Tender Specification No. DTL / DGM (TL) C / T-121 / 07-08

DELHI TRANSCO LIMITED
(A Govt. of NCT of Delhi Undertaking)

Erection, testing & commissioning of 220 KV Double circuit overhead transmission tower Line from Maharani Bagh 400 KV S/Stn to Gazipur 220 KV S/Stn.

(This document is meant for the exclusive purpose of bidding against this specification and shall not be transferred, reproduced or otherwise used for purposes other than that for which it is specifically issued).
Tender Specification No. DTL / DGM (TL) C / T-121 / 07-08

VOLUME-I

CONDITIONS OF CONTRACT
(ERECTION CONTRACT)

DELHI TRANSCO LIMITED
(A Govt. of NCT of Delhi Undertaking)

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CONDITIONS OF CONTRACT

FOR
Erection, testing & commissioning of 220 KV Double circuit overhead transmission tower Line from Maharani Bagh 400 KV S/Stn to Gazipur 220 KV S/Stn.

DELHI TRANSCO LIMITED
(A GOVT. OF NCT OF DELHI UNDERTAKING)
<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Description</th>
<th>Section</th>
<th>Page No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Invitation to Bid</td>
<td>INV</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Instruction to Bidders</td>
<td>INB</td>
<td>1-19</td>
</tr>
<tr>
<td>3</td>
<td>General Terms and Conditions of Contract</td>
<td>GCC</td>
<td>1-27</td>
</tr>
<tr>
<td>4</td>
<td>Erection Conditions of Contract</td>
<td>ECC</td>
<td>1-17</td>
</tr>
<tr>
<td>5</td>
<td>Annexures</td>
<td>ANNEX</td>
<td>1-23</td>
</tr>
</tbody>
</table>
SECTION – INV

INVITATION TO BID
Sealed tenders are invited in Two-Part Bid System from the experienced and registered contractors of DTL/PGCIL/Railways/MES/SEBs and any other Organizations dealing with EHV system etc. having valid electrical work contractor license and EPF Code No. for the following works:

<table>
<thead>
<tr>
<th>S. No</th>
<th>Tender No.</th>
<th>Description of Work</th>
<th>Estimated Cost</th>
<th>Bid Guarantee</th>
<th>Tender Cost</th>
<th>Completion Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>DTL/DGM(TL) C/T-121 / 07-08</td>
<td>Erection, testing &amp; commissioning of 220 KV Double circuit overhead transmission tower Line from Maharani Bagh 400 KV S/Stn to Gazipur 220 KV S/Stn.</td>
<td>Rs.360.93 lacs</td>
<td>Rs 7.22 lacs</td>
<td>Rs. 5000/-</td>
<td>Nine Months</td>
</tr>
</tbody>
</table>

Last Date of Receiving the Tender: 25.03.2008 upto 12.30PM
Date of opening of Tender: 25.03.2008 At 01.30 PM

IMPORTANT GUIDELINES: Bids are to be submitted in TWO PARTS viz: PART-A: Techno-Commercial Bid containing complete technical and all commercial aspects except price, and PART-B: Price Bid containing price element only. The envelopes containing the bids will be SUPERSCRIBED APPROPRIATELY WITH TYPE OF BID, TENDER NO. DUE DATE, ETC. AND OTHER RELEVANT DETAILS.

1. Bid Guarantee, as applicable, will be accompanied with the Techno-commercial Bid only.

2. The Techno-commercial Bids only will be opened on the due date. After Techno-commercial evaluation of the Bids, the price bids of successful bidders will be opened by the Tender Opening Committee in presence of representatives of the Bidders, if any.

3. DTL reserves the right to reject any / full tenders without assigning any reasons.
4. The contractor should have valid Electrical License, Work Contract Registration No., Service tax registration, Work Contract Sales Tax Registration Certificates & EPF Code Number, PAN No. etc.

5. The tender documents can be purchased on any working day from the office of Manager(TL) Construction-I, Room No. 26, Shakti Deep Building, Anarkali Market Complex, Jhandewalan Extn., New Delhi–110 055 respectively on or before 24.03.2008 between 10.00AM to 05.00PM on presentation of Pay Order / Demand Draft of Rs.5000/- (non-refundable) in favour of Delhi Transco Limited.

6. The tender will be received upto 12.30PM on 25.03.2008 in the office of DGM(TL)Constn., Room No.9, Shakti Deep Building, Anarkali Market Complex, Jhandewalan Extn., New Delhi–110055 and will be opened at 01.30PM on the same day. In case of the day of opening of tenders happens to be holiday. The tenders will be opened on next working day.

7. The tender document can also be downloaded from website of DTL www.delhitransco.gov.in, however, offer can only be considered if the prospective bidder deposits the tender cost.
8. The sealed tender documents should accompany the requisite Bid Guarantee defined in the tender specifications in the form of demand draft/pay order/BG in favour of Delhi Transco Limited. Registered Contractors will also have to deposit the requisite Bid Guarantee.
SECTION-INB

INSTRUCTION TO BIDDERS
## INSTRUCTION TO BIDDERS

### CONTENTS

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>DESCRIPTION</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A. INTRODUCTION</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.0</td>
<td>General Instructions</td>
<td>1</td>
</tr>
<tr>
<td>2.0</td>
<td>Qualifying Requirements of Bidders</td>
<td>1-3</td>
</tr>
<tr>
<td>3.0</td>
<td>Cost of Bidding</td>
<td>3</td>
</tr>
<tr>
<td><strong>B. THE BIDDING DOCUMENTS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.0</td>
<td>Contents of Bidding Document</td>
<td>3</td>
</tr>
<tr>
<td>5.0</td>
<td>Understanding of Bid Documents</td>
<td>3</td>
</tr>
<tr>
<td>6.0</td>
<td>Clarifications on Bid Documents</td>
<td>4</td>
</tr>
<tr>
<td>7.0</td>
<td>Amendment to Bidding Document</td>
<td>4</td>
</tr>
<tr>
<td><strong>C. PREPARATION OF BIDS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.0</td>
<td>Language of Bid</td>
<td>4-5</td>
</tr>
<tr>
<td>9.0</td>
<td>Local Conditions</td>
<td>5</td>
</tr>
<tr>
<td>10.0</td>
<td>Documents comprising the Bid</td>
<td>5</td>
</tr>
<tr>
<td>11.0</td>
<td>Scope of the proposal</td>
<td>5-6</td>
</tr>
<tr>
<td>12.0</td>
<td>Bid Price</td>
<td>6-7</td>
</tr>
<tr>
<td>13.0</td>
<td>Alternate Proposals</td>
<td>7</td>
</tr>
<tr>
<td>14.0</td>
<td>Price basis and payments</td>
<td>7</td>
</tr>
<tr>
<td>15.0</td>
<td>Taxes and Duties</td>
<td>7-8</td>
</tr>
<tr>
<td>16.0</td>
<td>Price Adjustment</td>
<td>8-9</td>
</tr>
<tr>
<td>17.0</td>
<td>Time Schedule</td>
<td>9</td>
</tr>
<tr>
<td>18.0</td>
<td>Contract Quality Assurance</td>
<td>9</td>
</tr>
<tr>
<td>19.0</td>
<td>Insurance</td>
<td>9</td>
</tr>
<tr>
<td>20.0</td>
<td>Erection tools and tackles</td>
<td>9</td>
</tr>
<tr>
<td>21.0</td>
<td>Bid Guarantee</td>
<td>9-11</td>
</tr>
<tr>
<td>22.0</td>
<td>Period of validity of Bids</td>
<td>11</td>
</tr>
<tr>
<td><strong>SUBMISSION OF BIDS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>23.0</td>
<td>Format of Bid</td>
<td>11-12</td>
</tr>
<tr>
<td>24.0</td>
<td>Signature of Bids</td>
<td>12</td>
</tr>
<tr>
<td>25.0</td>
<td>Sealing &amp; Marking of Bids</td>
<td>12-13</td>
</tr>
<tr>
<td>26.0</td>
<td>Deadline for Submission of Bids</td>
<td>13</td>
</tr>
<tr>
<td>27.0</td>
<td>Late Bids</td>
<td>13</td>
</tr>
<tr>
<td>28.0</td>
<td>Modification &amp; Withdrawal of Bids</td>
<td>13-14</td>
</tr>
<tr>
<td>29.0</td>
<td>Information Required with the Proposal</td>
<td>14</td>
</tr>
</tbody>
</table>
### D. BID OPENING AND EVALUATION

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>30.0</td>
<td>Opening of Bids by Owner</td>
<td>15</td>
</tr>
<tr>
<td>31.0</td>
<td>Clarification of Bids</td>
<td>15</td>
</tr>
<tr>
<td>32.0</td>
<td>Preliminary Examination</td>
<td>15-16</td>
</tr>
<tr>
<td>33.0</td>
<td>Definitions and Meanings</td>
<td>16-17</td>
</tr>
<tr>
<td>34.0</td>
<td>Comparison of Bids</td>
<td>17</td>
</tr>
<tr>
<td>35.0</td>
<td>Contacting the owner</td>
<td>17-18</td>
</tr>
</tbody>
</table>

### E. AWARD OF CONTRACT

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>36.0</td>
<td>Award Criteria</td>
<td>18</td>
</tr>
<tr>
<td>37.0</td>
<td>Owner’s Right to accept any Bid and to Reject any or all Bids</td>
<td>18</td>
</tr>
<tr>
<td>38.0</td>
<td>Notification of Award</td>
<td>18</td>
</tr>
<tr>
<td>39.0</td>
<td>Signing of Contract</td>
<td>18-19</td>
</tr>
<tr>
<td>40.0</td>
<td>Contract Performance Guarantee</td>
<td>19</td>
</tr>
</tbody>
</table>
SECTION-INB

INSTRUCTION TO BIDDERS

A. INTRODUCTION

1.0 GENERAL INSTRUCTIONS

1.1 Delhi Transco limited, New Delhi, hereinafter called DTL/OWNER will receive bids in respect Erection, Testing and Commissioning of:-

Erection, testing & commissioning of 220 KV Double circuit overhead transmission tower Line from Maharani Bagh 400 KV S/Stn to Gazipur 220 KV S/Stn.

as set-forth in the accompanying Specifications. All bids shall be prepared and submitted in accordance with these instructions.

2.0 QUALIFYING REQUIREMENTS OF BIDDERS

2.1 This bidding is open to any tenderer who provides satisfactory, evidence concerning the following that he:

   a. has experience of having successfully completed similar works during last 7 years ending last day of the month previous to the one in which applications are invited should be either of the following:

      i. Three similar completed works costing not less than the amount equal to 40% of the estimated cost, or
      ii. Two similar completed works costing not less than the amount equal to 50% of the estimated cost, or
      iii. One similar completed work costing not less than the amount equal to 80% of the estimated cost.

      ( NOTE : Similar work mean erection, testing and commissioning of 220KV tower lines or higher voltage lines. )

   b. does not anticipate change in the ownership during the proposed period of work (if such a change is anticipated, the scope and effect thereof shall be defined).

   c. For the purpose of this particular bid, bidders shall meet the following minimum criteria:

      i) Minimum Average Annual Turnover (MAAT) of the bidder for best three years out of the last five financial years as annualized should be
          \[ \frac{1.5 \times \text{estimated cost}}{\text{completion period in years}}. \]
ii) Bidder shall have Liquid Assets (LA) and/or evidence of access to or availability of credit facilities of not less than \( \frac{3 \times \text{estimated cost}}{\text{completion period in months}} \).

In case bidder is a holding Company, MAAT & LA referred to in clause 2.1c (i & ii) above shall be, that of holding Company only (i.e. excluding its subsidiary/ group companies). In case bidder is a subsidiary of a holding Company, MAAT & LA referred to in clause 2.2(a) & (b) above shall be that of subsidiary Company only (i.e. excluding its holding Company).

**Note:** In case completion period is less than one (1) year the denominator to calculate MAAT and LA shall be considered as one (1) and twelve (12) respectively.

d. Bidder should give in support of his experience the voltage level, date of order, date of commencement and completion of work including quantum of work and the name of purchaser and detailed scope of services rendered to the purchaser and status of projects in hand including scheduled and completion dates. The tenderer should also enclose along with his technical bid the satisfactory performance certificates of the works completed by him. The tenderer has to fill up the technical bid format attached.

e. has necessary infrastructure to carry out entire job including detailed survey, preparation of profile etc. and should possess all tools, tackles and trained manpower for execution of transmission line works, and

2.1.1 Majority publicly owned enterprises domiciled in India may be eligible to qualify if, in addition to meeting all the qualifying requirements, they also:

(a) are commercially oriented legal entities distinct from the Owner, and are not a government department;

(b) are financially autonomous, as demonstrated by requirements in their constitutions to provide separate audited accounts and return on capital, powers to raise loans and obtain revenues through the sale of goods or services; and

(c) are managerially autonomous

2.2 In addition, the qualifying requirements stated in the accompanying ‘Special Conditions of Contract’ shall also apply.
2.3 The above stated requirements are a minimum and the Owner reserves the right to request for any additional information and also reserves the right to reject the Proposal of any Bidder, if in the opinion of the Owner, the qualification data is incomplete or the Bidder is found not qualified to satisfactorily perform the Contract.

2.4 DTL also reserves the right to relax the qualifying requirement should the circumstances warrant such relaxation in the overall interest of the DTL.

3.0 COST OF BIDDING

3.1 The Bidder shall bear all costs and expenses associated with preparation and submission of its bid including post-bid discussions, technical and other presentations etc. and the Owner will in no case be responsible or liable for those costs, regardless of the conduct or outcome of the bidding process.

B. THE BIDDING DOCUMENTS

4.0 CONTENTS OF BIDDING DOCUMENT

4.1 The goods and services required, bidding procedures and contract terms are prescribed in the Bidding Document.

In addition to the Invitation to Bids, the Bidding Document is a compilation of the following Sections:

a. Instructions to Bidders-Section INB (Vol.I)
b. General Conditions of Contract-Section GCC (Vol.I)
c. Erection Conditions of Contract-Section ECC (Vol.I)
d. Special conditions of Contract (Vol.IA).
e. Bid Form and Price Schedules (Vol.IB)
f. Technical Specification (Vol.II)
g. Technical Data Sheets (Vol.III).

5.0 UNDERSTANDING OF BID DOCUMENTS

5.1 A prospective Bidder is expected to examine all instructions, forms, terms and specifications in the Bid documents and fully inform himself as to all the conditions and matters which may in any way affect the scope of work or the cost thereof. Failure to furnish all information required by the Bid document or submission of a Bid not substantially responsive to the Bid document in every respect will be at the Bidder’s risk and may result in the rejection of its bid.

6.0 CLARIFICATIONS ON BID DOCUMENTS
6.1 If the prospective Bidder finds discrepancies of omissions, in specifications and document or is in doubt as to the true meaning of any part, he shall at once make a request, in writing, for an interpretation/clarification, to the Owner in triplicate. The Owner, then, will issue interpretation(s) and clarification(s) as he may think fit in writing. After receipt of such interpretation(s) and clarification(s), the Bidder may submit his bid but within the time and data as specified in the Invitation to Bid. All such interpretations and clarifications shall form a part of the Bidding Document and shall accompany the Bidder’s proposal. A prospective Bidder requiring any clarification on Bidding Document may notify the Owner in writing. The Owner will respond in writing to any request for such clarification of the Bidding Document which it receives not later than fifteen (15) days prior to the deadline for submission of bids prescribed by the Owner. Written copies of the Owner’s response (including an explanation of the query but without identifying its source) will be sent to all prospective Bidders who have received the Bidding Document.

6.2 Verbal clarification and information given by the Owner or his employee(s), or his representative(s) shall not in any way be binding on the Owner.

6.3 If the tender document is downloaded from website of DTL/Delhi Govt., then in the case of any disputes regarding the content of NIT, DTL’s NIT will govern & it will be final.

7.0 AMENDMENT TO BIDDING DOCUMENT

7.1 At any time prior to the deadline for submission of bids, the Owner may, for any reason, whether at its own initiative or in response to a clarification requested by a prospective Bidder, modify the Bidding Document by amendment(s).

7.2 The amendment will be notified in writing or by telex or cable to all prospective Bidders, which have received the Bidding Document at the address contained in the letter of request for issue of Bidding Document from the Bidders. Owner will bear no responsibility or liability arising out of non-receipt of the same in time or otherwise.

7.3 In order to afford prospective Bidders reasonable time in which to take the amendment into account in preparing their bids, the Owner may, at its discretion, extend the deadline for the submission of bids.

7.4 Such amendments, clarifications, etc. shall be binding on the Bidders and will be given due consideration by the Bidders while they submit their bids and invariably enclose such documents as a part of the bid.

C PREPARATION OF BIDS

8.0 LANGUAGE OF BID
8.1 The bid prepared by the Bidder and all correspondences and documents relating to
the bid, exchanged by the Bidder and the Owner shall be written in the English
language, provided that any printed literature furnished by the Bidder may be
written in another language so that any printed literature furnished by the Bidder
may be written in another language so long as accompanied by an English
translation of its pertinent passages. Failure to comply with this may disqualify a
bid. For purposes of interpretation of the bid, the English translation shall govern.

9.0 LOCAL CONDITIONS

9.1 It will be imperative on each Bidder to fully inform himself of all local conditions
and factors which may have any effect on the execution of the Contract covered
under these documents and specifications. The Owner shall not entertain any
request for clarifications from the Bidders, regarding such local conditions.

9.2 It must be understood and agreed that such factors have properly been
investigated and considered while submitting the Proposals. No claim for
financial adjustment to the Contract awarded under these specifications and
documents will be entertained by the Owner. Neither any change in the time
schedule of the Contract nor any financial adjustments arising thereof shall be
permitted by the Owner, which are based on the lack of such clear information or
its effect on the cost of the Works to the Bidder.

10.0 DOCUMENTS COMPRISING THE BID

10.1 The bidder shall complete the Bid Form inclusive of Price Schedules, Technical
Data Requirements etc. furnished in the Bidding Documents, indicating for the
goods to be supplied and services to be rendered, a brief description of goods and
services, quantity and prices.

10.2 The Bidder shall also submit documentary evidence to establish that the Bidder
meets the Qualification Requirements as detailed in Clause 2.0 above and
accompanying Special Conditions of Contract.

10.3 The Bid Guarantee shall be furnished in a separate cover in accordance with clause
21.0 of Section INB.

11.0 SCOPE OF THE PROPOSAL

11.1 The scope of the proposal shall be on the basis of a single Bidder’s responsibility,
completely covering all the works specified under the accompanying Technical
Specifications. It will include the following:

(a) Detailed design of the each foundations – total 35 nos.(PILE & RAFT ).
(b) Providing Engineering Drawing, Data etc (including RIVER CROSSING, RAILWAY CROSSING & POWER LINE CROSSING). for the Owner’s approval.
(c) Transportation of owner supplied materials from owner’s stores to site of work, including loading/unloading.
(d) Receipt, storage, preservation and conservation of equipment/material at the site.
(e) Pre-assembly, if any, erection, testing & commissioning of the complete line.
(f) Performance and guarantee tests on completion of commissioning.
(g) Some part of the work should be executed by the bidder in the main flow of the river YAMUNA, all necessary arrangement for execution of the work are in the scope of contractor and nothing extra will be paid for execution of the work in the river.

11.2 Bids containing deviations from provisions relating to the following clauses will be considered as non-responsive:

a) **Price Basis and Payments & Price Adjustment**: Clause 14& 16, section INB, Volume-I, Conditions of Contract.
b) **Bid Guarantee**: Clause 21.0, Section INB, Volume-I, Conditions of Contract.
c) **Contract Performance Guarantee**: Clause 40.0, Section INB, Volume-I, Conditions of Contract.
d) **Liquidated damages**: Clause 14.0, Section GCC, Volume-I, Conditions of Contract.
e) **Guarantee**: Clause 15.0, Section GCC, Volume-I, Conditions of Contract.
f) **Payment**: Clause 32.0, section GCC, Volume-I, Conditions of Contract.

However, the Bidders, wishing to propose deviations to any of the above provisions, must provide in the commercial Deviations Schedule of Bid Proposal Sheet in their bid, the cost of withdrawal of such deviations. If the deviation to any of these provisions is not priced, the bid will be rejected. The evaluated cost of the bid shall include, in addition to the costs described in INB clause 34, the cost of withdrawal of the deviations from the above provisions to make the bid fully compliant with these provisions.

At the time of Award of Contract, if so desired by the Owner, the Bidder shall withdraw these deviation listed in Commercial Deviation Schedule of Bid Proposal Sheets in their Bid at the cost of withdrawal stated by him in the bid. In case the Bidder does not withdraw the deviations proposed by him, if any, at the cost of withdrawal stated by him in the bid, his bid will be rejected and his bid security forfeited. The Owner’s determination of a bid’s responsiveness is to be based on the contents of the bid itself without recourse to extrinsic evidence.

11.3 Bids not covering the above entire scope of Works may be treated as incomplete and hence rejected.

11.4 In his Bid, if Bidder does not specifically mentioned about any deviation from the NIT clauses/conditions, it will be taken that NIT temrs are accepted.

**12.0 BID PRICE**
12.1 The Bidder shall quote in the appropriate schedule of Bid Form lump-sum price for the entire scope of works (covered under the Bidding Document) and also the unit rates of the items of work it proposes to execute under the Contract on a base price with price adjustment basis, unless otherwise specified in the Special Conditions of Contract.

12.2 The Bidder shall also furnish the price break-down in the appropriate schedule of Bid Form to indicate the following:

i. Lump-sum charges towards loading, unloading, storage, insurance, erection, testing & commissioning.

ii. Service tax/ Works contract Tax and any other levies legally payable on the transactions between the owner and the bidder.

iii. Any other charges as per the requirements of Special Conditions of Contract/ Technical Specifications.

Total lump sum bid price will be inclusive of above mentioned charges. Any other tax which is not the part of total lump sum bid price shall also be born by bidder.

13.0 ALTERNATE PROPOSALS

13.1 Based on their experience, capabilities, patented research, and development works etc., the Bidder may, in addition to a base Proposal, offer alternate Proposal(s), for reasons of economy or better performance. But in all such cases, the base Proposal shall be strictly in line with the requirements as stipulated in the bidding Documents and only such base Proposal shall be considered for the purposes of evaluation of the Proposals. Should the bid by the successful Bidder contain such alternate Proposal then the Owner at its discretion may accept the same at the time of award of Contract.

14.0 PRICE BASIS AND PAYMENTS

14.1 The Bidders shall quote in their Proposals lump-sum price for the entire scope of works covered under the Technical Specifications as required in the Bid Proposal sheets on a base price plus escalation basis unless otherwise specified in the Special Conditions of Contract. Bidders quoting a system of pricing other than that specified run the risk of rejection.

14.2 Bidders shall indicate bid prices in Indian Rupees only.

15.0 TAXES AND DUTIES

15.1 All customs duties, excise duties, sales taxes and other levies payable by the Bidders in respect of the transaction between the Bidders and their vendors/sub-suppliers while procuring any components, sub-assemblies, raw materials and equipment shall be included in the bid price and no claim on this behalf will be entertained by the Owner.
15.2 The Bidder shall include the Sales Tax on Works Contract, Turnover Tax or any other similar taxes under the Sales tax Act, as applicable in their quoted bid price and DTL would not bear any liability on this account. DTL shall however, deduct such taxes at source as per the rules and issue TDS Certificate to the Contractor. The bidder shall also include Service tax/work contract tax (WCT) and/or any other tax in their quoted bid price and DTL will not bear any liability on this account.

15.3 As regards the Income Tax, surcharge on Income Tax and other corporate taxes the Bidder shall be responsible for such payment to the concerned authorities. Any other tax which is not the part of total lump sum bid price shall also be born by bidder.

16.0 PRICE ADJUSTMENT

16.1 Unless otherwise specified in the accompanying special conditions of contract, the Bidder shall, in his proposals quote a base price which will be subject to price adjustment on account of variations in the cost elements during the period the Contract. The intent of the price adjustment provisions in the bid documents is to provide reasonable protection to the parties to the contract, but within the prescribed limits, against fluctuations of the cost of material, labour etc. during execution of the contract and resulting in variation in the contract price.

16.2 The component of the Bid price which are subject to price adjustment provision and the formula for such price adjustment are described in Clause 31.0, Section GCC.

16.3 The indices for price adjustments shall be clearly named in the Bidder’s proposal in which the erection price has been expressed in the bid. The indices shall be well established and nationally recognized. Preferably only Government indices shall be used. For the Indian Field Labour, the index applicable shall be the all India Consumer Price Index for Industrial Workers as published by the Labour Bureau of the Government of India. The Bidder shall enclose with his proposal authenticated copies of the relevant published indices which reflect the price as of thirty (30) days prior to the date set for opening of bids.

16.4 However, the successful Bidder may be permitted to suggest modifications in the values of co-efficients or group of co-efficients indicated in the Bid in line with the requirements indicated in the above formula provided such successful Bidder is able to satisfy Owner with proper justification for such modifications.

16.5 Bids specify price adjustment provisions other than those specified in these specifications and documents run the risk of rejection. However, a bid submitted with fixed price quotation will not be rejected but the quoted will be treated as base price for the purpose of evaluation and no price variation will be allowed during the currency of the Contract.
16.6 The price adjustment provisions will not be taken into consideration for evaluation.

17.0 TIME SCHEDULE

17.1 The basic consideration and the essence of the Contract shall be strict adherence to the time schedule for performing the specified Works.

17.2 The Owner’s requirement of completion schedule for the Works are mentioned in the accompanying Special Conditions of Contract.

17.3 The completion schedule as stated in the Special Conditions of Contract shall be one of the major factors in consideration of the bids.

17.4 The Owner reserves the right to request for a change in the work schedule during pre-award discussions with successful Bidder.

17.5 The successful Bidder will be required to prepare detailed PERT network and finalise the same with owner as per the requirement of Clause 12.0 Section GCC.

18.0 CONTRACT QUALITY ASSURANCE

18.1 The Bidder shall include in his Proposal the Quality Assurance Programme containing the overall quality management and procedures which he proposes to follow in the performance of the Works during various phases as detailed in relevant clause of the General Technical Conditions.

18.2 At the time of Award of Contract, the detailed Quality Assurance Programme to be followed for the execution of the contract will be mutually discussed and agreed to and such agreed programme shall form a part of the Contract.

19.0 INSURANCE

The Bidder’s insurance liabilities pertaining to the scope of Works are detailed out in Clauses titled ‘insurance’ in General Terms and Conditions of Contract and in erection Conditions of Contract of this Volume-I. Bidder’s attention is specifically invited to these clauses. Bid price shall include all the cost in pursuance of fulfilling all the insurance liabilities under the Contract.

20.0 ERECTION TOOLS & TACKLES

The bidder, under a separate schedule, in his Proposal shall include a list of all special equipment, tools & tackles etc. which he proposes to bring to site for the purpose of erection, handling, testing and commissioning including performance & guarantee tests of the equipment.

21.0 BID GUARANTEE
21.1 The Bidder shall furnish, as part of its bid, bid guarantee for an amount as specified in the accompanying Special Conditions of Contract. The bid guarantee shall be valid, for a period of seven (7) calendar months from the date of opening of bids.

21.2 The bid security is required to protect the Owner against the risk of Bidder’s conduct, which would warrant the guarantee forfeiture, pursuant to Clause 21.7. The bid guarantee shall be made payable to the Owner without any condition whatsoever.

21.3 The bid guarantee shall be denominated in Indian Rupees only and shall be in one of the following forms:

   a. Crossed Bank draft in favour of Delhi Transco Limited, New Delhi, payable at New Delhi, from a reputed commercial Bank / Financial Institutions i.e. IFCI, ICICI, IDBI.

   b. A cheque certified by the Banker as good for payment drawn in favour of Delhi Transco limited, New Delhi payable at New Delhi on a reputed commercial Bank / Financial Institutions i.e. IFCI, ICICI, IDBI.

   c. An irrevocable Bank guarantee issued by a reputed commercial bank / financial institution i.e. IFCI, ICICI, IDBI in favour of Delhi Transco limited, New Delhi. Proforma for the Bank Guarantee is enclosed as Annexure-I to this Volume-I.

21.4 Any bid not secured in accordance with paras 21.1 and 21.3 above will be rejected by the Owner as non-responsive.

21.5 Unsuccessful Bidder’s bid guarantee will be discharged/returned as promptly as possible but not later than 60 days after the expiration of the period of bid validity prescribed by the Owner.

21.6 The successful Bidder’s bid guarantee will be discharged upon the Bidder’s executing the contract and furnishing the performance Guarantee pursuant to Clause 40.0.

21.7 The Bid Guarantee may be forfeited:

   a. If a Bidder withdraws/modifies his bid during the period of bid validity specified by the Bidder on the Bid Form; or

   b. In case the Bidder does not withdraws the deviations proposed by him, if any, at the cost of withdrawal stated by him in the bid; or

   c. If a Bidder does not accept the corrections to arithmetical errors identified during preliminary evaluation of his bid pursuant to Clause 32.2, Section-INB; or

   d. In case of a successful Bidder, if the Bidder fails to sign the Contract; or
e. In case of a successful bidder, if the Bidder fails to furnish the Performance Guarantee.

21.8 The bid guarantee shall be submitted alongwith the bid in separate sealed envelope in one original and two copies. Any bid not accompanied by the required bid security in accordance with provisions of this clause will be rejected by the owner and shall not be opened.

21.9 No interest shall be payable by the Owner on the above bid security.

22.0 PERIOD OF VALIDITY OF BIDS

22.1 Bids shall remain valid for 6 (six) calendar months after the date of bid opening prescribed by the Owner unless otherwise specified in the accompanying Special Conditions of Contract. The Owner as non-responsive will reject a bid valid for a shorter period.

22.2 In exceptional circumstances the owner may solicit the Bidder’s consent to an extension of the period of validity. The request and the response thereto shall be made in writing (including cable or telex). The bid security provided under Clause 21.0 shall also be extended by the same period as the extension in the validity of the Bid. A Bidder may refuse the request without forfeiting his bid security. A Bidder granting the request will not be required or permitted to modify its bid.

D. SUBMISSION OF BIDS

23.0 FORMAT OF BID

23.1 The Bidder shall prepare the bid in duplicate clearly marking each “Original Bid” and “copy of bid” as appropriate. In the event of any discrepancy between them, the original shall govern.

23.2 The original and all copies of the bid shall be typed or written in indelible ink and shall be signed by the Bidder or a person or persons duly authorized to bind the Bidder to the Contract. Written Power-of-Attorney accompanying the bid shall indicate the letter of authorization. The person or persons signing the bid shall initial all pages of the bid, except for un-amended printed literature.

23.3 The Bidders must submit the qualifying data in two copies, as required in this instruction to Bidders in a sealed envelope submitting Proposals, superscribed as under:

QUALIFYING DATA FOR THE ERECTION, TESTING AND COMMISSIONING OF

(Name of Transmission Line)
23.4 The bid shall contain no interlineations, erasures or overwriting except as necessary to correct errors made by the Bidder, in which case the person or persons signing the bid shall initial such corrections.

24.0 SIGNATURE OF BIDS

24.1 The bid must contain the name, residence and place of business of the person or persons making the bid and must be signed and sealed by the Bidder with his usual signature. The names of all persons signing should also be typed or printed below the signature.

24.2 Bid by a partnership must be furnished with full names of all partners and be signed with the partnership name, followed by the signature(s) and designation(s) of the authorized partner(s) or other authorized representative(s).

24.3 Bids by Corporation/Company must be signed with the legal name of the Corporation/Company by the President, Managing Director or by the Secretary or other person or persons authorized to bid on behalf of such Corporation/Company in the matter.

24.4 A bid by a person who affixes to his signature the word “President”, ‘Managing Director’, ‘Secretary’, Agent’ or other designation without disclosing his principal will be rejected.

24.5 Satisfactory evidence of authority of the person signing on behalf of the Bidder shall be furnished with the bid.

24.6 The Bidder’s name stated on the Proposal shall be the exact legal name of the firm.

24.7 Bids not conforming to the above requirements of signing may be disqualified.

25.0 SEALING AND MARKING OF BIDS

25.1 The original and copy of the Technical bid shall be submitted in a sealed envelope marked as Technical Bid. Similarly the original and copy of the Price bid shall also be submitted in another sealed envelope marked as Price Bid. These two envelopes along with the envelope of Bid Guarantee shall be placed in an outer envelope.

25.2 The inner and outer envelopes shall:
a. be addressed to the Owner at the following address:
Dy. General Manager (TL) Constrn.
Delhi Transco Limited,
Room No. 9, “Shakti Deep”,
Anarkali Market Complex,
Jhandewalan Extension
NEW DELHI-110055

b. bear the name of work, the specification/Tender number, validity of offer, particulars of Bid Guarantee (Amount, Name & address of Bank or Financial Institution, Demand Draft/Cheque/Bank Guarantee Number and Date) and the words “DO NOT OPEN BEFORE…………………………”.

25.3 The envelopes shall indicate the name and address of the Bidder to enable the bid to be returned unopened in case it is declared “late” or “rejected”.

25.4 If the outer envelope is not sealed and marked as required by para 25.2 above, the Owner will assume no responsibility for the bid’s misplacement or premature opening.

25.5 The Bid Guarantee must be submitted in a separate sealed envelope.

26.0 DEADLINE FOR SUBMISSION OF BIDS

26.1 The Bidders have the option of sending the bid by registered post or submitting the bid in person. Bids submitted by telex/telegram will not be accepted. No request from any Bidder to the Owner to collect the Proposals from airlines, cargo agents etc. shall be entertained by the Owner.

26.2 Bids must be received by the Owner at the address specified under para 25.2, not later than the time and date mentioned in the Invitation to Bid.

26.3 The owner may, at its discretion, extend this deadline for the submission of bids by amending the Bidding Document, in which case all rights and obligations of the Owner and Bidders previously subject to the deadline will thereafter be subject to the deadline as extended.

27.0 LATE BIDS

27.1 Any bid received by the owner after the time and date fixed or extended for submission of bids prescribed by the owner, will be rejected and/or returned unopened to the bidder.

28.0 MODIFICATION AND WITHDRAWAL OF BIDS
28.1 The bidder may modify or withdraw its bid after the bid’s submission provided that written notice of the modification or withdrawal is received by the Owner prior to the deadline prescribed for submission of bids.

28.2 The bidder’s modification or withdrawal notice shall be prepared, sealed, marked and dispatched in accordance with the provisions of Clause 25.0 of INB.

28.3 No bid may be modified subsequent to the deadline for submission of bids.

28.4 No bid may be withdrawn in the interval between the deadline for submission of bids and the expiration of the period of bid validity specified by the Bidder on the Bid Form. Withdrawal/modification of a bid during this interval may result in the Bidder’s forfeiture of its bid security.

29.0 INFORMATION REQUIRED WITH THE PROPOSAL

29.1 The bid should contain major construction equipment proposed to be deployed, method of erection and the proposed erection organizational structure.

29.2 The above information shall be provided by the Bidder in the form of separate sheets, drawings, catalogues, etc. in two copies.

29.3 Any bid not containing sufficient descriptive material to describe accurately the equipment proposed may be treated as incomplete and hence rejected. Such descriptive materials and drawings submitted by the Bidder will be retained by the Owner. Any major departure from these drawings and descriptive material submitted will not be permitted during the execution of the Contract without specific written permission of the owner.

29.4 Oral statements made by the Bidder at any time regarding quality, quantity or arrangement of the equipment or any other matter will not be considered.

29.5 Standard catalogue pages and other documents of the Bidder may be used in the bid to provide additional information and data as deemed necessary by the Bidder.

29.6 The Bidder, along with his proposal, shall submit a list of recommended erection equipment and materials which will be required for the purpose of erection of equipment and materials supplied under the Contract.

29.7 In case the ‘Proposal’ information contradicts specification requirements, the specification requirements will govern, unless otherwise brought out clearly in the Technical/Commercial Deviations Schedule.

E. BID OPENING AND EVALUATION
30.0 OPENING OF BIDS BY OWNER

30.1 The Owner will open Technical bids in the presence of Bidders’ representatives (upto 2 persons) who choose to attend at the date and time for opening of bids in the Invitation to Bid or in case any extension has been given thereto, on the extended bid opening date and time notified to all the Bidders who have purchased the Bidding Document. The Bidders’ representatives who are present shall sign in a register evidencing their attendance. Those finding qualified in Technical bids, only their Price bid will be opened later on.

30.2 The Bidders’ names, bid prices, modifications, bid withdrawals and the presence or absence of the requisite bid guarantee and such other details as the owner, at its discretion, may consider appropriate will be announced at the opening.

30.3 No electronic recording devices will be permitted during bid opening.

31.0 CLARIFICATION OF BIDS

31.1 To assist in the examination, evaluation and comparison of bids the owner may, at its discretion, ask the Bidder for a clarification of its bid. The request for clarification and the response shall be in writing and no change in the price or substance of the bid shall be sought, offered or permitted.

32.0 PRELIMINARY EXAMINATION

32.1 The Owner will examine the bids to determine whether they are complete, whether any computational errors have been made, whether required sureties have been furnished, whether the documents have been properly signed, and whether the bids are generally in order.

32.2 Arithmetical errors will be rectified on the following basis: If there is a discrepancy between the unit price and the total price, which is obtained by multiplying the unit price and quantity, or between subtotals and the total price, the unit or subtotal price shall prevail and total price shall be corrected. If there is a discrepancy between words and figures, the amount in words will prevail. If the Bidder does not accept the correction of the errors, its bid will be rejected and the bid security will be forfeited in accordance with clause 21.7 (c) in section INB.

The Bidder should ensure that the prices furnished in various price schedules are consistent with each other. In case of any inconsistency in the prices furnished in the specified price schedules to be identified in Bid Form for this purpose, the Owner shall be entitled to consider the highest price for the purpose of evaluation and for the purpose of award of the Contract use the lowest of the prices in these schedules.
32.3 Prior to the detailed evaluation, the Owner will determine the substantial responsiveness of each bid to the Bidding Document. For purpose of this Clause, a substantially responsive bid is one which conforms to all the terms and conditions of the Bidding Document without material deviations. A material deviation is one which affects in any way the prices, quality, quantity or delivery period of the equipment or which limits in any way the responsibilities or liabilities of the Bidder of any right of the Owner as required in these specifications and documents. The Owner’s determination of a bid’s responsiveness shall be based on the contents of the bid itself without recourse to extrinsic evidence.

32.4 A bid determined as not substantially responsive will be rejected by the owner and may not subsequently be made responsive by the Bidder by correction of the non-conformity.

32.5 The Owner may waive any minor informality or non-conformity or irregularity in a bid which does not constitute a material deviation, provided such waiver does not prejudice or affect the relative ranking of any Bidder.

33.0 DEFINITIONS AND MEANINGS

For the purpose of evaluation and comparison of bids, the following meanings and definitions will apply:

a. ‘Bid Price’ shall mean the base price quoted by each Bidder in his Proposal for the complete scope of works.

b. ‘Differential Price’ shall mean the summation of the equalizing elements of price for parameter differential or deficiencies in the services determined from the bidder’s Proposal.

c. ‘Cost Compensation for Deviations’ shall mean the Rupee value of deviations from the Bidding Documents as determined from the bidder’s Proposal.


33.1 Calculation of Differential Price and Cost Compensation for Deviations.

33.1.1 The Differential Price to be added to the bid Price of each bid during evaluation and comparison shall be derived as under:

\[ \text{Differential price (DP)} = n_1 F_1 + n_2 F_2 + \ldots + n_n F_n \]

where \( F_1, F_2, \ldots, F_n \) are the various factors in Indian Rupees per unit of parameter differential or deficiency in the services offered as stipulated in these specifications; \( n_1, n_2, \ldots, n_n \) are the respective parameter differential or deficiency in the corresponding units to be determined from the Bidder’s Proposal. The above factors and corresponding
units of parameter differential are brought out in the Technical Specifications and/or Special Conditions of Contract.

33.1.2 Deviations from the Bidding Documents in so far as paraacticable, will be converted to a Rupee value (D) and added to the bid price to compensate for the deviation from the Bidding Document while evaluating the bids. In determining the Rupee value of the deviations the Owner will use parameters consistent with those specified in the specifications and documents and/or other information as necessary and available to the Owner.

34.0 COMPARISON OF BIDS

34.1 The bids shall be compared on the basis of lump-sum prices (i.e. for prices for services to be rendered as quoted by the Bidder) for the entire scope of the Proposal as defined in the Bidding Document.

34.2 For comparison purpose all the evaluated bid prices shall be in Indian Rupees as under:

\[ W = M + DP + D \]

Where

\[ W = \text{Total Comparison Price} \]
\[ M = \text{Bid price in Indian Rupees (Components of erection cost + other components, if any).} \]
\[ DP = \text{Differential price in Indian Rupees calculated according to para 33.1.1 above.} \]
\[ D = \text{Cost compensation for deviations calculated according to para 33.1.2 above.} \]

34.3 All evaluated bid prices of all the Bidders, shall be compared among themselves to determine the lowest evaluated bid and, as a result of this comparison, the lowest Bid will be selected for the award of the Contract.

35.0 CONTACTING THE OWNER

Bids shall be deemed to be under consideration immediately after they are opened and until such time official intimation of award/rejection is made by the Owner to the Bidders. While the bids are under consideration, Bidders and/or their representatives or other interested parties are advised to refrain from contacting by any means, the owner and/or his employees/representatives on matters related to the bids under consideration. The Owner, if necessary, will obtain clarifications on the bids by requesting for such information from any or all the bidders, either
in writing or through personal contacts as may be necessary. Bidders will not be permitted to change the substance of the bids after the bids have been opened.

F. AWARD OF CONTRACT

36.0 AWARD CRITERIA

36.1 The Owner will award the Contract to the successful Bidder whose bid has been determined to be substantially responsive and has been determined as the lowest evaluated bid, provided further that the Bidder is determined to be qualified to perform the Contract satisfactorily. The Owner shall be the sole judge in this regard.

36.2 Further, the Owner reserves the right to award separate Contracts to two or more parties in line with the terms and conditions specified in the accompanying Technical Specifications.

37.0 OWNER’S RIGHT TO ACCEPT ANY BID AND TO REJECT ANY OR ALL BIDS

37.1 The Owner reserves the right to accept or reject any bid and to annul the bidding process and reject all bids at any time prior to award of Contract, without thereby incurring any liability to the affected Bidder or Bidders or any obligation to inform the affected Bidder or Bidders of the grounds for the Owner’s action.

38.0 NOTIFICATION OF AWARD

38.1 Prior to the expiration of the period of bid validity and extended validity period, if any, the Owner will notify the successful Bidder in writing by registered letter or by cable or telex or fax, to be confirmed in writing by registered letter, that its bid has been accepted.

38.2 The notification of award will constitute the formation of the Contract.

38.3 Upon the successful Bidder’s furnishing of Contract performance Guarantee pursuant clause 40.0 the Owner will promptly notify each unsuccessful Bidder and will discharge its bid security pursuant to Clause 21.0.

39.0 SIGNING OF CONTRACT

39.1 At the same time as the Owner notifies the successful Bidder that its bit has been accepted, the Owner will send the bidder the detailed Letter of Award, incorporating all agreements between the parties.

39.2 Within 60 days of receipt of the detailed Letter of Award, the successful Bidder shall sign and date the same and return it to the owner.
39.3 The Bidder will prepare the Contract Agreement as per the proforma enclosed at Annexure-IX to this Volume-I and the same will be signed within 60(sixty) days of Notification of Award.

40.0 CONTRACT PERFORMANCE GUARANTEE

40.1 As a Contract performance Security, the successful Bidder, to whom the work is awarded, shall be required to furnish a Performance Guarantee from (a) a Public Sector Bank or (b) a Scheduled Indian Bank having paid up capital (net of an accumulated losses) of Rs.100 crores or above (the latest annual report of the Bank should support compliance of capital adequacy ratio requirement) or (c) any foreign Bank or subsidiary of a foreign bank with overall international corporate rating or rating of long term debt not less than A – (A minus or equivalent by reputed rating agency in the form attached as Annexure-II to this Volume-I in favour of the Owner. The guarantee amount shall be equal to ten percent (10%) of the Contract Price and it shall guarantee the faithful performance of the Contract in accordance with the terms and conditions specified in these documents and specifications. The guarantee shall be valid upto 90 days after the end of Warranty Period.

40.2 The Performance Guarantee shall cover additionally the following guarantees to the Owner:

   a. The successful Bidder guarantees the successful and satisfactory operation of the equipment furnished and erected under the Contract, as per the specifications and documents.

   b. The successful Bidder further guarantees that the equipment provided and installed/erected by him shall be free from all defects in design, material and workmanship and shall upon written notice from the Owner fully remedy free of expenses to the Owner such defects as developed under the normal use of the said equipment within the period of guarantee specified in the relevant clause of the General Terms and Conditions in this Volume-I / Special Conditions of Contract.

40.3 The Contract Performance Guarantee is intended to secure the performance of the entire contract. However, it is not to be construed as limiting the damages under clause entitled “Equipment performance Guarantee” in Technical Specifications, Volume-II and damages stipulated in other clauses in the Bid documents.

40.4 The Performance Guarantee will be returned to the Contractor without any interest at the end of guarantee period, unless otherwise specified in the Special Conditions of Contract.

END OF SECTION – INB
SECTION – GCC

GENERAL TERMS & CONDITIONS OF CONTRACT
# GENERAL TERMS & CONDITIONS OF CONTRACT

## CONTENTS

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>DESCRIPTION</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td>Introduction</td>
<td></td>
</tr>
<tr>
<td>1.0</td>
<td>Definition of Terms</td>
<td>1-5</td>
</tr>
<tr>
<td>2.0</td>
<td>Application</td>
<td>5</td>
</tr>
<tr>
<td>3.0</td>
<td>Standards</td>
<td>5</td>
</tr>
<tr>
<td>4.0</td>
<td>Language and Measures</td>
<td>5</td>
</tr>
<tr>
<td>5.0</td>
<td>Contract Documents</td>
<td>5</td>
</tr>
<tr>
<td>6.0</td>
<td>Use of Contract Documents and Information</td>
<td>6</td>
</tr>
<tr>
<td>7.0</td>
<td>Construction of the Contract</td>
<td>6-7</td>
</tr>
<tr>
<td>8.0</td>
<td>Jurisdiction of Contract</td>
<td>7</td>
</tr>
<tr>
<td>9.0</td>
<td>Manner of Execution of Contract</td>
<td>7</td>
</tr>
<tr>
<td>10.0</td>
<td>Enforcement of terms</td>
<td>7</td>
</tr>
<tr>
<td>11.0</td>
<td>Completion of Contract</td>
<td>8</td>
</tr>
<tr>
<td>B.</td>
<td>Guarantees &amp; Liabilities</td>
<td></td>
</tr>
<tr>
<td>12.0</td>
<td>Time - The Essence of Contract</td>
<td>8</td>
</tr>
<tr>
<td>13.0</td>
<td>Effectiveness of Contract</td>
<td>8</td>
</tr>
<tr>
<td>14.0</td>
<td>Liquidated Damages</td>
<td>9</td>
</tr>
<tr>
<td>15.0</td>
<td>Guarantee</td>
<td>9-10</td>
</tr>
<tr>
<td>16.0</td>
<td>Taxes, Permits &amp; Licenses</td>
<td>10</td>
</tr>
<tr>
<td>17.0</td>
<td>Replacement of Defective Parts and Materials</td>
<td>10-11</td>
</tr>
<tr>
<td>18.0</td>
<td>Patent Rights and Royalties</td>
<td>11</td>
</tr>
<tr>
<td>19.0</td>
<td>Defence of Suits</td>
<td>12</td>
</tr>
<tr>
<td>20.0</td>
<td>Limitation of Liabilities</td>
<td>12</td>
</tr>
<tr>
<td>21.0</td>
<td>Engineer’s Decision</td>
<td>12</td>
</tr>
<tr>
<td>22.0</td>
<td>Power to vary or Omit Work</td>
<td>12-13</td>
</tr>
<tr>
<td>Section</td>
<td>Description</td>
<td>Page</td>
</tr>
<tr>
<td>---------</td>
<td>-----------------------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>23.0</td>
<td>Assignment and Sub-letting of Contract</td>
<td>14</td>
</tr>
<tr>
<td>24.0</td>
<td>Change of Quantity</td>
<td>14</td>
</tr>
<tr>
<td>25.0</td>
<td>Cooperation with other Contractors and Consulting Engineers</td>
<td>15</td>
</tr>
<tr>
<td>26.0</td>
<td>No Waiver of Rights</td>
<td>15</td>
</tr>
<tr>
<td>27.0</td>
<td>Certificate not to affect Right of Owner and Liability of Contractor</td>
<td>15</td>
</tr>
<tr>
<td>28.0</td>
<td>Progress Reports and Photographs</td>
<td>15</td>
</tr>
<tr>
<td>29.0</td>
<td>Taking Over</td>
<td>16</td>
</tr>
<tr>
<td>C.</td>
<td><strong>Contract Security and Payment</strong></td>
<td></td>
</tr>
<tr>
<td>30.0</td>
<td>Contract Performance Guarantee</td>
<td>16</td>
</tr>
<tr>
<td>31.0</td>
<td>Contract Price Adjustment</td>
<td>16-17</td>
</tr>
<tr>
<td>32.0</td>
<td>Payment</td>
<td>18-20</td>
</tr>
<tr>
<td>33.0</td>
<td>Deductions from Contract Price</td>
<td>20</td>
</tr>
<tr>
<td>D.</td>
<td><strong>Risk Distribution</strong></td>
<td></td>
</tr>
<tr>
<td>34.0</td>
<td>Transfer of title</td>
<td>20-21</td>
</tr>
<tr>
<td>35.0</td>
<td>Insurance</td>
<td>21-22</td>
</tr>
<tr>
<td>36.0</td>
<td>Liability for Accidents and Damages</td>
<td>22</td>
</tr>
<tr>
<td>37.0</td>
<td>Delays by Owner or his Authorized Agents</td>
<td>22</td>
</tr>
<tr>
<td>38.0</td>
<td>Demurrage, Wharfage, etc.</td>
<td>22</td>
</tr>
<tr>
<td>39.0</td>
<td>Force majeure</td>
<td>23</td>
</tr>
<tr>
<td>40.0</td>
<td>Suspension of Work</td>
<td>23</td>
</tr>
<tr>
<td>41.0</td>
<td>Contractor’s Default</td>
<td>23-24</td>
</tr>
<tr>
<td>42.0</td>
<td>Termination of Contract on Owner’s initiative</td>
<td>24-25</td>
</tr>
<tr>
<td>43.0</td>
<td>Frustration of Contract</td>
<td>25-26</td>
</tr>
<tr>
<td>44.0</td>
<td>Grafts and Commissions etc.</td>
<td>25</td>
</tr>
<tr>
<td>E.</td>
<td><strong>Resolution of Disputes</strong></td>
<td></td>
</tr>
<tr>
<td>45.0</td>
<td>Settlement of Disputes</td>
<td>26</td>
</tr>
<tr>
<td>46.0</td>
<td>Arbitration</td>
<td>26-27</td>
</tr>
<tr>
<td>47.0</td>
<td>Reconciliation of accounts</td>
<td>27</td>
</tr>
</tbody>
</table>
A. INTRODUCTION

1.0 DEFINITION OF TERMS

1.1 The ‘Contract’ means the agreement entered into between the Owner and the Contractor as per the Contract Agreement signed by the parties, including all attachments and appendices thereto and all documents incorporated by reference therein.

1.2 ‘Owner’ shall mean the Delhi Transco Limited., New Delhi, India (A Government of NCT of Delhi Undertaking) and shall include its legal representatives, successors and assigns.

1.3 ‘Contractor’ or ‘Manufacturer’ shall mean the Bidder whose bid will be accepted by the Owner for the award of the Works and shall include such successful Bidder’s legal representatives, successors and permitted assigns.

1.4 ‘Sub-Contractor’ shall mean the person named in the Contract for any part of the Works or any person to whom any part of the Contract has been sublet by the Contractor with the consent in writing of the Engineer and will include the legal representatives, successors and permitted assigns of such person.

1.5 ‘Engineer’ shall mean the officer appointed in writing by the Owner to act as Engineer from time to time for the purpose of the Contract.

1.6 ‘Consulting Engineer’/’Consultant’ shall mean any firm or person duly appointed as such from time to time by the owner.

1.7 The terms ‘Equipment’, ‘Stores’ and ‘Materials’ shall mean and include equipment, stores and materials to be provided by the Contractor or the Owner under the Contract.

1.8 ‘Works’ shall mean and include the furnishing of equipment, labour and services, as per the Specifications and complete erection, testing and putting into satisfactory operation including all transportation, handling, unloading and storage at the Site as defined in the Contract.

1.9 ‘Specifications’ shall mean the specifications and Bidding Document forming a part of the Contract and such other schedules and drawings as may be mutually agreed upon.
1.10 ‘Site’ shall mean and include the land and other places on, into or through which the works and the related facilities are to be erected or installed and any adjacent land, paths, street or, reservoir which may be allocated or used by the Owner or Contractor in the performance of the Contract.

1.11 The term ‘Contract Price’ shall mean the lump-sum price quoted by the Contractor in his bid with additions and/or deletions as may be agreed and incorporated in the Letter of Award, for the entire scope of the works.

1.12 The term ‘Erection portion’ of the contract price shall mean the value of field activities of the works including erection, testing and putting into satisfactory operation including successful completion of performance and guarantee tests to be performed at Site by the Contractor including cost of insurances.

1.13 ‘Manufacturer’s Works’ or ‘Contractor’s Works’ shall mean the place of work used by the manufacturer, the Contractor, their collaborators/associates or Sub-Contractors for the performance of the Contract.

1.14 ‘Inspector’ shall mean the Owner or any person nominated by the owner from time to time, to inspect the equipment; stores or Works under the Contract and/or the duly authorized representative of the Owner.

1.15 ‘Notice of Award of Contract’/‘Letter of Award’/‘Telex of Award’ shall mean the official notice issued by the Owner notifying the contractor that his bid has been accepted.

1.16 ‘Date of Contract’ shall mean the date on which Notice of Award of Contract/Letter of Award has been issued.

1.17 ‘Month’ shall mean the calendar month. ‘Day’ or ‘Days’ unless herein otherwise expressly defined shall mean calendar day or days of 24 hours each.

A ‘Week’ shall mean continuous period of seven (7) days.

1.18 ‘Writing’ shall include any manuscript, type written or printed statement, under or over signature and/or seal as the case may be.

1.19 When the words ‘Approved’, ‘subject to Approval’, ‘Satisfactory’, ‘Equal to’, ‘Proper’, ‘Requested’, ‘As directed’, ‘where directed’, ‘when directed’, ‘Determined by’, ‘Accepted’, ‘Permitted’, or words and phrases of like importance are used the approval, judgment, direction etc. is understood to be a function of the Owner/Engineer.

1.20 Test on completion shall mean such tests as prescribed in the contract to be performed by the Contractor before the work is taken over by the owner.
1.21 ‘Performance and Guarantee Tests’ shall mean all operational checks and tests required to determine and demonstrate capacity, efficiency, and operating characteristics as specified in the Contract Documents.

1.22 The term ‘Final Acceptance’/’taking over’ shall mean the Owner’s written acceptance of the Works performed under the Contract, after successful commissioning/completion of performance and Guarantee tests, as specified in the accompanying Technical Specifications or otherwise agreed in the contract.

1.23 ‘Commercial Operation’ shall mean the condition of operation in which the complete equipment covered under the contract is officially declared by the owner to be available for continuous operation at different loads up to and including rated capacity. Such declaration by the Owner, however, shall not relieve or prejudice the Contractor of any of his obligations under the Contract.

1.24 ‘Guarantee Period’/’Maintenance Period’ shall mean the period during which the contractor shall remain liable for repair or replacement of any defective part of the works performed under the Contract.

1.25 ‘Latent Defects’ shall mean such defects caused by faulty designs, material or workmanship which cannot be detected during inspection, testing etc. based on the technology available for carrying out such tests.

1.26 ‘Drawing’, ‘Plans’ shall mean all:
   a. Drawings furnished by the Owner/Consultant as a basis of Bid/Proposals.
   b. Supplementary drawings furnished by the Owner/Consultant to clarify and to define in greater detail the intent of the contract.
   c. Drawings submitted by the Contractor with his bid provided such drawings are acceptable to the owner/Consultant.
   d. Drawings furnished by the owner/Consultant to the Contractor during the progress of the work; and
   e. Engineering data and drawings submitted by the Contractor during the progress of the work provided such drawings are acceptable to the Engineer/Owner.

1.27 ‘Codes’ shall mean the following including the latest amendments and/or replacement, if any:
   a. Indian Electricity Act, 1905 and Rules and Regulations made thereunder.
   c. Indian Explosives Act, 1884 and Rules and Regulations made thereunder.
   d. Indian Petroleum Act, 1934 and Rules and Regulations made thereunder.
e. A.S.M.E. Test Codes.

f. A.I.E.E. Test codes.

g. American Society of Materials Testing Codes.

h. Standards of the Indian Standards Institution.

i. Other Internationally approved standards and/or rules and regulations touching the subject matter of the Contract.

1.28 Words imparting the singular only shall also include the plural and vice-versa where the context so requires.

1.29 Words imparting ‘Person’ shall include firms, companies, corporations and associations or bodies of individuals, whether incorporated or not.

1.30 Terms and expressions not herein defined shall have the same meaning as are assigned to them in the Indian Sale of Goods Act (1930), failing that in the Indian Contract Act (1872) and failing that in the General Clauses Act (1897) including amendments thereof, if any.

The various Acts and Regulations are normally available for sale from the following addresses:

(i) Deputy Controller
Publication Department
Government of India
Civil Lines
DELHI-110 006

(ii) Deptt.of Publication
(Government of India)
Kitab Mahal
Unit no.21, Emporia Building
Baba Kharak Singh Marg
NEW DELHI-110 001

OR
With leading authorized Government of India Book-Sellers.

1.31 In additional to the above the following definitions shall also apply.

a. ‘All equipment and materials’ to be supplied shall also mean ‘Goods’.

b. ‘Constructed’ shall also mean ‘erected and installed’.
c. ‘Contract Performance Guarantee’ shall also mean ‘Contract performance Security’.

2.0 APPLICATION

These General conditions shall apply to the extent that they are not superceded by provisions in other parts of the contract.

3.0 STANDARDS

The goods supplied and work done under this Contract shall conform to the standards mentioned in the technical Specifications, and, when no applicable standard is mentioned, to the authoritative standard appropriate to the goods and such standards shall be the latest issued by the concerned institution.

4.0 LANGUAGE AND MEASURES

All documents pertaining to the contract including specifications schedules, notices, correspondences, operating and maintenance instructions, drawings or any other writing shall be written in English language. The Metric System or measurement shall be used exclusively in the Contract.

5.0 CONTRACT DOCUMENTS

5.1 The term Contract Document shall mean and include the following which shall be deemed to form an integral part of the Contract:

a. Invitation to Bid including letter forwarding the Bidding Documents, Instructions to Bidders, General Terms and Conditions of Contract and all other documents included under Volume-I and the Special Conditions of Contract.

b. Specifications of the equipment/material to be furnished and erected under the Contract as brought out in the accompanying Technical Specifications.

c. Contractor’s Bid Proposal and the documents attached there to including the letters of clarifications thereto between the contractor and the Owner/Consultant prior to the Award of Contract except to the extent of repugnancy.

d. All the materials, literature, data and information of any sort given by the Contractor alongwith his bid, subject to the approval of the Owner/Consultant.

e. Letter of Award and any agreed variations of the conditions of the documents and special terms and conditions of Contract, if any.

5.2 In the event of any conflict between the above mentioned documents the matter shall be referred to the Engineer whose decision shall be considered as final and binding upon the parties.
6.0 **USE OF CONTRACT DOCUMENTS AND INFORMATION**

6.1 The contractor shall not, without the Owner’s prior written consent, disclose the contract, or any provision thereof, or any specification, plan, drawing, pattern, sample or information furnished by or on behalf of the Owner in connection therewith, to any person other than a person employed by the Contractor in the performance of the Contract. Disclosure to any such employed person shall be made in confidence and shall extend only so far as may be necessary for the purpose of such performance.

6.2 The Contractor shall not, without the Owner’s prior written consent, make use of any document or information enumerated in various Contract documents except for the purpose of performing the Contract.

6.3 The Contractor shall not communicate or use in advertising, publicity, sales releases or in any other medium, photographs or other reproduction of the Works under this Contract, or descriptions of the site, dimensions, quantity, quality or other information, concerning the works unless prior written permission has been obtained from the owner.

6.4 Any document, other than the Contract itself, enumerated in various Contract documents shall remain the property of the Owner and shall be returned (in all copies) to the owner on completion of the Contractor’s performance under the Contract if so required by the Owner.

7.0 **CONSTRUCTION OF THE CONTRACT**

7.1 Notwithstanding anything stated elsewhere in the bid documents, the Contract to be entered into will be treated as an erection Contract.

Award shall be placed on the successful Bidder for providing all other services like inland transportation, insurance for delivery at site, unloading, storage, handling at site, installation, testing and commissioning including performance testing in respect of all the equipment supplied and any other services specified in the Bid Documents.

7.2 In case where the Owner hands over his equipment or material to the Contractor for executing, then the Contractor shall at the time of taking delivery of the equipment/ material be required to execute an Indemnity Bond in favour of the Owner in the form acceptable to DTL for keeping the equipment / material in safe custody and to utilize the same exclusively for the purpose of the said Contract. Samples of proformae for the Indemnity bond are enclosed as Annexure-VII & VIII to this Volume –I.

7.3 The Contract shall in all respects be construed and governed according to Indian Laws.
7.4 It is clearly understood that the total consideration for the Contract(s) has been broken up into various components only for the convenience of payment of advance under the Contract(s) and for the measurement of deviations or modifications under the Contract(s).

8.0 JURISDICTION OF CONTRACT

8.1 The laws applicable to the Contract shall be the laws in force in India. The Courts of Delhi shall have exclusive jurisdiction in all matters arising under this Contract.

9.0 MANNER OF EXECUTION OF CONTRACT

9.1 The Owner, after the issue of the Letter of Award to the Contractor, will send one copy of the final agreement to the Contractor for his scrutiny and approval.

9.2 The Agreement, unless otherwise agreed to, shall be signed within 60 days of the acceptance of the Letter of Award, at the office of the Owner at New Delhi on a date and time to be mutually agreed. The Contractor shall provide for signing of the Contract, Performance Guarantee in six copies, appropriate power of attorney and other requisite materials. In case the Contract is to be signed beyond the stipulated time, the bid Guarantee submitted with the proposal will have to be extended accordingly.

9.3 The Agreement will be signed in six originals and the Contractor shall be provided with one signed original and the rest will be retained by the owner.

9.4 The Contractor shall provide free of cost to the Owner all the Engineering data, drawings, and descriptive materials submitted with the bid, in at least six (6) copies to form a part of the Contract immediately after issue of Letter of Award.

9.5 Subsequent to signing of the Contract, the Contractor at his own cost shall provide the Owner with at least the five (05) true copies of agreement within thirty (30) days after the signing of the Contract.

10.0 ENFORCEMENT OF TERMS

10.1 The failure of either party to enforce at any time any of the provisions of this Contract or any rights in respect thereto or to exercise any option therein provided, shall in no way be construed to be a waiver of such provisions, rights or options or in any way to affect the validity of the Contract. The exercise by either party of any of its rights herein shall not preclude or prejudice either party from exercising the same or any other right it may have under the Contract.
11.0 COMPLETION OF CONTRACT

11.1 Unless otherwise terminated under the provisions of any other relevant clause, this Contract shall be deemed to have been completed on the expiry of the guarantee period as provided for under the clause entitled ‘Guarantee’ in this section of the Volume-I.

B. GUARANTEES & LIABILITIES

12.0 TIME – THE ESSENCE OF CONTRACT

12.1 The time and the date of completion of the Contract as stipulated in the Contract by the Owner without or with modification, if any, and so incorporated in the Letter of Award, shall be deemed to be the essence of the Contract. The Contractor shall so organize his resources and perform his work as to complete it not later than the date agreed to.

12.2 The Contractor shall submit a detailed PERT network/bar chart within the time frame agreed consisting of adequate number of activities covering various key phases of the work within fifteen (15) days of the date of Notification of Award. This network shall also indicate the interface facilities to be provided by the Owner and the dates by which such facilities are needed. The Contractor shall discuss the network so submitted with the Owner and the agreed network shall form part of the Contract Documents. As provided in the clause of Terms of Payment in this Section, finalization of the network/bar charts will be precondition to release of any initial interest bearing advance to the Contractor. During the performance of the Contract, if in the opinion of the Engineer, proper progress is not maintained, suitable changes shall be made in the Contractor’s operations to ensure proper progress without any cost implication to the Owner. The interface facilities to be provided by the Owner in accordance with the agreed network shall also be reviewed while reviewing the progress of the Contractor.

12.3 Based on the above agreed network/bar chart fortnightly reports shall be submitted by the Contractor as directed by the Engineer.

12.4 The above bar charts/ work schedule shall be compatible with the Owner’s computer environment and furnished to the Owner on such media as may be desired by the Owner.

13.0 EFFECTIVENESS OF CONTRACT

The contract shall be considered as having come into force from the date of the notification of award unless otherwise provided in the notification of award.
14.0 LIQUIDATED DAMAGES

14.1.1 If the Contractor fails to successfully complete the commissioning within the time fixed under the Contract, the Contractor shall pay to the owner as liquidated damages and not as penalty a sum specified for each specified period of delay. The details of such liquidated damages are brought out in the accompanying Special Conditions of Contract.

14.1.2 Equipment and materials will be deemed to have been delivered only when all its components, parts are also delivered. If certain components are not delivered in time the equipment and materials will be considered as delayed until such time the missing parts are also delivered.

14.1.3 The total amount of liquidated damages for delay under the Contract will be subject to a maximum of 5% of the Contract price.

14.2 Liquidated damages for not meeting performance guarantee during the performance and guarantee tests shall be assessed and recovered from the Contractor as detailed in Technical Specifications/Special Conditions of Contract. Such liquidated damages shall be without any limitation whatsoever and shall be in addition to damages, if any, payable under any other clause of Conditions of Contract.

15.0 GUARANTEE

15.1 The contractor shall warrant that the equipment will be new, unused and in accordance with the Contractor documents and free from defects in material and workmanship for a period of twelve (12) calendar months commencing immediately upon the satisfactory commissioning. The Contractor’s liability shall be limited to the replacement of any defective parts in the equipment/material of his own manufacture or those of his Sub-Contractors under normal use and arising solely from faulty design, material and/or workmanship provided always that such defective parts are repairable at the site and are not in meantime essential in the commercial use of the equipment. Such replaced/defective parts shall be returned to the Contractor unless otherwise arranged. No repairs or replacement shall normally be carried out by the Engineer when the equipment is under the supervision of the Contractor’s supervisory Engineer.

15.2 In the event of an emergency wherein the judgment of the Engineer delay would cause serious loss or damage, repairs or adjustment may be made by the Engineer or a third party chosen by the Engineer without advance notice to the contractor and the cost of such works shall be paid by the contractor. In the event of such action is taken by the Engineer, the contractor will be notified promptly and he shall assist wherever possible in making necessary corrections. This shall not relieve the contractor’s liability under the terms and conditions of the contract.

15.3 If it becomes necessary for the contractors to replace or renew any defective portions of the work the provision of this clause shall apply to portion of the
work so replaced or renewed until the expiration of twelve (12) months from the date of such replacement or renewal. If any defects are not remedied within a reasonable time, the Engineer may proceed to do the work at the contractor’s risk and cost, but without prejudice to any other rights, which the owner may have against the contractor in respect of such defects.

15.4 The repaired or new parts will be furnished and erected free of cost by the contractor. If any repair is carried out on his behalf at the site, the contractor shall bear the cost of such repairs.

15.5 The cost of any special or general overhaul/repair rendered necessary during the performance period due to defective work carried out by the contractor, the same shall be borne by the contractor.

15.6 The acceptance of the work by the Engineer shall in no way relieve the contractor of his obligations under this clause.

15.7 In the case of those defective parts, which are not repairable at site but are essential for the commercial operation of the equipment/line, the contractor and the engineer shall mutually agree to a programme of replacement or renewal, which will minimize interruption to the maximum extent, in the operation of the equipment/line.

15.8 At the end of the guarantee period, the Contractor’s liability ceases except for latent defects. For latent defects, the Contractor’s liability as mentioned in Clause Nos. 15.1 through 15.7 above, shall remain till the end of 5 years from the date of completion of guarantee period.

In respect of goods supplied by the Sub-Contractors to the Contractor where a longer guarantee (more than 12 months) is provided by such Sub-Contractor, the Owner shall be entitled to the benefits of such longer guarantee.

16.0 TAXES, PERMITS & LICENCES

The contractor shall be liable and pay all non-Indian taxes, duties, levies, lawfully assessed against the owner or the contractor in pursuance of the contract. In addition the contractor shall be responsible for payment of all Indian duties, Levies and taxes lawfully assessed against the contractor for his personal income & property only. This clause shall be read in addition with Clause 15.0 of Section INB of this Volume I. Any other tax which is not the part of total lump sum bid price shall also be born by bidder.

17.0 REPLACEMENT OF DEFECTIVE PARTS AND MATERIALS

17.1 If during the performance of the Contract, the Engineer shall decide and inform in writing to the Contractor that the Contractor has used any equipment, material or
parts of equipment unsound and imperfect or has furnished any equipment / material inferior to the quality specified, the Contractor on receiving details of such defects or deficiencies shall at his own expense within seven (7) days of his receiving the notice, or otherwise, within such time as may be reasonably necessary for making it good, proceed to alter, reconstruct or remove such works and furnish fresh equipment/ materials up to the standards of the specifications. In case, the Contractor fails to do so, the Engineer may on giving the Contractor seven (7) days notice in writing of his intentions to do so, proceed to remove the portion of the works so complained of and at the cost of the Contractor perform all such works or furnish all such equipment/ material provided that nothing in this clause shall be deemed to deprive the Owner of or affect any rights under the Contract which the Owner may otherwise have in respect of such defects and deficiencies.

17.2 The Contractor’s full and extreme liability under this clause shall be satisfied by the payment to the Owner of extra cost, of such replacement procured including erection as provided for in the Contract, such extra cost being the ascertained difference between the price paid by the Owner for such replacement and the Contract Price by portion for such defective equipment/ material/works and repayment of any sum paid by the Owner to the Contractor in respect of such defective equipment/material. Should the Owner not so replace the defective equipment/material, the Contractor’s extreme liability under this clause shall be limited to repayment of all sums paid by the Owner under the Contract for such defective equipment/ materials.

18.0 PATENT RIGHTS AND ROYALTIES

Royalties and fees for patents covering materials, articles, apparatus, devices, equipment or processes used in the works shall be deemed to have been included in the Contract Price. The Contractor shall satisfy all demands that may be made at any time for such royalties or fees and he alone shall be liable for any damages or claims for patent infringements and shall keep the Owner indemnified in that regard. The Contractor shall, at his own cost and expense, defend all suits or proceedings that may be instituted for alleged infringement of any patents involved in the Works, and, in case of an award of damages, the Contractor shall pay for such award. In the event of any suit or other proceedings instituted against the Owner, the same shall be defended at the cost and expense of the Contractor who shall also satisfy/comply with any decree, order or award made against the Owner. But it shall be understood that no such machine, plant, work, material or thing has been used by the Owner for any purpose or any manner other than that for which they have been furnished and installed by the Contractor and specified under these specifications. Final payment to the Contractor by the Owner will not be made while any such suit or claim remains unsettled. In the event any apparatus or equipment, or any part thereof furnished by the Contractor, is in such suit or proceedings held to constitute infringement, and its use is enjoined, the Contractor shall at his option and at his own expense, either procure for the
Owner, the right to continue the use of said apparatus, equipment or part thereof, replace it with non-infringing apparatus or equipment or modify it, so it becomes non-infringing.

19.0 **DEFENCE OF SUITS**

If any action in court is brought against the owner or engineer or an officer or agent of the owner, for the failure, omissions or neglect on the part of the contractor to perform any acts, matters, covenants or things under the contract, or for damage or injury caused by the alleged omission or negligence on the part of the contractor, his agents, representatives or his sub-contractors, or in connection with any claim based on lawful demands of sub-contactors workmen, suppliers or employees, the contractor shall in all such cases indemnify and keep the owner, and the engineer and / or his representative harmless from all losses, damages, expenses or decrees arising of such action.

20.0 **LIMITATION OF LIABILITIES**

The final payment by the owner in pursuance of the contract shall mean the release of the contractor from all his liabilities under the contract. Such final payment shall be made only at the end of the guarantee / warranty period, and till such time as the contractual liabilities and responsibilities of the Contractor, shall prevail. All other payments made under the contract shall be treated as on account payments.

21.0 **ENGINEER’S DECISION**

21.1 In respect of all matters which are left to the decision of the Engineer including the granting or with-holding of the certificates, the Engineer shall, if required to do so by the Contractor, give in writing a decision thereon.

21.2 If, in the opinion of the Contractor, a decision made by the Engineer is not in accordance with the meaning and intent of the Contract, the Contractor may file with the Engineer, within fifteen (15) days after receipt of the decision, a written objection to the decision. Failure to file an objection within the allotted time will be considered as an acceptance of the Engineer’s decision and the decision shall become final and binding.

21.3 The Engineer’s decision and the filing of the written objection thereto shall be a condition precedent to the right to request arbitration. It is the intent of the Agreement that there shall be no delay in the execution of the works and the decision of the Engineer as rendered shall be promptly observed.

22.0 **POWER TO VARY OR OMIT WORK**
22.1 No alterations, amendments, omissions, suspensions or variations of the Works (hereinafter referred to as ‘variation’) under the Contract as detailed in the Contract Documents shall be made by the Contractor except as directed in writing by the Engineer, but the Engineer shall have full powers subject to the provisions hereinafter contained, from time to time during the execution of the Contract, by notice in writing to instruct the Contractor to make such variation without prejudice to the Contract. The Contractor shall carry out such variation and be bound by the same conditions as far as applicable as though the said variations occurred in the Contract Documents. If any suggested variations would, in the opinion of the Contractor, if carried out, prevent him from fulfilling any of his obligations or guarantees under the Contract, he shall notify the Engineer thereof in writing and the Engineer shall decide forthwith whether or not, the same shall be carried out and if the Engineer confirms his instructions, the Contractor’s obligations and guarantees shall be modified to such an extent as may be mutually agree. Any agreed difference in cost occasioned by any such variation shall be added to or deducted from the Contract Price as the case may be.

22.2 In the event of Engineer requiring any variation, a reasonable and proper notice shall be given to the Contractor to enable him to work his arrangement accordingly, and in cases where goods or materials are already prepared or any design, drawings or pattern made or work done requires to be altered, a reasonable and agreed sum in respect thereof shall be paid to the Contractor.

22.3 In any case in which the Contractor has received instructions from the Engineer as to the requirement of carrying out the alterations or additional or substituted work which either then or later on, will in the opinion of the Contractor, involve a claim for additional payment, the Contractor shall immediately and in no case later than thirty (30) days, after receipt of the instructions aforesaid and before carrying out the instructions, advise the Engineer to that effect. But the Engineer shall not become liable for payment of any charges in respect of any such variations, unless the instructions for the performance of the same shall be confirmed in writing by the Engineer.

22.4 If any variation in the Works results in reductions of Contract Price, the parties shall agree, in writing, so to the extent of any change in the price, before the Contractor proceeds with the change.

22.5 In all the above cases, in the event of a disagreement as to the reasonableness of the said sum, the decision of the Engineer shall prevail.

22.6 Notwithstanding anything stated above in this clause, the Engineers shall have the full power to instruct the Contractor, in writing, during the execution of the Contract to vary the quantities of the items or groups of items in accordance with the provisions of clause entitled ‘Change of Quantity’ in section GCC of this Volume-I. The Contractor shall carry out such variations and be bound by the same conditions as though the said variations occurred in the Contract.
Documents. However, the Contract Price shall be adjusted at the rates and the prices provided for the original quantities in the Contract.

23.0 ASSIGNMENT AND SUB-LETTING OF CONTRACT

23.1 The Contractor may, after informing the Engineer and getting his written approval, assign or sub-let the Contract or any part thereof. Such assignment/sub-letting shall not relieve the Contractor of any obligation, duty or responsibility under the Contract. Any assignment as above, without prior written approval of Engineer, shall be void.

23.2 For components/equipment procured by the Contractor for the purposes of the Contract after obtaining the written approval of the Owner, the Contractor’s purchase specifications and enquiries shall call for quality plan to be submitted by the supplier along with their proposals. The quality plans called for from the vendors shall set out during the various stages of manufacture and installation, the quality practices and procedure followed by the vendors’ quality control organization, the relevant reference document/standard used acceptance level, inspection documentation raised etc. Such quality plans of the successful vendors shall be discussed and finalized in consultation with the Engineer and shall form a part of the Purchase Order/Contract between the Contractor and the Vendor. Within three weeks of the release of the Purchase Orders/Contracts for such bought out items/components, a copy of the same without price details but together with detailed purchase specifications, quality plans and delivery conditions shall be furnished to the Engineer by the Contractor.

24.0 CHANGE OF QUANTITY

24.1 During the execution of the contract, the Owner reserves the right to increase or decrease the quantities of items under the contract but without any change in unit price or other terms and conditions. Such variations unless otherwise specified in the accompanying Special Conditions of Contract and/or Technical Specifications, shall not be subject to any limitation for the individual items but the total variations in all such items under the Contract shall be limited to a percentage of the Contract price as specified in the Special Conditions of Contract.

24.2 The Contract price shall accordingly be adjusted based on the unit rates available in the Contract for the change in quantities as above. The base unit rates, as identified in the Contract shall however remain constant during the currency of the Contract, except as provided for in Clause 31.0 below. In case the unit rates are not available for the change in quantity, the same shall be subject to mutual agreement.
25.0 COOPERATION WITH OTHER CONTRACTORS AND CONSULTING ENGINEERS.

The Contractor shall agree to cooperate with the Owner’s other contractors and Consulting Engineers and freely exchange with them such technical information as is necessary to obtain the most efficient and economical design and to avoid unnecessary duplication of efforts. The Engineer shall be provided with three copies of all correspondence addressed by the Contractor to other Contractors and consulting Engineers of the Owner in respect of such exchange of technical information.

26.0 NO WAIVER OF RIGHTS

Neither the inspection by the owner or the engineer or any of their officials, employees or agents nor any order by the owner of the engineer for payment of money or any payment for or acceptance of the whole or any part of the works by the owner or the Engineer, nor any extension of time, nor any possession taken by the Engineer shall operate as a waiver of any provision of the contract, or of any power herein reserved to the owner, or any right to damages herein provided nor shall any waiver of any breach in the contract be held to be a waiver of any other or subsequent breach.

27.0 CERTIFICATE NOT TO AFFECT RIGHT OF OWNER AND LIABILITY OF THE CONTRACTOR

No interim payment certificate of the Engineer, nor any sum paid on account by the owner, nor any extension of time for execution of the works granted by the engineer shall affect or prejudice the rights of the owner against the contractor or relieve the contractor of his obligations for the due performance of the contract, or be interpreted as approval of the works done or of the equipment furnished and no certificate shall create liability for the owner to pay for alternations, amendments, variations, or additional works not ordered, in writing, by the engineer or discharge the liability of the contractor for the payment of damages whether due, ascertained, or certified or not or any sum against the payment of which he is bound to indemnify the owner, nor shall any such certificate nor the acceptance by him of any sum paid on account or otherwise affect or prejudice the rights of the owner against the contractor.

28.0 PROGRESS REPORTS AND PHOTOGRAPHS

During the various stages of the works in the pursuance of the contract, the contractor shall at his own cost submit periodic progress reports as may be reasonably required by the Engineer with such materials as, charts, net works, photographs test certificates, etc. such progress reports shall be in the form and
size as may be required by the Engineer and shall be submitted in at least three (3) copies

29.0 TAKING OVER
Upon successful completion of all the tests to be performed at site on equipment furnished and / or erected by the contractor, the Engineer shall issue to the Contractor a Taking over certificate as a proof of the final acceptance of the equipment / Line. Such certificate shall not unreasonably be withheld nor will the Engineer delay the issuance thereof on account of minor omissions or defects which do not affect the commercial operation and / or cause any serious risk to the equipment / Line. Such certificate shall not relieve the contractor of any of his obligations which otherwise survive, by the terms and conditions of the contract after issue of such certificate.

C. CONTRACT SECURITY AND PAYMENT

30.0 CONTRACT PERFORMANCE GUARANTEE

The contractor shall furnish a contract performance guarantee(s) for the proper fulfillment of the contract in the prescribed form within thirty (30) days of ‘Notice of Award of Contract’. The performance guarantee(s) shall be as per terms prescribed in section INB, Conditions of contract Vol.I and / or Special Conditions of Contract.

31.0 CONTRACT PRICE ADJUSTMENT

31.1 The provisions detailed herein shall be read and interpreted in conjunction with provisions of Clause 16.0, section- INB and relevant provisions in accompanying ‘special conditions of contract’ and ‘bid proposal sheets’.

31.2 All adjustment in the contract price shall be computed in accordance with the conditions and formulae detailed hereunder.

31.3 The Bid Price less advance (if any) will be subject to price adjustment.

31.4 The price adjustment formulae for the Bid Price, as mentioned in clause 31.3 above shall be as stipulated hereinafter. The monthly erection price adjustment amount will be computed for the erection bid price, less advance as per the formula given below:

\[
d_{ER} = 0.75 \times E_{Ro} \times \frac{(F1-F0)}{F0}
\]

Where
dER = Price adjustment payable to the Contractor (if it works out as negative, the amount is to be recovered by the Owner from the Contractor), for each billing.

ERo = Value of erection work done in the billing period as established by the Contract, less advance.

F = Indian Field Labour Index – namely All India Consumer Price Index for Industrial Workers (All India Average) as published by Labour Bureau, Simla of the Government of India.

Subscript ‘0’ will correspond to 30 days prior to date set for opening of bids.

Subscript ‘1’ will correspond to the billing period. For the purpose of Price Adjustment, the billing period shall mean the Billing Period as per Contract time schedule i.e. the agreed Bar Chart or actual period, whichever is earlier. The Billing period, for various erection activities will be as per agreed erection Bar Chart indicating monthly schedule of erection activities for completion of works.

No Price increase shall be allowed beyond the original erection dates unless specifically stated in the Time Extension letter, if any, issued by the Owner. The Owner will, however, be entitled to any decrease in the Contract Price which may be caused due to lower price adjustment amount in case of delays beyond the original erection dates. Therefore, in case of delay beyond the original erection dates, the liability of the Owner shall be limited to the lower of the price adjustment amount which may work out either on schedule date or actual date of erection.

The price variations calculated by the above formula shall not be subject to any ceiling unless otherwise specially mentioned in Special Conditions of Contract.

31.5 Adjusted Contract Price
The adjusted Contract price shall be

\[ \text{ERo} + \text{dER} \]

Plus other element of Contract price, if any.

31.6 Every month after establishing his Site office the Contract shall submit to the Engineer written notice of the changes, if any, that have occurred in the specified labour indices during the previous reporting period containing the effective date of such change, the amount of change, the amount of Contract price adjustment and documentary evidence to substantiate the price adjustment.

31.7 No price adjustment shall be applicable on the portion of the Contract price paid to the Contractor as advance payment.
31.8 The Contractor shall promptly submit price adjustment invoices on monthly basis, whether such adjustment is positive or negative.

32.0 PAYMENT

32.1 The payment to the contractor for the performance of the works under the contract will be made by the owner as per the guidelines and conditions specified herein. All payments made during the contract shall be on account payments only. The final payment will be made on completion of all the works and on fulfillment by the contractor of all his liabilities under the contract.

32.2 Currency of Payment
All payments under the Contract shall be in Indian Rupees only.

32.3 Due Dates for Payments

The initial advance amount shall be payable after fulfillment of all conditions laid down in the special conditions of contracts, clause 32.7.1 below and receipt of the contractor’s invoice along with all necessary supporting documents for such advance payment. The price component of the initial advance amount will become due for payment within thirty (30) days of receipt of the contractor’s invoice. Owner will make progressive payment as and when the payment is due as per the terms of payment set forth in the accompanying special conditions of contract. Progressive payments other than those under the letter of credit will become due and payable by the owner within thirty (30) days of the date of receipt of contractor’s bill / invoice/ debit note by the owner provided the document submitted are complete in all respects.

32.4 Payment Schedule

The contractor shall prepare and submit to the engineer for approval, a break-up of the contract price. This contract price break-up shall be interlinked with the agreed detailed PERT network of the contractor setting forth his starting and completion dates for the various key phases of works prepared as per conditions in clause 12.0 of this section GCC of Volume – I. Any payment under the contract shall be made only after the contractor’s price break-up is approved by the Engineer. The aggregate sum of the contractor’s price break-up shall be equal to the lump sum contract price.

32.5 Application for Payment

32.5.1 The contractor shall submit application for the payment in the prescribed proforma of the owner. Proforma for application for payment is enclosed as Annexure –V of Volume-I.
32.5.2 Each such application shall state the amount claimed and shall set forth in details, the order of the payment schedule, particulars of the works including the works executed at site up to the date mentioned in the application and for the period covered since the last preceding certificate, if any.

32.5.3 Every interim payment certificate shall certify the contract value of the works executed upon the date mentioned in the application for the payment certificate, provided that no sum shall be included in any interim payment certificate in respect of the works that, according to the decision of the engineer, does not comply with contract, or has been performed, at the date of certificate prematurely.

32.6 **Mode of Payment**

The payment of the advance, test charges, if any, price adjustment, taxes and duties (whenever admissible), inland transportation, insurance of the works shall be made direct to the Contractor by the owner.

32.7 **Terms of Payment**

The terms of payments for various activities under the contract are as under.

32.7.1 The terms of payments for erection are detailed in Special Conditions of Contract. A certain percentage of the erection cost shall be paid as initial advance on fulfillment of the following by the Contractor.

a. Acknowledgement of Letter of Award.

b. On establishing his office at site preparatory to mobilization of his erection establishment, and

c. Submission of an unconditional Bank Guarantee from (a) a Public Sector Bank or (b) a scheduled Indian Bank having paid up capital (net of any accumulated losses) of Rs.100 crores or above (the latest annual report of the Bank should support compliance of capital adequacy ratio requirement) or (c) any foreign Bank or subsidiary of a foreign Bank with overall international corporate rating or rating or long term debt not less than A-(A minus) or equivalent by reputed rating agency, for an equivalent amount, which shall be initially kept valid till expiry of three months after the schedule date for successful completion of commissioning. The Proforma of Bank Guarantee for advance is enclosed as Annexure-VI to this Volume-I.

d. Submission of an unconditional Bank Guarantee towards Contract Performance Guarantee valid upto ninty (90) days after the end of the
warranty period, in accordance with clause 40.0 of Section INB of this Volume-I.

e. Submission of a detailed PERT network/bar chart based on the work schedule stipulated in the Letter of Award and its approval by the Owner.

32.7.2 All further payments under the Contract shall be made as stipulated in the Special Conditions of Contract after signing the Contract Agreement.

Progressive payments linked with erection shall only be made after the issue of certificates by the Engineer, one for the quantum of work completed and the other by the Engineer’s Field Quality Surveillance representative for the successful completion of quality check points involved in the quantum of work billed.

32.7.3 Price adjustment/Contract Variation

Any increase in Contract price due to price adjustment provision as per Clause 31.0 of this Section, shall be payable in the similar manner as provided in clause 32.7.2 above except that price adjustment amount corresponding to advance payment, if any, stipulated shall be clubbed with the first progressive payment. Any reduction in Contract price as per price adjustment provision given in Clause 31.0 of this Section shall be effected by recovering 100% of the reduction amount (including the advance) from any of the Contractor’s bills falling immediately due for payment.

The terms of payments for Contract variations in terms of Clause 22.0 and sub clause 24.1 (if any) of this Section shall be the same as given above for price adjustment.

33.0 DEDUCTIONS FROM CONTRACT PRICE

All costs, damages or expenses which the Owner may have paid, for which under the Contract the Contractor is liable, will be claimed by the Owner. All such claims shall be billed by the Owner to the Contractor regularly as and when they fall due. Such bills shall be supported by appropriate and certified vouchers or explanations, to enable the Contractor to properly identify such claims. Such claims shall be paid by the Contractor within thirty (30) days of the receipt of the corresponding bills and if not paid by the Contractor within the said period, the Owner may then deduct the amount, from any monies due or becoming due by him to the Contractor or may be recovered by actions of Law or otherwise.

D. RISK DISTRIBUTION

34.0 TRANSFER OF TITLE
34.1 Transfer of title in respect of equipment and materials supplied by the Contractor to DTL pursuant to the terms of the Contract shall pass on to DTL with negotiation of dispatch documents.

34.2 This Transfer to Title shall not be construed to mean the acceptance and the consequent ‘Taking Over’ of equipment and materials. The Contractors shall continue to be responsible for the quality and performance of such equipment and materials and for their Compliance with the specifications until “Taking Over” and the fulfillment of guarantee provision of this Contract.

34.3 This Transfer to Title shall not relieve the Contractor from the responsibility for all risks of loss or damage to the equipment and materials as specified under the clause entitled “Insurance” of this Section.

35.0 INSURANCE

35.1 The Contractor at his cost shall arrange, secure and maintain all insurance as may be pertinent to the works and obligatory in terms of law to protect his interest and interests of the owner against all perils detailed herein. The form and the limit of such insurance as defined herein together with the underwriter in each case shall be acceptable to the Owner. However, irrespective of such acceptance, the responsibility to maintain adequate insurance coverage at all times during the period of contract shall be of contractor alone. The contractor’s failure in this regard shall not relieve him of any of his contractual responsibilities and obligations. The insurance covers to be taken by the Contractor shall only be in the joint name of the owner and the contractor. The contractor shall, however, be authorized to deal directly with insurance company or companies and shall be responsible in regard to maintenance of all insurance covers. Further the insurance should be in freely convertible currency.

35.2 Any loss or damage to the equipment during handling, transportation, storage, erection, putting into satisfactory operation and all activities to be performed till successful completion of commissioning of the equipment/line shall be to the account of the contractor. The contractor shall be responsible for preference of all claims and make good the damage or loss by way of repairs and / or replacement of the equipment, damaged or lost. The transfer of title shall not in any way relieve the contractor of the above responsibilities during the period of Contract. The Contractor shall provide the owner with copy of all insurance policies and documents taken out by him in pursuance of the contract. Such copies of documents shall be submitted to the owner immediately after such insurance coverage. The contractor shall also inform the owner in writing at least sixty (60) days in advance regarding the expiry / cancellation and / or change in any of such documents and ensure revalidation, renewal etc. as may be necessary well in time.

35.3 The perils required to be covered under the insurance shall include, but not be limited to fire & allied risks, miscellaneous accidents (erection risks) workman
compensation risks, loss or damage in transit, theft, pilferage, riot and strikes and malicious damages, Civil commotion, weather conditions, accidents of all kinds, etc. The scope of such insurance shall be adequate to cover the replacement/reinstatement cost of the equipment/material for all risks up to and including delivery of goods and other costs till the equipment is delivered at site. The insurance policies to be taken should be on replacement value basis and/or incorporating escalation clause. Notwithstanding the extent of insurance cover and the amount of claim available form the underwriters, the Contractor shall be liable to make good the full replacement/rectification value of all equipment/materials and to ensure their availability as per project requirements.

35.4 All costs on account of insurance liabilities covered under the contract will be on contractor’s account and will be included in contract price, however, the owner may from time to time, during the pendency of the contract, ask the contractor in writing to limit the insurance coverage, risk and in such a case, the parties to the contract will agree for a mutual settlement, for reduction in contact price to the extent of reduced premia amount. The contractor, while arranging the insurance shall ensure to obtain all discounts on premia which may be available for higher volume or for reason of financing arrangement of the Project.

35.5 The clause entitled ‘Insurance’ under the section ECC of this Volume-I, covers the additional insurance requirements for the portion of the works to be performed at the site.

36.0 LIABILITY FOR ACCIDENTS AND DAMAGES

Under the contract, the contractor shall be responsible for loss or damage to the plant/material until the successful completion of commissioning as defined elsewhere in the bid document.

37.0 DELAY BY OWNER OR HIS AUTHRISED AGENTS

37.1 In case the Contractor’s performance is delayed due to any act of omission on the part of the owner or his authorized agents, then the contractor shall be given due extension of time for the completion of the works, to the extent such omission on the part of the owner has caused delay in the contractor’s performance of the contract.

Regarding reasonableness or otherwise of the extension of time, the decision of the Engineer shall be final.

37.2 In addition, the contractor shall be entitled to claim demonstrable and reasonable compensation if such delays have resulted in any increase in the cost. The owner shall examine the justification for such a request for claim and if satisfied, the extent of compensation shall be mutually agreed depending upon the circumstances at the time of such an occurrence.
38.0 **DEMURRAGE, WHARFAGE, ETC.**

All demurrage, wharfage and other expenses incurred due to delayed clearance of the material or any other reason shall be to the account of the Contractor.

39.0 **FORCE MAJEURE**

39.1 Force majeure is herein defined as any cause which is beyond the control of the contractor or the owner as the case may be, which they could not foresee or with a reasonable amount of diligence could not have foreseen and which substantially affect the performance of the contract, such as:

a) natural phenomena, including but not limited to floods, droughts, earthquakes and epidemics;

b) acts of any Government, domestic or foreign, including but not limited to war, declared or undeclared, priorities, guarantees, embargoes.

Provided either party shall within fifteen (15) days from the occurrence of such a cause notify the other in writing of such causes.

39.2 The contractor or the owner shall not be liable for delays in performing his obligations resulting from any force majeure cause as referred to and/or defined above.

The date of completion will, subject to hereinafter provided, be extended by a reasonable time even though such cause may occur after Contractor’s performance of obligations has been delayed due to other causes.

40.0 **SUSPENSION OF WORK**

40.1 The owner reserves the right to suspend and reinstate execution of the whole or any part of the works without invalidating the provisions of the contract. Orders for suspension or reinstatement of the works will be issued by the engineer to the contractor in writing. The time for completion of the works will be extended for a period equal to duration of the suspension.

40.2 Any necessary and demonstrable costs incurred by the Contractor as a result of such suspension of the works will be paid by the owner, provided such costs are substantiated to the satisfaction of the engineer. The owner shall not be responsible for any liabilities if suspension or delay is due to some default on the part of the contractor or his sub-contractor.

41.0 **CONTRACTOR’S DEFAULT**
41.1 If the contractor shall neglect to execute the works with due diligence and expedition or shall refuse or neglect to comply with any reasonable order given to him, in writing by the Engineer in connection with the works or shall contravene the provisions of the contract, the owner may give notice in writing to the contractor to make good the failure, neglect or contravention complained of. Should the contractor fail to comply with the notice within thirty (30) days from the date of serving the notice, then and in such case the owner shall be at liberty to employ other workmen and forthwith execute such part of the works as the contractor may have neglected to do or if the owner shall think fit, without prejudice to any other right he may have under the contract, to take the works wholly or in part out of the contractor’s hands and re-contract with any other person or persons to the complete the works or any part thereof and in that event the Owner shall have free use of all contractor’s equipment that may have been at the time on the site in connection with the works without being responsible to the contractor for fair wear and tear thereof and to the exclusion of any right of the contractor over the same, and the owner shall be entitled to retain and apply any balance which may otherwise be due on the contract by him to the contractor, or such part thereof as may be necessary, to the payment of the cost of executing the said part of the works or of completing the works as the case may be. If the cost of completing of works or executing a part thereof as aforesaid shall exceed the balance due to the contractor, the contractor shall pay such excess. Such payment of excess amount shall be independent of the liquidated damages for delay which the contractor shall have to pay if the completion of works is delayed.

41.2 In addition, such action by the owner as aforesaid shall not relieve the contractor of his liability to pay liquidated damages for delay in completion of works as defined in Clause 14.0 of this section.

41.3 Such action by the owner as aforesaid the termination of the contract under this clause shall not entitle the contractor to reduce the value of the Contractor Performance Guarantee nor the time thereof. The Contract Performance Guarantee shall be valid for the full value and for the full period of the contract including guarantee period.

42.0 TERMINATION OF CONTRACT ON OWNER’S INITIATIVE

42.1 The owner reserves the right to terminate the contract either in part or in full due to reasons other than those mentioned under clauses entitled ‘contractor’s default’. The owner shall in such an event give fifteen (15) days notice in writing to the contractor of his decision to do so.

42.2 The contractor upon receipt of such notice shall discontinue the work on the date and to the extent specified in the notice, made all reasonable efforts to obtain cancellation of all orders and contracts to the extent they are related to the work terminated and terms satisfactory to the owner, stop all further sub-contracting or purchasing activity related to the work terminated, and assist the owner in
maintenance, protection and disposition of the works acquired under the contract by the owner.

In the event of such a termination the contractor shall be paid compensation, equitable and reasonable, dictated by the circumstances prevalent at the time of termination.

42.3 If the Contractor is an individual or a proprietary concern and the individual or the proprietor dies and if the Contractor is a partnership concern and one of the partners dies then unless the Owner is satisfied that the legal representatives of the individual Contractor or of the proprietor of the propriety concern and in the case of partnership, the surviving partners, are capable of carrying out and completing the Contract the Owner shall be entitled to cancel the Contract as to its incompleted part without being in any way liable to payment of any compensation to the estate of deceased Contractor and/or to the surviving partners of the Contractor’s firm on account of the cancellation of the Contract. The decision of the Owner that the legal representatives of the deceased Contractor or surviving partners of the Contractor’s firm cannot carry out and complete the Contract shall be final and binding on the parties. In the event of such cancellation the Owner shall not hold the estate of the deceased Contractor and/or the surviving partners of the estate of the deceased Contractor and/or the surviving Partners of the Contractor’s firm liable to damages for not completing the Contract.

43.0 Frustration of Contract

43.1 In the event of frustration of Contract because of supervening impossibility in terms of Section 56 of the Indian Contract Act, parties shall be absolved of their responsibility to perform the balance portion of the Contract, subject to provisions contained in sub-clause 43.3 below.

43.2 In the event of non-availability or suspension of funds for any reasons, whatsoever (except for reason of willful or flagrant breach by the Owner) and/or Contractor then the works under the Contract shall be suspended.

Furthermore, if the Owner is unable to make satisfactory alternative arrangements for financing to the Contractor in accordance with the terms of the Contract with in three months of the event, the parties hereto shall be relived from carrying out further obligations under the Contract treating it as frustration of the Contract.

43.3 In the event referred to in sub-clauses 43.1 & 43.2 above the parties shall mutually discuss to arrive at reasonable settlement on all issues including amounts due to either party for the work already done on “Quantum merit” basis which shall be determined by mutual agreement between the parties.

44.0 Grafts and Commissions Etc.
Any graft, commission, gift or advantage given, promised or offered by or on behalf of the Contractor or his partner(s), agent(s), officer(s), director(s), employee(s), or servant(s) or any one on his or their behalf in relation to the obtaining or to the execution of this or any other Contract with the Owner, shall in addition to any criminal liability which it may incur, subject the Contractor to the cancellation of this and all other Contracts and also to payment of any loss or damage to the Owner resulting from any cancellation. The Owner shall then be entitled to deduct the amount so payable from any monies otherwise due to Contractor under the Contract.

E. RESOLUTION OF DISPUTES

45.0 SETTLEMENT OF DISPUTES

45.1 Any dispute(s) or difference(s) arising out of or in connection with the Contract shall, to the extent possible, be settled amicably between the parties.

45.2 If any dispute or difference of any kind, whatsoever, shall arise between the Owner and the Contractor, arising out of the Contract for the performance of the Works whether during the progress of the Works or after its completion or whether before or after the termination, abandonment or breach of the Contract, it shall, in the first place, be referred to and settled by the Engineer, who, within a period of thirty (30) days after being requested by either party to do so, shall give written notice of his decision to the Owner and the Contractor.

45.3 Save as hereinafter provided, such decision in respect of every matters so referred shall be final and binding upon the parties until the completion of the works and forthwith be given effect to by the Contractor who shall proceed with the Works with all due diligence, whether he or the Owner requires arbitration as hereinafter provided or not.

45.4 If after the Engineer has given written notice of his decision to the parties, no claim to arbitration has been communicated to him by either party within (30) days from the receipt of such notice, the said decision shall become final and binding on the parties.

45.5 In the event of the Engineer failing to notify his decision as aforesaid within thirty (30) days after being requested as aforesaid, or in the event of either the Owner or the Contractor being dissatisfied with any such decision, or within thirty (30) days after the expiry of the first mentioned period of thirty days, as the case may be, either party may require that the matters in dispute be referred to arbitration as hereinafter provided.

46.0 ARBITRATION
46.1 All disputes or difference in respect of which the decision, if any, of the Engineer has not become final or binding as aforesaid shall be settled by arbitration in the manner hereinafter provided.

46.1.1 The arbitration shall be conducted by three arbitrators, one each to be nominated by the Contractor and the Owner and the third to be appointed as an umpire by both the arbitrators in accordance with the Indian Arbitration Act. If either of the parties fails to appoint its arbitrator within sixty (60) days after receipt of a notice from the other party invoking the Arbitration clause, the arbitrator appointed by the party invoking the arbitration clause shall become the sole arbitrator to conduct the arbitration.

46.1.2 The arbitration shall be conducted in accordance with the provisions of the Indian Arbitration Act, 1940 or any statutory modification thereof. The venue of arbitration shall be New Delhi.

46.2 The decision of the majority of the arbitrators shall be final and binding upon the parties. The arbitrators may, from time to time with the consent of all the parties enlarge the time for making the award. In event of any of the aforesaid arbitrators dying, neglecting, resigning or being unable to act for any reason, it will be lawful for the party concerned to nominate another arbitrator in place of the outgoing arbitrator.

46.3 The arbitrator shall have full powers to review and/or revise any decision, opinion, direction, certification or valuation of the Engineer in accordance with the Contract, and neither party shall be limited in the proceedings before such arbitrators to the evidence or arguments put before the Engineer for the purpose of obtaining the said decision.

46.4 No decision given by the Engineer in accordance with the foregoing provisions shall disqualify him as being called as a witness or giving evidence before the arbitrators on any matter whatsoever relevant to the dispute or difference referred to the arbitrator as aforesaid.

46.5 During settlement of disputes and arbitration proceedings, both parties shall be obliged to carry out their respective obligations under the Contract.

47.0 RECONCILIATION OF ACCOUNTS

The Contractor shall prepare and submit every six months, a statement covering payments claimed and the payments received vis-à-vis the works executed, for reconciliation of accounts with the Owner. The contractor shall also prepare and submit a detailed account of Owner Issue materials received and utilized by him for reconciliation purpose in a format to be discussed & finalized with the Owner before the award of Contract.

END OF SECTION-GCC
SECTION – ECC

ERECTION CONDITIONS OF CONTRACT
## ERECTION CONDITIONS OF CONTRACT

### CONTENTS

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>GENERAL</td>
</tr>
<tr>
<td>2.0</td>
<td>REGULATION OF LOCAL AUTHORITIES AND STATUS</td>
</tr>
<tr>
<td>3.0</td>
<td>OWNER’S LIEN ON EQUIPMENT</td>
</tr>
<tr>
<td>4.0</td>
<td>INSPECTION, TESTING AND INSPECTION CERTIFICATES</td>
</tr>
<tr>
<td>5.0</td>
<td>ACCESS TO SITE AND WORKS ON SITE</td>
</tr>
<tr>
<td>6.0</td>
<td>CONTRACTOR’S SITE OFFICE ESTABLISHMENT</td>
</tr>
<tr>
<td>7.0</td>
<td>CO-OPERATION WITH OTHER CONTRACTORS</td>
</tr>
<tr>
<td>8.0</td>
<td>DISCIPLINE OF WORKMAN</td>
</tr>
<tr>
<td>9.0</td>
<td>CONTRACTOR’S FIELD OPERATION</td>
</tr>
<tr>
<td>10.0</td>
<td>PHOTOGRAPHS AND PROGRESS REPORT</td>
</tr>
<tr>
<td>11.0</td>
<td>MAN-POWER REPORT</td>
</tr>
<tr>
<td>12.0</td>
<td>PROTECTION OF WORK</td>
</tr>
<tr>
<td>13.0</td>
<td>EMPLOYMENT OF LABOUR</td>
</tr>
<tr>
<td>14.0</td>
<td>FACILITIES TO BE PROVIDED BY THE OWNER</td>
</tr>
<tr>
<td>15.0</td>
<td>FACILITIES TO BE PROVIDED BY THE CONTRACTOR</td>
</tr>
<tr>
<td>16.0</td>
<td>LINES AND GRADES</td>
</tr>
<tr>
<td>17.0</td>
<td>FIRE PROTECTION</td>
</tr>
<tr>
<td>18.0</td>
<td>SECURITY</td>
</tr>
<tr>
<td>19.0</td>
<td>CONTRACTOR’S AREA LIMITS</td>
</tr>
<tr>
<td>20.0</td>
<td>CONTRACTOR’S CO-OPERATION WITH THE OWNER</td>
</tr>
<tr>
<td>21.0</td>
<td>PRE-COMMISSIONING TRAILS AND INITIAL OPERATIONS</td>
</tr>
<tr>
<td>22.0</td>
<td>MATERIALS HANDLING AND STORAGE</td>
</tr>
<tr>
<td>23.0</td>
<td>CONSTRUCTION MANAGEMENT</td>
</tr>
<tr>
<td>24.0</td>
<td>FIELD OFFICE RECORDS</td>
</tr>
<tr>
<td>25.0</td>
<td>CONTRACTOR’S MATERIALS BROUGHT ON TO SITE</td>
</tr>
<tr>
<td>Section</td>
<td>Description</td>
</tr>
<tr>
<td>---------</td>
<td>-------------------------------------------------------</td>
</tr>
<tr>
<td>26.0</td>
<td>PROTECTION OF PROPERTY AND CONTRACTOR’S LIABILITY</td>
</tr>
<tr>
<td>27.0</td>
<td>INSURANCE</td>
</tr>
<tr>
<td>28.0</td>
<td>UNFAVOURABLE WORKING CONDITIONS</td>
</tr>
<tr>
<td>29.0</td>
<td>PROTECTION OF MONUMENTS AND REFERENCE POINTS</td>
</tr>
<tr>
<td>30.0</td>
<td>WORKS &amp; SAFETY REGULATIONS</td>
</tr>
<tr>
<td>31.0</td>
<td>FOREIGN PERSONNEL</td>
</tr>
<tr>
<td>32.0</td>
<td>CODE REQUIREMENTS</td>
</tr>
</tbody>
</table>
1.0 GENERAL

1.1 The following shall supplement the conditions already contained in other parts of these specifications and document and shall govern the portion of the work of this Contract to be performed at Site.

1.2 The Contractor upon signing of the Contract shall, in addition to a Project Coordinator, nominate another responsible officer as his representative at Site suitable designated for the purpose of overall responsibility and coordination of the works to be performed at Site. Such person shall function from the Site office of the Contractor during the pendency of Contract.

2.0 REGULATION OF LOCAL AUTHORITIES AND STATUES

2.1 The Contractor shall comply with all the rules and regulations of the local authorities during the performance of his field activities. He shall also comply with the Minimum Wages Act, 1948 and the Payment of Wages Act (both of the Government of India) and the rules made there under in respect of any employee or workman employed or engaged by him or his Sub-Contractor.

2.2 All registration and statutory inspection fees, if any, in respect of his work pursuant to this Contract shall be to the account of the Contractor. However, any registration, statutory inspection fees lawfully payable under any statutory laws and its amendments from time to time during erection in respect of the equipment ultimately to be owned by the owner, shall be to the account of the owner. Should any such inspection or registration need to be re-arranged due to the fault of the contractor or his Sub-Contractor, the additional fees to such inspection and/or registration shall be borne by the Contractor.

3.0 OWNERS’S LIEN ON EQUIPMENT

No material brought to the site shall be removed from the site by the Contractor and/or his Sub-Contractors without the prior written approval of the Engineer.

4.0 INSPECTION, TESTING AND INSPECTION CERTIFICATES

The provisions of the clause entitled Inspection, Testing and Inspection Certificates under Technical Specifications, Section GTR shall also be applicable to the erection portion of the Work. The Engineer shall have the right to re-inspect any equipment/material through previously inspected and approval by him at the Contractor’s works, before and after the same are erected at Site. If by the above inspection, the Engineer rejects any equipment/material, the Contractor shall make good for such rejections either by replacement or modifications/repairs as
may be necessary for the satisfaction of the Engineer. Such replacement will also include the replacements or re-execution of such of those works of other Contractors and/and agencies, which might have got damaged or affected by the replacements or re-work done to the Contractors work.

5.0 ACCESS TO SITE AND WORKS ON SITE

5.1 Suitable access to and possession of the site shall be afforded to the contractor by the Owner in reasonable time.

5.2 The works so far as it is carried out on the Owners premises, shall be carried out at such time as the owner may approve.

5.3 In the execution of the works no person other than the Contractor or his duly appointed representative, Sub-Contractor and workmen, shall be allowed to do work on the Site, except by the special permission, in writing of the Engineer or his representative.

6.0 CONTRACTOR’S SITE OFFICE ESTABLISHMENT

The Contractor shall establish a site office at the site and keep posted an authorized representative for the purpose of the Contract. Any written order or instruction of the Engineer or his duly authorized representative, shall be communicated to the said authorized resident representative of the Contractor and the same shall be deemed to have been communicated to the Contractor at his legal address.

7.0 CO-OPERATION WITH OTHER CONTACTORS

7.1 The Contractor shall co-operate with all other Contractors or tradesmen of the Owner who may be performing other works on behalf of the Owner and the workmen who may be employed by the owner and doing work in the vicinity of the works under the Contract. The Contractor shall also so arrange to perform his work as to minimize, to the maximum extent possible interference with the work of other contractors and their workmen. Any injury or damage that may sustain by the employees of the other Contractors and the Owner, due to the Contractor’s work shall promptly be made good at the Contractor’s own expense. The Engineer shall determine the resolution of any difference or conflict that may arise between the Contractor and other Contractor or between the Contractor and the workmen of the owner in regard to their work. If the work of the Contractor is delayed because of any acts of omission of another Contractor, the Contractor shall have no claim against the owner on that account other than an extension of time for completing this Works.

7.2 The Engineer shall be notified promptly by the contractor of any defects in the other Contractor’s works that could affects the contractor’s the Engineer shall
determine the corrective measures, if any required to rectify this situation after inspection of the works and such decision by the Engineer shall be binding on the Contractor.

8.0 DESCIPLEINE OF WORKMEN

The Contractor shall adhere to the disciplinary procedure set by the Engineer in respect of his employees and workmen at Site. The Engineer shall be at liberty to object to the presence of any representative or employee of the Contractor at the Site, if in the opinion of the Engineer such employee has misconducted himself or is incompetent or negligent or otherwise undesirable and then the Contractor shall remove such a person objected to and provide in his place a competent replacement.

9.0 CONTRACTOR’S FIELD OPERATION

9.1 The Contractor shall keep the Engineer informed in advance regarding his field activity plans and schedules for carrying-out each part of the works. Any review of such plan or schedule or method of work by the Engineer shall not relieved the Contractor of any of his responsibilities towards the field activities. Such reviews shall also not be considered as an assumption of any risk or liability by the Engineer or the Owner or any of his representatives and no claim of the Contractor will be entertained because of the failure or inefficiency of any such plan or schedule or method of work reviewed. The Contractor shall be solely responsible for the safety, adequacy and efficiency of plant and equipment and his erection methods.

9.2 The Contractor shall have the complete responsibility for the conditions of the Works-site including the safety of all persons employed by him or his Sub-Contractor and all the properties under his custody during the performance of the work. This requirement shall apply continuously till the completion review by the Engineer is not intended to include review of Contractor’s safety measures in, on or near the Works-Site, and their adequacy or otherwise.

10.0 PHOTOGRAPHS AND PROGRESS REPORT

10.1 The Contractor shall furnish three (3) prints each to the Engineer of progress photographs of the work done at Site. Photographs shall be taken as and when indicated by the Engineer or his representative. Photographs shall be adequate in size and number to indicate various stages of erection. Each photograph shall contain the date, the name of the Contractor and the title of the photograph.

10.2 The above photographs and appropriate visual chart shall accompany the monthly progress report detailing-out the progress achieved on all erection activities as compared to the schedules. The report shall also indicate the reasons for the variance between the scheduled and actual progress and the action proposed for corrective measures, wherever necessary.

11.0 MAN-POWER REPORT
11.1 The Contractor shall submit to the Engineer, on the first day of every month, a man hours schedule for the month, detailing the man hours scheduled for the month, skill-wise and area-wise.

11.2 The Contractor shall also submit to the Engineer, on the first day of every month, a man-power report of the previous month detailing the number of persons scheduled to have been employed and actually employed, skill-wise and the areas of employment of such labour.

12.0 PROTECTION OF WORK
The Contractor shall have total responsibility for protecting his works till it is finally taken over by the Engineer. No claim will be entertained by the Owner or by the Engineer for any damage or loss to the Contractor’s works and the contractor shall be responsible for complete restoration of the damaged works to original conditions to comply with the specification and drawings, should any such damage to the Contractor’s works occur because of any other party not being under his supervision or control. The Contractor shall make his claim directly with the party concerned. If disagreement or conflict or dispute develops between the Contractor and the other party or parties concerned regarding the responsibility for damage to the Contractor’s works, the same shall be resolved as per the provisions of the Clause 7.0 above entitled “Cooperation with other Contractors”. The Contractor shall not cause any delay in the repair of such damaged works because of any delay in the resolutions of such dispute. The Contractor shall proceed to repair the Work immediately and no cause thereof will be assigned pending resolution of such disputes.

13.0 EMPLOYMENT OF LABOUR

13.1 The Contractor will be expected to employ on the work only his regular skilled employees with experience of his particular work. No female labour shall be employed after darkness. No person below the age of eighteen years shall be employed.

13.2 All traveling expenses including provisions of all necessary transport to and from Site, lodging allowances and other payments to the Contractor’s employees shall be the sole responsibility of the Contractor.

13.3 The hours of work on the Site be decided by the Owner and the Contractor shall adhere to it. Working hours will normally be eight (8) hours per day-Monday through Saturday.

13.4 The contractor’s employees shall wear identification badges while on work at site.
13.5 In case the owner becomes liable to pay any wages or dues to labour or any Government agency under any of the provisions of the Minimum Wages Act, Workmen Compensation Act, Contract Labour Regulation Abolition Act or any other law due to act of omission of the Contractor the Owner may make such payment and shall recover the same from the Contractor’s bills.

14.0 FACILITIES TO BE PROVIDED BY THE OWNER

14.1 Space

Land for Contractor’s Office, Store, Workshop etc.

a) The Engineer shall at his discretion and for the duration of execution of the Contract make available at site, land for construction of Contract’s field office, workshop, stores, magazines for explosives in isolated locations, assembling yard, etc. required for execution of the Contract. Any construction of temporary roads, offices, workshop, etc. as per plan approved by the Engineer shall be done by the Contractor at his cost.

b) On completion of works the Contractor shall over the land daily cleaned to the Engineer until and unless the Contractor has handed over the vacant Possession of land allotted to him for the above purpose, the payment of his final bill shall not be made. The Contractor shall be made liable to pay for the use and occupation at the rates to be determined by the Engineer if the Contractor over stays in the land after the Contract is completed.

15.0 FACILITIES TO BE PROVIDED BY THE CONTRACTOR

15.1 Tools, tackles and scaffoldings

The Contractor shall provide all the construction equipment; tools, tackles and scaffoldings required for construction, erection, testing and commissioning of the transmission line covered under the Contract. He shall submit a list of all such materials to the Engineers before the commencement of work at Site. These tools and tackles shall not be removed from the Site without the written permission of the Engineer.

15.2 Communication

The Owner will extend the telephone and telex facilities, if available at Site, for purposes of Contract. The Contract shall be charged at actual for such facilities.

15.3 First-aid
15.3.1 The Contractor shall provide necessary first-aid facilities for all his employees, representatives and workmen working at the Site. Enough number of Contract’s personnels shall be trained in administering first-aid.

15.4 Cleanliness

15.4.1 The Contractor shall be responsible for keeping the entire area allotted to him clean and free from rubbish, debris etc, during the period of Contract. The Contractor shall employ enough number of special personnel to thoroughly clean his work-area atleast once in a day. All such rubbish and scrap material shall be stacked or disposed off in a place to be identified by the Engineer. Materials and stores shall be so arranged to permit easy cleaning of the area. In areas where equipment might drip oil and cause damage to the floor surface, a suitable protective cover of a flame resistant, oil proof sheet shall be provided to protect the floor from such damage.

15.4.2 Similarly the labour colony, the offices and the residential areas of the Contractor’s employees and workmen shall be dept clean and neat to the entire satisfaction of the Engineer. Proper sanitary arrangement shall be provided by the Contractor, in the work-areas, office and residential areas of the Contractor.

15.5 the water and electricity required by the contractor shall be arranged by him at his own cost.

16.0 LINES AND GRADES

All the works shall be performed to the lines, grades and elevations indicated on the drawings. The Contractor shall be responsible to locate and lay-out the works. Basic horizontal and vertical control points will be established and marked by the Engineer at site at suitable points. These points shall be used as datum for the works under the Contract. The Contractor shall inform the Engineer well in advance of the times and places at which he wishes to do work in the area allotted to him so that suitable datum points may be established and checked by the Engineer to enable the Contractor to proceed with his works. Any work done without being properly located may be removed and/or dismantled by the Engineer at Contractor’s expense.

17.0 FIRE PROTECTION

17.1 The work procedures that are to be used during the erection shall be those, which minimize fire hazards to the extent practicable. Combustible materials, combustible waste and rubbish shall be collected and removed from the Site at least one each day. Fuels, oils and volatile or inflammable materials shall be stored away from the construction and equipment and materials storages areas in safe containers. Un-treated materials shall not at all be used at Site for any other purpose unless otherwise specified. If any such materials are received with the
equipment at the Site, the same shall be removed and replaced with acceptable materials before moving into the construction or storage area.

17.2 Similarly, corrugated paper fabricated cartons etc will not be permitted on the Construction area either storage or for handing of materials all such materials used shall be of water proof and flame resistant type. All other material such as working drawings plans etc. Which are combustible but are essential for the works to be executed shall be protected against combustion resulting from welding sparks. Cutting flames and other similar fire sources.

17.3 All the contractors’ supervisory personnel and sufficient number of works shall be trained for fire fighting and shall be assigned specific fire protection duties. Enough of such trained personnel must be available at the site during the entire period of the contract.

17.4 The contractor shall provide enough fire protection equipment and materials in the types and numbers for the warehouses, office, temporary structures, labour colony area etc. Access to such fire protection equipment shall be easy and open at all times.

18.0 SECURITY

The contractor shall have total responsibility for all equipment and materials in his custody/stores, loose, semi assembled and/or erected by him at site. The contractor shall make suitable security arrangements including employment of security personnel to ensure the protection of all material, equipment and works from theft, fire, pilferage and any other damages and loss. All materials of the contractor shall enter and leave the project site only with the written permission of the Engineer in the prescribed manner.

19.0 CONTRACTOR’S AREA LIMITS

The Engineer will mark-out the boundary limits of access roads, parking spaces, storage and construction areas for the Contractor and Contractor shall not trespass the areas not so marked out for him.

20.0 CONTRACTOR’S CO-OPERATION WITH THE OWNER

In case where the performance of the erection work by the Contractor affects the operation of the system facilities of the owner, such erection work of the Contractor shall be scheduled to be performed only in the manner stipulated by the Engineer and the same shall be acceptable at all times to the Contractor. It will be the responsibility of the Contractor to provide all necessary temporary instrumentation and other measuring devices required during start-up and test charge of the line which are erected by him.
21.0 PRE-COMMISSIONING TRAILS AND INITIAL OPERATIONS

The pre-commissioning trials and test charging of the line erected by the Contractor shall be the responsibility of the Contractor as detailed in relevant clauses in Technical Specifications, the owner shall arrange the supply for test charging of the line but the connection/connecting arrangements shall be made by the contractor. The Contractor shall provide, in addition, test instruments, calibrating devices, etc and labour required for successful performance of these trials. If it is anticipated that the above test may prolong for a long time, the Contractor workmen required for the above test shall always be present at site during such trials.

22.0 MATERIALS HANDLING AND STORAGE

22.1 All the equipment/material furnished under the Contract and arriving at site shall be promptly received unloaded, transported and stored in the storage space by the Contractor.

22.2 Contractor shall be responsible for examining all the shipmen and notify the engineer immediately of any damages, storage, discrepancy etc, for the purpose of Engineer’s information only. The Contractor shall submit to the Engineer’s every week a report detailing all the receipts during week. However, the Contractor shall be solely responsible for any shortages or damages in transit, handling and/or in storage and erection of the equipment at site.

22.3 The Contractor shall maintain an accurate and exhaustive record detailing out the list of all material received by him for the purpose of erection and keep such record open for the inspection of the engineer in charge.

22.4 All material shall be handled very carefully to prevent any damage or loss. The material stored shall be properly protected to prevent damage.

22.5 The contractor shall ensure that all the packing materials and protection devices used for the various equipment/material during transit and storage are removed before the equipment/material are installed

22.6 The consumable and other supplies likely to deteriorate due to storage must be thoroughly protected and stored in a suitable manner to prevent damage or deterioration in quality by storage.

22.7 All the materials stored in the open or dusty location must be covered with suitable weatherproof and flame proof covering material wherever application.
22.8 If the materials belonging to the contractor are stored in areas other than those earmarked for him, the Engineer will have the right to get it moved to the area earmarked for the Contractor’s at the Contractor’s cost.

22.9 The Contractor shall be responsible for making suitable indoor storage facilities to store all equipment/material, which require indoor storage. The Engineer, may direct the Contractor to move materials, which in his opinion will require indoor storage, to indoor storage areas, which the Contractor shall strictly comply with.

23.0 CONSTRUCTION MANAGEMENT

23.1 The field activities of the Contractor working at site, will be coordinated by the Engineer and the Engineer’s decision shall be final in resolving any disputes or conflicts between the Contractor and other Contractor's and the tradesmen of the Owner regarding scheduling and coordination of work. Such decision by the Engineer shall not be a cause for extra compensation or extension of time for the Contractor.

23.2 The Engineer shall hold weekly meetings of all the Contractors working at Site, at a time and place to be designated by the Engineer. The Contractor shall attend such meetings and take notes of discussions during the meeting and the decision of the Engineer and shall strictly adhere to those decisions in performing his works. In addition to the above weekly meeting, the Engineer may call for other meetings either with individual Contractor's or with selected number of Contractors and in such a case the Contractors if called, will also attend such meetings.

23.3 Time is the essence of the Contract and the Contractor shall be responsible for performance of his works in accordance with the specified construction schedule. If at anytime, the contractor is falling behind the schedule, he shall take necessary action to make good for such delays by increasing his work force or by working overtime or otherwise accelerate the progress of the work to comply with the schedule and shall communicate such actions in writing to the Engineer, satisfying that his action will compensate for the delay. The Contractor shall not be allowed any extra compensation for such action.

23.4 The Engineer shall, however, not be responsible for provision of additional labour and/or materials or supply or any other services to the Contractor except for the coordination work between various Contractors as set out earlier.

24.0 FIELD OFFICE RECORDS

The Contractor shall maintain at his site office up to date copies of all drawings, specifications and other Contract Documents and any other supplementary date complete with all the latest revision thereto. The Contractor shall also maintain in addition the continuous record of all changes to the above Contract Documents, drawings, specifications, and supplementary date, etc, effected at the field and on completion of his total assignment under the contract shall incorporate all such changes on the drawings and other engineering data to indicate as installed.
conditions of the equipment furnished and erected under the Contract. Such drawings and Engineering data shall be submitted to the Engineer in required number of copies.

25.0 CONTRACTOR’S MATERIALS BROUGHT ON TO SITE

25.1 The Contractor shall bring to Site all equipment, components, parts, materials, including construction equipment, tools and tackles for the purpose of the work under intimation to the Engineer. All such goods shall, from the time of their being brought vest in the Owner, but may be used for the purpose of the works only and shall not on any account be removed or taken away by the Contractor without the written permission of the Engineer. The Contractor shall nevertheless be solely liable and responsible for any loss or destruction thereof and damage thereto.

25.2 The Owner shall have a lien on such goods for any sum or sums which may at any time be due or owing to him by the Contractor, under, in respect of or by reasons of the Contract. After giving a fifteen (15) days notice in writing of his intention to do so, the Owner shall be at liberty to sell and dispose off any such goods, in such manner as he shall think fit including public auction or private treaty and to apply the proceeds in or towards the satisfaction of such sum or sums due as aforesaid.

25.3 After the completion of the Works, the Contractor shall remove from the site under the direction of the Engineer the materials such as construction equipment, erection tools and tackles, scaffolding etc. with the written permission of the Engineer. If the Contractor fails to remove such materials, within fifteen (15) days of issue of a notice of a notice by the Engineer to do so then the Engineer shall have the liberty to dispose off such materials as detailed under Clause 25.2 above and credit the proceeds thereto to the account of the Contractor.

26.0 PROTECTION OF PROPERTY AND CONTRACTOR’S LIABILITY

26.1 The Contractor shall be responsible for any damage resulting from his operations. He shall also be responsible for protection of all persons including members of public and employees of the Owner and the employees of other Contractors and Sub-Contractor and all public and private property including structures, building, other plants and equipment and utility either above or below the ground.

26.2 The Contractor will ensure provision of necessary safety equipment such as barrier signboards, warning lights and alarms, etc. to provide adequate protections to persons and property. The Contractor shall be responsible to give reasonable notice to the Engineer and the Owner of public or private property and utilities when such property and utilizes are likely to get damaged or injured during the performance of his works and shall make all necessary arrangements
with such owners, related to removal and/or replacement or protection of such property and utilizes.

27.0 INSURANCE

27.1 In addition to the conditions covered under the Clause entitled ‘Insurance’ in General Terms and Conditions of Contract of this Volume-I, the following provisions will also apply to the portion of works to be done beyond the Contractor’s own or his Sub-Contractor’s manufacturing Works.

27.2 Workmen’s Compensation Insurance

This insurance shall protect the Contractor against all claims applicable under the Workmen’s Compensation Act, 1948 (Government of India). This policy shall also cover the Contractor against claims for injury, disability, disease or death of his or his Sub-Contractor’s employee, which for any reason are not covered under the Workmen’s Compensation Act, 1948. The liabilities shall not be less than:

- Workmen’s Compensation : As per statutory Provisions
- Employee’s Liability : as per statutory Provisions

27.3 Comprehensive Automobile Insurance

This insurance shall be in such a form to protect the Contractor against all claims for injuries, disability, disease and death to members of public including the Owner’s men and damage to the property of others arising from the use of motor vehicle during, on or off the site operations, irrespective of the Ownership of such vehicles. The liability covered shall be as herein indicated:

- Fatal Injury : Rs.100,000 each person
- : Rs.200,000 each occurrence
- Property Damage : Rs.100,000 each occurrence

27.4 Comprehensive General Liability Insurance

27.4.1 The insurance shall protect the Contractor against all claims arising from injuries, disabilities, disease or death of members of public or damage to property of others, due to any act of omission on the part of the Contract, his agents, his employees, his representatives and Sub-Contractors or from riots, strikes and civil commotion. This insurance shall also cover all the liabilities of the Contractor arising out of the Clause entitled “Defence of Suits” under General Terms & Conditions of Contract of this Volume-I.
27.4.2 The hazards to be covered will pertain to all the works and areas where the Contractor his Sub-Contractors, his agents and his employees have to perform work pursuant to the Contract.

27.5 The above are only illustrative list of insurance covers normally required and it will be the responsibility of the Contractors to maintain all necessary insurance coverage to the extent both in time and amount to take care of all his liabilities either direct or indirect, in pursuance of the Contract.

28.0 UNFAVOURABLE WORKING CONDITIONS

The Contractor shall confine all his field operations to those works, which can be performed without subjecting the equipment and materials to adverse effects during inclement weather conditions, like monsoon, storms etc. and during other unfavorable construction conditions. No field activities shall be performed by the Contractor under conditions, which might adversely affect the quality and efficiency thereof, unless special precautions or measures are taken by the Contractor in a proper and satisfactory manner in the performance of such Works and with the concurrence of the Engineer. Such unfavorable construction conditions, will in no way relieve the contractor of his responsibility to perform the works as per the schedule.

29.0 PROTECTION OF MONUMENTS AND REFERENCE POINTS

The contractor shall ensure that any finds such as relic, antiquity, coins fossils, etches he may come across during the course of performance of his works either during excavation or elsewhere, are properly protected and handed over to the engineer similarly the contractor shall ensure that the bench marks, reference, points, etc which disturbs such reference the same shall be done only after these are transferred to other suitable location under direction of the engineer. The contractor shall provide all necessary materials and assistance for such relocation of reference points etc.

30.0 WORKS & SAFETY REGULATION

30.1 The contractor shall ensure proper safety of all the workmen, material, plant and equipment belonging to him or to DTL or to others, working at the site. The contractor shall also be responsible for provision of all safety notices and safety equipment required both by the relevant legislation and the engineer, as he may deem necessary.

30.2 The contractor will notify well in advance to the engineer of his intention to bring to the site any container filled with liquid or gaseous fuel or explosive or petroleum substance or such chemicals which may involve hazards. The engineer
shall have the right to prescribe the conditions under which such container is to be stored, handled and used during the performance of the works and the Contractor shall strictly adhere to and comply with such instructions. The Engineer shall have the right at his sole discretion to inspect any such container or such construction plant/equipment for which material in the container is required to be used and if in his opinion, its use is not safe, he may forbid its use. No claim due to such prohibition shall be entertained by the Owner and the Owner shall not entertain any claim of the Contractor towards additional safety provisions/conditions to be provided for/constructed as per the Engineer’s instructions.

Further, any such decision of the Engineer shall not in any way absolve the Contractor of his responsibilities and in case, use of such a container or entry thereof into the Site area is forbidden by the engineer, the Contractor shall use alternative methods with the approval of the Engineer without any cost implication to DTL or extension of work schedule.

30.3 Where it is necessary to provide and/or store petroleum products or petroleum mixtures and explosives, the Contractor shall be responsible for carrying-out such provision and/or storage in accordance with the rules and regulations laid down in Petroleum Act 1934, Explosives Act. 1948 and Petroleum and Carbide of Calcium Manual published by the Chief Inspector of Explosives of India. All such storage shall prior approval of the Engineer. In case, any approvals are necessary from the Chief Inspector (Explosives) or any statutory authorities, the Contractor shall be responsible for obtaining the same.

30.4 All equipment used in construction and erection works Contractor shall meet Indian/International Standards and where such standards do exist, the Contractor shall ensure these to be absolutely safe. All material shall strictly used and maintained by the Contractor in accordance with safety instructions and as per Guidelines/rules of DTL in this regard.

30.5 The Contractor shall be fully responsible for the safe age of his and his Sub-Contractor’s radioactive sources in accordance with DAE Rules and other applicable provisions. All precautionary measures by BARC/DAE in connection with use, storage and handling of such material will be taken by the Contractor.

30.6 The Contractor shall provide suitable safety equipment prescribed standard to all employees and workmen according to the need as may be tested by the Engineer who will also have right to examine these safety equipment their suitability, reliability, acceptability and adaptability.

30.7 Where explosives are to be used, the same shall be use the direct control and supervision of an expert, experienced, qualified and person strictly in accordance with the Code of Practice/Rules framed Indian Explosive Act pertaining to handling, storage and use of explosive.
30.8 The Contractor shall provide safe working conditions to and employees at the Site including safe means of access, railings, scaffoldings etc. The scaffoldings shall be erected under the control and of an experienced and competent person. For erection, good and standard qualifying material only shall be used by the Contractor.

30.9 The Contractor shall not interfere or disturb electric and other electrical equipment belonging to the Owner or other Contractor any circumstances, whatsoever, unless expressly permitted in writing by DTL to handle such fuses, wiring or electrical equipment.

30.10 Before the Contractor connects any electrical appliances plug or socket belonging to the other Contractor or Owner, he shall:

   a) Satisfy the Engineer that the appliance in good condition.

   b) Inform the Engineer of the maximum current and phases of the appliances.

   c) Obtain permission of the Engineer detailing the sockets to which the appliance may be connected.

30.11 The Engineer will not grant permission to connect until he is satisfied that:

   A The appliance is in good condition and is fitted with suitable plug.

   B The appliance is filled with a suitable cable having two earth conductors, one of which shall be an earthed metal sheath surrounding the cores.

30.12 No electric cable in use by the Contractor or owner will be disturbed without prior permission. No weight of any description will be imposed on any cable and no ladder or similar equipment will rest against or attached to it.

30.13 No repair work shall be carried out on any live equipment. The equipment must be declared safe by the engineer and a permit to work shall be issued by the engineer before any repair work is carried out by the contractor. While working on electric lines equipment whether live or dead, suitable type and sufficient quantity of tools will have to be provided by the Contractor to electricians/workmen/officers.

30.14 The Contractors shall employ necessary number of qualified, full time electricians/electrical supervisors to maintain his temporary electrical installation.

30.15 The Contractor employing more than 250 workmen whether temporary, casual, probationer, regular or permanent or on contract, shall employ at least one full time officer exclusively as safety officer to supervise safety aspects of the equipment and workmen, who will coordinate with the Project Safety Officer. In case of work being carried out through Sub-Contractors, the Sub-Contractor’s
workmen/employees will also be considered as the Contractor’s employees/workmen for the above purpose.

The name and address of such Safety Officers of the Contractor will be promptly informed in writing to Engineer with a copy of Safety Officer-In charge before he starts work of immediately after any change of the incumbent is made during currency of the Contract.

30.16 In case of accident occurs during the construction/erection or other associated activities undertaken by the Contractor thereby causing any minor or major or fatal injury to his employees due to any reason, whatsoever, it shall be the responsibility of the Contractor to promptly inform the same to the Engineer in prescribed form and also to all the authorities envisaged under the applicable laws.

30.17 The Engineers shall have the right at his sole discretion to stop the work, if in his opinion the work is being carried out in such a way that it may cause accidents and endanger the safety of the persons and/or property, and/or equipment. In such cases, the Contractor shall be informed in writing about the nature of hazards and possible injury/accident and he shall comply to remove shortcomings promptly. The Contractor after stopping the specific work can, if felt necessary, appeal against the order of stoppage of work to the Engineer within 3 days of such stoppage of work and decision of the Engineer in this respect shall be conclusive and binding on the Contractor.

30.18 The Contractor shall not be entitled for any damages/compensation for stoppage of work due to safety reasons as provided in para 30.17 above and the period of such stoppage of work will not be taken as an extension of time for completion of work and will not be the ground for waiver of levy of liquidated damages.

30.19 It is mandatory for the Contractor to observe during the execution of the works, requirements of Safety Rules which would generally include but not limited to following:

Safety Rules
a) Each employee shall be provided with initial indoctrination regarding safety by the Contractor, so as to enable him to conduct his work in a safe manner.

b) No employee shall be given a new assignment of work unfamiliar to him without proper introduction as to the hazards incident thereto, both to himself and his fellow employees.

c) Under no circumstances shall an employee hurry or take unnecessary chance when working under hazardous conditions.
d) Employees must not leave naked fires unattended. Smoking shall not be permitted around fire prone areas and adequate fire fighting equipment shall be provided at crucial location.

e) Employees under the influence of any intoxicating beverage, even to the slightest degree shall not be permitted to remain at work.

f) There shall be a suitable arrangement at every work site for rendering prompt and sufficient first aid to the injured.

g) The staircases and passageways shall be adequately lighted.

h) The employees when working around moving machinery, must not be permitted to wear loose garments. Safety shoes are recommended when working in shops or places where materials or tools are likely to fall. Only experienced workers shall be permitted to go being guard rails or to clean around energized or moving equipment.

i) The employees must use the standard protection equipments intended for each job. Each piece of equipment shall be inspected before and after it is used.

j) Requirements of ventilation in underwater working to licensed and experienced divers, use of gum boots for working in slushy or in inundated conditions are essential requirements to be fulfilled.

k) In case of rock excavation, blasting shall invariable by done through licensed blasters and other precautions during blasting and storage/transport of charge material shall be observed strictly.

30.20 The Contactor shall follow and comply with all DTL Safety Rules, relevant provisions of applicable laws pertaining to the safety of workmen, employees, plant and equipment as may be prescribed from time to time by the Owner without any demur, protest or contest or reservation. In case of any unconformity between statutory requirement and DTL Safety Rules referred above, the later shall be binding on the contractor unless the statutory provisions are more stringent.

30.21 If the Contract fails in providing safe working environment as per DTL Safety Rules or continues the work even after being instructed to stop work by the Engineer as provided in para 30.17 above, the Contractor shall promptly pay to DTL, on demand by the Owner, compensation at the rate of Rs.5,000/- per day or part thereof till the instructions are complied with and so certified by the Engineer. However, in case of accident taking place causing injury to any individual, the provisions contained in para 30.22 shall also apply in addition to compensation mentioned in this para.
30.22 If the Contractor does not take all safety precautions and/or fails to comply with the Safety Rules as prescribed by DTL or under the applicable law for the safety of the equipment and plant and for the safety of personnel and the Contractor does not prevent hazardous conditions which cause injury to his own employees or employees of other Contractor or DTL employees or any other person who are at Site or adjacent thereto, the Contractor shall be responsible for payment of compensation to DTL as per the following schedule:-

a) Fatal injury or accident causing death Rs.1,00,000/- : These are per person : applicable : for death/ 

b) Major injuries or accident causing 25% Rs.20,000/- : injury to or more permanent disablement to per person : any person, Workmen or employees : whosoever.

Permanent disablement shall have same meaning as indicated in Indian workmen’s Compensation Act. The compensation mentioned above shall be in addition to the compensation payable to the workmen/employees under the relevant provisions of the Workman’s Compensation Act and Rules framed there under or any other applicable laws as applicable from time to time. Incase the owner is made to pay such compensation then the Contractor is liable to reimburse the Owner such amount in addition to the compensation indicated above.

30.23 If the Contractor observes all the Safety Rules and Codes, Statutory Laws and Rules during the currency of Contract awarded by the Owner and no accident occurs then Owner may consider the performances of the Contractor and award suitable “ACCIDENT FREE SAFETY MERITORIOUS AWARD” as per scheme as may be announced separately from time to time.

31.0 Foreign Personnel

31.1 In case necessary for the execution of the works, the Contractor shall bring foreign supervisors for the execution of the Contract, at his own cost. The Contractor shall submit to the Employer, data on all personnel he proposes to bring into India for the performance of the works under the Contract, at least sixty(60) days prior to their arrival in India. Such data shall include the name of each person, his present address, his assignment and responsibility in connection with the works, and a short resume of his qualification, experience etc. in relation to the work to be performed by him.

31.2 Any person, unsuitable and unacceptable to the Employer, shall not be brought to India. Any person brought to India, and found unsuitable or unacceptable to the Employer shall be immediately removed from Site and repatriated back. If found, necessary, he may be replaced by another personnel acceptable to the Employer.
31.3 No person brought to India by the Contractor, for the works shall be repatriated without the consent of the Employer in writing, based on a written request from the Contractor for such repatriation giving reasons for such an action to the Employer. The Employer may give permission for such repatriation provided it is satisfied that the progress of work will not suffer due to such repatriation.

31.4 The cost of passports, visas and all other travel expenses to and from India, shall be to the Contractor’s account. The Employer will not provide any residential accommodation and/or furniture for any of the Contractor’s personnel including foreign personnel Contractor shall make his own arrangements for such facilities.

31.5 The Contractor and its expatriate personnel shall respect all Indian Acts, Laws, Rules and Regulations and shall not, in any way, interfere with Indian political and religious affairs and shall conform to any other rules and regulations which the Government of India, and the Employer may establish on them. The Contractor’s expatriate personnel shall work and live in close co-operation and coordination with their co-workers and the community and shall not engage themselves in any other employment either part-time or full-time nor shall they take part in any local politics.

31.6 The owner shall assist the Contractor, to the extent possible, in obtaining necessary permits to travel to India and back, by issue of necessary certificated and other information needed by the Government agencies.

32.0 **CODE REQUIREMENTS**

The erection requirements and procedures to be followed during the execution of the project shall be in accordance with the applicable Indian/International standards/Regulations, as indicated in Technical specification, good engineering practice, the Drawing and other applicable Indian codes, laws and regulations.
SECTION – ANNEX

ANNEXURES
# ANNEXURES

## CONTENTS

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>DESCRIPTION</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>I.</td>
<td>Proforma of Bank guarantee for Bid Guarantee</td>
<td>1-2</td>
</tr>
<tr>
<td>II.</td>
<td>Proforma of Bank Guarantee for Contract Performance</td>
<td>3-5</td>
</tr>
<tr>
<td>III.</td>
<td>Proforma of extension of Bank Guarantee</td>
<td>6</td>
</tr>
<tr>
<td>IV.</td>
<td>Proforma of Letter of Undertaking</td>
<td>7-8</td>
</tr>
<tr>
<td>V.</td>
<td>Proforma of Application for Payment</td>
<td>9-10</td>
</tr>
<tr>
<td>VI.</td>
<td>Proforma of Bank guarantee for Advance Payment</td>
<td>11-12</td>
</tr>
<tr>
<td>VII.</td>
<td>Proforma of Indemnity Bond</td>
<td>13-15</td>
</tr>
<tr>
<td></td>
<td>(entire equipment consignment in one lot)</td>
<td></td>
</tr>
<tr>
<td>VIII</td>
<td>Proforma of Indemnity Bond</td>
<td>16-18</td>
</tr>
<tr>
<td></td>
<td>(Equipments handed over in installments)</td>
<td></td>
</tr>
<tr>
<td>IX</td>
<td>Proforma of ‘Agreement’</td>
<td>19-23</td>
</tr>
</tbody>
</table>
ANNEXURE-I

PROFORMA OF BANK GUARANTEE FOR BID GUARANTEE
(To be stamped in accordance with stamp act)
The non-judicial stamp paper should be in the name of issuing bank

Bank Guarantee No. …………….
Date ……………………………

Ref…………………………

To,
Delhi Transco Ltd.
Shakti Sadan,
Kotla Road,
New Delhi – 110002

Dear Sirs,

In accordance with your invitation to Bid under your specification No. ………………
M/s. …………………………. having its registered / head office at ………………………………. (hereinafter called the Bidder) wish to participate in the said bid for ………………………………………………. and you, as a special favour have agreed to accept an irrevocable and unconditional bank Guarantee for an amount of ………………………………. valid up to …………… on behalf of bidder lieu of the bid deposit required to be made by the bidder, as a condition precedent for participation in the said bid.

We, the …………………………. Bank at …………………………. having our Head Office at ……………………………………………. Guarantee and undertake to pay immediately on mere demand by Delhi Transco Ltd. The amount of ………………………………..(in words & figure) …………………………. without any reservations, protest, demur & recourse. Any such demand made by the said ‘Owner’ shall be conclusive and binding on us irrespective of any dispute or difference raised by the Bidder.

This guarantee shall be irrevocable and shall remain valid upto and including …………………….@………. if any further extension of this guarantee is required, the same shall be extended to such required period (not exceeding one year) on receiving instruction from M/s. ………………………………. On whose behalf this guarantee is issued.
CONTRACT T – 121

In witness whereof the Bank, through its authorised officer, has set its hand and stamp on this ……………………… day of ……………………………………………………… at ………………………………….

WITNESS

_______________________                           ________________________
(Signature)     (Signature)

_______________________
(Name)     (Name)

_______________________                          ___________________________
(Official Address)                                              (Designation with Bank Stamp)

Attorney as per Power of Attorney No…………………………..

Date………………………………………………..

NOTE :

• This date shall be thirty (30) days after the last date for which the bid is valid
To,
Delhi Transco Ltd.
Shakti Sadan
Kotla Road
New Delhi – 110001.

Dear Sirs,

In consideration of Delhi Transco Ltd hereinafter referred to be as the ‘Owner’ which expression shall unless repugnant to the context or meaning thereof include its successors, administrators and assigns) having awarded to M/s……………………………with its registered /Head Office at……………………………………....……………(hereinafter referred to as the contractor which expression shall unless repugnant to the context or meaning thereof, include its successors, administrators, executors and assigns),a contract by issue of Owner’s letter of award No…………………….. dt……………………………  and the same having been acknowledged by the contractor, resulting in a contract bearing No……………………. dt…………………………… valued at ……………………… for…(scope of Contract)…………………… and the contractor having agreed to provide a contract performance guarantee for the faithful performance of the entire contract equivalent to……………………. ( % )……………………percent) of the said value of the contract to the owner.

We………………(Name & Address)………………………………………………..having its Head Office at………………………………………………..(hereinafter referred to as the bank which expression shall ,unless repugnant to the context or meaning thereof ,include its successors ,administrators, executors and assigns) do hereby guarantee and undertake to pay the owner ,on demand any and all monies payable by the contractor to the extent of ………………………………………as aforesaid at any time upto …**(days / months / year)…….. without any demur, reservation, context, resources of protest and / or without any reference to the contractor. Any such demand made by the owner on the bank shall be conclusive and binding not with standing any difference between the owner and the contractor or any dispute pending before any court. Tribunal, Arbitrator or any other authority. The bank undertakes not to revoke this guarantee during its currency
without previous consent of the owner and further agrees that the guarantee herein contained shall continue to be enforceable till the owner discharges this guarantee.

The owner shall have the fullest liberty without affecting in any way the liability of the bank under this guarantee, from time to time to extend the time for performance of the contract by the contractor. The owner shall have the fullest liberty, without affecting this guarantee to postpone from time to time the exercise of any powers vested in them or of any right which they might have against the contractor, and to exercise the same at any time in any manner, and earlier to enforce or to forbear to enforce any covenants, contained or implied in the contract between the owner and the contractor or any other course or remedy or security available to the owner. The bank shall not be released of its obligations under these present by any exercise by the owner of its liberty with reference to the matters aforesaid or any of them or by reason of any other act or forbearance or other acts of omission or commission on the part of the owner or any other indulgences shown by the owner or by any other matter or thing whatsoever which under law would, but for this provision, have the effect of relieving the bank. The bank also agrees that the owner at its option shall be entitled to enforce this guarantee against the bank as a principal debtor, in the first instance without proceedings against the contractor and not with standing any security or other guarantee that the owner may have in relation to the contractor’s liabilities.

Not with standing anything contained herein above our liability under this guarantee is restricted to ………………………………………. and it shall remain in force upto and including ………………………………………. And shall be extend from time to time for such period M/s. ………………………………………. on whose behalf this guarantee has been given .

Dated this …………………………….. day of …………………………………
At………………………………………………..

WITNESS
(Signature)                                             (Signature)

NAME                                                   NAME

(Official Address)                                   (Designation with Bank stamp)

Attorney as per Power of
Attorney No………………
Date ……………………

NOTE :
1. :- Strike whichever is not applicable.
   :- This sum shall be ten percent (10%) of the Contract price.
   :- The date will be ninety (90) days after the end of the guaranty period as specified in the Contract.

2. The stamp papers of appropriate value shall be purchased in the name of Guarantee issuing Bank.
FORM OF EXTENSION OF BANK GUARANTEE
(To be stamped in accordance with stamp act)

Ref………………………..       Dated………..

Delhi Transco Ltd.
Shakti Sadan
Kotla Road
New Delhi – 110002.

Dear Sirs,

SUB.:  EXTN. OF BANK GUARANTEE NO. ………………….
       DT…………………
       FOR RS……………………………… FAVOURING YOURSELVES
       EXPIRING ON …………………………………..ON ACCOUNT OF
       M/S…………………………………………….. IN RESPECT OF
       CONTRACT NO. ……………DT………………...
       (HEREINAFTER CALLED ORIGINAL BANK GUARANTEE)

At the request of M/s. ………………………………. We …(Bank branch office
at)……………………. And having its head office at ……………………….. do hereby
extend our liability under the above mentioned guarantee no. ………………….. dt.
………………………… for a further period of ……………….. years /months
from …………….. to ………….. expire on ……………………………….Except as
provided above, all other terms and conditions of original bank guarantee ……No.
……………………………….. dt. ………………. shall remain unaltered and binding.

Please treat this as an integral part of the original Bank guarantee to which it would be
attached.

Yours faithfully,

For …………………………...
Manager / Agents / Accountant

Power of Attorney No. ………..
Dt…………………………...

SEAL OF BANK

Note : The nonjudicial stamp papers of appropriate value shall be purchased in the name
of bank who has issued the Ban Guarantee.
ANNEXURE-IV

PROFORMA OF LETTER OF UNDERTAKING
(To be submitted by the Bidder along with his Bid)
(To be executed on non-judicial stamp paper of requisite value)

Ref.: Date: ……………

To,
DGM(TL) Constn.
Delhi Transco Limited
Room No.9, Shakti Deep Bldg.,
Anarkali Bazaar Complex
Jhandewalan (Extn.),
New Delhi-110055

Dear Sir,

1. 1*/We* have read and examined the following bid documents relation to the ……………………………………..(full scope of work).
   a) Notice Inviting Tender
   b) Conditions of Contract (Non-IDIA Erection containing Sections Invitation to Bid (INV)”, “Instructions to Bidders (INB)”, “General Terms & Conditions of Contract (GCC)” & “Erection conditions of contract (ECC)”.
   c) Special Conditions of Contract along with Annexure ……………….. to ………………..
   d) Drawing Nos. ……………………………..
   e) Technical Specifications.

2. 1*/We* hereby submit our Bid and undertake to keep our Bid valid for a period of six (6) calendar months from the date of bid i.e. upto …………….
1*/We* hereby further under take that during the said period I/we shall not vary/alter or revoke my/our Bid.

This undertaking is in consideration of DTL agreeing to open my/our* Bid and consider and evaluate the same for the purpose of award of works in terms of provisions of clause entitled “Award of Contract”, Section INB, Conditions of Contract in the Bid Documents.
Should this Bid be accepted, *I/we* also agree to abide by and fulfill all the terms & conditions of provisions of the above mentioned bid documents.

Signature alongwith Seal of Company

………………………………………..

(Duly authorized to sign the Bid on behalf of the Contractor)

Name …………………………………………..

Designation …………………………………………..

Name of Company …………………………………………..

(in Block Letters)

WITNESS

Signature ………………………….. Date & Postal Address

Date ……………………………….. …………………………………………..

Name & Address ……………………………….. …………………………………………..

……………………………………………… Telephone No. ………………………………..

Fax No. ………………………………..

*Strike out whichever is not applicable.*
PROPORMA OF APPLICATION FOR PAYMENT

Project :   
Equipment/material package :   Date :  
Name of Contractor :   Contract No. : 
Contract Value :   Contract Name : 
Unit Reference :   Application Serial Number : 

To,

..............................................
Delhi Transco Limited

Dear Sir,

APPLICATION FOR PAYMENT
Pursuant to the above referred Contract dated ................. the undersigned hereby applies for payment of the sum of .......................................................... (Specify amount and currency in which claim is made).

2. The above amount is on account of: [TICK (√) which ever is applicable]

    Initial advance (Schedule **)  
    Interim payment as advance (Schedule**)  
    Progressive payment against dispatch of equipment (Schedule**)  
    Progressive payment against receipt of equipment at site (Schedule **)  
    Progressive payment against erection (Schedule **)  
    Ocean freight & marine insurance (Schedule**)  
    Inland transportation (Schedule**)  
    Inland Insurance  

CONTRACT T – 121

Price adjustment

Extra work not specified in Contract

(Ref. Contract change order No. ………………………..)

Other (specify)

Final payment (Schedule**)

as detailed in the attached Schedule(s) which form an integral part of this application.

3. The payment claimed is as per item(s) No.(s) ……………………. of the payment schedule annexed to the above-mentioned Contract.

4. The application consists of this page, a summary of claim statement (Schedule**) and the following signed schedule.

1. ……………………………………………………………………………

2. ……………………………………………………………………………

3. ……………………………………………………………………………

The following documents are also enclosed

1. ……………………………………………………………………………

2. ……………………………………………………………………………

3. ……………………………………………………………………………

Signature of Contract/ Authorized Signatory

* Application for payment will be made to ‘Engineer’ to be designated for this purpose at the time of award of the Contract.

** Performa for the Schedule will be mutually discussed and agreed to during the finalization of the Contract Agreement.
CONTRACT T – 121

ANNEXURE-VI

PROFORMA OF BANK GUARANTEE FOR ADVANCE PAYMENT
(To be stamped in accordance with Stamp Act)

Ref: ………………..

Bank Guarantee No…………….

DGM(TL) Constn.

Date……………………………..

Delhi Transco Limited

Room No.9, Shakti Deep Bldg.,

Anarkali Bazaar Complex

Jhandewalan (Extn.),

New Delhi-110055

Dear Sir,

In consideration of Delhi Transco Limited, (hereinafter referred to as the ‘Owner’, which expression shall, unless repugnant to the context or meaning thereof include its successors, administrators and assigns) having awarded to M/s…………….(hereinafter referred to as the “Contractor” which expression shall unless repugnant to the context or meaning thereof, include its successors, administrators, executors and assigns), a Contract by issue of Owner’s Letter of Award No……………… dated…………….and the same having been acknowledged by the Contractor, resulting in a Contract bearing No…………dated……………..valued at……………..for……………………………….(scope of work)…………………..(hereinafter called the ‘Contract’) and the Owner having agreed to make an advance payment to the Contractor for performance of the above Contract amounting …………………….(in words and figures) as an advance against Bank Guarantee to be furnished by the Contractor.

We…………………………………………………………………………………………..

(Name of the Bank)

having its Head Office at………………………………..(hereinafter referred to as the ‘Bank’, which expression shall, unless repugnant to the context or meaning thereof, include its successors, administrators, executors and assigns) do hereby guarantee and undertake to pay the Owner, immediately on demand any or, all monies payable by the Contractor to the extent of …………………….. as aforesaid at any time upto………@...................without any demur, reservation, contest, recourse or protest and/or without any reference to the Contractor. Any such demand made by the Owner on the Bank shall be conclusive and binding notwithstanding any difference between the Owner and the Contactor or any dispute pending before any Court, Tribunal, Arbitrator or any other authority. We agree that the guarantee herein contained shall be irrevocable and shall continue to be enforceable till the Owner discharges this guarantee.

The Owner shall have the fullest liberty without affecting in any way the liability of the Bank under this guarantee, from time to time to vary the advance or to extend the time for performance of the Contract by the Contractor. The Owner shall have the fullest liberty without affecting this guarantee, to postpone from time to time the exercise of any powers vested in them or of any right which they might have against the Contractor, and
to exercise the same at any time in any manner, and either to enforce or to forbear to enforce any covenants, contained or implied, in the Contract between the Owner and the Contactor or any other course or remedy or security available to the Owner. The Bank shall not be released of its obligations under these presents by any exercise by the Owner of its liberty with reference to the matters aforesaid or any of them or by reason of any other act or forbearance or other acts of omission or commission on the part of the Owner or any other indulgence shown by the Owner or by any other matter or thing, whatsoever, which under law would, but for this provision have the effect of relieving the Bank.

The Bank also agrees that the Owner at its option shall be entitled to enforce this Guarantee against the Bank as a principal debtor, in the first instance without proceeding against the Contractor and notwithstanding any security or other guarantee that the Owner may have in relation to the Contractor’s liabilities.

Notwithstanding anything contained hereinabove our liability under this guarantee is limited to .......... and it shall remain in force upto and including ..........@.......... and shall be extended from time to time for such period (not exceeding one year), as may be desired by M/s. ......................on whose behalf this guarantee has been given.

Dated this .......... day of ........20......at ..................................

WITNESS

........................................... ...........................................
(Signature) ...........................................
(Signature)

........................................... ...........................................
(Name) ...........................................
(Name)

........................................... ...........................................
(Official Address) ...........................................
(Designation) (with Bank Stamp)

Attorney as per Power of Attorney No..........................

Dated...........................................

@ The date will be ninety (90) days after the date of completion of Contract.

Note: The non-judicial stamp papers of appropriate value shall be purchased in the name of Bank which issues the Bank Guarantee.
INDEMNITY BOND

THIS INDEMNITY BOND is made this ........... day of ........... 20 ............ by 
........................ a Company registered under the Companies Act, 1956/Partnership 
Firm/Proprietary Concern having its Registered Office at ............... (hereinafter 
called as ‘Contractor’ or “Obligor” which expression shall include its successors and 
permitted assigns) in favour of Delhi Transco Limited a Company incorporated under the 
Companies Act, 1956 having its registered Office at Shakti Sadan Bldg., Kotla Road, 
New Delhi-110002 and its project at ..............(hereinafter called ‘DTL’ which 
expression shall include its successors and assigns).

WHEREAS DTL has awarded to the Contractor a Contract for ................. vide its 
Letter of Award/Contract No. ......................dated......................and its 
Amendment No..................... and Amendment No...................(applicable when 
amendments have been issued) (hereinafter called the “Contract”) in terms of which DTL 
is required to hand over various equipment/material to the Contractor for execution of the 
Contract.

And WHEREAS by virtue of Clause No. ............... of the said Contract, the 
Contractor is required to execute an Indemnity Bond in favour of DTL for the 
Equipment/material handed over to it by DTL for the purpose of performance of the 
Contract/Erection portion of the Contract (hereinafter called the “Equipment”).

NOW THEREFORE, This Indemnity Bond witnesseth as follows.

1. That in consideration of various equipment as mentioned in the Contract, valued 
at Rs.........(Rupees .................) handed over to the Contractor for the 
purpose of performance of the Contract, the Contractor hereby undertakes to 
indemnify and shall keep DTL indemnified, for the full value of the 
Equipment/material. The Contractor hereby acknowledges receipt of the 
equipment as per the dispatch title documents handed over to the contactor duly 
edorsed in their favour and detailed in the schedule appended thereto. It is 
expressly understood by the Contractor that handing over the dispatch title 
documents in respect of the said equipments duly endorsed by DTL in favour of 
the Contractor shall be construed as handing over of the equipment purported to 
be covered by such title documents and the Contractor shall hold such 
equipments/material in trust as a trusty for and on behalf of DTL.
2. That the Contractor is obliged and shall remain absolutely responsible for the safe transit/protection and custody of the Equipment/material at DTL project site against all risks, whatsoever, till the Equipment/material are duly used/erected in accordance with the terms of contract and the Plant/Package duly erected and commissioned in accordance with the terms of the Contract, is taken by the DTL. The Contractor undertakes to keep DTL harmless against any loss or damage that may be caused to the Equipment/material.

3. The Contractor undertakes that the Equipment/material shall be used exclusively for the performance/execution of the Contract strictly in accordance with its terms and conditions and no part of the equipment/materials shall be utilized for any other work or purpose whatsoever. It is clearly understood by the Contractor that non-observance of the obligations under this Indemnity Bond by the Contractor shall inter-alia constitute a criminal breach of trust on the part of the Contractor for all intents and purpose including legal/penal consequences.

4. That DTL is and shall remain the exclusive Owner of the Equipment/material free from all encumbrances, charges or liens of any kind, whatsoever. The equipment shall at all times be open to inspection and checking by Engineer or other employees/agents authorized by him in this regard. Further, DTL shall always be free at all times to take possession of the Equipment/material in whatever form the Equipment may be, if in its opinion the Equipment are likely to be endangered, mis-utilized or converted to uses other than those specified in the Contract, by any acts of omission or commission on the part of the contractor or any other person or on account of any reason whatsoever, and the Contractor binds himself and undertakes to comply with the direction of demand of DTL to return the equipment/material without any demur or reservation.

5. That this indemnity Bond is irrevocable. If at any time any loss or damage occurs to the equipment or the same or any part thereof is mis-utilized in any manner whatsoever, then the Contractor hereby agrees that the decision of the Engineer of DTL as to assessment of loss or damage to the Equipment/material shall be final and binding on the Contractor. The Contractor binds itself and undertakes to replace the lost and/or damaged Equipment/material at its own costs and/or shall pay the amount of loss of DTL without demur, or reservation or protest. This is without prejudice to any other right or remedy that may be available to the DTL against the Contractor under the Contract and under this Indemnity Bond.

6. NOW THE CONDITION of this Bond is that if the Contractor shall duly and punctually comply with the terms and conditions of this Bond to the satisfaction of DTL THEN, the above, Bond shall be void, but otherwise it shall remain in full force and virtue.
IN WITNESS WHEROF, the Contractor has hereunto set its hand through its authorized representative under the common seal of the Company, the day, month and year first above mentioned.

SCHEDULE

<table>
<thead>
<tr>
<th>Particulars of the Equipment/material handed over</th>
<th>Quantity</th>
<th>Particulars of Despatch Title Documents</th>
<th>Value of the Equipments/materials</th>
<th>Signature of Attorney (authorized representative) as a token of receipt</th>
</tr>
</thead>
<tbody>
<tr>
<td>RR/GR No./Date of Bill of Lading</td>
<td>Carrier</td>
<td>Have been handed over</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For and on behalf of
M/s. ...........................................................

WITNESS

1. 1. Signature ................................ Signature ...............................  
   2. Name ................................. Name ........................................  
   3. Address ............................... Designation .............................  

2. 1. Signature .............................  
   2. Name ................................. (Common Seal in case of Company)  
   3. Address .............................  

* Indemnity Bonds are to be executed by the authorised person and (i) in case of Contracting Company under common seal of the Company or (ii) having the Power of Attorney issued under common seal of the company with authority to execute Indemnity Bonds, (iii) In case of (ii), the original Power of Attorney if it is specifically for this Contract or a Photostat copy of the Power of Attorney, if it is General Power of Attorney and such documents should be attached to indemnity Bond.
INDEMNITY BOND

THIS INDEMNITY BOND is made this .......... day of .......... 20 ............... by
…………………… a Company registered under the Companies Act, 1956/Partnership
Firm/Proprietary Concern having its Registered Office at ................. (hereinafter
called as ‘Contractor’ or “Obligor” which expression shall include its successors and
permitted assigns) in favour of Delhi Transco Limited, having its registered Office at
Shakti Sadan Bldg., Kotla Road, New Delhi-110002 and its project at
...................(hereinafter called ‘DTL’ which expression shall include its successors and
assigns).

WHEREAS DTL has awarded to the Contractor a Contract for ................. vide its
Letter of Award/Contract No. ..................dated.........................and its
Amendment No.............. and Amendment No...................(applicable when
amendments have been issued) (hereinafter called the “Contract”) in terms of which DTL
is required to hand over various equipment/material to the Contractor for execution of the
Contract.

AND WHEREAS by virtue of Clause No. ................. of the said Contract, the
Contractor is required to execute an Indemnity Bond in favour of DTL for the
Equipment/material handed over to it by DTL for the purpose of performance of the
Contract/Erection portion of the Contract thereinafter called the “Equipment”).

NOW THEREFORE, This Indemnity Bond witnesses as follows.

1. That in consideration of various equipment/material as mentioned in the Contract,
valued at Rs.........................(Rupees ......................) to be handed over to
the Contractor in the installment from time to time for the purpose of performance
of the Contract, the Contractor hereby undertakes to indemnify and shall keep
DTL indemnified, for the full value of the Equipment/material. The Contractor
hereby acknowledges receipt of the initial installment of the equipment as per the
details in the schedule appended hereto. Further, the Contractor agrees to
acknowledge receipt of the subsequent installments of the equipment/material as
required by DTL in the form of Schedule consecutively numbered which shall be
attached to this Indemnity Bond so as to form integral parts of this Bond It is
expressly under stood by the Contractor that handing over the dispatch title
documents in respect of the said equipments/materials duly endorsed by DTL in
favour of the Contractor shall be construed as handing over of the
equipment/material purported to be covered by such title documents and the
Contractor shall hold such Equipment/material in trust as a trusty for and on behalf of DTL.

2. That the Contractor is obliged and shall remain absolutely responsible for the safe transit/protection and custody of the Equipment/material at DTL project site against all risks, whatsoever, till the Equipment/material are duly used/erected in accordance with the terms of contract and the Plant/Package duly erected and commissioned in accordance with the terms of the Contract, is taken over by the DTL. The Contractor undertakes to keep DTL harmless against any loss or damage that may be caused to the Equipment.

3. The Contractors undertakes that the Equipment shall be used exclusively for the performance/execution f the Contract strictly in accordance with its terms and conditions and no part of the equipments/materials shall be utilized for any other work or purpose whatsoever. It is clearly understood by the Contactor that non-observance of the obligations under this Indemnity Bond by the Contractor shall inter-alia constitute a criminal breach of trust on the part of the Contractor for all intents and purpose including legal/penal consequences.

4. That DTL is and shall remain the exclusive Owner of the Equipment/material free from all encumbrances, charges or liens of any kind, whatsoever. The equipment/material shall at all times be open to inspection and checking by Engineer or other employees/agents authorized by him in this regard. Further, DTL shall always be free at all times to take possession of the Equipment/material in whatever form the Equipment/material may be, if in its opinion the Equipment/material are likely to be endangered, mis-utilized or converted to use other than those specified in the Contract, by any acts of omission or commission on the part of the contactor or any other person or on account of any reason whatsoever, and the Contactor binds himself and under takes to comply with the direction of demand of DTL to return the equipment without any demur or reservation.

5. That this indemnity Bond is irrevocable. If at any time any loss or damage occurs to the equipment/material or the same or any part thereof is mis-utilized in any manner whatsoever, then the Contractor hereby agrees that the decision of the Engineer of DTL as to assessment of loss or damage to the Equipment/material shall be final and binding on the Contractor. The Contractor binds itself and under takes to replace the lost and/or damaged Equipment/material at its own costs and/or shall pay the amount of loss to DTL without any demur, reservation or protest. This is without prejudice to any other right or remedy that may be available to the DTL against the Contactor under the Contact and under this Indemnity Bond.

6. NOW THE CONDITION of this Bond is that if the Contractor shall duly and punctually comply with the terms and conditions of this Bond to the satisfaction
of DTL, THEN above Bond shall be void, but otherwise it shall remain in full force and virtue.

IN WITNESS WHEREOF, the Contractor has hereunto set its hand through its authorized representative under the common seal of the Company, the day, month and year first above mentioned.

SCHEDULE No.1

<table>
<thead>
<tr>
<th>Particulars of the Equipment/material handed over</th>
<th>Quantity</th>
<th>Particulars of Despatch Title Documents</th>
<th>Value of the Equipments/material</th>
<th>Signature of Attorney (authorized representative) as a token of receipt.</th>
</tr>
</thead>
<tbody>
<tr>
<td>RR/GR No./Date of Bill of Lading</td>
<td>Carrier</td>
<td></td>
<td></td>
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</tbody>
</table>

(please number subsequent schedules)

For and on behalf of M/s. ............................................

WITNESS

1. 1. Signature ....................... Signature .......................  

2. Name ............................. Name .............................  

3. Address ......................... Designation .......................  

Authorised representative*  

2. 1. Signature .......................  

2. Name .............................  

3. Address ........................... (Common Seal in case of Company)  

* Indemnity Bonds are to be executed by the authorised person and (i) in case of Contracting Company under common seal of the Company or (ii) having the Power of Attorney issued under common seal of the company with authority to execute Indemnity Bonds, (iii) In case of (ii), the original Power of Attorney if it is specifically for this Contract or a Photostat copy of the Power of Attorney, if it is General Power of Attorney and such documents should be attached to indemnity Bond.
THIS AGREEMENT MADE ON THIS ___ day of _____________, 200 (……….. date in words…………………….) B E T W E E N DELHI TRANSCO LIMITED having its registered office at Shakti Sadan, Kotla Road, New Delhi – 110 002 (hereinafter referred to a ‘OWNER’ or DTL which expression shall include its administrators, successors, executors and permitted assigns) of one part and _______________________________ M/s.________________________ , a company incorporated under the act (Indian Companies Act, 1956) having its registered office at ____________________________ (hereinafter referred to as the ‘Contractor’ or ‘X’ Name Of Contracting Company) which expression shall include its administrators, successors, executors and permitted assigns on the other parts.

WHEREAS DTL desirous of setting up its Transmission system associated with bids for ………………………………………………………………………………….. (Briefly describe scope of work) ………………………………………………………………………………………………………………………………………………….. against it Bid Specification No. ………………………………..

AND WHEREAS …………………………………… ‘X’ …………………….. had participated in the above referred bidding vide their proposal no. ………………… dated ………………… and DTL accepted their aforesaid proposal and awarded the contract to ……………………… ‘X’………………….. on terms and conditions contained in its Letter of Award No. …………………. Dtd.………………….. and the documents referred to therein, which have been accepted by ………………. ‘X’………………….. resulting into a ‘CONTRACT’.

NOW THEREFORE THIS DEED WITNESSETH AS UNDER :

1.0 Articles
1.1 AWARD OF CONTRACT

DTL has award the contract to ………………. ‘X’ ………………. for the work of on the terms and conditions contained in its Letter of Award No. ……………. Dated …………… and the documents referred to therein. The award has taken effect from ……………….. i.e. the date of issue of the aforesaid Letter of award. The terms & expressions used in this Agreement shall have the same meaning as are assigned to them in the ‘Contract Documents’ referred to in the succeeding Article.
2.0 CONTRACT DOCUMENTS

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

(i) DTL’s Bidding Documents in respect of Specification No.……………… issued vide its letter no. …………… dated ……….. consisting of invitation to Bid, Instructions to Bidders, General Terms & Conditions of Contract, special conditions of Contract and all other sections entitled ‘Conditions of Contract’ including all amendments issued vide its letter(s) no(s). ………., dated …………..

Volume-I

(ii) DTL Technical Specification (including amendments issued vide its Letter No. …………… dated …………..

Volume-II

(iii) ‘X’ is proposal no. …………… dated ………….. along with Bid proposal sheets, data requirements, payment terms and work schedules submitted by ‘X’ entitled as …………..

Volume-III

(iv) Agreed Minutes of the meeting held on ………………… between DTL and ‘X’.

Volume-IV

(v) DTL Letter of Award No. …………… dated ………….. duly accepted by ‘X’.

Volume-V

(vi) Quality Plans for field activities entitled as ‘Quality Plan’.

Volume-VI

(vii) Contact Network

Volume-VII

All the aforesaid contract documents shall form an integral part of this Agreement, in so far as the same or any part thereof conform to the Bid Documents (Volume I & II) and what has been specifically agreed to by the owner in its letter of Award. Any matter inconsistent therewith contrary or repugnant thereto or any deviations taken by the contractor in its ‘Proposal’ (Vol.-III) but not agreed to specifically by the Owner in the its letter of award shall be deemed to have been withdrawn by the contractor. For the sake of brevity, this agreement along with its aforesaid contract documents shall be referred to as the ‘Agreement’.
3.0 CONDITIONS OF CONVENANTS

3.1 The scope of contract, consideration, terms of payment, price adjustment, taxes wherever applicable, insurance, liquidated damages, performance guarantee and all other terms and conditions are contained in DTL’s Letter of Award No. ………….. dated ……………. Read in conjunction with other aforesaid contact documents. The contact shall be duly performed by the Contractor strictly and faithfully in accordance with the terms of the Agreement.

3.2 The scope of work shall also include supply and installation of all such items which are not specifically mentioned in the contact documents, but which are needed for successful, efficient, safe and reliable operation of the line unless otherwise specifically excluded in the specifications under ‘exclusions’ or letter of award.

3.3 TIME SCHEDULE

3.3.1 Time is the essence of the contract and schedules shall be strictly adhered to ‘X’ shall perform the work in accordance with the agreed schedule as given in Vol. V & VI.

3.4 QUALITY PLANS

3.4.1 The contractor is responsible for the proper execution of the quality plans enclosed in Volume VI. The owner will also undertake quality surveillance and quality audit of the contractor’s works, systems and procedures and quality control, activities. The contractor further agrees that any change in the quality plan will be made only with the owner’s approval. The contractor shall also perform all quality control activities, inspection and tests agreed with the owner to demonstrate full compliance with the contract requirements.

3.4.2 The contractor also agrees to provide the owner with the necessary facilities for carrying but inspection quality audit and quality surveillance of contractors Quality assurance systems and activities.

These shall include but not limited to the following:

i) Relevant standards, drawing and procedures;

ii) Detailed Quality Assurance System manual for activities,

iii) Storage procedures and instructions;

iv) Complete set of log sheets (blank) mentioned in the quality plan.

3.4.3 It is expressly agreed to by the contractor that the quality tests and inspection by the owner shall not in any way relieve the contractor
of its responsibility for quality standards, and performance guarantee and their other obligations under the agreement.

3.4.4 ‘X’ agrees to submit Quality Assurance Documents package to DTL for review and record.

3.5 It is expressly agreed to by the Contractor that this contract on single source responsibility basis and the Contractor is bound to perform the total Contract in its entirely and non-performance of any part or portion of the Contract shall be deemed to be a breach of the entire Contract.

3.6 The contractor guarantees that the equipment/material supplied by the contractor shall meet the parameters, as stipulated in the Technical Specifications (Volume II) and in the event of any deficiencies the owner may at its option reject it.

3.7 It is further agreed by the contractor that the contract performance guarantee shall in no way construed to limit or restrict the owner’s right to recover the damages / compensation due to short – fall in the performance or under any other clause of the Agreement. The amount of damages / compensation shall be recoverable either by way of deduction from the contract price, contract performance guarantee and / or otherwise.

The contract performance guarantee furnished by the contractor is irrevocable and un-conditional and the owner shall have the powers to invoke it notwithstanding any dispute or difference between the owner and the contractor pending before any court, tribunal, arbitrator or any other authority.

3.8 This agreement constitutes full and complete understandings between the parties and terms of the presents. It shall supersede any prior correspondence, terms and conditions contained in the agreement. Any modification of the Agreement shall be effected only be a written instrument signed by the authorized representatives of both the parties.

4 SETTLEMENT OF DISPUTES

4.1 It is specifically agreed by the between the parties that all the differences or disputes arising out of the agreement or touching the subject matter of the agreement, shall be decided by process of settlement and arbitration as specified in clause .......... and ............... Of the General terms & Conditions of the contract and the provisions of the Indian Arbitration Act, 1940, shall apply and Delhi Courts alone shall have exclusive jurisdiction over the same.

4.2 NOTICE OF DEFAULT

Notice of default given by either party to the other party under the agreement shall be in writing and shall be deemed to have been duly and
properly served upon the parties hereto. If delivered against acknowledgement or by telex or by registered mail with acknowledgement duly addressed to the signatories at the addresses mentioned hereinabove.

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

WITNESS

1. …………………… (Owner’s Signature)  
   (Printed Name)

2. …………………… (Designation)  
   (Company’s Stamp)

3. …………………… (Contractor’s Signature)  
   (Printed Name)

4. …………………… (Designation)  
   (Company’s Stamp)

‘X’ The contractor should write complete name of the company on which the contract has been awarded.
VOLUME-IA
CONTRACT T – 121

SPECIAL CONDITIONS OF CONTRACT

FOR

Erection, testing & commissioning of 220 KV Double circuit overhead transmission tower Line from Maharani Bagh 400 KV S/Stn to Gazipur 220 KV S/Stn.

VOLUME-IA

DELHI TRANSCO LIMITED
(A GOVT. OF NCT OF DELHI UNDERTAKING)
SPECIAL CONDITIONS OF CONTRACT

FOR

Erection, testing & commissioning of 220 KV Double circuit overhead transmission tower Line from Maharani Bagh 400 KV S/Stn to Gazipur 220 KV S/Stn.

VOLUME-IA

(This document is meant for the exclusive purpose of bidding against this specification and shall not be transferred, reproduced or otherwise used for purposes other than that for which it is specifically issued).
CONTRACT T – 121

SPECIAL CONDITIONS OF CONTRACT

FOR

Erection, testing & commissioning of 220 KV Double circuit overhead transmission tower Line from Maharani Bagh 400 KV S/Stn to Gazipur 220 KV S/Stn.

VOLUME – IA

CONTENTS

<table>
<thead>
<tr>
<th>Clause No.</th>
<th>Description</th>
<th>Page No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>General information</td>
<td>1</td>
</tr>
<tr>
<td>2.0</td>
<td>Scope</td>
<td>1</td>
</tr>
<tr>
<td>3.0</td>
<td>Qualifying Requirements</td>
<td>2</td>
</tr>
<tr>
<td>4.0</td>
<td>Basis of Award</td>
<td>2</td>
</tr>
<tr>
<td>5.0</td>
<td>Basis of Bid Evaluation and Bidding Schedule</td>
<td>2-3</td>
</tr>
<tr>
<td>6.0</td>
<td>Works schedule</td>
<td>3</td>
</tr>
<tr>
<td>7.0</td>
<td>Prices and Price Adjustment</td>
<td>3-4</td>
</tr>
<tr>
<td>8.0</td>
<td>Terms of Payment</td>
<td>4-6</td>
</tr>
<tr>
<td>9.0</td>
<td>Erection Insurance</td>
<td>6</td>
</tr>
<tr>
<td>10.0</td>
<td>Liquidated Damages for delay in completion</td>
<td>6-7</td>
</tr>
<tr>
<td>11.0</td>
<td>Bid Guarantee to be submitted by the Bidder in a separate sealed cover</td>
<td>7</td>
</tr>
<tr>
<td>12.0</td>
<td>Contract Performance Guarantee</td>
<td>7</td>
</tr>
<tr>
<td>13.0</td>
<td>Owner Supplied items</td>
<td>7</td>
</tr>
<tr>
<td>14.0</td>
<td>Indemnity Bond</td>
<td>7-8</td>
</tr>
<tr>
<td>15.0</td>
<td>Surplus Materials</td>
<td>8</td>
</tr>
<tr>
<td>16.0</td>
<td>Quantity Variation</td>
<td>8</td>
</tr>
<tr>
<td>11.0</td>
<td>Annexure-A(SCC)</td>
<td>9-10</td>
</tr>
<tr>
<td>11.0</td>
<td>Annexure-B(SCC)</td>
<td>11</td>
</tr>
</tbody>
</table>
1.0 GENERAL INFORMATION:
1.1 Delhi Transco Limited (DTL), A Govt. of NCT of Delhi Undertaking invites sealed bids for the Erection, Testing and Commissioning of:-

Erection, testing & commissioning of 220 KV Double circuit overhead transmission tower Line from Maharani Bagh 400 KV S/Stn to Gazipur 220 KV S/Stn. on Domestic Competitive Bidding basis:

1.2 The requirement, conditions, etc. stated in Vol.-I, Vol.-IB, Vol.-II & Vol.-III shall apply to and shall be considered as part of this Volume (Vol.-IA) as if bound together. In case any discrepancy between the provisions of this volume and other volumes, the provision of this volume shall prevail.

1.3 Unless brought out clearly, the Bidder shall be deemed to conform strictly to the provisions of the bidding, documents. All deviations from the specifications shall be clearly brought out in respective schedule of deviations. Any discrepancy between specification and bid if not clearly brought out in the schedule, will not be considered as a valid deviation.

1.4 The respective rights of DTL and Bidders/Contractors shall be governed by the bidding documents / contracts signed between DTL and the contractors for the respective packages/ lines.

2.0 SCOPE

Detailed scope of work is specified in Clause 1.1 of Technical Specification, Vol.II, which interalia includes the following:

2.1 The scope of work covered includes: (i) detailed survey, profiling, tower spotting/optimisation of tower locations, River & Railway crossing proposal, soil resistivity measurement, geotechnical investigation and check survey of 220 KV D/C Tower Line, (ii) selecting type of foundation (Raft & Pile) for different type of tower and casting of foundation for tower footings including unequal leg extension as per foundation design approved by the DTL, (iii) erection of towers, tack welding of bolts and nuts including supply and application of zinc rich primer & enamel paint, tower earthing, fixing of insulator strings, stringing of conductors and earthwire along with all necessary line accessories, (iv) supply and erection of tower accessories such as Danger plate, Circuit plate, Number plate, Phase plate & Anti-climbing Devices and (v) testing and commissioning of the erected transmission line (vi) other items not specified above, but required as per BPS (Bid Proposal Sheets).

The tower parts, Stubs, ACSR Zebra Conductor, Earthwire, their hardware fittings and insulators shall be issued free of cost to the contractor for use in line work.
3.0 QUALIFICATION REQUIREMENTS

3.1 The qualification requirements for the package is enclosed at Annexure-A (SCC) to this special conditions of contract.

4.0 BASIS OF AWARD

4.1 Bidder has to quote for the complete scope of work under the package as stated in Technical Specification Volume-II. Bids for part of the package will be treated as incomplete and shall be rejected.

5.0 BASIS OF BID EVALUATION AND BIDDING SCHEDULE

5.1 Bids shall be evaluated packagewise.

5.2 The quantities of various items covered under the package are indicated in the Bid Proposal Sheets (BPS), Vol.-IB of the bidding documents are only provisional. For evaluation purpose, total price for erection work on the basis of provisional quantities specified under Schedule-2 of BPS, Volume-IB. Since the quantities of items would depend upon final survey of the transmission line, the Contractor shall be responsible to execute such final quantities of items and they shall be paid for such actual quantities based on the unit rates incorporated in the contract. For this purpose unit rate for each item as required in the Bid Proposal Sheets are also to be quoted.

5.3 Basis of comparison

5.3.1 Bids shall be evaluated on the basis of lumpsum price for the entire scope of work under the package

The lumpsum price shall include erection price consisting of charges for transportation of owner supplied materials from owner's store to Contractor's store or site of work or vice versa loading handling, storage, survey, soil investigation, civil works, erection, testing and commissioning. Any other tax which is not the part of total lump sum bid price shall also be born by bidder.

5.3.2 The comparison of bids shall be done in the manner indicated in Clause 37.0 of Sec-INB, Vol.-I and in the Technical Specifications. The final comparison price shall comprise the following:

(i) The lumpsum price as per clause 5.3.2 above,

(ii) The cost compensation for Deviations’ which will be added to bid price as indicated under Clause 33.0, Section-INB, Vol.-I, using pricing information available to DTL.
(iii) The cost of withdrawal of the deviation, if any, indicated by the bidder in Bid Proposal sheets in line with the clause 11.2, Section-INB, Vol.-I along with its subsequent amendments (Amendment No.-VI) shall also be added to the Bid price for evaluation of Bid.

5.4 Conditional discount/rebate if any, offered by the Bidder shall not be taken into consideration for evaluation, however, it shall be considered in case of award.

6.0 **WORK SCHEDULE**

6.1 The completion of testing and commissioning of Transmission Line shall be nine (09) months from the date of Letter of Award.

7.0 **PRICES AND PRICE ADJUSTMENT**

7.1 Prices

7.1.1 Prices for work and materials covered under the scope of this specification shall be furnished by the Bidder in the matter specified in the Bid Proposal Sheets, Volume-IB. The bidder shall quote base price. This price will be subject to price adjustment as per the price adjustment formulae given hereunder.

7.1.2 Prices for survey, soil investigation, painting of towers, pipe and counterpoise earthing, aviation signal, tower accessories such as danger plate, phase plate, number plate, circuit plate, anticlimbing device etc. and other charges, if any, shall be on firm price basis and no price adjustment shall be applicable for these components.

7.2 Price adjustment for erection price component

7.2.1 The formula for calculation of the monthly price adjustment for erection price component (excluding charges mentioned at Para 7.1 above) as indicated in clause 31.4, Sec-GCC, Vol.-I shall be modified as under:

\[ DE = ECo \left[ 0.20 \frac{(A1-A0)}{A0} + 0.55 \frac{(B1-Bo)}{Bo} \right] \]

Where,

\[ DE = \text{Price variation amount of erection price component, excluding prices for items mentioned at para 7.1 above.} \]
ECo = Base Erection Price Component (Excluding prices for items mentioned at para 7.1 above, less advance.

A = Rate for Diesel oil

B = Indian field labour index - namely All India Consumer Price Index for Industrial Workers as published by Labour, Shimla, Government of India.

Subscript ‘o’ will correspond to 30 days prior to date of opening of bids and subscript ‘1’ will correspond to the month of billing.

7.2.2 The price variation on erection price component shall not be subject to any ceiling whatsoever.

7.3 The Bidder shall indicate the source of the indices and the base dated indices in his bids.

7.4 Bids specifying price adjustment provision other than those specified in these specification and documents run the risk of rejection.

8.0 TERMS OF PAYMENT

The payment to the Contractor for the performance of the contract will be made by the Owner as per Clause 32.7 Section GCC, Conditions of Contract, Vol.-I and as per conditions specified herein.

8.1 Survey

Payment for survey shall be paid on prorata basis on completion of survey and approval of the same by the owner.

8.2 Erection Price Component

a) Ten percent (10%) of the total erection price (excluding the price component for survey) shall be paid as an interest bearing initial advance on establishment of site office, commencement of stub setting work, and certification by Engineer that satisfactory mobilization for erection exists, subject to clause 32.7.1 Section GCC, Vol.-I, Conditions of contract against submission of an unconditional bank guarantee for the equivalent amount valid initially till expiry of three (3) months after the taking over of the line by the Owner.

   a This payment is an optional payment. The contractor has the option of taking the interest bearing advance or otherwise.
In case, the Contractor opts for this interest bearing advance, the same shall be paid to the Contractor on fulfillment of above conditions and an interest on monthly outstanding amounts will be charged at the rate of 11.5% per annum plus 1% Administrative expenses per annum. The monthly outstanding amount for the purpose of calculating the interest shall be worked out at the end of each calendar month against the progressive payment for the work done.

In case, the Contractor opts not to take interest bearing advance as above, it would be mandatory for him to submit the documents listed at Serial No. (a), (d) & (e) under clause 32.7.1 of Section GCC (Vol-I) within 30 days of issuance of LOA.

b) 90% (Ninety percent) of the erection price component, excluding price component of survey (In case, the Contractor opts not to take interest bearing advance as above) or Eighty percent (80%) of the erection price component excluding price component of survey (In case, the Contractor opts to take interest bearing advance as above) shall be paid on progressive monthly basis depending on actual work done against each completed erection activity and on certification of the same by the Owner.

c) The balance 10% (ten percent) of the erection price component (excluding price component for survey) shall be paid after successful commissioning of the transmission line and issuance of Taking Over Certificate. However, in case, for any reason solely attributable to the Owner, the commissioning of line is delayed beyond 120 days of successful completion of final checking and testing of line for the purpose of commissioning as defined in Technical Specification, Volume-II of the bidding documents, the balance 10% payment shall be released against an unconditional & irrevocable bank guarantee of equivalent amount initially valid till 6 months from the readiness of transmission line for commissioning and charging at rated voltage, to be extended till 90 days beyond actual commissioning & taking over.

8.3 PRICE ADJUSTMENT:

8.3.1 Any variation in contract price due to price adjustment provisions under Clause 7.0 above shall be effected on presentation of invoices supported by calculations as per formula specified therein along with the documentary evidence for different indices applicable for price adjustment.

8.3.2 Any increase in contract price due to price adjustment provision as per Clause 7.0 above shall be payable as per the followings:

(i) 90% of the price adjustment amount against erection for respective billing period shall be paid after certification by DTL representative for quantum of work done in the said billing period.
(ii) Balance 10% of the price adjustment amount shall be paid alongwith final payment as per Clause 8.2 (c) above.

8.3.3 Any reduction in contract price due to price adjustment provision as per Clause 7.0 above shall be effected by recovering 100% of the reduction amount from any of the Contractor’s invoices falling immediately due for payment.

8.3.4 Bills on account for price adjustment must be submitted by the Contractor at least once in a month.

8.4 MODE OF PAYMENT

All payments under the contract shall be released to the Contractor directly.

9.0 ERECTION INSURANCE

In addition to conditions specified in Clause 35.0 Section GCC Vol-I & 27.0 Section GCC, following shall apply:

All the equipment and materials including tower foundations being supplied by the Contractor shall be kept completely insured by the contractor at his cost from the time of despatch from the Contractor’s / sub-vendor's works, up to the completion of erection and final checking, testing and commissioning at site and taking over of the transmission line by the Owner.

Further, all the equipment and materials being supplied by the Owner (hereinafter to be referred as Owner supplied items) for the performance of the work, shall be kept insured by the Contractor against any loss, damage, theft, pilferage, fire etc. for the complete period of storage, erection and commissioning up to the time of taking over of the Works by the Owner. The premium paid to the Insurance Company for this purpose shall be reimbursed by the Owner to the Contractor at actuals against documentary proof by the Contractor. The Contractor shall obtain competitive quotations for such insurance and shall take prior approval from the Owner before taking the insurance. The insurance cost caused by the Owner supplied items shall not be included in the price to be given in Schedule of prices.

It will be the responsibility of the Contractor to lodge, pursue and settle all claims with the insurance company in case of any damage, loss, theft, pilferage or fire and the owner shall be kept informed about it. The Contractor shall replace the lost / damaged materials promptly irrespective of the settlement of the claims by the underwriters and ensure that the work progress is as per agreed schedule. The losses, if any, in such replacement will have to be borne by the Contractor.

10.0 LIQUIDATED DAMAGES FOR DELAY IN COMPLETION

10.1 If the handing over of the transmission line is delayed beyond the Scheduled date, as stipulated in clause 6.0 or above or any time extensions granted thereof, the
Contractor shall pay to the Owner as liquidated damages and not as penalty a sum of half percent (0.5%) of the contract price for each calendar week of delay or part thereof in the handing over the transmission line.

10.2 The above amount of liquidated damages shall be subject to a maximum of five percent (5%) of the total Contract price for the package.

11.0 **BID GUARANTEE TO BE SUBMITTED BY THE BIDDER IN A SEPARATE SEALED COVER**

11.1 A Bid Guarantee shall accompany the bid in the original and three copies of the original for the amount of Rs. **7.22 lacs** and in the manner as set forth in clause 21.0, Section INB Conditions of Contract, Volume-I.

11.2 Any bid not accompanied by a Bid Guarantee as set forth in Clause 21.0, Section INB, Conditions of Contract Volume-I & herein above will be rejected by the Owner as non-responsive.

12.0 **CONTRACT PERFORMANCE GUARANTEE**

The successful Bidder shall furnish to the Owner a Contract Performance Guarantee against the contract as per the terms prescribed in clause no.40, Section-INB, Volume-I & clause 30.0, Section-GCC, Volume-I.

13.0 **OWNER SUPPLIED ITEMS**

13.1 The equipment & materials to be furnished by the Owner shall be supplied to the Contractor from the appropriate depots established by the Owner. The contractor shall be responsible for taking delivery of these materials from Owner's Store, loading, unloading and carting them to the different stores built by him for the purpose, the loading, unloading and cartage being at the cost of the Contractor. The Contractor shall be responsible for the proper handling and storage of these materials from the time of their receipt up to the time of taking over of the respective section of the transmission line by the Owner.

13.2 Yards and store provided by the Contractor for stacking and storage of materials shall be open for inspection by the Owner as and when required. The cost of handling and storage shall be to the Contractor's account.

13.3 In case the material being arranged by the Owner and supplied to the Contractor for erection, **directly through the Supplier(s) of the Owner**, are received short, broken or damaged, an entry shall be made in the delivery register / challan of the road transporter / railway authorities as far as possible and a report of the same giving full details of shortage and damages & along with a copy of remarks entered in the delivery register / challan of the road transporter / railways shall be submitted by the Contractor to the Owner, immediately, who shall take further action in the matter.

14.0 **INDEMNITY BOND**
CONTRACT T – 121

14.1 For the equipment/material to be provided by the Contractor, it will be the responsibility of the contractor to take delivery, unload and store the materials at site and execute an indemnity bond as per proforma at Annexure-VIII Conditions of Contract, Vol. I, in favour of the Owner against loss, damage and risks involved for the full value of the materials. This indemnity bond shall be furnished by the Contractor before commencement of the supplies and shall be valid till the scheduled date of testing, commissioning and handing over of the respective section of the transmission line to the Owner.

15.0 SURPLUS MATERIALS

15.1 On completion of the works, the materials handed over to the Contractor for erection if found surplus over the permitted consumption as stipulated in the Technical Specification, shall be returned to the Owner by and at the expenses of the Contractor in the Owner's store(s) itself, details of which shall be intimated to the Contractor during the execution of Contract.

15.2 The Contractor within one (1) month from the taking over of the transmission line shall return and account for the surplus materials, failing which necessary recoveries will be made from the outstanding bills of the Contractor for the cost of materials left unaccounted as decided by the Owner's representative.

16.0 QUANTITY VARIATION

16.1 The quantity of all the items of work given in the Bid Proposal Sheets, Volume-IB of the bidding documents are provisional. The final quantity shall depend on the actual survey of the transmission line(s). The Contractor shall be responsible for execution of such final quantities for completion of transmission line(s) and they shall be paid for such finalized quantity at the unit rate indicated in the Letter of Award.
QUALIFYING REQUIREMENTS OF BIDDERS

1.0 This bidding is open to any tenderer who provides satisfactory, evidence concerning the following that he:

a. has experience of having successfully completed similar works during last 7 years ending last day of the month previous to the one in which applications are invited should be either of the following:
   i. Three similar completed works costing not less than the amount equal to 40% of the estimated cost, or
   ii. Two similar completed works costing not less than the amount equal to 50% of the estimated cost, or
   iv. One similar completed work costing not less than the amount equal to 80% of the estimated cost.

   (NOTE: Similar work mean erection, testing and commissioning of 220KV tower lines or higher voltage lines.)

b. does not anticipate change in the ownership during the proposed period of work (if such a change is anticipated, the scope and effect thereof shall be defined).

c. For the purpose of this particular bid, bidders shall meet the following minimum criteria:

   i) Minimum Average Annual Turnover (MAAT) of the bidder for best three years out of the last five financial years as annualized should be equal to (1.5 × estimated cost) / completion period in years.

   ii) Bidder shall have Liquid Assets (LA) and/or evidence of access to or availability of credit facilities of not less than equal to (3 × estimated cost) / completion period in months.

   In case bidder is a holding Company, MAAT & LA referred to in clause 2.1c (i & ii) above shall be, that of holding Company only (i.e. excluding its subsidiary/group companies). In case bidder is a subsidiary of a holding Company, MAAT & LA referred to in clause 2.2(a) & (b) above shall be that of subsidiary Company only (i.e. excluding its holding Company).

   Note: In case completion period is less than one (1) year the denominator to calculate MAAT and LA shall be considered as one (1) and twelve (12) respectively.

d. Bidder should give in support of his experience the voltage level, date of order, date of commencement and completion of work including quantum of work and the name of purchaser and detailed scope of services rendered
to the purchaser and status of projects in hand including scheduled and completion dates. The tenderer should also enclose along with his technical bid the satisfactory performance certificates of the works completed by him. The tenderer has to fill up the technical bid format attached.

e. has necessary infrastructure to carry out entire job including detailed survey, preparation of profile etc. and should possess all tools, tackles and trained manpower for execution of transmission line works, and

1.1 Majority publicly owned enterprises domiciled in India may be eligible to qualify if, in addition to meeting all the qualifying requirements, they also:
(a) are commercially oriented legal entities distinct from the Owner, and are not a government department;
(b) are financially autonomous, as demonstrated by requirements in their constitutions to provide separate audited accounts and return on capital, powers to raise loans and obtain revenues through the sale of goods or services; and
(c) are managerially autonomous

1.2 In addition, the qualifying requirements stated in the accompanying ‘Special Conditions of Contract’ shall also apply.

1.3 The above stated requirements are a minimum and the Owner reserves the right to request for any additional information and also reserves the right to reject the Proposal of any Bidder, if in the opinion of the Owner, the qualification data is incomplete or the Bidder is found not qualified to satisfactory perform the Contract.

1.4 DTL also reserves the right to relax the qualifying requirement should the circumstances warrant such relaxation in the overall interest of the DTL.
FORMAT FOR EVIDENCE OF ACCESS
TO OR AVAILABILITY OF CREDIT/FACILITIES

BANK CERTIFICATE

This is to certify that M/s .............................................................(full name & Address)...................................................... who are submitting their bid to DTL against their tender specification Vide ref. no...............................& date

.............................................is our Customer for the past....................years.

Their financial transactions with our Bank have been satisfactory. They enjoy the following fund based and non fund based limits including for guarantees, L/C and credit facilities with us against which the extent of utilization as on date is also indicated below:

<table>
<thead>
<tr>
<th>S.NO.</th>
<th>TYPE OF FACILITY</th>
<th>SANCTIONED LIMIT AS ON DATE</th>
<th>UTILIZATION AS ON DATE........</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

This letter is issued at the request of M/S........................................

Sd/-

Name of Bank........................................
Name of Authorised Signatory.............
Designation ........................................
Phone no...........................................
Address............................................

SEAL OF THE BANK
CONTRACT T – 121

BID PROPOSAL SHEETS

FOR

Erection, testing & commissioning of 220 KV Double circuit overhead transmission tower Line from Maharani Bagh 400 KV S/Stn to Gazipur 220 KV S/Stn.

VOLUME – IB

DELHI TRANSCO LIMITED
(A GOVT. OF NCT OF DELHI UNDERTAKING)
CONTRACT T – 121

DELHI TRANSCO LIMITED
(A Govt. of NCT of Delhi Undertaking)

BID PROPOSAL SHEETS

FOR

Erection, testing & commissioning of 220 KV Double circuit overhead transmission tower Line from Maharani Bagh 400 KV S/Stn to Gazipur 220 KV S/Stn.

VOLUME – IB

(This document is meant for the exclusive purpose of bidding against this specification and shall not be transferred, reproduced or otherwise used for purposes other than that for which it is specifically issued).
BID PROPOSAL SHEETS

FOR

Erection, testing & commissioning of 220 KV Double circuit overhead transmission tower Line from Maharani Bagh 400 KV S/Stn to Gazipur 220 KV S/Stn.

VOLUME – IB

CONTENTS

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bid Form</td>
<td>Proposal</td>
</tr>
<tr>
<td>2</td>
<td>Summary Price proposal</td>
<td>Schedule-1</td>
</tr>
<tr>
<td>3</td>
<td>Price break-up</td>
<td>Schedule-2</td>
</tr>
<tr>
<td>4</td>
<td>Price Adjustment Data</td>
<td>Schedule-3</td>
</tr>
<tr>
<td>5</td>
<td>Commercial Deviations</td>
<td>Schedule-4</td>
</tr>
<tr>
<td>6</td>
<td>Deviations on important conditions</td>
<td>Schedule-5</td>
</tr>
<tr>
<td>7</td>
<td>Technical Deviations</td>
<td>Schedule-6</td>
</tr>
<tr>
<td>8</td>
<td>Qualifying requirements</td>
<td>Schedule-7</td>
</tr>
<tr>
<td>9</td>
<td>Additional information</td>
<td>Schedule-8</td>
</tr>
<tr>
<td>10</td>
<td>Work Completion Schedule</td>
<td>Schedule-9</td>
</tr>
<tr>
<td>11</td>
<td>Information regarding Ex-employees of DTL in the Firm</td>
<td>Schedule-10</td>
</tr>
<tr>
<td>12</td>
<td>Check list</td>
<td>Schedule-11</td>
</tr>
</tbody>
</table>
PROPOSAL

Bidder’s Name and Address:

Bid Proposal Reference:

Person to be contacted:

Designation:

Telephone No.: Telex No.: Cable No.: 

To
DGM (TL) Constrn.
Delhi Transco Limited
Shakti Deep Building
Anarkali Market Complex
Jhandewalan Extn.
NEW DELHI-110055

Sub.: Erection, testing & commissioning of 220 KV Double circuit overhead transmission tower Line from Maharani Bagh 400 KV S/Stn to Gazipur 220 KV S/Stn.

b.

Dear Sirs,

1.0 We, the undersigned Bidder, having read and examined in detail the specifications and documents of subject work hereby propose to execute the subject work as set forth in your specifications and documents.

2.0 PRICES AND VALIDITY

2.1 All the erection prices stated in the bid are base prices, subject to price adjustment in line with the bidding documents. All prices and other terms and conditions of this proposal are valid for a period of six (6) calendar months from the date of opening of the bids. We further declare that prices stated in our proposal are in accordance with your “Instructions to Bidders” included in Volume-I.

2.2 We do hereby confirm that our lump sum Bid prices quoted in Schedule-1 includes all the taxes, duties and levies including licence fees law fully payable by
us and confirm that any such taxes, duties and levies additionally payable shall be
to our account.

2.3 Sales tax on Works Contract, turnover Tax or any other similar taxes under Sales
Tax Act, as applicable, are included in our Bid Price. We also understand that the
Owner would not bear any liability on this account.

3.0 CONSTRUCTION OF CONTRACT

3.1 We declare that we are making the offer for an Erection Contract on a single
source responsibility.

3.2 we hereby declare that if any income-tax, surcharge on income tax or any other
corporate tax is attached under the law, we agree to pay the same.

4.0 BID GUARANTEE

We have enclosed a Bid Guarantee (one original plus two copies of the original)
in the form of ………………………………………………………………………
(Please fill in the alternative chosen)
for the sum of ……………………………………………………………………
(Amount in Words & figures)
We have also assured that the above bid guarantee furnished by us is in line with
the bid documents and complete in respect of the following:
1. Value of non judicial stamp paper purchased in the name of executing
   bank is as per Stamp Act.
2. Power of Attorney no. and date as well as signature and full name &
designation of executant alongwith Bank's stamp are there.
3. Signature, full name, designation and address of witness are there.
4. Complete mailing address of the Head Office of the Bank is indicated.

5.0 DEVIATIONS

5.1 We declare that the Contract shall be executed strictly in accordance with the
Specifications and Documents except for the variations and deviations, all of
which have been detailed out exhaustively in the following schedules irrespective
of whatsoever has been stated to the contrary anywhere else in our Bid.

<table>
<thead>
<tr>
<th></th>
<th>Commercial Deviation Schedule</th>
<th>-</th>
<th>Schedule-4</th>
</tr>
</thead>
<tbody>
<tr>
<td>b)</td>
<td>Technical Deviations Schedule</td>
<td>-</td>
<td>Schedule-6</td>
</tr>
</tbody>
</table>
5.2 We confirm that specified stipulation of the following clauses are acceptable to us and no deviations / exceptions are taken on any account whatsoever in the following clauses:

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>Price &amp; Price Adjustment</td>
<td>Clause 7.0 of SCC, Vol-IA</td>
</tr>
<tr>
<td>b)</td>
<td>Bid Guarantee</td>
<td>Clause 21.0, Section-INB, Vol-I &amp; Clause 11.0 of SCC, Vol-IA</td>
</tr>
<tr>
<td>c)</td>
<td>Contract Performance Guarantee</td>
<td>Clause 40.0, Section-INB, Vol-I, Clause 30.0, Section-GCC, Vol-I &amp; Clause 12.0 of SCC, Vol-IA</td>
</tr>
<tr>
<td>d)</td>
<td>Liquidated damages for delay</td>
<td>Clause 14.0, Section-GCC, Vol-I &amp; Clause 10.0 of SCC, Vol-IA</td>
</tr>
<tr>
<td>e)</td>
<td>Guarantee</td>
<td>Clause 15.0, Section-GCC, Vol-I</td>
</tr>
<tr>
<td>f)</td>
<td>Terms of Payment</td>
<td>Clause 34.0, Section-GCC, Vol-I &amp; Clause 8.0 of SCC, Vol-IA</td>
</tr>
</tbody>
</table>

5.3 In line with Clause 11.2 of INB, Conditions of Contract, Volume-I along with its subsequent Amendment, we have declared the withdrawal price in Schedule-5 for the deviations taken against the Clauses mentioned at Clause 11.2, INB, Volume-I.

We undertake to execute the contract in line with the provisions of these clauses in case DTL agrees to bear the withdrawal cost.

5.4 Further, we agree that additional conditions, deviations, if any, found in the proposal documents other than those stated in Deviation Schedules, save that pertaining to any rebates, offered, shall not be given effect to.

* Strike out which is not applicable.

6.0 UNIT RATES

6.1 As per the requirements of Clause 5.0 of Special Conditions of Contract, Volume-IA, the unit rates of works and materials are furnished in Schedule-2.

7.0 PRICE BASIS

We declare that our price components, those are subject to price adjustment are based on the relevant indices prevailing as on thirty days prior to the date of opening of bids. The relevant data for price adjustment are detailed out in Schedule-3.

8.0 QUALIFICATION DATA
We confirm having submitted the Qualification Data in two copies, as required by you in your 'Instruction to Bidder' included in Volume-I in a separate envelop along with this proposal(Technical Bid Envelope). Further, we have filled in the information for Qualification Requirements in Schedule-7. In case you require any further information in this regard, we agree to furnish the same in time.

**9.0 ADDITIONAL INFORMATION**

In addition to the information called for in these proposal sheets, we have included with this proposal additional information as listed separately in Schedule-8.

**10.0 WORK SCHEDULE**

If this proposal is accepted by you, we agree to submit engineering data, provide services and complete the entire work in accordance with Schedule indicated in the proposal. We fully understand that work completion schedule stipulated in the proposal is the essence of the Contract, if awarded. The completion schedule of the various major key phases of the work is indicated in Schedule-9.

**11.0 INFORMATION REGARDING EX-EMPLOYEES OF DTL**

We have furnished the details of Ex-employees of DTL, who have retired/resigned at the level of General Manager and above from DTL and subsequently have been employed by us, in Schedule-10

**12.0 CHECK LIST**

We have enclosed checklist, duly filled, in Schedule-11.

**13.0 CONTRACT PERFORMANCE GUARANTEE**

We further agree that if our proposal is accepted, we shall provide a Contract Performance Guarantee of value, equivalent to ten percent (10%) of the total Contract Price valid up to the end of the Contract Warranty period in the form of

……………………………………………………………………………………..

(Please specify the form of guarantee)

in your favour and enter in to a formal agreement with you within 30 (thirty) days from the date of "Notice of Award of Contract".

**14.0 BID PRICE**

We have placed Schedule-I & Schedule-II in a separate envelope named as Price Bid.
15.0 We hereby, declare that only the persons or firms interested in this proposal as principles are named herein and that no company, persons or firms other than herein mentioned have any interest in this proposal or in the contract to be entered into, if we are awarded the Contract, that this proposal is made without any connection with any other persons, firm or party like-wise submitting a proposal and that this proposal is in all respects for and good faith without collusion or fraud.

Dated ………………. this ………………… day of …………………20 ……

Thanking you, we remain,

Your's faithfully

<table>
<thead>
<tr>
<th>Date:</th>
<th>(Signature)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Place:</td>
<td>(Printed Name)</td>
</tr>
<tr>
<td></td>
<td>(Designation)</td>
</tr>
<tr>
<td></td>
<td>(Common Seal)</td>
</tr>
<tr>
<td>Business Address:</td>
<td></td>
</tr>
<tr>
<td>Country of incorporation:</td>
<td></td>
</tr>
<tr>
<td>(State or Province to be indicated)</td>
<td></td>
</tr>
<tr>
<td>Name and Address of Principal Officer:</td>
<td></td>
</tr>
</tbody>
</table>
Erection, testing & commissioning of 220 KV Double circuit overhead transmission tower Line from Maharani Bagh 400 KV S/Stn to Gazipur 220 KV S/Stn.

(Summary Price Proposal)
(To be enclosed with Price Bid.)

Bidder’s Name and Address: To

DGM (TL) Constn.
Delhi Transco Limited
Shakti Deep Building
Anarkali Market Complex
Jhandewalan Extn.
NEW DELHI-110055

Dear Sirs,

We declare that in terms of Clause 12.0, Section-INB, Volume-I of bidding Documents, the following are our lump sum Bid price in Rupees for the entire scope of work as specified in the specifications and documents.

A. Lump sum Bid Price: Rupees……………………………………………………
   (In figures)
   Rupees……………………………………………………………………………

Date:   (Signature)
Place:  (Printed Name)

(Designation)
(Common Seal)

Note:
1. Service tax/ Work Contract Tax (WCT) not to be indicated separately and is to be included in the total lump sum bid price.
Erection, testing & commissioning of 220 KV Double circuit overhead transmission tower Line from Maharani Bagh 400 KV S/Stn to Gazipur 220 KV S/Stn.
(To be enclosed with price bid)
(Price Break-up)

Bidder’s Name and Address:
To
DGM (TL) Constrn.
Delhi Transco Limited
Shakti Deep Building
Anarkali Market Complex
Jhandewalan Exttn.
NEW DELHI-110055

Price Break-up for individual items of the above work
(All prices are in Indian Rupees)

<table>
<thead>
<tr>
<th>SLN. No.</th>
<th>Description of item of work</th>
<th>Unit</th>
<th>Quantity</th>
<th>Unit Rate (Rs.) (in figures)</th>
<th>(Unit Rate) (Rs.) (in words)</th>
<th>Total Charge (Rs.) (in figures)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Detailed survey from Maharani Bagh 400 KV Sub-station to Gazipur 220 KV s/stn including preparation of profile and site plan, crossing proposals for railway, river, lines etc.</td>
<td>KM</td>
<td>8.50</td>
<td>8.50</td>
<td>Eight point fifty</td>
<td>8.50</td>
</tr>
<tr>
<td>2</td>
<td>Excavation of pits of required width for tower foundation upto 4.0m depth (For Raft &amp; Pile type depth as per design) including getting out the excavated soil and then backfilling of the soil as required in layers not exceeding 20cm in depth including consolidation of each deposited layer by ramming, watering etc. and dispensing of surplus excavated soil as directed within a lead of 50M.</td>
<td>KM</td>
<td>8.50</td>
<td>8.50</td>
<td>Eight point fifty</td>
<td>8.50</td>
</tr>
<tr>
<td>SPECIFICATION No.:</td>
<td>SCHEDULE-2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>------------------</td>
<td>-------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I) Normal soil/Wet soil</td>
<td>M3 1467</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II) Partially/Fully submerged soil</td>
<td>M3 5447</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>1:3:6 Concrete mix for PCC work in bases, raft &amp; Pile footing for tower/gantry foundation (cement:coarse sand: Graded stone aggregate of 20mm and 38mm nominal size) including cost of centring and shuttering and including cost of 220 Kg. cement.</td>
<td>M3 345</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Providing, pumping and laying in position ready mixed concrete (RMC) in pile &amp; raft, procured from Unitech,ACC, Birla etc. as approved by Engineer-in-charge of specified grade for Reinforced cement concrete, structural elements including the cost of centring, shuttering &amp; finishing including Admixtures in recommended proportions (as per IS 9103) to accelerate, retard setting of concrete, improve workability without impairing strength and durability as per direction of Engineer-in-charge M-20 grade Reinforced Cement Concrete etc. with quantity of Cement as below.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a.</td>
<td>For raft, M20 Grade using 320 kg. cement</td>
<td>M3 1620</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b.</td>
<td>for Pile caps, Columns etc. M-20 Grade using 400 Kg cement.</td>
<td>M3 836</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Boring of piles DMC method bored cast-in-situ vertical as per IS:2911 (part-I/Sec.2) casting in ready mixed concrete (RMC) in piles, procured from Unitech, ACC, Birla etc. as approved by Engineer-in-charge of specified grade for Reinforced cement concrete, structural elements including the cost of centring, shuttering &amp; finishing including Admixtures in recommended proportions (as per IS 9103) to accelerate, retard setting of concrete, improve workability without impairing strength and durability as per direction of Engineer-in-charge M-20 grade Reinforced Cement Concrete etc. with quantity of Cement using 400 Kg. cement, (Pile average depth is 18 meters).</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### 6. Setting of stub-template/Prop of 220KV towers narrow/broad base/Anchor towers in Pile / raft including recheck survey, foundation design, soil report etc:

<table>
<thead>
<tr>
<th>a.</th>
<th>A+0 to A+6 tower</th>
<th>Nos.</th>
<th>14</th>
</tr>
</thead>
<tbody>
<tr>
<td>b.</td>
<td>B+0 to B+6</td>
<td>Nos.</td>
<td>5</td>
</tr>
<tr>
<td>c.</td>
<td>C+0 to C+14 tower</td>
<td>Nos.</td>
<td>16</td>
</tr>
<tr>
<td>d.</td>
<td>For Gantry Column</td>
<td>Nos.</td>
<td>03</td>
</tr>
</tbody>
</table>

### 7. Shoring & shuttering of pits.
- M2 800.00

### 8. Dewatering of pits by:

<table>
<thead>
<tr>
<th>a.</th>
<th>Manual labour.</th>
<th>Man hour</th>
<th>400.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>b.</td>
<td>Mechanical pump.</td>
<td>Pump hour</td>
<td>1200.00</td>
</tr>
</tbody>
</table>

### 9. Installation of steel reinforcement inclusive of cost of steel, binding wire, cutting, bending, binding & placing in position complete.
- MT 278.00

### 10. 220KV tower super structure erection complete with all accessories and fixing of tower parts including tightening, punching and tack-welding upto 1st section.
- MT 357

### 11. Laying, tensioning, testing & commissioning of line with six ACSR zebra conductors including hoisting of insulators, hardware fittings jumpering etc.
- KM 8.5

### 12. Supply and fixing of tower accessories:

<table>
<thead>
<tr>
<th>a) Pipe earthing of towers.</th>
<th>Nos.</th>
<th>39</th>
</tr>
</thead>
<tbody>
<tr>
<td>b) Number plate.</td>
<td>Nos.</td>
<td>36</td>
</tr>
<tr>
<td>C) Phase plate(set of two, one set contains IR, 1Y,1B).</td>
<td>sets</td>
<td>20</td>
</tr>
</tbody>
</table>
### SPECIFICATION No.: SCHEDULE-2

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>d) Danger plate.</strong></td>
<td>Nos.</td>
<td>36</td>
</tr>
<tr>
<td><strong>e) Circuit plate (set of two, circuit I&amp;II).</strong></td>
<td>sets</td>
<td>20</td>
</tr>
<tr>
<td><strong>f) Anticlimbing device including cost of barbed wire, MS angle etc.</strong></td>
<td>Nos.</td>
<td>39</td>
</tr>
<tr>
<td>12</td>
<td>Revetment with dry stone in cement mortar 1:6 mix including cost of cement, stone &amp; coarse sand etc.</td>
<td>M3</td>
</tr>
<tr>
<td>13</td>
<td>Supply and filling of good earth including cost of royalty, transportation, lead, lift etc.</td>
<td>M3</td>
</tr>
<tr>
<td>14</td>
<td>Bore hole for dewatering.</td>
<td>Nos.</td>
</tr>
<tr>
<td>15</td>
<td>Making termination in the existing line of six ACSR zebra conductors and one earthwire including resagging.</td>
<td>L.S.</td>
</tr>
</tbody>
</table>

**GRAND TOTAL**

---

**Note:**
1. In case of discrepancy between unit price and total, the unit price shall prevail.
2. Continuation sheets of like size and format may be used as per the Bidder's requirement and shall be annexed to this Schedule.
**SPECIFICATION No.:**

Schedule-3

**Erection, testing & commissioning of 220 KV Double circuit overhead transmission tower Line from Maharani Bagh 400 KV S/Stn to Gazipur 220 KV S/Stn.**

**Price Adjustment data**

Bidder’s Name and Address:
To  
DGM (TL) Constn.  
Delhi Transco Limited  
Shakti Deep Building  
Anarkali Market Complex  
Jhandewalan Extn.  
NEW DELHI-110055

We hereby furnish the relevant details pertaining to the price adjustment provisions in your specifications and documents. The necessary documentary evidence are enclosed: -

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Name of material</th>
<th>Value of Co-efficient</th>
<th>Name of Published index</th>
<th>Value of index as on 30 days prior to date set for opening of bids</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Diesel Oil</td>
<td>a=0.20</td>
<td>IOC Monthly Circular.</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Labour</td>
<td>b=0.55</td>
<td>Indian Labour Bureau, Simla Govt. of India</td>
<td></td>
</tr>
</tbody>
</table>

Date: (Signature)

Place: (Printed Name)

(Designation)

(Common Seal)
Erection, testing & commissioning of 220 KV Double circuit overhead transmission tower Line from Maharani Bagh 400 KV S/Stn to Gazipur 220 KV S/Stn.

(Commercial Deviations)

Bidder’s Name and Address:
To
DGM (400KV) TL
Delhi Transco Limited
Shakti Deep Building
Anarkali Market Complex
Jhandewalan Extn.
NEW DELHI-110055

Dear Sirs,

Sub. : Commercial Deviations for the above work

The following are the Commercial Deviations and Variations from and exceptions to the specifications and documents for the subject mentioned Package. These deviations and variations are exhaustive. Except for these deviations, the entire work shall be performed as per your specifications and documents.

<table>
<thead>
<tr>
<th>Volume</th>
<th>Section</th>
<th>Clause No.</th>
<th>Page No.</th>
<th>Statement of Deviations/Variations</th>
</tr>
</thead>
</table>

Date: (Signature)
Place: (Printed Name)
(Designation)
(Common Seal)

Note: Continuation sheets of like size and format may be used as per the Bidder's requirements and shall be annexed to this Schedule.
Erection, testing & commissioning of 220 KV Double circuit overhead transmission tower Line from Maharani Bagh 400 KV S/Stn to Gazipur 220 KV S/Stn.

(Deviations on Important Conditions)

Bidder’s Name and Address:  

To  
DGM (TL) Constn.  
Delhi Transco Limited  
Shakti Deep Building  
Anarkali Market Complex  
Jhandewalan Extn.  
NEW DELHI-110055

Dear Sirs,
Sub. : Deviation on important conditions alongwith their withdrawal price.
The following are the Deviations/ variations/ exceptions to the provisions of important conditions stipulated in Clause 11.2 of INB, Conditions of Contract, Volume-I alongwith subsequent amendment. We undertake to execute the contract in line with the provisions of bidding document in respect of above said clauses in case DTL agrees to pay us the withdrawal price indicated below against each such deviations/ variations/ exceptions.

<table>
<thead>
<tr>
<th>Volume</th>
<th>Section</th>
<th>Clause No.</th>
<th>Page No.</th>
<th>Statement of Deviations/ Variations/ exceptions</th>
<th>Withdrawal Price</th>
</tr>
</thead>
<tbody>
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</table>

Date:  
Place:  

(Signature)  
(Printed Name)  
(Designation)  
(Common Seal)

Note: Continuation sheets of like size and format may be used as per the Bidder's requirements and shall be annexed to this Schedule.
Erection, testing & commissioning of 220 KV Double circuit overhead transmission tower Line from Maharani Bagh 400 KV S/Stn to Gazipur 220 KV S/Stn.

(Technical Deviations)

Bidder’s Name and Address: To
DGM (TL) Constn.
Delhi Transco Limited
Shakti Deep Building
Anarkali Market Complex
Jhandewalan Extn.
NEW DELHI-110055

Dear Sirs,

Sub. : Technical Deviations for the above work

The following are the Technical Deviations and Variations from and exceptions to the specifications and documents for the subject mentioned Package. These deviations and variations are exhaustive. Except for these deviations, the entire work shall be performed as per your specifications and documents.

<table>
<thead>
<tr>
<th>Volume</th>
<th>Section</th>
<th>Clause No.</th>
<th>Page No.</th>
<th>Statement of Deviations/ Variations</th>
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</thead>
<tbody>
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</tbody>
</table>

Date: (Signature)
Place: (Printed Name)
(Designation)
(Common Seal)

Note: Continuation sheets of like size and format may be used as per the Bidder's requirements and shall be annexed to this Schedule.
Dear Sirs,

In accordance with the clause 2.0 of Section-INB, Volume-I & Annexure-A of SCC, Volume-IB, we are furnishing the following details/documents in support of Qualifying Requirement for the above work.

1.0 Attached copies of original documents defining
   (a) The constitution or legal status;
   (b) The place of registration and principal place of business;
   (c) Written power of attorney of the signatory of the bid to commit the Bidder.

2.0 Attached copies of original letter of authority to seek reference from our banks.

3.0 General Information

All individual firms are requested to complete the information in this form. The requisite information to be provided for all firms.

Where the Bidder proposes to use named subcontractors for critical components of the work, or for work contents in excess of 10 percent of the bid price, the following information should also be supplied for the subcontractor(s).

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Name of firm</td>
<td></td>
</tr>
<tr>
<td>2. Head Office address</td>
<td></td>
</tr>
<tr>
<td>3. Telephone, Contact Person</td>
<td></td>
</tr>
<tr>
<td>4. Fax</td>
<td>Telex</td>
</tr>
<tr>
<td>5. Place of incorporation/registration</td>
<td>Year of incorporation/registration</td>
</tr>
</tbody>
</table>
4.0 General Experience Record

All individual firms are requested to complete the information in this form.

4.1 Minimum Average Annual Turnover (MAAT)

The information supplied should be the annual turnover of the Bidder for the last three financial years.

Bidders should not be required to enclose testimonial certificates and publicity material with their application, they will not be taken into account in the evaluation of qualification.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Year</th>
<th>Turnover</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>2002-2003</td>
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<tr>
<td>2.</td>
<td>2003-2004</td>
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<td>3.</td>
<td>2004-2005</td>
<td></td>
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<tr>
<td>4.</td>
<td>2005-2006</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>2006-2007</td>
<td></td>
</tr>
</tbody>
</table>

The audited balance sheets and income statements of Bidder for last three years are enclosed with the Bid.

4.2 Liquid Assets (LA)

We hereby confirm that the liquid assets (current assets minus inventories) and / or evidence of excess to or availability of credit facilities of our company, i.e. ...................................(name of Bidder), as on .................(date) is Rs.................(million)

The audited balance sheets and income statements of Bidder for last three years are enclosed with the Bid.

5.0 Particular Experience Record

Name of Bidder

To qualify, the Bidder shall be required to pass the specified requirements applicable to this form, as set out in the 'Qualifying Requirements'.

On a separate page, using the format of Para 6.0, each Bidder is requested to list all Contracts of a nature similar to the proposed Contract for which the Bidder
wishes to qualify, under taken during the last ten years. The information is to be summarized for each contract completed or under execution by the Bidder.

Where the Bidder proposes to use named subcontractors for critical components of the work, or for work contents in excess of 10 percent of the bid price, the following information should also be supplied for the subcontractor(s).

### 6.0 Details of Contracts of Similar Nature and Complexity

<table>
<thead>
<tr>
<th>Name of Bidder</th>
</tr>
</thead>
</table>

Use a separate sheet for each contract.

<table>
<thead>
<tr>
<th>1. Number of Contract</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name of Contract</td>
</tr>
<tr>
<td>Country</td>
</tr>
</tbody>
</table>

| 2. Name of Owner       |

| 3. Owner's address     |

<table>
<thead>
<tr>
<th>4. Nature of works and special features relevant to the contract (Please indicate the following details)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Line Length (in Kms)</td>
</tr>
<tr>
<td>Number of circuits</td>
</tr>
<tr>
<td>Voltage level</td>
</tr>
<tr>
<td>Cost of the order</td>
</tr>
<tr>
<td>Date of commencement of work</td>
</tr>
<tr>
<td>Date of scheduled completion of work</td>
</tr>
<tr>
<td>Date of actual completion of work</td>
</tr>
<tr>
<td>Whether any penalty has been levied for delay</td>
</tr>
<tr>
<td>Whether satisfactory performance certificate is enclosed or not</td>
</tr>
</tbody>
</table>

### 7.0 Summary Sheet: Current Contract Commitments of Work in Progress

<table>
<thead>
<tr>
<th>Name of Contract</th>
<th>Value of outstanding work (Rs.)</th>
<th>Estimated completion date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td></td>
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<tr>
<td>2.</td>
<td></td>
<td></td>
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<tr>
<td>3.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 8.0 Financial Capability

### 9.0 Litigation History
10.0 Equipment & testing facilities for Construction
11.0 Service Tax registration/ Tin No.,
12.0 E.P.F. Details:
   (i) E.P.F. Code No.:
   (ii) Name of the RPFC where registered:
13.0 Work Contract Tax registration details of Delhi Administration:
14.0 Electrical Licence details:
15.0 PAN No.

Date:          (Signature)
Place:        (Printed Name)

(Designation)
(Common Seal)

Note: *Please furnish details item wise.
## Erection, testing & commissioning of 220 KV Double circuit overhead transmission tower Line from Maharani Bagh 400 KV S/Stn to Gazipur 220 KV S/Stn.

### (Additional Information to be included with this Proposal)

**Bidder’s Name and Address:**

To
DGM (TL) Constn.
Delhi Transco Limited
Shakti Deep Building
Anarkali Market Complex
Jhandewalan Extn.
NEW DELHI-110055

**Dear Sirs,**

We have enclosed with our proposal the following additional information for the above work.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Brief Description of Information</th>
<th>Ref. &amp; Page No.</th>
</tr>
</thead>
<tbody>
<tr>
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</table>

**Date:** (Signature)

**Place:** (Printed Name)

**(Designation)**

**(Common Seal)**

**Note:** Continuation sheets of like size and format may be used as per the Bidder's requirements and shall be annexed to this Schedule.
Erection, testing & commissioning of 220 KV Double circuit overhead transmission tower Line from Maharani Bagh 400 KV S/Stn to Gazipur 220 KV S/Stn.

(Work Completion Schedule)

Bidder’s Name and Address:
To
DGM (TL) Constn.
Delhi Transco Limited
Shakti Deep Building
Anarkali Market Complex
Jhandewalan Extn.
NEW DELHI-110055

Dear Sirs,

We hereby declare that the following work completion schedule shall be followed by us in executing the above work.

The period indicated below is from the date of Notice of Award of contract to us:

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Description of Work</th>
<th>Period of days</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Establishment of Site Office</td>
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<tr>
<td>2.</td>
<td>Commencement of Survey</td>
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<tr>
<td>3.</td>
<td>Completion of Survey</td>
<td></td>
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<tr>
<td>4.</td>
<td>Commencement of Foundation Work</td>
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</tr>
<tr>
<td>5.</td>
<td>Completion of Foundation Work</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Commencement of Tower Erection</td>
<td></td>
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<tr>
<td>7.</td>
<td>Completion of Tower Erection</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>Commencement of Stringing</td>
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<tr>
<td>9.</td>
<td>Completion of Stringing</td>
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<tr>
<td>10.</td>
<td>Commencement of Testing and Commissioning</td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>Completion of Testing and Commissioning</td>
<td></td>
</tr>
</tbody>
</table>

Date: (Signature)
Place: (Printed Name)
(Designation)
(Common Seal)


Erection, testing & commissioning of 220 KV Double circuit overhead transmission tower Line from Maharani Bagh 400 KV S/Stn to Gazipur 220 KV S/Stn.

(Information regarding Ex-employees of DTL in the firm)

Bidder’s Name and Address:

To
DGM (TL) Constn.
Delhi Transco Limited
Shakti Deep Building
Anarkali Market Complex
Jhandewalan Extn.
NEW DELHI-110055

We hereby furnish the details of ex-employees of DTL who had retired/ resigned at the level of General Manager and above from DTL and subsequently have been employed by us.

<table>
<thead>
<tr>
<th>SL. No.</th>
<th>Name of Person with designation in DTL</th>
<th>Date of retirement/resignation from DTL</th>
<th>Date of joining and designation in our Organisation</th>
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Date: (Signature)

Place: (Printed Name)

(Designation)

(Common Seal)
Erection, testing & commissioning of 220 KV Double circuit overhead transmission tower Line from Maharani Bagh 400 KV S/Stn to Gazipur 220 KV S/Stn.

(Check List)

| Bidder’s Name and Address: To DGM (TL) Constn. Delhi Transco Limited Shakti Deep Building Anarkali Market Complex Jhandewalan Extn. NEW DELHI-110055 |
|---|---|---|---|
| SL. No. | Item Description | Reference | Declaration (Strike out whichever is not applicable) |
| 1. | Bid Guarantee enclosed (one original & four copies) | Clause 21.0, Section INB, Vol.-I & 11.0 | Yes / No |
| 2. | Summary Price Schedule (one original & four copies) | Schedule-1 of BPS, Volume-IB | Yes / No |
| 3. | Price Break-up Schedule filled in | Schedule-2 of BPS, Volume-IB | Yes / No |
| 4. | Price Adjustment Data Schedule filled in | Schedule-3 of BPS, Volume-IB | Yes / No |
| 5. | Commercial Deviation Schedule filled in | Schedule-4 of BPS, Volume-IB | Yes / No |
| 6. | Deviation on Important Conditions Schedule filled in | Schedule-5 of BPS, Volume-IB | Yes / No |
| 7. | Technical Deviation Schedule filled in | Schedule-6 of BPS, Volume-IB | Yes / No |
| 8. | Qualification Requirements Schedule filled in | Schedule-7 of BPS, Volume-IB | Yes / No |
| 9. | Additional Information Schedule filled in | Schedule-8 of BPS, Volume-IB | Yes / No |
| 10. | Work completion Schedule filled in | Schedule-9 of BPS, Volume-IB | Yes / No |
| 11. | Information regarding Ex-employees of DTL in the Firm | Schedule-10 of BPS, Volume-IB | Yes / No |

Date: (Signature)
Place: (Printed Name)
(Designation)
(Common Seal)
TECHNICAL SPECIFICATIONS

FOR

Erection, testing & commissioning of 220 KV Double circuit overhead transmission tower Line from Maharani Bagh 400 KV S/Stn to Gazipur 220 KV S/Stn.

VOLUME-II

DELHI TRANSCO LIMITED
(A Government of NCT of Delhi Undertaking)
DELHI TRANSCO LIMITED
(A Government of NCT of Delhi Undertaking)

TECHNICAL SPECIFICATION

FOR

Erection, testing & commissioning of 220 KV Double circuit overhead transmission
tower Line from Maharani Bagh 400 KV S/Stn to Gazipur 220 KV S/Stn.

VOLUME-II

SECTION I TECHNICAL SPECIFICATION

(This document is meant for the exclusive purpose of bidding against this specification
and shall not be transferred, reproduced or otherwise used for purposes other than that for
which it is specifically issued).
SECTION – I

TECHNICAL SPECIFICATIONS

CONTENTS

<table>
<thead>
<tr>
<th>CLAUSE NO.</th>
<th>DESCRIPTION</th>
<th>PAGE NO.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>General Information and Scope</td>
<td>1-12</td>
</tr>
<tr>
<td>1.1</td>
<td>Scope</td>
<td>1-3</td>
</tr>
<tr>
<td>1.2</td>
<td>Details of Transmission line Routes and Terrain</td>
<td>3</td>
</tr>
<tr>
<td>1.3</td>
<td>Results of Preliminary Surveys</td>
<td>3</td>
</tr>
<tr>
<td>1.4</td>
<td>Access to the Line and Right of Way</td>
<td>3</td>
</tr>
<tr>
<td>1.5</td>
<td>Detailed Survey, Optimisation of Tower Location</td>
<td>3-9</td>
</tr>
<tr>
<td>1.6</td>
<td>Environmental conditions</td>
<td>9-10</td>
</tr>
<tr>
<td>1.7</td>
<td>Details of Tower and Foundation</td>
<td>10</td>
</tr>
<tr>
<td>1.8</td>
<td>Statutory regulations and Standards</td>
<td>10</td>
</tr>
<tr>
<td>1.9</td>
<td>Quality Assurance, Inspection and Testing</td>
<td>10-12</td>
</tr>
<tr>
<td>1.10</td>
<td>Technical Parameters for 220KV Lines</td>
<td>12</td>
</tr>
<tr>
<td>2.</td>
<td>Details of line Materials</td>
<td>12-14</td>
</tr>
<tr>
<td>2.1</td>
<td>Particulars of Conductor and Earthwire</td>
<td>12-13</td>
</tr>
<tr>
<td>2.2</td>
<td>Particulars of insulator Strings with Standard disc insulator</td>
<td>13</td>
</tr>
<tr>
<td>2.3</td>
<td>Insulator String Hardware</td>
<td>13-14</td>
</tr>
<tr>
<td>2.4</td>
<td>Accessories for Conductor Earthwire</td>
<td>14</td>
</tr>
<tr>
<td>3.</td>
<td>Transmission Towers</td>
<td>14-23</td>
</tr>
<tr>
<td>3.1</td>
<td>General description of the towers</td>
<td>14-15</td>
</tr>
<tr>
<td>3.2</td>
<td>Types of Tower</td>
<td>15-16</td>
</tr>
<tr>
<td>3.3</td>
<td>Design and Drawings</td>
<td>16-17</td>
</tr>
<tr>
<td>3.4</td>
<td>Materials</td>
<td>18</td>
</tr>
<tr>
<td>3.5</td>
<td>Tower Acessories</td>
<td>18-19</td>
</tr>
<tr>
<td>3.6</td>
<td>Earthing</td>
<td>19-20</td>
</tr>
<tr>
<td>3.7</td>
<td>Inspection and test</td>
<td>20</td>
</tr>
<tr>
<td>3.8</td>
<td>Standards</td>
<td>20-23</td>
</tr>
<tr>
<td>4.</td>
<td>Tower Foundations</td>
<td>24-57</td>
</tr>
<tr>
<td>4.1</td>
<td>Geotechnical Investigations</td>
<td>24-47</td>
</tr>
<tr>
<td>4.2</td>
<td>Foundations</td>
<td>47-50</td>
</tr>
<tr>
<td>4.3</td>
<td>Design of Foundations</td>
<td>50-51</td>
</tr>
<tr>
<td>4.4</td>
<td>Construction of Tower Foundation, Stub setting and Earthing</td>
<td>51-57</td>
</tr>
<tr>
<td>5.</td>
<td>Tower Erection, Stringing and Installation of Line Materials</td>
<td>57-65</td>
</tr>
<tr>
<td>5.1</td>
<td>General</td>
<td>57</td>
</tr>
<tr>
<td>5.2</td>
<td>Treatment of minor galvanizing damage</td>
<td>57</td>
</tr>
<tr>
<td>5.3</td>
<td>Assembly</td>
<td>57-58</td>
</tr>
<tr>
<td>5.4</td>
<td>Tightening of Bolts &amp; Nuts</td>
<td>58</td>
</tr>
<tr>
<td>Section</td>
<td>Description</td>
<td>Pages</td>
</tr>
<tr>
<td>---------</td>
<td>------------------------------------------------------------------</td>
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</tr>
<tr>
<td>5.5</td>
<td>Insulator Hoisting</td>
<td>59</td>
</tr>
<tr>
<td>5.6</td>
<td>Handling of Conductor and Earthwire</td>
<td>59-60</td>
</tr>
<tr>
<td>5.7</td>
<td>Stringing of conductor and earthwire</td>
<td>60-61</td>
</tr>
<tr>
<td>5.8</td>
<td>Jointing</td>
<td>61-62</td>
</tr>
<tr>
<td>5.9</td>
<td>Tensioning and sagging Operations</td>
<td>62</td>
</tr>
<tr>
<td>5.10</td>
<td>Clipping in</td>
<td>62</td>
</tr>
<tr>
<td>5.11</td>
<td>Fixing of conductors and earthwire Accessories</td>
<td>63</td>
</tr>
<tr>
<td>5.12</td>
<td>Replacement</td>
<td>63</td>
</tr>
<tr>
<td>5.13</td>
<td>Permitted Extra Consumption of Employer supplied Materials</td>
<td>63-64</td>
</tr>
<tr>
<td>5.14</td>
<td>Final checking, Testing and Commissioning</td>
<td>64-65</td>
</tr>
<tr>
<td>6.0</td>
<td>Special tower for River crossings</td>
<td>65</td>
</tr>
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<td>General</td>
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</tr>
<tr>
<td>6.2</td>
<td>Design of Special Towers</td>
<td>65</td>
</tr>
<tr>
<td>6.3</td>
<td>Foundations design</td>
<td>65</td>
</tr>
<tr>
<td>6.4</td>
<td>Earthing of River crossing towers</td>
<td>65</td>
</tr>
<tr>
<td>7.0</td>
<td>General technical Conditions</td>
<td>66-68</td>
</tr>
<tr>
<td>7.1</td>
<td>General</td>
<td>66</td>
</tr>
<tr>
<td>7.2</td>
<td>Engineering Data</td>
<td>66</td>
</tr>
<tr>
<td>7.3</td>
<td>Drawings</td>
<td>66-68</td>
</tr>
<tr>
<td>7.4</td>
<td>Packing</td>
<td>68</td>
</tr>
<tr>
<td>8.0</td>
<td>DTL’s Environment and Social Policy and its Implementation</td>
<td>68-70</td>
</tr>
<tr>
<td></td>
<td>Standard Field Quality Plan</td>
<td>71-91</td>
</tr>
</tbody>
</table>
SECTION-I

TECHNICAL SPECIFICATIONS

1.0 General Information and Scope

1.1 Scope

1.1.1 The scope of work covered includes: (i) detailed survey, profiling, tower spotting/optimisation of tower locations, River & Railway crossing proposal, soil resistivity measurement, geotechnical investigation and check survey of 220 KV D/C Tower Line, (ii) selecting type of foundation for different type of tower (PILE & RAFT) and casting of foundation for tower footings including unequal leg extension as per foundation design approved by the DTL, (iii) erection of towers, tack welding of bolts and nuts including supply and application of zinc rich primer & enamel paint, tower earthing, fixing of insulator strings, stringing of conductors and earthwire along with all necessary line accessories, (iv) supply and erection of tower accessories such as Danger plate, Circuit plate, Number plate, Phase plate & Anti-climbing Devices and (v) testing and commissioning of the erected transmission line (vi) other items not specified above, but required as per BPS (Bid Proposal Sheets).

1.1.1.1 DTL shall provide structural drawing & Bill of materials of all 220 KV Double Circuit Towers and their body extensions to the Contractor after the placement of award, in sequence, suiting the project requirement. Based on the tower loading data, the designs/drawings of the foundations required for these towers shall be developed by the Contractor and submitted to DTL, before casting of foundation, for approval.

1.1.2

a) The provisional quantities of concrete, excavation volume, & reinforcement steel for foundation, tower erection, stringing and other items are given in BPS. However, the work shall be executed as per approved construction drawings.

b) The various items of work are described very briefly in the Bid Form, Price and Other Schedules. The various items of the Schedule shall be read in conjunction with the corresponding sections in the Technical Specifications including amendments and addition, if any. The Bidder’s rates shall be based on the description of activities in the Bid Form, Price and other Schedule as well as necessary operations detailed in these Technical Specifications.

c) The unit rates quoted shall include minor details which are obviously and fairly intended, and which may not have been included in these documents but are essential for the satisfactory completion of the various works.
d) The unit rate quoted shall be inclusive of deployment of all plant equipment, men, material, skilled & unskilled labour etc. essential for satisfactory completions of various works.

e) All measurements for payment shall be in S.I. units. Lengths shall be measured in metres corrected to two decimals places. Areas shall be computed to in square meters & volume in cubic metres, rounded off to two decimals.

1.1.1.3 The Bidder shall quote the unit rate for these items as per their units mentioned in the appropriate schedule of BPS. However, payment shall be made on completion of an activity, for example, completion of foundation work at a location, tower erection at a location, stringing of six ACSR Zebra Conductors and an earthwire in a section, etc. as applicable.

1.1.2 The Contractor shall take delivery of Stubs & cleats, Stub setting Templates, Tower parts, insulator discs and hardware fittings, conductor, earth wire and their accessories (as listed under Cl. No. 2.1 to 2.4) as Owner supplied materials, ensure their safe custody and shall incorporate the same in the transmission line.

1.1.3 All the raw materials such as reinforcement steel, cement & RMC for tower foundation, coke and salt for tower earthing etc., danger plates, phase plates, number plates, circuits plates, Anticlimbing device etc. required for tower erection shall be included in the Contractor’s scope of supply. Bidder shall clearly indicate in the offer the sources from where he proposed to procure the raw materials and the components.

1.1.4 The entire stringing of the conductor and earthwire shall be carried out by tensioning stringing technique. The Contractor shall indicate in their offer, the sets of stringing equipment he is having in his possession and sets of stringing equipment he would deploy exclusively for this project which under no circumstance shall be less than one (1) no. of minimum eight (8) tonne capacity. However, the Bidder having requisite experience has freedom to use helicopter for construction and stringing. The Bidder intending to use helicopter shall furnish detailed description of procedure, type & number of helicopters & accessories etc. to be deployed for stringing operation.

1.1.5 The number of Towers for River crossing locations required to be erected for this transmission line are given in Schedule of Quantities. DTL shall provide the structural drawings and bill of materials of these towers for river crossing locations to the Contractor at the time of execution.

1.1.5.1 The Contractor shall also develop the design of foundation (open Raft type or pile type) for towers for river crossing locations based on tower spotting data provided by DTL and shall carry out subsequent erection and stringing work.
1.1.6 Location and Details of Terminal Points

The proposed 220KV line will be laid in the National Capital Territory of Delhi. In this case from Maharani Bagh 400 KV grid s/stn to Gazipur 220 KV S/Stn. (parallel to 400 kv line, crossing of yamuna river, crossing of DND fly over road, crossing of Noida Metro railway, on the bank of Gazipur drain parallel to 66 kv line, crossing of Kalyanpuri road, to be connect in bay no. 1 & 2 of Gazipur S/Stn.)

1.1.7 The Contractor shall have to erect this 220KV transmission line completely upto terminal arrangement/terminal point of both ends.

1.2 Details of Transmission Line Routes and Terrain

Bidder may visit the line route to acquaint themselves with terrain etc. of the proposed transmission line. For this purpose, they are requested to contact the following address:

Manager (TL) Construction-I,
Room No.26, Shaktideep,
Anarkali Market Building,
Jhandewalan Extension,
New Delhi- 110055

1.3 Results of Preliminary Surveys

Preliminary/Route alignment survey of the line shall be carried out by Owner.

The results collected through preliminary survey viz. route alignment drawing of the line, crossing details (railway lines & roads), accessibility and infrastructure details, the location of all obligatory points and details of river crossings shall be given to the Contractor.

1.4 Access to the Line and Right of Way

Right of way and way leave clearance shall be arranged by the Owner in accordance with work schedule. Owner will secure way leave and right of way in the Forest area.

1.5 Detailed Survey, Optimisation of Tower Location

Detailed survey including profiling and tower spotting have to be carried out by the Contractor. The Provisional quantity for detailed survey has been indicated in Schedule of quantities. The detailed survey, including profiling, tower optimisation and spotting, shall be carried out by the Contractor on the basis of tower spotting data given by Owner as stipulated herein.

1.5.1 The Contractor shall submit the proposal for detailed survey based on the preliminary route alignment finalized by the Owner. The Contractor shall finalise and submit results of detailed survey including any changes suggested within the
1.5.2 The Contractor should note that Owner will not furnish the topographical maps prepared by Survey of India but will make available any assistance that may be required in obtaining the topographical maps.

1.5.3 The detailed survey shall be made along the approved route alignment.

1.5.4 Soil resistivity, along the route alignment, shall be measured in dry weather by four electrode method keeping inter-electrode spacing of 50 meters. For calculating soil resistivity formula \( 2 \pi a r \) (where \( a=50 \) metres and \( r=\)megger reading in ohms \( \pi=3.14 \)) shall be adopted. Measurement shall be made at every 2 to 3 kms along the route of transmission lines. In case soil characteristics changes within 2 to 3 kms, the value shall also have to be measured at intermediate locations. The megger reading and soil characteristics shall also be indicated in the soil resistivity results.

1.5.5 **Route Marking**

At the starting point of the commencement of route survey, an angle iron spike of 65x65x6mm section and 1000 mm long shall be driven firmly into the ground to project only 150 mm above the ground level. A punch mark on the top section of the angle iron shall be made to indicate location of the survey instrument. Teak wood peg 50x50x650mm size shall be driven at prominent position at intervals of not more than 750 metres along the transmission line to be surveyed upto the next angle point. Nails of 100 mm wire length should be fixed on the top of these pegs to show the location of instrument. The pegs shall be driven firmly into the ground to project 100 mm only above ground level. At angle position stone/concrete pillar with DTL marked on them shall be put firmly on the ground for easy identification.

1.5.6 **Profile Plotting & Tower Spotting**

From the field book entries, the route plan with enroute details and level profile shall be plotted and prepared to scale of 1:2000 horizontal & 1:200 vertical on 1.0,10mm squared paper as per approved procedure. Reference levels at every 20 metres along the profile are also to be indicated on the profile besides, reduced levels (R/Ls) at undulations. Areas along the profile which, in the view of the Contractor, are not suitable for tower spotting, shall also be clearly marked on the profile plots. If the difference in levels be too high, the chart may be broken up according to requirement. A 10 mm overlap shall be shown on each following sheet. The chart shall progress from left to right. Sheet shall be 594 mm wide in accordance with the IS Standard. For ‘as built’ profile these shall be in A1 size.
1.5.7 **Contouring for Benching / Revetment Assessment**

Contouring/Spot level measurements for tower location in hilly/undulated locations shall be carried out and quantity of benching and revetment involved shall be calculated and furnished in survey report along with contour maps.

The spot level shall generally cover an area of 15mx15m for suspension towers and 20mX20m for angle towers and grid for the same shall be 2mX2m. The exact area for benching/revetment quantity shall depend on the base width of type of tower for each location. Details regarding base width/unequal leg extensions for each type of tower shall be intimated by DTL.

Special towers/higher extensions and the area of tower base for contour measurements shall be conveyed to the Contractor by Site In charge.

1.5.8 **Tower Location**

1.5.8.1 **Sag Template & Tower Spotting Data**

Sag template prepared based on the sag-template survey drawing shall only be used for tower spotting on the profiles. Two numbers of the approved template, prepared on rigid transparent plastic sheet, shall be provided by the Contractor to the Owner for the purpose of checking the tower spotting. The templates shall be on the same scale as that of the profile.

1.5.8.2 **Tower Spotting**

With the help of supplied sag template and tower spotting data, tower locations shall be marked on the profiles. While locating the towers on the profile sheet, the following shall be borne in mind:

i) **Span**

The number of consecutive spans between the section points shall not exceed 10 spans. A section point shall comprise of tension point with B type or C type towers as applicable.

ii) **Extension**

An individual span shall be as near to the normal design span as possible. The normal design span is 225 Mtrs. for narrow base and 320 Mtrs. for Broad base. In case an individual span becomes too short with normal supports on account of undulations in ground profile, one or both the supports of the span may be extended by inserting standard body extension designed for the purpose according to technical specification.
iii) **Loading**

There shall not be any upward force on suspension towers under normal working conditions and the suspension towers shall support at least the minimum weight span as provided in the designs. In case, the uplift is unavoidable, it shall be examined if the same can be overcome by adding standard body extensions to the towers failing which tension towers designed for the purpose shall be employed at such positions.

iv) **Road Crossing**

At all important road crossings, the ground clearance at the roads under maximum temperature and in still air shall be such that even with conductor broken in adjacent span, ground clearance of the conductor from the road surfaces will not be less than 7.10 meters. At all national highways, tension towers shall be used and crossing span will not be more than 200 meters.

v) **Railway Crossings**

All the railway crossings coming enroute the transmission line have already been identified by the Owner. At the time of detailed survey, the railway crossings shall be finalized as per the regulation laid down by the Railway Authorities. The following are the important features of the prevailing regulations (revised in 1987)

(i) The crossing shall be supported on C type tower on either side depending on the merits of each case.

(ii) The crossing shall normally be at right angle to the railway track.

(iii) The minimum distance of the crossing tower shall be at least equal to the height of the tower plus 6 meters away measured from the center of the nearest railway track.

(iv) No crossing shall be located over a booster transformer, traction switching station, traction sub-station or a track cabin location in an electrified area.

(v) Minimum ground clearance above rail level of the lowest portion of any conductor under condition of maximum sag shall be maintained at 17.90 meters.

(vi) The crossing span shall be limited to 150 meters. The approval for crossing railway track shall be obtained by the Owner from the Railways Authority. However, six copies of profile and plan and other
drawings required for the approval from the Railway Authority shall be supplied by the Contractor to the Owner.

vi) **River Crossings**

In case of major river crossing, tower shall be of suspension type and the anchor towers on either side of the main river crossing shall be C type tower. Clearance required by navigation authority shall be provided. For non navigable river, clearance shall be reckoned with respect to highest flood level (HFL).

vii) **Power Line Crossings**

Where this line is to cross over another line of the same voltage or lower voltage, A type tower with suitable extensions shall be used. Provisions to prevent the possibility of its coming into contact with other overhead lines shall be made in accordance with the Indian Electricity Rules, 1956 as amended from time to time. In order to reduce the height of the crossing towers it may be advantageous to remove the ground-wire of the line to be crossed (if this is possible, and permitted by the Owner of the line to be crossed). All the works related to the above proposal shall be deemed to be included in the scope of the Contractor except if modifications are required to line below, in which case, the conditions to be agreed upon.

For power line crossing of voltage level of 132 KV and above, an angle tower shall be provided on either side of A type tower which can be used for temporary dead end condition with proper guyin.

viii) **Telecommunication Line Crossing**

The angle of crossing shall be as near to 90 degree as possible. However, deviation to the extent of 30 degree may be permitted under exceptionally difficult situations.

When the angle of crossing has to be below 60 degree, the matter will be referred to the authority incharge of the telecommunication system. On a request from the Contractor, the permission of the telecommunication authority may be obtained by the Owner. Also, in the crossing span, power line support will be as near the telecommunication line as possible, to obtain increased vertical clearance between the wires.

ix) **Details Enroute**

All topographical details, permanent features, such as trees, building etc. 17.5 m on either side of the alignment shall be detailed on the profile plan.
1.5.9 **Clearance from Ground, Building, Trees etc.**

Clearance from ground, buildings, trees and telephone lines shall be provided in conformity with the Indian Electricity Rules, 1956 as amended up to date.

1.5.10 The tree-cutting shall be the responsibility of the Employer except for that required during survey. However, the Contractor shall count, mark and put proper numbers with suitable quality of paint at his own cost on all the trees that are to be cut by the Employer at the time of actual execution of the work as detailed below. Contractor may please note that Employer shall not pay any compensation for any loss or damage to the properties or for tree cutting due to Contractor’s work.

1.5.11 Any way leave which may be required by the Contractor, shall be arranged by the Employer as required by work programme.

1.5.12 To evaluate and tabulate the trees and bushes coming within 17.5 m for on either side of the central line alignment, the trees will be numbered and marked with quality paint serially from angle point 1(i) onwards and the corresponding number will be painted on the stem of trees at a height of 1 metre from ground level. The trees list should contain the following:

a) Girth (circumference) measured at a height of 1 metre from ground level.

b) Approximate height of the tree with an accuracy of ±2 METRES.

c) Name of the type of the species/tree

d) The bushy and under growth encountered in the 35m belt should also be evaluated with its type, height, girth and area in square metres, clearly indicating the growth in the tree/bush statement.

1.5.13 Payment of compensation towards the clearances etc., will be the responsibility of the Owner.

1.5.14 **Preliminary Schedule**

The profile sheets, duly spotted, alongwith preliminary schedules indicating type of towers, type of foundations, wind span, angle of deviation, river or road crossing and other details shall be submitted for the approval of the Employer. After approval, the Contractor shall submit six more sets of the approved reports along with one set of reproducible of final profile drawings to the owner for record purpose.
1.5.15 Detailed Survey for Tower Location

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

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

1.6 Environmental Conditions

1.6.1 Forest
The line route passing through forest stretches for transmission lines covered under this specification shall be furnished to the successful Bidder.

1.6.2 General Climatic Conditions

1.6.2.1 The Line covered under this specification is to run in the National Capital Territory of Delhi and shall be suitable for the climatic conditions prevailing in the area as per details given here below:

<table>
<thead>
<tr>
<th>I. Temperature:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>i) Peak Ambient temperature</td>
<td>50°C</td>
</tr>
<tr>
<td>ii) Reference Ambient air temperature</td>
<td>45°C</td>
</tr>
<tr>
<td>iii) Minimum Ambient temperature</td>
<td>0°C</td>
</tr>
<tr>
<td>iv) Daily Average Ambient Temp</td>
<td>32°C</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>II. Relative Humidity:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>i) Maximum</td>
<td>100%</td>
</tr>
<tr>
<td>ii) Minimum</td>
<td>10%</td>
</tr>
</tbody>
</table>

| III. Average Annual Rainfall | 750mm |
| IV. Average No. of rainy days | 50 |
| V. Average number of Thunderstorm | 40 days per annum |
| VI. Altitude not exceeding | 300 Mts. Above M.S.L. |
| VII. Maximum wind pressure | 195 Kgf/sq.m. up to 30 Metres above Mean retarding surface |

1.6.2.2 The atmosphere is generally laden with mild acid & heavy dust in suspension during the dry months and is subjected to fog in cold months. The comparative variation between daily minimum and maximum temperature is of the order of 15 to 20°C. Heavy lightening occurs during the rainy months.
1.6.2.3 All the equipment shall be designed to withstand seismic forces corresponding to an acceleration of 0.1g.

1.7 Details of Tower & Foundations

Foundation design/Foundation Working Drawing will be submitted by the Contractor on award of the Contract and will be approved by the DTL.

1.8 Statutory Regulations and Standards

1.8.1 Statutory Regulations

The Contractor is required to follow local statutory regulations stipulated in Electricity (Supply) Act 1948, Indian Electricity Rules 1956 as amended and other local rules and regulations referred in this specifications.

1.8.2 Reference Standards

1.8.2.1 The codes and/or standards referred to in the specifications shall govern, in all cases wherever such references are made. In case of a conflict between such codes and/or standards and the specifications, latter shall govern. Such codes and/or standards, referred to shall mean the latest revisions, amendments/changes adopted and published by the relevant agencies unless otherwise indicated.

1.8.2.2 Other internationally accepted standards which ensure equal or better performance than those specified shall also be accepted, subject to prior approval by the Owner.

1.9 Quality Assurance, Inspection and Testing

1.9.1 Quality Assurance

To ensure that the supply and services under the scope of this Contract whether manufactured or performed within the Contractor’s works or at his Sub-Contractor’s premises or at site or at any other place of work are in accordance with the specifications, the Contractor shall adopt suitable quality assurance programme to control such activities at all points necessary. Such programme except for the Field Quality Plan shall be submitted by the Contractor, in the bid. A quality assurance programme of the Contractor shall generally cover but not limited to the following:

a) His organization structure for the management and implementation of the proposed quality assurance programme.
b) Documentation control system.
c) Qualification data for Contractor’s key personnel;
d) The purchases for purpose of materials, parts/components and selection of sub-Contractor’s services including vendor analysis, source inspection, incoming raw material inspection, verification of material purchases etc.
e) Control of non-conforming items and system for corrective action.
f) Control of calibration and testing of measuring and testing equipments.
g) System for indication and appraisal of inspection status.
h) System for quality audits.
i) System for maintenance or records.
j) System for handing storage and delivery and
k) A quality plan detailing out the specific quality control procedure adopted for controlling the quality characteristics relevant to each item of supply.

The such Quality Plan shall be mutually discussed and approved by the Owner after incorporating necessary corrections by the Contractor as may be required

1.9.1.1 Field Quality Plan

All field activities shall be carried out in accordance with Standards Field Quality Plan enclosed at Cl. No. 9.0

1.9.1.2 Quality Assurance Documents

The Contractor shall be required to submit all the Quality Assurance Document as stipulated in the Quality Plan at the time of owner’s inspection.

1.9.1.3 The Owner, through his duly authorized representatives, reserves the right to carry out Quality Audit and Quality Surveillance of the systems and procedures of the Contractor’s / his sub Contractor’s Quality Management and Control activities.
1.9.2 **Inspection, Testing and Inspection Certificate**

The provisions of the clause regarding Inspection, Testing and Inspection Certificate as described in Conditions of Contract, Vol-I shall be applicable to the supply. The Owner shall have the right to reinspect at his expenses any material though previously inspected and approved by him at the Contractor’s works, before and after the same are delivered at DTL store/site. If following the latter, material is found defective, then the Contractor shall bear the cost of this inspection and replacement according to specification.

1.10 **Technical Parameters for 220KV Lines**

**Electrical System Data**

<table>
<thead>
<tr>
<th></th>
<th>a) Rated system voltage</th>
<th>220 KV</th>
</tr>
</thead>
<tbody>
<tr>
<td>b)</td>
<td>Highest system voltage</td>
<td>250 KV</td>
</tr>
<tr>
<td>c)</td>
<td>System Grounding</td>
<td>Effectively earthed</td>
</tr>
</tbody>
</table>

2.0 **Details of Line Materials**

2.1 **Particulars of Conductor and Earthwire**

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Particulars</th>
<th>Conductor</th>
<th>Earth Wire</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Type</td>
<td>ACSR‘ZEBRA’ Conductor.</td>
<td>19/2.50 mm Galvanized Steel Wire stranded of Grade 3, 1100 N/mm² quality</td>
</tr>
<tr>
<td>2.</td>
<td>Stranding and wire diameter</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>a) Aluminum</td>
<td>54/3.18 mm</td>
<td></td>
</tr>
<tr>
<td></td>
<td>b) Steel</td>
<td>7/3.18 mm</td>
<td>19/2.50 mm.</td>
</tr>
<tr>
<td>3.</td>
<td>Calculated equivalent area of Aluminum (mm²)</td>
<td>418.6</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Total sectional area (mm²)</td>
<td>483.1 mm²</td>
<td>90 mm²</td>
</tr>
<tr>
<td>5.</td>
<td>Approximate overall diameter (mm)</td>
<td>28.62</td>
<td>12.50</td>
</tr>
<tr>
<td>6.</td>
<td>Approximate mass (kg/km).</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>a) Aluminum</td>
<td>1185</td>
<td></td>
</tr>
</tbody>
</table>
b) Steel 438 707
c) Total 1623 707

7. Calculated Resistance at 20\(^\circ\) C (ohms/km). 0.0680

8. Approximate Calculated breaking load. 13316 Kg 9240 Kg.

9. Modulus of Elasticity 6850 Kg/mm\(^2\) 19650 Kg/mm\(^2\)

10. Co-efficient of linear expansion per degree centigrade 19.35X10\(^{-6}\) 11.5X10\(^{-6}\)

11. Configuration of phases of conductor of D/C Line. Vertical

12. Location of earthwire In place of earth wire OPG will be laid on the line.

### 2.2 Particulars of Insulator Strings with Standard Disc Insulator

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Particulars</th>
<th>Single Suspension string</th>
<th>Double Suspension String</th>
<th>Single tension String</th>
<th>Double tension String for important crossings</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>No. of standard discs per string</td>
<td>15</td>
<td>2X15</td>
<td>16</td>
<td>2X16</td>
</tr>
<tr>
<td>2.</td>
<td>Size of disc (mm)</td>
<td>255X145mm</td>
<td>255X145mm</td>
<td>280X170mm</td>
<td>280X170mm</td>
</tr>
<tr>
<td>4.</td>
<td>Creepage distance of each disc (mm)</td>
<td>315</td>
<td>315</td>
<td>330</td>
<td>330</td>
</tr>
</tbody>
</table>

### 2.3 Insulator String Hardware

a) Anchor Shackle
b) Chain Link  
c) Yoke Plate  
d) Ball Clevis  
e) Arcing horn holding plate  
f) Arcing horns  
g) Socket clevis  
h) Clevis eye  
i) Free centre type suspension clamp  
j) Compression type dead end clamp  

2.4 Accessories for Conductor & Earthwire  

a) Preformed armour rods  
b) Mid span compression joints  
c) Repair sleeves  
d) T-connectors  
e) Suspension Clamps  
f) Tension Clamps  
g) Flexible copper bonds  
h) Vibration dampers.  
i) Bird guard  
j) Earth bond  

3.0 Transmission Towers  

3.1 General Description of the Tower  

3.1.1 The towers are of the following type:  

a) Double Circuit (A, B&C)  
b) Special Towers  
c) Line gantry for making crossings.  

3.1.2 The towers are of self supporting lattice steel type, designed to carry the line conductors with necessary insulators, earthwire and all fittings under all loading
conditions. Outline diagram of double circuit tower is enclosed with the Specification.

3.1.3 The tower are fully galvanized structure using mild steel/high tensile steel sections as specified in Cl.3.4. Bolts and nuts with spring washers are to be used for connection.

3.2 Type of Towers

3.2.1 Three types of narrow base towers confirming to CBIP recommendations shall be used as specified here below:

a) ‘A’ type narrow base with suspension string to be used for straight run of line and for angles upto $2^\circ$ at normal ruling span of 225 meters for $2^\circ$ deviation and also longer spans with lesser angles.

b) ‘B’ type narrow base medium angle towers with tension strings to be used for angles upto $30^\circ$ deviation. These towers may also be used as section towers for transposition, if required.

c) ‘C’ type narrow base angle towers to be used with tension strings for angles upto $60^\circ$ for normal ruling spans and also for longer spans with lesser angles. These towers will also be used as deed end terminal towers.

d) JCS & ANCHOR TOWER

3.2.2 Special Towers

The towers which are specially designed for very long spans such as Major River crossings etc. which can not be crossed by normal Tower with extensions are special towers.

3.2.3 Extensions

3.2.3.1 The Double circuit towers are designed so as to be suitable for adding 3M and 6M body extensions for maintaining adequate ground clearance without reducing the specified factor of safety in any manner.

3.2.3.2 Provision of adding 12/14M extensions to tower type C is also kept by the Employer. For power line crossing or any other obstacle, tower type C can be used with 12/14M extensions depending on the merit of the prevailing site condition.

3.2.3.3 All above extensions provisions to normal towers shall be treated as part of normal tower only.
3.2.4 Spans and Clearances

3.2.4.1 Normal Span
The normal ruling span of the line is 225 metres for narrow base and 330 metres for broad base tower.

3.2.4.2 Wind Span
The wind span is the sum of the two half spans adjacent to the support under consideration. For normal horizontal spans this equals to normal ruling span.

3.2.4.3 Weight Span
The weight span is the horizontal distance between the lowest point of the conductors on the two spans adjacent to the tower. For spotting the tower the span limits are 100m to 270m for narrow base and 100m to 400m for broad base tower. In case at certain locations where actual spotting exceed the design spans and cross-arms and certain members of towers are required to be modified/reinforced, the modified/reinforced tower shall have factor of safety not less than of tested tower for the increased loadings. The price payable for additional weights on account of such modification/reinforcement shall be as per the unit price in the Letter of Award. The tower with same modified members will be treated as part of normal towers only.

3.2.4.4 Electrical Clearances

3.2.4.4.1 Ground Clearance
The min. ground clearance from the bottom conductor shall not be less than 7100m.

3.3 Design and Drawings
3.3.1 One copy of the structural/erection drawings and bills of materials for all the towers and their extensions shall be given to Contractor for erection purpose.

3.3.2 The loading data of various types of towers proposed to be installed in the line shall be supplied by the Owner to the Contractor for submitting the design and drawing of tower foundations (as per soil investigation carried out by him) for approval of the Owner.

3.3.2.1 Other than the drawings indicated above, some other drawing, if any, required for proper and effective execution of the project may also be required to be developed by the Contractor. However, no extra cost for same shall be payable to the Contractor.

3.3.2.2 The drawings submitted by the Contractor shall be approved/commented by the Employer as the case may be within thirty (30) days of receipt of drawing in owner’s office. If the designs/drawings are commented by the Owner, the Contractor shall submit revised design/drawings duly incorporating all comments within fifteen (15) days of date of issue of comments.
3.3.2.3 Tower accessories drawings like circuit plate, danger plate, phase plate, number plate, anticlimbing device etc. shall be prepared by the Contractor and submitted to the Owner in three copies alongwith one reproducible, for record. The drawings shall be prepared in A4 size only.

3.3.2.4 All the drawings shall have a proper name plate clearly displaying the name and logo of DTL on right hand bottom corner. The exact format of the name plate shall be handed over to the successful bidder for incorporation of the same on all the drawings. Also all the drawings shall carry the following statement and shall be displayed conspicuously on the drawing:

WARNING: THIS IS PROPRIETY ITEM AND DESIGN RIGHT IS STRICTLY RESERVED WITH DTL. UNDER NO CIRCUMSTANCES THIS DRAWING SHALL BE USED BY ANYBODY WITHOUT PRIOR PERMISSION FROM THE OWNER IN WRITING.

3.3.2.5 While submitting the foundation drawings and any other drawings pertaining to the subject transmission line, the Contractor shall clearly indicate on each drawing DTL Specification No., Name of the transmission line, letter reference no. and date on which the submission are made. The same practice is also to be followed while submitting distribution copies.

3.3.3 The Contractor shall furnish the following in three (03) copies to the Employer for necessary distribution within fifteen (15) days after the receipt of the approval from the Employer.

i. Detailed working drawing for foundations.

ii. Detailed structural drawings indicating section size, length of members, sizes of plate along with hole to hole distance, joint details etc.

iii. Bill of materials, indicating cutting and bending details against each member.

d) All the drawings for the tower accessories.

a. One copy of reproducible for all drawings.

3.3.4 The Contractor is required to furnish the progress of submission and approvals of drawings on fifth day of every month till the completion of all the Design/Engineering activities.

The details shall include description of drawing, schedule date of submission, actual date of submission schedule date of approval, actual date of submission of distribution copies and ‘Remarks’ column. Provision of six additional column shall also be made in the above progress report to indicate date of comments issued the owner and details of submission of revised drawings.
3.4 Tower Materials

3.4.1 Tower Members

All the tower members along with bolts, nuts & washer of the required size shall be provided to the contractor by the Owner as per relevant BOM.

3.4.2 Fasteners: Bolts, Nuts and Washers

3.4.2.1 The bolts, nuts and washers required for erection work shall also be issued to the Contractor as per relevant BOM.

3.4.2.2 Flat and tapered washers are to be provided wherever necessary. Spring washers as per IS:3063 shall be provided for insertion under all nuts.

3.4.2.3 The bolt positions in assembled towers shall be as per structural drawing.

3.5 Tower Accessories

3.5.1 Step Bolts & ladders

For double circuit tower, the step bolt shall be fixed on two diagonally opposite legs upto top of the towers. These step bolt shall be provided to the Contractor by the owner. In case of special towers, if ladders are also necessary due to tower height the same shall also be provided by the owner along with Platforms, protection rings etc. for erection by the contractor.

3.5.2 Insulator Strings Attachments

iv. Single/Double Insulator string assemblies to be supplied by the owner.

v. Tension Insulator string assemblies to be supplied by the owner.

3.5.3 Earthwire Clamps

a) Suspension Clamp
Earthwire suspension clamps will be supplied by the owner.

b) Tension clamps
The owner shall provide earthwire tension clamps for incorporation on the tower.

3.5.4 Anticlimbing Device
Barbed wire type anticlimbing device shall be provided and installed by the Contractor for all towers. The height of the anticlimbing device shall be provided
approximately 3m above ground level. The barbed wire shall conform to IS-278 (Grade A1). The barbed wires shall be given chromating dip as per procedure laid down in IS:1340. All the materials needed to make the anticlimbing device shall be arranged by the contractor at his own cost.

3.5.5 **Danger, Number, Circuit and Phase plate**

Danger Plates, Number Plates, Circuit Plate and Phase plates shall be provided and installed by the Contractor:

**a) Danger plates:**

Danger plate of not less that 200X250 mm manufactured out of 2 mm sheet steel with the letters, figures and conventional skull and bones painted in signal red on the front side conforming to IS: 2651-1963 shall be provided on all towers. It should specifically mention 2,20,000 Volts. The supply and fixing of Danger Plates is included in the scope of erection work.

**b) Number plates:**

Each tower will be numbered serially commencing from terminal structure indicating the number of tower. The number plate shall be of size 200X150 mm manufactured out of 2 mm sheet steel enameled red on white enameled background, will indicate the number of tower with number not less 45 mm height. The backside of the plate shall be enameled back. The number plate shall be fixed on each tower and the supply and fixing of these plates is included in the scope of erection work.

**c) Phase plate:**

Circular enameled disc of 75 mm diameter with a provision of 17.5 mm bolt and nut in sets of 3 enameled red, yellow and blue and the back side enameled black shall be provided for phase identification of each circuits and shall be fixed at a suitable places on all towers. The supply and fixing of phase plates is included in the scope of erection work.

**d) Circuit plate:**

Each tower shall be provided with a circuit plate of mild steel minimum 1.6 mm thick with rear side black enameled and front should have lettering in red enameled on white background. The circuit plate should conform to DTL drawing or specification with the size of 150 X 200 mm. The supply and fixing of circuit plates is included in the scope of erection work.

3.6 **Earthing**

3.6.1 The Contractor shall measure the tower footing resistance (TFR) of each tower after it has been erected and before the stringing of the earthwire during dry weather. Each tower shall be earthed, the tower footing resistance shall not exceed 10 ohms. Pipe type earthing and counter poise type earthing wherein required shall be done in accordance with the latest editions 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.

3.6.2 The details for pipe & counterpoise type earthing will be as per relevant IS.
3.6.3 The earthing will vary depending on soil resistivity. For soil resistivity less than 1500 ohms, earthing shall be established by providing 4 lengths of 30m counterpoise wire. Otherwise, for soil resistivity greater than 1500 ohms metre earthing shall be established by providing 4 length of 70m counterpoise wire.

3.6.4 The provisional quantities for pipe type earthings and counterpoise earthing are furnished in Schedule of Quantities as well as in Price Schedule. The Bidders are required to furnish unit rates also for adjustment purpose with actual quantities required during earthing. The quoted price shall include fabrication, supply and installation of earthing material including supply of coke, salt etc.

3.7 Inspection and Tests

3.7.1 General
All standard tests, including quality control tests, in accordance with appropriate Indian/international standard, shall be carried out unless otherwise specified.

3.7.2 Inspection
In addition to the provision of Conditions, the following shall also apply:

3.7.2.1 The acceptance of any part of items shall in no way relieve the Contractor of any part of his responsibility for meeting all the requirements of the specification.

3.7.2.2 All gauges and templates necessary to satisfy the Owner shall be supplied by the Contractor.

3.7.2.3 The specified grade and quality of steel be used by the Contractor. To ascertain the quality of steel used, the inspector may at his discretion get the material tested at an approved laboratory.

3.8 Standards

3.8.1 The erection procedure and materials used for construction of foundations shall conform to the following Indian Standards (IS)/International Standards which shall mean latest revisions, with amendments/changes adopted and published, unless specifically stated otherwise in the specification. In the event of supply material conforming to Standards other than specified, the Bidder shall confirm in his bid that these Standards are equivalent to those specified. In case of award, salient features of comparison between the Standards proposed by the Bidder and those specified in this document will be provided by the Contractor to establish their equivalence.

3.8.2 The materials and services covered under these specifications shall be performed as per requirements of the relevant standards code referred hereinafter against each set of equipment and services. Other Internationally acceptable standards which ensure equal or higher performance than those specified shall also be accepted.
<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Indian Standards (IS)</th>
<th>Title</th>
<th>Internationally Recognized Standards/Guides</th>
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</thead>
<tbody>
<tr>
<td>2.</td>
<td>(a) IS:802(Part1)</td>
<td>Code of Practice for Use of Structural Steel in Overhead Transmission</td>
<td>ASCE52, IEC826, BS8100</td>
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<td></td>
<td>Sec2-1992</td>
<td>Section 1 Materials and Loads.</td>
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<td>(b) IS:802</td>
<td>Section 2 Permissible Stresses.</td>
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<td></td>
<td>(Part2)</td>
<td>Code of Practice for use of Structural Steel in Overhead Transmission</td>
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<tr>
<td></td>
<td>(c) IS:802-1978</td>
<td>Line: Fabrication, Galvanizing, Inspection and Packing</td>
<td>ASCE52, IEC652</td>
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<tr>
<td></td>
<td>(Part3)</td>
<td>Code of Practice for Use of Structural Steel in Overhead Transmission</td>
<td></td>
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<td></td>
<td></td>
<td>Line Towers &amp; Testing</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>IS:808-1989</td>
<td>Dimensions for Hot Rolled Steel Beam, Column, Channel and Angle Sections</td>
<td></td>
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<td>4.</td>
<td>IS:1363-1992</td>
<td>Hexagon Nuts (size range M5 to M36)</td>
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<tr>
<td>5.</td>
<td>IS:1367-1992</td>
<td>Technical Supply Conditions for Threaded Steel Fasteners</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>IS:1852-1991</td>
<td>Rolling and Cutting Tolerances of Hot Rolled Steel Products</td>
<td></td>
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<tr>
<td>9.</td>
<td>IS:2062-1992</td>
<td>Steel for general structural purposes</td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>IS:2629-1990</td>
<td>Recommended Practice for Hot Dip Galvanizing of Iron and Steel</td>
<td>ASTM A123, CSA G164</td>
</tr>
<tr>
<td>13.</td>
<td>IS:3757-1992</td>
<td>High Strength Structural Bolts</td>
<td></td>
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<tr>
<td>14.</td>
<td>IS:4759-1990</td>
<td>Specification, for Hot Dip Zinc Coatings On Structural Steel and Other</td>
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<td>Allied Products</td>
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<td>15.</td>
<td>IS:5369-1991</td>
<td>General Requirements for Plain Washers</td>
<td></td>
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<td>17.</td>
<td>IS:6610-1991</td>
<td>Specification for Heavy Washers For Steel Structures</td>
<td></td>
</tr>
<tr>
<td>18.</td>
<td>IS:6623-1992</td>
<td>High Strength Structural Nuts</td>
<td></td>
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<td>19.</td>
<td>IS:6639-1990</td>
<td>Hexagon Bolts for Steel Structures</td>
<td>ASTM A394 CSA B33.4</td>
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<tr>
<td>20.</td>
<td>IS:6745-1990</td>
<td>Methods for Determination of weight of Zinc Coated Iron and Steel Articles.</td>
<td>ASTM A90</td>
</tr>
<tr>
<td>21.</td>
<td>IS:10238-1989</td>
<td>Step Bolts for Steel Structures</td>
<td></td>
</tr>
<tr>
<td>23.</td>
<td></td>
<td>Indian Electricity Rules.</td>
<td></td>
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<tr>
<td>24.</td>
<td>IS: 2911 part 1to4</td>
<td>PILE</td>
<td></td>
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</tbody>
</table>
3.8.3 The standards mentioned above are available from

<table>
<thead>
<tr>
<th>Reference/Abbreviation</th>
<th>Name and address from which the standards/guides are available</th>
</tr>
</thead>
</table>
| IS                     | Bureau of Indian Standards  
Manak Bhawan,  
9, Bahadur Shah Zafar Marg,  
New Delhi, INDIA            |
| ISO                    | International Organisation for Standardisation,  
Danish Board for standardization,  
Dansk Standardising  
Sraat, Aurehogvei-12  
DK-2900  
Helleprup,  
DENMARK                |
| CSA                    | Canadian standard Association  
178, Rexadale Boulevard  
Rexdale (Ontario)  
CANADA  
M9W IR3                |
| DIN                    | Deutches Institute Für Normung  
Burggrafenstrassee 4-10  
Post Fach 1107  
D-1000, Berlin-30  
GERMANY               |
| ASTM                   | American Society for Testing and Material  
1916 race Street Philadelphia, PA  
19103-1187 USA          |
| Indian Electricity Rules | Kitab Mahal  
Baba Kharak Singh Marg  
New Delhi-110001  
INDIA                |
| ASCE                   | American Society of Civil Engineers  
345 East 47th street, New York, NY  
10017-2398  
USA                  |
| IEEE                   | Institute of Electrical and Electronics Engineers  
445 Hoes Lane  
Piscataway, NJ  
0885-1331  
USA                |
| IEC                    | International Electrotechnical Commission  
Bureau Central de la Commission  
1 rue, de Varembe  
Geneva, Switzerland  |

SECTION-I VOLUME-II                                                                 Page 23 of 91
4.0 TOWER FOUNDATIONS

4.1 Geotechnical Investigation

4.1.1 General

4.1.1.1 Owner requires that a detailed geotechnical investigation be carried out at various tower locations to provide the designer with sufficiently accurate information both general and specific, about the substrata profile and relevant soil and rock parameters at site on the basis of which the foundation of transmission line towers can be classified and designed rationally.

4.1.1.2 These Specifications provide general guidelines for geotechnical investigation of normal soils. Cases of marshy locations and those affected by salt water or saltpetre shall be treated as special locations and the corresponding description in these specifications shall apply. Any other information required for such locations shall be obtained by Contractor and furnished to Owner.

4.1.2 Scope

4.1.2.1 The scope of work includes detail soil investigations and furnishing bore log data at various tower locations. The provisional quantities have been indicated in Bill of Quantities. However, during actual execution of the work, the quantities shall be decided by the Engineer Incharge, depending upon soil strata & terrain. Based on the bore log data/soil parameters/soil investigation result, the Contractor shall recommend the type of foundations suitable for each location for approval by the Engineer Incharge.

For bore log data, in case, the trial pit is taken by the Contractor at one of the tower leg locations instead of the center peg, the Contractor shall not be eligible for any payment towards furnishing of bore log data as payment for such excavation is included in the foundation cost. Further, where trial pits are taken at center peg, the scope of such work shall include back filling also, which shall be carried out after approval of the foundation classification.

4.1.2.2 These specifications cover the technical requirements for a detailed geotechnical investigation and submission of a detailed Geotechnical Report. The work shall include mobilization of all necessary tools and equipment and provision of necessary engineering, supervision and technical personnel, skilled and unskilled labour, etc. as required to carry out the entire field investigation as well as laboratory tests, analysis and interpretation of data collected and preparation of the Geotechnical Report. Contractor shall also collect data regarding variation of subsoil water table along the proposed line route. The aforementioned work shall be supervised by a graduate in Civil Engineering having at least 5 years of the site experience in geotechnical investigation work.
4.1.2.3 The Contractor shall make its own arrangements to establish the coordinate system required to position boreholes, tests pits and other field test locations as per the drawings/sketches supplied by Owner. Contractor shall determine the reduced levels (R.L’s) at these locations with respect to benchmarks used in the detailed survey. Two reference lines shall be established based on survey data/details. Contractor shall provide at site all required survey instruments to the satisfaction of the Owner so that the work can be carried out accurately according to specifications and drawings. Contractor shall arrange to collect the data regarding change of course of rivers, major natural streams and nalas, etc. encountered along the transmission line route from the best available sources and shall furnish complete hydrological details including maximum velocity discharge, highest flood level (H.F.L.), scour depth etc. of the concerned rivers, major streams and nalas (canals).

4.1.2.4 The field and laboratory data shall be recorded on the proforma recommended in relevant Indian Standards. Contractor shall submit to Owner two copies of field bore logs (one copy each to Owner’s site and Corporate Offices) and all the field records (countersigned by the Owner) soon after the completion of each borehole/test.

4.1.2.5 Whenever Contractor is unable to extract undisturbed samples, it shall immediately inform the Owner. Payment for boring charges shall be subject to Owner being satisfied that adequate effort has been made to extract undisturbed samples. Special care shall be taken for locations where marshy soils are encountered and Contractor in such cases shall ensure that specified number of vane shear tests are performed and the results correlated with other soil parameters.

4.1.2.6 One copy of all field record and laboratory test results shall be sent to Owner on a weekly basis. Owner may observe, at all times, the laboratory testing procedures.

4.1.2.7 The Contractor shall interact with the Owner to get acquainted with the different types of structures envisaged and in assessing the load intensities on the foundation for the various types of towers in order to enable him to make specific recommendations for the depth, founding stratum, type of foundation and the allowable bearing pressure.

4.1.2.8 After reviewing Contractor’s geotechnical investigation draft report, Owner will call for discussions to be held normally within one week at Owner’s site office/Corporate Office in New Delhi, in order to comment on the report in the presence of Contractor’s Geotechnical Engineer. Any expenditure associated with the redrafting and finalizing the report, traveling etc., shall be deemed included in the rates quoted for the geotechnical investigations.

4.1.2.9 Contractor shall carry out all work expressed and implied in Clause 4.1.2 of these specifications in accordance with requirements of the specification.
4.1.3 General Requirements

4.1.3.1 Wherever possible, Contractor shall research and review existing local knowledge, records of test pits, boreholes etc., types of foundations adopted and the behaviour of existing structures, particularly those similar to the present project.

4.1.3.2 Contractor shall make use of information gathered from nearby quarries, unlined wells, excavation etc. Study of the general topography of the surrounding areas will often help in the delineation of different soil types.

4.1.3.3 Contractor shall gather data regarding the removal of overburden in the project area either by performing test excavations, or by observing soil erosion or land slides in order to estimate reconsolidation of the soil strata. Similarly, data regarding recent land fills shall be studied to determine the characteristics of such land fills as well as the original soil strata.

4.1.3.4 The water level in neighbouring streams and water courses shall be noted. Contractor shall make enquiries and shall verify whether there are abandoned underground works e.g. worked out ballast pits, quarries, old brick fields, mines, mineral workings, etc.

4.1.3.5 It is essential that equipment and instruments be properly calibrated at the commencement of the work. If the Owner so desires, Contractor shall arrange for having the instruments tested at an approved laboratory at its cost and shall submit the test reports to the Owner. If the Owner desires to witness such tests, Contractor shall arrange for the same.

4.1.4 Codes and Standards for Geotechnical Investigations

4.1.4.1 All standards, specifications and codes of practice referred to herein shall be the latest editions including all applicable official amendments and revisions. In case of conflict between the present specifications and those referred to herein, the former shall prevail. Internationally accepted standards which ensure equal or higher performance than those specified shall also be accepted.

4.1.4.2 All work shall be carried out in accordance with the following Indian Standards and codes:

<table>
<thead>
<tr>
<th>Indian Standards (IS)</th>
<th>Title</th>
<th>International and Internationally Recognised standard/Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>IS:1080-1990</td>
<td>Codes of Practice for Design and Construction of Simple Spread Foundations</td>
<td></td>
</tr>
<tr>
<td>IS:1498-1992</td>
<td>Classification and Identification of Soils for General Engineering</td>
<td>ASTM D 2487, ASTM D 2488</td>
</tr>
<tr>
<td>IS: 1892-1992</td>
<td>Code of Practice for Subsurface investigation for Foundation</td>
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<tr>
<td>IS: 2131-1992</td>
<td>Method of Standard Penetration Test for Soils</td>
<td>ASTM D 1586</td>
</tr>
<tr>
<td>IS: 2132-1992</td>
<td>Code of Practice for Thin Walled Tube Sampling of Soils</td>
<td>ASTM D 1587</td>
</tr>
<tr>
<td>IS: 2720-1992</td>
<td>Method of Test for Soils (Relevant Parts)</td>
<td>ASTM D 420</td>
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<tr>
<td>IS: 2911-1980</td>
<td>Code of Practice for Design and Construction of pile foundations (relevant Parts)</td>
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</tr>
<tr>
<td>IS: 3025</td>
<td>Methods of Sampling and Testing (Physical and Chemical) for Water Used in Industry</td>
<td></td>
</tr>
<tr>
<td>IS: 3043-1991</td>
<td>Code of Practice for Earthing</td>
<td></td>
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<tr>
<td>IS: 4078-1990</td>
<td>Code of Practice for indexing and storage of Drill Cores.</td>
<td></td>
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<tr>
<td>IS: 4434-1992</td>
<td>Code of Practice for in-situ Vane Shear Test for Soils</td>
<td>ASTM D 2573 ASTM D 4648</td>
</tr>
<tr>
<td>IS: 4453-1992</td>
<td>Code of Practice for Exploration by Pits, trenches, Drifts and Shafts</td>
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<tr>
<td>IS: 4464-1990</td>
<td>Code of Practice for Presentation of Drilling Information and Core Description in Foundation investigation</td>
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<tr>
<td>IS: 5313-1989</td>
<td>Guide for core drilling observations</td>
<td></td>
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<tr>
<td>IS: 6403-1990</td>
<td>Code of Practice for Determination of Allowable Bearing Pressure on Shallow Foundation</td>
<td>ASTM D 194</td>
</tr>
<tr>
<td>IS:6926-1990</td>
<td>Code of Practice for Diamond Core Drilling for Site Investigation for River Valley Projects</td>
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<td>IS:6935-1989</td>
<td>Method of Determination of Water Level in a Bore Hole</td>
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<tr>
<td>IS:7422-1990</td>
<td>Symbols and Abbreviations for Use in Geological Maps, Sections and Subsurface Exploratory Logs (Relevant Parts)</td>
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<tr>
<td>IS:8764-1991</td>
<td>Method for Determination of Point Load strength index of Rocks</td>
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<td>IS:9179-1991</td>
<td>Method of Preparation of Rock Specimen for Laboratory Testing</td>
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<td>IS: 10050-1991</td>
<td>Method of Determination of Slake Durability Index of Rocks</td>
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<tr>
<td>IS:11315 (part-II)-1991</td>
<td>Description of Discontinuities in Rock Mass - Core Recovery and Rock Quality.</td>
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**4.1.5 Field Investigation for Soils**

**4.1.5.1 Boring**

Boreholes are required for detailed soil investigations.

**4.1.5.1.1 General Requirements**

a) Boreholes shall be made to obtain information about the subsoil profile, its nature and strength and to collect soil samples for strata identification and for conducting laboratory tests. The minimum diameter of the borehole shall be
150 mm and boring shall be carried out in accordance with the provisions of IS:1892 and the present specification.

b) All boreholes shall be 7m deep for normal soil conditions. The depth of boreholes at river crossings and special locations shall be 40m. If a strata is encountered where the Standard Penetration Test records N values greater than 100, with characteristics of rock, the borehole shall be advanced by coring at least 3 m further in normal locations and at least 7 m further for the case of river crossing towers with prior approval of the Owner. When the boreholes are to be terminated in soil strata an additional Standard Penetration Test shall be carried out, at the termination depth. No extra payment shall be made for carrying out Standard Penetration Tests.

c) Casing pipe shall be used when collapse of a borehole wall is probable. The bottom of the casing pipe shall at all times be above the test or sampling level but no more than 15 cm above the borehole bottom. In case of cohesionless soils, the advancement of the casing pipe shall be such that it does not disturb the soil to be tested of sampled. The casing shall preferably be advanced by slowly rotating the casing pipe and not by driving.

d) In-situ tests shall be conducted and undisturbed samples shall be obtained in the boreholes at intervals specified hereafter. Representative disturbed samples shall be preserved for conducting various identification tests in the laboratory. Water table in the borehole shall be carefully recorded and reported following IS:6935. No water or drilling mud shall be used while boring above ground water table. For cohesionless soil below water table, the water level in the borehole shall at all times be maintained slightly above the water table.

e) The borehole shall be cleaned using suitable tools to the depth of testing or sampling, ensuring least or minimum disturbances of the soil at the bottom of the borehole. The process of jetting through an open tube sampler shall not be permitted. In cohesive soils, the borehole may be cleaned by using a bailer with a flap valve. Gentle circulation of drilling fluid shall be done when rotary mud circulation boring is adopted.

f) On completion of the drilling, Contractor shall backfill all boreholes as directed by the Owner.

4.1.5.1.2 Auger Boring

Auger boring may be employed in soft to still cohesive soils above the water table. Augers shall be of helical or post hold type and the cuttings brought up by the auger shall be carefully examined in the field and the description of all strata shall be duly recorded in the field borelog as per IS: 1498. No water shall be introduced from the top while conducting auger boring.
4.1.5.1.3  Shell and Auger Boring

Shell and auger boring may be used in all types of soil which are free from boulders. For cohesionless soil below ground water table, the water level in the borehole shall always be maintained at or above ground water level. The use of chisel bits shall be permitted in hard strata having SPT-N value greater than 100. Chisel bits may also be used to extend the borehole through local obstructions such as old construction, boulders, rocky formations, etc. The requirements in Clause 4.1.5.1.2 shall apply for this type of boring also.

Rotary method may be used in all types of soil below water table. In this method the boring is carried out by rotating the bit fixed at the lower end of the drill rod. Proper care shall be taken to maintain firm contact between the bit and the bottom of the borehole. Bentonite or drilling mud shall be used as drilling fluid to stabilize and protect the inside surface of the borehole. Use of percussion tools shall be permitted in hard clays and in dense sandy deposits.

4.1.5.2  Standard Penetration Test (SPT)

4.1.5.2.1  This test shall be conducted in all types of soil deposits encountered within a borehole, to find the variation in the soil stratification by correlating with the number of blows required for unit penetration of a standard penetrometer. Structure sensitive engineering properties of cohesive soils and silts such as strength and compressibility shall not be inferred based on SPT values.

4.1.5.2.2  The test shall be conducted at depths as follows:

<table>
<thead>
<tr>
<th>Location</th>
<th>Depths (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal soils</td>
<td>2.0, 3.0, 5.0, 7.0</td>
</tr>
<tr>
<td>River crossings and special locations</td>
<td>2.0, 3.0, 5.0, 7.0, 10.0 and thereafter at the rate of 3m intervals to 40m.</td>
</tr>
</tbody>
</table>

4.1.5.2.3  The spacing between the levels of standard penetration testing and next undisturbed sampling shall not be less than 1.0m. Equipment, accessories and procedures for conducting the test and for the collection of the disturbed soil samples shall conform to IS: 2131.

4.1.5.2.4  The test shall be carried out by driving a standard split spoon sampler in the borehole by means of a 650N hammer having a free fall of 0.75 m. The sampler shall be driven using the hammer for 450mm recording the number of blows for every 150mm. The number of blows for the last 300mm drive shall be reported as N value.
4.1.5.2.5 This test shall be discontinued when the blow count is equal to 100 or the penetration is less than 25 mm for 50 blows. At the level where the test is discontinued, the number of blows and the corresponding penetration shall be reported. Sufficient quantity of disturbed soil samples shall be collected from the split spoon sampler for identification and laboratory testing. The sample shall be visually classified and recorded at the site as well as properly preserved without loss of moisture content and labeled.

4.1.5.3 Sampling

4.1.5.3.1 General

a) Sufficient number of soil samples shall be collected. Disturbed soil samples shall be collected identification and for conducting tests such as sieve analysis, Index properties, specific gravity, chemical analysis, etc. Undisturbed samples shall be collected to estimate the physical, bearing capacity and settlement properties of the soil.

b) All accessories and sampling methods shall conform to IS: 2132. All disturbed and undisturbed samples collected in the field shall be classified at site as per IS: 1498.

c) All samples shall be identified with date, borehole or test pit number, depth of sampling etc. The top surface of the sample in-situ shall also be marked. Care shall be taken to keep the core and box samples vertical, with the mark directing upwards. The tube samples shall be properly trimmed at one end and suitably capped and sealed with molten paraffin wax. The Contractor shall be responsible for packing, storing in a cool place and transporting all the samples from the site to the laboratory within seven days after sampling with proper protection against loss and damage.

4.1.5.3.2 Distributed Samples

a) Disturbed soil samples shall be collected in boreholes at regular intervals. Jar samples weighing approximately 1 kg shall be collected at 0.5 m intervals starting from a depth of 0.5m below ground level, and at every identifiable change of strata to supplement the boring records. Samples shall be stored immediately in airtight jars which shall be filled to capacity as much as possible.

b) In designated borrow areas, bulk samples, from a depth of about 0.5m below ground level, shall be collected to establish the required properties for use as a fill material. Disturbed samples weighing about 25 kg shall be collected at shallow depths and immediately stored in polyethylene bags as per IS:1892. The bags shall be sealed properly to preserve the natural
moisture content of the sample and placed in wooden boxes for transportation.

**4.1.5.3.3 Undistributed Samples**

4.1.5.3.3.1 In each borehole undisturbed samples shall be collected at every change of strata and at depths as follows:

<table>
<thead>
<tr>
<th>Location</th>
<th>Depths (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal soils</td>
<td>1.0, 4.0, 7.0</td>
</tr>
<tr>
<td>River crossings and special locations</td>
<td>1.0, 4.0, 7.0, 11.0 and thereafter at</td>
</tr>
<tr>
<td></td>
<td>the rate of 3m intervals to 38m.</td>
</tr>
</tbody>
</table>

4.1.5.3.3.2 The spacing between the top levels of undisturbed sampling and standard penetration testing shall not be less than 1.0 m. Undisturbed samples shall be of 100 mm diameter and 450 mm in length. Samples shall be collected in a manner to preserve the structure and moisture content of the soil. Accessories and sampling procedures shall conform to IS: 1892 and IS:2132:

a) **Undistributed sampling in cohesive soil**

Undisturbed samples in soft to stiff cohesive soils shall be obtained using a thin walled sampler. In order to reduce the wall friction, suitable precautions, such as oiling the surfaces, shall be taken. The sampling tube shall have a smooth finish on both surfaces and a minimum effective length of 450 mm. The area ratio of sampling tubes shall be less than 12.5%. However, in case of very stiff soils, areas ratio upto 20% shall be permitted.

b) **Undistributed sampling in very loose, saturated, sandy and silty soils and very soft clays**

Samples shall be obtained using a piston sampler consisting of a cylinder and piston system. In soft clays and silty clays, with water standing in the casing pipe, piston sampler shall be used to collect undisturbed samples in the presence of expert supervision.

Accurate measurements of the sampling depth, dimensions of sampler, stroke and length of sample recovery shall be recorded. After the sampler is pushed to the required depth, the cylinder and piston system shall be drawn up together, preventing disturbance and changes in moisture content of the sample.
c) Undistributed sampling in cohesionless soils
Undisturbed samples in cohesionless soils shall be obtained in accordance with IS: 8763. Sampler, operated by compressed air, shall be used to sample cohesionless soils below ground water table.

4.1.5.4 Ground Water

4.1.5.4.1 One of the following methods shall be adopted for determining the elevation of ground water table in boreholes as per IS: 6935 and the instructions of the Owner.

a) In permeable soils, the water level in the borehole shall be allowed to stabilize after depressing it adequately by bailing before recording its level. Stability of sides and bottom of the borehole shall be ensured at all times.

b) For both permeable and impermeable soils, the following method shall be suitable. The borehole shall be filled with water and then bailed out to various depths. Observations on the rise or fall of water level shall be made at each depth. The level at which neither fall nor rise is observed shall be considered the water table elevation and confirmed by three successive readings of water level taken at two hours interval.

4.1.5.4.2 If any variation of the ground water level is observed in any specific boreholes, the water level in these boreholes shall be recorded during the course of the field investigation. Levels in nearby wells, streams, etc. if any, shall also be noted in parallel.

4.1.5.4.3 Subsoil Water Samples (only at special locations)

a) Subsoil water samples shall be collected for performing chemical analysis. Representative ground water samples shall be collected when first encountered in boreholes and before the addition of water to aid boring or drilling.

b) Chemical analysis of water samples shall include determination of pH value, turbidity sulphate, carbonate, nitrate and chloride contents, presence of organic matter and suspended solids. Chemical preservatives may be added to the sample for cases as specified in the test methods or in applicable Indian Standards. This shall only be done if analysis cannot be conducted within an hour of collection and shall have the prior written permission and approval of the Owner.

4.1.5.5 Dynamic Cone Penetration Test (Only at Special Locations)
Dynamic cone penetration test shall be conducted to predict stratification, density, bearing capacity of granular soils, etc. The test shall be conducted to the specified depth or refusal, whichever comes first. Refusal shall be recorded when the blow count exceeds 150 for 300 mm penetration. Equipment, accessories, test
procedures, field observations and reporting of results shall conform to IS:4968, Part-II. The driving system shall comprise of a 65 Kg. Weight having a free fall of 0.75m. The cone shall be of 65mm diameter provided with vents for continuous flow of bentonite slurry through the cone and rods in order to avoid friction between the rods and soil. On completion of the test the results shall be presented as a continuous record of the number of blows required for every 300 mm penetration of the cone into the soil in a suitable chart supplemented by a graphical plot of blow count for 300 mm penetration vs. depth. On completion of the test, the results shall be presented on the proforma approved by the Owner.

4.1.5.6 Vane Shear Test (required for boreholes where UDS is not possible) (Only at Special Locations)

Field vane shear test shall be performed inside the borehole to determine the shear strength and bearing capacity of cohesive soils. Equipment, accessories, test procedures, field observations shall correspond to IS:4434. Tests may also be conducted by direct penetration from ground surface. If the cuttings at the test depth in the borehole show any presence of gravel, sand, shells, decomposed wood etc. which are likely to influence the test results substantially, the test at that particular depth may be omitted with the permission of the Owner. However, the test shall be conducted at a depth where these obstructions cease to occur. On completion of the test, the results shall be reported in an approved proforma as specified in IS:4434, Appendix A.

4.1.6 Field Investigation for Rock

4.1.6.1 Rock Drilling

4.1.6.1.1 If, during the investigation, large hard fragments or natural rock beds are encountered, work shall proceed with core drilling methods. The equipment and procedures for this operation shall conform to IS:1892. The starting depth of drilling in rock shall be certified by the Owner. At the end of the investigation, the hole drilled in rock shall be backfilled with grout consisting of 1 part cement and 3 parts sand by weight.

4.1.6.1.2 Drilling shall be carried out with NX size tungsten carbide (TC) or diamond tipped drill bits, depending on the type of rock and according to IS:6926. Suitable type of drill bit (TC/Diamond) and core catchers shall be used to ensure continuous and good core recovery. Core barrels and core catchers shall be used for breaking off the core and retaining it when the rods are withdrawn. Double tube core barrels shall be used to ensure better core recovery and to retrieve cores from layers of bedrock. Water shall be circulated continuously in the hollow rods and the sludge conveying the rock cuttings to the surface shall be collected. A very high core recovery ratio shall be aimed at in order to obtain a satisfactory undisturbed sample. Attempt shall be made to recover cores of 1.5m in length. Normally TC
bit shall be aimed at in order to obtain a satisfactory undisturbed sample. Attempt shall be made to recover cores of 1.5 m in length. Normally TC bit shall be used. Change over to a diamond bit shall require the specific written approval of the Owner and his decision as to whether a TC or a diamond bit is to be used shall be final and binding on Contractor.

4.1.6.1.3 No drilling run shall exceed 1.5m in depth. If the core recovery is less than 80% in any run, the length of the subsequent run shall be reduced to 0.75m. During drilling operations observations on return water, rate of penetration, etc. shall be made, recorded and reported as per IS:5313.

a) The colour of return water at regular intervals, the depth at which any change of colour of return water is observed, the depth of occurrence and amount of flow of water, if encountered, shall be recorded.

b) The depth through which a uniform rate of penetration was maintained, the depth at which marked change in rate of penetration or sudden fall or drill rod occurs, the depth at which any blockage of drill bit causing core loss, if any, shall be recorded.

c) Any heavy vibration or torque noticed during the drilling should be recorded together with the depth of occurrence.

d) Special conditions like the depth at which grouting was done during drilling, presence of artesian conditions, loss of drilling fluid, observations of gas discharge with return water, etc. shall also be observed and recorded.

e) All the observations and other details shall be recorded as per daily drill and reported in a proforma as given in IS:5313, Appendix A.

4.1.6.2 Core Sampling

4.1.6.2.1 Core samples shall be extracted by the application of a continuous pressure at one end of the core with the barrel held horizontally without vibration. Friable cores shall be extracted from the barrel directly into a suitably sized half round plastic channel section. Care shall be taken to extrude the samples in the direction of coring to avoid stress reversal.

4.1.6.2.2 Immediately after withdrawal from the core barrel, the cores shall be placed in a tray and transferred to boxes specially prepared for this purpose. The boxes shall be made from seasoned timber or any other durable material and shall be indexed on top of the lid according to IS:4078. The cores shall be numbered serially and arranged in the boxes in a sequential order. The description of the core samples shall be recorded as instructed in IS:4464. Where no core is recovered, it shall be recorded as specified in the standard. Continuous record of core recovery and rock
quality designation (RQD) are to be mentioned in the borelog in accordance with IS:11315(Part-II).

4.1.7 Laboratory testing

4.1.7.1 Essential Requirements

a) Depending on the types of substrata encountered, appropriate laboratory tests shall be conducted on soil and rock samples collected in the field. Laboratory tests shall be scheduled and performed by qualified and experienced personnel who are thoroughly conversant with the work. Tests indicated in the schedule of items shall be performed on soil, water and rock samples as per relevant IS codes. One copy of all laboratory test data records shall be submitted to Owner progressively every week. Laboratory tests shall be carried out concurrently with the field investigations as initial laboratory test results could be useful in planning the later stages of field work. A schedule of laboratory tests shall be established by Contractor to the satisfaction of the Owner within one week of completion of the first borehole.

b) Laboratory tests shall be conducted using approved apparatus complying with the requirements and specifications of Indian Standards or other approved standards for this type of work. It shall be checked that the apparatus are in good working condition before starting the laboratory tests. Calibration of all the instruments and their accessories shall be done carefully and precisely at an approved laboratory.

c) All samples, whether undisturbed or disturbed, shall be extracted, prepared and examined by competent personnel properly trained and experienced in soil sampling, examination, testing and in using the apparatus in conformance with the specified standards.

d) Undisturbed soil samples retained in liners or seamless tube samplers shall be removed, without causing any disturbance to the samples, using suitably designed extruders just prior to actual testing. If the extruder is horizontal, proper support shall be provided to prevent the sample from breaking. For screw tube extruders, the pushing head shall be free from the screw shaft so that no torque is applied to the soil sample in contact with the pushing head. For soft clay samples, the sample tube shall be cut by means of a high speed hacksaw to proper test length and placed over the mould before pushing the sample into it with a suitable piston.

e) While extracting a sample from a liner or tube, care shall be taken to assure that its direction of movement is the same as that during sampling to avoid stress reversal.
4.1.7.2 Tests

4.1.7.2.1 Tests, as indicated in these specifications and as may be requested by the Owner, shall be conducted. These tests shall include but may not be limited to the following:

a) Tests of undistributed and distributed samples:
   - Visual and engineering classification;
   - Sieve analysis and hydrometric analysis;
   - Liquid, plastic and shrinkage limits
   - Specific gravity
   - Chemical analysis;
   - Swell pressure and free swell index determination
   - Proctor compaction test.

b) Tests of undistributed samples:
   - Bulk density and moisture content;
   - Relative density (for sand),
   - Unconfined compression test;
   - Box shear test (for sand);
   - Triaxial shear tests (depending on the type of soil and field conditions on undisturbed or remoulded samples):
     i) unconsolidated undrained;
     ii) consolidated drained test;
     - Consolidation

c) Tests on rock samples:
   - Visual classification;
   - Moisture content, porosity and density;
   - Specific gravity,
   - Hardness.
   - Stake durability;
   - Unconfined compression test (both saturated and at in-situ water content);
   - Point load strength index;
   - Deformability test (both saturated and dry samples).

d) Chemical analysis of sub soil water.

4.1.7.3 Salient Test Requirements

a) Triaxial shear tests shall be conducted on undisturbed soil samples, saturated by the application of back pressure. Only if the water table is at sufficient depth so that chances of its rising to the base of the footing are small or nil, the triaxial tests shall be performed on specimens at natural moisture content. Each test shall be carried out on a set of three test
specimens from one sample at cell pressures equal to 100, 200 and 300 kPa respectively or as required depending on the soil conditions.

b) Direct shear test shall be conducted on undisturbed soil samples. The three normal vertical stresses for each test shall be 100, 200 and 300 kPa or as required for the soil conditions.

c) Consolidation test shall have loading stages of 10, 25, 50, 75, 100, 200, 400 and 800 kPa. Rebound curve shaft be recorded for all samples by unloading the specimen at its in-situ stress. Additional rebound curves shall also be recorded wherever desired by the Owner.

d) Chemical analysis of subsoil shaft include determination of pH value, carbonate, sulphate (both SO3 and SO4), chloride and nitrate contents, organic matter, salinity and any other chemicals which may be harmful to the foundation material. Their contents in the soil shall be indicated as percentage (%).

e) Chemical analysis of subsoil water samples shall include the determination of properties such as colour, odour, turbidity, pH value and specific conductivity, the last two at 250°C, and chemical contents such as carbonates, sulphates (both SO3 and SO4), chlorides, nitrates, organic matter and any other chemical harmful to the foundation material. The chemical contents shall be indicated as parts per million (ppm) based on weight.

4.1.8 Geotechnical Investigation Report

4.1.8.1 General

a) Contractor shall submit a formal report containing geological information of the region, procedures adopted for geotechnical investigation, field observations, summarized test data, conclusions and recommendations. The report shall also include detailed borelogs, sub-soil sections, field test results, laboratory observations and test results both in tabular as well as graphical form, practical and theoretical considerations for the interpretation of test results, supporting calculations for the conclusions drawn, etc. Initially, Contractor shall submit three copies of the report in draft form for Owner’s review.

b) Contractor’s Geotechnical engineer shall visit Owner’s Site Office for a detailed review based on Owner’s comments in order to discuss the nature of modifications, if any, to be done in the draft report. Contractor shall incorporate in the report the agreed modifications and resubmit the revised draft report for approval. Ten copies of the detailed final approved report
shall be submitted to Owner together with one set of reproducible of the
graphs, tables, etc.

c) The detailed final report based on field observations, in-situ and laboratory
tests shall encompass theoretical as well as practical considerations for
foundations for different types of structures as discussed in Clause 4.2.

4.1.8.2 Data to be furnished

4.1.8.2.1 The report shall also include the following

a) A plot plant / location plan showing the locations and reduced levels of all
field tests e.g. boreholes, trial pits, static cone penetration tests, dynamic
cone penetration tests, etc. properly drawn to scale and dimensioned with
reference to the established grid lines;

b) A true cross section of all individual boreholes and test pits with reduced
levels and coordinates showing the classification and thickness of individual
stratum, position of ground water table, various in-situ tests conducted,
samples collected at different depths and the rock stratum, if encountered.

c) Geological information of the area including geomorphology, geological
structure, lithology, stratigraphy and tectonics, core recovery and rock
quality designation (RQD), etc.;

d) Observations and data regarding change of course of rivers, velocity, scour
depths, slit factor, etc. and history of flood details for mid stream and river
bank locations;

e) Past observations and historical data, if available, for the area or for other
areas with similar soil profile, or with similar structures in the surrounding
areas;

f) Plot of Standard Penetration Test (uncorrected and corrected N values) with
depth for each test site;

g) Results of all laboratory tests summarized according to Table 4.0 (i) for
each sample as well as (ii) for each layer, along with all the relevant charts,
tables, graphs, figures, supporting calculations, conclusions and
photographs of representative rock cores.

h) For all triaxial shear tests, stress vs strain diagrams as well as Mohr’s circle
envelopes shall be furnished. If back pressure is applied for saturation, the
magnitude of the same shall be indicated. The value of modulus of
elasticity (E) shall be furnished for all tests along with relevant calculations;
i) For all consolidation tests, the following curves shall be furnished
   i) $e$ vs $\log p$
   ii) $e$ vs $p$
   iii) Compression vs $\log t$ or vs $t$

   depending upon the shape of the plot, for proper determination of
   coefficient of consolidation.

   The point showing the initial condition ($e_0$, $p_0$) of the soil shall be marked
   on the curves.

j) The procedure adopted for calculating the compression index from the field
   curve and settlement of soil strata shall be clearly specified. The time
   required for 50% and 90% primary consolidation along with secondary
   settlements, if significant, shall also be calculated.
TABLE 4.0
SUMMARY OF RESULTS OF LABORATORY TESTS ON SOIL AND WATER SAMPLES

1. Bore hole test pit no.
2. Depth (m)
3. Type of sample
4. Density (kg/m3)
   a) Bulk
   b) Dry
5. Water content (％)
6. Particle size (％)
   a) Gravel
   b) Sand
   c) Silt
   d) Clay
7. Consistency properties
   a) LL
   b) PL
   c) PI
   d) LI
8. Soil
   a) Classification – IS
   b) Description
   c) Specific gravity
9. Strength test
   a) Type
   b) c (Cohesion)
   c) F (angle of internal friction)
10. Consolidation test
    a) $e_0$
    b) $P_c$
    c) $C_ε$
    d) DP
    e) $M_v$
    f) $C_v$
11. Shrinkage limit (％)
12. Swell test
   a) S. Pr
   b) FS
13. Relative Density (%)
15. R.L. of the existing ground level of the location
16. Remarks

Notations:
I. For Type of sample
   DB Disturbed bulk soil sample
   DP Disturbed SPT soil sample
   DS Disturbed samples from cutting edge of undisturbed soil sample
   RM Remoulded soil sample
   UB Undisturbed block soil sample
   US Undisturbed soil sample by sampler
   W Water sample
II. For Strength Test
   SCPT Static Cone Penetration Test
   UCC Unconfined Compression Test
   VST Vane Shear Test
   Tuu Unconsolidated Undrained triaxial Test
   Note: Replace T by D for Direct Shear Test
   Tod Consolidated Drained Triaxial Test
III. For others
   LL Liquid Limit (%)
   PL Plastic Limit (%)
   PI Plasticity index (%)
   LI Liquidity index (%)
   c Cohesion (kPa)
   F Angle of Internal Friction (degrees)
   S.Pr. Swelling Pressure (kPa)
   e₀ Initial Void Ratio
   Pᵣ Reconsolidation Pressure (kPa)
   Cₑ Compression Index
   DP Change in Pressure (kPa)
   Mₑ Coefficient of Volume Compressibility (m²/kN)
   Cᵥ Coefficient of Consolidation (m²/hr)

IV. For Chemical Test
   As per Specifications – Clause 4.1.8.4

4.1.8.3 Recommendations

4.1.8.3.1 Recommendations shall be provided for each tower location duly considering soil
  type and tower spotting data. The recommendations shall provide all design
parameters and considerations required for proper selection, dimensioning and future performance of tower foundations, as discussed in part but not limited to Clause 4.2 of these Specifications and the following:

a) The subsurface material must provide safe bearing capacity and uplift resistance by incorporating appropriate safety factors specified in Clause 4.2 all the while experiencing small deformations throughout, thereby avoiding rupture under ultimate loads.

b) Movement of the foundation, including short and long term components under transient and permanent loading, shall be strictly controlled with regard to settlement, uplift, lateral translation and rotation;

c) Co-efficient of permeability of various sub soil and rock strata based on in-situ permeability tests.

Core resistance, frictional resistance, total resistance, relation between core resistance, Standard Penetration Test N value, and settlement analysis for different sizes of foundation based on static cone penetration test.

d) For shallow foundation the following shall be indicated with comprehensive supporting calculations:

i) Net safe allowable bearing pressure for isolated square footing of sizes 2.0, 3.0 and 4.0m at three different founding depths of 1, 2 and 3 m below ground level considering both shear failure and settlement criteria, giving reasons for type of shear failure adopted in the calculation.

ii) Net safe allowable bearing pressure for raft foundations of widths greater than 5 m at 2.0, 3.0 and 4.0 m below ground level considering both shear failure and settlement criteria.

iii) Rate and magnitude of settlement expected of the structure.

iv) Net safe bearing capacity for foundation sizes mentioned in para (i) above, modulus of subgrade reaction, modulus of elasticity from plate load test results along with time settlement curves and load settlement curve in both natural and log graph, variation of Modulus of subgrade reaction with size, shape and depth of foundation.

e) The stable slopes for shallow and deep excavations, active and passive earth pressure at rest and angle of repose or sandy soils shall be furnished. The loading of the foundation shall not compromise the stability of the surrounding subsurface materials and the stability of the foundation shall be ensured against sliding or overturning.
f) Depending on the subsurface material, water table level and tower type, either reinforced concrete isolated pad and chimney, cast-in-situ bored pile or special foundations shall be installed at a given location as discussed in Clause 4.2.

g) Net safe allowable bearing pressure and uplift resistance shall be provided for the various sizes of isolated square footings founded at various depths below ground level considering both shear failure and movement criteria; rate and magnitude of movement expected of the structure (settlement, uplift, rotation) shall also be given;

h) In cases where normal open cast/pile foundations appear to be impractical special pile foundations shall be given due consideration along with the following:

i) Type of pile foundation and reasons for recommending the same duly considering the soil characteristics,

ii) Suitable founding strata for the pile.

iii) Estimated length of pile for 500, 750 and 1000KN and 4500KN capacities; end bearing and frictional resistance shall be indicated separately.

iv) Magnitude of negative skin friction or uplift forces due to soil swelling.

i) Where the subsoil water and soil properties are found to be chemically aggressive, Contractor shall take suitable precautions during construction including any protective coating to be applied on the foundations; susceptibility of soil to termite action and remedial measures for the same shall be dealt with;

j) Suitability of locally available soils at site for filling, backfilling and adequate compaction shall be investigated;

k) If expansive soil such as black cotton soil is encountered recommendation of removal or retainment of the same shall be given; in the latter case, detailed specifications of special requirements shall also be given;

l) Susceptibility of subsoil strata to liquefaction in the event of earthquake and remedial measures, if required, shall be considered.
m) Any other information of special significance such as dewatering schemes, etc. which may have a bearing on the design and construction shall be provided.

n) Recommendations for additional soil investigations, beyond the scope of the present work, shall be given if Contractor considers such investigations necessary.

4.1.8.4 Hydrogeological Conditions

4.1.8.4.1 The maximum elevation of ground water table, amplitudes of its fluctuations and data on water aggressivity with regard to foundation structure materials shall be reported. While preparing ground water characteristics the following parameters should be specified for each aquifer:

a) bicarbonate alkalinity mg - eq/(degr),

b) pH value;

c) content of aggressive carbon dioxide, mg/l;

d) Content of magnesia salts, mg/l, recalculated in terms of ions Mg^{2+}

e) Content of ammonia salts, mg/l, recalculated in terms of ions NH^{3+}

f) Content of caustic alkalis, mg/l, recalculated in terms of ions Na^+ and K^+

g) Contents of chlorides, mg/l recalculated in terms of ions Cl^-

h) Contents of sulphates, mg/l, recalculated in terms of ions SO_{4}^{2-}

i) Aggregate content of chlorides, sulphates, nitrates, carbonates and other salts, mg/l.

4.1.9 Rates and Measurements

4.1.9.1 Rates

The Contractor’s quoted rates shall be inclusive of making observations, establishing the ground level and coordinates at the location of each borehole, test pit etc. No extra payments shall be made for conducting Standard Penetration Test, collecting, packing, transporting of all samples and cores, recording and submittal of results on approved formats.

4.1.9.2 Measurements
Certain tests have to be conducted in bore holes or test pits etc. Such, boreholes, test pits, etc. shall be measured only once for payment regardless of the number of tests carried out.

4.1.10 Specific Requirements for Geotechnical Investigation at River Crossings

4.1.10.1 The entire soil investigation work shall be carried out in accordance with the relevant parts of the specifications for geotechnical investigation modified to the extent given below.

4.1.10.2 Requirements

4.1.10.2.1 Bore holes shall be executed to the specified depth at locations as per Cl.No.4.1.5.1.1 of this specification.

4.1.10.2.2 Laboratory testing shall be conducted on all soil samples to determine grain size distribution, liquid limit and plastic limit of the different soil strata encountered.

4.1.10.2.3 Geotechnical Report must furnish the following:

a) Geotechnical investigation scheme;

b) Bore-logs indicating soil stratification, with IS classification sampling details and SPT ‘N’ values;

c) Soil cross-sections along various boreholes in two orthogonal directions indicating soil stratification based on field and laboratory tests;

d) Grain size distribution curves;

e) IS classification of soils;

f) Shear test(UU) to be done on saturated soil samples;

g) Bearing capacity of soil at different levels;

h) Scouring depth of river, (with supporting calculations as per IS reference);

i) Highest flood level (H.F.L.);

j) Recommendations regarding type of foundation to be adopted at the location.

k) R.L. of existing ground level at the proposed location.

l) Maximum/average velocity of water.
4.1.11 Special Terms and Conditions for Geotechnical Investigation in the River Bed

4.1.11.1 Contractor is required to mobilize a suitable arrangement (floating pontoon, plant, equipment etc.) to carry out geotechnical investigation work in creek/river locations identified by the Owner.

4.1.11.2 In the event of storm or stoppage of work etc., Contractor shall not be paid extra for mobilization/remobilization of floating pontoon, plant, equipment, etc.

4.1.11.3 Contractor shall fully satisfy himself about the conditions of creek/river (depth of water, wave currents, wind conditions, etc.) prevailing in the area of proposed investigation and plan the necessary tools and plant to be deployed before quoting. Any claim resulting from lack of data collection in this respect shall not be entertained.

4.1.11.4 Contractor shall make his own arrangements for locating the bed level and no payment shall be made for lowering the casing in water.

4.1.11.5 Boring in creek or river shall be payable only below the bed level and no payment shall be made for lowering the casing in water.

4.1.11.6 Contractor shall arrange for necessary transportation on water (e.g. motor boat) to facilitate the supervision of work by officials of Owner at its own cost.

4.1.11.7 Full details of the construction plant, proposed working method for boring and sampling in water shall be submitted along with the Tender.

4.1.11.8 The unit rate quoted for underwater boring shall include complete work required as per specification and no separate payment shall be made on any account.

4.1.12 Schedule of Quantities for Geotechnical Investigation including Laboratory Testing

4.1.12.1 The Bidder’s specific attention is drawn to Clause 4.1.9 it will be understood that the Bidder has fully studied the specification and Clause 4.1.9 in particular prior to bidding.

4.1.12.2 All quantities given in the specification are tentative and subject to change. Payment shall be made at quoted rates for actual quantities of work executed as approved by the Owner.

4.1.12.3 The provisional number of testing location are furnished in respective Schedule of Quantities.

4.2 Foundations
4.2.1 General

4.2.1.1 Foundation includes supply of materials such as cement, sand, coarse aggregate and reinforcement steel etc.

4.2.1.2 Based on the tower loading data supplied by the Owner, foundations shall be designed by the Contractor for all tower types & their extensions and for all foundations classification as described in Clause 4.2.2.

4.2.2 Classification of Foundations

The foundation classification shall depend upon the type of soil, sub-soil water level and the presence of surface water which have been classified as follows:

4.2.2.1 Normal Dry

To be used for locations where normal dry cohesive or non-cohesive soils are met.

4.2.2.2 Sandy Dry Soil

To be used for locations where cohesionless pure sand or negligible cohesion sand mixed with soil are met in dry condition.

4.2.2.3 Wet

To be used for locations:

a) Where sub-soil water is met at 1.5 metres or more below the ground level.

b) Which are in surface water for long periods with water penetration not exceeding one meter below the ground level e.g. the paddy fields.

4.2.2.4 Partially Submerged

To be used at locations where sub-soil water table is met between 0.75 meter to 1.5 meter below the ground level.

4.2.2.5 Fully Submerged

To be used at locations where sub-soil water table is met at less than 0.75 metre below the ground level.

4.2.2.6 Black Cotton Soil

To be used at locations where soil is clayey type, not necessarily black in colour, which shrinks when dry and swells when wet, resulting in differential movement.
For designing foundations, for such locations, the soil is to be considered submerged in nature.

4.2.7  **Fissured Rock**

To be used at locations where decomposed or fissured rock, hard gravel, kankar, limestone, laterite or any other soil of similar nature is met. Under cut type foundation is to be used for fissured rock locations.

In case of fissured rock locations, where water table is met at 1.5 meter or more below ground level, wet fissured rock foundations shall be adopted. In case of dry locations, dry fissured rock foundation shall be adopted.

4.2.8  **Hard Rock**

The locations where chiseling, drilling and blasting is required for excavation, Hard Rock type foundations are to be used. For these locations, rock anchoring is to be provided to resist uplift forces. For design purpose, rock level shall be considered at ground level and no over burden soil weight shall be considered for resisting the uplift.

4.2.9 Where soil is complete in nature, classification of foundation shall be according to the type of soil predominant in the footing.

4.2.10 In addition to the above, depending on the site conditions, other types of foundations shall also be provided to the Contractor suitable for intermediate conditions under the above classifications to effect more economy and Contractor should construct these foundation at the same unit rate of excavation, concreting and reinforcement as for other foundation.

4.2.11 The proposal for these types of foundations shall be submitted by the Contractor based on the detailed soil investigation and approval for the same shall be obtained from the Owner.

4.2.3  **Type of Foundations**

The open cast foundations i.e. slab and chimney type (max. depth of foundation 3.0 meters) design and working drawing of all type of foundations for all type of towers shall be developed by successful bidder based on tower loading data supplied by the Owner. Also open cast foundation, if required, for river crossing towers shall be designed and developed by the Contractor.

4.2.4  **Soil Investigation**
The Contractor shall undertake soil investigation, as per clause 4.1 at tower locations as approved by the Owner. The provisional number of testing locations are furnished in Schedule of prices. Unit rates for the same are to be furnished by the Bidder in appropriate Schedules of Price, for adjustment purpose with actual quantities required for soil-testing.

4.2.5 Properties of Concrete

4.2.5.1 For open cast type foundation

The cement concrete used for the foundations shall be of grade M-15 corresponding to 1:2:4 nominal mix ratio with 20mm coarse aggregate for chimney portion and 40mm aggregate for pyramid or slab portion. All the properties of concrete regarding its strength under compression tension, shear, punching and bend etc. as well as workmanship will conform to IS:456.

4.2.5.2

(a) The Portland Cement used in concrete shall conform to 33 grade (IS:269) or 43 grade (IS:8112) or 53 grade (IS:12269).

(b) The Puzzolena Cement used in concrete shall conform to IS:1489. The curing time of Puzzolena cement will be decided at the time of execution of the work under the contract based on the certificate from a reputed laboratory which will be obtained and submitted by the Contractor.

4.2.5.3 Concrete aggregates shall conform to IS: 383.

4.2.5.4 The water used for mixing concrete shall be fresh, clean and free from oil, acids and alkalies, organic materials or other deleterious substances. Potable water is generally preferred.

4.2.5.5 Reinforcement shall conform to IS:432 for M.S.bars and hard drawn steel wires and to IS:1139 and IS:1786 for deformed and cold twisted bards respectively. All reinforcement shall be clean and free from loose mill scales, dust, loose rust and coats of paint, oil or other coatings, which may destroy or reduce bond. Contractor shall supply fabricate and place reinforcement to shapes and dimensions as indicated or as required to carry out the intent of drawings and specifications.

4.3 Design of Foundations

Design of all types of foundations shall be developed by the Contractor based on tower loading data supplied by the Owner and soil investigation carried out by him.
The provision quantities of excavation, concreting and reinforcement steel required for the project are furnished in the Schedule of Prices in BPS. The indicative shape of foundation are also enclosed in this specification.

4.3.1 Unit Rates and Measurement for Foundation

4.3.1.1 The Bidder is required to quote the unit rates, for different foundation activity namely, excavation for different types of soil, concreting, and placement of reinforcement and stub setting in the relevant Price Schedule.

4.3.1.2 The unit rates of excavation for each type of soil shall include excavation along with all associated activities like shoring, shuttering, dewatering till completion of foundation work stock piling, dressing, back filling of foundations after concreting with excavated/borrowed earth (irrespective of lead) and consolidation of earth, carriage of surplus earth to the suitable point of disposal as required by the Owner or any other activity related to completion of foundation work.

The payment for this item shall be made on the basis of design excavation volume arrived at considering dimension of pit leaving 150 mm gap around (except for under cut foundations) the base pad or actually excavated whichever is less and the unit rate of this item is indicated in Letter of Award. However, where soil is of composite in nature, classification of foundation shall be according to the type of soil predominant in the footing. The payment for excavation shall be made as per actual type of soil encountered at the time of excavation, but the total payment for excavation portion shall not exceed the amount as payable for excavation considering the Owner, shall be final and binding with respect to classification of soil and foundations.

4.3.1.3 Form boxes shall be used for casting of foundations. The unit rate of concreting shall include the cost of supply, fabrication and placement of form boxes, cement, water, coarse and fine aggregates, mixing and placing concrete, curing of concrete and any other activities related to completion of concreting work of foundation. The payment for this item shall be made as per the actual volumes of concreting but limited to design volume based on unit rates for items indicated in letter of award.

4.3.1.4 The unit rate of reinforcement steel placement shall include supply and placement of reinforcement steel, stirrups, wire for binding the reinforcement chairs, bolsters and spacers etc. as required to complete the foundation work. The measurement of steel for payment shall be made on the calculation based on the calculated weight of reinforcement steel as per relevant Indian Standard actually used in Tonnes corrected to third place of decimals as calculated weight of steel as design / working drawing whichever is less. No allowance will be made for wastage.

4.4 Construction of Tower Foundation, Stub Setting and Earthing

4.4.1 General
Design of tower foundations is treated in Clause 4.2 and 4.3 and the required geotechnical investigation and geotechnical investigation report in Clause 4.1. The Contractor shall furnish soil resistivity values to the Owner along the line alignment.

4.4.2 Excavation

4.4.2.1 Excavation work must not be started until the final tower schedule and profile has been approved by the Owner.

4.4.2.2 Except as specifically otherwise provided, all excavation for footings shall be made to the lines and grades of the foundations. For estimation purposes, the excavation wall shall be vertical and the pit dimensions shall be based on an assumed clearance of 150 mm on all sides of the foundation pad. For footings without undercut, this clearance will actually be established in practice for facilitating work. For footings with undercut, no such clearance will be allowed. All excavation shall be protected so as to maintain a clean subgrade and provide worker safety until the footing is placed, using timbering, shoring, dewatering etc. as approved by Owner. Contractor shall especially avoid disturbing the bearing surface of the pad. Any sand, mud, silt or other undesirable materials which may accumulate in the excavated pit or borehole shall be removed by Contractor before placing concrete.

4.4.2.3 The soil to be excavated for tower foundations shall be classified as follows depending on the physical state of the soil at the time of excavation irrespective of the type of foundations to be installed.

a) Normal Dry Soil

Soil removable by means of a spade and shovel. Excavation done in dry soil for wet, partially submerged, fully submerged and wet black cotton type of foundations shall also be covered under this.

b) Wet Soil

Where the subsoil water table is encountered within the range of foundation depth or/and where pumping or bailing out of water is required due to presence of surface water shall be treated as wet soil. The portion of soil below the level of sub-soil water table upto the foundation depth shall only be treated as wet soil. The excavation done in wet soil for partially submerged, fully submerged and black cotton type of foundation shall also be covered under this.

c) Dry Fissured Rock
Limestone, laterite, hard conglomerate or other soft or fissured rock which can be quarried or split with crow bars, wedges or pickaxes. However, if required, light blasting may be resorted to for loosening the material, but this will not in any way entitle the material to be classified as hard rock.

d) **Wet Fissured Rock**

Above fissured rock, when encountered with sub soil water within the range of foundation depth or land where pumping or bailing out of water is required, shall be treated as wet fissured rock.

e) **Hard Rock**

Any rock excavation, other than specified under fissured rock above, for which blasting, drilling, chiseling are required. The unit rate quoted for hard rock excavation shall be inclusive of all costs for such drilling (including drilling required for anchoring), chiselling and blasting, etc.

4.4.2.4 Where soil is composite in nature, classification of foundation shall be according to the type of soil predominant in the footing.

4.4.2.5 No extra charge shall be allowed for the removal of fallen earth into a pit or borehole once excavated. Shoring and shuttering /timbering as approved by Owner shall be provided by the Contractor when the soil condition is so bad that there is likelihood of accident due to the falling of earth.

4.4.2.6 Where rock is encountered, the holes for tower footings, shall preferably be drilled. Blasting where restored to as an economy measure, it shall be done with the utmost care to minimize the use of concrete for filling the blasted area. Even in cases where unnecessary large quantities are excavated/blasted, resulting in placement of large volume of concrete, payment to the Contractor shall be limited to quantities as per foundation working drawing only. All necessary precautions for handling and use of blasting material shall be taken.

4.4.2.7 The Contractor shall supply requisite blasting material and be responsible for its storage and use.

4.4.2.8 Indian Standard IS:3764 shall be followed regarding safety of excavation work.

4.4.3 **Setting of Stubs**

4.4.3.1 For all towers the Contractor shall submit for approval the proposed method for setting of stubs.

4.4.3.2 The stubs shall be set correctly and precisely in accordance with approved method at the exact location, alignment and levels with the help of stub setting templates.
and leveling instruments. Stubs shall be set in the presence of Owner’s representative for which adequate advance intimation shall be given to Owner by Contractor.

4.4.3.3 Setting of stub at each location shall be approved by Owner.

4.4.4 Stub Setting Templates

4.4.4.1 Stub setting template shall be provided to the Contractor by the Owner for all types of towers with or without extension. Stub templates for standard towers and tower with extension upto +6M shall be of adjustable type. For towers with body extension beyond +6M, separate stub setting template shall be used. The stub templates shall be painted.

4.4.4.2 One set of each type of stub setting template shall be supplied to the Contractor & the contractor will provide the prop in case of special tower. If the Owner feels that more templates are required for timely completion of a particular line or due to some urgency, the same shall also be provided to the Contractor.

4.4.4.3 On completion of the project all the templates issued to the Contractor are to be returned to the Owner at a place decided by the Engineer.

4.4.4.4 In case the template issued to Contractor is damaged /lost /stolen, recovery shall be made from the Contractor's bill at the rate specified in clause 5.13.6.

4.4.5 Mixing, Placing and Compacting of Concrete

4.4.5.1 The Concrete shall be mixed in the mechanical mixer. However, in case of difficult terrain, hand mixing may be permitted at the discretion of Owner. The water for mixing concrete shall be fresh, clean and free from oil, acids and alkalies. Saltish or brackish water shall not be used.

4.4.5.2 Mixing shall be continued until there is uniform distribution of material and the mix is uniform in colour and consistency, but in no case the mixing be carried out for less than two minutes. Normal mixing shall be done close to the foundation, but exceptionally the concrete may be mixed at the nearest convenient place. The concrete shall be transported from the place of mixing to the place of final deposit as rapidly as practicable by methods which shall prevent the segregation or loss of any ingredient. The concrete shall be placed and compacted before setting commences.

4.4.5.3 To avoid the possibility of reinforcement rods being exposed due to unevenness of the bottom of the excavated pit, a paid of lean concrete 50 mm thick and corresponding to a 1:3:6 nominal mix shall be provided at the bottom of the pad.
4.4.5.4 Form boxes shall be used for casting all types of foundations except at an undercut interface for which the adjoining subsurface material shall provide adequate support.

4.4.5.5 The concrete shall be laid down in 150 mm layers and consolidated well so that the cement cream works, up to the top and no honey-combing occurs in the concrete. A mechanical vibrator shall be employed for compacting the concrete. However, in case of difficult terrain, manual compaction may be permitted at the discretion of the Owner. Monolithic casting of foundations must be carried out. However, in case of unavoidable circumstances, a key construction joint can be provided at the chimney-paid interface subject to approval of the Owner. After concreting the chimney portion to the required height, the top surface should be finished smooth with a slight slope towards the outer edge for draining rain water. However, nothing extra shall be paid to the Contractor for providing such construction joint.

4.4.5.6 Wet locations shall be kept completely dewatered, both during and 24 hours after placing the concrete, without disturbance of the concrete.

4.4.5.7 If the concrete surface is found to be defective after the form work has been removed, the damage shall be repaired with a rich cement sand mortar to the satisfaction of the Owner before the foundation is back filled.

4.4.6 Backfilling and removal of Stub Templates

4.4.6.1 After opening of form work and removal of shoring, timbering, etc., backfilling shall be started after repairs, if any, to the foundation concrete. Backfilling shall normally be done with the excavated soil, unless it is a clay type or it consists of large boulders/stones, in which case the boulders shall be broken to a maximum size of 80 mm. After locations where borrowed earth is required for backfilling, Contractor shall bear the cost, irrespective of lead.

4.4.6.2 The backfilling materials shall be clean and free from organic or other foreign materials. A clay type soil with a grain size distribution of 50% or more passing the # 200 sieve as well as a black cotton soil are unacceptable for backfilling. The earth shall be deposited in maximum 200 mm layers, leveled, wetted if necessary and compacted properly before another layer is deposited. The moisture content for compaction shall be based on the Proctor compaction test results given in the geotechnical Report, Clause 4.1. The density of the compacted backfill material may further be verified to the satisfaction of the Owner based on the sand-cone method described in the ASTM D1556-82 standard.

4.4.6.3 The backfilling and grading shall be carried to an elevation of about 75 mm above the finished ground level to drain out water. After backfilling 50 mm high, earthen embankment (band) will be made along the sides of excavation pits and sufficient water will be poured in the backfilling earth for at least 24 hours. After the pits
have been backfilled to full depth, the stub template/props, as the case may be, can be removed.

4.4.7 Curing

The concrete shall be cured by maintaining the concrete wet for a period of at least 10 days after placing. Once the concrete has set for 24 hours, the pit may be backfilled with selected moistened soil and well consolidated in layers not exceeding 200 mm thickness and thereafter both the backfill earth and exposed chimney shall be kept wet for the remainder of the prescribed 10 days. The exposed concrete chimney shall also be kept wet by wrapping empty cement bags around it and wetting the bags continuously during the critical 10 days period.

4.4.8 Benching

When the line passes through hilly/undulated terrain, leveling the ground may be required for casting of tower footings. All such activities shall be termed benching and shall include cutting of excess earth and removing the same to a suitable point of disposal as required by Owner. Benching shall be resorted to only after approval from Owner. Volume of the earth to be cut shall be measured before cutting and approved by Owner for payment purposes. Further to minimize benching, unequal leg extensions shall be considered and provided if economical. The proposal shall be submitted by the Contractor with detailed justification to the Owner.

4.4.9 Protection of Tower Footing

4.4.9.1 Tower spotting shall endeavour to minimize the quantity of revetment required.

4.4.9.2 The work shall include all necessary stone revetments, concreting and earth filling above ground level, the clearing from site of all surplus excavated soil, special measures for protection of foundation close to or in nala, river bed undulated terrain, etc., including suitable revetment or galvanized wire netting and meshing packed with boulders. The top cover of stone revetment shall be sealed with M-15 concrete (1:2:4 mix). Contractor shall recommend protection at such locations wherever required. Details of protection of tower footing are given in drawing enclosed with these specifications for reference purpose only.

4.4.9.3 Tower footings shall generally be backfilled using soil excavated at site unless deemed unsuitable for backfilling. In the latter case, backfilling shall be done with borrowed earth of suitable quality irrespective of lead. The unit rate for backfilling quoted in the BPS shall include the required lead and consolidation and leveling of earth after back-filling.

4.4.9.4 The provisional quantities for protection work of foundations are furnished in Schedule of Quantities as well as in Price Schedule. The unit rates shall also be applicable for actual quantities of protection works done. These unit rates shall
4.4.9.5 The unit rates for random rubble masonry revetment quoted in BPS shall also include excavation, (1:6) random masonry. Unit rate for top sealing with M-15 concrete is given separately.

For payment purposes, the volume of random rubble masonry revetment shall be measured from bottom lean concrete to top sealing coat and paid at the quoted rates indicated in BPS. No extra rates shall be paid for allied work such as excavation, for revetment, packed stone at head of weep holes etc. However, no deduction shall be made for the volume enclosed by weep holes. The locations where both benching and protection of tower footing are envisaged, an economy got to be established against providing unequal leg extension.

4.4.9.6 For some of the locations i.e. nalas, river bed or undulated terrain etc. nominal size boulder of minimum dimension bounded and packed in galvanized wire net/mesh of 8 SWG wire 152 Sq mesh are to be provided. These stone shall be provided in crates size of 2.0 m x 2.0 m or as deemed suitable for a particular location. Measurement shall be taken in cubic meter and 15% deduction will be made for voids from cage/stack measurement.

5.0 Tower Erection, Stringing and Installation of Line Materials

5.1 General

5.1.1 The scope of erection work shall include the cost of all labour, tools and plants such as tension stringing equipment and all other incidental expenses in connection with erection and stringing work. The Bidders shall indicate in the offer the sets and capacity of stringing equipment he would deploy exclusively for this transmission line package. Stringing equipment sets shall be sufficient capacity to string single ZEBRA conductor.

5.1.2 The Contractor shall be responsible for transportation to site all the materials to be provided by the Contractor as well as proper storage and preservation of the same at his own cost, till such time the erected line is taken over by the Owner. Similarly, the Contractor shall be responsible for transportation, proper storage, safe custody, and loss or damage of all Owner’s supplied items for incorporation in the lines and shall maintain and render proper account of all such materials at all times. The Contractor shall reimburse the cost of any of the materials lost or damaged during storage and erection.

5.1.3 Contractor shall set up required number of stores along the line and the exact location of such stores shall be discussed and agreed upon with the Owner. Owner supplied items shall be issued to the Contractor from the Respective Stores of the
Owner. From these Stores of the Owner, unloading, loading and transportation to
his stores and / or site shall be the entire responsibility of the Contractor.

5.1.4 Payment for stringing shall be done on the basis of per kilometer, and irrespective
of number of tension/suspension towers. However, stringing for river crossing
spans have been given separately in schedule of quantities.

5.2 Treatment of Minor Galvanisation Damage

Minor defects in hot-dip galvanized members shall be repaired by applying zinc
rich primer and two coats of enamel paint to the satisfaction of the Owner before
erection.

5.3 Assembly

The Contractor shall give complete details of the erection procedures he proposes
to follow.

5.3.1 The method for the erection of towers shall ensure the following:

a) Straining of the members shall not be permitted for positioning. It may,
   however, be necessary to match hole positions at joints using tommy bars
   not more than 450 mm in length;

b) Prior to erection of an upper section, the lower section shall be completely
   braced, and all bolts provided tightened adequately in accordance with
   approved drawings to prevent any mishap during tower erection;

c) All plan diagonals relevant section of tower shall be in place prior to
   assembly of an upper section;

d) The bolt positions in assembled towers shall be as per IS-5613 (Part
   II/Section 2);

e) Tower shall be fitted with number, danger and phase plates as well as anti
   climbing device, as described;

f) After complete erection of the tower, all blank holes, if any, are to be filled
   by bolts and nuts of correct size.

5.4 Tightening of Bolts and Nuts

5.4.1 All nuts shall be tightened properly using correct size spanner and torque wrench.
Before tightening, it will be verified that filler washers and Plates are placed in
relevant gap between members, bolts of proper size and length are inserted, and one
spring washer is inserted under each nut. In case of step bolts, spring washers shall
be placed under the outer nuts. The tightening shall progressively be carried out from the top downwards, care being taken that all bolts at every level are tightened simultaneously. The threads of bolts projecting outside the nuts shall be punched at their position on the diameter to ensure that the nuts are not loosened in course of time. If during tightening a nut is found to be slipping or running over the bolt threads, the bolt together with the nut shall be replaced.

5.4.2 The threads of all the bolts projected outside the nuts shall be welded at two diametrically opposite places, the circular length of each welding shall be at least 10 mm. The welding shall be provided from ground level to waist level for single circuit towers and to bottom cross arm for double circuit towers. However, for river crossing towers, the welding shall be provided from ground level to 30 m height from stub level. After welding, one coat of zinc rich primer and two coats of enamel paint shall be applied to the welded portion to the satisfaction of the Owner. Before application of zinc rich primer the welded portion shall be cleaned properly with steel wire brush. The cost of welding and paint, including application of paint shall be deemed to be included in the erection price.

5.5 Insulator Hoisting

‘I’ suspension insulator strings shall be used on Suspension towers (A) and tension insulator strings on angle and dead end towers. These shall be fixed on all the towers just prior to the stringing. Damaged insulators and fittings, if any, shall not be employed in the assemblies. Prior to hoisting, all insulators shall be cleaned in a manner that will not spoil, injure or scratch the surface of the insulator, but in no case shall any oil be used for that purpose. Corona control rings/arcing horn shall be fitted in an approved manner. Torque wrench shall be used for fixing various line materials and components, such as suspension clamp for conductor and earthwire, etc. whenever recommended by the manufacturer of the same.

5.6 Handling of Conductor and Earthwire

5.6.1 Running Out of the Conductors

5.6.1.1 The Contractor shall be entirely responsible for any damage to the tower or conductors during stringing. The conductors shall be run out of the drums from the top in order to avoid damage.

5.6.1.2 A suitable braking device shall be provided to avoid damaging, loose running out and kinking of the conductors. Care shall be taken that the conductors do not touch and rub against the ground or objects which could scratch or damage the strands.

5.6.1.3 The sequence of running out shall be from the top down, i.e. the earthwire shall be run out first, followed in succession by the conductors. Unbalanced loads on
towers shall be avoided as far as possible. Inner phase of line conductors shall be strung before the stringing of the outer phases is taken up.

5.6.1.4 The Contractor shall take adequate steps to prevent clashing of subconductors until installation of the spacers/spacer dampers. Care shall be taken that subconductors of a bundle are from the same Contractor and preferably from the same batch so that creep behaviour of subconductors remains identical. During sagging, care shall be taken to eliminate differential sag in sub-conductors as far as possible. However, in no case shall sag mismatch be more than 25 mm.

5.6.1.5 Towers not designed for not sided stringing shall be well guyed and steps taken by the Contractor to avoid damage. Guying proposal along with necessary calculations shall be submitted by the Contractor to Owner for approval. All expenditure related to this work is deemed to be included in the bid and no extra payment shall be made for the same.

5.6.1.6 When this transmission line runs parallel to existing energized powerlines, the Contractor shall take adequate safety precautions to protect personnel from the potentially dangerous voltage build up due to electromagnetic and electrostatic coupling in the pulling wire, conductors and earthwire during stringing operations.

5.6.1.7 The Contractor shall also take adequate safety precautions to protect personnel from potentially dangerous voltage build up due to distant electrical storms.

5.6.2 Running Blocks

5.6.2.1 The groove of the running blocks shall be of such a design that the seat is semicircular and larger than the diameter of the conductor/earthwire and it does not slip over or rub against the slides. The grooves shall be lined with hard rubber or neoprene to avoid damage to conductor and shall be mounted on properly lubricated bearings.

5.6.2.2 The running blocks shall be suspended in a manner to suit the design of the cross-arm. All running blocks, especially those at the tensioning end, will be fitted, on the cross-arms with jute cloth wrapped over the steel work and under the slings to avoid damage to the slings as well as to the protective surface finish of the steel work.

5.6.3 Repairs to Conductors

5.6.3.1 The conductor shall be continuously observed for loose or broken strands or any other damage during the running out operations.

5.6.3.2 Repairs to conductors, if necessary, shall be carried out with repair sleeves.
5.6.3.3 Repairing of the conductor surface shall be carried out only in case of minor damage, scuff marks, etc. The final conductor surface shall be clean, smooth and free from projections, sharp points, cuts, abrasions, etc.

5.6.3.4 The Contractor shall be entirely responsible for any damage to the towers during stringing.

5.6.4 Crossings

Derricks or other equivalent methods ensuring that normal services need not be interrupted nor damage caused to properly shall be used during stringing operations where roads, channels, telecommunication lines, powerlines and railway lines have to be crossed. However, shut down shall be obtained when working at crossings of overhead powerlines. The Contractor shall be entirely responsible for the proper handling of the conductor, earthwire and accessories in the field.

5.7 Stringing of Conductor and Earthwire

5.7.1 The stringing of the conductor shall be done by the standard stringing method.

5.7.2 The Bidder shall give complete details of the stringing methods he proposes to follow. Prior to stringing, the Contractor shall submit the stringing charts for the conductor and earthwire showing the initial and final sags and tension for various temperatures and spans, along with equivalent spans in the lines for the approval of the Owner.

5.7.3 A controlled stringing method suitable for simultaneous stringing of the subconductors shall be used. The two conductors making up one phase bundle shall be pulled in and paid out simultaneously. These conductors shall be matched length.

Conductors or earthwire shall not be allowed to hang in the stringing blocks for more than 96 hours before being pulled to the specified sag.

Conductors creep are to be compensated by over tensioning the conductor at a temperature of 26°C lower than the ambient temperature or by using the initial sag and tensions indicated in the tables.

5.8 Jointing

5.8.1 When approaching the end of a drum length, at least three coils shall be left in place when the stringing operations are stopped. These coils are to be removed carefully, and if another length is required to be run out, a joint shall be made as per the recommendations of the accessories manufacturer.
5.8.2 Conductor splices shall not crack or otherwise be susceptible to damage in the stringing operation. The Contractor shall use only such equipment/methods during conductor stringing which ensures complete compliance in this regard.

5.8.3 All the joints on the conductor and earthwire shall be of the compression type, in accordance with the recommendations of the manufacturer, for which all necessary tools and equipment like compressors, dies, etc. shall be obtained by the Contractor. Each part of the joint shall be cleaned by wire brush till it is free of rust or dirt, etc. and be properly greased with anti-corrosive compound. If required and as recommended by the manufacturer, before the final compression is carried out with the compressors.

5.8.4 All the joints or splices shall be made at least 30 meters away from the tower structures. No joints or splices shall be made in spans crossing over main roads, railways and small river tension spans. Not more than one joint per subconductor per span shall be allowed. The compression type fittings shall be of the self centring type or care shall be taken to mark the conductors to indicate when the fitting is centered properly. During compression or splicing operation; the conductor shall be handled in such a manner as to prevent lateral or vertical bearing against the dies. After compressing the joint, the aluminium sleeve shall have all corners rounded, burrs and sharp edges removed and smoothened.

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

5.9 **Tensioning and Sagging Operations**

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

5.9.2 The sag will be checked in the first and the last section span for sections up to eight spans, and in one additional intermediate span for sections with more than eight spans. The sag shall also be checked when the conductors have been drawn up and transferred from running blocks to the insulator clamps.

5.9.3 The running blocks, when suspended from the transmission structure for sagging, shall be so adjusted that the conductors on running blocks will be the same height as the suspension clamp to which it is to be secured.
5.9.4  At sharp vertical angles, conductor and earthwire sags and tensions shall be checked for equality on both sides of the angle and running block. The suspension insulator assemblies will normally assume verticality when the conductor is clamped.

5.9.5  Tensioning and sagging operations shall be carried out in calm weather when rapid changes in temperature are not likely to occur.

5.10  Clipping In

5.10.1  Clipping of conductors in to position shall be done in accordance with the manufacturer's recommendations.

5.10.2  Jumper at section and angle towers shall be formed to parabolic shape to ensure maximum clearance requirements. Pilot suspension insulator string shall be used, if found necessary, to restrict jumper swing to design values.

5.10.3  Fasteners in all fittings and accessories shall be secured in position. The security clip shall be properly opened and sprung in position.

5.11  Fixing of Conductors and Earthwire Accessories

Conductor and earthwire accessories including vibration dampers supplied by the Owner shall be installed by the Contractor as per the design requirements and manufacturer's instruction within 24 hours of the conductor / earthwire clamping. While installing the conductor and earthwire accessories, proper care shall be taken to ensure that the surfaces are clean and smooth and that no damage occurs to any part of the accessories or of the conductors.

5.12  Replacement

If any replacements are to be effected after stringing and tensioning or during maintenance, leg members and bracings shall not be removed without first reducing the tension on the tower by proper guying techniques or releasing of the conductor. For replacement of cross arms, the conductor shall be suitably tied to the tower at tension points or transferred to suitable roller pulleys at suspension points.

5.13  Permitted Extra Consumption of Owner Supplied Materials

5.13.1  The Contractor shall be supplied with conductor and earthwire as per the following norms:

Quantity of conductor = line length as per detailed survey X 6 phases

Quantity of earthwire = line length as per detailed survey
5.13.2 The Contractor shall make every effort to minimize breakage, losses and wastage of the line materials during erection. However, the Contractor shall be permitted an extra consumption of Owner supplied materials up to the limits specified in Table 5.1 and shall be permitted to dispose of the scrap, if any, at their end.

**Table 5.1: Permitted extra consumption of Owner supplied materials**

<table>
<thead>
<tr>
<th>Item</th>
<th>% of permitted extra consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conductor</td>
<td>1</td>
</tr>
<tr>
<td>Insulators</td>
<td>1</td>
</tr>
<tr>
<td>Earthwire</td>
<td>1</td>
</tr>
<tr>
<td>Hardware fittings</td>
<td>1</td>
</tr>
<tr>
<td>Conductor / Earthwire Accessories</td>
<td>1</td>
</tr>
</tbody>
</table>

5.13.3 In case of conductor / earthwire the permitted extra consumption limit of one percent is inclusive of sag, jumpering, damage, loss and wastage etc.

5.13.4 The Contractor shall not be required to return to the Owner empty conductor or earthwire drums and shall dispose off the same at his cost.

5.13.5 Any conductor / earthwire drum which has been opened by the Contractor shall not be taken back by Owner and the unused conductor / earthwire in such drums may be treated as wastage permissible within the overall limits specified in Table 5.1.

5.13.6 The Contractor shall return to the Owner all Owner supplied material not incorporated in the works, except those permitted by Owner as wastage in terms of Table 5.1. Otherwise, the Contractor shall pay in respect of such excess materials which he is unable to return, at rates corresponding to actual cost of procurement plus 50% thereof.

The "Cost of Procurement" for the above purpose shall be FOR destination site cost of Owner supplied material plus taxes & duties plus various (if positive) applicable as on the date of issuance of TOC.

5.14 **Final Checking, Testing and Commissioning**

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

a) Sufficient backfilled earth covers each foundation pit and is adequately compacted;
b) Concrete chimneys and their copings are in good condition and finely shaped;

c) All tower members are used strictly according to the Structural Drawings and are free of any defect or damage whatsoever;

d) All bolts are properly tightened, punched, tack welded and zinc rich primer (one coat) and two coats of enamel paint is to be applied to the satisfaction of Owner;

e) The stringing of the conductors and earthwire has been done as per the approved sag and tension charts and desired clearances are clearly available;

f) All conductor and earthwire accessories are properly installed;

g) All other requirements for completion of works such as fixing of danger plate, phase plate, number plate, circuit plate, anticlimbing device, aviation signal have been fulfilled;

h) Wherever required, that proper revetment (erosion protection) is provided;

i) The original tracings of profile and route alignment are submitted to the Owner for reference and record and the original copies of structural drawings, bill of material of all towers (given to the Contractor for execution of work) are returned back to the Owner;

j) The insulation of the line as a whole is tested by the Contractor through provision of his own equipment, labour, etc. to the satisfaction of the Owner;

k) All towers are properly grounded;

l) The line is tested satisfactorily for commissioning purpose.

6.0 Special Towers for River Crossings

6.1 General

Special towers shall be used for major river crossing having very long spans and as otherwise required for these lines. These towers including their foundations if open cast), soil testing, tower erections and stringing shall form the part of the Contractor's scope.

The river crossing tower shall be Double Circuit with one ground wire.

6.2 Design and drawing of Special Tower
6.2.1 The structural drawing and bill of materials for complete river crossing tower including stub / base plate and anchor bolts, ladder, platforms etc. shall be provide to the successful bidder.

6.2.2 For anchoring of major river crossing towers, Anchor (C-Type dead end tower) tower shall be used as mentioned in clause 3.2.1.

6.3 Foundation Designs

The design of foundation for river crossing locations (open cast type or pile type) shall be done by the Contractor based on tower loading data supplied by the Owner and soil investigation carried out by him.

6.4 Earthing of River Crossing Towers

Galvanised earthing strip of Flat 50X6mm is to be provided in two legs of tower for each location. Proper arrangement of connecting these strips by 16mm bolts shall be provided on the stub. Only bolted connection are allowed for connecting this strip to achieve desired length. Contractor shall submit the detailed drawing for approval of Owner before installation.

7.0 General Technical Conditions

7.1 General

The following provisions shall supplement all the detailed technical specifications and requirements brought out herein. The Contractor’s proposal shall be based on the use of material complying fully with the requirements specified herein.

7.2 Engineering Data

7.2.1 The furnishing of engineering data by the Contractor shall be in accordance with the Schedule as specified in the Technical specifications. The review of these data by the Owner will cover only general conformance of the data to the specifications and not a thorough review of all dimensions, quantities and details of the material, or items indicated or the accuracy of the information submitted. This review by the Owner shall not be considered by the Contractor, as limiting any or his responsibilities and liabilities for mistakes and deviations from the requirements, specified under these specifications.

7.2.2 All engineering data submitted by the Contractor after review by the Owner shall form part of the contract document.

7.3 Drawings
In addition to those stipulated in clause regarding drawings in GCC/SCC, the following also shall apply in respect of Contractor Drawings.

7.3.1 All drawings submitted by the Contractor including those submitted at the time of Bid shall be with sufficient detail to indicate the type, size, arrangement, dimensions, material description, Bill of Materials, weight of each component, break-up for packing and shipment, fixing arrangement required, the dimensions required for installation and any other information specifically requested in these specifications.

7.3.2 Each drawing submitted by the Contractor shall be clearly marked with the name of the Owner, the specification title, the specification number and the name of the work. All titles, notings, markings and writings on the drawing shall be in English. All the dimensions should be to the scale and in metric units.

7.3.3 The drawings submitted by the Contractor shall be reviewed by the Owner as far as practicable within 30 days and shall be modified by the Contractor if any modifications and/or corrections are required by the Owner. The Contractor shall incorporate such modifications and/or corrections and submit the final drawings for approval. Any delays arising out of failure by the Contractor to rectify the drawings in good time shall not alter the contract completion date.

7.3.4 The drawing submitted for approval to the Owner shall be in quadruplicate. One print of such drawings shall be returned to the Contractor by the Owner marked “approved / approved with corrections”. The Contractor shall thereupon furnish the Owner additional prints as may be required along with one reproducible in original of the drawings after incorporating all corrections.

7.3.5 The work shall be performed by the Contractor strictly in accordance with these drawings and no deviation shall be permitted without the written approval of the Owner, if so required.

7.3.6 All erection work under the scope of Contractor, prior to the approval of the drawings shall be at the Contractor’s risk. The Contractor may make any changes in the design which are necessary to conform to the provisions and intent of the Contract and such changes will again be subject to approval by the Owner.

7.3.7 The approval of the documents and drawings by the Owner shall mean that the Owner is satisfied that:

i. The Contractor has completed the part of the Works covered by the subject document (i.e. confirmation of progress of Work),

ii. The Works appear to comply with requirements of Specifications.
In no case the approval by the Owner of any document does imply compliance with all technical requirements nor the absence of errors in such documents.

If errors are discovered any time during the validity of the Contract, then the Contractor shall be responsible of their consequences.

7.3.8
The Owner may use a 35 mm microfilm system in processing drawings. All drawings shall be suitable for microfilming. Drawings which are not suitable for microfilming will not be accepted.

A copy of each drawing reviewed will be returned to the Contractor as stipulated herein.

7.3.9
Copies of drawings returned to the Contractor will be in the form of a print with the Owner's marking, or a print made from a microfilm of the marked up drawing.

7.3.10
The following is the general list of the documents and drawings that are to be approved by the Owner:

i) Work Schedule (Master Network) Plan.
ii) Sag Template.
iii) Detailed survey report and profile drawings showing ground clearance and tower locations.
iv) Tower schedule and foundation classification for individual tower locations.
v) Soil investigation report
vi) Foundation working drawings / excavation plan.
vii) Tower footing earthing drawing.
viii) Stringing procedure and stringing chart
ix) Tower accessories drawings like danger plate, number plate etc.
x) Quality Plan for site activities including Quality System.
xi) Sub vendor's approval etc.

7.3.11
All rights of the design for all types of towers including special towers developed by the Contractor shall be strictly reserved with the Owner only and all the designs/drawing/data sheets submitted by the Contractor from time to time after successful tower testing shall become the property of the Owner. Under no circumstances, the Contractor shall be allowed to use/offer above designs to any other authority without prior permission of the Owner. Any deviation to above is not acceptable and may be a cause of rejection of the Bid.

7.4
Packing

7.4.1
All the materials shall be suitably protected, coated, covered or boxed and created to prevent damage or deterioration during transit, handling and storage at site till
the time of erection. The Contractor shall be responsible for any loss or damage during transportation, handling and storage due to improper packing.

7.4.2 The Contractor shall include and provide for securely protecting and packing the materials so as to avoid loss or damage during transport by air, sea, rail and road.

7.4.3 All packing shall allow for easy removal and checking at site. Wherever necessary, proper arrangement for attaching slings for lifting shall be provided. All packages shall be clearly marked for with signs showing ‘up’ and ‘down’ on the sides of boxes, and handling and unpacking instructions as considered necessary. Special precaution shall be taken to prevent rusting of steel and iron parts during transit by sea.

7.4.4 The cases containing easily damageable materials shall be very carefully packed and marked with appropriate caution symbols i.e. fragile, handle with care, use no hook etc. wherever applicable.

8.0 DTL’s ENVIRONMENT AND SOCIAL POLICY AND ITS IMPLEMENTATION

8.1 Development and growth of mankind through Industrialisation and unwarranted use of natural resources has inflicted considerable impact on Environment and Society. As a result, Environment and Social issues have emerged as the focal point of global debate.

DTL activities by their inherent nature and flexibility have negligible impacts on environmental and social attributes. In order to address these issues and to match the rising expectations of a cleaner, safer and healthier environment, DTL has evolved its Environmental and Social Policy and Procedures (ESPP). The key principles of DTL Environmental and Social Policy are:

i) Avoidance of environmentally and socially sensitive areas while planning project activities.
ii) Minimisation of impacts when project activities occur in environmentally and socially sensitive areas.
iii) Mitigation of any unavoidable adverse impacts arising out of its projects.

8.2 Basic issues to be kept in mind while carrying out construction activities are to

i) Avoid socially sensitive areas with regard to human habitations and areas of cultural significance.
ii) Secure the interest of people affected by DTL projects.
iii) Involve local people affected by transmission line projects as per requirement and suitability.
iv) Consult affected people in decisions having implication to them if considered necessary.
v) Apply, efficient and safe technology/practices.
vi) Keep abreast of all potential dangers to people’s health, occupational safety and safety of environment and the respective mitigatory measures.

vii) Establish preventive mechanisms to guarantee safety.

viii) Mitigation measures in case of accidents.

ix) Avoid unwarranted cutting of trees in forest area.

8.3 While constructing the lines through forest stretches the contractor will provide alternate fuel to its employee e.g. working labours/supervisors etc. in order to avoid cutting of forest woods.

8.4 Contractor will ensure safety to the wild life, during working/camping near to the National Park.

8.5 Contractor during construction of lines in agricultural fields will ensure minimum damages to the crops, trees, bunds, irrigation etc. if the same is unavoidable, the decision of ENGG Incharge shall be final.

8.6 The waste/excess material/debris should be removed from the construction site including agricultural field, forest stretches, river etc. immediately after the construction work.

8.7 The contractor will ensure least disturbance to the hill slope and natural drainage so as to avoid soil erosion. Natural drainage in plain area if disturbed is to be trained to the satisfaction of ENGG Incharge.

8.8 As far as possible existing path/kutcha road/approach shall be used for the construction.

8.9 The contractor will ensure supply of stone chips/sand from authorised/approved quarry areas.

8.10 Proper documentation of above, if any.
## STANDARD FIELD QUALITY PLAN
FOR TRANSMISSION LINE PACKAGE

**Section: SURVEY & SOIL INVESTIGATION**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Component/Operation &amp; Description of Test</th>
<th>Sampling Plan with basis</th>
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<th>Testing Agency</th>
<th>Remarks</th>
<th>Check</th>
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</thead>
<tbody>
<tr>
<td>1.</td>
<td><strong>DETAILED SURVEY &amp; ALIGNMENT</strong></td>
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<tr>
<td>a)</td>
<td>Field Survey</td>
<td>100%</td>
<td>Route map &amp; measurement schedules</td>
<td>Contractor</td>
<td>Approved by DTL</td>
<td>B</td>
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<tr>
<td>b)</td>
<td>Plotting of Route</td>
<td>100%</td>
<td>Field book, DTL Technical Specification &amp; Geographical maps.</td>
<td>Contractor</td>
<td>Approved by DTL</td>
<td>B</td>
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<tr>
<td>c)</td>
<td>Profile Plotting</td>
<td>100%</td>
<td>Approved Sag template &amp; approved profile drawings.</td>
<td>Contractor</td>
<td>Approved by DTL</td>
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<tr>
<td>d)</td>
<td>Tower Spotting</td>
<td>100%</td>
<td>Tower Spotting Data &amp; DTL technical specification</td>
<td>Contractor</td>
<td>Approved by DTL</td>
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</tr>
<tr>
<td>e)</td>
<td>Tower Schedule</td>
<td>100%</td>
<td>Approved profile drawings &amp; route alignment.</td>
<td>Contractor</td>
<td>Approved by DTL</td>
<td>B</td>
</tr>
<tr>
<td>2.</td>
<td><strong>CHECK SURVEY</strong></td>
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<td>Bisecting of Angle/Accuracy of alignment</td>
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<td>Contractor</td>
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<tr>
<td>b)</td>
<td>Check for profile levels and electrical &amp; other clearances</td>
<td>100%</td>
<td>Approved profile drawings</td>
<td>Contractor</td>
<td>Approved by DTL</td>
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</tr>
<tr>
<td>c)</td>
<td>Check for span marking and lengths</td>
<td>100%</td>
<td>Approved profile drawings &amp; DTL technical specification</td>
<td>Contractor</td>
<td>Approved by DTL</td>
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</tr>
<tr>
<td>d)</td>
<td>Check for tower type and position as per site conditions</td>
<td>100%</td>
<td>Approved profile drawings &amp; DTL technical specification</td>
<td>Contractor</td>
<td>Approved by DTL</td>
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<tr>
<td>e)</td>
<td>Estimation of benching &amp; Revetment volumes (As per site conditions)</td>
<td>100%</td>
<td>Approved profile drawings &amp; DTL technical specification</td>
<td>Contractor</td>
<td>Approved by DTL</td>
<td>B</td>
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### STANDARD FIELD QUALITY PLAN
FOR TRANSMISSION LINE PACKAGE

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<tr>
<td>f)</td>
<td>Final profile &amp; tower schedule</td>
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<td>Approved profile drawings &amp; DTL technical specification</td>
<td>Contractor</td>
<td>Approval by DTL</td>
<td>B</td>
</tr>
</tbody>
</table>

#### 3. SOIL INVESTIGATION

**A) AT NORMAL LOCATIONS**

| i) | Borelog/ Trial pit | All other than angle, river crossing & special locations | DTL technical specification & relevant IS | Contractor/DTL approved lab. | Approval by DTL to witness for a min.25% of locations. | B     |
| ii) | Ground Water level | All other than angle, river crossing & special locations | DTL technical specification & relevant IS | Contractor | Approval by DTL to witness for a min.25% of locations | B     |
| iii) | Classification of foundations (based on soil classification, liquid limit, swell index & ground water level) | All other angle, river crossing & special locations | DTL technical specification & relevant IS | Contractor | Approval by DTL | B     |

**B) AT ANGLE TOWER LOCATIONS**

| i) | Borelog | All angle tower locations | DTL technical specification & relevant IS | Contractor/DTL approved lab | Approval by DTL | B     |
| ii) | Standard Penetration Test | All angle tower locations | DTL technical specification & relevant IS | Contractor | Approval by DTL | B     |
### SECTION-I VOLUME-II

#### DELHI TRANSCO LIMITED (Govt. of NCT of Delhi)

**STANDARD FIELD QUALITY PLAN FOR TRANSMISSION LINE PACKAGE**

**Surveys & Soil Investigation**

<table>
<thead>
<tr>
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<tr>
<td>iii)</td>
<td>Gradation All angle tower locations</td>
<td>DTL technical specification &amp; relevant IS</td>
<td>Contractor/DTL approved lab</td>
<td>Approval by DTL</td>
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<tr>
<td>iv)</td>
<td>Rock drilling wherever applicable All angle tower locations</td>
<td>DTL technical specification &amp; relevant IS</td>
<td>Contractor/DTL approved lab</td>
<td>Approval by DTL</td>
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<tr>
<td>v)</td>
<td>Chemical analysis of sub-soil All angle tower locations</td>
<td>DTL technical specification &amp; relevant IS</td>
<td>Contractor/DTL approved lab</td>
<td>Approval by DTL</td>
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<tr>
<td>vi)</td>
<td>Bearing Capacity All angle tower locations</td>
<td>DTL technical specification &amp; relevant IS</td>
<td>Contractor</td>
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<td>vii)</td>
<td>Classification of foundation All angle tower locations</td>
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<td>Contractor</td>
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</table>

C) **At River Crossing and Special Locations**

<table>
<thead>
<tr>
<th>Sl. No.</th>
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<td>Borelog At River Crossing &amp; Special Locations</td>
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<td>B</td>
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<tr>
<td>ii)</td>
<td>Standard Penetration Test At River Crossing &amp; Special Locations</td>
<td>DTL technical specification &amp; relevant IS</td>
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<td>B</td>
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<td>Gradation At River Crossing &amp; Special Locations</td>
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## STANDARD FIELD QUALITY PLAN
FOR TRANSMISSION LINE PACKAGE

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<td>v)</td>
<td>Ground Water level At River crossing &amp; special Locations</td>
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<td>vi)</td>
<td>Chemical Analysis of sub-soil At River Crossing &amp; Special Locations</td>
<td>DTL technical specification &amp; relevant IS</td>
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<td>vii)</td>
<td>Dynamic Cone Penetration Test At River Crossing &amp; Special Locations</td>
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<td>viii)</td>
<td>Vane Shear Test (Where USDA is not possible) At River Crossing &amp; Special Locations</td>
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<td>ix)</td>
<td>Bearing Capacity At River Crossing &amp; Special Locations</td>
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<tr>
<td>x)</td>
<td>Sourcing depth &amp; velocity of river At mid stream locations</td>
<td>DTL technical specification &amp; relevant IS</td>
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<td>xi)</td>
<td>Highest flood-level At mid stream locations</td>
<td>DTL technical specification &amp; relevant IS</td>
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<td>xii)</td>
<td>Classification of foundations At River crossing &amp; special locations</td>
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<td>D)</td>
<td>SOIL RESISTIVITY All locations</td>
<td>IS:2131, IS:2720 and DTL specifications</td>
<td>Contractor/DTL approved lab</td>
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### STANDARD FIELD QUALITY PLAN
FOR TRANSMISSION LINE PACKAGE

#### SECTION-I
FOR SURVEY & SOIL INVESTIGATION

<table>
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<tr>
<th>Sl. No.</th>
<th>Component/Operation &amp; Description of Test</th>
<th>Sampling Plan with basis</th>
<th>Ref. Document &amp; acceptance norm</th>
<th>Testing Agency</th>
<th>Remarks</th>
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<td>TEST ON SOIL AND ROCK ‘SAMPLES’</td>
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<td>a)</td>
<td>Tests on undisturbed and disturbed samples</td>
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<td>i)</td>
<td>Visual and Engineering Classifications</td>
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<td>Sieve Analysis and Hydrometer Analysis</td>
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<td>iii)</td>
<td>Liquid, plastic and Shrinkage limits</td>
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<td>v)</td>
<td>Chemical analysis</td>
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<td>Relative density (for sand)</td>
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<td>Unconfined compression test</td>
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<td>Box shear test (in case of sand)</td>
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<td>Triaxial shear Test</td>
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<td>Consolidated drained test</td>
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<td>c)</td>
<td>Consolidation</td>
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### Notes:
- All angle tower locations, river crossing and special locations
- IS:2131, IS:2720 & DTL specifications
- Contractor/DTL approved lab
- Approval by DTL

**Check:** B
## Section: SURVEY & SOIL INVESTIGATION

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Component/Operation &amp; Description of Test</th>
<th>Sampling Plan with basis</th>
<th>Ref. Document &amp; acceptance norm</th>
<th>Testing Agency</th>
<th>Remarks</th>
<th>Check</th>
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<td>c) i)</td>
<td>Tests on Rock Visual Classification</td>
<td>All angle tower locations, river crossing and special locations</td>
<td>IS:2131, IS:2720 &amp; DTL specifications</td>
<td>Contractor/DTL approved lab</td>
<td>Approval by DTL</td>
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<td></td>
<td>Moisture Content, Prorosity and density Specific Gravity Hardness Stake durability</td>
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<td>Contractor/DTL approved lab</td>
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<td>ii)</td>
<td>Unconfined compression test Point Load strength index Deformability test</td>
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<td>Contractor/DTL approved lab</td>
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<td>iii)</td>
<td>Chemical analysis of sub-soil water</td>
<td>All angle tower locations, river crossing and special location</td>
<td>IS:2131,IS:2720 &amp; DTL specifications</td>
<td>Contractor/DTL approved lab</td>
<td>Approval by DTL</td>
<td>B</td>
</tr>
</tbody>
</table>
### STANDARD FIELD QUALITY PLAN
FOR TRANSMISSION LINE PACKAGE

**SECTION: FOUNDATION MATERIALS**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Component/Operation &amp; Description of Test</th>
<th>Sampling Plan with basis</th>
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<th>Testing Agency</th>
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<td>CHECKING OF FOUNDATION MATERIALS</td>
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<td>A)</td>
<td>CEMENT</td>
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<td>Fitness</td>
<td>One sample per lot of 100MT or part thereof from each source for MTCs and one sample per lot of 200 MT or part thereof from each source for site testing</td>
<td>IS:456, IS:4031, IS:269, IS:8112, IS:12269, IS:1489 &amp; DTL specification</td>
<td>Manufacturer/ DTL approved lab</td>
<td>Review of manufacturers test certificates (MTCs) and laboratory test results by DTL</td>
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<tr>
<td>ii)</td>
<td>Compressive Strength</td>
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<td>iii)</td>
<td>Initial &amp; final setting time</td>
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<td>iv)</td>
<td>Soundness</td>
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<td>v)</td>
<td>Heat of Hydration for low, heat cement (Not Applicable for OPC &amp; PPC)</td>
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<td>vi)</td>
<td>Chemical Composition of Cement</td>
<td>One sample per lot of 100 MT or part thereof from each source for MTCs</td>
<td>IS:456, IS:4031, IS:269, IS:8112, IS:12269, IS:1489 &amp; DTL specification</td>
<td>Manufacturer</td>
<td>Review of manufacturers test certificates by DTL</td>
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<td>COARSE AGREGGATES</td>
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<tr>
<td>i)</td>
<td>Determination of Particle size (Sieve Analysis)</td>
<td>One sample per lot of 200 cubic meter or part thereof from each source for each size.</td>
<td>IS:383, IS:2386 and DTL specification</td>
<td>DTL approved lab</td>
<td>Each source to be approved by DTL Review and acceptance of test result by DTL</td>
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<td>ii)</td>
<td>Flakiness Index</td>
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<td>iii)</td>
<td>Crushing Value</td>
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<td>iv)</td>
<td>Specific Gravity*</td>
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<td>v)</td>
<td>Bulk Density*</td>
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<td>vi)</td>
<td>Absorption Value*</td>
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<td>vii)</td>
<td>Moisture Content*</td>
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<td>viii)</td>
<td>Soundness of Aggregate**</td>
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<td>ix)</td>
<td>Presence of deleterious materials</td>
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<td></td>
<td>**Applicable to concrete work subject to frost action</td>
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### STANDARD FIELD QUALITY PLAN
FOR TRANSMISSION LINE PACKAGE

#### SECTION-I

**FOUNDATION MATERIALS**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Component/Operation &amp; Description of Test</th>
<th>Sampling Plan with basis</th>
<th>Ref. Document &amp; acceptance norm</th>
<th>Testing Agency</th>
<th>Remarks Check</th>
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<tr>
<td>C) FINE AGGREGATE</td>
<td>i) Gradation/Determination of particle size (Sieve Analysis) Specific Gravity and density*</td>
<td>One sample per lot of 200 cubic meter or part thereof from each source</td>
<td>IS:383, IS:2386, IS:4031, IS:236, IS:456 and DTL specification</td>
<td>DTL approved lab</td>
<td>Each source to be approved by DTL Review and acceptance of test result by DTL</td>
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<td>ii)</td>
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<td>iii) Moisture Content*</td>
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<td>iv) Absorption Value*</td>
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<td>v) Builking*</td>
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<td>vi) Silt Content Test</td>
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<td>vii) Presence of deleterious materials</td>
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<tr>
<td>D) WATER</td>
<td>i) Cleanliness (Visual check)</td>
<td>100%</td>
<td>IS:456, IS:3205 and DTL specification. The water used for mixing concrete shall be fresh, clean and free from oil, acids and alkalies, organic materials, or other deleterious materials</td>
<td>Contractor</td>
<td>Each source to be approved by DTL</td>
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<td>ii) Suitability of water for RCC work</td>
<td>One sample per source</td>
<td>DTL specification, potable water is generally suitable for concreting.</td>
<td>Contractor</td>
<td>Certification regarding potability of water by contractor and approval by DTL</td>
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<td>iii) P. H. Value</td>
<td>One sample per source</td>
<td>IS:456, IS:3025 and DTL specification. Min.6 Max.8</td>
<td>DTL approved lab/Contractor</td>
<td>Approval by DTL</td>
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*Applicable to design mix concrete only. **Applicable to concrete work subject to frost action.
### Section: FOUNDATION MATERIALS

<table>
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<td>E.</td>
<td>REINFORCEMENT STEEL</td>
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<td>i)</td>
<td>Identification &amp; size</td>
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<td>IS:432, IS:1139, IS:1786 and DTL specification</td>
<td>Contractor</td>
<td>Approval by DTL</td>
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<td>ii)</td>
<td>Chemical Analysis Test</td>
<td>One sample per heat</td>
<td>IS:432, IS:1139, IS:1786 &amp; DTL specification</td>
<td>Manufacturer</td>
<td>Review of Manufacturer's test certificates by DTL</td>
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<td>iii)</td>
<td>Tensile Test</td>
<td>One sample per or part thereof for each size. of steel conforming to IS:1139 and 5 MT or part thereof for HDS wire for each size of steel as per IS:432. For steel as per IS:1786 under 10mm 1 sample for each 25 MT or part thereof. 10 mm-16mm 1 sample for each 35 MT or part thereof. Over 16 mm. 1 sample for each 45 Mt or part thereof.</td>
<td>IS:432, IS:1139, IS:1786 &amp; DTL specification</td>
<td>Manufacturer/DTL approved lab</td>
<td>Review of manufacturer's test certificates as well as lab test result by DTL</td>
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<td>iv)</td>
<td>Yield Stress/proof</td>
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<td>v)</td>
<td>Percentage Elongation</td>
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Section: **FOUNDATION MATERIALS**

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<th>Testing Agency</th>
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<td>vi)</td>
<td>Bend/Rebend Test</td>
<td>One sample per lot of 20MT or part thereof for each size of steel as per IS:432/IS:1139. For steel as per IS:1786 under 10mm sample for each 25 MT or part thereof. 10-16mm sample for each 35 MT or part thereof. Over 16mm sample for each 45 Mt or part thereof.</td>
<td>IS:432, IS:1139, IS:1786 &amp; DTL specification</td>
<td>Manufacturers/DTL approved lab</td>
<td>Review of manufacturers test certificates as well as lab test result by DTL.</td>
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<tr>
<td>vii)</td>
<td>Reverse Bend Test for HDS wire</td>
<td>One sample per lot of 5 MT or part thereof for each size</td>
<td>IS:432 DTL specification</td>
<td>Manufacturer/DTL approved lab</td>
<td>Review of manufacturers test certificates as well as lab test result by DTL.</td>
<td>B</td>
</tr>
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</table>

**F. EARTHING MATERIALS**

| i)     | Identification. Cleanliness & Galvanising effects | 100% | DTL approved drawing & specification | Contractor | Approval by DTL | C |
Section: **FOUNDATION**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Component/Operation &amp; Description of Test</th>
<th>Sampling Plan with basis</th>
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<td><strong>A) BEFORE EXCAVATION</strong></td>
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<td>i)</td>
<td>Checking of pegs condition as per line and alignment</td>
<td>100% on each location</td>
<td>IS:4019, IS:5613 &amp; DTL approved drawings/specifications</td>
<td>Contractor</td>
<td>Approval by DTL</td>
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<tr>
<td>ii)</td>
<td>Checking of pit making as per drawings &amp; RL</td>
<td>100% on each location</td>
<td>IS:4091, IS:5613 and DTL approved drawings/specification</td>
<td>Contractor</td>
<td>Approval by DTL</td>
</tr>
<tr>
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<td><strong>B) EXCAVATION</strong></td>
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<tr>
<td>i)</td>
<td>Dimension conformity</td>
<td>Each location</td>
<td>IS:4091, IS:5613 &amp; DTL approved drawings/specification</td>
<td>Contractor</td>
<td>Approval by DTL</td>
</tr>
<tr>
<td>ii)</td>
<td>Verticality &amp; Squareness of each pit</td>
<td>Each location</td>
<td>IS:4091, IS:5613 &amp; DTL approved drawings/specification</td>
<td>Joint Inspection by DTL and contractor</td>
<td>Approval by DTL</td>
</tr>
<tr>
<td>iii)</td>
<td>Verification of classification of foundation</td>
<td>Each location</td>
<td>IS:4091, IS:5613 &amp; DTL approved drawings/sections.</td>
<td>Joint Inspection by DTL and contractor</td>
<td>Approval by DTL</td>
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<td><strong>C. STUB &amp; TEMPLATE</strong></td>
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<tr>
<td>i)</td>
<td>Identification &amp; Assembly</td>
<td>100% on each location</td>
<td>DTL approved drawings/specification.</td>
<td>Joint Inspection by DTL and contractor</td>
<td>Approval/clearance by DTL</td>
</tr>
<tr>
<td>ii)</td>
<td>Template level, width &amp; diagonal</td>
<td>100% on each location</td>
<td>DTL approved drawings/specifications</td>
<td>Joint Inspection by DTL and contractor</td>
<td>Approval/clearance by DTL</td>
</tr>
<tr>
<td>iii)</td>
<td>Tightening of all bolts &amp; nuts of template, stubs &amp; cleats.</td>
<td>100% on each location.</td>
<td>DTL approved drawings/specification.</td>
<td>Joint Inspection by DTL and contractor</td>
<td>Approval/clearance by DTL</td>
</tr>
</tbody>
</table>
# STANDARD FIELD QUALITY PLAN

**FOR TRANSMISSION LINE PACKAGE**

## Section: FOUNDATION

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Component/Operation &amp; Description of Test</th>
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<td>iv)</td>
<td>Stub-setting</td>
<td>100% on each location.</td>
<td>DTL approved drawings/specification.</td>
<td>Joint inspection by DTL and contractor.</td>
<td>Approval/clearance by DTL.</td>
<td>B</td>
</tr>
<tr>
<td>D)</td>
<td>P.C.C.Padding</td>
<td>For all locations</td>
<td>IS:456 and DTL approved foundation drawings &amp; specification.</td>
<td>Joint inspection by DTL and contractor.</td>
<td>Approval by DTL.</td>
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<td>E)</td>
<td>STAGING FOR RAISED CHIMNEY</td>
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<td>i)</td>
<td>Check durability, strength &amp; soundness of staging, joints adequacy of its joints &amp; specific levels.</td>
<td>100%</td>
<td>DTL specification</td>
<td>Joint inspection by DTL and contractor.</td>
<td>Approval by DTL.</td>
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<td>F)</td>
<td>SHUTTERING(Form work)</td>
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<td>i)</td>
<td>Check for materials, breakage or damage</td>
<td>100%</td>
<td>DTL specification/approved drawings.</td>
<td>Joint inspection by DTL and contractor.</td>
<td>Approval by DTL.</td>
<td>C</td>
</tr>
<tr>
<td>ii)</td>
<td>Check for plumb alignment, parallelism, squareness and equidistance from stub.</td>
<td>100% before casting.</td>
<td>DTL specification/approved drawings.</td>
<td>Joint inspection by DTL and contractor.</td>
<td>Approval by DTL.</td>
<td>B</td>
</tr>
<tr>
<td>iii)</td>
<td>Dimensional check</td>
<td>100% before casting.</td>
<td>DTL specification/approved drawings.</td>
<td>Joint inspection by DTL and contractor.</td>
<td>Approval by DTL.</td>
<td>B</td>
</tr>
<tr>
<td>iv)</td>
<td>Check for level &amp; height</td>
<td>100% before casting</td>
<td>DTL specification/approved drawings.</td>
<td>Joint inspection by DTL and contractor</td>
<td>Approval by DTL.</td>
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</tbody>
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### STANDARD FIELD QUALITY PLAN
FOR TRANSMISSION LINE PACKAGE

#### Section: FOUNDATION

<table>
<thead>
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<th>Check</th>
</tr>
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<tbody>
<tr>
<td>v)</td>
<td>Check for rigidity of frame/tightness</td>
<td>100%</td>
<td>DTL specification/approved drawings</td>
<td>Joint Inspection by DTL and contractor</td>
<td>Approval by DTL</td>
<td>C</td>
</tr>
<tr>
<td>vi)</td>
<td>Cleaning and oiling</td>
<td>100%</td>
<td>DTL specification/approved drawings</td>
<td>Joint inspection by DTL and contractor</td>
<td>Approval by DTL</td>
<td>C</td>
</tr>
<tr>
<td>vii)</td>
<td>Diagonal bracing if required as per drawings/site conditions</td>
<td>100%</td>
<td>DTL specification/approved drawings</td>
<td>Joint Inspection by DTL and contractor</td>
<td>Approval by DTL</td>
<td>C</td>
</tr>
<tr>
<td>viii)</td>
<td>Checking of joints to avoid undue loss of cement slurry</td>
<td>100%</td>
<td>DTL specification/approved drawings</td>
<td>Joint inspection by DTL and contractor</td>
<td>Approval by DTL</td>
<td>C</td>
</tr>
</tbody>
</table>

#### G. PLACEMENT OF REINFORCEMENT STEEL

| i) | Check the steel bars for rust, cracks, surface flaws, laminate etc.(visual check) | 100% | IS:456 and DTL Specifications/approved drawings. | Joint inspection by DTL and contractor | Approval by DTL | C     |
| vii | Check as per the bar bending schedule before placement of concrete. | For all locations. | IS:456 and DTL Specification/approved drawings. | Joint inspection by DTL and contractor | Approval by DTL | B     |
| viii | Check cutting tolerance for bars as per check list/drawings.Check whether all the bent bars and lap lengths are as per approved bar bending schedule | For all locations | IS:4567 and DTL specification/approved drawings. | Joint inspection by DTL and contractor | Approval by DTL | B     |
### Section: FOUNDATION

#### FOR TRANSMISSION LINE PACKAGE

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<tbody>
<tr>
<td>iv)</td>
<td>Check whether at joints and crossing of bars are tied properly with right guage &amp; annealed wire as per specification</td>
<td>100%</td>
<td>IS:456 and DTL specification/approved drawings.</td>
<td>Joint inspection by DTL and contractor.</td>
<td>Approval by DTL</td>
<td>C</td>
</tr>
<tr>
<td>v)</td>
<td>Check for proper cover distance, spacing of bars, spacers and chairs after the reinforcement cage has been put inside the formwork</td>
<td>100%</td>
<td>IS:456 and DTL specification/approved drawings.</td>
<td>Joint inspection by DTL and contractor</td>
<td>Approval by DTL</td>
<td>C</td>
</tr>
<tr>
<td>vi)</td>
<td>Check whether lapping of bars are tied properly with right guage and annealed wire as per specification.</td>
<td>100%</td>
<td>IS:456 and DTL specification/approved drawings.</td>
<td>Joint inspection by DTL and contractor</td>
<td>Approval by DTL</td>
<td>B</td>
</tr>
</tbody>
</table>

#### H. PILE FOUNDATION (additional Tests) (for normal tower foundations)

| i)      | Checking of center line of pile group                                                                  | Each pile group          | IS:2911 & DTL approved pile foundation drawings/specification.                                  | Joint inspection by DTL and contractor.                                        | Checklist to be prepared and signed jointly. | B     |
| ii)     | Check pile location                                                                                     | Each pile                | IS:2911 & DTL approved pile foundation drawings/specification.                                  | Joint inspection by DTL and contractor.                                        | Checklist to be prepared and signed jointly. | B     |
| iii)    | Temporary casing tube & permanent liner also check thickness of liner material(if applicable)            | Each pile                | IS:2911 & DTL approved pile foundation drawings/specifications                                  | Joint inspection by DTL and contractor.                                        | Verticality of the tube to be checked.     | B     |
| iv)     | Bentonite slurry (if applicable)                                                                        | Each pile                | IS:2911 & DTL approved pile foundation drawings/specification.                                  | Joint inspection by DTL and contractor.                                        | Records to be kept by DTL for specific gravity of slurry | B     |
### Standard Field Quality Plan

**For Transmission Line Package**

**Section:** FOUNDATION

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<tr>
<td>v)</td>
<td>Pile depth, level, size and alignment</td>
<td>Each pile</td>
<td>IS:2911 &amp; DTL approved pile foundation drawings/specification.</td>
<td>Joint inspection by DTL and contractor.</td>
<td>Approval by DTL.</td>
<td>A</td>
</tr>
<tr>
<td>vi)</td>
<td>Clipping of pile head</td>
<td>Each pile</td>
<td>IS:291 &amp; DTL approved pile foundation drawings/specification.</td>
<td>Joint inspection by DTL and contractor.</td>
<td>Before concreting pile cap, pile head to be chipped off for concreting</td>
<td>B</td>
</tr>
<tr>
<td>vii)</td>
<td>Standard Penetration Test</td>
<td>As per DTL BOQ/specification</td>
<td>IS:2911 &amp; DTL approved pile foundation drawings/specification</td>
<td>Joint inspection by DTL and contractor</td>
<td>Records to be kept by DTL. Approval by DTL.</td>
<td>B</td>
</tr>
<tr>
<td>viii)</td>
<td>Pile load testing</td>
<td>As per DTL BOQ/specification</td>
<td>IS:2911 &amp; DTL approved pile foundation drawings/specification.</td>
<td>Joint inspection by DTL and contractor</td>
<td>Records to be kept by DTL. Approval by DTL.</td>
<td>B</td>
</tr>
<tr>
<td>ix)</td>
<td>Anchor bolts if applicable</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>a)</td>
<td>Level, center to center distance of bolts</td>
<td>100% on each location</td>
<td>DTL approved pile foundation drawings/specifications</td>
<td>Joint inspection by DTL and contractor</td>
<td>Checklist to be prepared and signed jointly.</td>
<td>B</td>
</tr>
<tr>
<td>b)</td>
<td>Visual check for galvanizing</td>
<td>100% on each location</td>
<td>DTL approved pile foundation drawings/specifications</td>
<td>Joint inspection by DTL and contractor</td>
<td>Checklist to be prepared and signed jointly.</td>
<td>B</td>
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## STANDARD FIELD QUALITY PLAN
### FOR TRANSMISSION LINE PACKAGE

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<tr>
<td>6)</td>
<td>CONCRETING</td>
<td></td>
<td></td>
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<tr>
<td>A)</td>
<td>BATCHING, MIXING &amp; PLACING OF CONCRETE AND COMPACTING</td>
<td>100%</td>
<td>IS:456 and DTL approved drawings and specifications.</td>
<td>Joint inspection by DTL and contractor</td>
<td>Approval by DTL.</td>
<td>B</td>
</tr>
<tr>
<td>B)</td>
<td>FIXING OF CHIMNEY COLUMN</td>
<td>100%</td>
<td>IS:456 and DTL approved drawings and specifications.</td>
<td>Joint inspection by DTL and contractor</td>
<td>Approval by DTL.</td>
<td>C</td>
</tr>
<tr>
<td>C)</td>
<td>PLACING CONCRETE, POKING AND COMPACTING</td>
<td>100%</td>
<td>IS:456 and DTL approved drawings and specifications.</td>
<td>Joint inspection by DTL and contractor</td>
<td>Min. gap between boxes and reinforcement bars should be maintained. Approval by DTL.</td>
<td>C</td>
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<tr>
<td>D)</td>
<td>CONCRETE TESTING</td>
<td></td>
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<tr>
<td>i)</td>
<td>Slump Test</td>
<td>One sample per location</td>
<td>IS:456, IS:516, IS:1199 and DTL specifications.</td>
<td>Contractor</td>
<td>Approval by DTL.</td>
<td>B</td>
</tr>
<tr>
<td>ii)</td>
<td>Check for quantities for cement, fine aggregate, coarse aggregate and water while batching</td>
<td>100% on all locations</td>
<td>IS:456, IS:516, IS:1199 and DTL specifications</td>
<td>Contractor</td>
<td>Checklist to be prepared and signed jointly.</td>
<td>B</td>
</tr>
<tr>
<td>E)</td>
<td>CHECK FINISHING, DIMENSIONAL CONFORMITY AND WORKMANSHIP BEFORE &amp; AFTER BOX REMOVAL.</td>
<td>100%</td>
<td>IS:456, IS:516, IS:1199 and DTL specification</td>
<td>Contractor</td>
<td>Approval by DTL.</td>
<td>B</td>
</tr>
<tr>
<td>F)</td>
<td>BACKFILLING</td>
<td>100%</td>
<td>DTL specification</td>
<td>Contractor</td>
<td>Approval by DTL.</td>
<td>C</td>
</tr>
<tr>
<td>i)</td>
<td>Check for thickness of layer &amp; watering</td>
<td></td>
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<tr>
<td>ii)</td>
<td>Check for compaction/ramming</td>
<td></td>
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<tr>
<td>G</td>
<td>REVETMENT</td>
<td></td>
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</tr>
<tr>
<td>i)</td>
<td>Size of stone for Revetment(Stones with round surface shall not be used)</td>
<td>100%</td>
<td>DTL specification &amp; approved drawings</td>
<td>Contractor</td>
<td>Approval by DTL</td>
<td>C</td>
</tr>
<tr>
<td>ii)</td>
<td>Moisture content for Revetment stone</td>
<td>One sample per source</td>
<td>IS:1124 Max. 5%</td>
<td>DTL approved lab</td>
<td>Approval by DTL</td>
<td>B</td>
</tr>
<tr>
<td>iii)</td>
<td>Check for Weep holes and Bond stones in Revetment</td>
<td>100%</td>
<td>DTL Specification/approved drawings/IS:1597</td>
<td>Contractor</td>
<td>Approval by DTL</td>
<td>C</td>
</tr>
<tr>
<td>H)</td>
<td>COPING</td>
<td>100% on all location</td>
<td>DTL Specification</td>
<td>Contractor</td>
<td>Approval by DTL</td>
<td>B</td>
</tr>
<tr>
<td>I)</td>
<td>CURING</td>
<td>100% on all location</td>
<td>DTL Specification</td>
<td>Contractor</td>
<td>Approval by DTL</td>
<td>C</td>
</tr>
<tr>
<td>J)</td>
<td>EARTHING (Pipe or counter poise type)</td>
<td>100%</td>
<td>IS:5613 and DTL Specification</td>
<td>Contractor</td>
<td>Approval by DTL</td>
<td>B</td>
</tr>
<tr>
<td>K)</td>
<td>CONCRETE CUBE TESTING</td>
<td></td>
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</tr>
<tr>
<td>i)</td>
<td>Compressive Strength</td>
<td>a)One sample for each location (One sample consists of min.3 test cubes for 28 days strength)</td>
<td>IS:1199,IS:456,IS:516 and DTL Specification</td>
<td>DTL approved lab</td>
<td>Approval by DTL Cubes must be tested within a week after 28 days curing period and test results should be approved before tower erection</td>
<td>A</td>
</tr>
<tr>
<td>ii)</td>
<td>Compressive Strength for concrete of pile cap, beams, chimney etc.</td>
<td>One sample for every 20 Cum of concrete or part thereof for each days of concreting</td>
<td>IS:1199,IS:456, IS:516 and DTL Specification</td>
<td>DTL approved lab</td>
<td>-do-</td>
<td>A</td>
</tr>
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<td>7.</td>
<td><strong>Tower Erection</strong></td>
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<tr>
<td>A)</td>
<td><strong>MATERIAL CHECKING</strong></td>
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<tr>
<td>i)</td>
<td>Visual checking of tower members for damage, cleanliness, galvanizing and stacking</td>
<td>100%</td>
<td>IS:5613 and DTL approved drawings/specification</td>
<td>Joint Inspection by DTL and contractor</td>
<td>Check list to be prepared and signed jointly</td>
<td>C</td>
</tr>
<tr>
<td>ii)</td>
<td>Visual checking of galvanized bolts and nuts, step bolts, D-shackles, U-bolts, spring washers &amp; enameled plates.</td>
<td>100%</td>
<td>IS:5613 and DTL approved drawings/specification</td>
<td>Joint Inspection by DTL and contractor</td>
<td>Check list to be prepared and signed jointly</td>
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</tr>
<tr>
<td>B)</td>
<td><strong>Erection of super Structure</strong></td>
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</tr>
<tr>
<td>i)</td>
<td>Tightness of bolts, identification, cleanliness &amp; galvanising</td>
<td>100% on each location</td>
<td>DTL approved drawings/Specification</td>
<td>Joint inspection by DTL and Contractor</td>
<td>Check list to be prepared and signed jointly</td>
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<tr>
<td>ii)</td>
<td>Punching of tightened bolts</td>
<td>100% on each location</td>
<td>DTL approved drawings/Specification</td>
<td>Joint inspection by DTL and Contractor</td>
<td>Check list to be prepared and signed jointly</td>
<td>C</td>
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<tr>
<td>iii)</td>
<td>Checking of assembly and vertically</td>
<td>100% on each location</td>
<td>DTL approved drawings/Specification</td>
<td>Joint inspection by DTL and Contractor</td>
<td>Check list to be prepared and signed jointly</td>
<td>B</td>
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<tr>
<td>iv)</td>
<td>Tack welding</td>
<td>100% on each location</td>
<td>DTL approved drawings/Specification</td>
<td>Joint inspection by DTL and Contractor</td>
<td>Check list to be prepared and signed jointly</td>
<td>B</td>
</tr>
<tr>
<td>v)</td>
<td>Tower footing resistance</td>
<td>100% on each location</td>
<td>DTL approved drawings/Specification</td>
<td>Joint inspection by DTL and Contractor</td>
<td>Record to be kept for tower footing resistance before and after earthing</td>
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FOR TRANSMISSION LINE PACKAGE

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<td>vi)</td>
<td>Fixing of danger plate, number plate, phase plates &amp; circuit plate as applicable</td>
<td>100% on each location</td>
<td>DTL approved drawings/Specification</td>
<td>Joint inspection by DTL and Contractor</td>
<td>Check list to be prepared and signed jointly</td>
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</tr>
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<td>8</td>
<td>LINE STRINGING</td>
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<tr>
<td>A)</td>
<td>Insulator Checking</td>
<td></td>
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<tr>
<td>i)</td>
<td>Visual checking of Insulators (Identification, cleanliness, glazing, cracks &amp; white spots)</td>
<td>100%</td>
<td>IS:5613 &amp; DTL approved drawings/specification</td>
<td>Joint inspection by DTL and Contractor</td>
<td>Approval by DTL</td>
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<tr>
<td>ii)</td>
<td>IR Measurement</td>
<td>100%</td>
<td>DTL specification</td>
<td>-do-</td>
<td>-do-</td>
<td>B</td>
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<tr>
<td>B)</td>
<td>Visual checking of Conductor and earthwire</td>
<td>100%</td>
<td>IS:5613 &amp; DTL approved drawings/specification</td>
<td>Joint inspection by DTL and Contractor</td>
<td>Approval by DTL</td>
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<tr>
<td>C)</td>
<td>Visual checking of hardware fittings(identification, cleanliness, galvanizing and mechanical damages)</td>
<td>100%</td>
<td>IS:5613 &amp; DTL approved drawings/specification</td>
<td>Joint inspection by DTL and Contractor</td>
<td>Approval by DTL</td>
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<tr>
<td>i)</td>
<td>Identification, cleanliness &amp; packing</td>
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<td>ii)</td>
<td>Damage of Conductor &amp; Earthwire</td>
<td></td>
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<tr>
<td>iii)</td>
<td>Drum rubbing against ground or any metal part</td>
<td></td>
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<tr>
<td>D)</td>
<td>Conductor &amp; Earthwire Stringing</td>
<td></td>
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<tr>
<td>i)</td>
<td>Initial conductor position</td>
<td>Entire route</td>
<td>IS:5613 &amp; DTL approved SAG &amp; Tension Charts and Specifications</td>
<td>Joint Inspection by DTL and Contractor</td>
<td>Approval by DTL</td>
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<td>ii)</td>
<td>Check for temperature</td>
<td>Entire route</td>
<td>IS:5613 &amp; DTL approved SAG &amp; Tension Charts and Specifications</td>
<td>Joint Inspection by DTL and Contractor</td>
<td>Approval by DTL</td>
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<tr>
<td>iii)</td>
<td>Final Conductor &amp; Earthwire position</td>
<td>Entire Route</td>
<td>IS:5613 &amp; DTL approved SAG &amp; Tension Charts and Specifications</td>
<td>Joint Inspection by DTL and Contractor</td>
<td>Records to be kept duly signed by DTL and contractor</td>
<td>B</td>
</tr>
</tbody>
</table>

#### a) Electrical Clearance

#### b) Sag/Tension for conductor & earthwire

#### c) Joints in conductor and earthwire

#### d) Jumpering

#### v) Fixing of pilot insulator string(if any)

<table>
<thead>
<tr>
<th>9.</th>
<th>FINAL CHECKING</th>
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<tr>
<td>a)</td>
<td>Check for the completion of back-filling &amp; leftover materials</td>
<td>100%</td>
<td>IS:5613 &amp; DTL approved drawings/specification</td>
<td>Joint Inspection by DTL and Contractor</td>
<td>Checklist to be prepared and signed jointly</td>
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<tr>
<td>b)</td>
<td>Fixing of ACD &amp; all tower accessories</td>
<td>Entire route</td>
<td>IS:5613 &amp; DTL approved drawings/specification</td>
<td>Joint Inspection by DTL and Contractor</td>
<td>Checklist to be prepared and signed jointly</td>
<td>B</td>
</tr>
<tr>
<td>c)</td>
<td>Tightening, punching and tack welding of bolts</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>A</td>
</tr>
<tr>
<td>d)</td>
<td>Final ground and electrical clearance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>A</td>
</tr>
<tr>
<td>e)</td>
<td>Earthing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>A</td>
</tr>
</tbody>
</table>
## Section: FINAL TESTING & PRE-COMMISSIONING

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Component/Operation &amp; Description of Test</th>
<th>Sampling Plan with basis</th>
<th>Ref. Document &amp; acceptance norm</th>
<th>Testing Agency</th>
<th>Remarks</th>
<th>Check</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.</td>
<td>MEGGER TEST</td>
<td>100%</td>
<td>DTL latest Pre-Commissioning Procedures</td>
<td>Joint Inspection by DTL and Contractor</td>
<td>Records to be kept duly signed by DTL and contractor</td>
<td>A</td>
</tr>
<tr>
<td>11.</td>
<td>FINAL TESTING &amp; PRE-COMMISSIONING ON LINE</td>
<td>100%</td>
<td>DTL latest Pre-Commissioning Procedures</td>
<td>Joint Inspection by DTL and Contractor</td>
<td>Records to be kept duly signed by DTL and contractor</td>
<td>A</td>
</tr>
</tbody>
</table>
SECTION-II
VOLUME-II

GENERAL GUIDANCE AND FOUNDATION MATERIAL ACCEPTING CRITERIA WITH PERMISSIBLE LIMITS
SECTION : GENERAL GUIDELINES FOR IMPLEMENTATION

1. Details of categories of check codes A, B & C including accepting and deviation dispositioning authorities are indicated at Annexure-I.

2. DTL specification shall mean DTL technical specification, approved drawings/data sheets and LOA provisions applicable for the specific contract.

3. Acceptance criteria and permissible limits for certain tests are indicated at Annexure-II. For balance tests, site to verify the same with respect to DTL specification, relevant Indian Standards and/or prevalent code of practice.

4. It is clarified that the tests indicated at column 2 of this FQP, i.e. against column “Component operation & Description of Test”, are only generally required to be conducted. However, DTL reserves the right to carry-out any additional tests at any stage if the situation so warrants.

5. DTL site representative shall witness all the tests conducted by the contractor as mentioned in this FQP. However, in case of tests conducted in the DTL approved lab, it is preferred to witness the tests in the lab itself, if possible.

6. Dy. G. M. shall approve testing laboratory before accepting the test results from the lab.

7. Dy. G. M. shall approve the sources for cement, coarse aggregate, fine aggregate & water before actual utilization.

8. All the testing & measuring equipments used by the contractor for testing are required to be calibrated. A copy of valid calibration report shall be retained by DTL as records.

9. Classification of foundations shall be approved by DTL based on the Joint Inspection Report & soil investigation reports.

10. Curing of concrete work should be continued for a minimum period of 10 days.

11. Zone-IV fine aggregate shall not be used for concreting work.

12. Identification and traceability records in the standard formats for various materials in line with QA&I shall be maintained and retained in DTL.
13. CEMENT
13.1 In case supply of cement is in the scope of the contractor, the same shall be procured from sources approved by DTL site and got tested at site on sample basis for specified acceptance tests as specified in this FQP at a reputed Third Party Lab approved by DTL.
13.2 The samples of cement for site testing shall be taken within three weeks of the delivery and all the tests shall be commenced within one week of sampling.

14. REINFORCEMENT STEEL
14.1 In case supply of reinforcement steel is in the scope of the contractor, the same shall be procured from the main producers i.e. SAIL, TISCO, IISCO or Rashtriya Ispat Nigam or the rerollers approved by main producers. This reinforcement steel shall be got tested at site on sample basis for specified acceptance tests as specified in this FQP at a reputed Third Party Lab approved by DTL site.
14.2 The results of the testing of cement and reinforcement steel referred to in 13.1 And 14.1 above shall be got approved from DTL site before cement and reinforcement steel are put to use. However, in exceptional cases due to exigencies of work, DTL site may authorize the contractor to use Cement and Reinforcement Steel even before the test results are received. However, in all such cases, if the test results subsequently received are found to be not complying with the specified acceptance criteria, the contractor shall have to dismantle and recast all such foundations cast with such non-conforming materials at his own cost. Confirmation to this effect shall be obtained from the contractor by the Project authorities beforehand and in all such cases.
# Accepting and Deviation Dispositioning Authorities for Different Categories of Checks as Envisaged in Field Quality Plan

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>TYPE OF CHECK</th>
<th>100% CHECKING WITNESSING BY</th>
<th>COUNTER CHECK/SURVEILLANCE CHECK BY</th>
<th>ACCEPTING AUTHORITY, IF TEST RESULTS ARE WITHIN PERMISSIBLE LIMITS</th>
<th>DEVIATION DISPOSITIONING AUTHORITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘A’</td>
<td>CRITICAL</td>
<td>EXECUTING/ QUALITY ASSURANCE DEPTT.</td>
<td>D.G.M./G.M. REPRESENTATIVE</td>
<td>DY.G.M./G.M.</td>
<td>G.M.</td>
</tr>
<tr>
<td>‘B’</td>
<td>MAJOR</td>
<td>EXECUTING DEPTT.</td>
<td>D.G.M. REPRESENTATIVE</td>
<td>DY.G.M.</td>
<td>G.M.</td>
</tr>
<tr>
<td>‘C’</td>
<td>MINOR</td>
<td>CONTRACTOR REPRESENTATIVE</td>
<td>EXECUTING DEPTT.</td>
<td>MANAGER</td>
<td>DY.G.M.</td>
</tr>
</tbody>
</table>
## ACCEPTANCE CRITERIA AND PERMISSIBLE LIMITS FOR FOUNDATION MATERIALS & CONCRETE

### A) CEMENT

<table>
<thead>
<tr>
<th>Description of the Tests</th>
<th>33 Grade OPC as per IS:269</th>
<th>43 Grade cement as per IS:8112</th>
<th>PP C as per IS:1489</th>
<th>Low Heat Cement</th>
</tr>
</thead>
<tbody>
<tr>
<td>i) Fineness (Min)</td>
<td>225 m²/kg</td>
<td>225 m²/kg</td>
<td>30M²/kg</td>
<td>225 m²/kg</td>
</tr>
<tr>
<td>ii) Compressive Strength (Min.)</td>
<td>160 kgf/cm²</td>
<td>23 MPa</td>
<td>16 MPa</td>
<td>100 kgf/cm²</td>
</tr>
<tr>
<td></td>
<td>220 kgf/cm²</td>
<td>33 MPa</td>
<td>22 MPa</td>
<td>160 kgf/cm²</td>
</tr>
<tr>
<td></td>
<td>672 ± 4 hours</td>
<td>43 MPa</td>
<td>33 MPa</td>
<td>350 kgf/cm²</td>
</tr>
<tr>
<td>iii) Initial Setting Time (Minimum)</td>
<td>30 minutes</td>
<td>30 minutes</td>
<td>30 minutes</td>
<td>30 minutes</td>
</tr>
<tr>
<td>iv) Final Setting Time (Maximum)</td>
<td>600 minutes</td>
<td>600 minutes</td>
<td>600 minutes</td>
<td>600 minutes</td>
</tr>
<tr>
<td>v) Soundness (Le chatelier Method)</td>
<td>Maximum 10mm expansion</td>
<td>Maximum 10mm expansion</td>
<td>Maximum 10mm expansion</td>
<td>Max.10mm expansion</td>
</tr>
<tr>
<td>vi) Heat of hydration (Max.)</td>
<td>As per IS</td>
<td>As per IS</td>
<td>As per IS</td>
<td>As per IS</td>
</tr>
<tr>
<td>vii) Chemical Composition</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### B) COARSE AGGREGATE:

i) Sieve Analysis

<table>
<thead>
<tr>
<th>IS SIEVE DESIGNATION</th>
<th>PERCENTAGE PASSING FOR GRADED AGGREGATE OF NOMINAL SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>40mm</td>
<td>40mm</td>
</tr>
<tr>
<td></td>
<td>20mm</td>
</tr>
<tr>
<td></td>
<td>10 mm</td>
</tr>
<tr>
<td></td>
<td>4.75mm</td>
</tr>
</tbody>
</table>
(ii)  Flakiness Index - Not to exceed 25%
(iii) Crushing Value - Not to exceed 45%
(iv)  Soundness of aggregate - Loss of weight after 5 cycle not to exceed 12%

works subject to frost when tested with Sodium, sulphate and 18% when tested with magnesium sulphate.
Action.
(v)  Deleterious material - Not to exceed 5% of the weight of aggregate.
© FINE AGGREGATE

(i)  Sieve Analysis - Shall confirm to Zone I, Zone II or Zone III.

<table>
<thead>
<tr>
<th>IS Sieve designation</th>
<th>Percentage Passing for</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Grading Zone - I</td>
</tr>
<tr>
<td>10 mm</td>
<td>100</td>
</tr>
<tr>
<td>4.75 mm</td>
<td>90-100</td>
</tr>
<tr>
<td>2.36 mm</td>
<td>60-95</td>
</tr>
<tr>
<td>1.18 mm</td>
<td>30-70</td>
</tr>
<tr>
<td>600 Micron</td>
<td>15-34</td>
</tr>
<tr>
<td>300 Micron</td>
<td>5-20</td>
</tr>
<tr>
<td>150 Micron</td>
<td>0-10</td>
</tr>
</tbody>
</table>

(ii)  For guidance of adjusting the quantity in mix of concrete, the following table may be used.

<table>
<thead>
<tr>
<th>Moisture Content%</th>
<th>Bulking % by volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>15</td>
</tr>
<tr>
<td>3</td>
<td>20</td>
</tr>
<tr>
<td>4</td>
<td>25</td>
</tr>
<tr>
<td>5</td>
<td>30</td>
</tr>
</tbody>
</table>

(iii)  Silt Content Test : Shall not exceed 8%
(iv)  Deleterious Materials : Total deleterious material shall not be more than 5% by weight.

(D) REINFORCEMENT STEEL : As per relevant Indian Standards

(E)  CONCRETE CUBE TEST
For nominal (volumetric) concrete mixes, compressive strength for 1:1 ½:3 (cement: sand coarse aggregate) concrete shall be 265 kg/cm² for 28 days and for 1:2:4 nominal mix, it shall be 210 kg/cm².

(F) ACCEPTANCE CRITERIA BASED ON 28 DAYS COMPRESSIVE STRENGTH FOR NOMINAL MIX CONCRETE

(a) The average of the strength of three specimen be accepted as the compressive strength of the concrete, provided the strength of any individual cube shall neither be less than 70% nor higher than 130% of the specified strength.

(b) If the actual average strength of accepted sample exceeds specified strength by more than 30%, the Engineer-in-charge. If he so desires, may further investigate the matter. However, if the strength of any individual cube exceeds more than 30% of specified strength, it will be restricted to 30% only for computation of strength.

(c) If the actual average strength of accepted sample is equal to or higher than specified strength upto 30%, then strength of the concrete shall be considered in order and the concrete shall be accepted at full rates.

(d) If the actual average strength of accepted sample is equal to or higher than specified strength but not less than 70% of the specified strength, the concrete may be accepted at reduced rate at the discretion of Engineer-in-Charge.

(e) If the actual average strength of accepted sample is less than 70% of specified strength, the Engineer-in-Charge shall reject the defective portion of work represented by sample and nothing shall be paid for the rejected work. Remedial measures necessary to retain the structure shall be taken at the risk and cost of contractor. If, however, the Engineer-in-Charge so desires, he may order additional tests, to be carried out to ascertain if the structure can be retained. All the charges in connection with these additional tests shall be borne by the Contractor.

(G) ACCEPTANCE CRITERIA FOR DESIGN MIX CONCRETE SHALL BE AS PER IS:456.
SECTION-III
VOLUME-II

GENERAL GUIDANCE AND FOUNDATION MATERIAL ACCEPTING CRITERIA WITH PERMISSIBLE LIMITS FOR READY MIX CONCRETE
1.0 MATERIALS AND TESTING OF MATERIALS FOR QUALITY:

1.1 Testing of Materials

Even ISI marked materials shall be subjected to quality test at the discretion of the Engineer-in-Charge besides testing of other materials as per the specifications described for the item/material. Whenever ISI marked materials are brought to the site of work; the contractor shall, if required by the Engineer-in-Charge, furnish manufacturers’ test certificate or test certificate from approved testing laboratory to establish that the material procured by the contractor for incorporation in the work satisfy the provisions of IS codes relevant to the material and/or the work done.

1.2 Water

The water used shall conform to the requirements as laid down in IS 456-2000 Para 5.3.

1.3 Materials

Cement and steel required for execution of this work shall be arranged by the contractor.

1.3.1 Conditions for Cement

The day to day actual issue/receipt and consumption of cement on work shall be regulated and proper accounts maintained as per directions of Engineer – in - Charge. The theoretical consumption of cement shall be worked out as per the procedure prescribed in clause 39 of the contract and shall be governed by conditions laid therein. If the quantity of cement actually used in the work is found to be more
than the theoretical quantity of cement including authorized variation, nothing extra shall be payable to the contractor on this account.

In the event of it being discovered that after completion of work, the quantity of cement used is less than the quantity ascertained as per theoretical calculations the recovery of less cement used shall be made in the manner given below:

1) Recovery for less quantity of cement used than theoretical requirement but within minus variation limit as specified in clause 39 of agreement shall be made @ Rs. 3,200/- M.T.

2) Recovery for less quantity of cement used than theoretical requirement minus variations allowed as per clause-39 of agreement shall be made @ Rs. 5,000/- M.T notwithstanding further action for substandard work as per other relevant clauses of agreement.

Decision of Engineer – in -Charge in regard to theoretical quantity of cement, which should have been actually used as per the schedule and recovered at the rate specified, shall be final and binding on the contractor.

For non-schedule items, the decision of the GM(T)Construction, Delhi Transco Limited regarding theoretical quantity of cement which should have been actually used, shall be final and binding on the contractor.

Cement brought to site and remaining unused after completion of work shall not be removed from site without written permission of the Engineer-in-Charge.

(i) The contractor shall procure 43 grade (conforming to IS : 8112) ordinary Portland cement as required in the work from reputed manufacturers of cement, having a production-capacity of one million tonnes per annum or more, such as A.C.C., L&T, J.P., Vikram, Shri Cement, Birla Jute, Cement Corporation of India, Gujrat Ambuja Cement and Rajasthan Ambuja Cement etc. as approved by Ministry of Industry, Govt. of India, and holding license to use ISI certification mark for their product whose name shall be got approved from Engineer-in-Charge. Supply of cement shall be taken in 50 Kg bags bearing manufacture's
name and ISI marking. Samples of cement arranged by the contractor shall be taken by the Engineer-in-Charge and got tested in accordance with provisions of the relevant BIS codes. In case test results indicate that the cement arranged by the contractor does not conform to the relevant BIS code the same shall stand rejected and shall be removed from the site by the contractor at his own cost within a week's time of written order from the Engineer-in-Charge to do so failing which the needful will be done by the Engineer-in-Charge at the risk and cost of the contractor.

(ii) The cement godown to store cement shall be constructed by the contractor at site of work for which no extra payment shall be made. Double lock provision shall be made to the door of the cement godown. The keys of one lock shall remain with the Engineer-in-Charge or his authorized representative and the key of the other lock shall remain with the contractor. The contractor shall facilitate the inspection of the cement godown by the Engineer-in-Charge at any time.

(iii) Cement which is not used within 90 days from its date of manufacture, shall be got tested from the approved laboratory by the Engineer-in-Charge and after satisfactory test result the same shall be put to use.

(iv) The contractor shall supply free of charge the cement required for testing. The cost of tests shall be borne by the contractor.

(v) The day-to-day receipt and issue accounts of different grade/brand of cement shall be maintained separately in the standard proforma by the Junior Engineer-in-charge of work and which shall be duly signed by the contractor or his authorized representative.

1.3.2 Conditions for Steel

(i) The contractor shall procure Fe 415 steel reinforcement bars conforming to relevant BIS codes from main producers as
approved by Ministry of Steel and secondary producers or re-rollers having valid BIS license. For TMT bars conforming to relevant BIS code/CPWD specifications, procurement shall be made from main producers and secondary producers having valid BIS license. The contractor shall have to obtain and furnish test certificates to the Engineer-in-Charge in respect of all supplies of steel brought by him to the site of work. The samples shall also be taken and got tested by the Engineer-in-Charge as per the provisions in this regard in relevant BIS codes. In case the test results indicate that the steel arranged by the contractor does not conform to BIS codes, the same shall stand rejected and shall be removed from the site of work by the contractor, at his own cost within a week’s time from written orders from the Engineer-in-Charge to do so.

(ii) The steel reinforcement shall be brought to the site in bulk as decided by the Engineer-in-Charge.

(iii) The steel reinforcement shall be stored by the contractor at site of work in such a way as to prevent distortion and corrosion and nothing extra shall be paid on this account. Bars of different sizes and lengths shall be stored separately to facilitate easy counting and checking.

(iv) For checking nominal mass, tensile strength, bend test, re-bend test etc. specimen of sufficient length shall be cut from each size of the bar at random at frequency not less than that specified below:

<table>
<thead>
<tr>
<th>SIZE OF BAR</th>
<th>FOR CONSIGNMENT BELOW 100 TONNES</th>
<th>FOR CONSIGNMENT OVER 100 TONNES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 10mm</td>
<td>One sample for each 25 dia. tones or part thereof.</td>
<td>One sample for each 40 tonnes or part thereof.</td>
</tr>
</tbody>
</table>
10mm to 16mm dia. One sample for each 35 tones or part thereof. One sample for each 45 tonnes or part thereof.

Over 16mm dia. One sample for each 45 tones or part thereof. One sample for each 50 tonnes or part thereof.

(v) The contractor shall supply free of charge the steel required for testing. The cost of tests shall be borne by the contractor.

(vi) The actual issue and consumption of steel on work shall be regulated and proper accounts maintained as per directions of Engineer-in-Charge. The theoretical consumption of steel shall be worked out as per procedure prescribed in clause 39 of the contract and shall be governed by conditions laid therein.

(vii) Steel brought to site and steel remaining unused shall not be removed from site without the written permission of the Engineer-in-Charge.

(viii) Nothing extra shall be paid for steel bars having weight/m more than the standard coefficient including of tolerance and steel with less weight/m than standard coefficient including tolerances shall not however be used.

2.0 RCC WORK:

2.1 RCC work shall be done with Design Mix Concrete/Ready mixed concrete/nominal mix, as specified. However quantity of various type of concrete mixes taken in the schedule of quantity can be changed as per site requirement with the sole discretion and decision of the Engineer-in-Charge. In the nomenclature of items wherever letter M has been indicated, the same shall employ for the design mix
concrete. For the nominal mix in RCC, CPWD specifications shall be followed. The design mix concrete will be designed based on the principles given in IS: 456, IS: 10262 and SP 23. The contractor shall design mixes for each class of concrete indicating that the concrete ingredients and proportions will result in concrete mix meeting requirements specified. In case of use of admixture, the mix shall be designed with these ingredients as well.

3.0 Design Mix Concrete - Grade of Concrete – The compressive strength of various grades of concrete shall be given as below:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Compressive Specified Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Designation</td>
<td>strength on characteristic cement water</td>
<td>cement water</td>
</tr>
<tr>
<td></td>
<td>15 cm cubes compressive content cement</td>
<td>min. at 7 strength at 28 (Kg. Per ratio days (N/mm2) days (N/mm) cubic meter)</td>
</tr>
<tr>
<td>Piles Other</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RCC Works</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M 20 As per design</td>
<td>20</td>
<td>400</td>
</tr>
</tbody>
</table>

Note: (i) In the designation of a concrete mix letter M refer to the mix and the number to the specified characteristics compressive strength of 15 cm cube at 28 days expressed in N/mm².

3.1 The concrete mix design/laboratory tests, with admixture (if to be used by contractor at his own cost) and without admixture, will be carried out by the contractor through one of the following laboratories/test houses:

(i) I.I.T, Delhi.

The Various ingredients for mix design/laboratory tests shall be sent to the lab/test houses through the Engineer-in-Charge and the samples of such aggregates sent shall be preserved at site by the department.

3.2 In case of change of source or characteristics properties of the ingredients used in the concrete mix during the work, a revised laboratory mix design report conducted at laboratory established at site shall be submitted by the contractor as per the direction of the Engineer-in-Charge.

4.0 READY MIXED CONCRETE

4.2 The contractor has to procure the concrete of specified grade (with design mix) from ready mixed concrete plants approved by the Engineer-in-Charge. The requirements for the production and supply of Ready Mixed concrete shall conform to IS 4926 : 2003. The contractor shall be fully responsible for quality of concrete including input control, production, transportation and placement compaction, curing and protection. The Engineer-in-Charge reserves his right to deploy his supervisor at plant site to inspect at any such stage and reject the material/concrete if he is not satisfied about quality of material/product.

4.3 Grade of Concrete – The compressive strength of various grades
of concrete shall be given as below:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Compressive Specified Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Designation strength on characteristic cement water</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15 cm cubes compressive content cement</td>
<td>min. at 7 strength at 28 (Kg. Per ratio days (N/mm2) days (N/mm2 cubic meter)</td>
<td></td>
</tr>
<tr>
<td>Piles Other</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RCC Works</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M 20 As per design 20</td>
<td>400</td>
<td>320</td>
</tr>
</tbody>
</table>

Note: (i) In the designation of a concrete mix letter M refer to the mix and the number to the specified characteristics compressive strength of 15 cm cube at 28 days expressed in N/mm2.

4.4 The concrete mix design/laboratory tests, with admixture (if to be used by contractor at his own cost) and without admixture will be carried out by the contractor through one of the following laboratories/test houses:

(i) I.I.T, Delhi.
(v) CRRI, Delhi.
(vi) Approved RMC supplier.
(v) Shri Ram test House.

The Various ingredients for mix design/laboratory tests shall be sent to the lab/test houses through the Engineer-in-Charge and the samples of such aggregates sent shall be preserved at site by the department.
2.0 Prevention of Nuisance and Pollution

2.1 The contractor shall take all necessary precautions to prevent any nuisance or inconvenience to the owners or occupiers of adjacent properties and to the public in general and to prevent any damage to such properties and any pollution by fly ash during transportation and filling of area. He shall make good at his cost and to the satisfaction of the Engineer-in-Charge, any damage to roads, paths, cross drainage works or public or private property whatsoever caused by the execution of the work or by traffic brought thereon by the contractor. All waste or superfluous materials shall be carried away by the contractor without any reservation entirely to the satisfaction of the Engineer-in-Charge.

2.2 The contractor shall at his own cost, execute all necessary formalities of insuring against all claims that may arise out of any damage to adjoining property or structure due to work done by him.

2.3 The contractor shall at his cost and responsibility give to the municipality, police or other authority all notices etc that may be required by laws and shall obtain all requisite license/permission for temporary obstructions and enclosures and shall pay all fees, taxes and other charges etc which may become liable on account of his operations in executing the contract.

2.4 Any damage to work from rains or from any other cause shall be made good by the contractor at his own cost until the work is taken over by the department.
CLAUSE 36
Contractors Superintendence, Supervision, Technical Staff & Employees

i) The contractor shall provide all necessary superintendence during execution of the work and as along thereafter as may be necessary for proper fulfilling of the obligations under the contract.

The contractor shall immediately after receiving letter of acceptance of the tender and before commencement of the work, intimate in writing to the Engineer-in-Charge the name, qualifications, experience, age, address and other particulars along with certificates, of the principal technical representative to be in charge of the work. Such qualifications and experience shall not be lower than specified in Schedule ‘F’. The Engineer-in-Charge shall within 15 days of receipt of such communication intimate in writing his approval or otherwise of such a representative to the contractor. Any such approval may at any time be withdrawn and in case of such withdrawal the contractor shall appoint another such representative according to the provisions of this clause. Decision of the tender accepting authority shall be final and binding on the contractor in this respect. Such a principal technical representative shall be appointed by the contractor soon after receipt of the approval from Engineer-in-charge and shall be available at site within fifteen days of start of work.

If the contractor (or any partner in case of firm/company) who himself has such qualifications, it will not be necessary for the said contractor to appoint such a principal technical representative but the contractor shall designate and appoint a responsible agent to represent him and to be present at the work whenever the contractor is not in a position to be so present. All the provisions applicable to the principal technical representative under the Clause will also be applicable in such a case to contractor or his responsible agent. The principal technical representative and/or the contractor shall on receiving reasonable notice from the Engineer-in-Charge or his designated representative(s) in charge of the work in writing or in person or otherwise, present himself to the Engineer-in-Charge and/or at the site of work, as required, to take instructions. Instructions given to the principal technical representative or the responsible agent shall be deemed to have the same force as if these have been given to the contractor. The principal technical representative and/or the contractor or his responsible authorized agent shall be actually available at site at least two working days every week, these days shall be determined in consultation with the Engineer-in-Charge as well as fully during important stages of execution of work, during recording of measurement of works and whenever so required by the Engineer-in-Charge by a notice as aforesaid and shall also note down instructions conveyed by the Engineer-in-Charge or his designated representative in the site order book and shall affix his signature in token of noting down the instructions and in token of acceptance of measurements. There shall be no objection if the
representative/agent looks after more than one work and not more than three works in the same station provided these details are disclosed to the Engineer-in-Charge and he shall be satisfied that the provisions and the purpose of this clause are fulfilled satisfactorily.

If the Engineer-in-Charge, whose decision in this respect is final and binding on the contractor, is convinced that no such technical representative or agent is effectively appointed or is effectively attending or fulfilling the provision of this clause, a recovery shall be effected from the contractor as specified in Schedule ‘F’ and the decision of the Engineer-in-Charge as recorded in the site order book and measurement recorded in Measurement Books shall be final and binding on the contractor. Further if the contractor fails to appoint a suitable technical representative or responsible agent and if such appointed persons are not effectively present or do not discharge their responsibilities satisfactorily, the Engineer-in-Charge shall have full powers to suspend the execution of the work until such date as a suitable agent is appointed and the contractor shall be held responsible for the delay so caused to the work. The contractor shall submit a certificate of employment of the technical representative/responsible agent along with every on account bill/fixed bill and shall produce evidence if at any time so required by the Engineer-in-Charge.

| ii) The contractor shall provide and employ on the site only such technical assistants as are skilled and experienced in their respective fields and such foremen and supervisory staff as are competent to give proper supervision to the work. |

The contractor shall provide and employ skilled, semiskilled and unskilled labour as is necessary for proper and timely execution of the work.

The Engineer-in-Charge shall be at liberty to object to and require the contractor to remove from the works any person who in his opinion misconducts himself, or is incompetent or negligent in the performance of his duties of whose employment is otherwise considered by the Engineer-in-Charge to be undesirable. Such person shall not be employed again at works site without the written permission of the Engineer-in-Charge and the persons so removed shall be replaced as soon as possible by competent substitutes.

**SCHEDULE-F**

Minimum Qualification & Experience required for Principal Technical Representative.

<table>
<thead>
<tr>
<th>a) For works with estimated cost put to tender more than</th>
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<tbody>
<tr>
<td>i) Rs. 10 Lakhs for Civil Work</td>
</tr>
<tr>
<td>ii) Rs. 5 Lakhs for Elec./Mech. Works</td>
</tr>
<tr>
<td>b) For works with estimated cost put to tender</td>
</tr>
<tr>
<td>i)</td>
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<tr>
<td>-----</td>
</tr>
<tr>
<td>ii)</td>
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<td>iii)</td>
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<td>iv)</td>
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<td>v)</td>
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CLAUSE-39: PENALTY FOR WASTAGE OF CEMENT AND USE OF LESS CEMENT THAN REQUIRED THEORETICALLY

i) After the completion of the work, the theoretical quantity of cement to be used on works shall be calculated on the basis of CPWD’s statement showing quantities of cement to be used in different items of work provided in the Delhi Schedule of Rates applicable to be the agreement or at places where Delhi Schedule of Rate will not be applicable in the case of agreements, it should be calculated on the basis of standard formula laid down by the Engineer-in-Charge. Over the theoretical quantity of cement shall be allowed variation upto 3% plus/minus for works the estimated cost of which as put to tender is not more than Rs. 5 lakhs, upto 2% plus/minus for works the estimated cost of which is more than Rs. 5 Lakhs. In case of departmental issue of cement, the difference in the quantity of cement actually issued to the contractor and the theoretically quantity including authorized variations, if not returned by the contractor shall be recovered at twice the issue rate including storage charges, without prejudice to the provision of the relevant conditions regarding return of materials governing the contract. In the event of it being discovered that the quantity of cement used is less than the quantity ascertained as here in before allowing variations on the minus side as stipulated above, the cost of the quantity of cement not so used shall be recovered from the contractor on the basis of stipulated issue rate including storage charges and cartage to site.

ii) The provisions of the foregoing sub-clause shall apply in the case of steel reinforcement except that theoretical quantity of steel shall be taken as the quantity required as per design or as authorized by the Engineer-in-charge including authorized lap-pages, chairs etc. plus 3% wastage due to cutting into pieces. Over this theoretical quantity +2% shall be allowed for variation due to wastage being more or less.
iii) The provisions made above are without prejudice to the right of the Delhi Trancso Ltd. to take action against the contractor under the conditions of the contract for not doing the work according to prescribed specifications.
VOLUME-III
TECHNICAL DATA SHEETS

FOR

Erection, testing & commissioning of 220 KV Double circuit overhead transmission tower Line from Maharani Bagh 400 KV S/Stn to Gazipur 220 KV S/Stn.

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DELHI TRANSCO LIMITED
( UNDER GOVT. OF NCT OF DELHI )
TECHNICAL DATA SHEET

FOR

Erection, testing & commissioning of 220 KV Double circuit overhead transmission tower Line from Maharani Bagh 400 KV S/Stn to Gazipur 220 KV S/Stn.

VOLUME-III

(This document is meant for the exclusive purpose of bidding against this specification and shall not be transferred, reproduced or otherwise used for purposes other than that for which it is specifically issued).
<table>
<thead>
<tr>
<th></th>
<th>220KV Transmission Line</th>
<th>FURNISHED</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>Bidder’s experience as per Annexure-B (SCC), Vol.- IA</td>
<td>Yes/No</td>
</tr>
<tr>
<td>1.2</td>
<td>Stringing Procedures</td>
<td>Yes/No</td>
</tr>
<tr>
<td></td>
<td>The details of the stringing procedures proposed the details and all other necessary tools and plants the bidder wishes to deploy for timely completion of the work.</td>
<td></td>
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<tr>
<td>2.0</td>
<td>Cement consumption in for different type of concrete Mixture (applicable for normal foundation)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(a) For M20 concrete (1:1.5:3 nominal,mix.) (Kg/m³)</td>
<td>……………………</td>
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<tr>
<td></td>
<td>(b) For M15 concrete (1:2:4 nominal,mix.) (Kg/m³)</td>
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<tr>
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<td>(c) For M10 concrete (1:3:6 nominal,mix.) (Kg/m³)</td>
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<tr>
<td></td>
<td>(d) For 1:6 random rubble stone masonry (Kg/m³)</td>
<td>……………………</td>
</tr>
</tbody>
</table>

Date: ____________________________  
Place: ____________________________  
(Signature)_________________________  
(Printed Name)______________________  
(Designation)_______________________  
(Common Seal)_____________________