC output for float and boost chargers.

(vii) Demonstration of guaranteed efficiency and power factor.

(viii) Insulation test (with 500 V megger)

(ix) Hipot test, excluding electronic controller, at 2 kV AC for one min.

(x) Efficiency tests

(xi) High voltage tests

(xii) Temperature rise test

(xiii) Short circuit test at no load and full load at rated voltage for sustained short-circuit.

(xiv) Degree of protection test

(xv) Measurement of ripple by oscilloscope.

(xvi) Temperature compensation feature demonstration

(xvii) Checking of DC charger system monitoring and associated communication system

(xviii) Checking of auxiliary devices, protective devices & control equipment

The BIDDER may be required to demonstrate to the OWNER that the chargers conform to the specification particularly regarding continuous rating, ripple free output, voltage regulation and load limiting characteristic, before despatch as well as after installation at site. At site the following tests shall be carried out:-

i) Insulation resistance test

ii) Checking of proper annunciation system operation

If a Charger fails to meet the specified requirements, the BIDDER shall replace the same with appropriate Charger without affecting the commissioning schedule of the Sub-Station, and without any extra cost to the OWNER.

The BIDDER shall present for inspection, the type and routine test certificates for the following components whenever required by the OWNER.

Switches

(i)	Relays/MCCBs
(ii)	Instruments
(iii)	DC fuses
(iv)	SCR
(v)	Diodes
(vi)	Condensers
(vii)	Potentiometers
(viii)	Semiconductor
(ix)	Annunciator
(x)	Control wiring
(xi)	Push buttons and contactors

Makes of above equipment shall be subject to Owner's approval

Certified copies of reports of all type tests carried out on similar type and rating of various equipment (offered under this contract) within last five years from the date of submission of Bid shall be furnished to the Purchaser for review and approval. In case the type test reports are not found to be meeting the specification requirements, the VENDOR shall conduct all such tests under this contract free of cost to the Purchaser and submit the reports for approval.

(a) Heat run test on each type of battery charger.

BIDDER shall ensure use of calibrated test equipment having valid calibration test certificates from standard laboratories traceable to National Standards.

All meters and other reference devices used for testing shall have valid Calibration Certificate traceable to reputed national laboratories/institutes. Inspection by Purchaser/Engineer will not be carried out unless the BIDDER confirms that such calibrated equipment are ready for proceeding with the tests.

The Vendor shall be responsible for all site/commissioning tests. All necessary testing equipment required for testing and commissioning shall be arranged by the Vendor. The following tests shall be conducted at site.

(a) Visual checks.

(b) Wiring checks and functional tests

(c) Load test

(d) Under shoot and over shoot test

(e) Battery current limit test and load current limit test

(f) Insulation resistance test (with 500 V megger)

(g) High Voltage test

BIDDER shall furnish detailed commissioning check lists along with procedures and formats for recording of the test results for all equipment for Purchaser's review/approval.

6.11 SPARES

BIDDER shall quote for the essential spares listed in Data sheet. Additionally BIDDER shall indicate a list of recommended spares for 5 years of operation with unit prices and total prices in his BID.

6.12 BID DRAWINGS

The BIDDER shall submit following:

(a) Schematic drawings showing main components and basic schemes.

(b) General arrangements showing dimensions and space requirements.

6.13 TECHNICAL DATA SHEET

SL. NO.	ITEM	UNIT	
1.0	**GENERAL**		

SL. NO.	ITEM	UNIT	
1.1	Number required		2 x 100%
1.2	Type (Float charger or Float-cum Boost charger)		Float cum Boost Charger
1.3	Charger Technology (SCR / modular SMPS)		SCR
1.4	DC System Voltage (Nominal)	V	24 V DC
1.5	DC System Earthing		Electronic Earthing (GI Strip of 50 x 6 mm)
1.6	Ambient Design Temperature	Deg. C	50
2.0	**DC BUS LOAD**		As Per Battery Sizing Calculation
2.1	Total continuous DC load	A	
2.2	Short time loads (Additional to continuous loads)		
	(a) Testing of DC lights/ Facia lamps	A / Secs	NA
	(b) Starting / Running current of Largest connected DC Motor	A / A / Secs	NA
3.0	**BATTERY DETAILS**		
3.1	Battery capacity & no. of cells	AH	Bidder to estimate
3.2	Battery type		Lead acid
4.0	**AC SYSTEM DATA**		
4.1	Supply		
	Volts		415
	Phase		3
	Hz		50

SL. NO.	ITEM	UNIT	
4.2	(a) Variation in supply Voltage	%	±10%
	(b) Variation in supply frequency	%	± 5%
4.3	Type of earthing		GI Strip (50x6 mm)
5.0	**PERFORMANCE**		
5.1	DC voltage setting adjustment for float charger	%	±10% of nominal voltage
5.2	Voltage stabilisation for constant voltage regulator.	%	±1% of set D.C voltage, with AC input variation as in 4.2
5.3	Maximum permissible variation in DC voltage (no load to full load)	%	±1%
5.4	D.C.voltage setting adjustment for boost charging	%	70% to 100% of maxim. Boost charging voltage
5.5	D.C. current adjustment for boost charging	%	30% to 100% of max. boost charging current
5.6	Current stabilisation for constant current regulator for boost charger	%	±2%
5.7	Minimum permissible power factor at rated continuous load		0.85
5.8	Permissible ripple content at rated continuous load	%	1% (maximum)
5.9	Maximum permissible harmonics with or without battery	%	5%
6.0	**MISCELLANEOUS**		
6.1	Cable entry		BOTTOM
6.3	Degree of protection of charger cubicle		IP 42
6.4	Overall efficiency of charger		>80%

SL. NO.	ITEM	UNIT	
6.5	Battery Monitoring System		Required
6.6	DCDB Monitoring System		Required
6.7	Communication Support		SCADA /BMS
6.8	Communication Protocol		RS-485
6.9	Standard reference drawings enclosed		
7.0	**LIST OF ESSENTIAL SPARES**		To suit project requirement- BIDDER to specify
7.1	Set of Diodes of each type and rating		
7.2	Set of Silicon controlled rectifiers of each type and rating		
7.3	SMPS Units (in case of SMPS based chargers)		
7.4	Set of Chokes of each type and rating		
7.5	Set of capacitors of each type and rating		
7.6	Set of resistors of each type and rating		
7.7	Set of load breaking switches of each type and rating		
7.8	Set of fuses of each type and rating		
	Set of contactors of each type and rating		
7.9	Set of thermal overload relays of each type		

SL. NO.	ITEM	UNIT	
	and rating		
7.10	Set of auxiliary contactors of each type and rating		
7.11	Set of control and selector switches of each type and rating		
7.12	Indicating lamps with series resistors of each type and rating		
7.13	Thermal O/L relay of each type and rating		
7.14	Meters		

7 L V PANELS

7.1 The scope of supply covers design, manufacture, testing and supply of LT Panels.

7.2 LT panel shall be (tested assembly - TTA) CPRI /Independent international test house tested for all the tests as per IEC61439-1 & 2 and internal arc tests as per IEC 61641 V3, 50kA (or as specified in BOQ/SLD) for 0.3 sec minimum at Horizontal bus bar, veridical bus bar and cable chamber.

7.3 LT Panel shall also be tested of design as per Seismic Zone II of IEC 60068-3-3.

7.4 Panel shall be rated for Impulse withstand capability equal to or greater than the switchgears inside the panel.

7.5 The metal enclosed switchgear shall be designed to operate continuously with reference of ambient temperature of 45ºC without any de-ration.

7.6 The equipment shall be designed and manufactured in accordance with the best engineering practice and shall be such that has been proved to be suitable for the intended purpose.

7.7 Provision for interlocking of LV Incomer breaker with HV side breaker shall be provided such that if the HV breaker trips then the LV breaker will trip and it shall not be possible to close the LV breaker unless the HV side breaker is closed.

7.8 The Panel shall be indoor type having incoming sectionalisation and outgoing switchgears as specified. The design shall be cubical type. The degree of enclosure protection shall be IP 52 for indoor up to 2500A rating and IP42 above 2500A rating and IP55 for outdoor as per IS: 13947 (Part-I).

7.9 All panels shall be from same manufacturer.

7.10 LV panel's manufacturer must have experience of manufacturing, supply and installation of LT panels of TTA or IEC 61439 design for past 07 years as a qualifying requirement.

7.11 Constructional Requirements:

All panel boards shall be free standing, metal enclosed, single front, fabricated with 2mm CRCA sheet steel for all doors, partitions and covers and 2 mm CRCA sheet steel for load bearing sections including all ACB feeders. A base channel of 75 mm x 40 mm x 5 mm thick shall be provided at the bottom for floor mounted panels.

The gasket shall be suitable to withstand all weathers for long tenure of service. All hardware shall be HD Galvanized or stainless steel.

Main PCC, APFC, DG panels shall conform to FORM 4B as per IS 61439 and metering, common services, street lighting panels shall conform to FORM 3B as per IS 61439.

For operator safety IP2 X (touch proof) protection to be available even after opening the feeder compartment door. The compartmentalization to be achieved by using metal separators.

Each door & cover shall have adequate reinforcement of suitable ribs & stiffeners. All such door shall open at min 1050. All feeders and cable alleys shall have hinged type door with panel locks. All bus-bar covers and other panel covers shall be screw fixed. Cable alleys and bus-bar chamber shall have minimum width of 300mm.

All doors shall be with concealed type hinges and captive screws. Rear doors of panels requiring rear access shall be provided with removable hinged doors. Side covers of panels shall be with removable panels.

All doors shall be provided with durable and easy fitting locks with special keys to ensure opening by authorized personnel. Rubber grommets shall be provided at the cable entry.

All mounting accessories like base channels, cross angles if required, nuts, bolts etc. shall be supplied by the vendor.

All the panels shall have uniform height. The operating height of all the panels shall not be less than 300mm and not more than 1900mm. Panel height should not be more than 2450mm.

All the panel boards shall have cable entry from bottom. Split gland plate of 2mm thick shall be supplied for termination of power, control and instrumentation cables sized as per the required no. of cable mentioned in the SLDs and 20% spare space for future addition.

Bus-Bars:

a. Bus-bar of the panels shall be rated for Continuous current at site conditions.

b. All bus-bars shall be electrolytic grade copper or aluminium. BIDDER shall specify the purity and conductivity of the bus bar along with the BID.

c. All the bus bars shall be sleeved with heat shrinkable black colour PVC sleeve or better insulation with coloured polyester tapes for phase identification at regular intervals/ locations.

d. BIDDER shall submit all calculations & documental proof of the adequacy of the bus bar sizes to meet the continuous and short time current ratings specified for reference during procurement/ manufacturing.

e. Vertical bus-bars shall have S.C. rating same as main bus bar and shall be suitable for all connected load of vertical section.

f. BIDDER shall ensure that incoming feeder shall be suitably designed for terminating the required no. of runs of 1.1kV grade XLPE insulated armoured cables with 20% spare capacity. BIDDER shall consider the necessary arrangement (dummy panel, adapter panel, rear extension etc.) if required, for terminating the cables within the limits specified above.

g. The bus-bars shall be designed considering the following criteria:

- Current density of 0.8A/sq mm maximum for aluminium and 1.6A/Sq mm for copper.
- Sleeves made of insulating material on all bus bars.
- Bus bars carrying rated current continuously at Design Ambient Temperature shall be considered as 45ºC and temperature rise shall be considered as per latest relevant standard.
- Configuration of bus bars and Proximity effect
- Bus bars shall withstand the short time rating of the panel.

h. The span between the two insulators shall be as per the approved TYPE TEST REPORT for short time rating. Joint positions and insulators shall be properly adjusted so that they don't interfere. Bus bar bending shall be carried out on appropriate machines designated for the same rather than doing manually.

i. Neutral bus-bars of the panel boards shall be rated equal to the size of phase bus and shall be in same chamber with phase bus bar.

j. All bus-bar shall be treated with anti-oxide paste wherever bi-metallic contact is required.

k. The material and spacing of the busbar support should be same as per the type tested assembly.

Earthing:

a. Earth bus bars of Aluminium material shall be run all along the panel, extended out at both ends of value equal to the rated symmetrical short circuit rating of the associated switchboard/ panel. The same shall be properly supported to withstand stresses induced by the rated symmetrical short circuit current.

b. Earthing bus-bar shall be terminated at both ends of the switchgear to suit the connections to earthing conductor. The locations where the bus are protruding out of the panel boards, CONTRACTOR shall ensure that proper ingress protections are provided at all such locations.

c. All doors and detachable components inside the feeder are required to be earthed individually with green (with yellow band) colour PVC insulated multi stranded copper conductor wire of size 4 sq.mm duly crimped with ring type lugs and are to be looped & connected to horizontal earth bus.

d. Earthing bus shall be run continuously in panel drawn out suitably considering respective cable entry inside the panel.

e. Separate Al earth bus shall be provided at each cable alley for all the panels.

Power Wiring (Inside The Feeder):

a. All power wiring for rating upto and including 63A shall be carried out with 1.1kV grade coloured HFFR/ FRLS PVC insulated, coloured for phase identification, multi stranded copper wires duly crimped with ring type lugs.

Control Wiring (For Panel And Feeders):

a. All panel Control wiring shall be done by 1.1kV grade HFFR/FRLS PVC insulated multi-stranded copper wire. CT circuit wiring shall be done with minimum 2.5 Sq.mm size wire of above specification. Control and Potential circuits shall be wired with minimum 1.5 sq. mm size wires of above specifications. Wires shall be gray coloured with suitable crimp able copper lugs. CT's & PT's wiring shall be colour coded for multi-phase identifications (R-Y-B-N).

General Requirements:

a. DP MCB shall be provided for all control circuits where the fault level is less than 10kA. Else the control supply shall be tapped through a control transformer of adequate capacity supplied with MCCB/ MPCB/ SFU of adequate short time rating. Independent DP MCBs shall be provided for each circuit such that tripping due to fault in one circuit should not affect other functions adversely.

b. Self explanatory Wiring diagrams with terminal and wire numbers, component numbers shall be provided on the inner face of the door of each feeder. Drawing set in the panel shall be laminated.

c. All labels for identification of feeders as well as internal and external components as per legends provided By PURCHASER shall be on white acrylic sheet with black engraving. These labels shall be fixed by screws/rivets and shall not be pasted.

d. Aluminium etched 415V Caution boards written in two languages (English, Hindi) shall be riveted on the panel at locations where live bus bars are present and need isolation before any access to it. In case secondary covers have been provided inside the panel, then caution boards shall be also marked on these boards in addition to the external covers. Stickers are not acceptable.

e. Selector/control switches shall have an 'Off' position. The 'Off' position shall not be wired in any circuit and shall be utilised to disconnect (or bypass) power supply to control circuit for any maintenance work.

f. All electrical panels (internal components & arrangement) shall have finger touch protection, for human safety viz. working on one component shall not cause shock to the personnel due to any other live component in the panel. Also, the terminal live parts shall not be accessible by fingers (finger cannot come in contact with live parts of the terminals).

g. No openings/ holes meant for fixing hardware shall be left open. All the hardware (esp. screws, nuts, bolts, and washers) shall be in all appropriate positions & properly tightened.

h. Phase separators, shrouds, falling tool barriers shall be suitably provided. Any additional requirements as observed at any stage upto handing-over shall be provided (for safety and ease of maintenance) without any cost implication to the PURCHASER.

i. All PVC/engineering plastic based items (including but not limited to conduits, casing-capping, trough, trunk, enclosures, covers, plugs, etc) shall be with FR properties.

j. Lifting hooks/eyes shall be provided in each shipping section of the equipment and shall be removable type. The equipment shall be given tropical and fungicidal treatment.

k. Insulation mat of suitable standard width shall be provided in front of the HV and LV panels.

l. Atleast one 230V, 1Ph, Space heater shall be provided for each vertical section of the switchboard. Each Space heater shall be provided with an isolating switch, a thermostat and dedicated MCB protection of appropriate rating. Heater shall be mounted at bottom of the panel with cover to avoid accidental contact of heater with skin.

m. 230V 1Ph, Panel illumination (11W CFL/ LED fixture with lamp, limit switch and isolation switch) along with 1 no. 5/15A 5 pin socket with switch shall be provided for each vertical section. Bare holder with open lamp is not acceptable.

n. Adequate space shall be provided for terminating the outgoing cables.

Equipment Requirement:

a. **MCCB:**

- All the panels shall have MCCBs upto 630Amp. All MCCBs shall be rated for 415V, 3 Ph, 50Hz.

- All MCCB shall be microprocessor based. MCCB shall have O/C, S/C Protection. Wherever MCCBs are used as incomer these shall be provided with earth fault & time delay or as specified in SLD/BOQ. MCCBs of suitable Icu=Ics=100% ratings.

- There should be earth fault indication on panel door.

- Rated operational voltage will be 415V AC with +/-10% variation.

- All MCCBs shall be with Utilisation Category "A".

- All the MCCBs shall invariably be Current Limiting type, features like Double Break, Positive Isolation functions shall be Integral feature of the device and shall provide a cut off in, < 10 ms for prospective currents during faults. All MCCBs shall be provided with rotary handle with door interlock and extension links/ spreaders with proper shrouds. No live part accessible even after opening the front cover.

b. **ACB:**

- From 800 A onwards ACBs shall normally be used. These should have 50 kA (Icu=Ics=Icw) Short Circuit Current rating with microprocessor based overload, short circuit and earth fault protection at 415 volts, 50 Hz.

- The air circuit-breakers (ACBs) used in low-voltage installations shall be designed, built and tested in compliance with the standards of the IEC 947-2 & EN 60947/ IS 19947 (Part-II) : 1993.

- Rated operational voltage Ue should be 690 V.

- The rated insulation voltage shall be equal to or greater than 1000 V.

- Overload protection shall have adjustable setting from 50% to 100% of the ACB's rating.

- The ACB release shall be self-powered, requiring no external power supply. For it to operate, it is sufficient for one phase to be loaded at 20% of the rated current of the current transformer.

- Power loss in breakers should also be watched for selection.

- Utilization category-B

- Releases are also available with LCD display which displays all three phase current & neutral current, running voltage, average voltage and maximum voltage. These releases will also display maintenance date like no. of operations, & fault history (last 10 trips and type of fault). To protect the load and cables from repetitive over temperature protection. In case of BMS connectivity through Ethernet communication, the release shall enable the user ON, OFF, Trip status communication.

- Individual fault indication LED's (OL,SC & EF) backed by lithium battery to give indications even when the CB is off and electrical fault trip (OL& SC) alarm indication on panel shall be available on trip units for easy & faster identification of cause of fault.

- ACB with microprocessor based trip release with adjustable (O/C, S/C & E/F Protection) with adjustable current & time delay & %loading bar graph for each phase.

c. For Distinct Fault Indication, required voltage supply shall be derived from the existing control supply by BIDDER. No separate charges shall be asked for later during execution.

d. All instrument transformers shall be cast resin type and shall have insulation of class B or better.

e. Indicating lamps shall be of the Multi chip LED type with low watt consumption.

f. Each incomer shall be provided with a Multi Function Meter displaying all electrical parameters like (but not limited to) current, voltage, kW, kVA, KVAr, kWH, MD, PF, Hz, (THD measurement only in main PCC incomer) etc. and shall have provision for remote communication with SCADA/ BMS..

g. The switchgear shall be complete with all equipment such as CT, VT, switches etc. duly wired up to terminal blocks. Terminal blocks shall be located at suitable place for easy access. CT shorting, isolating terminals shall be provided for CTs and isolating terminals shall be provided for VT connections. Twenty (20) percent spare terminals shall be provided in each cubicle. Ring type lugs suitable for termination of 2.5 sq mm copper wires shall be used.

8 CONTROL CABINETS

8.1 SCOPE

This specification covers the design, , manufacture, inspection and testing at the VENDOR'S / his SUB-VENDOR'S works, delivery to site and performance testing of Control cabinets and associated equipment mounted thereon upto 415V.

8.2 CONSTRUCTIONAL FEATURES

Control cabinets shall be sheet steel enclosed and shall be dust, weather and vermin proof providing a degree of protection of IP 52 for indoor use and IP 54 for outdoor use. Sheet Steel used shall be cold rolled and at least 2.0mm thick and properly braced to prevent wobbling.

Control cabinets shall be provided with hinged door(s) with padlocking arrangement and suitable brackets/channels shall be provided for the type of mounting.

All doors, removable covers and plates shall be gasketed all around with neoprene gaskets. All accessible live connections shall be shrouded and it shall be possible to change individual fuses, switches, MCBs without danger of contact with live metal.

All live parts shall be provided with atleast phase to phase and phase to earth clearances in air of 25 mm and 20mm respectively.

Adequate interior cabling space and suitable removable cable glands shall be provided. Necessary number of cable glands shall be supplied and fitted screwed-on type and made of brass.

Two earthing terminals shall be provided to suit the PURCHASER'S earthing conductor.

All sheet steel work shall be degreased, pickled, phosphated and then applied two coats of zinc chromate primer and two coats of finishing synthetic enamel paint, both inside and outside, of colour. For chemical/corrosive areas epoxy paint shall be used.

8.3 MAIN BUSBARS

Unless otherwise specified busbars shall be insulated and of aluminium alloy of E91E grade and shall have adequate cross-section to carry the required continuous currents such that the operating temperature of the busbars does not exceed 850C.

8.4 MOTOR FEEDERS

Each motor to be controlled from the cabinet shall be provided with 3 pole/2 pole isolating switch, HRC fuses, contractors with thermal overload relays and other equipment required for satisfactory control of motors. When schematic drawings/bill of material is enclosed, all equipment shown shall be supplied by the VENDOR. The isolating switch and contactor shall be rated at least 20% more than the connected motor full load current.

Unless otherwise specified motors rated 0.5KW and above being controlled from the control cabinet will be rated for 415V, 3 phase, 50 Hz and motors rated below 0.5 KW will be 240V, 1 phase, 50 Hz.

8.5 SWITCHES/MCBS

Switches / MCBs / MPCBs /MCCBs shall be hand operated, air break, heavy duty, quick make, quick break type conforming to applicable standards.

The rating of switch shall be so chosen as to get complete protection by associated O/L relay or fuse under all normal/abnormal conditions such as full load, overload, locked rotor, short circuit etc. MCBs / MPCBs /MCCBs shall be provided with overload/short-circuit protective device.

It shall be the responsibility of the VENDOR to fully coordinate the overload and short circuit tripping of the MCBs / MPCBs /MCCBs with the downstream MCBs/fuses/motor starters, to provide satisfactory discrimination.

Switch handle shall have provision for locking in both fully open and fully closed positions. MCBs / MPCBs /MCCBs shall be provided with locking facility when called for.

8.6 CONTACTORS

Contactor type motor starters shall be of the full voltage, direct-on-line, air break, single throw, electro-magnetic type unless otherwise specified. Automatic star-delta type starters shall be provided when specified.

Contactors shall be provided with at least 2 'NO' and 2 'NC' auxiliary contacts.

Contactor shall be provided with a three element, positive acting, ambient temperature compensated time lagged, hand reset type thermal overload relay with adjustable settings to suit the rated motor current.

8.7 FUSES

Fuses generally shall be of the HRC cartridge link type, mounted on plug-in type of fuse bases having a rupturing capacity of 80 kA. Fuses upto 63A may be of HRC cartridge screw-cap, D-type, having a rupturing capacity of not less than 46 kA at 440V A.C. and 16 kA at 250V D.C.

Fuses shall be provided with visible operation indicators to show its healthiness.

All accessible live connections shall be adequately shrouded, and it shall be possible to change fuses with the circuit alive, without danger of contact with live metal.

8.8 INSTRUMENT TRANSFORMERS

Current and voltage transformers shall be dry type. Unless otherwise specified it shall be the responsibility of the VENDOR to ensure that the class and VA burdens of the instrument transformers provided are adequate for the relays and meters connected to these. Facilities shall be provided for short circuiting and grounding the CT secondary at the terminal blocks. Test links shall be provided in the CT secondary leads to carryout current and phase angle measurement tests with CTs in service. Voltage transformers shall be provided with suitably rated primary and secondary rated fuses. The details of the instrument transformer are subject to the PURCHASER's approval.

8.9 CONTROL AND AUXILIARY POWER SUPPLY

All AC control equipment shall be suitable for operation on 240V AC, 1 phase, 50 Hz system. This supply may be obtained from phase and neutral when 4 wire 415V main supply is available. Otherwise, or when control voltage, other than

240V is specified, a suitable transformer shall be provided. The control transformer shall be complete with isolation facilities and with HRC fuses for the protection of primary and secondary windings.

Separate circuits with switches, fuses etc. of adequate rating shall be provided for control of space heater, through thermostat and panel illumination etc.

8.10 RELAYS

Necessary auxiliary release for alarm, time-delay relays, voltage relays as required for control and protection shall be mounted inside the cabinet. Relays shall be equipped with externally reset, positive action operation indicator. Voltage relays shall have sufficient thermal capacity for continuous energization, using external resistors if necessary.

Auxiliary relays shall be rated to operate satisfactorily between 80% and 110%of the rated voltage.

Each relay shall be provided with at least two potential free contacts (1NO+1NC) for the PURCHASER's use.

Make and type of relay shall be according to Purchaser vendor list or subject to the PURCHASER's approval.

8.11 CONTROL AND SELECTOR SWITCHES

Control and selector switches shall be of the rotary type provided with properly designated escutcheon plates clearly marked to show the operating positions. Control switches shall have momentary contacts, spring return to centre, with pistol grip handle. Selector switches shall have stay put contacts with oval handles. The number of contacts and their operation in each switch shall be as indicated in control schematic (when enclosed) or shall be as per the requirements of the connected circuit. The switches shall be rated for minimum 10A at 240V A.C. and 1A inductive break at 220V D.C.

8.12 PUSH BUTTONS

All pushbuttons shall be of push to actuate type having 2 'NO' and 2 'NC' self reset contacts. They shall be provided with integral escutcheon plates, engraved with their functions. Pushbuttons contacts shall be rated for 10 Amps at 240V A.C. and 1 Amp inductive breaking at 220V D.C.

8.13 INDICATING LAMPS

Indicating lamps of the Clustered Coloured LED type with coloured Lens engraved “ON”,”OFF”,”TRIP”.

8.14 SPACE HEATER

Strip type space heaters of adequate capacity shall be provided inside each cabinet. Heaters shall be complete with rotary type 'ON-OFF' switch, HRC fuse on phase or a single-pole MCB with overload and short circuit protection, link on the neutral and a thermostat to cut off the heaters at 45 Degree Celsius and shall have continuously settable range from 30 to 90 degree Celsius.

8.15 INTERIOR LIGHTING AND RECEPTACLE

Control cabinet shall be provided with a 240V, 1 phase, 50 Hz, 40W preferably fluorescent lighting fixture for interior illumination controlled by a 'ON-OFF' switch / MCBs and 240V, 1 phase, 5/15 Amp., 3 pin receptacle with Plug and Switch/MCB for Switching ON & OFF.

Power source for interior lighting and receptacles shall be completely independent of control power source.

8.16 CABINET INTERNAL WIRING

Control cabinet shall be supplied completely wired, ready for the PURCHASER'S external connections at the terminal blocks. All wiring shall be carried out with 650/1100V grade, FRLS, halogen free PVC insulated, stranded conductors. Power circuits shall be wired with standard aluminium conductors of adequate sizes to suit the rated circuit current; the minimum size shall be 4 sq.mm. Control, alarm and indication circuits shall be wired with stranded copper conductors of sizes not smaller than 1.5 sq.mm. C.T. circuits shall be colored wired for R Y B phases with stranded copper conductor of size, not smaller than 2.5 sq.mm.

Engraved identification ferrules, marked to correspond with the wiring diagram shall be fitted at both ends of each wire. All wiring shall be adequately rated for the circuit current; the minimum rating shall be 20A.

8.17 LABELS AND DIAGRAM PLATE

Every equipment mounted in the cabinet shall be provided with individual labels with equipment designation/rating. Also, the cabinet shall be provided on the front & Rear side with a non-rusting label engraved with the designation of the cabinet as furnished by the PURCHASER.

Inside the door a circuit diagram engraved on non-rusting metal / PVC shall be fixed for reference.

8.18 DRAWINGS AND DATA

As part of the proposal, the BIDDER shall furnish the following drawings and data for scrutiny.

a) Control cabinet general arrangement drawing showing dimensioned views, cable entry location and mounting details.

b) Schematic wiring diagram of the control cabinet.

c) Bill of material listing equipment designation, make, type, rating etc. of the various equipment mounted on the control cabinet.

8.19 TESTS & TEST REPORTS

Acceptance and routine tests for all supply equipments/component parts shall be carried out as per the relevant standards for the respective equipment. These test reports and available type test reports shall be submitted to the PURCHASER before despatch of the equipment.

Control cabinet shall be subjected to following tests:

a) High voltage test (2000 volts for 1 minute)

b) Megger test

c) Electrical control, interlock and sequential operation tests.

Calibration certificates. Instruments used for testing and inspection shall have valid calibration and accuracy traceable to National Standards.

9 APFC PANELS

9.1 The equipment shall be complete with all necessary accessories and components as required as per IS standard.

9.2 Supply , installation , Testing commissioning of power factor improvement (indoor) capacitor Bank , type test according to IEC 61439-1&2,IEC 61921 including interconnection with LT panel with appropriate size of electric cable for transformer. (Indoor) type panel factory made dust and vermin proof (IP 42) suitable for 1100 V/660 V grade 3 phase 50 HZ AC supply floor mounted in 12 stage with micro processor along with factory made type panel vermin proof ,fully ventilated both side opening.

Fabricated out of MS CRC sheet 2mm thick & frame angle of size 50 mm X 50 mm X 6 mm having bus bar of aluminium 600 Amps cap, three phase and one neutral fixed on insulator and bus bar insulated by coloured heats shrinkable sleeve & housed in specified compartment both side open able including Powder coating internally externally the entire steel surfaces. All the cover shall have with suitable locking arrangements , fully internally wired with suitable size of thimbles .Incoming

/ outgoing internal connection with PVC insulated PVC sheathed multistranded copper wire of suitable size all as directed.

a) The capacitor banks shall be complete with all parts that are necessary or essential for efficient operation. Such parts shall be deemed to be within the scope of supply whether specifically mentioned or not.

b) The capacitor bank may comprise of suitable number of single phase units in series parallel combination. However, the number of parallel units in each of the series racks shall be such that failure of one unit shall not create an overvoltage on the units in parallel with it, which will result in the failure of the parallel units.

c) The complete capacitor banks with its accessories shall be metal enclosed (in sheet steel cubicle), indoor floor mounting and free standing type.

d) All sheet steel work shall be thoroughly cleaned of rust, scale, oil, grease, dirt and swarf by pickling, emulsion cleaning etc. The sheet steel shall be phosphate and then painted with two coats of zinc rich primer paint. After application of primer, two coats of finishing synthetic enamel paint oven baked/stove shall be applied.

e) The assembly of the banks shall be such that it provides sufficient ventilation for each unit. Necessary louvers may be provided in the cubicle to ensure proper ventilation.

f) Each capacitor unit/bank shall be fitted with directly connected continuously rated, low loss discharge device to discharge the capacitors to reduce the voltage to 50 volts within one minute in accordance with the provisions of the latest edition of IS : 2834.

g) All panels of capacitor banks with MCCBs, Contactor, automatic power factor correction relay enclosed in IP 42 compliant CRCA Sheet Steel enclosure.

h) Capacitors shall be double layer All poly Polypropylene (APP) type having following specifications and conform to IS 13925:

i) The capacitors shall have Low Dielectric Loss of 0.5 W/ kVAR.

j) All capacitors shall be provided with 7% de-tuned filter along with all accessories and protections.

k) Any change in rated voltage level of the capacitor bank due to the filter or otherwise shall be considered by the Contractor. The indicated rating of capacitor banks are at rated voltage of 415V.

l) The banks shall be switched ON and OFF in both Auto as well as Manual mode. An “Auto/Manual” Switch at the incomer feeder shall be provided.

m) All necessary auxiliary contactors of suitable duty along with feeder accessories are included in scope. All power Contactors for capacitor switching shall be of required duty.

n) Manual operation shall be done with recess type panel mounted ON/OFF pushbutton with delay timer.

o) Minimum current rating under site conditions, of circuit breakers, Contactors, and cables shall be at least 150% of rated capacitor current.

p) Capacitors shall be mounted in such a way that heat dissipation is proper and the capacitors are accessible for maintenance and inspections.

q) Capacitor switching and automatic power factor correction panel shall be designed in such a way that power factor of 0.99 lagging shall always be maintained. Timings to cut in capacitors shall be provided in such a manner to facilitate capacitor discharging before next switching and shall also avoid hunting due to temporary fluctuations of load. The timer shall be provided in both auto and manual mode.

r) The Automatic power factor correction panel and capacitor panel are integral type, prewired including power connections. Due consideration shall be given for adding/ removal of capacitor or other components and maintenance considerations.

s) Each unit shall satisfactorily operate at 130% of rated KVAR including factors of overvoltage, harmonic currents and manufacturing tolerance. The units shall be capable of continuously withstanding satisfactorily any overvoltage up to a maximum of 10% above the rated voltage, excluding transients.

9.3 Unit Protection

Each capacitor unit shall be individually protected by a MCCB Breaker suitably rated for load current and short circuit capacity, so that a faulty capacitor unit shall be disconnected by the breaker without causing the bank to be disconnected. Thus, the breaker shall disconnect only the faulty unit and shall leave the rest of the units undisturbed.

The Inputs to the APFC system is Voltage input from two phases and current input from the third phase. Out of two phases of voltage one phase voltage is taken as Reference 0 and other phase voltage as 440 V. APFC need to be installed CT (Current Transformer) on the third phase at main incomer ACB after transformer, which will give signal to the APFC Relay. Based on this inputs the ASIC (Application Specific Integrated Circuit) OR Call it as Microprocessor internal to the APFC Relay will give output signal to relay outputs which will energize coil of the contactor so that the contactor come in line connecting the capacitor bank in circuit. However this is step correction means PF is corrected in steps. The Voltage rise due to connection of capacitor banks is marginal. There will be no frequency correction with APFC System.

9.4 APFC PANEL ACCESSORIES

a) Power capacitor and control panel shall be housed in metal enclosed cubicle. Power capacitor shall be housed in the lower compartment and capacitor control panel at top compartment.

b) The control equipment including capacitors shall be mounted in a panel of cold rolled sheet steel. The panel shall be of indoor type.
c) Bus bars shall be of aluminium conductor and high conductivity.
d) Isolating switch
e) Contactor with overload element
f) APFC Relays responsive to current/voltage/KVAR/PF as specified for automatic switching shall be of microprocessor based suitable for state board Electricity with reduced power factor.
g) Sequencing devices, timers and auxiliary relays for automatic sequential switching of the capacitors in and out of the circuit.
h) Auto-manual selector switches
i) Push button for opening and closing the power circuit.
j) Red and green cluster LED lights for capacitors ON/OFF indication
k) Protective numerical relays to protect the healthy capacitor units when one unit fails in a series connection
l) Space heater and cubicle lighting as per the requirements.

10 LV SANDWICHED BUS DUCT

SCOPE

The scope shall cover design, material, constructional features, manufacture, inspection and testing at the Vendor's/his sub-vendor's work, delivery to site and performance testing of sandwiched metal enclosed bus ducts.

CODES AND STANDARDS

The design, material, construction, manufacture, inspection, testing and performance of sandwiched metal enclosed phase bus duct shall comply with all currently applicable statutes, regulations and safety codes in the locality where the equipment will be installed. The equipment shall also conform to the latest applicable standards. Nothing in this specification shall be construed to relieve the VENDOR of this responsibility.

GENERAL

The busbar system shall be of low impedance and sandwiched construction, i.e. no air gap shall exist between bus-bars except at plug-in opening. It shall be possible to mount the busbar in any orientation, without affecting the current rating. The length of each section will be limited to max. 3 meters. It shall be totally enclosed pre-painted galvanized steel and be of the non-louvered type maintaining an overall degrees of ingress protection of IP 65(Outdoor) and IP 54/55(Indoor).

BUS BARS

Busbars shall be of Aluminum with conductivity >60%. Neutral shall be 100% of cross sectional area of the phase conductor. A continuous earth busbar (Internal/External) shall be provided. Flexible connections shall be provided with Cu braided / multi leafed conductors for termination at both the ends. The busbars shall be individually insulated

with by minimum 2 layers of insulating film. Bus bar conductors shall be insulated with insulation Class F material. All the insulation materials shall be halogen free and fire retardant.

HOUSING

The busbar housing shall be non-ventilated. The enclosure shall be of hot dip galvanized and pre-painted sheet steel. The housing shall be made of minimum 1.6 mm electro galvanized sheet steel, with an epoxy powder coated paint finish. It shall pass at least 1000 hours salt spray test to ensure the anticorrosion ability. The housings shall be profiled, to provide higher strength and efficient heat dissipation. The width of the housings shall be preferably the same for all ratings of busbars, in order to provide interchangeability of tap off boxes. Inspection cover shall be provided over joints to inspect the tightness of the connection.

JOINTS

The electrical joints shall be of one to four bolt type designed for even distribution of contact pressure. Bolts shall be accessible without removing covers. The joints shall be so designed as to allow removal of any length without disturbing adjacent lengths. The joints between sections shall be made so as to provide flexibility during installation and expansion / contraction of busbar during operation. The joints shall be of the Uniblock Joint. The joint construction must have the following features.

a) Shear off nut : To ensure tightness of joint at desired torque

b) Tamper proof cap over shear off nut to prevent opening of nut after achieving desired torque.

c) Heat expansion of atleast 3 mm per joint.

d) The joint insulation must be of one piece mould design and not have any cut edges which can absorb moisture.

e) Joint assembly shall be removable as separate sub-assembly so that it can be inserted or removed without disturbing the adjacent sections.

f) The busbars ends shall not have any holes or slots at the joints – the electrical continuity shall be through pressure plates, achieving a high area of joint cross section and expansion capability.

EXPANSION JOINT

Busbar expansion units shall be used in cases to reduce the stress on the system by differential expansion between the busbars and the casing; particularly for long run of the busbar. It shall consist of a flexible joint in the middle on the conductors and a sliding casing in 2 sections which can absorb the relative movements of each section of the length.

ACCESSORIES

The bus system shall be complete with all the accessories such as straight run lengths, bends/elbows / flat elbow/ edge elbow/ T sections, vertical anchors, expansion joints, flexible connections, flange ends, reducer, end covers etc. All the accessories as required to suit site conditions are deemed to be included in straight length of the bus trunk.

Flanged end boxes shall be provided to accommodate flange end for connecting the bus terminating with flanges of panels, transformers & DG sets etc. At every terminal point at flanges the connection shall be done using flexible connections.

Any other item/ accessory not specifically mentioned above but deemed necessary by the bidder for successful implementation

WALL FRAME ASSEMBLY AND SEAL OFF BUSHINGS

Wall Frame Assembly

Wherever the bus duct passes through the plant building wall, from indoors to outdoors, a wall frame assembly with seal-off bushings shall be provided to prevent any leakage of rain water, infiltration of dust and air temperature variations from indoors to outdoors. The wall frame shall be fabricated out of aluminium angles and sheet and shall be suitable for grouting in the wall.

End cable tap box

End cable tap boxes shall be applied to feed a run of bus duct with cable and conduit. The enclosure shall be designed to accommodate specified size and number of cables per phase. Conductors are separated and provided with the required number of cable lugs per phase, and necessary space for cable termination. The enclosure shall be provided with removable access covers as necessary for access to power cable terminations.

Phase Transposition

Phase transposition is normally provided within the switchgear equipment. However, when required, it can be provided within the bus run system to align phasing of terminal equipment at two ends.

BUS DUCT SUPPORTS

The supporting structure shall be fabricated from standard steel sections and shall be hot dipped galvanised after fabrication. Calculations shall be furnished to substantiate the strength of support structure shall withstand various static and dynamic loadings. The supporting structures shall include supporting members, brackets, hangers, longitudinal beams, channels, nuts, bolts, washers and all other hardware which are necessary for

the erection and support of the entire bus duct installation. All the accessories and hardware of ferrous material shall be hot dip galvanised.

Indoor portion of the bus duct may be supported from the floor or ceiling beams. Outdoor portion of the bus duct shall be supported from ground below on suitable foundation in the ground & on the wall with either embedded plates or anchor bolts wherever required. The foundations and structures in outdoor area shall clear the transformers, transformer foundations, cable trenches, CSS.

EARTHING

A separately run earthing flat suitably clamped along the enclosure shall be used as the ground bus. Conductor material and size shall be calculated during detailed design engineering by the Contractor. All parts of the bus enclosure, supporting structures and equipment frames shall be bonded to above ground bus. Ground pad shall be bolted type to accommodate the required size galvanized steel flats. Complete with suitable tapped holes, bolts and washers

TESTS

All routine tests as specified in IS/IEC shall be conducted at the works and all site tests shall be conducted as per IS/IEC at site after the complete bus bar is assembled.

Certified copies of reports/certificates with final conclusions of type tests carried out as per relevant standards on similar type and rating of the equipment within last five years shall be furnished for review along with the Bid. In case the type test reports are not found to be meeting the specification requirements or older than five years, then the VENDOR shall conduct all such tests free of cost and submit the reports for approval without any cost and time implication to the PURCHASER

Type test assembly shall comprise of all the major components such as Insulations, joints, Tap-off units, etc., and shall depict the actual site installation. The components used in the type test assembly shall not be used in the bus bar sections being supplied for the project.

The busbars shall be type tested at a reputed national / International test laboratory (ASTA / KEMA or CPRI) for short circuit withstand. The test shall be for a minimum duration of one second.

Degree of ingress protection (IP rating) shall also be tested at any reputed independent laboratory. This test shall be for IP54 / IP 55 for indoor and IP 65 / IP 67 FOR OUTDOOR application.

TYPE TESTS

The Bidder shall furnish type test certificate for the following tests conducted on similar equipment as per IEC 61439.

a) Temperature Rise Limits (for each rating)

b) Dielectric Properties

c) Short Circuit Strength

d) Degree of Protection

ROUTINE TESTS

Following routine tests shall be conducted on the Bus trunking.

a) Physical verification check

b) Megger Test

c) Power frequency with stand test

d) Any other tests as stipulated by the relevant standards

TECHNICAL DATASHEET

SL. NO.	ITEM	UNIT	
1.0	**General**		
1.1	Bus Bar arrangement		Sandwich
1.2	Bus Bar configuration		3phase + 100% Neutral
1.3	Phase		3
1.4	Neutral		100%
1.5	Rated operational voltage	V	1000
1.6	Rated insulation voltage	V	1000
1.7	Rated Dielectric voltage	kV in r.m.s	3.5
1.8	Rated impulse withstand voltage	kV	8
1.9	Rated frequency	Hz	50
1.10	Degree of protection		IP54/55 for Indoor IP 65/67 for outdoor
2.0	**Bus Bar**		

SL. NO.	ITEM	UNIT	
2.1	Bus Bar Ratings	A	Refer SLD / To be calculated
2.2	Short circuit rating	kA	Refer SLD / To be calculated
2.3	Bus Bar material (Phase / Neutral)		Aluminium
2.4	Bus Bar material (Internal earth bus bar)		GI
2.5	Bus Bar material (External earth)		GI
2.6	Bus Bar insulation		Minimum 2 layers of insulating film Class F
2.7	Fire rating		240min (ISO 834)
2.8	Joint type		Uni-block Joint
3.0	**Bus enclosure**		
3.1	Enclosure material		Hot dip galvanized sheet steel
3.2	Surface coating on enclosure		Epoxy powder coated paint
3.3	Paint		RAL 7035/ As per engineer-in-charge
4.0	**End Feed unit/Central Unit**		
4.1	End Feed unit Required	Yes/No	Yes
4.2	End Feed unit rating	A	As per requirement
4.3	Centre Unit Required	Yes/No	As per requirement
4.4	Centre Unit rating`	A	As per requirement
5.0	**Tap off Units**		
5.1	Tap off unit Required	Yes/No	No
5.2	Tap off unit Qty. and rating	A	Refer SLD
5.3	Tap off unit type		-
6.0	**Terminations**		
6.1	Flanged End Terminations required	Yes/No	Yes

SL. NO.	ITEM	UNIT	
6.2	Cu Flexible Connections required	Yes/No	Yes

11 CABLES AND CABLE CARRIER SYSTEM

11.1 Scope

This specification also covers the design, material, construction features, manufacture, inspection and testing at the VENDOR's/his SUB-VENDOR's works and delivery to site of HT Cables 33 kV and LT Cables, Cabling Accessories, conduits and pipes etc.

11.2 Applicable Codes & Standards

The design, construction, manufacture and performance of the equipment/components shall conform to latest applicable standards as on date of submission of the bid and comply with all currently applicable statutes, regulations and safety codes in the locality where the equipment/components will be installed. Nothing in this specification shall be construed to relieve the VENDOR of this responsibility.

Unless otherwise specified, equipment shall conform to the latest applicable standards for cables IS 1554, 7098, 8130, 5831, 3975, IEC 60183, 60227, 60502, 60885, 10418.

11.3 Technical Specification for Cables & Cable termination

The various types of cables covered in this specification shall meet the following requirements:

XLPE Insulated HV Power Cables

The conductors shall be screened by extruded semi-conducting compound and XLPE insulated. The cores shall be screened by extruded semi-conducting compound in combination with non-magnetic metallic tape (copper tape preferred).The inner sheath over laid up cores and outer sheath over the armour shall be extruded black PVC compound type ST-2. Core identification shall be by printed numerals. The construction, performance and testing of the cable shall comply with IS 7098-Part 2 (Cross Linked Polyethylene Insulated PVC Sheathed Cables for working voltages from 3.3kV upto and including 33kV).

1100 V Grade XLPE Insulated Power Cables

The cable shall be extruded XLPE insulated. The inner sheath over laid up cores and outer sheath over the armour shall be extruded PVC compound type ST-2. Core identification shall be by printed numerals. The construction, performance and testing of the cable shall comply with IS 7098-Part1 (Cross linked polyethylene insulated PVC sheathed cables for working voltages upto and including 1100 V).

1100 V grade PVC insulated Power / control cables

The cables shall be insulated with extruded PVC compound type C, provided with inner sheath and outer sheath of extruded black PVC compound type ST-2.

The construction, performance and testing of the cable shall comply with IS 1554 - Part 1 (PVC insulated heavy duty electric cables for working voltages upto and including 1100 V).

1100 V Grade Lighting/Misc./Light duty unarmoured cables

Cables shall be insulated with extruded PVC type-C. Outer sheath shall be extruded black PVC type ST-2. The sheathed cables shall be weather proof suitable for indoor/outdoor use. Twin and multicore cables shall be laid up and filled with thermoplastic material, bound by plastic tape and provided with outer sheath.

The construction, performance and testing of the cable shall comply with IS 694 (PVC insulated cables for working voltages upto and including 1100 V).

For all LT power and control cables, double compression glands with aluminium lugs for Aluminium cables and tinned Copper lugs for Copper cables shall be used in indoor and outdoor application.

The termination shall be inclusive of miscellaneous items such as clamps, cleats, cable tags, cable markers etc.

In general cable installation works shall be carried out in accordance with IS 1255 – 1983, latest version. At road crossings, the depth of the Pipe shall be minimum 1m else proper concrete encasing shall be provided.

For Underground cables, cable marker shall project 150mm above ground and shall be spaced at an interval of 30 metres, and at every change in direction. They shall be located on both side of road and drain crossings. Top of cable marker/joint marker shall be sloped, to avoid accumulation of water/dust on marker. On finished surface like foot path etc. The marking shall be accomplished with a separate colour tiles/ paver block for highlighting the route of the cable.

Cable tags shall be provided on all cables both at s feeder pillar end as well as on each pole (just before entering the equipment enclosure.

Cable Glands

a) Double compression type cable glands shall be used for the termination of all the power and control cables. Cable glands shall be brass casting, machine finished and Nickel-plated to avoid corrosion and oxidation. Rubber components used in cable gland shall be of neoprene.

b) For single core cables, gland shall be with brass ring.

c) Cable glands shall be with metric threads.

d) Cable glands shall be conical (& not flange type).

Cable Lugs

a) Cable lugs shall be of tinned copper, solder less crimping type for Cu cables & Al lugs for the Al cables.

b) The current rating of the lugs shall be same as that of the respective cable conductors.

c) Ring type cable terminations shall be used.

d) Insulated lugs are not acceptable for any cable terminations.

e) Bi-metal strip/ Bi-metallic lug shall be used whenever two different metals are to be connected together.

f) Double hole extended neck (long barrel neck) type lugs shall be used in case of cables above 185 sq. mm.

g) Fork terminals shall be used for luminaries & decorative switch/ socket. Pin terminals may be acceptable during execution only in case other terminals/ lugs cannot be accommodated.

h) Reducer / wire pin terminals shall be avoided for MCB terminations. MCB terminations shall be with 'long palm terminals.

i) All terminations in Feeder Pillars / enclosure for earthing & neutral busbars / terminals shall be with ring type terminals.

j) All earthing terminations shall be with ring type lugs only.

k) All control & interlock cable terminations shall be with ring type lugs.

l) Anticorrosion/ anti-oxidation compounds shall be used for crimping lugs [This shall especially be ensured for Al cable terminations & any

bimetallic terminations (Cu cable termination using tinned Copper lugs)].

m) If termination is done with crimping tool employing crimping die then forming dies shall be used to make the sector shaped conductor into a round conductor before crimping the lugs on the conductor. The lug must not be crimped directly on the sector conductor. Before crimping the lug, the conductor shall be thoroughly cleaned and special jelly applied over it to prevent further oxidation.

The cable carrier system covers the supply of cable racks, cable trays and its supporting accessories hardware and their installation. It shall be the responsibility of the Contractor to complete the cabling system in all respects.

Cable trays shall be of Galvanized steel and of perforated type, complete with all necessary coupler plates, elbows, tees, bends, reducers, stiffeners and other accessories and hardware as required. All hardware (i.e. bolts, nuts, screws, washers, etc.) shall be hot dip galvanized. (galvanization thickness not less than 70 microns).

Each 2.5 metre section of all types of cable trays and all elbows, tees, crosses, etc. shall be provided with two side coupler plates and associated bolts, nuts and washers.

11.4 Requirement of Special Sheath For FRLS Cable

1) Tests and Test Equipment

Cables shall be subjected to routine and acceptance tests in accordance with standards specified Test methods shall conform to IS 10810 (Methods of Test for Cables). Type tests and optional tests according to applicable standards shall be conducted on cables as specified. Contractor shall ensure use of calibrated test equipment having valid calibration test certificates from standard laboratory traceable to National Standards. Outer sheath for FRLS/FS cables shall meet the following test requirements related to flame retardance, low smoke emission, low acid and toxic gas emission. The Contractors shall have proper test apparatus to conduct all the relevant tests as per the applicable Standards mentioned herein.

2) Test for flame Retardance

(a) Oxygen Index

The critical oxygen index value shall be minimum 29 when tested at 27 +/-2 deg.C as per ASTM-D-2863 and the temperature index value shall be minimum 250^{o}C at oxygen index of 21 when tested as per NES 715.

(b) Flammability

i. Cables shall pass test under fire conditions as per IS-10810- Part-53.

ii. Cables shall also pass tests as per IS-10810 Part- 61 & Part-62.

iii. Fire survival cables in addition to tests (i) and (ii) above shall pass tests as per IEC-331.

3) Test for smoke generation

The cables shall satisfy the tests conducted to evaluate the percentage obscuration by smoke in an optical system placed in the path of the smoke. The maximum smoke density rating shall not be more than 60% when tested as per ASTM-D-2843.

4) Tests for acid gas generation

The hydrochloric acid generation when tested as per IEC 754-1 shall be less than 20% by weight.

5) Tests For Resistance To Ultra Violet Radiation

This test shall be carried out as per DIN 53387. The retention values of tensile strength and ultimate elongation after the tests shall be minimum 60% of tensile strength and ultimate elongation before test.

6) Tests for water absorption

Outer sheathes shall be subjected to tests for water absorption as per IS 10810. When additional characteristics are required, the tests shall be as agreed to between Employer and VENDOR before the placement of order.

12 EARTHING SYSTEM

12.1 Scope

This specification covers supply, design, installation, commissioning & testing of items required for earthing system including grounding conductors, rods, fittings, accessories and hardware to permanently and effectively ground the neutral points of transformers/ DG Sets, electrical apparatus, electrical equipment frames, conduit, cable trays and all non-current-carrying metal parts, including structural steel and fences.

The equipment shall be complete with all necessary accessories and components as required as per IS standard and PWD requirements.

12.2 Grounding System

GENERAL REQUIREMENTS

The design of the equipment shall meet the following requirements:

1 It should provide means to dissipate the current into the earth during normal and fault conditions without exceeding the operating and substation equipment limits and connections.

2 The ground grid shall provide least resistance path for grounded neutral circuits.

3 The ground grid shall provide means of discharging current carrying parts which are to be handled by personnel.

4 Grounding consists of all conductors, ground rods, connectors and all other necessary items to make a complete grounding system.

5 The Contractor shall finalize the layout of the grounding system as required for the final equipment dimensions and locations.

6 The ground grid shall be designed so as to provide a maximum ground resistance of 1.0 ohm or less.

7 Ground grid shall be installed at a minimum depth of 600 mm from ground level.

8 Earthing of transformers will be done separately through plate electrodes & further connected to the main collector network using connectors/ risers.

9 Where the ground conductor crosses the cable/ pipe trenches, the conductor shall be suitably lowered so as to cross cable trench at least 150 mm below its bottom surface.

10 Risers shall be brought out above the ground level for further extension and connection to equipment.

11 All conductors in the ground grid shall be welded together at every crossing and at every point where from risers emanate. Continuous lap welding shall be done instead of tack welding.

12 The risers from the grid shall be laid to avoid contact with reinforcement to guard against false grounding during resistance tests.

13 All non carrying current metal parts of electrical equipment and apparatus shall be earthed with two separate diametrically/ diagonally opposite connectors. The apparatus shall include:

14 Bodies of electrical machinery, transformers etc.

15 Frames of panels and cubicles

16 Metallic structures of switchgear, casing of cable boxes

17 Shielding of cables and electrical wiring conduits

12.3 Soil Resistivity

The Contractor shall undertake the soil resistivity measurements at site and select suitable type of conductors.

13 SAFETY REQUIREMENTS

Refer CPWD General Specification for Electrical Works Part IV-Substation (2013).

PART-C

(TECHNICAL SUBMISSION & DATA SHEET)

LIST OF DOCUMENTS AND SUBMITTAL

Sr. No.	Items
1	4-Sets of Technical Literature
2	Performance Guarantee
3	All Permits/ Licenses
4	Technical Data
5	Manufacturer's Drawings, Catalogues & Pamphlets & Other Documents
6	Electrical Installation Certificate
7	Results of Summer & Monsoon Tests.
8	Operating Instructions & Maintenance Manual
9	Balancing, Testing, and Commissioning Reports

1. LIST OF DRAWINGS TO BE SUBMITTED AFTER AWARD OF CONTRACT

Following drawings, calculations & schedules shall be submitted to Employer/ DISCOM for approval before procurement, fabrication and Installation of equipments at site,

S.N.	Drawings
1.0	Single Line Diagram of Complete Electrical System based on the design criteria.
2.0	Electrical Substation GA and sectional Layouts of substation showing locations of various Equipment including Compact substation, DG Sets , cable trenches, 33 kV VCB Switchgear Panel, LT Panels, control & relay panels and other allied equipments and associated systems.
3.0	Bill of quantities for 33/0.415kV Substation
4.0	33kV/0.433 kV transformers
a)	General arrangement drawing shall indicate the overall dimensions, net weights, quantity of oil, crane requirements for assembly and dismantling of transformers, and the general constructional features.
b)	General arrangement drawing of the transformer showing plan, front elevation and side elevation complete with all accessories and fittings, detailed dimensions, cable entries, earthing terminals, foundation/floor fixing details, jacking pads, crane lift for untanking, size of lifting lugs and

S.N.	Drawings
	eyes, clearances between HV terminals, between LV terminals, between HV and LV terminals, between HV & LV terminals and ground and bill of materials etc.
c)	Valve schedule, Rating, diagram and terminal marking plates, complete with polarity and vector group.
d)	OCTC cabinets: schematic circuit diagram and actual detailed wiring diagram giving terminal numbers.
e)	Bushings Plan, elevation, terminal details, mounting details, make and type number, current and voltage rating, creepage distances and principal characteristics.
f)	Control wiring diagram for marshalling box.
g)	QAP
5.0	Cabling system
a.	Details of Installation of Cables in Trenches, on cable trays, racks directly buried etc., at all locations as specified including cable trays.
b.	33kV & 1.1kV Cable routing layout inside and outside the building.
c.	Bill of quantities of LT cables, lugs and glands & HT Termination Kits.
d.	33kV Cable termination and mounting Kit Layout drawing.
6.0	Earthing system
a)	Detail calculations of earthing network including main grid calculations.
b)	Earthing notes including detail write up and drawings of earthing conductor layout, equipment & structural earthing, joints, cable earthing, instrument earthing and special earthing.
c)	Details such as material, sizes, etc. of the earth conductor and electrode pits
d)	Earthing layout drawing showing interconnection of equipment earthing to the grid and earth pits
7.0	VCB / LT Switchgear
a)	Design Calculations for Bus bar sizing, CT Sizing of all type etc. for each Switchboard along with a copy of relevant standard referred for the same
b)	Guaranteed Technical Parameters
c)	Equipment GA & Section drawings with dimensions, clearances, locations of components- CT, Terminals, etc. of each type of switchboard with component layouts like LV Compartment, etc with general notes
d)	Base frame and Foundation GA drawings with dimension and details
e)	Electrical Control drawing for all panels with general notes like sizes, type,

S.N.	Drawings
	Material details and other details
f)	Bill of material along with make, quantity, model no and ratings
g)	All the Type Test certificates to prove the compliance with the requirements and submit certificates before award of contract.
8.0	All civil drawings related to foundation of all the electrical items.
B)	**Calculations**
a)	Distribution Transformer Calculations
b)	Fault level Calculations
c)	Co-ordinated protection study with latest available version of ETAP software.
d)	HT & LT cable sizing
e)	Battery Sizing Calculations
f)	Earthing Sizing Calculations
C)	**Schedules**
a)	Cable Schedule
b)	Protection Relay Setting Schedule
c)	Interconnection schedule
d)	Junction Box Schedule

All equipment/system sizing calculations/drawings shall be submitted to the Employer for approval whether specifically mentioned or not.

TENDER DATA SHEETS

The Contractor shall furnish the following details as a part of technical bid. Contractor shall furnish all relevant catalogues relevant to the equipment required in the proposed building for Electrical Installation Works.

1) DISTRIBUTION TRANSFORMER

Sr.No.	Description	Unit	Technical Particulars
1	Make		
2	Type		
3	Applicable Standards		
4	Rated output	kVA	
5	Quantity required	Nos.	
6	Transformer location		

7	No load transformer ratio	kV/kV	
8	Number of phases		
9	Rated frequency	Hz	
10	Impedance at all taps	%	
11	No load loss on principal tap	W	
12	Load loss on principal tap and rated kVA	W	
13	Dimensions	mm x mm x mm	
14	Weight	Kg	
15	Number of winding / material of conductor		
15	Method of connection		
(a)	HV winding		
(b)	LV winding		
16	Vector group		
17	LV Neutral		
18	Type of cooling		
19	Tap changer		
20	Tap range	%	
21	Tap step	%	
22	Terminal connection		
(a)	HV terminals		
(b)	LV terminals		
23	Current Transformer		
(a)	On LV		
(b)	On LV Neutral		
24	LV Neutral earthing		
25	Insulation of Windings		H.V.
(a)	One minute power frequency withstand voltage (dry and wet)		
		kV	
		(r.m.s)	
(b)	1.2/50 micro second full wave impulse withstand voltage	kV	
		(peak)	

26	Insulation of bushings		H.V.
(a)	Rated Voltage of bushing	kV	
(b)	One minute power frequency withstand voltage	kV	
		(r.m.s)	
(c)	1.2/50 microsecond full wave impulse withstand voltage	kV	
		(peak)	
(d)	Minimum creepage distance	mm	
27	Whether all the above details attached for each rating of transformer	Yes /No	

2) 415V METAL ENCLOSED SWITCHGEAR

Sr. No	Description	Unit	Technical Particulars
1	**415 V Switchgear and Bus bar Ratings**		
(a)	Rated voltage phase and frequency		
(b)	System Neutral Earthing		
(c)	Maximum system voltage		
(d)	One minute power frequency voltage		
	i) Power circuits		
	ii) Control circuits		
	iii) Aux. Circuits connected to Sec of CTS		
(e)	Continuous current rating of Bus bars under site reference Ambient Temperature and type		
(f)	Bus bar insulation		
(g)	Reference Ambient Temperature		
(h)	Maximum Temperature of Bus bars, Droppers and Contacts at Continuous		
	current rating under site ambient temperature		
(i)	Short Circuit current withstand for Bus		

Sr. No	Description		Unit	Technical Particulars
	bars and droppers (i) Short time 1 sec			
	(ii) Dynamic Rating			
2	**Switchgear Constructional Requirements**			
(a)	Type of Construction			
(b)	Thickness of sheet steel (i) Frame, Frame enclosures, doors, covers and partitions			
(d)	Colour finish shade			
(e)	Earthing bus	Material		
		Size		
	Earthing conductor	Material		
		Size		
(g)	Minimum clearances in air of live parts (i) Phase to Phase			
	(ii) Phase to Earth			
(h)	Cable entry to cubicles			
3	**Instrumentation Transformers**			
(a)	Current transformer			
	(i) Ratio			
	(ii) Burden			
	(iii) Accuracy Class			
(b)	Voltage transformer			
	(i) Ratio			
	(ii) Burden			
	(iii) Accuracy Class			
4	**Type of Starter for MCC Panel**			

3) LV CAPACITOR PANEL

S. N.	Description	Unit	Technical Particulars
i	General		

(a)	Make			
(b)	Rated Capacity		kVAR	
(c)	Rated voltage		V	
(d)	Rated frequency and phases			
(e)	Ambient temperature		^{o} C	
(f)	Cable gland required			
(g)	Type of cable			
(h)	Size of cable			
(i)	Cable entry			
ii	Constructional Requirement			
(a)	Thickness of sheet steel			
	i) Frame, Frame enclosures, doors covers and partition		Mm	
(b)	Degree of protection			
(c)	Colour finish shade			
(d)	Earthing bus	Material		
		Size	mm x mm	
(e)	Earthing conductor	Material		
		Size	mm x mm	
iii	Design Requirement			
(a)	Insulation level		kV (rms)	
(b)	Capacitor bank connection			
(c)	Short circuit withstand for busbars			
	i) Short time (1 sec)		kA (rms)	
	ii) Dynamic		kA (peak)	
(d)	Type of switching & capacitor			
(e)	Switching steps			
(f)	Rating of contactor			
(g)	Incomer switch current rating			
(h)	Busbars			

4) HV, LV POWER & CONTROLCABLES

S.N.	Description	Unit	Technical Particulars	Technical Particulars	Technical Particulars
			0.415kV power cables	33kV power cables	Control cables
1	Name of the Manufacturer				
2	Conductor(stranded/solid)				
2.1	Form circular/segmented				
2.2	Nominal diameter in mm				
2.3	Effective cross sectional area sq mm				
3	Whether cores identified by numeral for cable with five core and above.				
4	Whether incremental running lengths are marked on cable at every 1 m interval.	YES/NO			
5	Finished cable				
5.1	Diameter under armour in mm				
5.2	Diameter over armour in mm				
5.3	Overall diameter in mm				
6	Whether cables will carry ISI stamp.	YES/NO			
6.1	If not explain reasons				
7	Cable drums				
7.1	Length of cables in cable drum and tolerance				
7.2	Weight of cable drum without cables				
7.3	Weight of cable drum with cables				

8	Type of end sealing				
9					
9.1	Any other details the CONTRACTOR would like to furnish?				
9.2	List of deviations if any from specification, data sheet-A and applicable standard furnished				
9.3	Conductor screen				
9.4	Insulation				
9.5	Insulation screen				
9.6	Sheath				
9.7	Armour				

5) EARTHING SYSTEM

S. No.	Description	Material	Technical Particulars
1	**Main Earthing Grid**		Quantity - As per requirement & Sizes – As per Fault level calculations
a)	Buried in earth	MS	
b)	Buried in floor slabs in buildings	MS	
2	**Conductor Leads To Equipment (above ground) – Substation Equipment & Structures**		
a)	Circuit Breaker	GS	
b)	Isolator	GS	
c)	Transformers		
	(i) Transformer neutral to bottom of tank	GS	
	(ii) From bottom of tank to earth grid	GS	
	(iii) Transformer tanks and radiator bank	GS	
	(iv) Marshalling Boxes	GS	
d)	Lightning arrester	GS	
e)	C.T. and P.T. body	GS	
f)	C.T. and P. T. secondary terminal box	GS	

S. No.	Description	Material	Technical Particulars
g)	Towers and structures	GS	
h)	Fence posts and gates (Flex. braid)	GS	
i)	415V switchgear and capacitor panel	GS	
j)	Motors		
	(i) 415V Motors above 10 kW	GS	
	(ii)415V Motors up to 10 kW	GI wire	
	(iii)Fractional horse power motors	GI wire	
k)	Other Items		
	Capacitor panel, Battery charger panel, Main lighting D.B, Control panels and sub-lighting distribution boards	GS	
	Hand Rails	GS	
	Cable trays	GS	
	Tanks	GS	
	Junction boxes	GS	
	Lighting fixtures, receptacles, lighting conduits	GS	
	Push button stations, limit switches	GS	
	Crane rail	GS	
	Street lighting, flood lighting poles and junctions boxes	GS	
	Metallic non-current carrying structures	GS	

6) BATTERY

Sr. No.	Description	Unit	Technical Particular
1.0	Manufacturer's name/Model Number		
2.0	Standards to which battery is manufactured		
3.0	Rated capacity		
3.1	At 270C and 10 hr discharge rate	Ah	
3.2	Capacity at minimum ambient temperature		

Sr. No.	Description	Unit	Technical Particular
	and the formulae used for calculations		
a)	Capacity calculated by Bidder based on the duty cycle, duration, voltage at the end of each duty, ageing factor, margin and applicable derating factors. (Pl furnish calculation and capacity rating factor curves)		
b)	Capacity at design temperature C at different end cell voltages (Enclose capacity rating factor curves)		
3.3.1	1 minute	Ah/ V	
3.3.1	15 minutes	Ah/ V	
3.3.2	30 minutes	Ah/ V	
3.3.3	45 minutes	Ah /V	
3.3.4	1 hour	Ah/ V	
3.3.5	2 hour	Ah /V	
3.3.6	3 hour	Ah/V	
3.3.7	4 hour	Ah/V	
3.3.8	5 hour	Ah/V	
3.3.9	6 hour	Ah/V	
3.3	7 hour	Ah/V	

Sr. No.	Description	Unit	Technical Particular
.10			
3.3.11	8 hour	Ah/V	
3.3.12	9 hour	Ah/V	
3.3.12	10 hour	Ah/V	
3.4	Maximum Momentary current 1 minute and voltage at the end of the duty	Amps	
3.5	Expected life of battery	Years	
4.0	Recommended charging rate		
4.1	Float charging voltage/ current	V/ A	
4.2	Trickle charging voltage/ current	V/ A	
4.3	Normal Boost charging voltage/ current and duration (from fully discharged to fully charged state)	V/ A	
4.4	Rapid Boost charging voltage/ current (in 8 hours duration)	V/ A	
4.5	Equalising charge		
	Voltage/ current	V/A	
	Duration	Hrs	
	Interval between successive equalising charges and criteria to initiate the same	days	
5.0	Expected fault level at bus due to battery	kA	
6.1	Internal resistance of each battery cell (fully charged)	Ohms	
6.2	Total Resistance of battery including resistance of inter-cell/ inter row connectors	Ohms	

Sr. No.	Description	Unit	Technical Particular
7.1	Ah efficiency at rated load	%	
7.2	Watt hour efficiency	%	
8.1	Type of positive plate		
8.2	No. of positive plates/ cell		
8.3	No. of cells per battery, with recommended float voltage		
8.4	Whether the battery can meet the duty cycle requirements with design margin, temperature correction factor , ageing factor etc., as specified (enclose battery sizing calculations)		
8.5	Inter – Cell/ Inter – Row Connectors		
	Type		
	Suitable terminal provided for tapped cell cable connection.		
8.6	Whether acid level indicators, included (applicable for opaque containers)		
8.7	Type of containers		
8.8	Type of cell		
9.0	Overall dimensions		
9.1	Each cell LxWxH		
9.2	Whether battery room size adequate (enclose dimensioned drawing indicating battery layout)		
10.0	Weight of each cell		
10.1	With electrolyte	kg	
10.	Without electrolyte	kg	

Sr. No.	Description	Unit	Technical Particular
2			
11.0	Are the vent plugs explosion proof	Yes/ No	
12.0	Ventilation requirements No. of air changes required	Changes/ Hr	
13.	Battery health monitoring system (make, technical details attached)		
14.0	Whether copy of the Type test reports (for a similar type & rating battery) enclosed.		
15.0	List of spares/ accessories enclosed	Yes/ No	
16.0	List of deviation enclosed	Yes/ No	

7) BATTERY CHARGER

SL. NO.	ITEM	UNIT	
1	Manufacturer's Name		
2	Type		
3	Ratings		
3.1	Input voltage (AC)	V/Phase	
3.2	Output voltage (DC)	V	
	(a) Nominal		
	(b) Setting range		
3.3	Rated output	kW	
3.4	Capability of starting the DC motor with other connected load	kW	

SL. NO.	ITEM	UNIT	
4	Type of AVR / controller		
4.1	Voltage regulation with AVR,when supply voltage fluctuation is +10% and frequency fluctuation is +5%	%	
4.2	Voltage regulation with % manual controller	%	
4.3	Indicate the protective devices provided		
5	Type of voltage/current control and adjustment provided for boost charger		
6	Type of range of tap changing gear (off load/on load) if provided on main transformer		
7	Guaranteed efficiency		
7.1	At 50% load	%	
7.2	At rated load	%	
8	Power factor		
8.1	At 50% load		
8.2	At rated load		
9	Maximum permissible temperature rise over ambient		
9.1	Rectifier transformer	0C	
9.2	Rectifier cells	0C	
9.3	Smoothing reactor	0C	
10	Class of insulation		
10.1	Rectifier transformer		
10.2	Smoothing reactor		

SL. NO.	ITEM	UNIT	
11	Type of rectifier cell		
12	Method of cooling		
12.1	Rectifier cells		
12.2	Transformer		
13	Whether rectifier and transformer are mounted in the same cubicle or in different cubicles		
14	Ripple content at rated load		
14.1	With battery	%	
14.2	Without battery	%	
15	Rectifier and Blocking Diodes		
15.1	Make and Type		
15.2	RMS current rating		
15.3	Peak inverse voltage continuous	V	
16	Silicon controlled Rectifiers (SCR)/SMPS		
16.1	Make and Type		
16.2	RMS current rating	A	
16.3	Peak inverse voltage continuous	V	
17	Common alarm contact provided	YES/NO	
18	Battery Monitoring System		Provided / Not Provided
19	DCDB Monitoring System		Provided / Not Provided
20	BATTERY DETAILS		
20.1	Float/Trickle charging current of battery	mA	

SL. NO.	ITEM	UNIT	
20.2	a) Boost Charging Current of Battery (Maximum)	A	
	(b) Boost Charging Voltage of Battery (Maximum)	V	
20.3	Maximum time for Boost charging of Battery	Hr	
21	Total system Heat losses in worst condition	kW	
22	Noise Level	dB	
23	Overall dimensions of charger (L x W x H)	Mm	
24	Degree of Protection		
25	SC Current		
	SC current contribution from Battery charger	kA	
26	Weight	Kg	
27	List of spares / accessories enclosed	YES/NO	
28	List of deviations brought out separately in schedule of deviations	YES/NO	

PART-D

LIST OF RECOMMENDED MAKES

Sr. No.	Material/ Equipment	Vendor
1.	Switchgear/Switchboard MV–33kV, 11kV VCB / RMU	ABB Siemens Schneider L&T
2.	Compact Substation	Siemens ABB Schneider Electric L&T
3.	Distribution Transformers	Schneider Electric Crompton Greaves Limited Transformers & Rectifiers India Limited Kirloskar Voltamp
4.	Sandwiched Type Bus Duct	Legrand L & T Schneider C&S
5.	Static Power Meter & Logger (Trivector Meters)	As per MPPTCL / DISCOM
6.	Protection Relays (Numeric / Electro mechanic Type)/ Auxiliary relays)	ABB Schneider Electric Siemens Alstom GE

7.	Potential & control Transformer (CT/PT)	Automatic Electric Gilbert & Maxwell Kappa Pragati Anant Powertech
8.	Current Transformer (Cast Resin Epoxy Coated)	Automatic Electric Gilbert & Maxwell Kappa Pragati Anant Powertech
9.	Electronic Digital Meter (A/V/PF/HZ/KWH) /MFM with LCD/LED Display.	Schneider Siemens L & T Socomec Secure
10.	HRC Fuse and Fuse Fitting	ABB GE Siemens L&T
11.	ACB	ABB Schneider Siemens L & T

12.	MCCB	ABB Schneider Siemens L & T
13.	Contactors	ABB Schneider Siemens L&T
14.	Change over switch (automatic/ manual)	HPL Hager Socomec GE
15.	Microprocessor based relays	Siemens ABB Schneider Electric
16.	Bi-metal / Overload Relays	Siemens Schneider Electric L&T
17.	Thermister relay	Alstom/ Minilec/ Siemens
18.	Push Buttons	ABB L&T Schneider Siemens BCH

19.	A. Power Distribution Panels & Boards Totally Type Tested Assembly (TTA) (AS PER IEC61439- 1 & 2). To be sourced directly from OEM or authorized licensed partner. To be manufactured at manufacturer's own factory.	Advance Panels & switchgears (P) Ltd. Adlec Power Pvt Ltd. Jakson C&S Electric limited
20.	Switches, Time Delay Relay	Schneider Siemens Hager Legrand
21.	Indicating Lamps	Siemens Schneider ABB L&T BCH
22.	HT Power Cables	Universal KEI KEC International CCI Polycab RR Kabel

23.	LT Power & Control Cables	Universal KEI KEC International Finolex Polycab RR Kabel
24.	HT/ LT Jointing Kit & Termination Kits	CABSEAL RACHEM COMPAQ M SEAL
25.	Termination (Lugs)/ Cable Glands (Double compression)	Commet Dowell Jainson
26.	Selector Switches	Kaycee ABB Siemens Schneider
27.	Alarm Annunciators (solid state type with LED illumination) / Facia Annunciator	Industrial Instruments & Controls Minilec Alstom ICA
28.	Cable Management Systems- Raceways/Floor Boxes/ Trunkings , Cable trays	Legrand OBO-Betterman MEM Schneider

29.	Earthing Strip	MARS MEM OBO STEELCO
30.	Copper Conductor PVC Insulated Wires/ Stranded Flexible Wires (FRLS) (including panel wiring)/ control cables	Finolex RR Kabel KEI Havells LAPP India
31.	Non-insulated Copper Earthing conductors	Gupta Industrial Corporation (Vasai, Palghar) Bharat Wires & Ropes Diamond Cables
32.	MCB/RCCB/ SPD/RCBO/MPCB	Legrand Schneider Siemens ABB L&T
33.	Lightning & Surge Voltage Protection	ABB Hager OBO Betterman DEHN
34.	Fire Sealant & Fire Retardant Paint	3 M India Ltd. HILTI Promat
35.	Fire Barriers / Sealing	Brattberg Roxtec Signum Navell Multikil

36.	Water barriers/sealing system	Roxtec Rayflate (Tyco Electronics)
37.	Insulating mats	Electromat Dozz Raychem RPG
38.	Terminal Blocks /connectors	Jainson Elmex Connect well Wago
39.	Single Phase Preventers	Minilec Siemens Schneider Electric L&T
40.	Selector Toggle Switch	Kaycee Salzer (Larsen & Toubro) ABB
41.	Battery/ Battery Charger	HBL AMARARAJA EXIDE CALDYNE STATCON
42.	Fire Survival cables	INDIA-IMPEX(FRTEK) LEONI Bonton ner

43.	Polycarbonate Sockets	Clipsal MANNEKER Legrand
44.	Water Tight Polycarbonate Boxes	Hensel Legrand Phraser
45.	APFC Capacitor Panels	L & T Schneider EPCOS ABB
46.	Capacitor (APP) / Series reactors / APFC relay	Schneider EPCOS ABB L & T

Note:-

1) Only one of the above makes of the materials will be acceptable. The Contractor has to comply with the approved makes given in the tender document.

2) The Bidder shall offer the equipment of makes mentioned above. Other makes are subjected to Client approval before procurement.

3) The items manufactured in India shall be permitted only if the items are ISI marked (any other definition of compliance to BIS shall not be acceptable).

4) Samples from all the approved makes shall be offered for selection.

5) For standardization, inventory, electrical system coordination, the Employer/ Employer's Representative can insist on any one make from the makes indicated above.

6) The items shall meet specifications. Mere mention of a make as approved make in the above list does not qualify for acceptance of an item.

PART-E

(TESTS ON COMPLETION)

Completion and Post Completion Activities

Mechanical completion is said to occur, when all erection/installation and commissioning of all electrical works and minor civil works under the scope of the Contractor are completed to the satisfaction of the Project Manager's Representative with,

a) All installation alignment checks.

b) All panels and equipment erected, grouted, with all cabling and wiring, terminations, routing, clamping, dressing, tagging, and ferruling duly completed including continuity and megger testing, and all installation checks.

At the stage of Mechanical completion, the Contractor shall ensure that all physical, aesthetic and workmanship aspects are totally completed, and the plant is fit and sound for undertaking pre-commissioning checks followed by commissioning.

Upon achieving mechanical completion, the Contractor shall notify the Project Manager of such mechanical completion upon which the Project Manager shall proceed with the checking of the works.

The Project Manager may inform the Contractor regarding deficiencies for rectification by the Contractor within a jointly agreed period before the pre-commissioning checks could be undertaken. Alternately the Project Manager, when the defects are of minor nature may undertake the pre-commissioning checks, permitting the Contractor to concurrently undertake rectification of such defects. Rectification of all defects, so notified by the Project Manager, to his satisfaction shall be a prerequisite to issue of Taking over Certificate.

Testing and Commissioning

The Contractor shall carry out commissioning tests in the presence of the Project Manager's representative. The evaluation of test results and decision passed by the Project Manager's representative regarding the test results will be final and binding on the Contractor. Any additional tests or repetition of tests to establish satisfactory operation of any equipment shall be carried out by the Contractor, if so desired by the Project Manager's representative at no extra cost.

The completion checks and commissioning tests to be carried out shall include, but not be limited to, those described in subsequent paragraphs, as applicable to the individual equipment/system.

All checks and tests shall be as per the Manufacturer's drawing manuals, relevant codes of installation and commissioning checklists described in subsequent paragraphs.

Among other commissioning tests, the following shall be carried out at site after completion of installation. Contractor shall ensure to use calibrated test equipment having valid calibration test certificates from standard laboratories traceable to National Standards / International Standards. All tests to be carried out in the presence of Project Manager's representatives.

a) Switchboard: Power frequency high voltage test, IR test, operation tests

b) Relays: Check internal wiring, relay settings

c) Cables

- All new LT cables shall be megger tested before terminating / jointing. After terminations / joints shall be megger tested by 1000V megger.
- All HT cables shall be megger tested before terminating / jointing. After terminations / joints shall be megger tested by 5000V megger.
- Cable core shall be tested for
  - Continuity
  - Absence of cross phasing
  - Insulation resistance to earth
  - Insulation resistance between conductors

d) Earthing System

Continuity of all conductors and joints. The Project Manager's representatives may ask for earth continuity tests, earth resistance measurements and other tests, which in his opinion are necessary, to prove that the system is in accordance with design, specification, code of practice and CEA Regulations 2010. Earth resistance value should be not greater than one (1) ohm.

e) Lighting System

Commissioning tests stipulated in applicable standards and code of practice covering all lighting system equipment

The Contractor shall carry out insulation resistance tests by a megger of following rating

Control circuits up to 220 V 500 V megger

Power circuits up to 1.1 kV 1000 V megger

In general, the following checks shall be carried out on all the equipment/systems, as applicable.

a) Name plate details according to approved drawings/ specifications

b) Any physical damage or defect and cleanliness

c) Tightness of all bolts, clamps and connections

d) Oil leakages and oil level

e) Condition of accessories and their completeness

f) Clearances

g) Earthing connections

h) Correctness of installation with respect to approved drawings/specifications

i) Lubrication of moving parts

j) Alignment

k) Correctness and condition of connections

Commissioning Tests

The following commissioning tests are to be carried out on all the equipment/systems, as applicable and as desired by EMPLOYER/ STATUTORY requirements.

a) Insulation resistance measurement of equipment, accessories, cabling/wiring etc.

b) Dielectric tests on equipment, accessories, cabling/ wires etc.

c) Phase sequence and polarity

d) Voltage and current ratios

e) Vector group

f) Resistance measurement of winding, contacts etc.

g) Continuity tests

h) Calibration of indicators, meters, relays, etc.

i) Control and interlock checks

j) Settings of equipment and accessories

k) Checking of accuracy/error

l) Checking of operating characteristics, pick-up voltages and currents, etc.

m) Operational and functional tests on equipment, accessories, control schemes, alarm/trip/indication circuits, etc.

n) Operational Checks for all the equipments for Auto and Manual mode through SCADA interface.

o) Measurement of guaranteed/approved design values including lighting levels, earth resistance measurement, etc.

p) Complete commissioning checks of the system

Specific Tests to be carried out Equipments are as follows;

13.1 Distribution Transformer

a) Insulation resistance test HV side, LV side and HV - LV
b) Magnetizing current test.
c) Winding resistance test.
d) Voltage Ratio & Tap continuity test at all tap.
e) Vector group test.
f) Magnetic Balance Test.
g) Buchholz Relay Test (if any)
h) Neutral CT Test
i) Winding Temperature Indicator / Oil Temperature Indicator Test
j) Polarization Index Test
k) Cooling System.
l) Local / Remote operations of OLTC
m) No load test and performance observation
n) RTCC Panel: Operational tests, IR values, Insulation withstand.
o) OLTC: Operational test from local & remote, insulation withstand

13.2 HT Switchgear Panels

a) Check of electrical wiring.
b) Tests on auxiliary and control circuits.
c) Check of electrical operation of safety (interlocking, automatic changeover, Local / Remote operations in test as well as service position including all electrical interlocks etc).
d) Check of mechanical operations (insertion and withdrawal of removable parts, locks and interlocks system, operation of safety shutters, Anti pumping device operation etc.).
e) MV Switchgear communication interface tests.

f) Protection system operation stability and sensitivity by primary injection testing method including testing of metering circuits

g) Check of setting of all protective and measurement devices (e.g. protection relays, smart devices, etc...).

h) Loop checks with SCADA and MCS Systems.

i) IR values of power and control circuits

j) HV Test - DC High voltage on switchboard

k) Panel indication, annunciation, space heater circuits

l) Spare contact for customer use

13.3 Control Circuit

a) Operational test of control circuits to be tested as per schematic drawing.

b) Indications/Alarm/Annunciation circuit to be tested as per control schematic drawing.

c) Check for panel space heater and illumination circuits.

13.4 LT Switchgear Panels

a) Check of electrical wiring.

b) IR Values of power circuits & control circuits

c) Tests on auxiliary and control circuits.

d) Check of electrical operation of safety (interlocking, automatic changeover, Remote closing / Tripping circuits etc…).

e) Check of mechanical operations (insertion and withdrawal of removable parts, locks and interlocks system, operation of safety shutters, charging - closing - tripping of breaker etc..).

f) Power centre communication interface tests.

g) Check of setting of all protective and measurement devices (e.g. protection relays, smart devices, Secondary injection testing of protective relays/releases, Trip circuit healthiness and tripping through relays/ release etc...).

h) Indication / Annunciation / Panel space heater circuit / Space contacts for customer use

i) CT testing for polarity, ratio, IR values and magnetization for class PS characteristics

j) PT testing for ratio, IR values

k) Testing of modules for DOL/ Star-Delta/ATS/ Soft Starter starting or any other starting method as per the schematic drawings applicable.

13.5 HV & LV power cable, control cable & cable accessories

a) IR Values before Hi-pot

b) Hi Pot test for MV & HV cables.

c) IR Values after Hi-pot

13.6 DC Systems

a) Check of electrical wiring.

b) Tests on auxiliary and control circuits.

c) Check of electrical operation of safety (interlocking, etc…).

d) Check of mechanical operations (insertion and withdrawal of removable parts, locks and interlocks system, operation of safety shutters, etc…).

e) DC System communication interface tests.

f) Check of setting of all protective and measurement devices (e.g. protection relays, smart devices, etc...).

13.7 Batteries

a) Battery electrolyte check (where applicable and as recommended by the Manufacturer)

b) Battery check and polarity.

c) Floating charge output voltage measurement.

d) Battery charging and current absorbed check.

e) Battery discharge and cells voltage check.

f) Battery recharge

13.8 Earthing System

a) Earthing resistance of each electrode

b) Earth continuity check.

c) Overall resistance of earthing installation.

13.9 Lighting system

a) Check of electrical wiring.

b) Functional tests.

c) Lux level measurement for each plant area.

PART-F
(OPERATION AND MAINTENANCE)

1.0 Scope of Work

The scope of Contractor includes O&M for the specified period in contract and Training of Employer's staff for operation and handling of the respective systems, carry out Operation & Maintenance of power supply system along with its associated components including the following;

i) 33 kV HT Switchgear Panels

ii) 33/0.433kV Distribution Transformer

iii) 415 V Switchboards, APFC Panels etc.

iv) HV & LV Cable network, LV Bus duct

v) Earthing & Lightning protection System

vi) DC System

vii) Comprehensive Maintenance of all the Systems installed.

1.1 Operation and Maintenance

1.1.1 The Contractor shall also be required to operate and maintain the system Designed, Supplied, Installed, tested and commissioned by him, for the duration specified under contract document. The Operation and Maintenance Contract shall be comprehensive type. The Contractor shall take full responsibility for the care of the electrical, electro-mechanical services/ system and other allied systems during the contract period till it is handed over to the Employer at the end of O&M period. If any loss or damage occurs to the treatment works or to any other system, during the period for the contractor is responsible, the contractor shall rectify such loss or damage, at his cost, so that all the electrical, electro-mechanical services/ system conforms to its condition when the contractor took possession at the commencement of the contract.

1.1.2 The Contractor shall be responsible for, but not limited to, the following:

a. Providing the required staff, but not less than the minimum specified numbers/ level, during operation and maintenance period and additional staff as per requirement during periodic maintenance and in emergencies.
b. The Contractor shall also acknowledge that the Employer and the Employer's Personnel and other contractors may be carrying out work at the Facilities and shall endeavour to fully co-operate and work in a manner so as not to cause any obstruction or hindrance to them.
c. Providing all required consumables such as spares, tools, tackles & Equipment and consumables required for functioning of equipment.
d. Establish work control procedures including preventive and corrective maintenance so that the entire electrical, electro-mechanical services/ system shall work in automatic mode and/or semi automatic at all times.
e. Preventive maintenance shall be done as per manufacturer's O&M manuals.
f. Submission of monthly report.
g. The Contractor shall be solely responsible for the safety and security of the goods in the store and will be responsible for any loss or damages in stores for any reason.
h. Proper maintenance and housekeeping along with provision of all tools & equipment.
i. Insurance: The Contractor shall, without limiting his or the Employer`s obligations and responsibilities, undertake the following;
    i. The insurance shall be at the Contractor`s cost and shall cover the Employer and the Contractor against all losses or damages from whatsoever cause arising from the start of the O&M until the date of completion of O&M in respect of the facility or any section or part thereof as the case may be.
    ii. Insurance shall cover for all the Civil, mechanical, electrical and instrumentation works together with material to the full replacement cost.
    iii. Any amount not insured or not recovered from the insurer shall be borne by the Contractor.

1.1.3 The Contractor shall comply with all Applicable Law relevant to the Contractor's Personnel, including Applicable Law relating to their employment, health, safety, welfare, immigration and emigration, and shall allow them all their legal rights.

1.1.4 The Contractor shall ensure his employees to obey all Applicable Laws, including those concerning safety at work.

1.1.5 In the event Employer becomes liable to any Employers Personnel, any Governmental authority (including but not limited to any fines or penalties levied by or payable to such authority) or to any other third party under the provisions of any Applicable Law resulting from Contractor's failure to comply with such Applicable Law, Contractor shall reimburse Employer for all payments required to be made by Employer to such Employers Personnel, Governmental authority or any other third party, plus the actual expenses that Employer may incur in investigating, settling or defending any litigation or threatened litigation.

1.1.6 The Contractor will not be entitled to sub-contract any part of his obligation under these Conditions to any third party without prior approval of the Employer. Neither party may assign their rights and obligations under these Conditions without the consent of the other Party. However the Employer may assign any rights under these Conditions to any financial institution from whom any financial assistance/credit facilities have been availed by the Employer.

1.1.7 In the event of an emergency the Contractor shall forthwith notify the Employer of the emergency, the expenditures made and the operating actions taken.

1.1.8 In the event of an emergency endangering any life or property, the Contractor shall immediately take such action as may be necessary to prevent, avoid or mitigate injury, damage or loss and shall, as soon as possible, report any such incidents, including his response thereto to the Employer.

1.1.9 The Contractor shall be solely and exclusively responsible for obtaining all necessary permits and consents required by Applicable Law or any Governmental authority for the Contractor to carry out the O & M Services.

1.1.10 Client's representative can inspect the facility at any moment during the O& M period. The Contractor at its own cost shall provide any assistance required for such inspection of the building.

1.1.11 CONTRACTOR shall carry out the following maintenance activities

a. Contractor should carry out Operation and Maintenance requirements as per O&M manual of each equipment.
b. Carry out Preventive & Predictive maintenance of the equipment and associated system to ensure the health of the network.
c. Carry out breakdown maintenance of equipment and systems including identifying the fault and its location; repairs with all required spares and tools; testing and regularize the operations with minimum downtime.
d. Maintain the Critical Spares required for emergency resolution of outages of Key equipments and systems.
e. Carry out Root Cause Analysis to find the reasons and taking measures to eliminate its reoccurrence.
f. Provide required all the necessary latest Tools and Tackles along with Test Equipments for carrying maintenance activities
g. Necessary Human Safety Norms as per the updated Indian Electricity Rules.

1.1.12 For detailed terms & conditions regarding to O&M, please refer contract document.

2.0 Distribution Transformer

2.1 Oil type Transformer Maintenance:

(i) Without shut down activities

S. N.	Maintenance or test	Recommended Interval
1	Checking of bushing oil level	Weekly
2	Checking of oil level in conservator	Weekly
3	Checking of oil level in OLTC conservator	Weekly
4	Checking of oil leaks	Weekly
5	Checking condition of silica gel in breather	Weekly
6	Checking of oil level in oil seal of breather	Weekly
7	Testing of oil for DGA and other oil parameters	Monthly

(ii) Shut down activities

S. N.	Maintenance or test	Recommended Interval

S. N.	Maintenance or test	Recommended Interval
1	BDV, ppm of OLTC Diverter Switch compartment oil (Less frequently if operations are not more)	Yearly
2	External cleaning of radiators	Yearly
3	Cleaning of all bushings	Yearly
4	Checking of auto starting of cooler pumps and fans	Yearly
5	Marshalling boxes of transformer	Yearly
	(i) Cleaning of marshalling boxes of transformer	Yearly
	(ii) Tightening of terminators	Yearly
	(iii) Checking of contractors, space heaters, illumination, etc	Yearly
6	Maintenance of OLTC driving mechanisms	Yearly
7	Checking of all remote indicators (WTI and Tap position indicator) and top up oil in pockets, if required	Yearly
8	Electrical checking/testing of pressure relief device, Buchholz relay, OLTC surge relay/checking of alarm/trip and checking/replacement of the gaskets of the terminal box	Yearly
9	Checking/testing of Buchholz relay by oil draining	Yearly
10	Frequency response analysis	as and when required
11	Tan measurement of bushings	Yearly
12	Recovery voltage measurement	as and when required
13	IR measurement of Windings (Polarization Index and D.A. Ratio)	Once in 2 years
14	Tan measurement of Windings	Once in 2 years
15	Checking and cleaning of diverter contacts	Once in 2 years
16	Checking and calibration of OTI, WTI	Once in 2 years
17	Measurement of Windings resistance at all tap positions	Once in 4 years
18	Filtration/degassing of main tank oil	as and when required
19	Testing of bushing CT's	as and when required

S. N.	Maintenance or test	Recommended Interval
20	Filtration/replacement of oil of OLTC	as and when required
21	Measurement of Windings Ratio	as and when required
22	Checking of earthing connections	Yearly

Note:

- Insulation resistance measurement, tan delta of winding resistance at all taps to be carried out once before expiry of warranty and then to be continued as per schedule.
- FRA at factory and during pre-commissioning is preferable to serve as base signature.

(iii) Breaker operations checks

Sr. No.	Maintenance or test	Recommended Interval
1	CB operating timings (Main, PIR, Aux.)	Yearly
2	Static contact resistance measurement	Once in 2 years
3	Dynamic contact resistance (DCRM), contact travel, contact speed, contact wipe, arcing contact length	Once in 2 years
4	Checking of pole discrepancy relay	Yearly
5	Functional checks, duty cycle operations	Yearly
6	Checking of all operation lock-outs including SF6 density monitor	Yearly
7	Checking of all interlocks	Yearly

(iv) Control cabinet

Sr. No.	Maintenance or test	Recommended Interval
1	Checking of tightness of all cable terminations in MB	Yearly
2	Checking of door sealing gaskets and replacement, if necessary	Yearly
3	Repainting of metallic surfaces	as and when required
4	Checking of space heater (before monsoon)	Yearly

2.2	Air Circuit Breaker	-	As per OEM Manual
2.3	GIS Breaker	-	As per OEM Manual

A) PROTECTION SYSTEMS- As per OEM Manual

Calibration and Periodic functional testing is recommended to ensure the integrity of protection circuits.

S.N.	Maintenance or test	Recommended Interval
1	Testing of DR/EL with time synchronization unit	Monthly
2	Calibration of tariff energy meters	-
3	Checking of voltage (in service) for relays	Yearly
4	Checking of DC logic circuits for trip and annunciations including timers by simulation	Yearly
5	Calibration of panel meters (Indicating/recording instruments along with the transducers)	Once in 2 years

(i) Bus bar protection

S. N.	Maintenance or test	Recommended Interval
1	Primary injection test	SOS
2	Protection stability and sensitivity checks	SOS
3	Relay and DC logic check	Yearly

(To be done whenever the protection AC circuits are disturbed like addition of new feeder)

(ii) Under voltage relay

S. N.	Maintenance or test	Recommended Interval
1	Starting and pick up of the relay as per plug setting	Yearly
2	Relay Operating time as per relay characteristics	Yearly
3	Operation of alarm and trip contacts	Yearly
4	Verification of input voltage on relay terminals	Yearly

(iii) Over voltage relay

S. N.	Maintenance or test	Recommended Interval
1	Starting and pick up of the relay as per plug setting	Yearly
2	Relay Operating time as per relay characteristics	Yearly
3	Operation of high set element/instantaneous unit at voltage setting, if applicable	Yearly
4	Operation of alarm and trip contacts	Yearly
5	Verification of input voltage on relay terminals	Yearly

(iv) Over current and earth fault relay

S. N.	Maintenance or test	Recommended Interval
1	Starting and pick up of the relay as per plug setting	Yearly
2	Time of Operation as per relay characteristics	Yearly
3	Operation of high set element/instantaneous unit at current setting, if applicable	Yearly
4	Operation of alarm and trip contacts	Yearly
5	Verification of input currents	Yearly
6	Verification of directional feature, if applicable	Yearly

(v) Under frequency relay

S. N.	Maintenance or test	Recommended Interval
1	Pick up value of the relay as its settings by slowly decreasing the frequency from 50 HZ	Yearly
2	Drop off value of the relay as its settings by slowly increasing the frequency from pick up value	Yearly
3	Verification of df/dt feature of the relay, if applicable	Yearly
4	Operation of alarm and trip contacts	Yearly
5	Verification of input voltage on relay terminals	Yearly

(vi) Local breaker back up protection, restricted earth fault (REF) and other instantaneous current operated relays

S. N.	Maintenance or test	Recommended Interval
1	Pick up value of the relay at the selected setting	Yearly
2	Operating time of the relay	Yearly
3	Operation of alarm and trip contacts	Yearly
4	Verification of input voltage on relay terminals	Yearly
5	Through current stability checks on the existing load in case of REF/circulating current differential protection	Yearly

(vii) Fuse failure relays

S. N.	Maintenance or test	Recommended Interval
1	Remove main fuse of each phase voltage input to the distance protection scheme one by one in the relay panel	Yearly
2	Checking that the “VT Fuse Fail Alarm” is received	Yearly
3	Checking that the distance protection does not operate	Yearly

2.4 VCB- As per OEM Manual

Sl. No.	Control activity	Frequency of checks
1	Cleaning of bus bars, insulators, etc.	Yearly
2	Relays testing	Yearly
3	Tightness of all electrical and earthing connections	Yearly
4	Checking of indicating meters	Yearly
5	Check for change-over facility, if provided	Yearly
6	Check operation/Indications in Off-load conditions of VCB	Yearly
7	Check spring charging of VCB	Yearly
8	Functional Checking (Trip, close, etc.)	Yearly

Sl. No.	Control activity	Frequency of checks
9	Measurement of operating timings	Yearly
10	Cleaning of insulators and tightness of terminal connections of CB's, CT's, PT's, Isolators, etc.	Yearly
11	Alignment Checking of isolators	Yearly

2.5 ANNUNCIATORS

Annunciator provides essential substation condition status information to O&M personnel. Two aspects must be considered:

(1) Correct operation of the annunciator itself and

(2) Integrity of the alarm devices and interconnected wiring.

Annunciator operation is easily tested using the "Test" button provided on most annunciator and is considered an "operations" activity. Verifying integrity of the alarm devices and interconnecting wiring requires a "functional test" of these circuits. Functional testing is accomplished by

(1) Resetting the annunciator,

(2) Closing (or opening) contacts at the alarm device, and

(3) Verifying that the correct annunciator window is activated.

Note: Items not included in this manual should follow OEM O&M manuals for maintenance. All stand-by equipment to be operated as per mutually agreed programme.

3.0 Electrical Main Panels / PDB / APFC panels / MCC panels / Junction box

3.1 It is recommended that the following maintenance be performed on a regular basis with the Main panel / PDB/ APFC Panel/ MCC Panel de-energized and incoming power locked out:

3.1.1 Feel the doors, enclosures, and enclosure sides and dead front surfaces over all circuit breakers and switches with the palm of the hand. Any surface with a temperature which the palm of the hand cannot stand for about 3 seconds may indicate trouble. Heat detectors are also available to detect trouble spots.

3.1.2 Wipe all bus insulators and vertical bus barriers and vaccum any accumulation of dust.

3.1.3 Check the following for tightness:

a. Bus Connections
b. Power cable connections
c. Control wire connections

3.1.4 Inspect all wiring for insulation deterioration, wear or cuts. Replace if necessary.

3.1.5 Look for wear of the plating on the unit stab fingers and on the vertical bus at the location where the unit stab fingers and on the vertical bus at the location where the unit stabs fingers engage the vertical bus. The plating is part of environmental protection system for the copper. Oxide and/or other films can form on exposed copper or aluminium, resulting in a poor contact.

3.1.6 These parts must be replaced when the plating is worn to the point where copper can be seen, because contact resistance becomes higher, increasing the heat generated at the contact point, which, in turn, may lead to arcing and possible bus flashover.

3.1.7 Check all operating handles and mechanical interlocks for proper operation

3.1.8 Check and replace defective pilot lamps

3.1.9 Inspect starter contacts and replace if over half-eroded. Do not dress silver alloy contacts. Replace contact springs at the same time the movable contacts are replaced.

3.1.10 Look for indications for overheating, arcing or insulation breakdown and replace defective parts.

3.1.11 Visually inspect all instruments and check instrument calibrations.

3.1.12 Always replace fuses with those of the same type and rating. Even though another replacement fuse may be physically interchangeable with the original. It may not have the same short circuit interrupting capacity and current limiting ability.

3.1.13 Operate each switch or circuit breaker several times to ensure that all mechanisms are free and in proper working order.

3.1.14 Check all devises for missing or broken parts, proper spring tension, free movement, rusting or corrosion, dirt and excessive wear.

3.1.15 Look for any moisture or signs of previous wetness or dripping inside the PANEL. Condensation in conduits or dripping from outside sources is a common cause of control centre failure. if evidence of moisture is found, seal all cracks and openings and eliminate all sources of moisture such as those which cause a dripping on the PANEL enclosure.

3.1.16 Check for Tightness of all bolts, clamps and connecting terminals, locking of all the bolts.

3.1.17 Check the Earthing of Panel and earthing healthiness shall be done for equipment neutral. Check the earthing and non conducting metallic portions.

3.1.18 Ensure the grounding flat/wire is connected with Main earthing grid.

3.2 CIRCUIT BREAKERS

3.2.1 Check for any physical damage.

3.2.2 Check for the tightness of all bolts, clamps and connecting terminals, vermin proofing of all holes

3.2.3 Ensure proper sealing of any extra hole/any gap.

3.2.4 Check power and control cable are dressed and glanded properly.

3.2.5 Check for earth connections. Check earth switch/earthing truck interlock with shutter. Also, earthing of the breaker trucks. Ensure the grounding flat/wire is connected with Main earthing grid.

3.2.6 Check cleanliness of insulators and bushings (including seal-off bushings, wherever applicable).

3.2.7 Check all moving parts are properly lubricated.

3.2.8 Ensure space heater connections are proper.

3.2.9 Check control wiring for correctness of connections, continuity and Insulation resistance values of each pole. Space heater operation, module light if applicable.

3.2.10 Check for power closing/opening operation manually and electrically, Trip free and anti-pumping operation, three phase auto-reclose operation.

3.2.11 Check the electrical & mechanical interlocks.

3.2.12 **Checks on spring charging motor:** correct operation of limit switches and time of charging, Insulation resistance values

3.2.13 **Checks on CTs:** Ensure that the CT secondary is not open circuited. Check all CT connections. Also ensure that CT secondary is grounded.

3.2.14 Check the condition of PT fuse, continuity and health check.

3.2.15 All functional checks in different modes viz. Local/Remote, Auto/Manual.

3.2.16 Check breaker operation with protective relays.

3.2.17 Check for annunciators in the control room.

3.3 ADDITIONAL CHECKS FOR AIR-BLAST CIRCUIT BREAKERS

3.3.1 Calibration of pressure gauges and pressure switches.

3.3.2 Air leakage test.

3.3.3 Adequacy of air receivers, for the designed set of operations.

3.3.4 Operation of breaker (by pneumatic and electric impulses) at the pressure specified.

3.3.5 Time of blowing-out of air during closing and opening operation.

3.3.6 Check on 'drying air device'.

3.3.7 Blocking of opening at low pressure.

3.3.8 Pneumatic pole discrepancy protection.

3.3.9 Safety valve settings.

3.3.10 Check the compressed air supply system and pressure switch settings.

Sl. No.	***Name of the activity***	***Frequency of checks***	***Remarks***
1	General cleaning of panels	Every Week	All faulty spare parts should be replaced immediately.
2	Check Proper operation of ACB, SFU, MCCB etc.	Every Month	
3	Check healthiness of protection system of ACB in MCC.	Every 3 Month	
4	Check looseness of connection in panels, PDB etc	Every 6 Month	
5	Check operation of APFC relay & healthiness of capacitors banks.	Every 3 Month	
6	Check operation of UPS in online mode & Bypass mode.	Every 6 Month	
7	Check healthiness of batteries & Back up.	Every 6 Month	

4.0 CABLES

Maintenance tests can detect problems in cables that are approaching failure without accelerating the insulation deterioration process due to operational or environmental conditions. Except for infrared scanning, de-energize the cable circuit before maintenance.

Sl. No.	**Name of the activity**	**Frequency of checks**
1	Equipment Ratings	Every 5 year
2	Visual inspection of cables	Every month

Sl. No.	Name of the activity	Frequency of checks
3	Checking and recording or IR values of all cables with megger of suitable range.	Every month
4	Checking all cable terminals & joins for overhauling / loose connections and tightening, terminating, rejoining, if required	Every month

5.0 BATTERIES AND DC DISTRIBUTION SYSTEM

Battery system maintenance should have highest priority. Computerized, online battery monitoring systems can greatly reduce maintenance required on battery systems and actually improve battery reliability and increase battery life. Battery chargers, important to the health and readiness of battery systems, require regular maintenance as well.

(i) Maintenance Schedule for Batteries and DC Distribution system:

S. N.	Maintenance or test	Recommended Interval
1	Measurement of specific gravity and voltage of cell	Every month
2	Checking electrolyte level and topping up with DM water, if required	Every month
3	Checking of Emergency DC lightening to control Room	Every month
4	Checking of any earth fault (If E/F relay not provided)	Every month
5	Checking of electrical connections of charger panel and DCDB panels for tightness and cleanliness	Every year
6	Checking of electrical connections for batteries and application of petroleum jelly on cell terminal, if required	Every year
7	Checking control cards of charger and measurement of test point voltage values	Every year
8	Battery impedance testing (Optional)	Every year
9	Testing of DC E/F and under voltage relays	Every year
10	IR measurement of charger transformer	Every year
11	Discharge test of battery set	Every 3 year

6.0 EARTHING SYSTEM

Sl. No.	Name of the activity	Frequency of checks
1	Checking of all earthing connections, joints and cleaning and tightening thereof	Every 3 month
2	Putting adequate quantity of water in earth pits.	Every 3 month
3	Checking and recording of earth resistance of all points, pits and taking corrective action to improve it, if required.	Every 3 month

7.0 METERS

Sl. No.	Name of the activity	Frequency of checks
1	Checking of each meter (analog/digital) for its correct operation	Every year
2	Calibration of indicating meter.	Every month

Maintenance schedules listed in the manual are to be adhered by the Operation and Maintenance staff and Observation so made during such inspections are required to be properly recorded giving complete details of the activity, observed parameters, remarks/views about the inspection carried out. Such observations are to be duly signed by the Maintenance engineer in-charge and deviations with reference to acceptable norms/limits are to be approved by the competent authority having requisite experience and expertise since this is considered very vital for providing reliable and quality power to the consumers.

8.0 Preventive maintenance:

8.1 The Contractor shall plan the day-to-day and the preventive maintenance shall be done as per manufacturer's O&M manuals.

8.2 Checks to be performed daily

a) Tightness

b) Working of gauges and other measuring devices.

8.3 Checks to be performed weekly

a) Pipeline leakages

b) Tightness of all electrical connections

c) Tightness of all cable connections

d) Operation of all sluice and butterfly valves, scour and pressure relief valves, gates and air valves.

e) Contractor shall be equipped with dewatering pump of required capacity of pumping sewage; the unit shall also consist of power generating set.

f) All parts of the machinery and electrical equipments liable to wear and tear shall be replaced by the contractor as per direction of engineer in charge.

g) Current and voltages in all electrical equipments.

8.4 Checks to be performed monthly

a) Gland packing

b) Wear and tear of moving parts.

c) Maintenance of Valve actuator, Battery, etc. shall be carried our as approved by the Engineer-in-charge.

8.5 Checks to be performed bi-annually

a) Battery and Battery charger

8.6 Checks to be performed annually

a) Overhauling requirement of all equipment

b) Testing and calibration of all instruments

9.0 Safety

9.1 The Contractor shall be responsible for safety of his staff during O & M of the Plant and shall procure, provide and maintain all safety equipment necessary for satisfactory O & M such as gasmasks, gloves, boots, mats etc.,

9.2 The Contractor shall utilize safety awareness procedures in every element of operation and maintenance.

9.3 The Contractor shall emphasize site safety including adoption of

(a) Safe working procedures

(b) Cleanliness and care of the plant as a whole

(c) Accident and hazardous conditions prevention and reporting.

(d) Safe practice while working near digester / gas holder areas

9.4 The Contractor shall impart safety training to all members at regular intervals, especially for new comers.

9.5 The Contractor shall provide Notice boards and display boards at appropriate locations detailing precautions to be taken by O & M personnel to work in conformity to regulations and procedures and by the visitors to the Plant.

9.6 The Contractor shall notify the Engineer in Charge representative immediately if any accident occurs whether on-site or off site in which Contractor is directly involved and results in any injury to any person, whether directly concerned with the site or a third party. Such initial notification may be verbal and shall be followed comprehensive report within 24 hours of the accident.

10.0 Documents Records / Log Book

10.1 The contractor will be responsible for keeping up to date records of documents including History Card for equipment and maintaining every day log book relating to various analysis performed and to prepare and submit a daily report and also maintain complaints register.

10.2 The contractor shall maintain an updated log book and details of operational parameters like H.T. Voltage, Current, Power Factor, energy meter reading, pressure; daily consumption report, summary of operation and other reading required are recorded in every shift at regular interval as per Client's requirement.

10.3 Printing of log sheets, registers and all necessary stationery required for maintaining records of operations and maintenance has to be arranged by the Contractor at his cost.

11.0 Monthly Report:

11.1 Monthly statements on all the records, data maintenance schedules, spares available, manpower list available at site, routine test result, monthly consumable and repair maintenance during the month shall be furnished by the contractor.

12.0 Repair / Rectification Of Defects And Deficiencies

i) **Complaints**

The Contractor shall receive calls for any and all problems experienced in the operation of the system under this contract, attend to these within 2 hours of receiving the complaints and shall take steps to immediately correct any deficiencies that may exist. Corrective actions to problem experienced, if takes longer time, shall be complied 100% by during next business hours.

ii) Repairs

All equipment that require repairing shall be immediately serviced and repaired as defined below. Since the period of Maintenance runs concurrently with the defects liability period, all replacement parts and labour shall be supplied promptly free-of-charge to the Owner.

a) Minor rectifications - 2 to 4 hours

b) Major rectifications - 12 to 24 hours

iii) Extension of time limit

Notwithstanding anything to the contrary as specified above, if the nature and extent of any Defect or deficiency justifies more time for its repair or rectification than the time specified herein, the Contractor shall be entitled to additional time in conformity with Good Industry Practice. Such additional time shall be determined by the Owner's Engineer and conveyed to the Contractor and the Owner with reasons thereof.

iv) Emergency Repairs/Restoration

Notwithstanding anything as mentioned above, if any defect, deficiency or deterioration in the Project Components poses a hazard to safety or risk of damage to property, the Contractor shall promptly take all reasonable measures for eliminating such danger.

13.0 All Inclusive Maintenance Contract

a. Scope.

The AMC shall cover all the items installed by the contractor including replacement of all switches, fittings etc. consumable like bulbs, tubes, oil etc. shall be excluded.

b. Routine Preventive Maintenance Schedule to be submitted

i. Schedule to cover manufacturer's recommendation and/or common engineering practice (for all plant and machinery under contract).

ii. Plant and machinery history card giving full details of equipment and frequency of checks and overhaul.

iii. Monthly status report.

iv. Entire Electrical installation to be repainted in fourth year (from commissioning) before the expiry of operation and maintenance contract.

c. Uptime during maintenance contract

i. 99.9% uptime of all systems under contract.

ii. Up time shall be assessed every month and in case of shortfall during

any month the contract shall be extended by a month.

iii. There shall be no reimbursement for the extended period.

iv. Break-downs shall be attended to within ten hours of reporting.

d. Manpower

i. Adequate number of persons to the satisfaction of the Engineer In-charge shall be provided including relievers.

ii. Statutory requirements of EPF, ESIC and other applicable labour legislations to be complied with; and monthly certification to that effect to be submitted.

iii. Duty allocation and Roaster control shall be contractor's responsibility.

iv. No overtime shall be payable by Owner for any reason whatsoever.

e. Shut Downs

i. Routine shut downs shall be permitted only as allowed by the Chief Engineer.

ii. Contractor shall be at liberty to carry out routine maintenance as and when required but with prior permission of the Owner.

PART-G

LIST OF DRAWINGS

Sr.No.	List of Drawings	Drawing Number
1.	Schematic SLD for Bhopal Smart City for Plot no. 22 & 23 (Sheet 1 of 6)	TCE.10339A-EL-4001-AU-40002
2.	Schematic SLD for Bhopal Smart City for Plot no. 22 & 23 (Sheet 2 of 6)	TCE.10339A-EL-4001-AU-40003

SECTION-8

DRAWINGS

(Attached Separately)

SECTION-9

BILL OF QUANTITIES

(Attached in Financial Bid Cover)

SECTION-10

ENVIRONMENT

HEALTH AND SAFETY REQUIREMENTS

(EHS POLICY)

ENVIRONMENT, HEALTH & SAFETY POLICY

SPECIFICATION FOR ENVIRONMENT, HEALTH & SAFETY POLICY (EHS) MANAGEMENT

CONTENTS

1.0 **SCOPE**: This specification established the Environment, Health and Safety (EHS) management requirement to be complied with by the Contractors during construction. Requirements stipulated in this specification shall supplement the requirements of EHS Management given in relevant Act (s) / legislations. General Conditions of Contract (GCC), Special Conditions of Contract (SCC) and Job Specifications. Where different documents stipulate different requirements, the most stringent shall be adopted.

2.0 REFERENCES: This document should be read in conjunction with following:

- General Conditions of Contract (GCC)
- Special Conditions of Contract (SCC)
- Job pecifications

3.0 REQUIREMENTS OF ENVIRONMENT, HEALTH & SAFETY (EHS)MANAGEMENT SYSTEM TO BE COMPLIED BY BIDDERS

3.1MANAGEMENT RESPONSIBILITY

3.1.1The Contractor should have a documented EHS policy to cover commitment of their organization to ensure health, safety and environment aspects in their line of operations.

3.1.2The EHS management system of the Contractor shall cover the EHS requirements including but not limited to what is specified under Para 1.0 and para 2.0 above.

3.1.3Contractor shall be fully responsible for planning and implementing EHS requirements. Contractor as a minimum requirement shall designate / deploy the following to co-ordinate the above :

No. of workers deployed

Up to 250 - Designate one safety supervisor

Above 250 & up to 500 - Deploy one qualified and experienced safety Engineer /officer

Above 500-One additional safety (for every 500 or less) engineer/officer as above.

Contractor shall indemnify & hold harmless Owner / BSCDCL & either representatives free from any and all liabilities arising out of non – fulfillments of EHS requirements.

3.1.4 The Contractor shall ensure that the Environment, Health & Safety (EHS) requirements are clearly understood & faithfully implemented at all levels at site.

3.1.5 The Contractor shall promote and develop consciousness for Safety , Health and Environment among all personnel working for the Contractor. Regular awareness, program site meetings shall be arranged on EHS activities to cover hazards involved in various operations during construction.

3.1.6 Arrange suitable first aid measures such as First Aid Box, trained personnel to give First Aid, Stand by Ambulance or Vehicle and install fire protection measures such as : adequate number of steel buckets with sand and adequate fire extinguishers to the satisfaction of BSCDCL/Owner.

3.1.7 The Contractor shall evolve a comprehensive planned and documented system for implementation and monitoring of the EHS requirements. This shall be submitted to BSCDCL/Owner for approval. The monitoring for implementation shall be done by regular inspections and compliance to the observations thereof. The Contractor shall get similar EHS requirements implemented at his sub-contractor(s) work site/office. However, compliance of EHS requirements shall be the sole responsibility of the Contractor. Any review / approval by BSCDCL/Owner shall not absolve contractor of his responsibility / liability in relation to all HSE requirements.

3.1.8Non-Conformance on EHS by Contractor (including his Sub-contractors) as brought out during review/audit by BSCDCL/Owner representatives shall be resolved forthwith by Contractor. Compliance report shall be provided to BSCDCL/Owner.

3.1.9The Contractor shall ensure participation of his Resident Engineer / Site-in- Charge in the Safety Committee / EHS Committees meetings arranged by BSCDCL/Owner. The compliance of any observations shall be arranged urgently. He shall assist BSCDCL/Owner to achieve the targets set by them on EHS during the project implementation.

3.1.10 The Contractor shall adhere consistently to all provisions of EHS requirements. In case of non-compliance or continuous failure in implementation of any of EHS provisions; BSCDCL/Owner may impose stoppage of work without any Cost & Time implication to Owner and/or impose a suitable penalty for non-compliance with a notice of suitable period, up to a cumulative limit of 1.0% (one percent) of Contract Value with a maximum limit of Rs. 10 lakhs. This penalty shall be in addition to all other penalties specified else where in the contract. The decision of imposing stoppage work, its extent & monitory penalty shall rest with BSCDCL/Owner & binding on the Contractor.

3.1.11 All fatal accidents and other personnel accidents shall be investigated by a team of Contractor‟s senior personnel for root cause & recommend corrective and preventive actions. Findings shall be documented and suitable actions taken to avoid recurrences shall be communicated to BSCDCL/Owner. Owner / BSCDCL shall have the liberty to independently investigate such occurrences and Contractor shall extend all necessary help and co-operation in this regard.

3.2 HOUSE KEEPING

3.2.1Contractor shall ensure that a high degree of house keeping is maintained and shall ensure inter alia the followings wherever applicable:

a. All surplus earth and debris are removed/disposed off from the working areas to identified location(s).

b. Unused/Surplus Cables, Steel items and steel scrap lying scattered at different places within the working areas are removed to identified location(s).

c All wooden scrap, empty wooden cable drums and other combustible packing materials, shall be removed from work place to identified location(s).

d. Roads shall be kept clear and materials like: pipes, steel, sand boulders, concrete, chips and bricks etc. shall not be allowed on the roads to obstruct free movement of men & machineries.

e. Fabricated steel structural, pipes & piping materials shall be stacked properly for erection.

f. Water logging on roads shall not be allowed.

g. No parking of trucks / trolleys, cranes and trailers etc. shall be allowed on roads which may obstruct the traffic movement.

h. Utmost care shall be taken to ensure over all cleanliness and proper upkeep of the working areas.

i. Trucks carrying sand, earth and pulverised materials etc. shall be covered while moving within the premises.

j. Only properly designed steel scaffolding materials to be used for working at heights more than 3.0M . Double scaffolding using wooden ballis may be allowed for working at height less than 3.0M

3.3 ENVIRONMENT, HEALTH AND SAFETY

3.3.1 The Contractor shall provide safe means of access to any working place including provisions of suitable and sufficient scaffolding at various stages during all operations of the work for the safety of his workmen, and,

BSCDCL/Owner. Contractor shall ensure deployment of appropriate equipment and appliances for adequate safety and health of the workmen and protection of surrounding areas.

3.3.2 The Contractor shall ensure that all their staff and workers including their sub-contractor(s) shall wear Safety Helmet and Safety shoes. Contractor shall also ensure use of safety belt, protective goggles, gloves etc. by the personnel as per job requirements. All these gadgets shall conform to relevant IS specifications or equivalent.

3.3.3 Contractor shall ensure that a proper Safety Net System shall be used at appropriate locations. The safety net shall be located not more than 30 feet (9.0 metres) below the working surface at site to arrest or to reduce the consequences of a possible fall of persons working at different heights.

3.3.4 Contractor shall ensure that flash back arrester shall be used while using

Gas Cylinders at site. Cylinders shall be mounted on trolleys.

3.3.5 The Contractor shall assign to his workmen, tasks commensurate with their qualification, experience and state of health for driving of vehicles, handling and erection of materials and equipments. All lifting equipments shall be tested certified for its capacity before use. Adequate and suitable lighting at every work place and approach there to, shall be provided by the Contractor before starting the actual operations at night.

3.3.6 Hazardous and/or toxic materials such as solvent coating, or thinners shall be stored in appropriate containers.

3.3.7 All hazardous materials shall be labelled with the name of the materials, the hazards associated with its use and necessary precautions to be taken.

3.3.8 Contractor shall ensure that during the performance of the work, all hazards to be health of personnel, have been identified, assessed and eliminated.

3.3.9 Chemical spills shall be contained & cleaned up immediately to prevent further contamination.

3.3.10All personnel exposed to physical agents such as ionizing radiation, ultraviolet rays or similar other physical agents shall be provided with adequate shielding or protection commensurate with the type of exposure involved.

3.3.11 Where contact or exposure of hazardous materials could

exceed limits or could otherwise have harmful affects, appropriate personal protective equipments such as gloves, goggles, aprons, chemical resistant clothing and respirator shall be used.

A Crèche where 10 or more female workers are having children below the age of 6 years.

Reasonable Canteen facilities are made available at appropriate location depending upon site conditions.

3.3.13 Suitable facilities for toilet, drinking water, proper lighting shall be provided at site and labour camps, commensurate with applicable Laws / Legislation.

3.3.14 Contractor shall ensure storage and utilization methodology of materials that are not detrimental to the environment. Where required Contractor shall ensure that only the environment friendly materials are selected.

3.3.15All persons deployed at site shall be knowledgeable of and comply with the environmental laws, rules & regulations relating to the hazardous materials substances and wastes. Contractor shall not dump, release or otherwise discharge or dispose off any such materials without the express authorization of BSCDCL/Owner.

4.0 DETAILS OF EHS MANAGEMENT SYSTEM BY CONTRACTOR

4.1 On Award of Contract

The Contractor shall prior to start of work submit his Safety Health and

Environment Manual or procedure and EHS Plans for approval by BSCDCL/Owner. The Contractor shall participate in the pre-start meeting with BSCDCL/Owner to finalise EHS Plans including the following :

1. Job procedure to be followed by Contractor for activities covering. Handling of equipment, Scaffolding, Electric Installation, describing the risks involved, actions to be taken and methodology for monitoring each activity.
2. BSCDCL/Owner review / audit requirement.
3. Organization structure along with responsibility and authority records / reports etc. on
   EHS activities.

4.2 During job execution

4.2.1 Implement approved Environment, Health & Safety management procedure including but not limited to as brought out under para 3.0. Contractor shall also

ensure to:

1. Arrange workmen compensation insurance, registration under ESI Act, third party liability insurance etc., as applicable.
2. Arrange all HSE permits before start of activities (as applicable) like hot work, confined space, work at heights, storage of chemical / explosive materials and its use and implement all precautions mentioned therein.
3. Submit timely the completed checklist on EHS activities, Monthly EHS report, accident reports, investigation reports etc. as per BSCDCL/Owner requirements. Compliance of instructions on EHS shall be done by Contractor and informed urgently to BSCDCL/Owner.
4. Ensure that Resident Engineer / Site-in-Charge of the Contractor shall attend all the Safety Committee / EHS meetings arranged by BSCDCL/Owner. Only in case of his absence from site that a second senior most person shall be nominated by him in advance and communicated to BSCDCL/Owner.
5. Display at site office and work locations caution boards, list of hospitals, emergency services available.
6. Provide posters, banners for safe working to promote safety consciousness.
7. Carryout audits / inspection at sub contractor works as per approved EHS
8. Document and submit the reports for BSCDCL/Owner review.
9. Assist in EHS audits by BSCDCL/Owner, and submit compliance report.
10. Generate & submit HSE records / report as per EHS Plan
11. Appraise BSCDCL/Owner on EHS activity