BIDDING DOCUMENT

FOR

Construction of 1(One) No. of B+6 tower on pile foundation at Loc. No. 16 and 1(one) No. B+6 tower on normal foundation at Loc. No. 15 of 132KV Dibrugarh-Tinsukia S/C line near Tingrai River

ASSAM ELECTRICITY GRID CORPORATION LIMITED

BID IDENTIFICATION NO:

AEGCL/MD/CGM(UAR)/FLOOD/132KV DBR-TSK/2024/BID(R)

Tender Fee: Rs. 2500.00

SECTION 1

INSTRUCTION TO BIDDERS

Corporate Office,
Assam Electricity Grid Corporation Limited, Bijulee Bhawan,
Paltan Bazar, Guwahati-781001
PHONE: 0361-2739520 FAX NO.0361-2739513
Web: www.aegcl.co.in Email: managing.director@aegcl.co.in

1.1.0 INTRODUCTION:

The Chief General Manager (O&M), UAR on behalf of Assam Electricity Grid Corporation Ltd (AEGCL), hereinafter referred to as AEGCL or Purchaser invites single stage two envelope e-bids for the following work from eligible manufacturers/firms/companies / contractors. Joint venture is allowed for this bid.

a) Name of work: Construction of 1(One) No. of B+6 tower on pile foundation at Loc. No. 16 and 1(one) No. B+6 tower on normal foundation at Loc. No. 15 of 132KV Dibrugarh-Tinsukia S/C line near Tingrai River

1.2.0 INTENT OF THE TENDER ENQUIRY:

The intent of the Tender Enquiry is to invite proposals from the prospective and relevantly experienced and financially sound contractor(s) /firms to carry out the works as specified in this bidding document.

1.3.0 SCOPE OF WORK:

The major scopes of work are as follows: -

a) Supply of Tower superstructure including nuts and bolts, stubs, ACSR Panther conductors as per Bill of Quantity and bid specification.
b) Supply of insulators, conductor accessories, hangers, vibration dampers, clamps & connectors, and hardware fittings as per BoQ and bid specification.
c) Construction of pile foundation (rig drilling) and normal foundation as per BoQ and bid specification.
d) All necessary survey works shall be done by the contractor and submit profile drawing and tower schedule based on the survey reports to AEGCL for approval.
e) The contractors shall submit regenerated drawings already approved by AEGCL in the past for similar type of towers instead of new drawings
f) Dismantling of existing TL Towers and Erection of new towers, hoisting of insulators, conductor accessories, hardware, clamps and connectors, OPGW etc. including installation of danger plates etc. as per BoQ and bid specification.
g) Lowering of existing line conductors and stringing of new conductor as per the BOQ. ERS shall be utilized in the period from lowering of conductor and till charging of the transmission lines. Arrangement of ERS and erection & dismantling of ERS towers shall be in the scope of the Contractor. The contractor shall be responsible for all works related to stringing and lowering of conductor on ERS towers. The ERS will be provided by AEGCL on rental basis if requested subject to availability and all the expenditure for the same will be borne by the contractor.
h) Storage of dismantled Tower structures and TL materials and accessories to AEGCL store including transportation to store and material handling.
i) Freight and Transit Insurance, storage at site and site insurance of all material at site shall be in the scope of the contractor.

j) Any permits required for supply of materials shall be arranged by the contractor. However, AEGCL shall assist the contractor in arranging permits if any to the extent possible.

k) Arrangement of RoW clearances and compensation will be in the scope of AEGCL. However, in the event of any ROW issue, the contractor shall be liable to assist AEGCL for resolving any such issues.

1.4.0 TIME SCHEDULE:

The successful bidder shall have to complete the works within **9 (Nine) months** from the date of signing of contract agreement.

1.5.0 ESTIMATE:

Rs. 1,26,52,557.00 (Rupees One Crore Twenty-Six Lakh Fifty-Two Thousand Five Hundred and Fifty-Seven) Only including GST.

1.6.0 ELIGIBILITY CRITERIA:

1.6.1. EXPERIENCE

To be qualified for the bid, the bidder must compulsorily meet the following minimum criteria; Bidder must establish the experience as single contractor or as a lead partner of a JV.

i. Must have completed supply of materials, construction and commissioning of transmission lines with lattice structure including pile foundation for 132 KV voltage class and above.

ii. Relevant experience as a sub-contractor for having executed works as described under point (i) above will also be considered subject to submission of valid supporting documents up to the satisfaction of the bid evaluation committee.

iii. Bidder must have valid electrical license for working on 132 KV Transmission line.

Bidder must fill form **EXP-I** and submit supporting documents (Copy of work orders and completion certificates) to establish his experience. Performance certificate from competent authority showing satisfactory performance for a period not less than one year is to be submitted.

Participation as Joint Venture/Consortium is allowed for this bid. In case bidder is participating as JV, experience of all partners combined should meet the eligibility criteria (Experience) under clause 1.6.1.

1.6.2. FINANCIALS:

i. As a minimum, a Bidder's net worth calculated as the difference between total assets and total liabilities should be positive. As supporting document, bidder should submit audited balance sheets or other financial statements acceptable to the Purchaser, for last 3 (three) financial years to demonstrate the current soundness of the Bidders financial position and its prospective long-term profitability. Apart from audited balance sheet, bidder shall submit duly filled and signed **Form 'FIN-1**' given in Section 2. Using the 'Form LIT – 1' (Section 2, Bidding Form), bidder shall list all Pending Litigation. All pending litigation shall be treated as resolved against the Bidder and so shall in total not represent more than 50% percent of the Bidder's net worth.

ii. Bidder must have minimum **Average Annual Turnover (AAT) of Rs. 40,00,000.00 (Rupees Forty Lakhs only)** . AAT shall be calculated by averaging total certified payments received

for contracts in progress or completed, of the last 3 (three) financial years. The bidder shall furnish, along with its bid, audited balance sheets and duly filled up Form '**FIN-2'** in support of this Clause.

iii. Bidder must demonstrate access to, or availability of, financial resources such as liquid assets, unencumbered real assets, lines of credit, and other financial means, other than any contractual advance payments to meet:

(a) the cash-flow requirement, **Rs. 14,00,000.00(Rupees Fourteen Lakh) only** for this work and

(b) the overall cash flow requirements for this contract and its current works commitment.

(c) The cash flow must be furnished in the prescribed format of ICAI (Institute of chartered accountant of India).

Bidder must submit duly filled and signed **Form FIN-3 & FIN-4** of section 2 in support of this clause.

Joint Venture/Consortium is allowed for this bid. In case bidder is participating as JV, all partners combined should meet the eligibility criteria (Financial) under clause 1.6.2.

1.6.3. TYPE TEST REPORT:

The offered products must be type tested at CPRI or NABL accredited test laboratory for critical performance at the time of bid submission. Bidder must submit full type test reports for the offered product along with the techno-commercial bid.

1.7.0 SITE VISIT:

The bidders are advised to visit and examine the sites of works and its surroundings and obtain for itself on its own responsibility all information that may be necessary for preparing the bid. The costs of visiting the Site shall be at the bidder's own expense. The location of work is near Tingrai river, Seupur, Tinsukia.

1.8.0 QUANTUM OF WORK:

The quantum of work is stated in the PRICE SCHEDULE at the end of section 2 – bidding forms.

1.9.0 QUERY ON THE BIDDING DOCUMENT:

Prospective bidder may submit queries, if felt necessary, requesting clarification of any bid clause. Such queries must be submitted in the e-tendering portal latest by the **Tender clarification end date and time** mentioned in the Bid Data Sheet. Purchaser shall clarify to the extent felt necessary or issue corrigendum for any amendment required in the bidding document. Such corrigendum/clarification shall be made available in the e-tendering portal and official website of AEGCL, www.aegcl.co.in . Any query submitted outside the e-tender portal viz. email, or in physical letters, shall not be entertained.

1.10.0 CLARIFICATION OF BIDS

To assist in the examination, evaluation, and comparison of the Technical and Price Bids, and qualification of the Bidders, the Purchaser may, at its discretion, ask any Bidder for a clarification of its bid. Any clarification submitted by a Bidder that is not in response to a request by the Purchaser shall not be considered. The Purchaser's request for clarification and the response shall be in writing. No change in the substance of the Technical Bid or prices in the Price Bid shall be sought, offered, or permitted, except to confirm the correction of arithmetic errors discovered by the Purchaser in the evaluation of the bids. If a Bidder does not provide

clarifications of its bid by the date and time set in the Purchaser's request for clarification, its bid may be rejected.

1.11.0 DEADLINE FOR SUBMISSION OF BID

Bids shall be received ONLINE only on or before the date and time indicated in the Bid Data Sheet. The Purchaser may, at its discretion, extend the deadline for the submission of bids by amending the Bidding Document, in which case all rights and obligations of the Purchaser and Bidders previously subject to the deadline shall thereafter be subject to the deadline as extended.

1.12.0 SUBMISSION OF BID:

The bidder shall submit the techno commercial & price bid through e-tendering portal **https://assamtenders.gov.in**. All documents as required by this bidding document shall be scanned and uploaded in the portal. Price schedule should be submitted in the format provided in the online portal. Bidder must go through the document checklist provided in this bidding document and submit all required document. Bidders are also requested to submit the information in the format provided in this bidding document where applicable.

In addition to the online bid submission, (i) **Duly filled and signed tender submission form** and (ii) **Authorization letter of bid signatory** must be submitted in a sealed envelope superscribed with the name of bidder, full address, IFB reference, name of work etc. at the office of the Managing Director, Assam Electricity Grid Corporation Ltd, Bijulee Bhawan, Paltan Bazar Guwahati-781001 **one hour prior to bid submission end date and time**. **In case these documents are not received, the bid shall be summarily rejected.**

1.13.0 BID VALIDITY

The validity of bid shall be for **180(One Hundred Eighty) days** from the date of bid submission end date.

1.14.0 OPENING OF TECHNO-COMMERCIAL BIDS

The Purchaser shall conduct the opening of Technical Bids through online process at the address, date and time specified in the BDS. Bidders at their discretion may attend the techno-commercial bid opening.

Price bid of those bidders shall only be opened whose techno-commercial bids are found to be responsive to the requirement of the bidding document.

1.15.0 EARNEST MONEY DEPOSIT (EMD):

The bid must be accompanied with earnest money as mentioned in the **Bid Data Sheet** against the works to be deposited through online mode only in Assam e-tender portal. The EMD should be submitted along with Techno-Commercial bid. The earnest money will be released to the unsuccessful bidders on finalization of the tenders. The EMD to the successful bidder will be released on submission of Security Deposit after execution of the contract agreement.

1.16.0 PRICE BASIS:

Cost quoted by the bidder shall be inclusive of all scope of work as specified in this bidding document including any related services that is implicit to carry out the work successfully. Price will be firm and no price variation will be allowed within the completion period given in the work order.

1.17.0 DEVIATIONS, RESERVATIONS, AND OMISSIONS:

During the evaluation of bids, the following definitions apply:

a) "Deviation" is a departure from the requirements specified in the Bidding Document;

b) "Reservation" is the setting of limiting conditions or withholding from complete acceptance of the requirements specified in the Bidding Document; and

c) "Omission" is the failure to submit part or all of the information or documentation required in the Bidding Document.

1.18.0 PRELIMINARY EXAMINATION OF TECHNICAL BIDS:

The Purchaser shall examine the Techno-commercial Bid to confirm that all documents and technical documentation requested in this bidding document have been provided, and to determine the completeness of each document submitted. If any of these documents or information is missing, **the Bid may be rejected.** The Purchaser shall confirm that the following documents and information have been provided in the Technical Bid. If any of these documents or information is missing, the offer ***shall be rejected***.

a) Letter of Technical Bid;

b) Written confirmation of authorization to commit the Bidder (i.e., Notarized Power of Attorney)

c) Notarized JV agreement, if bidder is a JV. However, the bidder is required to submit registered JV agreement once the contract is awarded to them.

Bidder should submit hard copies of the documents mentioned above in (a), (b) and (c) in a physical envelope prior to deadline for technical bid submission. Techno-commercial bids shall be summarily rejected if these four documents are not submitted in hard copy deadline for technical bid submission.

1.19.0 RESPONSIVENESS OF TECHNO-COMMERCIAL BID:

The Purchaser's determination of a bid's responsiveness is to be based on the contents of the bid itself. A substantially responsive Techno-commercial Bid is one that meets the requirements of the Bidding Document without material deviation, reservation, or omission. A material deviation, reservation, or omission is one that,

a) If accepted, would:

(i). Affect in any substantial way the scope, quality, or performance of the plant and services specified in the Contract; or

(ii). Limit in any substantial way, inconsistent with the Bidding Document, the Purchaser's rights or the Bidder's obligations under the proposed Contract; or

b) If rectified, would unfairly affect the competitive position of other Bidders presenting substantially responsive bids.

The Purchaser shall examine the Techno-commercial Proposal, to confirm that the requirement of the bidding document have been met without any material deviation or reservation.

If a bid is not substantially responsive to the requirements of the Bidding Document, it shall be rejected by the Purchaser and may not subsequently be made responsive by correction of the material deviation, reservation, or omission.

1.20.0 EVALUATION OF PRICE BIDS:

The Purchaser shall use the criteria and methodologies listed in this Clause. No other evaluation criteria or methodologies shall be used.

To evaluate a Price Bid, the Purchaser shall consider the following:

a) The bid price excluding taxes as quoted in the Price Schedules;

b) Price adjustment for correction of arithmetical errors.

c) The following methodology will be practiced for identification and treatment of the Abnormally Low Bids (ALB) in this tender process of AEGCL:

i. Absolute Approach is to be considered when there is fewer than five substantially responsive bidders and if the bid price is 20% or more below AEGCL's cost estimate then AEGCL's tender

evaluation committee should clarify the Bid price with the bidder to determine whether the Bid is Abnormally low.

ii. Relative approach is to be considered when there are at least 5(five) nos. of substantially responsive bids and the lowest bid price is 20% or more below AEGCL's cost estimate. In this approach, first the Average bid price is determined and then by deducting the standard deviation from the Average bid price, potentially ALB may be determined.

d) In case of an ALB, the tender evaluation committee/appropriate authority of the respective tenders shall undertake the following three stage review process which is as below:

i. To identify ALB as per the steps mentioned in Sl no. 1.20.a.(i) and 1.20.b.(ii) Whichever is applicable.

ii. To seek and analyze the clarifications from the abnormally low Bidder in terms of resource inputs and pricing, including overheads, contingencies and profit margins. In that respect, the committee may refer to guideline of World Bank, AIIB, ADB etc. prescribed for ALB.

iii. To decide whether to accept or reject the bid.

iv. On acceptance of the bid, whether Additional Performance Security is to imposed on the bidder supplemented by adequate justification.

e) In case of acceptance of ALB with Additional Performance Security:

I. If any abnormally low bid is accepted under point 1.20.d.(iii) with additional performance security, it is to be noted that the total performance security should not exceed 20% of the total contract value.

II. The additional performance security shall be treated as part of the original performance security and shall be valid for a period similar to that applicable for defect liability period of the contract.

III. Non submission of the additional performance security shall constitute sufficient ground for rejection of the bid and similar assessment shall then be initiated for next ranked bidder if that bidder is also identified as ALB.

1.21.0 AWARD CRITERIA:

Purchaser shall in general award the contract to the lowest substantially responsive bidder. However, the purchaser reserves the right to not award contract to the lowest substantially responsive bidder without thereby incurring any liability to Bidders.

1.22.0 PURCHASER'S RIGHT TO ACCEPT ANY BID, AND TO REJECT ANY OR ALL BIDS:

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

1.23.0 NOTIFICATION OF AWARD:

Prior to the expiration of the period of bid validity, the Purchaser shall notify the successful Bidder, in writing, that its bid has been partially or fully accepted quoting acceptance of the bid. The notification letter (hereinafter called the "Notification of Award") shall specify the sum that the Purchaser will pay the Contractor (hereinafter called "Contract Price") in consideration of the execution and completion of the services. Until a formal contract is prepared and executed, the notification of award shall constitute a binding Contract.

1.24.0 PERFORMANCE SECURITY:

Within 15 (five) days of receipt of the Notification of Award from AEGCL, the successful bidder shall

furnish to AEGCL a performance security in an amount of **10 (Ten) percent** of the Contract Price in accordance with the Conditions of Contract. The form of performance security provided in Section 3 of the bidding documents may be used or some other form acceptable to AEGCL. The performance guarantee BG shall be valid through 60 days beyond the warranty period.

1.25.0 SIGNING OF CONTRACT AGREEMENT:

Within **15 (Fifteen) days** of receipt of the Notification of Award, the successful Bidder shall be required to sign the Contract Agreement with AEGCL using for that purpose, the contract form provided with this bidding document failing which AEGCL at its discretion may cancel the award.

Annexure to SECTION 1

BID DATA SHEET

Name of Work	Construction of 1(One) No. of B+6 tower on pile foundation at Loc. No. 16 and 1(one) No. B+6 tower on normal foundation at Loc. No. 15 of 132KV Dibrugarh-Tinsukia S/C line near Tingrai River
Location of Work	Seupur, Tinsukia
NIT No.	AEGCL/MD/CGM(UAR)/FLOOD/132KV DBR-TSK/2024/37 Dated:25/02/2025
Bid Identification No.	AEGCL/MD/CGM(UAR)/FLOOD/132KV DBR-TSK/2024/BID(R)
Estimate (In Indian Rupees)	**Rs. 1,26,52,557.00 (**Rupees One Crore Twenty-Six Lakh Fifty-Two Thousand Five Hundred and Fifty-Seven) Only including GST.
Earnest Money Deposit (EMD)	**Rs. 2,53,051.00** (Rupees Two Lakh Fifty-Three Thousand and Fifty-One Only
Purchaser's Address for correspondence	**The Chief General Manager(O&M), UAR AEGCL** **1st Floor, Bijulee Bhawan, Paltanbazar** **Guwahati (Assam)** **781001** Telephone: +91 361 2739520 Facsimile number: +91 361 2739513 Electronic mail address: **cgmom.uar@aegcl.co.in**
Pre-bid date	Shall be notified, if any, in due course.
Bid submission mode	E-tenders shall be accepted through online portal **https://assamtenders.gov.in** only)
Address for bid opening	**The Chief General Manager(O&M), UAR, AEGCL** Floor/Room number: **First Floor** Street Address: **Bijulee Bhawan, Paltanbazar** City: **Guwahati (Assam)** PIN Code: **781001** Country: **India**
Key dates	**Tender publishing date: 12:00 Hrs. 26.02.2025** **Tender submission start date: 12:00 Hrs. 10.03.2025** **Tender clarification end date: 12:00 Hrs. 10.03.2025** **Tender submission end date and time: 12:00 Hrs. 18.03.2025** **Techno-commercial bid opening date: 14:00 Hrs. 19.03.2025**

SECTION -2 BIDDING FORMS

(This Section contains the forms which are to be completed by the Bidder and submitted as part of his Bid)

Form – 1: Document checklist

SL. No.	Document to be submitted	Submitted (Yes/No)	Name of uploaded pdf
1.	Letter of Technical Bid (Form-2)		
2.	JV agreement/Deed of consortium(applicable only if bidder is participating as a JV/consortium)		
3.	Notarized Power of attorney for the person signing the tender		
4.	EMD		
5.	Manufacturer's authorization		
6.	Bidders company/firm registration certificate/certificate of incorporation		
7.	GST registration		
8.	Electrical license for working on 132 KV (or above) line		
9.	Filled up Form ELI-1		
10.	Filled up Form LIT		
11.	Filled up Form FIN-1		
12.	Filled up Form FIN-2		
13.	Filled up Form FIN-3		
14.	Filled up Form FIN-4		
15.	Audited Balance sheet for last three years		
16.	Bank solvency certificate/other supporting document		
17.	Filled up Form EXP-1		
18.	Order/Contract copies establishing past experience		
19.	Completion certificate of work executed		
20.	Type test reports/Undertaking for insulator and hardware fittings		
21.	Completion schedule bar chart		
22.	Additional documents if any		

Note: Bidders are requested to submit all required documents in e-tender portal and **physical copies of i) Letter of technical bid, ii) Power of Attorney(notarized) for bid signatory to Tender inviting authority and iii)JV agreement, if bidder is a JV.**

(In bidders letterhead)

Form-2
Letter of technical bid

Date:

To

The Chief General Manager (O&M), UAR
AEGCL, 1st Floor, Bijulee Bhawan,
Paltan Bazar, Guwahati-01

Bid Identification No: AEGCL/MD/CGM(UAR)/FLOOD/132KV DBR-TSK/2024/BID(R)

Sir,

I/We the undersigned, declare that, we, [insert name of the bidder] having registered office at [insert address of the registered office] having experience in construction/stringing of EHV transmission line, have read the bid document and do not have any reservation to any of the clause therein. We offer to execute the work of:

"**Construction of 1(One) No. of B+6 tower on pile foundation at Loc. No. 16 and 1(one) No. B+6 tower on normal foundation at Loc. No. 15 of 132KV Dibrugarh-Tinsukia S/C line near Tingrai River**"

in conformity with the bid specification. Our Bid shall be valid for a period of **180(One Hundred Eighty)** days from the date fixed for the bid submission deadline and it shall remain binding upon us at any time before the expiration of that period.

Common Seal and Signature of the authorized person:
Name:
Designation:

Form – 3

Format for Bank Guarantee (Earnest money deposit)
(EMD to be paid in online mode only)

Form 4
Manufacturer's Authorization
(To be submitted in Manufacturer's Letterhead)

Bid No – **AEGCL/MD/CGM(UAR)/FLOOD/132KV DBR-TSK/2024/BID(R)**

To

The Chief General Manager (O&M), UAR
AEGCL, 1st Floor, Bijulee Bhawan,
Paltan Bazar, Guwahati-01

WE *[insert:* ***name of Manufacturer****]* who are established and reputable manufacturers of *[insert:* ***name and/or description of the Goods****]* having production facilities at *[insert:* ***address of factory****]* do hereby authorize *[insert:* ***name & address of Bidder****]* (hereinafter, the "Bidder") to submit a bid the purpose of which is to provide the following goods, manufactured by us, and to subsequently negotiate and sign the Contract:

1. ----------

2. ----------

We hereby extend our full guarantee and warranty in accordance with ***Clause 5.11.0*** of the Special Conditions of Contract, for the above specified Goods supporting the Supply of specified Goods and fulfilling the Related Services by the Bidder against this Bidding Documents, and duly authorize said Bidder to act on our behalf in fulfilling these guarantee and warranty obligations.

Further, we also hereby declare that we and *[insert:* ***name of the Bidder****]* have entered into a formal relationship in which, during the duration of the Contract (**including related services and warranty / defects liability**) we, the Manufacturer or Producer, will make our technical and engineering staff fully available to the technical and engineering staff of the successful Bidder to assist that Bidder, on a reasonable and best effort basis, in the performance of all its obligations to the Purchaser under the Contract.

For and on behalf of the Manufacturer

Common Seal and Signature of the authorised person:
Name:
Designation:

NOTE:
This MA should be signed by a person having either of the following-
1) Valid Power of attorney
2) Authorised by Managing Director
3) Member of Board of Directors

Form-ELI-1

Bidder's information Sheet

Sl. No.	Particulars	Bidders response
1	Bidder's name and registered address	
2	Bidder's authorized representative, designation and contacts	
3	GST registration no.	
4	Bid validity	180(One Hundred Eighty) Days

(Signature and common seal)
Name:
Designation:
Date:

Form – LIT
Pending Litigation

Year	Matter in Dispute	Value of Pending Claim in Rupees	Value of Pending Claim as a Percentage of Net Worth

(Signature and common seal)
Name:
Designation:
Date:

Form FIN – 1
Financial Situation

Information from Balance Sheet

Financial Data for Previous 3 Years [Rupees]	Year 1 [Mention Financial Year]	Year 2 [Mention Financial Year]	Year 3 [Mention Financial Year]
Total Assets			
Total Liabilities			
Net Worth			
Current Assets			
Current Liabilities			

Information from Income Statement

Total Revenues			
Profits Before Taxes			
Profits After Taxes			

Note: To be supported by audited financial documents

(Signature and common seal)
Name:
Designation:
Date:

Form FIN – 2
Average Annual Turnover

Annual Turnover Data for the Last 3 Years	
Year	**Amount (Rupees)**
Average Annual Turnover	

The information supplied should be the Annual Turnover of the Bidder in terms of the amounts billed to clients for each year for contracts in progress or completed.

(Signature and common seal)
Name:
Designation:
Date:

Form FIN – 3
Financial Resources

Specify proposed sources of financing, such as liquid assets, unencumbered real assets, lines of credit, and other financial means, net of current commitments, available to meet the total cash flow demands of the subject contract or contracts with necessary supporting documents.

Financial Resources		
No.	**Source of financing**	**Amount (Rupees)**
1		
2		
3		

(Signature and common seal)
Name:
Designation:
Date:

Form FIN- 4

Current Contract Commitments

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

No.	Contract No., Customer and name of work	Contract value(Rs.)	Estimated Completion Date	Value of Outstanding Work (Rs.)
1				
2				
3				
4				
5				

(Signature and common seal)
Name:
Designation:
Date:

Form – EXP-1
EXPERIENCE

Each Bidder must fill in this form

Sl. No.	Customer name	Contract No. and date	Work order value	Brief description of work	Completion date

Note: Order/contract copies are to be submitted as supporting document. Performance/completion certificate to be submitted wherever applicable. Performance / Completion certificate of recently completed / commissioned works will also be considered. Performance certificate from competent authority showing satisfactory performance for a period not less than one year is to be submitted.

(Signature and common seal)
Name:
Designation:
Date:

PRICE SCHEDULE-1(A)

Construction of 1(One) No. of B+6 tower on pile foundation at Loc. No. 16 and 1(one) No. B+6 tower on normal foundation at Loc. No. 15 of 132KV Dibrugarh-Tinsukia S/C line near Tingrai River

(Supply schedule)

(This BOQ template must not be modified/replaced by the bidder and the same should be uploaded after filling the relevant columns, else the bidder is liable to be rejected for this tender. Bidders are allowed to enter the Bidder Name and Values only)

NUMBER #	TEXT #	NUMBER #	TEXT #	NUMBER #	NUMBER #	TEXT #
Sl. No.	Item Description	Quantity	Units	BASIC RATE In Figures To be entered by the Bidder in Rs. P	TOTAL AMOUNT Without Taxes in Rs. P	TOTAL AMOUNT In Words
1	2	4	5	13	53	55
1	**Tower Superstructures**					
1.1	Galvanized lattice steel tower superstructure including hangers, gussets, strain plate B+6=2 Nos.	12.299	MT		**0.00**	INR Zero Only
2	**Stub sets**					
2.1	Partially galvanized stub angle with cleat	0.572	MT		**0.00**	INR Zero Only
3	**Stub setting template**					
3.1	Stub setting template	2.097	MT		**0.00**	INR Zero Only
4	**Nuts and Bolts**					
4.1	Galvanized nuts and bolts	0.666	MT		**0.00**	INR Zero Only
5	**Power Conductor**					
5.1	ACSR Panther Conductor	4.70	KM		**0.00**	INR Zero Only

6	**Insulators**					
6.1	90KN Porcelain Insulators	240.00	Nos		**0.00**	INR Zero Only
7	**Conductor Accessories**					
71	Double tension Hardware fittings including all accessories suitable for ACSR Panther	6.00	Nos		**0.00**	INR Zero Only
7.2	Single tension Hardware fittings including all accessories suitable for ACSR Panther	6.00	Nos		**0.00**	INR Zero Only
7.3	Vibration Damper suitable for ACSR Panther	12.00	Nos		**0.00**	INR Zero Only
8	**OPGW**					
8.1	OPGW 24 Fibre Overhead Cable	2.00	KM		**0.00**	INR Zero Only
8.2	Downlead Clamp	30.00	Nos		**0.00**	INR Zero Only
8.3	OPGW vibration damper c/w preform armoured rod	18.00	Nos		**0.00**	INR Zero Only
8.4	OPGW optical splice kit including junction box	2.00	Nos		**0.00**	INR Zero Only
8.5	OPGW tension double dead end set with and without splice location (Tension Tower Arrangement)	4.00	Nos		**0.00**	INR Zero Only
8.6	OPGW suspension assembly with twisted link c/w preform armour rods & lower bond clamp	2.00	Nos		**0.00**	INR Zero Only
9	**Tower accessories**					

9.1	Supply of Danger plate	2.00	Nos		**0.00**	INR Zero Only
9.2	Supply of phase plate	2.00	Sets		**0.00**	INR Zero Only
9.3	Supply of Number plate	2.00	Nos		**0.00**	INR Zero Only
9.4	Supply of Anti Climbing Device	2.00	Sets		**0.00**	INR Zero Only
Total in Figures					**0.00**	INR Zero Only
Quoted Rate in Words		**INR Zero Only**				

PRICE SCHEDULE-1(B)

Construction of 1(One) No. of B+6 tower on pile foundation at Loc. No. 16 and 1(one) No. B+6 tower on normal foundation at Loc. No. 15 of 132KV Dibrugarh-Tinsukia S/C line near Tingrai River

(F&I schedule)

(This BOQ template must not be modified/replaced by the bidder and the same should be uploaded after filling the relevant columns, else the bidder is liable to be rejected for this tender. Bidders are allowed to enter the Bidder Name and Values only)

NUMBER #	TEXT #	NUMBER #	TEXT #	NUMBER #	NUMBER #	TEXT #
Sl. No.	**Item Description**	**Quantity**	**Units**	**BASIC RATE In Figures To be entered by the Bidder in Rs. P**	**TOTAL AMOUNT Without Taxes in Rs. P**	**TOTAL AMOUNT In Words**
1	**2**	**4**	**5**	**13**	**53**	**55**
1	**Tower superstructures**					
1.1	Galvanized lattice steel tower superstructure including hangers, gussets, strain plate B+6=2 Nos.	12.299	MT		**0.00**	INR Zero Only
2	**Stub sets**					

2.1	Partially galvanized stub angle with cleat	0.572	MT		**0.00**	INR Zero Only
3	**Stub setting template**					
3.1	Stub setting template	2.097	MT		**0.00**	INR Zero Only
4	**Nuts and Bolts**					
4.1	Galvanized nuts and bolts	0.666	MT		**0.00**	INR Zero Only
5	**Power Conductor**					
5.1	ACSR Panther Conductor	4.70	KM		**0.00**	INR Zero Only
6	**Insulators**					
6.1	90KN Porcelain Insulators	240.00	Nos		**0.00**	INR Zero Only
7	**Conductor Accessories**					
71	Double tension Hardware fittings including all accessories suitable for ACSR Panther	6.00	Nos		**0.00**	INR Zero Only
7.2	Single tension Hardware fittings including all accessories suitable for ACSR Panther	6.00	Nos		**0.00**	INR Zero Only
7.3	Vibration Damper suitable for ACSR Panther	12.00	Nos		**0.00**	INR Zero Only
8	**OPGW**					
8.1	OPGW 24 Fibre Overhead Cable	2.00	KM		**0.00**	INR Zero Only
8.2	Downlead Clamp	30.00	Nos		**0.00**	INR Zero Only

8.3	OPGW vibration damper c/w preform armoured rod	18.00	Nos		**0.00**	INR Zero Only
8.4	OPGW optical splice kit including junction box	2.00	Nos		**0.00**	INR Zero Only
8.5	OPGW tension double dead end set with and without splice location (Tension Tower Arrangement)	4.00	Nos		**0.00**	INR Zero Only
8.6	OPGW suspension assembly with twisted link c/w preform armour rods & lower bond clamp	2.00	Nos		**0.00**	INR Zero Only
9	**Tower accessories**					
9.1	Supply of Danger plate	2.00	Nos		**0.00**	INR Zero Only
9.2	Supply of phase plate	2.00	Sets		**0.00**	INR Zero Only
9.3	Supply of Number plate	2.00	Nos		**0.00**	INR Zero Only
9.4	Supply of Anti Climbing Device	2.00	Sets		**0.00**	INR Zero Only
Total in Figures					**0.00**	INR Zero Only
Quoted Rate in Words		**INR Zero Only**				

PRICE SCHEDULE-1(C)

Construction of 1(One) No. of B+6 tower on pile foundation at Loc. No. 16 and 1(one) No. B+6 tower on normal foundation at Loc. No. 15 of 132KV Dibrugarh-Tinsukia S/C line near Tingrai River

(Erection schedule)

(This BOQ template must not be modified/replaced by the bidder and the same should be uploaded after filling the relevant columns, else the bidder is liable to be rejected for this tender. Bidders are allowed to enter the Bidder Name and Values only)

NUMBER #	TEXT #	NUMBER #	TEXT #	NUMBER #	NUMBER #	TEXT #
Sl. No.	Item Description	Quantity	Units	BASIC RATE In Figures To be entered by the Bidder in Rs. P	TOTAL AMOUNT Without Taxes in Rs. P	TOTAL AMOUNT In Words
1	2	4	5	13	53	55
1	**Survey**					
1.1	Detail & Check survey as per specification	1.50	KM		**0.00**	INR Zero Only
2	**Stub setting**					
2.1	Setting of stubs (sets of four) including transportation & distribution of stub and accessories from store to site excluding cost of excavation, concreting & back filling	2.00	Sets		**0.00**	INR Zero Only
3	**Erection of superstructure**					
3.1	Superstructure erection including transportation of structures by any means and distribution of structure and accessories from store to site	12.299	MT		**0.00**	INR Zero Only
3.2	Weilding of all nuts & bolts upto the bottom cross arm level including all charges of transportation, materials etc	2.00	Nos		**0.00**	INR Zero Only
4	**Stringing**					
4.1	Stringing of power conductors including transportation from stores and distribution of conductors and accessories to sites and laying, stringing, tensioning , clamping, jointing, jumpering and hoisting of insulators complete including cost of all fittings and accessories not specifically	1.50	RKM		**0.00**	INR Zero Only

	mentioned elsewhere per route Km of line					
4.2	Stringing of OPGW including transportation and distribution of ground wire and accessories to sites and laying, stringing, tensioning , clamping, jointing, jumpering and hoisting of insulators complete including all fittings and accessories not specifically mentioned elsewhere per route Km of line	2.00	RKM		**0.00**	INR Zero Only
5	**Grounding and other works**					
5.1	Grounding of towers with 3 metre long 25mm dia GI pipe including cost of all materials, such as GI pipes, GI bolts & nuts and washers, salt, cock etc as per specification	2.00	Nos		**0.00**	INR Zero Only
5.2	Painting of the towers with bituminuous paints of approved quality up to a 3 meters from ground level including the cost of paints	2.00	Nos		**0.00**	INR Zero Only
6	Erection of Danger plates	2.00	Nos		**0.00**	INR Zero Only
7	Erection of Phase plates	2.00	Sets		**0.00**	INR Zero Only
8	Erection of Number plates	2.00	Nos		**0.00**	INR Zero Only
9	Erection of Anti Climbing Device	2.00	Sets		**0.00**	INR Zero Only
10	Arrangement of ERS, erection & dismantling of ERS towers and all necessary associated works involving ERS required for completion of the work	1.00	Job		**0.00**	INR Zero Only
Total in Figures					**0.00**	INR Zero Only
Quoted Rate in Words		**INR Zero Only**				

PRICE SCHEDULE -1(D)

Construction of 1(One) No. of B+6 tower on pile foundation at Loc. No. 16 and 1(one) No. B+6 tower on normal foundation at Loc. No. 15 of 132KV Dibrugarh-Tinsukia S/C line near Tingrai River

Civil Schedule

(This BOQ template must not be modified/replaced by the bidder and the same should be uploaded after filling the relevant columns, else the bidder is liable to be rejected for this tender. Bidders are allowed to enter the Bidder Name and Values only)

NUMBER #	TEXT #	NUMBER #	TEXT #	NUMBER #	NUMBER #	TEXT #
Sl. No.	Item Description	Quantity	Units	BASIC RATE In Figures To be entered by the Bidder in Rs. P	TOTAL AMOUNT Without Taxes in Rs. P	TOTAL AMOUNT In Words
1	2	4	5	13	53	55
1	**Construction of Pile Foundation for B+6 tower at Loc. No. 16**					
1.1	Mobilization (including preparation of work space, Approach road, dewatering, arrangement of electricity, jungle clearing, earth filling and making all arrangement for completion of the work) and construction and supply of all materials & labours of temporary island/platform to facilitate the construction of foundation including platform for storage of construction materials such as stone chips, sand, cement, steel reinforcement bar, mixture machines, tools & plants all foundation materials keeping & mixing.	1.00	Job		**0.00**	INR Zero Only

1.2	Providing, driving with hydraulic piling rigs with power unit and installing driven cast-in-situ reinforced cement concrete piles of grade M25 including the cost of reinforcement steel, cost of boring with temporary guide casting bentonite solution (length of the pile for payment shall be measured from the Ground level). All necessary labour materials plants, tools and tackles etc. complete as necessary for proper execution of the job. The pile top should be chipped off to remove laitance concrete above cut off level 1m from the top of the pile (no additional payment shall be done for this) The unit rate should include excavation, dewatering, socketing, anchoring (if required), backfilling, form work for placing plain or reinforced cement concrete, supply & providing MS liner of 6 mm thick in piles up to 10 metre depth from ground level. Each leg will require 1 nos RCC bored pile of 1200 mm diameter i.e. 4 nos of pile each tower foundation. (Payment will be made as per actual length of the piles as per site condition necessary and approved drawing.) (A) 1200 mm dia piles 4 Nos. of pile	88.00	RM		**0.00**	INR Zero Only
1.3	Providing and laying in M25 grade concrete of specified 28 days strength for pile cap, chimney and tie beam including reinforcement steel form work all necessary materials and equipments, transportation, batching, mixing, vibrating, dewatering etc. complete.	20.12	CU M		**0.00**	INR Zero Only
1.4	Conducting Pile Integrity test on piles using electronic control unit, hand held hammer, accelerometer, computer with required software to assess as-installed pile characteristics including mobilisation of necessary manpower, equipments, materials etc. required for successful completion of the job.	4.00	Nos.		**0.00**	INR Zero Only
2	**Construction of RCC foundation for B+6 tower at Loc No. 15 including all labour, material equipment, excavation shuttering, head loading, back filling etc. complete inclusive of cost of transportation batching, mixing cement and reinforcement steel**					
2.1	Concreting	28.17	CU M		**0.00**	INR Zero Only
2.2	Reinforcement	2.151	MT		**0.00**	INR Zero Only

Total in Figures					**0.00**	INR Zero Only
Quoted Rate in Words		**INR Zero Only**				

PRICE SCHEDULE -1(E)

Construction of 1(One) No. of B+6 tower on pile foundation at Loc. No. 16 and 1(one) No. B+6 tower on normal foundation at Loc. No. 15 of 132KV Dibrugarh-Tinsukia S/C line near Tingrai River

Dismantling Schedule

(This BOQ template must not be modified/replaced by the bidder and the same should be uploaded after filling the relevant columns, else the bidder is liable to be rejected for this tender. Bidders are allowed to enter the Bidder Name and Values only)

NUMBER #	TEXT #	NUMBER #	TEXT #	NUMBER #	NUMBER #	TEXT #
Sl. No.	**Item Description**	**Quantity**	**Units**	**BASIC RATE In Figures To be entered by the Bidder in Rs. P**	**TOTAL AMOUNT Without Taxes in Rs. P**	**TOTAL AMOUNT In Words**
1	**2**	**4**	**5**	**13**	**53**	**55**
1	Opening and lowering of OPGW along with accessories from the portion of the line to be dismantled and transportation to the AEGCL store	2.0	RKM		**0.00**	INR Zero Only
2	Opening and lowering of conductors from the portion of the line to be dismantled and transportation to the store	1.5	RKM		**0.00**	INR Zero Only
3	Dismantling of towers without damaging the members and transportation to the store with proper staking	2.0	Nos		**0.00**	INR Zero Only
Total in Figures					**0.00**	INR Zero Only
Quoted Rate in Words		**INR Zero Only**				

Note:

1) Price quoted should be without GST.

2) The price schedules presented here is for reference only. Bidders must submit the price using the price schedule available in e-tendering portal. These are not to be submitted in the techno-commercial envelope.

3) If any item is not specifically mentioned in the price schedule but required to complete the job successfully, same shall be deemed to be included in any of the items of the price schedule.

Section - 3
Purchaser's Requirements

3.1.0 SCOPE

The brief description of scope covered under this Bidding Document is furnished below. Bidders must read the bid document particularly the bid specifications thoroughly to understand the scope of work.

a) Supply of Tower superstructure including nuts and bolts, stubs, ACSR Panther conductors as per Bill of Quantity and bid specification.
b) Supply of insulators, conductor accessories, hangers, vibration dampers, clamps & connectors and hardware fittings as per BoQ and bid specification.
c) Construction of pile foundation (rig drilling) and normal foundation as per BoQ and bid specification.
d) Dismantling of existing TL Towers and Erection of new towers, hoisting of insulators, conductor accessories, hardwares, clamps and connectors, OPGW etc. including installation of danger plates etc as per BoQ and bid specification.
e) Lowering of existing line conductors and stringing of new ACSR conductor. ERS shall be utlised in the period from lowering of conductor and till charging of the Transmision lines. Arrangement of ERS, erection and dismantling of ERS towers shall be in the scope of the Contractor. The contractor shall be responsible for all works related to stringing and lowering of conductor on ERS towers. The ERS will be provided by AEGCL on rental basis if requested subject to availability and all the expenditure for the same will be borne by the contractor.
f) Storage of dismantled Tower structures and TL materials and accessories to AEGCL store including transportation to store and material handling.
g) Freight and Transit Insurance, storage at site and site insurance of all material at site shall be in the scope of the contractor.
h) Any permits required for supply of materials shall be arranged by the contractor. However, AEGCL shall assist the contractor in arranging permits if any to the extent possible.
i) Arrangement of RoW clearances and compensation will be in the scope of AEGCL.
However, in the event of any ROW issue, the contractor shall be liable to assist AEGCL for resolving any such issues.

3.2.0 SERVICE CONDITIONS

Bidder should note the following climatic and other conditions prevailing in the location of work:

a)	Peak ambient day temperature in still air			: 45°C
b)	Minimum night temperatures			: 0°C
c)	Ground temperatures			: 40°C
c)	Reference ambient day temperature			: 45°C
d)	Relative Humidity	a)	Maximum	: 100 %
		b)	Minimum	: 10 %
e)	Altitude			: Below1000 M above MSL
f)	Maximum wind pressure			: As per IS: 802 latest code.
g)	Seismic Intensity			: ZONE-V as per IS 1893.

3.3.0 Technical Standards

The tension string assemblies, insulator discs and hardware offered, material and processes adopted in the manufacture of insulator discs and hardware shall conform to the provision of the following standards or equivalent other international standards:

(1) IS: 731 Specification of porcelain insulators for overhead power lines.
(2) IS: 2486 Specification of insulator fittings for overhead power lines.
(3) IS: 2026 Specification for recommended practice for hot dip galvanizing of steel
(4) IS: 2633 Specification for method for testing uniformity of coating on zinc coated articles.
(5) IS: 2107 Specification for white hearth malleable iron castings.
(6) IS: 2108 Specification for black hearth malleable iron castings.

3.4.0 TECHNICAL SPECIFICATION

3.4.1. TOWER SUPERSTRUCTURE AND ACCESORIES

3.4.1.1. GENERAL

The AEGCL shall provide drawings for G.I. towers to the successful bidder at the time of award of contract. The Contractor has to regenerate three copies of drawings for approval.

3.4.1.2. DRAWING TO BE PREPARED BY CONTRACTOR

The contractor shall conduct the detail and check survey as per BOQ and submit profile drawings etc. based on the survey to AEGCL for necessary approval.

The contractor shall submit regenerated drawings by collecting previous approved drawings of AEGCL for same tower type as required for this work as per BOQ / survey report. He shall submit the same along with the detailed bill of materials for AEGCL's approval / reference. The fabrication work shall be started strictly in conformation to the approved drawings of AEGCL. It is the responsibility of the Contractor to reproduce the drawings and The Site Engineer reserves the right to make changes to drawings supplied to the contractor for revisions to reflect more updated requirements. Revisions to drawings and any new drawings made to include additional works by the contractors shall be considered as a part of this specification and AEGCL shall entertain no extra claim on this account.

In the case of variations in drawings and specifications the decisions of the site Engineer shall be final. If the contractor found discrepancies in the execution of his work he shall refer such discrepancies to the site Engineer before proceedings with such works.

3.4.1.3. MATERIALS

Materials for steel structure including bolts, anchor bolts, washers etc shall be of tested quality and shall conform to IS: 226 and IS: 2062 (for plates over 20mm thick) Dimensions of all bolts and nuts shall conform to IS 6639 and their mechanical properties shall conform to property class 4.6 and class 4 of IS: 1367 for bolts and nuts respectively. Dimensions and mechanical properties of all washers shall conform to IS: 6610 and IS: 3063 respectively. Other materials used in the construction of steel structure shall conform to appropriate IS specification for the materials wherever they exist. All members of the steel structures, bolts, nuts and washers shall be galvanized.

3.4.1.4. FABRICATION

The workmanship shall conform to the best practice in modern structural shops and to the provisions of IS: 802 (Part-II) and IS: 800 as applicable.

3.4.1.5. CONNECTIONS

All connections shall be designed for the full strength and properties of the members. The fabrication, in general shall be bolted type. Bolts shall also be used for field connections unless otherwise specified in the drawings or permitted by the site engineer for any special circumstances. Bolting shall be conforming to IS: 802 (Part-I & II) and IS: 800 as applicable.

Welding where required shall be generally done in accordance with the relevant IS standards. Selection of electrodes shall conform to IS: 815. MS electrodes for welding shall conform to IS 814. Welding procedure

shall conform to IS: 816 and IS 823.

3.4.1.6. TOLERANCES.

Fabrications tolerances shall conform to IS: 802 (Part-II) and IS: 800 as applicable.

3.4.1.7. MARKING

The marking procedure shall conform to IS: 802 and IS: 800 as applicable.

3.4.1.8. SHOP ASSEMBLY

All steelworks (one in each type) shall be temporarily shop assembled complete or as directed by the site engineer before commencing mass fabrication to ensure proper field erections. Reaming of untrue holes will not be allowed. A reasonable amount of drifting will be allowed in assembling. Shop assembled parts shall be dismantled for shipment.

3.4.1.9. GALVANIZING

Bolts and other fasteners shall be galvanized in accordance with IS: 5358. Galvanizing members of structures shall conform to IS: 4759 and spring washers shall be galvanized in accordance IS; 1573.

The recommendation given in IS: 2629 and IS: 6159 shall be complied with in respect of surface preparations, safety and applications of coating.

3.4.1.10. INSPECTION AND PACKING

The recommendation given in IS: 802 (Part-II) and IS 800 for inspection and packing shall be complied with.

3.4.1.11. TESTING

The material used for fabrication of towers shall be tested for quality.

3.4.1.12. FIELD ERECTION

Erection work shall be done strictly according to the provisions of IS: 802.

3.4.2. CONDUCTOR (ACSR Panther)

3.4.2.1. GENERAL

The Power Conductor shall conform to IS: 398 Part-IV.

3.4.2.2. CONDUCTOR PARTICULARS:

The Power Conductor properties shall conform to IS: 398 Part-IV.

3.4.3. HANGER

3.4.3.1. Hanger material shall be of forged steel conforming to IS:2004:1993 class-4. Galvanising shall be hot dip conforming to IS:2629. Ultimate tensile strength shall be 120 KN or above.

3.4.4. INSULATOR DISCS AND STRINGS

3.4.4.1. TYPE OF INSULATORS:

All suspension and tension strings shall consist of standard centre ball and socket type porcelain insulators with all the exposed porcelain parts fully glazed, unless otherwise specified.

3.4.4.2. QUALITY AND STRENGTH OF THE INSULATORS:

The insulators and their hardware used in the lines shall comply with requirement of relevant IS or other equivalent international standards.

3.4.4.3. MATERIALS USED:

The porcelain used in the manufacture of the insulators shall be of the best quality and shall be manufactured by the wet process. It shall be homogeneous, free from lamination; flaws etc. and well

finished making it impervious to moisture. The glaze shall be brown color and shall cover all the porcelain parts of the insulator except those areas necessarily left unglazed for the purpose of assembly. The cement used in the construction of the insulators shall not cause fracture by expansion or loosening and shall not give rise to any chemical reaction with the metal fittings.

3.4.5. HARDWARE FITTINGS FOR INSULATOR

3.4.5.1. HARDWARE:

Each insulator string assembly shall generally include the following hardware:

Anchor shackle for attachment of suspension string assembly to the tower hanger and tension string assembly to the tower strain plate. Suitable top and bottom yoke assemblies with the arrangement of fixing a set of arcing horns.

- Set of arcing horns
- Suspension or tension clamp
- Bolts, nuts, washers, split pins etc.
- Other fitting s necessary to make the strings complete such as ball clevis, socket clevis, chain links etc.

The bidder shall be responsible and satisfy himself that all the hardware included in strings are entirely suitable for the conductor offered.

3.4.5.2. STRAIN CLAMP:

The bolted strain clamps shall also be made of malleable iron or aluminum alloy; hot dip galvanized, lined with sheet aluminum liners and shall be suitable to accommodate the conductor with necessary binding tapes etc. The lips shall be rounded off carefully and conductor seating and the ball mouth shall be smooth to avoid corona and radio interference noises. Suitable attachment for receiving one side of arcing horns and for connecting to the insulator strings shall be provided.

The strain clamps shall be such that the conductor should not slip at a load of 90% of the breaking load of the conductor. The ultimate strength of the clamp for horizontal load shall not be less than the ultimate strength of the conductor.

3.4.5.3. OTHER INSULATOR STRING HARDWARE:

The strength of other string hardware namely anchor shackle, yoke plates, socket-clevis etc. shall be coordinated with insulator disc strength.

3.4.5.4. INTERCHANGEABILITY:

The hardware together with ball and socket fittings shall be of standard design, so that this hardware are interchangeable with each other and suitable for use with disc insulators of any make conforming to relevant Indian/International Standard

3.4.5.5. BALL AND SOCKET DESIGNATION:

The dimensions of the ball and socket shall be of 20 mm designation for 70 KN , 90 KN and 120 KN discs, in accordance with the standard dimensions stated in IS: 2486-(Part-II) /IEC: 120. The dimensions shall be checked by the appropriate gauge after galvanizing only.

3.4.5.6. SECURITY CLIPS AND SPLIT PINS:

Security clips for use with ball and socket coupling shall be R-shaped, hump type which provides

positive locking of the coupling as per IS: 2486-(Part-III)/IEC: 372. The legs of the security clips shall be spread after assembly in the works to prevent complete withdrawal from the socket. The locking device

should be resilient, corrosion resistant and of suitable mechanical strength. There shall be no risk of the locking device being displaced accidentally or being rotated when in position. Under no circumstances shall the locking devices allow separation of fittings.

The hole for the security clip shall be countersunk and the clip should be of such design that the eye of clip may be engaged by a hot line clip puller to provide for disengagement under energized conditions. The force required to pull the security clip into its unlocked position shall neither be less than 50 N (5 kg) nor more than 500 N (50 kg).

Split pins shall be used with bolts & nuts.

3.4.5.7. ARCING HORN FOR EHV STRINGS:

The arcing horn shall be provided on both tower side & line side of the hardware fittings. The same shall be either ball ended rod type or tubular type.
The spark gap shall be so adjusted to ensure effective operation under actual field conditions.

3.4.5.8. DEAD END ASSEMBLY:

The dead end assembly shall be suitable for Conductor as detailed in the document.

The dead end assembly shall be compression type with provision for comprising the jumper terminal at one end. The angle of the jumper terminal to be mounted should be 300 with respect to the vertical line. The area of bearing surface on all the connections shall be sufficient to ensure positive electrical and mechanical contact. The resistance of the clamp when compressed on Conductor shall not be more than 75% of the resistance of equivalent length of Conductor.
The assembly shall not permit slipping of, damage to, or failure of the complete conductor or any part thereof at a load less than 95% of the ultimate tensile strength of the conductor.

3.4.6. TOWER FOUNDATION

This section covers the specifications for design of foundations for various types of towers and special structures under different soil condition described hereinafter.
Design of foundations is not in the scope of Bidders for this package. The foundations shall be constructed on the basis of drawings supplied by the Employer. However, in case any special type of foundation is required but is not covered in the bidding document, the Employer may ask the Contractor to design and construct such foundation.

3.4.6.1. STANDARDS

For design of foundations reference shall be made to ***IS 4099.***

3.4.6.2. TYPE OF FOUNDATION

3.4.6.2.1. Most of the paddy fields of Assam remain under water for about 3 months in a year. During the remaining period of the year sub-soil water is normally found about 1.5 meters below the ground level. The Contractor shall note this factor while designing the foundation of towers.

3.4.6.2.2. It is expected that the type of foundations defined in **Clause 4.3.4** below shall be suitable for use at various locations of all the Transmission Lines covered in this Bid Document. *The Contractor shall examine the suitability of foundation type assigned for each location depending on the soil investigation*

reports.

3.4.6.2.3. In case a defined type of foundations cannot be used at certain location(s), the Contractor may be asked to design foundations for such locations and payments shall be made at unit rates of other type of foundations.

3.4.6.2.4. The Contractor shall design and quote for the following four types of foundations and all the foundations shall be RCC type.

(i) ***Dry type foundation***: Design of this type of foundation shall be normally for dry / rocky / hard soil for which, (a) weight of earth shall be assumed to be 1600 kg/cum. (b) The Limit Bearing Capacity of the soil shall be 22000 kg/square meter. (c) The angle of repose shall be 30°.

(ii) ***Wet type foundation (Suitable for paddy field location):*** Design of this type of foundation shall be for locations where sub-soil water level is found below 1.5 meters from the ground level. This design shall also be suitable for paddy fields in Assam, as described in the first Para4.3.1 above. The weight, the limit bearing capacity, the angle of repose and the ultimate bearing capacity of soil up to depth of 1.5 meter shall be taken as mentioned in (i) above and same for earth beyond 1.5 meter depth shall be taken as per (iv) below.

(iii) ***Semi sub-merged type foundation***: Design of this type of foundations shall be for locations where sub-soil water level is found below 0.75 meter from the ground level.The weight, the limit bearing capacity, the angle of repose and the ultimate bearing capacity of soil up to depth of 0.75 meter shall be taken as mentioned in (i) above and same for earth beyond 0.75 meter depth shall be taken as per (iv) below.

(iv) ***Sub-merged type foundation***: Design of this type of foundations shall be for locations where sub-soil water level is found at less than 0.75 meter from the ground level including completely sub-merged locations. (a) The weight of earth shall be assumed to be 850 kg/cum. (b) The limit bearing capacity of the soil shall be 11000 kg/sq. meter. (c) The angle of repose shall be 15°.

3.4.6.3. SEISMIC CONDITION:

Each foundation shall be provided with the tie beam for each type of tower to take care of seismic conditions. Force due to earthquake shall be assumed to be vertical 0.1g and horizontal 0.2g.

3.4.6.4. OVER LOAD FACTOR

The magnitude of limit loads for foundation should be taken as 10% higher than those for the corresponding towers.

3.4.6.5. FOUNDATION DEPTH

The total depth of foundations below the ground level shall not be less than 1.5 meter. To maintain inter-changeability of stubs for all type foundations of each type of towers almost the same depths of foundations will be used. However, the maximum depth of foundations for all types of towers shall not be more than 3.0 meters below the ground level.

3.4.6.6. LOADS ON FOUNDATIONS

The foundation shall be designed to withstand the loads of the superstructure (as specified under Section - 3) for the full footing reactions obtained from the structure as per analysis in conformity with the relevant factors of safety. The reactions on the footings shall be composed of the following types of loads for which they shall be required to be checked.

1. Maximum tension or uplift
2. Maximum compression or down thrust
3. Maximum horizontal shear or side thrust

The additional weight of concrete in the footing below ground level over the earth weight and the full weight of concrete above the ground level in the footing and the embedded steel parts will also be taken into account adding to the down thrust.

3.4.6.7. CONCRETING

The concrete foundation for transmission line towers shall consists of two portions viz. (i) pyramid & (ii) chimney. In chimney portion, the thickness of the concrete cover should be such that it provides minimum cover of not less than 10 cm from any part of the stub angle to the nearest outer surface of the concrete in

respect of all dry locations, limiting the minimum section of chimney to 30.5 cm. Sq. In respect of all wet locations, the section of chimney should be 45.72 cm. Sq. uniformly for all sizes of stub angle.

The chimney top or muffing must be 23 cm above ground level in dry locations, 38 cm in irrigated field and 15.24 cm above maximum water level in tank beds.

The size of the bottom portion of the foundation viz. Pyramid should be designed according to the nature of the sub soil met with at the design depth for the stub angles.

The maximum base thickness in the pyramid portion in case of sub-merged foundation may be taken as 200 mm.

3.4.6.8. VOLUME OF FOUNDATIONS

The volume of foundation of a tower shall mean the total volume of the foundation including chimney, tie beams and the PCC soling. The volumes indicated for various types of tower foundations in Annexure-II of Sections 1 are provisional only and for bidding purpose. Measurements and payments shall be made only on the basis drawings released for construction.

Similarly for reinforcement steel, the weight for payment shall be as indicated in the drawings released for construction and no extra shall be paid for lap joints, hooks, etc. and wastages.

3.4.6.9. CONSTRUCTION OF BORED CAST IN-SITU-PILE FOUNDATION

3.4.6.9.1 General Requirement

1. The specification covers the technical requirements for piling work, general description of work, quality and workmanship. In every case, work shall be carried out to the satisfaction of the Owner in accordance with the Technical Specifications and conform to location, lines, grades and cross sections shown on the construction drawing or as directed by the Owner. The specifications are not, however, intended to cover all the minute details and the work shall be executed according to the specified IS Codes. In absence of the IS Codes, work shall be executed according to the best prevailing local Public Works Department practice or to the recommendations of the relevant International Standards or to the instructions of the Owner. This specification shall have precedence in case anything contrary to this is stated anywhere in this Bid Document. In case of conflict between the Specification and Codes, the former shall prevail.
2. The work shall include mobilization of all necessary equipment's, providing necessary engineering supervision through qualified and technical personnel, skilled and unskilled labour, etc. as required to carry out the complete piling work. The capacities of some equipment are listed below. However, bidder has to furnish information regarding the equipment's they intend to deploy for the project.

3.4.6.9.2 Layout and Levels

Layout and levels of structures etc. shall be made by the Contractor, at his own cost, from the general grid of the plot and the bench marks given by the Owner. The Contractor shall make his own arrangements, at his own cost, for locating the co - ordinates and position of piles as per approved drawings and for determining the Reduced Level (R.L.) of the locations with respect to the single bench mark indicated by the Owner. Two established reference lines in mutually perpendicular direction shall be indicated to the Contractor. The Contractor shall provide at site all the required survey instruments, materials and men to Owner for verification of the detailed layout and correctness of the layout and levels to the satisfaction of the Owner so that the work can be carried out accurately according to specifications and drawings. The contractor shall be solely responsible for the correctness of layout and levels.

3.4.6.9.3 Site Preparation

This section of the specification covers site preparation of the areas as indicated in the drawings.

3.4.6.9.4 Reference Points and Bench Marks

1. Permanent reference pillars have been established and under no circumstances shall the Contractor remove or disturb any permanent mark without the approval of the Owner. The Contractor shall carefully maintain and protect all bench marks and reference points and shall layout all his work by accurate reference thereto. The Contractor shall remove all vegetation, excluding trees, from the site areas as directed by the Owner.

2. The area shall be stripped to remove roots of grass, rubbish and slush, shrubs or other organic materials. Spoiled materials shall be burnt or removed to approved disposal areas on or near the job site as directed by the Owner.

3.4.6.9.5 Properties of Construction Materials

All Constructional material shall be approved by the Site Engineer before using them at site.

This clause specifies the properties of common building materials unless otherwise mentioned in the drawings or schedule of items.

All materials viz., cement, steel, aggregates, water etc. which are to be used for pile construction are detailed below. However, aggregates more than 20mm shall not be used.

3.4.6.9.6 Coarse aggregates/Stone

1. All coarse aggregates shall be as per IS:383 consisting of hard, strong, compact grained and durable pieces of crushed stone having uniform in texture and colour and free from decay, flaws, veins, cracks and sand holes. Coarse aggregates should be of angular shape & rectangular surface and shall be free from organic or clay coatings and other impurities like disintegrated stones, soft flaky particles,

   adherent coatings, clinkers, slag, mica and any other materials liable to affect the strength, durability or appearance of concrete. The surface of a freshly broken stone shall be bright, clean, and free from any dull, chalky or earthy appearance. Coarse aggregates with round surface shall not be used. A coarse aggregate shall not absorb more than 5% of its weight of water after 24 hours immersion. Samples shall be submitted by the Contractor and approved samples shall be retained by the Owner for comparison of bulk supply.
2. Sieving and washing of aggregates by approved method shall be carried out wherever required.
3. Grading of coarse aggregate shall generally conform to IS:383 and shall be such as to produce a dense concrete of the specified proportions and strength and of consistency that will work readily into position without segregation.
4. The maximum size of aggregate shall be as follows unless specified otherwise:
5. Reinforced concrete with very narrow space - 10mm.
6. Reinforced concrete & Plain Concrete - 20mm.
7. Lean Concrete M15 -40mm.

3.4.6.9.7 Cement

Cement used shall generally be Ordinary Portland Cement conforming to the latest Indian Standard Code IS:8112 or IS:12269. Alternatively, other varieties of cement other than ordinary Portland Cement such as Portland Pozzolana Cement conforming to IS;1489 or Portland Slag Cement conforming to IS:455 can also be used. The contractor shall submit the manufacturer's certificate, for each consignment of cement procured, to the Owner. However, Owner reserves the right to direct the Contractor to conduct tests for each batch/lot of cement used by the Contractor and Contractor will conduct those tests free of cost at the laboratory so directed by the Owner. The Contractor shall also have no claim towards suspension of work due to time taken in conducting tests in the laboratory.

Changing of brand or type of cement within the same structure shall not be permitted without the prior

approval of the Owner. Sulphate Resistant Cement shall be used if Sulphate content is more than the limits specified in IS:456, as per Geotechnical investigation report and as mentioned in the construction drawing. No additional payment shall be made for using Sulphate Resistant Cement.

3.4.6.9.8 Sand

Sand shall be hard, durable, clean and free from any adherent coatings or organic matter and shall not contain clay balls or pellets. The sand shall be free from impurities such as iron pyrites, alkalis, salts, coal, mica, shale or other laminated materials, in such forms or quantities as to affect adversely the hardening, strength, durability or appearance of concrete or to cause corrosions to any metal in contact with such concrete. In no case the cumulative percentage of impurities in sand shall be more than 5% by weight. All sand shall be properly graded. Unless otherwise directed by the Owner all sand shall pass through IS Sieve no. 2.36mm. Sand for concrete shall conform to IS:383.

3.4.6.9.9 Water

Water shall be clean, fresh and free from organic matters, acids or soluble salts and other deleterious substances which may cause corrosion, discoloration, efflorescence etc. Potable water is generally considered fit for use. Water to be used shall comply with the requirements of IS:456. Average 28 days compressive strength of at least three 15 cm. cubes of concrete prepared with proposed water shall not be less than 90% of average strength of three similar cubes prepared with distilled water. PH of water shall generally be not less than 6

3.4.6.9.10 Reinforcement

Reinforcement shall be of Fe-500 complying to the appropriate Indian Standards from Primary Producer e.g TATA Steel, SAIL, Jindal, RINL, or equivalent as per IS 13620:1993 or latest version. For reinforcement lapping for pile, only welding shall be adopted. Reinforcement steel shall be clean and free from loose mill scales, dust, loose rust, oil and grease or other coatings which may impair proper bond. Structural steel and medium tensile steel bars and hard drawn steel wire for concrete reinforcement shall conform to IS:432 (Part-I).

Hard drawn steel wire fabric shall conform to IS:1566. All steel bars including and above 6mm diameter shall be of tested for quality. Substitution of reinforcement, other than those mentioned above, shall not be permitted without the prior approval of the Owner.

3.4.6.9.11 Storage & Handling of construction Materials

All materials shall be stored by the Contractor in a manner aiding convenient access for identification and inspection at all times. The storage arrangements shall be subject to the approval of the Owner. Storage of materials shall be as described in IS:4082.

All materials shall be so stored as to prevent deterioration or intrusion of foreign matter and to ensure the preservation of their quality and fitness for the work. Any material which has deteriorated or has been damaged or is otherwise considered defective by the Owner shall not be used for concrete, and shall be removed from site immediately, failing which, the Owner will get the materials removed and the cost thereof shall be recovered from contract price. The Contractor shall maintain up to date accounts of receipt, issue and balance (stock wise) of all materials.

3.4.6.9.12 Cement

The cement shall be stored in dry enclosed shed, well away from the walls and insulated from the floor to avoid contact with moisture. The cement shall be stacked in easily countable stacks to facilitate removal of first in first out basis. The cement bags shall be gently kept on the floor to avoid leakage of cement from the bags. Sub-standard or partially set cement shall be immediately removed from the site as soon as it is detected. Cement stored for period beyond 90 days shall be tested before use.

3.4.6.9.13 Coarse Aggregates and Sand

All coarse aggregates & sand shall be stored on brick soling or an equivalent platform so that they do not come in contact with dirt, clay, grass or any other injurious substance at any stage. Aggregate of different sizes shall be kept in separate and easily measurable stacks. If so desired by the Owner, aggregates from different sources shall be stacked separately with proper care to prevent intermixing.

3.4.6.9.14 Reinforcement

Reinforcements should be procured from primary producer only. Reinforcement steel shall be stored consignment wise and size wise, off the ground and under cover. It shall be protected from rusting, oil

grease and distortions. If directed by the Owner, the reinforcement steel may have to be coated with cement wash before stacking, to prevent scale and rust at no extra cost to the Owner. The stacks shall be easily measurable. Only steel needed for immediate use shall be removed from storage. Fabricated reinforcement shall be carefully stored to prevent damage, distortion, corrosion & deterioration.

3.4.6.9.15 Cement Concrete

General

1 This section of the specification deals with cement concrete, plain or reinforced, and covers the requirement for concrete mix design, strength and quality, pouring at all levels, forming, protection, curing finishing, admixtures, inserts and other miscellaneous works.

2 The provisions of IS:456 shall be complied with, unless permitted otherwise. Any other Indian Standard Code shall form the part of the specification to the extent it has been referred to or applicable within this specification.

3 The Contractor shall furnish all labour, material and equipment to form, place and finish all structural concrete, concrete works and miscellaneous items complete, as described herein.

a. Admixtures

i. The admixtures in concrete for promoting workability, improving strength or for any other purpose, shall be used only after the written permission from the Owner. The Admixtures shall conform to IS:9103.

ii. Admixtures should not impair durability of concrete nor combined with the constituent to form harmful compounds nor increase the risk of corrosion of reinforcement.

iii. Addition of admixtures should not reduce the specified strength of concrete in any case. The workability, compressive strength and the slump loss of concrete with and without the use of admixtures shall be established during the trial mixes before use of admixtures.

iv. The chloride content of admixtures shall be independently tested for each batch before acceptance.

v. If two or more admixtures are used simultaneously in the same concrete mix, data shall be provided to assess their interaction and to ensure their compatibility.

vi. In case admixtures are used in the concrete for any structure, fresh mix design be done considering the admixture with the specific approval from Owner. No extra payment shall be made to the Contractor on this account.

b. Grades of Concrete

i. **The minimum grade of concrete to be used for piling shall be M-25 with minimum cement content 12 Bags of 50 kg each per cum and maximum water cement ratio of 0.5.** Concrete shall conform to the controlled design mix as specified in IS:456. In addition, nominal mixes of 1:3:6 (with aggregates of nominal size 40mm maximum, by weight converted to equivalent volume shall also be used as per field quality plan. The concrete in aggressive surroundings due to presence of sulphate, etc., shall confirm to IS:456. The slump of concrete shall be maintained between 150 to 200 mm.

ii. The Contractor shall carry out concrete mix design in accordance with IS:10262 and submit mix design calculations and get them approved from the Owner well in advance of installation of pile foundations. The Contractor shall carry out adequate number of tests in accordance with IS:456 to ensure concrete of the minimum specified strength at requisite workability (i.e Slump).

c. Workmanship

All workmanship shall be according to the current Industry standard and best practices.

Before starting a pour, the Contractor shall obtain the approval of the Owner in a “Pour Card” maintained for this purpose. He shall obtain complete instructions about the material and

proportions to be used, Slump / workability, Quantity of water per unit weight of cement, number of test cubes to be taken, type of finishing to be done, any admixture to be added, any limitation on size of pour and stopping of concrete in case of premature stopping of pours.

d. Mixing of Concrete

i. All design mix concrete shall be mixed in mechanically operated mixer of an approved size and type capable of ensuring a uniform distribution on the materials through the mass. However, contractor can also use central batching plant situated within the area allocated for the Contractor's particular use.

ii. The proportions of sand, coarse aggregate, cement and water shall be as determined by the mix design. However, in case of nominal mix concrete (for lean concrete only) the proportions of sand, coarse aggregate, cement and water shall be fixed. The proportions, as determined for design mix concrete and shall always be approved by the Owner. The quantities of the cement, sand and coarse aggregates shall be determined by weight.

However, for a faster progress at site, quantities of the cement, sand and coarse aggregates can be converted to equivalent volume. The water shall be measured accurately after giving proper allowance for surface water present in the aggregate for which regular check shall be made by the Contractor.

iii. The water shall not be added to the mix until all the cement and aggregates consisting the batch are already in the drum and dry mixed for at least one minute. Mixing of each batch shall be continued until there is a uniformity in colour and consistency but in no case shall mixing be done for less than two (2) minutes and at least forty (40) revolutions after all the materials and water are in the drum. When absorbent aggregates are used or when the mix is very dry, the mixing time shall be extended as may be directed by the Owner. Mixers shall not be loaded above their rated capacity as it prevents thorough mixing. If there is segregation after unloading from the mixer the concrete should be remixed.

iv. The entire contents of the drum shall be discharged before the ingredients for the next batch are fed into the drum. No partly set or remixed or excessively wet concrete shall be used and it shall be immediately removed from site. Each time the work stops, the mixer shall be thoroughly cleaned and when the next mixing commences, the first batch shall have 10% additional cement at no extra cost to the Owner to allow for loss in the drum.

e. Conveying Concrete

Concrete shall be handled and conveyed from the place of mixing to the place of final laying as rapidly as practicable, by approved means, before the initial setting of the cement starts. Concrete should be conveyed in such a way as will prevent segregation of Concrete which may occur during transportation of concrete. In case of any such segregation during transport, the concrete shall be re-mixed. During very hot or cold weather, if directed by the Owner, concrete shall be transported in deep containers, having mortar leak proof, which will reduce the rate of water loss by evaporation and loss of heat. Conveying equipment's for concrete shall be well maintained and thoroughly cleaned before commencement of concrete mixing. Such equipment shall be kept free from set concrete.

f. Placing of Concrete

a) Formwork and placement of reinforcement shall be approved in writing by the Owner before concrete is placed. The forms shall be well wetted and oil shavings, dirt and water that may have collected at the bottom shall be removed before concrete is placed. Concrete shall be deposited in its final position without segregation, re-

handling or flowing. The interval between adding the water to the dry materials in the mixer and the completion of the final placing inclusive of compaction of the concrete shall be well within the initial setting time for the particular cement in use or as directed by the Owner. As far as possible, concrete shall be placed in the formwork by means approved by the Owner and shall not be dropped from a height or handled in a manner which may cause segregation. Any drop over 1800 mm shall have to be approved by the Owner. Once the concrete is deposited in its final position, it shall not be disturbed. Care should be taken to avoid displacement of reinforcement or movement of formwork.

b) The placing of concrete shall be a continuous operation with no interruption in excess of 30 minutes between the placing of continuous portions of concrete.

c) After the concrete has been placed it shall be spread and thoroughly compacted by approved mechanical vibration to a maximum subsidence without segregation and thoroughly worked around reinforcement or other embedded fixtures into the correct form and shape. Vibrators shall not be used for pushing and shovelling concrete into adjoining areas. Vibrators must be operated by experienced men and over-vibration shall not be permitted. Head tamping in some case may be allowed subject to the approval of the Owner. Care must be taken to ensure that the inserts, fixtures, reinforcement and form work are not displaced or disturbed during placing of concrete. No concrete shall be placed in open while it rains. If there has been any sign of washing of cement and sand, the concrete shall be entirely removed immediately. Suitable precautions shall be taken in advance to guard against rains before leaving the fresh concrete unattended. No accumulation of water shall be permitted on or around freshly laid concrete. Tie beams, pile caps, footings shall be poured in one operation normally, in special circumstances with the approval of the Owner these can be poured in horizontal layers not exceeding 500 mm in depth. When poured in layers, it must be ensured that the under layer, is not already hardened. Blending of under layer if any, shall be effectively removed.

d) Wherever vibration has to be applied externally the design of formwork and the disposition of vibrators shall receive special consideration to ensure efficient compaction and to avoid surface blemishes.

g. Inserts

All anchors, anchor bolts, inserts, etc. and any other items those are required to be embedded in the concrete shall be placed in correct position before pouring. Extra care shall be taken during pouring operation to maintain their position as indicated in the drawings. These inserts shall be welded to the nearest reinforcement to keep them in position and all such welding shall be deemed to be included in the unit rate quoted and no extra payment shall be made on this account.

h. Blockouts

Blockouts in concrete as indicated in the drawing or as directed by the Owner shall be provided wherever required. No extra payment shall be made to the Contractor on this account.

i. Repairs and Finishes of Concrete

All concrete surfaces shall have even and clean finish, free from honeycombs, air bubbles, fins or other blemishes. The formwork joints marks for concrete work exposed to view shall be rubbed with carborundum stone and defects patched up with a paste of 1 part sand and 1 part cement and cured. The finish shall be made to the satisfaction of the Owner.

The unit rate of concrete work shall be inclusive of the cost of cleaning and finishing exposed

surface as mentioned above.

3.4.6.9.16 Reinforcement Steel

This section of the specification shall cover providing reinforcement steel and its cleaning, bending, binding, placing with arrangements for chairs, supports and suitable covers for all reinforced concrete works, below and above ground level as per drawings and specifications.

A. General Requirements

1. Reinforcement steel of same type & grade shall be used for structural reinforcement work as detailed in the drawing released by the Owner. No work shall be commenced without proper verification with the bar-bending schedule provided in the drawing.
2. Contractor shall supply, fabricate and place reinforcement to shapes and dimensions as indicated on the drawings and as per specifications. The reinforcement shall be either plain or deformed steel bars or welded wire fabric conforming to relevant IS specifications.
3. Any adjustment in reinforcement to suit field conditions and construction joints other than shown on drawings shall be subjected to the approval of Employer.

B. Bending

i. Unless otherwise specified, reinforcement steel shall be bent in accordance with procedure specified in IS:2502. Bends and shapes shall comply strictly with the dimensions in the approved Bar Bending Schedule. Contractor shall be entirely responsible for its correctness. Bars correctly bend shall only be used.

ii. No reinforcement shall be bent when in position in the work without approval of the Owner, whether or not it is partially embedded in concrete. Bars shall not be straightened in a manner that will injure the material. Re-bending can be done only if approved by the Owner. Reinforcement bars shall be bent by machine or other approved means producing a gradual and even motion. All the bars shall be cold bent unless otherwise approved.

C. Placing in position

i. All reinforcement shall be accurately fixed and maintained in position as shown on the drawings by approved means as mild steel chairs, and/or concrete spacer blocks. Bars intended to be in contact, at crossing points, shall be securely bond together at all such points by two number No.20G annealed soft-iron wire. Binders shall tightly embrace the bars with which they are intended to be in contact and shall be securely held. The vertical distance between successive layers of bars shall be maintained by provision of spacer bars. They should be so spaced that the main bars do not sag perceptibly between adjacent spacers.

ii. The placing of reinforcements shall be completed well in advance of concrete pouring. Immediately before pouring, the reinforcement shall be checked by the Owner for accuracy of placement and cleanliness and necessary correction as directed by him shall be carried out. The cover for concrete over the reinforcements shall be as shown on the approved drawings unless otherwise directed by the Owner. Care should be taken to ensure that projecting ends of ties and other embedded metal do not encroach into the concrete cover. Where concrete blocks are used for ensuring the cover and positioning reinforcement, they shall be made of mortar 1:2 (one part cement: two parts sand) by volume and cured for at least (7) days. The sizes and locations of the concrete blocks shall be approved by the Owner.

iii. Longitudinal reinforcement in pile shall be high yield strength cold twisted deformed steel bars conforming to IS:1786. Thermo mechanically Treated (TMT) bars (equivalent grade) in place of Cold twisted deformed steel bars are also accepted.

Lateral reinforcement in pile shall be of tor steel conforming to IS:432 Part-I.

iv. The longitudinal reinforcement lapping length shall be 50 times its diameter.

v. The minimum diameter of the links or spirals bar shall be 8mm and the spacing of the links or spiral shall not be less than 150mm and in no case more than 250mm. The laterals shall be tied to the longitudinal reinforcement to maintain its shape and spacing.

vi. Reinforcement cage shall be sufficiently rigid to withstand handling and installation without any deformation and damage. As far as possible number of joints (laps) in longitudinal reinforcement shall be minimum. In case the reinforcement cage is made up of more than one segment, these shall preferably be assembled before lowering into casing tube/pile bore by providing necessary laps as per IS:456.

vii. The minimum clear distance between the two adjacent main reinforcement bars shall normally be 100mm for the full depth of cage, unless otherwise specified.

viii. The laps in the reinforcement shall be such that the full strength of the bar is effective across the joint and the reinforcement cage is of sound construction. Laps and anchorage lengths of reinforcing bars shall be in accordance with IS:456, unless otherwise specified. If the bars in a lap are not of the same diameter, the smaller will guide the lap length.

ix. Lapping of pile main reinforcement shall be done by welding only.

x. Proper cover and central placement of the reinforcement cage in the pile bore shall be ensured by use of suitable concrete spacers or rollers, as required, without any additional cost to the Owner.

xi. Minimum clear cover to the reinforcement shall be 75mm unless otherwise mentioned.

xii. Unless otherwise specified by the Owner reinforcement shall be placed within the following tolerance as specified in IS: 456:2000.

4. For effective depth 200mm or less +10mm.
5. For effective depth more than 200mm +15mm.

The cover shall in no case be reduced by more than one-third of specified cover or 5mm whichever is less. Welding of reinforcement bars shall be avoided. However, welding may be done in specific case subject to prior permission from the Owner.

3.4.6.9.17 Construction of Pile Head, Pedestal, Tie Beam etc.

The Contractor shall deploy all labour, equipment, tools & tackles and materials required for complete execution of the work in accordance with the drawings and as described herein:

A. Excavation

1. The Contractor shall control the grading in the vicinity of all excavation so that the surface of the ground will be properly slopped or diked to prevent surface water from running into the excavated areas during construction.
2. Excavation shall include the removal of all materials required to execute the work properly and shall be made with sufficient clearance to permit the placing, inspection and setting of forms and completion of all works for which the excavation was done.
3. Side and bottoms of excavation shall be cut sharp and true, undercutting shall not be permitted. Each side of excavation shall be used in lieu of formwork for placement of concrete unless authorised, in special cases, by the Owner, where limitation of space

for larger excavation necessitates such decision.

4. When machines are used for excavation, the last 300mm before reaching the required level shall be excavated by hand or by such equipment that will leave the soil at the required final level, in its natural conditions.
5. Suitability for bearing of the bottoms of excavations shall be determined by the Owner.
6. The bottom of excavation shall be trimmed to the required level and when carried below such levels, by error, shall be brought to level by filling with lean concrete 1:3:6 mix, with aggregate of 40mm maximum nominal size at no additional cost to the Owner.
7. The Contractor shall be responsible for assumptions and conclusions regarding the nature of materials to be excavated and the difficulty of making and maintaining the required excavations and performing the work required as shown on the drawing and in accordance with these specifications. The Contractor shall be responsible for any damage to any part of the work and property caused by collapse of sides of excavations. Materials may be salvaged, if it can be done with safety for the work and structure, as approved by the Owner.

   However, no extra claim shall be entertained for materials not salvaged or any other damage to Contractor's property as a result of the collapse. He shall not be entitled to any claim for redoing the excavation as a result of the same. Excavations for foundations specified shall be carried out at least 75mm or as specified in relevant drawings below the bottom of structural concrete and then be brought to the required level by placing lean concrete of 1:3:6 mix or as specified in drawings with aggregate of 40mm maximum nominal size.
8. When excavation requires coffer dams, sheet piling, bracing, sheeting, shoring, draining, dewatering etc. the Contractor shall have to provide the same as required and the cost there of shall be included in the unit rate quoted for the item of excavation and contractor shall submit necessary drawings showing arrangement and details of proposed installation and shall not proceed until he has received approval from the Owner.

The Contractor shall have to constantly pump out the water collected in pits due to rain water, springs, seepage etc. and maintain dry working conditions at no extra cost to the Owner.

9. For the purpose of excavation in earthwork, all types of soil including kankar, morum, shingle and boulders up to 150mm size are included and no separate payment shall be made for different type of soils encountered.

B. Form work

i. General

1. If it is so desired by the Owner, the Contractor shall prepare, before commencement of the actual work, design and drawings for form work and cantering and get them approved by the Owner. The form work shall conform to the shape, alignment and dimensions as shown in the drawings. Form work shall be composed of steel and/or non - absorbent type or plywood. Plywood or equivalent shall be used where specified to obtain smooth surfaces for exposed concrete work. Struts shall generally be mild steel tubes, and strong sal ballis of 150mm in diameter or above. Bamboos, small diameter ballis, etc. shall not be used unless approved by the Owner in specified cases.

2. Supports or props should not be supported on an unpropped lower suspended floor or beam unless calculations are submitted to the Owner to confirm the strength of the lower floor or beam and no propping shall be

taken out until the Owner approval has been given.

3. The form work shall be true and rigid and thoroughly braced both horizontally and diagonally. The forms shall be sufficiently strong to carry without undue deformation, the dead weight of the concrete as well as working load. Where the concrete is vibrated, the formwork shall be strong enough to withstand the effects of vibration, without appreciable deflection, bulging, distortion or loosening off its components. The joints in the formwork shall be sufficiently tight to prevent any leakage of mortar. The formwork shall be such as to ensure a smooth uniform surface free from honeycombs, air bubbles, bulges, fins and other blemishes. Any blemish or defect found on the surface of the concrete must be brought to the notice of Owner immediately and rectified free of charge as directed by him. To achieve the desired rigidity, the bolts, space blocks, the wires and clamps as approved by the Owner shall be used but they must in no way impair the strength of concrete or leave stains or marks on the finished surface, where there are chances of these fixtures being embedded, only mild steel or concrete of adequate strength shall be used. Bolts passing completely through liquid retaining walls/slabs for the purpose of securing and aligning the formwork should not be used.

4. Temporary openings for cleaning, inspection and for pouring concrete may be provided at the base of vertical forms and as may be directed by the Owner. The temporary openings shall be so formed that they can be conveniently closed when required and must not leave any mark on the concrete.

ii. Cleaning and Treatment of Forms

1. All forms shall be thoroughly cleaned of old concrete wood shavings, saw dust, dirt and dust sticking to them before they are fixed in position. All rubbish loose concrete, chippings, shavings, saw dust etc. shall be scrupulously removed from the interior of the forms before the concrete is poured. Along with wire brushes, brooms, etc. compressed air jet and/or water jet shall be kept handy for cleaning, if directed by the Owner.

2. Before shuttering is placed in position the form surface in contact with concrete shall be treated with approved non-standing oil or composition of other material approved by the Owner. Care shall be taken that the oil or composition does not come in contact with reinforcing steel or existing concrete surface. They shall not be allowed to accumulate at the bottom of the shuttering.

3. If formwork for pedestal/chimney is erected for the full height of the section, as placing of concrete proceeds, wedges, spacer bolts, clamps or other suitable means shall be provided to allow accurate adjustment of the formwork and to allow it to be removed gradually without jarring the concrete.

iii. Removal of Forms

1. The Contractor shall begin the removal of formwork only after approval of Owner. He shall place on record the date on which the concrete is placed in different parts of the work and the date of the removal of formwork there from. This record shall be checked and countersigned by the Owner. The Contractor shall be responsible for the safe removal of formwork but the Owner may delay the time of removal if he considers it necessary. Any work showing signs of damage through premature removal of formwork or loading shall be entirely reconstructed without any extra cost to Owner.

2. Forms for various types of structural components shall not be removed before the minimum periods specified below which shall also be subject to the approval of the Owner.

3. No supporting forms shall be removed suddenly in such manner as to create shock loading. Forms for sides shall not be removed before 2 days. Bottom forms shall not be removed before 28 days unless this period is reduced with specified concurrence of the Owner. However, in any case, formwork shall not be struck until the concrete has reached a strength at least twice the stress to which the concrete may be subjected to, at the time of removal of forms.

iv. Re-use of Forms

Before re-use, all forms shall be thoroughly scrapped cleaned and joints, etc. shall be examined, when necessary repaired and inside surface treated as specified. Formwork shall not be used/re-used, if declared unfit or unserviceable by the Owner.

C. Back Filling

i. General Requirement

1. After completion of foundation footings, pile caps, pedestals, tie beams and other constructions below the elevation of the grades, and prior to back filling, all forms of temporary shoring, timber etc. shall be removed and the excavation cleaned of all trash, debris and perishable materials, back filling shall begin only with the approval of the Owner.
2. The soil to be used for back filling purpose shall be inorganic material and shall be free from any foreign substance which can harm or impair the strength of footing in any manner. In any case the soil to be used for back filling purpose shall have the prior approval of the Owner.
3. The soil to be used for back filling purpose shall be either from the excavated earth or from the borrow pits, as directed by the Owner. The soil may have to be brought from a distance up to 2 km. By the shortest haulage route as approved by the Owner. If directed by the Owner, the excavated earth from the adjoining areas (which is to be disposed off up to a distance of 500 meters by manual labour) shall be used as for back filling purpose.
4. Back filling shall not be dropped directly upon or against any structure where there is danger of displacement or damage.
5. Back filling shall be placed in horizontal layers not to exceed 200mm in thickness. Each layer shall be compacted with proper moisture content and with such equipment as may be required to obtain a density equal to or greater than 95% of maximum dry density as determined by the relevant Indian Standard. The method of compaction shall be subject to the approval of the Owner. Pushing of earth for back filling shall not be adopted under any circumstances.
6. On completion of structures, the earth surrounding them shall be accurately finished to line and grade as shown on the drawings or as per the instruction of the Owner. Finished surface shall be free of irregularities and depressions and shall be within 50mm of the specified level.
7. Any additional quantity of back filling, if required, beyond the excavation payment line shall be done by the contractor at his own expense.

D. Construction Joints

a) When the work is to be interrupted, the concrete shall be rebated at the joint to such shape and size as may be required by the Owner or as shown on the drawings. All vertical construction joints shall be made with stone boards, which are rigidly fixed and slotted to allow for the passage of the reinforcing steel. If desired by the Owner, keys and/or dowel bars shall be provided at the construction joints. Construction joints shall be provided in positions as shown or described on the drawing. Where it is not described, the joints shall be in accordance with the following:

i) In a column, the joint shall be formed about 75mm below the lowest soffit of the beams framing into it.

ii) Concrete in tie beam shall be placed throughout without a joint, but if the provision or a joint is unavoidable, the joint shall be vertical and at the middle of the span.

iii) In forming a joint, concrete shall not be allowed to slope away to thin edge. The locations of construction joints shall be planned by the Contractor well in advance of pouring and have to be approved by the Owner.

b) Before the fresh concrete is placed, the cement skin of the partially hardened concrete shall be thoroughly removed and surface made rough by hacking, sand blasting, water jetting, air jetting or any other method as directed by the Owner. The rough surface shall be thoroughly wetted for about two hours and shall be dried and coated with 1:1 freshly mixed cement sand slurry immediately before placing the new concrete. The new concrete shall be worked against the prepared surface before the slurry sets. Special care shall be taken to see that the first layer of concrete placed after a construction joint is thoroughly rammed against the existing layer. Old joints during pour shall be treated with 1:1 freshly made cement sand slurry only after removing all loose materials.

c) The unit rate of concrete work shall include the cost of construction joints.

E. Curing and Protection of Concrete

Newly placed concrete shall be protected by approved means from rain, sun & wind. Concrete placed below ground level shall be protected from falling earth during and after placing. Concrete placed in ground containing deleterious substances shall be kept free from contact with such ground or with water leaking from such ground during placing of concrete and for a period of three days or as otherwise instructed by the Owner after placing of concrete. The ground water around newly poured concrete shall be kept to an approved level by pumping or other approved means of drainage. Adequate steps shall be taken to prevent floatation or flooding. Steps, as approved by the Owner, shall also be taken to protect -immature concrete from damage by debris, excessive loading, vibration etc. which may impair the strength or durability of the concrete. All fresh concrete shall be covered with a layer of Hessian or similar absorbent material and kept constantly wet for a period of seven days or more from the date of placing of concrete as per directions of the Owner. Curing can also be made by ponding. Concrete shall be cured by flooding with water of minimum 25mm depth for the period mentioned above. Step shall also be taken to protect immature concrete from damage debris by excessive loading, vibrations, abrasions, deleterious ground water, mixing with earth or foreign materials, floatation etc. that may impair the strength and durability of the concrete. Approved curing compound can be used with the permission of the Owner. Such compound shall be applied to all exposed surfaces of the concrete as soon as possible after the concrete has set.

3.4.6.9.18 Pile Installation

Installation of piles shall be carried out as per pile layout drawings, installation criteria, technical specifications and the directions of the Owner.

3.4.6.9.18.1 Installation Criteria

The Contractor while boring the pile bores, shall constantly collect the bore spoils and these shall be compared with the layer wise soil classifications reported in the bore- log details of the location, reported in the soil investigation report. Should there be any variation between the two-soil classification, these shall be immediately reported to the Owner.

Whenever the rock strata is encountered in the pile bore, the Contractor shall immediately report the matter to the Owner and shall take up the work of rock chiseling or any other suitable method only after the certification/approval of the Owner. Since the piles are required to be terminated in the firm/hard strata and as stipulated in the construction drawing the Contractor shall demonstrate such

founding strata and seek approval of the Owner before terminating the piles.

1. The pile should be socketed and founded in good rock only. Whenever rock strata is encountered at any pile bore and the level of good rock (i.e. rock strata is not highly fractured and weathered and core recovery is not less than 80% with RQD 70%) is different than that is given in the Geotechnical Investigation report, in that case to establish the level of good rock, core drilling is necessary to be carried out at least upto 5m depth in rock strata encountered by the contractor without any additional cost implication to AEGCL and no time extension will be permitted on this account.

2. In order to verify the terminating depth, where rock strata is met with, the rock samples obtained from the bore spoils of pile shall also be tested for point load strength index and these shall then be compared/correlated to the values of uniaxial compression strength test shown in the soil investigation report. Accordingly, the termination of piles in the socketing zone shall be done with prior approval of the Owner.

3.4.6.9.18.3 Control of position and alignment

Piles shall be installed vertically as accurately as possible as per the construction drawing. The permissible limits for deviation with respect to position and inclination/alignment shall conform to IS-2911 (Part I/Sec.2), as reproduced below. Maximum permissible deviation in alignment is 1.5%. Piles should not deviate more than 75mm or D/10 whichever is less from their positions at the working level. In case of piles deviating beyond these limits, the piles should be replaced or supplemented by one or more additional piles including the revised cap size (as the situation may be) at no additional cost to the Owner. Any extra claim whatsoever from the contractor on this account shall not be entertained.

3.4.6.9.18.4 Boring

1. Boring operations shall be done by rotary or percussion type drilling rigs using Direct Mud Circulation (DMC), Reverse Mud Circulation (RMC) methods or grab method. In soft clays and loose sands bailer method, if used, shall be used with caution to avoid the effect of suction. In cohesive soils, use of water for boring shall be restricted to a minimum, while boring in cohesion less deposits water level in the bore hole shall be maintained at or slightly above the standing water table.

   Boring operations by any of the above methods shall be done using drilling mud. The bidder shall be required to furnish along with their bid, complete details regarding g the installation of piles and the method by which they wish to install the piles.

2. The Contractor shall satisfy himself about the suitability of the method to be adopted for site. If DMC or RMC is used, bentonite slurry shall be pumped through drill rods by means of high-pressure pumps. The cutting tools shall have suitable pores for the bentonite slurry to flow out at high pressure. If the Contractor fails to make proper bore for any reason, the Contractor has to modify the boring technique and switchover to other boring methods as approved by the Owner at no extra cost to the Owner.

3. Working level shall be above the pile cut off level. After the initial boring of about 1.0 to 2.0m temporary guide casing shall be lowered in the pile bore. The diameter of guide casing shall be of such diameter to give the necessary finished diameter of the concrete pile. The center line of guide casing shall be checked before continuing further boring. Guide casing shall be minimum 2.0m length. Additional length of guide casing shall be used depending on the conditions of the strata, ground water level etc. as required by the Owner without any additional cost to the Owner.

4. Use of drilling mud (bentonite slurry) for stabilising the sides of the pile bore is necessary wherever subsoil is likely to collapse in the pile bore.

5. The bentonite slurry and the cuttings, which are carried to the surface by the rising flow of the slurry shall pass through settling tanks of adequate size to remove the sand and spoils from the slurry before the slurry is recirculated back to the boring. The bentonite slurry

mixing and recirculation plant shall be suitably designed and installed.

6. The bentonite slurry shall be maintained at 1.5m above the ground water level during boring operations and till the pile is concreted. When DMC or RMC method is used the bentonite slurry shall be under constant circulation till start of concreting.

7. The size of cutting tools shall not be less than the diameter of the pile as specified in the drawing and not more than 75mm.

3.4.6.9.18.5 Chiselling

Chiselling, if required, may be resorted to with the permission of the Owner below the socketing horizon. The chiselling tool or bit shall be of adequate size and weight so as to reach the desired depth.

3.4.6.9.18.6 Cleaning of Pile bore

1. After completion the pile bore up to the required depth, the bottom of the pile bore shall be thoroughly cleaned. Cleaning shall ensure that the pile bore is completely free from sludge/bored material, debris of rock/boulder etc. Necessary checks shall be made as given in this Section to confirm the thorough cleaning of the pile bore.
2. Pile bore shall be cleaned by fresh drilling mud through tremie pipe before start of concreting and after placing reinforcement.
3. Pile bore spoil along with used drilling mud shall be disposed off from site up to 2 Km. or as directed by the Owner.

3.4.6.9.18.7 Adjacent Structures

When working near existing structures care shall be taken to avoid any damage to such structures.

3.4.6.9.18.8 Concreting

1. Concreting shall not be done until the Owner is satisfied that the bearing strata (soil/rock) met with the termination level of pile, satisfied the installation criteria/approved founding depth.
2. The time between the completion of boring and placing of concrete shall not exceed 6 hrs. In case the time interval exceeds 6 hrs the pile bore shall be abandoned. However, the Owner may allow concreting, provided the Contractor extends the pile bore by 0.5 m beyond the proposed depth, and clean the pile bore properly. The entire cost of all operation and materials for this extra length shall be borne by the Contractor.
3. Pile bore bottom shall be thoroughly cleaned to make it free from sludge or any foreign matter before and after placing the reinforcement cage.
4. Proper placement of the reinforcement cage to its full length shall be ensured before concerting.
5. Entire concreting in pile bores shall be done by tremie method. The operation of tremie concreting shall be governed by IS:2911 Part I/Sec.2. Drilling mud shall be maintained sufficiently above the ground water level.
6. Concreting operations shall not proceed if the contaminated drilling mud at the bottom of the pile bore possess density more than 1.25 T/Cu.m. or sand content more than 7%. The drilling mud sample shall be collected from the bottom of pile bore. This shall be checked at regular intervals, as decided by the Owner thereafter.
7. Consistency of the drilling mud suspension shall be controlled throughout concreting operations in order to keep the bore stabilised as well as to prevent concrete getting mixed up with the thicker suspension of the mud.
8. It shall be ensured that volume of concrete poured is at least equal to the theoretically computed volume of pile shaft being cast.
9. The temporary guide casing shall be entirely withdrawn cautiously, after concreting is done up to the required level. While withdrawing the casing concrete shall not be disturbed.

10. Tests on concrete cubes shall be carried out as specified in this section of the Specifications.

3.4.6.9.18.9 Cut-off-level (COL)

1. Cut-off-level of piles shall be as indicated in approved construction drawings or as directed by the Engineer-in-Charge.
2. The top of concrete in pile shall be brought above the COL to dismantle all laitance and weak concrete and shall be re-casted to ensure good concrete at COL for proper embedment into pile head.
3. When the pile cut off level is less than 1.0 meter below the working level, concrete shall be cast up to the piling platform level to permit overflow of concrete for visual inspection. In case COL of pile is more than 1.0 meter below working level then concrete shall be cast to minimum of one meter above COL.
4. In the circumstances where COL is below ground water level, the need to maintain a pressure on the unset concrete equal to or greater than water pressure shall be observed and accordingly length of extra concrete above COL shall be determined by the Contractor with prior approval of Owner.

3.4.6.9.18.10 Sequence of Piling

1. Each pile shall be identified with a reference number and date wise proper record of construction shall be maintained by the Contractor.
2. The convenience of installation may be taken into account while scheduling the sequence of piling in a group. This scheduling shall avoid piles being bored close to other recently constructed piles.

3.4.6.9.18.11 Building up of Piles

If any pile, already cast as per construction drawing, requires any extra casting due to any change in cut off level or the cast pile top level is less than the specified level or for any other reason, then the pile shall be built up by using M-25 grade of concrete, ensuring proper continuity with the existing concrete and to the satisfaction of the Owner. Necessary reinforcement as per design requirement and suitable shuttering shall be provided before casting the concrete. Surrounding soil shall also be built up to the required level by proper compaction to ensure lateral capacity of the pile.

3.4.6.9.18.12 Breaking off of Piles

If any pile already cast requires breaking due to lowering in cut off level or for any other reason, then the same shall be carried out, (not before seven days of casting of concrete in the piles) without affecting the quality of existing pile such as loosening, cracking etc. to the satisfaction of the Owner. No extra payment shall be made on this account.

3.4.6.9.18.13 Preparation of Pile head

1. The soil surrounding the piles shall be excavated up to the bottom of the lean concrete below the pile cap with provision for working space sufficient enough to place shuttering, reinforcement, concreting and any other related operations.
2. The exposed part of concrete above the COL, shall be removed/chipped off and made square at COL not before seven days of casting of pile.
3. The projected reinforcement above COL shall be properly cleaned and bent to the required shape and level to be anchored into the pile cap as shown in the drawing.
4. The pile top shall be embedded into the pile cap by minimum 50mm or clear cover to reinforcement, whichever is higher. All loose material on the top of pile head after chipping to the desired level shall be removed and disposed off up to a lead of 2km or as directed by the Owner.

3.4.6.9.18.14 Rejection and Replacement of Defective Piles

1. The Owner reserve the right to reject any pile which in his opinion is defective with reference to technical specification & construction drawings on account of load capacity, structural integrity, position, alignment, concrete quality etc. Piles that are judged defective shall be pulled out or left in place as decided by the Owner without affecting the performance of adjacent piles. The Contractor shall install additional piles to substitute the defective piles as per the directions of the Owner at no extra cost to the Owner.

2. During execution of pile foundation work, if the bore holes need to be abandoned due to any reason and pile position to be shifted or realigned, other than for any design requirement by the Owner, fresh bore holes are to be executed at a suitable new position, which may vary from 2D to 3D (where, D is diameter of pile) as decided by the Owner, which may demand for resizing of pile cap including possible increase in reinforcement quantity due to resizing of pile cap. In all such cases the abandoned bore holes are to be filled up with plain cement concrete M15 so that no cavity remains in the bore hole of the abandoned pile. Any extra claim whatsoever from the contractor on account of abandoned bore hole, filling up of abandoned bore hole with concrete and any extra cost due to resizing of pile cap including increase in reinforcement quantity shall not be entertained by the Owner & the same have to be borne by the contractor.

3.4.6.9.18.15 Criteria for Terminating the Piles

1. The piles can be terminated at a depth based on design developed by the Owner, where loads on the piles can be transmitted to the soil in a proper manner or the depth where specified `Value is achieved, whichever occurs later. However, in no case piles should be terminated at a higher level than that indicated in the construction drawing.

2. Standard penetration test (SPT) shall be carried out starting from 1.0 M above the specified pile termination depth and there after @ 1m. up to the pile termination depth.

3. The Standard Penetration Test (SPT) shall be carried out based on the following test procedures:

   The test shall be conducted by driving a standard split spoon sampler in the borehole by means of a 650 N hammer having a free fall of 0.75 M. The sampler shall be driven for 450 mm using the hammer and the number of blows shall be recorded for every 150mm penetration. The number of blows for the last 300 mm drive shall be reported as N value. The test shall be discontinued when the blow count is equal to 100 or the penetration is less than 25mm for 50 blows, whichever is earlier.

   At the location where the test discontinued, the penetration and the number of blows shall be reported. Sufficient quantity of disturbed sample shall be collected from the split spoon sampler for identification/classification of soil. The sample shall be visually classified and recorded at the site.
   The specification for the equipment's and other accessories, procedure for conducting the test and collection of the disturbed soil sample shall conform to IS:2131. Recording of Piling Data

4. The Contractor shall record all the information during installation of piles. Typical data sheet for recording pile data as shown in Appendix D of IS:2911 Part I/Sec.2 shall be maintained by the contractor. The pile data shall also include all the details as in Annexure-D. On completion of each pile installation, pile record in triplicate shall be submitted to Owner within two days of completion of concreting of the pile.

3.4.6.9.18.16 Check for Pile bore

1. On completion of boring and cleaning the bottom of each pile bore shall be checked by the methods as approved by the Owner, to ensure that it is free from pile bore

spoil/debris and any other loose material, before concreting. Concreting shall be done only after the approval of the Owner.

2. For sampling of drilling mud from the pile bore the following method or any other suitable method shall be adopted. A solid cone shall be lowered by a string to the bottom of pile bore. A sampler tube closed at top with a central hole (hollow cylinder) is lowered over the cone, then a top cover shall be lowered over the cylinder. Care shall be taken for proper fittings of assembly to minimise the leakage while lifting the cone assembly to the ground surface. The slurry collected in the sampler tube shall be tested for density and sand content.

3.4.6.9.18.17 Properties of drilling mud

1. Properties of drilling mud shall be checked as per requirements prior to the commencement of piling work and thereafter at least once in a week or as found necessary by the Owner, one sample consisting of 3 specimens shall be tested.
2. Density and sand content of the drilling mud shall be checked in each pile.

3.4.6.9.19 Erection of Steel Embedded Parts

1. This covers the technical requirements for the supply and fabrication and/or erection of all embedded steel parts by the Contractor. The extent and type of embedded steel parts to be erected shall be as per detailed drawings.
2. The supply of embedded steel parts like ladders, steel pieces set in concrete inserts, dowel bars required for construction joints etc. are in the scope of the Contractor. However, supply of anchor bolts/stubs, as the case may be, will be supplied by tower contractor.
3. Embedded steel parts shall include items such as foundation anchor bolts, stubs, ladders, steel pieces set in concrete inserts, dowel bars for concrete work etc. shown on the drawing or as required by the Owner. Material shall also include setting in forms for connecting in place and grouting as required. The grouting operations, if required, shall be performed as per the direction of Owner.
4. The Contractor shall erect all embedded steel parts in accordance with the drawings and this specification including setting materials in concrete or grouting pieces in place, furnishing all labour, materials, scaffolding, tools and services necessary for and incidental to the work to its transporting, unloading, storing, handling and erection. Contractor shall furnish welding rods and arrange for field welding as required in accordance with IS: 816.
5. Exposed surface of embedded material is to be painted with one coat of approved anticorrosive and/or bituminous paint without any extra cost to the Owner. The threads of holding down bolts shall be greased and protected with water proof tape.

3.4.6.9.20 Installation

During erection, the Contractor shall provide necessary temporary bracing or supports to ensure proper installation of the materials. All materials shall be erected in the true locations as shown in the drawings, plumb and level. Extreme care shall be taken to ensure that the threads of holding down bolts and comparable items are protected from damage. Groups of holding down bolts shall be set in such a manner that the tolerance of whole group is not more than 3mm from its true position in plan at the top of the bolt and not more than 3mm from the required level. The top ends of all bolt shanks shall be in one plane to the tolerance stated above. Holding down bolt assemblies shall be set vertically to a tolerance of not more than 1:500.

3.4.6.9.21 Protection Against Damage in Transit

All steel work shall be efficiently and sufficiently protected against damage in transit to site

from any cause whatsoever. All protecting plates or bars and all ends of members at joints shall be stiffened, all straight bars and plates shall be bundled, all screwed ends and machined surface shall be suitably packed and all bolts, nuts, washers and small loose parts shall be packed separately in cases so as to prevent damage or distortion during transit. Should there be any distortion of fabricated members, the Contractor shall immediately report the matter to the Owner. Distorted reinforcement bars or plates received from stores or distorted during transport from stores to the fabrication yard shall not be used in fabrication unless the distortions are minor which in the opinion of the Owner can be removed by acceptable methods. The cost of all such straightening shall be borne by the Contractor within his unit rates.

These distortions shall be rectified by the Contractor by cold bending. If heating is necessary to rectify the defects, the details of the procedure shall be intimated to the Owner whose approval shall be taken before such rectification. The temperature of heat treatment shall not exceed the limits beyond which the original properties of steel are likely to be impaired.

3.4.6.9.22 Foundations Bolts

1. The foundation bolts / stubs, as required, for the tower structures shall be supplied by the respective tower contractor. These shall be embedded in concrete while the foundation is cast. The Contractor shall ensure the proper alignment of these bolts to match the holes in the base plate and also co-ordinate with the respective tower contractor for its correctness. The final adjustment of these bolts and their grouting are included in the scope of this contract. Grouting of block outs and the gap between the base plate and top of concrete shall be done by the Contractor after finalisation of alignments. The unit rate of concreting shall include the cost of above adjustments, grouting, and skins etc. required for this purpose.

2. The Contractor shall be responsible for the correct alignment and levelling of all steel work on site to ensure that the towers are in plumb.

3. Before erection of towers, by tower contractor, on the foundations the top surface of base concrete shall be thoroughly cleaned with wire brushes and by chipping to remove all laitance and loose materials and shall be chipped with a chisel to ensure proper bond between the grout and the foundation concrete. The piling Contractor shall also be responsible for bringing down the top of concrete to the desired level by chipping. In case the foundation as cast is lower than the desired level, the Contractor shall make up the difference by providing additional pack plates without extra cost for any such work or material. No steel structures shall be erected on their foundations unless such foundations have been certified fit for erection by the Owner. Adequate number of air release holes and inspection holes shall be provided in the base plate.

3.4.6.9.23 Stability of Structure

The Contractor shall be responsible for the stability of the structure at all stages of its erection at site and shall take all necessary measures by the additions of temporary bracings and guying to ensure adequate resistance to wind and also to loads due to erection equipment and their operations. Guying and bracing shall be done for erection equipment and their operations. Guying and bracing shall be done in such a way that it does not interface with the movement or working of other agencies working in the area. For the purpose of guying, the Contractor shall not use other structures in the vicinity which are likely to be damaged by the guy.

Such temporary bracings shall neither be included in the measurement nor extra rate shall be payable. Such temporary bracings used shall be the property of the Contractor and may be removed by him at the end of the job from the site of work.

3.4.6.9.24 Grouting and under Pinning

1. General

1. Furnishing of all labour materials and equipment and performance of all

operations necessary to complete the work of grouting of block outs and foundation bolt holes and under pinning of base plates is in the scope of the Contractor. The cost of the above shall be included in the unit concreting rate.

2. Grouting shall be adopted for filling the block outs, pockets below foundation bolt holes. The block out and bolt holes which have to be grouted shall be cleaned thoroughly by use of compressed air immediately before taking up the grouting operations.

3. Cement and aluminium powder or anti-shrinkage admixture of approved quality shall be first blended thoroughly in the required proportions as per manufacturer's specification. The mix of grouting shall contain one part of cement and two parts of coarse sand. Admixture should be according to IS:9103.

4. The quantity of aluminium powder shall usually be of the order of 0.005% by weight of cement. Any grout which has been mixed for a period longer than half an hour shall not be used on the work. Immediately after preparation the grout shall be poured into the block outs, pockets and foundation bolt holes either from the sides or through the holes provided for this purpose in the base plate, by using special equipment for pressure grouting. It shall be ensured by rodding and by tapping of bolts that the block out is completely filled without leaving any voids. The pouring shall cease as soon as each hole is filled and any excess grout found on the surface of the concrete foundation shall be completely removed and the surface dried.

5. Under pinning It shall be resorted to for filling the space between the underside of base plate and the top of foundation concrete. After grouting has been completed as specified above, space between the top surface of the foundation concrete and the underside of the base plate shall be filled with mortar or concrete depending upon thickness to be filled as follows:

Less than 40mm	Dry packed cement mortar
Over 40mm	Dry packed fine concrete Mortar,

fine concrete shall be blended with aluminum powder about 0.005% by weight of cement or with anti-shrinkage admixture in a suitable proportion to the cement mortar in accordance with the recommendations of the manufacturer and subject to the approval of the Owner. Mortar shall comprise cement, sand and water in proportion of approx. 1:3:0.4 by weight. Concrete shall comprise cement, sand, 10mm max. sized aggregate and water in proportion of 1:1.25:2:0.4 by weight. In all cases minimum 28 days cube strength should not be less than 25N/mm^2.

Shims provided for the alignment of bases shall be positioned at the edges of the base to permit subsequent removal which shall take place not less than 7 days after the underpinning has been executed. The resulting cavities shall be made good with the same grade of mortar or concrete as has been used for the underpinning of the rest of the base plate.

6. Cement, sand and aluminium powder or approved anti-shrinkage admixture, shall first be blended thoroughly in the required proportion. The mortar shall then be prepared by mixing with quantity of water which will produce a sufficiently workable mix to enable complete and proper compaction of the mortar.

7. The mortar shall then be placed below the base plate and rammed in a horizontal direction for each edge until the mortar oozes out through the grout holes provided in the base plate.

8. When it is clear that the centre of base has been properly filled, the mortar outside the base plate shall be briefly rammed to ensure compaction below the edges. Any mortar which has been mixed for a period longer than half an hour, shall not be used in the work.

3.4.6.9.25 Materials

1. Cement shall conform to the stipulations contained in IS:8112and shall have a fineness (specific surface of cement) not less than 225 sq./kg when tested for fineness by Blaine's air permeability method as per IS:4031.
2. Sand shall conform to the stipulations contained in IS:383.
3. Water shall be clean and fresh and shall be of potable quality.
4. Aluminium powder or anti-shrinkage admixture like 'Groutex' CRS-NS grout (by Cement Research Institute of India) or its equivalent shall be of standard brand from reputed manufacturer and shall be approved by the Owner prior to its use for work.

3.4.6.9.26 Curing

The work shall be cured for a period of 7 days commencing 24 hours after the completion of the grouting and under pinning operations. The curing shall be done by covering the surfaces with wet gunny bags.

3.4.6.9.25 Bar Grips

1. This covers the technical requirement for furnishing and installation of bar grips complete including all labour materials, equipment, staging, etc.
2. The Contractor shall furnish and install the bar grips for various dia of deformed bars as indicated in drawings and as required by these specifications. The bar grip splicing system shall be of approved manufacturer and of the best quality available subject to approval of the Owner.

3.4.6.9.26 Splicing

1. a) The reinforcement bars are to be joined without any gap and the sleeve placed in position.
   b) Pressure is applied by means of a hydraulic press which swages the sleeve down on the bar ends in a series of bites which are applied at high pressure.
   c) The job can also be done in two stages. The 1st stage is to press the half sleeve on the loose bar at the reinforcement yard. The 2nd stage work is to be done at the actual site after the loose bar is inserted through the unpresented end of the sleeve and pressed in-situ.
2. The joints shall be staggered as far as possible. Necessary staging arrangements are to be made by the Contractor.
3. It may be necessary to fix the sleeve to the reinforcement bars at one end in the open yard for the facility of working. All these working details are to be furnished earlier subject to the approval of the Owner.
4. The length of the sleeve should be adequate, that it is safe under the pull-out loading conditions.
5. One percent representative samples of each dia, bars shall be sent for laboratory testing at the cost of the Contractor to check the efficiency of the joints under ideal condition. These samples of sleeves will be sent in the Laboratory for pull out tests.
6. All bar grips installation shall be subject to inspection and approval by the Owner before concreting operation are performed. In case of any defect or joint being not up to mark, the same shall be replaced by the Contractor at no extra cost.

NOTE:

At the time of execution, the soil strata should match with the parameters considered in the design of pile foundation.

For that req. standard penetration tests will be carried out by contractor at his own cost to ascertain the design parameters. Any change req. in design will have to be carried out with the

prior approval of Engineer-in-charge.

3.4.7. ERECTION

3.4.7.1. GENERAL:

The details specifications given below are intended for general description of quality, workmanship etc for the items given under clause 3.1.0 above but do not cover minutes details of the work. In the absence of relevance details in the specifications the work shall be executed according to the prevailing practices and to the discretion of the site engineer.

3.4.7.2. TYPE OF FOUNDATION:

Construction of foundation is in the scope of this work.

3.4.7.3. TOWER ERECTION:

Erection of towers is in the scope of this work.

3.4.7.4. STRINGING OF CONDUCTOR:

The Hotline stringing of the conductors shall be done in a most standard method used for such lines, which shall be indicated in the tender. The tenderer shall give complete details of the stringing method they propose to follow and indicate its adaptability and advantages. They shall also indicate the tools and equipment required for stringing by the method proposed by them. The contractor shall use his own stringing and erection tools and other equipment.

The contractor shall be entirely responsible for any damage to the towers or the conductors during stringing.

3.4.7.5. PULLING OPERATION:

The earth wire shall be strung and securely clamped to the towers before the conductors are drawn up in order of the top conductor first.

The pulling of the conductor into the travellers (comprising of aerial and ground rollers) shall be carried out in such a manner that the conductor is not damaged or contaminated with any foreign substance and that it may not be rubbed with rough ground surface. The traveler surface in contact with aluminium surface of conductor is not damaged. These shall be equipped with high quality ball and roller bearings for minimum friction.

During pulling out operation the tension in each conductor and earth wire shall not exceed the design working tension of the conductor at the actual prevailing temperature. After being pulled the conductor and the earth wire shall not be allowed to hang in the stringing blocks for more than 96 hours, before being pulled to the specified sag. It shall be ensured that the conductors and earth wire are not damaged due to wind, vibration or other cause.

3.4.7.6. SAGGING IN OPERATION:

The conductors shall be pulled up to desired sag and left in travellers for at least one hour after which the sag shall be rechecked and adjusted. The conductors shall be clamped within 36 hours for sagging in. The sags shall also be checked when the conductors have been drawn up and transferred to the insulator clamps.

At sharp vertical angles the sags and tensions shall be checked on both sides of the angle. Sagging operations shall not be carried out under wind, extremely low temperature or other adverse weather conditions, which prevent satisfactory sagging.

3.4.7.7. JOINTING:

All the joints of the conductor or the earth wire shall be compression type in accordance with the

recommendations of the manufacturers, for which the necessary tools and equipment like compressors and dies, grease guns, presses shall have to be arranged by the contractor.

All joints and splices shall be made at least 30 meters away from the structures. No joint or splices shall be made in span crossing over main roads, railways, small rivers or in tension spans. Not more than one joint shall be allowed in one span.

After pressing the joint the aluminum sleeve shall have all corners rounded, burrs and sharp edges removed and smoothened.

3.4.7.8. INSULATOR HOISTING:

Suspension insulator strings shall be used up to deviation of 2 degrees on all 'A' type towers in the line and strain insulators on all 'B' , C and D' type towers. Except on approaching towers, all suspension strings will consist of the specified number of insulator discs per string with arching horns on line side only and tension string of specified number of insulator discs per string with arcing horns on both line and tower sides.

Insulator strings shall be assembled on the ground. These shall be cleaned and examined before hoisting. Insulators with hair cracks or clips or those having glazing defects exceeding half centimeter square will not be used. No separate rates shall be quoted for insulator hoisting. The charges shall be included in the rates of string of conductors.

3.4.7.9. ACCESSORIES:

Accessories like vibration dampers; armour rods etc. for the conductor shall also be fitted on the line. Armour rods shall be provided at all suspension support of the conductors and vibration dampers shall be provided at both ends of each span at suitable distances from the supporting points for each phase conductor. All accessories shall be clean, smooth and in perfect condition before fitting.

3.4.7.10. GROUNDING:

The Contractor shall measure the tower footing resistance (TFR) of each tower in the diverted section of the line after it has been erected and before the stringing of the earth wire during dry weather. Each tower shall be earthed and the tower footing resistance shall not exceed 10 ohms. Generally pipe type earthing shall be done in accordance with the latest additions and revisions of:

IS: 3043 : Code of practice for Earthing.

IS: 5613 : Code of practice for Design, Installation and maintenance (Part-II/Section-2) of overhead power lines.

The earthing will be effected by burying 3 meters long GI pipe in a 300 mm diameter and 3750 mm deep pit at a distance of not less than 3650 mm diagonally away from the stubs and filling in the pit with finely broken coke having the granule sizes not less than 25 mm and salt in such a way that a minimum cover of 125 mm thick salt mixed coke shall be maintained from the pipe on all sides and that the top edge of the pipe shall be at least 600 mm below the ground level. A 45 X 6 mm-galvanized steel flat shall be used to connect the tower with the pipe. The galvanizing steel strip shall be buried not less than 600 mm deep from the ground level. The tenderer will quote the erection charges for each earthing inclusive of the cost of coke and salt, excavation and back filling etc.

3.4.8. FINAL CHECKING, TESTING & COMMISSIONING

(a) After completion of the works, final checking of the line shall be done by the contractor to ensure that all the foundation work; tower erection and stringing have been done strictly according to the specifications and as approved by the Employer. All the works shall be thoroughly inspected keeping in view the following main points:

1. All the tower members are correctly used strictly according to final approved drawings are free of any defect or damage whatsoever.
2. All the bolts are fully tightened and they are properly punched.
3. The stringing of the conductors and earth wire done to maintain proper sag.

The contractor shall submit a report to the above effect. After final checking the line shall be tested for insulation and any defect found shall be rectified by the contractor.

(b) After satisfactory tests on the line and on approval by the Employer the line shall be energized at full operating voltage before handing over.

Section - 4
General Conditions of Supply and Erection of AEGCL

This Section 'General Conditions of Supply and Erection of AEGCL' supplementary to Section -5 'Special Conditions of Contract' of this document and can be downloaded from www.aegcl.co.in. Whenever there is a conflict, the provisions in SCC or the other Sections of this bid document shall prevail over those in the 'General Conditions of Supply and Erection of AEGCL'.

Section - 5
Special Conditions of Contract

5.1.0 DEFINITION OF TERMS

"Contract" means the Contract Agreement entered into between the Purchaser and the Contractor, together with the Contract Documents referred to therein; they shall constitute the Contract, and the term "the Contract" shall in all such documents be construed accordingly.

"Contract Documents" means the documents listed in Article 1.1 (Contract Document) of the Contract Agreement (including any amendments thereto).

"Contract Price" means the price payable to the Contractor as specified in the Agreement, subject to such additions and adjustments thereto or deductions therefrom, as may be made pursuant to the Contract.

"Day" means calendar day

"Year" means 365 days.

"Month" means calendar month.

"Party" means the "Purchaser" or the "Contractor", as the context requires.

"*Purchaser*" means the Assam Electricity Grid Corporation Limited (in short AEGCL) and its assignees.

The "*Contractor*" shall mean the tenderer / bidder whose tender/ bid has been accepted by the "Purchaser" and shall include the bidder's legal representatives, successors and assignees.

"Goods" means all of the commodities, raw material, machinery and equipment, and/or other materials that the Contractor is required to supply to the Purchaser under the Contract.

"Delivery" means the transfer of the Goods from the Contractor to the Purchaser in accordance with the terms and conditions set forth in the Contract.

"Completion" means the fulfilment of the Related Services by the Contractor in accordance with the terms and conditions set forth in the Contract.

"Related Services" means the services incidental to the supply of the goods, such as insurance, installation, training and initial maintenance and other similar obligations of the Contractor under the Contract.

The "Specification" shall mean the "Purchaser's Requirements".

"Contractor" means the natural person, a company/firm, or a combination of these, whose bid to perform the Contract has been accepted by the Purchaser and is named as such in the Agreement, and includes the legal successors or permitted assigns of the Contractor.

5.2.0 CONTRACT DOCUMENTS

5.2.1. Subject to Article 1.2 (Order of Precedence) of the Contract Agreement, all documents forming part of the Contract (and all parts thereof) are intended to be correlative, complementary and mutually explanatory. The Contract shall be read as a whole.

5.3.0 LEGAL JURISDITCTION

5.3.1. For any litigation arising out of the contract which cannot be resolve through mutual agreement or through Arbitration the honorable Guwahati High Court will have sole jurisdiction of all settlement.

5.4.0 LANGUAGE

5.4.1. The ruling language of the Contract shall be English.

5.5.0 SCOPE OF WORK

5.5.1. The Goods and Related Services to be supplied shall be as specified in section 3- Purchaser's requirement and quantity as stated in Schedule No. 1 of Section -2, Bidding Forms.

5.5.2. **Unless otherwise stipulated in expressly limited in the *Purchaser's Requirements*, the Scope of Supply shall include all such items not specifically mentioned in the Contract but that can be reasonably inferred from the Contract as being required for attaining Delivery and Completion of the Goods and Related Services as if such items were expressly mentioned in the Contract.**

5.6.0 DELIVERY SCHEDULE

5.6.1. Contract completion period shall be counted from contract commencement date. Completion of the work shall be within **9 (Nine) months** from Contract commencement.

5.6.2. The Delivery of the Goods and Completion of the Related Services shall be in accordance with the Delivery and Completion Schedule specified in the Article 3 of the Contract Agreement (Contract Forms) or within such extended time to which the Contractor shall be entitled under *SCC* ***Clause 5.16.0*** hereof.

5.7.0 CONTRACT PRICE

5.7.1. The Contract Price shall be as specified in **Article 2 (Contract Price)** of the Contract Agreement.

5.7.2. Unless an escalation clause is provided for in the **Article 2 (Contract Price)**, the Contract Price shall be a firm shall not subject to any alteration, except in the event of a Change in the scope or changes in applicable tax rates or as otherwise provided in the Contract.

5.8.0 TERMS OF PAYMENT

5.8.1. The contract price shall be paid as specified in subsequent sub-clauses, if not provided in Contract Forms, Section-6.

A. <u>Progressive payments for supply items including F&I within the country</u>:

1. Within 60 (sixty) days from the date of submission of the invoice against supply, not more than 60% (sixty percent) payment of the total supply invoice value would be made, on receipt and acceptance of materials in full and good conditions. However, GST amount on invoice would be paid 100% or as per Govt. Rules.
2. Maximum 10 (ten) Nos. of progressive supply invoice would be entertained.
3. Remaining 40% (forty percent) retention amount would be released subject to fulfilment of the following conditions –

(a) 50% of balance supply amount would be paid on completion of 50% of the total erection works of the project.

(b) Remaining 50% of the supply amount would be paid on completion of 100% erection, testing and commissioning activities of the project, which should be certified by the Project Manager.

B. <u>Progressive payments for erection works:</u>

1. Within 60 (sixty) days from the date of submission of invoice against foundation, erection & civil works, not more than 80% (eighty percent) of the total verified invoice would be made. However, GST amount on invoice would be paid 100% or as per Govt. Rules.
2. Maximum 8 (eight) Nos. of progressive erection invoice/ bill would be entertained during entire erection work.
3. The 1st progressive erection invoice/ bill would be entertained on completion of 30% of total erection cost of the project.
4. Maximum 6 (six) Nos. of additional progressive erection invoice/ bill would be entertained. Minimum value of each invoice should be 10% of the total ordered value for foundation, erection and civil work.
5. Remaining 20% of the erection value would be paid on successful completion of 100% erection, testing and commissioning activities of the project, which should be certified by the Project Manager.

5.8.2. Documents required along with invoice: Following documents need to be submitted along with invoice – Payment of invoice would be entertained subject to submission of the following documents with the invoice –

(a) Unconditional acceptance of the Letter of Award and signed Contract Agreement, by the contractor for supply.
(b) Detailed Supply Plan /Project Execution Plan/ PERT chart approved by AEGCL.
(c) Documentary evidence of dispatch (R/R or receipt of L/R)-(for Supply only.)
(d) Contractor's detailed invoice & packing list identifying contents of each shipment/supply. -(for Supply only.)
(e) Copy of certificate in respect of payments of State/ Central taxes, duties, levies, etc. have been made against supply of equipment/ materials through contractors/ sub-vendors under the contract, if applicable.
(f) Certified copy of Insurance Policy/ Insurance Certificate.
(g) Manufacturer's/ Contractor's Guarantee Certificate of Quality.
(h) Material Dispatch Clearance Certificate (MDCC)/ Dispatch Instructions (DI) for dispatch of materials from the manufacturer's works. MDCC/DI shall be issued by authorised Officer of the AEGCL. -(for Supply only.)
(i) Manufacturer's/ Supplier's copy of challan.-(for Supply only.)
(j) Copy of testing/ inspection of equipment/ material clearance certificate issued by AEGCL. -(for Supply only.)
(k) Copy of Goods Receipt Sheet (GRS)/ Materials Received Voucher (MRV)/ Materials Handing Over Voucher (MHOV). - (for Supply only.)
(l) Joint Measurement Sheet. - (for erection only.)
(m) Labour Licence, Insurance, etc. - (for erection only.)

5.8.3. Payments would be made subject to fulfilment of the following conditions -

(i) Advance copy of invoices in duplicate with documents/ information as stated under clause (a) to (m), Whichever is applicable, are to be furnished sufficiently in advance.
(ii) Any demurrage charges on account of late intimation and/or delivery of documents by the Bank is to be borne by the supplier.
(iii) The supplier should intimate the dispatch of each and every consignment to the Purchaser and the Consignee.
(iv) All Bank charges are to be borne by the supplier.
(v) Payment through Bank for supply of equipment/ materials, dispatched by Rail would be allowed if required, however the equipment/ materials have to reach at destination/ project site in full and good condition and additional expenditure in any form for this is to be borne by the supplier. A prior approval from appropriate authority of the AEGCL is to be taken in this respect.
(vi) Payment through Bank for supply of equipment/ materials, dispatched by road transport would be allowed if required, provided that, the transport agency is approved by the Banking Association and prior approval thereof is given by the AEGCL's appropriate authority.

5.8.4. ADVANCE PAYMENT

No advance payment is applicable for this contract.

5.9.0 PERFORMANCE SECURITY DEPOSIT

5.9.1. The successful bidder shall have to deposit to the extent of **10% (Ten percent) of the Contract price** as performance security (Bank Guarantee), within fifteen (15) days of receipt of notification of award, duly pledged in favor of the Managing Director, AEGCL and such security deposits shall be valid up to 60(sixty) days beyond the warranty period as per **clause 5.11.3**.

5.9.2. If the Contractor fails or neglects to observe, perform any of his obligations under the contract, it will be

lawful for the "Purchaser" to forfeit either in full or in part at his absolute discretion, the security deposit furnished by the Contractor.

5.9.3. No interest shall be payable on such deposits.

5.10.0 RETENTION MONEY

5.10.1. Deduction shall be as per payment terms clause no. 5.8.2.

5.10.2. No interest shall be payable on such deductions/retentions.

5.11.0 WARRANTY

5.11.1. The Contractor/Manufacturer warrants that all the Goods are new, unused, and of the most recent or current models, and that they incorporate all recent improvements in design and materials, unless provided otherwise in the Contract.

5.11.2. The Contractor/Manufacturer further warrants that the Goods shall be free from defects arising from any act or omission of the Contractor or arising from design, materials, and workmanship, under normal use in the conditions prevailing in the country of final destination.

5.11.3. The warranty shall remain valid for **18 (Eighteen*) months*** from the date of successful commissioning after the Goods, or any portion thereof as the case may be, have been delivered to and accepted at the final destination indicated in the Purchaser's Requirement. Bidder may at its discretion offer extra warranty which shall be evaluated in the mark based evaluation system

5.11.4. If during the Period Warranty any defect should be found, the Purchaser shall give Notice to the Contractor/Manufacture stating the nature of any such defects together with all available evidence thereof, promptly following the discovery thereof. The Purchaser shall afford all reasonable opportunity for the Contractor/Manufacturer to inspect such defects.

5.11.5. If having been notified, the Contractor/Manufacturer fails to remedy the defect within a period of 15 (fifteen) days, the Purchaser may, following notice to the Contractor/Manufacturer, proceed to do such work, and the reasonable costs incurred by the Purchaser in connection therewith shall be paid to the Purchaser by the Contractor or may be deducted by the Purchaser from any amount due the Contractor or claimed under the Performance Security.

5.12.0 QUANTITY VARIATION

5.12.1. "Purchaser" shall have the right to increase/decrease the ordered quantity by 35% within 50 days of the period of completion and the same shall be carried out at the same rates /prices and terms and conditions stipulated in the contract except in regard to completion schedule, which shall be mutually agreed upon in case of enhancement of the ordered quantity.

5.13.0 INSPECTION AND TESTING

5.13.1. The Contractor shall at its own expense and at no cost to the Purchaser carry out all such tests and/or inspections of the Goods and Related Services as are specified in Sections 3, Purchaser's Requirements.

5.13.2. The inspections and tests shall generally be conducted on the premises of the Contractor/Manufacture. Subject to Sub-Clause 5.13.3, The Contractor shall furnish, all reasonable facilities and assistance, including access to drawings/process chart and production data to the inspectors at no charge to the Purchaser.

5.13.3. The Purchaser or its designated representative shall be entitled to attend the tests and/or inspections referred to in SCC Sub-Clause 5.13.2, provided that the Purchaser bear all of its own costs and expenses incurred in connection with such attendance including, but not limited to, all traveling and board and lodging expenses.

5.13.4. Whenever the Contractor is ready to carry out any such test and/or inspection, the Contractor shall give a reasonable advance notice (not less than 21 days) of such test and/or inspection and of the place and time thereof to the Purchaser. The Contractor shall obtain from any relevant third party or manufacturer any

necessary permission or consent to enable the Purchaser or its designated representative to attend the test and/or inspection.

5.13.5. The Contractor/manufacture shall provide the Purchaser with a certified report of the results of any such test and/or inspection.

5.13.6. The Purchaser may reject any Goods or any part thereof that fail to pass any test and/or inspection or do not conform to the specifications. The Contractor shall either rectify or replace such rejected Goods or parts thereof or make alterations necessary to meet the specifications at no cost to the Purchaser, and shall repeat the test and/or inspection, at no cost to the Purchaser, upon giving a notice pursuant to SCC Sub-Clause 5.13.4

5.13.7. If it is agreed between the Purchaser and the Contractor that the Purchaser shall not attend the test and/or inspection, then the Contractor may proceed with the test and/or inspection, and should provide the Purchaser with a certified report of the results thereof.

5.13.8. The Contractor agrees that neither the execution of a test and/or inspection of the Goods or any part thereof, nor the attendance by the Purchaser or its representative, nor the issue of any report pursuant to SCC Sub-Clause 5.13.5 & 5.13.7, shall release the Contractor from any warranties or other obligations under the Contract.

5.14.0 INSURANCE

5.14.1. The "Contractor" shall, have, unless, otherwise specified by the Purchaser, insure the materials through their underwrites at their cost and shall keep it insured against any loss/ damaged/ pilferage in transit, destruction or damage by fire/ flood, without exposure to vagaries of weather or through riot, civil commotion, war or rebellion, for the full value of the materials until the materials are received at the purchaser's destination store.

5.14.2. The "Contractor" shall be responsible for safe arrival at destination, unloading and receipt of the materials by the consignee. The Purchaser will discharge consignee's responsibilities only and shall not be responsible for any damage/ loss/ pilferage/ non-delivery by the carriers.

5.14.3. In case of any loss/ damage/ pilferage/ non-delivery/ short delivery by carriers etc.; the Contractor shall replace free of cost missing / damaged / lost materials within 30(thirty) days from the receipt of report thereof from the consignee(s) without waiting for settlement of their claims with their carriers / under-writers. Normally, such reports from the consignee(s) to the Contractor shall be initiated within a period of 30(thirty) days from the date of receipt of each consignment by him /them.

5.14.4. If it is considered necessary that the damage equipment either in part or in full to be sent back to the manufacturer's works for repair, the manufacturers/ Contractors will furnish the Bank Guarantee for the full value of equipment needing repairs and such Bank Guarantee shall remain valid till such time, the equipment are repaired and returned to the consignee in good condition. The to and fro freight, handling and insurance charges in such cases will be borne by the Contractor.

5.14.5. Unless, otherwise mutually agreed upon, in case of failure by the Contractor to replenish /make good of the loss /damage /short supplied quantities, within the stipulated period, the Purchaser reserves the right to forfeit the security deposit and/ or adjust any outstanding payment to the "Contractor" with the Purchaser or take any other appropriate action.

5.15.0 FORCE MAJEURE

5.15.1. "Force Majeure" shall mean any event beyond the reasonable control of the Purchaser or of the Contractor, as the case may be, and which is unavoidable notwithstanding the reasonable care of the party affected, and shall include, without limitation, the following:

(a) war, hostilities or warlike operations whether a state of war be declared or not, invasion, act of foreign enemy and civil war

(b) rebellion, revolution, insurrection, mutiny, usurpation of civil or military government, conspiracy, riot, civil commotion and terrorist acts

(c) confiscation, nationalization, mobilization, commandeering or requisition by or under the order of any

government or de jure or de facto authority or ruler or any other act or failure to act of any local state or national government authority

(d) strike, sabotage, lockout, embargo, import restriction, port congestion, lack of usual means of public transportation and communication, industrial dispute, shipwreck, shortage or restriction of power supply, epidemics, quarantine and plague

(e) earthquake, landslide, volcanic activity, fire, flood or inundation, tidal wave, typhoon or cyclone, hurricane, storm, lightning, or other inclement weather condition, nuclear and pressure waves or other natural or physical disaster

(f) shortage of labor, materials or utilities where caused by circumstances that are themselves Force Majeure.

5.15.2. If either party is prevented, hindered or delayed from or in performing any of its obligations under the Contract by an event of Force Majeure, then it shall notify the other in writing of the occurrence of such event and the circumstances thereof within fourteen (14) days after the occurrence of such event.

5.15.3. The party who has given such notice shall be excused from the performance or punctual performance of its obligations under the Contract for so long as the relevant event of Force Majeure continues and to the extent that such party's performance is prevented, hindered or delayed. The Time for Completion shall be extended in accordance with ***SCC Clause 5.16.0***.

5.16.0 EXTENSION OF TIME FOR COMPLETION

5.16.1. The Time(s) for Completion specified in the Article 3 of the Contract Agreement (Contract Forms) shall be extended if the Contractor is delayed or impeded in the performance of any of its obligations under the Contract by reason of any of the following:

(a) any Change in the scope of works by the Purchaser; which justifies extension of completion time as provided in ***SCC Clause 5.12.0***; and

(b) any occurrence of Force Majeure as provided in ***SCC Clause 5.15.0***.

5.16.2. Except where otherwise specifically provided in the Contract, the Contractor shall submit to the Purchaser's Representative a notice of a claim for an extension of the Time for Completion, together with particulars of the event or circumstance justifying such extension as soon as reasonably practicable after the commencement of such event or circumstance. As soon as reasonably practicable after receipt of such notice and supporting particulars of the claim, the Purchaser and the Contractor shall agree upon the period of such extension. In the event that the Contractor does not accept the Purchaser's estimate of a fair and reasonable time extension, the Contractor shall be entitled to refer the matter to a Dispute Board, pursuant to ***SCC Sub-Clause 5.19.0***.

5.17.0 LIQUIDATED DAMAGE

5.17.1. The Contractor guarantees that it shall attain Completion of the Works within the Time for Completion specified in the Contract Agreement pursuant to ***SCC Sub-Clause 5.6.2***, or within such extended time to which the Contractor shall be entitled under ***SCC Clause 5.16.0*** hereof.

5.17.2. If the Contractor fails to attain Completion of the Works within the Time for Completion or any extension thereof under ***SCC Clause 5.16.0***, the Contractor shall pay to the Purchaser liquidated damages at the rate of ***1% (one percent)*** of the total Contract Price per week or part thereof delay. The aggregate amount of such liquidated damages shall in no event exceed ***10% (ten percent)*** of the total contract price.
However, the payment of liquidated damages shall not in any way relieve the Contractor from any of its obligations to complete the Works or from any other obligations and liabilities of the Contractor under the Contract.

5.17.3. Once the aggregated "Liquidated damage" reaches10% of the total contract price, the Purchaser may consider following actions:

(a) Procure the undelivered material/ equipment and/or complete the balance works from elsewhere giving notice to the Contractor and to recover any extra expenditure incurred thereby for having to

procure these materials and works at higher price, at the risk and responsibility of the Contractor; or

(b) Cancel the contract wholly or in part and to complete the works at the full risk and cost of the Contractor and forfeit the security deposit.

(c) Declare it as a "Contractual Failure" and act in accordance with ***SCC Clause 5.18.0***.

5.18.0 CONTRACTUAL FAILURE

5.18.1. In the event of contractual failure of any respect on the part of the Contractor, the Purchaser shall be entitled to operate security deposit or any deposit or any payment due to Contractor irrespective of whether his default relates to the particular orders or not towards the Purchaser's claim for damages arising out of the failure. In addition, the Purchaser may black-list or bans the "Contractor" or pending enquiry, suspend him or take any other steps considered suitable.

5.19.0 ARBITRATION

5.19.1. If at any time, any question, disputes or differences whatsoever shall rise between the Purchaser and the Contractor, upon or in relation to or in connection with the contract, either party may forthwith give notice to the other in writing of the existence of such question of dispute or difference and the same shall be referred to the adjudication of three Arbitrators, one to be nominated by the Purchaser the other by the Contractor and the third by the President of the Institution of Engineers, India/ Retired or Sitting Judge not below the status of a retired Judge of High Court of India. If either of the parties fail to appoint its arbitrators within 60(sixty) days after receipt of notice of the appointment of arbitrators then the President of the Institution of Engineers /retired or sitting Judge of India, as the case may be, shall have the power at request of either of the parties, to appoint an Arbitrator. A certified copy of the "President" making such an appointment shall be furnished to both parties

5.19.2. The arbitration shall be conducted as per provisions of the Indian Arbitration Act, shall be held at Guwahati or any other place as may be decided by the Purchaser. The decision of the majority of Arbitrators shall be final & binding upon the parties and the expenses of the arbitration shall be paid as may be determined by the Arbitrator. However, any dispute arising out of this contract will first be discussed and settled bilaterally between Purchaser and the Contractor.

Section 6 - Contract Forms

This Section contains the format for Notification of Award, the Contract Agreement and Appendices to the Contract Agreement which, once completed, will form the Contract along with the Section 4 and Section 5.The Bidder should note that this Section shall be completed fully at the time of Contract signing.

[AEGCL's letter head]

Notification of Award

[date]

To: [Name and address of the Contractor]

This is to notify you that your Bid dated *[date]* for execution of the *[name of the work]* against *[Bid identification number]* for the Contract Price in the aggregate of Rupees *[amounts in numbers and words]* (as per Price Schedule-1), as corrected and modified in accordance with the Instructions to Bidders is hereby accepted, and it is decide to award on you the ('**____Name of work**___') covering inter-alia supply of all equipment and services specified in bidding document.

You are requested to furnish the Performance Security within fifteen (15) days in accordance with the Conditions of Contract, using for that purpose one of the Performance Security Forms included in Section 6 (Contract Forms) of the Bidding Document.

[Authorized Signature]
[Name and Title of Signatory]
Assam Electricity Grid Corporation Limited

Attachment: 1) Price schedule (with arithmetic correction if any)
2) Draft Contract agreement

STAMP(Rs. 100, Non Judicial)

1. Contract Agreement

(Supply and related services Contract)

THIS AGREEMENT made the _____day of _____, ____,
BETWEEN

Assam Electricity Grid Corporation Limited (herein after referred to as AEGCL), a corporation incorporated under the laws of Company Act, 1956 and having its registered office at First Floor, Bijuli Bhawan, Paltanbazar, Guwahati-781001, Assam and [***name of Contractor***], a firm/company incorporated under the laws of Company Act, 1956 and having its principal place of business at [***address of Contractor***] (hereinafter called "the Contractor"). [***~~in case of JV insert name and address of the Lead Partner as well as other Partners~~]***

WHEREAS AEGCL desires to engage the Contractor to the 'Ex-works Supply Contract' (also referred to as the 'First Contract') covering inter-alia supply of all equipment and materials for the complete execution of '**Construction of 1(One) No. of B+6 tower on pile foundation at Loc. No. 16 and 1(one) No. B+6 tower on normal foundation at Loc. No. 15 of 132KV Dibrugarh-Tinsukia S/C line near Tingrai River'** as detailed in the Contract Document ("the Facilities"), and the Contractor has agreed to such engagement upon and subject to the terms and conditions hereinafter appearing.

NOW IT IS HEREBY AGREED as follows:

Article 1
Contract Documents

1.1 **Contract Documents** (Reference SCC Clause 5.2.0)
The following documents shall constitute the Contract between the Purchaser and the Contractor, and each shall be read and construed as an integral part of the Contract:

(a) This Contract Agreement and the Appendices hereto
(b) Letter of Price Bid and Price Schedules submitted by the Contractor
(c) Letter of Technical Bid and Technical Proposal submitted by the Contractor
(d) Special Conditions of Contract
(e) General Conditions of Supply and Erection.
(f) Specification (Purchaser's Requirements)
(g) Drawings (Purchaser's Requirements)
(h) Other completed Bidding Forms submitted with the Letters of Technical and Price Bids
(i) Guaranteed and other Technical Particulars (as submitted with the Bid).
(j) Any other documents shall be added here

1.2 **Order of Precedence** (Reference SCC Clause 5.2.0)
In the event of any ambiguity or conflict between the Contract Documents listed above, the order of precedence shall be the order in which the Contract Documents are listed in Article 1.1 (Contract Documents) above.

1.3 **Definitions** (Reference SCC Clause 5.1.0)
Capitalized words and phrases used herein shall have the same meanings as are ascribed to them in the SCC.

Article 2
Contract Price and Terms of Payment

2.1 **Contract Price** (Reference SCC Clause 5.7.0)
The Purchaser hereby agrees to pay to the Contractor the Contract Price in consideration of the performance by the Contractor of its obligations hereunder. The Contract Price shall [. . . ***amounts in rupees in words*** . . .], [. . . ***amounts in figures***. . .] as specified in Price Schedule No. 3 (Grand Summary).
The Contract Price is fixed.

2.2 **Terms of Payment** (Reference SCC Clause 5.8.0)
The terms and procedures of payment according to which the Purchaser will pay the Contractor are given in the Appendix (Terms and Procedures of Payment) hereto.

Article 3
Commencement Date and Completion Time

3.1 **Commencement Date** (Reference SCC Clause 5.6.1)
The Commencement Date upon which the period until the Time for Completion of the Works shall be counted from is the date when this Contract Document is signed.

3.2 **Completion Time** (Reference SCC Clause 5.6.2)
The whole works under the scope of this Contract shall be completed within **9** (**Nine)** months from Contract Commencement Date with following schedule:

Article 4. Appendices

4.1 The Appendices listed in the attached List of Appendices shall be deemed to form an integral part of this Contract Agreement.

4.2 Reference in the Contract to any Appendix shall mean the Appendices attached hereto, and the Contract shall be read and construed accordingly.

IN WITNESS WHEREOF the Purchaser and the Contractor have caused this Agreement to be duly executed by their duly authorized representatives the day and year first above written.

Signed by, for and on behalf of the Purchaser

[***Signature***]

[***Title***]

in the presence of

[***Signature***]

[***Title***]

Signed by, for and on behalf of the Contractor

[***Signature***]

[***Title***]

in the presence of

[***Signature***]
[***Title***]

APPENDICES

Appendix 1 - Special Conditions of Contract
Appendix 2 - Completion schedule (bar chart)
Appendix 3 - Performance Security.
Appendix 4 - Price Schedule.
Appendix 5 - Guaranteed Technical Particulars
(Other documents if required shall be added here)

Appendix 3 - Form of Performance Security
Bank Guarantee

(To be stamped in accordance with Stamp Act)
(The non-Judicial Stamp Paper should be in the name of issuing Bank)

Bank's Name:
Address of Issuing Branch or Office:
Email id and phone no for correspondence:

Beneficiary: Managing Director, AEGCL
Name and Address of Purchaser

Bid Security No.:

*WHEREAS*_____ *[name and address of Contractor]* (hereinafter called "the Contractor") has undertaken, in pursuance of LoA No. _____ dated _____ to execute _____ *[name of Contract and brief description of Works]* (hereinafter called "the Contract");

AND WHEREAS it has been stipulated by you in the said Contract that the Contractor shall furnish you with a Bank Guarantee by a recognized/scheduled bank for the sum specified therein as security for compliance with its obligations in accordance with the Contract;

AND WHEREAS we have agreed to give the Contractor such a Bank Guarantee;

NOW THEREFORE we hereby affirm that we are the Guarantor and responsible *to* you, on behalf of the Contractor, up to a total of _____ *[amount of Guarantee]* _____*[in words],* such sum being payable in the currencies in which the Contract Price is payable, and we undertake to pay you, upon your first written demand and without cavil or argument, any sum or sums within the limits of _____ *[amount of Guarantee]* as aforesaid without your needing to prove or to show grounds or reasons for your demand for the sum specified therein.

We hereby waive the necessity of your demanding the said debt from the Contractor before presenting us with the demand.

We further agree that no change or addition to or other modification of the terms of the Contract or of the Works to be performed there under or of any of the Contract documents which may be made between you and the Contractor shall in any way release us from any liability under this guarantee, and we hereby waive notice of any such change, addition or modification.

BG expiry date:
BG clam date:

Bank's seal and authorized signature(s)

NOTE

1. *All italicized text is for use in preparing this form and shall be deleted from the final document. An amount is to be inserted by the Guarantor, representing the percentage of the Contract Price specified in the Contract.*
2. *This guarantee shall be valid upto 30 days beyond the Warranty Period as per the Contract.*
3. *For BG amount equal to or more than 50,000.00, BG should be signed by two bank officers to be valid.*

4. ***Address of the banker with email and phone number for correspondence with banker should be clearly mentioned. Any correspondence related to the BG with the banker shall be made to the address mentioned in the BG.***